

## RESUMO DOS EQUIPAMENTOS VRF, E CONDENSADORAS DO SISTEMA INDEPENDENTE ITEM 2.2 DA PLANILHA

MODELO - TRANE	CONDENSADORAS VRF - Q/F ITEM 2.1 e SISTEMAS INDIVIDUAIS ITEM 2.2 DA PLANILHA	QTDE
4TVH0086K8000AA	Unid. Condensadora TVR Connect - 8hp , 220V 3F	3
4TVH0096K8000AA	Unid. Condensadora TVR Connect - 10hp , 220V 3F	4
4TVH0115K8000AA	Unid. Condensadora TVR Connect - 12hp , 220V 3F	3
4TVH0140K8000AA	Unid. Condensadora TVR Connect - 14hp , 220V 3F	1
4TVH0155K8000AA	Unid. Condensadora TVR Connect - 16hp , 220V 3F	3
4TVH0210K8000AA	Unid. Condensadora TVR Connect - 22hp , 220V 3F	1
4TVH0268K8000AA	Unid. Condensadora TVR Connect - 28hp , 220V 3F	2
<b>SIMULTÂNEO</b>		
4TVR0096EE000AA	Unid. Condensadora TVR Ultra HR - 10, 380V 3F	1
4TVR0115EE000AA	Unid. Condensadora TVR Ultra HR - 12, 380V 3F	9
4TVR0155EE000AA	Unid. Condensadora TVR Ultra HR - 16, 380V 3F	3
<b>EVAPORADORAS TIPO HI-WALL</b>		
4TVW0010KF000AA	Unid. Evaporadora Connect Hi-Wall 10 kBtu/h	18
4TVW0012KF000AA	Unid. Evaporadora Connect Hi-Wall 12 kBtu/h	1
4TVW0015KF000AA	Unid. Evaporadora Connect Hi-Wall 15 kBtu/h	56
<b>EVAPORADORAS TIPO CASSETES</b>		
4TVB0008KF000AA	Unid. Evap. Connect Cassete de 4 Vias Compacto, 8 kBtu/h	4
4TVC0010KF000AA	Unid. Evap. Cassete Connect de 4 Vias, 10 kBtu/h	16
4TVC0012KF000AA	Unid. Evap. Cassete Connect de 4 Vias, 12 kBtu/h	5
4TVC0015KF000AA	Unid. Evap. Cassete Connect de 4 Vias, 15 kBtu/h	25
4TVC0018KF000AA	Unid. Evap. Cassete Connect de 4 Vias, 18 kBtu/h	7
4TVC0024KF000AA	Unid. Evap. Cassete Connect de 4 Vias, 24 kBtu/h	6
4TVC0030KF000AA	Unid. Evap. Cassete Connect de 4 Vias, 30 kBtu/h	4
TRDK225HP	Ramificação para unid. Interna tam. 225	129
FIACNFOURPNL01	Painel para Cassete de 4 Vias Compacto (Connect)	4
FIACNFOURPNL02	Painel para Cassete de 4 Vias (10 até 48k Btu/h) Connect	67
TCONTNRM12F1	Controle remoto sem fio (IDUs Connect)	141
TCONTWEBBAC02	BacNet Gateway (TVR Ultra, Pro)	1
TCONTAHUKIT03E	Kit para Air Handling Unit de 10.2 até 15.6 TR	12
TMSBOX04E	Cx. Rec. 4 grupos (20 IDUs)	31
TODK002HRU	Conexão para 2 unid. externas (TVR Ultra HR)	6
TODK002HR	Conexão para 2 unid. externas (TVR HR)	1

## DISTRIBUIÇÃO DAS CONDENSADORAS

			DISTRIBUIÇÃO DAS CONDENSADORAS					
MODELO - TRANE	CONDENSADORAS VRF - Q/F ITEM 2.1 e SISTEMAS INDIVIDUAIS ITEM 2.2 DA PLANILHA	QTDE	Q/F	SIMULTÂNEO	SIMULTÂNEO	SIMULTÂNEO	INDIVIDUAIS	INDIVIDUAIS
4TVH0086K8000AA	Unid. Condensadora TVR Connect - 8hp , 220V 3F	3					3 HP	
4TVH0096K8000AA	Unid. Condensadora TVR Connect - 10hp , 220V 3F	4	1				3 HP	
4TVH0115K8000AA	Unid. Condensadora TVR Connect - 12hp , 220V 3F	3					3 HP	
4TVH0140K8000AA	Unid. Condensadora TVR Connect - 14hp , 220V 3F	1	1					
4TVH0155K8000AA	Unid. Condensadora TVR Connect - 16hp , 220V 3F	3					2 HP	
4TVH0210K8000AA	Unid. Condensadora TVR Connect - 22hp , 220V 3F	1						1x22+1x16 HP
4TVH0268K8000AA	Unid. Condensadora TVR Connect - 28hp , 220V 3F	2	2					
	<b>SIMULTÂNEO</b>							
4TVR0096EE000AA	Unid. Condensadora TVR Ultra HR - 10, 380V 3F	1		1*(10) HP				
4TVR0115EE000AA	Unid. Condensadora TVR Ultra HR - 12, 380V 3F	9		2*(12) HP	4*(12) HP			
4TVR0155EE000AA	Unid. Condensadora TVR Ultra HR - 16, 380V 3F	3				3*(16)+3*(12) HP		

# TVR™ Ultra & TVR™ Pro

Tecnologia de ponta para diferentes Aplicações










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# TVR Ultra

## Linha de Condensadoras




### 380V

HP	8	10	12	14	16	18	20	22	24	26	28	30	32
Aparência	 (ventilador único)		 (ventilador único)		 (ventilador duplo)		 (ventilador duplo)						
8	•												
10		•											
12			•										
14				•									
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78								•			•		•
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88											•		•
90												•	•
92											•		•
94												•	•
96													•

# TVR Ultra

## Linha de Condensadoras




### 220V

HP	8	10	12	14	16	18	20	22	24	26	28
Aparência	 (ventilador único)			 (ventilador duplo)				 (ventilador duplo)			
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88								• • • •			
96									• • • •		

# TVR Pro

## Linha de Condensadoras

### 220/380V

HP	8	10	12	14	16	18	20	22	24	26	28	30
Aparência	 (ventilador único)				 (ventilador duplo)				 (ventilador duplo)			
8	•											
10		•										
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86										••		•
88										•		••
90												•••

# Linha de Unidades Evaporadoras

kW		1.8	2.2	2.8	3.6	4.5	5.6	7.1	8.0	9.0	10.0	11.2	12.5	14.0	16.0	20.0	25.0	28.0	40.0	45.0	56.0
Btu/h x 1000		5	7	9	12	15	18	24	27	30	34	38	42	48	55	68	85	96	136	154	192
Cassete de 1 via		•	•	•	•	•	•	•													
Cassete de 2 vias			•	•	•	•	•	•													
Cassete de 4 vias compacto			•	•	•	•															
Cassete de 4 vias				•	•	•	•	•	•	•	•	•		•	•						
Tipo Duto de média pressão			•	•	•	•	•	•	•	•		•		•							
Tipo Duto de alta pressão								•	•	•		•		•	•	•	•	•	•	•	•
Unidade de tratamento de ar externo													•	•		•	•	•		•	•
Hi-Wall			•	•	•	•	•	•	•	•											
Piso Teto					•	•	•	•	•	•		•		•							
Unidade de Piso			•	•	•	•	•	•	•												
Tipo Console			•	•	•	•															

# Diversas Aplicações






## Ampla variedade de combinações

Começando com 8 hp com acréscimo de capacidades a cada 2 hp até 96 hp para o TVR Ultra e 90 hp para o TVR Pro tanto para 220V como para 380V, com os maiores módulos “combináveis” do mercado.

### TVR Ultra, 380V, 50-60 Hz

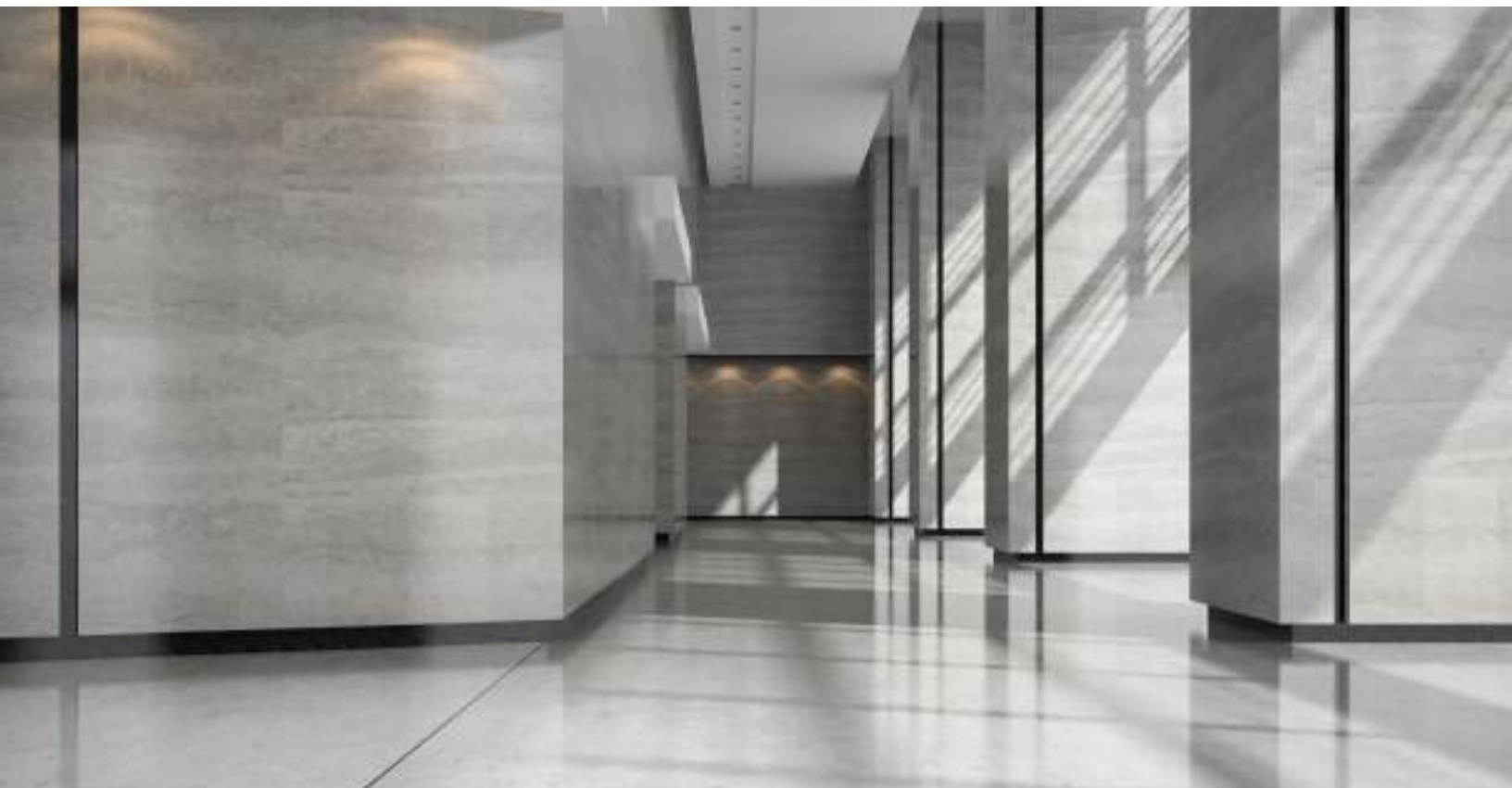
8/10/12 HP (ventilador simples)	14/16 HP (ventilador simples)	18/20/22 HP (ventilador duplo)	24/26/28/30/32 HP (ventilador duplo)
			
16-64 HP		66-96 HP	
			

### TVR Ultra, 220V, 50-60 Hz

8/10/12 HP (ventilador simples)	14/16/18/20/22 HP (ventilador duplo)	24/26/28/30/32 HP (ventilador duplo)
		
16-56 HP	58-64 HP	86-96 HP
		

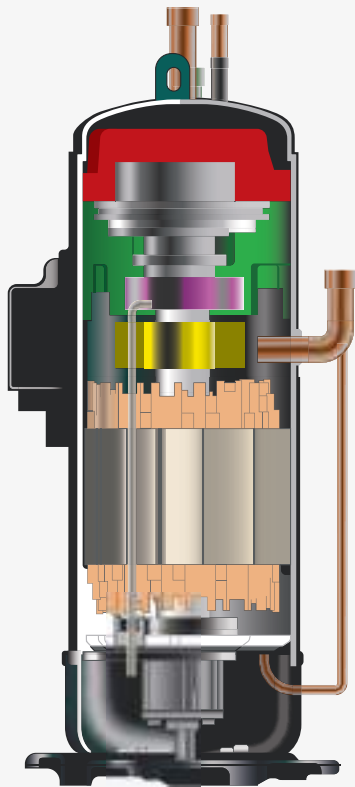
### TVR Pro, 220V-380V, 50-60 Hz

8/10/12/14/16 HP	18/20/22 HP	24/26/28/30 HP
		
16-60 HP		24/90 HP
		



## Alta Eficiência

Tanto o TVR Ultra quanto o TVR Pro têm compressores DC Inverter poderosos e eficientes com tecnologia de ponta que garante a regulação precisa da temperatura e o uso de energia altamente eficiente.



**TVR Ultra**

DC Inverter Compressor (EVI)

- 1 Novo projeto de compressor**  
Melhora de desempenho e maior confiabilidade.
- 2 Tecnologia de injeção de vapor**  
Melhora de desempenho.
- 3 Novo projeto de mancais para operação em alta frequência**  
Frequência de operação mais ampla
- 4 Novo motor BLDC**  
Melhor desempenho sobretudo em cargas parciais
- 5 Melhor gerenciamento do óleo**  
Novo projeto para circulação de óleo, bomba de óleo de deslocamento positivo e balanceamento dinâmico de óleo
- 6 Nova estrutura para lado de alta pressão**  
Melhor lubrificação, maior estabilidade e menor ruído
- 7 Nova válvula de alívio**  
Menor nível de ruído

### **Maior confiabilidade 1**

Magneto de neodímio de alta densidade.

### **Novo compressor 2**

Estrutura compacta e leve.

### **Motor DC de alta eficiência 3**

Frequência estendida de operação do compressor & tecnologia de acionamento otimizada.

### **Projeto moderno do compressor 4**

Novo estator concentrado.

### **Vibração extremamente reduzida 5**

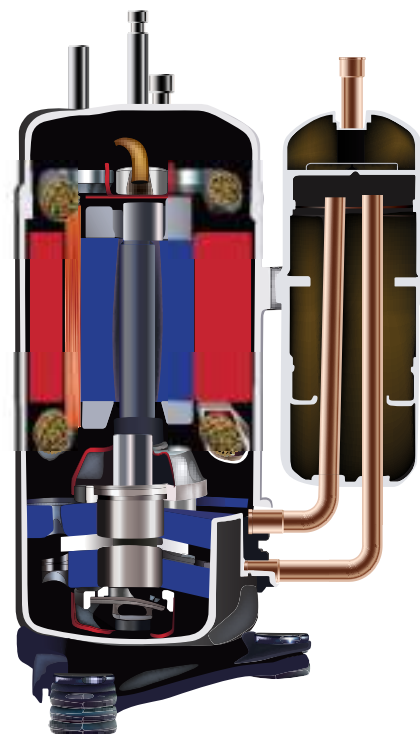
Câmaras gêmeas excêntricas & melhor balanceamento.

### **Tecnologia de ponta 6**

Novo compressor DC Inverter duplo rotativo assegura desempenho superior.

### **Partes móveis altamente estáveis 7**

Mancais altamente robustos.



**TVR Pro**

DC Inverter Twin Rotary Compressor



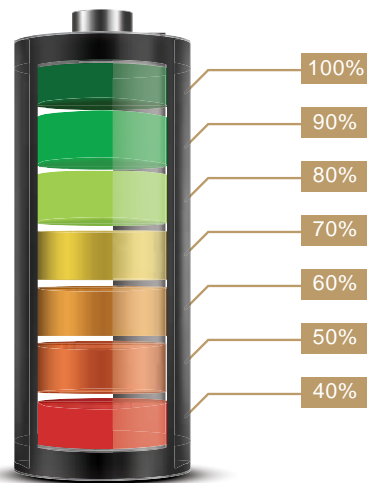
## Trocador de calor otimizado

- As unidades TVR Ultra de 24-32HP e as unidades TVR Pro de 24-30HP utilizam um trocador de calor alta eficiência de 3 filas em forma de "G".
- As serpentinas são em cobre com aletado com proteção especial contra corrosão do tipo Blue Fin.
- O TVR Ultra utiliza um ventilador de diâmetro de até 750mm é utilizado para maior troca de calor.



## Definição de nível máximo de consumo de energia

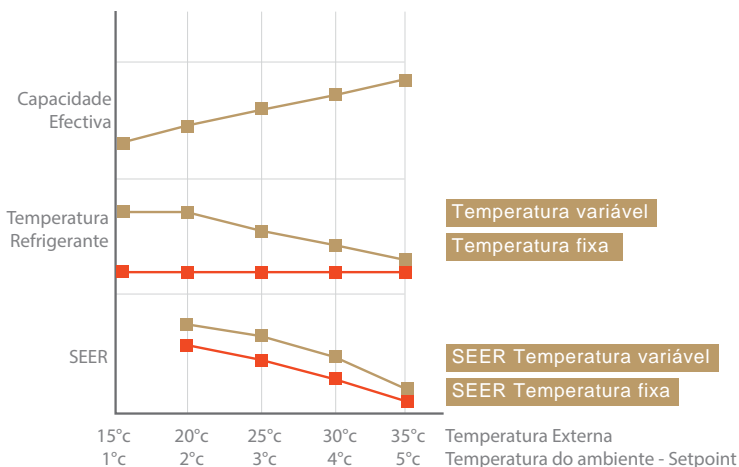
Com a integração do SGE, para projetos com limitações temporárias de demanda energética, por exemplo, o TVR Ultra pode ser ajustado para trabalhar desde 40 até 100% da capacidade



## Sistema de Gerenciamento de Energia (SGE)

### Gerenciamento da temperatura de refrigerante

- A temperatura de refrigerante é automaticamente ajustada de acordo com a temperatura exterior e a carga térmica dos ambientes de forma a maximizar o conforto e a eficiência energética.
- A capacidade é controlada pelo compressor inverter e a variação da temperatura de refrigerante melhorando a eficiência ao longo das diferentes estações do ano sem comprometer o conforto térmico.
- O novo algoritmo permite que, quanto menor a temperatura e umidades externas maior o ganho com a utilização do SGE. Em geral, a eficiência energética pode ser melhorada em média de 30%.

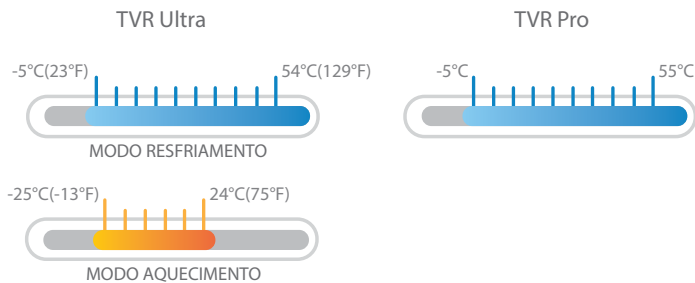




## Faixa de operação estendida

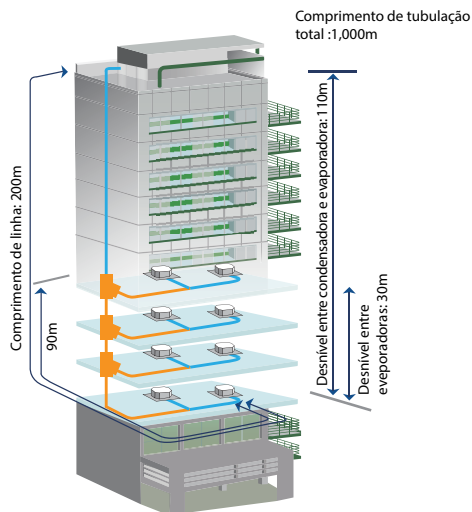
No verão com temperaturas de até 54°C a série TVR Ultra poderá operar normalmente no modo refrigeração.

No inverno, com temperaturas abaixo de -23°C a série TVR Ultra poderá operar normalmente no modo aquecimento.



## Longas distâncias de tubulação

A possibilidade de se utilizar longas linhas de tubulação permite ao projetista e instalador utilizar o TVR Ultra nas mais diferentes aplicações.



\*O comprimento máximo de linha após a primeira ramificação é de até 40 metros como padrão, mas pode ser estendido até 90 metros dentro de certas condições (deve-se aprovar com engenharia da Trane).

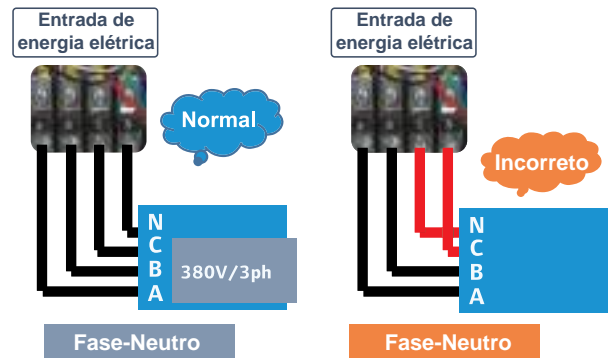
## Placa eletrônica resfriada por refrigerante

- Tubulação de refrigerante na forma de “U-duplo” decresce a temperatura da placa e aumenta a confiabilidade do produto (temperatura em média 10°C menor que modelos resfriados a ar).

## Alta Confiabilidade

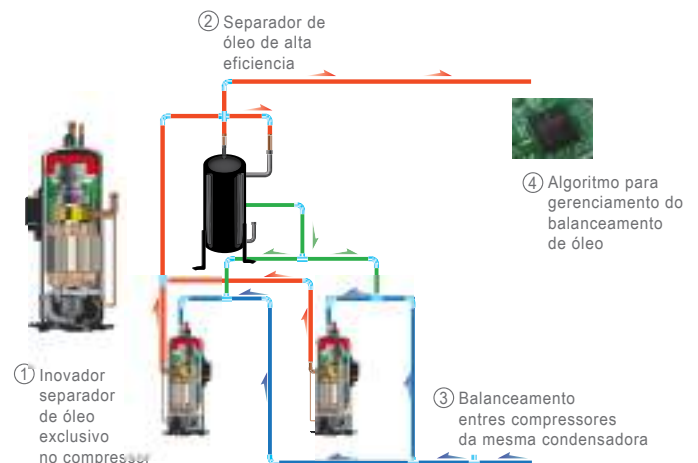
### Proteção de conexões elétricas

Proteção interna especial dos circuitos projetado para evitar erros das conexões elétricas.



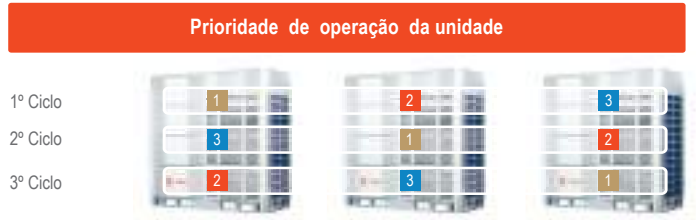
### Gerenciamento avançado de óleo

Quatro estágios da tecnologia de controle de óleo certifica que todo o óleo compressor exterior é sempre mantido a um nível seguro.



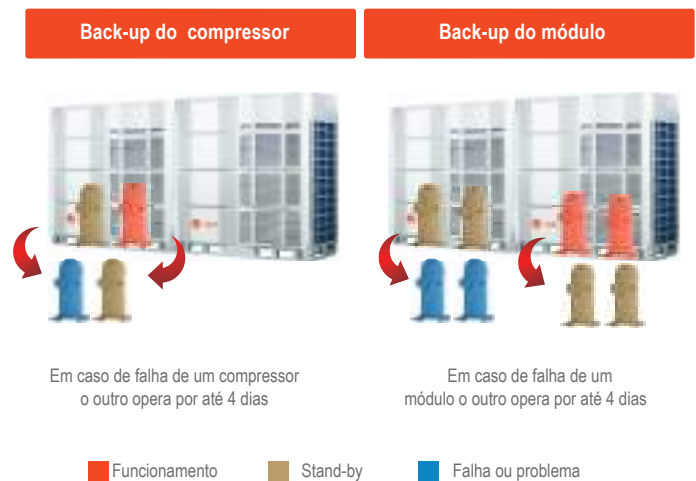
### Escalonamento da operação de compressores

O gerenciamento do ciclo de trabalho equaliza o tempo de trabalho dos compressores em um sistema de unidades múltiplas e dos compressores em cada unidade, estendendo significativamente a vida útil do compressor.



### Back-up duplo

Back-up da modulo e back-up da sistema.. Enquanto conforto permanece garantido, permitindo tempo para manutenção ou reparação.



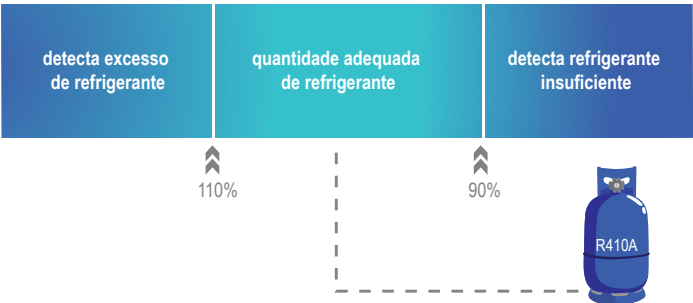
### Projeto integrado dos componentes elétricos

O projeto integrado fará com que o cabeamento elétrico seja mais simples e muito mais confiável.



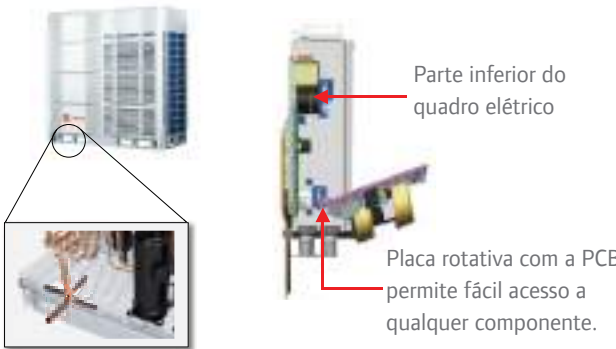
### Monitoramento da carga de refrigerante em tempo real

Monitoramento da carga de refrigerante em tempo real através do gerenciamento da temperatura e a pressão do fluido refrigerante. A unidade exterior TVR Ultra pode detectar quantidades excessivas ou insuficientes de refrigerante, para garantir um desempenho consistente.



### Conexões de tubulação em 4 direções e PCB rotativa

Tubulação com conexões em 360° / cabos de potência / conexão dos cabos de comunicação Os components localizados na parte inferior podem ser facilmente acessados já que a PCB está instalada em uma placa rotativa, tornando a manutenção facilitada.



### Diferentes modos de prioridade

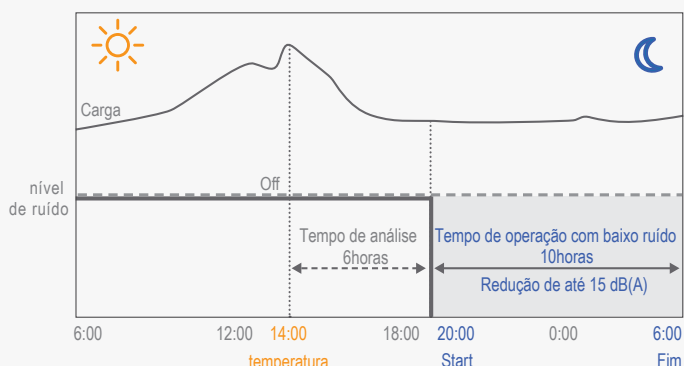
- Configurações triplas (local/remoto/rede) para instalação simplificada, comissionamento e manutenção.
- Configuração local em campo permite configurações no local rápidas e fáceis, simplificando a instalação e comissionamento





## Tecnologia avançada para operação silenciosa

7 modos de silêncio noturno, 3 modos “silenciosos” e 4 opções de modo “super silencioso” proporcionam mais liberdade e conveniência para atender às necessidades dos clientes.



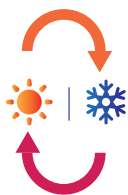
Modo silencioso e modo silencioso noturno  
A velocidade do ventilador é limitada



Modo super silencioso  
A velocidade do ventilador e a frequência do compressor são limitadas

## 5 Diferentes modos de prioridade

5 opções de ajustes de modo de prioridade permitem maior Liberdade e conveniência para atender as necessidades dos clientes.



Prioridade Automática



Prioridade Resfriamento



VIP / Prioridade de voto



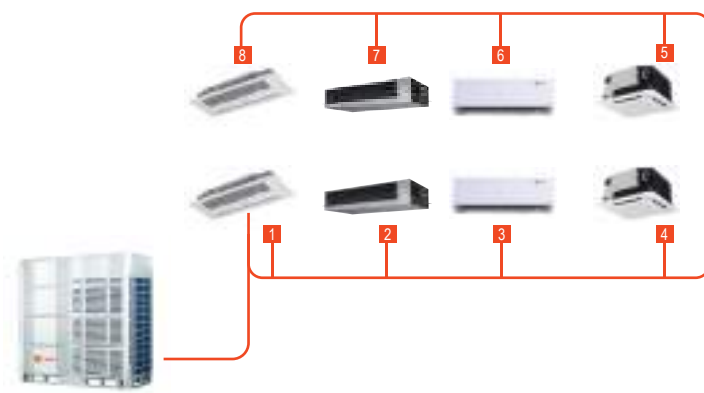
Apenas Aquecimento



Apenas Resfriamento

## Endereçamento automático

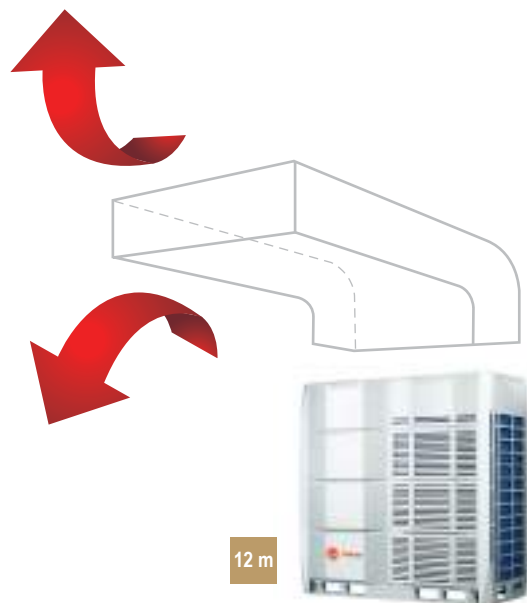
O novo TVR Ultra economiza tempo de instalação através do simples endereçamento automático de até 64 evaporadoras por sistema.



## Facilidade de instalação e Manutenção

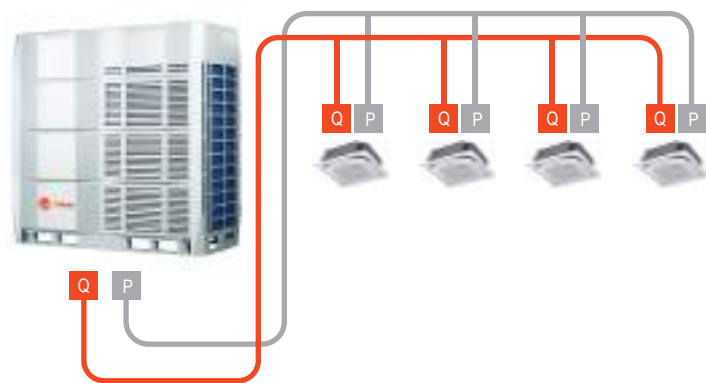
### Alta pressão estática disponível

É possível ter pressão estática externa disponível de até 60Pa (opcional – o padrão é 20 Pa).



### Cabos de comunicação não polarizados\*

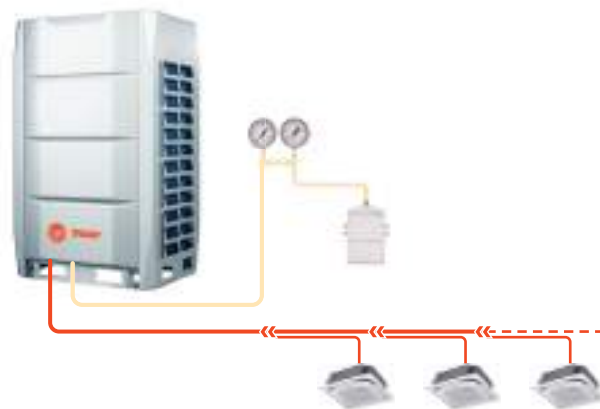
Apenas um par de cabos de comunicação blindados não polarizados de 2 vias é necessário para a comunicação entre as unidades evaporadoras e condensadoras.



\* Em instalações onde relativamente fortes campos eletromagnéticos estão presentes, cabeamento blindado com cabos de 3 vias deve ser usado para evitar interferência.

### Carga de Refrigerante Automática\*

A carga de refrigerante automática permite maior facilidade e efetividade da instalação e manutenção (função opcional).



\* Esta função está disponível como uma opção de personalização

### Placa Multifuncional (opcional apenas para TVR Ultra)

Uma pequena placa multifuncional pode ser instalada junto as unidades condensadoras, de forma a possibilitar aos engenheiros de serviços a ativação do comissionamento ou verificação do status de operação sem remover o painel da unidade condensadora. Este dispositivo também permite realizar o back-up automático de dados e gravação dos últimos 30 minutos de operação.



## Proteção resistente a corrosão

As unidades condensadoras recebem tratamento resistente a corrosão para condições não extremas nas unidades padrão e também podem ser fornecidas, como opcional, com forte tratamento resistente a corrosão nos componentes principais para proteção de superfície contra ar corrosivo, chuva ácida e ar salino (para instalações em regiões costeiras), de forma a estender vida útil total.

A integridade do tratamento resistente a corrosão é assegurada sujeitando principais componentes e peças aos mais rigorosos testes de salt spray.

### Motor do ventilador

Padrão:  
72 horas de salt spray

Opção resistente a corrosão:  
240 horas de salt spray



### Estrutura metálica

Padrão: 500h de salt spray

Opção resistente a corrosão:  
1000h de teste de umidade e calor e 500h de teste de envelhecimento com luz



### Trocador de calor: aletas

Padrão:  
72h de salt spray  
Opção resistente a corrosão:  
1000h de salt spray e 140h de névoa ácida

### Trocador de calor

Padrão: 24h de salt spray  
Opção resistente a corrosão:  
240 horas de salt spray



### Parafusos e gaxetas

Padrão: 300h de salt spray

Opção resistente a corrosão:  
1000h de salt spray e 2000h de teste de umidade e calor e 720h de teste de envelhecimento com luz

### Quadro elétrico

Padrões: 96h de salt spray



# Unidades Condensadoras - TVR Ultra

## Especificações 220V



Capacidade		HP	8	10	12	14	16
Modelo			4TVH0086E8000AA	4TVH0096E8000AA	4TVH0115E8000AA	4TVH0140E8000AA	4TVH0155E8000AA
Características Elétricas		V/F/Hz	220V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	25.2	28.0	33.5	40.0	45.0
		kBtu/h	86.0	95.5	114.3	136.5	153.5
	Potência	kW	4.80	5.70	7.08	8.70	10.27
		EER	5.25	4.91	4.73	4.60	4.38
		IEER	9.70	9.09	8.75	8.51	8.12
Aquecimento²	Capacidade	kW	25.2	28.0	33.5	40.0	45.0
		kBtu/h	86.0	95.5	114.3	136.5	153.5
	Potência	kW	4.56	5.12	6.65	8.47	9.62
	COP	kW/kW	5.53	5.47	5.04	4.72	4.68
Unid. Evaporadoras Conectáveis		Qtde. Max.	13	16	20	23	26
Compressores		Quantidade	1				
Refrigerante (R-410a)		Carga de fábrica	kg			13	
Conexões da Tubulação³	Linha de líquido	mm	Φ12.7			Φ15.9	
	Linha de gás	mm	Φ25.4			Φ31.8	
Vazão de Ar		m³/h	11000				14000
Pressão Sonora⁴		dB(A)	58			60	61
Dimensões (LxAxP)		mm	990×1635×790				1340×1635×825
Dimensões com Embalagem (LxAxP)		mm	1090×1805×860				1405×1805×910
Peso		kg	227				284
Peso para Transporte		kg	248				311

Capacidade			HP	18	20	22	24	26	28
Modelo				4TVH0170E8000AA	4TVH0192E8000AA	4TVH0210E8000AA	4TVH0229E8000AA	4TVH0249E8000AA	4TVH0268E8000AA
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	50.0	56.0	61.5	67.0	73.0	78.5	
		kBtu/h	170.6	191.1	209.8	228.6	249.1	267.8	
	Potência	kW	11.57	13.66	15.19	16.58	19.11	23.43	
	EER	kW/kW	4.32	4.10	4.05	4.04	3.82	3.35	
	IEER	kW/kW	8.01	7.60	7.51	7.49	7.09	6.21	
Aquecimento²	Capacidade	kW	50.0	56.0	61.5	67.0	73.0	78.5	
		kBtu/h	170.6	191.1	209.8	228.6	249.1	267.8	
	Potência	kW	10.53	12.56	14.61	15.12	17.38	20.23	
	COP	kW/kW	4.75	4.46	4.21	4.43	4.20	3.88	
Unid. Evaporadoras Conectáveis	Qtde. Max.		29	33	36	39	43	46	
Compressores	Quantidade		2						
Refrigerante (R-410a)	Carga de fábrica	kg	17				21		
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1				Φ22.2		
	Linha de gás	mm	Φ31.8						
Vazão de Ar		m³/h	17000				25000		
Pressão Sonora⁴		dB(A)	62	63			64		
Dimensões (LxAxP)		mm	1340×1635×825				1730×1830×850		
Dimensions com Embalagem (LxAxP)		mm	1405×1805×910				1800×2000×910		
Peso		kg	366				438		
Peso para Transporte		kg	386				461		

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.



# Unidades Condensadoras - TVR Ultra

## Especificações 220V

Capacidade			HP	30	32	34
Modelo				4TVH0295E8000AA	4TVH0310E8000AA	4TVH0325E8000AA
Tipo de Combinação				14HP+16HP	16HP+16HP	12HP+22HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	85.0	90.0	95.0	
		kBtu/h	290.0	307.1	324.1	
	Potência	kW	18.97	20.55	22.27	
	EER	kW/kW	4.48	4.38	4.27	
Aquecimento²	Capacidade	kW/kW	85.0	90.0	95.0	
		kW	290.0	307.1	324.1	
	Potência	kBtu/h	18.09	19.23	21.25	
	COP	kW	4.70	6.48	4.47	
Unid. Evaporadoras Conectáveis	Qtde. Max.		50	53	56	
Compressores	Quantidade		2		3	
Refrigerante (R-410a)	Carga de fábrica	kg	26		28	
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1			
	Linha de gás	mm	Φ31.8			
Vazão de Ar		m³/h	28000			
Pressão Sonora⁴		dB(A)	64		65	
Dimensões (LxAxP)		mm	(1340×1635×825)×2		(990×1635×790)+(1340×1635×825)	
Dimensions com Embalagem (LxAxP)		mm	(1405×1805×910)×2		(1090×1805×860)+(1405×1805×910)	
Peso		kg	284x2		227+366	
Peso para Transporte		kg	311x2		248+386	

Capacidade			HP	36	38	40
Modelo				4TVH0350E8000AA	4TVH0365E8000AA	4TVH0383E8000AA
Tipo de Combinação				14HP+22HP	16HP+22HP	12HP+28HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	101.5	106.5	112.0	
		kBtu/h	346.3	363.4	382.1	
	Potência	kW	23.88	25.46	30.52	
		EER	kW/kW	4.25	4.18	3.67
Aquecimento²	Capacidade	kW/kW	101.5	106.5	112.0	
		kW	346.3	363.4	382.1	
	Potência	kBtu/h	23.08	24.22	26.88	
		COP	kW	4.40	4.40	4.17
Unid. Evaporadoras Conectáveis	Qtde. Max.		59	63	64	
Compressores	Quantidade		4		3	
Refrigerante (R-410a)	Carga de fábrica	kg	30		32	
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1			
	Linha de gás	mm	Φ31.8			
Vazão de Ar		m³/h	31000	28000		
Pressão Sonora⁴		dB(A)	30	64	65	
Dimensões (LxAxP)		mm	(1340×1635×825)×2		(990×1635×790)+(1730×1830×850)	
Dimensions com Embalagem (LxAxP)		mm	(1405×1805×910)×2		(1090×1805×860)+(1800×2000×910)	
Peso		kg	284x366		227+438	
Peso para Transporte		kg	311+386		248+461	

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

Unidades Condensadoras - TVR Ultra

Especificações 220V

Capacidade			HP	42	44	46	48	50	
Modelo				4TVH0408E8000AA	4TVH0423E8000AA	4TVH0439E8000AA	4TVH0459E8000AA	4TVH0478E8000AA	
Tipo de Combinação				14HP+28HP	16HP+28HP	22HP+24HP	22HP+26HP	22HP+28HP	
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	118.5	123.5	128.5	134.5	140.0		
		kBtu/h	404.3	421.4	438.4	458.9	477.7		
	Potência	kW	32.13	33.71	31.77	34.30	38.62		
		EER	kW/kW	3.69	3.66	4.04	3.92	3.63	
Aquecimento²	Capacidade	kW/kW	118.5	123.5	128.5	134.5	140.0		
		kBtu/h	404.3	421.4	438.4	458.9	477.7		
	Potência	kW	28.71	29.85	29.73	31.99	34.84		
		COP		4.13	4.14	4.32	4.20	4.02	
Unid. Evaporadoras Conectáveis		Qtde. Max.	64						
Compressores		Quantidade	3			4			
Refrigerante (R-410a)		Carga de fábrica	kg	39000			42000		
Conexões da Tubulação³	Linha de Líquido		mm	34			38		
	Linha de gás		mm	Φ19.1					
Vazão de Ar			m³/h	Φ38.1					
Pressão Sonora⁴			dB(A)	66					
Dimensões (LxAxP)			mm	(1340×1635×825)+(1730×1830×850)					
Dimensões com Embalagem (LxAxP)			mm	(1405×1805×910)+(1800×2000×910)					
Peso			kg	284+438			366+438		
Peso para Transporte			kg	311+461			386+461		

Capacidade			HP	52	54	56
Modelo				4TVH0498E8000AA	4TVH0517E8000AA	4TVH0536E8000AA
Tipo de Combinação				26HP+26HP	26HP+28HP	28HP+28HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	146.0	151.5	157.0	
		kBtu/h	498.2	516.9	535.7	
	Potência	kW	38.22	42.54	46.87	
		EER	kW/kW	3.82	3.56	3.35
Aquecimento²	Capacidade	kW/kW	146.0	151.5	157.0	
		kBtu/h	498.2	516.9	535.7	
	Potência	kW	34.76	37.61	40.46	
		COP		4.20	4.03	3.88
Unid. Evaporadoras Conectáveis	Qtde. Max.		64			
Compressores	Quantidade		50000			
Refrigerante (R-410a)	Carga de fábrica	kg	4			
Conexões da Tubulação³	Linha de líquido	mm	42			
	Linha de gás	mm	Φ19.1			
Vazão de Ar		m³/h	Φ31.8		Φ41.3	
Pressão Sonora⁴		dB(A)	66			
Dimensões (LxAxP)		mm	(1730×1830×850)×2			
Dimensões com Embalagem (LxAxP)		mm	(1800×2000×910)×2			
Peso		kg	438×2			
Peso para Transporte		kg	461×2			

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.



# Unidades Condensadoras - TVR Ultra

## Especificações 220V

Capacidade		HP	58	60	62
Modelo			4TVH0563E8000AA	4TVH0578E8000AA	4TVH0593E8000AA
Tipo de Combinação			14HP+16HP+28HP	16HP+16HP+28HP	12HP+22HP+28HP
Características Elétricas		V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	163.5	168.5	173.5
		kBtu/h	557.9	574.9	592.0
	Potência	kW	42.40	43.98	45.70
	EER	kW/kW	3.86	3.83	3.80
Aquecimento²	Capacidade	kW/kW	163.5	168.5	173.5
		kW	557.9	574.9	592.0
	Potência	kBtu/h	38.32	39.46	41.49
	COP	kW	4.27	4.27	4.18
Unid. Evaporadoras Conectáveis		Qtde. Max.	64		
Compressores		Quantidade	4		5
Refrigerante (R-410a)		Carga de fábrica	47		49
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1		
	Linha de gás	mm	Φ41.3		
Vazão de Ar		m³/h	53000		
Pressão Sonora⁴		dB(A)	66		
Dimensões (LxAxP)		mm	(1340×1635×825)×2+(1730×1830×850)		(990×1635×790)+(1340×1635×825)+
Dimensões com Embalagem (LxAxP)		mm	(1405×1805×910)×2+(1800×2000×910)		(1090×1805×860)+(1405×1805×910)+(1800×2000×910)
Peso		kg	284×2+438		227+366+438
Peso para Transporte		kg	311×2+461		248+386+461

Capacidade		HP	64	66	68
Modelo			4TVH0618E8000AA	4TVH0633E8000AA	4TVH0651E8000AA
Tipo de Combinação			14HP+22HP+28HP	16HP+22HP+28HP	12HP+28HP+28HP
Características Elétricas		V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	180.0	185.0	190.5
		kBtu/h	614.2	631.2	650.0
	Potência	kW	47.31	48.89	53.95
	EER	kW/kW	3.80	3.78	3.53
Aquecimento²	Capacidade	kW/kW	180.0	185.0	190.5
		kW	614.2	631.2	650.0
	Potência	kBtu/h	43.31	44.46	47.11
	COP	kW	4.16	4.16	4.04
Unid. Evaporadoras Conectáveis		Qtde. Max.	64		
Compressores		Quantidade	5		
Refrigerante (R-410a)		Carga de fábrica	51		53
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1		
	Linha de gás	mm	Φ41.3		
Vazão de Ar		m³/h	56000		61000
Pressão Sonora⁴		dB(A)	66	67	
Dimensões (LxAxP)		mm	(1340×1635×825)×2+(1730×1830×850)		(990×1635×790)+(1730×1830×850)×2
Dimensões com Embalagem (LxAxP)		mm	(1405×1805×910)×2+(1800×2000×910)		(1090×1805×860)+(1800×2000×910)×2
Peso		kg	284+366+438		227+438×2
Peso para Transporte		kg	311+386+461		248+461×2

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS; 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 220V

Unidades Condensadoras

Capacidade			HP	70	72	74	76	78	
Modelo				4TVH0676E8000AA	4TVH0691E8000AA	4TVH0707E8000AA	4TVH0727E8000AA	4TVH0746E8000AA	
Tipo de Combinação				14HP+28HP+28HP	16HP+28HP+28HP	22HP+24HP+28HP	22HP+26HP+28HP	22HP+28HP+28HP	
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	197.0	202.0	207.0	213.0	218.5		
		kBtu/h	672.2	689.2	706.3	726.8	745.5		
	Potência	kW	55.56	57.14	55.20	57.73	62.05		
	EER	kW/kW	3.55	3.54	3.75	3.69	3.52		
Aquecimento²	Capacidade	kW/kW	197.0	202.0	207.0	213.0	218.5		
		kBtu/h	672.2	689.2	706.3	726.8	745.5		
	Potência	kW	48.94	50.08	49.96	52.22	55.07		
	COP		4.03	4.03	4.14	4.08	3.97		
Unid. Evaporadoras Conectáveis		Qtde. Max.	64						
Compressores		Quantidade	5			6			
Refrigerante (R-410a)		Carga de fábrica	kg	64000			67000		
Conexões da Tubulação³	Linha de líquido		mm	55			59		
	Linha de gás		mm	Φ22.2					
Vazão de Ar			m³/h	Φ44.5					
Pressão Sonora⁴			dB(A)	67			68		
Dimensões (LxAxP)			mm	(1340×1635×825)+(1730×1830×850)×2					
Dimensões com Embalagem (LxAxP)			mm	(1405×1805×910)+(1800×2000×910)×2					
Peso			kg	284+438×2	284+438×2	366+438×2	366+438×2	366+438×2	
Peso para Transporte			kg	311+461×2	311+461×2	311+461×2	311+461×2	311+461×2	

Capacidade		HP	80	82	84
Modelo			4TVH0766E8000AA	4TVH0785E8000AA	4TVH0804E8000AA
Tipo de Combinação			26HP+26HP+28HP	26HP+28HP+28HP	28HP+28HP+28HP
Características Elétricas		V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	224.5	320.0	235.5
		kBtu/h	766.0	784.8	803.5
	Potência	kW	61.65	65.98	70.30
		EER	3.64	3.49	3.35
Aquecimento²	Capacidade	kW/kW	224.5	230.0	235.5
		kBtu/h	776.0	784.8	803.5
	Potência	kW	54.99	57.84	60.70
	COP		4.08	3.98	3.88
Unid. Evaporadoras Conectáveis		Qtde. Max.	64		
Compressores		Quantidade	6		
Refrigerante (R-410a)		Carga de fábrica	kg		
Conexões da Tubulação³	Linha de líquido		mm		
	Linha de gás		mm		
Vazão de Ar		m³/h	Φ22.2		
Pressão Sonora⁴		dB(A)	Φ44.5		
Dimensões (LxAxP)		mm	68		
Dimensões com Embalagem (LxAxP)		mm	(1730×1830×850)×3		
Peso		kg	(1800×2000×910)×3		
Peso para Transporte		kg	438×3		
		kg	461×3		

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS; 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 220V

Capacidade			HP	86	88	96
Modelo				4TVH0822E8000AA	4TVH0840E8000AA	4TVH0916E8000AA
Tipo de Combinação				20+22+22+22HP	22+22+22+22HP	24+24+24+24HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz		
Resfriamento <sup>1</sup>	Capacidade	kW	240.5	246	268	
		kBtu/h	820.8	307.1	324.1	
	Potência	kW	59.23	60.76	66.32	
		EER	kW/kW	4.06	4.05	4.04
Aquecimento <sup>2</sup>	Capacidade	kW/kW	85.0	90.0	95.0	
		kW	240.5	246	268	
	Potência	kBtu/h	820.8	839.6	914.7	
		COP	kW	4.26	4.21	4.43
Unid. Evaporadoras Conectáveis		Qtde. Max.	64	53	56	
Compressores		Quantidade	8	8	8	
Refrigerante (R-410a)		Carga de fábrica	kg	68		84
Conexões da Tubulação <sup>3</sup>		Linha de líquido	mm	Φ19.1		
		Linha de gás	mm	Φ31.8		
Vazão de Ar			m³/h	28000		
Pressão Sonora <sup>4</sup>			dB(A)	64		65
Dimensões (LxAxP)			mm	(1340×1635×825)×4		(1730×1830×850)×4
Dimensões com Embalagem (LxAxP)			mm	(1405×1805×910)×4		(1800x2000x910)×4
Peso			kg	366x4		438x4
Peso para Transporte			kg	386x4		461x4

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 380V

Unidades Condensadoras

Capacidade			HP	8	10	12	14
Modelo				4TVH0086EE000AA	4TVH0096EE000AA	4TVH0115EE000AA	4TVH0140EE000AA
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	25.2	28.0	33.5	40.0	
		kBtu/h	86.0	95.5	114.3	136.5	
	Potência	kW	4.80	5.70	7.08	8.70	
	EER	kW/kW	5.25	4.91	4.73	4.60	
Aquecimento²	Capacidade	kW	25.2	28.0	33.5	40.0	
		kBtu/h	86.0	95.5	114.3	136.5	
	Potência	kW	4.56	5.12	6.65	8.47	
	COP	kW/kW	5.53	5.47	5.04	4.72	
Unid. Evaporadoras Conectáveis	Qtde. Max.		13	16	20	23	
Compressores	Quantidade		1				
Refrigerante (R-410a)	Carga de fábrica	kg	11				13
Conexões da Tubulação³	Linha de líquido	mm	Φ12.7			Φ15.9	Φ15.9
	Linha de gás	mm	Φ25.4			Φ28.6	Φ31.8
Vazão de ar		m³/h	11000				13000
Pressão Sonora⁴		dB(A)	58			60	
Dimensões (LxAxP)		mm	990×1635×790				1340×1635×850
Dimensões com Embalagem (LxAxP)		mm	1090×1805×860				1405×1805×910
Peso		kg	227				277
Peso para Transporte		kg	242				304

Capacidade			HP	16	18	20	22
Modelo				4TVH0155EE000AA	4TVH0170EE000AA	4TVH0192EE000AA	4TVH0210EE000AA
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	45.0	50.0	56.0	61.5	
		kBtu/h	153.5	170.6	191.1	209.8	
	Potência	kW	10.27	11.57	13.66	15.19	
	EER	kW/kW	4.38	4.32	4.10	4.05	
Aquecimento²	Capacidade	kW	45.0	50.0	56.0	61.5	
		kBtu/h	153.5	170.6	191.1	209.8	
	Potência	kW	9.6	10.5	12.6	14.6	
	COP	kW/kW	4.68	4.75	4.46	4.21	
Unid. Evaporadoras Conectáveis	Qtde. Max.		26	29	33	36	
Compressores	Quantidade		1	2			
Refrigerante (R-410a)	Carga de fábrica	kg	13	17			
Conexões da Tubulação³	Linha de líquido	mm	Φ15.9	Φ19.1			
	Linha de gás	mm	Φ31.8				
Vazão de Ar			m³/h	13000	17000		
Pressão Sonora⁴			dB(A)	61	62	63	
Dimensões (LxAxP)			mm	1340×1635×850	1340×1635×825		
Dimensões com Embalagem (LxAxP)			mm	1405×1805×910			
Peso			kg	277	348		
Peso para Transporte			kg	304	368		

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS; 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-aneecóica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções eletricas nao deve ser superior ao valor maximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 380V

Capacidade			HP	24	26	28
Modelo				4TVH0229EE000AA	4TVH0249EE000AA	4TVH0268EE000AA
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz		
Resfriamento¹	Capacidade	kW	67.0	73.0		78.5
		kBtu/h	228.6	249.1	267.8	
	Potência	kW	16.58	19.11		23.43
		EER	kW/kW	4.04	3.82	
Aquecimento²	Capacidade	kW	67.0	73.0		78.5
		kBtu/h	228.6	249.1	267.8	
	Potência	kW	15.12	17.38		20.23
		COP	kW/kW	4.43	4.20	
Unid. Evaporadoras Conectáveis	Qtde. Max.		39	43	46	
Compressores	Quantidade		2			
Refrigerante (R-410a)	Carga de fábrica	kg	22			
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1	Φ22.2		
	Linha de gás	mm	Φ31.8	Φ31.8		
Vazão de Ar		m³/h	25000			
Pressão Sonora⁴		dB(A)	64			
Dimensões (LxAxP)		mm	1730×1830×850			
Dimensions com Embalagem (LxAxP)		mm	1800×2000×910			
Peso		kg	430			
Peso para Transporte		kg	453			

Capacidade		HP	30	32
Modelo			4TVH0290EE000AA	4TVH0307EE000AA
Características Elétricas		V/F/Hz	380V, trifásico, 50/60 Hz	
Resfriamento <sup>1</sup>	Capacidade	kW	85.0	90.0
		kBtu/h	290.0	307.1
	Potência	kW	25.68	28.30
		EER	kW/kW	3.31
Aquecimento <sup>2</sup>	Capacidade	kW	85.0	90.0
		kBtu/h	290.0	307.1
	Potência	kW	22.55	25.28
		COP	kW/kW	3.77
Unid. Evaporadoras Conectáveis	Qtde. Max.		50	53
Compressores	Quantidade		2	
Refrigerante (R-410a)	Carga de fábrica	kg	25	
Conexões da Tubulação <sup>3</sup>	Linha de líquido	mm	Φ22.2	
	Linha de gás	mm	Φ38.1	
Vazão de Ar		m³/h	24000	
Pressão Sonora <sup>4</sup>		dB(A)	64	
Dimensões (LxAxP)		mm	1730×1830×850	
Dimensions com Embalagem (LxAxP)		mm	1800×2000×910	
Peso		kg	475	
Peso para Transporte		kg	507	

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS; 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 380V

Capacidade			HP	34	36	38	40
Modelo				4TVH0325EE000AA	4TVH0350EE000AA	4TVH0365EE000AA	4TVH0383EE000AA
Tipo de Combinação				12HP+22HP	14HP+22HP	16HP+22HP	12HP+28HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	95.0	101.5	106.5	112.0	
		kBtu/h	324.1	346.3	363.4	382.1	
	Potência	kW	22.3	23.9	25.5	30.5	
	EER	kW/kW	4.27	4.25	4.18	3.67	
Aquecimento²	Capacidade	kW	95.0	101.5	106.5	112.0	
		kBtu/h	324.1	346.3	363.4	382.1	
	Potência	kW	21.3	23.1	24.2	26.9	
	COP	kW/kW	4.47	4.40	4.40	4.17	
Unid. Evaporadoras Conectáveis	Qtde. Max.		56	59	63	64	
Compressores	Quantidade		3				
Refrigerante (R-410a)	Carga de fábrica	kg	11+17	13+17		11+22	
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1	Φ19.1			
	Linha de gás	mm	Φ31.8	Φ38.1			
Vazão de Ar		m³/h	28000	30000		36000	
Pressão Sonora⁴		dB(A)	65				
Dimensões (LxAxP)		mm	(990×1635×790)+ (1340×1635×825)	(1340×1635×850)+(1340×1635×825)		(990×1635×790)+ (1730×1830×850)	
Dimensions com Embalagem (LxAxP)		mm	(1090×1805×860)+ (1405×1805×	(1405×1805×910)×2		(1090×1805×860)+ (1800×2000×	
Peso		kg	227+348	277+348		277	
Peso para Transporte		kg	242+368	304+368		304	

Capacidade			HP	42	44	46	48				
Modelo				4TVH0402EE000AA		4TVH0420EE000AA		4TVH0439EE000AA		4TVH0459EE000AA	
Tipo de Combinação				20HP+22HP		22HP+22HP		22HP+24HP		22HP+26HP	
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz							
Resfriamento <sup>1</sup>	Capacidade	kW	117.5		123.0		128.5		134.5		
		kBtu/h	400.9		419.7		438.4		458.9		
	Potência	kW	28.8		30.4		31.8		34.3		
	EER	kW/kW	4.07		4.05		4.04		3.92		
Aquecimento <sup>2</sup>	Capacidade	kW	117.5		128.5		128.5		134.5		
		kBtu/h	400.9		438.4		438.4		458.9		
	Potência	kW	27.2		29.2		29.7		32.0		
	COP	kW/kW	4.33		4.21		4.32		4.20		
Unid. Evaporadoras Conectáveis		Qtde. Max.	64								
Compressores		Quantidade	4								
Refrigerante (R-410a)		Carga de fábrica	kg	17x2				17+22			
Conexões da Tubulação <sup>3</sup>		Linha de líquido	mm	Φ19.1							
		Linha de gás	mm	Φ38.1							
Vazão de Ar			m³/h	34000				42000			
Pressão Sonora <sup>4</sup>			dB(A)	66							
Dimensões (LxAxP)			mm	(1340×1635×825)×2				(1340×1635×825)+(1730×1830×850)			
Dimensions com Embalagem (LxAxP)			mm	(1405×1805×910)×2				(1405×1805×910)+(1800×2000×910)			
Peso			kg	348x2				348+430			
Peso para Transporte			kg	348x2				368+453			

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS; 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 380V

Capacidade			HP	50	52	54	56
Modelo				4TVH0478EE000AA	4TVH0498EE000AA	4TVH0517EE000AA	4TVH0536EE000AA
Tipo de Combinação				22HP+28HP	26HP+26HP	26HP+28HP	28HP+28HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	140.0	146.0	151.5	157.0	
		kBtu/h	477.7	498.2	516.9	535.7	
	Potência	kW	38.6	38.2	42.5	46.9	
	EER	kW/kW	3.63	3.82	3.56	3.35	
Aquecimento²	Capacidade	kW	140.0	146.0	151.5	157.0	
		kBtu/h	477.7	498.2	516.9	535.7	
	Potência	kW	34.8	34.8	37.6	40.5	
	COP	kW/kW	4.02	4.20	4.03	3.88	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64				
Compressores	Quantidade		4				
Refrigerante (R-410a)	Carga de fábrica	kg	17+22	22x2			
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1				Φ19.1
	Linha de gás	mm	Φ38.1				Φ41.3
Vazão de Ar		m³/h	42000	50000			
Pressão Sonora⁴		dB(A)	66				
Dimensões (LxAxP)		mm	(1340×1635×825)+ (1730×1830×850)	(1730×1830×850)×2			
Dimensões com Embalagem (LxAxP)		mm	(1405×1805×910)+ (1800×2000×910)	(1800×2000×910)×2			
Peso		kg	348+430	430x2			
Peso para Transporte		kg	368+453	453x2			

Capacidade			HP	58	60	62	64
Modelo				4TVH0558EE000AA	4TVH0575EE000AA	4TVH0597EE000AA	4TVH0614EE000AA
Tipo de Combinação				28HP+30HP	28HP+32HP	30HP+32HP	32HP+32HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	163.5	168.5	175.0	180.0	
		kBtu/h	557.9	574.9	597.1	614.2	
	Potência	kW	49.1	51.7	54.0	56.6	
	EER	kW/kW	3.33	3.26	3.24	3.18	
Aquecimento²	Capacidade	kW	163.5	168.5	175.0	180.0	
		kBtu/h	557.9	574.9	597.1	614.2	
	Potência	kW	42.8	45.5	47.8	50.6	
	COP	kW/kW	3.82	3.70	3.66	3.56	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64				
Compressores	Quantidade		4				
Refrigerante (R-410a)	Carga de fábrica	kg	22+25		25x2		
Conexões da Tubulação³	Linha de líquido	mm	φ19.1				
	Linha de gás	mm	φ38.1				
Vazão de Ar			m³/h	34000		42000	
Pressão Sonora⁴			dB(A)	66			
Dimensões (LxAxP)			mm	(1730×1830×850)×2			
Dimensões com Embalagem (LxAxP)			mm	(1800×2000×910)×2			
Peso			kg	430+475			475x2
Peso para Transporte			kg	453+507			507x2

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS; 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras - TVR Ultra

## Especificações 380V

Unidades Condensadoras

Capacidade			HP	66	68	70	72
Modelo				4TVH0632EE000AA	4TVH0657EE000AA	4TVH0672EE000AA	4TVH0690EE000AA
Tipo de Combinação				12HP+22HP+32HP	14HP+22HP+32HP	16HP+22HP+32HP	12HP+28HP+32HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	185.0	191.5	196.5	202.0	
		kBtu/h	631.2	653.4	670.5	689.2	
	Potência	kW	22.3	23.9	25.5	30.5	
	EER	kW/kW	4.27	4.25	4.18	3.67	
Aquecimento²	Capacidade	kW	185.0	191.5	196.5	202.0	
		kBtu/h	631.2	653.4	670.5	689.2	
	Potência	kW	21.3	23.1	24.2	26.9	
	COP	kW/kW	4.47	4.40	4.40	4.17	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64				
Compressores	Quantidade		5				
Refrigerante (R-410a)	Carga de fábrica	kg	11+17+25	13+17+25			11+22+25
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1	Φ22.2			
	Linha de gás	mm	Φ41.3	Φ44.5			
Vazão de Ar		m³/h	52000	54000			60000
Pressão Sonora⁴		dB(A)	67				
Dimensões (LxAxP)		mm	(990×1635×790)+ (1340×1635×825)+ (1730×1830×850)	(1340×1635×850)+(1340×1635×825)+ (1730×1830×850)			(990×1635×790)+ (1730×1830×850) ×2
Dimensões com Embalagem (LxAxP)		mm	(1090×1805×860)+ (1405×1805×910)+ (1800×2000×910)	(1405×1805×910)×2+(1800×2000×910)			(1090×1805×860)+ (1800×2000×910)×2
Peso		kg	227+348+475	277+348+475			227+430+475
Peso para Transporte		kg	242+368+507	304+368+507			242+453+507

Capacidade			HP	74	76	78	80
Modelo				4TVH0709EE000AA	4TVH0727EE000AA	4TVH0746EE000AA	4TVH0766EE000AA
Tipo de Combinação				20HP+22HP+32HP	22HP+22HP+32HP	22HP+24HP+32HP	22HP+26HP+32HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento <sup>1</sup>	Capacidade	kW	207.5	213.0	218.5	224.5	
		kBtu/h	708.0	726.8	745.5	766.0	
	Potência	kW	28.8	30.4	31.8	34.3	
	EER	kW/kW	4.07	4.05	4.04	3.92	
Aquecimento <sup>2</sup>	Capacidade	kW	207.5	213.0	218.5	224.5	
		kBtu/h	708.0	726.8	745.5	766.0	
	Potência	kW	27.2	29.2	29.7	32.0	
	COP	kW/kW	4.33	4.21	4.32	4.20	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64				
Compressores	Quantidade		6				
Refrigerante (R-410a)	Carga de fábrica	kg	7x2+25			17+22+25	
Conexões da Tubulação <sup>3</sup>	Linha de líquido	mm	Φ22.2				
	Linha de gás	mm	Φ44.5				
Vazão de Ar			m³/h	58000			66000
Pressão Sonora <sup>4</sup>			dB(A)	68			
Dimensões (LxAxP)			mm	(1340×1635×825)×2+(1730×1830×850)			(1340×1635×825)+(1730×1830×850)×2
Dimensões com Embalagem (LxAxP)			mm	(1405×1805×910)×2+(1800×2000×910)			(1405×1805×910)+(1800×2000×910)×2
Peso			kg	348x2+475			348+430+475
Peso para Transporte			kg	368x2+507			368+453+507

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.



# Unidades Condensadoras - TVR Ultra

## Especificações 380V

Capacidade			HP	82	84	86	88
Modelo				4TVH0785EE000AA	4TVH0805EE000AA	4TVH0824EE000AA	4TVH0843EE000AA
Tipo de Combinação				22HP+28HP+32HP	26HP+26HP+32HP	26HP+28HP+32HP	28HP+28HP+32HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	230.0	236.0	241.5	247.0	
		kBtu/h	784.8	805.2	824.0	842.8	
	Potência	kW	38.6	38.2	42.5	46.9	
	EER	kW/kW	3.63	3.82	3.56	3.35	
Aquecimento²	Capacidade	kW	230.0	236.0	241.5	247.0	
		kBtu/h	784.8	805.2	824.0	842.8	
	Potência	kW	34.8	34.8	37.6	40.5	
	COP	kW/kW	4.02	4.20	4.03	3.88	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64				
Compressores	Quantidade		6				
Refrigerante (R-410a)	Carga de fábrica	kg	17+22+25	22x2+25			
Conexões da Tubulação³	Linha de líquido	mm	Φ22.2	Φ25.4			
	Linha de gás	mm	Φ44.5	Φ50.8			
Vazão de Ar		m³/h	66000	74000			
Pressão Sonora⁴		dB(A)	68				
Dimensões (LxAxP)		mm	(1340×1635×825)+ (1730×1830×850)×2	(1730×1830×850)×3			
Dimensões com Embalagem (LxAxP)		mm	(1405×1805×910)+ (1800×2000×910)×2	(1800×2000×910)×3			
Peso		kg	348+430+475	430x2+475			
Peso para Transporte		kg	368+453+507	453x2+507			

Capacidade			HP	90	92	94	96
Modelo				4TVH0865EE000AA	4TVH0882EE000AA	4TVH0904EE000AA	4TVH0921EE000AA
Tipo de Combinação				28HP+30HP+32HP	28HP+32HP+32HP	30HP+32HP+32HP	32HP+32HP+32HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz			
Resfriamento¹	Capacidade	kW	253.5	258.5	265.0	270.0	
		kBtu/h	864.9	882.0	904.2	921.2	
	Potência	kW	49.1	51.7	54.0	56.6	
	EER	kW/kW	3.33	3.26	3.24	3.18	
Aquecimento²	Capacidade	kW	253.5	258.5	265.0	270.0	
		kBtu/h	864.9	882.0	904.2	921.2	
	Potência	kW	42.8	45.5	47.8	50.6	
	COP	kW/kW	3.82	3.70	3.66	3.56	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64				
Compressores	Quantidade		6				
Refrigerante (R-410a)	Carga de fábrica	kg	22+25x2			25+25x2	
Conexões da Tubulação³	Linha de líquido	mm	ø25.4				
	Linha de gás	mm	ø50.8				
Vazão de Ar		m³/h	73000			72000	
Pressão Sonora⁴		dB(A)	68				
Dimensões (LxAxP)		mm	(1730×1830×850)×3				
Dimensões com Embalagem (LxAxP)		mm	(1800×2000×910)×3				
Peso		kg	348x2			348+430	
Peso para Transporte		kg	348x2			368+453	

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 220V



Capacidade			HP	8	10	12	14	16
Modelo				4TVY0077H8000AA	4TVY0096H8000AA	4TVY0115H8000AA	4TVY0140H8000AA	4TVY0155H8000AA
Tipo de Combinação								
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	22.4	28	33.5	40	45	
		kBtu/h	76.5	95.6	114.4	136.6	153.7	
	Potência	kW	5.08	6.68	8.85	10.30	12.00	
	EER	kW/kW	4.41	4.19	3.79	3.88	3.75	
Unid. Evaporadoras Conectáveis		Qtde. Max.	13	16	20	23	26	
Compressores		Quantidade	1					
Refrigerante (R-410a)		Carga de fábrica	kg	8(17.6)			11(24.3)	
Conexões da Tubulação³		Linha de líquido	mm	Φ12.7(1/2)			Φ15.9(5/8)	
		Linha de gás	mm	Φ25.4(1)		Φ28.6(1-1/8)	Φ31.8(1-1/4)	
Pressão Sonora⁴			dB(A)	57	58	60		61
Dimensões (LxAxP)			mm	960×1615×765				
Dimensões com Embalagem (LxAxP)			mm	1025×1790×830				
Peso			kg	193			200	
Peso para Transporte			kg	209			216	

Capacidade			HP	18	20	22	24	26
Modelo				4TVY0170H8000AA	4TVY0192H8000AA	4TVY0210H8000AA	4TVY0229H8000AA	4TVY0249H8000AA
Tipo de Combinação								
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	50	56	61.5	67	73	
		kBtu/h	170.8	191.3	210	228.8	249.3	
	Potência	kW	13.70	15.80	19.65	20.10	22.80	
	EER	kW/kW	3.65	3.54	3.13	3.33	3.20	
Unid. Evaporadoras Conectáveis		Qtde. Max.	29	33	36	39	43	
Compressores		Quantidade	2					
Refrigerante (R-410a)		Carga de fábrica	kg	13(28.7)			19(41.9)	
Conexões da Tubulação³		Linha de líquido	mm	Φ15.9(5/8)			Φ19.1(3/4)	
		Linha de gás	mm	Φ31.8(1-1/4)				Φ34.9(1-3/8)
Pressão Sonora⁴			dB(A)	62	63		64	
Dimensões (LxAxP)			mm	1250×1615×765			1585×1615×765	
Dimensões com Embalagem (LxAxP)			mm	1305×1790×820			1650×1810×840	
Peso			kg	296			352	
Peso para Transporte			kg	313			376	

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 220V

Capacidade		HP	28	30	32	34	36
Modelo			4TVY0268H8000AA	4TVY0290H8000AA	4TVY0310H8000AA	4TVY0325H8000AA	4TVY0347H8000AA
Tipo de Combinação					16HP+16HP	22HP+12HP	20HP+16HP
Características Elétricas		V/F/Hz	220V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	78.5	85	90	95	101
		kBtu/h	268.1	290.3	307.4	324.4	345
	Potência	kW	24.06	27.30	24.00	28.50	27.80
	EER	kW/kW	3.26	3.11	3.75	3.33	3.63
Unid. Evaporadoras Conectáveis	Qtde. Max.		46	50	53	56	59
Compressores	Quantidade		2			3	
Refrigerante (R-410a)	Carga de fábrica	kg	19(41.9)		11×2(24×2)	13+8(28.7+17.6)	13+11(28.7+24.3)
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1(3/4)				
	Linha de gás	mm	Φ34.9(1-3/8)		Φ31.8(1-1/4)		Φ38.1(1-1/2)
Pressão Sonora⁴		dB(A)	64			65	
Dimensões (LxAxP)		mm	1585×1615×765		(960×1615×765)×2	(1250×1615×765)+(960×1615×765)	
Dimensões com Embalagem (LxAxP)		mm	1650×1810×840		(1025×1790×830)×2	(1305×1790×820)+(1025×1790×830)	
Peso		kg	352		193×2	296+193	
Peso para Transporte		kg	376		209×2	313+209	

Capacidade			HP	38	40	42	44	46
Modelo				4TVY0365H8000AA	4TVY0384H8000AA	4TVY0404H8000AA	4TVY0423H8000AA	4TVY0445H8000AA
Tipo de Combinação				22HP+16HP	24HP+16HP	26HP+16HP	28HP+16HP	30HP+16HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	106.5	112	118	123.5	130	
		kBtu/h	363.7	382.5	403	421.8	444	
	Potência	kW	31.65	32.10	34.05	36.06	39.30	
	EER	kW/kW	3.36	3.49	3.47	3.42	3.31	
Unid. Evaporadoras Conectáveis	Qtde. Max.		63	64				
Compressores	Quantidade		3					
Refrigerante (R-410a)	Carga de fábrica	kg	13+11(28.7+24.3)	19+11(41.9+24.3)				
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1(3/4)					
	Linha de gás	mm	Φ38.1(1-1/2)					
Pressão Sonora⁴		dB(A)	65				66	
Dimensões (LxAxP)		mm	(1250×1615×765) +(960×1615×765)	(1585×1615×765)+(960×1615×765)				(1585×1615×765)+ (960×1615×765)
Dimensões com Embalagem (LxAxP)		mm	(1305×1790×820) +(1025×1790×830)	(1650×1810×840)+(1025×1790×830)				(1650×1810×840)+ (1025×1790×830)
Peso		kg	296+193	352+193				
Peso para Transporte		kg	313+209	376+209				

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 220V

Capacidade			HP	48	50	52	54	56
Modelo				4TVY0459H8000AA	4TVY0478H8000AA	4TVY0500H8000AA	4TVY0517H8000AA	4TVY0536H8000AA
Tipo de Combinação				26HP+22HP	28HP+22HP	30HP+22HP	28HP+26HP	28HP+28HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	134.5	140	146.5	151.5	157	
		kBtu/h	459.3	478.1	500.3	517.4	536.2	
	Potência	kW	41.70	43.71	46.95	46.11	48.12	
	EER	kW/kW	3.23	3.20	3.12	3.29	3.26	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64					
Compressores	Quantidade		4					
Refrigerante (R-410a)	Carga de fábrica	kg	19+13(41.9+28.7)				19×2(41.9×2)	
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1(3/4)					
	Linha de gás	mm	Φ38.1(1-1/2)					Φ41.2(1-5/8)
Pressão Sonora⁴		dB(A)	66					
Dimensões (LxAxP)		mm	(1585×1615×765)+(1250×1615×765)				(1585×1615×765)×2	
Dimensões com Embalagem (LxAxP)		mm	(1650×1810×840)+(1305×1790×820)				(1650×1810×840)×2	
Peso		kg	352+193				352×2	
Peso para Transporte		kg	376+209				376×2	

Capacidade			HP	58	60	62	64	66
Modelo				4TVY0558H8000AA	4TVY0580H8000AA	4TVY0600H8000AA	4TVY0614H8000AA	4TVY0633H8000AA
Tipo de Combinação				30HP+28HP	30HP+30HP	30HP+16HP+16HP	26HP+22HP+16HP	28HP+22HP+16HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	163.5	170	175	179.5	185	
		kBtu/h	558.4	580.6	597.8	613	631.8	
	Potência	kW	51.36	54.60	51.30	53.70	55.71	
	EER	kW/kW	3.18	3.11	3.41	3.34	3.32	
Unid. Evaporadoras Conectáveis		Qtde. Max.	64					
Compressores		Quantidade	4				5	
Refrigerante (R-410a)		Carga de fábrica	kg	19×2(41.9×2)		19+11×2(41.9+24.3×2)		19+13+11(41.9+28.7+24.3)
Conexões da Tubulação³		Linha de líquido	mm	Φ19.1(3/4)				
		Linha de gás	mm	Φ41.2(1-5/8)				
Pressão Sonora⁴			dB(A)	66				
Dimensões (LxAxP)			mm	(1585×1615×765)×2		(1585×1615×765)+ (960×1615×765)×2	(1585×1615×765)+(1250×1615×765) +(960×1615×765)	
Dimensões com Embalagem (LxAxP)			mm	(1650×1810×840)×2		(1650×1810×840)+ (1025×1790×830)×2	(1650×1810×840)+(1305×1790×820) +(1025×1790×830)	
Peso			kg	338×2		352+193×2		352+296+193
Peso para Transporte			kg	362×2		376+209×2		376+313+209

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 220V

Capacidade			HP	68	70	72	74	76	78
Modelo				4TVY0655H8000AA	4TVY0672H8000AA	4TVY0691H8000AA	4TVY0713H8000AA	4TVY0735H8000AA	4TVY0746H8000AA
Tipo de Combinação				30HP+22HP+16HP	28HP+26HP+16HP	28HP+28HP+16HP	30HP+28HP+16HP	30HP+30HP+16HP	28HP+28HP+22HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	191.5	196.5	202	208.5	215	218.5	
		kBtu/h	654.1	671.1	689.9	712.2	734.4	746.2	
	Potência	kW	58.95	58.11	60.12	63.36	66.60	67.77	
	EER	kW/kW	3.25	3.38	3.36	3.29	3.23	3.22	
Unid. Evaporadoras Conectáveis		Qtde. Max.	64						
Compressores		Quantidade	5						6
Refrigerante (R-410a)		Carga de fábrica	kg	19+13+11 (41.9+28.7+24.3)	19×2+11(41.9×2+24.3)			19×2+11 (41.9×2+24.3)	19×2+13 (41.9×2+28.7)
Conexões da Tubulação³		Linha de líquido	mm	Φ22.2(7/8)					
		Linha de gás	mm	Φ44.5(1-3/4)					
Pressão Sonora⁴			dB(A)	67	68				
Dimensões (LxAxP)			mm	(1585×1615×765)+ (1250×1615×765)+ (960×1615×765)	(1585×1615×765)×2+(960×1615×765)			(1585×1615×765)×2 + (960×1615×765)	(1585×1615×765)×2 +(1250×1615×765)
Dimensões com Embalagem (LxAxP)			mm	(1650×1810×840)+ (1305×1790×820)+ (1025×1790×830)	(1650×1810×840)×2+(1025×1790×830)			(1650×1810×840)×2 +(1025×1790×830)	(1650×1810×840)×2 +(1305×1790×820)
Peso			kg	352+296+193	352×2+193				
Peso para Transporte			kg	376+313+209	376×2+209				

Capacidade			HP	80	82	84	86	88	90
Modelo				4TVY0768H8000AA	4TVY0790H8000AA	4TVY0804H8000AA	4TVY0826H8000AA	4TVY0848H8000AA	4TVY0870H8000AA
Tipo de Combinação				30HP+28HP+22HP	30HP+30HP+22HP	28HP+28HP+28HP	30HP+28HP+28HP	30HP+30HP+28HP	30HP+30HP+30HP
Características Elétricas			V/F/Hz	220V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	225	231.5	235.5	242	248.5	255	
		kBtu/h	768.4	790.6	804.3	826.5	848.7	870.9	
	Potência	kW	71.01	74.25	72.18	75.42	78.66	81.90	
	EER	kW/kW	3.17	3.12	3.26	3.21	3.16	3.11	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64						
Compressores	Quantidade		6						
Refrigerante (R-410a)	Carga de fábrica	kg	19×2+13(41.9×2+28.7)			19×3(41.9×3)			
Conexões da Tubulação³	Linha de líquido	mm	Φ22.2(7/8)			Φ25.4(1)			
	Linha de gás	mm	Φ44.5(1-3/4)			Φ50.8(2)			
Pressão Sonora⁴		dB(A)	68						
Dimensões (LxAxP)		mm	(1585×1615×765)×2+(1250×1615×765)			(1585×1615×765)×3			
Dimensões com Embalagem (LxAxP)		mm	(1650×1810×840)×2+(1305×1790×820)			(1650×1810×840)×3			
Peso		kg	352×2+193			352×3			
Peso para Transporte		kg	376×2+209			376×3			

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 380V

Unidades Condensadoras

Capacidade			HP	8	10	12	14	16
Modelo				4TVY0077HE000AA	4TVY0096HE000AA	4TVY0115HE000AA	4TVY0140HE000AA	4TVY0155HE000AA
Tipo de Combinação								
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	22.4	28	33.5	40	45	
		kBtu/h	76.5	95.6	114.4	136.6	153.7	
	Potência	kW	5.13	6.75	9.03	10.42	12.15	
	EER	kW/kW	4.37	4.15	3.71	3.84	3.70	
Unid. Evaporadoras Conectáveis		Qtde. Max.	13	16	20	23	26	
Compressores		Quantidade	1					
Refrigerante (R-410a)	Carga de fábrica	kg	8			11		
Conexões da Tubulação³	Linha de líquido	mm	Φ12.7			Φ15.9		
	Linha de gás	mm	Φ25.4			Φ28.6	Φ31.8	
Pressão Sonora⁴		dB(A)	57	58	60			61
Dimensões (LxAxP)		mm	960×1615×765					
Dimensões com Embalagem (LxAxP)		mm	1025×1790×830					
Peso		kg	188				197	
Peso para Transporte		kg	204				213	

Capacidade			HP	18	20	22	24	26
Modelo				4TVY0170HE000AA	4TVY0192HE000AA	4TVY0210HE000AA	4TVY0229HE000AA	4TVY0249HE000AA
Tipo de Combinação								
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	50	56	61.5	67	73	
		kBtu/h	170.8	191.3	210	228.8	249.3	
	Potência	kW	14.68	17.41	19.95	20.65	22.80	
	EER	kW/kW	3.41	3.22	3.08	3.24	3.20	
Unid. Evaporadoras Conectáveis		Qtde. Max.	29	33	36	39	43	
Compressores		Quantidade	2					
Refrigerante (R-410a)		Carga de fábrica	kg	13			19	
Conexões da Tubulação³	Linha de líquido	mm	Φ15.9	Φ19.1			Φ22.2	
	Linha de gás	mm	Φ31.8					
Pressão Sonora⁴			dB(A)	62	63		64	
Dimensões (LxAxP)			mm	1250×1615×765			1585×1615×765	
Dimensões com Embalagem (LxAxP)			mm	1305×1790×820			1650×1810×840	
Peso			kg	278			338	
Peso para Transporte			kg	297			362	

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 380V

Capacidade		HP	28	30	32	34	36
Modelo			4TVY0268HE000AA	4TVY0290HE000AA	4TVY0310HE000AA	4TVY0325HE000AA	4TVY0347HE000AA
Tipo de Combinação					16HP+16HP	22HP+12HP	20HP+16HP
Características Elétricas		V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	78.5	85	90	95	101
		kBtu/h	268.1	290.3	307.4	324.4	345
	Potência	kW	25.48	28.90	24.30	28.98	29.56
	EER	kW/kW	3.08	2.94	3.70	3.28	3.42
Unid. Evaporadoras Conectáveis	Qtde. Max.		46	50	53	56	59
Compressores	Quantidade		2			3	
Refrigerante (R-410a)	Carga de fábrica	kg	19		11×2	13+8	13+11
Conexões da Tubulação³	Linha de líquido	mm	Φ22.2			Φ19.1	
	Linha de gás	mm	Φ31.8	Φ38.1	31.8		38.1
Pressão Sonora⁴		dB(A)	64			65	
Dimensões (LxAxP)		mm	1585×1615×765		(960×1615×765)×2	(1250×1615×765)+(960×1615×765)	
Dimensões com Embalagem (LxAxP)		mm	1650×1810×840		(1025×1790×830)×2	(1305×1790×820)+(1025×1790×830)	
Peso		kg	338		188×2	278+188	
Peso para Transporte		kg	362		204×2	297+204	

Capacidade			HP	38	40	42	44	46
Modelo				4TVY0365HE000AA	4TVY0384HE000AA	4TVY0404HE000AA	4TVY0423HE000AA	4TVY0445HE000AA
Tipo de Combinação				22HP+16HP	24HP+16HP	26HP+16HP	28HP+16HP	30HP+16HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	106.5	112	118	123.5	130	
		kBtu/h	363.7	382.5	403	421.8	444	
	Potência	kW	32.10	32.80	34.95	37.63	41.05	
	EER	kW/kW	3.32	3.41	3.38	3.28	3.17	
Unid. Evaporadoras Conectáveis	Qtde. Max.		63	64				
Compressores	Quantidade		3					
Refrigerante (R-410a)	Carga de fábrica	kg	13+11	19+11				
Conexões da Tubulação³	Linha de líquido	mm	Ø19.1					
	Linha de gás	mm	Ø38.1					
Pressão Sonora⁴		dB(A)	65				66	
Dimensões (LxAxP)		mm	(1250×1615×765) +(960×1615×765)	(1585×1615×765)+(960×1615×765)				(1585×1615×765) +(960×1615×765)
Dimensões com Embalagem (LxAxP)		mm	(1305×1790×820) +(1025×1790×830)	(1650×1810×840)+(1025×1790×830)				(1650×1810×840) +(1025×1790×830)
Peso		kg	278+188	338+188				
Peso para Transporte		kg	297+204	362+204				

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.

# Unidades Condensadoras TVR PRO

## Especificações 380V

Capacidade			HP	48	50	52	54	56
Modelo				4TVY0459HE000AA	4TVY0478HE000AA	4TVY0500HE000AA	4TVY0517HE000AA	4TVY0536HE000AA
Tipo de Combinação				26HP+22HP	28HP+22HP	30HP+22HP	28HP+26HP	28HP+28HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	134.5	140	146.5	151.5	157	
		kBtu/h	459.3	478.1	500.3	517.4	536.2	
	Potência	kW	42.75	45.43	48.85	48.28	50.96	
	EER	kW/kW	3.15	3.08	3.00	3.14	3.08	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64					
Compressores	Quantidade		4					
Refrigerante (R-410a)	Carga de fábrica	kg	19+13				19×2	
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1					
	Linha de gás	mm	Φ38.1					Φ41.2
Pressão Sonora⁴		dB(A)	66					
Dimensões (LxAxP)		mm	(1585×1615×765)+(1250×1615×765)				(1585×1615×765)×2	
Dimensões com Embalagem (LxAxP)		mm	(1650×1810×840)+(1305×1790×820)				(1650×1810×840)×2	
Peso		kg	338+188				338×2	
Peso para Transporte		kg	362+204				362×2	

Capacidade			HP	58	60	62	64	66
Modelo				4TVY0558HE000AA	4TVY0580HE000AA	4TVY0600HE000AA	4TVY0614HE000AA	4TVY0633HE000AA
Tipo de Combinação				30HP+28HP	30HP+30HP	30HP+16HP+16HP	26HP+22HP+16HP	28HP+22HP+16HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz				
Resfriamento¹	Capacidade	kW	163.5	170	175	179.5	101	
		kBtu/h	558.4	580.6	597.8	613	345	
	Potência	kW	54.38	57.80	53.20	54.90	29.56	
	EER	kW/kW	3.01	2.94	3.29	3.27	3.42	
Unid. Evaporadoras Conectáveis	Qtde. Max.	64						
Compressores	Quantidade	4					5	
Refrigerante (R-410a)	Carga de fábrica	kg	19×2			19+11×2		19+13+11
Conexões da Tubulação³	Linha de líquido	mm	Φ19.1					
	Linha de gás	mm	Φ41.2					
Pressão Sonora⁴		dB(A)	66					
Dimensões (LxAxP)		mm	(1585×1615×765)×2			(1585×1615×765)+(960×1615×765)×2		(1585×1615×765)+(1250×1615×765)+(960×1615×765)
Dimensões com Embalagem (LxAxP)		mm	(1650×1810×840)×2			(1650×1810×840)+(1025×1790×830)×2		(1650×1810×840)+(1305×1790×820)+(1025×1790×830)
Peso		kg	338×2			338+188		338+278+197
Peso para Transporte		kg	362×2			362+204		362+297+213

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.

4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anecóica.

Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A). Estes valores de amperagem (A) estão disponíveis nos manuais de instalação.



# Unidades Condensadoras TVR PRO

## Especificações 380V

Capacidade			HP	68	70	72	74	76	78
Modelo				4TVY0655HE000AA	4TVY0672HE000AA	4TVY0691HE000AA	4TVY0713HE000AA	4TVY0735HE000AA	4TVY0746HE000AA
Tipo de Combinação				30HP+22HP+16HP	28HP+26HP+16HP	28HP+28HP+16HP	30HP+28HP+16HP	30HP+30HP+16HP	28HP+28HP+22HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	191.5	196.5	202	208.5	215	218.5	
		kBtu/h	654.1	671.1	689.9	712.2	734.4	746.2	
	Potência	kW	61.00	60.43	63.11	66.53	69.95	70.91	
	EER	kW/kW	3.14	3.25	3.20	3.13	3.07	3.08	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64						
Compressores	Quantidade		5						6
Refrigerante (R-410a)	Carga de fábrica	kg	19+13+11	19×2+11					19×2+13
Conexões da Tubulação³	Linha de líquido	mm	Φ22.2						
	Linha de gás	mm	Φ44.5						
Pressão Sonora⁴		dB(A)	67				68		
Dimensões (LxAxP)		mm	(1585×1615×765)+ (1250×1615×765)+ (960×1615×765)	(1585×1615×765)×2+(960×1615×765)			(1585×1615×765)×2 +(960×1615×765)	(1585×1615×765)×2 +(1250×1615×765)	
Dimensões com Embalagem (LxAxP)		mm	(1585×1615×765)+ (1250×1615×765)+ (960×1615×765)	(1650×1810×840)×2+(1025×1790×830)			(1650×1810×840)×2 +(1025×1790×830)	(1650×1810×840)×2 +(1305×1790×820)	
Peso		kg	338+278+197	338×2+188					
Peso para Transporte		kg	362+297+213	362×2+204					

Capacidade			HP	80	82	84	86	88	90
Modelo				4TVY0768HE000AA	4TVY0790HE000AA	4TVY0804HE000AA	4TVY0826HE000AA	4TVY0848HE000AA	4TVY0870HE000AA
Tipo de Combinação				30HP+28HP+22HP	30HP+30HP+22HP	28HP+28HP+28HP	30HP+28HP+28HP	30HP+30HP+28HP	30HP+30HP+30HP
Características Elétricas			V/F/Hz	380V, trifásico, 50/60 Hz					
Resfriamento¹	Capacidade	kW	225	231.5	235.5	242	248.5	255	
		kBtu/h	768.4	790.5	804.3	826.5	848.7	870.9	
	Potência	kW	74.33	77.75	76.44	79.86	83.28	86.70	
	EER	kW/kW	3.03	2.98	3.08	3.03	2.98	2.94	
Unid. Evaporadoras Conectáveis	Qtde. Max.		64						
Compressores	Quantidade		6						
Refrigerante (R-410a)	Carga de fábrica	kg	19×2+13			19×3			
Conexões da Tubulação³	Linha de líquido	mm	Φ22.2			Φ25.4			
	Linha de gás	mm	Φ44.5			Φ50.8			
Pressão Sonora⁴		dB(A)	68						
Dimensões (LxAxP)		mm	(1585×1615×765)×2+(1250×1615×765)			(1585×1615×765)×3			
Dimensões com Embalagem (LxAxP)		mm	(1650×1810×840)×2+(1305×1790×820)			(1650×1810×840)×3			
Peso		kg	338×2+188			338×3			
Peso para Transporte		kg	362×2+204			362×3			

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.Os diâmetros apresentados são os das válvulas de bloqueio das unidades.  
4.A pressão Sonora é medida em uma posição 1m em frente a unidade e de 1.3m acima do nível do solo, em uma câmara semi-anechoica.  
Obs.: Para dimensionamento de cabeamento elétrico utilizar a partir do valor mínimo de amperagem MCA (A). O seccionamento dos disjuntores e proteções elétricas não deve ser superior ao valor máximo do MFA (A).  
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# Unidades Evaporadoras

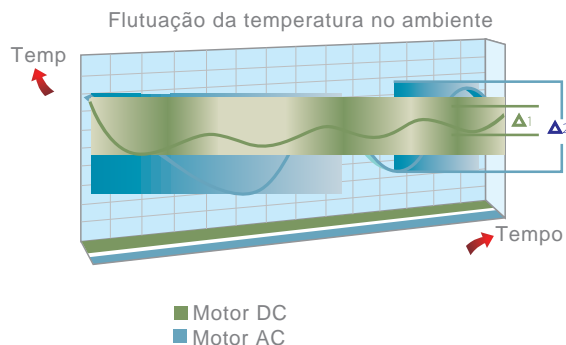
## Ampla variedade de unidades evaporadoras

Com 11 diferentes tipos e mais de 100 modelos, o TVR Ultra dispõe de uma ampla gama de unidades evaporadoras para atender as mais diferentes necessidades dos clientes.



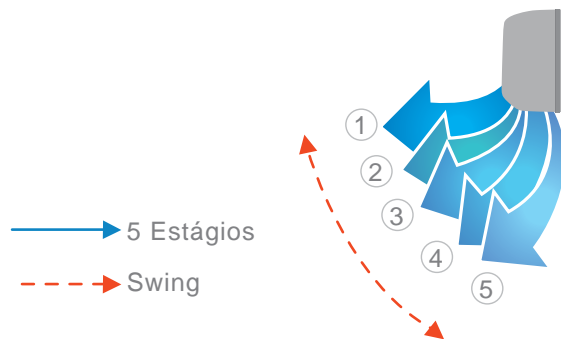
## Nível constante da temperatura do ar nos ambientes

O motor de corrente contínua ajusta perfeitamente a vazão de ar de acordo com a carga térmica de forma a garantir uma menor oscilação de temperatura e consequentemente uma melhor percepção de conforto.



## Swing de 5 passos

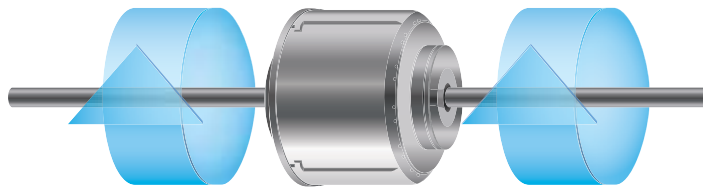
O ar é insuflado confortavelmente graças ao swing de 5 passos que pode ser facilmente programado no controle remoto.



## Conforto & Eficiência

### Motores do ventilador de corrente contínua (DC) de alta eficiência

O consumo e nível de ruído dos motores de corrente contínua são enormemente reduzidos quando comparados aos motores de corrente alternada (AC).



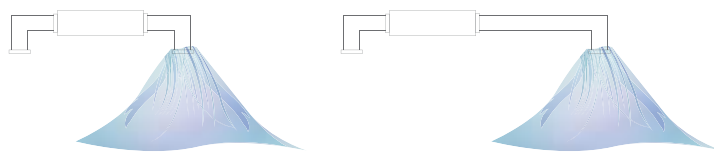
### Operação Silenciosa

A operação do motor de corrente contínua (DC) como também o novo projeto aerodinâmico das pás dos ventiladores garantem uma melhor distribuição de ar com um menor nível de ruído.



## Controle de 20 passos da pressão estática externa (evaporadoras tipo duto)

Dependendo do local a ser instalada, as unidades evaporadora tipo duto de média e alta pressão estática podem ser controladas em até 20 passos através do controle remoto, de forma a obter um ambiente mais confortável.



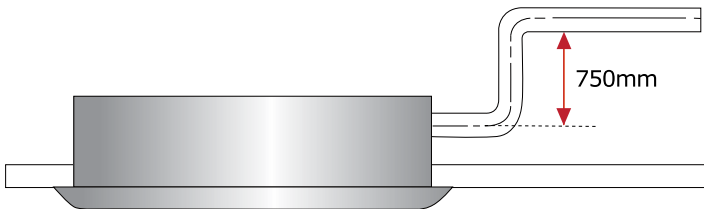
Descarga constante do fluxo de ar



Controle de pressão estática de 20 passos

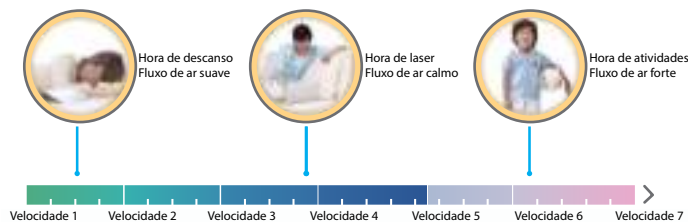
## Bombas de dreno

Uma bomba de dreno com 500 até 700 mm de desnível pode ser fornecido como padrão ou opcional, simplificando a instalação.



## Ventilador de 7 velocidades

O ventilador de 7 velocidades promove um controle flexível para atender as mais diversas condições de cada ambiente.

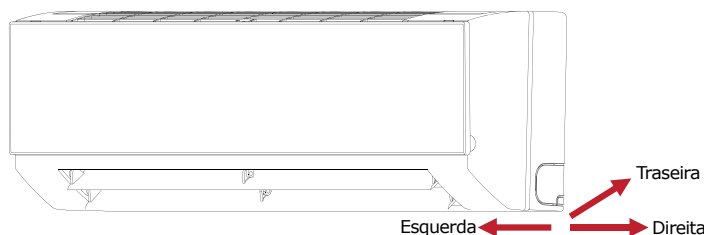


## Instalação Flexível

Para as unidades evaporadoras do tipo duto de média pressão, de forma a adaptar a diferentes situações de instalação, a tomada de ar de retorno pode ser realizada tanto na parte inferior quanto na parte traseira da unidade evaporadora.

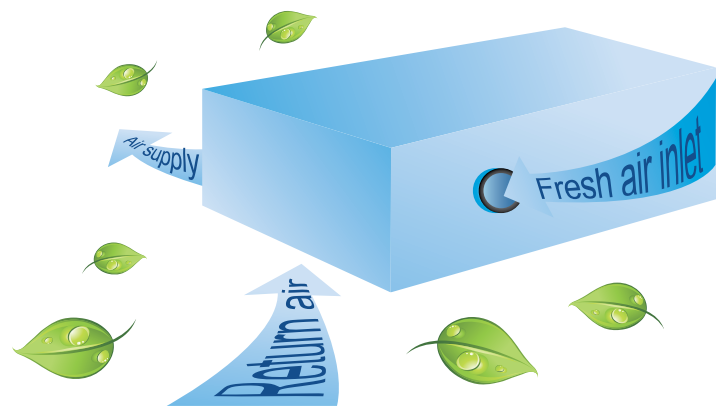


Para unidades do tipo hi-wall a direção de saída da tubulação de refrigerante pode ser esquerda, direita ou traseira conforme exigido quando da instalação. Uma nova placa de fixação acelera o processo de instalação e permite maior estabilidade.



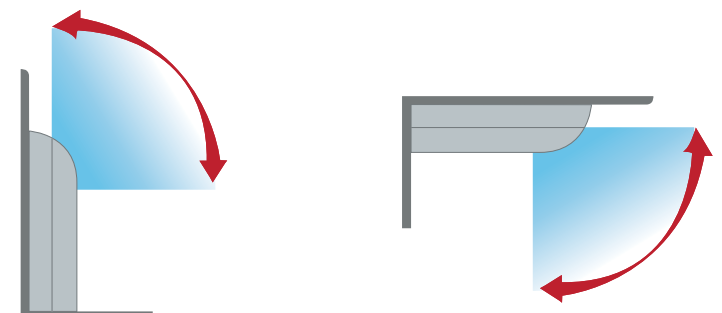
## Tomada de Ar Externo

Nos modelos selecionados uma tomada de ar externo permite a conexão de ar exterior diretamente na unidade evaporadora, possibilitando eventual não utilização de sistema de ar externo em separado.



## Piso-Teto

As unidades e evaporadoras tipo Piso-Teto podem ser instaladas tanto no teto como no piso, de forma a de adaptar as mais diferentes necessidades de diversas aplicações.



Instalação no Piso

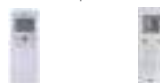
Instalação no Teto

## Cassete de 1 Via

- Tomada de ar exterior para modelos de 15 ~24.000 btu/h
- Unidades compactas, ideais para instalações em residências e escritórios de alto padrão.
- Bomba de dreno para 750 mm inclusa no produto.



controles remotos sem fio opcionais



controle apenas frio para TVR Pro



controle com fio opcional



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVE0005EF000AA	4TVE0007EF000AA	4TVE0009EF000AA	4TVE0012EF000AA	
Resfriamento¹	Capacidade	kW	1.8	2.2	2.8	3.6	
		kBtu/h	6.1	7.5	9.6	12.3	
	Potência elétrica	W	25	25	30	30	
Aquecimento²	Capacidade	kW/kW	2.2	2.6	3.2	4.0	
		kBtu/h	7.5	8.9	10.9	13.6	
	Potência elétrica	W	25	25	30	30	
Vazão de Ar³		m³/h	380/355/330/300/286/263/240		460/440/410/380/355/330/300		
Pressão Sonora⁴		dB(A)	30/28/27/26/25/24/22			37/36/35/34/32/31/30	38/37/35/34/32/31/30
Corpo Principal	Dimensões⁵ (LxAxP)	mm	1054×153×425				
	Dimensões para transporte (LxAxP)	mm	1155×245×490				
	Peso (líquido / embalado)	kg	11.8/15.3		12.3/15.8		
Painel	Dimensões⁵ (LxAxP)	mm	1180×25×465				
	Dimensões para transporte (LxAxP)	mm	1232×107×517				
	Peso (líquido / embalado)	kg	3.5/5.2				
	Modelo		RAYONEWAYPNL01B				
Conexões de Tubulação	Tubulação de líquido / gas	mm	Φ6.35/Φ12.7				
	Tubulação de dreno	mm	OD Φ32				

Modelo			4TVE0015EF000AA	4TVE0018EF000AA	4TVE0024EF000AA
Resfriamento¹	Capacidade	kW	4.5	5.6	7.1
		kBtu/h	15.4	19.1	24.2
	Potência elétrica	W	40	48	60
Aquecimento²	Capacidade	kW/kW	5.0	6.3	8.0
		kBtu/h	17.1	21.5	27.3
	Potência elétrica	W	40	48	60
Vazão de Ar³		m³/h	693/662/638/600/556/510/476	792/763/728/688/643/589/549	933/873/815/749/689/637/592
Pressão Sonora⁴		dB(A)	39/37/36/35/34/32/31	41/39/38/37/36/35/33	43/41/40/39/37/36/35
Corpo Principal	Dimensões⁵ (LxAxP)	mm	1275×189×450		
	Dimensões para transporte (LxAxP)	mm	1370×295×505		
	Peso (líquido / embalado)	kg	16.1/20.4	16.4/20.7	17.6/22.4
Painel	Dimensões⁵ (LxAxP)	mm	1350×25×505		
	Dimensões para transporte (LxAxP)	mm	1410×95×560		
	Peso (líquido / embalado)	kg	4/5.4		
	Modelo		RAYONEWAYPNL02B		
Conexões de Tubulação	Tubulação de líquido / gas	mm	Φ6.35/Φ12.7	Φ9.53/Φ15.9	
	Tubulação de dreno	mm	OD Φ32		

Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anechoica.

## Cassete de 2 Vias

- Tomada de ar exterior.
- Insuflamento de ar em duas saídas, perfeito para aplicações com espaço limitado no forro.
- Bomba de dreno para 750 mm inclusa no produto.



controles remotos sem fio opcionais



TCONTRMUT05B

controle apenas frio para TVR Pro



TCONTRM02WA

controle com fio opcional



TCONTRM03WA



TCONTKJRUT86ED



TCONTKJRUT120G

Modelo			4TVG0007EF000AA	4TVG0009EF000AA	4TVG0012EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	2.2	2.8	3.6
		kBtu/h	7.5	9.6	12.3
	Potência elétrica	W	35	40	40
Aquecimento <sup>2</sup>	Capacidade	kW/kW	2.6	3.2	4.0
		kBtu/h	8.9	10.9	13.6
	Potência elétrica	W	35	40	40
Vazão de Ar <sup>3</sup>		m³/h	654/612/571/530/488/449/410		725/679/641/591/554/509/458
Pressão Sonora <sup>4</sup>		dB(A)	33/31/30/29/27/25/24		35/33/32/30/29/27/25
Corpo Principal	Dimensões <sup>5</sup> (LxAxP)	mm	1172×299×591		
	Dimensões para transporte (LxAxP)	mm	1355×400×675		
	Peso (líquido / embalado)	kg	33.5/42.0		
Painel	Dimensões <sup>5</sup> (LxAxP)	mm	1430×53×680		
	Dimensões para transporte (LxAxP)	mm	1525×130×765		
	Peso (líquido / embalado)	kg	10.5/15		
	Modelo		RAYTWOPNL01		
Conexões de Tubulação	Tubulação de líquido / gas	mm	Φ6.35/Φ12.7		
	Tubulação de dreno	mm	OD Φ32		

Modelo			4TVG0015EF000AA	4TVG0018EF000AA	4TVG0024EF000AA
Resfriamento¹	Capacidade	kW	4.5	5.6	7.1
		kBtu/h	15.4	19.1	24.2
	Potência elétrica	W	50	69	98
Aquecimento²	Capacidade	kW/kW	5.0	6.3	8.0
		kBtu/h	17.1	21.5	27.3
	Potência elétrica	W	50	69	98
Vazão de Ar³		m³/h	850/792/731/670/631/592/550	980/925/855/800/755/702/670	1200/1115/1068/1000/921/808/770
Pressão Sonora⁴		dB(A)	37/36/35/34/32/31/30	39/37/36/35/33/31/30	44/42/41/40/38/36/34
Corpo Principal	Dimensões⁵ (LxAxP)	mm	1172×299×591		
	Dimensões para transporte (LxAxP)	mm	1355×400×675		
	Peso (líquido / embalado)	kg	35/43.5		
Painel	Dimensões⁵ (LxAxP)	mm	1430×53×680		
	Dimensões para transporte (LxAxP)	mm	1525×130×765		
	Peso (líquido / embalado)	kg	10.5/15		
	Modelo		RAYTWOPNL01		
Conexões de Tubulação	Tubulação de líquido / gas	mm	Φ6.35/Φ12.7	Φ9.53/Φ15.9	
	Tubulação de dreno	mm	OD Φ32		

### Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.emperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

Cassete de 4 Vias compacto

- Insuflamento de ar em 360° para melhor desempenho e distribuição de ar.
- Bomba de dreno para 750 mm inclusa no produto.



controles remotos sem fio opcionais



controle apenas frio para TVR Pro



controle com fio opcional



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVB0007EF000AA	4TVB0009EF000AA	4TVB0012EF000AA	4TVB0015EF000AA
Resfriamento¹	Capacidade	kW	2.2	2.8	3.6	4.5
		kBtu/h	7.5	9.6	12.3	15.4
	Potência elétrica	W	35	35	40	50
Aquecimento²	Capacidade	kW/kW	2.4	3.2	4.0	5.0
		kBtu/h	8.2	10.9	13.6	17.1
	Potência elétrica	W	35	35	40	50
Vazão de Ar³		m³/h	414/380/345/313/288/268/238		521/485/450/409/380/350/314	
Pressão Sonora⁴		dB(A)	35/34/34/33/28/27/26		41/39/37/35/32/31/29	
Corpo Principal	Dimensões⁵ (LxAxP)		mm		630×260×570	
	Dimensões para transporte (LxAxP)		mm		700×330×660	
	Peso (líquido / embalado)		kg		18/23.8	
Painel	Dimensões⁵ (LxAxP)		mm		647×50×647	
	Dimensões para transporte (LxAxP)		mm		715×123×715	
	Peso (líquido / embalado)		kg		2.5/4.5	
	Modelo				RAYFOURPNL01	
Conexões de Tubulação	Tubulação de líquido / gas		mm		Φ6.35/Φ12.7	
	Tubulação de dreno		mm		OD Φ32	

Notes:  
1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.emperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-aneecóica.Ublius foreo hosu vividius? Nihilin sum silicaut





## Cassete de 4 Vias

- Tomada de ar exterior
- Insuflamento de ar em 360° para melhor desempenho e distribuição de ar.
- Bomba de dreno para 750 mm inclusa no produto.
- Aletas de insuflamento com controle independente de angulação.



controles remotos sem fio opcionais



controle apenas frio para TVR Pro



controle com fio opcional



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVC0009EF000AA	4TVC0012EF000AA	4TVC0015EF000AA	4TVC0018EF000AA	4TVC0024EF000AA
Resfriamento¹	Capacidade	kW	2.8	3.6	4.5	5.6	7.1
		kBtu/h	9.6	12.3	15.4	19.1	24.2
	Potência elétrica	kW	40	45	50	60	70
Aquecimento²	Capacidade	kW/kW	3.2	4.0	5.0	6.3	8.0
		kBtu/h	10.9	13.6	17.1	21.5	27.3
	Potência elétrica	W	40	45	50	60	70
Vazão de Ar³		m³/h	801/751/711/658/637/611/542		893/866/804/744/714/698/635		977/937/864/800/778/738/671
Pressão Sonora⁴		dB(A)	32/31/30/28/28/26/23		35/34/31/31/30/28/26		35/35/34/31/30/28/27
Corpo Principal	Dimensões⁵ (LxAxP)	mm	840×230×840				
	Dimensões para transporte (LxAxP)	mm	955×260×955				
	Peso (líquido / embalado)	kg	21.3/25.8		23.2/27.6		
Painel	Dimensões⁵ (LxAxP)	mm	950×54.5×950				
	Dimensões para transporte (LxAxP)	mm	1035×90×1035				
	Peso (líquido / embalado)	kg	5.5/8.2				
	Modelo		RAYFOURPNL02				
Conexões de Tubulação	Tubulação de líquido / gas	mm	Φ6.35/Φ12.7			Φ9.53/Φ15.9	
	Tubulação de dreno	mm	OD Φ32				

Modelo			4TVC0027EF000AA	4TVC0030EF000AA	4TVC0034EF000AA	4TVC0038EF000AA	4TVC0048EF000AA	4TVC0055EF000AA
Resfriamento¹	Capacidade	kW	8.0	9.0	10.0	11.2	14.0	16.0
		kBtu/h	27.3	30.7	34.1	38.2	47.8	54.5
	Potência elétrica	kW	96	100	150	160	170	170
Aquecimento²	Capacidade	kW/kW	9.0	10.0	11.0	12.5	16.0	18
		kBtu/h	30.7	34.1	37.5	42.7	54.6	61.3
	Potência elétrica	W	96	100	150	160	170	170
Vazão de Ar³		m³/h	1203/1131/1064/ 977/ 912/840/774	1349/1294/1230/ 1201/1111/1029/ 970	1700/1600/1440/1250/ 1200/1150/ 1100		1800/1650/1500/ 1300/1250/1200/ 1150	2100/1950/1800/ 1750/1600/1450/ 1350
Pressão Sonora⁴		dB(A)	36/35/34/31/ 31/29/28	37/35/34/31/ 31/30/28	43/42/40/38/37/35/34		45/44/42/41/ 40/39/37	46/44/42/41/ 39/38/37
Corpo Principal	Dimensões⁵ (LxAxP)	mm	840×300×840			840×300×840		950x300x950
	Dimensões para transporte (LxAxP)	mm	955×330×955			955×330×955		1050x335x1050
	Peso (líquido / embalado)	kg	23.2/27.6			28.4/33.8		30.7/35.8
Painel	Dimensões⁵ (LxAxP)	mm	950×54.5×950					1050x55x1050
	Dimensões para transporte (LxAxP)	mm	1035×90×1035					1115x100x1115
	Peso (líquido / embalado)	kg	5.5/8.2					7.4/9.7
	Modelo		RAYFOURPNL02					RAYFOURPNL03
Conexões de Tubulação	Tubulação de líquido / gas	mm	Φ9.53/Φ15.9					
	Tubulação de dreno	mm	OD Φ32					

Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.emperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

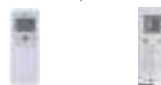
3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

## Tipo Duto de Média Pressão

- Tomada de ar exterior.
- Controle de 6 passos para modelos de 7.500 até 24.000 btu/h e 10 passos de 28.000 até 48.000 btu/h (necessita dos controles de última geração).
- Bomba de dreno para 750 mm inclusa no produto.
- Flexibilidade na tomada de ar de retorno pode ser realizada tanto na parte inferior quanto na parte traseira da unidade evaporadora.



controles remotos sem fio opcionais



controle apenas frio para TVR Pro



controle com fio opcional



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVD0007EF000AA	4TVD0009EF000AA	4TVD0012EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	2.2	2.8	3.6
		kBtu/h	7.5	9.6	12.3
	Potência elétrica	W	40	40	45
Aquecimento <sup>2</sup>	Capacidade	kW	2.6	3.2	4.0
		kBtu/h	8.2	10.9	13.6
	Potência elétrica	W	40	40	45
Vazão de Ar <sup>3</sup>		m³/h	520/480/440/400/360/330/300		580/540/500/460/430/400/370
Pressão Estática Disponível		Pa	10 (0~50)		
Pressão Sonora <sup>4</sup>		dB(A)	32/31/29/28/26/25/23		33/32/31/30/28/27/25
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	780×210×500		
	Dimensões para transporte (LxAxP)	mm	870×285×525		
	Peso (líquido / embalado)	kg	18/21		
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/ Φ12.7		
	Tubulação de dreno	mm	OD Φ25		

Modelo			4TVD0015EF000AA	4TVD0018EF000AA	4TVD0024EF000AA
Resfriamento¹	Capacidade	kW	4.5	5.6	7.1
		kBtu/h	15.4	19.1	24.2
	Potência elétrica	W	92	92	98
Aquecimento²	Capacidade	kW	5.0	6.3	8.0
		kBtu/h	17.1	21.5	27.3
	Potência elétrica	W	92	92	98
Vazão de Ar³		m³/h	800/740/680/620/540/480/400	830/760/720/680/640/600/560	1000/960/900/840/780/720/680
Pressão Estática Disponível		Pa	10 (0~50)		
Pressão Sonora⁴		dB(A)	36/34/32/31/29/27/25	36/34/33/32/30/29/28	37/35/33/32/30/29/28
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm	1000×210×500		1220×210×500
	Dimensões para transporte (LxAxP)	mm	1090x285x525		1335×285×525
	Peso (líquido / embalado)	kg	21.5/25		25.7/30.2
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/ Φ12.7	Φ9.53/Φ15.9	
	Tubulação de dreno	mm	OD Φ25		

Modelo			4TVD0027EF000AA	4TVD0030EF000AA	4TVD0038EF000AA	4TVD0048EF000AA
Resfriamento¹	Capacidade	kW	8.0	9.0	11.2	14.0
		kBtu/h	27.3	30.7	38.2	47.8
	Potência elétrica	W	110	120	200	250
Aquecimento²	Capacidade	kW	9.0	10.0	12.5	15.5
		kBtu/h	30.7	34.1	42.7	52.9
	Potência elétrica	W	110	120	200	250
Vazão de Ar³		m³/h	1260/1180/1100/1020/940/860/780		1500/1430/1360/1290/1210/1140/1080	1960/1860/1760/1660/1560/1460/1360
Pressão Estática Disponível		Pa	20 (10~100)			40 (30~150)
Pressão Sonora⁴		dB(A)	37/35/34/33/31/29/28		39/38/38/37/35/34/33	41/39/38/37/36/35/33
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm	1230×270×775			1290×300×865
	Dimensões para transporte (LxAxP)	mm	1355×350×795			1400×375×925
	Peso (líquido / embalado)	kg	36.5/44.5	37/45		46.5/55.5
Conexões de Tubulação	Linha de líquido / gás	mm	Φ9.53/Φ15.9			
	Tubulação de dreno	mm	OD Φ25			

Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

4.Todas as especificações são medidas na pressão estática externa padrão.



## Tipo Duto de Alta Pressão

- Pressão estática externa de até 400 Pa.
- Controle de 20 passos para ajuste preciso de pressão e vazão de ar (necessita dos controles de última geração)
- Bomba de dreno para 750 mm (opcional).



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Model			4TVA0024EF000AA	4TVA0027EF000AA	4TVA0030EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	7.1	8.0	9.0
		kBtu/h	24.2	27.3	30.7
	Potência elétrica	W	180	180	220
Aquecimento <sup>2</sup>	Capacidade	kW	8.0	9.0	10.0
		kBtu/h	27.3	30.7	34.1
	Potência elétrica	W	180	180	220
Vazão de Ar <sup>3</sup>			1360/1327/1293/1260/1227/1193/1160	1360/1327/1293/1260/1227/1193/1160	1420/1373/1327/1280/1233/1187/1140
Pressão Estática Disponível			100 (30~ 200)		
Pressão Sonora <sup>4</sup>			42/41/40/40/39/39/38	42/41/40/40/39/39/38	45/44/43/42/41/40/39
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	965x423x690		
	Dimensões para transporte (LxAxP)	mm	1090x440x768		
	Peso (líquido / embalado)	kg	41/47		48/55
Conexões de Tubulação	Linha de líquido / gás	mm	Φ9.53/ Φ15.9		
	Tubulação de dreno	mm	OD Φ25		

Model			4TVA0038EF000AA	4TVA0048EF000AA	4TVA0055EF000AA
Resfriamento¹	Capacidade	kW	11.2	14.0	16.0
		kBtu/h	38.2	47.8	54.6
	Potênciaelétrica	W	380	420	700
Aquecimento²	Capacidade	kW	12.5	16.0	17.0
		kBtu/h	42.7	54.6	58.0
	Potência elétrica	W	380	420	700
Vazão de Ar³		m³/h	1870/1783/1697/1610/1523/1437/1350	2240/2133/2027/1920/1813/1707/1600	2660/2530/2400/2270/2140/2010/1880
Pressão Estática Disponível		Pa	100 (30~ 200)		
Pressão Sonora4⁴		dB(A)	48/47/46/45/43/42/41	45/44/43/42/41/40/40	46/45/44/43/42/41/40
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm	965x423x690	1322x423x691	
	Dimensões para transporte (LxAxP)	mm	1090x440x768	1436x450x768	
	Peso (líquido / embalado)	kg	48/55	68/76	
Conexões de Tubulação	Linha de líquido / gás	mm	Φ9.53/Φ15.9		
	Tubulação de dreno	mm	OD Φ25		

Model			4TVA0068EF000AA	4TVA0085EF000AA	4TVA0095EF000AA	4TVA0136EF000AA	4TVA0154EF000AA	4TVA0192EF000AA
Resfriamento¹	Capacidade	kW	20.0	25.0	28.0	40.0	45.0	56.0
		kBtu/h	68.2	85.3	95.5	136.5	153.6	191.1
	Potência elétrica	W	990	1200	1200	1800	1800	2272
Aquecimento²	Capacidade	kW	22.5	26.0	31.5	45.0	56.0	63.0
		kBtu/h	76.8	88.7	107.5	153.6	191.1	215.0
	Potência elétrica	W	990	1200	1200	1800	1800	2272
Vazão de Ar³		m³/h	4330/4230/4130/4030/3930/3830/3730			6500/6150/5800/5450/ 5100/4750/4400		7400/7000/6600/ 6200/5800/5400/ 5000
Pressão Estática Disponível		Pa	170 (30~250)					300 (100~400)
Pressão Sonora4⁴		dB(A)	51/50/50/49/49/48/47		51/50/49/ 49/48/48/47	60/59/58/57/55/54/52		59/58/57/56/ 55/53/51
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm	1454x515x931			2005x929x670		2010x680x905
	Dimensões para transporte (LxAxP)	mm	1509x550x990			2095x800x964		2095x800x914
	Peso (líquido / embalado)	kg	130/142			220/245		218/248
Conexões de Tubulação	Linha de líquido / gás	mm	Φ12.7/Φ22.2			Φ15.9 /Φ28.6		Φ15.9/Φ28.6
	Tubulação de dreno	mm	OD Φ32			OD Φ32		OD Φ32

Notes:  
1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.  
4.Todas as especificações são medidas na pressão estática externa padrão.

## Unidade de Tratamento de Ar Externo

- Unidades para processamento de 100% de ar externo.
- Pressão estática externa de até 400 Pa.
- Controle de 20 passos para ajuste preciso de pressão e vazão de ar (necessita dos controles de última geração)
- Bomba de dreno para 750 mm (opcional).



controles remotos sem fio opcionais



controle apenas frio para TVR Pro



controle com fio opcional



TCONTRMUT05B TCONTRM02WA

TCONTRM03WA

TCONTKJRUT86ED

TCONTKJRUT120G

Model			4TVF0042EF000AA	4TVF0048EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	12.5	14.0
		kBtu/h	42.6	47.8
	Potência elétrica	W	480	480
Aquecimento <sup>2</sup>	Capacidade	kW	10.5	12.0
		kBtu/h	36.0	41.1
	Potência elétrica	W	480	480
Vazão de Ar <sup>3</sup>		m³/h	2000/1917/1833/1750/1667/1583/1500	
Pressão Estática Disponível		Pa	180 (30~200)	
Pressão Sonora <sup>4</sup>		dB(A)	48/47/46/45/44/43/42	
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	1322x423x691	
	Dimensões para transporte (LxAxP)	mm	1436x450x768	
	Peso (líquido / embalado)	kg	68/76	
Conexões de Tubulação	Linha de líquido / gás	mm	Φ9.53/ Φ15.9	
	Tubulação de dreno	mm	OD Φ25	

Model			4TVF0068EF000AA	4TVF0085EF000AA	4TVF0095EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	20.0	25.0	28.0
		kBtu/h	68.2	85.3	95.5
	Potência elétrica	W	850	850	850
Aquecimento <sup>2</sup>	Capacidade	kW	12.8	16.0	31.5
		kBtu/h	43.7	54.6	107.5
	Potência elétrica	W	850	850	850
Vazão de Ar <sup>3</sup>		m³/h	3000/2833/2667/2500/2333/2167/2000		
Pressão Estática Disponível		Pa	200 (100~400)		
Pressão Sonora <sup>4</sup>		dB(A)	50/49/48/47/46/44/43		
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	1454x515x931		
	Dimensões para transporte (LxAxP)	mm	1509x550x990		
	Peso (líquido / embalado)	kg	130/142		
Conexões de Tubulação	Linha de líquido / gás	mm	Φ12.7/Φ22.2		
	Tubulação de dreno	mm	OD Φ32		

### Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-aneecóica.

4.Todas as especificações são medidas na pressão estática externa padrão.

5.A unidade de tratamento de ar externo pode ser utilizada independentemente ou em conjunto com outros tipos de unidades evaporadoras. Se utilizada de forma independente a capacidade total da unidade de tratamento de ar externo deve ser entre 50 e 100% da capacidade das unidades condensadoras. Quando utilizada em conjunto com outros tipos de unidades evaporadoras, a capacidade total das unidades de tratamento de ar externo somadas as demais unidades evaporadoras deve ser entre 50 e 100% da capacidade das unidades condensadoras, bem como a capacidade total das unidades de tratamento de ar externo não deve exceder 30% da capacidade das unidades condensadoras.

## Unidade de Tratamento de Ar Externo

- Motor de ventilador CC de alta eficiência.
- Operação silenciosa.
- 7 velocidades do ventilador.
- Controle estático de 20 etapas da pressão.
- ESP até 400Pa.
- A temperatura definida pode ser ajustada em passos de 0,5 C ou 1 C.



controles remotos sem fio opcionais



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controle com fio opcional



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Model			4TVF0154EF000AA	4TVF0192EF000AA
Fonte de energia			1 phase,220 240V,50/60Hz	1 phase,220 240V,50/60Hz
Resfriamento <sup>1</sup>	Capacidade	kW	45	56
		kBtu/h	153.6	191.1
	Potência	W	1080	2272
Aquecimento <sup>2</sup>	Capacidade	kW	28	39
		kBtu/h	95.6	133.1
	Potência	W	1080	2272
Vazão de Ar <sup>3</sup>		m³/h	4200/3967/3733/3500/3267/3033/2800	6000/5665/5330/5000/4665/4330/4000
Pressão Estática Externa <sup>3</sup>		Pa		300 (100~400)
Pressão Sonora <sup>4</sup>		dB(A)	58/56/55/53/51/49/48	59/57/56/55/53/51/50
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	2010x680x905	
	Dimensões para transporte (LxAxP)	mm	2095x800x964	
	Peso (líquido / embalado)	kg	195/215	218/248
Conexões de Tubulação	Linha de líquido / gás	mm	Φ15.9/Φ28.6	
	Tubulação de dreno	mm	OD Φ32	

### Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

4.Todas as especificações são medidas na pressão estática externa padrão.

## Hi-Wall

- Novo design do painel pode se adequar facilmente com qualquer decoração de interiores, perfeita para espaços sem forro
- Direção da tubulação de refrigerante pode ser esquerda, direita ou para a traseira, de acordo com a situação de instalação



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVW0007EF000AA	4TVW0009EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	2.2	2.8
		kBtu/h	7.5	9.6
	Potência	W	28	28
Aquecimento <sup>2</sup>	Capacidade	kW	2.4	3.2
		kBtu/h	8.2	10.9
	Potência	W	28	28
Vazão de Ar <sup>3</sup>		m³/h	422/411/402/393/380/368/356	417/402/386/370/353/338/316
Pressão Sonora <sup>4</sup>		dB(A)	31/30/30/30/29/29/29	31/30/30/30/29/29/29
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)		835×280×203	
	Dimensões para transporte (LxAxP)		935×385×320	
	Peso (líquido / embalado)		8.4/12.1	9.5/13.1
Conexões de Tubulação	Linha de líquido / gás		Φ6.35/Φ12.7	
	Tubulação de dreno		OD Φ16	

Modelo			4TVW0012EF000AA	4TVW0015EF000AA	4TVW0018EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	3.6	4.5	5.6
		kBtu/h	12.3	15.4	19.1
	Potência	W	30	40	45
Aquecimento <sup>2</sup>	Capacidade	kW	4.0	5.0	6.3
		kBtu/h	13.6	17.1	21.5
	Potência	W	30	40	45
Vazão de Ar <sup>3</sup>		m³/h	656/628/591/573/544/515/488	594/563/535/507/478/450/424	747/713/685/648/613/578/547
Pressão Sonora <sup>4</sup>		dB(A)	33/32/32/31/31/30/30	35/34/33/33/32/31/31	38/37/36/36/35/34/34
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)		990×315×223		
	Dimensões para transporte (LxAxP)		1085×420×335		
	Peso (líquido / embalado)		11.4/15.5	12.8/16.9	
Conexões de Tubulação	Linha de líquido / gás		Φ6.35/Φ12.7		Φ9.53/Φ15.9
	Tubulação de dreno		OD Φ16		

Modelo			4TVW0024EF000AA	4TVW0027EF000AA	4TVW0030EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	7.1	8.0	9.0
		kBtu/h	24.2	27.3	30.7
	Potência	W	55	55	82
Aquecimento <sup>2</sup>	Capacidade	kW	8.0	9.0	10.0
		kBtu/h	27.3	30.7	34.1
	Potência	W	55	55	82
Vazão de Ar <sup>3</sup>		m³/h	1195/1130/1065/1005/940/875/809	1195/1130/1065/1005/940/875/809	1421/1300/1125/1067/1005/934/867
Pressão Sonora <sup>4</sup>		dB(A)	44/43/42/39/38/37/36	44/43/42/39/38/37/36	48/46/45/43/41/40/38
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)		1194×343×262		
	Dimensões para transporte (LxAxP)		1290×375×460		
	Peso (líquido / embalado)		17.0/22.4		
Conexões de Tubulação	Linha de líquido / gás		Φ9.53/Φ15.9		
	Tubulação de dreno		OD Φ16		

Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anechoica.

## Piso-Teto

- Unidades evaporadoras conversíveis para instalação no teto ou no piso.
- Design compacto e limpo
- Baixo nível de ruído



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controle com fio opcional



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVX0012EF000AA	4TVX0015EF000AA	4TVX0018EF000AA	4TVX0024EF000AA
Resfriamento¹	Capacidade	kW	3.6	4.5	5.6	7.1
		kBtu/h	12.3	15.4	19.1	24.2
	Potência	W	49	115	115	115
Aquecimento²	Capacidade	kW	4.0	5.0	6.3	8.0
		kBtu/h	13.6	17.1	21.5	27.3
	Potência	W	49	115	115	115
Vazão de Ar³		m³/h	550/525/500/480/ 460/440/420	800/750/700/650/600/550/500		
Pressão Sonora⁴		dB(A)	40/39/38/38/37/36/36	43/42/41/41/39/38/38		
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm	990×660×203			
	Dimensões para transporte (LxAxP)	mm	1089×744×296			
Conexões de Tubulação	Peso (líquido / embalado)	kg	27/33	28/34		
	Linha de líquido / gás	mm	Φ6.35/Φ12.7		Φ9.53/Φ15.9	
	Tubulação de dreno	mm	OD Φ16			

Modelo			4TVX0027EF000AA	4TVX0030EF000AA	4TVX0038EF000AA	4TVX0048EF000AA	4TVX0055EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	8.0	9.0	11.2	14.0	16
		kBtu/h	27.2	30.7	38.2	47.8	54.6
	Potência	W	130	130	180	180	288
Aquecimento <sup>2</sup>	Capacidade	kW	9.0	10.0	12.5	15.0	18
		kBtu/h	30.7	34.1	42.7	51.2	61.4
	Potência	W	130	130	180	180	288
Vazão de Ar <sup>3</sup>		m³/h	1280/1245/1210/1170/1130/1085/1050		1890/1830/1765/1700/1660/1620/1580		2300/2240/2180/2100/2005/1950/1800
Pressão Sonora <sup>4</sup>		dB(A)	45/44/43/43/42/41/40		47/46/45/45/44/43/42		50/49/48/47/46/45/44
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	1280×660×203		1670×680×244		
	Dimensões para transporte (LxAxP)	mm	1379×744×296		1915×760×330		
Conexões de Tubulação	Peso (líquido / embalado)	kg	35/41		48/58		
	Linha de líquido / gás	mm	Φ9.53/Φ15.9				
	Tubulação de dreno	mm	OD Φ16				

### Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

## Unidade de Piso (embutida)

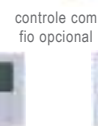
Unidade evaporadora projetada para instalação embutida em paredes ou nichos com grelhas de insuflamento e retorno visíveis



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controle apenas frio para TVR Pro



controle com fio opcional

TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVS0007EF000AA	4TVS0009EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	2.2	2.8
		kBtu/h	7.5	9.6
	Potência	W	40	45
Aquecimento <sup>2</sup>	Capacidade	kW	2.4	3.2
		kBtu/h	8.2	10.9
	Potência	W	40	45
Vazão de Ar <sup>3</sup>		m³/h	530/504/478/456/439/418/400	569/540/515/485/462/443/421
Pressão Sonora <sup>4</sup>		dB(A)	36/35/34/33/31/30/29	36/35/34/33/31/30/29
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	840×545×212	
	Dimensões para transporte (LxAxP)	mm	925×639×305	
	Peso (líquido / embalado)	kg	21/25.5	
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/Φ12.7	
	Tubulação de dreno	mm	Φ16	

Modelo			4TVS0012EF000AA	4TVS0015EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	3.6	4.5
		kBtu/h	12.3	15.4
	Potência	W	55	60
Aquecimento <sup>2</sup>	Capacidade	kW	4.0	5.0
		kBtu/h	13.6	17.1
	Potência	W	55	60
Vazão de Ar <sup>3</sup>		m³/h	624/591/557/522/473/420/375	660/625/583/542/501/475/440
Pressão Sonora <sup>4</sup>		dB(A)	37/36/35/34/32/31/30	37/36/35/34/32/31/30
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	1036×639×305	
	Dimensões para transporte (LxAxP)	mm	1125×639×305	
	Peso (líquido / embalado)	kg	25.5/30.5	
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/Φ12.7	
	Tubulação de dreno	mm	Φ16	

Modelo			4TVS0018EF000AA	4TVS0024EF000AA	4TVS0027EF000AA
Resfriamento <sup>1</sup>	Capacidade	kW	5.6	7.1	8.0
		kBtu/h	19.1	24.2	27.3
	Potência	W	88	110	130
Aquecimento <sup>2</sup>	Capacidade	kW	6.3	8.0	9.0
		kBtu/h	21.5	27.3	30.7
	Potência	W	88	110	130
Vazão de Ar <sup>3</sup>		m³/h	1150/1094/1028/970/925/886/830	1380/1290/1205/1100/1033/955/870	1380/1290/1205/1100/1033/955/870
Pressão Sonora <sup>4</sup>		dB(A)	41/39/37/35/33/32/31	44/42/40/39/37/35/33	44/42/40/39/37/35/33
Unidade Evaporadora	Dimensões <sup>5</sup> (LxAxP)	mm	1340×545×212		
	Dimensões para transporte (LxAxP)	mm	1425×639×305		
	Peso (líquido / embalado)	kg	30.5/35.5		32/37
Conexões de Tubulação	Linha de líquido / gás	mm	Φ9.53/Φ15.9		
	Tubulação de dreno	mm	Φ16		

Notes:

1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

4.Todas as especificações são medidas na pressão estática externa padrão.

## Unidade de Piso (aparente)

- Dois diferentes modelos com retorno de ar frontal ou inferior oferecem flexibilidade para diferentes aplicações.



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVN0007EF000AA	4TVN0009EF000AA
			4TVU0007EF000AA	4TVU0009EF000AA
Resfriamento¹	Capacidade	kW	2.2	2.8
		kBtu/h	7.5	9.6
	Potência	W	40	45
Aquecimento²	Capacidade	kW	2.4	3.2
		kBtu/h	8.2	10.9
	Potência	W	40	45
Vazão de Ar³		m³/h	530/504/478/456/439/418/400	569/540/515/485/462/443/421
Pressão Sonora⁴		dB(A)	36/35/34/33/31/30/29	
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm(F4)	1000×596×225	
		mm(F5)	1000×677×220	
	Dimensões para transporte (LxAxP)	mm(F4)	1089×683×312	
		mm(F5)	1182×683×312	
	Peso (líquido / embalado)	kg(F4)	28/33	
	kg(F5)	28/35		
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/Φ12.7	
	Tubulação de dreno	mm	Φ16	

Modelo			4TVN0012EF000AA	4TVN0015EF000AA
			4TVU0012EF000AA	4TVU0015EF000AA
Resfriamento¹	Capacidade	kW	3.6	4.5
		kBtu/h	12.3	15.4
	Potência	W	55	60
Aquecimento²	Capacidade	kW	4.0	5.0
		kBtu/h	13.6	17.1
	Potência	W	55	60
Vazão de Ar³		m³/h	624/591/557/522/473/420/375	660/625/583/542/501/475/440
Pressão Sonora⁴		dB(A)	37/36/35/34/32/31/30	
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm(F4)	1200×596×225	
		mm(F5)	1200×677×220	
	Dimensões para transporte (LxAxP)	mm(F4)	1289×683×312	
		mm(F5)	1382×683×312	
	Peso (líquido / embalado)	kg(F4)	33/38.6	
	kg(F5)	33/40.7		
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/Φ12.7	
	Tubulação de dreno	mm	Φ16	

Modelo			4TVN0018EF000AA	4TVN0024EF000AA	4TVN0027EF000AA
			4TVU0018EF000AA	4TVU0024EF000AA	4TVU0027EF000AA
Resfriamento¹	Capacidade	kW	5.6	7.1	8.0
		kBtu/h	19.1	24.2	27.3
	Potência	W	88	110	130
Aquecimento²	Capacidade	kW	6.3	8.0	9.0
		kBtu/h	21.5	27.3	30.7
	Potência	W	88	110	130
Vazão de Ar³		m³/h	1150/1094/1028/970/925/886/830	1380/1290/1205/1100/1033/955/870	1380/1290/1205/1100/1033/955/870
Pressão Sonora⁴		dB(A)	41/39/37/35/33/32/31	44/42/40/39/37/35/33	
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm(F4)	1500×596×225		
		mm(F5)	1500×677×220		
	Dimensões para transporte (LxAxP)	mm(F4)	1589×683×312		
		mm(F5)	1682×683×312		
	Peso (líquido / embalado)	kg(F4)	38.4/44.6	40.4/46.2	
		kg(F5)	39/47.7	40.7/49.4	
Conexões de Tubulação	Linha de líquido / gás	mm	Φ9.53/Φ15.9		
	Tubulação de dreno	mm	Φ16		

Notes:

1.Temperatura interna de 27°C TBS; 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.

3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-anecóica.

Tipo Console

- Combinação de quatro entradas de ar e duas saídas de ar garante melhor desempenho tanto para resfriamento como para aquecimento



controles remotos sem fio opcionais



controle apenas frio para TVR Pro



controle com fio opcional


















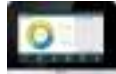



TCONTRMUT05B TCONTRM02WA TCONTRM03WA TCONTKJRUT86ED TCONTKJRUT120G

Modelo			4TVJ0007EF000AA	4TVJ0009EF000AA	4TVJ0012EF000AA	4TVJ0015EF000AA
Resfriamento¹	Capacidade	kW	2.2	2.8	3.6	4.5
		kBtu/h	7.5	9.6	12.3	15.4
	Potência	W	20	25	25	35
Aquecimento²	Capacidade	kW/kW	2.6	3.2	4.0	5.0
		kBtu/h	8.9	10.9	13.4	17.1
	Potência	W	20	25	25	35
Vazão de Ar³		m³/h	430/401/374/345/ 302/268/229	510/482/456/430/355/286/229		660/614/561/512/ 478/436/400
Pressão Sonora⁴		dB(A)	38/36/34/32/28/27/26	39/37/35/33/31/29/27		42/41/40/39/37/36/36
Unidade Evaporadora	Dimensões⁵ (LxAxP)	mm	700×600×210			
	Dimensões para transporte (LxAxP)	mm	810×710×305			
	Peso (líquido / embalado)	kg	14/19	15/20		
Conexões de Tubulação	Linha de líquido / gás	mm	Φ6.35/Φ12.7			
	Tubulação de dreno	mm	OD Φ16			

Notes:  
1.Temperatura interna de 27°C TBS, 19°C TBU; Temperatura externa de 35°C TBS; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
2.Temperatura interna de 20°C TBS; Temperatura externa de 7°C TBS, 6°C TBU; Comprimento de tubulação de refrigerante equivalente de 7.5m sem desnível.  
3.A pressão sonora é medida em uma posição 1,4 abaixo da unidade evaporadora em uma câmara semi-aneecóica.



# Linha de Controles

Controle remoto sem fio	Controladores Centralizados	Conversor de dados	Controladores de Rede	Gateways BMS	Acessórios
<p>TCONTRMUT05B</p>  <p>TCONTRM02WA</p>  <p>TCONTRM03WA</p> 	<p>TCONTCCM180A</p> 	<p>TCONTCCM15B</p> 		<p>TCONTWEBBAC01</p> 	<p>Hotel Key Card Interface Module</p>  <p>TCONTNAM05A</p>  <p>TCONTNAM05B</p>
	<p>TCONTCCM270A</p> 		<p>TCONTWEBBAC01</p>  <p>+</p>  <p>TCONTCNTSUT</p>	<p>TCONTCCM20</p> 	<p>Controlador de Sensor infravermelho</p>  <p>TCONTNAM09A</p>
<p>TCONTKJRUT86ED</p>  <p>TCONTKJRUT120G</p> 			<p>TCONTCCM270A</p>  <p>+</p>  <p>TCONTCNTSUT</p>	<p>TCONTCCM18E</p> 	<p>Software de Diagnósticos</p>  <p>TCONTDIAGS</p>



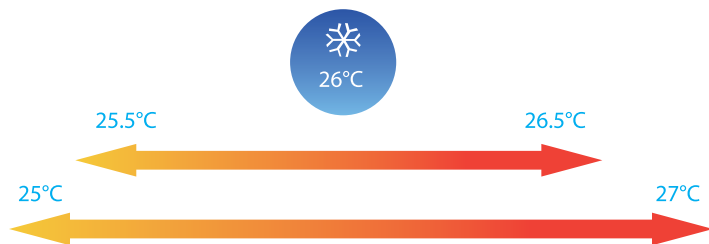
Controle Remoto Sem Fio

	TCONTRMUT05B	TCONTRMUT05B	TCONTRMUT05B
MODELO			
Liga / Desliga	•	•	•
Seleção de Modo	•	•	• (Solo Frio)
Ajuste de Temperatura	•	•	•
Controle de 7 velocidades do Ventilador	• (ajustes de 0,5°C ou 1°C)	• (0.5°C ou 1°C)	• (0.5°C ou 1°C)
Swing de 5 estágios	•	•	•
Ajuste de endereçamento	•	•	•
Follow me	—	•	•
Modo Eco	•	•	•
Modo Silencioso Noturno	•	•	•
Desligamento do display	•	•	•
Temporizador	•	•	•
Trava de teclado	•	•	•
Luz de fundo	•	•	•
Dimensões (A x L x P) (mm)	150x65x20	170x48x20	170x48x20
Pilhas		1.5V (LR03/AAA) × 2	



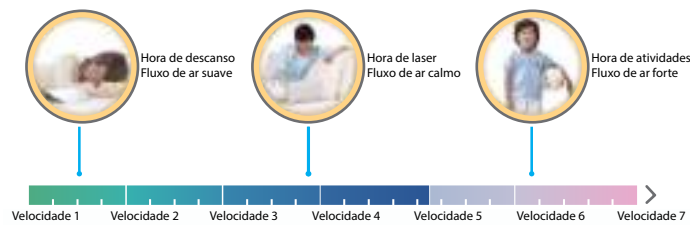
## Ajuste de temperatura

O setpoint de temperatura pode ser ajustado para cada 0.5°C ou 1°C. Esta característica permite um controle preciso resultando em um ambiente mais confortável.



## Controle de 7 velocidades do ventilador

Os motores de corrente contínua dos ventiladores possuem 7 velocidades garantindo maior flexibilidade no ajuste da vazão de ar para qualquer condição de utilização.



## Desligamento do display

O display da unidade interna pode ser desligado de forma a criar um ambiente mais acolhedor durante a noite.



## Função "Follow Me"

A função "Follow Me" quando ativada permite que a unidade interna responda ao sensor de temperatura localizado no controle remoto sem fio ao invés do sensor localizado no retorno de ar da unidade interna. Desta forma o conforto do usuário é otimizado devido ao controle mais preciso da temperatura.



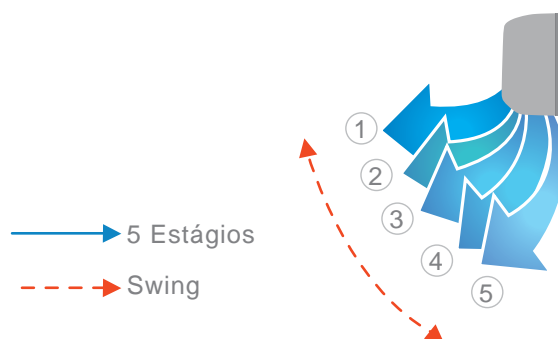
## Modo Eco

No Modo Eco o sistema buscará reduzir o consumo de energia sem comprometer o conforto do ambiente.



## Swing de 5 estágios

O swing de 5 estágios permite direcionar o ar insuflado no ângulo desejado. Esta função está disponível pelo controle remoto.



## Controles com fio

	TCONTKJRUT86ED	TCONTKJRUT12DG
MODELO		
Liga / Desliga	•	•
Seleção de Modo	•	•
Ajuste de Temperatura	• (0.5°C ou 1°C)	• (0.5°C ou 1°C)
Duplo setpoint de temperatura	•	•
Controle de 7 velocidades do ventilador	•	•
Auto swing	•	•
Swing de 5 estágios	•	•
Ajuste de endereçamento	•	•
Follow me	•	•
Modo Eco	•	•
Indicação de temperatura do ambiente	•	•
Indicação de temperatura °F / °C	•	•
Trava de teclado	—	•
Luz de fundo	•	•
Temporizador	•	•
Programação de Agenda Semanal	—	•
Auto restart	•	•
2 Níveis de permissão	—	•
Comunicação bi-direcional	•	•
Controle de grupo	—	•
Ajuste de controle principal ou secundário	•	•
Desligamento do visor	•	•
Modo silencioso noturno	•	•
Receptor de sinal remoto	•	•
Lembrete de limpeza de filtro	•	•
Função de extensão de tempo de funcionamento	—	•
Função Horário de verão	—	•
Mostrador de relógio	—	•
Display matricial	—	•
Função verificação de erros	•	•
Consulta de parâmetros do sistema	•	•
Ajuste do sistema	•	•
Dimensões (A x L x P) (mm)	86x86x18	86x86x18
Fonte de energia	18V DC	18V DC

## Controle em Grupo

Os controles com fio são capazes de controlar até 16 unidades internas utilizando o mesmo setpoint.



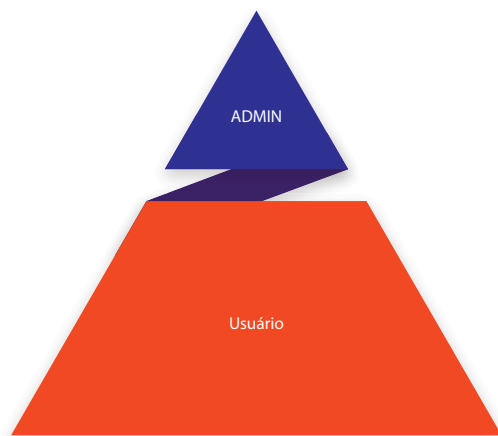
## Ajuste de controle principal ou secundário

Uma única unidade interna pode receber instruções de 2 controles diferentes. A unidade interna responderá ao último comando recebido. Quando um comando é enviado por um dos controles o outro controle será automaticamente ajustado indicando a mesma informação no visor.



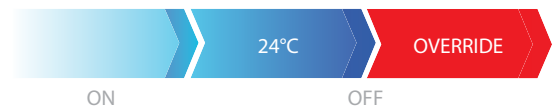
## 2 Níveis de Permissão

A utilização de 2 níveis de permissão assegura que apenas o administrador tenha acesso a funções avançadas e os usuários tenham permissão para controle de funções básicas evitando problemas de operação.



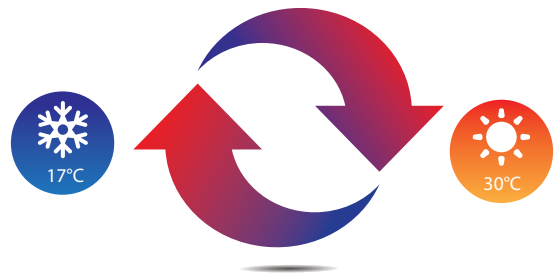
## Função de extensão de tempo de funcionamento

Quando a função de extensão de tempo de funcionamento é acionada a agenda de desligamento do sistema é adiada por 1 ou 2 horas.



## Duplo setpoint de temperatura

Um setpoint para resfriamento e outro para aquecimento pode ser utilizado através da função de duplo setpoint. Quando o modo de operação é alterado o setpoint já estará definido para melhor conveniência do usuário.



## Agenda Semanal

A agenda semanal permite aos usuários que definam agendas múltiplas para modo de operação, setpoint de temperatura e velocidade do ventilador.



## Comunicação bi-direcional

O controle com fio pode verificar parâmetros de operação do sistema graças a funcionalidade de comunicação bi-direcional. Além disso, ajustes de pressão estática externa, prevenção de insuflamento de ar frio e compensação de temperaturas podem ser configurados pelo controle com fio.



## Controles Centralizados

	TCONTCCM180A	TCONTCCM270A
MODELO		
Número máximo de evaporadoras	64	384
Número máximo de sistemas	8	48
Tela Touch Screen	(6.2-inch)	(10.1-inch)
Liga / Desliga	●	●
Seleção de Modo	●	●
Ajuste de temperatura	● (0.5°C ou 1°C Passos)	● (0.5°C Passos)
Controle de ventilação com até 7 velocidades	●	●
Auto swing	●	●
Controle de Aletas com 5 posições	●	●
Exibição de temperatura ambiente	—	●
Configuração modo Eco (Condensadora)	●	●
Configuração Modo férias	●	●
Visualização ° C / ° F	●	●
Programação horária (Calendário)	●	●
Exibição de relógio	●	●
2 níveis de gerenciamento	●	●
Função de extensão	●	—
Função de extensão	●	—
Reconhecimento de unidade (ext. intern)	●	●
Rateio de energia elétrica	—	●
Esquema visual em Layout	—	●
Gerenciamento de energia	●	●
Criar e monitorar grupos	●	●
Histórico de erros	●	●
Consulta de parâmetros do sistema	●	—
Saída USB	Relatório de erros	Relatório de erros, registro de operação e relatório de consumo de eletricidade
Exibição de relatórios		
Registros de operações	—	●
Operation log	—	●
Acesso LAN	—	●
Dimensões (A x L x P) (mm)	181x124x30	270x183x27
Alimentação	12V DC	24V AC

## Touch Screen

Nova tela sensível ao toque colorida, que permite melhor controle tornando o a operação mais simples e conveniente.



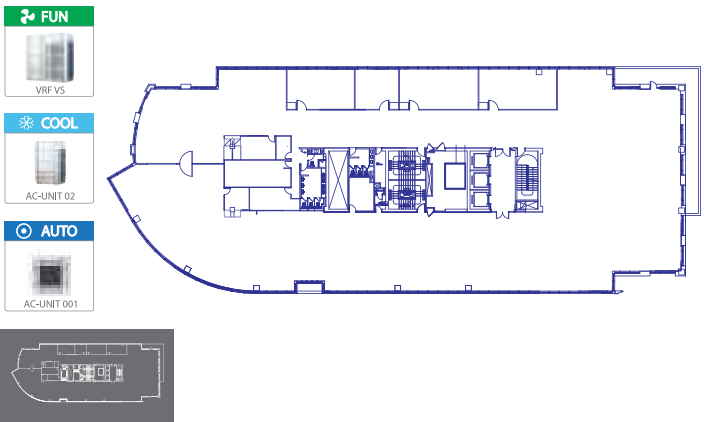
## Gerenciamento de energia

O usuário pode definir limites ou bloqueios em uma unidade interna, como temperatura mínima de resfriamento, ou máxima temperatura de aquecimento velocidade do ventilador, modo de operação bloqueio de rotação, bloqueio do controle remoto e bloqueio do controlador com fio.



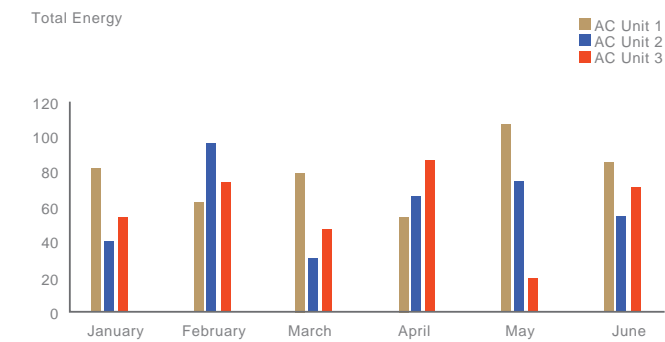
## Planta em Lay out

O Controlador permite carregar as plantas em Lay out, possibilitando o controle personalizado de cada ambiente.



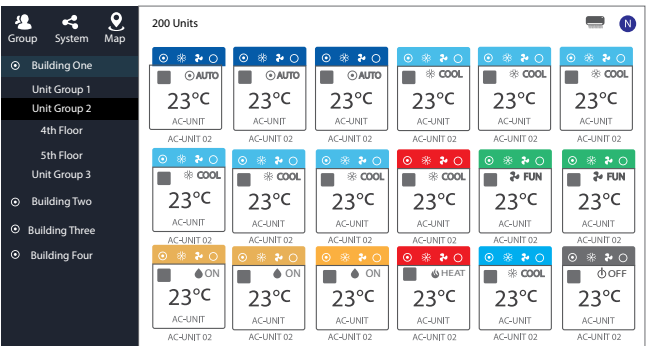
## Rateio de energia

Os controladores usam o método de cálculo para estimar o consumo de energia das unidades externas, este consumo é dividido entre as unidades internas de acordo com seu funcionamento (modo de operação e quantidade de horas em funcionamento) para que as tarifas de eletricidade possam ser adequadamente divididas entre os ocupantes do edifício.



## Gerenciamento de Grupos

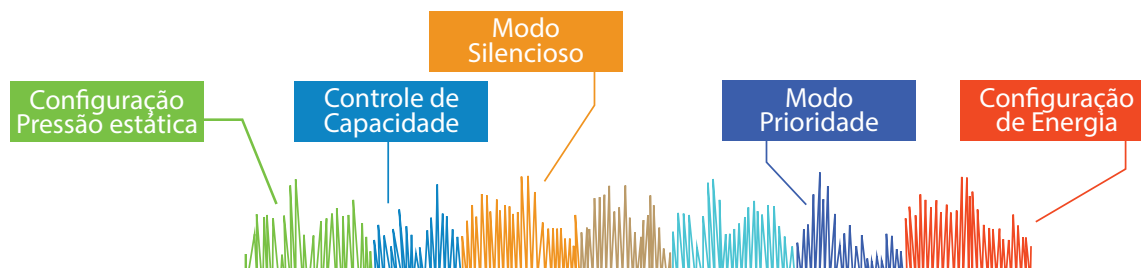
As unidades podem ser visualizadas de acordo com grupo, sistema ou localização, tornando o gerenciamento de unidades mais claro e mais conveniente.





# Soluções em Controles

Verifique todos os parâmetros e configurações das unidades condensadoras pelo controlador.



## Reconhecimento de modelo

O controlador reconhece o modelo de unidades internas e externas e cada modelo é representado por diferente ícone.



## Acesso LAN

Pelo computador ou laptop permite o acesso via navegador através de uma conexão LAN.



### Programação horária (Calendário)

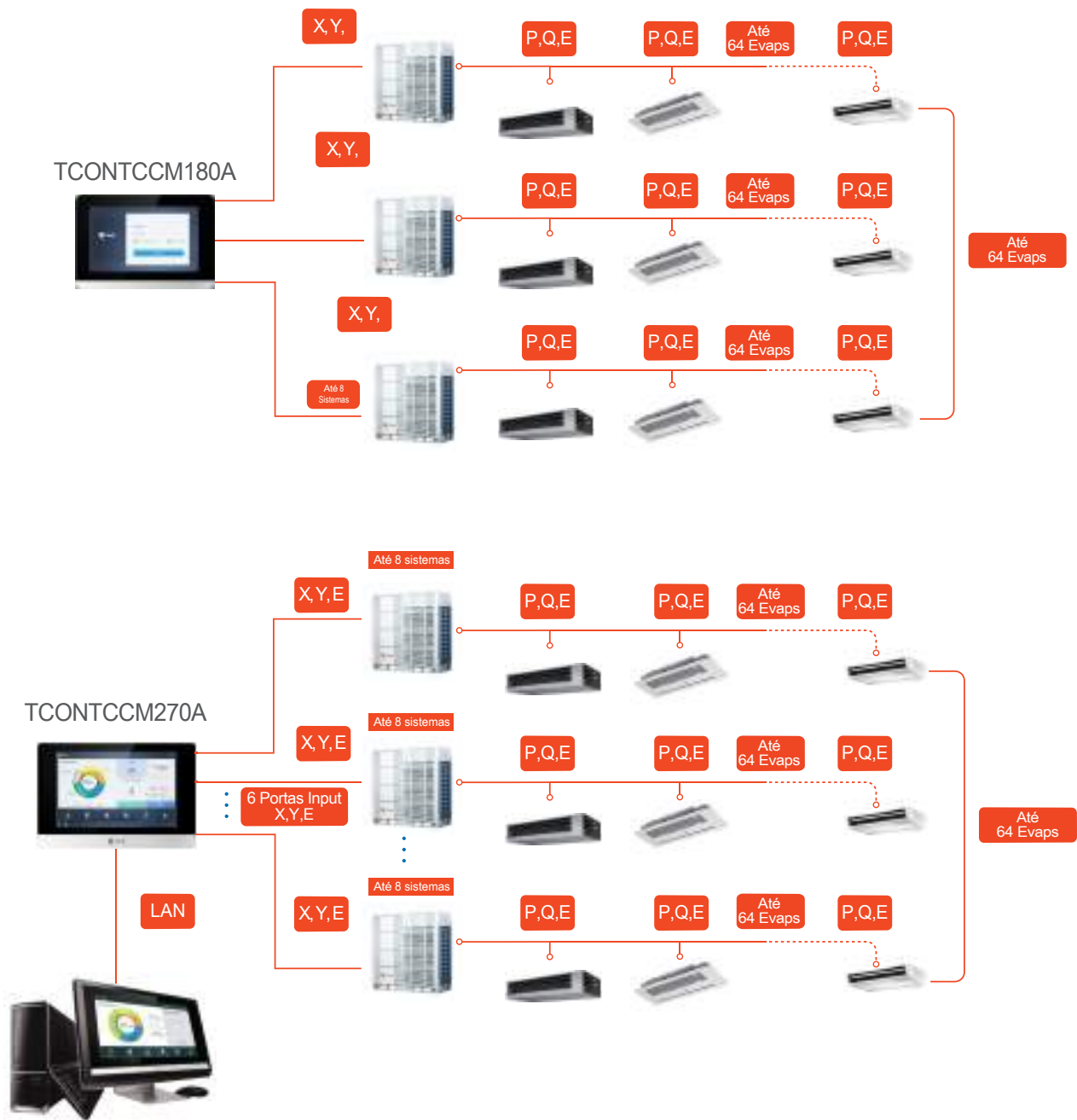
Programação horária,diária, semanal ou anual podem ser definidas e configuradas de acordo com a necessidade do cliente, Liga/ Desliga, modo de operação, set-point de temperatura, velocidade do ventilador.







Instalação Flexível

O controlador pode ser instalado diretamente na unidade externa.



Modelo do Software	TCONTENTSUT	
	TCONTWEBBAC01	TCONTCCM270A
Modelo do Software		
Modelo do Hardware		
Número máximo por rede	10	10
Número máximo de unidades internas	2560	3840
Número máximo de sistemas	320	480
Ajuste de temperatura	● (ajustes de 0.5°C)	● (ajustes de 0.5°C)
Duplo setpoint de temperatura	●	●
Controle de 7 velocidades do ventilador	●	●
Auto swing	●	●
Swing de 5 estágios	●	●
Ajuste de Modo Eco para unidade externa	●	●
Ajuste de feriado	●	●
Gerenciamento de Agenda	●	●
Visor de relógio	●	●
Dois Níveis de permissão	●	●
Reconhecimento do modelo da unidade	●	●
Cálculo do consumo de energia	●	●
Telas Personalizadas	●	●
Gerenciamento de energia	●	●
Gerenciamento em Grupo	●	●
Função verificação de erros	●	●
Consulta de parâmetros do sistema	●	●
Emissão de relatórios	●	●
Log de operação	●	●
Acesso LAN	●	●
Backup de dados	●	●
Acesso VPN remoto	●	●
Dimensões (A x L x P) (mm)	251x319x66	270x183x27
Fonte de energia	100-240V, 50/60Hz, Monofásico	24V AC

Controle Central via celular & tablet

Modelo de hardware	<div></div> <div>TCONTCCM15B</div>	
Cenários de aplicativos	<div><div></div><div></div><div></div></div> <div>Aplicativo para celular</div>	<div></div> <div>Site do servidor em nuvem</div>
Máx. número de CCM-15 para um aplicativo móvel	10	10
Número máximo de unidades internas	64	64
Máx. número de sistemas de refrigerante	8	8
Liga / Desliga	●	●
Seleção de modo	●	●
Duplo setpoint de temperatura	● (ajustes a cada 1°C)	● (ajustes a cada 1°C)
Controle de 7 velocidades do ventilador	■	■
Auto swing	●	●
Swing de 5 estágios	■	■
Indicador de temperatura ambiente	●	●
°C/°F exibição	●	●
Temporizador semanal	●	●
Reconhecimento de tipo de unidade interna	■	■
Gerenciamento de energia	●	●
Gerenciamento em Grupo	●	●
Gerenciamento de grupo de usuários	●	●
Log de operação	●	●
Log de dispositivo	●	●
Registro de login	●	●
Função verificação de erros	■	●
Configuração	●	■
Registro de conta	●	■
Virtual	●	■
Modo de exibição	●	●
Languages supported	Inglês, francês e espanhol.	Inglês, francês e espanhol.
Dimensões (A x L x P) (mm)	187x115x28	
Fonte de energia	100-240V, 50/60Hz, Monofásico	

## Interface amigável

A interface simples e prática permite uma interação amigável para os usuários.



## Configuração da unidade externa

A utilização de controladores centralizados possibilita o monitoramento e controle de diferentes configurações para as unidades externas sem a necessidade de acesso ao local de instalação.



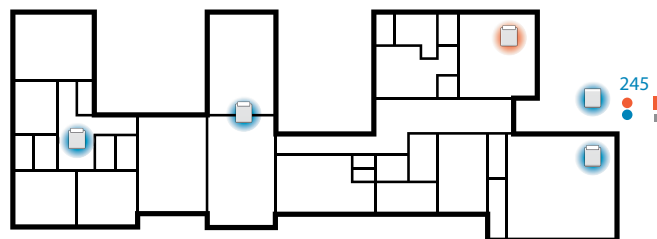
## Cálculo do consumo de energia

O controlador central TCONTCCM270A utiliza um algoritmo patenteado para calcular o consumo de energia. O consumo das unidades externas é distribuído de acordo com a utilização das unidades internas. Esta função permite ao administrador do prédio determinar o consumo de energia de cada condômino.



## Telas personalizadas

Os usuários podem criar telas personalizadas possibilitando o monitoramento e controle das unidades internas através de uma representação do lay-out dos sistemas. A configuração é simples ao importar as plantas baixas e arrastar as unidades internas para as suas posições na planta.

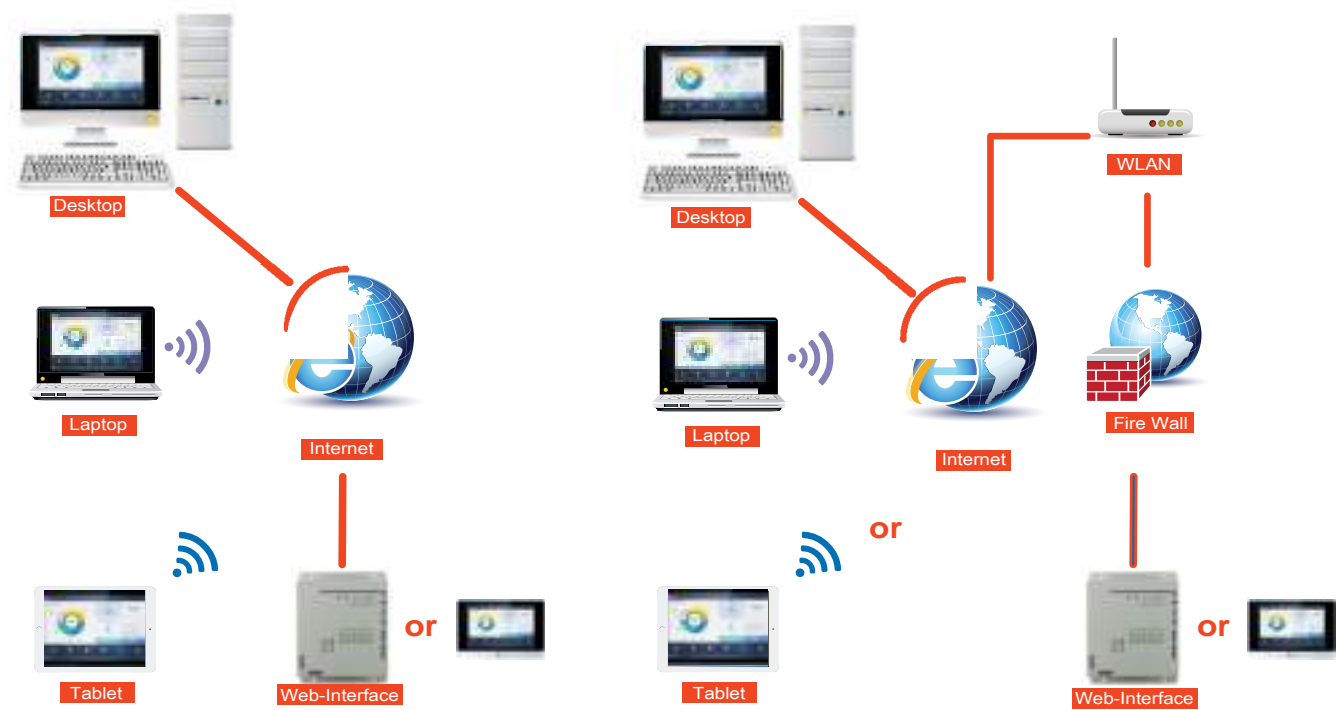


## Gerenciamento de agenda

A função de agenda pode ser utilizada para criação de agendas diária, semanal ou anual. É possível definir a operação das unidades para liga / desliga, modos de operação, setpoints de temperatura, velocidade do ventilador e swing das unidades internas.



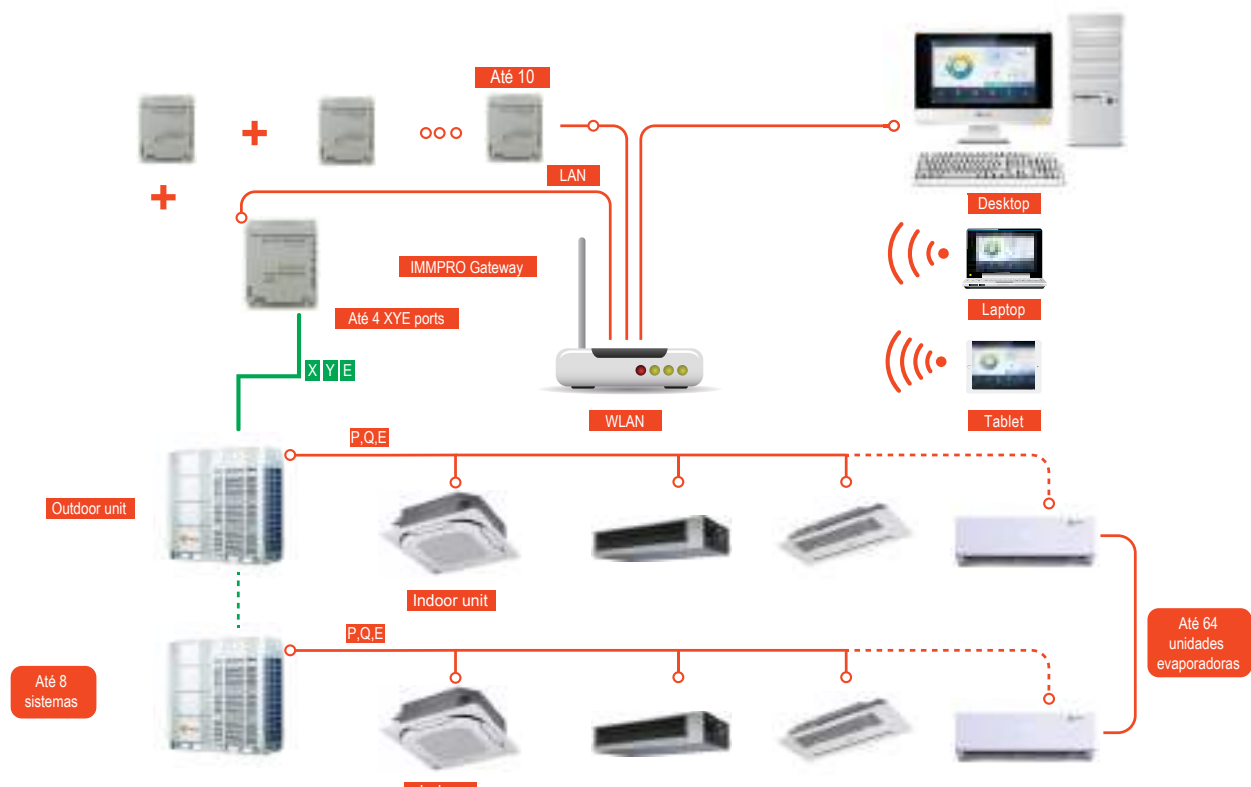
Flexibilidade de redes

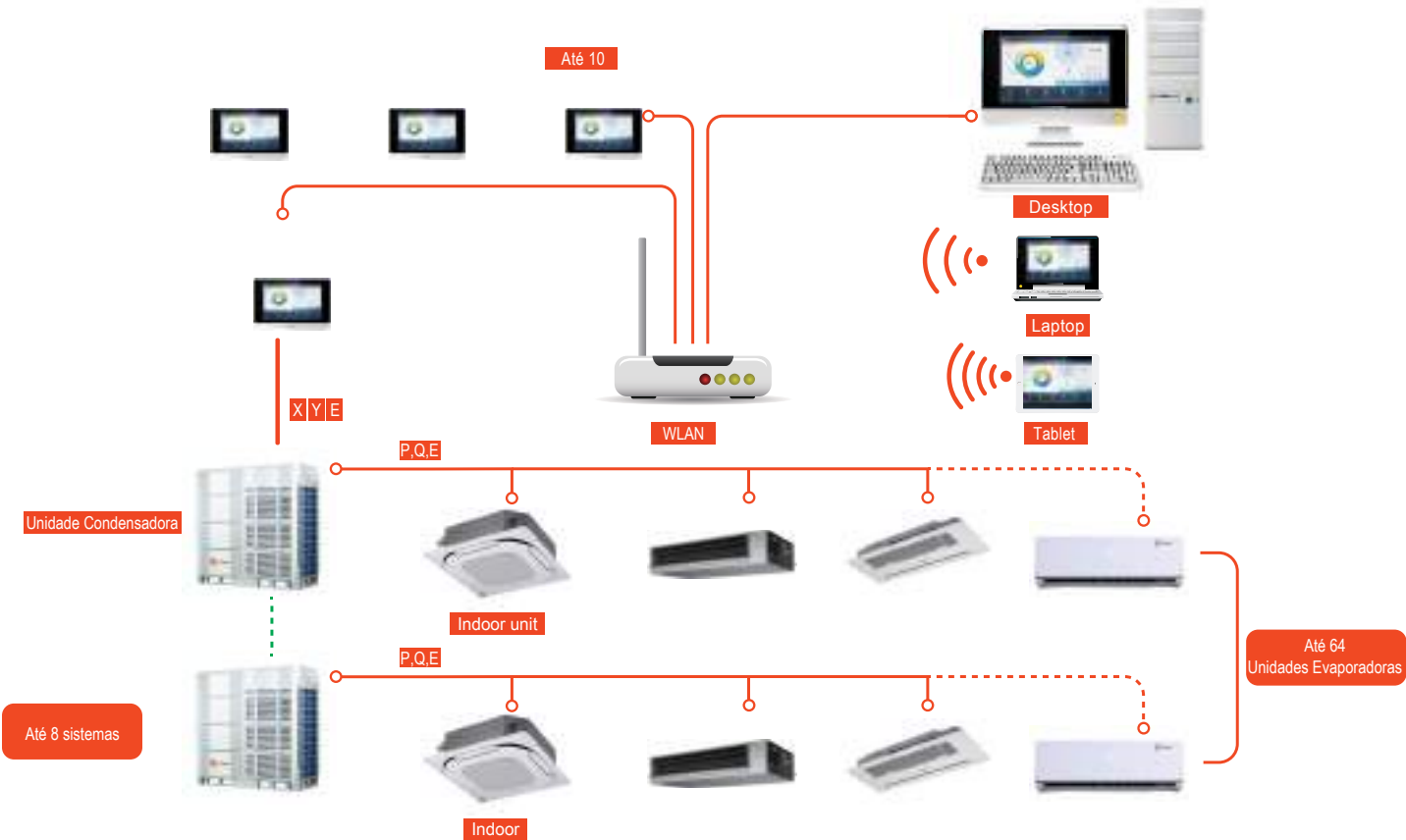


Acesso LAN

Acesso remoto via VPN

Controlador de Rede







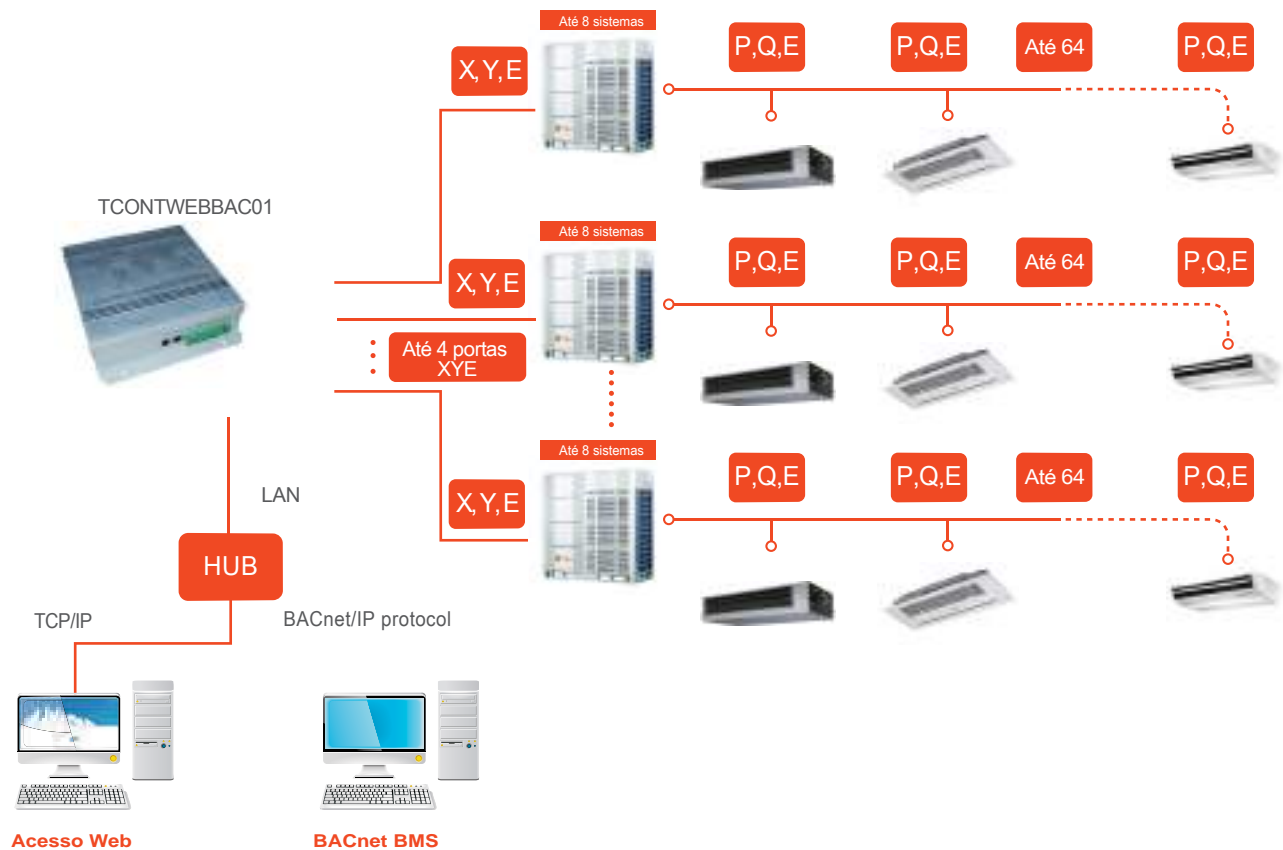
Integração completa

O gateway BACnet permite que os sistemas sejam monitorados e controlados juntamente com outras tecnologias de gerenciamento predial que utilizam o protocolo BACnet tais como controle de acesso, detecção de incêndio e sistemas de iluminação.

Flexibilidade de redes

O gateway pode ser conectado diretamente as portas XYE da unidade externa master.

MODELO	BACnet	
Número máximo de unidades internas		256
Número máximo de sistemas		32
Controle	Liga / Desliga	•
	Seleção de Modo	•
	Ajuste de temperatura	•
	Velocidade do ventilador	•
	Gerenciamento de energia	•
Monitoramento da unidade interna	Indicador de temperatura ambiente	•
	Status de erros	•
	alarme Error	•
Monitoramento da unidade externa	Modo de operação	•
	Temperatura exterior	•
	Velocidade do ventilador	•
	Temperatura do ambiente	•
	Temperatura do ambiente	•
	Pressão do sistema	•
	Alarme de erros	•
	Status de erros	•
	Status de erros	•
Acesso LAN		•
Fonte de energia		•



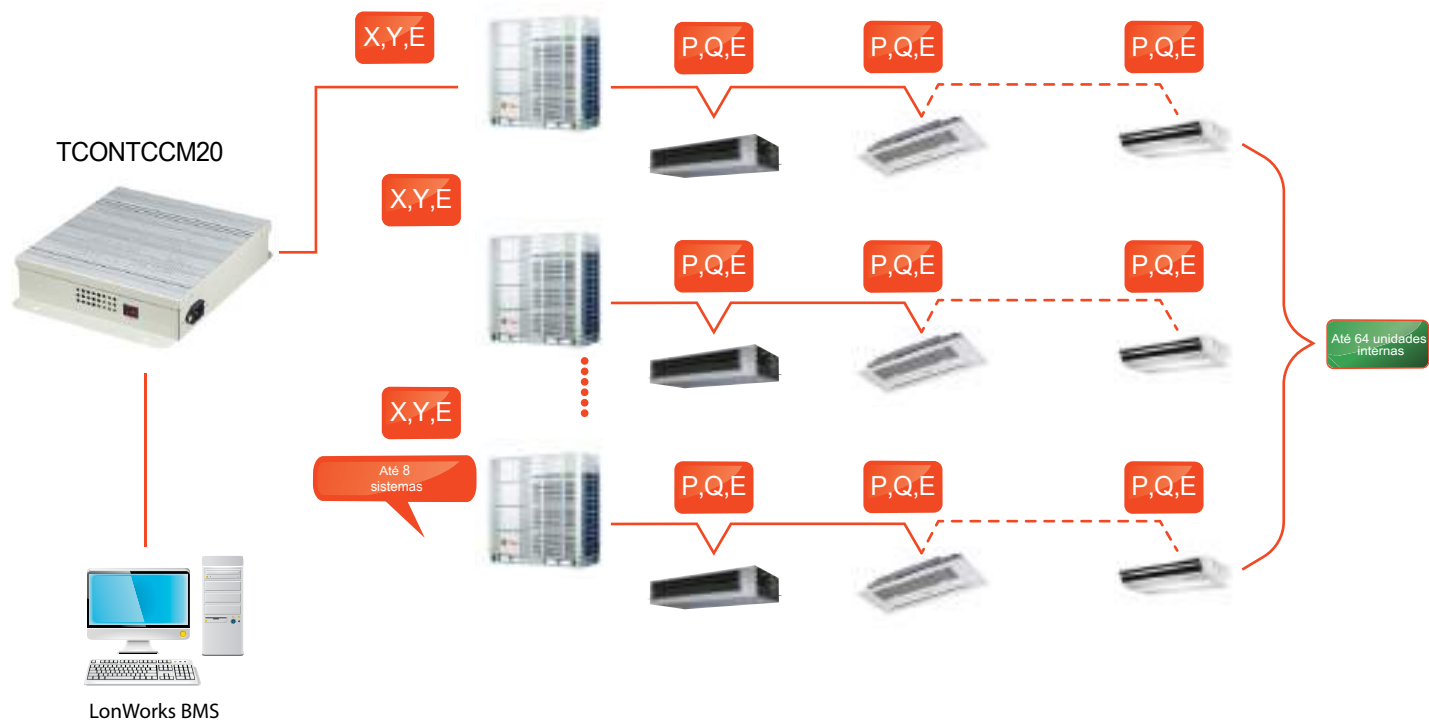


MODELO	LonWorks	
Número máximo de unidades internas	64	
Número máximo de sistemas	8	
Controle	Seleção de Modo	•
	Ajuste de temperatura	•
	Velocidade do ventilador	•
	Desligamento em grupo	•
	Liga / Desliga	•
Monitoramento da unidade interna	Modo de operação	•
	Ajuste de Temperatura	•
	Velocidade do ventilador	•
	Status online	•
	Status de operação	•
	Temperatura do ambiente	•
	Alarme de erros	•
Monitoramento da unidade externa	Alarme de erros	•
Dimensões (A x L x P) (mm)	319x251x61	
Fonte de energia	Monofásico, 100-240V, 50/60Hz	

Integração Completa

O gateway LonWorks permite que os sistemas sejam monitorados e controlados juntamente com outras tecnologias de gerenciamento predial que utilizam o protocolo LonWorks tais como controle de acesso, detecção de incêndio e sistemas de iluminação.

Flexibilidade de redes





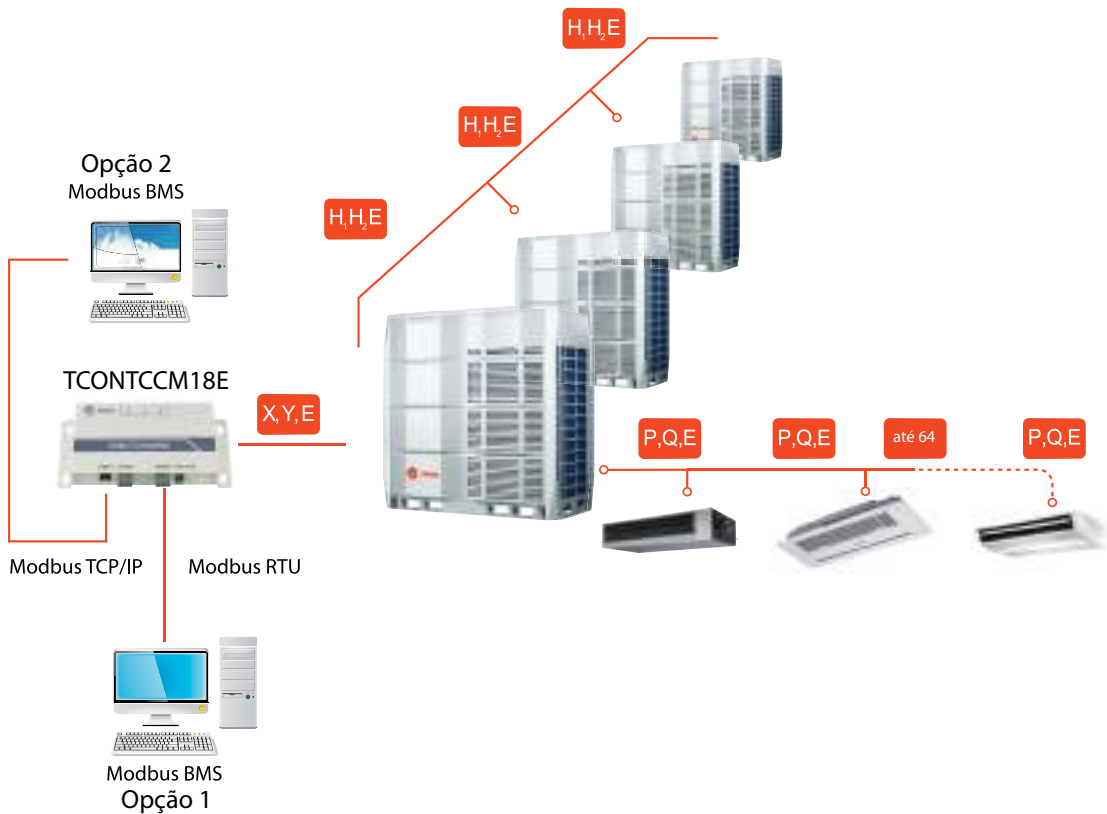


Integração Completa

O gateway Modbus permite que os sistemas Trane TVR comuniquem com outros sistemas BMS configurados através do protocolo Modbus.

Flexibilidade de redes

MODELO		Modbus Gateway
Número máximo de unidades internas		64
Número máximo de sistemas		1
Controle	Liga / Desliga	•
	Seleção de Modo	•
	Ajuste de temperatura	•
	Velocidade do ventilador	•
	Desligamento em grupo	•
Monitoramento da unidade interna	Status online	•
	Temperatura do ambiente	•
	Status de erros	•
	Modo de operação	•
Monitoramento da unidade externa	Modo de operação	•
	Status de trava	•
	Velocidade do ventilador	•
	Ajuste de Temperatura	•
	Temperatura do ambiente externo	•
LAN access		•
Dimensões (A x L x P) (mm)		187×115×28
Fonte de energia		Monofásico, 100-240V, 50/60Hz



# Módulo para cartão chave de hotel

## Integração completa

A interface para cartão chave de hotel é projetada para energizar as unidades internas apenas quando o cartão chave do hotel é inserido. Desta forma a unidade interior só funcionará quando necessário, economizando energia.


Modelo	TCONTNAM05A	TCONTNAM05B
Aparência		
Flexibilidade de instalação		
Auto restart	●	●
Compatibilidade	Controle remoto sem fio e com fio	Controle remoto sem fio e com fio
Dimensões (A x L x P) (mm)	15.5x86x72.8	87x150x70
Fonte de energia	5V DC (alimentado pela unidade interna)	Monofásico, 100-240V, 50/60Hz

A interface cartão chave de hotel necessita de uma conexão com a porta de infravermelho do controle com fio. Um controle com fio deve ser instalado.

# Sensor Infravermelho

## Integração Completa

Os sensores infravermelho foram projetados para detecção de movimento. Quando o sensor detecta movimento no ambiente a unidade interna é automaticamente ligada e quando a area é desocupada a unidade interna é automaticamente desligada. Este acessório pode ser utilizado em hotéis, escritórios, salas de conferência e residências, auxiliando a redução do consumo de energia.

Modelo	TCONTNAM09A
Aparência	
Flexibilidade de instalação	
Dimensões (A x L x P) (mm)	Sensor 46x30x25.6 Caixa de Controle
Fonte de energia	5V DC (alimentado pela unidade interna)

# Monitoramento & Diagnóstico

## Monitoramento & Diagnóstico

O Software de Diagnóstico Trane TVR é uma ferramenta utilizada para monitorar e diagnosticar os alarmes e erros do sistema. Os ajustes do sistema e os parâmetros de operação podem ser acessados facilmente. O registro de dados da operação também pode ser revisado com esta ferramenta de forma a prevenir eventuais falhas.

Além disso, uma representação esquemática do sistema com o diagrama de fluxo de refrigerante e um gráfico com os parâmetros pode, ser gerados para facilitar a interpretação do status do sistema.

MODELO		TCONTDIAGS
Número máximo de unidades internas		64
Número máximo de sistemas		1
Controle	Seleção de modo	•
	Ajuste de temperatura	•
	Velocidade do ventilador	•
Monitoramento da Unidade Externa	Modo de operação	•
	Capacidade	•
	Frequência de operação do compressor	•
	Corrente de operação	•
	Status de erros	•
	Temperaturas	T3, T4, Tp (Ver nota 1)
	Status das válvulas	SV4, SV5, SV6, ST1 (Ver nota 2)
	Posição da EXV	•
	Modo de operação	•
	Capacidade	•
Monitoramento da Unidade Interna	Velocidade do ventilador	•
	Endereço	•
	Temperaturas	T1, T2, T2B, TS (Ver nota 3)
	Posição da EXV	•
Códigos de erros		•
Solução de Problemas		•
Registro de Dados		•
Diagramas		Esquemático do sistema, diagrama de fluxo de refrigerante, gráfico de parâmetros.
Linguagem Suportada		Inglês

Observações:

1. Temperatura do trocador de calor, temperatura do ambiente externo, temperatura de descarga.
2. Válvula de retorno de óleo, válvula de descongelamento, ento, válvula de by pass EXV, válvula de 4 vias.
3. Temperatura do ambiente interno, temperatura do ponto médio do trocador de calor da unidade interna, temperatura de saída do trocador de calor da unidade interna, temperatura de setpoint.

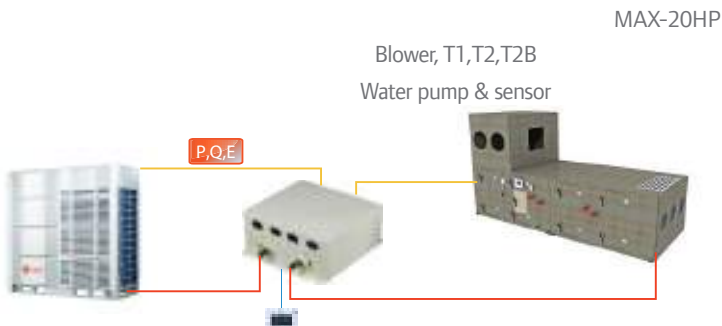
# Caixa de Controle do AHU (Air Handling Unit)

## Grande Faixa de Capacidade

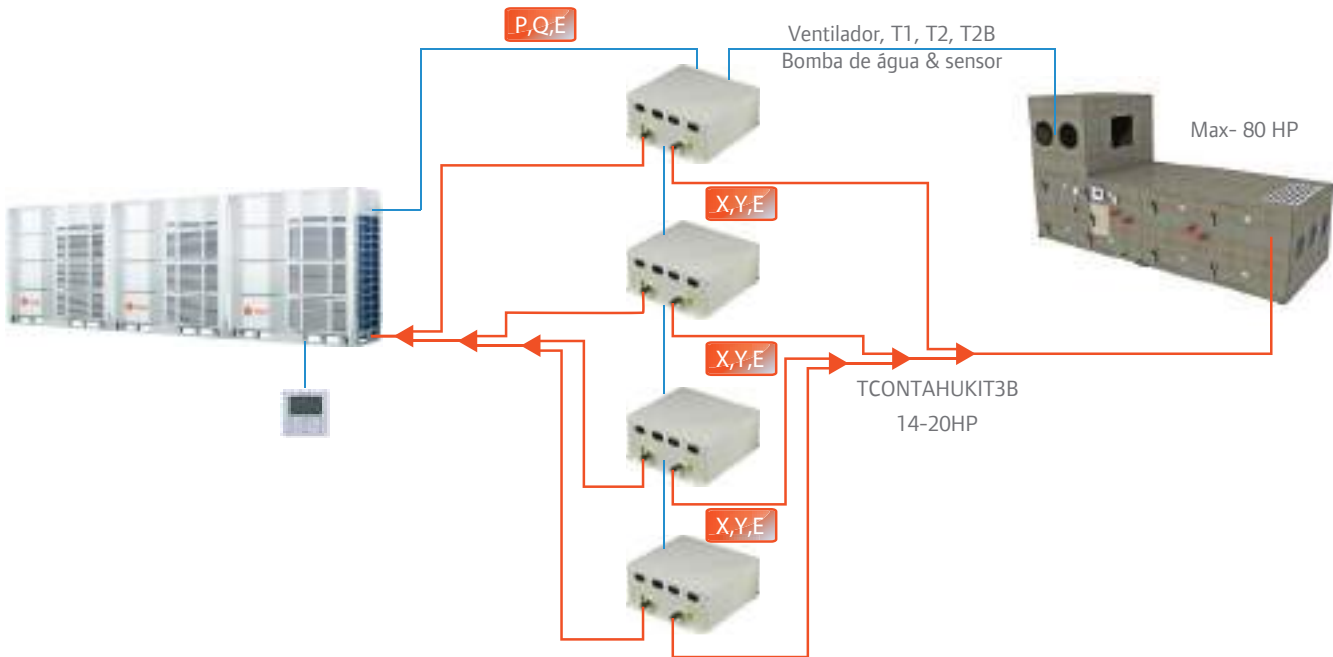
Quatro caixas de controle podem ser utilizadas em paralelo com uma capacidade total desde 3,2 HP até 80 HP.



## Conexão de caixa de controle AHU única



## Conexão de Múltiplas Caixas de Controle



Modelo		TCONTAHUKIT1B	TCONTAHUKIT2B	TCONTAHUKIT3B
Capacidade	HP	3.2-6	8-12	14-20
Refrigerante			R410A	
Dimensões das conexões (entrada e saída)	mm	φ8	φ12.7	φ15.9
Dimensões líquidas (LxAxP)	mm	350×150×375		
Dimensões da embalagem (LxAxP)	mm	420×240×490		
Peso líquido	kg	8.4	8.7	8.9
Peso Bruto	kg	11.4	11.7	11.9
Modos de operação		Resfriamento, aquecimento e ventilação		
Controle padrão		Controle com fio		
Controles opcionais		Controle remoto sem fio, Controlador SIEMENS		

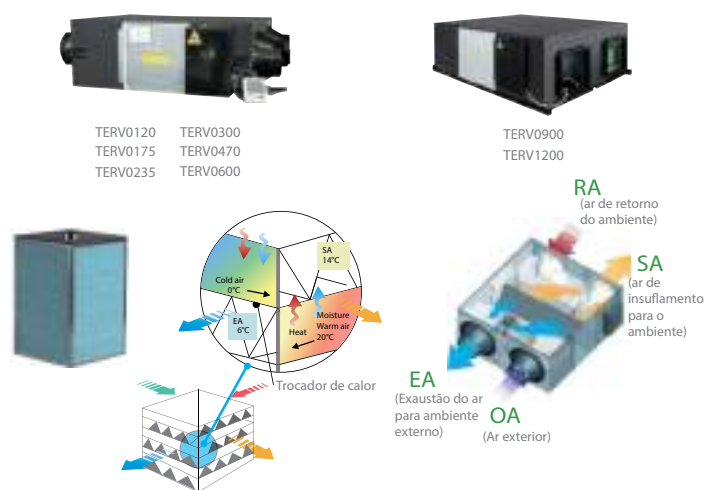
# Recuperador de Calor para Ventilação

## Melhor Eficiência Energética

Os recuperadores de calor para ventilação do TVR Trane podem reduzir significativamente as perdas de energia devido as flutuações de temperatura causada pela necessidade de ventilação com ar exterior.

Estas unidades são projetadas com um trocador de calor produzido com um material especial que garante o melhor desempenho no controle de umidade e temperatura.

As eficiências de troca de temperatura e entalpia podem chegar até 65%.

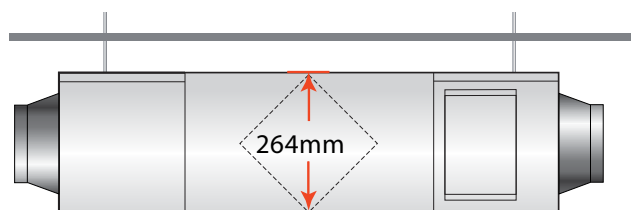


## Baixo nível de ruído

Atenuadores de ruído são utilizados para garantir uma operação silenciosa

## Flexibilidade

As unidades são compactas de forma a facilitar a instalação mesmo quando há limitações de espaço.



# Especificações DC Series




Modelo		TERV0120AF0AA	TERV0175AF0AA	TERV0235AF0AA	TERV0300AF0AA
Fonte de energia	V/Ph/Hz	220-240/1/ 50(60)			
Eficiência de troca T. resfriamento	%	76.1	74.8	76.2	76.1
Eficiência de troca entalpia - resfr.	%	77.3	76.1	78.7	78.2
Eficiência de troca T. - aquecimento	%	76.1	74.8	76.2	76.1
Eficiência de troca ent. - aquecimento	%	82.6	79.8	83.6	80.4
Pressão sonora	dB(A)	27	30	32	35
Vazão de ar	m³/h	200	300	400	500
Pressão estática externa	Pa	75	75	80	80
Tipo de motor		DC			
Diâmetro da sessão do duto	mm	Φ144	Φ144	Φ144	Φ194
Dimensões líquidas (L x P x A)	mm	852×665×264	928×734×270	928×940×270	1020×1036×270
Dimensões embaladas (LxPx A)	mm	910×710×430	980×774×435	1010×1010×440	1120×1120×452
Peso líquido	kg	25	27	32	35
Peso bruto	kg	37	40	46	51
Faixa de temperatura de operação	°C	-7 to 43 DB, RH80% ou nferior			

Modelo		TERV0470AF0AA	TERV0600AF0AA	TERV0900AF0AA	TERV1200AF0AA
Fonte de energia	V/Ph/Hz	220-240/1/ 50(60)			
Eficiência de troca T. resfriamento	%	76.9	75.8	77.8	77.2
Eficiência de troca entalpia - resfr.	%	78.1	76.9	79.2	78.7
Eficiência de troca T. - aquecimento	%	76.9	75.8	77.8	77.2
Eficiência de troca ent. - aquecimento	%	80.1	78.6	80.5	80.3
Pressão sonora	dB(A)	39	40	51	53
Vazão de ar	m³/h	800	1000	1500	2000
Pressão estática externa	Pa	100	100	160	170
Tipo de motor		DC			
Diâmetro da sessão do duto	mm	Φ242	Φ242	346×326	346×326
Dimensões líquidas (L x P x A)	mm	1276×1020×388	1276×1269×388	1600×1270×540	1650×1470×540
Dimensões embaladas (LxPx A)	mm	1355×1045×560	1400×1370×573	1710×1410×720	1760×1610×720
Peso líquido	kg	58	69	151	165
Peso bruto	kg	77	90	184	198
Faixa de temperatura de operação	°C	-7 to 43 DB, RH80% ou nferior			

1. Todos os modelos tem três opções de ajustes de vazão de ar.

2. A pressão sonora é medida de acordo com as seguintes condições: Resfriamento: Temperatura do ar de exaustão de 27°C de bulbo seco, 19,5°C de bulbo úmido; Temperatura de ar externo de 35°C de bulbo seco, 28 °C de bulbo úmido. Aquecimento: Temperatura do ar de exaustão de 21°C de bulbo seco, 13°C de bulbo úmido; Temperatura de ar externo de 5°C de bulbo seco, 2°C de bulbo úmido

## Conexões de Ramificações

Tipo	Aparência	Modelo	Dimensões da embalagem mm	Peso bruto (kg) kg	Observações
Ramificações para unidades externas		TODK02UTHP	255×150×185	2.0	Conexão para duas unidades externas
		TODK03UTHP	345×160×285	4.3	Conexão para três unidades externas
Ramificações para unidades internas		TRDK056HP	290×105×100	0.4	/
		TRDK112HP	290×105×100	0.6	/
		TRDK225HP	310×130×125	0.9	/
		TRDK314HP	04350×180×170	1.5	/
		TRDK768HP	365×195×215	1.9	/
		TRDK840HP	390×230×255	3.1	/
		TRDK918HP	390×230×255	3.4	/



# Conexões de Ramificações Unidades Externas

Modelo	Ramificações para o lado Gás	Ramificações para o lado Líquido
TODK02UTHP		
TODK03UTHP		



# Conexões de Ramificações Unidades Internas

Model	Gas side joints	Liquid side joints
TRDK056HP		
TRDK112HP		
TRDK225HP		
TRDK314HP		
TRDK768HP		
TRDK840HP		
TRDK918HP		



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VRF-SLB031-PB  
08/21/2020

# Engineering Data

## TVR Ultra HR Series VRF



4TVR0086EE000AA

4TVR0155EE000AA

4TVR0096EE000AA

4TVR0170EE000AA

4TVR0115EE000AA

4TVR0192EE000AA

4TVR0140EE000AA

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# Part 1

## General Information

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4 Nomenclature .....	11
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## 1 Indoor and Outdoor Unit Capacities

### 1.1 Indoor Units

#### 1.1.1 TVR indoor units

Table 1-1.1: TVR indoor unit abbreviation codes

Abbreviation code	Type
Q1	One-way Cassette
Q2	Two-way Cassette
Q4C	Compact Four-way Cassette
Q4	Four-way Cassette
T2	Medium Static Pressure Duct

Abbreviation code	Type
T1	High Static Pressure Duct
G	Wall-mounted
DL	Ceiling & Floor
F	Floor Standing

Table 1-1.2: TVR indoor unit<sup>1</sup> capacity range

Capacity		Capacity index	Q1	Q2	Q4C	Q4	T2	T1	G	DL	F
kW	HP										
1.8	0.6	18	18	—	—	—	—	—	—	—	—
2.2	0.8	22	22	22	22	—	22	—	22	—	22
2.8	1	28	28	28	28	28	28	—	28	—	28
3.6	1.25	36	36	36	36	36	36	—	36	36	36
4.5	1.6	45	45	45	45	45	45	—	45	45	45
5.6	2	56	56	56	—	56	56	—	56	56	56
7.1	2.5	71	71	71	—	71	71	71	71	71	71
8.0	3	80	—	—	—	80	80	80	80	80	80
9.0	3.2	90	—	—	—	90	90	90	90	90	—
10.0	3.6	100	—	—	—	100	—	—	—	—	—
11.2	4	112	—	—	—	112	112	112	—	112	—
14.0	5	140	—	—	—	140	140	140	—	140	—
16.0	6	160	—	—	—	160	160	160	—	160	—
20.0	7	200	—	—	—	—	—	200	—	—	—
25.0	9	250	—	—	—	—	—	250	—	—	—
28.0	10	280	—	—	—	—	—	280	—	—	—

Notes:

- TVR ULTRA HR series outdoor units are compatible with the Ultra DC TVR indoor unit and Ultra AC TVR indoor units (which will be released soon).

#### 1.1.2 Fresh air processing unit

Table 1-1.3: Fresh air processing unit capacity range

Capacity	12.5kW	14kW	20kW	25kW	28kW
Capacity index	125	140	200	250	280

Notes:

- TVR ULTRA HR series outdoor units are compatible with the Ultra DC fresh air processing unit.

## 1.2 Heat Recovery Ventilator

Table 1-1.4: Heat recovery ventilator capacity range

Capacity	200m <sup>3</sup> /h	300m <sup>3</sup> /h	400m <sup>3</sup> /h	500m <sup>3</sup> /h	800m <sup>3</sup> /h	1000m <sup>3</sup> /h	1500m <sup>3</sup> /h	2000m <sup>3</sup> /h
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Notes:

- TVR ULTRA HR series outdoor units are compatible with the DC type heat recovery ventilator.



### 1.3 High Temperature Hydro Module

Table 1-1.5: High temperature hydro module capacity range

Capacity	14kW
Capacity index	140

### 1.4 Outdoor Units

Table 1-1.6: Outdoor unit capacity range

Capacity	Model Name	Combination Type
8HP	4TVR0086EE000AA	/
10HP	4TVR0096EE000AA	/
12HP	4TVR0115EE000AA	/
14HP	4TVR0140EE000AA	/
16HP	4TVR0155EE000AA	/
18HP	4TVR0170EE000AA	/
20HP	4TVR0192EE000AA	/
22HP	4TVR0210EE000AA	12HP+10HP
24HP	4TVR0232EE000AA	14HP+10HP
26HP	4TVR0250EE000AA	14HP+12HP
28HP	4TVR0268EE000AA	16HP+12HP
30HP	4TVR0285EE000AA	18HP+12HP
32HP	4TVR0308EE000AA	16HP+16HP
34HP	4TVR0325EE000AA	18HP+16HP
36HP	4TVR0342EE000AA	18HP+18HP
38HP	4TVR0362EE000AA	20HP+18HP
40HP	4TVR0382EE000AA	20HP+20HP
42HP	4TVR0404EE000AA	16HP+14HP+12HP
44HP	4TVR0422EE000AA	16HP+16HP+12HP
46HP	4TVR0444EE000AA	16HP+16HP+14HP
48HP	4TVR0462EE000AA	16HP+16HP+16HP
50HP	4TVR0479EE000AA	18HP+16HP+16HP
52HP	4TVR0496EE000AA	18HP+18HP+16HP
54HP	4TVR0513EE000AA	18HP+18HP+18HP
56HP	4TVR0533EE000AA	20HP+18HP+18HP
58HP	4TVR0553EE000AA	20HP+20HP+18HP
60HP	4TVR0573EE000AA	20HP+20HP+20HP

Notes:

1. The combinations of units shown in the table are factory-recommended. Other combinations of units are also possible.



2 External Appearance

2.1 Indoor Units

2.1.1 TVR indoor units

Table 1-2.1: TVR indoor unit appearance

<p>One-way Cassette</p> <p>Q1</p> 	<p>Two-way Cassette</p> <p>Q2</p> 
<p>Compact Four-way Cassette</p> <p>Q4C</p> 	<p>Four-way Cassette</p> <p>Q4</p> 
<p>Medium Static Pressure Duct</p> <p>T2</p> 	<p>High Static Pressure Duct</p> <p>T1</p> 
<p>Wall-mounted</p> <p>G</p> 	<p>Ceiling &amp; Floor</p> <p>DL</p> 
<p>Floor Standing</p> <p>F</p> 	

2.1.2 Fresh air processing unit

Table 1-2.2: Fresh air processing unit appearance

<p>Fresh Air Processing Unit</p> <p>FA</p> 
--

## 2.2 Heat Recovery Ventilator

Table 1-2.3: Heat recovery ventilator appearance

Heat Recovery Ventilator



## 2.3 High Temperature Hydro Module

Table 1-2.4: High temperature hydro module appearance

High Temperature Hydro Module





TVR Ultra HR 50/60Hz



2.4 Outdoor Units





2.4.1 Single units

Table 1-2.5: Single outdoor unit appearance

8/10/12HP (with single fan)	14/16/18/20HP (with dual fan)
	







2.4.2 Combinations of units

Table 1-2.6: Combination outdoor unit appearance

22HP	24/26/28/30HP
	
32/34/36/38/40HP	42/44HP
	
46/48/50/52/54/56/58/60HP	
	

## 2.5 Mode Selection Box

Table 1-2.7: MS box appearance

Model name	Appearance	Max. number of downstream indoor units
TMSBOX01E <sup>1,2</sup>		8
TMSBOX04E		20
TMSBOX06E		30
TMSBOX08E		40
TMSBOX10E		47
TMSBOX12E		47

Notes:

1. TMSBOX01E can be ceiling-suspended installed and wall-mounted installed.
2. Low temperature cooling operation and leakage detection function are available in TMSBOX01E.

### 3 Outdoor Unit Combinations

Table 1-3.1: Outdoor unit combinations

System capacity		Number of units	Modules <sup>1</sup>							Outdoor branch joint kit <sup>2</sup>
kW	HP		8	10	12	14	16	18	20	
22.4	8	1	•							—
28.0	10	1		•						
33.5	12	1			•					
40.0	14	1				•				
45.0	16	1					•			
50.0	18	1						•		
56.0	20	1							•	
61.5	22	2		•	•					TODK002HRU
68.0	24	2		•		•				
73.5	26	2			•	•				
78.5	28	2			•		•			
83.5	30	2			•			•		
90.0	32	2					••			
95.0	34	2					•	•		
100.0	36	2						••		
106.0	38	2						•	•	
112.0	40	2							••	
118.5	42	3			•	•	•			TODK003HRU
123.5	44	3			•		••			
130.0	46	3				•	••			
135.0	48	3					•••			
140.0	50	3					••	•		
145.0	52	3					•	••		
150.0	54	3						•••		
156.0	56	3						••	•	
162.0	58	3						•	••	
168.0	60	3							•••	

## Notes:

1. The combinations of units shown in the table are factory-recommended. Other combinations of units are also possible.
2. For systems with two or more outdoor units, outdoor branch joints (sold separately) are required.

## 4 Nomenclature

### 4.1 Indoor Units

#### 4.1.1 TVR indoor units

4 T V E 0 0 0 7 E F 0 0 0 A A  
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Legend		
No.	Code	Remarks
1	4	R-410A
2	T	Trane
3	V	TVR
4		Indoor Unit Type E: One - Way Cassette G: Two - Way Cassette B: Compact Four - Way Cassette C: Four - Way Cassette D: Medium Static Pressure Duct A: High Static Pressure Duct W: Wall - Mounted C: Ceiling & Floor S, N, U: Floor Standing F: Fresh air processing unit
5	0	Currently not used
6	0	Btu/h x 1000
7	0	
8	7	
9	E	TVR Ultra
10	F	380V50-60Hz/1P
11	0	Currently not used
12	0	Currently not used
13	0	Currently not used
14	A	First design sequence
15	A	First service sequence

## TVR Ultra HR 50/60Hz



### 4.2 Outdoor Units

4 T V H 0 0 8 6 E E 0 0 0 A A  
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Legend		
No.	Code	Remarks
1	4	R-410A
2	T	Trane
3	V	Air Cooled
4	H	Heat Pump
5	0	Currently not used
6	0	Btu/h x 1000
7	8	
8	6	
9	E	TVR Ultra
10	E	380V50-60Hz/1P
11	0	Currently not used
12	0	Currently not used
13	0	0: Standard C: Corrosion treatment
14	A	First design sequence
15	A	First design sequence



## 5 Combination Ratio

$$\text{Combination ratio} = \frac{\text{Sum of capacity indexes of the indoor units}}{\text{Capacity index of the outdoor units}}$$

Table 1-5.1: Indoor and outdoor unit combination ratio limitations

Type	Total combination ratio	Allowed combination ratio			
		TVR indoor units <sup>1</sup>	HT hydro module	AHU	Fresh air processing units
TVR indoor units only	50%~200% (Single) 50%~150% (2 units combination) 50%~130% (3 units combination)	50%~200% (Single) 50%~150% (2 units combination) 50%~130% (3 units combination)	/	/	/
TVR indoor units + HT hydro module units	50%~200%	50%~130%	0%~100% <sup>2</sup>	/	/
TVR indoor units + AHUs	50%~100%	50%~100%	/	0%~50% <sup>3</sup>	/
TVR indoor units + fresh air processing units	50%~100%	50%~100%	/	/	0%~30% <sup>3</sup>
Fresh air processing units only	50%~100%	/	/	/	50%~100%

Notes:

1. TVR ULTRA HR series outdoor units are compatible with the Ultra DC TVR indoor unit and Ultra AC TVR indoor units (which will be released soon).
2. When HT hydro module units are installed together with TVR indoor units, the total capacity of HT hydro module units must not exceed 100% of the total capacity of the outdoor units and the combination ratio must not exceed 200%.
3. When AHUs are installed together with TVR indoor units, the total capacity of AHUs must not exceed 50% of the total capacity of the outdoor units and the combination ratio must not exceed 100%.
4. When fresh air processing units are installed together with TVR indoor units, the total capacity of the fresh air processing units must not exceed 30% of the total capacity of the outdoor units and the combination ratio must not exceed 100%.
5. HT hydro module units only and AHUs only are not allowed.

# TVR Ultra HR 50/60Hz



Table 1-5.2: Combinations of indoor and outdoor units

Outdoor unit capacity			Sum of capacity indexes				Maximum number of connected indoor units <sup>1</sup>
kW	HP	Capacity index	TVR indoor units only	TVR indoor units + HT hydro module	TVR indoor units + AHUs	TVR indoor units + fresh air processing units	
22.4	8	224	112 to 291.2	112 to 448	112 to 224	112 to 224	64
28	10	280	140 to 364	140 to 560	140 to 280	140 to 280	
33.5	12	335	167.5 to 435.5	167.5 to 670	167.5 to 335	167.5 to 335	
40	14	400	200 to 520	200 to 800	200 to 400	200 to 400	
45	16	450	225 to 585	225 to 900	225 to 450	225 to 450	
50	18	500	250 to 650	250 to 1000	250 to 500	250 to 500	
56	20	560	280 to 728	280 to 1120	280 to 560	280 to 560	
61.5	22	615	307.5 to 799.5	307.5 to 1230	307.5 to 615	307.5 to 615	
68	24	680	340 to 884	340 to 1360	340 to 680	340 to 680	
73.5	26	735	367.5 to 955.5	367.5 to 1470	367.5 to 735	367.5 to 735	
78.5	28	785	392.5 to 1020.5	392.5 to 1570	392.5 to 785	392.5 to 785	
83.5	30	835	417.5 to 1085.5	417.5 to 1670	417.5 to 835	417.5 to 835	
90	32	900	450 to 1170	450 to 1800	450 to 900	450 to 900	
95	34	950	475 to 1235	475 to 1900	475 to 950	475 to 950	
100	36	1000	500 to 1300	500 to 2000	500 to 1000	500 to 1000	
107	38	1070	535 to 1391	535 to 2140	535 to 1070	535 to 1070	
112	40	1120	560 to 1456	560 to 2240	560 to 1120	560 to 1120	
118.5	42	1185	592.5 to 1540.5	592.5 to 2370	592.5 to 1185	592.5 to 1185	
123.5	44	1235	617.5 to 1605.5	617.5 to 2470	617.5 to 1235	617.5 to 1235	
130	46	1300	650 to 1690	650 to 2600	650 to 1300	650 to 1300	
135	48	1350	675 to 1755	675 to 2700	675 to 1350	675 to 1350	
140	50	1400	700 to 1820	700 to 2800	700 to 1400	700 to 1400	
145	52	1450	725 to 1885	725 to 2900	725 to 1450	725 to 1450	
150	54	1500	750 to 1950	750 to 3000	750 to 1500	750 to 1500	
156	56	1560	780 to 2028	780 to 3120	780 to 1560	780 to 1560	
162	58	1620	810 to 2106	810 to 3240	810 to 1620	810 to 1620	
168	60	1680	840 to 2184	840 to 3360	840 to 1680	840 to 1680	

Notes:

1. The maximum number of connected indoor units depend upon indoor unit type and total combination ratio.

## 6 Selection Procedure

### 6.1 Procedure

#### Step 1: Establish design conditions

Design temperature and humidity (indoor and outdoor)  
Required heat load of each room  
System peak load  
Piping length, level differences  
Indoor unit specifications (type and quantity)

#### Step 2: Select indoor units

Decide indoor unit safety factor

Select indoor unit models ensuring that:  
Indoor unit capacity corrected for indoor air temperature  $WB^1 \geq \text{Required heat load} \times \text{Indoor unit safety factor}$

#### Step 3: Select outdoor units

Determine required total heat load on outdoor units

Use the sum of the peak load of each room

Use the system peak load

Provisionally select outdoor unit capacity based on combination ratio limitations

Confirm that the number of indoor units connected to the outdoor units is within limitation

Correct cooling and heating capacities of the outdoor units for the following items:  
Outdoor air temperature / Indoor air temperature  $WB$  / Combination ratio / Piping length, level difference / Piping heat loss / Frost accumulation (for heating capacity only)

Is corrected outdoor unit capacity  $\geq$  Required total heat load on outdoor units?

No

Yes

TVR system selection is complete

#### Notes:

1. If the indoor design temperature falls between two temperatures listed in the indoor unit's capacity table, calculate the corrected capacity by interpolation. If the indoor unit selection is to be based on total heat load and sensible heat load, select indoor units which satisfy not only the total heat load requirements of each room but also the sensible heat load requirements of each room. As with total heat capacity, the sensible heat capacity of indoor units should be corrected for indoor temperature, interpolating where necessary. For the indoor unit capacity tables, refer to the indoor unit technical manuals.

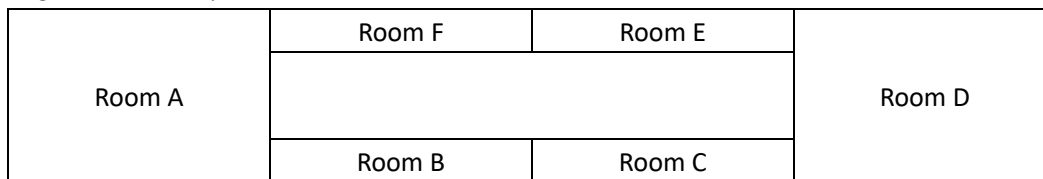
## TVR Ultra HR 50/60Hz



### 6.2 Example

The following is a selection example based on total heat load for cooling. All the indoor units are TVR indoor unit.

Figure 1-6.1: Room plan



#### Step 1: Establish design conditions

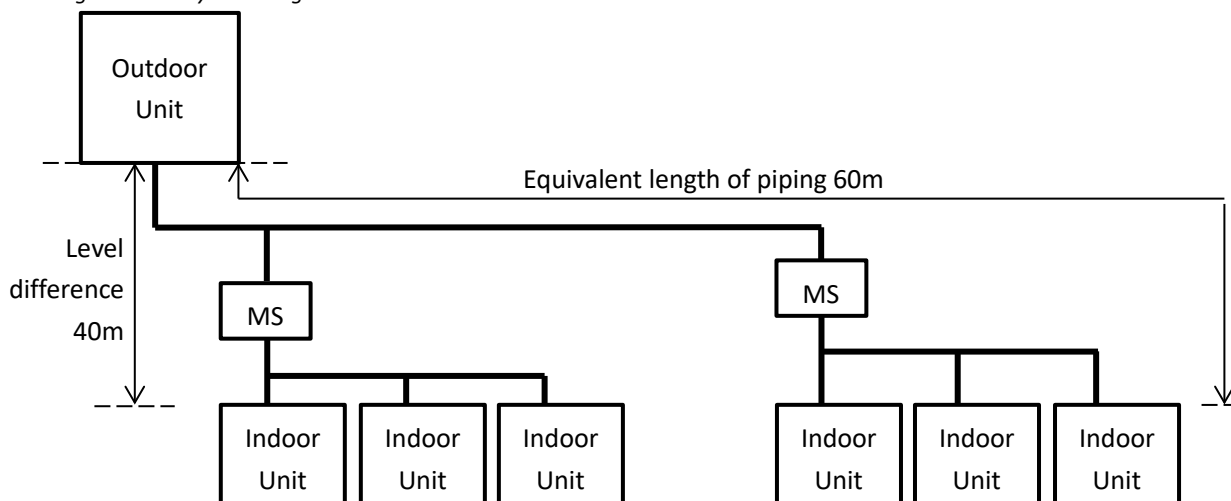
- Indoor air temperature 25°C DB, 18°C WB; outdoor air temperature 33°C DB.
- Determine peak load of each room and system peak load. As shown in Table 1-6.1, the system peak load is 34kW.

Table 1-6.1: Required heat load of each room (kW)

Time	Room A	Room B	Room C	Room D	Room E	Room F	Total
9:00	4.8	3.0	3.0	9.0	2.9	2.9	25.6
12:00	6.6	5.1	5.1	6.8	4.0	4.0	31.6
14:00	9.0	4.9	4.9	6.8	4.2	4.2	34
16:00	10.6	3.9	3.9	6.2	3.8	3.8	32.2

- The maximum piping lengths and level differences in this example are as given in Figure 1-6.2.

Figure 1-6.2: System diagram



- Indoor unit type for all rooms: Medium Static Pressure Duct (T2).

#### Step 2: Select indoor units

- In this example, a safety factor is not used (i.e. the safety factor is 1).
- Select indoor unit models using the medium static pressure duct cooling capacity table. Each indoor unit's corrected capacity needs to be greater than or equal to the peak load of the relevant room. The selected indoor units are shown in Table 1-6.3.

Table 1-6.2: Extract from medium static pressure duct (T2) cooling capacity table

Model	Capacity index	Indoor air temperature													
		14°C WB		16°C WB		18°C WB		19°C WB		20°C WB		22°C WB		24°C WB	
		20°C DB		23°C DB		26°C DB		27°C DB		28°C DB		30°C DB		32°C DB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
T2	22	1.5	1.4	1.8	1.5	2.1	1.6	2.2	1.6	2.3	1.7	2.4	1.5	2.4	1.5
	28	1.9	1.7	2.3	1.9	2.6	2.1	2.8	2.1	3.0	2.1	3.1	2.0	3.1	1.9
	36	2.5	2.1	2.9	2.3	3.4	2.5	3.6	2.6	3.8	2.7	4.2	2.8	3.9	2.3
	45	3.1	2.6	3.7	2.8	4.2	3.1	4.5	3.2	4.8	3.2	4.9	3.1	5.1	2.9
	56	3.9	3.0	4.6	3.3	5.3	3.6	5.6	3.7	5.9	3.8	6.2	3.7	6.2	3.4
	71	4.9	3.9	5.8	4.3	6.7	4.7	7.1	4.9	7.5	4.8	7.8	4.6	7.8	4.3
	80	5.5	4.4	6.6	4.9	7.5	5.3	8.0	5.5	8.4	5.5	8.8	5.2	8.8	4.8
	90	6.2	5.3	7.3	5.8	8.4	6.3	9.0	6.4	9.6	6.5	9.9	6.1	9.9	5.7
	112	7.7	6.4	9.1	7.1	10.5	7.7	11.2	7.8	11.9	8.1	12.5	7.8	12.5	7.4
	140	9.7	7.8	11.3	8.6	13.2	9.6	14.0	9.8	14.8	9.8	15.7	9.7	15.4	8.8

Abbreviations:

TC: Total capacity (kW); SHC: Sensible heat capacity (kW)

Table 1-6.3: Selected indoor units

	Room A	Room B	Room C
Peak heat load (kW)	10.6	5.1	5.1
Selected indoor unit	4TVD0048EF000AA	4TVD0018EF000AA	4TVD0018EF000AA
Corrected TC (kW)	13.2	5.3	5.3
	Room D	Room E	Room F
Peak heat load (kW)	9.0	4.2	4.2
Selected indoor unit	4TVD0038EF000AA	4TVD0015EF000AA	4TVD0015EF000AA
Corrected TC (kW)	10.5	4.2	4.2

### Step 3: Select outdoor units

- Determine the required total heat load from the indoor units to the outdoor units based on either the sum of the peak loads of each room or the system peak load. In this example, it is determined based on the system peak load. Therefore, the required heat load is 34kW.
- Provisionally select outdoor units using the sum of the capacity indexes (CIs) of the selected indoor units (as shown in Table 1-6.4), ensuring that the combination ratio is between 50% and 130%. Refer to Table 1-6.5. As the sum of CIs of the indoor units is 454, outdoor units from 14HP to 32HP are potentially suitable. Start from the smallest, which is the 14HP unit.

Table 1-6.4: Sum of indoor unit capacity indexes

Model	Capacity Index	No. of units
4TVD0048EF000AA	140	1
4TVD0038EF000AA	112	1
4TVD0018EF000AA	56	2
4TVD0015EF000AA	45	2
<b>Sum of CIs</b>	<b>454</b>	

# TVR Ultra HR 50/60Hz



Table 1-6.5: Extract from Table 1-5.2 Combinations of Indoor and outdoor units

Outdoor unit capacity			Sum of capacity indexes				Maximum number of connected indoor units
kW	HP	Capacity index	TVR indoor units only	TVR indoor units + HT hydro module	TVR indoor units + AHUs	TVR indoor units + fresh air processing units	
33.5	12	335	167.5 to 435.5	167.5 to 670	167.5 to 368.5	167.5 to 335	64
40	14	400	200 to 520	200 to 800	200 to 440	200 to 400	
45	16	450	225 to 585	225 to 900	225 to 495	225 to 450	
50	18	500	250 to 650	250 to 1000	250 to 550	250 to 500	
56	20	560	280 to 728	280 to 1120	280 to 616	280 to 560	
61.5	22	615	307.5 to 799.5	307.5 to 1230	307.5 to 676.5	307.5 to 615	
68	24	680	340 to 884	340 to 1360	340 to 748	340 to 680	
73.5	26	735	367.5 to 955.5	367.5 to 1470	367.5 to 808.5	367.5 to 735	
78.5	28	785	392.5 to 1020.5	392.5 to 1570	392.5 to 863.5	392.5 to 785	
83.5	30	835	417.5 to 1085.5	417.5 to 1670	417.5 to 918.5	417.5 to 835	
90	32	900	450 to 1170	450 to 1800	450 to 990	450 to 900	
95	34	950	475 to 1235	475 to 1900	475 to 1045	475 to 950	

- The number of connected indoor units is 6 and the maximum number of connected indoor units on the 14HP outdoor unit is 64, so the number of connected indoor units is within the limitation.
- Calculate the corrected capacity of the outdoor units:
  - a) The sum of the indoor unit CIs is 454 and the CI of the 14HP outdoor unit (4TVR0140EE000AA) is 400, so the combination ratio is  $454 / 400 = 113.5\%$ .
  - b) Using the outdoor units' cooling capacity table, interpolate to obtain the capacity ("B") corrected for outdoor air temperature, indoor air temperature, and combination ratio. Refer to Tables 1-6.6 and 1-6.7.

Table 1-6.6: Extract from Table 2-9.4 4TVR0140EE000AA cooling capacity

CR	Outdoor air temp. (°C DB)	Indoor air temp. (°C DB / °C WB)	
		25.8 / 18.0	
		TC	PI
		kW	kW
120%	31	48.00	11.02
	33	45.73	10.99
	35	44.05	11.00
110%	31	40.62	8.74
	33	40.62	9.38
	35	40.62	10.17

Table 1-6.7: Cooling capacity calculated by interpolation

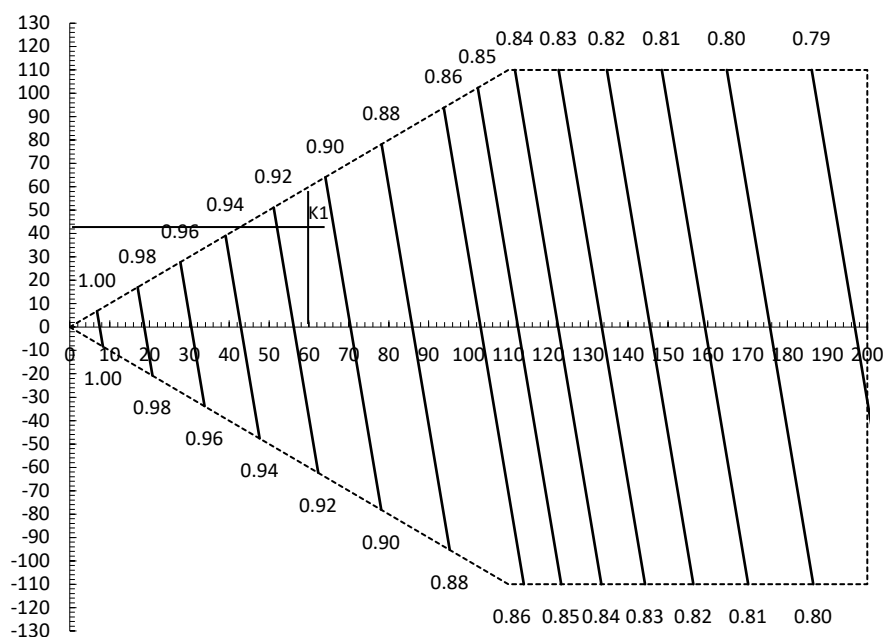
CR	Outdoor air temp. (°C DB)	Indoor air temp. (°C DB / °C WB)	
		25.8 / 18.0	
		TC	PI
		kW	kW
120%	33	45.73	10.99
		<b>B = 41.2<sup>1</sup></b>	
110%	33	40.62	9.38

Notes:

1.  $40.62 + (45.73 - 40.62) \times (113.5 - 110) / (120 - 110) = 41.2$ .

- c) Find the correction factor for piping length and level difference ("K1")

Figure 1-6.3: TVR ULTRA HR rate of change in cooling capacity



Notes:

1. The horizontal axis shows equivalent length of piping between farthest indoor unit and first outdoor branch joint; the vertical axis shows the largest level difference between indoor unit and outdoor unit. For level differences, positive values indicate that the outdoor unit is above the indoor unit, negative values indicate that the outdoor unit is below the indoor unit.

- d) Calculate the corrected capacity of 4TVR0140EE000AA ("C") by using K1:

$$C = B \times K1 = 41.2 \times 0.91 = 37.5\text{kW}$$

- The corrected capacity 37.5kW is larger than required total heat load 34kW, so selection is complete. (In the event that the corrected capacity is lower than the required total heat load, Step 3 should be repeated from the point where the outdoor unit capacity is provisionally selected.)





# Part 2

## Outdoor Unit

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## 1 Specifications

### 1.1 Outdoor Units

#### 8-12HP

Table 2-1.1: 8-12HP specifications

HP			8	10	12
Model name			4TVR0086EE000AA	4TVR0096EE000AA	4TVR0115EE000AA
Power supply		V/N/Hz	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	22.4	28	33.5
	Power input	kW	5.25	7.18	8.64
	EER		4.27	3.90	3.88
Heating <sup>2</sup> (Rated)	Capacity	kW	22.4	28	33.5
	Power input	kW	3.96	5.46	6.57
	COP		5.66	5.13	5.10
Heating <sup>2</sup> (Max)	Capacity	kW	25	31.5	37.5
	Power input	kW	4.69	7.12	9.48
	COP		5.33	4.43	3.95
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		1		
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		1		
	Motor output	kW	0.92	0.92	0.92
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	9000	9500	10000
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	8	8	8
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ12.7	Φ12.7	Φ12.7
	Low pressure gas pipe	mm	Φ25.4	Φ25.4	Φ25.4
	High pressure gas pipe	mm	Φ19.1	Φ19.1	Φ19.1
Sound pressure level <sup>5</sup>		dB(A)	58	58	60
Sound power level <sup>5</sup>		dB(A)	78	78	81
Net dimensions (W×H×D)		mm	990×1635×790	990×1635×790	990×1635×790
Packed dimensions (W×H×D)		mm	1090×1805×860	1090×1805×860	1090×1805×860
Net weight		kg	232	232	232
Gross weight		kg	248	248	248
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those of the unit's stop valve.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

**16-20HP**
*Table 2-1.2: 16-20HP specifications*

HP			14	16	18	20
Model name			4TVR0140EE000AA	4TVR0155EE000AA	4TVR0170EE000AA	4TVR0192EE000AA
Power supply		V/N/Hz	380-415/3/50(60)			
Cooling <sup>1</sup>	Capacity	kW	40	45	50	56
	Power input	kW	9.83	12.00	13.81	17.39
	EER		4.07	3.75	3.62	3.22
Heating <sup>2</sup> (Rated)	Capacity	kW	40	45	50	56
	Power input	kW	8.26	9.78	11.90	14.77
	COP		4.84	4.60	4.20	3.79
Heating <sup>2</sup> (Max)	Capacity	kW	45	50	56	63
	Power input	kW	9.78	12.26	14.77	18.33
	COP		4.60	4.08	3.79	3.44
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>			
	Maximum quantity		64	64	64	64
Compressor	Type		DC inverter			
	Quantity		1			
	Oil type		FV68H			
	Start-up method		Soft start			
Fan	Type		Propeller			
	Motor type		DC			
	Quantity		2			
	Motor output	kW	0.92×2	0.92×2	0.92×2	0.92×2
	Static pressure	Pa	0,20,40,60,80(Selectable)			
	Air flow rate	m <sup>3</sup> /h	14000	14900	15800	15800
	Drive type		Direct			
Refrigerant	Type		R410A			
	Factory charge	kg	10	10	10	10
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ15.9	Φ15.9	Φ15.9	Φ15.9
	Low pressure gas	mm	Φ28.6	Φ28.6	Φ28.6	Φ28.6
	High pressure gas	mm	Φ22.2	Φ22.2	Φ22.2	Φ22.2
Sound pressure level <sup>5</sup>		dB(A)	61	64	65	65
Sound power level <sup>5</sup>		dB(A)	81	88	88	88
Net dimensions (W×H×D)		mm	1340×1635×825	1340×1635×825	1340×1635×825	1340×1635×825
Packed dimensions (W×H×D)		mm	1405×1805×910	1405×1805×910	1405×1805×910	1405×1805×910
Net weight		kg	300	300	300	300
Gross weight		kg	325	325	325	325
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52			
	Heating	°C(WB)	-25 ~ 19			
	Domestic hot water	°C(DB)	-20 ~ 43			

**Notes:**

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those of the unit's stop valve.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

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## 22-26HP

Table 2-1.3: 22-26HP specifications

HP			22	24	26
Model name			4TVR0210EE000AA	4TVR0232EE000AA	4TVR0250EE000AA
Combination type			10HP+12HP	10HP+14HP	12HP+14HP
Power supply		V/N/Hz	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	61.5	68	73.5
	Power input	kW	15.82	17.01	18.46
	EER		3.89	4.00	3.98
Heating <sup>2</sup> (Rated)	Capacity	kW	61.5	68	73.5
	Power input	kW	12.03	13.72	14.83
	COP		5.11	4.96	4.96
Heating <sup>2</sup> (Max)	Capacity	kW	69.00	76.50	82.5
	Power input	kW	16.60	16.90	19.27
	COP		4.16	4.53	4.28
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		2		
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		2	2	3
	Motor output	kW	0.92×2	0.92×3	0.92×3
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	19500	23500	24000
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	16	18	18
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ15.9	Φ15.9	Φ19.1
	Low pressure gas pipe	mm	Φ28.6	Φ34.9	Φ34.9
	High pressure gas	mm	Φ28.6	Φ28.6	Φ28.6
Sound pressure level <sup>5</sup>		dB(A)	62	63	64
Sound power level <sup>5</sup>		dB(A)	83	83	84
Net dimensions (W×H×D)		mm	(990×1635×790)×2	990×1635×790+ 1340×1635×825	990×1635×790+ 1340×1635×825
Packed dimensions (W×H×D)		mm	(1090×1805×860)×2	1090×1805×860+ 1405×1805×910	1090×1805×860+ 1405×1805×910
Net weight		kg	232×2	232+300	232+300
Gross weight		kg	248×2	248+325	248+325
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

### Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

**28-32HP**
*Table 2-1.4: 28-32HP specifications*

HP			28	30	32
Model name			4TVR0268EE000AA	4TVR0285EE000AA	4TVR0308EE000AA
Combination type			12HP+16HP	12HP+18HP	16HP+16HP
Power supply		V/N/Hz	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	78.5	83.5	90
	Power input	kW	20.64	22.45	24.00
	EER		3.80	3.72	3.75
Heating <sup>2</sup> (Rated)	Capacity	kW	78.5	83.5	90
	Power input	kW	16.35	18.47	19.57
	COP		4.80	4.52	4.60
Heating <sup>2</sup> (Max)	Capacity	kW	87.5	93.5	100
	Power input	kW	21.74	24.25	24.52
	COP		4.02	3.86	4.08
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		2		
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		3	3	4
	Motor output	kW	0.92×3	0.92×3	0.92×4
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	24900	25800	29800
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	18	18	20
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ19.1	Φ19.1	Φ19.1
	Low pressure gas pipe	mm	Φ34.9	Φ34.9	Φ34.9
	High pressure gas pipe	mm	Φ28.6	Φ28.6	Φ28.6
Sound pressure level <sup>5</sup>		dB(A)	65	66	67
Sound power level <sup>5</sup>		dB(A)	89	89	91
Net dimensions (W×H×D)		mm	990×1635×790+ 1340×1635×825	990×1635×790+ 1340×1635×825	(1340×1635×825)×2
Packed dimensions (W×H×D)		mm	1090×1805×860+ 1405×1805×910	1090×1805×860+ 1405×1805×910	(1405×1805×910)×2
Net weight		kg	232+300	232+300	300×2
Gross weight		kg	248+325	248+325	325×2
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

**Notes:**

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

# TVR Ultra HR 50/60Hz



## 34-38HP

Table 2-1.5: 34-38HP specifications

HP			34	36	38
Model name			4TVR0325EE000AA	4TVR0342EE000AA	4TVR0362EE000AA
Combination type			16HP+18HP	18HP+18HP	18HP+20HP
Power supply		V/N/Hz	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	95	100	106
	Power input	kW	25.81	27.62	31.20
	EER		3.68	3.62	3.40
Heating <sup>2</sup> (Rated)	Capacity	kW	95	100	106
	Power input	kW	21.69	23.81	26.67
	COP		4.38	4.20	3.97
Heating <sup>2</sup> (Max)	Capacity	kW	106	112	119
	Power input	kW	27.03	29.53	33.09
	COP		3.92	3.79	3.60
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		2		
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		4		
	Motor output	kW	0.92×4	0.92×4	0.92×4
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	30700	31600	31600
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	20	20	20
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ19.1	Φ19.1	Φ19.1
	Low pressure gas	mm	Φ34.9	Φ34.9	Φ41.3
	High pressure gas	mm	Φ28.6	Φ28.6	Φ34.9
Sound pressure level <sup>5</sup>		dB(A)	68	68	68
Sound power level <sup>5</sup>		dB(A)	91	91	91
Net dimensions (W×H×D)		mm	(1340×1635×825)×2	(1340×1635×825)×2	(1340×1635×825)×2
Packed dimensions (W×H×D)		mm	(1405×1805×910)×2	(1405×1805×910)×2	(1405×1805×910)×2
Net weight		kg	300×2	300×2	300×2
Gross weight		kg	325×2	325×2	325×2
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

**40-44HP**

Table 2-1.6: 40-44HP specifications

HP			40	42	44
Model name			4TVR0382EE000AA	4TVR0404EE000AA	4TVR0422EE000AA
Combination type			20HP+20HP	12HP+14HP+16HP	12HP+16HP+16HP
Power supply		V/N/H	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	112	118.5	123.5
	Power input	kW	34.78	30.46	32.64
	EER		3.22	3.89	3.78
Heating <sup>2</sup> (Rated)	Capacity	kW	112	118.5	123.5
	Power input	kW	29.53	24.62	26.13
	COP		3.79	4.81	4.73
Heating <sup>2</sup> (Max)	Capacity	kW	126	132.5	137.5
	Power input	kW	36.65	31.53	34.01
	COP		3.44	4.20	4.04
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		2	3	3
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		4	5	5
	Motor output	kW	0.92×4	0.92×5	0.92×5
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	31600	38900	39800
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	20	28	28
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ19.1	Φ19.1	Φ19.1
	Low pressure gas	mm	Φ41.3	Φ41.3	Φ41.3
	High pressure gas	mm	Φ34.9	Φ34.9	Φ34.9
Sound pressure level <sup>5</sup>		dB(A)	68	67	68
Sound power level <sup>5</sup>		dB(A)	91	89	91
Net dimensions (W×H×D)		mm	(1340×1635×825)×2	990×1635×790+ (1340×1635×825)×2	990×1635×790+ (1340×1635×825)×2
Packed dimensions (W×H×D)		mm	(1405×1805×910)×2	1090×1805×860+ (1405×1805×910)×2	1090×1805×860+ (1405×1805×910)×2
Net weight		kg	300×2	232+300×2	232+300×2
Gross weight		kg	325×2	248+325×2	248+325×2
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

## Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

# TVR Ultra HR 50/60Hz



## 46-50HP

Table 2-1.7: 46-50HP specifications

HP			46	48	50
Model name			4TVR0444EE000AA	4TVR0462EE000AA	4TVR0479EE000AA
Combination type			14HP+16HP+16HP	16HP+16HP+16HP	16HP+16HP+18HP
Power supply		V/N/Hz	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	130	135	140
	Power input	kW	33.83	36.00	37.81
	EER		3.84	3.75	3.70
Heating <sup>2</sup> (Rated)	Capacity	kW	130	135	140
	Power input	kW	27.83	29.35	31.47
	COP		4.67	4.60	4.45
Heating <sup>2</sup> (Max)	Capacity	kW	145	150	156
	Power input	kW	34.31	36.79	39.29
	COP		4.23	4.08	3.97
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		3		
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		6	6	6
	Motor output	kW	0.92×6	0.92×6	0.92×6
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	43800	44700	45600
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	30	30	30
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ19.1	Φ19.1	Φ19.1
	Low pressure gas pipe	mm	Φ41.3	Φ41.3	Φ41.3
	High pressure gas pipe	mm	Φ34.9	Φ34.9	Φ34.9
Sound pressure level <sup>5</sup>		dB(A)	68	69	69
Sound power level <sup>5</sup>		dB(A)	91	93	93
Net dimensions (W×H×D)		mm	(1340×1635×825)×3	(1340×1635×825)×3	(1340×1635×825)×3
Packed dimensions (W×H×D)		mm	(1405×1805×910)×3	(1405×1805×910)×3	(1405×1805×910)×3
Net weight		kg	300×3	300×3	300×3
Gross weight		kg	325×3	325×3	325×3
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

### Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.



**52-56HP**

Table 2-1.8: 52-56HP specifications

HP			52	54	56
Model name			4TVR0496EE000AA	4TVR0513EE000AA	4TVR0533EE000AA
Combination type			16HP+18HP+18HP	18HP+18HP+18HP	18HP+18HP+20HP
Power supply		V/N/Hz	380-415/3/50(60)		
Cooling <sup>1</sup>	Capacity	kW	145	150	156
	Power input	kW	39.62	41.44	45.01
	EER		3.66	3.62	3.47
Heating <sup>2</sup> (Rated)	Capacity	kW	145	150	156
	Power input	kW	33.59	35.71	38.58
	COP		4.32	4.20	4.04
Heating <sup>2</sup> (Max)	Capacity	kW	162	168	175
	Power input	kW	41.80	44.30	47.86
	COP		3.97	3.88	3.79
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity <sup>3</sup>		
	Maximum quantity		64	64	64
Compressor	Type		DC inverter		
	Quantity		3		
	Oil type		FV68H		
	Start-up method		Soft start		
Fan	Type		Propeller		
	Motor type		DC		
	Quantity		6	6	6
	Motor output	kW	0.92×6	0.92×6	0.92×6
	Static pressure	Pa	0,20,40,60,80(Selectable)		
	Air flow rate	m <sup>3</sup> /h	46500	47400	47400
	Drive type		Direct		
Refrigerant	Type		R410A		
	Factory charge	kg	30	30	30
Pipe connections <sup>4</sup>	Liquid pipe	mm	Φ19.1	Φ19.1	Φ19.1
	Low pressure gas	mm	Φ41.3	Φ41.3	Φ41.3
	High pressure gas	mm	Φ34.9	Φ34.9	Φ34.9
Sound pressure level <sup>5</sup>		dB(A)	69	70	70
Sound power level <sup>5</sup>		dB(A)	93	93	93
Net dimensions (W×H×D)		mm	(1340×1635×825)×3	(1340×1635×825)×3	(1340×1635×825)×3
Packed dimensions (W×H×D)		mm	(1405×1805×910)×3	(1405×1805×910)×3	(1405×1805×910)×3
Net weight		kg	300×3	300×3	300×3
Gross weight		kg	325×3	325×3	325×3
Ambient temp. operation range	Cooling <sup>6</sup>	°C(DB)	-15 ~ 52		
	Heating	°C(WB)	-25 ~ 19		
	Domestic hot water	°C(DB)	-20 ~ 43		

Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

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## 58-60HP

Table 2-1.9: 58-60HP specifications

HP			58	60
Model name			4TVR0553EE000AA	4TVR0573EE000AA
Combination type			18HP+20HP+20HP	20HP+20HP+20HP
Power supply		V/N/Hz	380-415/3/50(60)	
Cooling <sup>1</sup>	Capacity	kW	162	168
	Power input	kW	48.59	52.17
	EER		3.33	3.22
Heating <sup>2</sup> (Rated)	Capacity	kW	162	168
	Power input	kW	41.44	44.30
	COP		3.91	3.79
Heating <sup>2</sup> (Max)	Capacity	kW	182	189
	Power input	kW	51.42	54.98
	COP		3.54	3.44
Connected indoor unit	Total capacity		50-200% of outdoor unit capacity	
	Maximum quantity		64	64
Compressor	Type		DC inverter	
	Quantity		3	
	Oil type		FV68H	
	Start-up method		Soft start	
Fan	Type		Propeller	
	Motor type		DC	
	Quantity		6	6
	Motor output	kW	0.92×6	0.92×6
	Static pressure	Pa	0,20,40,60,80(Selectable)	
	Air flow rate	m <sup>3</sup> /h	47400	47400
	Drive type		Direct	
Refrigerant	Type		R410A	
	Factory charge	kg	30	30
Pipe connections <sup>3</sup>	Liquid pipe	mm	Φ19.1	Φ19.1
	Low pressure gas pipe	mm	Φ41.3	Φ41.3
	High pressure gas pipe	mm	Φ34.9	Φ34.9
Sound pressure level <sup>4</sup>		dB(A)	70	70
Sound power level <sup>4</sup>		dB(A)	93	93
Net dimensions (W×H×D)		mm	(1340×1635×825)×3	(1340×1635×825)×3
Packed dimensions (W×H×D)		mm	(1405×1805×910)×3	(1405×1805×910)×3
Net weight		kg	300×3	300×3
Gross weight		kg	325×3	325×3
Ambient temp. operation range	Cooling	°C(DB)	-15 ~ 52	
	Heating	°C(WB)	-25 ~ 19	
	Domestic hot water	°C(DB)	-20 ~ 43	

### Notes:

- Indoor air temperature 27°C DB, 19°C WB; outdoor air temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor air temperature 20°C DB; outdoor air temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Refer to table 1-5.1: Indoor and outdoor unit combination ratio limitations in Part 1.
- Diameters given are those for the pipe connecting the outdoor unit combination to the first indoor branch joint for systems with total equivalent liquid piping lengths of less than 90m. For systems with total equivalent liquid piping lengths of 90m or longer, please refer to Part 3 "System Design and Installation" for connection piping diameters.
- Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber.
- 15°C to -5°C low temperature cooling operation is just available for MS01.

## 1.2 Mode Selection Box

### TMSBOX01E / TMSBOX04E / TMSBOX06E

Table 2-1.10: TMSBOX01E, TMSBOX04E, TMSBOX06E specifications

Model name			TMSBOX01E <sup>1</sup>	TMSBOX04E	TMSBOX06E
Power supply	V/ph/Hz		220-240/1/50(60)		
Max. number of indoor unit groups			1	4	6
Max. number of units per group			8	5	5
Max. number of downstream indoor units			8	20	30
Max. capacity of each group of indoor units	kW		32	16	16
Total capacity of downstream indoor units	kW		32	49	63
Pipe connections to ODU	Liquid pipe	mm	Ø9.53/Ø12.7	Ø9.53/Ø12.7/Ø15.9/Ø19.05	Ø9.53/Ø12.7/Ø15.9/Ø19.05
	Low pressure gas pipe	mm	Ø15.9/Ø19.1/Ø22.2	Ø19.1/Ø22.2/Ø28.6	Ø19.1/Ø22.2/Ø28.6
	High pressure gas pipe	mm	Ø12.7/Ø15.9/Ø19.1	Ø15.9/Ø19.1/Ø22.2/Ø28.6	Ø15.9/Ø19.1/Ø22.2/Ø28.6
Pipe connections to IDU	Liquid pipe	mm	Ø6.35/Ø9.53	Ø6.35/Ø9.53	Ø6.35/Ø9.53
	Gas pipe	mm	Ø12.7/Ø15.9	Ø12.7/Ø15.9	Ø12.7/Ø15.9
Sound pressure level <sup>2</sup>	dB(A)		40	44	45
Sound power level <sup>2</sup>	dB(A)		60	63	65
Net dimensions (W×H×D)	mm		440×195×296	668×250×574	668×250×574
Packed dimensions (W×H×D)	mm		740×275×405	1020×390×850	1020×390×850
Net weight	kg		10.5	33	36
Gross weight	kg		14	58	61

Notes:

- MS01 is for low temperature cooling operation and leakage detection.
- The sound level is measured at a position 1m below the MS box in a semi-anechoic chamber whilst the MS box is switching mode. MS box should not be installed in locations with low-noise requirements.

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## TMSBOX08E / TMSBOX10E / TMSBOX12E

Table 2-1.11: TMSBOX08E, TMSBOX10E, TMSBOX12E specifications

Model name			TMSBOX08E	TMSBOX10E	TMSBOX12E
Power supply		V/ph/Hz	220-240/1/50(60)		
Max. number of indoor unit groups			8	10	12
Max. number of units per group			5	5	5
Max. number of downstream indoor units			40	47	47
Max. capacity of each group of indoor units		kW	16	16	16
Total capacity of downstream indoor units		kW	85	85	85
Pipe connections to ODU	Liquid pipe	mm	Ø12.7/Ø15.9/Ø19.1/Ø22.2	Ø12.7/Ø15.9/Ø19.1/Ø22.2	Ø12.7/Ø15.9/Ø19.1/Ø22.2
	Low pressure gas pipe	mm	Ø22.2/Ø28.6/Ø34.9	Ø22.2/Ø28.6/Ø34.9	Ø22.2/Ø28.6/Ø34.9
	High pressure gas pipe	mm	Ø19.1/Ø22.2/Ø28.6	Ø19.1/Ø22.2/Ø28.6	Ø19.1/Ø22.2/Ø28.6
Pipe connections to IDU	Liquid pipe	mm	Ø6.35/Ø9.53	Ø6.35/Ø9.53	Ø6.35/Ø9.53
	Gas pipe	mm	Ø12.7/Ø15.9	Ø12.7/Ø15.9	Ø12.7/Ø15.9
Sound pressure level <sup>1</sup>		dB(A)	47	47	47
Sound power level <sup>1</sup>		dB(A)	65	65	65
Net dimensions (W×H×D)		mm	974×250×574	974×250×574	974×250×574
Packed dimensions (W×H×D)		mm	1320×390×850	1320×390×850	1320×390×850
Net weight		kg	48	51	54
Gross weight		kg	79	82	85

Notes:

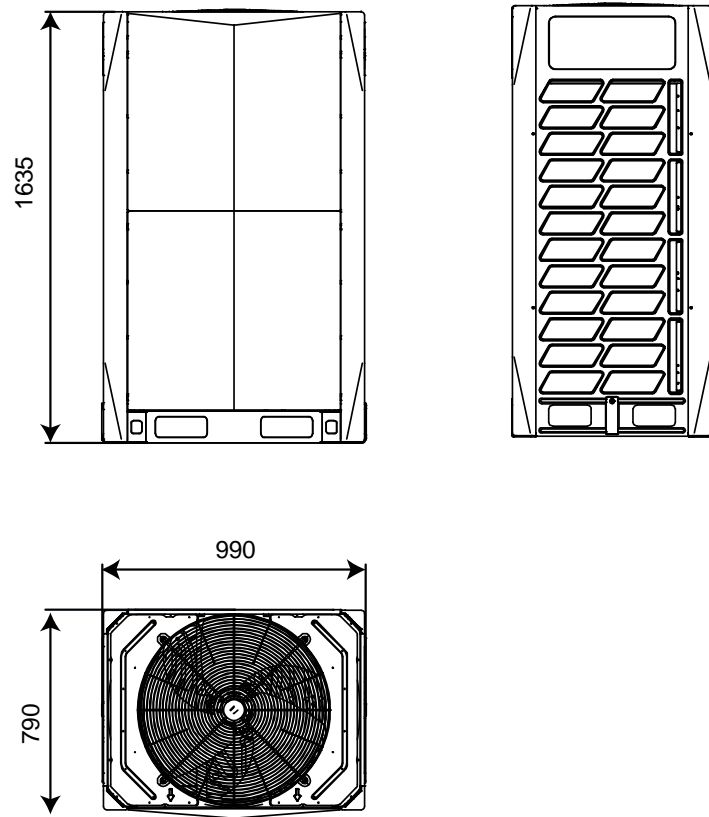
1. The sound level is measured at a position 1m below the MS box in a semi-anechoic chamber whilst the MS box is switching mode. MS box should not be installed in locations with low-noise requirements.

## 2 Dimensions

### 2.1 Single Units

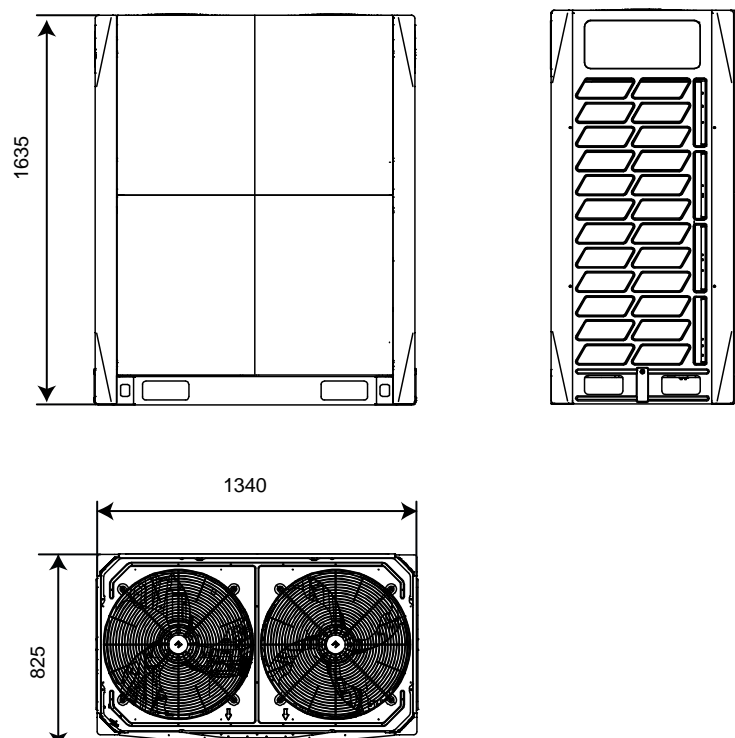
#### 8/10/12HP

Figure 2-2.1: 8/10/12HP dimensions (unit: mm)



#### 14/16/18/20HP

Figure 2-2.2: 14/16/18/20HP dimensions (unit: mm)



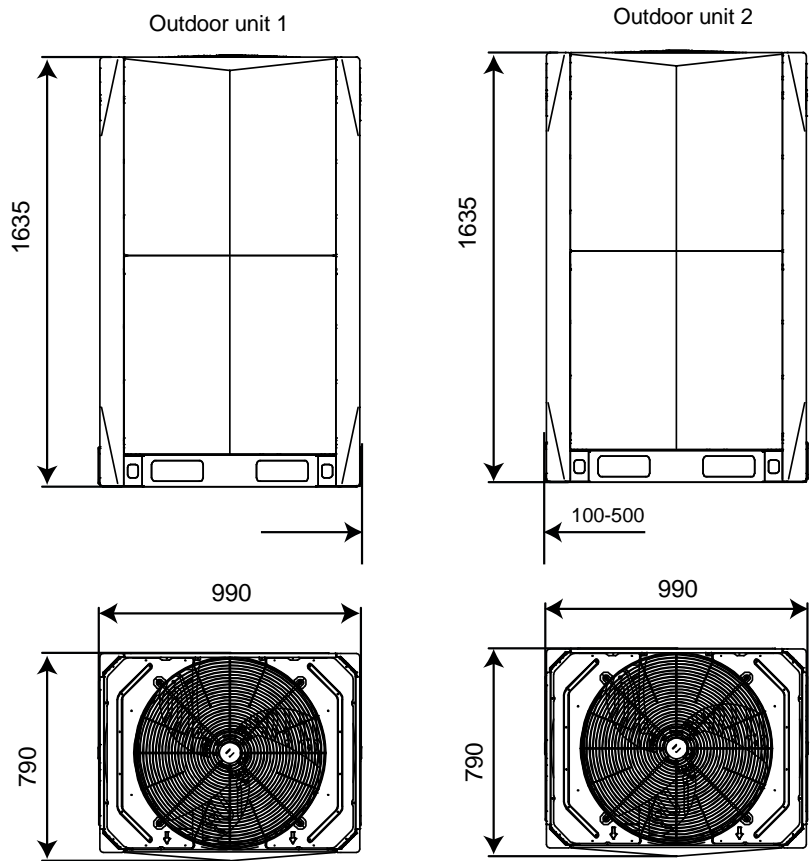
# TVR Ultra HR 50/60Hz



## 2.2 Combinations of Units

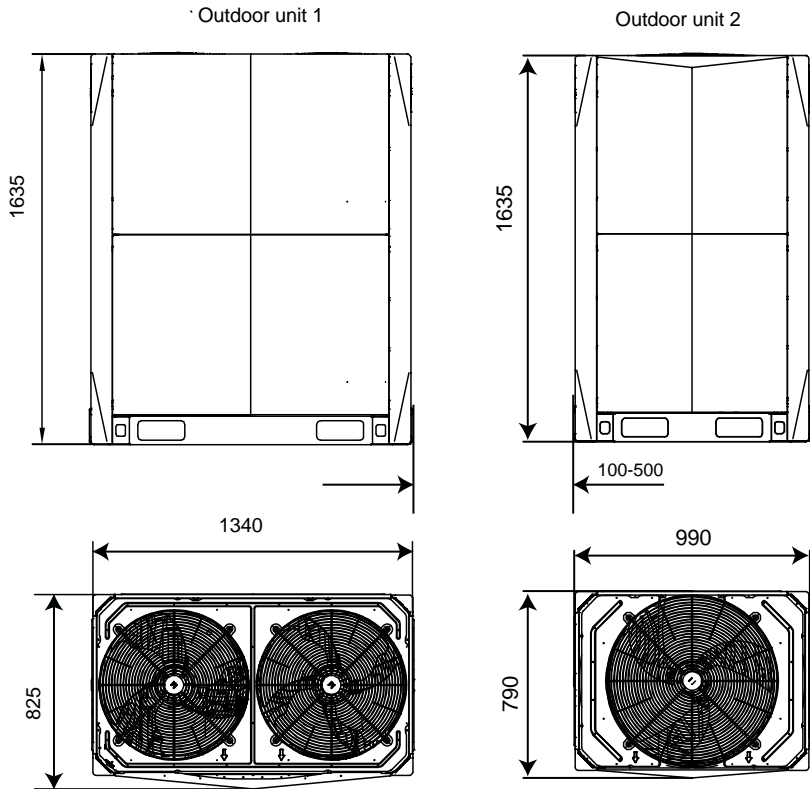
### 22HP

Figure 2-2.3: 22HP dimensions (unit: mm)



### 24/26/28/30HP

Figure 2-2.4: 24/26/28/30HP dimensions (unit: mm)



**32/34/36/38/40HP**

Figure 2-2.5: 32/34/36/38/40HP dimensions (unit: mm)

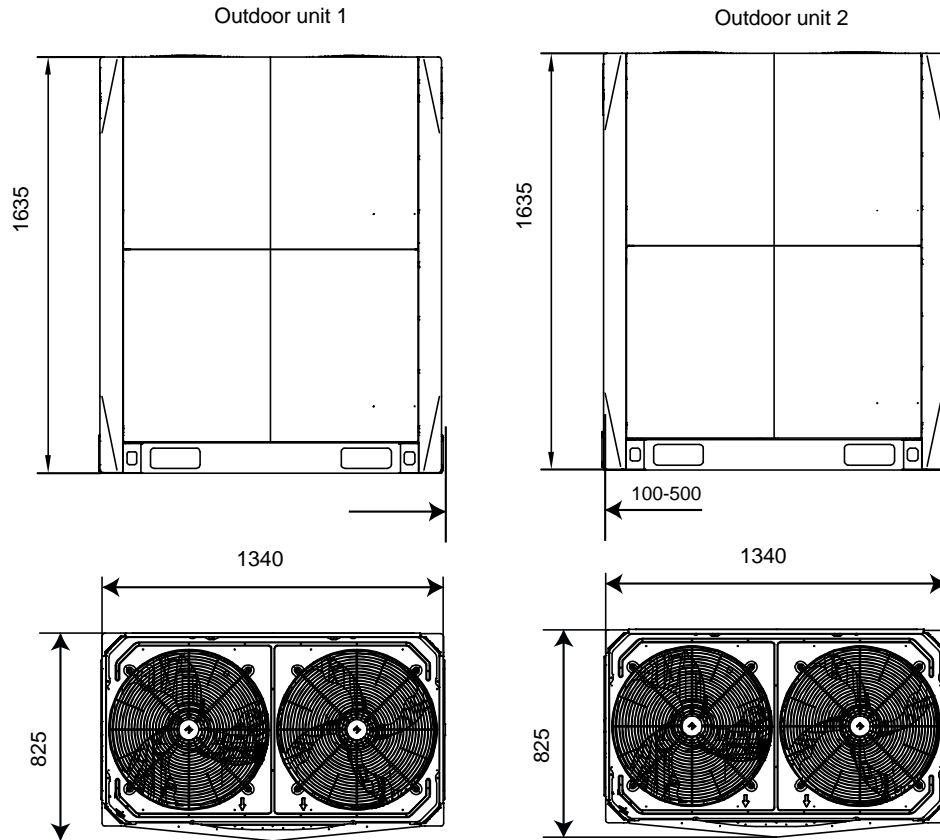
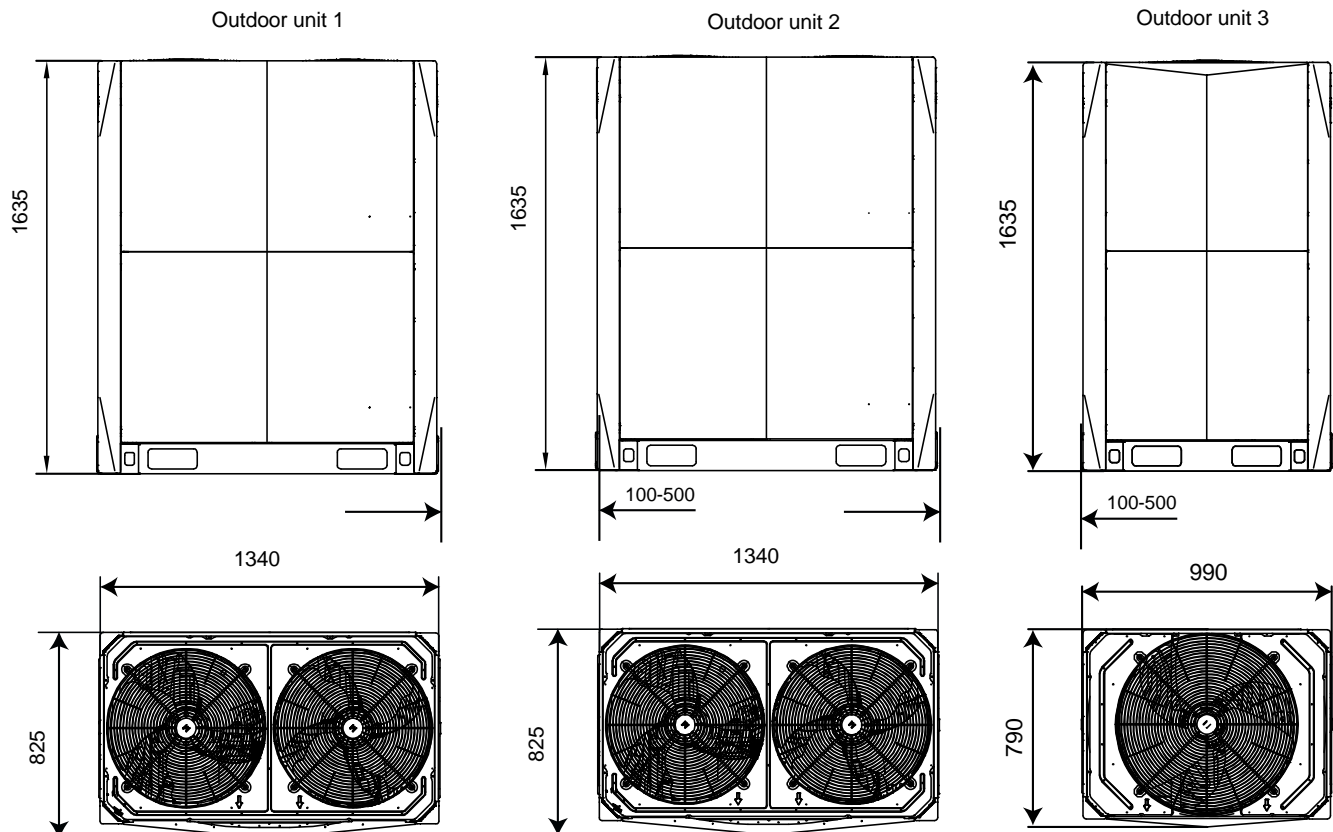

**42/44HP**

Figure 2-2.6: 42/44HP dimensions (unit: mm)

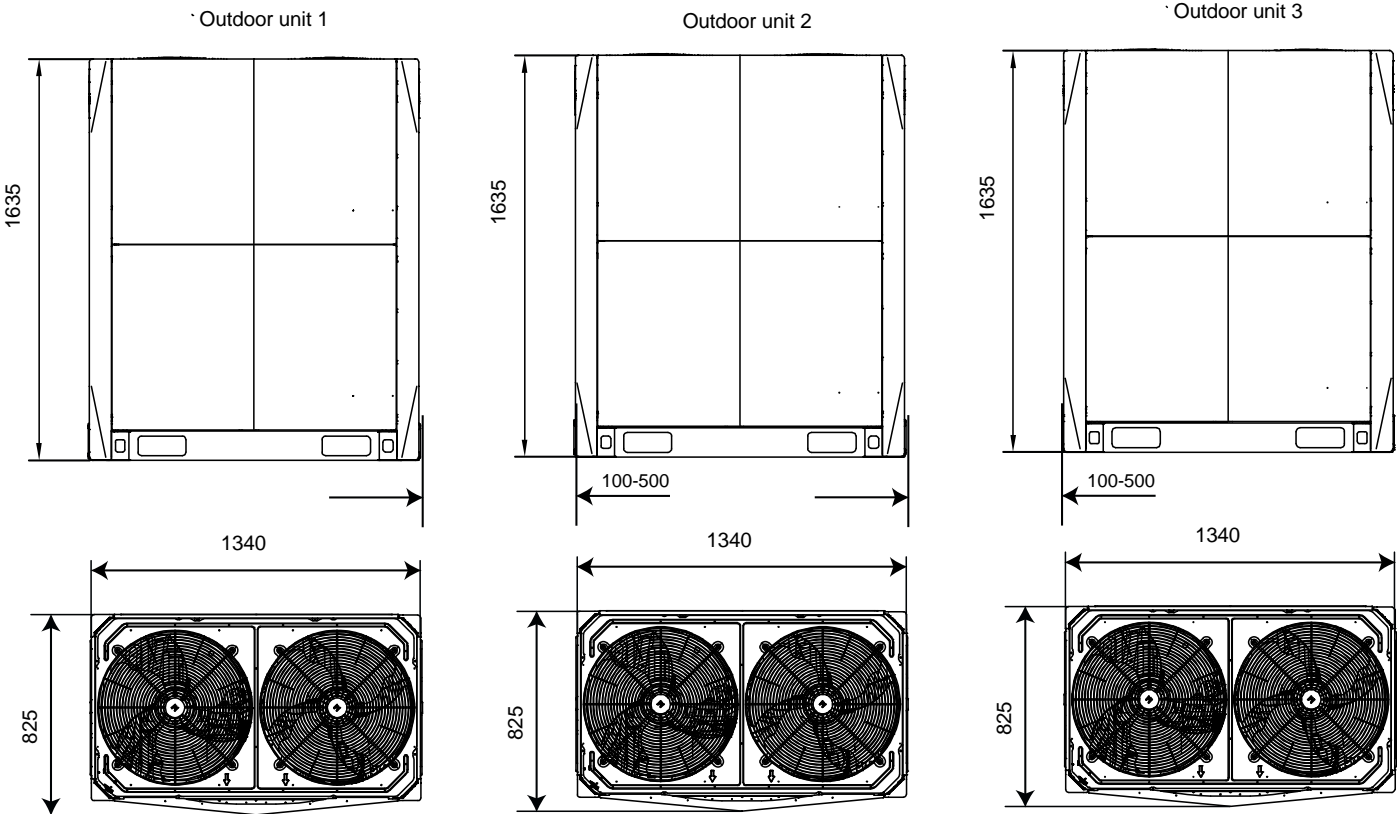


TVR Ultra HR 50/60Hz

46/48/50/52/54/56/58/60HP



Figure 2-2.7: 46/48/50/52/54/56/58/60HP dimensions (unit: mm)

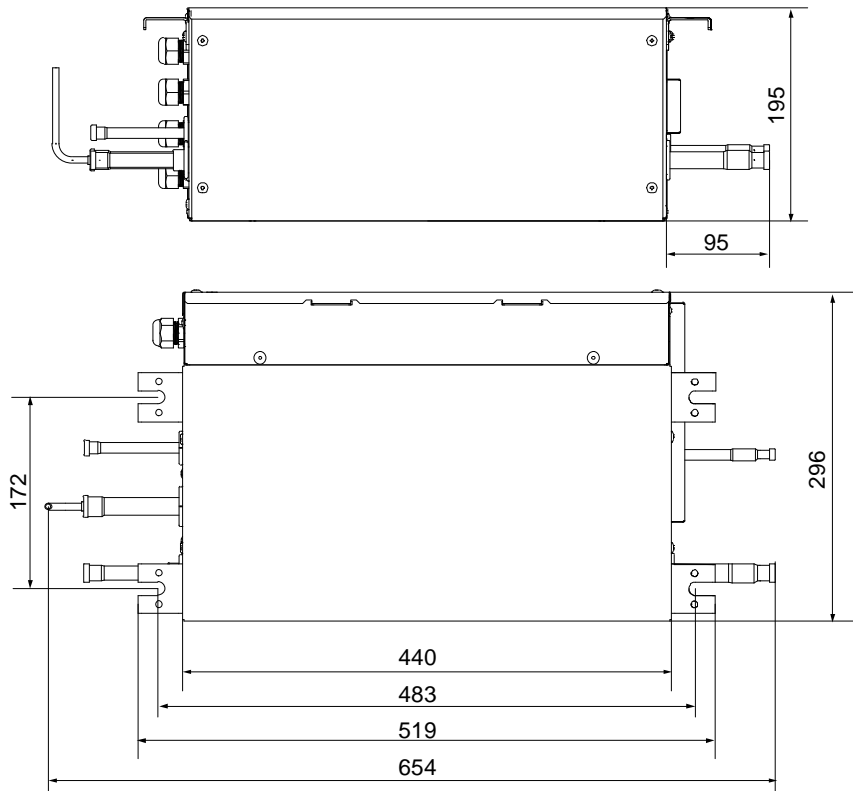




## 2.3 Mode Selection Box

### MS01

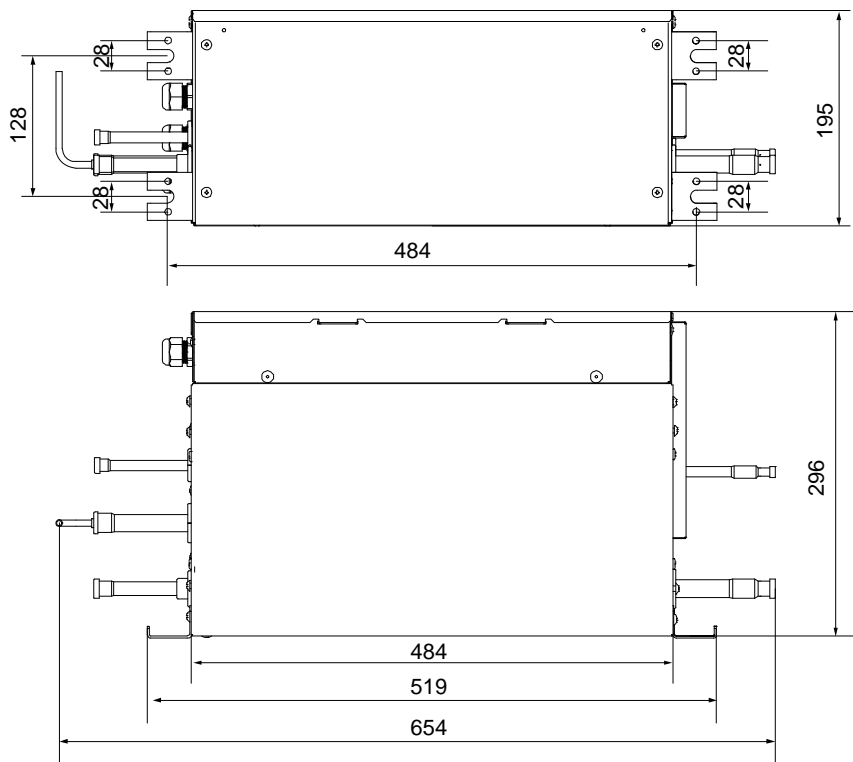
Figure 2-2.8: Ceiling-suspended type MS01 dimensions (unit: mm)



Notes :

1. MS01 can be ceiling-suspended installed and wall-mounted installed.
2. MS01 is for low temperature cooling operation and leakage detection.

Figure 2-2.9: Wall-mounted type MS01 dimensions (unit: mm)



Notes :

1. MS01 can be ceiling-suspended installed and wall-mounted installed.
2. Low temperature cooling operation and leakage detection function are available in MS01.

# TVR Ultra HR 50/60Hz

MS04-12



Figure 2-2.8: MS04-12 dimensions (unit: mm)

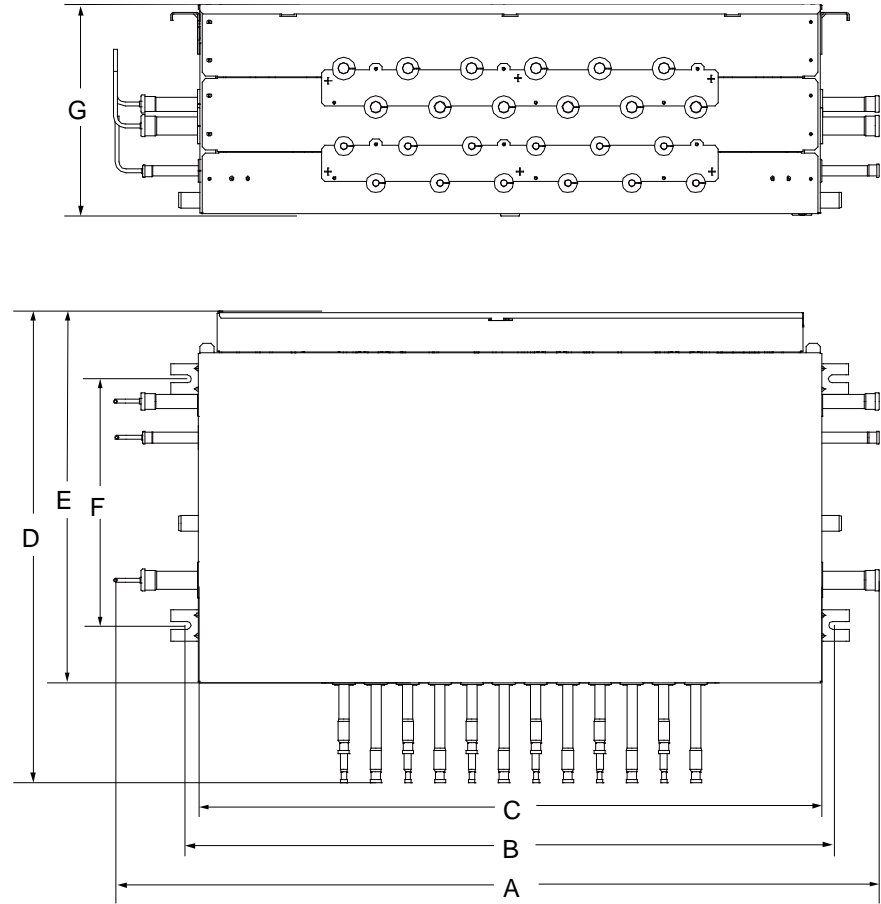


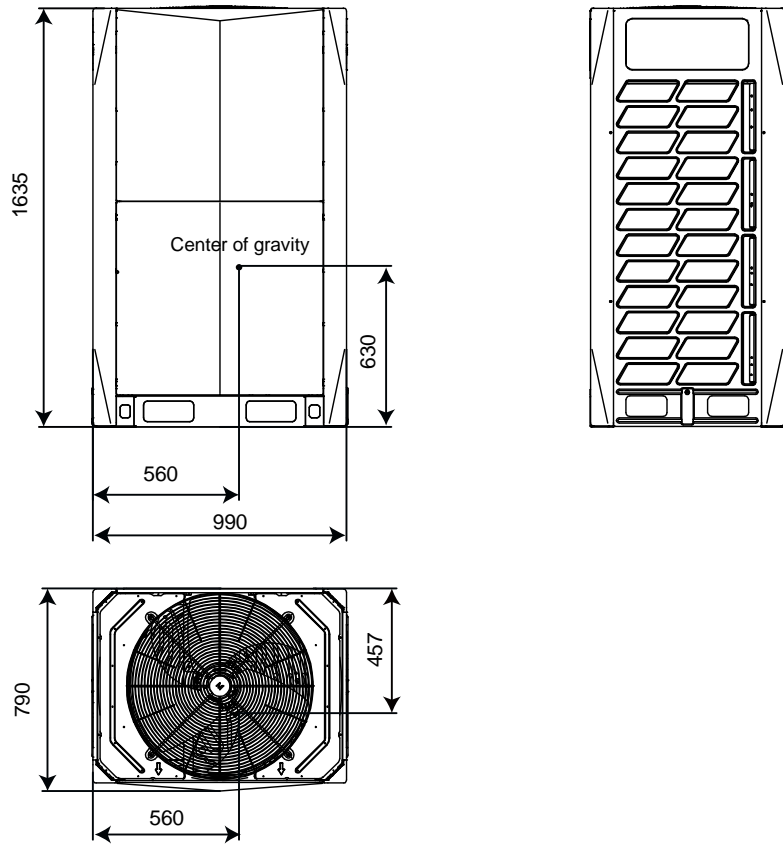
Table 2-1.1: MS04-12 dimensions (unit :mm)

Model	A	B	C	D	E	F	G
MS04 MS06	889	702	700	700	574	383	250
MS08 MS10 MS12	1195	1008	700	700	574	383	250

### 3 Center of Gravity

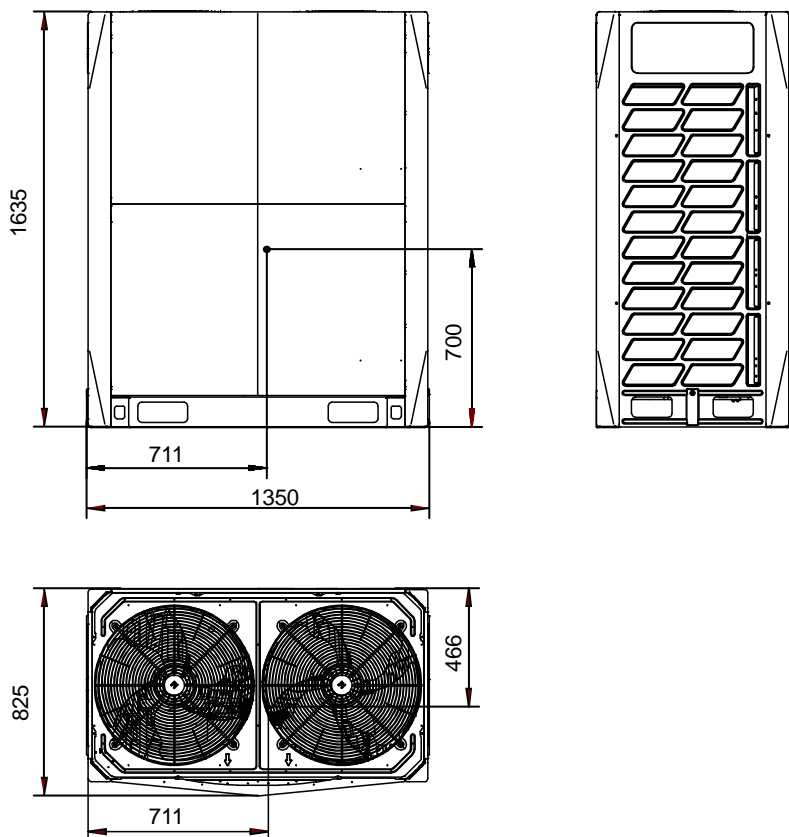
#### 8/10/12HP

Figure 2-3.1: 8/10/12HP center of gravity (unit: mm)



#### 14/16/18/20HP

Figure 2-3.2: 14/16/18/20HP center of gravity (unit: mm)

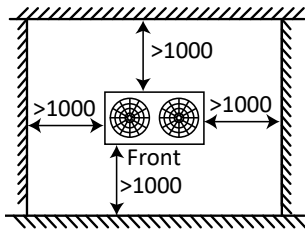


## 4 Installation Space Requirements

### 4.1 Outdoor Units Space Requirements

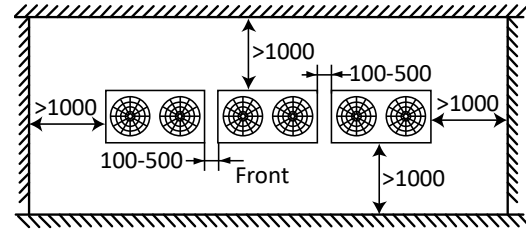
#### For single unit installation

Figure 2-4.1: Single unit installation (unit: mm)



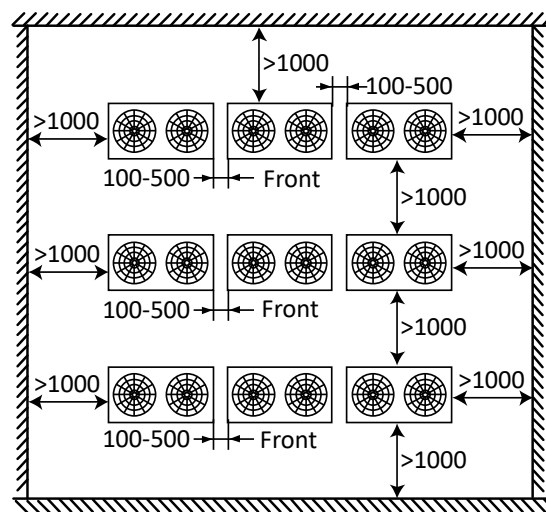
#### For single row installation

Figure 2-4.2: Single row installation (unit: mm)



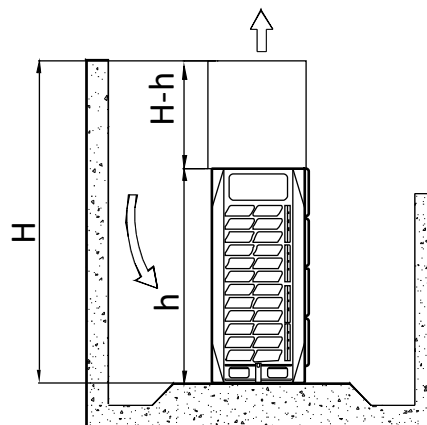
#### For multi-row installation

Figure 2-4.3: Multi-row installation (unit: mm)



Depending on the height of adjacent walls relative to the height of the units, ducting may be required to ensure proper air discharge. In the situation depicted in Figure 2-4.4, the vertical section of ducting should be at least  $H-h$  high.

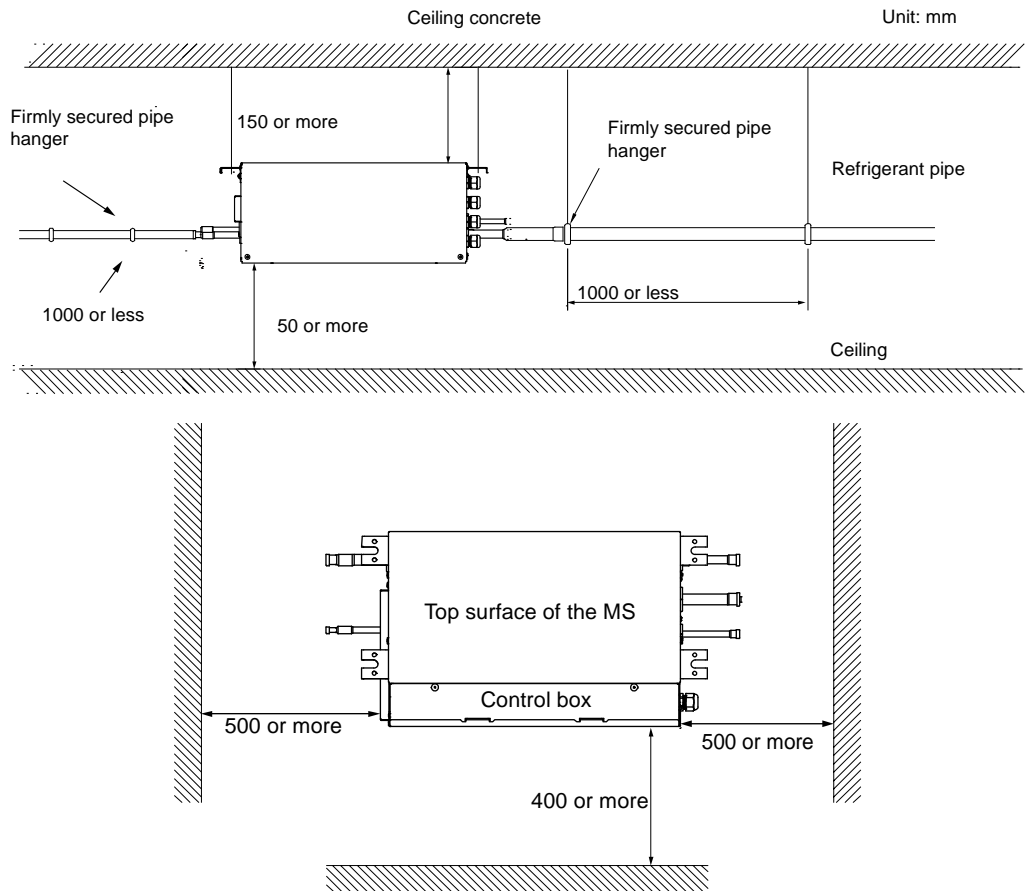
Figure 2-4.4: Top of unit below top of adjacent wall



## 4.2 Mode Selection Box Space Requirements

### MS01

Figure 2-4.5: MS01 installation requirement (unit: mm)

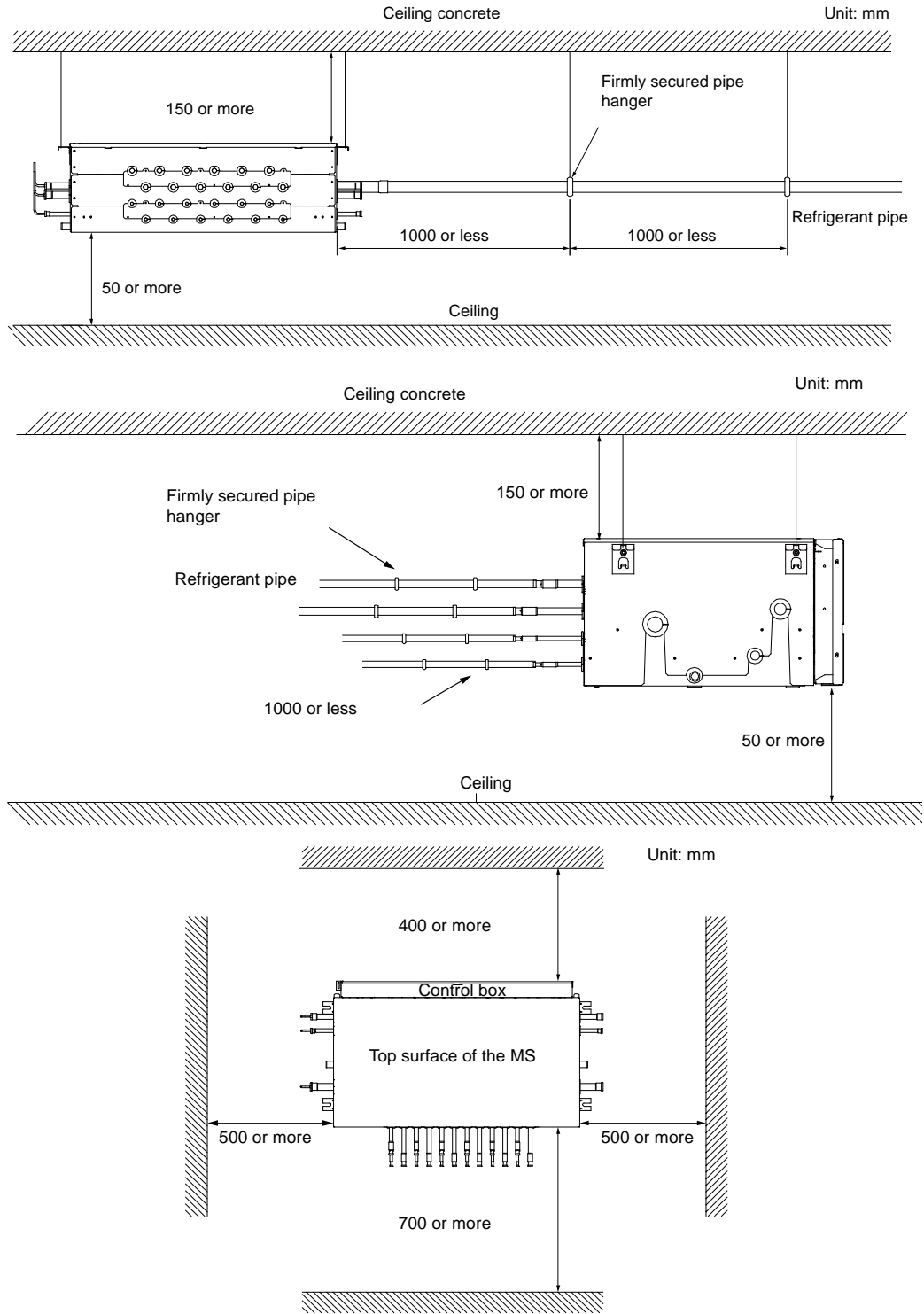


# TVR Ultra HR 50/60Hz

MS04-12

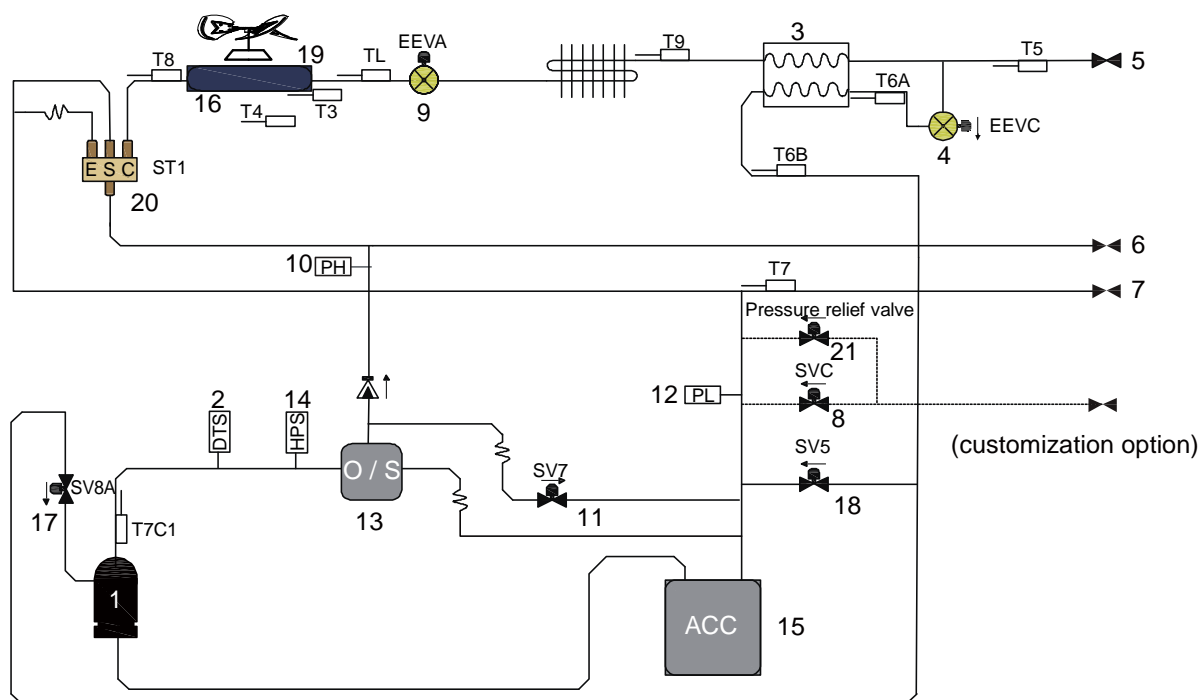


Figure 2-4.6: MS04-12 installation requirement (unit: mm)



## 5 Piping Diagrams

Figure 2-5.1: 8HP/10HP/12HP piping diagram

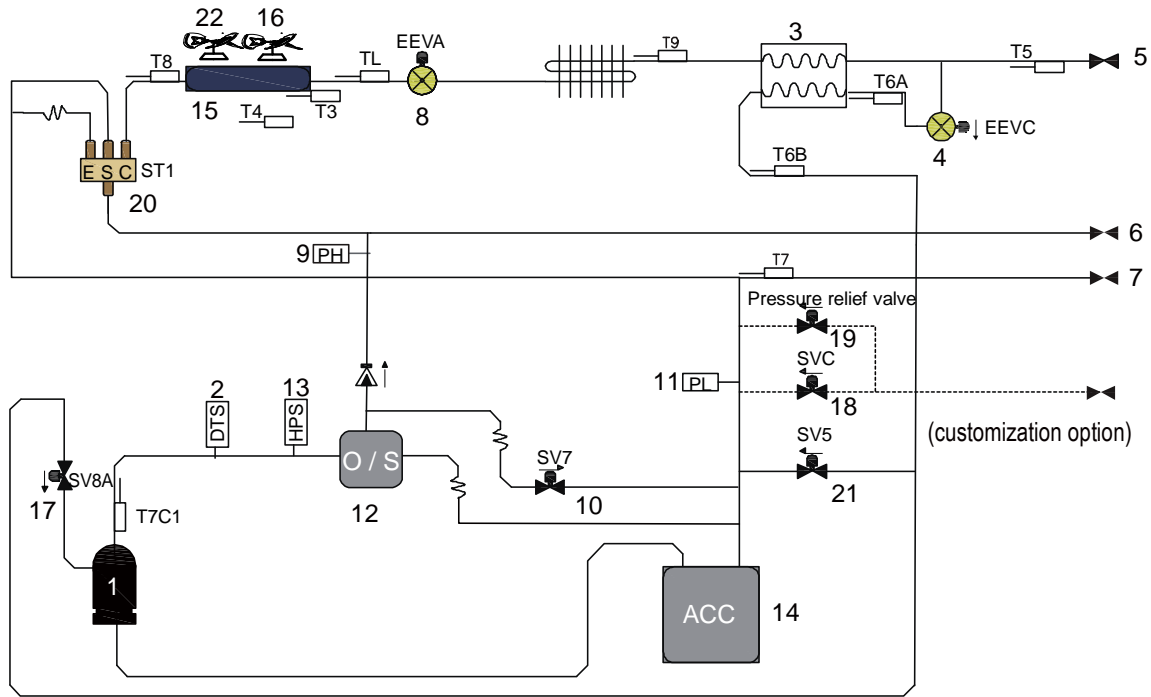


Legend			
No.	Parts name	No.	Parts name
1	Inverter compressor	17	Compressor vapor injection valve ( SV8A)
2	Discharge temperature switch	18	Injection bypass solenoid valve(SV5)
3	Plate heat exchanger	19	FAN A
4	Electronic expansion valve (EEVC)	20	4-way valve
5	Stop valve (liquid side)	21	Pressure relief valve (customization option)
6	Stop valve (high pressure gas side)	Sensor Code	Description
7	Stop valve (low pressure gas side)	T3	Heat exchanger deicer temperature sensor
8	Refrigerant charge solenoid valve(SVC) (customization option)	T4	Outdoor air temperature sensor
9	Electronic expansion valve (EEVA)	T5	Liquid pipe temperature sensor
10	High pressure sensor	T6A	Injection liquid temperature sensor
11	Hot gas bypass solenoid valve(SV7)	T6B	Subcooling gas temperature sensor
12	Low pressure sensor	T7	Suction temperature sensor
13	Oil separator	T8	Heat exchanger gas temperature sensor
14	High pressure switch	T9	Heat sink temperature sensor
15	Gas-liquid separator	TL	Heat exchanger liquid temperature sensor
16	Heat exchanger	T7C1	Compressor discharge temperature sensor

# TVR Ultra HR 50/60Hz



Figure 2-5.2: 14HP/16HP/18HP/20HP piping diagram



Legend			
No.	Parts name	No.	Parts name
1	Inverter compressor	18	Refrigerant charge solenoid valve(SVC) (customization option)
2	Discharge temperature switch	19	Pressure relief valve (customization option)
3	Plate heat exchanger	20	4-way valve
4	Electronic expansion valve (EEVC)	21	Injection bypass solenoid valve(SV5)
5	Stop valve (liquid side)	22	FAN A
6	Stop valve (high pressure gas side)	<b>Sensor Code      Description</b>	
7	Stop valve (low pressure gas side)	T3	Heat exchanger deicer temperature sensor
8	Electronic expansion valve (EEVA)	T4	Outdoor air temperature sensor
9	High pressure sensor	T5	Liquid pipe temperature sensor
10	Hot gas bypass solenoid valve(SV7)	T6A	Injection liquid temperature sensor
11	Low pressure sensor	T6B	Subcooling gas temperature sensor
12	Oil separator	T7	Suction temperature sensor
13	High pressure switch	T8	Heat exchanger gas temperature sensor
14	Gas-liquid separator	T9	Heat sink temperature sensor
15	Heat exchanger	TL	Heat exchanger liquid temperature sensor
16	FAN B	T7C1	Compressor discharge temperature sensor
17	Compressor vapor injection valve ( SV8A)		



**Key components:**

1. **Oil separator:**  
Separates oil from gas refrigerant pumped out of the compressor and quickly returns it to the compressor. Separation efficiency is up to 99%.
2. **Gas-liquid separator:**  
Separates liquid refrigerant from gas refrigerant, stores liquid refrigerant and oil to protect compressor from liquid hammering.
3. **Electronic expansion valve (EEV):**  
Controls refrigerant flow and reduces refrigerant pressure.
4. **Four-way valve:**  
Controls heat exchanger function. When open, the heat exchanger functions as an evaporator; When closed, the heat exchanger functions as a condenser. Refer to part 3, "Heat Exchanger Control".
5. **Plate heat exchanger:**  
In cooling mode, it can improve super-cooling degree and the super-cooled refrigerant can achieve better heat exchange in indoor side. In heating mode, the refrigerant comes from the plate heat exchanger going to the compressor can enhance the refrigerant enthalpy and improve the heating capacity in low ambient temperature. Refrigerant volume in plate heat exchanger is controlled according to temperature different between plate heat exchanger inlet and outlet or the temperature different between discharge temperature and target discharge temperature.
6. **Solenoid valve SV5:**  
Controls the refrigerant from plate heat exchanger to gas-liquid separator.
7. **Solenoid valve SV7:**  
Bypass pressure at start-up stage and control capacity at low load condition; High-pressure-rise prevention; Discharge superheat protection.
8. **Solenoid valve SV8A**  
Allows refrigerant from plate heat exchanger inject directly to the compressor. SV8A opens when compressor startup and closes when compressor stop.
9. **High pressure switch**  
Regulate system pressure. When system pressure rises above the upper limit, the high pressure switch turn off, stopping the compressor. When the high pressure protection recovers, the compressor restarts.

# TVR Ultra HR 50/60Hz



## 6 Wiring Diagrams

Figure 2-6.1: TVR ULTRA HR wiring diagram

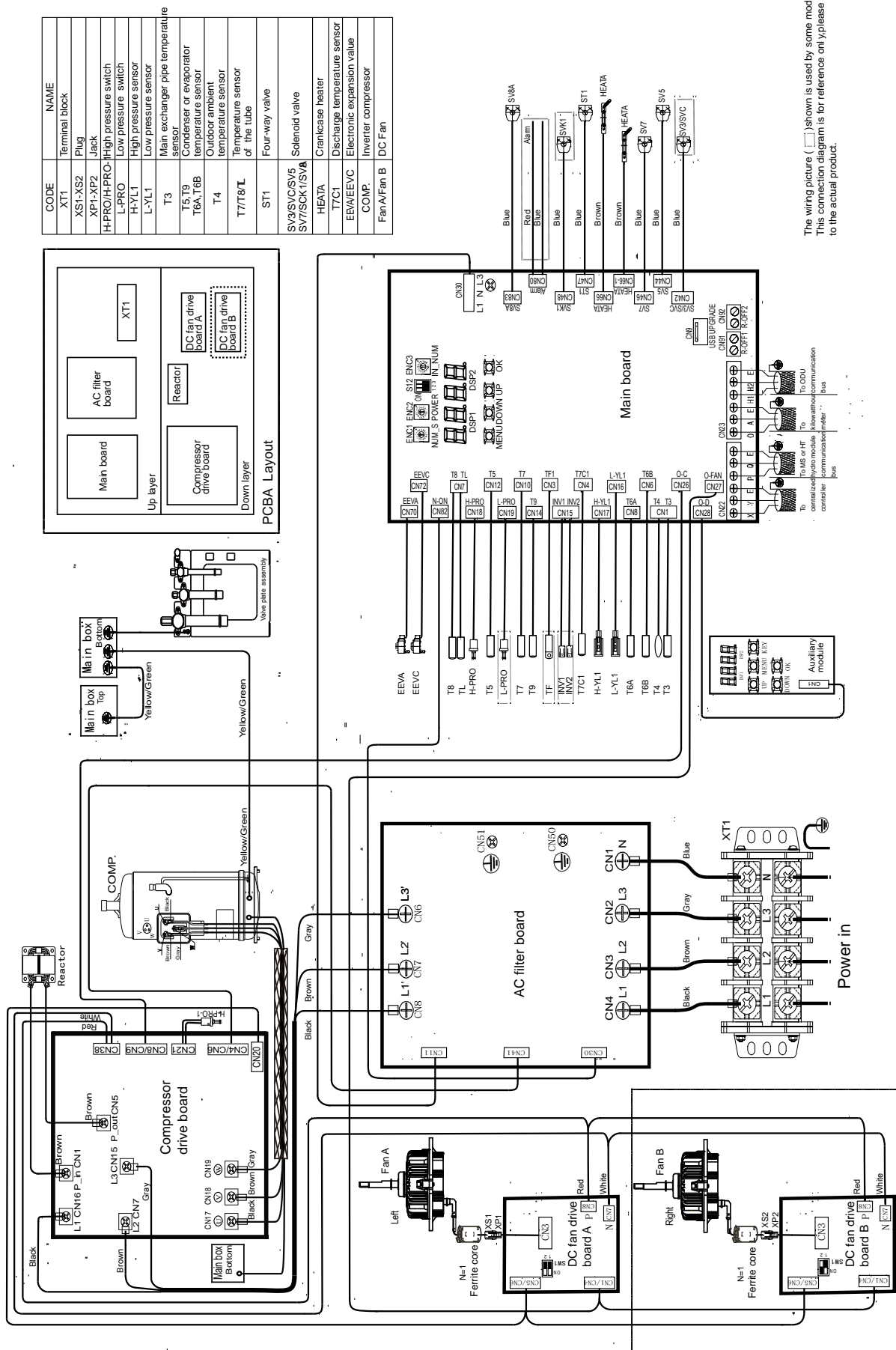
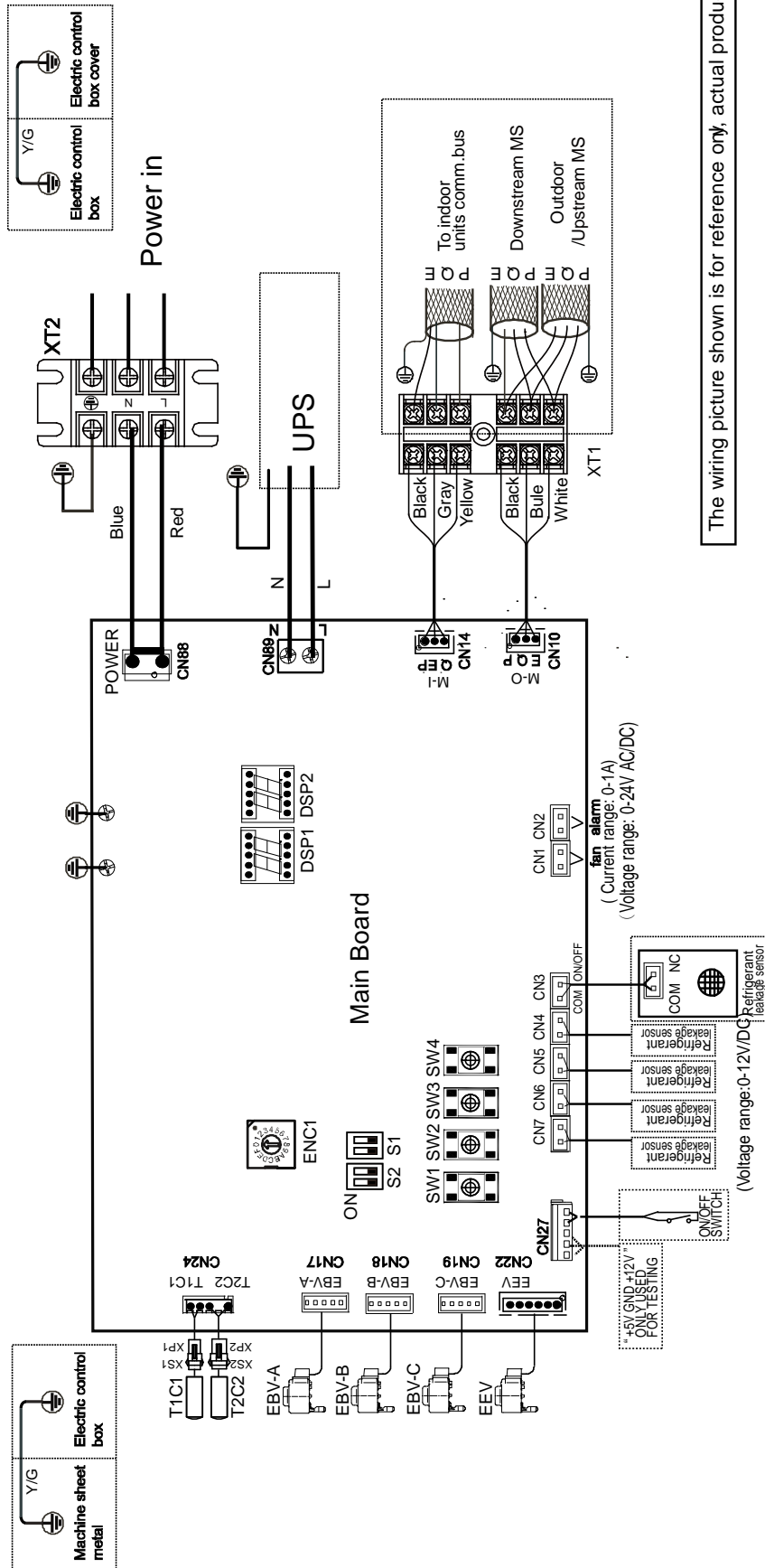


Figure 2-6.2: MS01 wiring diagram



The wiring picture shown is for reference only, actual product may vary.

NAME		Error Code	
XS1~XS2	Connectors	E2	Communication failure between MS and master outdoor unit
XP1~XP2	Connectors	E3	Malfunction of subcooler outlet thermistor(T1C1)
T1C1~T2C2	Temperature Sensor	E4	Malfunction of subcooler inlet thermistor(T2C2)
EBV-A~EBV-C	Electronic BallValve	E7	EEPROM error
EEV	Electronic ExpansionValve	F6	Electronic ball valve connection failure
XT1	Terminal Block	F7	Main power
XT2	Terminal Block	F9	Overload error(The total capacity of indoor unit connected by MS is more than 12 )
		FE	MS has no address when first powered on
		A1	Refrigerant leakage protection or ENC1PDSwitch value >5

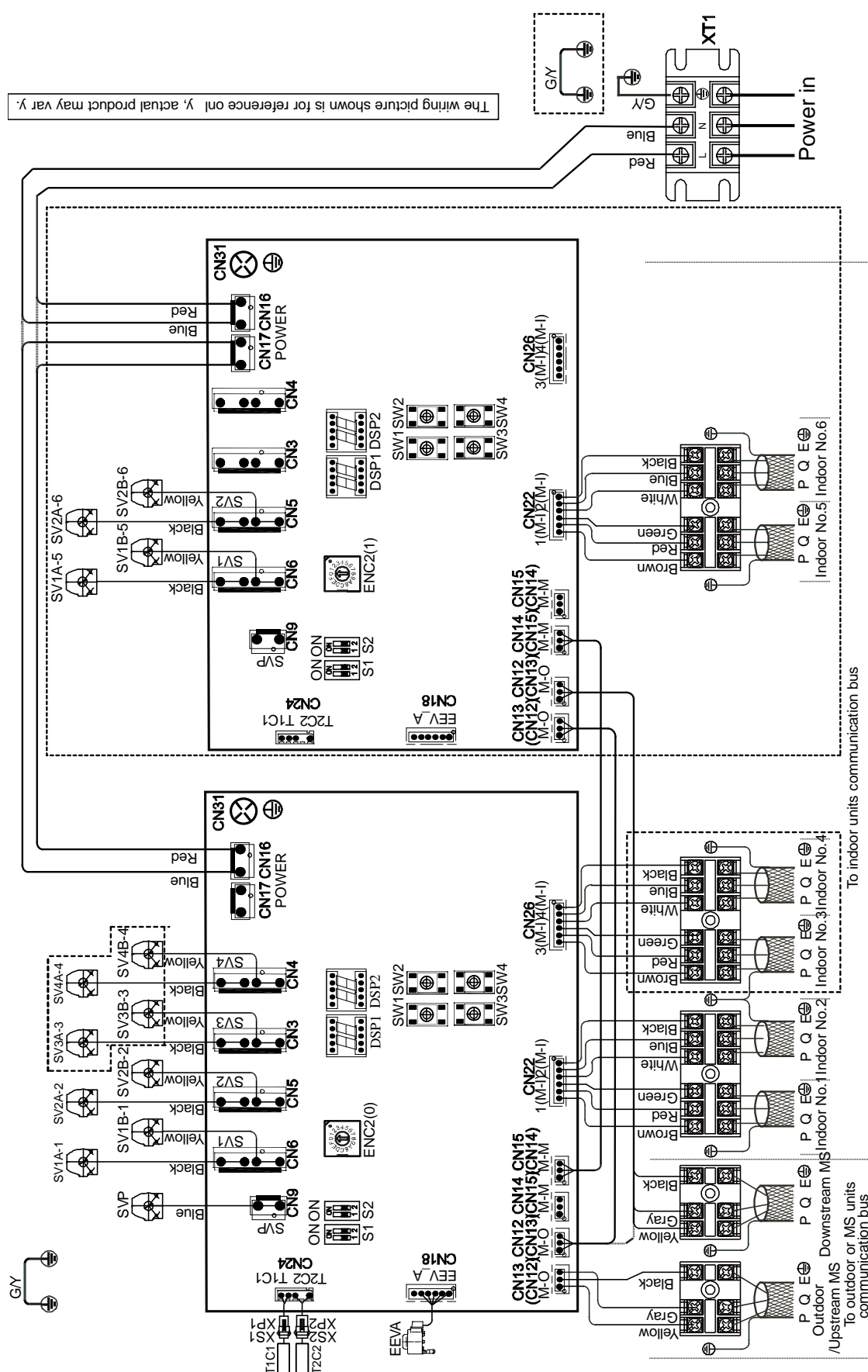
  

Guide for main board dial code	
DIP switch for number of refrigerant leakage sensors	S1
Note: Under normal circumstances, MS is connected to the closing signal output by the refrigerant sensor. When MS detects the opening signal of the refrigerant sensor, it indicates that there is refrigerant gas leakage.	S1-1 ON
	S1-2 ON
	S2
	S2-1 ON
	S2-2 Reserved

Error Code	
S1-1	OFF: refrigerant leakage function invalid, (default) ON: connected to refrigerant leakage sensor.
S1-2	OFF: dry contact is always closed, and opened when being triggered by refrigerant leakage, (default) ON: dry contact is always opened, and closed when being triggered by refrigerant leakage.
S2-1	OFF: low temperature cooling function valid, (default) ON: low temperature cooling function invalid.
S2-2	Reserved

Figure 2-6.3: MS04/MS06 wiring diagram



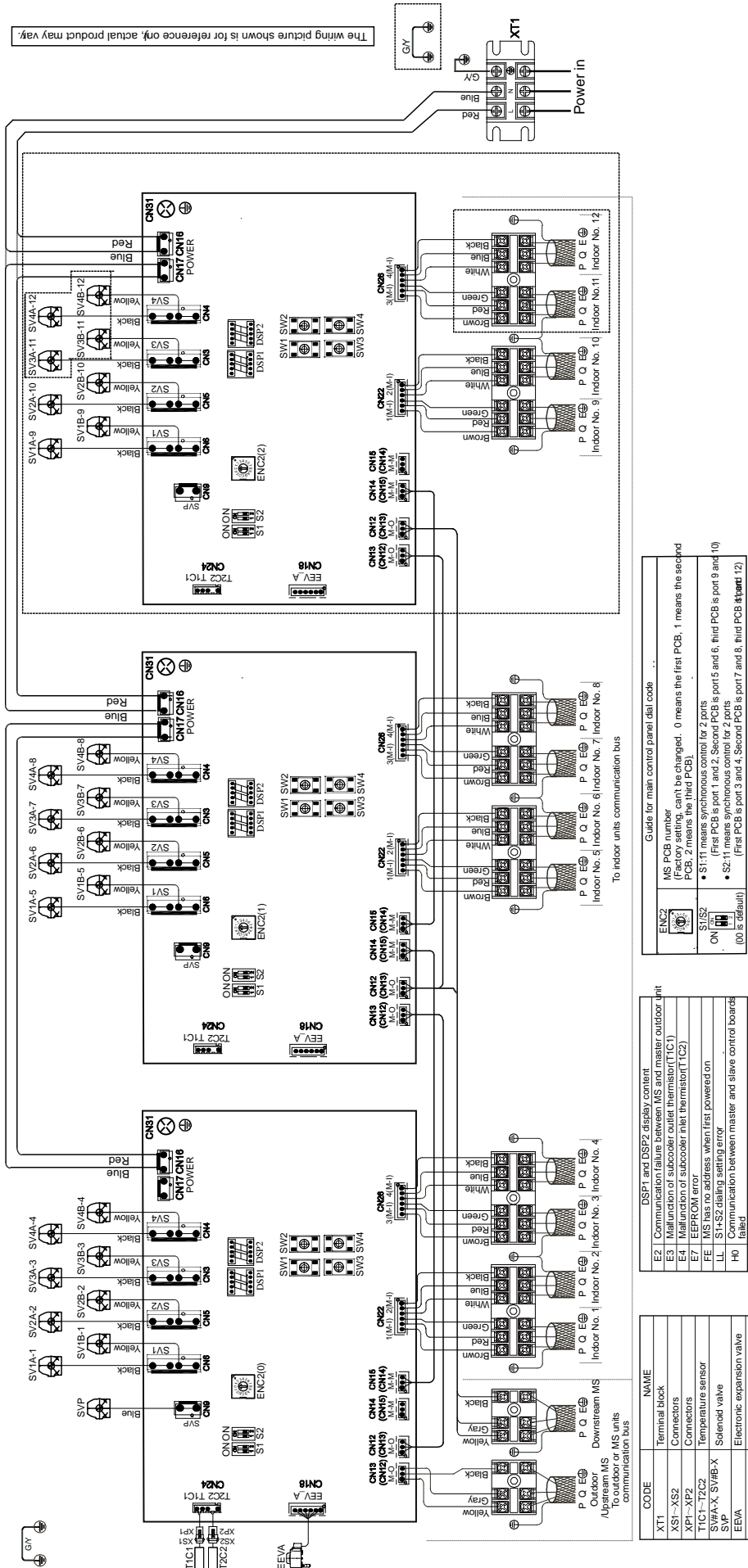
The wiring picture shown is for reference only, actual product may vary.

CODE	NAME	DSP1 and DSP2 display content	Guide for main control panel dial code
XT1	Terminal block		
XS1~XS2	Connectors	E2 Communication failure between MS and master outdoor unit	
XP1~XP2	Connectors	E3 Malfunction of subcooler outlet thermistor(T1C1)	
		E4 Malfunction of subcooler inlet thermistor(T1C2)	
T1C1~T2C2	Temperature sensor	E7 EEPROM error	
SV#A-X, SV#B-X	Solenoid valve	FE MS has no address when first powered on	
SVP		LL S1+S2 dialing setting error	
EEVA	Electronic expansion valve	H0 Communication between master and slave control boards	

Guide for main control panel dial code	
ENC2	MS PCB number (Factory setting, can't be changed. 0 means the first PCB, 1 means the second PCB, 2 means the third PCB)
S1/S2	<ul style="list-style-type: none"> <li>S1: 11 means synchronous control for 2 ports (First PCB is port 1 and 2, Second PCB is port 5 and 6, third PCB is port 9 and 10)</li> <li>S2: 11 means synchronous control for 2 ports (First PCB is port 3 and 4, Second PCB is port 7 and 8, third PCB is port 11 and 12)</li> </ul>

Figure 2-6.4: MS08/MS10/MS12 wiring diagram



CODE	NAME
XT1	Terminal block
XS1-XS2	Connectors
XP1-XP2	Connectors
TC1-TC2	Temperature sensor
SVFA-X, SVFB-X	Solenoid valve
SVP	Electronic expansion valve
EEVA	

CODE	NAME
ENC2	Guide for main control panel dial code
ENC2	MS PCB number (Factory setting, can't be changed. 0 means the first PCB, 1 means the second PCB, 2 means the third PCB)
ENC2	• S1:11 means synchronous control for 2 ports (First PCB is port 1 and 2, Second PCB is port 5 and 6, third PCB is port 9 and 10)
ENC2	• S2:11 means synchronous control for 2 ports (First PCB is port 3 and 4, Second PCB is port 7 and 8, third PCB is port 11 and 12)
ENC2	(00 is default)

CODE	NAME
E2	Communication failure between MS and outdoor unit
E3	Malfunction of subcooler inlet thermostat (TIC1)
E4	Malfunction of subcooler inlet thermostat (TIC2)
E7	EEPROM error
FE	MS has no address when first powered on
LL	S1-S2 dialing setting error
H0	Communication between master and slave control boards failed

## 7 Electrical Characteristics

Table 2-7.1: Outdoor unit electrical characteristics

Model				Power Supply <sup>1</sup>							Compressor		OFM	
Capacity	Modules			Hz	Volts	Min.	Max.	MCA <sup>2</sup>	TOCA <sup>3</sup>	MFA <sup>4</sup>	MSC <sup>5</sup>	RLA <sup>6</sup>	kW	FLA
						volts	volts							
8HP				50/60	380~415	342	456	18	21.3	20	/	12.2	0.92	1.3
10HP				50/60	380~415	342	456	22	25.5	25	/	16.5	0.92	1.5
12HP				50/60	380~415	342	456	24	27.7	25	/	17.2	0.92	1.7
14HP				50/60	380~415	342	456	28	31.7	30	/	20.1	0.92×2	1.7
16HP				50/60	380~415	342	456	34	37.9	35	/	24.5	0.92×2	1.9
18HP				50/60	380~415	342	456	36	40.2	40	/	29.7	0.92×2	2.2
20HP				50/60	380~415	342	456	36	40.2	40	/	29.7	0.92×2	2.2
22HP	10HP	12HP		50/60	380~415	342	456	46	42.6	25+25	/	16.5+17.2	0.92×2	3.2
24HP	10HP	14HP		50/60	380~415	342	456	50	53.2	25+30	/	16.5+20.1	0.92×3	3.2
26HP	12HP	14HP		50/60	380~415	342	456	52	57.2	25+30	/	17.2+20.1	0.92×3	3.4
28HP	12HP	16HP		50/60	380~415	342	456	58	59.4	25+35	/	17.2+24.5	0.92×3	3.9
30HP	12HP	18HP		50/60	380~415	342	456	60	65.6	25+40	/	17.2+29.7	0.92×3	3.9
32HP	16HP	16HP		50/60	380~415	342	456	68	67.9	35+35	/	24.5×2	0.92×4	3.8
34HP	16HP	18HP		50/60	380~415	342	456	70	75.8	35+40	/	24.5+29.7	0.92×4	4.1
36HP	18HP	18HP		50/60	380~415	342	456	72	78.1	40+40	/	29.7×2	0.92×4	4.4
38HP	18HP	20HP		50/60	380~415	342	456	72	80.4	40+40	/	29.7×2	0.92×4	4.4
40HP	20HP	20HP		50/60	380~415	342	456	72	80.4	40+40	/	29.7×2	0.92×4	4.4
42HP	12HP	14HP	16HP	50/60	380~415	342	456	86	80.4	25+30+35	/	17.2+20.1+24.5	0.92×5	5.3
44HP	12HP	16HP	16HP	50/60	380~415	342	456	92	87.1	25+35+35	/	17.2+24.5×2	0.92×5	5.5
46HP	14HP	16HP	16HP	50/60	380~415	342	456	96	93.3	30+35+35	/	20.1+24.5×2	0.92×6	5.5
48HP	16HP	16HP	16HP	50/60	380~415	342	456	102	97.3	35+35+35	/	24.5×3	0.92×6	5.7
50HP	16HP	16HP	18HP	50/60	380~415	342	456	104	103.5	35+40+40	/	24.5×2+29.7	0.92×6	6
52HP	16HP	18HP	18HP	50/60	380~415	342	456	106	107.5	35+40+40	/	24.5+29.7×2	0.92×6	6.3
54HP	18HP	18HP	18HP	50/60	380~415	342	456	108	113.7	40+40+40	/	29.7×3	0.92×6	6.6
56HP	18HP	18HP	20HP	50/60	380~415	342	456	108	116	40+40+40	/	29.7×3	0.92×6	6.6
58HP	18HP	20HP	20HP	50/60	380~415	342	456	108	118.3	40+40+40	/	29.7×3	0.92×6	6.6
60HP	20HP	20HP	20HP	50/60	380~415	342	456	108	120.6	40+40+40	/	29.7×3	0.92×6	6.6

**Abbreviations:**

MCA: Minimum Circuit Amps; TOCA: Total Over-current Amps; MFA: Maximum Fuse Amps; MSC: Maximum Starting Current (A); RLA: Rated Load Amps; FLA: Full Load Amps

**Notes:**

- Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed range limits. Maximum allowable voltage variation between phases is 2%.
- Select wire size based on the value of MCA.
- TOCA indicates the total overcurrent amps value of each OC set.
- MFA is used to select overcurrent circuit breakers and residual-current circuit breakers.
- MSC indicates the maximum current on compressor start-up in amps.
- RLA is based on the following conditions: indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB.

Table 2-7.2: MS box electrical characteristics

Model	Power Supply <sup>1</sup>						Rated power
	Hz	Volts	Min.	Max.	MCA <sup>2</sup>	MFA	W
			volts	volts			
MS01	50	220~240	198	264	0.30	15	57
MS04	50	220~240	198	264	0.38	15	69
MS06	50	220~240	198	264	0.63	15	115
MS08	50	220~240	198	264	0.80	15	138
MS10	50	220~240	198	264	0.90	15	173
MS12	50	220~240	198	264	1.10	15	196

Notes:

1. Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed range limits.
2. Select wire size based on the value of MCA.

## 8 Functional Components and Safety Devices

Table 2-8.1: Functional components and safety devices

Item			8-20HP TVR ULTRA HR
Compressor	Discharge temperature switch		Off: 115 (±5) °C / On: 75 (±15) °C
	Compressor discharge pipe temperature sensor		90°C = 5kΩ ± 3%
	Crankcase heater		30W × 2
Inverter module	Inverter module temperature sensor		25°C = 5kΩ 100°C = 493Ω ± 5%
Fan motor	Safety thermostat	On	115°C
		Off	-
System	High pressure switch		Off: 4.0 (±0.1) MPa / On: 3.0 (±0.1) MPa
	High pressure sensor		Output voltage (V) =0.8696 × P + 0.5 (where P is the discharge pressure in MPa)
	Heat exchanger temperature sensor		25°C = 10kΩ
	Outdoor ambient temperature sensor		25°C = 10kΩ



## 9 Capacity Tables

### 9.1 Cooling Capacity Tables

Table 2-9.1: 8HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22, WB:15		DB:23.3, WB:16		DB:25.8, WB:18		DB:27, WB:19		DB:28.2, WB:20		DB:30.7, WB:22		DB:32, WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	20.16	2.10	22.40	2.35	26.88	2.81	29.12	3.16	31.36	3.58	35.84	4.33	40.32	5.05
	-2	20.16	2.11	22.40	2.36	26.88	2.81	29.12	3.19	31.36	3.61	35.84	4.38	40.32	5.13
	0	20.16	2.11	22.40	2.38	26.88	2.83	29.12	3.20	31.36	3.64	35.84	4.44	40.32	5.16
	2	20.16	2.11	22.40	2.39	26.88	2.83	29.12	3.23	31.36	3.65	35.84	4.44	40.32	5.19
	4	20.16	2.14	22.40	2.39	26.88	2.87	29.12	3.25	31.36	3.69	35.84	4.52	40.32	5.22
	6	20.16	2.14	22.40	2.40	26.88	2.90	29.12	3.28	31.36	3.72	35.84	4.59	40.32	5.26
	8	20.16	2.16	22.40	2.40	26.88	2.93	29.12	3.28	31.36	3.73	35.84	4.59	40.32	5.38
	10	20.16	2.16	22.40	2.40	26.88	2.95	29.12	3.43	31.36	3.85	35.84	4.62	40.32	5.38
	12	20.16	2.17	22.40	2.44	26.88	3.08	29.12	3.53	31.36	3.98	35.84	4.72	40.32	5.50
	14	20.16	2.18	22.40	2.52	26.88	3.31	29.12	3.73	31.36	4.01	35.84	4.77	40.32	5.52
	16	20.16	2.27	22.40	2.69	26.88	3.51	29.12	3.76	31.36	4.14	35.84	4.85	40.32	5.67
	18	20.16	2.50	22.40	3.04	26.88	3.53	29.12	3.86	31.36	4.17	35.84	4.94	40.32	5.86
	20	20.16	2.81	22.40	3.08	26.88	3.57	29.12	3.93	31.36	4.18	35.84	4.96	39.27	6.17
	21	20.16	2.84	22.40	3.10	26.88	3.69	29.12	4.02	31.36	4.34	35.84	5.07	38.70	6.17
	23	20.16	3.03	22.40	3.33	26.88	3.99	29.12	4.34	31.36	4.71	35.84	5.61	37.58	6.16
	25	20.16	3.27	22.40	3.61	26.88	4.32	29.12	4.70	31.36	5.08	35.84	6.12	36.42	6.18
	27	20.16	3.54	22.40	3.90	26.88	4.67	29.12	5.09	31.36	5.52	34.32	6.17	35.25	6.18
	29	20.16	3.82	22.40	4.21	26.88	5.05	29.12	5.49	31.36	5.97	33.11	6.16	34.14	6.17
	31	20.16	4.12	22.40	4.56	26.88	5.45	29.12	5.94	30.22	6.15	31.91	6.16	32.89	6.15
	33	20.16	4.46	22.40	4.91	26.88	5.90	28.13	6.15	28.90	6.15	30.74	6.20	31.45	6.17
	35	20.16	4.80	22.40	5.31	26.15	6.16	26.86	6.17	27.61	6.16	29.17	6.15	30.25	6.25
	37	20.16	5.18	22.40	5.72	24.87	6.18	25.53	6.17	26.32	6.17	27.75	6.16	28.83	6.26
	39	20.16	5.60	22.40	6.17	23.62	6.16	24.41	6.21	24.96	6.17	26.57	6.23	27.40	6.27
	41	20.16	6.02	21.06	6.17	22.44	6.18	23.13	6.21	23.67	6.16	25.17	6.22	25.95	6.27
	43	19.28	6.17	19.93	6.15	21.19	6.16	22.05	6.26	22.73	6.29	24.16	6.36	24.55	6.24
	45	18.24	6.18	18.82	6.15	20.12	6.21	20.77	6.24	21.40	6.27	22.80	6.33	23.06	6.23
	48	16.76	6.22	17.21	6.17	18.24	6.15	18.85	6.18	19.80	6.37	20.66	6.30	20.87	6.19
	50	15.64	6.17	16.23	6.19	16.22	5.81	16.74	5.84	16.85	5.73	17.47	5.64	16.50	5.25
	52	12.06	5.06	12.14	4.95	12.57	4.86	12.95	4.89	13.32	4.92	12.48	4.58	12.76	4.62
120%	-5	18.61	1.95	20.68	2.18	24.81	2.62	26.88	2.84	28.95	3.21	33.08	3.97	37.22	4.61
	-2	18.61	1.96	20.68	2.19	24.81	2.62	26.88	2.87	28.95	3.38	33.08	4.06	37.22	4.69
	0	18.61	1.98	20.68	2.20	24.81	2.63	26.88	2.96	28.95	3.40	33.08	4.10	37.22	4.71
	2	18.61	1.98	20.68	2.22	24.81	2.65	26.88	2.98	28.95	3.40	33.08	4.12	37.22	4.77
	4	18.61	1.99	20.68	2.22	24.81	2.71	26.88	2.98	28.95	3.43	33.08	4.20	37.22	4.81
	6	18.61	1.99	20.68	2.23	24.81	2.73	26.88	3.07	28.95	3.47	33.08	4.22	37.22	4.83
	8	18.61	2.00	20.68	2.24	24.81	2.74	26.88	3.11	28.95	3.49	33.08	4.27	37.22	4.85
	10	18.61	2.01	20.68	2.25	24.81	2.77	26.88	3.13	28.95	3.53	33.08	4.30	37.22	5.01
	12	18.61	2.03	20.68	2.28	24.81	2.87	26.88	3.20	28.95	3.72	33.08	4.31	37.22	5.01
	14	18.61	2.05	20.68	2.33	24.81	2.97	26.88	3.46	28.95	3.76	33.08	4.37	37.22	5.07
	16	18.61	2.10	20.68	2.49	24.81	3.29	26.88	3.52	28.95	3.77	33.08	4.47	37.22	5.21
	18	18.61	2.24	20.68	2.79	24.81	3.31	26.88	3.56	28.95	3.82	33.08	4.51	37.22	5.21
	20	18.61	2.65	20.68	2.88	24.81	3.37	26.88	3.60	28.95	3.91	33.08	4.54	37.22	5.50
	21	18.61	2.68	20.68	2.92	24.81	3.40	26.88	3.67	28.95	3.96	33.08	4.61	37.22	5.76
	23	18.61	2.80	20.68	3.09	24.81	3.67	26.88	3.98	28.95	4.29	33.08	4.95	37.22	6.33
	25	18.61	3.04	20.68	3.33	24.81	3.97	26.88	4.31	28.95	4.65	33.08	5.37	35.49	6.25
	27	18.61	3.28	20.68	3.60	24.81	4.29	26.88	4.65	28.95	5.04	33.08	5.87	34.41	6.26
	29	18.61	3.54	20.68	3.90	24.81	4.63	26.88	5.04	28.95	5.46	32.32	6.25	33.26	6.25
	31	18.61	3.83	20.68	4.21	24.81	5.02	26.88	5.45	28.95	5.90	31.21	6.26	32.22	6.28
	33	18.61	4.13	20.68	4.55	24.81	5.42	26.88	5.88	28.95	6.38	29.92	6.26	30.89	6.29
	35	18.61	4.47	20.68	4.91	24.81	5.85	26.88	6.39	27.11	6.26	28.72	6.27	29.57	6.31
	37	18.61	4.81	20.68	5.29	24.81	6.34	25.16	6.28	25.84	6.28	27.40	6.28	28.41	6.39
	39	18.61	5.19	20.68	5.71	23.28	6.26	23.93	6.26	24.71	6.30	26.02	6.29	26.66	6.25
	41	18.61	5.59	20.68	6.17	22.06	6.26	22.72	6.27	23.43	6.29	24.91	6.35	25.70	6.39
	43	18.61	6.03	19.70	6.27	21.01	6.30	21.50	6.25	22.16	6.28	23.57	6.34	24.33	6.38
	45	18.02	6.26	18.60	6.26	19.80	6.28	20.63	6.37	20.89	6.26	22.20	6.33	23.35	6.51
	48	16.51	6.25	17.16	6.31	18.20	6.29	18.78	6.32	19.75	6.50	20.62	6.43	20.86	6.31
	50	15.62	6.31	15.88	6.19	16.26	5.95	16.40	5.83	16.09	5.57	16.65	5.49	16.18	5.23
	52	11.86	5.06	12.30	5.09	12.36	4.85	12.73	4.88	13.10	4.91	12.30	4.57	12.59	4.61

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.1: 8HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
110%	-5	17.06	1.82	18.95	2.02	22.74	2.43	24.64	2.67	26.54	2.95	30.33	3.67	34.12	4.19
	-2	17.06	1.82	18.95	2.04	22.74	2.46	24.64	2.69	26.54	2.96	30.33	3.67	34.12	4.26
	0	17.06	1.83	18.95	2.05	22.74	2.46	24.64	2.69	26.54	3.01	30.33	3.73	34.12	4.28
	2	17.06	1.86	18.95	2.07	22.74	2.49	24.64	2.76	26.54	3.02	30.33	3.80	34.12	4.28
	4	17.06	1.86	18.95	2.08	22.74	2.53	24.64	2.79	26.54	3.09	30.33	3.81	34.12	4.37
	6	17.06	1.86	18.95	2.09	22.74	2.54	24.64	2.80	26.54	3.09	30.33	3.81	34.12	4.38
	8	17.06	1.86	18.95	2.09	22.74	2.54	24.64	2.85	26.54	3.15	30.33	3.84	34.12	4.45
	10	17.06	1.88	18.95	2.11	22.74	2.55	24.64	2.87	26.54	3.29	30.33	3.93	34.12	4.48
	12	17.06	1.89	18.95	2.13	22.74	2.68	24.64	2.87	26.54	3.30	30.33	3.96	34.12	4.60
	14	17.06	1.91	18.95	2.15	22.74	2.75	24.64	3.06	26.54	3.52	30.33	3.99	34.12	4.68
	16	17.06	1.93	18.95	2.23	22.74	3.02	24.64	3.31	26.54	3.53	30.33	4.00	34.12	4.68
	18	17.06	2.07	18.95	2.48	22.74	3.11	24.64	3.33	26.54	3.53	30.33	4.09	34.12	4.71
	20	17.06	2.50	18.95	2.70	22.74	3.14	24.64	3.36	26.54	3.57	30.33	4.17	34.12	4.84
	21	17.06	2.50	18.95	2.73	22.74	3.18	24.64	3.39	26.54	3.61	30.33	4.19	34.12	4.90
	23	17.06	2.58	18.95	2.84	22.74	3.35	24.64	3.61	26.54	3.89	30.33	4.45	34.12	5.36
	25	17.06	2.80	18.95	3.06	22.74	3.63	24.64	3.92	26.54	4.22	30.33	4.82	34.12	5.87
	27	17.06	3.03	18.95	3.32	22.74	3.93	24.64	4.25	26.54	4.56	30.33	5.23	34.12	6.45
	29	17.06	3.26	18.95	3.58	22.74	4.24	24.64	4.58	26.54	4.94	30.33	5.66	32.45	6.36
	31	17.06	3.53	18.95	3.87	22.74	4.59	24.64	4.96	26.54	5.36	30.33	6.15	31.33	6.36
	33	17.06	3.81	18.95	4.18	22.74	4.96	24.64	5.38	26.54	5.80	29.35	6.37	30.11	6.36
	35	17.06	4.11	18.95	4.51	22.74	5.36	24.64	5.80	26.54	6.26	27.99	6.35	28.83	6.36
	37	17.06	4.43	18.95	4.88	22.74	5.79	24.64	6.27	25.32	6.36	26.70	6.35	27.59	6.37
	39	17.06	4.79	18.95	5.26	22.74	6.25	23.53	6.38	24.10	6.35	25.44	6.35	26.27	6.37
	41	17.06	5.16	18.95	5.67	21.74	6.36	22.34	6.35	22.93	6.36	24.36	6.42	24.96	6.37
	43	17.06	5.54	18.95	6.11	20.58	6.35	21.15	6.35	21.90	6.42	23.30	6.47	23.65	6.36
	45	17.06	5.97	18.40	6.36	19.53	6.37	20.07	6.37	20.70	6.39	22.02	6.46	23.08	6.65
	48	16.36	6.37	16.85	6.35	17.92	6.36	18.67	6.46	19.25	6.49	20.48	6.56	19.88	6.16
	50	15.40	6.37	15.68	6.26	15.92	5.93	16.40	5.97	16.53	5.85	16.30	5.48	17.26	5.66
	52	11.66	5.05	12.08	5.08	12.53	4.99	12.09	4.73	12.87	4.90	12.12	4.56	12.40	4.60
100%	-5	15.51	1.67	17.23	1.85	20.68	2.26	22.40	2.46	24.12	2.68	27.57	3.30	31.02	3.86
	-2	15.51	1.67	17.23	1.86	20.68	2.26	22.40	2.46	24.12	2.69	27.57	3.30	31.02	3.87
	0	15.51	1.67	17.23	1.87	20.68	2.31	22.40	2.48	24.12	2.70	27.57	3.33	31.02	3.87
	2	15.51	1.68	17.23	1.88	20.68	2.32	22.40	2.48	24.12	2.72	27.57	3.37	31.02	3.89
	4	15.51	1.68	17.23	1.88	20.68	2.33	22.40	2.49	24.12	2.77	27.57	3.40	31.02	3.91
	6	15.51	1.69	17.23	1.92	20.68	2.34	22.40	2.53	24.12	2.80	27.57	3.47	31.02	3.97
	8	15.51	1.72	17.23	1.92	20.68	2.34	22.40	2.54	24.12	2.83	27.57	3.55	31.02	4.07
	10	15.51	1.73	17.23	1.93	20.68	2.37	22.40	2.56	24.12	2.87	27.57	3.64	31.02	4.08
	12	15.51	1.73	17.23	1.93	20.68	2.40	22.40	2.62	24.12	2.90	27.57	3.67	31.02	4.09
	14	15.51	1.76	17.23	1.95	20.68	2.49	22.40	2.71	24.12	3.12	27.57	3.70	31.02	4.17
	16	15.51	1.79	17.23	1.98	20.68	2.71	22.40	3.00	24.12	3.26	27.57	3.72	31.02	4.17
	18	15.51	1.83	17.23	2.20	20.68	2.91	22.40	3.09	24.12	3.29	27.57	3.74	31.02	4.31
	20	15.51	2.18	17.23	2.52	20.68	2.92	22.40	3.14	24.12	3.33	27.57	3.76	31.02	4.34
	21	15.51	2.33	17.23	2.54	20.68	2.94	22.40	3.15	24.12	3.35	27.57	3.84	31.02	4.51
	23	15.51	2.38	17.23	2.59	20.68	3.03	22.40	3.27	24.12	3.50	27.57	3.98	31.02	4.71
	25	15.51	2.56	17.23	2.79	20.68	3.28	22.40	3.55	24.12	3.80	27.57	4.32	31.02	5.09
	27	15.51	2.77	17.23	3.02	20.68	3.56	22.40	3.83	24.12	4.11	27.57	4.67	31.02	5.51
	29	15.51	2.99	17.23	3.27	20.68	3.85	22.40	4.15	24.12	4.45	27.57	5.06	31.02	6.00
	31	15.51	3.24	17.23	3.54	20.68	4.16	22.40	4.49	24.12	4.83	27.57	5.49	31.02	6.56
	33	15.51	3.49	17.23	3.82	20.68	4.49	22.40	4.85	24.12	5.21	27.57	5.94	29.40	6.45
	35	15.51	3.77	17.23	4.12	20.68	4.86	22.40	5.25	24.12	5.64	27.57	6.45	28.14	6.47
	37	15.51	4.07	17.23	4.45	20.68	5.24	22.40	5.66	24.12	6.10	26.16	6.45	26.97	6.50
	39	15.51	4.38	17.23	4.79	20.68	5.66	22.40	6.10	24.12	6.59	24.92	6.45	25.75	6.50
	41	15.51	4.72	17.23	5.17	20.68	6.10	22.40	6.59	22.50	6.46	23.79	6.47	24.52	6.50
	43	15.51	5.09	17.23	5.58	20.68	6.58	20.86	6.45	21.36	6.45	22.58	6.46	23.31	6.49
	45	15.51	5.48	17.23	5.99	19.25	6.48	19.77	6.47	20.28	6.45	21.56	6.52	22.05	6.48
	48	15.51	6.11	16.67	6.46	17.77	6.50	18.16	6.45	18.72	6.48	19.55	6.40	20.13	6.44
	50	15.51	6.57	15.40	6.29	15.53	5.93	15.67	5.80	15.77	5.69	16.34	5.61	16.41	5.50
	52	11.60	5.12	11.86	5.07	11.91	4.84	11.87	4.72	12.21	4.76	11.93	4.55	12.19	4.60

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.1: 8HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
90%	-5	13.96	1.46	15.51	1.67	18.61	2.03	20.16	2.18	21.71	2.35	24.81	2.89	27.91	3.31
	-2	13.96	1.49	15.51	1.68	18.61	2.05	20.16	2.18	21.71	2.39	24.81	2.90	27.91	3.36
	0	13.96	1.50	15.51	1.72	18.61	2.06	20.16	2.20	21.71	2.40	24.81	2.94	27.91	3.40
	2	13.96	1.50	15.51	1.73	18.61	2.06	20.16	2.21	21.71	2.40	24.81	2.97	27.91	3.42
	4	13.96	1.51	15.51	1.74	18.61	2.06	20.16	2.22	21.71	2.42	24.81	3.00	27.91	3.44
	6	13.96	1.52	15.51	1.74	18.61	2.08	20.16	2.23	21.71	2.46	24.81	3.04	27.91	3.44
	8	13.96	1.52	15.51	1.74	18.61	2.09	20.16	2.27	21.71	2.47	24.81	3.07	27.91	3.46
	10	13.96	1.53	15.51	1.76	18.61	2.11	20.16	2.28	21.71	2.53	24.81	3.09	27.91	3.53
	12	13.96	1.57	15.51	1.77	18.61	2.11	20.16	2.31	21.71	2.54	24.81	3.22	27.91	3.69
	14	13.96	1.57	15.51	1.77	18.61	2.18	20.16	2.41	21.71	2.68	24.81	3.32	27.91	3.71
	16	13.96	1.61	15.51	1.80	18.61	2.28	20.16	2.64	21.71	2.97	24.81	3.35	27.91	3.73
	18	13.96	1.66	15.51	1.85	18.61	2.64	20.16	2.84	21.71	2.98	24.81	3.36	27.91	3.74
	20	13.96	1.73	15.51	2.20	18.61	2.64	20.16	2.85	21.71	3.02	24.81	3.36	27.91	3.77
	21	13.96	2.00	15.51	2.29	18.61	2.66	20.16	2.86	21.71	3.04	24.81	3.38	27.91	3.89
	23	13.96	2.05	15.51	2.34	18.61	2.73	20.16	2.92	21.71	3.10	24.81	3.45	27.91	4.00
	25	13.96	2.16	15.51	2.47	18.61	2.88	20.16	3.09	21.71	3.31	24.81	3.71	27.91	4.33
	27	13.96	2.25	15.51	2.68	18.61	3.13	20.16	3.35	21.71	3.59	24.81	4.04	27.91	4.71
	29	13.96	2.40	15.51	2.90	18.61	3.38	20.16	3.63	21.71	3.88	24.81	4.38	27.91	5.10
	31	13.96	2.63	15.51	3.14	18.61	3.66	20.16	3.92	21.71	4.20	24.81	4.74	27.91	5.53
	33	13.96	2.99	15.51	3.39	18.61	3.95	20.16	4.24	21.71	4.55	24.81	5.12	27.91	6.00
	35	13.96	3.23	15.51	3.66	18.61	4.27	20.16	4.59	21.71	4.91	24.81	5.55	27.91	6.47
	37	13.96	3.49	15.51	3.95	18.61	4.61	20.16	4.95	21.71	5.31	24.81	6.01	26.45	6.47
	39	13.96	3.78	15.51	4.26	18.61	4.98	20.16	5.36	21.71	5.73	24.81	6.47	25.21	6.45
	41	13.96	4.08	15.51	4.59	18.61	5.38	20.16	5.78	21.71	6.18	23.40	6.47	24.08	6.48
	43	13.96	4.40	15.51	4.95	18.61	5.78	20.16	6.22	21.10	6.45	22.27	6.47	22.89	6.47
	45	13.96	4.75	15.51	5.33	18.61	6.23	19.50	6.45	20.04	6.47	21.21	6.50	21.72	6.45
	48	13.96	5.45	15.51	5.94	17.49	6.45	18.00	6.47	18.47	6.47	19.45	6.45	19.89	6.41
	50	13.96	5.85	15.51	6.39	15.70	6.06	15.69	5.87	16.00	5.82	15.79	5.45	15.84	5.34
	52	11.69	5.18	11.79	5.06	11.87	4.83	12.22	4.86	12.57	4.88	11.90	4.54	12.18	4.58
80%	-5	12.41	1.29	13.78	1.47	16.54	1.78	17.92	1.92	19.30	2.07	22.06	2.39	24.81	2.82
	-2	12.41	1.31	13.78	1.47	16.54	1.78	17.92	1.93	19.30	2.10	22.06	2.41	24.81	2.84
	0	12.41	1.33	13.78	1.48	16.54	1.79	17.92	1.94	19.30	2.10	22.06	2.43	24.81	2.85
	2	12.41	1.33	13.78	1.52	16.54	1.79	17.92	1.96	19.30	2.11	22.06	2.43	24.81	2.88
	4	12.41	1.33	13.78	1.53	16.54	1.80	17.92	1.97	19.30	2.13	22.06	2.46	24.81	2.91
	6	12.41	1.36	13.78	1.53	16.54	1.81	17.92	2.00	19.30	2.14	22.06	2.47	24.81	2.91
	8	12.41	1.36	13.78	1.53	16.54	1.81	17.92	2.01	19.30	2.14	22.06	2.47	24.81	2.94
	10	12.41	1.40	13.78	1.53	16.54	1.85	17.92	2.01	19.30	2.16	22.06	2.53	24.81	2.96
	12	12.41	1.41	13.78	1.59	16.54	1.85	17.92	2.05	19.30	2.21	22.06	2.63	24.81	3.23
	14	12.41	1.44	13.78	1.59	16.54	1.92	17.92	2.12	19.30	2.29	22.06	2.82	24.81	3.33
	16	12.41	1.45	13.78	1.61	16.54	1.93	17.92	2.26	19.30	2.50	22.06	3.01	24.81	3.35
	18	12.41	1.45	13.78	1.62	16.54	2.27	17.92	2.53	19.30	2.71	22.06	3.03	24.81	3.35
	20	12.41	1.56	13.78	1.87	16.54	2.38	17.92	2.55	19.30	2.71	22.06	3.04	24.81	3.37
	21	12.41	1.57	13.78	1.91	16.54	2.41	17.92	2.56	19.30	2.74	22.06	3.04	24.81	3.39
	23	12.41	1.59	13.78	2.08	16.54	2.44	17.92	2.61	19.30	2.77	22.06	3.11	24.81	3.44
	25	12.41	1.59	13.78	2.09	16.54	2.52	17.92	2.69	19.30	2.86	22.06	3.18	24.81	3.67
	27	12.41	1.76	13.78	2.10	16.54	2.72	17.92	2.91	19.30	3.10	22.06	3.46	24.81	3.99
	29	12.41	2.01	13.78	2.29	16.54	2.96	17.92	3.15	19.30	3.36	22.06	3.75	24.81	4.32
	31	12.41	2.20	13.78	2.56	16.54	3.20	17.92	3.42	19.30	3.64	22.06	4.06	24.81	4.69
	33	12.41	2.41	13.78	2.73	16.54	3.46	17.92	3.70	19.30	3.94	22.06	4.41	24.81	5.09
	35	12.41	2.65	13.78	2.98	16.54	3.74	17.92	4.00	19.30	4.26	22.06	4.77	24.81	5.49
	37	12.41	2.88	13.78	3.24	16.54	4.03	17.92	4.32	19.30	4.61	22.06	5.16	24.81	5.94
	39	12.41	3.14	13.78	3.63	16.54	4.36	17.92	4.65	19.30	4.96	22.06	5.56	24.81	6.42
	41	12.41	3.40	13.78	3.92	16.54	4.69	17.92	5.03	19.30	5.36	22.06	6.01	23.59	6.46
	43	12.41	3.69	13.78	4.23	16.54	5.06	17.92	5.41	19.30	5.78	22.06	6.48	22.44	6.46
	45	12.41	4.08	13.78	4.55	16.54	5.44	17.92	5.83	19.30	6.22	20.79	6.48	21.43	6.50
	48	12.41	4.59	13.78	5.09	16.54	6.07	17.92	6.51	18.18	6.46	19.17	6.47	19.70	6.47
	50	12.41	5.17	13.78	5.62	15.61	6.11	15.74	5.97	15.77	5.80	15.98	5.58	16.07	5.46
	52	11.69	5.22	11.76	5.08	12.15	4.95	12.13	4.84	12.49	4.87	12.33	4.66	12.15	4.56

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.1: 8HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	10.86	1.13	12.06	1.26	14.47	1.54	15.68	1.67	16.89	1.83	19.30	2.13	21.71	2.35
	-2	10.86	1.13	12.06	1.27	14.47	1.55	15.68	1.69	16.89	1.86	19.30	2.15	21.71	2.37
	0	10.86	1.14	12.06	1.28	14.47	1.56	15.68	1.72	16.89	1.87	19.30	2.16	21.71	2.38
	2	10.86	1.14	12.06	1.28	14.47	1.58	15.68	1.74	16.89	1.87	19.30	2.17	21.71	2.41
	4	10.86	1.14	12.06	1.30	14.47	1.58	15.68	1.75	16.89	1.88	19.30	2.18	21.71	2.42
	6	10.86	1.15	12.06	1.34	14.47	1.58	15.68	1.76	16.89	1.89	19.30	2.19	21.71	2.42
	8	10.86	1.15	12.06	1.36	14.47	1.60	15.68	1.77	16.89	1.91	19.30	2.22	21.71	2.50
	10	10.86	1.18	12.06	1.37	14.47	1.61	15.68	1.77	16.89	1.95	19.30	2.23	21.71	2.52
	12	10.86	1.19	12.06	1.37	14.47	1.65	15.68	1.82	16.89	1.95	19.30	2.25	21.71	2.60
	14	10.86	1.19	12.06	1.39	14.47	1.65	15.68	1.83	16.89	1.95	19.30	2.35	21.71	2.65
	16	10.86	1.22	12.06	1.40	14.47	1.67	15.68	1.90	16.89	2.06	19.30	2.62	21.71	2.97
	18	10.86	1.25	12.06	1.41	14.47	1.82	15.68	2.11	16.89	2.24	19.30	2.68	21.71	2.98
	20	10.86	1.26	12.06	1.42	14.47	2.10	15.68	2.26	16.89	2.38	19.30	2.69	21.71	2.98
	21	10.86	1.27	12.06	1.45	14.47	2.14	15.68	2.27	16.89	2.44	19.30	2.70	21.71	3.00
	23	10.86	1.29	12.06	1.63	14.47	2.17	15.68	2.31	16.89	2.47	19.30	2.74	21.71	3.03
	25	10.86	1.35	12.06	1.72	14.47	2.20	15.68	2.37	16.89	2.52	19.30	2.80	21.71	3.12
	27	10.86	1.46	12.06	1.72	14.47	2.23	15.68	2.51	16.89	2.65	19.30	2.94	21.71	3.36
	29	10.86	1.63	12.06	1.81	14.47	2.41	15.68	2.72	16.89	2.88	19.30	3.20	21.71	3.65
	31	10.86	1.81	12.06	2.01	14.47	2.63	15.68	2.95	16.89	3.13	19.30	3.47	21.71	3.95
	33	10.86	2.00	12.06	2.22	14.47	2.87	15.68	3.20	16.89	3.39	19.30	3.76	21.71	4.29
	35	10.86	2.21	12.06	2.44	14.47	3.11	15.68	3.46	16.89	3.67	19.30	4.07	21.71	4.64
	37	10.86	2.42	12.06	2.67	14.47	3.37	15.68	3.73	16.89	3.96	19.30	4.40	21.71	5.01
	39	10.86	2.64	12.06	2.92	14.47	3.64	15.68	4.03	16.89	4.27	19.30	4.75	21.71	5.40
	41	10.86	2.88	12.06	3.21	14.47	3.93	15.68	4.34	16.89	4.61	19.30	5.12	21.71	5.85
	43	10.86	3.14	12.06	3.49	14.47	4.41	15.68	4.68	16.89	4.97	19.30	5.52	21.71	6.29
	45	10.86	3.41	12.06	3.78	14.47	4.72	15.68	5.03	16.89	5.34	19.30	5.94	20.82	6.45
	48	10.86	3.86	12.06	4.25	14.47	5.26	15.68	5.61	16.89	5.96	18.76	6.45	19.31	6.46
	50	10.86	4.54	12.06	4.91	14.47	5.65	15.68	6.04	15.85	5.94	15.91	5.62	16.20	5.58
	52	10.86	4.87	11.81	5.15	12.01	4.94	12.02	4.82	12.36	4.85	12.23	4.63	12.55	4.67
60%	-5	9.30	0.92	10.34	1.06	12.41	1.30	13.44	1.42	14.47	1.54	16.54	1.77	18.61	2.01
	-2	9.30	0.94	10.34	1.06	12.41	1.32	13.44	1.44	14.47	1.54	16.54	1.79	18.61	2.04
	0	9.30	0.98	10.34	1.07	12.41	1.33	13.44	1.45	14.47	1.55	16.54	1.79	18.61	2.05
	2	9.30	1.00	10.34	1.08	12.41	1.37	13.44	1.45	14.47	1.55	16.54	1.80	18.61	2.05
	4	9.30	1.00	10.34	1.09	12.41	1.37	13.44	1.47	14.47	1.56	16.54	1.81	18.61	2.05
	6	9.30	1.01	10.34	1.11	12.41	1.37	13.44	1.48	14.47	1.56	16.54	1.85	18.61	2.09
	8	9.30	1.01	10.34	1.11	12.41	1.39	13.44	1.48	14.47	1.59	16.54	1.88	18.61	2.09
	10	9.30	1.02	10.34	1.12	12.41	1.39	13.44	1.49	14.47	1.63	16.54	1.89	18.61	2.10
	12	9.30	1.02	10.34	1.15	12.41	1.41	13.44	1.50	14.47	1.64	16.54	1.90	18.61	2.17
	14	9.30	1.03	10.34	1.16	12.41	1.42	13.44	1.51	14.47	1.65	16.54	1.93	18.61	2.26
	16	9.30	1.04	10.34	1.18	12.41	1.42	13.44	1.55	14.47	1.66	16.54	2.07	18.61	2.44
	18	9.30	1.07	10.34	1.19	12.41	1.45	13.44	1.64	14.47	1.82	16.54	2.32	18.61	2.57
	20	9.30	1.07	10.34	1.19	12.41	1.58	13.44	1.76	14.47	2.08	16.54	2.33	18.61	2.59
	21	9.30	1.07	10.34	1.22	12.41	1.61	13.44	1.96	14.47	2.09	16.54	2.35	18.61	2.60
	23	9.30	1.07	10.34	1.29	12.41	1.67	13.44	1.98	14.47	2.12	16.54	2.38	18.61	2.63
	25	9.30	1.07	10.34	1.29	12.41	1.77	13.44	1.98	14.47	2.17	16.54	2.43	18.61	2.70
	27	9.30	1.17	10.34	1.31	12.41	1.85	13.44	2.02	14.47	2.18	16.54	2.53	18.61	2.81
	29	9.30	1.33	10.34	1.47	12.41	1.88	13.44	2.06	14.47	2.32	16.54	2.70	18.61	3.05
	31	9.30	1.49	10.34	1.65	12.41	1.97	13.44	2.21	14.47	2.46	16.54	2.93	18.61	3.30
	33	9.30	1.66	10.34	1.83	12.41	2.25	13.44	2.43	14.47	2.68	16.54	3.19	18.61	3.58
	35	9.30	1.84	10.34	2.03	12.41	2.46	13.44	2.71	14.47	2.99	16.54	3.45	18.61	3.88
	37	9.30	2.03	10.34	2.23	12.41	2.67	13.44	2.94	14.47	3.24	16.54	3.72	18.61	4.19
	39	9.30	2.22	10.34	2.44	12.41	2.91	13.44	3.20	14.47	3.50	16.54	4.02	18.61	4.52
	41	9.30	2.43	10.34	2.66	12.41	3.17	13.44	3.46	14.47	3.79	16.54	4.33	18.61	4.87
	43	9.30	2.65	10.34	2.90	12.41	3.44	13.44	3.75	14.47	4.09	16.54	4.66	18.61	5.26
	45	9.30	2.88	10.34	3.15	12.41	3.73	13.44	4.05	14.47	4.57	16.54	5.02	18.61	5.66
	48	9.30	3.26	10.34	3.56	12.41	4.19	13.44	4.65	14.47	5.07	16.54	5.60	18.61	6.33
	50	9.30	3.78	10.34	4.24	12.41	4.84	13.44	5.14	14.47	5.44	15.94	5.78	16.16	5.69
	52	9.30	4.22	10.34	4.54	11.95	5.00	12.05	4.90	12.16	4.83	12.45	4.75	12.81	4.78

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.1: 8HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	10.86	1.13	12.06	1.26	14.47	1.54	15.68	1.67	16.89	1.83	19.30	2.13	21.71	2.35
	-2	10.86	1.13	12.06	1.27	14.47	1.55	15.68	1.69	16.89	1.86	19.30	2.15	21.71	2.37
	0	10.86	1.14	12.06	1.28	14.47	1.56	15.68	1.72	16.89	1.87	19.30	2.16	21.71	2.38
	2	10.86	1.14	12.06	1.28	14.47	1.58	15.68	1.74	16.89	1.87	19.30	2.17	21.71	2.41
	4	10.86	1.14	12.06	1.30	14.47	1.58	15.68	1.75	16.89	1.88	19.30	2.18	21.71	2.42
	6	10.86	1.15	12.06	1.34	14.47	1.58	15.68	1.76	16.89	1.89	19.30	2.19	21.71	2.42
	8	10.86	1.15	12.06	1.36	14.47	1.60	15.68	1.77	16.89	1.91	19.30	2.22	21.71	2.50
	10	10.86	1.18	12.06	1.37	14.47	1.61	15.68	1.77	16.89	1.95	19.30	2.23	21.71	2.52
	12	10.86	1.19	12.06	1.37	14.47	1.65	15.68	1.82	16.89	1.95	19.30	2.25	21.71	2.60
	14	10.86	1.19	12.06	1.39	14.47	1.65	15.68	1.83	16.89	1.95	19.30	2.35	21.71	2.65
	16	10.86	1.22	12.06	1.40	14.47	1.67	15.68	1.90	16.89	2.06	19.30	2.62	21.71	2.97
	18	10.86	1.25	12.06	1.41	14.47	1.82	15.68	2.11	16.89	2.24	19.30	2.68	21.71	2.98
	20	10.86	1.26	12.06	1.42	14.47	2.10	15.68	2.26	16.89	2.38	19.30	2.69	21.71	2.98
	21	10.86	1.27	12.06	1.45	14.47	2.14	15.68	2.27	16.89	2.44	19.30	2.70	21.71	3.00
	23	10.86	1.29	12.06	1.63	14.47	2.17	15.68	2.31	16.89	2.47	19.30	2.74	21.71	3.03
	25	10.86	1.35	12.06	1.72	14.47	2.20	15.68	2.37	16.89	2.52	19.30	2.80	21.71	3.12
	27	10.86	1.46	12.06	1.72	14.47	2.23	15.68	2.51	16.89	2.65	19.30	2.94	21.71	3.36
	29	10.86	1.63	12.06	1.81	14.47	2.41	15.68	2.72	16.89	2.88	19.30	3.20	21.71	3.65
	31	10.86	1.81	12.06	2.01	14.47	2.63	15.68	2.95	16.89	3.13	19.30	3.47	21.71	3.95
	33	10.86	2.00	12.06	2.22	14.47	2.87	15.68	3.20	16.89	3.39	19.30	3.76	21.71	4.29
	35	10.86	2.21	12.06	2.44	14.47	3.11	15.68	3.46	16.89	3.67	19.30	4.07	21.71	4.64
	37	10.86	2.42	12.06	2.67	14.47	3.37	15.68	3.73	16.89	3.96	19.30	4.40	21.71	5.01
	39	10.86	2.64	12.06	2.92	14.47	3.64	15.68	4.03	16.89	4.27	19.30	4.75	21.71	5.40
	41	10.86	2.88	12.06	3.21	14.47	3.93	15.68	4.34	16.89	4.61	19.30	5.12	21.71	5.85
	43	10.86	3.14	12.06	3.49	14.47	4.41	15.68	4.68	16.89	4.97	19.30	5.52	21.71	6.29
	45	10.86	3.41	12.06	3.78	14.47	4.72	15.68	5.03	16.89	5.34	19.30	5.94	20.82	6.45
	48	10.86	3.86	12.06	4.25	14.47	5.26	15.68	5.61	16.89	5.96	18.76	6.45	19.31	6.46
	50	10.86	4.54	12.06	4.91	14.47	5.65	15.68	6.04	15.85	5.94	15.91	5.62	16.20	5.58
	52	10.86	4.87	11.81	5.15	12.01	4.94	12.02	4.82	12.36	4.85	12.23	4.63	12.55	4.67

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.2: 10HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	25.20	2.54	28.00	2.81	33.60	3.53	36.40	3.93	39.20	4.45	44.80	5.35	50.40	6.12
	-2	25.20	2.54	28.00	2.82	33.60	3.56	36.40	3.95	39.20	4.54	44.80	5.45	50.40	6.23
	0	25.20	2.54	28.00	2.83	33.60	3.64	36.40	4.01	39.20	4.54	44.80	5.45	50.40	6.25
	2	25.20	2.55	28.00	2.85	33.60	3.68	36.40	4.10	39.20	4.58	44.80	5.55	50.40	6.35
	4	25.20	2.57	28.00	2.85	33.60	3.69	36.40	4.13	39.20	4.59	44.80	5.62	50.40	6.53
	6	25.20	2.57	28.00	2.87	33.60	3.70	36.40	4.22	39.20	4.60	44.80	5.72	50.40	6.67
	8	25.20	2.58	28.00	2.88	33.60	3.75	36.40	4.26	39.20	4.77	44.80	5.92	50.40	7.05
	10	25.20	2.61	28.00	2.92	33.60	3.77	36.40	4.42	39.20	4.95	44.80	6.13	50.40	7.54
	12	25.20	2.64	28.00	2.98	33.60	4.03	36.40	4.71	39.20	5.26	44.80	6.17	50.40	8.11
	14	25.20	2.71	28.00	3.09	33.60	4.28	36.40	4.76	39.20	5.26	44.80	6.65	48.74	8.18
	16	25.20	2.87	28.00	3.41	33.60	4.33	36.40	4.99	39.20	5.69	44.80	7.16	47.48	8.17
	18	25.20	3.32	28.00	3.76	33.60	4.71	36.40	5.41	39.20	6.16	44.80	7.71	46.32	8.17
	20	25.20	3.64	28.00	4.04	33.60	5.12	36.40	5.89	39.20	6.64	44.80	8.30	45.03	8.18
	21	25.20	3.76	28.00	4.19	33.60	5.36	36.40	6.13	39.20	6.91	43.38	8.16	44.40	8.17
	23	25.20	4.05	28.00	4.51	33.60	5.82	36.40	6.60	39.20	7.44	42.16	8.16	43.22	8.19
	25	25.20	4.36	28.00	4.86	33.60	6.32	36.40	7.16	39.20	8.03	40.85	8.18	41.91	8.18
	27	25.20	4.69	28.00	5.25	33.60	6.85	36.40	7.73	37.74	8.17	39.57	8.18	40.63	8.19
	29	25.20	5.07	28.00	5.69	33.60	7.40	36.40	8.35	36.48	8.18	38.32	8.20	39.33	8.19
	31	25.20	5.46	28.00	6.18	33.60	8.01	34.41	8.19	35.23	8.18	37.11	8.20	38.10	8.28
	33	25.20	5.88	28.00	6.71	32.35	8.17	33.18	8.20	33.92	8.16	35.82	8.21	36.79	8.28
	35	25.20	6.35	28.00	7.27	31.08	8.17	31.94	8.21	32.77	8.19	34.51	8.21	35.48	8.28
	37	25.20	6.89	28.00	7.89	29.86	8.18	30.64	8.18	31.51	8.19	33.18	8.22	34.17	8.27
	39	25.20	7.47	27.14	8.18	28.66	8.18	29.53	8.21	30.25	8.19	31.88	8.21	33.17	8.43
	41	25.20	8.07	25.96	8.21	27.60	8.25	28.28	8.20	29.09	8.26	30.59	8.20	31.86	8.42
	43	23.98	8.17	24.74	8.17	26.38	8.24	27.02	8.20	27.84	8.25	29.34	8.17	30.27	8.23
	45	22.89	8.19	23.62	8.18	25.17	8.22	25.51	8.01	25.72	7.72	26.31	7.36	26.76	7.27
	48	19.35	7.22	19.41	6.96	20.14	6.73	19.67	6.33	20.32	6.37	20.37	6.02	21.05	6.06
	50	15.51	6.03	15.79	5.91	15.80	5.54	16.72	5.72	15.96	5.34	17.01	5.41	15.97	5.03
	52	11.47	4.85	12.33	5.01	11.96	4.66	12.34	4.69	12.71	4.73	11.81	4.40	12.09	4.44
120%	-5	23.26	2.37	25.85	2.62	31.02	3.30	33.60	3.70	36.18	4.13	41.35	4.98	46.52	5.71
	-2	23.26	2.38	25.85	2.63	31.02	3.30	33.60	3.73	36.18	4.14	41.35	5.05	46.52	5.76
	0	23.26	2.39	25.85	2.64	31.02	3.30	33.60	3.74	36.18	4.15	41.35	5.11	46.52	5.83
	2	23.26	2.39	25.85	2.66	31.02	3.31	33.60	3.75	36.18	4.17	41.35	5.12	46.52	5.84
	4	23.26	2.40	25.85	2.67	31.02	3.32	33.60	3.76	36.18	4.22	41.35	5.19	46.52	5.91
	6	23.26	2.40	25.85	2.68	31.02	3.32	33.60	3.84	36.18	4.29	41.35	5.22	46.52	6.12
	8	23.26	2.42	25.85	2.71	31.02	3.40	33.60	3.88	36.18	4.38	41.35	5.44	46.52	6.33
	10	23.26	2.42	25.85	2.71	31.02	3.52	33.60	4.00	36.18	4.55	41.35	5.63	46.52	6.50
	12	23.26	2.47	25.85	2.77	31.02	3.64	33.60	4.17	36.18	4.79	41.35	5.72	46.52	6.99
	14	23.26	2.51	25.85	2.88	31.02	3.88	33.60	4.30	36.18	4.83	41.35	5.76	46.52	7.49
	16	23.26	2.62	25.85	3.07	31.02	3.98	33.60	4.45	36.18	4.93	41.35	6.18	46.52	8.05
	18	23.26	2.96	25.85	3.49	31.02	4.18	33.60	4.68	36.18	5.33	41.35	6.68	45.30	8.32
	20	23.26	3.34	25.85	3.71	31.02	4.50	33.60	5.11	36.18	5.79	41.35	7.20	44.08	8.32
	21	23.26	3.46	25.85	3.84	31.02	4.67	33.60	5.34	36.18	6.03	41.35	7.50	43.45	8.32
	23	23.26	3.73	25.85	4.13	31.02	5.10	33.60	5.80	36.18	6.54	41.35	8.09	42.25	8.32
	25	23.26	4.01	25.85	4.46	31.02	5.55	33.60	6.30	36.18	7.09	40.06	8.32	40.99	8.33
	27	23.26	4.32	25.85	4.80	31.02	6.04	33.60	6.81	36.18	7.67	38.76	8.30	39.77	8.30
	29	23.26	4.66	25.85	5.18	31.02	6.56	33.60	7.41	36.18	8.26	37.56	8.30	38.53	8.31
	31	23.26	5.01	25.85	5.58	31.02	7.12	33.60	8.00	34.63	8.32	36.29	8.30	37.27	8.32
	33	23.26	5.40	25.85	6.04	31.02	7.71	32.64	8.31	33.36	8.30	35.15	8.34	36.01	8.32
	35	23.26	5.83	25.85	6.54	31.02	8.36	31.41	8.34	32.16	8.31	33.90	8.34	34.82	8.41
	37	23.26	6.29	25.85	7.09	29.37	8.30	30.18	8.31	30.95	8.33	32.65	8.34	33.56	8.41
	39	23.26	6.76	25.85	7.69	28.26	8.30	28.98	8.32	29.78	8.33	31.36	8.35	32.29	8.41
	41	23.26	7.32	25.85	8.33	27.04	8.32	27.89	8.36	28.56	8.32	30.11	8.35	31.06	8.39
	43	23.26	7.92	24.47	8.30	25.91	8.30	26.69	8.34	27.35	8.31	28.86	8.33	29.80	8.38
	45	22.67	8.31	23.33	8.30	24.87	8.36	25.21	8.16	25.42	7.87	26.04	7.50	25.79	7.09
	48	19.13	7.28	19.20	7.02	20.07	6.87	19.63	6.48	20.27	6.51	19.98	6.01	20.64	6.05
	50	15.28	6.02	15.89	6.04	15.52	5.55	16.04	5.58	15.72	5.33	16.75	5.40	15.75	5.02
	52	11.35	4.85	11.80	4.88	11.84	4.66	12.21	4.69	12.58	4.72	11.72	4.39	12.00	4.44

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.2: 10HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
110%	-5	21.32	2.20	23.69	2.44	28.43	2.92	30.80	3.29	33.17	3.70	37.91	4.57	42.65	5.19
	-2	21.32	2.21	23.69	2.45	28.43	2.93	30.80	3.32	33.17	3.72	37.91	4.65	42.65	5.24
	0	21.32	2.21	23.69	2.46	28.43	2.95	30.80	3.33	33.17	3.75	37.91	4.66	42.65	5.32
	2	21.32	2.21	23.69	2.46	28.43	2.96	30.80	3.34	33.17	3.82	37.91	4.66	42.65	5.34
	4	21.32	2.22	23.69	2.46	28.43	2.96	30.80	3.34	33.17	3.84	37.91	4.71	42.65	5.42
	6	21.32	2.23	23.69	2.47	28.43	3.02	30.80	3.44	33.17	3.87	37.91	4.81	42.65	5.47
	8	21.32	2.23	23.69	2.48	28.43	3.04	30.80	3.49	33.17	3.99	37.91	4.86	42.65	5.69
	10	21.32	2.25	23.69	2.49	28.43	3.08	30.80	3.58	33.17	4.14	37.91	5.09	42.65	5.92
	12	21.32	2.25	23.69	2.59	28.43	3.19	30.80	3.77	33.17	4.29	37.91	5.16	42.65	5.99
	14	21.32	2.30	23.69	2.63	28.43	3.40	30.80	3.96	33.17	4.31	37.91	5.24	42.65	6.39
	16	21.32	2.38	23.69	2.82	28.43	3.72	30.80	4.03	33.17	4.45	37.91	5.25	42.65	6.87
	18	21.32	2.63	23.69	3.26	28.43	3.77	30.80	4.12	33.17	4.55	37.91	5.69	42.65	7.42
	20	21.32	3.06	23.69	3.38	28.43	4.05	30.80	4.42	33.17	4.94	37.91	6.19	42.65	7.98
	21	21.32	3.17	23.69	3.50	28.43	4.20	30.80	4.61	33.17	5.17	37.91	6.45	42.65	8.27
	23	21.32	3.41	23.69	3.76	28.43	4.54	30.80	5.00	33.17	5.64	37.91	6.98	41.29	8.45
	25	21.32	3.67	23.69	4.05	28.43	4.89	30.80	5.46	33.17	6.12	37.91	7.55	40.10	8.46
	27	21.32	3.95	23.69	4.36	28.43	5.29	30.80	5.96	33.17	6.67	37.91	8.17	38.87	8.44
	29	21.32	4.26	23.69	4.72	28.43	5.74	30.80	6.45	33.17	7.23	36.79	8.45	37.67	8.45
	31	21.32	4.59	23.69	5.09	28.43	6.24	30.80	7.03	33.17	7.84	35.51	8.43	36.46	8.44
	33	21.32	4.95	23.69	5.49	28.43	6.78	30.80	7.62	33.17	8.50	34.32	8.44	35.25	8.45
	35	21.32	5.32	23.69	5.92	28.43	7.38	30.80	8.26	31.57	8.45	33.15	8.45	34.03	8.46
	37	21.32	5.73	23.69	6.36	28.43	7.99	29.59	8.43	30.35	8.43	32.03	8.47	32.82	8.46
	39	21.32	6.18	23.69	6.85	27.75	8.43	28.46	8.44	29.18	8.44	30.82	8.48	31.68	8.55
	41	21.32	6.66	23.69	7.44	26.61	8.44	27.29	8.44	28.09	8.46	29.61	8.48	30.46	8.54
	43	21.32	7.17	23.69	8.06	25.53	8.44	26.14	8.43	26.92	8.45	28.38	8.48	28.98	8.36
	45	21.32	7.70	23.00	8.43	24.38	8.44	24.87	8.30	25.08	8.01	25.40	7.48	25.48	7.23
	48	18.90	7.36	19.11	7.16	19.31	6.72	19.58	6.61	19.88	6.49	20.01	6.13	20.22	6.03
	50	15.35	6.15	15.25	5.91	15.63	5.68	15.37	5.43	15.47	5.32	16.47	5.39	16.99	5.43
100%	52	11.57	4.98	11.67	4.87	11.71	4.65	12.08	4.68	12.44	4.71	11.62	4.39	11.89	4.43
	-5	19.38	2.02	21.54	2.24	25.85	2.67	28.00	2.91	30.15	3.28	34.46	4.09	38.77	4.75
	-2	19.38	2.03	21.54	2.25	25.85	2.70	28.00	2.95	30.15	3.29	34.46	4.15	38.77	4.80
	0	19.38	2.03	21.54	2.26	25.85	2.71	28.00	3.04	30.15	3.30	34.46	4.16	38.77	4.81
	2	19.38	2.03	21.54	2.26	25.85	2.72	28.00	3.05	30.15	3.40	34.46	4.19	38.77	4.83
	4	19.38	2.03	21.54	2.27	25.85	2.75	28.00	3.05	30.15	3.43	34.46	4.23	38.77	4.92
	6	19.38	2.04	21.54	2.27	25.85	2.76	28.00	3.09	30.15	3.44	34.46	4.23	38.77	4.96
	8	19.38	2.05	21.54	2.27	25.85	2.77	28.00	3.14	30.15	3.47	34.46	4.39	38.77	5.16
	10	19.38	2.05	21.54	2.28	25.85	2.82	28.00	3.15	30.15	3.52	34.46	4.52	38.77	5.29
	12	19.38	2.05	21.54	2.32	25.85	2.87	28.00	3.25	30.15	3.74	34.46	4.56	38.77	5.34
	14	19.38	2.08	21.54	2.36	25.85	3.04	28.00	3.50	30.15	3.93	34.46	4.69	38.77	5.41
	16	19.38	2.17	21.54	2.52	25.85	3.47	28.00	3.69	30.15	3.97	34.46	4.71	38.77	5.73
	18	19.38	2.32	21.54	2.87	25.85	3.49	28.00	3.74	30.15	4.13	34.46	4.82	38.77	6.21
	20	19.38	2.82	21.54	3.06	25.85	3.63	28.00	3.94	30.15	4.27	34.46	5.17	38.77	6.71
	21	19.38	2.88	21.54	3.16	25.85	3.78	28.00	4.10	30.15	4.45	34.46	5.41	38.77	6.99
	23	19.38	3.09	21.54	3.40	25.85	4.07	28.00	4.42	30.15	4.80	34.46	5.88	38.77	7.56
	25	19.38	3.33	21.54	3.67	25.85	4.38	28.00	4.78	30.15	5.19	34.46	6.41	38.77	8.13
	27	19.38	3.59	21.54	3.95	25.85	4.74	28.00	5.15	30.15	5.69	34.46	6.96	37.90	8.58
	29	19.38	3.86	21.54	4.26	25.85	5.12	28.00	5.56	30.15	6.19	34.46	7.56	36.71	8.57
	31	19.38	4.16	21.54	4.59	25.85	5.52	28.00	6.06	30.15	6.76	34.46	8.18	35.60	8.58
	33	19.38	4.49	21.54	4.96	25.85	5.94	28.00	6.59	30.15	7.33	33.63	8.57	34.41	8.60
	35	19.38	4.84	21.54	5.34	25.85	6.41	28.00	7.18	30.15	7.96	32.41	8.57	33.25	8.57
	37	19.38	5.20	21.54	5.75	25.85	7.00	28.00	7.76	30.15	8.63	31.20	8.57	32.08	8.59
	39	19.38	5.61	21.54	6.20	25.85	7.59	28.00	8.46	28.58	8.57	30.10	8.61	30.91	8.59
	41	19.38	6.04	21.54	6.68	25.85	8.25	26.83	8.59	27.48	8.57	29.02	8.61	29.75	8.59
	43	19.38	6.50	21.54	7.17	25.08	8.59	25.70	8.57	26.35	8.57	27.87	8.61	28.66	8.67
	45	19.38	6.99	21.54	7.75	23.99	8.58	24.54	8.53	24.67	8.15	25.01	7.61	25.12	7.36
	48	18.70	7.46	18.81	7.23	19.19	6.85	19.16	6.59	19.77	6.62	19.92	6.27	20.20	6.15
	50	15.04	6.15	15.31	6.03	15.70	5.81	15.85	5.70	15.58	5.45	16.17	5.37	16.68	5.41
	52	11.76	5.11	11.87	5.00	11.57	4.64	11.93	4.67	12.28	4.70	11.51	4.38	11.78	4.42

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1.Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.2: 10HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
90%	-5	17.45	1.79	19.38	2.01	23.26	2.42	25.20	2.62	27.14	2.94	31.02	3.50	34.89	4.12
	-2	17.45	1.80	19.38	2.02	23.26	2.43	25.20	2.63	27.14	2.95	31.02	3.63	34.89	4.22
	0	17.45	1.80	19.38	2.02	23.26	2.44	25.20	2.66	27.14	2.95	31.02	3.65	34.89	4.23
	2	17.45	1.81	19.38	2.02	23.26	2.44	25.20	2.66	27.14	2.96	31.02	3.67	34.89	4.23
	4	17.45	1.82	19.38	2.04	23.26	2.46	25.20	2.66	27.14	2.96	31.02	3.67	34.89	4.23
	6	17.45	1.83	19.38	2.04	23.26	2.47	25.20	2.68	27.14	3.01	31.02	3.71	34.89	4.28
	8	17.45	1.85	19.38	2.06	23.26	2.49	25.20	2.70	27.14	3.05	31.02	3.75	34.89	4.44
	10	17.45	1.85	19.38	2.08	23.26	2.53	25.20	2.73	27.14	3.06	31.02	3.90	34.89	4.54
	12	17.45	1.91	19.38	2.09	23.26	2.57	25.20	2.82	27.14	3.16	31.02	3.97	34.89	4.61
	14	17.45	1.92	19.38	2.09	23.26	2.68	25.20	2.94	27.14	3.42	31.02	4.03	34.89	4.71
	16	17.45	1.92	19.38	2.18	23.26	2.96	25.20	3.36	27.14	3.57	31.02	4.17	34.89	4.78
	18	17.45	2.00	19.38	2.39	23.26	3.16	25.20	3.39	27.14	3.59	31.02	4.18	34.89	4.87
	20	17.45	2.32	19.38	2.77	23.26	3.21	25.20	3.43	27.14	3.66	31.02	4.22	34.89	5.21
	21	17.45	2.58	19.38	2.80	23.26	3.26	25.20	3.53	27.14	3.80	31.02	4.34	34.89	5.46
	23	17.45	2.72	19.38	2.97	23.26	3.52	25.20	3.81	27.14	4.10	31.02	4.70	34.89	5.96
	25	17.45	2.93	19.38	3.21	23.26	3.80	25.20	4.11	27.14	4.43	31.02	5.08	34.89	6.49
	27	17.45	3.17	19.38	3.46	23.26	4.10	25.20	4.43	27.14	4.79	31.02	5.52	34.89	7.06
	29	17.45	3.40	19.38	3.73	23.26	4.42	25.20	4.79	27.14	5.17	31.02	6.05	34.89	7.64
	31	17.45	3.67	19.38	4.02	23.26	4.78	25.20	5.18	27.14	5.57	31.02	6.62	34.89	8.28
	33	17.45	3.95	19.38	4.34	23.26	5.15	25.20	5.58	27.14	6.04	31.02	7.21	33.83	8.57
	35	17.45	4.25	19.38	4.67	23.26	5.55	25.20	6.02	27.14	6.52	31.02	7.81	32.71	8.60
	37	17.45	4.59	19.38	5.04	23.26	5.99	25.20	6.51	27.14	7.11	31.02	8.51	31.50	8.56
	39	17.45	4.93	19.38	5.41	23.26	6.45	25.20	7.03	27.14	7.73	29.66	8.60	30.37	8.57
	41	17.45	5.31	19.38	5.84	23.26	6.95	25.20	7.63	27.14	8.40	28.54	8.61	29.37	8.63
	43	17.45	5.72	19.38	6.29	23.26	7.51	25.20	8.29	26.08	8.57	27.42	8.60	28.25	8.62
	45	17.45	6.15	19.38	6.76	23.26	8.14	24.32	8.56	24.74	8.42	24.99	7.73	25.12	7.48
	48	17.45	6.85	18.89	7.34	19.15	6.91	19.29	6.72	19.58	6.61	20.14	6.38	19.59	6.00
	50	15.16	6.23	15.22	6.03	15.64	5.80	15.42	5.55	15.90	5.58	15.67	5.23	16.61	5.40
	52	11.45	4.97	11.54	4.86	11.98	4.77	11.96	4.66	12.32	4.69	11.58	4.37	11.86	4.41
80%	-5	15.51	1.57	17.23	1.79	20.68	2.15	22.40	2.31	24.12	2.48	27.57	2.94	31.02	3.54
	-2	15.51	1.59	17.23	1.79	20.68	2.19	22.40	2.33	24.12	2.51	27.57	3.08	31.02	3.61
	0	15.51	1.59	17.23	1.80	20.68	2.19	22.40	2.36	24.12	2.52	27.57	3.13	31.02	3.62
	2	15.51	1.62	17.23	1.81	20.68	2.19	22.40	2.37	24.12	2.54	27.57	3.15	31.02	3.64
	4	15.51	1.62	17.23	1.81	20.68	2.21	22.40	2.40	24.12	2.54	27.57	3.19	31.02	3.67
	6	15.51	1.62	17.23	1.81	20.68	2.21	22.40	2.42	24.12	2.55	27.57	3.21	31.02	3.76
	8	15.51	1.62	17.23	1.81	20.68	2.23	22.40	2.43	24.12	2.59	27.57	3.25	31.02	3.80
	10	15.51	1.64	17.23	1.85	20.68	2.24	22.40	2.43	24.12	2.61	27.57	3.31	31.02	3.89
	12	15.51	1.66	17.23	1.86	20.68	2.30	22.40	2.46	24.12	2.72	27.57	3.42	31.02	3.97
	14	15.51	1.66	17.23	1.87	20.68	2.31	22.40	2.61	24.12	2.88	27.57	3.59	31.02	4.04
	16	15.51	1.74	17.23	1.92	20.68	2.45	22.40	2.88	24.12	3.21	27.57	3.61	31.02	4.05
	18	15.51	1.76	17.23	2.04	20.68	2.83	22.40	3.03	24.12	3.22	27.57	3.63	31.02	4.13
	20	15.51	1.95	17.23	2.50	20.68	2.87	22.40	3.07	24.12	3.26	27.57	3.65	31.02	4.19
	21	15.51	2.22	17.23	2.50	20.68	2.89	22.40	3.09	24.12	3.29	27.57	3.77	31.02	4.29
	23	15.51	2.38	17.23	2.58	20.68	3.02	22.40	3.25	24.12	3.48	27.57	3.94	31.02	4.65
	25	15.51	2.56	17.23	2.79	20.68	3.26	22.40	3.51	24.12	3.76	27.57	4.26	31.02	5.01
	27	15.51	2.77	17.23	3.01	20.68	3.52	22.40	3.78	24.12	4.06	27.57	4.60	31.02	5.43
	29	15.51	2.98	17.23	3.24	20.68	3.80	22.40	4.09	24.12	4.38	27.57	4.99	31.02	5.97
	31	15.51	3.22	17.23	3.50	20.68	4.11	22.40	4.42	24.12	4.74	27.57	5.39	31.02	6.51
	33	15.51	3.47	17.23	3.77	20.68	4.42	22.40	4.76	24.12	5.11	27.57	5.81	31.02	7.11
	35	15.51	3.73	17.23	4.07	20.68	4.77	22.40	5.15	24.12	5.53	27.57	6.29	31.02	7.73
	37	15.51	4.02	17.23	4.38	20.68	5.15	22.40	5.55	24.12	5.97	27.57	6.79	31.02	8.38
	39	15.51	4.32	17.23	4.71	20.68	5.55	22.40	5.99	24.12	6.43	27.57	7.44	29.86	8.60
	41	15.51	4.65	17.23	5.08	20.68	5.98	22.40	6.44	24.12	6.93	27.57	8.10	28.78	8.58
	43	15.51	4.99	17.23	5.46	20.68	6.43	22.40	6.94	24.12	7.50	26.97	8.59	27.69	8.58
	45	15.51	5.37	17.23	5.87	20.68	6.93	22.40	7.50	24.12	8.11	25.04	7.98	25.27	7.75
	48	15.51	5.98	17.23	6.55	19.21	7.03	19.28	6.82	19.47	6.66	19.52	6.22	19.74	6.12
	50	15.51	6.43	15.31	6.12	15.53	5.78	15.68	5.67	16.14	5.70	15.99	5.35	16.06	5.24
	52	11.59	5.03	11.54	4.84	11.60	4.63	12.34	4.79	11.89	4.55	13.03	4.75	11.88	4.40

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.2: 10HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	13.57	1.36	15.08	1.52	18.09	1.85	19.60	1.99	21.11	2.17	24.12	2.47	27.14	2.92
	-2	13.57	1.37	15.08	1.54	18.09	1.86	19.60	2.01	21.11	2.19	24.12	2.52	27.14	2.93
	0	13.57	1.37	15.08	1.54	18.09	1.88	19.60	2.02	21.11	2.20	24.12	2.61	27.14	2.94
	2	13.57	1.37	15.08	1.55	18.09	1.88	19.60	2.02	21.11	2.21	24.12	2.64	27.14	2.98
	4	13.57	1.39	15.08	1.56	18.09	1.89	19.60	2.06	21.11	2.25	24.12	2.65	27.14	3.00
	6	13.57	1.40	15.08	1.58	18.09	1.90	19.60	2.08	21.11	2.26	24.12	2.70	27.14	3.08
	8	13.57	1.41	15.08	1.59	18.09	1.90	19.60	2.09	21.11	2.28	24.12	2.71	27.14	3.12
	10	13.57	1.41	15.08	1.61	18.09	1.92	19.60	2.11	21.11	2.29	24.12	2.75	27.14	3.14
	12	13.57	1.42	15.08	1.61	18.09	1.93	19.60	2.12	21.11	2.36	24.12	2.82	27.14	3.25
	14	13.57	1.43	15.08	1.62	18.09	1.99	19.60	2.18	21.11	2.41	24.12	3.01	27.14	3.51
	16	13.57	1.43	15.08	1.62	18.09	2.08	19.60	2.33	21.11	2.66	24.12	3.14	27.14	3.52
	18	13.57	1.51	15.08	1.68	18.09	2.41	19.60	2.71	21.11	2.84	24.12	3.16	27.14	3.56
	20	13.57	1.62	15.08	2.00	18.09	2.56	19.60	2.72	21.11	2.87	24.12	3.20	27.14	3.57
	21	13.57	1.73	15.08	2.23	18.09	2.56	19.60	2.72	21.11	2.89	24.12	3.22	27.14	3.58
	23	13.57	1.77	15.08	2.26	18.09	2.62	19.60	2.80	21.11	2.97	24.12	3.30	27.14	3.80
	25	13.57	1.88	15.08	2.32	18.09	2.78	19.60	2.97	21.11	3.16	24.12	3.54	27.14	4.12
	27	13.57	2.06	15.08	2.52	18.09	3.00	19.60	3.21	21.11	3.43	24.12	3.84	27.14	4.45
	29	13.57	2.31	15.08	2.82	18.09	3.24	19.60	3.47	21.11	3.70	24.12	4.15	27.14	4.82
	31	13.57	2.52	15.08	3.03	18.09	3.50	19.60	3.75	21.11	4.00	24.12	4.49	27.14	5.22
	33	13.57	2.68	15.08	3.18	18.09	3.78	19.60	4.05	21.11	4.31	24.12	4.85	27.14	5.65
	35	13.57	3.03	15.08	3.52	18.09	4.07	19.60	4.36	21.11	4.65	24.12	5.25	27.14	6.10
	37	13.57	3.28	15.08	3.79	18.09	4.39	19.60	4.71	21.11	5.02	24.12	5.67	27.14	6.58
	39	13.57	3.55	15.08	4.07	18.09	4.72	19.60	5.07	21.11	5.41	24.12	6.11	27.14	7.11
	41	13.57	3.83	15.08	4.37	18.09	5.09	19.60	5.46	21.11	5.84	24.12	6.58	27.14	7.75
	43	13.57	4.13	15.08	4.70	18.09	5.48	19.60	5.88	21.11	6.29	24.12	7.09	27.14	8.44
	45	13.57	4.45	15.08	5.06	18.09	5.90	19.60	6.33	21.11	6.77	24.12	7.66	25.20	8.02
	48	13.57	5.19	15.08	5.63	18.09	6.57	19.60	7.07	19.46	6.79	19.67	6.42	19.80	6.23
	50	13.57	5.56	15.08	6.05	15.57	5.88	15.64	5.73	15.94	5.68	16.21	5.46	16.31	5.36
	52	11.59	5.05	11.64	4.90	11.92	4.75	11.92	4.64	12.26	4.67	12.53	4.60	11.90	4.38
60%	-5	11.63	1.14	12.92	1.30	15.51	1.57	16.80	1.74	18.09	1.85	20.68	2.15	23.26	2.42
	-2	11.63	1.15	12.92	1.31	15.51	1.59	16.80	1.75	18.09	1.85	20.68	2.16	23.26	2.43
	0	11.63	1.15	12.92	1.32	15.51	1.59	16.80	1.75	18.09	1.86	20.68	2.19	23.26	2.45
	2	11.63	1.15	12.92	1.34	15.51	1.60	16.80	1.75	18.09	1.87	20.68	2.19	23.26	2.45
	4	11.63	1.16	12.92	1.34	15.51	1.61	16.80	1.75	18.09	1.88	20.68	2.20	23.26	2.45
	6	11.63	1.18	12.92	1.34	15.51	1.62	16.80	1.76	18.09	1.88	20.68	2.21	23.26	2.47
	8	11.63	1.19	12.92	1.34	15.51	1.63	16.80	1.76	18.09	1.89	20.68	2.21	23.26	2.50
	10	11.63	1.24	12.92	1.36	15.51	1.64	16.80	1.77	18.09	1.93	20.68	2.21	23.26	2.52
	12	11.63	1.26	12.92	1.36	15.51	1.64	16.80	1.80	18.09	1.94	20.68	2.25	23.26	2.62
	14	11.63	1.26	12.92	1.36	15.51	1.66	16.80	1.84	18.09	2.03	20.68	2.44	23.26	2.78
	16	11.63	1.28	12.92	1.39	15.51	1.72	16.80	1.96	18.09	2.09	20.68	2.63	23.26	3.09
	18	11.63	1.29	12.92	1.40	15.51	1.87	16.80	2.10	18.09	2.42	20.68	2.75	23.26	3.09
	20	11.63	1.30	12.92	1.57	15.51	2.22	16.80	2.36	18.09	2.50	20.68	2.80	23.26	3.09
	21	11.63	1.34	12.92	1.61	15.51	2.24	16.80	2.37	18.09	2.51	20.68	2.80	23.26	3.12
	23	11.63	1.38	12.92	1.78	15.51	2.26	16.80	2.42	18.09	2.57	20.68	2.85	23.26	3.18
	25	11.63	1.40	12.92	1.80	15.51	2.36	16.80	2.50	18.09	2.66	20.68	2.94	23.26	3.35
	27	11.63	1.56	12.92	1.82	15.51	2.45	16.80	2.69	18.09	2.85	20.68	3.17	23.26	3.63
	29	11.63	1.74	12.92	1.97	15.51	2.76	16.80	2.91	18.09	3.09	20.68	3.43	23.26	3.92
	31	11.63	1.93	12.92	2.17	15.51	2.96	16.80	3.15	18.09	3.34	20.68	3.71	23.26	4.23
	33	11.63	2.12	12.92	2.48	15.51	3.19	16.80	3.40	18.09	3.60	20.68	4.01	23.26	4.58
	35	11.63	2.33	12.92	2.68	15.51	3.44	16.80	3.67	18.09	3.89	20.68	4.33	23.26	4.95
	37	11.63	2.55	12.92	2.92	15.51	3.71	16.80	3.96	18.09	4.20	20.68	4.66	23.26	5.34
	39	11.63	2.78	12.92	3.16	15.51	3.99	16.80	4.25	18.09	4.53	20.68	5.04	23.26	5.76
	41	11.63	3.03	12.92	3.42	15.51	4.30	16.80	4.58	18.09	4.86	20.68	5.42	23.26	6.22
	43	11.63	3.33	12.92	3.71	15.51	4.62	16.80	4.93	18.09	5.23	20.68	5.85	23.26	6.70
	45	11.63	3.61	12.92	4.00	15.51	4.97	16.80	5.30	18.09	5.64	20.68	6.30	23.26	7.24
	48	11.63	4.06	12.92	4.62	15.51	5.52	16.80	5.91	18.09	6.29	19.70	6.63	19.78	6.41
	50	11.63	4.76	12.92	5.15	15.51	5.94	15.76	5.88	15.86	5.74	15.92	5.44	16.05	5.33
	52	11.63	5.11	11.73	4.99	11.99	4.80	12.18	4.75	12.15	4.65	12.03	4.45	12.79	4.61

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table continued on next page ...

# TVR Ultra HR 50/60Hz



Table 2-9.2: 10HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	9.69	0.91	10.77	1.05	12.92	1.30	14.00	1.42	15.08	1.56	17.23	1.74	19.38	1.96
	-2	9.69	0.93	10.77	1.05	12.92	1.31	14.00	1.42	15.08	1.56	17.23	1.75	19.38	2.00
	0	9.69	0.95	10.77	1.06	12.92	1.32	14.00	1.43	15.08	1.57	17.23	1.80	19.38	2.02
	2	9.69	0.96	10.77	1.08	12.92	1.33	14.00	1.43	15.08	1.60	17.23	1.81	19.38	2.02
	4	9.69	0.97	10.77	1.09	12.92	1.35	14.00	1.44	15.08	1.61	17.23	1.81	19.38	2.03
	6	9.69	0.97	10.77	1.09	12.92	1.37	14.00	1.47	15.08	1.61	17.23	1.82	19.38	2.03
	8	9.69	0.98	10.77	1.10	12.92	1.38	14.00	1.47	15.08	1.61	17.23	1.82	19.38	2.04
	10	9.69	0.99	10.77	1.11	12.92	1.39	14.00	1.48	15.08	1.64	17.23	1.87	19.38	2.06
	12	9.69	0.99	10.77	1.14	12.92	1.40	14.00	1.50	15.08	1.64	17.23	1.88	19.38	2.07
	14	9.69	1.01	10.77	1.17	12.92	1.41	14.00	1.50	15.08	1.65	17.23	1.89	19.38	2.16
	16	9.69	1.03	10.77	1.18	12.92	1.43	14.00	1.52	15.08	1.65	17.23	1.98	19.38	2.32
	18	9.69	1.03	10.77	1.18	12.92	1.45	14.00	1.64	15.08	1.80	17.23	2.29	19.38	2.60
	20	9.69	1.03	10.77	1.21	12.92	1.59	14.00	1.87	15.08	2.16	17.23	2.36	19.38	2.64
	21	9.69	1.04	10.77	1.21	12.92	1.65	14.00	1.89	15.08	2.17	17.23	2.41	19.38	2.66
	23	9.69	1.06	10.77	1.24	12.92	1.68	14.00	2.03	15.08	2.20	17.23	2.43	19.38	2.68
	25	9.69	1.07	10.77	1.27	12.92	1.86	14.00	2.06	15.08	2.24	17.23	2.49	19.38	2.76
	27	9.69	1.21	10.77	1.35	12.92	1.88	14.00	2.08	15.08	2.28	17.23	2.59	19.38	2.91
	29	9.69	1.36	10.77	1.52	12.92	1.92	14.00	2.12	15.08	2.48	17.23	2.80	19.38	3.16
	31	9.69	1.53	10.77	1.69	12.92	2.05	14.00	2.33	15.08	2.61	17.23	3.03	19.38	3.41
	33	9.69	1.69	10.77	1.87	12.92	2.25	14.00	2.55	15.08	2.90	17.23	3.28	19.38	3.69
	35	9.69	1.87	10.77	2.06	12.92	2.57	14.00	2.83	15.08	3.06	17.23	3.54	19.38	3.99
	37	9.69	2.05	10.77	2.26	12.92	2.77	14.00	3.07	15.08	3.39	17.23	3.82	19.38	4.30
	39	9.69	2.25	10.77	2.47	12.92	3.02	14.00	3.32	15.08	3.65	17.23	4.11	19.38	4.63
	41	9.69	2.46	10.77	2.70	12.92	3.27	14.00	3.59	15.08	4.02	17.23	4.42	19.38	5.00
	43	9.69	2.68	10.77	2.93	12.92	3.53	14.00	3.87	15.08	4.31	17.23	4.76	19.38	5.37
	45	9.69	2.91	10.77	3.19	12.92	3.82	14.00	4.17	15.08	4.63	17.23	5.12	19.38	5.78
	48	9.69	3.29	10.77	3.59	12.92	4.29	14.00	4.88	15.08	5.16	17.23	5.71	19.38	6.46
	50	9.69	4.02	10.77	4.31	12.92	4.92	14.00	5.22	15.08	5.53	16.02	5.63	16.15	5.50
	52	9.69	4.30	10.77	4.62	11.99	4.87	12.03	4.76	12.15	4.69	12.27	4.55	12.20	4.45

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.3: 12HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	30.15	3.01	33.50	3.63	40.20	4.69	43.55	5.23	46.90	5.76	53.60	6.98	60.30	8.02
	-2	30.15	3.04	33.50	3.66	40.20	4.71	43.55	5.27	46.90	5.77	53.60	7.11	60.30	8.18
	0	30.15	3.04	33.50	3.67	40.20	4.74	43.55	5.38	46.90	5.88	53.60	7.22	60.30	8.33
	2	30.15	3.16	33.50	3.70	40.20	4.75	43.55	5.42	46.90	5.95	53.60	7.22	60.30	8.42
	4	30.15	3.18	33.50	3.74	40.20	4.88	43.55	5.53	46.90	6.10	53.60	7.30	60.30	8.43
	6	30.15	3.20	33.50	3.77	40.20	4.98	43.55	5.61	46.90	6.24	53.60	7.39	60.30	8.57
	8	30.15	3.20	33.50	3.79	40.20	5.18	43.55	5.71	46.90	6.26	53.60	7.42	60.30	9.06
	10	30.15	3.25	33.50	3.99	40.20	5.26	43.55	5.85	46.90	6.37	53.60	7.54	60.30	9.72
	12	30.15	3.35	33.50	4.13	40.20	5.29	43.55	5.91	46.90	6.45	53.60	7.83	57.68	9.52
	14	30.15	3.71	33.50	4.18	40.20	5.40	43.55	5.94	46.90	6.71	53.60	8.42	56.27	9.52
	16	30.15	3.83	33.50	4.31	40.20	5.61	43.55	6.38	46.90	7.22	53.60	9.10	54.87	9.51
	18	30.15	4.02	33.50	4.54	40.20	6.05	43.55	6.88	46.90	7.77	52.30	9.50	53.55	9.52
	20	30.15	4.32	33.50	4.94	40.20	6.53	43.55	7.41	46.90	8.33	50.97	9.52	52.15	9.52
	21	30.15	4.48	33.50	5.14	40.20	6.79	43.55	7.68	46.90	8.63	50.29	9.53	51.47	9.53
	23	30.15	4.81	33.50	5.58	40.20	7.32	43.55	8.26	46.90	9.27	48.93	9.51	50.21	9.57
	25	30.15	5.23	33.50	6.05	40.20	7.89	43.55	8.90	45.42	9.51	47.51	9.52	48.68	9.54
	27	30.15	5.69	33.50	6.54	40.20	8.48	43.55	9.58	43.93	9.52	45.90	9.49	47.14	9.54
	29	30.15	6.16	33.50	7.10	40.20	9.15	41.44	9.49	42.47	9.52	44.57	9.55	45.61	9.56
	31	30.15	6.69	33.50	7.67	39.08	9.50	40.03	9.50	40.94	9.51	43.09	9.58	44.05	9.58
	33	30.15	7.24	33.50	8.27	37.61	9.50	38.53	9.51	39.44	9.52	41.40	9.51	42.52	9.59
	35	30.15	7.82	33.50	8.94	36.14	9.51	37.06	9.52	38.04	9.54	39.85	9.53	40.99	9.61
	37	30.15	8.45	33.50	9.64	34.73	9.54	35.74	9.58	36.57	9.55	38.35	9.54	39.50	9.60
	39	30.15	9.14	31.52	9.51	33.24	9.50	34.13	9.50	34.97	9.49	36.85	9.55	38.29	9.78
120%	41	29.21	9.50	30.10	9.50	31.91	9.54	32.69	9.51	33.63	9.58	34.13	8.85	34.25	8.41
	43	27.87	9.50	28.78	9.55	29.27	8.87	29.37	8.50	29.69	8.21	29.93	7.52	30.08	7.28
	45	24.87	8.56	25.13	8.24	25.45	7.60	25.91	7.51	26.00	7.25	26.04	6.75	25.95	6.52
	48	18.94	6.73	19.37	6.61	19.62	6.26	19.89	6.16	19.62	5.92	19.45	5.58	20.13	5.62
	50	15.38	5.83	15.58	5.74	15.03	5.26	15.57	5.29	16.10	5.32	15.52	4.99	16.02	5.03
	52	11.66	4.96	10.86	4.59	11.70	4.65	12.10	4.69	10.84	4.33	11.43	4.41	11.71	4.45
	-5	27.83	2.82	30.92	3.25	37.11	4.29	40.20	4.75	43.29	5.32	49.48	6.39	55.66	7.38
	-2	27.83	2.83	30.92	3.26	37.11	4.39	40.20	4.82	43.29	5.41	49.48	6.58	55.66	7.44
	0	27.83	2.83	30.92	3.27	37.11	4.39	40.20	4.84	43.29	5.44	49.48	6.62	55.66	7.60
	2	27.83	2.84	30.92	3.35	37.11	4.39	40.20	4.95	43.29	5.46	49.48	6.67	55.66	7.65
	4	27.83	2.84	30.92	3.36	37.11	4.46	40.20	5.11	43.29	5.57	49.48	6.73	55.66	7.75
	6	27.83	2.89	30.92	3.38	37.11	4.65	40.20	5.21	43.29	5.75	49.48	6.73	55.66	7.92
	8	27.83	2.95	30.92	3.49	37.11	4.81	40.20	5.23	43.29	5.79	49.48	6.78	55.66	7.92
	10	27.83	3.04	30.92	3.53	37.11	4.84	40.20	5.38	43.29	5.90	49.48	6.93	55.66	8.18
	12	27.83	3.07	30.92	3.78	37.11	4.84	40.20	5.47	43.29	5.90	49.48	6.98	55.66	8.80
	14	27.83	3.41	30.92	3.92	37.11	4.97	40.20	5.50	43.29	6.01	49.48	7.22	55.66	9.53
	16	27.83	3.59	30.92	4.05	37.11	5.07	40.20	5.52	43.29	6.25	49.48	7.77	53.89	9.67
	18	27.83	3.69	30.92	4.07	37.11	5.24	40.20	5.98	43.29	6.75	49.48	8.36	52.54	9.66
	20	27.83	3.96	30.92	4.37	37.11	5.69	40.20	6.46	43.29	7.27	49.48	8.98	51.18	9.68
	21	27.83	4.09	30.92	4.54	37.11	5.93	40.20	6.73	43.29	7.54	49.48	9.35	50.49	9.65
	23	27.83	4.41	30.92	4.89	37.11	6.41	40.20	7.27	43.29	8.13	48.08	9.66	49.11	9.65
	25	27.83	4.74	30.92	5.33	37.11	6.93	40.20	7.83	43.29	8.77	46.70	9.65	47.80	9.66
	27	27.83	5.11	30.92	5.79	37.11	7.51	40.20	8.45	43.29	9.41	45.30	9.66	46.37	9.67
	29	27.83	5.49	30.92	6.31	37.11	8.12	40.20	9.10	41.85	9.66	43.78	9.66	44.88	9.68
	31	27.83	5.95	30.92	6.83	37.11	8.75	40.20	9.82	40.41	9.67	42.30	9.67	43.40	9.70
	33	27.83	6.47	30.92	7.38	37.11	9.44	38.07	9.67	38.94	9.67	40.97	9.73	41.88	9.73
	35	27.83	6.99	30.92	8.01	35.78	9.69	36.58	9.65	37.49	9.67	39.34	9.66	40.40	9.75
	37	27.83	7.59	30.92	8.65	34.35	9.69	35.20	9.68	36.12	9.69	37.87	9.68	38.92	9.76
	39	27.83	8.19	30.92	9.36	32.96	9.66	33.74	9.68	34.70	9.71	36.38	9.70	37.45	9.77
	41	27.83	8.89	29.88	9.68	31.46	9.65	32.35	9.66	32.98	9.56	33.40	8.84	33.86	8.56
	43	27.83	9.59	28.55	9.70	29.03	9.02	29.13	8.65	29.42	8.37	29.84	7.63	30.00	7.39
	45	24.64	8.64	24.86	8.30	25.37	7.74	25.87	7.63	25.93	7.40	26.05	6.89	26.51	6.79
	48	19.07	6.87	19.11	6.61	19.38	6.26	19.17	6.02	19.38	5.91	20.76	5.99	19.89	5.61
	50	15.25	5.83	15.08	5.59	14.92	5.25	15.45	5.28	15.97	5.31	15.42	4.98	15.90	5.02
	52	11.63	4.96	10.86	4.59	11.69	4.65	12.08	4.68	10.86	4.32	11.45	4.40	11.72	4.44

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1.Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.3: 12HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
110%	-5	25.51	2.55	28.35	3.03	34.02	3.96	36.85	4.42	39.68	4.82	45.35	5.85	51.02	6.80
	-2	25.51	2.59	28.35	3.03	34.02	3.98	36.85	4.43	39.68	4.92	45.35	5.99	51.02	6.85
	0	25.51	2.60	28.35	3.04	34.02	3.99	36.85	4.48	39.68	4.96	45.35	6.06	51.02	6.92
	2	25.51	2.61	28.35	3.05	34.02	4.07	36.85	4.51	39.68	5.00	45.35	6.10	51.02	6.95
	4	25.51	2.65	28.35	3.09	34.02	4.14	36.85	4.59	39.68	5.07	45.35	6.11	51.02	7.06
	6	25.51	2.65	28.35	3.11	34.02	4.17	36.85	4.67	39.68	5.20	45.35	6.15	51.02	7.13
	8	25.51	2.68	28.35	3.15	34.02	4.25	36.85	4.74	39.68	5.29	45.35	6.21	51.02	7.23
	10	25.51	2.74	28.35	3.21	34.02	4.31	36.85	4.84	39.68	5.31	45.35	6.29	51.02	7.34
	12	25.51	2.78	28.35	3.32	34.02	4.45	36.85	4.90	39.68	5.35	45.35	6.35	51.02	7.36
	14	25.51	2.98	28.35	3.65	34.02	4.49	36.85	4.97	39.68	5.49	45.35	6.46	51.02	7.90
	16	25.51	3.35	28.35	3.72	34.02	4.54	36.85	5.06	39.68	5.56	45.35	6.61	51.02	8.49
	18	25.51	3.42	28.35	3.78	34.02	4.62	36.85	5.08	39.68	5.76	45.35	7.12	51.02	9.16
	20	25.51	3.60	28.35	3.96	34.02	4.86	36.85	5.52	39.68	6.22	45.35	7.68	51.02	9.95
	21	25.51	3.73	28.35	4.11	34.02	5.06	36.85	5.77	39.68	6.46	45.35	7.97	49.50	9.82
	23	25.51	4.01	28.35	4.41	34.02	5.52	36.85	6.26	39.68	7.00	45.35	8.57	48.17	9.81
	25	25.51	4.31	28.35	4.75	34.02	6.02	36.85	6.78	39.68	7.59	45.35	9.26	46.90	9.84
	27	25.51	4.63	28.35	5.12	34.02	6.51	36.85	7.33	39.68	8.16	45.35	9.99	45.52	9.83
	29	25.51	5.00	28.35	5.53	34.02	7.09	36.85	7.94	39.68	8.82	43.11	9.83	44.07	9.84
	31	25.51	5.38	28.35	6.00	34.02	7.67	36.85	8.58	39.68	9.55	41.62	9.81	42.66	9.82
	33	25.51	5.78	28.35	6.53	34.02	8.29	36.85	9.25	38.40	9.84	40.22	9.85	41.23	9.85
	35	25.51	6.24	28.35	7.05	34.02	8.97	36.85	10.02	36.94	9.80	38.72	9.83	39.80	9.87
	37	25.51	6.75	28.35	7.67	34.02	9.71	34.75	9.83	35.54	9.81	37.32	9.81	38.33	9.90
	39	25.51	7.32	28.35	8.30	32.53	9.82	33.36	9.84	34.15	9.82	35.90	9.83	36.90	9.91
	41	25.51	7.93	28.35	8.99	31.18	9.82	31.96	9.84	32.58	9.70	32.98	8.99	33.43	8.70
	43	25.51	8.58	28.35	9.69	28.61	9.07	28.73	8.72	29.13	8.52	29.49	7.79	29.75	7.54
	45	24.41	8.74	24.59	8.40	24.91	7.73	25.01	7.48	25.52	7.36	26.03	7.01	25.52	6.65
	48	18.82	6.86	18.84	6.61	19.51	6.39	19.34	6.15	19.57	6.05	20.47	5.98	19.63	5.60
	50	14.73	5.69	14.96	5.58	15.70	5.51	15.32	5.28	15.83	5.31	15.30	4.97	15.78	5.01
100%	52	11.23	4.81	10.85	4.59	11.67	4.64	12.05	4.68	10.87	4.32	11.45	4.39	11.72	4.44
	-5	23.19	2.32	25.77	2.66	30.92	3.53	33.50	3.96	36.08	4.48	41.23	5.32	46.38	6.14
	-2	23.19	2.35	25.77	2.72	30.92	3.58	33.50	4.02	36.08	4.52	41.23	5.38	46.38	6.25
	0	23.19	2.37	25.77	2.74	30.92	3.64	33.50	4.06	36.08	4.53	41.23	5.45	46.38	6.28
	2	23.19	2.37	25.77	2.82	30.92	3.64	33.50	4.11	36.08	4.56	41.23	5.46	46.38	6.29
	4	23.19	2.38	25.77	2.83	30.92	3.67	33.50	4.17	36.08	4.62	41.23	5.51	46.38	6.40
	6	23.19	2.40	25.77	2.86	30.92	3.75	33.50	4.19	36.08	4.76	41.23	5.62	46.38	6.49
	8	23.19	2.48	25.77	2.86	30.92	3.86	33.50	4.25	36.08	4.78	41.23	5.63	46.38	6.54
	10	23.19	2.48	25.77	2.87	30.92	3.97	33.50	4.29	36.08	4.80	41.23	5.68	46.38	6.55
	12	23.19	2.50	25.77	2.99	30.92	3.97	33.50	4.34	36.08	4.85	41.23	5.73	46.38	6.68
	14	23.19	2.65	25.77	3.31	30.92	4.11	33.50	4.44	36.08	4.94	41.23	5.80	46.38	6.72
	16	23.19	3.04	25.77	3.37	30.92	4.14	33.50	4.58	36.08	5.04	41.23	5.91	46.38	7.06
	18	23.19	3.16	25.77	3.44	30.92	4.23	33.50	4.59	36.08	5.06	41.23	5.94	46.38	7.61
	20	23.19	3.24	25.77	3.56	30.92	4.32	33.50	4.69	36.08	5.20	41.23	6.42	46.38	8.17
	21	23.19	3.36	25.77	3.70	30.92	4.38	33.50	4.83	36.08	5.43	41.23	6.70	46.38	8.50
	23	23.19	3.61	25.77	3.96	30.92	4.73	33.50	5.28	36.08	5.92	41.23	7.25	46.38	9.14
	25	23.19	3.89	25.77	4.26	30.92	5.10	33.50	5.74	36.08	6.40	41.23	7.81	46.38	9.88
	27	23.19	4.19	25.77	4.60	30.92	5.55	33.50	6.26	36.08	6.98	41.23	8.44	44.66	10.00
	29	23.19	4.50	25.77	4.96	30.92	6.07	33.50	6.81	36.08	7.57	41.23	9.17	43.27	9.97
	31	23.19	4.84	25.77	5.33	30.92	6.61	33.50	7.37	36.08	8.19	41.23	9.91	41.88	9.99
	33	23.19	5.21	25.77	5.75	30.92	7.17	33.50	7.97	36.08	8.86	39.54	10.00	40.42	9.97
	35	23.19	5.61	25.77	6.21	30.92	7.78	33.50	8.64	36.08	9.57	38.12	10.00	39.09	9.99
	37	23.19	6.04	25.77	6.70	30.92	8.43	33.50	9.35	35.08	9.97	36.71	9.97	37.71	10.02
	39	23.19	6.50	25.77	7.28	30.92	9.10	33.50	10.11	33.65	9.97	35.34	10.02	36.19	9.96
	41	23.19	6.99	25.77	7.86	30.92	9.86	31.52	9.98	32.22	9.92	32.54	9.12	32.90	8.86
	43	23.19	7.57	25.77	8.55	28.27	9.25	28.44	8.90	28.67	8.58	29.12	7.94	29.54	7.65
	45	23.19	8.20	24.38	8.51	24.73	7.87	24.89	7.60	24.96	7.36	25.07	6.86	25.50	6.76
	48	18.58	6.89	18.75	6.68	19.60	6.52	19.05	6.14	19.70	6.18	19.68	5.84	19.36	5.59
	50	14.94	5.83	15.16	5.73	15.09	5.38	15.17	5.27	15.68	5.30	15.18	4.97	15.64	5.01
	52	11.17	4.82	10.84	4.58	11.64	4.64	12.01	4.67	10.87	4.31	11.45	4.39	11.72	4.43

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.3: 12HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
90%	-5	20.87	2.08	23.19	2.33	27.83	3.09	30.15	3.53	32.47	3.83	37.11	4.55	41.75	5.40
	-2	20.87	2.09	23.19	2.36	27.83	3.13	30.15	3.54	32.47	3.94	37.11	4.63	41.75	5.42
	0	20.87	2.14	23.19	2.37	27.83	3.16	30.15	3.55	32.47	3.96	37.11	4.74	41.75	5.48
	2	20.87	2.14	23.19	2.40	27.83	3.20	30.15	3.61	32.47	3.98	37.11	4.76	41.75	5.50
	4	20.87	2.18	23.19	2.40	27.83	3.27	30.15	3.61	32.47	4.03	37.11	4.83	41.75	5.54
	6	20.87	2.19	23.19	2.40	27.83	3.29	30.15	3.74	32.47	4.06	37.11	4.85	41.75	5.63
	8	20.87	2.19	23.19	2.47	27.83	3.31	30.15	3.81	32.47	4.14	37.11	4.90	41.75	5.66
	10	20.87	2.23	23.19	2.48	27.83	3.48	30.15	3.85	32.47	4.18	37.11	4.95	41.75	5.71
	12	20.87	2.26	23.19	2.59	27.83	3.55	30.15	3.86	32.47	4.21	37.11	5.06	41.75	5.76
	14	20.87	2.37	23.19	2.81	27.83	3.57	30.15	3.89	32.47	4.27	37.11	5.06	41.75	5.87
	16	20.87	2.56	23.19	3.08	27.83	3.62	30.15	3.92	32.47	4.37	37.11	5.09	41.75	5.90
	18	20.87	2.84	23.19	3.08	27.83	3.65	30.15	4.03	32.47	4.38	37.11	5.13	41.75	5.97
	20	20.87	2.93	23.19	3.18	27.83	3.70	30.15	4.07	32.47	4.50	37.11	5.18	41.75	6.40
	21	20.87	2.97	23.19	3.22	27.83	3.77	30.15	4.09	32.47	4.51	37.11	5.26	41.75	6.65
	23	20.87	3.17	23.19	3.46	27.83	4.07	30.15	4.38	32.47	4.71	37.11	5.68	41.75	7.23
	25	20.87	3.42	23.19	3.73	27.83	4.39	30.15	4.74	32.47	5.10	37.11	6.18	41.75	7.80
	27	20.87	3.66	23.19	4.01	27.83	4.72	30.15	5.10	32.47	5.56	37.11	6.75	41.75	8.43
	29	20.87	3.96	23.19	4.33	27.83	5.09	30.15	5.52	32.47	6.06	37.11	7.33	41.75	9.14
	31	20.87	4.26	23.19	4.66	27.83	5.50	30.15	5.97	32.47	6.64	37.11	7.98	41.75	9.85
	33	20.87	4.58	23.19	5.02	27.83	5.94	30.15	6.52	32.47	7.21	37.11	8.66	40.07	9.99
	35	20.87	4.93	23.19	5.39	27.83	6.39	30.15	7.12	32.47	7.82	37.11	9.37	38.64	9.98
	37	20.87	5.29	23.19	5.82	27.83	6.96	30.15	7.72	32.47	8.51	37.11	10.17	37.31	9.96
	39	20.87	5.71	23.19	6.24	27.83	7.58	30.15	8.39	32.47	9.22	35.03	9.99	35.84	9.96
	41	20.87	6.14	23.19	6.72	27.83	8.22	30.15	9.08	32.47	9.99	32.67	9.37	32.90	8.98
	43	20.87	6.59	23.19	7.25	27.83	8.93	28.59	9.09	28.75	8.75	29.04	8.00	29.24	7.64
	45	20.87	7.07	23.19	7.81	24.78	8.00	25.09	7.73	25.20	7.48	25.33	6.99	25.78	6.89
	48	18.82	6.97	18.91	6.74	19.20	6.37	19.48	6.26	19.28	6.03	20.14	5.96	19.38	5.58
	50	15.00	5.83	15.24	5.71	15.57	5.50	15.71	5.39	15.29	5.16	15.28	4.96	15.75	4.99
	52	10.93	4.68	11.37	4.71	11.78	4.63	12.16	4.66	12.53	4.69	11.62	4.38	11.90	4.42
80%	-5	18.55	1.86	20.62	2.04	24.74	2.62	26.80	2.94	28.86	3.39	32.98	4.02	37.11	4.55
	-2	18.55	1.87	20.62	2.04	24.74	2.63	26.80	2.97	28.86	3.39	32.98	4.04	37.11	4.65
	0	18.55	1.88	20.62	2.05	24.74	2.67	26.80	2.97	28.86	3.43	32.98	4.06	37.11	4.71
	2	18.55	1.89	20.62	2.08	24.74	2.71	26.80	3.06	28.86	3.46	32.98	4.06	37.11	4.72
	4	18.55	1.90	20.62	2.10	24.74	2.75	26.80	3.13	28.86	3.51	32.98	4.13	37.11	4.74
	6	18.55	1.90	20.62	2.11	24.74	2.79	26.80	3.16	28.86	3.52	32.98	4.13	37.11	4.76
	8	18.55	1.92	20.62	2.14	24.74	2.83	26.80	3.31	28.86	3.55	32.98	4.15	37.11	4.79
	10	18.55	1.92	20.62	2.16	24.74	2.85	26.80	3.38	28.86	3.60	32.98	4.23	37.11	4.86
	12	18.55	1.96	20.62	2.23	24.74	3.00	26.80	3.39	28.86	3.66	32.98	4.33	37.11	4.86
	14	18.55	2.03	20.62	2.27	24.74	3.18	26.80	3.43	28.86	3.68	32.98	4.34	37.11	4.99
	16	18.55	2.19	20.62	2.53	24.74	3.21	26.80	3.47	28.86	3.72	32.98	4.40	37.11	5.03
	18	18.55	2.56	20.62	2.77	24.74	3.24	26.80	3.51	28.86	3.80	32.98	4.46	37.11	5.04
	20	18.55	2.60	20.62	2.83	24.74	3.25	26.80	3.61	28.86	3.90	32.98	4.49	37.11	5.09
	21	18.55	2.64	20.62	2.86	24.74	3.30	26.80	3.65	28.86	3.95	32.98	4.56	37.11	5.21
	23	18.55	2.76	20.62	3.00	24.74	3.47	26.80	3.73	28.86	3.97	32.98	4.57	37.11	5.47
	25	18.55	2.97	20.62	3.22	24.74	3.75	26.80	4.03	28.86	4.30	32.98	4.84	37.11	5.99
	27	18.55	3.20	20.62	3.47	24.74	4.03	26.80	4.33	28.86	4.64	32.98	5.24	37.11	6.51
	29	18.55	3.44	20.62	3.74	24.74	4.36	26.80	4.67	28.86	5.01	32.98	5.68	37.11	7.10
	31	18.55	3.70	20.62	4.04	24.74	4.69	26.80	5.06	28.86	5.40	32.98	6.24	37.11	7.75
	33	18.55	3.98	20.62	4.34	24.74	5.07	26.80	5.45	28.86	5.85	32.98	6.83	37.11	8.42
	35	18.55	4.29	20.62	4.67	24.74	5.45	26.80	5.88	28.86	6.29	32.98	7.44	37.11	9.13
	37	18.55	4.60	20.62	5.02	24.74	5.89	26.80	6.35	28.86	6.83	32.98	8.10	37.11	9.88
	39	18.55	4.95	20.62	5.41	24.74	6.35	26.80	6.84	28.86	7.45	32.98	8.81	35.45	9.97
	41	18.55	5.33	20.62	5.82	24.74	6.82	26.80	7.41	28.86	8.08	32.98	9.53	32.99	9.24
	43	18.55	5.72	20.62	6.26	24.74	7.34	26.80	8.02	28.86	8.81	29.20	8.27	29.32	7.86
	45	18.55	6.16	20.62	6.71	24.74	7.94	25.11	7.85	25.21	7.59	25.49	7.12	25.54	6.86
	48	18.55	6.84	19.10	6.83	19.32	6.43	19.40	6.25	19.64	6.15	19.64	5.80	19.86	5.69
	50	15.12	5.87	15.26	5.71	16.03	5.62	16.12	5.52	15.78	5.28	16.33	5.22	15.82	4.98
	52	11.42	4.81	11.87	4.84	11.46	4.50	12.28	4.65	12.65	4.68	11.78	4.37	12.06	4.41

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.3: 12HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	16.23	1.58	18.04	1.80	21.65	2.25	23.45	2.49	25.25	2.74	28.86	3.32	32.47	3.94
	-2	16.23	1.58	18.04	1.80	21.65	2.25	23.45	2.54	25.25	2.90	28.86	3.40	32.47	3.95
	0	16.23	1.60	18.04	1.83	21.65	2.27	23.45	2.65	25.25	2.94	28.86	3.43	32.47	3.98
	2	16.23	1.60	18.04	1.84	21.65	2.28	23.45	2.66	25.25	2.94	28.86	3.45	32.47	3.98
	4	16.23	1.63	18.04	1.85	21.65	2.30	23.45	2.66	25.25	2.94	28.86	3.53	32.47	3.98
	6	16.23	1.68	18.04	1.85	21.65	2.44	23.45	2.71	25.25	3.00	28.86	3.58	32.47	4.02
	8	16.23	1.72	18.04	1.88	21.65	2.45	23.45	2.71	25.25	3.13	28.86	3.58	32.47	4.08
	10	16.23	1.72	18.04	1.89	21.65	2.49	23.45	2.75	25.25	3.18	28.86	3.62	32.47	4.09
	12	16.23	1.72	18.04	1.93	21.65	2.49	23.45	2.89	25.25	3.22	28.86	3.65	32.47	4.11
	14	16.23	1.72	18.04	1.93	21.65	2.72	23.45	2.98	25.25	3.25	28.86	3.67	32.47	4.23
	16	16.23	1.81	18.04	2.25	21.65	2.82	23.45	3.00	25.25	3.27	28.86	3.72	32.47	4.25
	18	16.23	2.06	18.04	2.46	21.65	2.83	23.45	3.05	25.25	3.27	28.86	3.81	32.47	4.27
	20	16.23	2.31	18.04	2.49	21.65	2.88	23.45	3.09	25.25	3.28	28.86	3.85	32.47	4.39
	21	16.23	2.31	18.04	2.52	21.65	2.90	23.45	3.17	25.25	3.36	28.86	3.93	32.47	4.48
	23	16.23	2.40	18.04	2.60	21.65	2.99	23.45	3.19	25.25	3.37	28.86	4.00	32.47	4.54
	25	16.23	2.56	18.04	2.77	21.65	3.17	23.45	3.39	25.25	3.59	28.86	4.01	32.47	4.64
	27	16.23	2.76	18.04	2.99	21.65	3.43	23.45	3.66	25.25	3.88	28.86	4.33	32.47	5.02
	29	16.23	2.98	18.04	3.22	21.65	3.70	23.45	3.95	25.25	4.20	28.86	4.70	32.47	5.41
	31	16.23	3.20	18.04	3.46	21.65	3.99	23.45	4.26	25.25	4.54	28.86	5.08	32.47	5.87
	33	16.23	3.45	18.04	3.73	21.65	4.30	23.45	4.59	25.25	4.90	28.86	5.47	32.47	6.36
	35	16.23	3.71	18.04	4.01	21.65	4.62	23.45	4.95	25.25	5.28	28.86	5.91	32.47	6.99
	37	16.23	3.98	18.04	4.32	21.65	4.99	23.45	5.34	25.25	5.67	28.86	6.37	32.47	7.63
	39	16.23	4.28	18.04	4.64	21.65	5.37	23.45	5.75	25.25	6.12	28.86	6.90	32.47	8.32
	41	16.23	4.60	18.04	4.98	21.65	5.77	23.45	6.20	25.25	6.59	28.86	7.44	32.47	9.06
	43	16.23	4.93	18.04	5.35	21.65	6.22	23.45	6.67	25.25	7.12	28.86	8.11	29.46	8.20
	45	16.23	5.30	18.04	5.74	21.65	6.69	23.45	7.16	25.25	7.66	25.62	7.30	25.77	7.05
	48	16.23	5.90	18.04	6.39	19.46	6.55	19.61	6.38	19.69	6.20	19.96	5.92	20.58	5.96
	50	15.34	5.95	15.40	5.77	15.61	5.47	15.72	5.37	16.20	5.40	15.86	5.07	15.85	4.97
	52	11.52	4.80	11.58	4.70	11.99	4.62	11.92	4.52	12.27	4.55	11.91	4.36	12.20	4.40
60%	-5	13.92	1.36	15.46	1.53	18.55	1.83	20.10	2.02	21.65	2.15	24.74	2.78	27.83	3.26
	-2	13.92	1.38	15.46	1.54	18.55	1.83	20.10	2.11	21.65	2.30	24.74	2.80	27.83	3.30
	0	13.92	1.39	15.46	1.55	18.55	1.84	20.10	2.11	21.65	2.35	24.74	2.85	27.83	3.36
	2	13.92	1.41	15.46	1.55	18.55	1.84	20.10	2.11	21.65	2.37	24.74	2.88	27.83	3.36
	4	13.92	1.43	15.46	1.58	18.55	1.87	20.10	2.13	21.65	2.37	24.74	2.97	27.83	3.38
	6	13.92	1.44	15.46	1.59	18.55	1.89	20.10	2.14	21.65	2.38	24.74	2.98	27.83	3.39
	8	13.92	1.44	15.46	1.60	18.55	1.90	20.10	2.16	21.65	2.45	24.74	3.05	27.83	3.45
	10	13.92	1.45	15.46	1.62	18.55	1.92	20.10	2.18	21.65	2.46	24.74	3.06	27.83	3.46
	12	13.92	1.46	15.46	1.62	18.55	2.04	20.10	2.35	21.65	2.66	24.74	3.10	27.83	3.47
	14	13.92	1.47	15.46	1.63	18.55	2.10	20.10	2.42	21.65	2.72	24.74	3.13	27.83	3.49
	16	13.92	1.50	15.46	1.73	18.55	2.43	20.10	2.57	21.65	2.80	24.74	3.14	27.83	3.52
	18	13.92	1.52	15.46	2.06	18.55	2.46	20.10	2.59	21.65	2.82	24.74	3.21	27.83	3.56
	20	13.92	1.88	15.46	2.15	18.55	2.48	20.10	2.68	21.65	2.82	24.74	3.22	27.83	3.60
	21	13.92	1.99	15.46	2.19	18.55	2.52	20.10	2.68	21.65	2.90	24.74	3.30	27.83	3.74
	23	13.92	2.00	15.46	2.24	18.55	2.59	20.10	2.74	21.65	2.94	24.74	3.32	27.83	3.75
	25	13.92	2.01	15.46	2.35	18.55	2.68	20.10	2.85	21.65	3.02	24.74	3.36	27.83	3.90
	27	13.92	2.08	15.46	2.54	18.55	2.88	20.10	3.05	21.65	3.22	24.74	3.56	27.83	4.06
	29	13.92	2.33	15.46	2.73	18.55	3.11	20.10	3.30	21.65	3.49	24.74	3.85	27.83	4.38
	31	13.92	2.45	15.46	2.95	18.55	3.35	20.10	3.57	21.65	3.76	24.74	4.17	27.83	4.73
	33	13.92	2.66	15.46	3.18	18.55	3.61	20.10	3.84	21.65	4.06	24.74	4.50	27.83	5.13
	35	13.92	2.88	15.46	3.42	18.55	3.89	20.10	4.14	21.65	4.38	24.74	4.84	27.83	5.53
	37	13.92	3.25	15.46	3.67	18.55	4.19	20.10	4.45	21.65	4.71	24.74	5.24	27.83	5.96
	39	13.92	3.58	15.46	3.94	18.55	4.50	20.10	4.79	21.65	5.09	24.74	5.64	27.83	6.42
	41	13.92	3.85	15.46	4.23	18.55	4.85	20.10	5.16	21.65	5.48	24.74	6.07	27.83	6.94
	43	13.92	4.13	15.46	4.54	18.55	5.20	20.10	5.54	21.65	5.89	24.74	6.55	27.83	7.47
	45	13.92	4.44	15.46	4.88	18.55	5.60	20.10	5.97	21.65	6.32	24.74	7.05	25.86	7.28
	48	13.92	4.94	15.46	5.42	18.55	6.22	20.10	6.64	19.82	6.34	19.90	5.97	20.37	5.93
	50	13.92	5.37	15.46	5.81	15.74	5.57	15.81	5.43	16.13	5.38	16.25	5.18	16.75	5.21
	52	11.60	4.82	11.62	4.68	12.04	4.60	12.40	4.63	11.87	4.40	12.01	4.34	12.30	4.38

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.3: 12HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	11.60	1.12	12.88	1.23	15.46	1.51	16.75	1.64	18.04	1.77	20.62	2.16	23.19	2.53
	-2	11.60	1.14	12.88	1.25	15.46	1.52	16.75	1.66	18.04	1.77	20.62	2.22	23.19	2.55
	0	11.60	1.15	12.88	1.26	15.46	1.52	16.75	1.70	18.04	1.79	20.62	2.22	23.19	2.57
	2	11.60	1.15	12.88	1.26	15.46	1.53	16.75	1.70	18.04	1.80	20.62	2.28	23.19	2.61
	4	11.60	1.15	12.88	1.28	15.46	1.57	16.75	1.71	18.04	1.82	20.62	2.29	23.19	2.70
	6	11.60	1.16	12.88	1.29	15.46	1.58	16.75	1.71	18.04	1.90	20.62	2.30	23.19	2.72
	8	11.60	1.16	12.88	1.30	15.46	1.60	16.75	1.74	18.04	1.92	20.62	2.34	23.19	2.78
	10	11.60	1.17	12.88	1.31	15.46	1.62	16.75	1.76	18.04	1.96	20.62	2.43	23.19	2.82
	12	11.60	1.19	12.88	1.32	15.46	1.63	16.75	1.77	18.04	1.98	20.62	2.43	23.19	2.89
	14	11.60	1.21	12.88	1.32	15.46	1.69	16.75	1.84	18.04	2.10	20.62	2.57	23.19	2.89
	16	11.60	1.22	12.88	1.32	15.46	1.73	16.75	2.10	18.04	2.33	20.62	2.64	23.19	2.91
	18	11.60	1.26	12.88	1.52	15.46	2.09	16.75	2.23	18.04	2.39	20.62	2.67	23.19	2.95
	20	11.60	1.27	12.88	1.64	15.46	2.13	16.75	2.23	18.04	2.39	20.62	2.67	23.19	2.98
	21	11.60	1.43	12.88	1.71	15.46	2.14	16.75	2.27	18.04	2.41	20.62	2.71	23.19	3.03
	23	11.60	1.48	12.88	1.85	15.46	2.19	16.75	2.34	18.04	2.49	20.62	2.72	23.19	3.05
	25	11.60	1.60	12.88	1.86	15.46	2.27	16.75	2.39	18.04	2.53	20.62	2.80	23.19	3.11
	27	11.60	1.72	12.88	1.89	15.46	2.39	16.75	2.53	18.04	2.66	20.62	2.92	23.19	3.24
	29	11.60	1.77	12.88	1.91	15.46	2.58	16.75	2.72	18.04	2.86	20.62	3.13	23.19	3.51
	31	11.60	1.77	12.88	2.07	15.46	2.79	16.75	2.94	18.04	3.09	20.62	3.39	23.19	3.79
	33	11.60	1.96	12.88	2.26	15.46	3.01	16.75	3.18	18.04	3.34	20.62	3.66	23.19	4.10
	35	11.60	2.15	12.88	2.47	15.46	3.24	16.75	3.42	18.04	3.60	20.62	3.94	23.19	4.42
	37	11.60	2.41	12.88	2.68	15.46	3.48	16.75	3.67	18.04	3.87	20.62	4.25	23.19	4.77
	39	11.60	2.61	12.88	2.91	15.46	3.74	16.75	3.95	18.04	4.16	20.62	4.57	23.19	5.14
	41	11.60	2.85	12.88	3.16	15.46	4.01	16.75	4.25	18.04	4.48	20.62	4.93	23.19	5.52
	43	11.60	3.08	12.88	3.41	15.46	4.31	16.75	4.56	18.04	4.81	20.62	5.29	23.19	5.95
	45	11.60	3.34	12.88	3.70	15.46	4.62	16.75	4.89	18.04	5.16	20.62	5.69	23.19	6.40
	48	11.60	3.76	12.88	4.24	15.46	5.13	16.75	5.44	18.04	5.74	20.09	6.15	20.18	6.00
	50	11.60	4.51	12.88	4.84	15.46	5.50	16.00	5.55	16.05	5.42	16.28	5.22	16.57	5.18
	52	11.60	4.82	11.80	4.75	12.01	4.59	11.98	4.48	12.32	4.51	12.54	4.45	12.86	4.48

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.4: 14HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	36.00	4.11	40.00	4.47	48.00	5.85	52.00	6.85	56.00	7.52	64.00	8.84	72.00	10.90
	-2	36.00	4.13	40.00	4.52	48.00	6.12	52.00	6.89	56.00	7.55	64.00	9.20	72.00	10.97
	0	36.00	4.15	40.00	4.62	48.00	6.16	52.00	6.91	56.00	7.61	64.00	9.38	72.00	11.04
	2	36.00	4.16	40.00	4.62	48.00	6.21	52.00	6.96	56.00	7.68	64.00	9.46	72.00	11.26
	4	36.00	4.18	40.00	4.65	48.00	6.21	52.00	6.97	56.00	7.76	64.00	9.50	72.00	11.40
	6	36.00	4.24	40.00	4.67	48.00	6.28	52.00	7.00	56.00	7.91	64.00	9.59	72.00	11.48
	8	36.00	4.27	40.00	4.70	48.00	6.30	52.00	7.23	56.00	7.91	64.00	9.60	72.00	11.64
	10	36.00	4.31	40.00	4.83	48.00	6.46	52.00	7.34	56.00	8.14	64.00	9.72	72.00	11.70
	12	36.00	4.40	40.00	4.99	48.00	6.62	52.00	7.50	56.00	8.27	64.00	9.88	72.00	12.09
	14	36.00	4.52	40.00	5.07	48.00	6.86	52.00	7.61	56.00	8.37	64.00	9.92	70.18	11.01
	16	36.00	4.72	40.00	5.28	48.00	7.07	52.00	7.65	56.00	8.43	64.00	10.14	68.41	11.00
	18	36.00	5.08	40.00	5.73	48.00	7.09	52.00	7.81	56.00	8.45	64.00	10.31	66.51	11.02
	20	36.00	5.50	40.00	5.96	48.00	7.22	52.00	8.13	56.00	9.10	64.00	11.10	64.69	11.01
	21	36.00	5.69	40.00	6.21	48.00	7.50	52.00	8.44	56.00	9.43	62.12	11.00	63.77	11.03
	23	36.00	6.10	40.00	6.66	48.00	8.16	52.00	9.13	56.00	10.21	60.36	11.01	62.01	11.00
	25	36.00	6.53	40.00	7.14	48.00	8.81	52.00	9.85	56.00	10.93	58.51	11.01	60.25	11.04
	27	36.00	6.99	40.00	7.63	48.00	9.50	52.00	10.61	53.70	10.99	56.63	10.98	58.38	11.02
	29	36.00	7.46	40.00	8.14	48.00	10.22	50.55	11.00	51.93	11.01	54.88	11.01	56.51	11.01
	31	36.00	7.95	40.00	8.69	48.00	11.02	48.86	11.02	50.22	11.03	53.09	10.99	54.54	11.00
	33	36.00	8.47	40.00	9.38	45.73	10.99	47.11	11.03	48.44	11.01	51.46	11.07	52.66	10.98
	35	36.00	9.03	40.00	10.11	44.05	11.00	45.32	11.00	46.85	11.07	49.60	11.07	51.23	11.18
	37	36.00	9.66	40.00	10.90	42.35	11.00	43.62	11.02	45.04	11.06	47.65	11.04	49.35	11.16
	39	36.00	10.37	38.19	10.98	40.67	10.98	42.01	11.04	43.21	11.02	45.77	11.01	47.92	11.34
	41	36.00	11.22	36.53	10.98	39.07	11.05	40.20	11.03	41.33	11.00	44.33	11.20	45.55	11.07
	43	33.65	10.99	34.83	10.99	37.29	11.02	38.57	11.10	39.39	10.99	42.34	11.18	43.33	11.08
	45	31.95	11.02	32.97	10.98	35.31	11.04	36.57	11.12	37.39	10.99	40.20	11.18	41.13	11.08
	48	29.33	11.05	30.28	11.01	32.38	11.05	34.14	11.33	33.71	10.77	34.57	10.27	35.21	10.16
	50	26.16	10.42	26.23	10.04	26.73	9.51	27.11	9.36	26.93	8.98	27.61	8.69	28.71	8.76
	52	19.87	8.46	20.19	8.28	21.20	8.15	20.00	7.56	20.74	7.60	19.88	7.05	20.62	7.09
120%	-5	33.23	3.86	36.92	4.19	44.31	5.49	48.00	6.13	51.69	6.83	59.08	8.28	66.46	9.68
	-2	33.23	3.89	36.92	4.20	44.31	5.51	48.00	6.25	51.69	6.92	59.08	8.32	66.46	9.82
	0	33.23	3.92	36.92	4.24	44.31	5.51	48.00	6.26	51.69	6.95	59.08	8.35	66.46	9.84
	2	33.23	3.93	36.92	4.25	44.31	5.59	48.00	6.30	51.69	6.95	59.08	8.41	66.46	10.02
	4	33.23	3.96	36.92	4.31	44.31	5.66	48.00	6.35	51.69	7.03	59.08	8.67	66.46	10.11
	6	33.23	4.00	36.92	4.33	44.31	5.69	48.00	6.57	51.69	7.23	59.08	8.70	66.46	10.14
	8	33.23	4.01	36.92	4.37	44.31	5.90	48.00	6.59	51.69	7.30	59.08	8.84	66.46	10.26
	10	33.23	4.05	36.92	4.48	44.31	5.90	48.00	6.73	51.69	7.41	59.08	8.95	66.46	10.30
	12	33.23	4.16	36.92	4.58	44.31	6.03	48.00	6.89	51.69	7.49	59.08	8.95	66.46	10.48
	14	33.23	4.24	36.92	4.70	44.31	6.39	48.00	6.94	51.69	7.66	59.08	9.06	66.46	10.70
	16	33.23	4.40	36.92	4.96	44.31	6.42	48.00	7.13	51.69	7.73	59.08	9.12	66.46	10.76
	18	33.23	4.71	36.92	5.38	44.31	6.52	48.00	7.15	51.69	7.91	59.08	9.14	65.00	11.20
	20	33.23	5.18	36.92	5.60	44.31	6.59	48.00	7.17	51.69	8.03	59.08	9.76	63.25	11.17
	21	33.23	5.32	36.92	5.77	44.31	6.76	48.00	7.45	51.69	8.34	59.08	10.13	62.33	11.17
	23	33.23	5.71	36.92	6.21	44.31	7.26	48.00	8.11	51.69	9.02	59.08	10.89	60.55	11.19
	25	33.23	6.11	36.92	6.64	44.31	7.81	48.00	8.76	51.69	9.69	57.21	11.17	58.87	11.17
	27	33.23	6.53	36.92	7.11	44.31	8.46	48.00	9.44	51.69	10.46	55.56	11.19	57.09	11.16
	29	33.23	6.96	36.92	7.57	44.31	9.15	48.00	10.16	51.69	11.28	53.73	11.19	55.30	11.16
	31	33.23	7.42	36.92	8.09	44.31	9.86	48.00	10.97	49.18	11.17	52.00	11.18	53.71	11.27
	33	33.23	7.91	36.92	8.63	44.31	10.63	46.18	11.16	47.55	11.18	50.45	11.24	51.91	11.24
	35	33.23	8.42	36.92	9.20	43.33	11.17	44.52	11.17	45.81	11.20	48.66	11.22	50.21	11.35
	37	33.23	8.96	36.92	9.84	41.70	11.18	42.84	11.16	44.15	11.16	46.86	11.21	48.39	11.33
	39	33.23	9.57	36.92	10.60	40.04	11.19	41.17	11.19	42.51	11.22	45.04	11.19	46.56	11.30
	41	33.23	10.24	36.01	11.17	38.34	11.20	39.62	11.22	40.74	11.19	43.15	11.16	44.73	11.27
	43	33.23	11.01	34.40	11.18	36.80	11.23	37.86	11.19	39.16	11.28	41.73	11.36	42.76	11.25
	45	31.66	11.18	32.75	11.18	35.01	11.22	36.00	11.20	36.96	11.18	39.69	11.37	41.18	11.47
	48	29.01	11.20	30.09	11.21	32.16	11.24	33.31	11.32	33.53	10.95	34.28	10.49	33.82	9.90
	50	25.91	10.51	26.24	10.24	26.73	9.72	27.21	9.55	26.99	9.19	27.09	8.67	28.15	8.74
	52	19.60	8.46	19.33	8.08	20.90	8.15	19.74	7.55	20.46	7.59	22.02	7.68	20.36	7.08

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.4: 14HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
110%	-5	30.46	3.63	33.85	3.89	40.62	4.86	44.00	5.51	47.38	6.18	54.15	7.53	60.92	8.64
	-2	30.46	3.64	33.85	3.97	40.62	4.95	44.00	5.60	47.38	6.32	54.15	7.60	60.92	8.67
	0	30.46	3.65	33.85	3.98	40.62	4.99	44.00	5.70	47.38	6.34	54.15	7.71	60.92	8.74
	2	30.46	3.69	33.85	4.02	40.62	5.03	44.00	5.85	47.38	6.45	54.15	7.81	60.92	8.93
	4	30.46	3.71	33.85	4.02	40.62	5.10	44.00	5.88	47.38	6.49	54.15	7.86	60.92	8.96
	6	30.46	3.76	33.85	4.08	40.62	5.22	44.00	5.88	47.38	6.58	54.15	7.89	60.92	9.23
	8	30.46	3.78	33.85	4.09	40.62	5.22	44.00	5.89	47.38	6.59	54.15	8.02	60.92	9.24
	10	30.46	3.79	33.85	4.15	40.62	5.25	44.00	6.13	47.38	6.72	54.15	8.12	60.92	9.28
	12	30.46	3.87	33.85	4.21	40.62	5.39	44.00	6.24	47.38	6.90	54.15	8.20	60.92	9.40
	14	30.46	3.96	33.85	4.37	40.62	5.76	44.00	6.39	47.38	6.94	54.15	8.39	60.92	9.45
	16	30.46	4.09	33.85	4.53	40.62	5.92	44.00	6.45	47.38	6.97	54.15	8.39	60.92	9.54
	18	30.46	4.35	33.85	4.96	40.62	6.05	44.00	6.45	47.38	7.12	54.15	8.42	60.92	9.92
	20	30.46	4.87	33.85	5.25	40.62	6.16	44.00	6.61	47.38	7.22	54.15	8.62	60.92	10.65
	21	30.46	4.97	33.85	5.39	40.62	6.21	44.00	6.66	47.38	7.42	54.15	8.74	60.92	11.03
	23	30.46	5.33	33.85	5.76	40.62	6.67	44.00	7.17	47.38	7.86	54.15	9.48	59.18	11.33
	25	30.46	5.69	33.85	6.15	40.62	7.15	44.00	7.70	47.38	8.49	54.15	10.21	57.46	11.37
	27	30.46	6.08	33.85	6.58	40.62	7.66	44.00	8.28	47.38	9.19	54.15	10.99	55.75	11.38
	29	30.46	6.48	33.85	7.02	40.62	8.17	44.00	8.96	47.38	9.91	52.61	11.33	53.96	11.36
	31	30.46	6.89	33.85	7.47	40.62	8.74	44.00	9.69	47.38	10.66	50.93	11.37	52.24	11.36
	33	30.46	7.32	33.85	7.98	40.62	9.38	44.00	10.43	47.38	11.51	49.16	11.35	50.73	11.41
	35	30.46	7.81	33.85	8.50	40.62	10.17	44.00	11.28	44.94	11.39	47.50	11.38	48.98	11.40
	37	30.46	8.30	33.85	9.05	40.62	10.98	42.03	11.34	43.23	11.36	45.89	11.38	47.23	11.38
	39	30.46	8.85	33.85	9.68	39.26	11.33	40.41	11.35	41.62	11.36	44.16	11.36	45.60	11.48
	41	30.46	9.47	33.85	10.35	37.68	11.34	38.78	11.35	40.05	11.37	42.40	11.33	43.82	11.45
	43	30.46	10.13	33.85	11.16	36.07	11.34	37.21	11.37	38.32	11.35	40.98	11.55	42.03	11.42
	45	30.46	10.85	32.29	11.33	34.42	11.34	35.56	11.37	36.49	11.35	39.09	11.54	40.57	11.64
	48	28.74	11.35	29.72	11.35	31.89	11.44	32.98	11.51	33.16	11.15	34.05	10.65	33.56	10.09
	50	25.64	10.64	25.94	10.34	26.23	9.69	27.19	9.74	26.44	9.17	27.24	8.85	27.57	8.72
	52	19.33	8.45	20.11	8.49	19.98	7.93	19.47	7.54	20.17	7.58	21.67	7.67	20.08	7.07
100%	-5	27.69	3.35	30.77	3.69	36.92	4.57	40.00	4.88	43.08	5.81	49.23	6.97	55.38	7.83
	-2	27.69	3.42	30.77	3.69	36.92	4.57	40.00	5.21	43.08	5.83	49.23	7.05	55.38	8.05
	0	27.69	3.43	30.77	3.70	36.92	4.58	40.00	5.23	43.08	5.85	49.23	7.06	55.38	8.09
	2	27.69	3.47	30.77	3.72	36.92	4.60	40.00	5.24	43.08	5.87	49.23	7.06	55.38	8.15
	4	27.69	3.48	30.77	3.75	36.92	4.64	40.00	5.26	43.08	5.90	49.23	7.10	55.38	8.15
	6	27.69	3.50	30.77	3.78	36.92	4.64	40.00	5.29	43.08	5.92	49.23	7.11	55.38	8.34
	8	27.69	3.50	30.77	3.79	36.92	4.72	40.00	5.37	43.08	6.00	49.23	7.13	55.38	8.35
	10	27.69	3.51	30.77	3.84	36.92	4.73	40.00	5.44	43.08	6.05	49.23	7.25	55.38	8.41
	12	27.69	3.58	30.77	3.92	36.92	4.74	40.00	5.52	43.08	6.17	49.23	7.34	55.38	8.50
	14	27.69	3.63	30.77	4.03	36.92	5.12	40.00	5.70	43.08	6.34	49.23	7.44	55.38	8.59
	16	27.69	3.79	30.77	4.15	36.92	5.26	40.00	5.91	43.08	6.42	49.23	7.46	55.38	8.65
	18	27.69	3.98	30.77	4.44	36.92	5.41	40.00	5.99	43.08	6.49	49.23	7.54	55.38	8.83
	20	27.69	4.42	30.77	4.88	36.92	5.62	40.00	6.10	43.08	6.62	49.23	7.73	55.38	9.06
	21	27.69	4.63	30.77	5.00	36.92	5.74	40.00	6.13	43.08	6.63	49.23	7.77	55.38	9.41
	23	27.69	4.93	30.77	5.31	36.92	6.11	40.00	6.54	43.08	6.95	49.23	8.09	55.38	10.14
	25	27.69	5.28	30.77	5.69	36.92	6.54	40.00	7.01	43.08	7.48	49.23	8.73	55.38	10.92
	27	27.69	5.64	30.77	6.07	36.92	6.99	40.00	7.47	43.08	7.98	49.23	9.45	55.38	11.76
	29	27.69	5.99	30.77	6.47	36.92	7.47	40.00	8.00	43.08	8.55	49.23	10.22	52.74	11.53
	31	27.69	6.38	30.77	6.89	36.92	7.97	40.00	8.55	43.08	9.25	49.23	11.01	51.06	11.51
	33	27.69	6.77	30.77	7.34	36.92	8.51	40.00	9.13	43.08	9.98	47.99	11.54	49.41	11.52
	35	27.69	7.20	30.77	7.80	36.92	9.08	40.00	9.83	43.08	10.83	46.39	11.53	47.65	11.53
	37	27.69	7.65	30.77	8.30	36.92	9.69	40.00	10.62	43.08	11.68	44.78	11.55	46.10	11.54
	39	27.69	8.14	30.77	8.86	36.92	10.42	40.00	11.48	40.73	11.54	43.12	11.54	44.43	11.51
	41	27.69	8.69	30.77	9.46	36.92	11.26	38.14	11.54	39.19	11.54	41.68	11.63	42.91	11.61
	43	27.69	9.28	30.77	10.12	35.47	11.56	36.43	11.52	37.50	11.53	40.00	11.60	41.13	11.60
	45	27.69	9.93	30.77	10.87	33.85	11.51	34.88	11.54	35.96	11.51	38.23	11.59	39.29	11.60
	48	27.69	11.06	29.39	11.53	31.33	11.53	32.34	11.58	32.52	11.23	33.08	10.63	33.20	10.28
	50	25.33	10.75	25.54	10.41	26.13	9.89	26.06	9.51	26.45	9.35	26.57	8.85	26.95	8.69
	52	19.05	8.44	19.28	8.27	20.22	8.13	20.37	7.96	19.85	7.57	21.30	7.65	19.78	7.06

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1.Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.4: 14HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
90%	-5	24.92	3.08	27.69	3.29	33.23	3.81	36.00	4.35	38.77	5.01	44.31	6.07	49.85	7.08
	-2	24.92	3.09	27.69	3.30	33.23	3.89	36.00	4.39	38.77	5.02	44.31	6.10	49.85	7.10
	0	24.92	3.13	27.69	3.35	33.23	3.90	36.00	4.41	38.77	5.09	44.31	6.16	49.85	7.14
	2	24.92	3.13	27.69	3.37	33.23	3.92	36.00	4.44	38.77	5.12	44.31	6.17	49.85	7.14
	4	24.92	3.13	27.69	3.39	33.23	3.97	36.00	4.54	38.77	5.12	44.31	6.32	49.85	7.15
	6	24.92	3.16	27.69	3.41	33.23	4.09	36.00	4.61	38.77	5.15	44.31	6.34	49.85	7.17
	8	24.92	3.20	27.69	3.45	33.23	4.11	36.00	4.63	38.77	5.23	44.31	6.39	49.85	7.18
	10	24.92	3.20	27.69	3.46	33.23	4.20	36.00	4.72	38.77	5.34	44.31	6.41	49.85	7.37
	12	24.92	3.26	27.69	3.51	33.23	4.29	36.00	4.82	38.77	5.51	44.31	6.49	49.85	7.40
	14	24.92	3.29	27.69	3.69	33.23	4.34	36.00	4.96	38.77	5.51	44.31	6.58	49.85	7.50
	16	24.92	3.36	27.69	3.74	33.23	4.53	36.00	5.29	38.77	5.74	44.31	6.61	49.85	7.58
	18	24.92	3.55	27.69	3.96	33.23	4.94	36.00	5.30	38.77	5.75	44.31	6.73	49.85	7.63
	20	24.92	3.93	27.69	4.43	33.23	5.09	36.00	5.42	38.77	5.86	44.31	6.76	49.85	7.83
	21	24.92	4.22	27.69	4.53	33.23	5.19	36.00	5.54	38.77	5.89	44.31	6.83	49.85	7.88
	23	24.92	4.48	27.69	4.81	33.23	5.44	36.00	5.78	38.77	6.15	44.31	7.01	49.85	8.14
	25	24.92	4.80	27.69	5.13	33.23	5.84	36.00	6.20	38.77	6.58	44.31	7.35	49.85	8.81
	27	24.92	5.11	27.69	5.48	33.23	6.23	36.00	6.63	38.77	7.04	44.31	7.84	49.85	9.51
	29	24.92	5.44	27.69	5.83	33.23	6.65	36.00	7.09	38.77	7.53	44.31	8.41	49.85	10.25
	31	24.92	5.78	27.69	6.20	33.23	7.09	36.00	7.56	38.77	8.03	44.31	9.01	49.85	11.07
	33	24.92	6.12	27.69	6.58	33.23	7.55	36.00	8.05	38.77	8.57	44.31	9.74	48.54	11.52
	35	24.92	6.50	27.69	7.00	33.23	8.04	36.00	8.58	38.77	9.13	44.31	10.54	46.88	11.53
	37	24.92	6.91	27.69	7.44	33.23	8.57	36.00	9.15	38.77	9.78	44.31	11.37	45.23	11.51
	39	24.92	7.32	27.69	7.91	33.23	9.13	36.00	9.80	38.77	10.48	42.41	11.51	43.64	11.55
	41	24.92	7.78	27.69	8.42	33.23	9.77	36.00	10.48	38.77	11.39	40.79	11.53	42.12	11.54
	43	24.92	8.30	27.69	8.98	33.23	10.46	36.00	11.29	37.03	11.54	39.26	11.55	40.46	11.52
	45	24.92	8.86	27.69	9.61	33.23	11.26	34.42	11.52	35.49	11.54	37.57	11.54	38.70	11.53
	48	24.92	9.82	27.69	10.72	30.99	11.51	31.90	11.52	32.57	11.39	33.17	10.79	33.29	10.45
	50	24.92	10.56	25.67	10.56	26.12	9.98	26.34	9.70	26.20	9.33	26.95	9.03	27.33	8.88
	52	19.23	8.54	19.28	8.25	19.63	7.91	19.74	7.73	20.42	7.77	21.25	7.64	22.02	7.69
80%	-5	22.15	2.77	24.62	2.98	29.54	3.44	32.00	3.66	34.46	4.15	39.38	5.02	44.31	5.85
	-2	22.15	2.77	24.62	3.01	29.54	3.47	32.00	3.67	34.46	4.24	39.38	5.09	44.31	5.89
	0	22.15	2.80	24.62	3.03	29.54	3.50	32.00	3.73	34.46	4.24	39.38	5.18	44.31	6.11
	2	22.15	2.81	24.62	3.04	29.54	3.55	32.00	3.77	34.46	4.32	39.38	5.27	44.31	6.23
	4	22.15	2.82	24.62	3.05	29.54	3.57	32.00	3.81	34.46	4.34	39.38	5.32	44.31	6.25
	6	22.15	2.83	24.62	3.06	29.54	3.58	32.00	3.88	34.46	4.38	39.38	5.39	44.31	6.32
	8	22.15	2.85	24.62	3.07	29.54	3.64	32.00	3.90	34.46	4.41	39.38	5.53	44.31	6.33
	10	22.15	2.87	24.62	3.11	29.54	3.65	32.00	3.94	34.46	4.44	39.38	5.57	44.31	6.38
	12	22.15	2.94	24.62	3.14	29.54	3.68	32.00	4.21	34.46	4.56	39.38	5.73	44.31	6.45
	14	22.15	2.96	24.62	3.26	29.54	3.82	32.00	4.22	34.46	4.80	39.38	5.82	44.31	6.50
	16	22.15	3.00	24.62	3.33	29.54	4.02	32.00	4.39	34.46	5.10	39.38	5.86	44.31	6.51
	18	22.15	3.14	24.62	3.52	29.54	4.35	32.00	4.69	34.46	5.11	39.38	5.90	44.31	6.57
	20	22.15	3.40	24.62	3.91	29.54	4.59	32.00	4.87	34.46	5.18	39.38	6.02	44.31	6.77
	21	22.15	3.70	24.62	4.08	29.54	4.69	32.00	4.96	34.46	5.25	39.38	6.11	44.31	6.81
	23	22.15	3.85	24.62	4.31	29.54	4.89	32.00	5.19	34.46	5.47	39.38	6.11	44.31	6.95
	25	22.15	4.05	24.62	4.51	29.54	5.20	32.00	5.48	34.46	5.79	39.38	6.38	44.31	7.26
	27	22.15	4.33	24.62	4.82	29.54	5.55	32.00	5.86	34.46	6.18	39.38	6.81	44.31	7.77
	29	22.15	4.73	24.62	5.27	29.54	5.91	32.00	6.26	34.46	6.61	39.38	7.28	44.31	8.29
	31	22.15	5.01	24.62	5.57	29.54	6.29	32.00	6.66	34.46	7.04	39.38	7.79	44.31	8.87
	33	22.15	5.32	24.62	5.91	29.54	6.69	32.00	7.08	34.46	7.49	39.38	8.31	44.31	9.56
	35	22.15	5.65	24.62	6.26	29.54	7.10	32.00	7.55	34.46	7.99	39.38	8.86	44.31	10.33
	37	22.15	5.99	24.62	6.63	29.54	7.55	32.00	8.03	34.46	8.51	39.38	9.48	44.31	11.21
	39	22.15	6.37	24.62	7.04	29.54	8.03	32.00	8.55	34.46	9.08	39.38	10.12	42.78	11.55
	41	22.15	6.77	24.62	7.48	29.54	8.57	32.00	9.12	34.46	9.72	39.38	10.88	41.23	11.56
	43	22.15	7.32	24.62	7.96	29.54	9.16	32.00	9.77	34.46	10.40	38.54	11.51	39.63	11.55
	45	22.15	7.77	24.62	8.49	29.54	9.79	32.00	10.49	34.46	11.19	36.90	11.53	38.03	11.56
	48	22.15	8.59	24.62	9.39	29.54	10.92	32.00	11.73	32.30	11.53	33.01	10.96	33.24	10.60
	50	22.15	9.28	24.62	10.10	26.10	10.07	26.23	9.79	26.39	9.52	26.64	8.99	27.58	9.06
	52	19.41	8.66	19.65	8.45	20.11	8.09	20.22	7.93	20.91	7.96	20.45	7.41	21.88	7.66

## Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

## Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.4: 14HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	19.38	2.39	21.54	2.67	25.85	2.93	28.00	3.25	30.15	3.45	34.46	4.13	38.77	4.86
	-2	19.38	2.44	21.54	2.69	25.85	3.07	28.00	3.26	30.15	3.53	34.46	4.23	38.77	4.96
	0	19.38	2.47	21.54	2.70	25.85	3.07	28.00	3.31	30.15	3.55	34.46	4.27	38.77	5.00
	2	19.38	2.48	21.54	2.71	25.85	3.09	28.00	3.33	30.15	3.58	34.46	4.34	38.77	5.05
	4	19.38	2.51	21.54	2.73	25.85	3.10	28.00	3.33	30.15	3.59	34.46	4.38	38.77	5.21
	6	19.38	2.52	21.54	2.73	25.85	3.18	28.00	3.34	30.15	3.62	34.46	4.43	38.77	5.31
	8	19.38	2.54	21.54	2.74	25.85	3.20	28.00	3.39	30.15	3.70	34.46	4.57	38.77	5.38
	10	19.38	2.55	21.54	2.76	25.85	3.21	28.00	3.46	30.15	3.73	34.46	4.71	38.77	5.44
	12	19.38	2.57	21.54	2.78	25.85	3.28	28.00	3.54	30.15	3.77	34.46	4.86	38.77	5.62
	14	19.38	2.58	21.54	2.80	25.85	3.38	28.00	3.63	30.15	4.03	34.46	4.91	38.77	5.62
	16	19.38	2.69	21.54	2.88	25.85	3.48	28.00	3.85	30.15	4.11	34.46	5.03	38.77	5.69
	18	19.38	2.73	21.54	3.07	25.85	3.72	28.00	4.10	30.15	4.42	34.46	5.07	38.77	5.71
	20	19.38	2.98	21.54	3.34	25.85	4.07	28.00	4.31	30.15	4.60	34.46	5.14	38.77	5.78
	21	19.38	3.16	21.54	3.64	25.85	4.15	28.00	4.42	30.15	4.67	34.46	5.24	38.77	5.90
	23	19.38	3.34	21.54	3.85	25.85	4.36	28.00	4.60	30.15	4.85	34.46	5.33	38.77	5.97
	25	19.38	3.47	21.54	3.87	25.85	4.61	28.00	4.85	30.15	5.09	34.46	5.56	38.77	6.19
	27	19.38	3.72	21.54	4.12	25.85	4.92	28.00	5.17	30.15	5.42	34.46	5.92	38.77	6.62
	29	19.38	3.97	21.54	4.40	25.85	5.23	28.00	5.50	30.15	5.78	34.46	6.30	38.77	7.08
	31	19.38	4.24	21.54	4.68	25.85	5.56	28.00	5.85	30.15	6.15	34.46	6.72	38.77	7.57
	33	19.38	4.51	21.54	4.97	25.85	5.90	28.00	6.21	30.15	6.53	34.46	7.16	38.77	8.07
	35	19.38	4.80	21.54	5.28	25.85	6.25	28.00	6.60	30.15	6.94	34.46	7.61	38.77	8.60
	37	19.38	5.10	21.54	5.61	25.85	6.63	28.00	7.00	30.15	7.38	34.46	8.13	38.77	9.19
	39	19.38	5.50	21.54	5.97	25.85	7.03	28.00	7.45	30.15	7.86	34.46	8.66	38.77	9.81
	41	19.38	5.83	21.54	6.35	25.85	7.47	28.00	7.92	30.15	8.37	34.46	9.26	38.77	10.54
	43	19.38	6.21	21.54	6.83	25.85	7.95	28.00	8.44	30.15	8.93	34.46	9.89	38.77	11.31
	45	19.38	6.62	21.54	7.28	25.85	8.48	28.00	9.01	30.15	9.55	34.46	10.64	37.08	11.51
	48	19.38	7.32	21.54	8.03	25.85	9.38	28.00	10.02	30.15	10.63	33.06	11.27	33.35	10.97
	50	19.38	8.12	21.54	8.77	25.85	10.09	26.38	10.02	26.56	9.75	26.97	9.27	27.11	9.01
	52	19.38	8.69	19.71	8.54	19.90	8.08	20.03	7.91	20.15	7.73	20.92	7.60	20.97	7.43
60%	-5	16.62	2.02	18.46	2.23	22.15	2.65	24.00	2.87	25.85	2.96	29.54	3.34	33.23	4.02
	-2	16.62	2.13	18.46	2.31	22.15	2.66	24.00	2.87	25.85	2.99	29.54	3.42	33.23	4.05
	0	16.62	2.14	18.46	2.35	22.15	2.68	24.00	2.88	25.85	3.02	29.54	3.53	33.23	4.12
	2	16.62	2.17	18.46	2.36	22.15	2.69	24.00	2.94	25.85	3.04	29.54	3.56	33.23	4.16
	4	16.62	2.17	18.46	2.36	22.15	2.74	24.00	2.95	25.85	3.06	29.54	3.60	33.23	4.16
	6	16.62	2.17	18.46	2.36	22.15	2.76	24.00	2.95	25.85	3.12	29.54	3.61	33.23	4.25
	8	16.62	2.22	18.46	2.38	22.15	2.76	24.00	2.97	25.85	3.12	29.54	3.64	33.23	4.25
	10	16.62	2.22	18.46	2.39	22.15	2.80	24.00	3.02	25.85	3.17	29.54	3.72	33.23	4.29
	12	16.62	2.23	18.46	2.42	22.15	2.84	24.00	3.03	25.85	3.25	29.54	3.85	33.23	4.42
	14	16.62	2.25	18.46	2.43	22.15	2.88	24.00	3.08	25.85	3.32	29.54	3.98	33.23	4.48
	16	16.62	2.30	18.46	2.49	22.15	2.98	24.00	3.21	25.85	3.48	29.54	4.00	33.23	4.91
	18	16.62	2.36	18.46	2.60	22.15	3.15	24.00	3.45	25.85	3.81	29.54	4.32	33.23	4.92
	20	16.62	2.49	18.46	2.81	22.15	3.49	24.00	3.81	25.85	3.99	29.54	4.47	33.23	4.93
	21	16.62	2.64	18.46	2.97	22.15	3.62	24.00	3.84	25.85	4.08	29.54	4.49	33.23	4.97
	23	16.62	2.76	18.46	3.13	22.15	3.81	24.00	4.02	25.85	4.24	29.54	4.65	33.23	5.14
	25	16.62	2.98	18.46	3.19	22.15	3.84	24.00	4.24	25.85	4.45	29.54	4.86	33.23	5.36
	27	16.62	3.20	18.46	3.42	22.15	4.04	24.00	4.33	25.85	4.73	29.54	5.11	33.23	5.64
	29	16.62	3.42	18.46	3.66	22.15	4.31	24.00	4.71	25.85	5.04	29.54	5.44	33.23	6.03
	31	16.62	3.64	18.46	3.91	22.15	4.58	24.00	5.02	25.85	5.35	29.54	5.79	33.23	6.42
	33	16.62	3.88	18.46	4.16	22.15	4.88	24.00	5.32	25.85	5.68	29.54	6.15	33.23	6.83
	35	16.62	4.12	18.46	4.43	22.15	5.19	24.00	5.65	25.85	6.01	29.54	6.53	33.23	7.27
	37	16.62	4.38	18.46	4.71	22.15	5.62	24.00	5.98	25.85	6.38	29.54	6.93	33.23	7.73
	39	16.62	4.65	18.46	5.08	22.15	5.96	24.00	6.35	25.85	6.77	29.54	7.38	33.23	8.25
	41	16.62	4.95	18.46	5.38	22.15	6.30	24.00	6.74	25.85	7.18	29.54	7.84	33.23	8.80
	43	16.62	5.26	18.46	5.73	22.15	6.70	24.00	7.16	25.85	7.63	29.54	8.36	33.23	9.39
	45	16.62	5.61	18.46	6.10	22.15	7.13	24.00	7.73	25.85	8.14	29.54	8.93	33.23	10.08
	48	16.62	6.19	18.46	6.74	22.15	7.86	24.00	8.52	25.85	8.98	29.54	9.89	33.23	11.24
	50	16.62	7.04	18.46	7.55	22.15	8.59	24.00	9.11	25.85	9.63	26.90	9.47	26.96	9.17
	52	16.62	7.51	18.46	8.07	19.99	8.23	20.27	8.09	20.40	7.91	20.59	7.57	21.30	7.61

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table continued on next page ...

# TVR Ultra HR 50/60Hz



Table 2-9.4: 14HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22, WB:15		DB:23.3, WB:16		DB:25.8, WB:18		DB:27, WB:19		DB:28.2, WB:20		DB:30.7, WB:22		DB:32, WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	13.85	1.74	15.38	1.84	18.46	2.28	20.00	2.43	21.54	2.49	24.62	2.82	27.69	3.25
	-2	13.85	1.76	15.38	2.02	18.46	2.28	20.00	2.46	21.54	2.59	24.62	2.86	27.69	3.30
	0	13.85	1.78	15.38	2.04	18.46	2.29	20.00	2.48	21.54	2.61	24.62	2.91	27.69	3.31
	2	13.85	1.84	15.38	2.04	18.46	2.30	20.00	2.49	21.54	2.62	24.62	2.91	27.69	3.32
	4	13.85	1.84	15.38	2.05	18.46	2.30	20.00	2.49	21.54	2.67	24.62	2.93	27.69	3.34
	6	13.85	1.89	15.38	2.07	18.46	2.31	20.00	2.51	21.54	2.67	24.62	2.96	27.69	3.35
	8	13.85	1.89	15.38	2.07	18.46	2.32	20.00	2.52	21.54	2.69	24.62	2.98	27.69	3.40
	10	13.85	1.90	15.38	2.08	18.46	2.32	20.00	2.52	21.54	2.72	24.62	3.01	27.69	3.42
	12	13.85	1.92	15.38	2.09	18.46	2.36	20.00	2.52	21.54	2.79	24.62	3.03	27.69	3.44
	14	13.85	1.92	15.38	2.09	18.46	2.44	20.00	2.60	21.54	2.79	24.62	3.20	27.69	3.64
	16	13.85	1.97	15.38	2.10	18.46	2.44	20.00	2.74	21.54	2.88	24.62	3.35	27.69	3.71
	18	13.85	1.99	15.38	2.17	18.46	2.63	20.00	2.79	21.54	3.08	24.62	3.64	27.69	4.06
	20	13.85	2.10	15.38	2.29	18.46	2.78	20.00	3.08	21.54	3.34	24.62	3.79	27.69	4.19
	21	13.85	2.16	15.38	2.39	18.46	3.10	20.00	3.30	21.54	3.50	24.62	3.86	27.69	4.28
	23	13.85	2.29	15.38	2.52	18.46	3.13	20.00	3.46	21.54	3.66	24.62	4.02	27.69	4.42
	25	13.85	2.54	15.38	2.71	18.46	3.28	20.00	3.48	21.54	3.80	24.62	4.18	27.69	4.58
	27	13.85	2.75	15.38	2.93	18.46	3.28	20.00	3.50	21.54	3.83	24.62	4.39	27.69	4.81
	29	13.85	2.94	15.38	3.13	18.46	3.51	20.00	3.75	21.54	3.98	24.62	4.57	27.69	5.10
	31	13.85	3.13	15.38	3.34	18.46	3.75	20.00	4.00	21.54	4.35	24.62	4.85	27.69	5.43
	33	13.85	3.33	15.38	3.55	18.46	4.00	20.00	4.26	21.54	4.59	24.62	5.15	27.69	5.75
	35	13.85	3.53	15.38	3.77	18.46	4.25	20.00	4.53	21.54	4.89	24.62	5.47	27.69	6.11
	37	13.85	3.74	15.38	4.01	18.46	4.52	20.00	4.90	21.54	5.19	24.62	5.79	27.69	6.48
	39	13.85	3.97	15.38	4.25	18.46	4.81	20.00	5.20	21.54	5.50	24.62	6.15	27.69	6.88
	41	13.85	4.21	15.38	4.51	18.46	5.11	20.00	5.50	21.54	5.84	24.62	6.52	27.69	7.30
	43	13.85	4.46	15.38	4.79	18.46	5.51	20.00	5.85	21.54	6.21	24.62	7.03	27.69	7.77
	45	13.85	4.74	15.38	5.09	18.46	5.84	20.00	6.22	21.54	6.60	24.62	7.47	27.69	8.27
	48	13.85	5.19	15.38	5.60	18.46	6.43	20.00	6.85	21.54	7.36	24.62	8.20	27.69	9.14
	50	13.85	5.64	15.38	6.23	18.46	7.24	20.00	7.63	21.54	8.01	24.62	8.76	27.05	9.58
	52	13.85	6.41	15.38	6.85	18.46	7.71	20.00	8.14	20.31	8.05	20.70	7.74	20.78	7.57

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.5: 16HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	40.50	4.36	45.00	4.83	54.00	6.30	58.50	7.31	63.00	8.12	72.00	9.43	81.00	12.85
	-2	40.50	4.44	45.00	4.84	54.00	6.52	58.50	7.32	63.00	8.12	72.00	9.84	81.00	12.90
	0	40.50	4.45	45.00	4.90	54.00	6.61	58.50	7.39	63.00	8.18	72.00	9.92	81.00	13.07
	2	40.50	4.46	45.00	4.92	54.00	6.67	58.50	7.43	63.00	8.24	72.00	10.02	81.00	13.19
	4	40.50	4.48	45.00	4.93	54.00	6.71	58.50	7.48	63.00	8.26	72.00	10.06	78.88	13.01
	6	40.50	4.52	45.00	4.97	54.00	6.74	58.50	7.50	63.00	8.29	72.00	10.29	78.86	13.27
	8	40.50	4.57	45.00	5.02	54.00	6.75	58.50	7.71	63.00	8.52	72.00	10.47	78.53	13.52
	10	40.50	4.69	45.00	5.18	54.00	6.94	58.50	7.93	63.00	8.78	72.00	10.70	77.47	13.51
	12	40.50	4.74	45.00	5.36	54.00	7.13	58.50	8.21	63.00	9.05	72.00	10.90	76.28	13.53
	14	40.50	4.92	45.00	5.47	54.00	7.37	58.50	8.44	63.00	9.37	72.00	11.79	74.94	13.52
	16	40.50	5.17	45.00	5.88	54.00	7.85	58.50	8.95	63.00	10.05	72.00	12.89	73.54	13.51
	18	40.50	5.61	45.00	6.33	54.00	8.46	58.50	9.59	63.00	10.79	70.37	13.54	72.12	13.50
	20	40.50	6.11	45.00	6.92	54.00	9.09	58.50	10.31	63.00	11.53	68.90	13.51	70.56	13.52
	21	40.50	6.34	45.00	7.20	54.00	9.44	58.50	10.65	63.00	11.96	68.08	13.56	69.79	13.51
	23	40.50	6.79	45.00	7.80	54.00	10.10	58.50	11.42	63.00	12.79	66.51	13.51	68.28	13.57
	25	40.50	7.27	45.00	8.41	54.00	10.88	58.50	12.23	63.00	13.80	64.84	13.53	66.77	13.60
	27	40.50	7.85	45.00	9.06	54.00	11.64	58.50	13.07	60.12	13.51	62.98	13.54	64.68	13.54
	29	40.50	8.45	45.00	9.72	54.00	12.53	56.77	13.53	58.24	13.54	61.19	13.54	62.82	13.58
	31	40.50	9.11	45.00	10.45	54.00	13.41	54.98	13.54	56.22	13.51	59.36	13.59	60.59	13.53
	33	40.50	9.79	45.00	11.21	51.80	13.57	53.00	13.51	54.44	13.54	57.28	13.52	58.72	13.56
	35	40.50	10.52	45.00	12.08	49.94	13.53	51.18	13.51	52.56	13.52	55.41	13.55	56.99	13.58
	37	40.50	11.37	45.00	13.03	48.05	13.54	49.45	13.56	50.74	13.56	53.63	13.71	54.93	13.62
	39	40.50	12.25	43.73	13.56	46.16	13.52	47.66	13.61	48.91	13.60	51.33	13.51	53.00	13.64
	41	40.50	13.20	41.87	13.51	44.43	13.53	45.63	13.52	46.78	13.52	49.42	13.54	51.47	13.90
	43	38.88	13.52	40.03	13.51	42.63	13.56	43.93	13.68	44.92	13.55	47.51	13.54	49.50	13.92
	45	37.07	13.52	38.27	13.51	40.81	13.61	42.08	13.70	43.04	13.57	43.93	12.58	44.22	11.98
	48	32.69	12.38	33.12	11.99	33.43	11.02	34.14	10.88	34.30	10.54	34.54	9.87	35.88	9.97
	50	26.16	10.00	26.75	9.84	26.73	9.13	27.74	9.19	27.52	8.84	27.61	8.34	28.71	8.41
	52	19.37	7.92	19.60	7.76	21.20	7.83	20.00	7.26	20.74	7.30	19.88	6.77	20.62	6.81
120%	-5	37.38	4.16	41.54	4.51	49.85	5.93	54.00	6.58	58.15	7.35	66.46	8.87	74.77	10.58
	-2	37.38	4.18	41.54	4.51	49.85	5.96	54.00	6.65	58.15	7.39	66.46	8.91	74.77	10.62
	0	37.38	4.21	41.54	4.58	49.85	5.97	54.00	6.69	58.15	7.43	66.46	8.93	74.77	10.78
	2	37.38	4.22	41.54	4.60	49.85	6.06	54.00	6.75	58.15	7.49	66.46	9.00	74.77	10.98
	4	37.38	4.22	41.54	4.64	49.85	6.08	54.00	6.80	58.15	7.53	66.46	9.03	74.77	11.15
	6	37.38	4.27	41.54	4.68	49.85	6.09	54.00	6.84	58.15	7.77	66.46	9.28	74.77	11.68
	8	37.38	4.31	41.54	4.71	49.85	6.09	54.00	7.05	58.15	7.78	66.46	9.52	74.77	11.69
	10	37.38	4.41	41.54	4.79	49.85	6.28	54.00	7.24	58.15	8.00	66.46	9.82	74.77	12.30
	12	37.38	4.46	41.54	4.90	49.85	6.45	54.00	7.45	58.15	8.28	66.46	9.91	74.77	13.29
	14	37.38	4.58	41.54	5.07	49.85	6.68	54.00	7.68	58.15	8.52	66.46	10.19	72.95	13.74
	16	37.38	4.79	41.54	5.36	49.85	7.12	54.00	7.84	58.15	8.88	66.46	10.95	71.58	13.73
	18	37.38	5.16	41.54	5.81	49.85	7.44	54.00	8.49	58.15	9.52	66.46	11.71	70.25	13.73
	20	37.38	5.67	41.54	6.25	49.85	8.07	54.00	9.12	58.15	10.24	66.46	12.49	68.75	13.73
	21	37.38	5.88	41.54	6.46	49.85	8.39	54.00	9.46	58.15	10.59	66.46	13.03	68.07	13.75
	23	37.38	6.32	41.54	6.95	49.85	9.03	54.00	10.17	58.15	11.35	64.90	13.76	66.49	13.77
	25	37.38	6.77	41.54	7.50	49.85	9.69	54.00	10.90	58.15	12.17	63.37	13.75	64.97	13.75
	27	37.38	7.22	41.54	8.11	49.85	10.44	54.00	11.70	58.15	13.03	61.78	13.74	63.33	13.77
	29	37.38	7.72	41.54	8.72	49.85	11.15	54.00	12.57	58.15	13.99	59.85	13.77	61.54	13.82
	31	37.38	8.22	41.54	9.37	49.85	12.04	54.00	13.47	55.15	13.74	57.95	13.76	59.53	13.75
	33	37.38	8.83	41.54	10.12	49.85	12.90	52.11	13.77	53.41	13.75	56.23	13.78	57.72	13.80
	35	37.38	9.50	41.54	10.90	49.85	13.88	50.27	13.74	51.55	13.74	54.43	13.83	55.58	13.75
	37	37.38	10.25	41.54	11.74	47.23	13.73	48.48	13.74	49.75	13.77	52.42	13.75	53.75	13.78
	39	37.38	11.06	41.54	12.67	45.48	13.76	46.66	13.78	47.98	13.78	50.64	13.79	51.90	13.82
	41	37.38	11.93	41.54	13.64	43.66	13.76	45.02	13.82	46.20	13.81	48.86	13.95	50.06	13.84
	43	37.38	12.95	39.52	13.75	41.94	13.76	43.06	13.75	44.21	13.74	46.61	13.74	48.55	14.10
	45	37.38	14.03	37.84	13.75	40.19	13.79	41.28	13.77	42.33	13.76	43.19	12.77	43.87	12.41
	48	32.17	12.53	32.43	11.96	33.09	11.22	33.85	11.07	33.53	10.52	34.35	10.06	35.05	9.93
	50	26.13	10.19	26.73	10.04	26.73	9.34	26.64	8.97	27.00	8.83	27.09	8.33	28.15	8.39
	52	20.11	8.33	19.34	7.75	20.90	7.82	19.74	7.25	20.46	7.29	22.02	7.38	20.36	6.80

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1.Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.5: 16HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
110%	-5	34.27	3.87	38.08	4.17	45.69	5.30	49.50	5.93	53.31	6.67	60.92	8.09	68.54	9.26
	-2	34.27	3.90	38.08	4.24	45.69	5.31	49.50	6.00	53.31	6.69	60.92	8.09	68.54	9.27
	0	34.27	3.97	38.08	4.27	45.69	5.33	49.50	6.07	53.31	6.75	60.92	8.15	68.54	9.32
	2	34.27	3.97	38.08	4.29	45.69	5.35	49.50	6.10	53.31	6.79	60.92	8.16	68.54	9.40
	4	34.27	3.98	38.08	4.35	45.69	5.45	49.50	6.22	53.31	6.90	60.92	8.41	68.54	9.63
	6	34.27	4.00	38.08	4.36	45.69	5.47	49.50	6.36	53.31	7.05	60.92	8.45	68.54	9.70
	8	34.27	4.05	38.08	4.39	45.69	5.62	49.50	6.39	53.31	7.07	60.92	8.71	68.54	9.97
	10	34.27	4.09	38.08	4.46	45.69	5.67	49.50	6.53	53.31	7.25	60.92	8.91	68.54	10.24
	12	34.27	4.15	38.08	4.55	45.69	5.80	49.50	6.68	53.31	7.46	60.92	9.03	68.54	10.56
	14	34.27	4.25	38.08	4.70	45.69	6.21	49.50	6.93	53.31	7.72	60.92	9.21	68.54	11.26
	16	34.27	4.42	38.08	4.95	45.69	6.36	49.50	7.15	53.31	7.90	60.92	9.47	68.54	12.26
	18	34.27	4.70	38.08	5.34	45.69	6.43	49.50	7.35	53.31	8.25	60.92	10.15	68.54	13.32
	20	34.27	5.25	38.08	5.74	45.69	7.04	49.50	7.95	53.31	8.94	60.92	10.90	66.95	13.98
	21	34.27	5.45	38.08	5.96	45.69	7.33	49.50	8.27	53.31	9.27	60.92	11.25	66.22	13.96
	23	34.27	5.85	38.08	6.41	45.69	7.93	49.50	8.92	53.31	9.92	60.92	12.11	64.76	13.96
	25	34.27	6.27	38.08	6.86	45.69	8.56	49.50	9.60	53.31	10.65	60.92	12.97	63.17	13.96
	27	34.27	6.69	38.08	7.32	45.69	9.19	49.50	10.29	53.31	11.44	60.92	13.90	61.71	13.98
	29	34.27	7.12	38.08	7.83	45.69	9.88	49.50	11.08	53.31	12.32	58.53	13.96	60.00	13.97
	31	34.27	7.59	38.08	8.36	45.69	10.64	49.50	11.89	53.31	13.24	56.70	13.99	58.22	13.99
	33	34.27	8.09	38.08	9.01	45.69	11.46	49.50	12.78	53.31	14.19	54.81	13.95	56.49	14.05
	35	34.27	8.63	38.08	9.70	45.69	12.33	49.50	13.77	50.53	14.00	53.02	13.96	54.55	13.98
	37	34.27	9.21	38.08	10.44	45.69	13.24	47.53	13.95	48.73	13.97	51.41	14.01	52.85	14.03
	39	34.27	9.89	38.08	11.30	44.65	13.97	45.79	13.96	46.95	13.95	49.67	14.07	50.72	13.97
	41	34.27	10.70	38.08	12.20	42.90	13.98	44.06	13.95	45.27	13.99	47.72	13.98	48.93	14.01
	43	34.27	11.59	38.08	13.20	41.20	14.01	42.26	13.97	43.54	14.04	46.03	14.15	47.14	14.04
	45	34.27	12.58	37.25	13.94	39.46	13.96	40.54	13.97	41.79	14.08	42.72	13.21	43.03	12.59
	48	31.78	12.71	32.09	12.24	32.76	11.40	32.97	11.06	33.20	10.70	34.05	10.23	33.57	9.69
	50	25.60	10.19	26.18	10.03	26.74	9.51	27.14	9.37	27.06	9.00	26.55	8.31	27.57	8.37
	52	19.32	8.12	19.59	7.95	20.58	7.81	19.47	7.24	20.17	7.28	21.67	7.37	20.08	6.79
100%	-5	31.15	3.63	34.62	3.92	41.54	4.71	45.00	5.49	48.46	5.92	55.38	7.46	62.31	8.31
	-2	31.15	3.66	34.62	3.96	41.54	4.72	45.00	5.50	48.46	6.14	55.38	7.50	62.31	8.32
	0	31.15	3.67	34.62	3.97	41.54	4.72	45.00	5.53	48.46	6.16	55.38	7.57	62.31	8.39
	2	31.15	3.70	34.62	4.00	41.54	4.84	45.00	5.56	48.46	6.26	55.38	7.58	62.31	8.47
	4	31.15	3.73	34.62	4.02	41.54	4.87	45.00	5.63	48.46	6.27	55.38	7.62	62.31	8.69
	6	31.15	3.74	34.62	4.03	41.54	4.99	45.00	5.64	48.46	6.29	55.38	7.65	62.31	8.74
	8	31.15	3.76	34.62	4.08	41.54	4.99	45.00	5.65	48.46	6.34	55.38	7.87	62.31	8.98
	10	31.15	3.77	34.62	4.14	41.54	5.00	45.00	5.81	48.46	6.51	55.38	8.06	62.31	9.24
	12	31.15	3.85	34.62	4.22	41.54	5.13	45.00	5.98	48.46	6.70	55.38	8.14	62.31	9.52
	14	31.15	3.92	34.62	4.32	41.54	5.27	45.00	6.19	48.46	7.04	55.38	8.24	62.31	9.58
	16	31.15	4.06	34.62	4.49	41.54	5.66	45.00	6.37	48.46	7.09	55.38	8.31	62.31	10.26
	18	31.15	4.29	34.62	4.80	41.54	5.86	45.00	6.58	48.46	7.10	55.38	8.64	62.31	11.01
	20	31.15	4.78	34.62	5.27	41.54	6.18	45.00	6.81	48.46	7.65	55.38	9.34	62.31	11.77
	21	31.15	5.02	34.62	5.47	41.54	6.42	45.00	7.09	48.46	7.95	55.38	9.67	62.31	12.16
	23	31.15	5.38	34.62	5.86	41.54	6.89	45.00	7.67	48.46	8.57	55.38	10.41	62.31	13.02
	25	31.15	5.76	34.62	6.28	41.54	7.41	45.00	8.30	48.46	9.22	55.38	11.13	62.31	14.16
	27	31.15	6.16	34.62	6.70	41.54	7.97	45.00	8.92	48.46	9.94	55.38	12.01	59.89	14.20
	29	31.15	6.56	34.62	7.16	41.54	8.62	45.00	9.64	48.46	10.70	55.38	12.84	58.44	14.22
	31	31.15	6.99	34.62	7.63	41.54	9.30	45.00	10.38	48.46	11.51	55.38	13.85	56.69	14.21
	33	31.15	7.42	34.62	8.13	41.54	10.01	45.00	11.15	48.46	12.37	53.55	14.19	54.87	14.17
	35	31.15	7.92	34.62	8.66	41.54	10.79	45.00	12.00	48.46	13.28	51.89	14.17	53.27	14.21
	37	31.15	8.44	34.62	9.26	41.54	11.65	45.00	12.97	48.46	14.35	50.12	14.21	51.59	14.28
	39	31.15	8.99	34.62	9.94	41.54	12.55	45.00	13.97	45.90	14.18	48.37	14.19	49.72	14.21
	41	31.15	9.62	34.62	10.74	41.54	13.57	43.16	14.20	44.31	14.19	46.75	14.25	48.06	14.27
	43	31.15	10.31	34.62	11.64	40.38	14.21	41.47	14.17	42.56	14.17	44.86	14.19	46.01	14.20
	45	31.15	11.11	34.62	12.64	38.69	14.19	39.73	14.19	40.92	14.26	41.81	13.38	42.08	12.77
	48	31.15	12.62	31.62	12.44	32.14	11.47	32.56	11.23	32.77	10.88	33.62	10.41	33.23	9.87
	50	25.47	10.37	25.62	10.01	26.59	9.71	26.06	9.13	26.95	9.20	27.19	8.70	26.95	8.35
	52	19.49	8.31	19.78	8.14	19.66	7.61	20.97	7.84	19.85	7.27	21.30	7.35	19.78	6.78

## Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

## Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.5: 16HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
90%	-5	28.04	3.33	31.15	3.58	37.38	4.19	40.50	4.70	43.62	5.30	49.85	6.27	56.08	7.35
	-2	28.04	3.33	31.15	3.61	37.38	4.20	40.50	4.72	43.62	5.34	49.85	6.58	56.08	7.54
	0	28.04	3.34	31.15	3.62	37.38	4.24	40.50	4.78	43.62	5.36	49.85	6.60	56.08	7.56
	2	28.04	3.38	31.15	3.63	37.38	4.25	40.50	4.81	43.62	5.38	49.85	6.67	56.08	7.67
	4	28.04	3.38	31.15	3.64	37.38	4.29	40.50	4.85	43.62	5.43	49.85	6.68	56.08	7.68
	6	28.04	3.39	31.15	3.66	37.38	4.32	40.50	4.85	43.62	5.45	49.85	6.71	56.08	7.68
	8	28.04	3.40	31.15	3.68	37.38	4.32	40.50	4.87	43.62	5.51	49.85	6.87	56.08	7.92
	10	28.04	3.41	31.15	3.71	37.38	4.39	40.50	4.98	43.62	5.61	49.85	7.05	56.08	8.17
	12	28.04	3.49	31.15	3.79	37.38	4.50	40.50	5.01	43.62	5.76	49.85	7.11	56.08	8.21
	14	28.04	3.53	31.15	3.87	37.38	4.64	40.50	5.32	43.62	5.96	49.85	7.25	56.08	8.37
	16	28.04	3.63	31.15	4.02	37.38	4.90	40.50	5.67	43.62	6.13	49.85	7.29	56.08	8.39
	18	28.04	3.84	31.15	4.29	37.38	5.31	40.50	5.70	43.62	6.27	49.85	7.48	56.08	8.83
	20	28.04	4.16	31.15	4.78	37.38	5.50	40.50	5.86	43.62	6.38	49.85	7.48	56.08	9.50
	21	28.04	4.54	31.15	4.91	37.38	5.65	40.50	6.07	43.62	6.49	49.85	7.76	56.08	9.84
	23	28.04	4.85	31.15	5.24	37.38	6.07	40.50	6.52	43.62	6.98	49.85	8.42	56.08	10.53
	25	28.04	5.18	31.15	5.61	37.38	6.50	40.50	6.98	43.62	7.52	49.85	9.05	56.08	11.34
	27	28.04	5.54	31.15	5.99	37.38	6.95	40.50	7.48	43.62	8.15	49.85	9.75	56.08	12.13
	29	28.04	5.88	31.15	6.38	37.38	7.42	40.50	7.98	43.62	8.79	49.85	10.52	56.08	13.04
	31	28.04	6.26	31.15	6.79	37.38	7.92	40.50	8.58	43.62	9.48	49.85	11.34	56.08	14.05
	33	28.04	6.65	31.15	7.23	37.38	8.46	40.50	9.26	43.62	10.23	49.85	12.21	53.91	14.20
	35	28.04	7.07	31.15	7.70	37.38	9.01	40.50	9.98	43.62	11.04	49.85	13.17	52.27	14.17
	37	28.04	7.52	31.15	8.20	37.38	9.72	40.50	10.77	43.62	11.90	49.85	14.18	50.53	14.18
	39	28.04	8.01	31.15	8.74	37.38	10.48	40.50	11.64	43.62	12.82	47.53	14.17	48.73	14.18
	41	28.04	8.54	31.15	9.33	37.38	11.37	40.50	12.62	43.62	13.87	45.84	14.21	47.26	14.29
	43	28.04	9.13	31.15	10.00	37.38	12.29	40.50	13.64	41.90	14.18	44.17	14.17	45.41	14.22
	45	28.04	9.78	31.15	10.76	37.38	13.37	39.22	14.19	40.26	14.21	41.88	13.77	42.41	13.42
	48	28.04	10.89	31.15	12.14	32.19	11.73	32.37	11.29	32.78	11.05	33.65	10.57	33.29	10.04
	50	25.50	10.48	25.81	10.20	26.38	9.68	26.30	9.33	26.18	8.97	27.53	8.88	26.73	8.32
	52	19.49	8.29	20.22	8.33	20.18	7.80	20.33	7.63	19.83	7.26	21.25	7.34	22.02	7.38
80%	-5	24.92	2.98	27.69	3.20	33.23	3.71	36.00	4.01	38.77	4.51	44.31	5.59	49.85	6.30
	-2	24.92	3.00	27.69	3.24	33.23	3.74	36.00	4.01	38.77	4.51	44.31	5.60	49.85	6.56
	0	24.92	3.03	27.69	3.26	33.23	3.77	36.00	4.03	38.77	4.51	44.31	5.61	49.85	6.57
	2	24.92	3.05	27.69	3.27	33.23	3.78	36.00	4.09	38.77	4.58	44.31	5.65	49.85	6.64
	4	24.92	3.05	27.69	3.28	33.23	3.80	36.00	4.10	38.77	4.64	44.31	5.71	49.85	6.65
	6	24.92	3.05	27.69	3.29	33.23	3.80	36.00	4.10	38.77	4.65	44.31	5.75	49.85	6.65
	8	24.92	3.05	27.69	3.29	33.23	3.88	36.00	4.15	38.77	4.66	44.31	5.79	49.85	6.69
	10	24.92	3.09	27.69	3.33	33.23	3.94	36.00	4.23	38.77	4.77	44.31	5.90	49.85	6.84
	12	24.92	3.11	27.69	3.42	33.23	3.98	36.00	4.32	38.77	4.85	44.31	6.11	49.85	7.07
	14	24.92	3.15	27.69	3.44	33.23	4.13	36.00	4.58	38.77	5.06	44.31	6.18	49.85	7.23
	16	24.92	3.24	27.69	3.57	33.23	4.27	36.00	4.70	38.77	5.42	44.31	6.29	49.85	7.27
	18	24.92	3.37	27.69	3.78	33.23	4.68	36.00	5.10	38.77	5.42	44.31	6.31	49.85	7.37
	20	24.92	3.67	27.69	4.21	33.23	4.94	36.00	5.26	38.77	5.57	44.31	6.42	49.85	7.47
	21	24.92	3.90	27.69	4.40	33.23	5.04	36.00	5.36	38.77	5.68	44.31	6.43	49.85	7.67
	23	24.92	4.36	27.69	4.67	33.23	5.33	36.00	5.68	38.77	6.04	44.31	6.79	49.85	8.32
	25	24.92	4.66	27.69	5.00	33.23	5.71	36.00	6.09	38.77	6.48	44.31	7.27	49.85	9.00
	27	24.92	4.97	27.69	5.32	33.23	6.11	36.00	6.51	38.77	6.93	44.31	7.78	49.85	9.69
	29	24.92	5.27	27.69	5.67	33.23	6.51	36.00	6.95	38.77	7.40	44.31	8.42	49.85	10.44
	31	24.92	5.60	27.69	6.02	33.23	6.93	36.00	7.42	38.77	7.91	44.31	9.08	49.85	11.22
	33	24.92	5.94	27.69	6.41	33.23	7.38	36.00	7.91	38.77	8.45	44.31	9.81	49.85	12.09
	35	24.92	6.29	27.69	6.81	33.23	7.86	36.00	8.42	38.77	9.00	44.31	10.59	49.85	13.06
	37	24.92	6.69	27.69	7.24	33.23	8.38	36.00	9.01	38.77	9.68	44.31	11.45	49.85	14.05
	39	24.92	7.10	27.69	7.69	33.23	8.95	36.00	9.61	38.77	10.46	44.31	12.41	47.81	14.21
	41	24.92	7.54	27.69	8.19	33.23	9.58	36.00	10.34	38.77	11.34	44.31	13.42	46.07	14.18
	43	24.92	8.04	27.69	8.75	33.23	10.25	36.00	11.18	38.77	12.33	43.28	14.20	44.46	14.22
	45	24.92	8.58	27.69	9.36	33.23	11.05	36.00	12.18	38.77	13.35	41.58	14.18	42.21	13.80
	48	24.92	9.52	27.69	10.43	32.30	12.11	32.50	11.63	32.67	11.20	33.06	10.52	33.23	10.18
	50	24.92	10.25	25.80	10.32	26.26	9.76	26.50	9.49	26.41	9.14	26.62	8.64	26.99	8.49
	52	19.38	8.29	19.68	8.11	20.60	7.98	20.77	7.81	20.32	7.45	21.14	7.32	21.88	7.36

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.5: 16HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	21.81	2.63	24.23	2.84	29.08	3.29	31.50	3.51	33.92	3.74	38.77	4.52	43.62	5.33
	-2	21.81	2.68	24.23	2.88	29.08	3.30	31.50	3.54	33.92	3.76	38.77	4.54	43.62	5.38
	0	21.81	2.69	24.23	2.90	29.08	3.30	31.50	3.54	33.92	3.80	38.77	4.56	43.62	5.39
	2	21.81	2.70	24.23	2.91	29.08	3.35	31.50	3.56	33.92	3.84	38.77	4.62	43.62	5.47
	4	21.81	2.70	24.23	2.91	29.08	3.37	31.50	3.58	33.92	3.90	38.77	4.64	43.62	5.54
	6	21.81	2.71	24.23	2.93	29.08	3.39	31.50	3.63	33.92	3.92	38.77	4.75	43.62	5.63
	8	21.81	2.73	24.23	2.95	29.08	3.41	31.50	3.64	33.92	3.93	38.77	4.81	43.62	5.66
	10	21.81	2.74	24.23	2.96	29.08	3.42	31.50	3.69	33.92	3.94	38.77	4.81	43.62	5.81
	12	21.81	2.75	24.23	2.97	29.08	3.48	31.50	3.74	33.92	4.03	38.77	5.11	43.62	5.98
	14	21.81	2.79	24.23	3.04	29.08	3.59	31.50	3.88	33.92	4.16	38.77	5.26	43.62	6.08
	16	21.81	2.83	24.23	3.12	29.08	3.72	31.50	4.03	33.92	4.43	38.77	5.46	43.62	6.12
	18	21.81	2.93	24.23	3.27	29.08	4.00	31.50	4.42	33.92	4.78	38.77	5.48	43.62	6.15
	20	21.81	3.14	24.23	3.58	29.08	4.39	31.50	4.66	33.92	4.93	38.77	5.56	43.62	6.16
	21	21.81	3.32	24.23	3.83	29.08	4.47	31.50	4.75	33.92	5.02	38.77	5.63	43.62	6.33
	23	21.81	3.61	24.23	4.05	29.08	4.69	31.50	4.97	33.92	5.24	38.77	5.78	43.62	6.61
	25	21.81	3.88	24.23	4.34	29.08	5.00	31.50	5.29	33.92	5.59	38.77	6.20	43.62	7.08
	27	21.81	4.14	24.23	4.62	29.08	5.34	31.50	5.65	33.92	5.98	38.77	6.63	43.62	7.60
	29	21.81	4.41	24.23	4.92	29.08	5.69	31.50	6.03	33.92	6.39	38.77	7.08	43.62	8.11
	31	21.81	4.70	24.23	5.23	29.08	6.04	31.50	6.43	33.92	6.80	38.77	7.55	43.62	8.76
	33	21.81	4.99	24.23	5.55	29.08	6.43	31.50	6.84	33.92	7.25	38.77	8.07	43.62	9.42
	35	21.81	5.42	24.23	5.89	29.08	6.84	31.50	7.27	33.92	7.71	38.77	8.60	43.62	10.23
	37	21.81	5.72	24.23	6.38	29.08	7.26	31.50	7.75	33.92	8.22	38.77	9.19	43.62	11.03
	39	21.81	6.09	24.23	6.75	29.08	7.72	31.50	8.25	33.92	8.78	38.77	9.84	43.62	11.96
	41	21.81	6.46	24.23	7.16	29.08	8.23	31.50	8.81	33.92	9.38	38.77	10.61	43.62	12.96
	43	21.81	6.88	24.23	7.61	29.08	8.79	31.50	9.42	33.92	10.05	38.77	11.54	43.62	14.07
	45	21.81	7.34	24.23	8.12	29.08	9.41	31.50	10.10	33.92	10.82	38.77	12.59	41.71	14.22
	48	21.81	8.23	24.23	8.99	29.08	10.49	31.50	11.30	32.74	11.60	33.12	10.87	33.39	10.53
	50	21.81	8.86	24.23	9.66	26.24	9.93	26.46	9.67	26.64	9.41	26.74	8.80	27.09	8.66
	52	19.52	8.42	19.71	8.20	19.89	7.77	20.04	7.60	20.71	7.63	20.28	7.10	21.66	7.34
60%	-5	18.69	2.27	20.77	2.47	24.92	2.83	27.00	3.04	29.08	3.30	33.23	3.65	37.38	4.35
	-2	18.69	2.33	20.77	2.53	24.92	2.84	27.00	3.05	29.08	3.31	33.23	3.67	37.38	4.38
	0	18.69	2.34	20.77	2.54	24.92	2.87	27.00	3.07	29.08	3.34	33.23	3.72	37.38	4.40
	2	18.69	2.36	20.77	2.55	24.92	2.89	27.00	3.07	29.08	3.34	33.23	3.78	37.38	4.41
	4	18.69	2.37	20.77	2.56	24.92	2.91	27.00	3.10	29.08	3.35	33.23	3.82	37.38	4.47
	6	18.69	2.38	20.77	2.56	24.92	2.95	27.00	3.13	29.08	3.38	33.23	3.82	37.38	4.52
	8	18.69	2.40	20.77	2.59	24.92	2.97	27.00	3.17	29.08	3.39	33.23	3.84	37.38	4.54
	10	18.69	2.40	20.77	2.59	24.92	3.03	27.00	3.19	29.08	3.42	33.23	3.89	37.38	4.58
	12	18.69	2.42	20.77	2.61	24.92	3.04	27.00	3.26	29.08	3.46	33.23	3.92	37.38	4.73
	14	18.69	2.45	20.77	2.62	24.92	3.08	27.00	3.35	29.08	3.59	33.23	4.19	37.38	4.90
	16	18.69	2.48	20.77	2.68	24.92	3.21	27.00	3.42	29.08	3.77	33.23	4.29	37.38	5.21
	18	18.69	2.54	20.77	2.78	24.92	3.36	27.00	3.65	29.08	4.03	33.23	4.67	37.38	5.22
	20	18.69	2.69	20.77	3.03	24.92	3.77	27.00	4.08	29.08	4.31	33.23	4.79	37.38	5.30
	21	18.69	2.81	20.77	3.20	24.92	3.92	27.00	4.15	29.08	4.40	33.23	4.85	37.38	5.36
	23	18.69	2.98	20.77	3.38	24.92	4.11	27.00	4.34	29.08	4.58	33.23	5.04	37.38	5.56
	25	18.69	3.21	20.77	3.56	24.92	4.26	27.00	4.59	29.08	4.81	33.23	5.26	37.38	5.91
	27	18.69	3.44	20.77	3.80	24.92	4.55	27.00	4.89	29.08	5.14	33.23	5.62	37.38	6.32
	29	18.69	3.68	20.77	4.06	24.92	4.84	27.00	5.21	29.08	5.48	33.23	6.00	37.38	6.75
	31	18.69	3.92	20.77	4.32	24.92	5.25	27.00	5.54	29.08	5.83	33.23	6.39	37.38	7.22
	33	18.69	4.25	20.77	4.60	24.92	5.57	27.00	5.87	29.08	6.19	33.23	6.80	37.38	7.69
	35	18.69	4.49	20.77	4.89	24.92	5.91	27.00	6.24	29.08	6.57	33.23	7.23	37.38	8.19
	37	18.69	4.78	20.77	5.29	24.92	6.26	27.00	6.62	29.08	6.99	33.23	7.72	37.38	8.75
	39	18.69	5.08	20.77	5.60	24.92	6.64	27.00	7.03	29.08	7.43	33.23	8.21	37.38	9.36
	41	18.69	5.41	20.77	5.96	24.92	7.05	27.00	7.48	29.08	7.92	33.23	8.76	37.38	10.02
	43	18.69	5.75	20.77	6.33	24.92	7.50	27.00	7.97	29.08	8.45	33.23	9.38	37.38	10.77
	45	18.69	6.14	20.77	6.75	24.92	7.99	27.00	8.51	29.08	9.02	33.23	10.06	37.38	11.74
	48	18.69	6.80	20.77	7.46	24.92	8.84	27.00	9.43	29.08	10.03	33.23	11.25	33.24	10.90
	50	18.69	7.60	20.77	8.21	24.92	9.48	27.00	10.13	26.65	9.66	27.03	9.16	27.46	9.00
	52	18.69	8.13	19.81	8.36	20.10	7.94	20.28	7.77	20.38	7.61	20.61	7.27	20.67	7.11

## Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

## Notes:

Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.5: 16HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	15.58	1.84	17.31	2.09	20.77	2.44	22.50	2.55	24.23	2.73	27.69	3.05	31.15	3.38
	-2	15.58	1.84	17.31	2.13	20.77	2.45	22.50	2.60	24.23	2.75	27.69	3.05	31.15	3.46
	0	15.58	1.98	17.31	2.15	20.77	2.46	22.50	2.62	24.23	2.76	27.69	3.08	31.15	3.47
	2	15.58	2.00	17.31	2.20	20.77	2.47	22.50	2.64	24.23	2.79	27.69	3.11	31.15	3.53
	4	15.58	2.03	17.31	2.22	20.77	2.48	22.50	2.66	24.23	2.79	27.69	3.15	31.15	3.54
	6	15.58	2.04	17.31	2.22	20.77	2.52	22.50	2.68	24.23	2.81	27.69	3.20	31.15	3.55
	8	15.58	2.05	17.31	2.22	20.77	2.53	22.50	2.70	24.23	2.86	27.69	3.20	31.15	3.61
	10	15.58	2.07	17.31	2.24	20.77	2.55	22.50	2.70	24.23	2.92	27.69	3.20	31.15	3.65
	12	15.58	2.07	17.31	2.25	20.77	2.55	22.50	2.77	24.23	2.93	27.69	3.34	31.15	3.68
	14	15.58	2.09	17.31	2.26	20.77	2.61	22.50	2.80	24.23	2.95	27.69	3.47	31.15	3.89
	16	15.58	2.10	17.31	2.31	20.77	2.70	22.50	2.90	24.23	3.09	27.69	3.57	31.15	3.99
	18	15.58	2.16	17.31	2.36	20.77	2.77	22.50	3.05	24.23	3.29	27.69	3.89	31.15	4.39
	20	15.58	2.24	17.31	2.47	20.77	3.01	22.50	3.35	24.23	3.69	27.69	4.06	31.15	4.54
	21	15.58	2.32	17.31	2.58	20.77	3.21	22.50	3.56	24.23	3.76	27.69	4.14	31.15	4.59
	23	15.58	2.47	17.31	2.73	20.77	3.41	22.50	3.73	24.23	3.92	27.69	4.30	31.15	4.76
	25	15.58	2.73	17.31	2.93	20.77	3.55	22.50	3.75	24.23	4.14	27.69	4.50	31.15	4.95
	27	15.58	2.93	17.31	3.14	20.77	3.65	22.50	3.92	24.23	4.31	27.69	4.75	31.15	5.26
	29	15.58	3.13	17.31	3.35	20.77	3.90	22.50	4.19	24.23	4.57	27.69	5.05	31.15	5.60
	31	15.58	3.33	17.31	3.58	20.77	4.16	22.50	4.46	24.23	4.86	27.69	5.37	31.15	5.96
	33	15.58	3.54	17.31	3.81	20.77	4.42	22.50	4.74	24.23	5.16	27.69	5.71	31.15	6.34
	35	15.58	3.76	17.31	4.05	20.77	4.70	22.50	5.04	24.23	5.47	27.69	6.05	31.15	6.74
	37	15.58	4.00	17.31	4.30	20.77	5.00	22.50	5.43	24.23	5.80	27.69	6.42	31.15	7.17
	39	15.58	4.24	17.31	4.58	20.77	5.31	22.50	5.77	24.23	6.15	27.69	6.82	31.15	7.64
	41	15.58	4.51	17.31	4.87	20.77	5.65	22.50	6.13	24.23	6.53	27.69	7.25	31.15	8.14
	43	15.58	4.79	17.31	5.18	20.77	6.08	22.50	6.51	24.23	7.07	27.69	7.72	31.15	8.67
	45	15.58	5.10	17.31	5.52	20.77	6.47	22.50	6.93	24.23	7.50	27.69	8.22	31.15	9.30
	48	15.58	5.62	17.31	6.10	20.77	7.15	22.50	7.76	24.23	8.25	27.69	9.10	31.15	10.33
	50	15.58	6.45	17.31	6.92	20.77	7.86	22.50	8.35	24.23	8.83	26.95	9.49	27.12	9.22
	52	15.58	6.85	17.31	7.37	20.19	8.17	20.30	7.96	20.41	7.77	20.70	7.43	21.37	7.47

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.6: 18HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	45.00	4.76	50.00	5.55	60.00	7.31	65.00	8.18	70.00	9.00	80.00	12.04	85.90	14.70
	-2	45.00	4.79	50.00	5.61	60.00	7.35	65.00	8.18	70.00	9.02	80.00	12.10	85.74	14.80
	0	45.00	4.80	50.00	5.74	60.00	7.42	65.00	8.25	70.00	9.09	80.00	12.51	85.44	14.88
	2	45.00	4.82	50.00	5.88	60.00	7.49	65.00	8.32	70.00	9.12	80.00	12.58	85.12	15.01
	4	45.00	4.83	50.00	5.89	60.00	7.53	65.00	8.34	70.00	9.36	80.00	12.80	85.00	15.20
	6	45.00	4.92	50.00	5.91	60.00	7.55	65.00	8.57	70.00	9.42	80.00	13.19	84.97	15.59
	8	45.00	5.10	50.00	5.91	60.00	7.75	65.00	8.81	70.00	9.69	80.00	13.55	83.91	15.47
	10	45.00	5.12	50.00	6.08	60.00	7.97	65.00	8.92	70.00	9.98	80.00	14.01	82.82	15.45
	12	45.00	5.26	50.00	6.27	60.00	8.23	65.00	9.35	70.00	10.44	80.00	14.84	81.63	15.47
	14	45.00	5.55	50.00	6.54	60.00	8.69	65.00	9.90	70.00	11.33	80.00	15.72	80.26	15.45
	16	45.00	5.89	50.00	6.98	60.00	9.32	65.00	10.55	70.00	12.36	77.07	15.47	78.87	15.48
	18	45.00	6.44	50.00	7.56	60.00	9.99	65.00	11.29	70.00	13.35	75.54	15.45	77.37	15.46
	20	45.00	7.00	50.00	8.14	60.00	10.69	65.00	12.17	70.00	14.36	74.00	15.48	75.87	15.52
	21	45.00	7.27	50.00	8.47	60.00	11.03	65.00	12.69	70.00	14.93	73.19	15.47	74.98	15.48
	23	45.00	7.84	50.00	9.10	60.00	11.80	65.00	13.74	68.23	15.45	71.55	15.49	73.41	15.56
	25	45.00	8.45	50.00	9.75	60.00	12.64	65.00	14.82	66.54	15.47	69.81	15.48	71.66	15.52
	27	45.00	9.08	50.00	10.43	60.00	13.67	63.38	15.52	64.80	15.46	68.13	15.47	69.86	15.52
	29	45.00	9.74	50.00	11.21	60.00	14.84	61.59	15.45	63.11	15.46	66.31	15.46	68.31	15.58
	31	45.00	10.45	50.00	12.00	58.44	15.51	59.88	15.47	61.33	15.47	64.59	15.52	66.30	15.45
	33	45.00	11.23	50.00	12.90	56.66	15.46	58.11	15.52	59.52	15.47	62.74	15.48	64.46	15.53
	35	45.00	12.09	50.00	13.86	54.90	15.48	56.32	15.49	57.79	15.50	60.94	15.58	62.61	15.62
	37	45.00	13.02	50.00	14.98	53.03	15.47	54.61	15.54	55.82	15.45	58.74	15.53	60.13	15.47
	39	45.00	14.01	48.41	15.47	51.04	15.46	52.52	15.51	53.89	15.52	56.81	15.59	58.09	15.53
	41	45.00	15.14	46.45	15.45	49.14	15.47	50.45	15.48	52.09	15.59	54.76	15.67	56.06	15.59
	43	43.23	15.50	44.49	15.48	47.23	15.55	48.48	15.54	49.24	15.18	50.31	14.28	50.33	13.48
	45	41.28	15.47	41.69	14.92	42.36	13.83	42.58	13.21	43.17	12.86	43.64	11.69	43.90	11.13
	48	32.34	11.70	32.44	11.07	33.55	10.61	33.75	10.29	33.32	9.76	34.68	9.52	33.96	9.02
	50	26.46	9.82	26.12	9.26	27.12	9.00	26.35	8.46	27.38	8.52	27.45	8.04	28.58	8.11
	52	20.07	8.00	19.23	7.46	20.87	7.53	19.63	6.98	20.38	7.02	19.47	6.51	20.22	6.55
120%	-5	41.54	4.43	46.15	5.15	55.38	6.66	60.00	7.40	64.62	8.21	73.85	10.71	83.08	13.97
	-2	41.54	4.45	46.15	5.16	55.38	6.72	60.00	7.51	64.62	8.21	73.85	10.94	83.08	14.16
	0	41.54	4.48	46.15	5.22	55.38	6.79	60.00	7.56	64.62	8.30	73.85	11.11	83.08	14.38
	2	41.54	4.52	46.15	5.22	55.38	6.83	60.00	7.70	64.62	8.56	73.85	11.27	83.08	14.49
	4	41.54	4.55	46.15	5.27	55.38	6.93	60.00	7.82	64.62	8.59	73.85	11.33	83.08	14.78
	6	41.54	4.57	46.15	5.31	55.38	7.07	60.00	7.84	64.62	8.62	73.85	11.45	83.08	15.15
	8	41.54	4.60	46.15	5.32	55.38	7.08	60.00	8.06	64.62	8.88	73.85	11.51	83.08	15.69
	10	41.54	4.69	46.15	5.50	55.38	7.27	60.00	8.30	64.62	9.14	73.85	11.90	80.96	15.75
	12	41.54	4.80	46.15	5.65	55.38	7.48	60.00	8.55	64.62	9.43	73.85	12.00	79.71	15.70
	14	41.54	4.97	46.15	5.82	55.38	7.92	60.00	8.68	64.62	9.81	73.85	13.04	78.45	15.71
	16	41.54	5.26	46.15	6.23	55.38	8.22	60.00	9.32	64.62	10.48	73.85	14.01	77.05	15.70
	18	41.54	5.72	46.15	6.68	55.38	8.84	60.00	10.00	64.62	11.23	73.85	15.00	75.58	15.75
	20	41.54	6.18	46.15	7.24	55.38	9.46	60.00	10.70	64.62	12.02	73.85	16.06	74.04	15.73
	21	41.54	6.43	46.15	7.50	55.38	9.81	60.00	11.08	64.62	12.52	71.62	15.72	73.20	15.71
	23	41.54	6.99	46.15	8.10	55.38	10.52	60.00	11.84	64.62	13.58	69.98	15.73	71.63	15.77
	25	41.54	7.53	46.15	8.72	55.38	11.26	60.00	12.68	64.62	14.73	68.29	15.70	70.08	15.78
	27	41.54	8.15	46.15	9.37	55.38	12.07	60.00	13.70	64.62	15.90	66.62	15.77	68.33	15.76
	29	41.54	8.76	46.15	10.04	55.38	12.94	60.00	14.86	61.77	15.71	64.89	15.72	66.59	15.72
	31	41.54	9.41	46.15	10.80	55.38	13.89	58.67	15.73	60.12	15.76	63.14	15.74	64.75	15.72
	33	41.54	10.12	46.15	11.61	55.38	14.98	56.97	15.71	58.38	15.72	61.42	15.77	63.35	15.90
	35	41.54	10.89	46.15	12.45	53.96	15.72	55.23	15.71	56.63	15.72	59.57	15.73	61.34	15.75
	37	41.54	11.71	46.15	13.44	52.14	15.71	53.47	15.75	54.92	15.71	57.83	15.80	59.35	15.84
	39	41.54	12.64	46.15	14.50	50.28	15.72	51.61	15.76	53.07	15.80	55.66	15.76	57.41	15.92
	41	41.54	13.63	46.15	15.64	48.33	15.73	49.73	15.77	51.01	15.77	53.83	15.82	54.98	15.76
	43	41.54	14.76	43.92	15.71	46.46	15.72	47.70	15.72	48.33	15.38	49.06	14.23	49.47	13.66
	45	41.54	15.98	41.22	15.14	41.82	14.03	41.95	13.43	42.56	13.06	43.02	11.88	43.32	11.31
	48	31.93	11.80	32.17	11.29	33.37	10.80	33.59	10.47	33.21	9.94	33.97	9.50	33.27	8.99
	50	26.10	9.79	25.65	9.27	26.16	8.77	25.93	8.44	26.93	8.50	27.00	8.02	28.10	8.09
	52	19.32	7.81	19.04	7.45	20.64	7.52	19.43	6.97	20.16	7.01	19.29	6.50	20.02	6.55

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.6: 18HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
110%	-5	38.08	4.15	42.31	4.55	50.77	5.95	55.00	6.90	59.23	7.66	67.69	8.91	76.15	11.18
	-2	38.08	4.19	42.31	4.56	50.77	6.19	55.00	6.94	59.23	7.67	67.69	9.28	76.15	11.62
	0	38.08	4.20	42.31	4.61	50.77	6.29	55.00	7.03	59.23	7.74	67.69	9.50	76.15	11.75
	2	38.08	4.24	42.31	4.66	50.77	6.29	55.00	7.03	59.23	7.79	67.69	9.60	76.15	11.83
	4	38.08	4.25	42.31	4.70	50.77	6.37	55.00	7.10	59.23	7.82	67.69	9.67	76.15	12.14
	6	38.08	4.29	42.31	4.70	50.77	6.38	55.00	7.11	59.23	7.83	67.69	9.84	76.15	12.29
	8	38.08	4.30	42.31	4.72	50.77	6.40	55.00	7.31	59.23	8.04	67.69	9.97	76.15	12.55
	10	38.08	4.37	42.31	4.91	50.77	6.55	55.00	7.51	59.23	8.29	67.69	10.28	76.15	13.20
	12	38.08	4.46	42.31	4.94	50.77	6.73	55.00	7.74	59.23	8.54	67.69	10.47	76.15	14.07
	14	38.08	4.60	42.31	5.17	50.77	7.16	55.00	7.99	59.23	8.60	67.69	10.50	76.15	14.99
	16	38.08	4.82	42.31	5.36	50.77	7.21	55.00	8.10	59.23	9.12	67.69	11.18	76.15	15.93
	18	38.08	5.24	42.31	5.80	50.77	7.67	55.00	8.70	59.23	9.77	67.69	12.16	73.72	15.96
	20	38.08	5.69	42.31	6.29	50.77	8.29	55.00	9.37	59.23	10.47	67.69	13.22	72.23	15.96
	21	38.08	5.90	42.31	6.57	50.77	8.58	55.00	9.68	59.23	10.84	67.69	13.71	71.41	15.96
	23	38.08	6.32	42.31	7.11	50.77	9.25	55.00	10.35	59.23	11.59	67.69	14.84	69.89	15.96
	25	38.08	6.78	42.31	7.69	50.77	9.92	55.00	11.13	59.23	12.37	67.69	16.02	68.28	15.98
	27	38.08	7.25	42.31	8.28	50.77	10.63	55.00	11.91	59.23	13.29	65.07	16.02	66.61	15.96
	29	38.08	7.76	42.31	8.92	50.77	11.39	55.00	12.78	59.23	14.40	63.44	15.98	65.00	15.98
	31	38.08	8.38	42.31	9.56	50.77	12.26	55.00	13.74	59.23	15.66	61.70	15.96	63.39	16.08
	33	38.08	9.00	42.31	10.32	50.77	13.15	55.00	14.83	57.15	15.99	60.02	15.97	61.62	16.05
	35	38.08	9.67	42.31	11.08	50.77	14.16	55.00	16.14	55.45	16.03	58.26	15.99	59.89	16.00
	37	38.08	10.45	42.31	11.91	50.77	15.30	52.44	15.99	53.76	16.00	56.66	16.06	57.96	15.98
	39	38.08	11.26	42.31	12.88	49.40	15.96	50.70	15.98	52.03	15.97	54.74	16.01	56.08	16.07
	41	38.08	12.16	42.31	13.92	47.61	15.98	48.82	15.99	50.18	16.05	52.67	16.00	54.33	16.13
	43	38.08	13.14	42.31	15.05	45.64	15.97	46.85	15.97	47.65	15.67	48.21	14.39	48.52	13.83
	45	38.08	14.28	40.69	15.44	41.17	14.20	41.55	13.73	41.85	13.25	42.33	12.06	42.61	11.49
	48	31.48	11.92	31.71	11.39	32.13	10.58	32.81	10.45	33.02	10.11	33.82	9.67	34.53	9.56
	50	25.61	9.79	25.74	9.44	26.24	8.96	26.68	8.81	26.45	8.48	26.53	8.00	27.59	8.07
100%	52	19.65	7.98	18.84	7.45	20.38	7.52	19.22	6.97	19.93	7.00	21.47	7.09	19.80	6.54
	-5	34.62	3.84	38.46	4.19	46.15	5.54	50.00	6.19	53.85	6.84	61.54	8.30	69.23	9.84
	-2	34.62	3.88	38.46	4.21	46.15	5.55	50.00	6.22	53.85	6.90	61.54	8.31	69.23	9.95
	0	34.62	3.89	38.46	4.24	46.15	5.55	50.00	6.22	53.85	6.97	61.54	8.37	69.23	9.97
	2	34.62	3.90	38.46	4.24	46.15	5.60	50.00	6.28	53.85	7.01	61.54	8.40	69.23	10.20
	4	34.62	3.97	38.46	4.30	46.15	5.66	50.00	6.35	53.85	7.03	61.54	8.57	69.23	10.32
	6	34.62	3.99	38.46	4.34	46.15	5.69	50.00	6.39	53.85	7.26	61.54	8.66	69.23	10.49
	8	34.62	3.99	38.46	4.38	46.15	5.69	50.00	6.54	53.85	7.28	61.54	8.88	69.23	10.61
	10	34.62	4.05	38.46	4.42	46.15	5.84	50.00	6.76	53.85	7.44	61.54	9.03	69.23	10.66
	12	34.62	4.10	38.46	4.52	46.15	6.00	50.00	6.94	53.85	7.69	61.54	9.15	69.23	10.90
	14	34.62	4.23	38.46	4.69	46.15	6.40	50.00	7.14	53.85	7.73	61.54	9.16	69.23	11.61
	16	34.62	4.41	38.46	4.90	46.15	6.55	50.00	7.18	53.85	7.91	61.54	9.54	69.23	12.67
	18	34.62	4.71	38.46	5.38	46.15	6.64	50.00	7.44	53.85	8.34	61.54	10.24	69.23	13.68
	20	34.62	5.20	38.46	5.70	46.15	7.11	50.00	8.01	53.85	9.00	61.54	10.93	69.23	14.71
	21	34.62	5.39	38.46	5.91	46.15	7.37	50.00	8.32	53.85	9.28	61.54	11.34	69.23	15.24
	23	34.62	5.80	38.46	6.33	46.15	7.99	50.00	8.97	53.85	10.00	61.54	12.15	69.23	16.35
	25	34.62	6.19	38.46	6.80	46.15	8.57	50.00	9.63	53.85	10.71	61.54	13.00	66.47	16.24
	27	34.62	6.61	38.46	7.27	46.15	9.24	50.00	10.35	53.85	11.50	61.54	14.14	64.89	16.22
	29	34.62	7.06	38.46	7.78	46.15	9.92	50.00	11.08	53.85	12.36	61.54	15.33	63.33	16.24
	31	34.62	7.54	38.46	8.39	46.15	10.68	50.00	11.95	53.85	13.23	60.21	16.25	61.70	16.24
	33	34.62	8.03	38.46	9.04	46.15	11.46	50.00	12.84	53.85	14.22	58.62	16.22	59.93	16.23
	35	34.62	8.56	38.46	9.72	46.15	12.36	50.00	13.81	53.85	15.40	56.80	16.23	58.36	16.27
	37	34.62	9.20	38.46	10.49	46.15	13.29	50.00	14.86	52.52	16.28	55.18	16.26	56.60	16.24
	39	34.62	9.95	38.46	11.33	46.15	14.37	50.00	16.08	50.84	16.23	53.37	16.22	54.96	16.30
	41	34.62	10.75	38.46	12.23	46.15	15.55	47.89	16.24	49.04	16.22	51.61	16.25	52.87	16.30
	43	34.62	11.63	38.46	13.23	44.92	16.25	46.04	16.28	46.92	16.07	47.51	14.80	47.83	14.23
	45	34.62	12.58	38.46	14.33	40.66	14.57	40.98	14.02	41.14	13.42	41.90	12.48	42.59	12.12
	48	31.10	12.10	31.37	11.59	31.83	10.76	32.48	10.63	32.72	10.29	32.41	9.44	33.62	9.54
	50	25.13	9.78	25.25	9.43	26.25	9.14	25.61	8.60	25.94	8.46	26.03	7.98	27.04	8.05
	52	18.86	7.80	19.12	7.64	20.10	7.51	18.99	6.96	19.68	6.99	21.17	7.08	19.57	6.53

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.6: 18HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
90%	-5	31.15	3.54	34.62	3.72	41.54	4.71	45.00	5.31	48.46	5.94	55.38	7.26	62.31	8.37
	-2	31.15	3.55	34.62	3.78	41.54	4.77	45.00	5.34	48.46	5.95	55.38	7.27	62.31	8.41
	0	31.15	3.55	34.62	3.80	41.54	4.77	45.00	5.37	48.46	6.05	55.38	7.34	62.31	8.43
	2	31.15	3.55	34.62	3.86	41.54	4.78	45.00	5.45	48.46	6.09	55.38	7.36	62.31	8.49
	4	31.15	3.56	34.62	3.88	41.54	4.83	45.00	5.46	48.46	6.10	55.38	7.38	62.31	8.69
	6	31.15	3.58	34.62	3.91	41.54	4.87	45.00	5.49	48.46	6.31	55.38	7.61	62.31	8.74
	8	31.15	3.62	34.62	3.93	41.54	4.87	45.00	5.66	48.46	6.34	55.38	7.80	62.31	8.97
	10	31.15	3.65	34.62	3.98	41.54	5.05	45.00	5.71	48.46	6.50	55.38	7.91	62.31	9.11
	12	31.15	3.69	34.62	4.06	41.54	5.17	45.00	6.00	48.46	6.72	55.38	8.00	62.31	9.23
	14	31.15	3.79	34.62	4.20	41.54	5.34	45.00	6.22	48.46	6.73	55.38	8.11	62.31	9.25
	16	31.15	3.92	34.62	4.38	41.54	5.72	45.00	6.24	48.46	6.87	55.38	8.18	62.31	9.66
	18	31.15	4.19	34.62	4.70	41.54	5.73	45.00	6.40	48.46	6.89	55.38	8.23	62.31	10.36
	20	31.15	4.69	34.62	5.07	41.54	5.90	45.00	6.45	48.46	7.24	55.38	8.82	62.31	11.11
	21	31.15	4.81	34.62	5.24	41.54	6.12	45.00	6.71	48.46	7.54	55.38	9.12	62.31	11.49
	23	31.15	5.18	34.62	5.61	41.54	6.57	45.00	7.30	48.46	8.13	55.38	9.83	62.31	12.27
	25	31.15	5.53	34.62	6.02	41.54	7.04	45.00	7.87	48.46	8.76	55.38	10.56	62.31	13.18
	27	31.15	5.91	34.62	6.43	41.54	7.61	45.00	8.48	48.46	9.41	55.38	11.32	62.31	14.37
	29	31.15	6.30	34.62	6.85	41.54	8.23	45.00	9.17	48.46	10.13	55.38	12.18	62.31	15.55
	31	31.15	6.70	34.62	7.30	41.54	8.83	45.00	9.88	48.46	10.89	55.38	13.10	60.66	16.24
	33	31.15	7.13	34.62	7.80	41.54	9.54	45.00	10.61	48.46	11.70	55.38	14.05	58.99	16.27
	35	31.15	7.59	34.62	8.30	41.54	10.28	45.00	11.45	48.46	12.61	55.38	15.14	57.43	16.22
	37	31.15	8.10	34.62	8.88	41.54	11.08	45.00	12.31	48.46	13.64	55.38	16.54	55.64	16.24
	39	31.15	8.64	34.62	9.53	41.54	11.97	45.00	13.32	48.46	14.68	52.73	16.22	53.95	16.25
	41	31.15	9.23	34.62	10.29	41.54	12.94	45.00	14.41	48.46	15.93	50.77	16.23	52.24	16.28
	43	31.15	9.90	34.62	11.14	41.54	14.01	45.00	15.60	46.57	16.26	47.58	15.28	47.84	14.61
	45	31.15	10.67	34.62	12.11	41.54	15.18	41.00	14.37	41.31	13.82	42.04	12.88	42.33	12.29
	48	31.15	12.09	31.50	11.84	31.96	10.93	32.18	10.59	32.36	10.26	32.60	9.62	33.30	9.49
	50	25.21	9.87	25.57	9.61	26.60	9.31	25.97	8.79	25.85	8.43	27.14	8.36	26.89	8.02
	52	18.90	7.79	19.67	7.82	19.54	7.31	20.86	7.53	19.72	6.98	21.18	7.06	19.63	6.51
80%	-5	27.69	3.14	30.77	3.39	36.92	4.08	40.00	4.51	43.08	5.09	49.23	6.23	55.38	7.22
	-2	27.69	3.15	30.77	3.42	36.92	4.10	40.00	4.61	43.08	5.11	49.23	6.29	55.38	7.24
	0	27.69	3.21	30.77	3.42	36.92	4.13	40.00	4.62	43.08	5.15	49.23	6.31	55.38	7.30
	2	27.69	3.21	30.77	3.42	36.92	4.14	40.00	4.65	43.08	5.24	49.23	6.37	55.38	7.35
	4	27.69	3.22	30.77	3.47	36.92	4.17	40.00	4.65	43.08	5.26	49.23	6.44	55.38	7.36
	6	27.69	3.22	30.77	3.50	36.92	4.18	40.00	4.73	43.08	5.29	49.23	6.61	55.38	7.59
	8	27.69	3.23	30.77	3.52	36.92	4.22	40.00	4.83	43.08	5.40	49.23	6.73	55.38	7.76
	10	27.69	3.26	30.77	3.57	36.92	4.27	40.00	4.88	43.08	5.50	49.23	6.81	55.38	7.80
	12	27.69	3.31	30.77	3.60	36.92	4.31	40.00	5.04	43.08	5.74	49.23	6.82	55.38	7.89
	14	27.69	3.37	30.77	3.70	36.92	4.59	40.00	5.33	43.08	5.90	49.23	6.82	55.38	8.07
	16	27.69	3.48	30.77	3.87	36.92	4.88	40.00	5.50	43.08	5.91	49.23	6.97	55.38	8.08
	18	27.69	3.66	30.77	4.13	36.92	5.04	40.00	5.51	43.08	5.94	49.23	7.03	55.38	8.22
	20	27.69	4.03	30.77	4.54	36.92	5.24	40.00	5.58	43.08	6.09	49.23	7.13	55.38	8.66
	21	27.69	4.32	30.77	4.65	36.92	5.34	40.00	5.70	43.08	6.10	49.23	7.13	55.38	9.01
	23	27.69	4.60	30.77	4.96	36.92	5.73	40.00	6.13	43.08	6.55	49.23	7.71	55.38	9.68
	25	27.69	4.92	30.77	5.31	36.92	6.13	40.00	6.57	43.08	7.03	49.23	8.35	55.38	10.45
	27	27.69	5.25	30.77	5.67	36.92	6.55	40.00	7.02	43.08	7.56	49.23	9.02	55.38	11.22
	29	27.69	5.59	30.77	6.04	36.92	7.00	40.00	7.52	43.08	8.15	49.23	9.74	55.38	12.02
	31	27.69	5.94	30.77	6.43	36.92	7.47	40.00	8.03	43.08	8.79	49.23	10.49	55.38	12.93
	33	27.69	6.31	30.77	6.84	36.92	7.97	40.00	8.61	43.08	9.51	49.23	11.31	55.38	13.90
	35	27.69	6.71	30.77	7.29	36.92	8.49	40.00	9.32	43.08	10.23	49.23	12.19	55.38	15.02
	37	27.69	7.13	30.77	7.75	36.92	9.07	40.00	10.03	43.08	11.03	49.23	13.12	55.38	16.22
	39	27.69	7.60	30.77	8.26	36.92	9.82	40.00	10.85	43.08	11.96	49.23	14.19	52.96	16.27
	41	27.69	8.08	30.77	8.83	36.92	10.63	40.00	11.74	43.08	12.93	49.23	15.36	51.19	16.26
	43	27.69	8.65	30.77	9.46	36.92	11.53	40.00	12.76	43.08	14.02	47.59	15.81	47.89	15.16
	45	27.69	9.26	30.77	10.16	36.92	12.48	40.00	13.81	41.31	14.27	41.85	13.14	42.23	12.67
	48	27.69	10.33	30.77	11.39	32.06	11.19	32.37	10.85	32.58	10.52	33.18	9.97	33.36	9.64
	50	25.44	10.04	25.55	9.70	25.87	9.10	26.25	8.96	26.13	8.62	26.29	8.14	26.66	7.99
	52	19.39	7.96	19.15	7.62	20.07	7.49	20.22	7.33	19.71	6.97	21.14	7.04	21.91	7.09

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.6: 18HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	24.23	2.75	26.92	3.00	32.31	3.47	35.00	3.77	37.69	4.31	43.08	5.36	48.46	6.15
	-2	24.23	2.79	26.92	3.04	32.31	3.51	35.00	3.84	37.69	4.33	43.08	5.37	48.46	6.15
	0	24.23	2.79	26.92	3.04	32.31	3.56	35.00	3.87	37.69	4.41	43.08	5.40	48.46	6.22
	2	24.23	2.85	26.92	3.05	32.31	3.60	35.00	3.90	37.69	4.41	43.08	5.42	48.46	6.25
	4	24.23	2.86	26.92	3.10	32.31	3.63	35.00	3.93	37.69	4.45	43.08	5.48	48.46	6.26
	6	24.23	2.86	26.92	3.10	32.31	3.63	35.00	3.94	37.69	4.59	43.08	5.53	48.46	6.34
	8	24.23	2.87	26.92	3.12	32.31	3.63	35.00	4.03	37.69	4.60	43.08	5.59	48.46	6.44
	10	24.23	2.88	26.92	3.14	32.31	3.68	35.00	4.04	37.69	4.65	43.08	5.80	48.46	6.51
	12	24.23	2.93	26.92	3.17	32.31	3.75	35.00	4.09	37.69	4.66	43.08	5.88	48.46	6.65
	14	24.23	2.99	26.92	3.24	32.31	3.88	35.00	4.31	37.69	4.78	43.08	5.89	48.46	6.66
	16	24.23	3.07	26.92	3.37	32.31	4.05	35.00	4.41	37.69	5.14	43.08	5.92	48.46	6.79
	18	24.23	3.16	26.92	3.56	32.31	4.36	35.00	4.77	37.69	5.18	43.08	5.95	48.46	6.83
	20	24.23	3.44	26.92	3.94	32.31	4.62	35.00	4.93	37.69	5.22	43.08	6.07	48.46	6.87
	21	24.23	3.66	26.92	4.12	32.31	4.72	35.00	5.01	37.69	5.32	43.08	6.08	48.46	7.03
	23	24.23	3.99	26.92	4.36	32.31	4.95	35.00	5.27	37.69	5.60	43.08	6.22	48.46	7.41
	25	24.23	4.27	26.92	4.67	32.31	5.31	35.00	5.65	37.69	6.00	43.08	6.68	48.46	8.01
	27	24.23	4.55	26.92	4.98	32.31	5.68	35.00	6.04	37.69	6.42	43.08	7.16	48.46	8.63
	29	24.23	4.85	26.92	5.30	32.31	6.05	35.00	6.45	37.69	6.84	43.08	7.66	48.46	9.32
	31	24.23	5.15	26.92	5.64	32.31	6.45	35.00	6.87	37.69	7.31	43.08	8.17	48.46	10.06
	33	24.23	5.57	26.92	5.98	32.31	6.86	35.00	7.32	37.69	7.79	43.08	8.82	48.46	10.85
	35	24.23	5.91	26.92	6.35	32.31	7.30	35.00	7.79	37.69	8.31	43.08	9.53	48.46	11.68
	37	24.23	6.26	26.92	6.75	32.31	7.77	35.00	8.32	37.69	8.89	43.08	10.34	48.46	12.59
	39	24.23	6.64	26.92	7.18	32.31	8.30	35.00	8.87	37.69	9.50	43.08	11.17	48.46	13.64
	41	24.23	7.05	26.92	7.64	32.31	8.87	35.00	9.51	37.69	10.26	43.08	12.13	48.46	14.73
	43	24.23	7.53	26.92	8.16	32.31	9.50	35.00	10.20	37.69	11.19	43.08	13.12	48.46	16.02
	45	24.23	8.01	26.92	8.72	32.31	10.18	35.00	11.06	37.69	12.14	41.82	13.71	42.06	13.09
	48	24.23	8.87	26.92	9.69	32.31	11.45	32.44	11.11	32.54	10.72	33.01	10.11	33.23	9.78
	50	24.23	9.53	25.78	9.92	26.19	9.37	26.43	9.11	26.33	8.77	26.53	8.30	27.50	8.36
	52	19.28	7.96	19.57	7.79	20.50	7.66	20.66	7.50	20.21	7.15	21.02	7.02	21.77	7.07
60%	-5	20.77	2.42	23.08	2.67	27.69	2.99	30.00	3.18	32.31	3.47	36.92	4.19	41.54	4.90
	-2	20.77	2.49	23.08	2.67	27.69	3.04	30.00	3.21	32.31	3.48	36.92	4.22	41.54	4.99
	0	20.77	2.50	23.08	2.67	27.69	3.05	30.00	3.27	32.31	3.52	36.92	4.26	41.54	5.06
	2	20.77	2.51	23.08	2.68	27.69	3.09	30.00	3.28	32.31	3.52	36.92	4.34	41.54	5.12
	4	20.77	2.52	23.08	2.70	27.69	3.12	30.00	3.29	32.31	3.52	36.92	4.41	41.54	5.14
	6	20.77	2.52	23.08	2.71	27.69	3.12	30.00	3.29	32.31	3.53	36.92	4.54	41.54	5.17
	8	20.77	2.53	23.08	2.71	27.69	3.15	30.00	3.38	32.31	3.60	36.92	4.59	41.54	5.31
	10	20.77	2.55	23.08	2.74	27.69	3.20	30.00	3.43	32.31	3.64	36.92	4.65	41.54	5.38
	12	20.77	2.57	23.08	2.78	27.69	3.27	30.00	3.53	32.31	3.82	36.92	4.80	41.54	5.51
	14	20.77	2.58	23.08	2.79	27.69	3.38	30.00	3.61	32.31	3.86	36.92	4.85	41.54	5.58
	16	20.77	2.62	23.08	2.87	27.69	3.47	30.00	3.82	32.31	4.07	36.92	5.01	41.54	5.68
	18	20.77	2.72	23.08	3.00	27.69	3.76	30.00	4.08	32.31	4.44	36.92	5.04	41.54	5.70
	20	20.77	2.91	23.08	3.23	27.69	4.03	30.00	4.29	32.31	4.55	36.92	5.13	41.54	5.70
	21	20.77	3.13	23.08	3.52	27.69	4.11	30.00	4.39	32.31	4.62	36.92	5.22	41.54	5.89
	23	20.77	3.26	23.08	3.82	27.69	4.31	30.00	4.57	32.31	4.82	36.92	5.30	41.54	5.91
	25	20.77	3.50	23.08	3.90	27.69	4.58	30.00	4.83	32.31	5.10	36.92	5.61	41.54	6.34
	27	20.77	3.74	23.08	4.16	27.69	4.89	30.00	5.16	32.31	5.44	36.92	5.99	41.54	6.79
	29	20.77	4.00	23.08	4.44	27.69	5.20	30.00	5.50	32.31	5.81	36.92	6.39	41.54	7.27
	31	20.77	4.26	23.08	4.72	27.69	5.53	30.00	5.86	32.31	6.17	36.92	6.82	41.54	7.76
	33	20.77	4.60	23.08	5.02	27.69	5.87	30.00	6.23	32.31	6.58	36.92	7.27	41.54	8.27
	35	20.77	4.89	23.08	5.44	27.69	6.24	30.00	6.62	32.31	7.00	36.92	7.76	41.54	8.84
	37	20.77	5.20	23.08	5.75	27.69	6.63	30.00	7.04	32.31	7.45	36.92	8.27	41.54	9.55
	39	20.77	5.51	23.08	6.11	27.69	7.05	30.00	7.48	32.31	7.94	36.92	8.84	41.54	10.36
	41	20.77	5.86	23.08	6.48	27.69	7.50	30.00	7.99	32.31	8.49	36.92	9.46	41.54	11.22
	43	20.77	6.25	23.08	6.89	27.69	8.01	30.00	8.54	32.31	9.08	36.92	10.15	41.54	12.18
	45	20.77	6.66	23.08	7.35	27.69	8.54	30.00	9.14	32.31	9.74	36.92	10.99	41.54	13.28
	48	20.77	7.44	23.08	8.21	27.69	9.49	30.00	10.19	32.31	10.88	33.01	10.43	33.20	10.11
	50	20.77	8.11	23.08	8.80	26.18	9.57	26.32	9.28	26.50	9.03	27.06	8.64	27.48	8.50
	52	19.47	8.12	19.57	7.88	19.76	7.45	19.91	7.29	20.57	7.32	20.13	6.81	20.82	6.85

**Abbreviations:**

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

**Notes:**

Shaded cells indicate rating condition.

Table continued on next page ...

# TVR Ultra HR 50/60Hz



Table 2-9.6: 18HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	17.31	2.04	19.23	2.20	23.08	2.57	25.00	2.75	26.92	2.93	30.77	3.26	34.62	3.75
	-2	17.31	2.04	19.23	2.25	23.08	2.61	25.00	2.75	26.92	2.97	30.77	3.30	34.62	3.89
	0	17.31	2.12	19.23	2.29	23.08	2.63	25.00	2.78	26.92	2.98	30.77	3.31	34.62	3.96
	2	17.31	2.13	19.23	2.31	23.08	2.65	25.00	2.80	26.92	2.99	30.77	3.32	34.62	3.97
	4	17.31	2.15	19.23	2.32	23.08	2.66	25.00	2.81	26.92	3.00	30.77	3.33	34.62	4.05
	6	17.31	2.16	19.23	2.32	23.08	2.67	25.00	2.81	26.92	3.01	30.77	3.35	34.62	4.08
	8	17.31	2.17	19.23	2.33	23.08	2.67	25.00	2.85	26.92	3.06	30.77	3.37	34.62	4.10
	10	17.31	2.17	19.23	2.34	23.08	2.69	25.00	2.87	26.92	3.09	30.77	3.59	34.62	4.22
	12	17.31	2.17	19.23	2.35	23.08	2.71	25.00	2.94	26.92	3.13	30.77	3.59	34.62	4.38
	14	17.31	2.19	19.23	2.41	23.08	2.81	25.00	3.00	26.92	3.23	30.77	3.62	34.62	4.38
	16	17.31	2.22	19.23	2.45	23.08	2.86	25.00	3.08	26.92	3.35	30.77	3.93	34.62	4.50
	18	17.31	2.27	19.23	2.52	23.08	3.04	25.00	3.29	26.92	3.63	30.77	4.19	34.62	4.67
	20	17.31	2.41	19.23	2.72	23.08	3.38	25.00	3.66	26.92	3.86	30.77	4.28	34.62	4.74
	21	17.31	2.52	19.23	2.89	23.08	3.51	25.00	3.76	26.92	3.94	30.77	4.36	34.62	4.82
	23	17.31	2.68	19.23	3.03	23.08	3.70	25.00	3.91	26.92	4.11	30.77	4.51	34.62	4.99
	25	17.31	2.88	19.23	3.15	23.08	3.74	25.00	4.12	26.92	4.32	30.77	4.71	34.62	5.20
	27	17.31	3.09	19.23	3.36	23.08	4.00	25.00	4.29	26.92	4.59	30.77	4.98	34.62	5.56
	29	17.31	3.30	19.23	3.60	23.08	4.26	25.00	4.57	26.92	4.89	30.77	5.31	34.62	5.93
	31	17.31	3.52	19.23	3.83	23.08	4.53	25.00	4.98	26.92	5.19	30.77	5.66	34.62	6.33
	33	17.31	3.75	19.23	4.08	23.08	4.81	25.00	5.27	26.92	5.52	30.77	6.01	34.62	6.74
	35	17.31	3.98	19.23	4.34	23.08	5.11	25.00	5.58	26.92	5.85	30.77	6.40	34.62	7.16
	37	17.31	4.24	19.23	4.61	23.08	5.42	25.00	5.91	26.92	6.21	30.77	6.81	34.62	7.65
	39	17.31	4.51	19.23	4.90	23.08	5.87	25.00	6.27	26.92	6.59	30.77	7.24	34.62	8.14
	41	17.31	4.80	19.23	5.21	23.08	6.21	25.00	6.65	26.92	7.02	30.77	7.70	34.62	8.70
	43	17.31	5.11	19.23	5.60	23.08	6.60	25.00	7.07	26.92	7.46	30.77	8.22	34.62	9.31
	45	17.31	5.44	19.23	5.98	23.08	7.03	25.00	7.53	26.92	7.97	30.77	8.81	34.62	10.02
	48	17.31	6.02	19.23	6.60	23.08	7.76	25.00	8.31	26.92	8.82	30.77	9.80	33.23	10.62
	50	17.31	6.80	19.23	7.33	23.08	8.38	25.00	8.92	26.92	9.46	26.77	8.80	26.90	8.54
	52	17.31	7.26	19.23	7.84	19.98	7.66	20.06	7.45	20.18	7.29	20.98	7.16	21.09	7.01

## Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

## Notes:

Shaded cells indicate rating condition.



Table 2-9.7: 20HP cooling capacity

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-5	50.40	5.56	56.00	6.42	67.20	8.50	72.80	10.05	78.40	12.35	82.50	12.78	84.54	12.88
	-2	50.40	5.62	56.00	6.70	67.20	8.56	72.80	10.25	78.40	12.35	82.28	13.07	84.23	13.17
	0	50.40	5.65	56.00	6.71	67.20	8.65	72.80	10.34	78.40	12.60	82.07	13.22	84.10	13.07
	2	50.40	5.80	56.00	6.77	67.20	8.71	72.80	10.70	78.40	12.69	81.84	13.19	83.88	13.26
	4	50.40	5.88	56.00	6.93	67.20	8.98	72.80	10.85	78.40	13.03	81.59	13.41	83.57	13.47
	6	50.40	5.97	56.00	7.17	67.20	9.11	72.80	11.24	78.40	13.34	81.29	13.57	83.33	13.63
	8	50.40	6.23	56.00	7.21	67.20	9.45	72.80	11.55	78.40	13.84	81.02	13.90	82.98	13.95
	10	50.40	6.33	56.00	7.40	67.20	9.79	72.80	11.99	78.40	14.40	80.57	14.30	82.57	14.36
	12	50.40	6.57	56.00	7.70	67.20	10.37	72.80	12.79	76.35	14.55	80.04	14.71	82.02	14.78
	14	50.40	6.90	56.00	8.12	67.20	11.23	72.80	13.62	75.70	14.98	79.36	15.15	81.34	15.21
	16	50.40	7.36	56.00	8.68	67.20	12.12	72.80	14.47	75.02	15.42	78.68	15.59	80.62	15.67
	18	50.40	7.93	56.00	9.30	67.20	12.99	72.80	15.39	74.23	15.89	77.88	16.07	79.87	16.15
	20	50.40	8.51	56.00	9.94	67.20	13.94	72.80	16.39	73.42	16.37	77.06	16.57	78.99	16.64
	21	50.40	8.80	56.00	10.27	67.20	14.43	71.25	16.52	72.95	16.62	76.66	16.81	78.54	16.90
	23	50.40	9.43	56.00	10.99	67.20	15.45	70.35	17.03	72.06	17.15	75.73	17.34	77.63	17.45
	25	50.40	10.09	56.00	11.70	67.20	16.55	69.42	17.58	71.10	17.69	74.73	17.89	76.77	17.99
	27	50.40	10.78	56.00	12.57	67.20	17.72	68.41	18.15	70.10	18.26	73.74	18.49	75.62	18.60
	29	50.40	11.57	56.00	13.63	65.71	18.62	67.38	18.74	69.07	18.87	72.69	19.11	74.50	19.24
	31	50.40	12.41	56.00	14.74	64.67	19.24	66.32	19.32	67.83	19.33	71.10	19.38	72.77	19.41
	33	50.40	13.29	56.00	15.93	62.89	19.30	64.34	19.29	66.02	19.41	69.07	19.32	70.75	19.31
	35	50.40	14.29	56.00	17.26	60.94	19.31	62.48	19.28	63.95	19.32	67.12	19.33	68.89	19.50
	37	50.40	15.54	56.00	18.65	59.03	19.29	60.59	19.34	62.05	19.35	65.26	19.50	66.99	19.67
	39	50.40	16.96	54.23	19.32	57.13	19.38	58.62	19.37	60.09	19.35	61.88	18.34	62.28	17.52
	41	50.40	18.45	52.27	19.29	54.46	18.71	54.82	17.77	55.35	17.13	56.56	15.98	56.75	15.22
	43	47.35	17.92	47.77	17.10	48.57	15.74	48.98	15.16	49.26	14.60	50.03	13.50	50.05	12.73
	45	41.55	15.01	41.71	14.31	42.40	13.27	42.58	12.70	43.58	12.58	43.64	11.24	44.82	11.14
	48	32.37	11.24	32.87	10.86	33.55	10.20	34.26	10.09	33.82	9.59	34.68	9.15	33.96	8.67
	50	26.52	9.43	26.10	8.91	27.12	8.65	26.35	8.13	27.38	8.19	27.45	7.73	28.58	7.80
	52	20.07	7.70	19.23	7.17	20.87	7.24	19.63	6.71	20.38	6.75	19.47	6.26	20.22	6.30
120%	-5	46.52	5.00	51.69	5.80	62.03	7.64	67.20	8.48	72.37	10.00	80.10	13.03	82.10	12.81
	-2	46.52	5.00	51.69	5.98	62.03	7.70	67.20	8.57	72.37	10.23	79.90	13.01	81.79	13.11
	0	46.52	5.02	51.69	6.04	62.03	7.80	67.20	8.71	72.37	10.25	79.69	13.15	81.57	13.25
	2	46.52	5.09	51.69	6.08	62.03	7.81	67.20	8.79	72.37	10.65	79.45	13.30	81.39	13.22
	4	46.52	5.13	51.69	6.17	62.03	7.95	67.20	9.06	72.37	10.72	79.25	13.35	81.13	13.44
	6	46.52	5.31	51.69	6.34	62.03	8.27	67.20	9.12	72.37	11.17	78.95	13.61	80.84	13.60
	8	46.52	5.50	51.69	6.35	62.03	8.38	67.20	9.43	72.37	11.48	78.69	13.84	80.54	13.92
	10	46.52	5.58	51.69	6.56	62.03	8.66	67.20	9.90	72.37	11.95	78.24	14.25	80.17	14.31
	12	46.52	5.78	51.69	6.80	62.03	9.03	67.20	10.47	72.37	12.75	77.73	14.66	79.64	14.73
	14	46.52	6.09	51.69	7.19	62.03	9.61	67.20	11.36	72.37	13.60	77.11	15.10	78.99	15.16
	16	46.52	6.47	51.69	7.68	62.03	10.23	67.20	12.20	72.37	14.43	76.42	15.54	78.33	15.61
	18	46.52	7.02	51.69	8.27	62.03	10.92	67.20	13.13	72.37	15.35	75.66	16.01	77.57	16.09
	20	46.52	7.56	51.69	8.83	62.03	11.86	67.20	14.08	72.37	16.38	74.84	16.51	76.71	16.58
	21	46.52	7.85	51.69	9.17	62.03	12.35	67.20	14.57	72.37	16.90	74.40	16.76	76.31	16.83
	23	46.52	8.44	51.69	9.80	62.03	13.30	67.20	15.60	70.01	17.08	73.52	17.29	75.39	17.37
	25	46.52	9.04	51.69	10.47	62.03	14.32	67.20	16.67	69.09	17.62	72.58	17.85	74.46	17.95
	27	46.52	9.70	51.69	11.22	62.03	15.40	67.20	17.93	68.16	18.19	71.67	18.40	73.48	18.54
	29	46.52	10.37	51.69	12.03	62.03	16.59	65.50	18.67	67.16	18.80	70.63	19.02	72.43	19.15
	31	46.52	11.14	51.69	12.92	62.03	17.85	64.49	19.30	66.08	19.44	69.60	19.69	71.27	19.68
	33	46.52	11.96	51.69	13.90	62.03	19.31	63.12	19.63	64.57	19.64	67.62	19.61	69.40	19.73
	35	46.52	12.83	51.69	15.06	59.82	19.62	61.24	19.62	62.67	19.64	65.73	19.66	67.36	19.65
	37	46.52	13.80	51.69	16.37	57.95	19.63	59.35	19.67	60.85	19.67	63.83	19.70	65.54	19.84
	39	46.52	14.90	51.69	17.75	56.10	19.64	57.44	19.62	58.93	19.68	60.93	18.78	61.82	18.44
	41	46.52	16.17	51.69	19.32	53.54	19.08	53.97	18.25	54.50	17.59	55.08	15.91	55.63	15.37
	43	46.52	17.64	47.06	17.41	47.78	15.92	48.06	15.36	48.40	14.79	49.57	13.90	49.60	13.13
	45	40.90	15.17	41.31	14.62	41.78	13.48	42.00	12.89	42.96	12.77	43.01	11.42	43.74	11.09
	48	32.11	11.45	32.63	11.06	33.37	10.38	33.58	10.07	33.18	9.55	33.97	9.13	33.27	8.65
	50	25.60	9.23	26.19	9.09	26.67	8.64	25.93	8.12	26.93	8.17	27.00	7.71	28.10	7.78
	52	19.86	7.69	19.04	7.16	20.64	7.23	19.43	6.70	20.16	6.74	19.29	6.25	20.02	6.29

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.7: 20HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
110%	-5	42.65	4.40	47.38	5.15	56.86	6.82	61.60	7.65	66.34	8.47	75.82	11.24	79.42	13.07
	-2	42.65	4.43	47.38	5.23	56.86	6.89	61.60	7.67	66.34	8.49	75.82	11.30	79.22	13.03
	0	42.65	4.44	47.38	5.25	56.86	6.95	61.60	7.75	66.34	8.53	75.82	11.55	79.02	13.17
	2	42.65	4.47	47.38	5.36	56.86	7.00	61.60	7.77	66.34	8.62	75.82	11.93	78.81	13.33
	4	42.65	4.49	47.38	5.39	56.86	7.02	61.60	7.91	66.34	8.89	75.82	12.01	78.59	13.37
	6	42.65	4.60	47.38	5.55	56.86	7.18	61.60	8.23	66.34	8.95	75.82	12.51	78.31	13.64
	8	42.65	4.79	47.38	5.55	56.86	7.31	61.60	8.34	66.34	9.36	75.82	12.88	78.03	13.87
	10	42.65	4.84	47.38	5.78	56.86	7.69	61.60	8.55	66.34	9.64	75.82	13.48	77.64	14.27
	12	42.65	5.11	47.38	5.99	56.86	7.88	61.60	8.98	66.34	10.10	75.82	14.24	77.13	14.68
	14	42.65	5.24	47.38	6.22	56.86	8.35	61.60	9.51	66.34	11.04	75.82	15.06	76.53	15.12
	16	42.65	5.65	47.38	6.69	56.86	8.95	61.60	10.18	66.34	11.95	74.07	15.48	75.85	15.57
	18	42.65	6.11	47.38	7.22	56.86	9.57	61.60	10.83	66.34	12.80	73.34	15.94	75.13	16.03
	20	42.65	6.64	47.38	7.76	56.86	10.25	61.60	11.71	66.34	13.79	72.58	16.43	74.34	16.53
	21	42.65	6.91	47.38	8.08	56.86	10.59	61.60	12.21	66.34	14.23	72.17	16.68	73.94	16.79
	23	42.65	7.43	47.38	8.66	56.86	11.32	61.60	13.18	66.34	15.32	71.36	17.18	73.11	17.30
	25	42.65	8.02	47.38	9.29	56.86	12.10	61.60	14.18	66.34	16.42	70.41	17.76	72.21	17.85
	27	42.65	8.61	47.38	9.94	56.86	13.03	61.60	15.26	66.34	17.63	69.43	18.35	71.26	18.43
	29	42.65	9.25	47.38	10.67	56.86	14.15	61.60	16.43	66.34	18.96	68.42	18.97	70.29	19.08
	31	42.65	9.91	47.38	11.45	56.86	15.24	61.60	17.76	64.19	19.34	67.49	19.61	69.29	19.73
	33	42.65	10.64	47.38	12.28	56.86	16.55	61.60	19.11	63.17	19.97	66.01	19.93	67.76	20.04
	35	42.65	11.42	47.38	13.20	56.86	17.88	59.91	19.95	61.25	19.93	64.40	20.07	65.81	19.94
	37	42.65	12.27	47.38	14.21	56.86	19.43	58.11	19.97	59.49	19.95	62.44	19.97	63.99	19.99
	39	42.65	13.24	47.38	15.34	55.00	20.01	56.33	19.93	57.62	19.95	59.82	19.37	60.41	18.60
	41	42.65	14.32	47.38	16.67	52.65	19.54	53.12	18.76	53.46	17.91	54.26	16.29	54.79	15.75
	43	42.65	15.49	46.35	17.75	47.23	16.32	47.39	15.63	47.84	15.19	48.62	14.06	48.64	13.29
	45	40.34	15.40	40.66	14.83	41.49	13.89	41.69	13.31	41.89	12.72	42.33	11.60	43.02	11.27
	48	31.47	11.42	31.89	11.06	32.18	10.16	32.34	9.85	33.00	9.73	33.17	9.12	34.53	9.19
	50	25.63	9.41	26.17	9.28	26.21	8.62	27.19	8.68	26.45	8.16	26.53	7.69	27.59	7.76
100%	52	19.62	7.68	18.84	7.16	20.38	7.22	19.22	6.70	19.93	6.73	21.47	6.82	19.80	6.28
	-5	38.77	4.06	43.08	4.52	51.69	5.94	56.00	6.65	60.31	7.41	68.92	8.86	77.54	12.65
	-2	38.77	4.12	43.08	4.55	51.69	6.03	56.00	6.85	60.31	7.60	68.92	8.98	77.54	13.08
	0	38.77	4.12	43.08	4.56	51.69	6.13	56.00	6.86	60.31	7.62	68.92	9.09	77.54	13.13
	2	38.77	4.15	43.08	4.59	51.69	6.16	56.00	6.91	60.31	7.71	68.92	9.25	77.54	13.43
	4	38.77	4.20	43.08	4.60	51.69	6.22	56.00	6.99	60.31	7.75	68.92	9.25	75.91	13.31
	6	38.77	4.20	43.08	4.70	51.69	6.29	56.00	7.04	60.31	7.88	68.92	9.58	75.69	13.56
	8	38.77	4.32	43.08	4.86	51.69	6.36	56.00	7.22	60.31	8.01	68.92	9.93	75.38	13.81
	10	38.77	4.48	43.08	4.88	51.69	6.51	56.00	7.47	60.31	8.24	68.92	10.38	75.01	14.20
	12	38.77	4.51	43.08	5.03	51.69	6.80	56.00	7.71	60.31	8.64	68.92	11.16	74.54	14.61
	14	38.77	4.69	43.08	5.30	51.69	7.19	56.00	8.14	60.31	9.19	68.92	12.04	74.01	15.02
	16	38.77	4.92	43.08	5.66	51.69	7.66	56.00	8.74	60.31	9.84	68.92	12.96	73.34	15.49
	18	38.77	5.33	43.08	6.17	51.69	8.24	56.00	9.35	60.31	10.48	68.92	13.85	72.62	15.96
	20	38.77	5.78	43.08	6.71	51.69	8.85	56.00	10.00	60.31	11.22	68.92	14.82	71.88	16.45
	21	38.77	6.01	43.08	6.95	51.69	9.17	56.00	10.33	60.31	11.60	68.92	15.30	71.45	16.70
	23	38.77	6.47	43.08	7.54	51.69	9.81	56.00	11.07	60.31	12.57	68.92	16.44	70.64	17.23
	25	38.77	6.99	43.08	8.10	51.69	10.51	56.00	11.82	60.31	13.55	68.92	17.55	69.79	17.78
	27	38.77	7.53	43.08	8.68	51.69	11.25	56.00	12.69	60.31	14.64	67.16	18.25	68.80	18.38
	29	38.77	8.10	43.08	9.33	51.69	12.08	56.00	13.73	60.31	15.82	66.25	18.86	67.92	18.99
	31	38.77	8.72	43.08	10.01	51.69	12.93	56.00	14.88	60.31	17.10	65.26	19.50	67.01	19.62
	33	38.77	9.36	43.08	10.75	51.69	13.88	56.00	16.10	60.31	18.44	64.28	20.18	66.03	20.28
	35	38.77	10.07	43.08	11.57	51.69	15.09	56.00	17.39	60.31	20.00	62.68	20.34	64.29	20.34
	37	38.77	10.84	43.08	12.43	51.69	16.36	56.00	18.91	58.11	20.32	60.88	20.29	62.36	20.30
	39	38.77	11.66	43.08	13.40	51.69	17.85	56.00	20.53	56.29	20.30	58.83	20.07	59.25	18.99
	41	38.77	12.59	43.08	14.50	51.69	19.41	52.21	19.28	52.62	18.51	53.39	16.82	53.79	16.12
	43	38.77	13.62	43.08	15.64	46.34	16.67	46.72	16.02	47.05	15.44	47.52	14.22	48.33	13.89
	45	38.77	14.70	40.14	15.14	40.62	13.95	40.93	13.48	41.10	12.91	41.94	11.99	42.60	11.66
	48	31.11	11.62	31.54	11.25	31.87	10.33	32.01	10.03	32.72	9.89	32.38	9.09	33.62	9.17
	50	25.15	9.40	25.22	9.08	26.21	8.80	26.65	8.66	25.94	8.14	26.03	7.68	27.04	7.74
	52	18.86	7.49	20.17	7.71	20.10	7.22	18.99	6.69	19.68	6.72	21.17	6.80	19.57	6.27

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...



Table 2-9.7: 20HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
90%	-5	34.89	3.67	38.77	4.03	46.52	5.05	50.40	5.73	54.28	6.36	62.03	7.75	69.78	8.92
	-2	34.89	3.69	38.77	4.09	46.52	5.10	50.40	5.74	54.28	6.40	62.03	7.77	69.78	9.28
	0	34.89	3.74	38.77	4.10	46.52	5.12	50.40	5.74	54.28	6.44	62.03	7.82	69.78	9.35
	2	34.89	3.76	38.77	4.11	46.52	5.15	50.40	5.84	54.28	6.52	62.03	7.89	69.78	9.47
	4	34.89	3.83	38.77	4.12	46.52	5.19	50.40	5.86	54.28	6.56	62.03	7.93	69.78	9.70
	6	34.89	3.84	38.77	4.17	46.52	5.23	50.40	5.91	54.28	6.58	62.03	8.13	69.78	9.84
	8	34.89	3.89	38.77	4.22	46.52	5.26	50.40	6.09	54.28	6.79	62.03	8.37	69.78	10.27
	10	34.89	3.91	38.77	4.30	46.52	5.44	50.40	6.11	54.28	6.97	62.03	8.42	69.78	10.70
	12	34.89	3.98	38.77	4.38	46.52	5.57	50.40	6.45	54.28	7.19	62.03	8.89	69.78	11.59
	14	34.89	4.15	38.77	4.53	46.52	5.75	50.40	6.69	54.28	7.43	62.03	9.15	69.78	12.46
	16	34.89	4.31	38.77	4.76	46.52	6.12	50.40	7.02	54.28	7.89	62.03	9.78	69.78	13.35
	18	34.89	4.61	38.77	5.17	46.52	6.66	50.40	7.58	54.28	8.53	62.03	10.44	69.78	14.25
	20	34.89	5.12	38.77	5.62	46.52	7.18	50.40	8.17	54.28	9.13	62.03	11.15	69.78	15.25
	21	34.89	5.31	38.77	5.83	46.52	7.47	50.40	8.46	54.28	9.45	62.03	11.51	69.78	15.76
	23	34.89	5.70	38.77	6.27	46.52	8.04	50.40	9.09	54.28	10.16	62.03	12.42	69.78	16.82
	25	34.89	6.10	38.77	6.71	46.52	8.66	50.40	9.73	54.28	10.88	62.03	13.50	69.78	18.04
	27	34.89	6.51	38.77	7.23	46.52	9.31	50.40	10.45	54.28	11.63	62.03	14.54	67.47	18.25
	29	34.89	6.94	38.77	7.78	46.52	9.99	50.40	11.17	54.28	12.47	62.03	15.77	66.59	18.86
	31	34.89	7.41	38.77	8.38	46.52	10.74	50.40	12.03	54.28	13.35	62.03	16.98	65.65	19.50
	33	34.89	7.89	38.77	8.99	46.52	11.52	50.40	12.92	54.28	14.43	62.03	18.42	64.65	20.19
	35	34.89	8.47	38.77	9.70	46.52	12.39	50.40	13.88	54.28	15.71	62.03	19.85	63.08	20.29
	37	34.89	9.14	38.77	10.44	46.52	13.32	50.40	14.91	54.28	17.07	59.83	20.27	61.23	20.26
	39	34.89	9.83	38.77	11.24	46.52	14.36	50.40	16.28	54.28	18.57	58.06	20.27	59.17	19.95
	41	34.89	10.62	38.77	12.16	46.52	15.54	50.40	17.74	52.56	19.17	53.30	17.47	53.71	16.59
	43	34.89	11.49	38.77	13.15	46.52	16.85	46.69	16.52	47.02	15.84	47.72	14.70	47.87	14.04
	45	34.89	12.44	38.77	14.25	40.72	14.32	41.14	13.86	41.25	13.29	42.08	12.37	42.72	12.03
	48	31.29	11.85	31.62	11.44	31.97	10.50	32.22	10.17	32.36	9.86	32.60	9.25	33.27	9.13
	50	25.45	9.57	25.58	9.24	26.55	8.97	26.49	8.64	26.90	8.50	27.77	8.23	26.89	7.71
	52	19.38	7.67	19.16	7.33	20.13	7.20	20.86	7.24	19.72	6.71	21.18	6.79	19.63	6.26
80%	-5	31.02	3.37	34.46	3.63	41.35	4.26	44.80	4.90	48.25	5.47	55.14	6.67	62.03	7.72
	-2	31.02	3.39	34.46	3.67	41.35	4.31	44.80	4.91	48.25	5.48	55.14	6.68	62.03	7.74
	0	31.02	3.41	34.46	3.69	41.35	4.36	44.80	4.95	48.25	5.49	55.14	6.76	62.03	7.81
	2	31.02	3.44	34.46	3.69	41.35	4.37	44.80	4.95	48.25	5.55	55.14	6.84	62.03	7.85
	4	31.02	3.45	34.46	3.73	41.35	4.39	44.80	5.00	48.25	5.58	55.14	6.86	62.03	7.88
	6	31.02	3.46	34.46	3.75	41.35	4.43	44.80	5.00	48.25	5.61	55.14	7.03	62.03	8.11
	8	31.02	3.48	34.46	3.79	41.35	4.44	44.80	5.03	48.25	5.80	55.14	7.08	62.03	8.13
	10	31.02	3.53	34.46	3.82	41.35	4.59	44.80	5.18	48.25	5.85	55.14	7.25	62.03	8.37
	12	31.02	3.54	34.46	3.89	41.35	4.61	44.80	5.33	48.25	5.95	55.14	7.47	62.03	8.83
	14	31.02	3.61	34.46	3.98	41.35	4.87	44.80	5.50	48.25	6.34	55.14	7.62	62.03	9.09
	16	31.02	3.75	34.46	4.16	41.35	5.21	44.80	5.89	48.25	6.54	55.14	7.71	62.03	9.70
	18	31.02	3.98	34.46	4.45	41.35	5.43	44.80	5.90	48.25	6.68	55.14	8.21	62.03	10.37
	20	31.02	4.44	34.46	4.90	41.35	5.79	44.80	6.43	48.25	7.23	55.14	8.85	62.03	11.09
	21	31.02	4.67	34.46	5.08	41.35	6.00	44.80	6.70	48.25	7.53	55.14	9.17	62.03	11.45
	23	31.02	5.02	34.46	5.46	41.35	6.45	44.80	7.26	48.25	8.07	55.14	9.83	62.03	12.38
	25	31.02	5.36	34.46	5.84	41.35	6.98	44.80	7.84	48.25	8.71	55.14	10.56	62.03	13.41
	27	31.02	5.73	34.46	6.24	41.35	7.51	44.80	8.41	48.25	9.37	55.14	11.31	62.03	14.47
	29	31.02	6.10	34.46	6.66	41.35	8.12	44.80	9.06	48.25	10.07	55.14	12.13	62.03	15.65
	31	31.02	6.50	34.46	7.11	41.35	8.73	44.80	9.73	48.25	10.82	55.14	12.97	62.03	16.89
	33	31.02	6.91	34.46	7.56	41.35	9.41	44.80	10.47	48.25	11.63	55.14	13.96	62.03	18.32
	35	31.02	7.35	34.46	8.08	41.35	10.10	44.80	11.29	48.25	12.51	55.14	15.16	62.03	19.84
	37	31.02	7.84	34.46	8.61	41.35	10.90	44.80	12.15	48.25	13.47	55.14	16.47	59.97	20.31
	39	31.02	8.35	34.46	9.30	41.35	11.74	44.80	13.08	48.25	14.54	55.14	17.97	58.26	20.25
	41	31.02	8.95	34.46	10.04	41.35	12.71	44.80	14.16	48.25	15.71	53.18	18.35	53.59	17.47
	43	31.02	9.57	34.46	10.85	41.35	13.72	44.80	15.31	47.05	16.45	47.68	15.26	47.96	14.60
	45	31.02	10.34	34.46	11.79	41.35	14.90	41.03	14.23	41.27	13.72	41.98	12.74	42.26	12.18
	48	31.02	11.74	31.62	11.64	32.13	10.76	32.61	10.52	32.83	10.20	33.17	9.59	33.89	9.46
	50	25.42	9.65	25.80	9.41	26.36	8.93	26.80	8.79	26.65	8.47	26.90	8.01	26.66	7.68
	52	19.82	7.85	19.64	7.51	20.10	7.19	20.81	7.22	19.71	6.70	21.14	6.77	21.91	6.82

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

1. Shaded cells indicate rating condition.

Table continued on next page ...

## TVR Ultra HR 50/60Hz



Table 2-9.7: 20HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22,WB:15		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-5	27.14	3.01	30.15	3.22	36.18	3.75	39.20	4.01	42.22	4.58	48.25	5.67	54.28	6.56
	-2	27.14	3.01	30.15	3.23	36.18	3.76	39.20	4.02	42.22	4.60	48.25	5.69	54.28	6.59
	0	27.14	3.04	30.15	3.25	36.18	3.79	39.20	4.08	42.22	4.65	48.25	5.73	54.28	6.65
	2	27.14	3.05	30.15	3.26	36.18	3.79	39.20	4.10	42.22	4.65	48.25	5.76	54.28	6.70
	4	27.14	3.06	30.15	3.27	36.18	3.81	39.20	4.11	42.22	4.70	48.25	5.83	54.28	6.71
	6	27.14	3.06	30.15	3.33	36.18	3.84	39.20	4.17	42.22	4.74	48.25	5.83	54.28	6.72
	8	27.14	3.07	30.15	3.33	36.18	3.87	39.20	4.18	42.22	4.75	48.25	5.97	54.28	6.91
	10	27.14	3.11	30.15	3.38	36.18	3.94	39.20	4.35	42.22	4.90	48.25	6.18	54.28	7.09
	12	27.14	3.15	30.15	3.43	36.18	4.04	39.20	4.48	42.22	5.01	48.25	6.37	54.28	7.32
	14	27.14	3.18	30.15	3.50	36.18	4.16	39.20	4.59	42.22	5.19	48.25	6.37	54.28	7.37
	16	27.14	3.27	30.15	3.61	36.18	4.37	39.20	4.74	42.22	5.51	48.25	6.55	54.28	7.54
	18	27.14	3.41	30.15	3.81	36.18	4.70	39.20	5.12	42.22	5.54	48.25	6.55	54.28	7.93
	20	27.14	3.70	30.15	4.24	36.18	4.97	39.20	5.30	42.22	5.67	48.25	6.70	54.28	8.54
	21	27.14	3.94	30.15	4.43	36.18	5.12	39.20	5.49	42.22	5.89	48.25	6.99	54.28	8.85
	23	27.14	4.39	30.15	4.75	36.18	5.50	39.20	5.90	42.22	6.32	48.25	7.55	54.28	9.50
	25	27.14	4.70	30.15	5.07	36.18	5.90	39.20	6.32	42.22	6.79	48.25	8.17	54.28	10.18
	27	27.14	5.00	30.15	5.42	36.18	6.30	39.20	6.77	42.22	7.32	48.25	8.80	54.28	10.93
	29	27.14	5.33	30.15	5.77	36.18	6.72	39.20	7.22	42.22	7.89	48.25	9.45	54.28	11.70
	31	27.14	5.66	30.15	6.14	36.18	7.17	39.20	7.72	42.22	8.53	48.25	10.15	54.28	12.56
	33	27.14	6.01	30.15	6.54	36.18	7.65	39.20	8.30	42.22	9.19	48.25	10.94	54.28	13.49
	35	27.14	6.40	30.15	6.96	36.18	8.14	39.20	8.98	42.22	9.89	48.25	11.77	54.28	14.55
	37	27.14	6.80	30.15	7.40	36.18	8.71	39.20	9.64	42.22	10.65	48.25	12.71	54.28	15.82
	39	27.14	7.22	30.15	7.89	36.18	9.42	39.20	10.43	42.22	11.52	48.25	13.71	54.28	17.25
	41	27.14	7.70	30.15	8.43	36.18	10.16	39.20	11.27	42.22	12.42	48.25	14.85	54.28	18.80
	43	27.14	8.22	30.15	9.01	36.18	11.03	39.20	12.24	42.22	13.50	48.25	16.04	47.91	15.33
	45	27.14	8.80	30.15	9.68	36.18	11.97	39.20	13.26	42.22	14.58	41.81	13.15	42.13	12.64
	48	27.14	9.81	30.15	10.87	32.24	11.16	32.36	10.67	32.60	10.35	33.04	9.71	33.67	9.60
	50	25.57	9.86	25.72	9.53	26.01	8.90	26.40	8.77	26.79	8.63	27.09	8.17	27.50	8.03
	52	19.29	7.65	20.02	7.68	19.97	7.18	20.12	7.03	20.80	7.06	21.02	6.75	21.77	6.79
60%	-5	23.26	2.58	25.85	2.81	31.02	3.23	33.60	3.47	36.18	3.74	41.35	4.49	46.52	5.24
	-2	23.26	2.62	25.85	2.84	31.02	3.25	33.60	3.48	36.18	3.76	41.35	4.51	46.52	5.25
	0	23.26	2.65	25.85	2.85	31.02	3.32	33.60	3.52	36.18	3.76	41.35	4.52	46.52	5.26
	2	23.26	2.65	25.85	2.87	31.02	3.32	33.60	3.53	36.18	3.77	41.35	4.55	46.52	5.32
	4	23.26	2.68	25.85	2.87	31.02	3.32	33.60	3.55	36.18	3.78	41.35	4.59	46.52	5.41
	6	23.26	2.69	25.85	2.88	31.02	3.32	33.60	3.57	36.18	3.86	41.35	4.69	46.52	5.61
	8	23.26	2.69	25.85	2.89	31.02	3.37	33.60	3.58	36.18	3.87	41.35	4.76	46.52	5.61
	10	23.26	2.70	25.85	2.91	31.02	3.39	33.60	3.65	36.18	3.91	41.35	4.80	46.52	5.73
	12	23.26	2.75	25.85	2.97	31.02	3.45	33.60	3.74	36.18	4.03	41.35	5.10	46.52	5.90
	14	23.26	2.78	25.85	2.99	31.02	3.53	33.60	3.84	36.18	4.13	41.35	5.26	46.52	6.07
	16	23.26	2.83	25.85	3.08	31.02	3.70	33.60	3.99	36.18	4.37	41.35	5.41	46.52	6.11
	18	23.26	2.92	25.85	3.23	31.02	3.95	33.60	4.36	36.18	4.72	41.35	5.41	46.52	6.17
	20	23.26	3.12	25.85	3.48	31.02	4.33	33.60	4.60	36.18	4.88	41.35	5.51	46.52	6.29
	21	23.26	3.29	25.85	3.78	31.02	4.42	33.60	4.70	36.18	4.98	41.35	5.62	46.52	6.46
	23	23.26	3.66	25.85	4.11	31.02	4.68	33.60	4.97	36.18	5.29	41.35	5.89	46.52	7.01
	25	23.26	3.91	25.85	4.39	31.02	5.00	33.60	5.33	36.18	5.66	41.35	6.33	46.52	7.58
	27	23.26	4.18	25.85	4.68	31.02	5.34	33.60	5.70	36.18	6.04	41.35	6.77	46.52	8.18
	29	23.26	4.45	25.85	4.98	31.02	5.70	33.60	6.07	36.18	6.45	41.35	7.23	46.52	8.82
	31	23.26	4.84	25.85	5.29	31.02	6.05	33.60	6.46	36.18	6.88	41.35	7.73	46.52	9.50
	33	23.26	5.12	25.85	5.61	31.02	6.44	33.60	6.89	36.18	7.35	41.35	8.28	46.52	10.20
	35	23.26	5.43	25.85	5.95	31.02	6.85	33.60	7.34	36.18	7.82	41.35	8.96	46.52	10.99
	37	23.26	5.76	25.85	6.32	31.02	7.30	33.60	7.82	36.18	8.36	41.35	9.68	46.52	11.87
	39	23.26	6.12	25.85	6.72	31.02	7.78	33.60	8.35	36.18	8.93	41.35	10.49	46.52	12.79
	41	23.26	6.51	25.85	7.14	31.02	8.31	33.60	8.93	36.18	9.61	41.35	11.34	46.52	13.89
	43	23.26	6.93	25.85	7.62	31.02	8.89	33.60	9.58	36.18	10.41	41.35	12.28	46.52	15.03
	45	23.26	7.48	25.85	8.13	31.02	9.53	33.60	10.33	36.18	11.34	41.35	13.35	42.03	13.37
	48	23.26	8.27	25.85	9.03	31.02	10.66	32.45	11.16	32.66	10.75	32.99	10.03	33.25	9.71
	50	23.26	8.88	25.85	9.73	26.31	9.25	26.32	8.92	26.76	8.77	27.58	8.50	26.93	7.98
	52	19.48	7.80	19.60	7.57	20.27	7.35	19.91	7.01	20.01	6.85	20.79	6.73	21.51	6.77

## Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

## Notes:

Shaded cells indicate rating condition.

Table continued on next page ...

Table 2-9.7: 20HP cooling capacity (continued)

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(°C DB/WB)													
		DB:22, WB:15		DB:23.3, WB:16		DB:25.8, WB:18		DB:27, WB:19		DB:28.2, WB:20		DB:30.7, WB:22		DB:32, WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
50%	-5	19.38	2.09	21.54	2.38	25.85	2.78	28.00	2.95	30.15	3.14	34.46	3.50	38.77	4.03
	-2	19.38	2.21	21.54	2.44	25.85	2.78	28.00	2.96	30.15	3.14	34.46	3.53	38.77	4.18
	0	19.38	2.24	21.54	2.44	25.85	2.80	28.00	2.99	30.15	3.15	34.46	3.58	38.77	4.21
	2	19.38	2.26	21.54	2.44	25.85	2.80	28.00	3.01	30.15	3.18	34.46	3.65	38.77	4.21
	4	19.38	2.27	21.54	2.45	25.85	2.80	28.00	3.02	30.15	3.19	34.46	3.65	38.77	4.26
	6	19.38	2.28	21.54	2.47	25.85	2.81	28.00	3.03	30.15	3.21	34.46	3.66	38.77	4.26
	8	19.38	2.32	21.54	2.47	25.85	2.83	28.00	3.05	30.15	3.25	34.46	3.67	38.77	4.29
	10	19.38	2.33	21.54	2.50	25.85	2.85	28.00	3.05	30.15	3.28	34.46	3.69	38.77	4.35
	12	19.38	2.34	21.54	2.51	25.85	2.90	28.00	3.11	30.15	3.36	34.46	3.80	38.77	4.39
	14	19.38	2.38	21.54	2.54	25.85	2.95	28.00	3.18	30.15	3.42	34.46	3.93	38.77	4.69
	16	19.38	2.39	21.54	2.58	25.85	3.05	28.00	3.33	30.15	3.56	34.46	4.12	38.77	4.85
	18	19.38	2.44	21.54	2.68	25.85	3.21	28.00	3.52	30.15	3.87	34.46	4.46	38.77	5.01
	20	19.38	2.59	21.54	2.87	25.85	3.54	28.00	3.94	30.15	4.14	34.46	4.61	38.77	5.11
	21	19.38	2.67	21.54	3.02	25.85	3.76	28.00	4.00	30.15	4.24	34.46	4.69	38.77	5.18
	23	19.38	2.92	21.54	3.27	25.85	3.97	28.00	4.19	30.15	4.42	34.46	4.86	38.77	5.46
	25	19.38	3.15	21.54	3.50	25.85	4.23	28.00	4.46	30.15	4.70	34.46	5.16	38.77	5.85
	27	19.38	3.37	21.54	3.75	25.85	4.50	28.00	4.76	30.15	5.01	34.46	5.52	38.77	6.26
	29	19.38	3.60	21.54	4.00	25.85	4.79	28.00	5.06	30.15	5.34	34.46	5.88	38.77	6.69
	31	19.38	3.83	21.54	4.25	25.85	5.09	28.00	5.38	30.15	5.68	34.46	6.27	38.77	7.14
	33	19.38	4.08	21.54	4.52	25.85	5.41	28.00	5.71	30.15	6.04	34.46	6.67	38.77	7.62
	35	19.38	4.34	21.54	4.80	25.85	5.73	28.00	6.07	30.15	6.43	34.46	7.11	38.77	8.12
	37	19.38	4.61	21.54	5.10	25.85	6.08	28.00	6.45	30.15	6.83	34.46	7.57	38.77	8.67
	39	19.38	4.98	21.54	5.42	25.85	6.44	28.00	6.86	30.15	7.26	34.46	8.10	38.77	9.35
	41	19.38	5.27	21.54	5.86	25.85	6.85	28.00	7.30	30.15	7.74	34.46	8.66	38.77	10.12
	43	19.38	5.62	21.54	6.21	25.85	7.30	28.00	7.78	30.15	8.28	34.46	9.27	38.77	11.00
	45	19.38	5.99	21.54	6.62	25.85	7.79	28.00	8.33	30.15	8.87	34.46	9.98	38.77	11.94
	48	19.38	6.63	21.54	7.31	25.85	8.63	28.00	9.26	30.15	9.88	32.97	10.55	33.17	10.19
	50	19.38	7.35	21.54	7.98	25.85	9.28	26.42	9.28	26.51	8.99	26.98	8.53	27.17	8.29
	52	19.38	7.88	19.79	7.79	20.13	7.41	20.08	7.16	20.20	7.01	20.41	6.70	20.46	6.55

**Abbreviations:**

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

**Notes:**

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



## 9.2 Heating Capacity Tables

Table 2-9.8: 8HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW
130%	-25	-25.4	21.76	8.13	22.00	8.50	22.21	8.87	22.29	9.05	22.37	9.24	22.51	9.61
	-19.8	-20	23.40	8.35	23.54	8.71	23.64	9.08	23.68	9.26	23.71	9.44	23.76	9.81
	-18.8	-19	23.80	8.41	23.92	8.77	24.01	9.13	24.04	9.31	24.06	9.49	24.09	9.86
	-16.7	-17	24.69	8.54	24.77	8.90	24.82	9.26	24.83	9.44	24.84	9.62	24.83	9.99
	-13.7	-15	25.68	8.74	25.72	9.10	25.74	9.47	25.73	9.65	25.72	9.83	25.68	10.20
	-11.8	-13	26.77	8.88	26.77	9.25	26.75	9.61	26.73	9.79	26.70	9.98	26.63	10.35
	-9.8	-11	27.94	9.05	27.91	9.41	27.85	9.78	27.81	9.96	27.77	10.14	27.50	10.15
	-9.5	-10	28.56	9.09	28.51	9.45	28.43	9.82	28.39	10.00	28.33	10.18	27.50	9.75
	-8.5	-9.1	29.13	9.18	29.07	9.54	28.97	9.91	28.92	10.09	28.86	10.27	27.50	9.44
	-7	-7.6	30.12	9.32	30.03	9.68	29.91	10.05	29.85	10.23	30.00	10.34	27.50	8.92
	-5	-5.6	31.50	9.52	31.38	9.89	31.23	10.25	31.25	10.25	30.00	9.57	27.50	8.24
	-3	-3.7	32.88	9.60	32.72	9.96	32.50	10.02	31.25	9.37	30.00	8.73	27.50	7.67
	0	-0.7	35.17	9.73	35.00	9.83	32.50	8.66	31.25	8.09	30.00	7.63	27.50	6.90
	3	2.2	37.50	9.60	35.00	8.52	32.50	7.54	31.25	7.21	30.00	6.88	27.50	6.21
	5	4.1	37.50	8.73	35.00	7.74	32.50	7.06	31.25	6.74	30.00	6.43	27.50	5.79
	7	6	37.50	7.93	35.00	7.19	32.50	6.59	31.25	6.27	30.00	5.88	27.50	5.22
	9	7.9	37.50	7.27	35.00	6.71	32.50	6.05	31.25	5.75	30.00	5.45	27.50	4.85
	11	9.8	37.50	6.79	35.00	6.22	32.50	5.63	31.25	5.33	30.00	5.03	27.50	4.46
	13	11.8	37.50	6.31	35.00	5.76	32.50	5.17	31.25	4.89	30.00	4.61	27.50	4.12
	15	13.7	37.50	5.85	35.00	5.36	32.50	4.80	31.25	4.53	30.00	4.25	27.50	3.83
120%	-25	-25.4	21.09	8.20	21.33	8.57	21.53	8.94	21.61	9.12	21.69	9.31	21.82	9.69
	-19.8	-20	22.72	8.43	22.85	8.79	22.95	9.15	22.98	9.33	23.01	9.52	23.05	9.89
	-18.8	-19	23.12	8.49	23.23	8.85	23.31	9.21	23.34	9.39	23.36	9.57	23.38	9.94
	-16.7	-17	24.00	8.62	24.08	8.98	24.12	9.34	24.13	9.52	24.13	9.71	24.12	10.08
	-13.7	-15	24.99	8.82	25.02	9.19	25.03	9.55	25.02	9.74	25.01	9.92	25.38	10.44
	-11.8	-13	26.07	8.97	26.06	9.34	26.03	9.70	26.01	9.88	25.98	10.07	25.38	9.81
	-9.8	-11	27.23	9.14	27.19	9.51	27.13	9.87	27.09	10.06	27.04	10.24	25.38	9.17
	-9.5	-10	27.85	9.19	27.79	9.55	27.71	9.91	27.66	10.10	27.69	10.11	25.38	8.79
	-8.5	-9.1	28.41	9.28	28.34	9.64	28.25	10.01	28.19	10.19	27.69	9.79	25.38	8.50
	-7	-7.6	29.40	9.43	29.30	9.79	29.18	10.15	28.85	9.88	27.69	9.24	25.38	8.00
	-5	-5.6	30.77	9.63	30.64	9.99	30.00	9.74	28.85	9.11	27.69	8.52	25.38	7.58
	-3	-3.7	32.14	9.71	32.31	10.05	30.00	8.87	28.85	8.31	27.69	7.80	25.38	7.09
	0	-0.7	34.62	9.72	32.31	8.66	30.00	7.65	28.85	7.33	27.69	7.02	25.38	6.37
	3	2.2	34.62	8.38	32.31	7.49	30.00	6.91	28.85	6.62	27.69	6.32	25.38	5.73
	5	4.1	34.62	7.60	32.31	7.00	30.00	6.46	28.85	6.18	27.69	5.90	25.38	5.34
	7	6	34.62	7.05	32.31	6.54	30.00	5.94	28.85	5.64	27.69	5.34	25.38	4.75
	9	7.9	34.62	6.56	32.31	6.01	30.00	5.47	28.85	5.21	27.69	4.95	25.38	4.44
	11	9.8	34.62	6.11	32.31	5.58	30.00	5.06	28.85	4.81	27.69	4.54	25.38	4.12
	13	11.8	34.62	5.71	32.31	5.17	30.00	4.66	28.85	4.41	27.69	4.19	25.38	3.79
	15	13.7	34.62	5.26	32.31	4.75	30.00	4.27	28.85	4.08	27.69	3.88	25.38	3.50
110%	-25	-25.4	20.50	8.29	20.73	8.66	20.92	9.03	21.00	9.21	21.07	9.40	21.20	9.78
	-19.8	-20	22.11	8.52	22.23	8.88	22.32	9.24	22.35	9.43	22.38	9.61	22.41	9.98
	-18.8	-19	22.50	8.58	22.61	8.94	22.68	9.30	22.70	9.48	22.72	9.67	22.74	10.04
	-16.7	-17	23.38	8.71	23.44	9.07	23.48	9.44	23.48	9.62	23.48	9.80	23.27	9.83
	-13.7	-15	24.35	8.93	24.38	9.29	24.38	9.65	24.37	9.84	24.35	10.02	23.27	9.35
	-11.8	-13	25.42	9.08	25.41	9.44	25.38	9.81	25.35	9.99	25.38	10.03	23.27	8.76
	-9.8	-11	26.58	9.26	26.53	9.62	26.46	9.98	26.44	9.96	25.38	9.34	23.27	8.14
	-9.5	-10	27.19	9.30	27.13	9.66	27.50	10.17	26.44	9.55	25.38	8.94	23.27	7.83
	-8.5	-9.1	27.76	9.40	27.68	9.76	27.50	9.83	26.44	9.23	25.38	8.64	23.27	7.66
	-7	-7.6	28.73	9.55	28.63	9.91	27.50	9.25	26.44	8.68	25.38	8.13	23.27	7.36
	-5	-5.6	30.09	9.76	29.62	9.61	27.50	8.51	26.44	7.99	25.38	7.61	23.27	6.95
	-3	-3.7	31.73	9.78	29.62	8.74	27.50	7.74	26.44	7.42	25.38	7.12	23.27	6.50
	0	-0.7	31.73	8.38	29.62	7.50	27.50	6.96	26.44	6.68	25.38	6.40	23.27	5.83
	3	2.2	31.73	7.26	29.62	6.77	27.50	6.28	26.44	6.02	25.38	5.77	23.27	5.24
	5	4.1	31.73	6.79	29.62	6.33	27.50	5.86	26.44	5.61	25.38	5.37	23.27	4.92
	7	6	31.73	6.35	29.62	5.89	27.50	5.31	26.44	5.04	25.38	4.78	23.27	4.34
	9	7.9	31.73	5.83	29.62	5.36	27.50	4.91	26.44	4.67	25.38	4.44	23.27	4.06
	11	9.8	31.73	5.44	29.62	4.96	27.50	4.51	26.44	4.30	25.38	4.14	23.27	3.77
	13	11.8	31.73	5.01	29.62	4.55	27.50	4.15	26.44	3.98	25.38	3.81	23.27	3.47
	15	13.7	31.73	4.60	29.62	4.18	27.50	3.87	26.44	3.67	25.38	3.51	23.27	3.20

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.8: 8HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	19.97	8.39	20.19	8.76	20.38	9.13	20.45	9.32	20.52	9.50	20.64	9.88
	-19.8	-20	21.56	8.63	21.67	8.99	21.75	9.35	21.78	9.54	21.80	9.72	21.15	9.39
	-18.8	-19	21.95	8.69	22.04	9.05	22.11	9.41	22.13	9.60	22.14	9.78	21.15	9.17
	-16.7	-17	22.82	8.83	22.87	9.19	22.90	9.55	22.90	9.74	23.08	9.89	21.15	8.71
	-13.7	-15	23.78	9.05	23.80	9.41	23.79	9.78	24.04	9.98	23.08	9.38	21.15	8.24
	-11.8	-13	24.84	9.21	24.82	9.57	25.00	9.90	24.04	9.32	23.08	8.76	21.15	7.74
	-9.8	-11	25.99	9.39	25.93	9.75	25.00	9.20	24.04	8.65	23.08	8.12	21.15	7.38
	-9.5	-10	26.59	9.44	26.92	9.89	25.00	8.79	24.04	8.27	23.08	7.76	21.15	7.16
	-8.5	-9.1	27.15	9.54	26.92	9.54	25.00	8.49	24.04	7.97	23.08	7.58	21.15	6.99
	-7	-7.6	28.12	9.69	26.92	8.96	25.00	7.96	24.04	7.57	23.08	7.28	21.15	6.70
	-5	-5.6	28.85	9.17	26.92	8.21	25.00	7.44	24.04	7.17	23.08	6.90	21.15	6.32
	-3	-3.7	28.85	8.30	26.92	7.47	25.00	6.97	24.04	6.71	23.08	6.44	21.15	5.91
	0	-0.7	28.85	7.17	26.92	6.73	25.00	6.27	24.04	6.03	23.08	5.79	21.15	5.29
	3	2.2	28.85	6.48	26.92	6.07	25.00	5.64	24.04	5.42	23.08	5.19	21.15	4.83
	5	4.1	28.85	6.06	26.92	5.67	25.00	5.26	24.04	5.04	23.08	4.87	21.15	4.47
	7	6	28.85	5.57	26.92	5.16	25.00	4.69	24.04	4.47	23.08	4.28	21.15	3.93
	9	7.9	28.85	5.12	26.92	4.73	25.00	4.34	24.04	4.17	23.08	4.02	21.15	3.69
	11	9.8	28.85	4.74	26.92	4.35	25.00	4.02	24.04	3.86	23.08	3.73	21.15	3.41
	13	11.8	28.85	4.34	26.92	4.00	25.00	3.71	24.04	3.56	23.08	3.42	21.15	3.13
	15	13.7	28.85	4.00	26.92	3.72	25.00	3.41	24.04	3.28	23.08	3.14	21.15	2.88
90%	-25	-25.4	19.52	8.51	19.73	8.89	19.90	9.26	19.98	9.45	20.04	9.64	19.04	9.02
	-19.8	-20	21.08	8.76	21.18	9.13	21.25	9.49	21.63	9.81	20.77	9.25	19.04	8.21
	-18.8	-19	21.47	8.82	21.55	9.19	21.60	9.55	21.63	9.58	20.77	9.02	19.04	8.01
	-16.7	-17	22.32	8.97	22.36	9.33	22.50	9.61	21.63	9.06	20.77	8.53	19.04	7.62
	-13.7	-15	23.28	9.20	23.28	9.56	22.50	9.06	21.63	8.55	20.77	8.05	19.04	7.37
	-11.8	-13	24.32	9.37	24.23	9.45	22.50	8.42	21.63	7.94	20.77	7.55	19.04	7.03
	-9.8	-11	25.96	9.74	24.23	8.72	22.50	7.77	21.63	7.45	20.77	7.20	19.04	6.68
	-9.5	-10	25.96	9.28	24.23	8.32	22.50	7.47	21.63	7.23	20.77	6.98	19.04	6.46
	-8.5	-9.1	25.96	8.92	24.23	8.01	22.50	7.31	21.63	7.07	20.77	6.82	19.04	6.31
	-7	-7.6	25.96	8.34	24.23	7.49	22.50	7.02	21.63	6.78	20.77	6.54	19.04	6.04
	-5	-5.6	25.96	7.59	24.23	7.09	22.50	6.64	21.63	6.41	20.77	6.17	19.04	5.69
	-3	-3.7	25.96	7.05	24.23	6.64	22.50	6.21	21.63	6.00	20.77	5.77	19.04	5.30
	0	-0.7	25.96	6.36	24.23	5.98	22.50	5.58	21.63	5.37	20.77	5.16	19.04	4.84
	3	2.2	25.96	5.73	24.23	5.38	22.50	5.01	21.63	4.86	20.77	4.71	19.04	4.42
	5	4.1	25.96	5.35	24.23	5.01	22.50	4.70	21.63	4.57	20.77	4.36	19.04	3.96
	7	6	25.96	4.81	24.23	4.48	22.50	4.12	21.63	3.98	20.77	3.83	19.04	3.53
	9	7.9	25.96	4.44	24.23	4.12	22.50	3.86	21.63	3.74	20.77	3.59	19.04	3.28
	11	9.8	25.96	4.08	24.23	3.82	22.50	3.57	21.63	3.44	20.77	3.31	19.04	3.03
	13	11.8	25.96	3.77	24.23	3.51	22.50	3.27	21.63	3.15	20.77	3.04	19.04	2.77
	15	13.7	25.96	3.47	24.23	3.24	22.50	3.00	21.63	2.90	20.77	2.78	19.04	2.57
80%	-25	-25.4	19.15	8.67	19.35	9.05	19.51	9.42	19.23	9.18	18.46	8.70	16.92	7.84
	-19.8	-20	20.67	8.93	20.76	9.30	20.00	8.75	19.23	8.28	18.46	7.84	16.92	7.30
	-18.8	-19	21.05	9.00	21.54	9.55	20.00	8.52	19.23	8.06	18.46	7.62	16.92	7.17
	-16.7	-17	21.89	9.15	21.54	8.96	20.00	8.01	19.23	7.58	18.46	7.32	16.92	6.91
	-13.7	-15	23.08	9.37	21.54	8.39	20.00	7.52	19.23	7.29	18.46	7.08	16.92	6.65
	-11.8	-13	23.08	8.62	21.54	7.74	20.00	7.17	19.23	6.96	18.46	6.75	16.92	6.31
	-9.8	-11	23.08	7.89	21.54	7.22	20.00	6.83	19.23	6.62	18.46	6.41	16.92	5.96
	-9.5	-10	23.08	7.50	21.54	7.01	20.00	6.62	19.23	6.42	18.46	6.20	16.92	5.76
	-8.5	-9.1	23.08	7.22	21.54	6.85	20.00	6.46	19.23	6.26	18.46	6.05	16.92	5.61
	-7	-7.6	23.08	6.95	21.54	6.59	20.00	6.20	19.23	6.00	18.46	5.79	16.92	5.37
	-5	-5.6	23.08	6.58	21.54	6.23	20.00	5.85	19.23	5.66	18.46	5.46	16.92	5.10
	-3	-3.7	23.08	6.17	21.54	5.82	20.00	5.47	19.23	5.28	18.46	5.10	16.92	4.82
	0	-0.7	23.08	5.55	21.54	5.23	20.00	4.91	19.23	4.79	18.46	4.66	16.92	4.39
	3	2.2	23.08	5.00	21.54	4.72	20.00	4.49	19.23	4.37	18.46	4.25	16.92	4.01
	5	4.1	23.08	4.66	21.54	4.44	20.00	4.15	19.23	3.96	18.46	3.79	16.92	3.46
	7	6	23.08	4.11	21.54	3.86	20.00	3.61	19.23	3.49	18.46	3.37	16.92	3.13
	9	7.9	23.08	3.83	21.54	3.60	20.00	3.37	19.23	3.25	18.46	3.13	16.92	2.87
	11	9.8	23.08	3.53	21.54	3.32	20.00	3.11	19.23	3.00	18.46	2.87	16.92	2.64
	13	11.8	23.08	3.23	21.54	3.04	20.00	2.85	19.23	2.74	18.46	2.62	16.92	2.41
	15	13.7	23.08	2.97	21.54	2.78	20.00	2.60	19.23	2.51	18.46	2.43	16.92	2.26

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.8: 8HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW	TC kW	PI kW
70%	-25	-25.4	18.87	8.88	18.85	8.87	17.50	7.98	16.83	7.60	16.15	7.37	14.81	7.15
	-19.8	-20	20.19	8.77	18.85	7.84	17.50	7.19	16.83	7.06	16.15	6.91	14.81	6.60
	-18.8	-19	20.19	8.46	18.85	7.60	17.50	7.08	16.83	6.94	16.15	6.79	14.81	6.47
	-16.7	-17	20.19	7.86	18.85	7.13	17.50	6.84	16.83	6.69	16.15	6.53	14.81	6.18
	-13.7	-15	20.19	7.30	18.85	6.92	17.50	6.60	16.83	6.44	16.15	6.27	14.81	5.90
	-11.8	-13	20.19	6.90	18.85	6.61	17.50	6.29	16.83	6.12	16.15	5.94	14.81	5.57
	-9.8	-11	20.19	6.59	18.85	6.29	17.50	5.96	16.83	5.79	16.15	5.61	14.81	5.24
	-9.5	-10	20.19	6.39	18.85	6.09	17.50	5.77	16.83	5.60	16.15	5.42	14.81	5.08
	-8.5	-9.1	20.19	6.25	18.85	5.94	17.50	5.62	16.83	5.45	16.15	5.28	14.81	4.97
	-7	-7.6	20.19	6.00	18.85	5.70	17.50	5.38	16.83	5.22	16.15	5.06	14.81	4.80
	-5	-5.6	20.19	5.68	18.85	5.38	17.50	5.07	16.83	4.95	16.15	4.83	14.81	4.58
	-3	-3.7	20.19	5.31	18.85	5.03	17.50	4.78	16.83	4.67	16.15	4.56	14.81	4.33
	0	-0.7	20.19	4.77	18.85	4.57	17.50	4.37	16.83	4.26	16.15	4.16	14.81	3.94
	3	2.2	20.19	4.35	18.85	4.17	17.50	3.98	16.83	3.88	16.15	3.79	14.81	3.59
	5	4.1	20.19	4.09	18.85	3.77	17.50	3.48	16.83	3.33	16.15	3.20	14.81	2.94
60%	7	6	20.19	3.49	18.85	3.31	17.50	3.12	16.83	3.02	16.15	2.92	14.81	2.72
	9	7.9	20.19	3.26	18.85	3.07	17.50	2.87	16.83	2.77	16.15	2.67	14.81	2.47
	11	9.8	20.19	3.01	18.85	2.82	17.50	2.63	16.83	2.54	16.15	2.45	14.81	2.26
	13	11.8	20.19	2.74	18.85	2.57	17.50	2.39	16.83	2.30	16.15	2.22	14.81	2.04
	15	13.7	20.19	2.48	18.85	2.36	17.50	2.22	16.83	2.14	16.15	2.09	14.81	1.91
	-25	-25.4	17.31	7.43	16.15	7.00	15.00	6.86	14.42	6.79	13.85	6.71	12.69	6.53
	-19.8	-20	17.31	6.74	16.15	6.56	15.00	6.36	14.42	6.25	13.85	6.13	12.69	5.88
	-18.8	-19	17.31	6.64	16.15	6.45	15.00	6.24	14.42	6.12	13.85	6.00	12.69	5.73
	-16.7	-17	17.31	6.42	16.15	6.21	15.00	5.97	14.42	5.85	13.85	5.71	12.69	5.42
	-13.7	-15	17.31	6.20	16.15	5.97	15.00	5.72	14.42	5.58	13.85	5.44	12.69	5.14
	-11.8	-13	17.31	5.91	16.15	5.67	15.00	5.40	14.42	5.26	13.85	5.12	12.69	4.86
	-9.8	-11	17.31	5.61	16.15	5.36	15.00	5.09	14.42	4.96	13.85	4.85	12.69	4.62
	-9.5	-10	17.31	5.43	16.15	5.18	15.00	4.92	14.42	4.82	13.85	4.71	12.69	4.49
	-8.5	-9.1	17.31	5.30	16.15	5.05	15.00	4.82	14.42	4.72	13.85	4.62	12.69	4.40
	-7	-7.6	17.31	5.08	16.15	4.84	15.00	4.65	14.42	4.56	13.85	4.46	12.69	4.26
50%	-5	-5.6	17.31	4.79	16.15	4.62	15.00	4.44	14.42	4.35	13.85	4.26	12.69	4.06
	-3	-3.7	17.31	4.53	16.15	4.37	15.00	4.20	14.42	4.11	13.85	4.02	12.69	3.84
	0	-0.7	17.31	4.14	16.15	3.99	15.00	3.83	14.42	3.74	13.85	3.66	12.69	3.49
	3	2.2	17.31	3.77	16.15	3.62	15.00	3.48	14.42	3.40	13.85	3.32	12.69	3.16
	5	4.1	17.31	3.33	16.15	3.08	15.00	2.86	14.42	2.76	13.85	2.68	12.69	2.51
	7	6	17.31	2.92	16.15	2.77	15.00	2.62	14.42	2.55	13.85	2.47	12.69	2.31
	9	7.9	17.31	2.68	16.15	2.53	15.00	2.37	14.42	2.30	13.85	2.22	12.69	2.06
	11	9.8	17.31	2.45	16.15	2.30	15.00	2.16	14.42	2.09	13.85	2.02	12.69	1.87
	13	11.8	17.31	2.21	16.15	2.08	15.00	1.95	14.42	1.89	13.85	1.82	12.69	1.68
	15	13.7	17.31	2.03	16.15	1.95	15.00	1.81	14.42	1.74	13.85	1.68	12.69	1.54
	-25	-25.4	14.42	6.30	13.46	6.22	12.50	6.12	12.02	6.07	11.54	6.01	10.58	5.87
	-19.8	-20	14.42	5.80	13.46	5.66	12.50	5.50	12.02	5.42	11.54	5.32	10.58	5.13
	-18.8	-19	14.42	5.69	13.46	5.54	12.50	5.37	12.02	5.28	11.54	5.18	10.58	4.97
	-16.7	-17	14.42	5.44	13.46	5.27	12.50	5.08	12.02	4.98	11.54	4.88	10.58	4.63
	-13.7	-15	14.42	5.20	13.46	5.02	12.50	4.82	12.02	4.72	11.54	4.62	10.58	4.41
	-11.8	-13	14.42	4.92	13.46	4.73	12.50	4.56	12.02	4.48	11.54	4.39	10.58	4.20
	-9.8	-11	14.42	4.65	13.46	4.50	12.50	4.35	12.02	4.27	11.54	4.19	10.58	4.01
	-9.5	-10	14.42	4.52	13.46	4.38	12.50	4.23	12.02	4.15	11.54	4.07	10.58	3.91
	-8.5	-9.1	14.42	4.43	13.46	4.29	12.50	4.15	12.02	4.07	11.54	4.00	10.58	3.84
	-7	-7.6	14.42	4.28	13.46	4.15	12.50	4.01	12.02	3.94	11.54	3.86	10.58	3.71
	-5	-5.6	14.42	4.09	13.46	3.96	12.50	3.83	12.02	3.76	11.54	3.69	10.58	3.54
	-3	-3.7	14.42	3.87	13.46	3.75	12.50	3.62	12.02	3.55	11.54	3.48	10.58	3.34
	0	-0.7	14.42	3.52	13.46	3.41	12.50	3.29	12.02	3.22	11.54	3.16	10.58	3.03
	3	2.2	14.42	3.20	13.46	3.08	12.50	2.97	12.02	2.92	11.54	2.86	10.58	2.65
	5	4.1	14.42	2.56	13.46	2.45	12.50	2.33	12.02	2.27	11.54	2.21	10.58	2.08
	7	6	14.42	2.35	13.46	2.24	12.50	2.14	12.02	2.08	11.54	2.02	10.58	1.90
	9	7.9	14.42	2.11	13.46	2.00	12.50	1.88	12.02	1.83	11.54	1.77	10.58	1.65
	11	9.8	14.42	1.91	13.46	1.81	12.50	1.70	12.02	1.65	11.54	1.60	10.58	1.49
	13	11.8	14.42	1.70	13.46	1.61	12.50	1.52	12.02	1.48	11.54	1.43	10.58	1.33
	15	13.7	14.42	1.57	13.46	1.48	12.50	1.39	12.02	1.34	11.54	1.29	10.58	1.20

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.



Table 2-9.9: 10HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-25	-25.4	21.93	8.69	22.56	9.12	23.09	9.55	23.32	9.76	23.54	9.97	23.92	10.39
	-19.8	-20	24.01	9.00	24.42	9.42	24.76	9.83	24.90	10.03	25.03	10.23	25.24	10.64
	-18.8	-19	24.49	9.07	24.87	9.49	25.17	9.89	25.30	10.10	25.41	10.30	25.59	10.71
	-16.7	-17	25.54	9.24	25.85	9.65	26.09	10.05	26.18	10.25	26.26	10.45	26.39	10.86
	-13.7	-15	26.69	9.47	26.93	9.88	27.11	10.29	27.17	10.49	27.23	10.69	27.30	11.10
	-11.8	-13	27.93	9.65	28.11	10.06	28.22	10.46	28.26	10.66	28.29	10.86	28.31	11.27
	-9.8	-11	29.25	9.84	29.37	10.25	29.43	10.65	29.44	10.85	29.44	11.05	29.41	11.46
	-9.5	-10	29.94	9.89	30.03	10.30	30.06	10.70	30.06	10.90	30.05	11.10	30.00	11.50
	-8.5	-9.1	30.58	10.00	30.64	10.40	30.65	10.80	30.63	11.00	30.61	11.20	30.54	11.60
	-7	-7.6	31.67	10.16	31.69	10.56	31.66	10.96	31.63	11.16	31.59	11.36	31.48	11.77
	-5	-5.6	33.19	10.38	33.15	10.79	33.07	11.19	33.02	11.39	32.95	11.59	32.80	12.00
	-3	-3.7	34.69	10.47	34.60	10.87	34.47	11.27	34.40	11.46	34.32	11.66	34.65	12.19
	0	-0.7	37.16	10.63	37.00	11.02	36.81	11.41	36.70	11.61	36.58	11.80	34.65	10.74
	3	2.2	39.32	10.59	39.10	10.96	38.84	11.34	39.38	11.69	37.80	10.93	34.65	9.43
	5	4.1	39.61	9.84	39.32	10.18	39.02	10.53	39.38	10.75	37.80	10.04	34.65	8.63
	7	6	40.90	9.74	40.59	10.07	40.95	10.56	39.38	9.86	37.80	9.20	34.65	7.95
	9	7.9	42.59	9.85	42.25	10.19	40.95	9.68	39.38	9.03	37.80	8.42	34.65	7.36
120%	11	9.8	44.33	9.97	44.10	10.09	40.95	8.87	39.38	8.28	37.80	7.76	34.65	6.86
	13	11.8	46.19	10.11	44.10	9.21	40.95	8.07	39.38	7.62	37.80	7.23	34.65	6.41
	15	13.7	47.25	9.53	44.10	8.43	40.95	7.50	39.38	7.12	37.80	6.74	34.65	5.93
	-25	-25.4	21.35	8.78	21.96	9.21	22.48	9.63	22.71	9.84	22.92	10.06	23.29	10.48
	-19.8	-20	23.40	9.09	23.80	9.51	24.12	9.92	24.25	10.12	24.37	10.33	24.57	10.74
	-18.8	-19	23.87	9.17	24.24	9.58	24.53	9.99	24.65	10.19	24.75	10.39	24.92	10.80
	-16.7	-17	24.91	9.33	25.20	9.74	25.43	10.15	25.52	10.35	25.59	10.55	25.71	10.96
	-13.7	-15	26.05	9.58	26.27	9.98	26.44	10.39	26.50	10.59	26.55	10.80	26.61	11.20
	-11.8	-13	27.28	9.75	27.44	10.16	27.54	10.57	27.57	10.77	27.60	10.97	27.61	11.38
	-9.8	-11	28.59	9.95	28.69	10.36	28.74	10.76	28.74	10.96	28.74	11.16	28.70	11.57
	-9.5	-10	29.27	10.01	29.34	10.41	29.36	10.81	29.36	11.01	29.34	11.21	29.28	11.62
	-8.5	-9.1	29.90	10.11	29.95	10.51	29.94	10.91	29.93	11.11	29.90	11.32	29.82	11.72
	-7	-7.6	30.99	10.28	30.99	10.68	30.95	11.08	30.91	11.28	30.87	11.48	30.75	11.89
	-5	-5.6	32.49	10.51	32.44	10.91	32.35	11.31	32.29	11.52	32.22	11.72	31.98	11.82
	-3	-3.7	33.97	10.61	33.87	11.00	33.74	11.40	33.66	11.60	33.57	11.80	31.98	10.92
	0	-0.7	36.42	10.77	36.25	11.16	36.05	11.55	36.35	11.76	34.89	11.03	31.98	9.57
	3	2.2	38.56	10.73	38.33	11.11	37.80	11.04	36.35	10.35	34.89	9.67	31.98	8.35
	5	4.1	38.82	9.97	38.53	10.32	37.80	10.13	36.35	9.49	34.89	8.86	31.98	7.76
110%	7	6	40.10	9.87	39.78	10.21	37.80	9.28	36.35	8.68	34.89	8.10	31.98	7.24
	9	7.9	41.78	9.99	40.71	9.61	37.80	8.49	36.35	7.94	34.89	7.49	31.98	6.68
	11	9.8	43.62	9.90	40.71	8.80	37.80	7.78	36.35	7.38	34.89	6.99	31.98	6.21
	13	11.8	43.62	9.02	40.71	8.02	37.80	7.25	36.35	6.90	34.89	6.48	31.98	5.74
	15	13.7	43.62	8.25	40.71	7.43	37.80	6.75	36.35	6.43	34.89	6.06	31.98	5.36
	-25	-25.4	20.84	8.88	21.44	9.31	21.94	9.74	22.16	9.95	22.37	10.16	22.72	10.59
	-19.8	-20	22.86	9.20	23.24	9.62	23.55	10.03	23.67	10.23	23.79	10.44	23.98	10.85
	-18.8	-19	23.33	9.28	23.67	9.69	23.95	10.10	24.06	10.30	24.16	10.51	24.32	10.92
	-16.7	-17	24.35	9.45	24.63	9.86	24.84	10.26	24.92	10.47	24.99	10.67	25.09	11.08
	-13.7	-15	25.48	9.70	25.69	10.11	25.83	10.51	25.89	10.71	25.93	10.92	25.98	11.33
	-11.8	-13	26.69	9.88	26.84	10.29	26.92	10.69	26.95	10.89	26.96	11.10	26.97	11.51
	-9.8	-11	27.99	10.09	28.07	10.49	28.10	10.89	28.10	11.10	28.09	11.30	28.05	11.71
	-9.5	-10	28.66	10.15	28.72	10.55	28.72	10.95	28.71	11.15	28.69	11.35	28.62	11.75
	-8.5	-9.1	29.29	10.25	29.32	10.65	29.30	11.05	29.28	11.25	29.24	11.46	29.32	11.78
	-7	-7.6	30.36	10.42	30.35	10.83	30.29	11.22	30.25	11.43	30.20	11.63	29.32	11.22
	-5	-5.6	31.85	10.67	31.78	11.07	31.68	11.47	31.61	11.67	31.98	11.96	29.32	10.49
	-3	-3.7	33.31	10.77	33.20	11.16	33.05	11.56	33.32	11.76	31.98	11.05	29.32	9.66
	0	-0.7	35.74	10.94	35.55	11.33	34.65	10.96	33.32	10.32	31.98	9.67	29.32	8.41
	3	2.2	37.85	10.91	37.32	10.81	34.65	9.62	33.32	9.02	31.98	8.44	29.32	7.53
	5	4.1	38.08	10.13	37.32	9.92	34.65	8.79	33.32	8.24	31.98	7.78	29.32	7.04
	7	6	39.98	10.14	37.32	9.06	34.65	8.03	33.32	7.63	31.98	7.23	29.32	6.46
	9	7.9	39.98	9.28	37.32	8.28	34.65	7.40	33.32	7.05	31.98	6.69	29.32	5.99
	11	9.8	39.98	8.49	37.32	7.61	34.65	6.94	33.32	6.61	31.98	6.23	29.32	5.56
	13	11.8	39.98	7.71	37.32	7.08	34.65	6.44	33.32	6.11	31.98	5.79	29.32	5.11
	15	13.7	39.98	7.17	37.32	6.60	34.65	5.98	33.32	5.67	31.98	5.34	29.32	4.71

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.9: 10HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	20.43	9.00	21.00	9.43	21.49	9.86	21.70	10.08	21.90	10.29	22.24	10.73
	-19.8	-20	22.40	9.33	22.76	9.75	23.05	10.16	23.17	10.37	23.27	10.57	23.45	10.99
	-18.8	-19	22.86	9.41	23.19	9.82	23.44	10.23	23.55	10.44	23.64	10.64	23.78	11.06
	-16.7	-17	23.87	9.59	24.13	10.00	24.32	10.40	24.39	10.61	24.45	10.81	24.54	11.22
	-13.7	-15	24.98	9.84	25.17	10.25	25.30	10.66	25.34	10.86	25.37	11.07	25.41	11.48
	-11.8	-13	26.18	10.03	26.30	10.44	26.37	10.84	26.39	11.05	26.40	11.25	26.65	11.69
	-9.8	-11	27.45	10.25	27.52	10.65	27.53	11.05	27.53	11.26	27.51	11.46	26.65	11.06
	-9.5	-10	28.12	10.31	28.16	10.71	28.15	11.11	28.13	11.31	28.10	11.51	26.65	10.66
	-8.5	-9.1	28.74	10.42	28.75	10.82	28.71	11.22	28.68	11.42	29.08	11.74	26.65	10.36
	-7	-7.6	29.80	10.60	29.76	11.00	29.69	11.40	29.64	11.60	29.08	11.18	26.65	9.84
	-5	-5.6	31.26	10.85	31.18	11.25	31.50	11.74	30.29	11.08	29.08	10.42	26.65	9.14
	-3	-3.7	32.71	10.96	32.58	11.35	31.50	10.81	30.29	10.20	29.08	9.58	26.65	8.38
	0	-0.7	35.10	11.14	33.92	10.58	31.50	9.44	30.29	8.89	29.08	8.34	26.65	7.49
	3	2.2	36.35	10.29	33.92	9.24	31.50	8.23	30.29	7.77	29.08	7.44	26.65	6.77
	5	4.1	36.35	9.41	33.92	8.45	31.50	7.59	30.29	7.27	29.08	6.96	26.65	6.32
	7	6	36.35	8.59	33.92	7.70	31.50	7.12	30.29	6.72	29.08	6.39	26.65	5.72
	9	7.9	36.35	7.84	33.92	7.14	31.50	6.53	30.29	6.22	29.08	5.92	26.65	5.35
	11	9.8	36.35	7.26	33.92	6.68	31.50	6.08	30.29	5.79	29.08	5.51	26.65	4.91
	13	11.8	36.35	6.75	33.92	6.21	31.50	5.63	30.29	5.34	29.08	5.05	26.65	4.50
	15	13.7	36.35	6.29	33.92	5.76	31.50	5.20	30.29	4.92	29.08	4.64	26.65	4.18
90%	-25	-25.4	20.11	9.15	20.66	9.59	21.13	10.02	21.33	10.24	21.51	10.46	21.84	10.89
	-19.8	-20	22.02	9.49	22.36	9.91	22.63	10.32	22.74	10.53	22.83	10.74	22.99	11.16
	-18.8	-19	22.48	9.57	22.78	9.99	23.01	10.40	23.11	10.61	23.19	10.81	23.32	11.23
	-16.7	-17	23.47	9.76	23.70	10.17	23.86	10.57	23.93	10.78	23.98	10.98	23.99	11.20
	-13.7	-15	24.55	10.02	24.72	10.43	24.82	10.84	24.86	11.04	24.89	11.25	23.99	10.78
	-11.8	-13	25.73	10.22	25.83	10.63	25.88	11.03	25.89	11.24	26.17	11.48	23.99	10.21
	-9.8	-11	26.99	10.44	27.03	10.85	27.02	11.25	27.26	11.46	26.17	10.82	23.99	9.58
	-9.5	-10	27.64	10.51	27.66	10.91	27.63	11.31	27.26	11.04	26.17	10.43	23.99	9.23
	-8.5	-9.1	28.25	10.62	28.24	11.02	28.35	11.34	27.26	10.73	26.17	10.12	23.99	8.95
	-7	-7.6	29.29	10.81	29.24	11.21	28.35	10.77	27.26	10.18	26.17	9.60	23.99	8.46
	-5	-5.6	30.73	11.07	30.53	11.16	28.35	10.01	27.26	9.45	26.17	8.91	23.99	7.92
	-3	-3.7	32.71	11.35	30.53	10.25	28.35	9.18	27.26	8.66	26.17	8.14	23.99	7.42
	0	-0.7	32.71	9.88	30.53	8.91	28.35	7.96	27.26	7.61	26.17	7.30	23.99	6.67
	3	2.2	32.71	8.59	30.53	7.73	28.35	7.15	27.26	6.87	26.17	6.58	23.99	6.02
	5	4.1	32.71	7.83	30.53	7.21	28.35	6.68	27.26	6.42	26.17	6.15	23.99	5.62
	7	6	32.71	7.23	30.53	6.70	28.35	6.12	27.26	5.83	26.17	5.56	23.99	4.99
	9	7.9	32.71	6.70	30.53	6.17	28.35	5.66	27.26	5.41	26.17	5.15	23.99	4.67
	11	9.8	32.71	6.25	30.53	5.74	28.35	5.29	27.26	5.02	26.17	4.75	23.99	4.31
	13	11.8	32.71	5.78	30.53	5.34	28.35	4.83	27.26	4.59	26.17	4.39	23.99	3.99
	15	13.7	32.71	5.38	30.53	4.90	28.35	4.43	27.26	4.23	26.17	4.06	23.99	3.69
80%	-25	-25.4	19.91	9.35	20.43	9.79	20.86	10.23	21.05	10.45	21.22	10.67	21.32	10.90
	-19.8	-20	21.74	9.70	22.05	10.12	22.29	10.53	22.39	10.74	22.47	10.95	21.32	10.28
	-18.8	-19	22.18	9.78	22.45	10.20	22.66	10.61	22.74	10.82	23.26	11.25	21.32	10.10
	-16.7	-17	23.15	9.97	23.34	10.38	23.49	10.79	23.54	11.00	23.26	10.81	21.32	9.67
	-13.7	-15	24.21	10.25	24.34	10.66	24.42	11.07	24.23	10.93	23.26	10.36	21.32	9.25
	-11.8	-13	25.35	10.46	25.43	10.86	25.20	10.89	24.23	10.32	23.26	9.77	21.32	8.70
	-9.8	-11	26.58	10.69	27.14	11.32	25.20	10.21	24.23	9.67	23.26	9.15	21.32	8.11
	-9.5	-10	27.22	10.76	27.14	10.89	25.20	9.82	24.23	9.30	23.26	8.78	21.32	7.85
	-8.5	-9.1	27.82	10.88	27.14	10.56	25.20	9.52	24.23	9.01	23.26	8.50	21.32	7.67
	-7	-7.6	29.08	11.04	27.14	10.00	25.20	9.00	24.23	8.51	23.26	8.03	21.32	7.38
	-5	-5.6	29.08	10.21	27.14	9.25	25.20	8.31	24.23	7.87	23.26	7.58	21.32	6.98
	-3	-3.7	29.08	9.34	27.14	8.45	25.20	7.65	24.23	7.37	23.26	7.10	21.32	6.53
	0	-0.7	29.08	8.07	27.14	7.40	25.20	6.90	24.23	6.64	23.26	6.38	21.32	5.87
	3	2.2	29.08	7.13	27.14	6.68	25.20	6.22	24.23	5.99	23.26	5.76	21.32	5.28
	5	4.1	29.08	6.67	27.14	6.25	25.20	5.80	24.23	5.59	23.26	5.36	21.32	4.99
	7	6	29.08	6.15	27.14	5.70	25.20	5.21	24.23	4.98	23.26	4.75	21.32	4.33
	9	7.9	29.08	5.67	27.14	5.28	25.20	4.83	24.23	4.64	23.26	4.42	21.32	4.10
	11	9.8	29.08	5.26	27.14	4.85	25.20	4.44	24.23	4.26	23.26	4.10	21.32	3.78
	13	11.8	29.08	4.85	27.14	4.44	25.20	4.10	24.23	3.95	23.26	3.79	21.32	3.49
	15	13.7	29.08	4.44	27.14	4.12	25.20	3.81	24.23	3.65	23.26	3.52	21.32	3.22

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.



Table 2-9.9: 10HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
70%	-25	-25.4	19.83	9.60	20.31	10.05	20.71	10.50	21.20	10.87	20.35	10.37	18.66	9.45
	-19.8	-20	21.56	9.97	21.83	10.39	22.05	10.69	21.20	10.18	20.35	9.68	18.66	8.75
	-18.8	-19	21.98	10.05	22.22	10.47	22.05	10.48	21.20	9.97	20.35	9.49	18.66	8.55
	-16.7	-17	22.91	10.25	23.08	10.67	22.05	10.02	21.20	9.52	20.35	9.05	18.66	8.13
	-13.7	-15	23.94	10.54	23.75	10.53	22.05	9.54	21.20	9.07	20.35	8.61	18.66	7.76
	-11.8	-13	25.44	10.89	23.75	9.89	22.05	8.95	21.20	8.50	20.35	8.05	18.66	7.42
	-9.8	-11	25.44	10.15	23.75	9.22	22.05	8.34	21.20	7.91	20.35	7.59	18.66	7.06
	-9.5	-10	25.44	9.73	23.75	8.83	22.05	7.99	21.20	7.63	20.35	7.37	18.66	6.85
	-8.5	-9.1	25.44	9.41	23.75	8.54	22.05	7.72	21.20	7.46	20.35	7.21	18.66	6.68
	-7	-7.6	25.44	8.86	23.75	8.05	22.05	7.41	21.20	7.17	20.35	6.92	18.66	6.40
	-5	-5.6	25.44	8.15	23.75	7.48	22.05	7.02	21.20	6.78	20.35	6.54	18.66	6.04
	-3	-3.7	25.44	7.44	23.75	7.01	22.05	6.57	21.20	6.34	20.35	6.12	18.66	5.65
	0	-0.7	25.44	6.71	23.75	6.31	22.05	5.91	21.20	5.70	20.35	5.49	18.66	5.12
	3	2.2	25.44	6.06	23.75	5.70	22.05	5.32	21.20	5.13	20.35	4.98	18.66	4.68
	5	4.1	25.44	5.65	23.75	5.31	22.05	4.97	21.20	4.83	20.35	4.62	18.66	4.15
	7	6	25.44	5.11	23.75	4.71	22.05	4.34	21.20	4.19	20.35	4.05	18.66	3.74
60%	9	7.9	25.44	4.69	23.75	4.37	22.05	4.08	21.20	3.93	20.35	3.80	18.66	3.49
	11	9.8	25.44	4.32	23.75	4.03	22.05	3.77	21.20	3.65	20.35	3.53	18.66	3.23
	13	11.8	25.44	3.97	23.75	3.72	22.05	3.48	21.20	3.36	20.35	3.25	18.66	2.98
	15	13.7	25.44	3.70	23.75	3.43	22.05	3.21	21.20	3.09	20.35	2.97	18.66	2.75
	-25	-25.4	19.91	9.96	20.35	10.33	18.90	9.45	18.17	9.05	17.45	8.67	15.99	7.96
	-19.8	-20	21.81	10.44	20.35	9.50	18.90	8.67	18.17	8.28	17.45	7.90	15.99	7.39
	-18.8	-19	21.81	10.20	20.35	9.29	18.90	8.47	18.17	8.08	17.45	7.71	15.99	7.27
	-16.7	-17	21.81	9.65	20.35	8.80	18.90	8.02	18.17	7.65	17.45	7.41	15.99	7.00
	-13.7	-15	21.81	9.12	20.35	8.32	18.90	7.57	18.17	7.37	17.45	7.16	15.99	6.74
	-11.8	-13	21.81	8.48	20.35	7.75	18.90	7.24	18.17	7.04	17.45	6.83	15.99	6.40
	-9.8	-11	21.81	7.86	20.35	7.29	18.90	6.89	18.17	6.69	17.45	6.48	15.99	6.05
	-9.5	-10	21.81	7.51	20.35	7.07	18.90	6.68	18.17	6.48	17.45	6.28	15.99	5.85
	-8.5	-9.1	21.81	7.28	20.35	6.91	18.90	6.52	18.17	6.33	17.45	6.12	15.99	5.70
	-7	-7.6	21.81	7.01	20.35	6.64	18.90	6.26	18.17	6.06	17.45	5.86	15.99	5.45
	-5	-5.6	21.81	6.63	20.35	6.28	18.90	5.91	18.17	5.72	17.45	5.53	15.99	5.18
	-3	-3.7	21.81	6.21	20.35	5.88	18.90	5.52	18.17	5.34	17.45	5.17	15.99	4.90
	0	-0.7	21.81	5.59	20.35	5.27	18.90	4.98	18.17	4.86	17.45	4.73	15.99	4.48
50%	3	2.2	21.81	5.03	20.35	4.78	18.90	4.56	18.17	4.44	17.45	4.33	15.99	4.09
	5	4.1	21.81	4.71	20.35	4.50	18.90	4.15	18.17	3.92	17.45	3.76	15.99	3.44
	7	6	21.81	4.08	20.35	3.86	18.90	3.63	18.17	3.51	17.45	3.40	15.99	3.16
	9	7.9	21.81	3.82	20.35	3.63	18.90	3.39	18.17	3.27	17.45	3.16	15.99	2.91
	11	9.8	21.81	3.53	20.35	3.33	18.90	3.14	18.17	3.02	17.45	2.91	15.99	2.68
	13	11.8	21.81	3.26	20.35	3.06	18.90	2.88	18.17	2.77	17.45	2.66	15.99	2.45
	15	13.7	21.81	2.99	20.35	2.82	18.90	2.64	18.17	2.56	17.45	2.48	15.99	2.32
	-25	-25.4	18.17	8.74	16.96	8.05	15.75	7.45	15.14	7.32	14.54	7.22	13.33	7.01
	-19.8	-20	18.17	7.83	16.96	7.23	15.75	6.98	15.14	6.85	14.54	6.71	13.33	6.41
	-18.8	-19	18.17	7.61	16.96	7.12	15.75	6.87	15.14	6.72	14.54	6.58	13.33	6.27
	-16.7	-17	18.17	7.15	16.96	6.89	15.75	6.60	15.14	6.45	14.54	6.30	13.33	5.98
	-13.7	-15	18.17	6.93	16.96	6.65	15.75	6.35	15.14	6.20	14.54	6.04	13.33	5.69
	-11.8	-13	18.17	6.62	16.96	6.33	15.75	6.03	15.14	5.87	14.54	5.70	13.33	5.36
	-9.8	-11	18.17	6.30	16.96	6.01	15.75	5.70	15.14	5.54	14.54	5.37	13.33	5.08
	-9.5	-10	18.17	6.10	16.96	5.82	15.75	5.51	15.14	5.35	14.54	5.19	13.33	4.93
	-8.5	-9.1	18.17	5.96	16.96	5.67	15.75	5.37	15.14	5.21	14.54	5.08	13.33	4.84
	-7	-7.6	18.17	5.71	16.96	5.43	15.75	5.13	15.14	5.02	14.54	4.90	13.33	4.67
	-5	-5.6	18.17	5.39	16.96	5.11	15.75	4.90	15.14	4.79	14.54	4.68	13.33	4.46
	-3	-3.7	18.17	5.03	16.96	4.82	15.75	4.63	15.14	4.53	14.54	4.43	13.33	4.22
	0	-0.7	18.17	4.59	16.96	4.41	15.75	4.23	15.14	4.14	14.54	4.05	13.33	3.85
	3	2.2	18.17	4.19	16.96	4.03	15.75	3.86	15.14	3.78	14.54	3.69	13.33	3.51
	5	4.1	18.17	3.73	16.96	3.46	15.75	3.26	15.14	3.11	14.54	2.99	13.33	2.81
	7	6	18.17	3.28	16.96	3.12	15.75	2.94	15.14	2.86	14.54	2.77	13.33	2.59
	9	7.9	18.17	3.05	16.96	2.88	15.75	2.70	15.14	2.62	14.54	2.52	13.33	2.35
	11	9.8	18.17	2.81	16.96	2.64	15.75	2.48	15.14	2.40	14.54	2.31	13.33	2.14
	13	11.8	18.17	2.56	16.96	2.41	15.75	2.26	15.14	2.18	14.54	2.10	13.33	1.95
	15	13.7	18.17	2.36	16.96	2.23	15.75	2.13	15.14	2.05	14.54	1.97	13.33	1.82

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.10: 12HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-25	-25.4	22.75	9.48	23.75	9.98	24.62	10.47	25.00	10.72	25.36	10.96	25.99	11.45
	-19.8	-20	25.29	9.84	25.99	10.33	26.59	10.81	26.84	11.04	27.07	11.28	27.47	11.74
	-18.8	-19	25.85	9.92	26.51	10.41	27.05	10.88	27.29	11.12	27.50	11.35	27.86	11.81
	-16.7	-17	27.06	10.10	27.62	10.58	28.08	11.05	28.27	11.29	28.44	11.52	28.73	11.98
	-13.7	-15	28.36	10.36	28.83	10.84	29.21	11.31	29.36	11.54	29.50	11.78	29.71	12.24
	-11.8	-13	29.75	10.54	30.14	11.02	30.44	11.49	30.55	11.72	30.65	11.95	30.80	12.41
	-9.8	-11	31.22	10.74	31.53	11.22	31.75	11.69	31.83	11.92	31.90	12.15	31.98	12.61
	-9.5	-10	31.98	10.79	32.25	11.27	32.44	11.73	32.51	11.96	32.55	12.19	32.60	12.65
	-8.5	-9.1	32.68	10.90	32.92	11.37	33.08	11.84	33.13	12.07	33.16	12.29	33.18	12.75
	-7	-7.6	33.88	11.06	34.07	11.54	34.17	12.00	34.20	12.23	34.21	12.46	34.19	12.92
	-5	-5.6	35.54	11.29	35.65	11.76	35.69	12.23	35.69	12.46	35.67	12.69	35.60	13.14
	-3	-3.7	37.17	11.37	37.22	11.84	37.20	12.29	37.17	12.52	37.13	12.75	37.00	13.20
	0	-0.7	39.84	11.51	39.80	11.96	39.69	12.41	39.62	12.64	39.54	12.86	39.34	13.31
	3	2.2	42.22	11.45	42.09	11.89	41.90	12.32	41.79	12.54	41.67	12.75	41.25	12.77
	5	4.1	42.72	10.72	42.51	11.12	42.25	11.52	42.11	11.72	41.97	11.92	41.25	11.75
	7	6	44.16	10.60	43.89	10.99	43.60	11.39	43.44	11.58	43.28	11.78	41.25	10.79
	9	7.9	45.96	10.70	45.66	11.09	45.33	11.48	45.16	11.68	45.00	11.57	41.25	9.91
	11	9.8	47.81	10.81	47.47	11.19	47.11	11.58	46.88	11.42	45.00	10.62	41.25	9.08
	13	11.8	49.79	10.92	49.42	11.31	48.75	11.20	46.88	10.44	45.00	9.69	41.25	8.29
	15	13.7	51.71	11.04	51.31	11.42	48.75	10.29	46.88	9.58	45.00	8.90	41.25	7.74
120%	-25	-25.4	21.97	9.55	22.96	10.05	23.81	10.55	24.19	10.79	24.54	11.04	25.17	11.53
	-19.8	-20	24.48	9.92	25.18	10.41	25.75	10.89	26.00	11.12	26.23	11.36	26.61	11.83
	-18.8	-19	25.04	10.00	25.69	10.49	26.22	10.97	26.44	11.20	26.65	11.43	26.99	11.90
	-16.7	-17	26.24	10.19	26.79	10.67	27.23	11.14	27.42	11.37	27.58	11.60	27.85	12.06
	-13.7	-15	27.53	10.45	27.99	10.93	28.35	11.40	28.50	11.63	28.63	11.87	28.83	12.33
	-11.8	-13	28.91	10.64	29.29	11.12	29.57	11.58	29.68	11.82	29.77	12.05	29.90	12.51
	-9.8	-11	30.37	10.84	30.67	11.32	30.87	11.79	30.95	12.02	31.01	12.25	31.07	12.71
	-9.5	-10	31.13	10.90	31.39	11.37	31.56	11.83	31.62	12.06	31.66	12.29	31.69	12.75
	-8.5	-9.1	31.83	11.00	32.05	11.48	32.19	11.94	32.23	12.17	32.26	12.40	32.27	12.85
	-7	-7.6	33.02	11.17	33.19	11.64	33.28	12.11	33.30	12.34	33.30	12.56	33.27	13.02
	-5	-5.6	34.66	11.41	34.76	11.88	34.79	12.34	34.78	12.57	34.75	12.80	34.66	13.26
	-3	-3.7	36.28	11.49	36.31	11.95	36.28	12.41	36.24	12.64	36.19	12.86	36.06	13.32
	0	-0.7	38.93	11.64	38.87	12.09	38.75	12.54	38.68	12.76	38.59	12.98	38.08	12.91
	3	2.2	41.29	11.58	41.14	12.02	40.94	12.45	40.83	12.67	41.54	13.15	38.08	11.38
	5	4.1	41.76	10.84	41.54	11.24	41.28	11.64	41.13	11.84	41.54	12.11	38.08	10.44
	7	6	43.18	10.73	42.91	11.12	42.61	11.51	43.27	11.92	41.54	11.12	38.08	9.57
	9	7.9	44.98	10.83	44.67	11.22	45.00	11.70	43.27	10.94	41.54	10.21	38.08	8.76
	11	9.8	46.81	10.94	46.47	11.33	45.00	10.74	43.27	10.04	41.54	9.34	38.08	8.06
	13	11.8	48.78	11.06	48.46	11.15	45.00	9.81	43.27	9.16	41.54	8.52	38.08	7.50
	15	13.7	50.69	11.18	48.46	10.23	45.00	8.98	43.27	8.38	41.54	7.89	38.08	7.04
110%	-25	-25.4	21.29	9.63	22.27	10.14	23.11	10.64	23.48	10.89	23.82	11.13	24.43	11.62
	-19.8	-20	23.77	10.02	24.45	10.51	25.01	10.98	25.25	11.22	25.47	11.45	25.84	11.92
	-18.8	-19	24.33	10.10	24.96	10.59	25.47	11.06	25.69	11.30	25.88	11.53	26.22	12.00
	-16.7	-17	25.52	10.29	26.05	10.77	26.47	11.24	26.65	11.47	26.81	11.71	27.06	12.17
	-13.7	-15	26.80	10.56	27.24	11.04	27.58	11.51	27.72	11.74	27.84	11.97	28.02	12.44
	-11.8	-13	28.17	10.75	28.52	11.23	28.78	11.69	28.89	11.93	28.97	12.16	29.09	12.62
	-9.8	-11	29.62	10.96	29.89	11.44	30.08	11.90	30.14	12.13	30.19	12.36	30.25	12.82
	-9.5	-10	30.37	11.02	30.60	11.49	30.75	11.95	30.81	12.18	30.84	12.41	30.86	12.87
	-8.5	-9.1	31.06	11.13	31.26	11.60	31.38	12.06	31.42	12.29	31.44	12.52	31.43	12.98
	-7	-7.6	32.24	11.30	32.39	11.77	32.46	12.23	32.47	12.46	32.47	12.69	32.42	13.15
	-5	-5.6	33.87	11.55	33.95	12.01	33.95	12.48	33.94	12.70	33.90	12.93	33.80	13.39
	-3	-3.7	35.47	11.63	35.49	12.09	35.44	12.55	35.39	12.78	35.33	13.00	34.90	12.96
	0	-0.7	38.10	11.79	38.02	12.24	37.89	12.68	37.80	12.91	38.08	13.11	34.90	11.40
	3	2.2	40.43	11.74	40.26	12.17	40.05	12.60	39.66	12.34	38.08	11.53	34.90	10.00
	5	4.1	40.87	10.98	40.64	11.38	40.36	11.78	39.66	11.33	38.08	10.59	34.90	9.15
	7	6	42.28	10.87	42.00	11.26	41.25	11.07	39.66	10.38	38.08	9.71	34.90	8.37
	9	7.9	44.06	10.98	44.42	11.48	41.25	10.16	39.66	9.51	38.08	8.87	34.90	7.73
	11	9.8	45.88	11.10	44.42	10.52	41.25	9.30	39.66	8.71	38.08	8.13	34.90	7.21
	13	11.8	47.60	10.77	44.42	9.60	41.25	8.46	39.66	7.97	38.08	7.58	34.90	6.69
	15	13.7	47.60	9.87	44.42	8.79	41.25	7.82	39.66	7.44	38.08	7.07	34.90	6.24

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.10: 12HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	20.73	9.73	21.69	10.25	22.50	10.75	22.87	11.00	23.20	11.25	23.80	11.74
	-19.8	-20	23.17	10.13	23.83	10.62	24.36	11.10	24.60	11.34	24.80	11.57	25.16	12.04
	-18.8	-19	23.72	10.22	24.32	10.70	24.82	11.18	25.02	11.42	25.21	11.65	25.53	12.12
	-16.7	-17	24.89	10.41	25.40	10.89	25.80	11.36	25.97	11.60	26.12	11.83	26.36	12.29
	-13.7	-15	26.16	10.68	26.58	11.17	26.90	11.64	27.03	11.87	27.14	12.10	27.31	12.57
	-11.8	-13	27.52	10.89	27.85	11.36	28.09	11.83	28.18	12.06	28.25	12.29	28.36	12.75
	-9.8	-11	28.95	11.11	29.20	11.58	29.37	12.04	29.42	12.27	29.46	12.51	29.50	12.97
	-9.5	-10	29.69	11.17	29.90	11.63	30.03	12.10	30.07	12.33	30.10	12.55	30.11	13.01
	-8.5	-9.1	30.38	11.28	30.55	11.75	30.65	12.21	30.68	12.44	30.69	12.67	30.67	13.12
	-7	-7.6	31.54	11.46	31.67	11.93	31.72	12.39	31.72	12.62	31.71	12.84	31.73	13.13
	-5	-5.6	33.16	11.71	33.21	12.18	33.20	12.64	33.17	12.86	33.13	13.09	31.73	12.28
	-3	-3.7	34.74	11.81	34.73	12.26	34.66	12.72	34.61	12.94	34.62	12.95	31.73	11.33
	0	-0.7	37.34	11.97	37.24	12.42	37.50	12.87	36.06	12.11	34.62	11.36	31.73	9.90
	3	2.2	39.64	11.92	39.45	12.35	37.50	11.29	36.06	10.61	34.62	9.95	31.73	8.65
	5	4.1	40.05	11.16	40.38	11.64	37.50	10.35	36.06	9.73	34.62	9.11	31.73	8.01
	7	6	41.43	11.05	40.38	10.67	37.50	9.48	36.06	8.90	34.62	8.32	31.73	7.41
	9	7.9	43.27	10.90	40.38	9.77	37.50	8.65	36.06	8.11	34.62	7.64	31.73	6.85
	11	9.8	43.27	9.98	40.38	8.94	37.50	7.94	36.06	7.54	34.62	7.16	31.73	6.37
	13	11.8	43.27	9.09	40.38	8.12	37.50	7.39	36.06	7.02	34.62	6.65	31.73	5.89
	15	13.7	43.27	8.32	40.38	7.54	37.50	6.90	36.06	6.58	34.62	6.18	31.73	5.45
90%	-25	-25.4	20.29	9.86	21.22	10.38	22.02	10.89	22.37	11.14	22.70	11.39	23.27	11.89
	-19.8	-20	22.68	10.27	23.31	10.76	23.82	11.24	24.04	11.48	24.24	11.72	24.57	12.19
	-18.8	-19	23.22	10.36	23.80	10.85	24.26	11.33	24.46	11.56	24.64	11.80	24.93	12.27
	-16.7	-17	24.38	10.56	24.85	11.04	25.23	11.51	25.39	11.75	25.52	11.98	25.75	12.45
	-13.7	-15	25.63	10.84	26.01	11.32	26.31	11.79	26.42	12.03	26.52	12.26	26.67	12.73
	-11.8	-13	26.96	11.05	27.26	11.53	27.48	11.99	27.56	12.23	27.62	12.46	27.71	12.92
	-9.8	-11	28.37	11.28	28.59	11.75	28.74	12.22	28.78	12.45	28.81	12.68	28.56	12.70
	-9.5	-10	29.11	11.34	29.29	11.81	29.40	12.27	29.43	12.50	29.44	12.73	28.56	12.26
	-8.5	-9.1	29.78	11.46	29.93	11.93	30.01	12.39	30.02	12.62	30.02	12.85	28.56	11.94
	-7	-7.6	30.93	11.65	31.03	12.12	31.05	12.57	31.05	12.80	31.15	12.89	28.56	11.35
	-5	-5.6	32.52	11.91	32.55	12.37	32.51	12.83	32.45	12.78	31.15	12.03	28.56	10.56
	-3	-3.7	34.09	12.01	34.05	12.47	33.75	12.49	32.45	11.77	31.15	11.07	28.56	9.71
	0	-0.7	36.65	12.19	36.35	12.22	33.75	10.91	32.45	10.28	31.15	9.65	28.56	8.43
	3	2.2	38.94	11.88	36.35	10.68	33.75	9.53	32.45	8.97	31.15	8.40	28.56	7.61
	5	4.1	38.94	10.87	36.35	9.76	33.75	8.70	32.45	8.18	31.15	7.81	28.56	7.12
	7	6	38.94	9.92	36.35	8.92	33.75	7.95	32.45	7.65	31.15	7.21	28.56	6.47
	9	7.9	38.94	9.06	36.35	8.13	33.75	7.34	32.45	6.99	31.15	6.66	28.56	5.98
	11	9.8	38.94	8.27	36.35	7.53	33.75	6.87	32.45	6.55	31.15	6.19	28.56	5.54
	13	11.8	38.94	7.57	36.35	7.02	33.75	6.37	32.45	6.05	31.15	5.74	28.56	5.10
	15	13.7	38.94	7.07	36.35	6.53	33.75	5.91	32.45	5.60	31.15	5.29	28.56	4.68
80%	-25	-25.4	19.99	10.03	20.89	10.55	21.66	11.06	22.00	11.31	22.31	11.57	22.87	12.07
	-19.8	-20	22.31	10.45	22.90	10.94	23.39	11.42	23.59	11.66	23.78	11.90	24.09	12.38
	-18.8	-19	22.84	10.54	23.38	11.03	23.82	11.51	24.00	11.75	24.16	11.99	24.44	12.46
	-16.7	-17	23.97	10.75	24.41	11.23	24.76	11.70	24.90	11.94	25.03	12.17	25.38	12.62
	-13.7	-15	25.20	11.04	25.55	11.52	25.81	11.99	25.92	12.23	26.00	12.46	25.38	12.15
	-11.8	-13	26.51	11.26	26.77	11.74	26.96	12.20	27.03	12.43	27.08	12.67	25.38	11.51
	-9.8	-11	27.90	11.50	28.08	11.97	28.19	12.43	28.23	12.66	27.69	12.23	25.38	10.83
	-9.5	-10	28.62	11.57	28.76	12.03	28.84	12.49	28.85	12.50	27.69	11.78	25.38	10.42
	-8.5	-9.1	29.28	11.69	29.39	12.16	30.00	12.84	28.85	12.14	27.69	11.44	25.38	10.11
	-7	-7.6	30.41	11.89	30.47	12.35	30.00	12.19	28.85	11.51	27.69	10.86	25.38	9.59
	-5	-5.6	31.97	12.16	32.31	12.64	30.00	11.33	28.85	10.69	27.69	10.08	25.38	8.87
	-3	-3.7	33.51	12.27	32.31	11.60	30.00	10.39	28.85	9.80	27.69	9.23	25.38	8.19
	0	-0.7	34.62	11.16	32.31	10.06	30.00	9.01	28.85	8.50	27.69	8.05	25.38	7.39
	3	2.2	34.62	9.69	32.31	8.74	30.00	7.87	28.85	7.58	27.69	7.28	25.38	6.67
	5	4.1	34.62	8.84	32.31	7.97	30.00	7.37	28.85	7.08	27.69	6.81	25.38	6.23
	7	6	34.62	8.05	32.31	7.42	30.00	6.79	28.85	6.47	27.69	6.17	25.38	5.57
	9	7.9	34.62	7.41	32.31	6.83	30.00	6.26	28.85	5.98	27.69	5.70	25.38	5.14
	11	9.8	34.62	6.90	32.31	6.34	30.00	5.80	28.85	5.54	27.69	5.26	25.38	4.73
	13	11.8	34.62	6.41	32.31	5.88	30.00	5.35	28.85	5.09	27.69	4.83	25.38	4.36
	15	13.7	34.62	6.01	32.31	5.47	30.00	4.94	28.85	4.68	27.69	4.45	25.38	4.05

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.10: 12HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-25	-25.4	19.85	10.25	20.72	10.78	21.45	11.30	21.77	11.55	22.07	11.81	22.21	11.98
	-19.8	-20	22.08	10.69	22.63	11.18	23.07	11.66	23.26	11.90	23.43	12.15	22.21	11.32
	-18.8	-19	22.59	10.78	23.09	11.27	23.49	11.75	23.65	11.99	24.23	12.44	22.21	11.12
	-16.7	-17	23.69	11.00	24.09	11.48	24.40	11.95	24.52	12.19	24.23	11.94	22.21	10.66
	-13.7	-15	24.89	11.30	25.19	11.78	25.42	12.25	25.24	12.09	24.23	11.43	22.21	10.19
	-11.8	-13	26.16	11.53	26.38	12.01	26.25	12.04	25.24	11.39	24.23	10.77	22.21	9.59
	-9.8	-11	27.52	11.79	27.66	12.25	26.25	11.27	25.24	10.67	24.23	10.09	22.21	8.96
	-9.5	-10	28.22	11.86	28.27	12.05	26.25	10.83	25.24	10.25	24.23	9.69	22.21	8.60
	-8.5	-9.1	28.86	11.99	28.27	11.67	26.25	10.49	25.24	9.93	24.23	9.39	22.21	8.31
	-7	-7.6	30.29	12.21	28.27	11.02	26.25	9.91	25.24	9.38	24.23	8.85	22.21	7.98
	-5	-5.6	30.29	11.26	28.27	10.19	26.25	9.15	25.24	8.66	24.23	8.18	22.21	7.56
	-3	-3.7	30.29	10.27	28.27	9.30	26.25	8.35	25.24	7.96	24.23	7.67	22.21	7.08
	0	-0.7	30.29	8.84	28.27	8.00	26.25	7.44	25.24	7.18	24.23	6.91	22.21	6.37
	3	2.2	30.29	7.65	28.27	7.19	26.25	6.72	25.24	6.49	24.23	6.24	22.21	5.75
	5	4.1	30.29	7.17	28.27	6.74	26.25	6.29	25.24	6.06	24.23	5.83	22.21	5.38
60%	7	6	30.29	6.65	28.27	6.14	26.25	5.63	25.24	5.38	24.23	5.13	22.21	4.64
	9	7.9	30.29	6.13	28.27	5.64	26.25	5.20	25.24	4.97	24.23	4.74	22.21	4.37
	11	9.8	30.29	5.66	28.27	5.22	26.25	4.80	25.24	4.57	24.23	4.38	22.21	4.05
	13	11.8	30.29	5.23	28.27	4.80	26.25	4.40	25.24	4.21	24.23	4.05	22.21	3.73
	15	13.7	30.29	4.84	28.27	4.40	26.25	4.07	25.24	3.90	24.23	3.75	22.21	3.45
	-25	-25.4	19.93	10.56	20.74	11.09	21.42	11.62	21.63	11.73	20.77	11.14	19.04	10.10
	-19.8	-20	22.02	11.01	22.51	11.50	22.50	11.51	21.63	10.92	20.77	10.37	19.04	9.33
	-18.8	-19	22.50	11.11	22.94	11.60	22.50	11.27	21.63	10.69	20.77	10.15	19.04	9.12
	-16.7	-17	23.56	11.33	24.23	11.92	22.50	10.73	21.63	10.19	20.77	9.66	19.04	8.67
	-13.7	-15	24.70	11.65	24.23	11.31	22.50	10.19	21.63	9.68	20.77	9.18	19.04	8.22
	-11.8	-13	25.96	11.71	24.23	10.57	22.50	9.54	21.63	9.05	20.77	8.58	19.04	7.84
	-9.8	-11	25.96	10.85	24.23	9.82	22.50	8.87	21.63	8.41	20.77	8.00	19.04	7.47
	-9.5	-10	25.96	10.38	24.23	9.40	22.50	8.50	21.63	8.05	20.77	7.77	19.04	7.24
	-8.5	-9.1	25.96	10.01	24.23	9.08	22.50	8.20	21.63	7.85	20.77	7.59	19.04	7.07
	-7	-7.6	25.96	9.40	24.23	8.53	22.50	7.79	21.63	7.54	20.77	7.30	19.04	6.79
50%	-5	-5.6	25.96	8.63	24.23	7.84	22.50	7.38	21.63	7.15	20.77	6.91	19.04	6.41
	-3	-3.7	25.96	7.82	24.23	7.36	22.50	6.92	21.63	6.70	20.77	6.46	19.04	6.00
	0	-0.7	25.96	7.02	24.23	6.63	22.50	6.23	21.63	6.03	20.77	5.82	19.04	5.42
	3	2.2	25.96	6.35	24.23	5.99	22.50	5.62	21.63	5.43	20.77	5.26	19.04	4.96
	5	4.1	25.96	5.94	24.23	5.60	22.50	5.25	21.63	5.10	20.77	4.88	19.04	4.38
	7	6	25.96	5.29	24.23	4.92	22.50	4.52	21.63	4.37	20.77	4.21	19.04	3.91
	9	7.9	25.96	4.87	24.23	4.54	22.50	4.22	21.63	4.09	20.77	3.95	19.04	3.65
	11	9.8	25.96	4.50	24.23	4.18	22.50	3.91	21.63	3.78	20.77	3.66	19.04	3.38
	13	11.8	25.96	4.12	24.23	3.86	22.50	3.61	21.63	3.48	20.77	3.36	19.04	3.11
	15	13.7	25.96	3.81	24.23	3.58	22.50	3.33	21.63	3.21	20.77	3.09	19.04	2.86
	-25	-25.4	20.28	11.01	20.19	10.77	18.75	9.74	18.03	9.30	17.31	8.89	15.87	8.15
	-19.8	-20	21.63	10.83	20.19	9.76	18.75	8.86	18.03	8.44	17.31	8.05	15.87	7.59
	-18.8	-19	21.63	10.52	20.19	9.51	18.75	8.63	18.03	8.22	17.31	7.85	15.87	7.47
	-16.7	-17	21.63	9.88	20.19	8.95	18.75	8.14	18.03	7.76	17.31	7.58	15.87	7.19
	-13.7	-15	21.63	9.26	20.19	8.43	18.75	7.71	18.03	7.52	17.31	7.33	15.87	6.92
	-11.8	-13	21.63	8.57	20.19	7.80	18.75	7.37	18.03	7.18	17.31	6.99	15.87	6.57
	-9.8	-11	21.63	7.88	20.19	7.39	18.75	7.02	18.03	6.83	17.31	6.63	15.87	6.22
	-9.5	-10	21.63	7.51	20.19	7.18	18.75	6.82	18.03	6.62	17.31	6.43	15.87	6.02
	-8.5	-9.1	21.63	7.35	20.19	7.02	18.75	6.66	18.03	6.47	17.31	6.27	15.87	5.86
	-7	-7.6	21.63	7.08	20.19	6.74	18.75	6.39	18.03	6.20	17.31	6.01	15.87	5.61
	-5	-5.6	21.63	6.71	20.19	6.38	18.75	6.03	18.03	5.85	17.31	5.67	15.87	5.35
	-3	-3.7	21.63	6.29	20.19	5.98	18.75	5.65	18.03	5.47	17.31	5.32	15.87	5.06
	0	-0.7	21.63	5.67	20.19	5.38	18.75	5.11	18.03	4.99	17.31	4.88	15.87	4.64
	3	2.2	21.63	5.12	20.19	4.89	18.75	4.68	18.03	4.58	17.31	4.46	15.87	4.24
	5	4.1	21.63	4.81	20.19	4.53	18.75	4.17	18.03	4.00	17.31	3.83	15.87	3.52
	7	6	21.63	4.08	20.19	3.86	18.75	3.64	18.03	3.53	17.31	3.42	15.87	3.19
	9	7.9	21.63	3.80	20.19	3.61	18.75	3.40	18.03	3.28	17.31	3.16	15.87	2.93
	11	9.8	21.63	3.52	20.19	3.33	18.75	3.14	18.03	3.03	17.31	2.92	15.87	2.70
	13	11.8	21.63	3.22	20.19	3.05	18.75	2.87	18.03	2.77	17.31	2.67	15.87	2.46
	15	13.7	21.63	2.96	20.19	2.80	18.75	2.63	18.03	2.55	17.31	2.47	15.87	2.33

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.11: 14HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-25	-25.4	25.18	9.07	25.29	9.45	25.36	9.83	25.40	10.01	25.42	10.20	25.46	10.59
	-19.8	-20	30.29	9.68	30.26	10.06	30.21	10.45	30.17	10.64	30.13	10.84	30.04	11.23
	-18.8	-19	31.25	9.80	31.20	10.19	31.12	10.58	31.08	10.77	31.02	10.97	30.91	11.36
	-16.7	-17	33.17	10.07	33.09	10.46	32.97	10.85	32.90	11.05	32.83	11.24	32.67	11.65
	-13.7	-15	35.12	10.41	35.00	10.81	34.84	11.20	34.75	11.41	34.66	11.61	34.45	12.02
	-11.8	-13	37.09	10.68	36.93	11.08	36.74	11.48	36.63	11.69	36.52	11.89	36.27	12.31
	-9.8	-11	39.09	10.97	38.89	11.38	38.66	11.78	38.53	11.99	38.40	12.20	38.13	12.62
	-9.5	-10	40.09	11.07	39.88	11.47	39.63	11.88	39.50	12.08	39.36	12.29	39.06	12.72
	-8.5	-9.1	41.00	11.21	40.78	11.62	40.51	12.03	40.37	12.23	40.22	12.44	39.91	12.87
	-7	-7.6	42.53	11.44	42.28	11.85	41.99	12.26	41.84	12.47	41.68	12.68	41.34	13.12
	-5	-5.6	44.60	11.76	44.32	12.17	44.00	12.59	43.83	12.80	43.65	13.02	43.29	13.45
	-3	-3.7	46.58	11.91	46.28	12.32	45.93	12.74	45.75	12.95	45.56	13.17	45.16	13.61
	0	-0.7	49.78	12.16	49.43	12.57	49.04	12.98	48.84	13.20	48.63	13.41	48.19	13.85
	3	2.2	52.41	12.15	52.02	12.55	51.60	12.96	51.39	13.17	51.16	13.38	49.50	12.89
	5	4.1	52.32	11.27	51.91	11.64	51.48	12.02	51.26	12.21	51.04	12.41	49.50	11.97
	7	6	53.82	11.13	53.39	11.49	52.94	11.86	52.71	12.06	52.47	12.25	49.50	11.10
	9	7.9	55.91	11.25	55.45	11.61	54.98	11.99	54.74	12.18	54.00	11.82	49.50	10.32
120%	11	9.8	58.03	11.37	57.56	11.73	57.06	12.11	56.25	11.71	54.00	11.02	49.50	9.65
	13	11.8	60.31	11.50	59.81	11.86	58.50	11.52	56.25	10.76	54.00	10.20	49.50	8.99
	15	13.7	62.53	11.62	63.00	12.11	58.50	10.61	56.25	10.07	54.00	9.54	49.50	8.40
	-25	-25.4	24.27	9.13	24.37	9.51	24.45	9.88	24.48	10.07	24.50	10.26	24.54	10.65
	-19.8	-20	29.37	9.76	29.34	10.14	29.28	10.52	29.24	10.72	29.20	10.91	29.10	11.31
	-18.8	-19	30.32	9.88	30.27	10.27	30.19	10.66	30.14	10.85	30.09	11.05	29.97	11.45
	-16.7	-17	32.24	10.16	32.15	10.54	32.03	10.94	31.96	11.13	31.88	11.33	31.72	11.74
	-13.7	-15	34.19	10.51	34.05	10.90	33.89	11.30	33.80	11.50	33.70	11.71	33.50	12.12
	-11.8	-13	36.15	10.79	35.98	11.18	35.78	11.59	35.67	11.79	35.55	12.00	35.31	12.42
	-9.8	-11	38.14	11.08	37.93	11.49	37.69	11.89	37.56	12.10	37.43	12.31	37.15	12.74
	-9.5	-10	39.14	11.18	38.91	11.58	38.66	11.99	38.52	12.20	38.38	12.41	38.08	12.84
	-8.5	-9.1	40.05	11.33	39.81	11.73	39.54	12.14	39.39	12.35	39.24	12.56	38.93	12.99
	-7	-7.6	41.57	11.56	41.31	11.97	41.01	12.39	40.85	12.60	40.69	12.81	40.35	13.25
	-5	-5.6	43.62	11.89	43.33	12.30	43.00	12.72	42.83	12.93	42.65	13.15	42.28	13.59
	-3	-3.7	45.60	12.05	45.28	12.46	44.93	12.88	44.74	13.09	44.55	13.31	44.15	13.75
	0	-0.7	48.78	12.31	48.42	12.72	48.02	13.14	47.82	13.35	47.60	13.57	45.69	12.93
	3	2.2	51.40	12.31	51.00	12.70	50.57	13.12	50.35	13.33	49.85	13.13	45.69	11.57
	5	4.1	51.30	11.41	50.88	11.78	50.45	12.16	50.23	12.36	49.85	12.21	45.69	10.76
110%	7	6	52.79	11.28	52.35	11.64	51.90	12.01	51.92	12.06	49.85	11.32	45.69	10.00
	9	7.9	54.87	11.40	54.41	11.76	54.00	11.87	51.92	11.16	49.85	10.53	45.69	9.33
	11	9.8	56.98	11.53	56.50	11.89	54.00	10.98	51.92	10.35	49.85	9.79	45.69	8.71
	13	11.8	59.25	11.66	58.15	11.42	54.00	10.18	51.92	9.65	49.85	9.13	45.69	8.10
	15	13.7	62.31	11.84	58.15	10.48	54.00	9.52	51.92	9.06	49.85	8.54	45.69	7.56
	-25	-25.4	23.44	9.20	23.54	9.58	23.61	9.96	23.64	10.15	23.66	10.34	23.70	10.72
	-19.8	-20	28.52	9.85	28.49	10.23	28.42	10.62	28.38	10.81	28.34	11.01	28.24	11.41
	-18.8	-19	29.47	9.98	29.41	10.36	29.33	10.75	29.28	10.95	29.22	11.15	29.10	11.55
	-16.7	-17	31.39	10.26	31.29	10.65	31.16	11.04	31.08	11.24	31.01	11.44	30.84	11.85
	-13.7	-15	33.32	10.62	33.18	11.01	33.01	11.41	32.92	11.62	32.82	11.82	32.61	12.24
	-11.8	-13	35.28	10.91	35.10	11.31	34.89	11.71	34.77	11.92	34.66	12.12	34.41	12.55
	-9.8	-11	37.25	11.21	37.04	11.62	36.79	12.03	36.66	12.23	36.52	12.44	36.24	12.87
	-9.5	-10	38.25	11.32	38.02	11.72	37.75	12.13	37.61	12.34	37.47	12.55	37.16	12.98
	-8.5	-9.1	39.15	11.47	38.90	11.87	38.63	12.28	38.48	12.50	38.32	12.71	38.01	13.14
	-7	-7.6	40.67	11.71	40.39	12.12	40.09	12.54	39.93	12.75	39.77	12.96	39.42	13.40
	-5	-5.6	42.71	12.04	42.41	12.46	42.07	12.88	41.90	13.10	41.72	13.31	41.88	13.87
	-3	-3.7	44.68	12.21	44.35	12.62	43.98	13.05	43.79	13.26	43.60	13.48	41.88	12.95
	0	-0.7	47.84	12.48	47.47	12.89	47.06	13.32	47.60	13.70	45.69	12.98	41.88	11.54
	3	2.2	50.44	12.49	50.04	12.89	49.50	13.00	47.60	12.31	45.69	11.62	41.88	10.38
	5	4.1	50.34	11.58	49.92	11.95	49.50	12.09	47.60	11.43	45.69	10.78	41.88	9.72
	7	6	51.82	11.45	51.37	11.81	49.50	11.20	47.60	10.60	45.69	10.04	41.88	8.95
	9	7.9	53.88	11.58	53.31	11.63	49.50	10.34	47.60	9.83	45.69	9.34	41.88	8.35
	11	9.8	57.12	11.95	53.31	10.69	49.50	9.66	47.60	9.18	45.69	8.71	41.88	7.78
	13	11.8	57.12	10.97	53.31	9.94	49.50	9.09	47.60	8.60	45.69	8.12	41.88	7.24
	15	13.7	57.12	10.11	53.31	9.28	49.50	8.40	47.60	7.97	45.69	7.53	41.88	6.67

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.11: 14HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	22.70	9.29	22.79	9.66	22.85	10.04	22.88	10.23	22.90	10.42	22.94	10.81
	-19.8	-20	27.75	9.96	27.71	10.34	27.64	10.73	27.60	10.92	27.55	11.12	27.45	11.52
	-18.8	-19	28.70	10.09	28.63	10.48	28.54	10.87	28.49	11.06	28.43	11.26	28.30	11.66
	-16.7	-17	30.61	10.38	30.49	10.77	30.36	11.16	30.28	11.36	30.20	11.57	30.03	11.97
	-13.7	-15	32.53	10.75	32.38	11.15	32.20	11.55	32.10	11.75	32.00	11.96	31.79	12.38
	-11.8	-13	34.47	11.05	34.28	11.45	34.06	11.86	33.95	12.06	33.83	12.27	33.58	12.70
	-9.8	-11	36.44	11.37	36.21	11.77	35.96	12.19	35.82	12.40	35.68	12.61	35.39	13.04
	-9.5	-10	37.43	11.48	37.18	11.88	36.91	12.29	36.77	12.50	36.62	12.71	36.31	13.15
	-8.5	-9.1	38.32	11.63	38.06	12.04	37.78	12.46	37.63	12.67	37.47	12.88	37.15	13.32
	-7	-7.6	39.83	11.89	39.54	12.30	39.23	12.72	39.07	12.93	38.90	13.15	38.08	13.15
	-5	-5.6	41.86	12.23	41.54	12.65	41.20	13.07	41.02	13.29	41.54	13.71	38.08	12.38
	-3	-3.7	43.81	12.41	43.47	12.82	43.10	13.25	43.27	13.46	41.54	12.81	38.08	11.50
	0	-0.7	46.96	12.69	46.57	13.11	45.00	12.66	43.27	12.05	41.54	11.41	38.08	10.27
	3	2.2	49.54	12.71	48.46	12.51	45.00	11.32	43.27	10.73	41.54	10.24	38.08	9.27
	5	4.1	49.43	11.78	48.46	11.63	45.00	10.51	43.27	10.04	41.54	9.59	38.08	8.68
	7	6	51.92	11.89	48.46	10.77	45.00	9.78	43.27	9.30	41.54	8.82	38.08	7.90
	9	7.9	51.92	10.99	48.46	9.95	45.00	9.08	43.27	8.64	41.54	8.23	38.08	7.39
	11	9.8	51.92	10.16	48.46	9.29	45.00	8.49	43.27	8.06	41.54	7.64	38.08	6.89
	13	11.8	51.92	9.45	48.46	8.64	45.00	7.84	43.27	7.46	41.54	7.06	38.08	6.31
	15	13.7	51.92	8.81	48.46	8.06	45.00	7.28	43.27	6.91	41.54	6.54	38.08	5.94
90%	-25	-25.4	22.03	9.39	22.12	9.77	22.18	10.15	22.20	10.34	22.22	10.53	22.26	10.92
	-19.8	-20	27.06	10.09	27.01	10.47	26.93	10.86	26.89	11.06	26.84	11.26	26.73	11.66
	-18.8	-19	28.00	10.23	27.93	10.62	27.83	11.01	27.77	11.21	27.71	11.41	27.58	11.81
	-16.7	-17	29.90	10.53	29.77	10.92	29.63	11.32	29.55	11.52	29.47	11.72	29.30	12.13
	-13.7	-15	31.80	10.92	31.64	11.32	31.46	11.72	31.36	11.92	31.25	12.13	31.04	12.55
	-11.8	-13	33.73	11.23	33.53	11.63	33.31	12.04	33.19	12.25	33.06	12.46	32.81	12.89
	-9.8	-11	35.68	11.56	35.44	11.97	35.18	12.38	35.04	12.59	34.90	12.81	34.27	12.94
	-9.5	-10	36.67	11.67	36.41	12.08	36.13	12.50	35.98	12.71	35.83	12.92	34.27	12.53
	-8.5	-9.1	37.56	11.84	37.28	12.25	36.99	12.66	36.83	12.88	37.38	13.35	34.27	12.22
	-7	-7.6	39.05	12.10	38.75	12.51	38.43	12.94	38.94	13.37	37.38	12.81	34.27	11.66
	-5	-5.6	41.06	12.46	40.73	12.88	40.50	13.20	38.94	12.63	37.38	12.06	34.27	10.89
	-3	-3.7	43.00	12.65	42.64	13.07	40.50	12.32	38.94	11.76	37.38	11.19	34.27	10.13
	0	-0.7	46.73	13.05	43.62	12.00	40.50	10.95	38.94	10.45	37.38	9.99	34.27	9.08
	3	2.2	46.73	11.72	43.62	10.70	40.50	9.83	38.94	9.42	37.38	9.00	34.27	8.20
	5	4.1	46.73	10.85	43.62	9.97	40.50	9.19	38.94	8.81	37.38	8.43	34.27	7.68
	7	6	46.73	10.06	43.62	9.26	40.50	8.43	38.94	8.02	37.38	7.63	34.27	6.86
	9	7.9	46.73	9.31	43.62	8.57	40.50	7.85	38.94	7.49	37.38	7.14	34.27	6.45
	11	9.8	46.73	8.67	43.62	7.97	40.50	7.30	38.94	6.94	37.38	6.61	34.27	6.02
	13	11.8	46.73	8.04	43.62	7.37	40.50	6.71	38.94	6.39	37.38	6.09	34.27	5.65
	15	13.7	46.73	7.55	43.62	6.83	40.50	6.19	38.94	5.94	37.38	5.73	34.27	5.32
80%	-25	-25.4	21.45	9.52	21.53	9.90	21.58	10.28	21.61	10.47	21.63	10.66	21.66	11.06
	-19.8	-20	26.45	10.26	26.38	10.64	26.30	11.03	26.25	11.23	26.20	11.43	26.09	11.84
	-18.8	-19	27.38	10.41	27.29	10.79	27.18	11.19	27.13	11.39	27.06	11.59	26.93	12.00
	-16.7	-17	29.25	10.72	29.12	11.12	28.97	11.51	28.89	11.72	28.80	11.92	28.63	12.33
	-13.7	-15	31.15	11.13	30.97	11.52	30.78	11.93	30.68	12.14	30.57	12.35	30.46	12.78
	-11.8	-13	33.06	11.45	32.84	11.86	32.61	12.27	32.49	12.48	32.36	12.69	30.46	12.16
	-9.8	-11	34.98	11.80	34.73	12.21	34.46	12.63	34.62	12.89	33.23	12.44	30.46	11.47
	-9.5	-10	35.96	11.92	35.69	12.33	36.00	12.94	34.62	12.49	33.23	12.02	30.46	11.04
	-8.5	-9.1	36.84	12.09	36.55	12.51	36.00	12.66	34.62	12.19	33.23	11.72	30.46	10.72
	-7	-7.6	38.32	12.37	38.77	13.04	36.00	12.13	34.62	11.66	33.23	11.16	30.46	10.17
	-5	-5.6	40.31	12.75	38.77	12.34	36.00	11.39	34.62	10.90	33.23	10.42	30.46	9.51
	-3	-3.7	41.54	12.39	38.77	11.48	36.00	10.54	34.62	10.11	33.23	9.68	30.46	8.84
	0	-0.7	41.54	11.06	38.77	10.19	36.00	9.41	34.62	9.03	33.23	8.66	30.46	7.92
	3	2.2	41.54	9.85	38.77	9.15	36.00	8.47	34.62	8.13	33.23	7.80	30.46	7.16
	5	4.1	41.54	9.18	38.77	8.54	36.00	7.91	34.62	7.60	33.23	7.29	30.46	6.70
	7	6	41.54	8.45	38.77	7.84	36.00	7.13	34.62	6.80	33.23	6.48	30.46	5.98
	9	7.9	41.54	7.82	38.77	7.26	36.00	6.64	34.62	6.36	33.23	6.08	30.46	5.70
	11	9.8	41.54	7.27	38.77	6.68	36.00	6.14	34.62	5.92	33.23	5.73	30.46	5.35
	13	11.8	41.54	6.68	38.77	6.15	36.00	5.72	34.62	5.55	33.23	5.38	30.46	5.02
	15	13.7	41.54	6.15	38.77	5.73	36.00	5.39	34.62	5.22	33.23	5.06	30.46	4.73

## Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

## Notes:

Shaded cells indicate rating condition.



Table 2-9.11: 14HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-25	-25.4	20.96	9.69	21.03	10.07	21.08	10.45	21.10	10.64	21.12	10.84	21.15	11.23
	-19.8	-20	25.90	10.47	25.83	10.86	25.74	11.25	25.69	11.45	25.64	11.66	25.53	12.07
	-18.8	-19	26.83	10.63	26.73	11.02	26.61	11.42	26.55	11.62	26.49	11.82	26.65	12.37
	-16.7	-17	28.68	10.97	28.54	11.36	28.38	11.77	28.29	11.97	28.21	12.18	26.65	11.91
	-13.7	-15	30.55	11.39	30.36	11.80	30.16	12.21	30.29	12.48	29.08	12.14	26.65	11.40
	-11.8	-13	32.43	11.74	32.21	12.15	31.50	12.25	30.29	11.88	29.08	11.51	26.65	10.71
	-9.8	-11	34.33	12.11	33.92	12.34	31.50	11.60	30.29	11.21	29.08	10.81	26.65	9.93
	-9.5	-10	35.29	12.24	33.92	11.96	31.50	11.20	30.29	10.80	29.08	10.39	26.65	9.52
	-8.5	-9.1	36.35	12.39	33.92	11.66	31.50	10.88	30.29	10.48	29.08	10.05	26.65	9.20
	-7	-7.6	36.35	11.89	33.92	11.13	31.50	10.34	30.29	9.92	29.08	9.51	26.65	8.73
	-5	-5.6	36.35	11.18	33.92	10.40	31.50	9.63	30.29	9.24	29.08	8.87	26.65	8.15
	-3	-3.7	36.35	10.36	33.92	9.61	31.50	8.92	30.29	8.57	29.08	8.23	26.65	7.57
	0	-0.7	36.35	9.18	33.92	8.55	31.50	7.95	30.29	7.66	29.08	7.36	26.65	6.90
	3	2.2	36.35	8.21	33.92	7.68	31.50	7.15	30.29	6.92	29.08	6.75	26.65	6.39
	5	4.1	36.35	7.66	33.92	7.16	31.50	6.74	30.29	6.59	29.08	6.21	26.65	5.70
	7	6	36.35	6.88	33.92	6.36	31.50	5.93	30.29	5.76	29.08	5.59	26.65	5.23
60%	9	7.9	36.35	6.43	33.92	5.92	31.50	5.62	30.29	5.46	29.08	5.30	26.65	5.00
	11	9.8	36.35	5.88	33.92	5.56	31.50	5.28	30.29	5.14	29.08	5.00	26.65	4.69
	13	11.8	36.35	5.47	33.92	5.24	31.50	4.96	30.29	4.82	29.08	4.70	26.65	4.38
	15	13.7	36.35	5.18	33.92	4.90	31.50	4.66	30.29	4.54	29.08	4.40	26.65	4.15
	-25	-25.4	20.56	9.92	20.62	10.30	20.66	10.68	20.68	10.88	20.70	11.08	20.73	11.48
	-19.8	-20	25.43	10.77	25.35	11.16	25.25	11.55	25.20	11.76	24.92	11.88	22.85	11.40
	-18.8	-19	26.34	10.94	26.23	11.33	26.11	11.73	25.96	11.90	24.92	11.66	22.85	11.15
	-16.7	-17	28.16	11.30	28.01	11.70	27.00	11.68	25.96	11.42	24.92	11.15	22.85	10.58
	-13.7	-15	30.00	11.76	29.08	11.75	27.00	11.21	25.96	10.92	24.92	10.61	22.85	9.94
	-11.8	-13	31.15	11.71	29.08	11.15	27.00	10.55	25.96	10.23	24.92	9.87	22.85	9.10
	-9.8	-11	31.15	11.08	29.08	10.48	27.00	9.80	25.96	9.42	24.92	9.07	22.85	8.37
	-9.5	-10	31.15	10.70	29.08	10.08	27.00	9.35	25.96	9.01	24.92	8.67	22.85	8.01
	-8.5	-9.1	31.15	10.39	29.08	9.73	27.00	9.04	25.96	8.71	24.92	8.38	22.85	7.74
	-7	-7.6	31.15	9.83	29.08	9.17	27.00	8.53	25.96	8.22	24.92	7.92	22.85	7.32
	-5	-5.6	31.15	9.11	29.08	8.51	27.00	7.93	25.96	7.65	24.92	7.38	22.85	6.93
	-3	-3.7	31.15	8.40	29.08	7.87	27.00	7.34	25.96	7.09	24.92	6.92	22.85	6.57
50%	0	-0.7	31.15	7.45	29.08	7.00	27.00	6.68	25.96	6.53	24.92	6.38	22.85	6.06
	3	2.2	31.15	6.67	29.08	6.43	27.00	6.19	25.96	6.06	24.92	5.92	22.85	5.64
	5	4.1	31.15	6.33	29.08	6.01	27.00	5.58	25.96	5.38	24.92	5.18	22.85	4.84
	7	6	31.15	5.52	29.08	5.30	27.00	5.06	25.96	4.92	24.92	4.79	22.85	4.51
	9	7.9	31.15	5.23	29.08	5.03	27.00	4.80	25.96	4.69	24.92	4.58	22.85	4.27
	11	9.8	31.15	4.91	29.08	4.73	27.00	4.53	25.96	4.40	24.92	4.26	22.85	3.99
	13	11.8	31.15	4.61	29.08	4.43	27.00	4.23	25.96	4.11	24.92	3.99	22.85	3.75
	15	13.7	31.15	4.33	29.08	4.16	27.00	3.98	25.96	3.89	24.92	3.80	22.85	3.56
	-25	-25.4	20.26	10.24	20.31	10.63	20.34	11.02	20.36	11.22	20.77	11.63	19.04	11.36
	-19.8	-20	25.03	11.18	24.23	11.28	22.50	10.94	21.63	10.76	20.77	10.57	19.04	10.16
	-18.8	-19	25.96	11.39	24.23	11.06	22.50	10.69	21.63	10.50	20.77	10.29	19.04	9.86
	-16.7	-17	25.96	10.93	24.23	10.55	22.50	10.13	21.63	9.91	20.77	9.68	19.04	9.02
	-13.7	-15	25.96	10.44	24.23	10.01	22.50	9.47	21.63	9.15	20.77	8.83	19.04	8.22
	-11.8	-13	25.96	9.79	24.23	9.20	22.50	8.60	21.63	8.31	20.77	8.03	19.04	7.48
	-9.8	-11	25.96	8.94	24.23	8.38	22.50	7.85	21.63	7.59	20.77	7.34	19.04	6.88
	-9.5	-10	25.96	8.50	24.23	7.99	22.50	7.49	21.63	7.25	20.77	7.00	19.04	6.62
	-8.5	-9.1	25.96	8.18	24.23	7.69	22.50	7.22	21.63	6.98	20.77	6.81	19.04	6.45
	-7	-7.6	25.96	7.68	24.23	7.23	22.50	6.84	21.63	6.69	20.77	6.54	19.04	6.21
	-5	-5.6	25.96	7.10	24.23	6.76	22.50	6.52	21.63	6.38	20.77	6.24	19.04	5.93
	-3	-3.7	25.96	6.62	24.23	6.41	22.50	6.18	21.63	6.06	20.77	5.93	19.04	5.65
	0	-0.7	25.96	6.12	24.23	5.93	22.50	5.72	21.63	5.62	20.77	5.50	19.04	5.25
	3	2.2	25.96	5.68	24.23	5.51	22.50	5.33	21.63	5.23	20.77	5.12	19.04	4.90
	5	4.1	25.96	5.10	24.23	4.79	22.50	4.54	21.63	4.44	20.77	4.33	19.04	4.11
	7	6	25.96	4.58	24.23	4.41	22.50	4.22	21.63	4.13	20.77	4.03	19.04	3.81
	9	7.9	25.96	4.35	24.23	4.19	22.50	3.99	21.63	3.89	20.77	3.78	19.04	3.55
	11	9.8	25.96	4.08	24.23	3.91	22.50	3.73	21.63	3.64	20.77	3.54	19.04	3.34
	13	11.8	25.96	3.80	24.23	3.66	22.50	3.50	21.63	3.42	20.77	3.33	19.04	3.15
	15	13.7	25.96	3.59	24.23	3.47	22.50	3.32	21.63	3.24	20.77	3.15	19.04	2.98

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.12: 16HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-25	-25.4	30.99	10.68	31.19	11.15	31.34	11.62	31.41	11.85	31.47	12.08	31.57	12.55
	-19.8	-20	34.56	11.11	34.58	11.58	34.55	12.04	34.53	12.27	34.49	12.50	34.40	12.97
	-18.8	-19	35.32	11.22	35.31	11.68	35.25	12.15	35.21	12.38	35.16	12.61	35.04	13.08
	-16.7	-17	36.91	11.46	36.85	11.93	36.73	12.39	36.66	12.62	36.59	12.86	36.41	13.33
	-13.7	-15	38.59	11.81	38.48	12.28	38.32	12.74	38.23	12.98	38.12	13.22	37.90	13.69
	-11.8	-13	40.36	12.08	40.21	12.55	40.00	13.02	39.88	13.26	39.76	13.50	39.49	13.98
	-9.8	-11	42.21	12.39	42.01	12.86	41.77	13.33	41.63	13.57	41.48	13.81	41.17	14.30
	-9.5	-10	43.16	12.49	42.95	12.96	42.68	13.43	42.53	13.67	42.37	13.91	42.04	14.39
	-8.5	-9.1	44.04	12.65	43.80	13.12	43.52	13.59	43.36	13.83	43.19	14.07	42.84	14.55
	-7	-7.6	45.52	12.91	45.26	13.38	44.95	13.85	44.78	14.09	44.60	14.33	44.22	14.82
	-5	-5.6	47.55	13.26	47.26	13.74	46.91	14.21	46.72	14.46	46.53	14.70	46.11	15.20
	-3	-3.7	49.54	13.45	49.21	13.91	48.84	14.39	48.63	14.63	48.42	14.87	47.98	15.37
	0	-0.7	52.77	13.75	52.40	14.21	51.98	14.68	51.76	14.92	51.53	15.16	51.04	15.65
	3	2.2	55.50	13.79	55.10	14.24	54.64	14.70	54.40	14.94	54.16	15.17	53.64	15.66
	5	4.1	55.54	12.94	55.13	13.36	54.69	13.79	54.45	14.00	54.21	14.23	53.70	14.68
	7	6	57.14	12.84	56.71	13.25	56.25	13.67	56.00	13.89	55.75	14.11	55.00	14.11
	9	7.9	59.31	13.01	58.86	13.42	58.37	13.84	58.12	14.05	57.85	14.27	55.00	13.13
	11	9.8	61.51	13.17	61.04	13.58	60.53	14.00	60.27	14.22	60.00	14.09	55.00	12.18
	13	11.8	63.87	13.35	63.37	13.75	62.85	14.18	62.50	13.99	60.00	13.04	55.00	11.26
	15	13.7	66.14	13.51	65.63	13.92	65.00	13.90	62.50	12.99	60.00	12.08	55.00	10.55
120%	-25	-25.4	30.12	10.78	30.31	11.25	30.46	11.72	30.52	11.95	30.58	12.18	30.68	12.65
	-19.8	-20	33.66	11.22	33.67	11.69	33.63	12.15	33.60	12.38	33.56	12.61	33.47	13.08
	-18.8	-19	34.41	11.33	34.39	11.80	34.33	12.26	34.28	12.49	34.23	12.72	34.10	13.19
	-16.7	-17	35.99	11.58	35.92	12.04	35.80	12.51	35.72	12.74	35.64	12.97	35.46	13.45
	-13.7	-15	37.67	11.93	37.54	12.40	37.37	12.87	37.27	13.11	37.16	13.34	36.93	13.82
	-11.8	-13	39.43	12.22	39.25	12.69	39.04	13.16	38.92	13.39	38.79	13.63	38.51	14.11
	-9.8	-11	41.26	12.53	41.05	13.00	40.79	13.47	40.65	13.71	40.50	13.95	40.18	14.44
	-9.5	-10	42.21	12.64	41.98	13.10	41.70	13.57	41.55	13.81	41.39	14.05	41.04	14.54
	-8.5	-9.1	43.08	12.80	42.83	13.27	42.53	13.74	42.37	13.98	42.20	14.22	41.84	14.71
	-7	-7.6	44.55	13.06	44.27	13.53	43.95	14.01	43.78	14.25	43.59	14.49	43.21	14.98
	-5	-5.6	46.58	13.43	46.26	13.90	45.91	14.38	45.71	14.62	45.51	14.87	45.09	15.37
	-3	-3.7	48.55	13.61	48.21	14.08	47.82	14.56	47.61	14.80	47.39	15.04	46.94	15.54
	0	-0.7	51.77	13.93	51.38	14.39	50.95	14.86	50.72	15.10	50.48	15.34	50.77	16.02
	3	2.2	54.48	13.98	54.06	14.43	53.60	14.89	53.35	15.13	53.10	15.37	50.77	14.47
	5	4.1	54.52	13.11	54.10	13.53	53.64	13.96	53.40	14.18	53.15	14.41	50.77	13.51
	7	6	56.11	13.02	55.67	13.43	55.19	13.85	54.95	14.07	55.38	14.36	50.77	12.55
	9	7.9	58.27	13.19	57.81	13.60	57.31	14.03	57.69	14.26	55.38	13.38	50.77	11.62
	11	9.8	60.46	13.36	59.98	13.77	60.00	14.14	57.69	13.28	55.38	12.43	50.77	10.82
	13	11.8	62.81	13.54	62.30	13.96	60.00	13.11	57.69	12.28	55.38	11.44	50.77	10.11
	15	13.7	65.07	13.71	64.62	13.79	60.00	12.13	57.69	11.32	55.38	10.68	50.77	9.49
110%	-25	-25.4	29.33	10.90	29.51	11.37	29.65	11.83	29.71	12.07	29.77	12.30	29.87	12.77
	-19.8	-20	32.84	11.35	32.83	11.82	32.79	12.28	32.75	12.51	32.71	12.74	32.61	13.21
	-18.8	-19	33.58	11.47	33.55	11.93	33.47	12.39	33.42	12.62	33.37	12.86	33.24	13.33
	-16.7	-17	35.15	11.72	35.06	12.18	34.93	12.65	34.85	12.88	34.77	13.12	34.58	13.59
	-13.7	-15	36.81	12.08	36.67	12.55	36.49	13.02	36.39	13.26	36.28	13.49	36.04	13.97
	-11.8	-13	38.56	12.38	38.37	12.84	38.14	13.31	38.02	13.55	37.88	13.79	37.60	14.27
	-9.8	-11	40.38	12.70	40.15	13.17	39.88	13.64	39.74	13.88	39.58	14.12	39.26	14.61
	-9.5	-10	41.32	12.81	41.07	13.27	40.78	13.74	40.63	13.98	40.46	14.22	40.11	14.71
	-8.5	-9.1	42.19	12.97	41.92	13.44	41.61	13.91	41.44	14.15	41.27	14.40	40.91	14.89
	-7	-7.6	43.65	13.24	43.36	13.71	43.02	14.19	42.84	14.43	42.65	14.67	42.26	15.17
	-5	-5.6	45.66	13.62	45.33	14.09	44.96	14.57	44.76	14.82	44.55	15.06	44.13	15.57
	-3	-3.7	47.62	13.81	47.26	14.28	46.86	14.76	46.64	15.01	46.42	15.25	46.54	15.85
	0	-0.7	50.82	14.14	50.41	14.60	49.97	15.08	49.73	15.32	49.49	15.57	46.54	14.29
	3	2.2	53.52	14.20	53.08	14.65	52.60	15.12	52.88	15.36	50.77	14.53	46.54	12.83
	5	4.1	53.56	13.32	53.12	13.74	52.65	14.17	52.88	14.38	50.77	13.56	46.54	11.91
	7	6	55.14	13.22	54.68	13.64	55.00	14.20	52.88	13.40	50.77	12.61	46.54	11.06
	9	7.9	57.28	13.41	56.81	13.82	55.00	13.24	52.88	12.46	50.77	11.70	46.54	10.32
	11	9.8	59.46	13.59	59.23	13.80	55.00	12.30	52.88	11.54	50.77	10.85	46.54	9.66
	13	11.8	61.80	13.78	59.23	12.78	55.00	11.30	52.88	10.71	50.77	10.13	46.54	9.00
	15	13.7	63.46	13.28	59.23	11.81	55.00	10.54	52.88	10.03	50.77	9.47	46.54	8.40

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.



Table 2-9.12: 16HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	28.64	11.04	28.80	11.51	28.94	11.97	28.99	12.21	29.05	12.44	29.15	12.91
	-19.8	-20	32.10	11.51	32.07	11.97	32.02	12.44	31.98	12.67	31.93	12.90	31.83	13.37
	-18.8	-19	32.83	11.63	32.78	12.09	32.69	12.55	32.64	12.78	32.58	13.02	32.45	13.49
	-16.7	-17	34.38	11.89	34.28	12.35	34.13	12.82	34.05	13.05	33.96	13.29	33.78	13.76
	-13.7	-15	36.03	12.26	35.87	12.73	35.68	13.20	35.57	13.44	35.46	13.67	35.21	14.16
	-11.8	-13	37.76	12.56	37.55	13.03	37.31	13.50	37.18	13.74	37.05	13.98	36.76	14.47
	-9.8	-11	39.57	12.90	39.32	13.37	39.04	13.84	38.88	14.08	38.72	14.32	38.39	14.82
	-9.5	-10	40.50	13.01	40.23	13.48	39.93	13.95	39.76	14.19	39.59	14.43	39.24	14.92
	-8.5	-9.1	41.35	13.18	41.07	13.65	40.74	14.13	40.57	14.37	40.40	14.61	40.03	15.10
	-7	-7.6	42.81	13.46	42.49	13.93	42.14	14.41	41.96	14.65	41.76	14.90	41.37	15.40
	-5	-5.6	44.80	13.85	44.45	14.33	44.06	14.81	43.86	15.05	43.65	15.30	42.31	15.02
	-3	-3.7	46.74	14.06	46.36	14.53	45.95	15.01	45.73	15.25	46.15	15.66	42.31	14.06
	0	-0.7	49.92	14.40	49.49	14.86	50.00	15.64	48.08	14.88	46.15	14.11	42.31	12.56
	3	2.2	52.59	14.46	52.13	14.92	50.00	14.15	48.08	13.41	46.15	12.67	42.31	11.23
	5	4.1	52.64	13.56	52.18	13.99	50.00	13.19	48.08	12.49	46.15	11.76	42.31	10.54
	7	6	54.20	13.47	53.85	13.66	50.00	12.26	48.08	11.57	46.15	10.91	42.31	9.74
	9	7.9	56.34	13.67	53.85	12.71	50.00	11.37	48.08	10.71	46.15	10.23	42.31	9.13
	11	9.8	57.69	13.10	53.85	11.78	50.00	10.56	48.08	10.04	46.15	9.52	42.31	8.52
	13	11.8	57.69	12.10	53.85	10.82	50.00	9.85	48.08	9.36	46.15	8.86	42.31	7.90
	15	13.7	57.69	11.14	53.85	10.13	50.00	9.30	48.08	8.80	46.15	8.31	42.31	7.37
90%	-25	-25.4	28.03	11.21	28.18	11.68	28.31	12.15	28.36	12.38	28.41	12.62	28.51	13.09
	-19.8	-20	31.43	11.70	31.39	12.16	31.32	12.63	31.28	12.86	31.23	13.09	31.13	13.57
	-18.8	-19	32.15	11.82	32.09	12.28	31.99	12.75	31.93	12.98	31.87	13.22	31.74	13.69
	-16.7	-17	33.68	12.10	33.56	12.56	33.41	13.02	33.32	13.26	33.23	13.49	33.04	13.97
	-13.7	-15	35.31	12.48	35.13	12.95	34.93	13.42	34.82	13.66	34.70	13.90	34.45	14.38
	-11.8	-13	37.02	12.80	36.80	13.26	36.54	13.74	36.41	13.98	36.27	14.22	35.98	14.71
	-9.8	-11	38.81	13.14	38.54	13.61	38.24	14.09	38.09	14.33	37.92	14.57	38.08	15.22
	-9.5	-10	39.73	13.26	39.44	13.73	39.12	14.20	38.96	14.44	38.78	14.69	38.08	14.82
	-8.5	-9.1	40.57	13.44	40.27	13.91	39.93	14.39	39.76	14.63	39.58	14.87	38.08	14.54
	-7	-7.6	42.01	13.73	41.68	14.20	41.31	14.68	41.12	14.93	41.54	15.36	38.08	13.98
	-5	-5.6	43.98	14.14	43.61	14.61	43.21	15.10	43.27	15.29	41.54	14.60	38.08	13.20
	-3	-3.7	45.91	14.35	45.51	14.83	45.00	15.02	43.27	14.35	41.54	13.67	38.08	12.27
	0	-0.7	49.05	14.71	48.46	14.83	45.00	13.54	43.27	12.88	41.54	12.21	38.08	10.94
	3	2.2	51.92	14.63	48.46	13.38	45.00	12.12	43.27	11.49	41.54	10.92	38.08	9.91
	5	4.1	51.92	13.67	48.46	12.47	45.00	11.24	43.27	10.72	41.54	10.23	38.08	9.28
	7	6	51.92	12.75	48.46	11.57	45.00	10.46	43.27	9.95	41.54	9.46	38.08	8.49
	9	7.9	51.92	11.83	48.46	10.66	45.00	9.73	43.27	9.28	41.54	8.88	38.08	7.97
	11	9.8	51.92	10.92	48.46	10.03	45.00	9.10	43.27	8.67	41.54	8.23	38.08	7.39
	13	11.8	51.92	10.13	48.46	9.31	45.00	8.45	43.27	8.04	41.54	7.64	38.08	6.84
	15	13.7	51.92	9.47	48.46	8.69	45.00	7.86	43.27	7.52	41.54	7.11	38.08	6.39
80%	-25	-25.4	27.51	11.42	27.66	11.89	27.77	12.36	27.83	12.60	27.88	12.84	27.98	13.32
	-19.8	-20	30.84	11.94	30.79	12.40	30.71	12.87	30.66	13.10	30.61	13.34	30.51	13.82
	-18.8	-19	31.55	12.07	31.47	12.53	31.36	13.00	31.30	13.23	31.23	13.47	31.10	13.94
	-16.7	-17	33.05	12.36	32.91	12.82	32.75	13.29	32.66	13.52	32.56	13.76	32.37	14.24
	-13.7	-15	34.65	12.76	34.46	13.22	34.24	13.70	34.12	13.94	34.00	14.18	33.85	14.65
	-11.8	-13	36.34	13.09	36.09	13.56	35.83	14.03	35.69	14.27	35.54	14.51	33.85	14.13
	-9.8	-11	38.10	13.45	37.81	13.92	37.50	14.40	37.34	14.64	36.92	14.61	33.85	13.50
	-9.5	-10	39.00	13.57	38.70	14.04	38.37	14.52	38.46	14.77	36.92	14.22	33.85	13.07
	-8.5	-9.1	39.84	13.76	39.51	14.23	40.00	15.03	38.46	14.49	36.92	13.92	33.85	12.75
	-7	-7.6	41.25	14.07	40.90	14.54	40.00	14.53	38.46	13.96	36.92	13.38	33.85	12.17
	-5	-5.6	43.20	14.49	43.08	14.92	40.00	13.79	38.46	13.19	36.92	12.60	33.85	11.37
	-3	-3.7	45.10	14.72	43.08	14.01	40.00	12.88	38.46	12.29	36.92	11.70	33.85	10.60
	0	-0.7	46.15	13.66	43.08	12.57	40.00	11.45	38.46	10.92	36.92	10.45	33.85	9.52
	3	2.2	46.15	12.27	43.08	11.22	40.00	10.30	38.46	9.87	36.92	9.45	33.85	8.61
	5	4.1	46.15	11.40	43.08	10.45	40.00	9.64	38.46	9.24	36.92	8.85	33.85	8.07
	7	6	46.15	10.56	43.08	9.72	40.00	8.87	38.46	8.45	36.92	8.04	33.85	7.25
	9	7.9	46.15	9.78	43.08	9.01	40.00	8.26	38.46	7.90	36.92	7.54	33.85	6.82
	11	9.8	46.15	9.15	43.08	8.40	40.00	7.72	38.46	7.33	36.92	6.99	33.85	6.34
	13	11.8	46.15	8.48	43.08	7.79	40.00	7.12	38.46	6.78	36.92	6.44	33.85	5.96
	15	13.7	46.15	7.90	43.08	7.25	40.00	6.57	38.46	6.27	36.92	6.06	33.85	5.61

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.12: 16HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-25	-25.4	27.10	11.70	27.23	12.17	27.34	12.65	27.39	12.88	27.45	13.12	27.56	13.61
	-19.8	-20	30.32	12.25	30.25	12.71	30.16	13.18	30.12	13.42	30.06	13.65	29.62	14.00
	-18.8	-19	31.02	12.39	30.92	12.85	30.80	13.32	30.73	13.55	30.67	13.79	29.62	13.85
	-16.7	-17	32.49	12.69	32.33	13.15	32.15	13.62	32.06	13.86	32.31	14.24	29.62	13.48
	-13.7	-15	34.05	13.11	33.84	13.58	33.61	14.06	33.65	14.32	32.31	13.92	29.62	13.07
	-11.8	-13	35.70	13.46	35.44	13.93	35.00	14.23	33.65	13.81	32.31	13.37	29.62	12.44
	-9.8	-11	37.42	13.85	37.69	14.52	35.00	13.64	33.65	13.19	32.31	12.72	29.62	11.72
	-9.5	-10	38.31	13.98	37.69	14.14	35.00	13.25	33.65	12.78	32.31	12.29	29.62	11.28
	-8.5	-9.1	39.13	14.18	37.69	13.86	35.00	12.94	33.65	12.46	32.31	11.97	29.62	10.94
	-7	-7.6	40.38	14.24	37.69	13.35	35.00	12.39	33.65	11.90	32.31	11.39	29.62	10.40
	-5	-5.6	40.38	13.54	37.69	12.60	35.00	11.62	33.65	11.12	32.31	10.65	29.62	9.74
	-3	-3.7	40.38	12.64	37.69	11.72	35.00	10.77	33.65	10.34	32.31	9.91	29.62	9.07
	0	-0.7	40.38	11.28	37.69	10.42	35.00	9.64	33.65	9.26	32.31	8.88	29.62	8.14
	3	2.2	40.38	10.08	37.69	9.38	35.00	8.69	33.65	8.35	32.31	8.03	29.62	7.38
	5	4.1	40.38	9.41	37.69	8.77	35.00	8.14	33.65	7.82	32.31	7.51	29.62	6.90
60%	7	6	40.38	8.69	37.69	7.99	35.00	7.33	33.65	7.00	32.31	6.72	29.62	6.17
	9	7.9	40.38	8.04	37.69	7.45	35.00	6.87	33.65	6.56	32.31	6.29	29.62	5.88
	11	9.8	40.38	7.48	37.69	6.91	35.00	6.33	33.65	6.12	32.31	5.93	29.62	5.55
	13	11.8	40.38	6.90	37.69	6.35	35.00	5.92	33.65	5.74	32.31	5.56	29.62	5.21
	15	13.7	40.38	6.37	37.69	5.93	35.00	5.58	33.65	5.42	32.31	5.23	29.62	4.88
	-25	-25.4	26.81	12.08	26.92	12.55	27.03	13.03	27.09	13.27	27.69	13.79	25.38	13.38
	-19.8	-20	29.88	12.67	29.80	13.13	30.00	13.74	28.85	13.49	27.69	13.23	25.38	12.67
	-18.8	-19	30.55	12.81	30.44	13.28	30.00	13.60	28.85	13.34	27.69	13.06	25.38	12.46
	-16.7	-17	31.97	13.14	32.31	13.82	30.00	13.25	28.85	12.95	27.69	12.63	25.38	11.96
	-13.7	-15	33.49	13.59	32.31	13.50	30.00	12.86	28.85	12.52	27.69	12.17	25.38	11.42
	-11.8	-13	34.62	13.62	32.31	12.96	30.00	12.25	28.85	11.89	27.69	11.50	25.38	10.69
	-9.8	-11	34.62	13.04	32.31	12.33	30.00	11.57	28.85	11.17	27.69	10.77	25.38	9.90
	-9.5	-10	34.62	12.65	32.31	11.93	30.00	11.15	28.85	10.74	27.69	10.32	25.38	9.49
	-8.5	-9.1	34.62	12.36	32.31	11.61	30.00	10.82	28.85	10.41	27.69	10.00	25.38	9.19
	-7	-7.6	34.62	11.83	32.31	11.05	30.00	10.25	28.85	9.86	27.69	9.48	25.38	8.73
50%	-5	-5.6	34.62	11.09	32.31	10.32	30.00	9.58	28.85	9.22	27.69	8.86	25.38	8.16
	-3	-3.7	34.62	10.26	32.31	9.56	30.00	8.90	28.85	8.56	27.69	8.24	25.38	7.59
	0	-0.7	34.62	9.13	32.31	8.54	30.00	7.95	28.85	7.66	27.69	7.37	25.38	6.96
	3	2.2	34.62	8.20	32.31	7.69	30.00	7.17	28.85	7.00	27.69	6.82	25.38	6.45
	5	4.1	34.62	7.66	32.31	7.18	30.00	6.81	28.85	6.54	27.69	6.27	25.38	5.74
	7	6	34.62	6.87	32.31	6.36	30.00	5.99	28.85	5.81	27.69	5.64	25.38	5.27
	9	7.9	34.62	6.38	32.31	5.99	30.00	5.68	28.85	5.53	27.69	5.38	25.38	5.07
	11	9.8	34.62	5.91	32.31	5.64	30.00	5.35	28.85	5.22	27.69	5.06	25.38	4.72
	13	11.8	34.62	5.55	32.31	5.29	30.00	5.03	28.85	4.90	27.69	4.74	25.38	4.41
	15	13.7	34.62	5.23	32.31	4.98	30.00	4.73	28.85	4.59	27.69	4.46	25.38	4.21
	-25	-25.4	26.65	12.62	26.92	13.21	25.00	12.93	24.04	12.79	23.08	12.63	21.15	12.30
	-19.8	-20	28.85	12.96	26.92	12.59	25.00	12.18	24.04	11.97	23.08	11.74	21.15	11.27
	-18.8	-19	28.85	12.80	26.92	12.40	25.00	11.97	24.04	11.74	23.08	11.50	21.15	10.99
	-16.7	-17	28.85	12.41	26.92	11.96	25.00	11.47	24.04	11.21	23.08	10.94	21.15	10.37
	-13.7	-15	28.85	12.00	26.92	11.49	25.00	10.93	24.04	10.64	23.08	10.34	21.15	9.60
	-11.8	-13	28.85	11.39	26.92	10.82	25.00	10.21	24.04	9.85	23.08	9.50	21.15	8.81
	-9.8	-11	28.85	10.71	26.92	10.08	25.00	9.40	24.04	9.07	23.08	8.75	21.15	8.12
	-9.5	-10	28.85	10.29	26.92	9.63	25.00	8.99	24.04	8.68	23.08	8.37	21.15	7.76
	-8.5	-9.1	28.85	9.94	26.92	9.30	25.00	8.68	24.04	8.38	23.08	8.09	21.15	7.51
	-7	-7.6	28.85	9.39	26.92	8.79	25.00	8.21	24.04	7.94	23.08	7.65	21.15	7.16
	-5	-5.6	28.85	8.72	26.92	8.18	25.00	7.66	24.04	7.40	23.08	7.20	21.15	6.81
	-3	-3.7	28.85	8.07	26.92	7.58	25.00	7.15	24.04	6.98	23.08	6.81	21.15	6.45
	0	-0.7	28.85	7.18	26.92	6.86	25.00	6.58	24.04	6.43	23.08	6.28	21.15	5.96
	3	2.2	28.85	6.59	26.92	6.35	25.00	6.10	24.04	5.97	23.08	5.83	21.15	5.55
	5	4.1	28.85	6.15	26.92	5.84	25.00	5.41	24.04	5.22	23.08	5.03	21.15	4.74
	7	6	28.85	5.44	26.92	5.21	25.00	4.95	24.04	4.82	23.08	4.69	21.15	4.41
	9	7.9	28.85	5.16	26.92	4.95	25.00	4.74	24.04	4.61	23.08	4.46	21.15	4.16
	11	9.8	28.85	4.84	26.92	4.66	25.00	4.42	24.04	4.30	23.08	4.17	21.15	3.90
	13	11.8	28.85	4.55	26.92	4.35	25.00	4.14	24.04	4.03	23.08	3.91	21.15	3.67
	15	13.7	28.85	4.27	26.92	4.10	25.00	3.93	24.04	3.82	23.08	3.71	21.15	3.49

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.13: 18HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-25	-25.4	37.67	12.00	38.02	12.56	38.32	13.11	39.39	13.64	38.59	13.66	37.91	13.94
	-19.8	-20	40.39	12.41	40.48	12.96	40.51	13.50	40.50	13.77	40.49	14.03	40.44	14.57
	-18.8	-19	40.84	12.46	40.89	13.01	40.87	13.55	40.85	13.81	40.81	14.08	40.72	14.61
	-16.7	-17	41.92	12.63	41.90	13.17	41.82	13.70	41.76	13.97	41.68	14.23	41.52	14.76
	-13.7	-15	43.22	12.93	43.14	13.47	43.00	14.00	42.90	14.27	42.80	14.54	42.57	15.07
	-11.8	-13	44.71	13.17	44.57	13.71	44.37	14.24	44.25	14.51	44.12	14.77	43.83	15.31
	-9.8	-11	46.35	13.47	46.17	14.00	45.92	14.53	45.77	14.79	45.62	15.06	45.28	15.60
	-9.5	-10	47.22	13.56	47.02	14.08	46.75	14.61	46.59	14.88	46.42	15.14	46.06	15.68
	-8.5	-9.1	48.03	13.72	47.81	14.24	47.52	14.77	47.35	15.04	47.18	15.30	46.80	15.84
	-7	-7.6	49.44	13.98	49.18	14.51	48.86	15.03	48.68	15.30	48.49	15.57	48.08	16.10
	-5	-5.6	51.41	14.35	51.12	14.88	50.76	15.41	50.56	15.68	50.35	15.94	49.90	16.49
	-3	-3.7	53.37	14.54	53.04	15.06	52.65	15.59	52.43	15.85	52.21	16.11	51.73	16.65
	0	-0.7	56.61	14.87	56.23	15.38	55.80	15.89	55.56	16.15	55.31	16.42	54.78	16.95
	3	2.2	59.41	14.96	59.00	15.45	58.53	15.95	58.27	16.21	58.01	16.46	57.45	16.99
	5	4.1	59.59	14.17	59.18	14.63	58.72	15.09	58.47	15.33	58.21	15.57	57.67	16.06
	7	6	61.29	14.11	60.86	14.56	60.39	15.02	60.13	15.25	59.86	15.48	59.30	15.97
	9	7.9	63.54	14.31	63.09	14.76	62.59	15.21	62.33	15.44	62.05	15.68	61.60	15.86
	11	9.8	65.82	14.51	65.35	14.96	64.84	15.41	64.56	15.64	64.27	15.88	61.60	14.82
	13	11.8	68.26	14.72	67.78	15.16	67.24	15.62	66.95	15.85	67.20	15.99	61.60	13.75
	15	13.7	70.61	14.92	70.11	15.36	69.55	15.81	70.00	16.03	67.20	14.93	61.60	12.76
120%	-25	-25.4	36.70	12.12	37.04	12.68	38.27	13.49	37.47	13.51	37.60	13.78	37.86	14.33
	-19.8	-20	39.37	12.54	39.44	13.09	39.46	13.63	39.45	13.90	39.43	14.16	39.38	14.70
	-18.8	-19	39.81	12.60	39.84	13.14	39.82	13.68	39.79	13.94	39.75	14.21	39.65	14.75
	-16.7	-17	40.88	12.77	40.84	13.30	40.75	13.83	40.68	14.10	40.60	14.36	40.43	14.90
	-13.7	-15	42.17	13.07	42.07	13.61	41.91	14.14	41.81	14.41	41.70	14.67	41.46	15.21
	-11.8	-13	43.64	13.32	43.49	13.85	43.27	14.38	43.15	14.65	43.01	14.91	42.71	15.45
	-9.8	-11	45.27	13.62	45.07	14.15	44.80	14.68	44.65	14.94	44.49	15.21	44.15	15.75
	-9.5	-10	46.13	13.71	45.91	14.24	45.62	14.76	45.46	15.03	45.29	15.29	44.92	15.83
	-8.5	-9.1	46.94	13.87	46.70	14.40	46.39	14.93	46.22	15.19	46.04	15.46	45.65	15.99
	-7	-7.6	48.34	14.14	48.06	14.67	47.73	15.19	47.54	15.46	47.35	15.73	46.93	16.27
	-5	-5.6	50.30	14.52	49.98	15.05	49.61	15.58	49.40	15.84	49.19	16.11	48.73	16.66
	-3	-3.7	52.24	14.72	51.90	15.24	51.49	15.76	51.27	16.02	51.04	16.29	50.55	16.83
	0	-0.7	55.47	15.05	55.08	15.56	54.62	16.08	54.38	16.34	54.12	16.60	53.59	17.14
	3	2.2	58.26	15.15	57.83	15.64	57.34	16.14	57.08	16.40	56.81	16.65	56.86	17.21
	5	4.1	58.44	14.34	58.01	14.80	57.54	15.27	57.28	15.51	57.01	15.75	56.86	16.13
	7	6	60.13	14.29	59.69	14.74	59.19	15.19	58.93	15.43	58.66	15.67	56.86	15.10
	9	7.9	62.37	14.49	61.91	14.94	61.39	15.40	61.12	15.63	62.03	16.18	56.86	14.07
	11	9.8	64.65	14.70	64.16	15.15	63.63	15.60	64.62	16.16	62.03	15.13	56.86	13.09
	13	11.8	67.08	14.92	66.57	15.36	67.20	16.06	64.62	15.06	62.03	14.05	56.86	12.08
	15	13.7	69.42	15.12	68.90	15.57	67.20	15.02	64.62	14.03	62.03	13.06	56.86	11.21
110%	-25	-25.4	35.84	12.27	37.08	13.08	36.45	13.38	35.68	13.39	35.79	13.66	36.98	14.48
	-19.8	-20	38.44	12.70	38.50	13.24	38.51	13.78	38.49	14.05	38.47	14.32	38.41	14.86
	-18.8	-19	38.87	12.76	38.89	13.30	38.85	13.83	38.82	14.10	38.77	14.37	38.67	14.90
	-16.7	-17	39.93	12.93	39.87	13.46	39.76	13.99	39.69	14.26	39.61	14.52	39.43	15.05
	-13.7	-15	41.20	13.24	41.08	13.77	40.90	14.31	40.80	14.57	40.69	14.84	40.44	15.37
	-11.8	-13	42.65	13.49	42.48	14.02	42.25	14.55	42.12	14.82	41.98	15.08	41.67	15.62
	-9.8	-11	44.27	13.80	44.04	14.32	43.76	14.85	43.61	15.12	43.44	15.38	43.09	15.92
	-9.5	-10	45.13	13.89	44.88	14.42	44.58	14.94	44.41	15.21	44.23	15.47	43.86	16.01
	-8.5	-9.1	45.93	14.06	45.66	14.58	45.34	15.11	45.16	15.37	44.97	15.64	44.58	16.18
	-7	-7.6	47.32	14.33	47.02	14.86	46.66	15.38	46.47	15.65	46.27	15.92	45.84	16.46
	-5	-5.6	49.26	14.72	48.92	15.25	48.53	15.78	48.32	16.04	48.10	16.31	47.63	16.86
	-3	-3.7	51.19	14.92	50.82	15.44	50.40	15.96	50.17	16.23	49.93	16.50	49.44	17.04
	0	-0.7	54.40	15.27	53.98	15.78	53.51	16.29	53.26	16.56	53.00	16.82	52.12	16.83
	3	2.2	57.17	15.37	56.71	15.86	56.21	16.37	55.94	16.62	55.66	16.88	52.12	15.25
	5	4.1	57.36	14.55	56.91	15.01	56.41	15.48	56.15	15.72	56.86	16.20	52.12	14.25
	7	6	59.04	14.49	58.57	14.95	58.06	15.41	57.79	15.64	56.86	15.16	52.12	13.26
	9	7.9	61.27	14.71	60.78	15.16	60.25	15.62	59.23	15.08	56.86	14.15	52.12	12.34
	11	9.8	63.53	14.92	63.02	15.37	61.60	14.98	59.23	14.09	56.86	13.18	52.12	11.40
	13	11.8	65.95	15.15	66.34	15.69	61.60	13.93	59.23	13.05	56.86	12.16	52.12	10.63
	15	13.7	68.29	15.36	66.34	14.66	61.60	12.92	59.23	12.08	56.86	11.23	52.12	10.00

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.13: 18HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	35.99	12.70	35.40	13.01	34.77	13.29	34.89	13.56	35.95	14.11	35.24	14.38
	-19.8	-20	37.61	12.89	37.65	13.43	37.64	13.97	37.62	14.23	37.60	14.50	37.54	15.04
	-18.8	-19	38.03	12.95	38.03	13.48	37.97	14.02	37.93	14.28	37.89	14.55	37.78	15.09
	-16.7	-17	39.06	13.12	38.98	13.65	38.85	14.18	38.78	14.45	38.69	14.71	38.51	15.25
	-13.7	-15	40.31	13.44	40.17	13.97	39.98	14.50	39.87	14.77	39.75	15.03	39.50	15.57
	-11.8	-13	41.75	13.70	41.55	14.23	41.30	14.76	41.16	15.02	41.02	15.29	40.71	15.83
	-9.8	-11	43.34	14.01	43.10	14.54	42.80	15.06	42.64	15.33	42.46	15.60	42.10	16.14
	-9.5	-10	44.19	14.11	43.92	14.63	43.60	15.16	43.43	15.42	43.24	15.69	42.86	16.23
	-8.5	-9.1	44.98	14.28	44.69	14.80	44.36	15.33	44.17	15.59	43.98	15.86	43.58	16.40
	-7	-7.6	46.36	14.56	46.04	15.08	45.67	15.61	45.47	15.88	45.26	16.14	44.83	16.69
	-5	-5.6	48.29	14.96	47.93	15.49	47.51	16.01	47.30	16.28	47.07	16.55	47.38	17.34
	-3	-3.7	50.20	15.17	49.81	15.69	49.37	16.21	49.13	16.48	48.89	16.74	47.38	16.38
	0	-0.7	53.39	15.53	52.94	16.04	52.45	16.55	52.19	16.82	51.69	16.63	47.38	14.81
	3	2.2	56.13	15.63	55.65	16.13	56.00	16.83	53.85	15.95	51.69	15.07	47.38	13.33
	5	4.1	56.33	14.79	55.85	15.26	56.00	15.79	53.85	14.93	51.69	14.09	47.38	12.39
	7	6	58.00	14.74	57.51	15.20	56.00	14.77	53.85	13.94	51.69	13.11	47.38	11.49
	9	7.9	60.21	14.97	60.31	15.40	56.00	13.79	53.85	12.98	51.69	12.18	47.38	10.68
	11	9.8	62.47	15.19	60.31	14.39	56.00	12.84	53.85	12.04	51.69	11.27	47.38	10.00
	13	11.8	64.62	14.92	60.31	13.35	56.00	11.82	53.85	11.08	51.69	10.49	47.38	9.32
	15	13.7	64.62	13.90	60.31	12.38	56.00	10.93	53.85	10.38	51.69	9.85	47.38	8.73
90%	-25	-25.4	34.45	12.67	35.71	13.51	35.03	13.78	34.21	13.77	34.33	14.05	34.58	14.59
	-19.8	-20	36.88	13.12	36.89	13.66	36.87	14.19	36.85	14.46	36.82	14.73	36.76	15.27
	-18.8	-19	37.28	13.18	37.25	13.71	37.18	14.25	37.14	14.51	37.09	14.78	36.98	15.32
	-16.7	-17	38.28	13.36	38.18	13.89	38.03	14.41	37.95	14.68	37.86	14.95	37.67	15.48
	-13.7	-15	39.50	13.68	39.34	14.21	39.13	14.74	39.01	15.01	38.89	15.28	38.63	15.81
	-11.8	-13	40.91	13.95	40.69	14.48	40.43	15.00	40.28	15.27	40.13	15.54	39.82	16.08
	-9.8	-11	42.49	14.27	42.21	14.79	41.90	15.32	41.73	15.59	41.55	15.86	41.19	16.40
	-9.5	-10	43.32	14.37	43.03	14.89	42.69	15.42	42.51	15.69	42.32	15.95	42.65	16.75
	-8.5	-9.1	44.11	14.55	43.79	15.07	43.43	15.60	43.24	15.86	43.05	16.13	42.65	16.50
	-7	-7.6	45.47	14.84	45.12	15.36	44.73	15.89	44.52	16.16	44.31	16.42	42.65	16.02
	-5	-5.6	47.37	15.25	46.98	15.78	46.56	16.31	46.33	16.58	46.52	16.87	42.65	15.27
	-3	-3.7	49.27	15.47	48.85	15.99	48.38	16.51	48.46	16.72	46.52	15.93	42.65	14.33
	0	-0.7	52.42	15.84	51.95	16.35	50.40	15.94	48.46	15.17	46.52	14.38	42.65	12.82
	3	2.2	55.14	15.96	54.28	15.93	50.40	14.43	48.46	13.68	46.52	12.93	42.65	11.43
	5	4.1	55.34	15.10	54.28	14.92	50.40	13.46	48.46	12.74	46.52	12.03	42.65	10.71
	7	6	58.15	15.36	54.28	13.95	50.40	12.54	48.46	11.83	46.52	11.14	42.65	9.95
	9	7.9	58.15	14.37	54.28	12.99	50.40	11.65	48.46	10.94	46.52	10.36	42.65	9.28
	11	9.8	58.15	13.41	54.28	12.07	50.40	10.75	48.46	10.22	46.52	9.70	42.65	8.67
	13	11.8	58.15	12.40	54.28	11.08	50.40	10.03	48.46	9.53	46.52	9.03	42.65	8.06
	15	13.7	58.15	11.45	54.28	10.33	50.40	9.42	48.46	8.92	46.52	8.43	42.65	7.49
80%	-25	-25.4	34.89	13.23	34.23	13.51	33.55	13.77	33.67	14.04	33.79	14.32	33.27	14.62
	-19.8	-20	36.24	13.41	36.23	13.94	36.20	14.48	36.17	14.75	36.14	15.02	36.08	15.57
	-18.8	-19	36.61	13.47	36.57	14.00	36.49	14.53	36.44	14.80	36.38	15.07	36.28	15.61
	-16.7	-17	37.57	13.65	37.45	14.18	37.29	14.71	37.20	14.97	37.11	15.24	36.92	15.78
	-13.7	-15	38.77	13.99	38.58	14.51	38.35	15.04	38.23	15.31	38.10	15.58	37.91	16.09
	-11.8	-13	40.15	14.26	39.90	14.79	39.62	15.32	39.47	15.58	39.31	15.85	37.91	15.71
	-9.8	-11	41.69	14.59	41.39	15.12	41.06	15.65	40.88	15.91	41.35	16.42	37.91	15.19
	-9.5	-10	42.51	14.70	42.19	15.22	41.84	15.75	41.65	16.01	41.35	16.07	37.91	14.80
	-8.5	-9.1	43.28	14.88	42.94	15.41	42.57	15.93	43.08	16.44	41.35	15.83	37.91	14.52
	-7	-7.6	44.62	15.19	44.25	15.71	43.84	16.24	43.08	15.98	41.35	15.33	37.91	13.97
	-5	-5.6	46.50	15.62	46.08	16.14	44.80	15.92	43.08	15.27	41.35	14.59	37.91	13.20
	-3	-3.7	48.37	15.84	48.25	16.31	44.80	15.00	43.08	14.34	41.35	13.65	37.91	12.27
	0	-0.7	51.69	16.08	48.25	14.81	44.80	13.51	43.08	12.85	41.35	12.21	37.91	10.93
	3	2.2	51.69	14.61	48.25	13.37	44.80	12.12	43.08	11.49	41.35	10.90	37.91	9.89
	5	4.1	51.69	13.66	48.25	12.45	44.80	11.23	43.08	10.70	41.35	10.22	37.91	9.27
	7	6	51.69	12.73	48.25	11.56	44.80	10.44	43.08	9.93	41.35	9.43	37.91	8.46
	9	7.9	51.69	11.81	48.25	10.65	44.80	9.72	43.08	9.27	41.35	8.86	37.91	7.95
	11	9.8	51.69	10.91	48.25	10.02	44.80	9.07	43.08	8.64	41.35	8.22	37.91	7.37
	13	11.8	51.69	10.12	48.25	9.29	44.80	8.44	43.08	8.01	41.35	7.62	37.91	6.82
	15	13.7	51.69	9.46	48.25	8.66	44.80	7.84	43.08	7.48	41.35	7.07	37.91	6.36

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

Table 2-9.13: 18HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-25	-25.4	32.65	13.02	32.91	13.57	32.59	13.94	32.70	14.21	32.63	14.42	33.17	15.16
	-19.8	-20	35.69	13.78	35.67	14.31	35.62	14.85	35.59	15.12	36.18	15.66	33.17	15.00
	-18.8	-19	36.04	13.84	35.97	14.37	35.88	14.90	35.83	15.17	36.18	15.62	33.17	14.92
	-16.7	-17	36.95	14.03	36.80	14.55	36.63	15.08	36.54	15.35	36.18	15.47	33.17	14.67
	-13.7	-15	38.10	14.38	37.88	14.90	37.64	15.43	37.69	15.73	36.18	15.30	33.17	14.39
	-11.8	-13	39.44	14.66	39.16	15.19	39.20	15.80	37.69	15.35	36.18	14.87	33.17	13.86
	-9.8	-11	40.94	15.01	40.62	15.53	39.20	15.33	37.69	14.84	36.18	14.31	33.17	13.22
	-9.5	-10	41.74	15.12	42.22	15.95	39.20	14.97	37.69	14.45	36.18	13.92	33.17	12.80
	-8.5	-9.1	42.50	15.31	42.22	15.72	39.20	14.71	37.69	14.18	36.18	13.63	33.17	12.49
	-7	-7.6	43.80	15.63	42.22	15.26	39.20	14.20	37.69	13.64	36.18	13.08	33.17	11.91
	-5	-5.6	45.23	15.61	42.22	14.56	39.20	13.47	37.69	12.90	36.18	12.31	33.17	11.13
	-3	-3.7	45.23	14.73	42.22	13.66	39.20	12.55	37.69	11.99	36.18	11.42	33.17	10.36
	0	-0.7	45.23	13.29	42.22	12.23	39.20	11.15	37.69	10.67	36.18	10.21	33.17	9.30
	3	2.2	45.23	11.93	42.22	10.90	39.20	10.04	37.69	9.63	36.18	9.22	33.17	8.41
	5	4.1	45.23	11.06	42.22	10.17	39.20	9.39	37.69	9.02	36.18	8.63	33.17	7.87
	7	6	45.23	10.27	42.22	9.43	39.20	8.62	37.69	8.22	36.18	7.82	33.17	7.05
60%	9	7.9	45.23	9.50	42.22	8.77	39.20	8.03	37.69	7.68	36.18	7.33	33.17	6.63
	11	9.8	45.23	8.93	42.22	8.17	39.20	7.47	37.69	7.13	36.18	6.80	33.17	6.21
	13	11.8	45.23	8.23	42.22	7.55	39.20	6.91	37.69	6.62	36.18	6.29	33.17	5.83
	15	13.7	45.23	7.65	42.22	7.04	39.20	6.38	37.69	6.12	36.18	5.91	33.17	5.48
	-25	-25.4	32.06	13.37	32.11	13.85	32.16	14.33	32.31	14.69	31.02	14.48	28.43	14.06
	-19.8	-20	35.25	14.27	35.21	14.81	33.60	14.72	32.31	14.46	31.02	14.18	28.43	13.58
	-18.8	-19	35.56	14.33	36.18	15.17	33.60	14.64	32.31	14.36	31.02	14.06	28.43	13.42
	-16.7	-17	36.40	14.53	36.18	15.01	33.60	14.41	32.31	14.09	31.02	13.75	28.43	13.02
	-13.7	-15	37.48	14.89	36.18	14.83	33.60	14.15	32.31	13.78	31.02	13.40	28.43	12.58
	-11.8	-13	38.77	15.11	36.18	14.40	33.60	13.65	32.31	13.24	31.02	12.82	28.43	11.93
	-9.8	-11	38.77	14.64	36.18	13.87	33.60	13.03	32.31	12.60	31.02	12.15	28.43	11.21
	-9.5	-10	38.77	14.29	36.18	13.49	33.60	12.64	32.31	12.19	31.02	11.73	28.43	10.76
	-8.5	-9.1	38.77	14.03	36.18	13.20	33.60	12.33	32.31	11.87	31.02	11.40	28.43	10.43
	-7	-7.6	38.77	13.54	36.18	12.68	33.60	11.78	32.31	11.31	31.02	10.82	28.43	9.91
	-5	-5.6	38.77	12.82	36.18	11.93	33.60	11.01	32.31	10.56	31.02	10.13	28.43	9.28
	-3	-3.7	38.77	11.95	36.18	11.06	33.60	10.21	32.31	9.82	31.02	9.41	28.43	8.63
50%	0	-0.7	38.77	10.61	36.18	9.85	33.60	9.14	32.31	8.77	31.02	8.43	28.43	7.74
	3	2.2	38.77	9.51	36.18	8.87	33.60	8.23	32.31	7.92	31.02	7.60	28.43	7.08
	5	4.1	38.77	8.89	36.18	8.28	33.60	7.70	32.31	7.41	31.02	7.14	28.43	6.52
	7	6	38.77	8.13	36.18	7.50	33.60	6.89	32.31	6.59	31.02	6.32	28.43	5.89
	9	7.9	38.77	7.55	36.18	6.99	33.60	6.43	32.31	6.18	31.02	6.01	28.43	5.64
	11	9.8	38.77	7.04	36.18	6.47	33.60	6.00	32.31	5.83	31.02	5.66	28.43	5.28
	13	11.8	38.77	6.43	36.18	5.97	33.60	5.64	32.31	5.49	31.02	5.30	28.43	4.96
	15	13.7	38.77	5.93	36.18	5.62	33.60	5.31	32.31	5.15	31.02	4.99	28.43	4.68
	-25	-25.4	32.31	14.17	30.15	13.87	28.00	13.57	26.92	13.42	25.85	13.25	23.69	12.88
	-19.8	-20	32.31	13.88	30.15	13.48	28.00	13.05	26.92	12.82	25.85	12.58	23.69	12.06
	-18.8	-19	32.31	13.77	30.15	13.35	28.00	12.88	26.92	12.64	25.85	12.38	23.69	11.82
	-16.7	-17	32.31	13.49	30.15	13.01	28.00	12.48	26.92	12.20	25.85	11.90	23.69	11.28
	-13.7	-15	32.31	13.19	30.15	12.63	28.00	12.04	26.92	11.72	25.85	11.40	23.69	10.70
	-11.8	-13	32.31	12.66	30.15	12.05	28.00	11.40	26.92	11.05	25.85	10.69	23.69	9.90
	-9.8	-11	32.31	12.05	30.15	11.39	28.00	10.69	26.92	10.31	25.85	9.91	23.69	9.14
	-9.5	-10	32.31	11.66	30.15	10.98	28.00	10.25	26.92	9.87	25.85	9.49	23.69	8.76
	-8.5	-9.1	32.31	11.35	30.15	10.66	28.00	9.92	26.92	9.54	25.85	9.18	23.69	8.48
	-7	-7.6	32.31	10.81	30.15	10.09	28.00	9.39	26.92	9.04	25.85	8.69	23.69	8.03
	-5	-5.6	32.31	10.07	30.15	9.40	28.00	8.75	26.92	8.44	25.85	8.12	23.69	7.49
	-3	-3.7	32.31	9.31	30.15	8.70	28.00	8.12	26.92	7.82	25.85	7.54	23.69	7.07
	0	-0.7	32.31	8.28	30.15	7.76	28.00	7.24	26.92	7.05	25.85	6.88	23.69	6.51
	3	2.2	32.31	7.44	30.15	6.97	28.00	6.68	26.92	6.53	25.85	6.37	23.69	6.04
	5	4.1	32.31	6.94	30.15	6.63	28.00	6.14	26.92	5.91	25.85	5.68	23.69	5.23
	7	6	32.31	6.12	30.15	5.81	28.00	5.52	26.92	5.37	25.85	5.21	23.69	4.89
	9	7.9	32.31	5.76	30.15	5.51	28.00	5.24	26.92	5.11	25.85	4.98	23.69	4.66
	11	9.8	32.31	5.42	30.15	5.20	28.00	4.94	26.92	4.82	25.85	4.67	23.69	4.35
	13	11.8	32.31	5.08	30.15	4.88	28.00	4.63	26.92	4.50	25.85	4.36	23.69	4.08
	15	13.7	32.31	4.78	30.15	4.57	28.00	4.36	26.92	4.24	25.85	4.14	23.69	3.88

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.14: 20HP heating capacity

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-25	-25.4	37.67	12.01	38.02	12.57	38.32	13.12	38.45	13.39	38.59	13.66	37.91	13.95
	-19.8	-20	43.30	13.31	43.44	13.90	43.50	14.49	43.52	14.78	43.53	15.07	43.52	15.65
	-18.8	-19	43.51	13.32	43.59	13.91	43.60	14.49	43.59	14.77	43.57	15.06	43.50	15.63
	-16.7	-17	44.22	13.42	44.21	14.00	44.13	14.57	44.08	14.85	44.01	15.13	43.84	15.70
	-13.7	-15	45.25	13.68	45.17	14.26	45.02	14.83	44.93	15.11	44.82	15.39	44.58	15.96
	-11.8	-13	46.53	13.90	46.40	14.47	46.19	15.03	46.06	15.31	45.92	15.60	45.62	16.16
	-9.8	-11	48.03	14.18	47.84	14.74	47.58	15.30	47.43	15.58	47.26	15.87	46.91	16.43
	-9.5	-10	48.85	14.26	48.63	14.82	48.35	15.38	48.19	15.66	48.01	15.94	47.63	16.50
	-8.5	-9.1	49.62	14.42	49.39	14.98	49.08	15.54	48.90	15.82	48.72	16.10	48.32	16.66
	-7	-7.6	50.97	14.69	50.70	15.25	50.37	15.80	50.18	16.08	49.97	16.36	49.54	16.93
	-5	-5.6	52.89	15.08	52.58	15.63	52.21	16.19	52.00	16.47	51.78	16.75	51.30	17.32
	-3	-3.7	54.82	15.27	54.48	15.82	54.07	16.37	53.84	16.64	53.60	16.92	53.10	17.48
	0	-0.7	58.05	15.61	57.66	16.15	57.20	16.69	56.95	16.96	56.69	17.23	56.14	17.79
	3	2.2	61.35	15.98	60.92	16.50	60.42	17.03	60.15	17.30	59.86	17.57	59.28	18.13
	5	4.1	63.60	16.23	63.14	16.75	62.61	17.27	62.33	17.54	62.04	17.81	61.42	18.36
	7	6	65.90	16.48	65.41	17.00	64.86	17.52	64.57	17.79	64.27	18.05	63.63	18.61
	9	7.9	68.24	16.74	67.73	17.25	67.17	17.77	66.87	18.04	66.55	18.31	65.89	18.86
	11	9.8	70.63	17.01	70.10	17.51	69.52	18.03	69.21	18.29	68.88	18.56	69.30	19.34
	13	11.8	73.19	17.28	72.66	17.79	72.05	18.30	71.72	18.57	71.39	18.83	69.30	18.06
	15	13.7	75.66	17.55	75.11	18.05	74.48	18.56	74.14	18.83	73.80	19.09	69.30	16.92
120%	-25	-25.4	36.70	12.13	37.04	12.69	37.33	13.24	37.47	13.52	36.69	13.53	37.86	14.34
	-19.8	-20	42.31	13.47	42.42	14.06	42.48	14.64	42.49	14.94	42.49	15.23	42.49	15.81
	-18.8	-19	42.50	13.48	42.56	14.06	42.56	14.64	42.54	14.93	42.52	15.21	42.45	15.79
	-16.7	-17	43.19	13.57	43.16	14.15	43.07	14.72	43.00	15.00	42.93	15.28	42.76	15.85
	-13.7	-15	44.20	13.84	44.10	14.42	43.94	14.98	43.83	15.27	43.72	15.55	43.47	16.11
	-11.8	-13	45.47	14.06	45.31	14.63	45.08	15.19	44.95	15.47	44.81	15.75	44.50	16.32
	-9.8	-11	46.95	14.35	46.74	14.91	46.46	15.47	46.30	15.75	46.13	16.03	45.77	16.60
	-9.5	-10	47.76	14.43	47.53	14.99	47.22	15.55	47.05	15.83	46.87	16.11	46.48	16.67
	-8.5	-9.1	48.53	14.60	48.27	15.15	47.95	15.71	47.77	15.99	47.57	16.27	47.16	16.83
	-7	-7.6	49.87	14.87	49.58	15.42	49.22	15.98	49.03	16.26	48.82	16.54	48.38	17.10
	-5	-5.6	51.78	15.26	51.45	15.81	51.05	16.37	50.83	16.65	50.61	16.93	50.13	17.50
	-3	-3.7	53.70	15.46	53.33	16.00	52.90	16.55	52.67	16.83	52.42	17.11	51.91	17.67
	0	-0.7	56.91	15.81	56.49	16.34	56.01	16.88	55.76	17.16	55.49	17.43	54.93	17.99
	3	2.2	60.20	16.18	59.73	16.71	59.21	17.24	58.94	17.51	58.65	17.78	58.05	18.34
	5	4.1	62.43	16.44	61.94	16.96	61.40	17.49	61.11	17.75	60.81	18.03	60.18	18.58
	7	6	64.71	16.70	64.20	17.22	63.64	17.74	63.34	18.01	63.03	18.28	62.38	18.84
	9	7.9	67.05	16.97	66.53	17.48	65.93	18.00	65.62	18.27	65.30	18.54	63.97	18.25
	11	9.8	69.43	17.24	68.89	17.75	68.28	18.27	67.95	18.54	67.62	18.81	63.97	17.09
	13	11.8	71.99	17.52	71.42	18.03	70.78	18.55	70.45	18.82	69.78	18.44	63.97	15.92
	15	13.7	74.45	17.79	73.86	18.30	73.21	18.82	72.69	18.51	69.78	17.26	63.97	14.85
110%	-25	-25.4	35.84	12.28	36.17	12.84	36.45	13.39	35.68	13.40	35.79	13.67	36.02	14.21
	-19.8	-20	41.41	13.65	41.50	14.25	41.55	14.83	41.55	15.12	41.55	15.41	41.55	15.99
	-18.8	-19	41.58	13.66	41.63	14.24	41.61	14.82	41.59	15.11	41.56	15.39	41.48	15.97
	-16.7	-17	42.24	13.76	42.19	14.33	42.09	14.90	42.02	15.18	41.94	15.46	41.76	16.03
	-13.7	-15	43.23	14.03	43.11	14.60	42.93	15.17	42.82	15.45	42.71	15.73	42.45	16.30
	-11.8	-13	44.48	14.26	44.30	14.82	44.06	15.38	43.92	15.66	43.77	15.94	43.45	16.51
	-9.8	-11	45.95	14.54	45.71	15.10	45.42	15.66	45.25	15.94	45.08	16.22	44.71	16.79
	-9.5	-10	46.75	14.63	46.49	15.19	46.17	15.74	45.99	16.02	45.81	16.30	45.41	16.87
	-8.5	-9.1	47.51	14.80	47.23	15.35	46.89	15.91	46.70	16.19	46.50	16.47	46.08	17.03
	-7	-7.6	48.84	15.08	48.53	15.63	48.15	16.18	47.95	16.46	47.73	16.74	47.28	17.31
	-5	-5.6	50.73	15.48	50.38	16.03	49.96	16.59	49.74	16.87	49.51	17.15	49.02	17.72
	-3	-3.7	52.64	15.68	52.25	16.23	51.80	16.78	51.56	17.05	51.31	17.33	50.79	17.90
	0	-0.7	55.83	16.04	55.39	16.58	54.89	17.12	54.62	17.39	54.35	17.67	53.78	18.23
	3	2.2	59.09	16.42	58.61	16.95	58.07	17.48	57.78	17.76	57.49	18.03	56.88	18.59
	5	4.1	61.31	16.69	60.80	17.21	60.23	17.74	59.94	18.01	59.63	18.29	58.64	18.21
	7	6	63.59	16.96	63.05	17.48	62.46	18.01	62.15	18.28	61.83	18.55	58.64	17.05
	9	7.9	65.91	17.23	65.35	17.75	64.74	18.28	64.41	18.55	63.97	18.31	58.64	15.96
	11	9.8	68.28	17.51	67.69	18.03	67.07	18.55	66.63	18.31	63.97	17.17	58.64	14.89
	13	11.8	70.81	17.81	70.22	18.32	69.30	18.24	66.63	17.10	63.97	15.99	58.64	13.82
	15	13.7	73.26	18.09	72.65	18.60	69.30	17.08	66.63	16.00	63.97	14.93	58.64	12.81

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.



Table 2-9.14: 20HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
100%	-25	-25.4	35.09	12.46	35.40	13.02	34.77	13.30	35.81	13.85	35.95	14.12	36.22	14.68
	-19.8	-20	40.61	13.88	40.68	14.47	40.71	15.05	40.72	15.34	40.71	15.63	40.71	16.22
	-18.8	-19	40.76	13.88	40.78	14.46	40.75	15.04	40.72	15.32	40.69	15.61	40.62	16.19
	-16.7	-17	41.39	13.98	41.32	14.55	41.19	15.12	41.12	15.40	41.03	15.68	40.85	16.25
	-13.7	-15	42.35	14.26	42.20	14.82	42.01	15.39	41.89	15.67	41.77	15.95	41.51	16.52
	-11.8	-13	43.58	14.49	43.37	15.05	43.11	15.61	42.96	15.89	42.81	16.17	42.49	16.73
	-9.8	-11	45.02	14.78	44.76	15.34	44.45	15.90	44.27	16.18	44.09	16.46	43.71	17.02
	-9.5	-10	45.82	14.87	45.53	15.43	45.19	15.98	45.00	16.26	44.81	16.54	44.41	17.10
	-8.5	-9.1	46.56	15.04	46.26	15.60	45.90	16.15	45.70	16.43	45.50	16.71	45.07	17.28
	-7	-7.6	47.88	15.33	47.54	15.88	47.15	16.43	46.93	16.71	46.71	16.99	46.26	17.56
	-5	-5.6	49.75	15.74	49.37	16.29	48.94	16.84	48.71	17.12	48.46	17.41	47.97	17.98
	-3	-3.7	51.64	15.95	51.22	16.49	50.75	17.04	50.51	17.32	50.25	17.60	49.72	18.17
	0	-0.7	54.80	16.32	54.33	16.86	53.81	17.40	53.54	17.67	53.26	17.95	53.31	18.60
	3	2.2	58.04	16.72	57.53	17.24	56.97	17.78	56.67	18.05	56.37	18.33	53.31	16.90
	5	4.1	60.24	16.99	59.70	17.51	59.12	18.05	58.81	18.32	58.15	17.99	53.31	15.81
	7	6	62.50	17.27	61.93	17.79	63.00	18.33	60.58	17.91	58.15	16.85	53.31	14.77
	9	7.9	64.81	17.56	64.22	18.08	63.00	17.83	60.58	16.79	58.15	15.77	53.31	13.76
	11	9.8	67.16	17.85	67.85	18.73	63.00	16.70	60.58	15.70	58.15	14.72	53.31	12.79
	13	11.8	69.67	18.15	67.85	17.50	63.00	15.54	60.58	14.60	58.15	13.65	53.31	11.79
	15	13.7	72.69	18.32	67.85	16.40	63.00	14.52	60.58	13.57	58.15	12.66	53.31	11.06
90%	-25	-25.4	34.45	12.68	35.71	13.52	35.03	13.79	34.21	13.78	34.33	14.06	34.58	14.60
	-19.8	-20	39.91	14.15	39.96	14.74	39.98	15.32	39.98	15.61	39.98	15.90	39.98	16.49
	-18.8	-19	40.03	14.15	40.03	14.73	39.99	15.30	39.95	15.59	39.92	15.88	39.85	16.46
	-16.7	-17	40.62	14.25	40.52	14.82	40.38	15.38	40.30	15.66	40.21	15.95	40.03	16.52
	-13.7	-15	41.55	14.53	41.37	15.10	41.16	15.66	41.04	15.94	40.91	16.22	40.65	16.79
	-11.8	-13	42.74	14.77	42.51	15.32	42.23	15.88	42.08	16.16	41.92	16.44	41.59	17.01
	-9.8	-11	44.16	15.07	43.87	15.62	43.54	16.18	43.36	16.46	43.17	16.74	42.79	17.31
	-9.5	-10	44.94	15.16	44.63	15.71	44.27	16.27	44.08	16.55	43.88	16.83	43.47	17.39
	-8.5	-9.1	45.68	15.34	45.34	15.89	44.96	16.44	44.76	16.72	44.55	17.00	44.12	17.57
	-7	-7.6	46.98	15.63	46.61	16.18	46.19	16.74	45.98	17.02	45.75	17.30	45.29	17.87
	-5	-5.6	48.82	16.05	48.41	16.60	47.96	17.16	47.72	17.44	47.48	17.73	47.98	18.69
	-3	-3.7	50.69	16.27	50.24	16.82	49.75	17.37	49.50	17.65	49.24	17.93	47.98	17.73
	0	-0.7	53.82	16.66	53.32	17.20	52.78	17.74	52.51	18.02	52.34	18.05	47.98	16.08
	3	2.2	57.02	17.07	56.48	17.60	56.70	18.30	54.52	17.35	52.34	16.40	47.98	14.50
	5	4.1	59.20	17.36	58.63	17.89	56.70	17.19	54.52	16.25	52.34	15.33	47.98	13.52
	7	6	61.44	17.65	61.06	17.92	56.70	16.10	54.52	15.21	52.34	14.33	47.98	12.55
	9	7.9	63.72	17.95	61.06	16.81	56.70	15.05	54.52	14.19	52.34	13.33	47.98	11.65
	11	9.8	65.42	17.44	61.06	15.72	56.70	14.04	54.52	13.21	52.34	12.37	47.98	10.87
	13	11.8	65.42	16.29	61.06	14.64	56.70	13.01	54.52	12.19	52.34	11.42	47.98	10.16
	15	13.7	65.42	15.23	61.06	13.62	56.70	12.02	54.52	11.29	52.34	10.72	47.98	9.51
80%	-25	-25.4	33.94	12.96	33.31	13.24	34.51	14.07	34.65	14.35	33.79	14.33	34.05	14.88
	-19.8	-20	39.31	14.50	39.34	15.08	39.35	15.66	39.35	15.95	39.35	16.25	39.37	16.85
	-18.8	-19	39.40	14.49	39.37	15.07	39.32	15.64	39.29	15.93	39.25	16.22	39.19	16.81
	-16.7	-17	39.93	14.59	39.81	15.15	39.65	15.71	39.56	16.00	39.48	16.28	39.30	16.85
	-13.7	-15	40.81	14.87	40.62	15.43	40.38	15.99	40.25	16.28	40.13	16.56	39.86	17.13
	-11.8	-13	41.97	15.11	41.71	15.67	41.41	16.23	41.26	16.51	41.09	16.79	40.76	17.36
	-9.8	-11	43.36	15.43	43.04	15.98	42.69	16.54	42.50	16.82	42.31	17.10	42.65	17.95
	-9.5	-10	44.12	15.53	43.78	16.08	43.40	16.63	43.20	16.91	43.00	17.19	42.65	17.63
	-8.5	-9.1	44.84	15.71	44.48	16.26	44.08	16.81	43.87	17.09	43.66	17.37	42.65	17.40
	-7	-7.6	46.12	16.01	45.72	16.56	45.29	17.11	45.06	17.40	44.83	17.68	42.65	16.92
	-5	-5.6	47.93	16.45	47.50	17.00	47.02	17.56	46.78	17.84	46.52	17.86	42.65	16.18
	-3	-3.7	49.77	16.68	49.30	17.23	48.79	17.78	48.46	17.73	46.52	16.89	42.65	15.20
	0	-0.7	52.85	17.09	52.33	17.63	50.40	16.95	48.46	16.13	46.52	15.30	42.65	13.63
	3	2.2	56.01	17.52	54.28	16.94	50.40	15.35	48.46	14.56	46.52	13.77	42.65	12.17
	5	4.1	58.15	17.43	54.28	15.88	50.40	14.35	48.46	13.58	46.52	12.80	42.65	11.35
	7	6	58.15	16.37	54.28	14.86	50.40	13.37	48.46	12.63	46.52	11.88	42.65	10.57
	9	7.9	58.15	15.32	54.28	13.87	50.40	12.42	48.46	11.71	46.52	11.02	42.65	9.89
	11	9.8	58.15	14.30	54.28	12.89	50.40	11.49	48.46	10.87	46.52	10.40	42.65	9.29
	13	11.8	58.15	13.28	54.28	11.89	50.40	10.75	48.46	10.20	46.52	9.65	42.65	8.62
	15	13.7	58.15	12.29	54.28	11.01	50.40	10.04	48.46	9.53	46.52	9.02	42.65	8.04

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.

## TVR Ultra HR 50/60Hz



Table 2-9.14: 20HP heating capacity (continued)

Combination (%) (Capacity index)	Outdoor air temp.		Indoor air temp. °C DB											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
70%	-25	-25.4	32.65	13.03	33.86	13.88	33.15	14.13	33.28	14.40	33.41	14.68	32.49	14.86
	-19.8	-20	38.82	14.94	38.84	15.52	38.85	16.11	38.85	16.40	38.86	16.70	37.32	16.72
	-18.8	-19	38.87	14.93	38.82	15.50	38.76	16.08	38.73	16.37	38.70	16.66	37.32	16.72
	-16.7	-17	39.32	15.02	39.17	15.58	39.01	16.14	38.92	16.43	38.83	16.71	37.32	16.65
	-13.7	-15	40.15	15.31	39.92	15.87	39.67	16.43	39.54	16.71	39.41	17.00	37.32	16.57
	-11.8	-13	41.26	15.56	40.97	16.11	40.65	16.67	40.49	16.95	40.71	17.35	37.32	16.20
	-9.8	-11	42.59	15.89	42.25	16.44	41.88	16.99	42.40	17.55	40.71	16.95	37.32	15.68
	-9.5	-10	43.33	15.99	42.97	16.54	42.57	17.09	42.40	17.23	40.71	16.60	37.32	15.29
	-8.5	-9.1	44.04	16.18	43.65	16.73	44.10	17.63	42.40	17.00	40.71	16.36	37.32	14.99
	-7	-7.6	45.28	16.50	44.86	17.05	44.10	17.20	42.40	16.53	40.71	15.85	37.32	14.44
	-5	-5.6	47.06	16.96	47.49	17.84	44.10	16.50	42.40	15.80	40.71	15.10	37.32	13.64
	-3	-3.7	48.86	17.20	47.49	16.90	44.10	15.53	42.40	14.84	40.71	14.13	37.32	12.68
	0	-0.7	50.88	16.67	47.49	15.35	44.10	13.99	42.40	13.31	40.71	12.61	37.32	11.30
	3	2.2	50.88	15.15	47.49	13.84	44.10	12.54	42.40	11.89	40.71	11.28	37.32	10.24
	5	4.1	50.88	14.16	47.49	12.90	44.10	11.65	42.40	11.09	40.71	10.59	37.32	9.62
	7	6	50.88	13.20	47.49	11.98	44.10	10.82	42.40	10.31	40.71	9.79	37.32	8.81
	9	7.9	50.88	12.25	47.49	11.07	44.10	10.09	42.40	9.64	40.71	9.18	37.32	8.29
	11	9.8	50.88	11.35	47.49	10.34	44.10	9.45	42.40	9.00	40.71	8.57	37.32	7.70
	13	11.8	50.88	10.52	47.49	9.70	44.10	8.79	42.40	8.37	40.71	7.95	37.32	7.13
	15	13.7	50.88	9.85	47.49	9.03	44.10	8.20	42.40	7.86	40.71	7.42	37.32	6.65
60%	-25	-25.4	32.43	13.50	32.68	14.05	32.16	14.34	32.09	14.56	32.02	14.77	31.98	15.29
	-19.8	-20	38.46	15.53	38.47	16.12	37.80	16.46	36.35	16.16	34.89	15.84	31.98	15.16
	-18.8	-19	38.44	15.51	38.38	16.09	37.80	16.46	36.35	16.14	34.89	15.80	31.98	15.07
	-16.7	-17	38.78	15.59	38.62	16.16	37.80	16.39	36.35	16.03	34.89	15.64	31.98	14.81
	-13.7	-15	39.53	15.89	39.28	16.45	37.80	16.32	36.35	15.90	34.89	15.46	31.98	14.52
	-11.8	-13	40.57	16.15	40.71	16.84	37.80	15.96	36.35	15.49	34.89	15.01	31.98	13.97
	-9.8	-11	41.85	16.50	40.71	16.45	37.80	15.47	36.35	14.95	34.89	14.42	31.98	13.30
	-9.5	-10	42.56	16.61	40.71	16.12	37.80	15.10	36.35	14.56	34.89	14.02	31.98	12.87
	-8.5	-9.1	43.62	16.85	40.71	15.86	37.80	14.81	36.35	14.26	34.89	13.70	31.98	12.53
	-7	-7.6	43.62	16.41	40.71	15.38	37.80	14.28	36.35	13.72	34.89	13.13	31.98	11.94
	-5	-5.6	43.62	15.74	40.71	14.65	37.80	13.52	36.35	12.93	34.89	12.34	31.98	11.17
	-3	-3.7	43.62	14.81	40.71	13.71	37.80	12.59	36.35	12.01	34.89	11.42	31.98	10.42
	0	-0.7	43.62	13.33	40.71	12.26	37.80	11.18	36.35	10.72	34.89	10.26	31.98	9.38
	3	2.2	43.62	11.94	40.71	10.95	37.80	10.10	36.35	9.70	34.89	9.30	31.98	8.50
	5	4.1	43.62	11.05	40.71	10.25	37.80	9.48	36.35	9.10	34.89	8.71	31.98	7.96
	7	6	43.62	10.29	40.71	9.50	37.80	8.68	36.35	8.29	34.89	7.90	31.98	7.14
	9	7.9	43.62	9.57	40.71	8.84	37.80	8.13	36.35	7.78	34.89	7.44	31.98	6.72
	11	9.8	43.62	8.94	40.71	8.24	37.80	7.55	36.35	7.22	34.89	6.87	31.98	6.31
	13	11.8	43.62	8.31	40.71	7.69	37.80	7.00	36.35	6.67	34.89	6.39	31.98	5.93
	15	13.7	43.62	7.79	40.71	7.09	37.80	6.47	36.35	6.24	34.89	6.02	31.98	5.59
50%	-25	-25.4	31.66	13.90	31.71	14.38	31.50	14.83	30.29	14.63	29.08	14.44	26.65	14.00
	-19.8	-20	36.35	15.59	33.92	15.13	31.50	14.62	30.29	14.34	29.08	14.06	26.65	13.45
	-18.8	-19	36.35	15.55	33.92	15.06	31.50	14.51	30.29	14.22	29.08	13.92	26.65	13.27
	-16.7	-17	36.35	15.42	33.92	14.85	31.50	14.23	30.29	13.90	29.08	13.56	26.65	12.83
	-13.7	-15	36.35	15.27	33.92	14.62	31.50	13.92	30.29	13.55	29.08	13.16	26.65	12.34
	-11.8	-13	36.35	14.86	33.92	14.14	31.50	13.36	30.29	12.95	29.08	12.53	26.65	11.64
	-9.8	-11	36.35	14.33	33.92	13.54	31.50	12.70	30.29	12.26	29.08	11.81	26.65	10.87
	-9.5	-10	36.35	13.96	33.92	13.14	31.50	12.28	30.29	11.84	29.08	11.37	26.65	10.44
	-8.5	-9.1	36.35	13.68	33.92	12.84	31.50	11.95	30.29	11.50	29.08	11.03	26.65	10.13
	-7	-7.6	36.35	13.14	33.92	12.28	31.50	11.37	30.29	10.92	29.08	10.49	26.65	9.63
	-5	-5.6	36.35	12.40	33.92	11.51	31.50	10.63	30.29	10.23	29.08	9.83	26.65	9.03
	-3	-3.7	36.35	11.50	33.92	10.67	31.50	9.90	30.29	9.52	29.08	9.15	26.65	8.41
	0	-0.7	36.35	10.24	33.92	9.55	31.50	8.87	30.29	8.55	29.08	8.21	26.65	7.57
	3	2.2	36.35	9.23	33.92	8.61	31.50	8.01	30.29	7.71	29.08	7.43	26.65	6.99
	5	4.1	36.35	8.63	33.92	8.06	31.50	7.50	30.29	7.26	29.08	6.95	26.65	6.35
	7	6	36.35	7.85	33.92	7.25	31.50	6.68	30.29	6.43	29.08	6.23	26.65	5.79
	9	7.9	36.35	7.31	33.92	6.81	31.50	6.30	30.29	6.11	29.08	5.93	26.65	5.56
	11	9.8	36.35	6.79	33.92	6.28	31.50	5.94	30.29	5.76	29.08	5.58	26.65	5.21
	13	11.8	36.35	6.25	33.92	5.90	31.50	5.57	30.29	5.41	29.08	5.23	26.65	4.88
	15	13.7	36.35	5.87	33.92	5.55	31.50	5.25	30.29	5.08	29.08	4.93	26.65	4.63

Abbreviations:

CR: Combination ratio

TC: Total capacity (kW)

PI: Power input (compressor + outdoor fan motor) (kW)

Notes:

Shaded cells indicate rating condition.



### 9.3 Capacity Correction Factors for Piping Length and Level Difference

Figure 2-9.1: Rate of change in cooling capacity

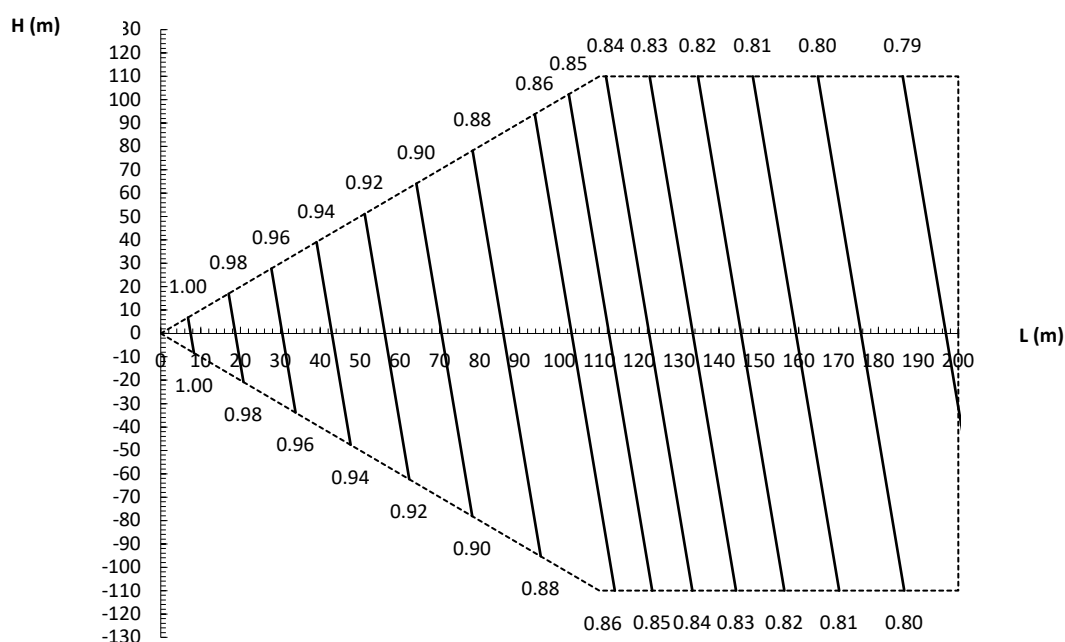
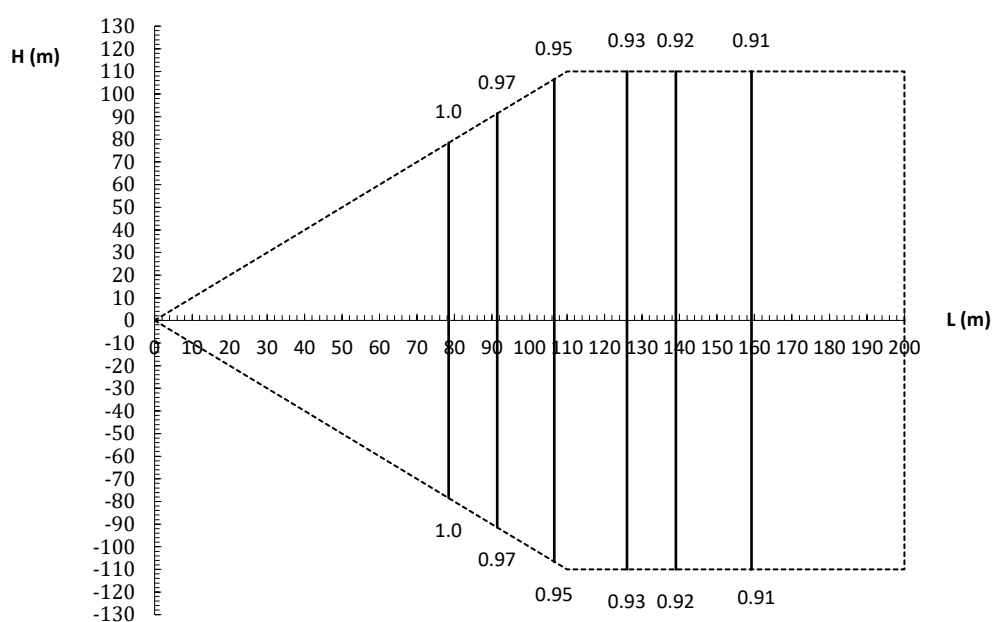


Figure 2-9.2: Rate of change in heating capacity



**Notes:**

1. The horizontal axis shows equivalent length of piping between farthest indoor unit and first outdoor branch joint; the vertical axis shows the largest level difference between indoor unit and outdoor unit. For level differences, positive values indicate that the outdoor unit is above the indoor unit, negative values indicate that the outdoor unit is below the indoor unit.
2. These figures illustrate the rate of change in capacity of a system with only standard indoor units at maximum load (with the thermostat set to maximum) under standard conditions. Under partial load conditions there is only a minor deviation from the rate of change in capacity shown in these figures.
3. The capacity of the system is either the total capacity of the indoor units obtained from indoor unit capacity tables or the corrected capacity of the outdoor units as per the calculations below, whichever is smaller.

Corrected capacity of outdoor units	=	Capacity of outdoor units obtained from outdoor unit capacity tables at the combination ratio	x	Capacity correction factor
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### 9.3 Capacity Correction Factors for Frost Accumulation

The heating capacity tables do not take account of the reduction in capacity when frost has accumulated or while the defrosting operation is in progress. If snow has accumulated against the outside surface of the outdoor unit heat exchanger heating capacity is reduced. The reduction in heating capacity is dependent on a number of factors including the outdoor temperature, the relative humidity and the amount of frosting which has occurred.

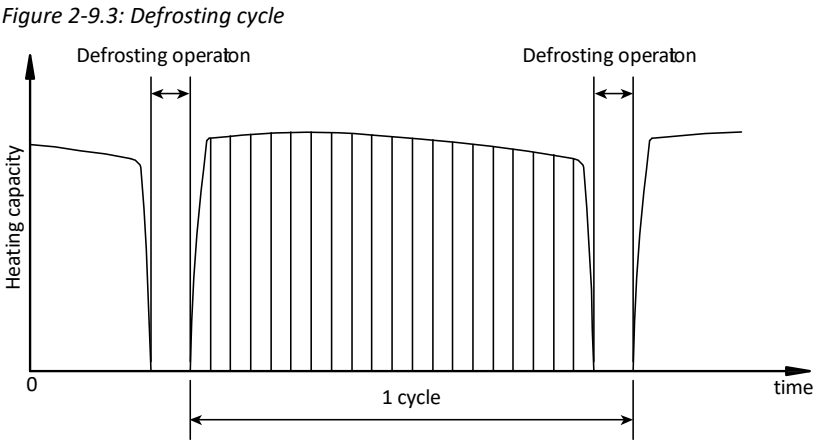
Corrected heating capacity values, which take these factors into account, can be calculated as follows, using the correction factors for frost accumulation given in Table 2-9.13:

Corrected heating capacity = Value given in outdoor heating capacity table × Correction factor for frost accumulation

Table 2-9.13: Correction factor for frost accumulation

Heat exchanger inlet port temperature (°C / RH 85%)	-7	-5	-2	0	2	5	7
Correction factor for frost accumulation	0.94	0.93	0.89	0.84	0.83	0.91	1.00

Corrected heating capacities express the heating capacity over the heating/defrosting cycle shown in Figure 2-9.3.



## 10 Operating Limits

Figure 2-10.1: Cooling operating limits

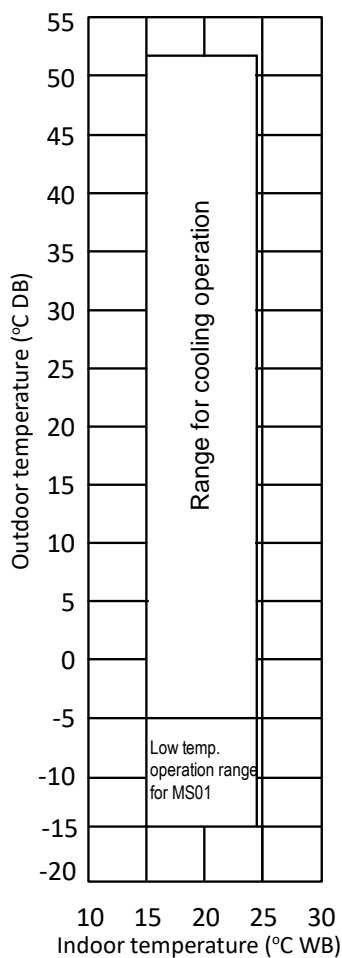


Figure 2-10.2: DHW operating limits

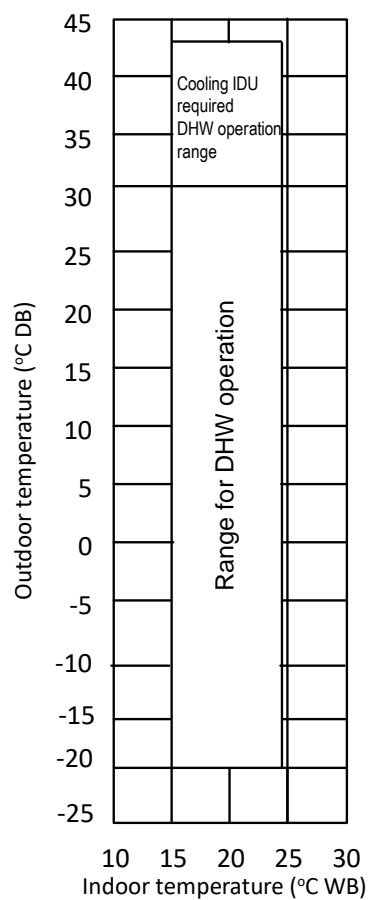
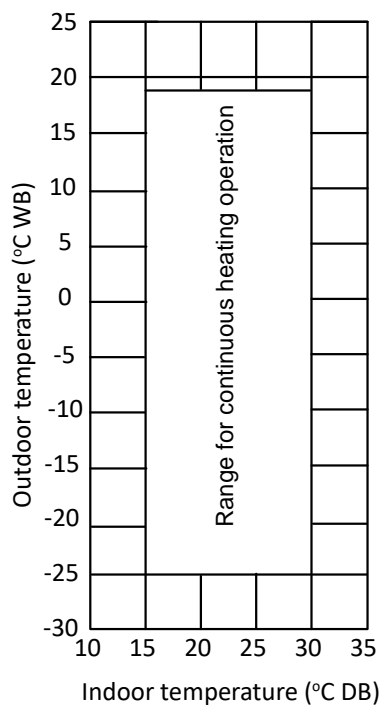


Figure 2-10.3: Heating operating limits



**Notes:**

- These figures assume the following operating conditions:
  - Equivalent piping length: 7.5m
  - Level difference: 0



# 11 Sound Levels

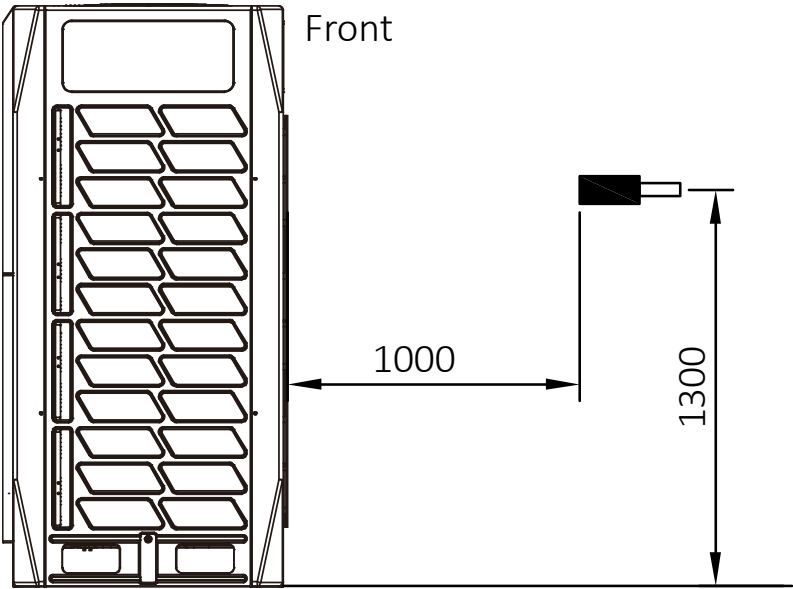
## 11.1 Overall

Table 2-11.1: Sound pressure level

Model	dB(A)	Model	dB(A)	Model	dB(A)
8HP	58	26HP	64	44HP	68
10HP	58	28HP	65	46HP	68
12HP	60	30HP	66	48HP	69
14HP	61	32HP	67	50HP	69
16HP	64	34HP	68	52HP	69
18HP	65	36HP	68	54HP	70
20HP	65	38HP	68	56HP	70
22HP	62	40HP	68	58HP	70
24HP	63	42HP	67	60HP	70

- Notes:
1. Sound pressure level is measured at a position 1m in front of the unit and 1.3m above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

Figure 2-11.1: Sound pressure level measurement (unit: mm)



## 11.2 Octave Band Levels

Figure 2-11.2: 8HP octave band level

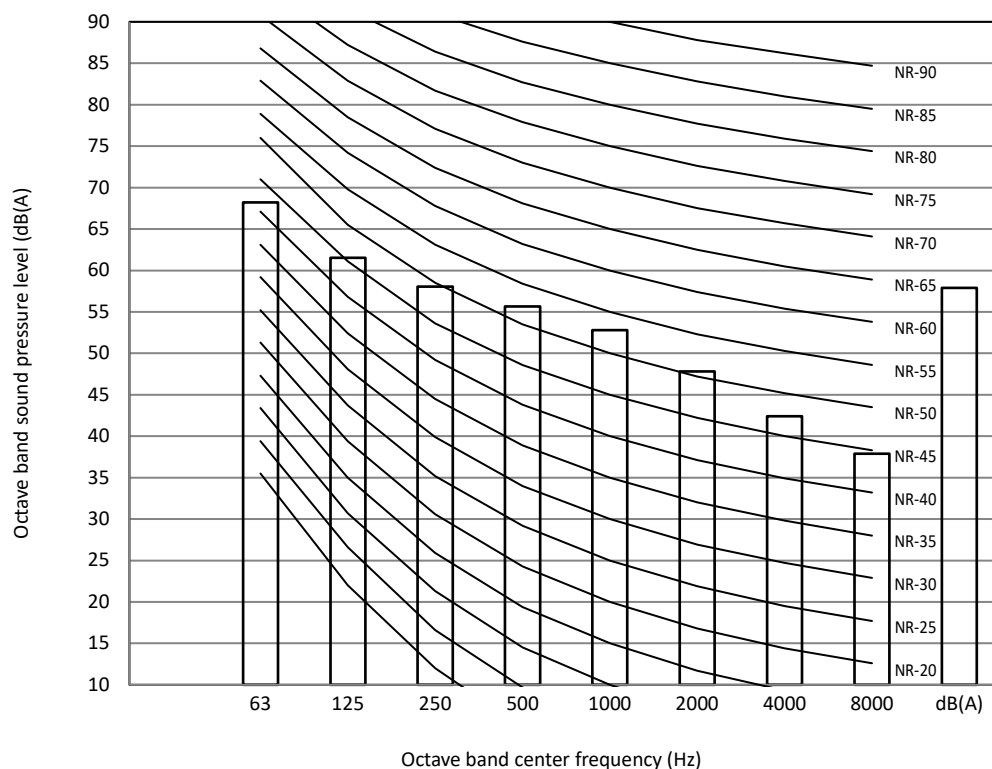
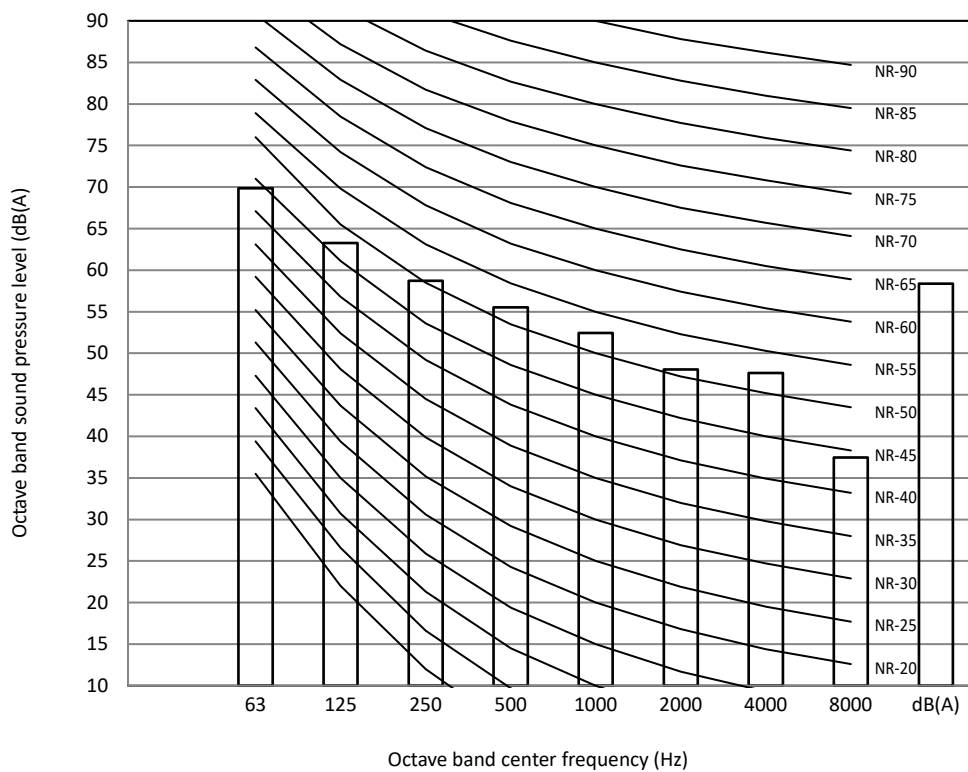


Figure 2-11.3: 10HP octave band level



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Figure 2-11.4: 12HP octave band level

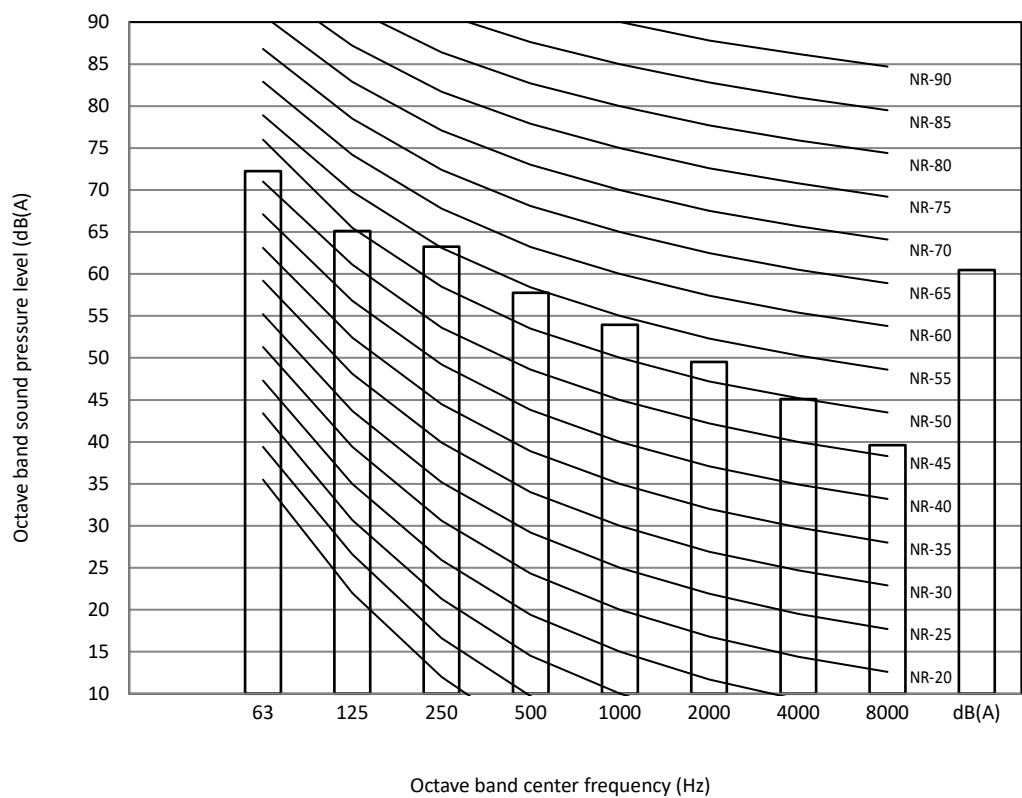


Figure 2-11.5: 14HP octave band level

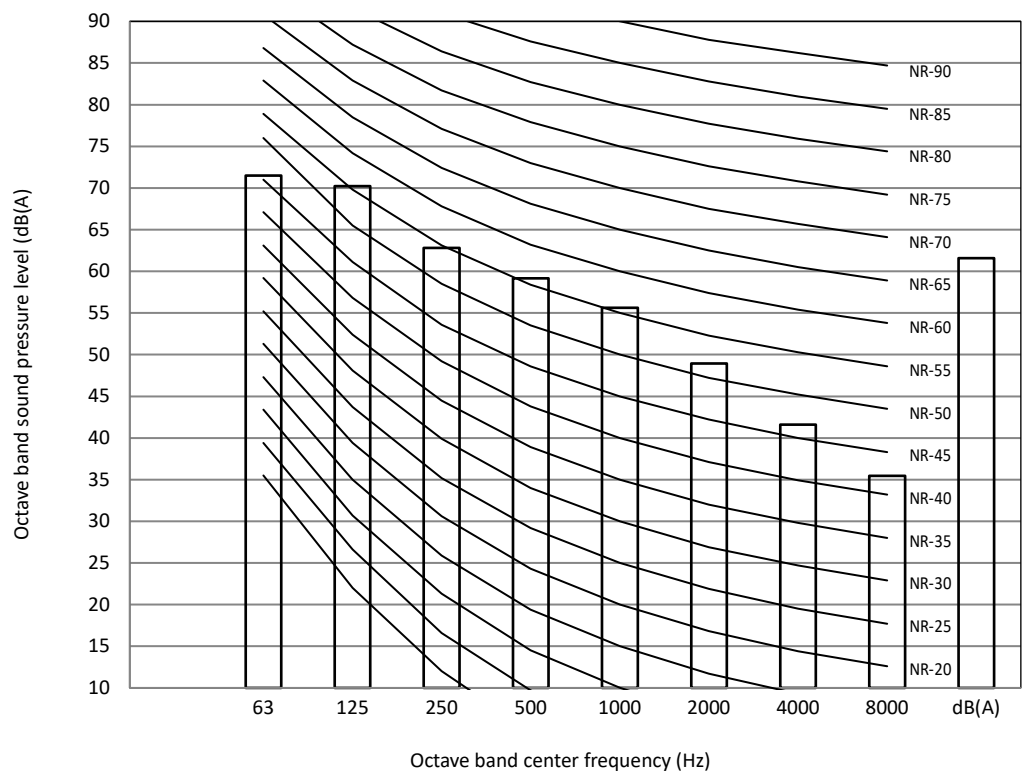


Figure 2-11.6: 16HP octave band level

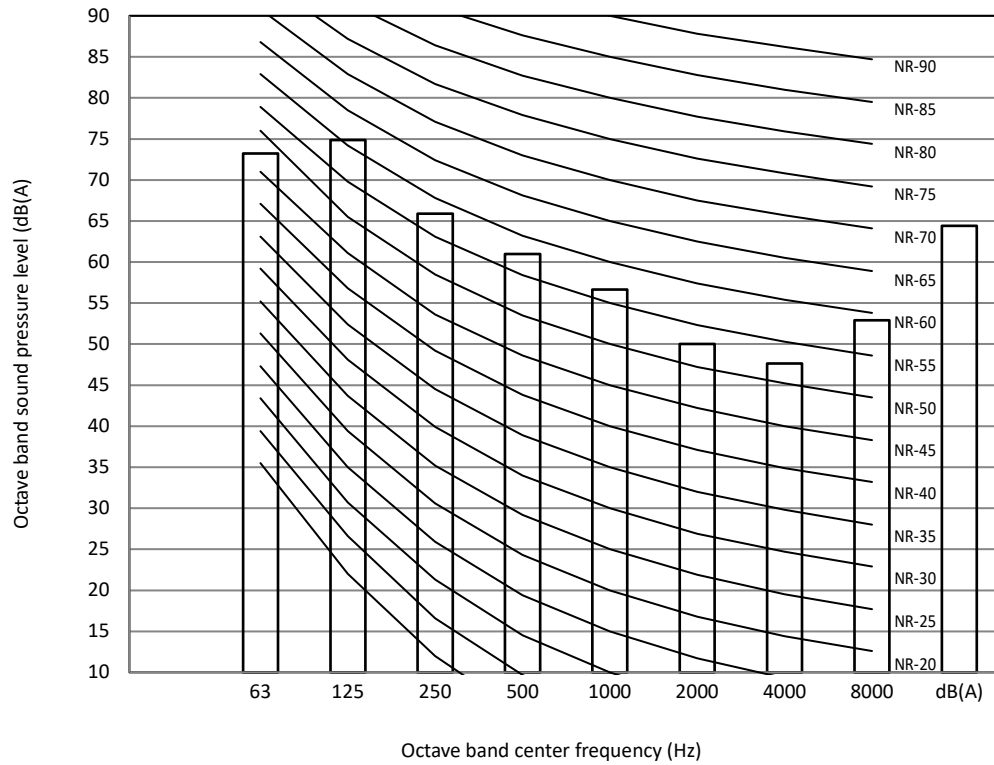
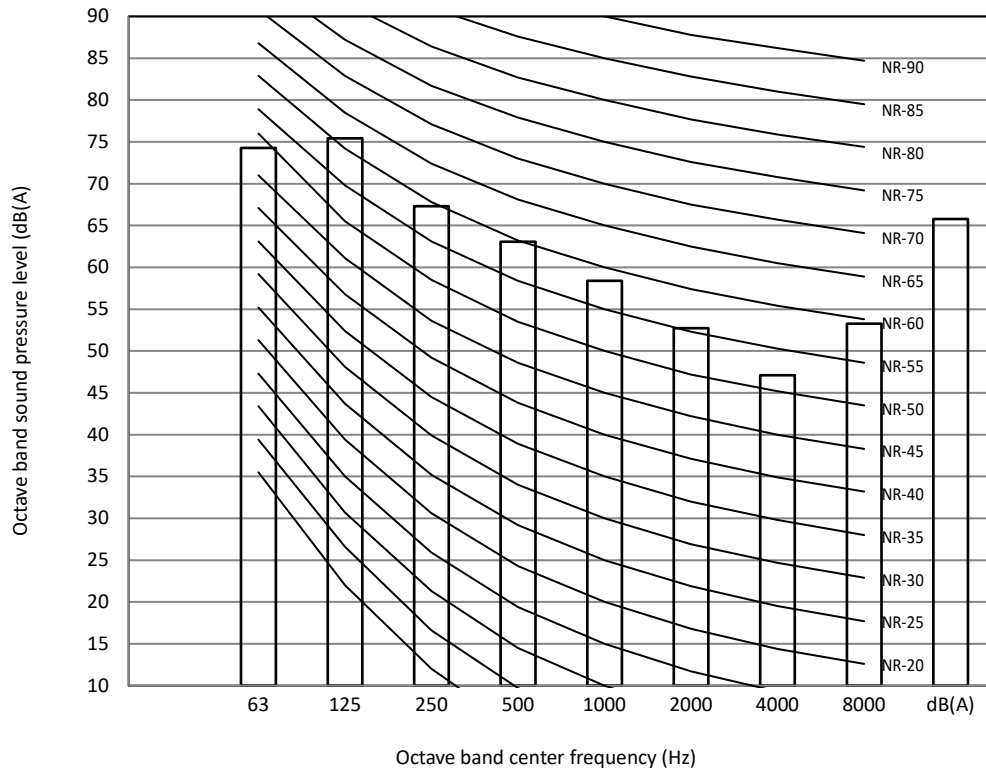


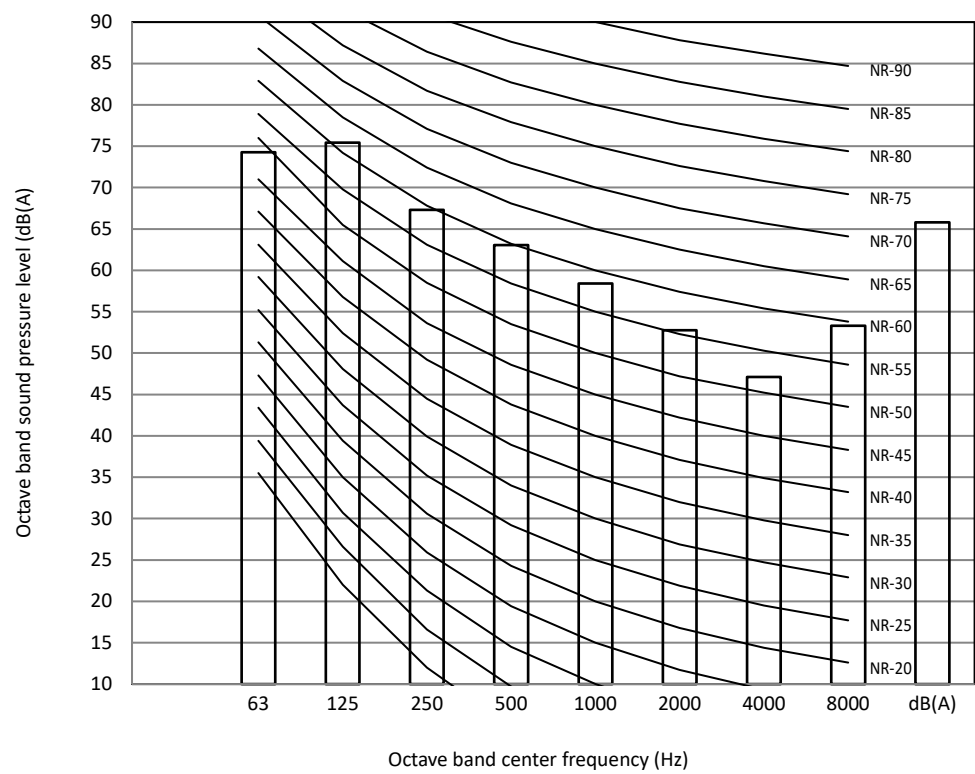
Figure 2-11.7: 18HP octave band level



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Figure 2-11.8: 20HP octave band level







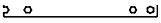




## 12 Accessories

### 12.1 Outdoor Unit Standard Accessories

Table 2-12.1: Outdoor unit standard accessories

Name	Shape	Quantity	Function
Installation manual		1	
Owner's manual		1	
Erp. information		1	
Information requirements		1	
Tie wrap		2	
Screw pack	-	1	Reserved for maintenance
90° elbow		1	To connect piping (For 10-20HP)
Seal plug		8	To clean pipes
Connection pipe		3	To connect gas and liquid pipes
Matched resistor		2	Enhances communication stability
Wrench		1	Removing side plate screws

### 12.2 Mode Selection Box Standard Accessories

Table 2-12.2: MS01 standard accessories












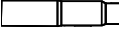


Name	Shape	Quantity	Function
MS installation & operation manual		1	
Adapter pipe (for liquid pipe)		1	Connect the MS box and the outdoor unit.
Adapter pipe (for high pressure gas pipe)		2	
Adapter pipe (for low pressure gas pipe)		2	

Table 2-12.3: MS04-12 standard accessories

Name	Shape	Quantity	Function
MS installation & operation manual		1	
Drainage pipe		2	Connect the drainage port of the MS box and the PVC water pipe.
Snap ring		2	Fasten the connector between the drainage pipe and the MS drainage port.
Adapter pipe (for liquid pipe)		1	Connect the MS box and the outdoor unit. The quantity of adapter pipe (for liquid pipe) of MS08/MS10/MS12 is 2.
		1	
Adapter pipe (for high pressure gas pipe)		1	
		1	
Adapter pipe (for low pressure gas pipe)		1	
		1	
Matched resistor		4	Enhances communication stability

## TVR Ultra HR 50/60Hz



### 12.3 Optional Accessories

Table 2-12.4: Optional accessories

Optional accessories	Model	Packed dimensions (mm)	Net/gross weight (kg)	Function
Outdoor branch joint kits	TODK002HRU	272×167×232	2.7/3.5	Distribute refrigerant to indoor units and balance flow resistance between outdoor units
	TODK003HRU	472×157×312	4.9/6.1	
Branch joint kits /branch headers for joints between indoor units and MS box	TRDK056HP	290×105×100	0.3 / 0.4	
	TRDK112HP	290×105×100	0.4 / 0.6	
Branch joint kits for joints between MS box and outdoor units	TRDK057HRU	257×127×107	0.2/0.4	
	TRDK112HRU	287×137×107	0.8/1.0	
	TRDK242HRU	297×167×177	1.3/1.6	
	TRDK354HRU	372×197×187	1.7/2.4	
	TRDK573HRU	432×222×227	2.4/3.5	
Branch joint kits for MS box	TRIJ095HRU	287×137×107	0.3 / 0.7	Connect larger capacity indoor unit (capacity is 16-28 kW)

# Part 3

## System Design and Installation

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## 1 Preface to Part 3

### 1.1 Notes for Installers Boxes

The information contained in this Engineering Data Book may primarily be of use during the system design stage of a TVR Ultra HR Series project. Additional important information which may primarily be of use during field installation has been placed in boxes, such as the example below, titled “Notes for installers”.

#### Notes for installers



- Notes for installers boxes contain important information which may primarily be of use during field installation, rather than during desk-based system design.

### 1.2 Definitions

In this Engineering Data Book, the term “applicable legislation” refers to all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation.

### 1.3 Precautions

All system installation including installation of piping and electrical works must only be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.

## 2 Unit Placement and Installation

### 2.1 Outdoor Units

#### 2.1.1 Placement considerations

Placement of outdoor units should take account of the following considerations:

- Air conditioners should not be exposed to direct radiation from a high-temperature heat source.
- Air conditioners should not be installed in positions where dust or dirt may affect heat exchangers.
- Air conditioners should not be installed in locations where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
- Air conditioners should not be installed in locations where exposure to salinity may occur unless the anti-corrosion treatment for high-salinity areas customization option has been added and the precautions described in Part 3, 10 “Installation in Areas of High Salinity” are taken.
- Outdoor units should be installed in well-drained, well-ventilated positions that are as close as possible to the indoor units.

#### 2.1.2 Spacing

Outdoor units must be spaced such that sufficient air may flow through each unit. Sufficient airflow across heat exchangers is essential for outdoor units to function properly. Figures 3-2.1 to 3-2.3 show spacing requirements in three different scenarios.

If the particular circumstances of an installation require a unit to be placed closer to a wall than specified in Figures 3-2.1 to 3-2.3, a discharge duct should be installed. Refer to Part 3, 3 “Outdoor Unit Ducting and Shielding”. Depending on the height of adjacent walls relative to the height of the units, ducting may be required. Refer to Part 3, 3 “Outdoor Unit Ducting and Shielding”.

Figure 3-2.1: Single unit installation (unit: mm)

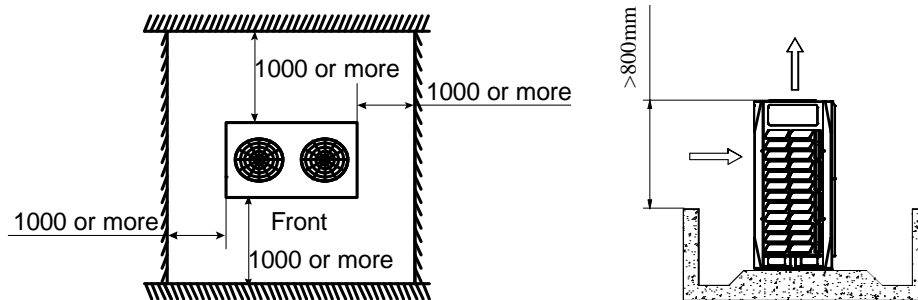
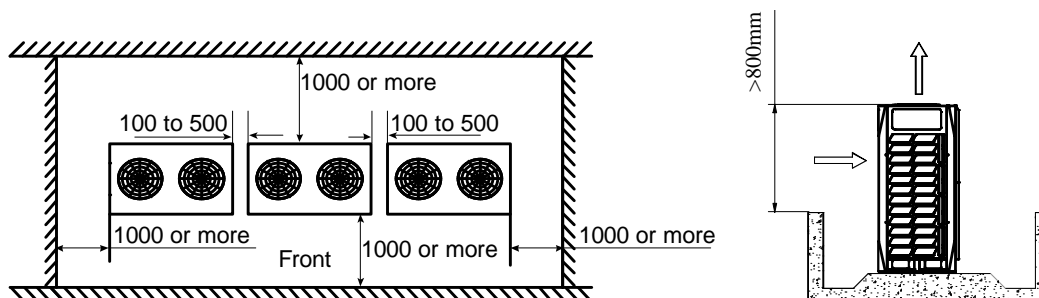


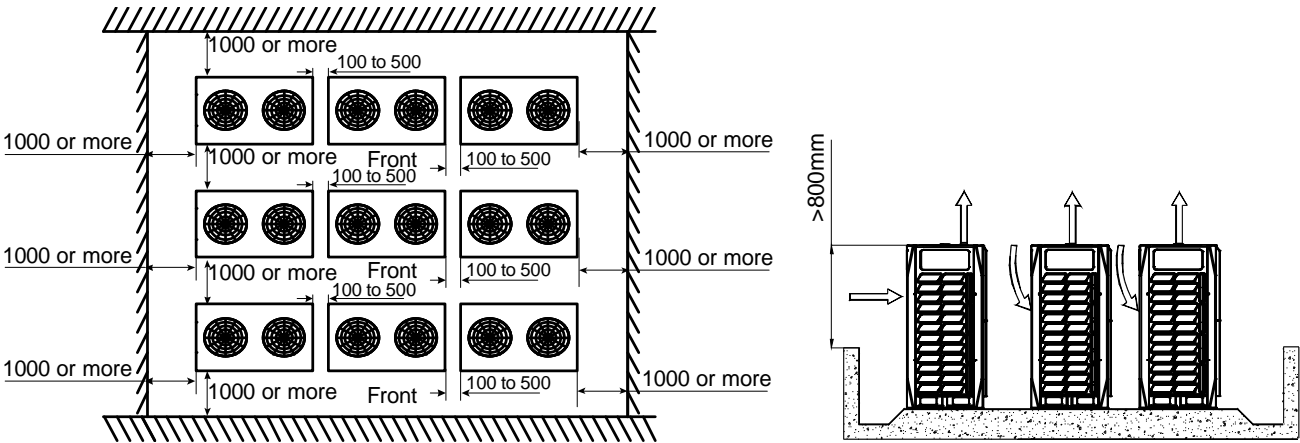
Figure 3-2.2: Single row installation (unit: mm)



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Figure 3-2.3: Multi-row installation (unit: mm)



If obstacles are around the outdoor unit, they must be 800mm below the top of the outdoor unit. Otherwise, a mechanical exhaust device must be added.

Figure 3-2.4: Mechanical exhaust device requirements

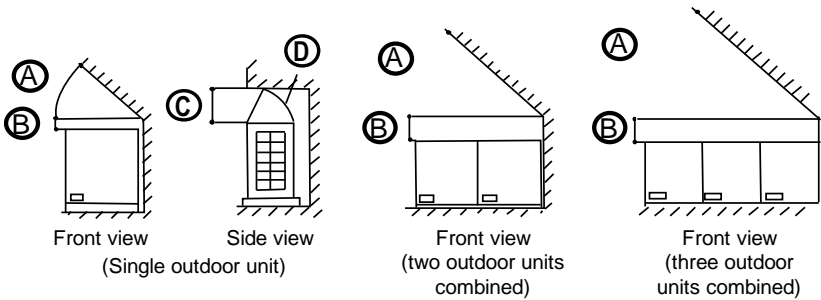


Table 3-2.1: Mechanical exhaust device requirements

A	A > 45°
B	B > 300 mm
C	C > 1000 mm
D	Airflow deflector

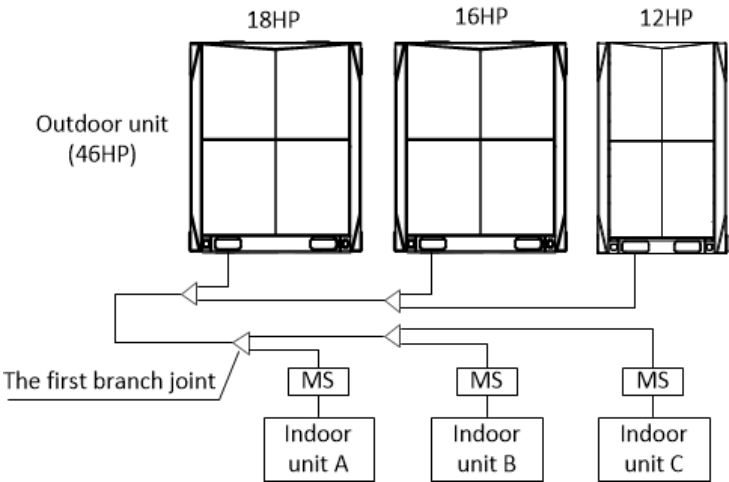
## 2.1.3 Master and slave unit positioning

In systems with multiple outdoor units, the units should be placed in order from largest capacity unit to smallest capacity unit. The largest capacity unit must be placed on the first branch, and be set as the master unit, while the others should be set as slave units. Refer to the TVR Ultra HR Service Manual, Part 4 for details of how to set units as master/slave.

The example in Figure 3-2.5 illustrates the placing of units in a 46HP combination:

- Place the 18HP unit on the first branch and set it as the master unit.
- Place the 16HP and 12HP units on the next branches and set them as slave units.

Figure 3-2.5: Positioning of master and slave units



### 2.1.4 Base structures

Outdoor unit base structure design should take account of the following considerations:

- A solid base prevents excess vibration and noise. Outdoor unit bases should be constructed on solid ground or on structures of sufficient strength to support the units' weight.
- Bases should be at least 200mm high to provide sufficient access for installation of piping.
- Either steel or concrete bases may be suitable.
- A typical concrete base design is shown in Figure 3-2.6. A typical concrete specification is 1 part cement, 2 parts sand and 4 parts crushed stone with  $\Phi 10$ mm steel reinforcing bar. The edges of the base should be chamfered.
- To ensure that all contact points are equally secure, bases should be completely level. Base design should ensure that the points on the units' bases designed for weight-bearing support are fully supported. Bolt spacings should be as per Figure 3-2.7 and Table 3-2.2.
- A drainage ditch should be provided to allow drainage of condensate that may form on the heat exchangers when the units are running in heating mode. The drainage should ensure that condensate is directed away from roadways and footpaths, especially in locations where the climate is such that condensate may freeze.

Figure 3-2.6: Outdoor unit typical concrete base structure design (unit: mm)

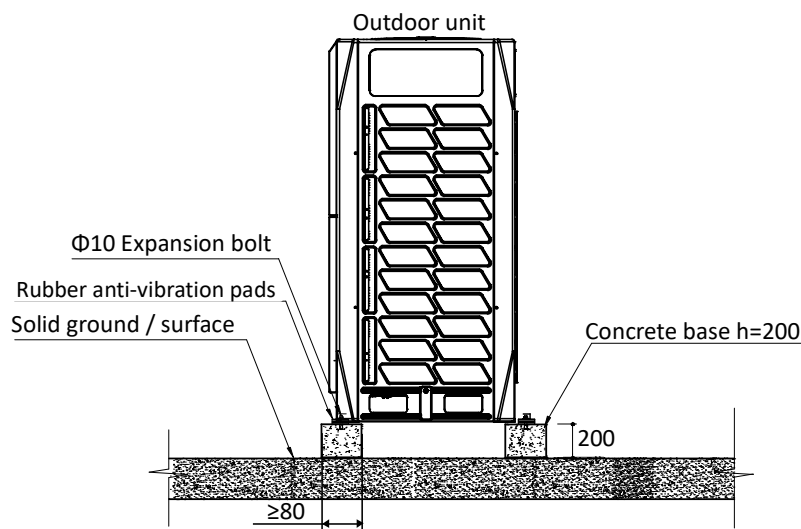


Figure 3-2.7: Expansion bolt positioning

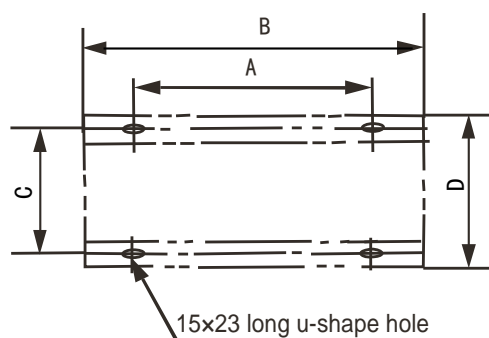


Table 3-2.2: Expansion bolt spacings

Dimension (mm)	8-12HP	14-20HP
A	740	1090
B	990	1340
C	723	723
D	790	790

## TVR Ultra HR 50/60Hz



### 2.1.5 Acceptance and unpacking

#### Notes for installers



- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories ordered have been included. Retain the Owner's Manual for future reference.

### 2.1.6 Hoisting

#### Notes for installers



- Do not remove any packaging before hoisting. If units are not packaged or if the packaging is damaged, use suitable boards or packing material to protect the units.
- Hoist one unit at a time, using two ropes to ensure stability.
- Keep units upright during hoisting, ensuring that the angle to the vertical does not exceed 30°.

## 2.2 Mode Selection Box

### 2.2.1 Placement considerations

Placement of indoor units should take account of the following considerations:

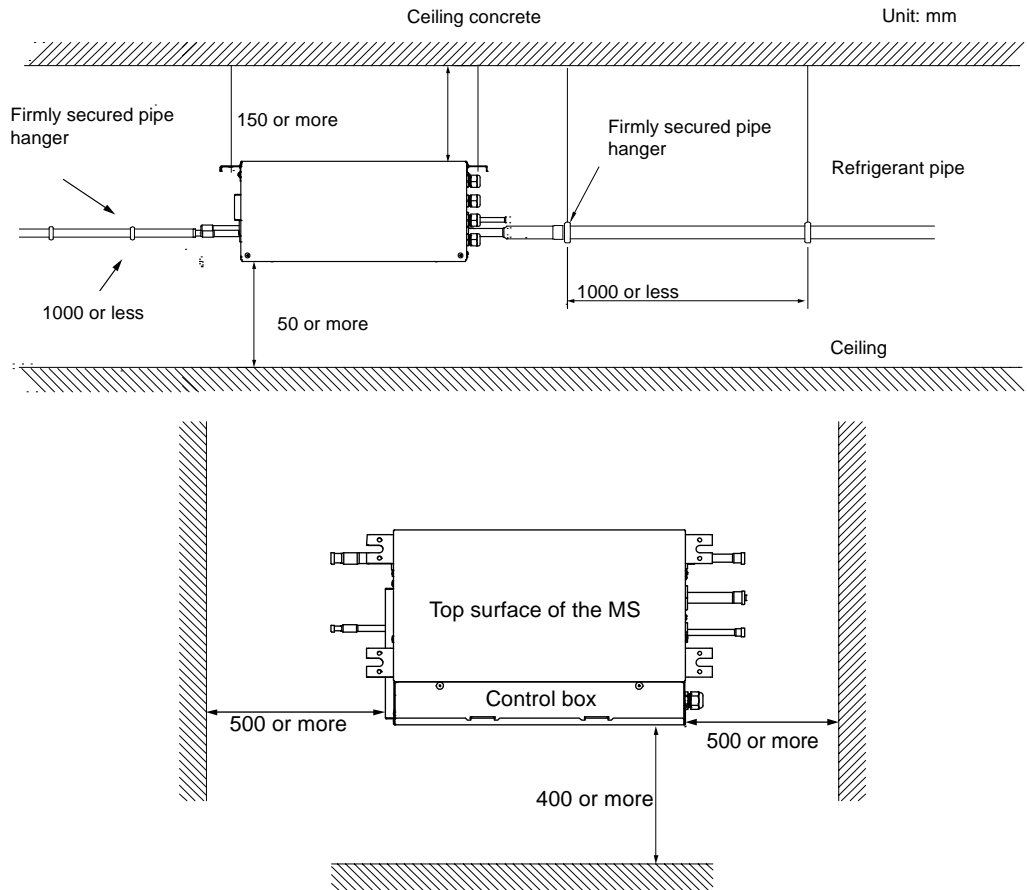
- To prevent the refrigerant noise from disturbing the people in the room, keep at least 5 m of piping between the occupied room and the MS box.
- If there is no false ceiling in the room, please add sound insulation around the piping between the MS box and the indoor unit, or keep a much longer distance between the MS box and occupied room.
- To prevent excessive noise or vibration during operation, suspension rods or other weight-bearing fixings should typically be able to bear twice the unit's weight.
- Sufficient space for drain piping and for access during servicing and maintenance should be allowed.

### 2.2.2 Spacing

MS box must be spaced such that servicing and maintenance should be allowed. Figures 3-2.8 to 3-2.9 show spacing requirements for MS box.



Figure 3-2.8: MS01 installation requirement (unit: mm)

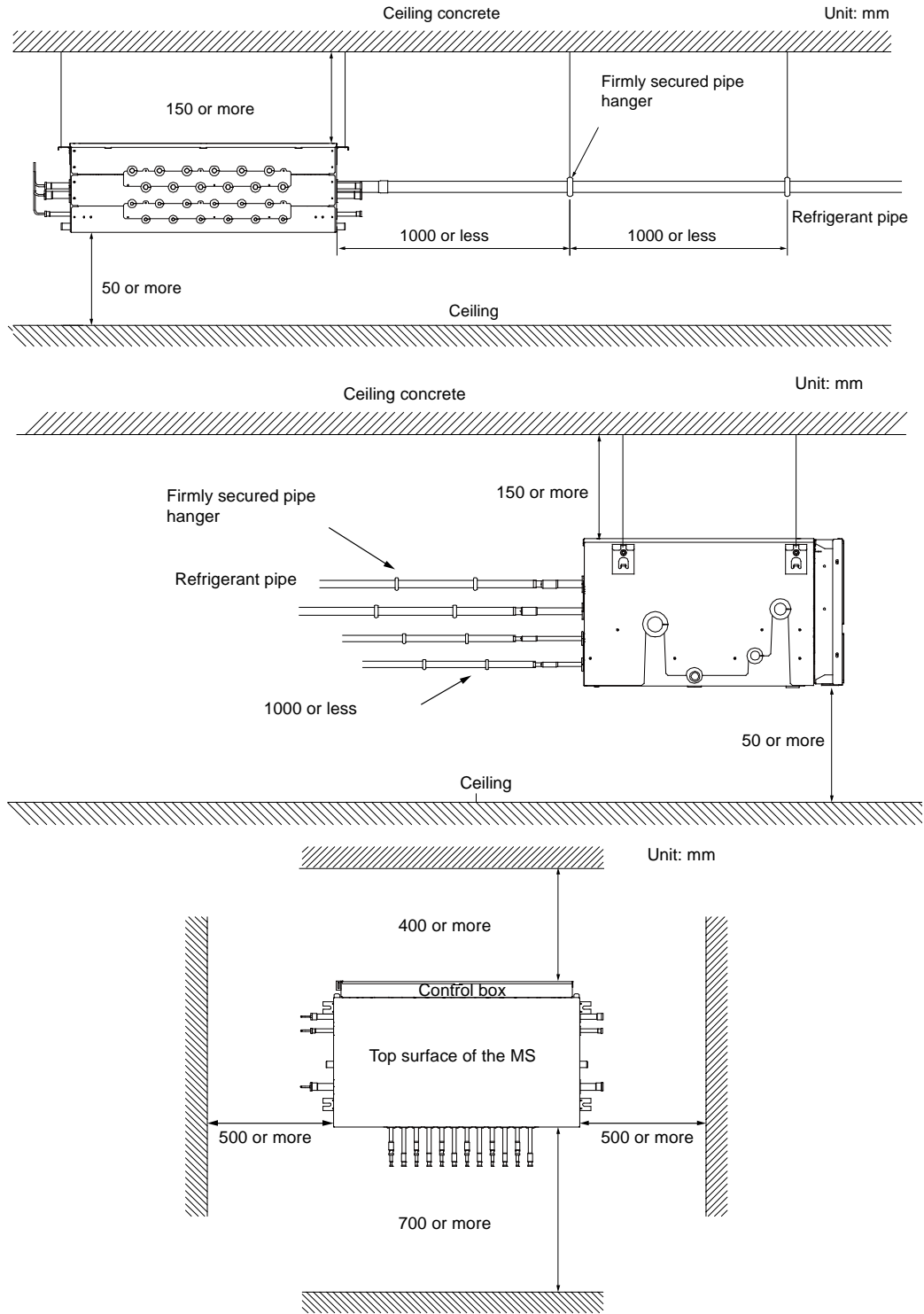


# TVR Ultra HR 50/60Hz

MS04-12



Figure 3-2.9: MS04-12 installation requirement (unit: mm)



### 2.2.3 Hanging brackets

MS box hanging brackets installation should take account of the following considerations:

- Use a suspension bolt size of M10
- Use mold-in inserts and embedded foundation bolts for new installations or hole-in anchor bolts or similar hardware for existing installations, taking care to install them in a manner that can withstand the unit's weight.

Figure 3-2.10: Suspension bolt spacing

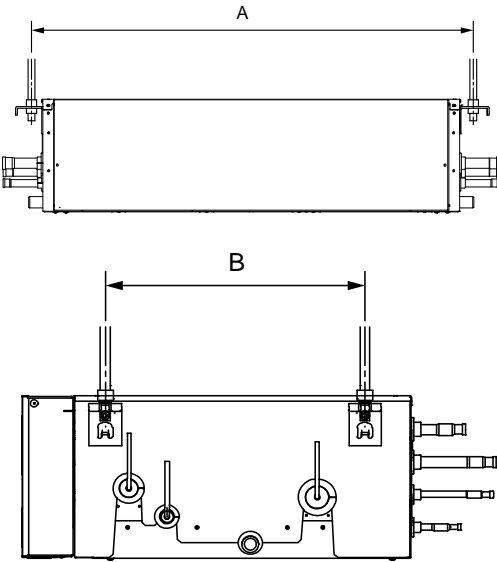


Table 3-2.3: Suspension bolt spacing (unit: mm)

Model	A	B
MS01	483	172
MS04	702	383
MS06		
MS08	1008	383
MS10		
MS12		

### 2.2.4 Acceptance and unpacking

#### Notes for installers



- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories ordered have been included.

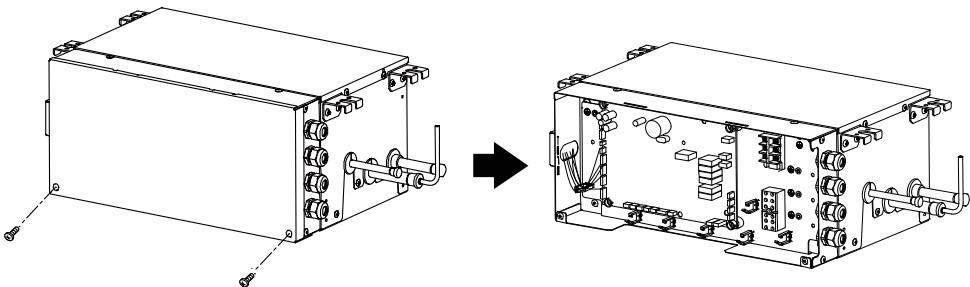
### 2.2.5 Multiple installations for MS01

#### Electric control box replacing

If the installation location of the electric control box must be changed because of the installation conditions, follow these steps (1) to (4):

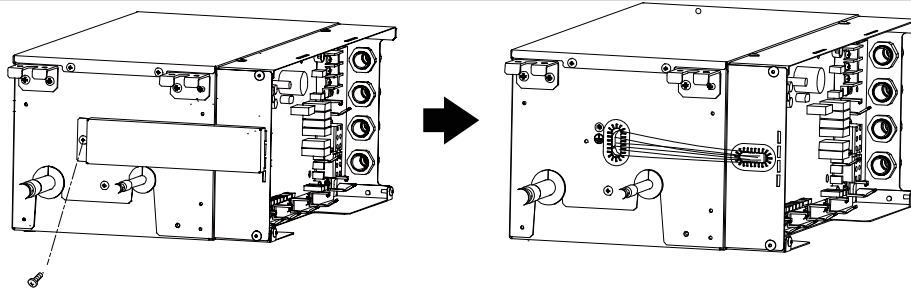
- (1) Remove the screws and pull off the electrical box cover.

Figure 3-2.11: Step 1 for electric control box replacing



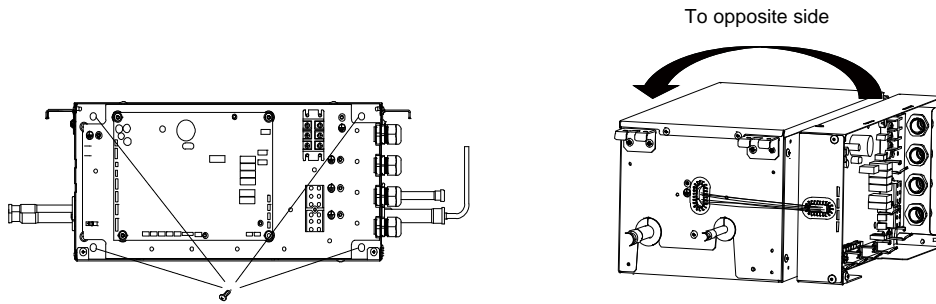
- (2) Remove 1 screw shown in the figure on the below. Remove the sealing plate.

Figure 3-2.12: Step 2 for electric control box replacing



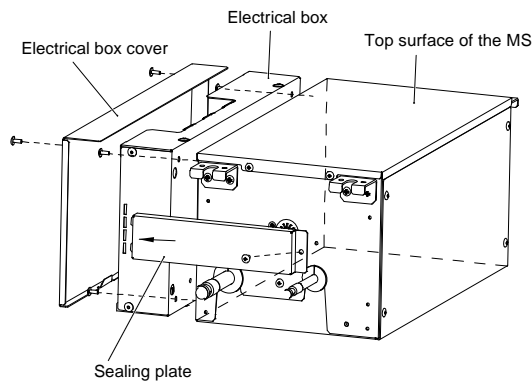
- (3) Remove 4 screws shown in the figure on the below, remove the electrical box to the opposite side.

Figure 3-2.13: Step 3 for electric control box replacing



- (4) Attach the electrical box and electrical box cover to the other side and secure them with the screws. Attach the sealing plate with 1 screw.

Figure 3-2.14: Step 4 for electric control box replacing



### Change to wall-mounted type

MS01 has two different installation types: ceiling-suspended type and wall-mounted type. The factory default installation type is ceiling-suspended type, if the installation type must be changed to wall-mounted type, follow these steps (1) to (4):

- (1) Remove the 8 screws shown in the figure and pull off 4 hooks.  
 (2) Attach the hooks shown in the figure with 8 screws from the previous step.

Figure 3-2.15: Step 1 for wall-mounted type replacing

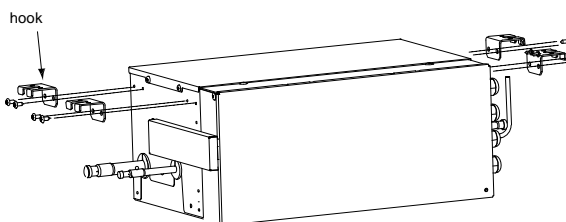
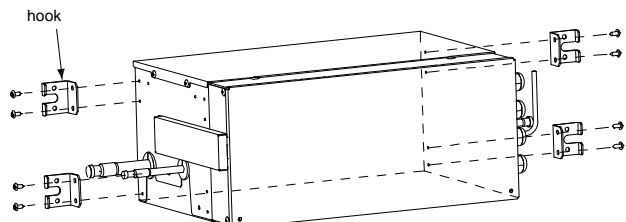


Figure 3-2.16: Step 2 for wall-mounted type replacing



- (3) Create a gap between the wall, screw in the temporary screws (M5, field supply), and hang the MS box.
- (4) After checking with a level that the MS box is horizontal, fix the unit with 8 screws (M5, field supply).

Figure 3-2.17: Step 1 for wall-mounted type replacing

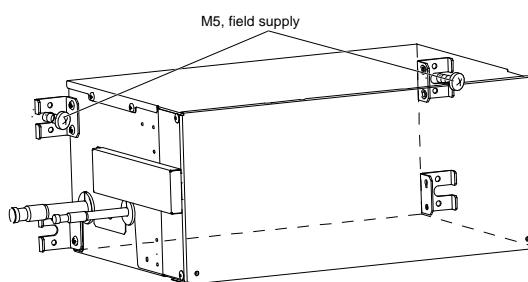
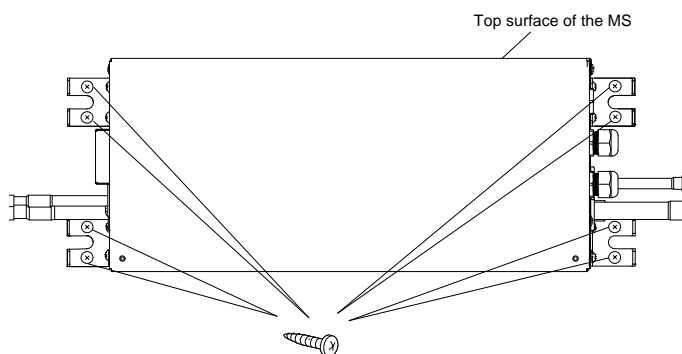


Figure 3-2.18: Step 2 for wall-mounted type replacing



## 2.3 Indoor Units

### 2.3.1 Placement considerations

Placement of indoor units should take account of the following considerations:

- Sufficient space for drain piping and for access during servicing and maintenance should be allowed.
- To ensure a good cooling/heating effect, short-circuit ventilation (where outlet air returns quickly to a unit's air inlet) should be avoided.
- To prevent excessive noise or vibration during operation, suspension rods or other weight-bearing fixings should typically be able to bear twice the unit's weight.

#### Notes for installers



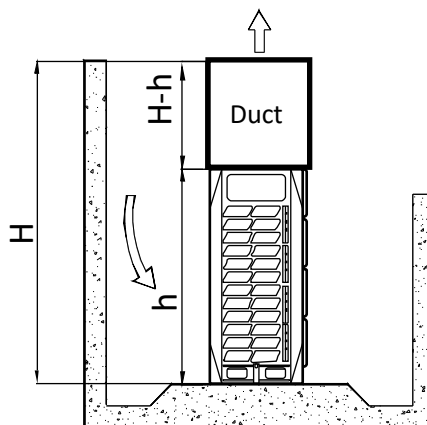
- Before installing an indoor unit, check that the model to be installed is as specified in the construction drawings and confirm the correct orientation of the unit.
- Ensure that units are installed at the correct height.
- To allow smooth condensate drainage and to ensure unit stability (to prevent excessive noise or vibration), ensure that units are level to within 1° of the horizontal. If a unit is not level to within 1° of the horizontal, water leakage or abnormal vibration/noise may occur.

### 3 Outdoor Unit Ducting and Shielding

#### 3.1 Ducting Requirements

Depending on the height of adjacent walls relative to the height of the units, ducting may be required to ensure proper air discharge. In the situation depicted in Figure 3-3.1, the vertical section of ducting should be at least  $H-h$  high.

Figure 3-3.1: Adjacent wall higher than outdoor unit



#### 3.2 Design Considerations

Outdoor unit ducting design should take account of the following:

- Each duct should contain no more than one bend.
- Vibration isolation should be added to the connection between the unit and the ducting to avoid vibration/noise.
- Louvers are installed for safety, they should be installed at an angle no greater than  $15^\circ$  to the horizontal, to minimize the impact on airflow.

### 3.3 Ducting for 8/10/12HP Units

#### 3.3.1 Option A – Transverse ducting

Figure 3-3.2: Transverse ducting for 8/10/12HP units (unit: mm)

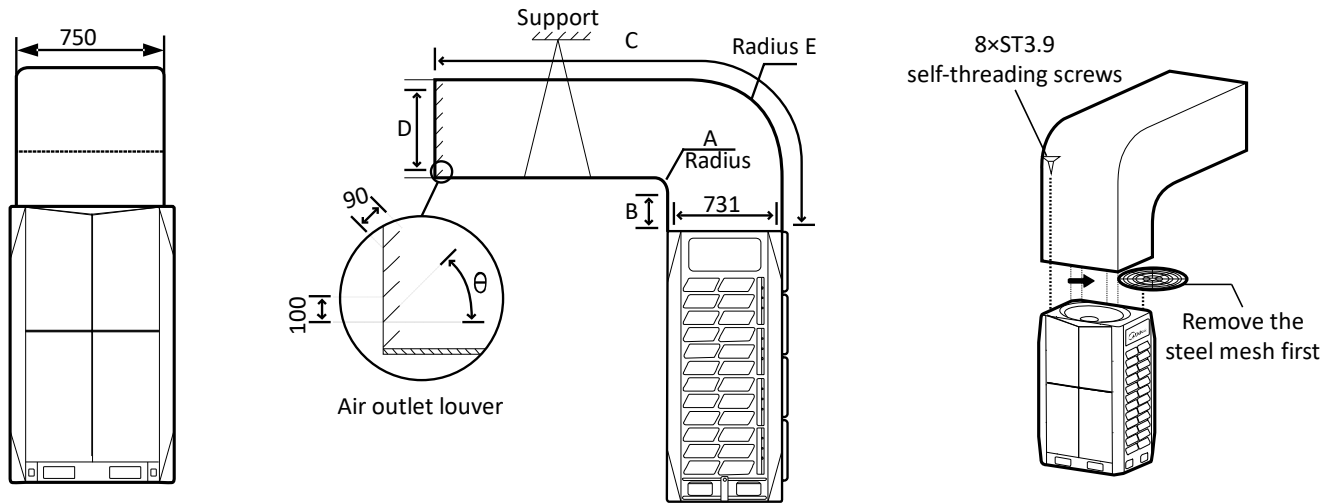


Table 3-3.1: Duct dimensions

Dimensions (mm)	
A	$A \geq 300$
B	$B \geq 250$
C	$C \leq 3000$
D	$731 \leq D \leq 770$
E	$E = A + 731$
$\theta$	$\theta \leq 15^\circ$

Table 3-3.2: External static pressure

ESP (Pa)	Remarks
0	Factory default
0 – 20	Remove steel mesh and connect to duct < 3m long
20-80	Dial switch S4 setting

#### 3.3.2 Option B – Longitudinal ducting

Figure 3-3.3: Longitudinal ducting for 8/10/12HP units (unit: mm)

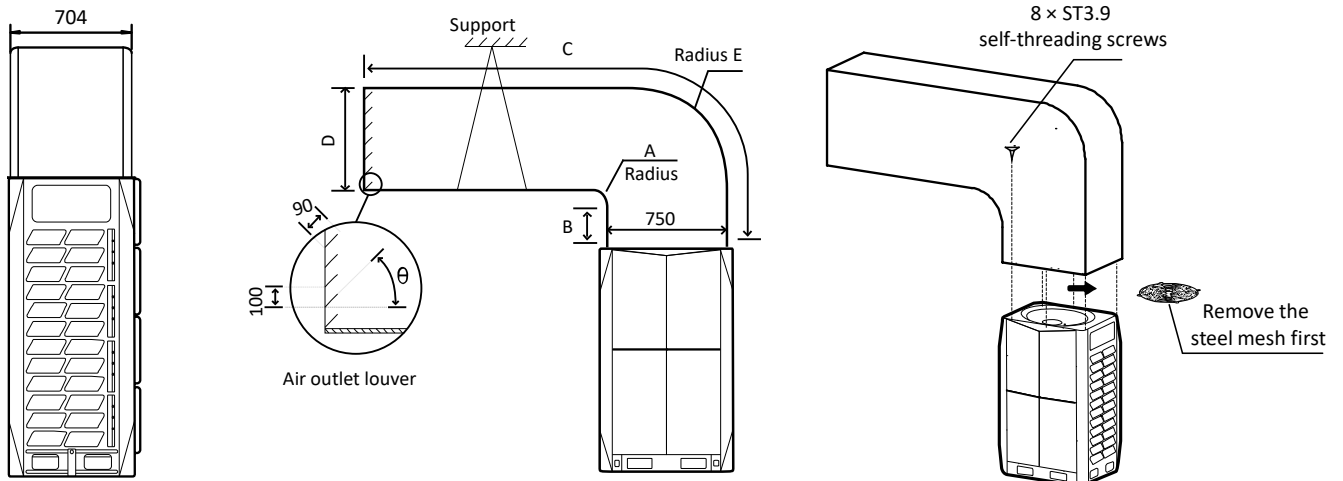


Table 3-3.3: Duct dimensions

Dimensions (mm)	
A	$A \geq 300$
B	$B \geq 250$
C	$C \leq 3000$
D	$D \geq 750$
E	$E = A + 750$
$\theta$	$\theta \leq 15^\circ$

Table 3-3.4: External static pressure

ESP (Pa)	Remarks
0	Factory default
0 – 20	Remove steel mesh and connect to duct < 3m long
20-80	Dial switch S4 setting

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## Ducting for 14/16/18/20HP Units

### 3.3.3 Option A – Transverse ducting

Figure 3-3.4: Transverse ducting for 14/16/18/20HP units (unit: mm)

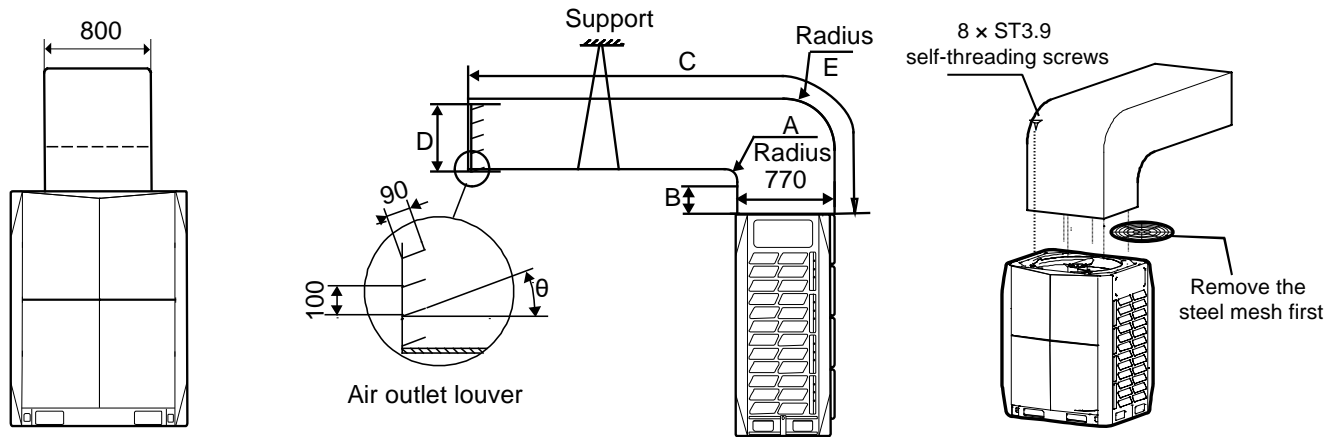


Table 3-3.5: Duct dimensions

Dimensions (mm)	
A	$A \geq 300$
B	$B \geq 250$
C	$C \leq 3000$
D	$D \geq 770$
E	$E = A + 770$
$\theta$	$\theta \leq 15^\circ$

Table 3-3.6: External static pressure

ESP (Pa)	Remarks
0	Factory default
0 – 20	Remove steel mesh and connect to duct < 3m long
20-80	Dial switch S4 setting

### 3.3.4 Option B – Longitudinal ducting

Figure 3-3.5: Longitudinal ducting for 14/16/18/20HP units (unit: mm)

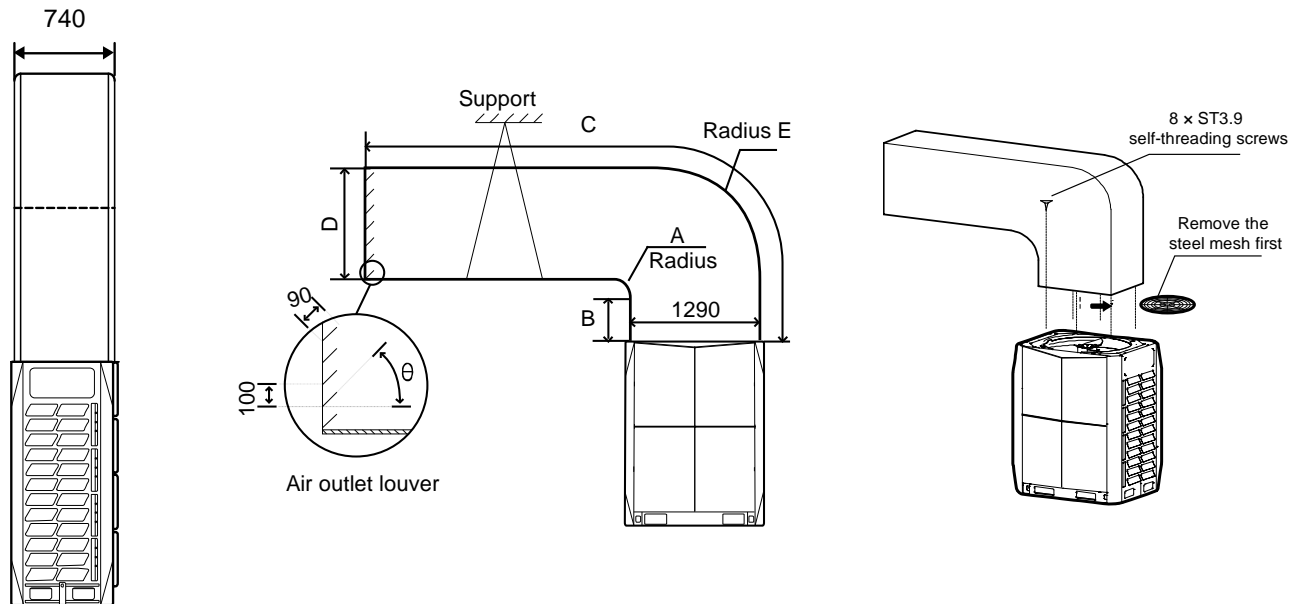


Table 3-3.7: Duct dimensions

Dimensions (mm)	
A	$A \geq 300$
B	$B \geq 250$
C	$C \leq 3000$
D	$D \geq 1290$
E	$E = A + 1290$
$\theta$	$\theta \leq 15^\circ$

Table 3-3.8: External static pressure

ESP (Pa)	Remarks
0	Factory default
0 – 20	Remove steel mesh and connect to duct < 3m long
20-80	Dial switch S4 setting



### 3.4 Fan Performance

The default external static pressure of outdoor units is zero. With the steel mesh cover removed the external static pressure is 0-20Pa.

Figure 3-3.6: 8HP units fan performance

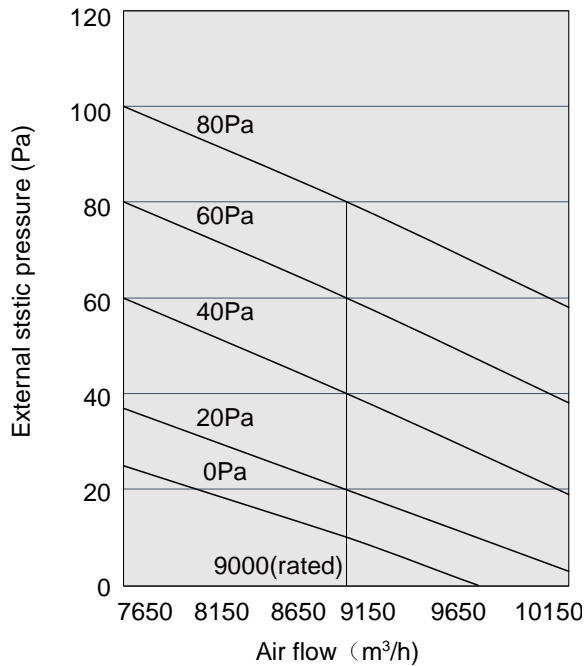


Figure 3-3.7: 10HP units fan performance

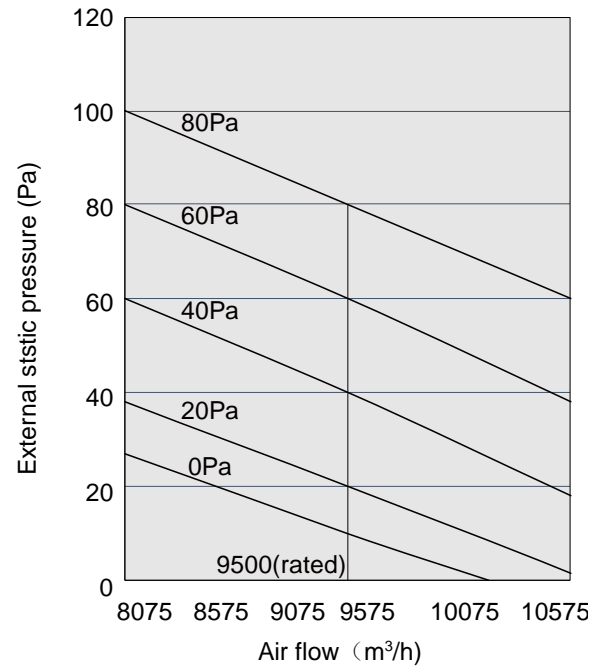


Figure 3-3.8: 12HP units fan performance

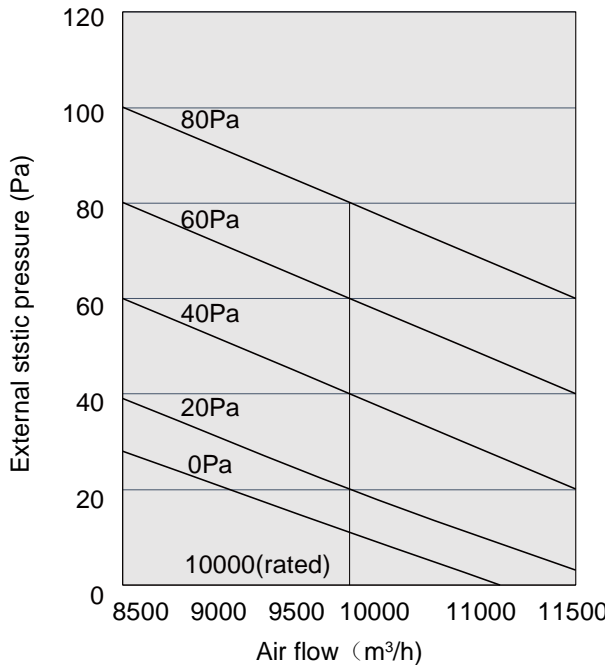
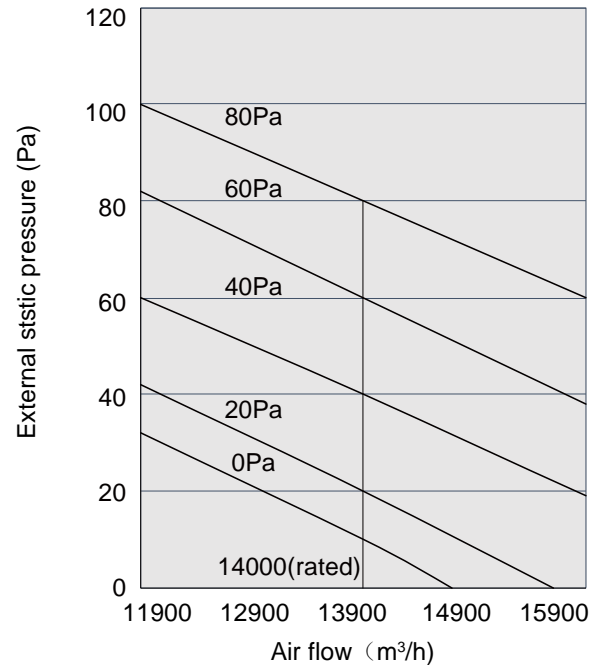


Figure 3-3.9: 14HP units fan performance



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Figure 3-3.10: 16HP units fan performance

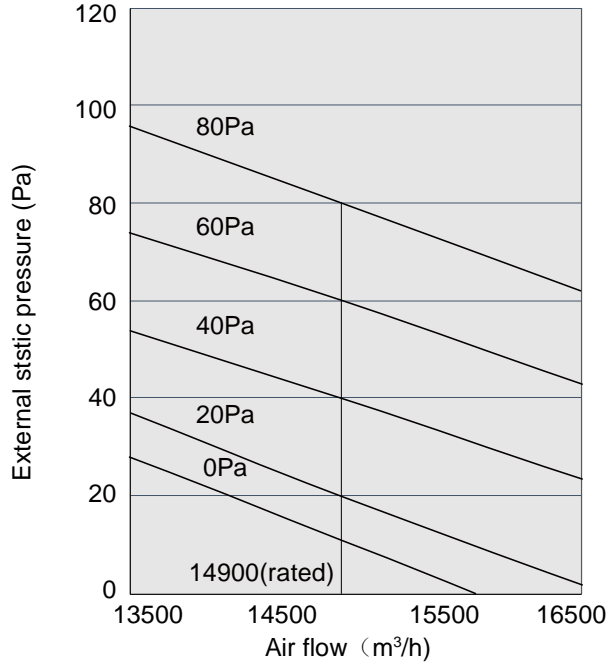
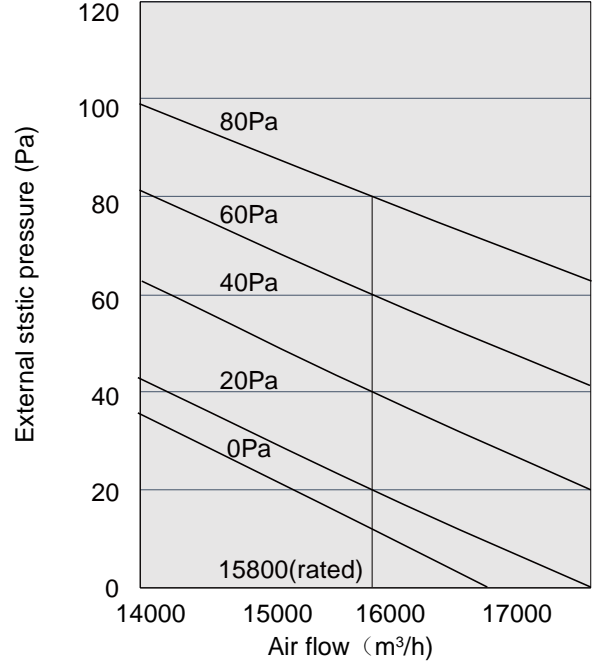


Figure 3-3.11: 18/20HP units fan performance



## Notes for installers

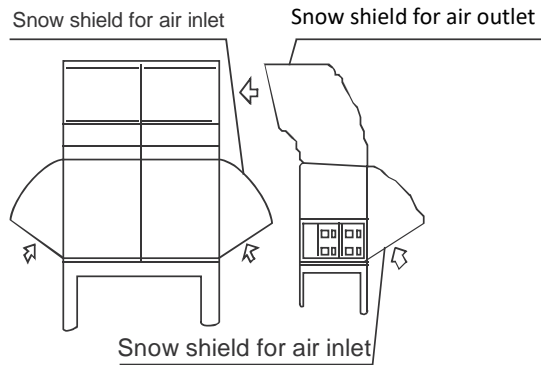


- Before instal outdoor unit ducting, be sure to remove the unit's steel mesh cover, otherwise airflow will be adversely affected.

## 3.5 Snow Shielding

In areas of high snowfall, snow shields should be installed on air inlets and outlets to prevent snow from entering the units. Additionally, the height of the base support should be higher than the highest snow level of local area.

Figure 3-3.12: Outdoor unit snow shielding



## 4 Refrigerant Piping Design

### 4.1 Design Considerations

Refrigerant piping design should take account of the following considerations:

- The amount of brazing required should be kept to a minimum.
- On the two inside sides of the first indoor branch joint ("A" in Figures 3-4.2, 3-4.3 and 3-4.4) the system should, as far as possible, be equal in terms of number of units, total capacities and total piping lengths.

### 4.2 Material Specification

Only seamless phosphorus-deoxidized copper piping that complies with all applicable legislation should be used. Temper grades and minimum thicknesses for different diameters of piping are specified in Table 3-4.1.

Table 3-4.1: Piping temper and thickness

Piping outer diameter (mm)	Temper <sup>1</sup>	Minimum thickness (mm)
Φ6.35	O (annealed)	0.8
Φ9.53		0.8
Φ12.7		0.8
Φ15.9		1.0
Φ19.1		1.0
Φ22.2	1/2H (half hard)	1.2
Φ25.4		1.2
Φ28.6		1.3
Φ31.8		1.5
Φ38.1		1.5
Φ41.3		1.5
Φ44.5		1.5
Φ54.0		1.8

Notes:

1. O: coiled piping; 1/2H: straight piping.

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### 4.3 Permitted Piping Lengths and Level Differences

#### 4.3.1 Connection with only TVR indoor units

The piping length and level difference requirements that apply are summarized in Table 3-4.3 and are fully described as follows (refer to Figure 3-4.2):

- Requirement 1:** The total length of piping in each refrigerant system should not exceed 1000m. When calculating the total length of piping, the actual length of the indoor main pipes (the piping between the first indoor branch joint and the MS box, L<sub>2</sub> to L<sub>9</sub>) should be doubled.
- Requirement 2:** The piping between the farthest indoor unit and the first outdoor branch joint should not exceed 175m (actual length) and 200m (equivalent length). (The equivalent length of each branch joint is 0.5m and the equivalent length of each MS box is 1m.) When the equivalent piping length from outdoor units to the farthest indoor unit is larger than 90 m, the liquid pipe of the main pipe (L<sub>1</sub>) should be increased as Table 3-4.2
- Requirement 3:** The piping between the farthest indoor unit (N<sub>8</sub>) and first indoor branch joint (A) should not exceed 40m in length ( $L_2 + L_4 + f + i \leq 40\text{m}$ ) unless the following conditions are met and the following measures are taken, in which case the permitted length is up to 90m:

#### Conditions:

- The piping from each indoor unit to its nearest branch joint or MS box does not exceed 40m in length (a to m each  $\leq 40\text{m}$ ).
- The difference in length between {the piping from the first indoor branch joint (A) to the farthest indoor unit (N<sub>8</sub>)} and {the piping from the first indoor branch joint (A) to the nearest indoor unit (N<sub>3</sub>)} does not exceed 40m. That is:  $(L_1 + L_2 + L_4 + f + i) - (L_1 + L_2 + L_3 + c) \leq 40\text{m}$ .

#### Measures:

- Increase the diameter of the indoor main pipes (the piping between the first indoor branch joint and the MS box, L<sub>2</sub> to L<sub>9</sub>) as per Table 3-4.2, except for indoor main pipes which are already the same size as the main pipe (L<sub>1</sub>), for which no diameter increases are required.
- Requirement 4:** The largest level difference between indoor unit and outdoor unit should not exceed 110m.

If the outdoor unit is above and the level difference is greater than 50 m, the liquid pipe of the main pipe (L<sub>1</sub>) should be increased as Table 3-4.2. And it is recommended that an oil return bend with dimensions as specified in Figure 3-4.1 is set every 10m in the gas pipe of the main pipe.

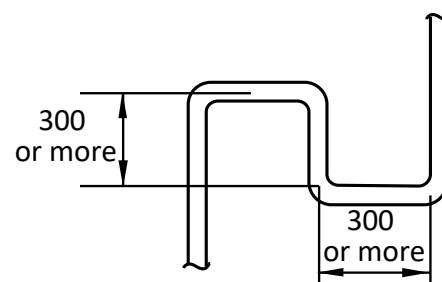
If the outdoor unit is below and the level difference is more than 40 m, the liquid pipe of the main pipe (L<sub>1</sub>) should be increased as Table 3-4.2.

- Requirement 5:** The largest level difference between indoor units should not exceed 30m.
- Requirement 6:** Piping between outdoor unit and outdoor branch joint should not exceed 30m.  $g_1 \leq 10\text{ m}$ ;  $g_2 + G_1 \leq 10\text{ m}$ ;  $g_3 + G_1 \leq 10\text{ m}$

Table 3-4.2: Diameter increase requirements

Original (mm)	Increased (mm)
Φ9.53	Φ12.7
Φ12.7	Φ15.9
Φ15.9	Φ19.1
Φ19.1	Φ22.2
Φ22.2	Φ25.4

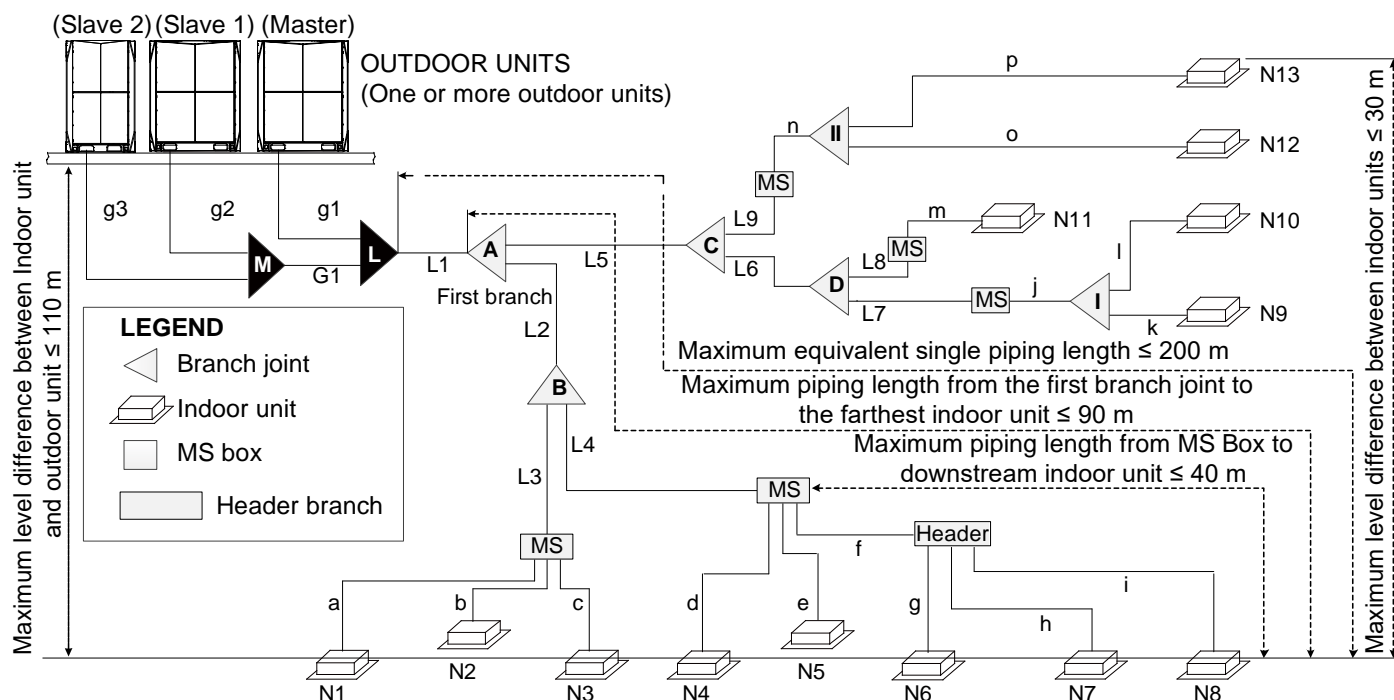
Figure 3-4.1: Oil return bend (unit: mm)



#### Notes:

- The size of main liquid pipe (L<sub>1</sub>) and indoor main liquid pipes (L<sub>2</sub> to L<sub>9</sub>) can only be increased once if one or more of requirements are met in the requirement 2 to requirement 4.

Figure 3-4.2: Permitted refrigerant piping lengths and level differences



Legend	
g1, g2, g3, G1	Outdoor unit connection pipe
L, M	Outdoor unit branch joint
L1	Main pipe
L2 to L9	Indoor unit main pipe
A to D	Branch joint between main pipe and MS
I, II	Branch joint between MS and indoor unit
a to p	Indoor unit auxiliary pipe
N1 to N13	TVR indoor unit

Notes:

- When multiple MS units are used in a single system, they should be installed in parallel.
- Header branch can only be installed downstream of MS.
- Branches and others header branches cannot be installed downstream of the head branch.

Table 3-4.3: Summary of permitted refrigerant piping lengths and level differences

			Permitted values	Piping in Figure 3-4.2
Piping lengths	Total piping length <sup>1</sup>		$\leq 1000$ m	$L1 + 2 \times \sum\{L2 \text{ to } L9\} + \sum\{a \text{ to } p\}$
	Piping between farthest indoor unit and first outdoor branch joint <sup>2</sup>	Actual length	$\leq 175$ m	$L1 + L2 + L4 + f + i$
		Equivalent length	$\leq 200$ m	
	Piping between farthest indoor unit and first indoor branch joint <sup>3</sup>		$\leq 40$ m / 90m	$L2 + L4 + f + i$
	Piping between MS to downstream indoor unit		$\leq 40$ m	$f + i$
Level differences	Piping between outdoor unit and outdoor branch joint		$\leq 10$ m	$g1 \leq 10$ m; $g2 + G1 \leq 10$ m; $g3 + G1 \leq 10$ m
	Largest level difference between indoor unit and outdoor unit <sup>4</sup>		$\leq 110$ m	
	Largest level difference between indoor units		$\leq 30$ m	

Notes:

- Refer to Requirement 1, above.
- Refer to Requirement 2, above.
- Refer to Requirement 3, above.
- Refer to Requirement 4 above.

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### 4.3.2 Connection with TVR indoor units and HT hydro module

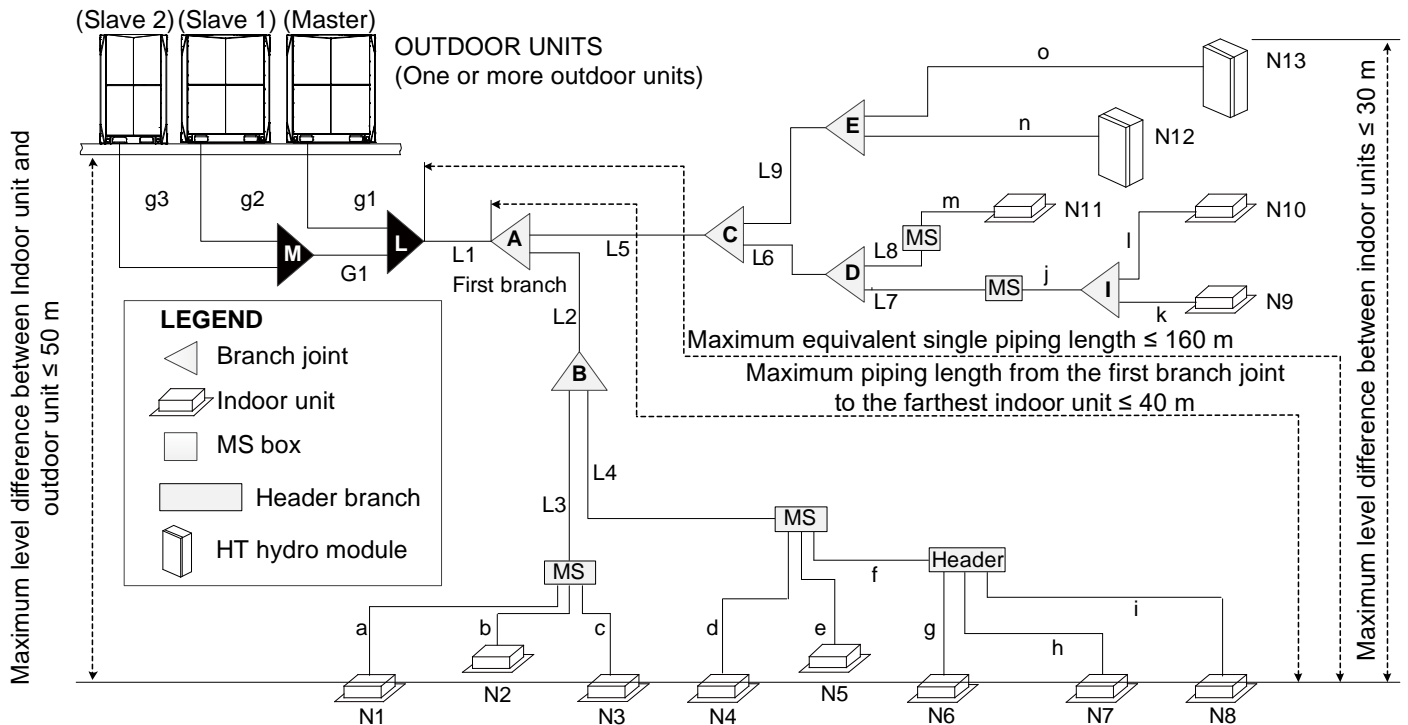
The piping length and level difference requirements that apply are summarized in Table 3-4.4 and are fully described as follows (refer to Figure 3-4.3):

1. **Requirement 1:** The total length of piping in each refrigerant system should not exceed 600m. When calculating the total length of piping, the actual length of the indoor main pipes (the piping between the first indoor branch joint and the MS box, L2 to L9) should be doubled.
2. **Requirement 2:** The piping between the farthest indoor unit and the first outdoor branch joint should not exceed 135m (actual length) and 160m (equivalent length). (The equivalent length of each branch joint is 0.5m and the equivalent length of each MS box is 1m.) When the equivalent piping length from outdoor units to the farthest TVR indoor unit or HT hydro module unit is  $\geq 90$  m, the liquid pipe of the main pipe (L1) should be increased as Table 3-4.2.
3. **Requirement 3:** The piping between the farthest indoor unit (N8) and first indoor branch joint (A) should not exceed 40m in length ( $L1 + L2 + L4 + f + i \leq 40$ m). The piping between HT hydro module and first branch joint should not exceed 40m in length ( $L5 + L9 + o \leq 40$ m)
4. **Requirement 4:** The largest level difference between indoor unit or HT hydro module and outdoor unit should not exceed 50m when the outdoor unit is above. The largest level difference between indoor unit or HT hydro module and outdoor unit should not exceed 40m when the outdoor unit is below.
5. **Requirement 5:** The largest level difference between indoor units should not exceed 30m.
6. **Requirement 6:** Piping between outdoor unit and outdoor branch joint should not exceed 30m.  $g1 \leq 10$  m;  $g2+G1 \leq 10$  m;  $g3 + G1 \leq 10$  m

Table 3-4.2: Diameter increase requirements

Original (mm)	Increased (mm)
Φ9.53	Φ12.7
Φ12.7	Φ15.9
Φ15.9	Φ19.1
Φ19.1	Φ22.2
Φ22.2	Φ25.4

Figure 3-4.3: Permitted refrigerant piping lengths and level differences



Legend	
g1, g2, g3, G1	Main pipe
L, M	Outdoor unit connection pipe
L1	Outdoor unit branch joint
L2 to L9	Main pipe
A to E	Indoor unit main pipe
I	Branch joint between main pipe and MS or HT hydro module
a to o	Branch joint between MS and indoor unit
N1 to N11	TVR indoor unit
N12, N13	HT Hydro module

Table 3-4.4: Summary of permitted refrigerant piping lengths and level differences

			Permitted values	Piping in Figure 3-4.5
Piping lengths	Total piping length <sup>1</sup>		≤ 600 m	$L1 + 2 \times \sum\{L2 \text{ to } L9\} + \sum\{a \text{ to } o\}$
	Piping between farthest TVR indoor unit or HT hydro module and first indoor branch joint <sup>2</sup>	Actual length	≤ 135 m	$L1 + L2 + L4 + f + i$
		Equivalent length	≤ 160 m	
	Piping between farthest TVR indoor unit or HT hydro module and first branch joint <sup>3</sup>		≤ 40 m	$L2 + L4 + f + i$
	Piping between outdoor unit and outdoor branch joint		≤ 10 m	$g1 \leq 10 \text{ m}; g2+G1 \leq 10 \text{ m}; g3 + G1 \leq 10 \text{ m}$
Level differences	Largest level difference between TVR indoor unit or HT hydro module and outdoor unit <sup>4</sup>	Outdoor unit is above	≤ 50 m	
		Outdoor unit is below	≤ 40 m	
	Largest level difference between TVR indoor units or HT hydro module		≤ 30 m	

Notes:

1. Refer to Requirement 1, above.
2. Refer to Requirement 2, above.
3. Refer to Requirement 3, above.
4. Refer to Requirement 4, above.

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### 4.3.3 Connection with TVR indoor units and AHU kits

The piping length and level difference requirements that apply are summarized in Table 3-4.5 and are fully described as follows (refer to Figure 3-4.4):

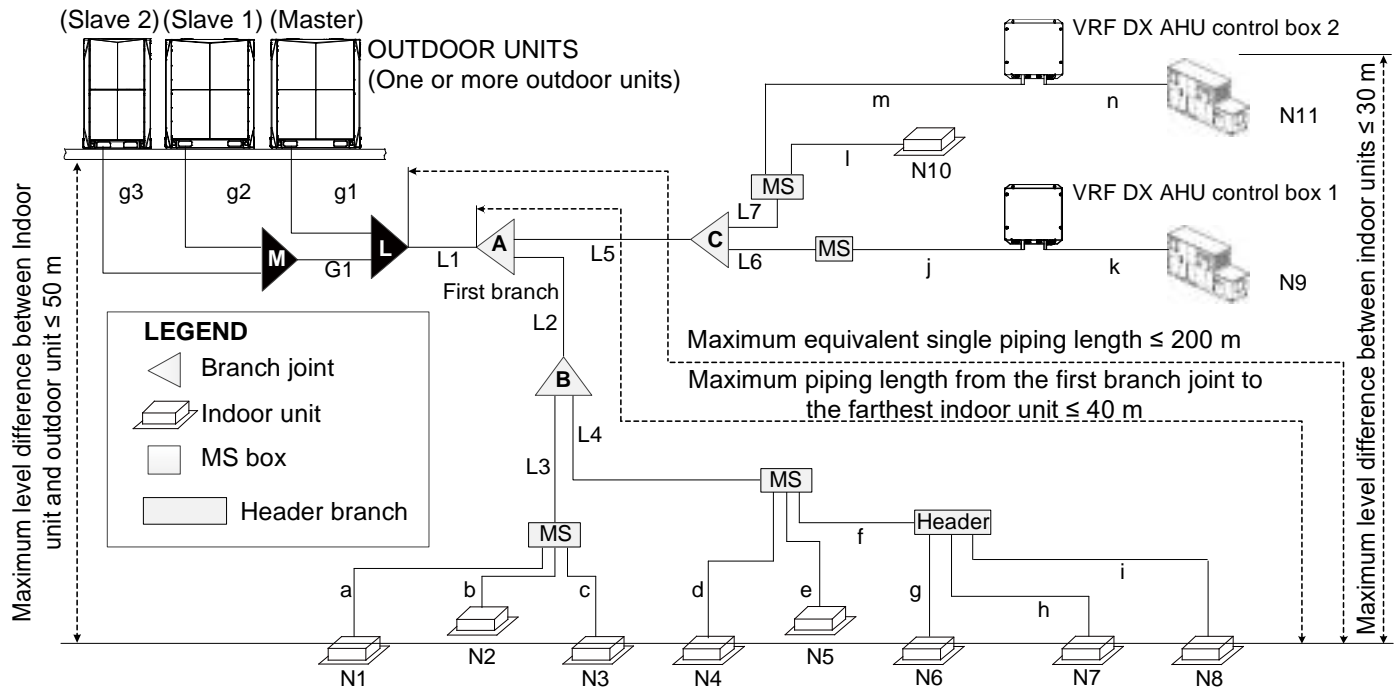
- Requirement 1:** The total length of piping in each refrigerant system should not exceed 1000m. When calculating the total length of piping, the actual length of the indoor main pipes (the piping between the first indoor branch joint and the MS box, L2 to L13) should be doubled.
- Requirement 2:** The piping between the farthest indoor unit and the first outdoor branch joint should not exceed 175m (actual length) and 200m (equivalent length). (The equivalent length of each branch joint is 0.5m and the equivalent length of each MS box is 1m.) When the equivalent piping length from outdoor units to the farthest TVR indoor unit or AHU is  $\geq 90$  m, the liquid pipe of the main pipe (L1) should be increased as Table 3-4.2.
- Requirement 3:** The piping between the farthest indoor unit (N8) or AHU (N11) and first indoor branch joint (A) should not exceed 40m.
- Requirement 4:** The largest level difference between indoor unit or AHU and outdoor unit should not exceed 50m when the outdoor unit is above. The largest level difference between indoor unit or AHU and outdoor unit should not exceed 40m when the outdoor unit is below.
- Requirement 5:** The largest level difference between indoor units or AHUs should not exceed 30m.
- Requirement 6:** Piping between outdoor unit and outdoor branch joint should not exceed 30m.  $g1 \leq 10$  m;  $g2+G1 \leq 10$  m;  $g3 + G1 \leq 10$  m

Table 3-4.2: Diameter increase requirements

Original (mm)	Increased (mm)
Φ9.53	Φ12.7
Φ12.7	Φ15.9
Φ15.9	Φ19.1
Φ19.1	Φ22.2
Φ22.2	Φ25.4



Figure 3-4.4: Permitted refrigerant piping lengths and level differences



Legend	
g1, g2, g3, G1	Outdoor unit connection pipe
L, M	Outdoor unit branch joint
L1	Main pipe
L2 to L7	Indoor unit main pipe
A to C	Branch joint between main pipe and MS
a to n	Indoor unit auxiliary pipe
N1 to N8, N10	TVR indoor unit
N9, N11	AHUs
g1, g2, g3, G1	Outdoor unit connection pipe

Table 3-4.5: Summary of permitted refrigerant piping lengths and level differences

			Permitted values	Piping in Figure 3-4.6
Piping lengths	Total piping length		≤ 1000 m	$L1 + 2 \times \sum\{L2 \text{ to } L7\} + \sum\{a \text{ to } n\}$
	Piping between farthest TVR indoor unit and outdoor unit or the last multi-outdoor piping branch <sup>2</sup>	Actual length	≤ 175 m	$L1 + L2 + L4 + f + i$
		Equivalent length	≤ 200 m	
	Piping between farthest TVR indoor unit or AHU and first branch joint <sup>3</sup>		≤ 40 m	$L2 + L4 + f + i$
	Piping between outdoor unit and outdoor branch joint		≤ 10 m	$g1 \leq 10 \text{ m}; g2 + G1 \leq 10 \text{ m}; g3 + G1 \leq 10 \text{ m}$
Level differences	Largest level difference between TVR indoor unit or AHU and outdoor unit <sup>4</sup>	Outdoor unit is above	≤ 50 m	
		Outdoor unit is below	≤ 40 m	
	Largest level difference between standard indoor units or AHUs		≤ 30 m	

Notes:

1. Refer to Requirement 1, above.
2. Refer to Requirement 2, above.
3. Refer to Requirement 3, above.
4. Refer to Requirement 4, above.

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## 4.4 Selecting Piping Diameters

Tables 3-4.6 to 3-4.11 specify the required pipe diameters for the indoor and outdoor piping.

Figure 3-4.5: Selecting piping diameters

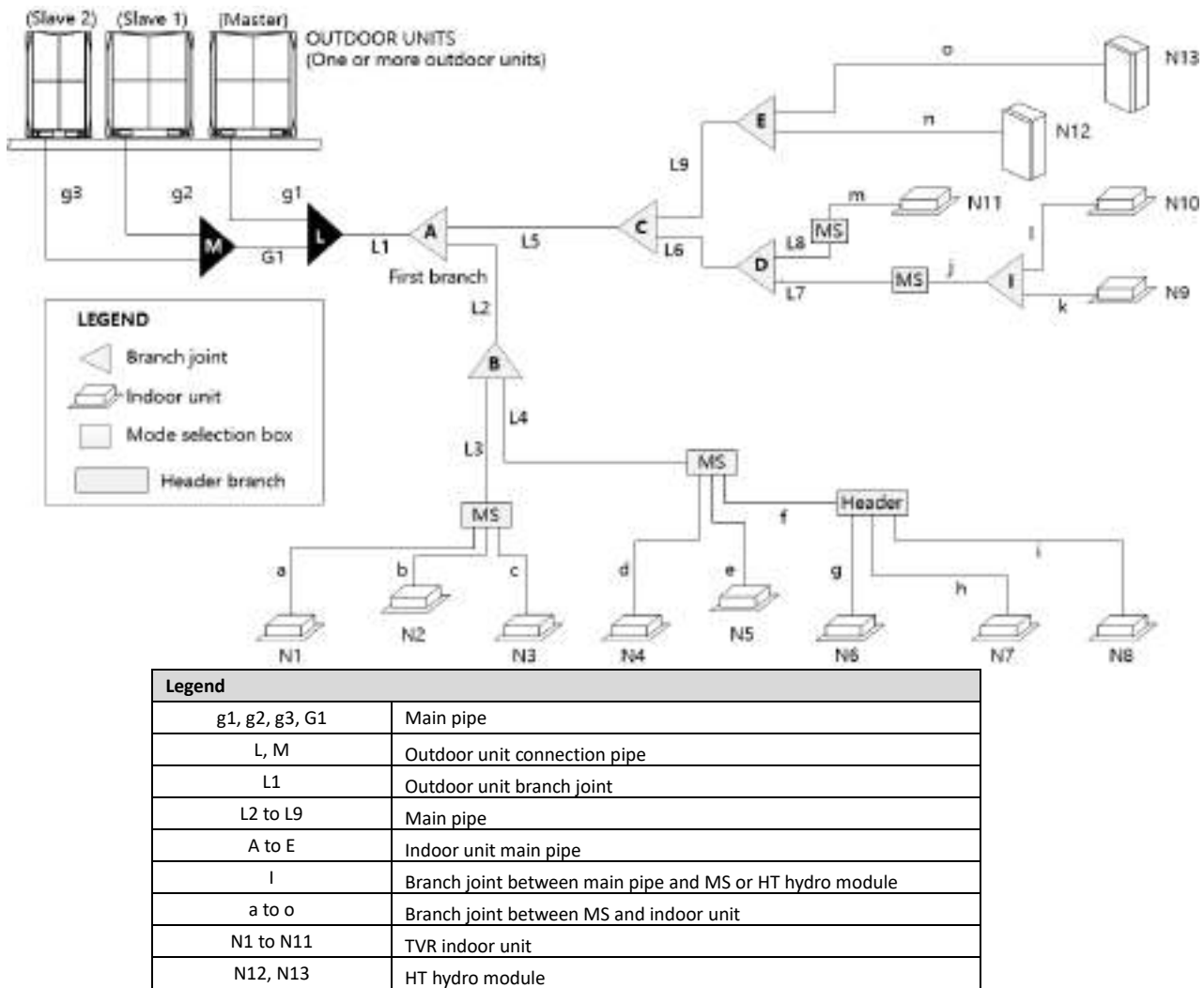


Figure 3-4.6: Outdoor connection pipes

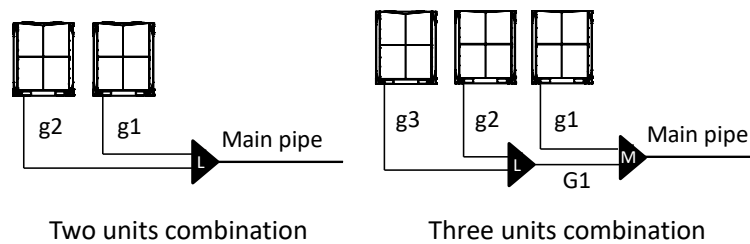


Table 3-4.6: Outdoor unit connection pipes (g1 to g3, G1)

Pipes	Outdoor unit capacity (HP)	Pipe Diameter (mm OD)		
		Liquid pipe	Low Pressure Gas Pipe	High Pressure Gas Pipe
g1 to g3	8	Φ9.53	Φ19.1	Φ15.9
	10	Φ9.53	Φ22.2	Φ19.1
	12	Φ12.7	Φ28.6	Φ19.1
	14-16	Φ12.7	Φ28.6	Φ22.2
	18	Φ15.9	Φ28.6	Φ22.2
G1	≤ 24	Φ15.9	Φ34.9	Φ28.6
	26-34	Φ19.1	Φ34.9	Φ28.6
	36	Φ19.1	Φ41.3	Φ28.6
	≥ 38	Φ19.1	Φ41.3	Φ34.9

*Table 3-4.7: Outdoor unit branch joint kits (L, M)*

Number of outdoor units	Branch joint kit
2	L: TODK002HRU
3	L+M: TODK003HRU

*Table 3-4.8: Main pipe (L1) and first branch joint (A)*

Outdoor Unit Capacity (HP)	Pipe Diameter (mm OD)			
	Liquid pipe	Low Pressure Gas Pipe	High Pressure Gas Pipe	Branch joint kit
8	Φ9.53	Φ19.1	Φ15.9	TRDK112HRU
10	Φ9.53	Φ22.2	Φ19.1	TRDK112HRU
12	Φ12.7	Φ28.6	Φ19.1	TRDK242HRU
14-16	Φ12.7	Φ28.6	Φ22.2	TRDK242HRU
18	Φ15.9	Φ28.6	Φ22.2	TRDK242HRU
20-22	Φ15.9	Φ28.6	Φ28.6	TRDK242HRU
24	Φ15.9	Φ34.9	Φ28.6	TRDK354HRU
26-34	Φ19.1	Φ34.9	Φ28.6	TRDK354HRU
36	Φ19.1	Φ41.3	Φ28.6	TRDK573HRU
38-60	Φ19.1	Φ41.3	Φ34.9	TRDK573HRU

Notes:

- When the equivalent piping length from outdoor units to the farthest indoor unit exceed 90 m, or the level difference is greater than 50 m (outdoor unit is above) or 40 m (outdoor unit is below), the liquid pipe of the main pipe (L1) should be increased as Table 3-4.2.

*Table 3-4.9: Indoor unit main pipes (L2 to L8) and indoor unit branch joint kits*

Total capacity of downstream indoor units (× 100W)	Pipe Diameter (mm OD)			Branch joint kit
	Liquid pipe	Low Pressure Gas Pipe	High Pressure Gas Pipe	
< 168	Ø9.53	Φ15.9	Φ12.7	TRDK057HRU
168 ≤ A < 224	Ø9.53	Φ19.1	Φ15.9	TRDK112HRU
224 ≤ A < 330	Ø9.53	Φ22.2	Φ19.1	TRDK112HRU
330 ≤ A < 470	Φ12.7	Φ28.6	Φ19.1	TRDK242HRU
470 ≤ A < 710	Φ15.9	Φ28.6	Φ28.6	TRDK242HRU
710 ≤ A < 1040	Φ19.1	Φ34.9	Φ28.6	TRDK354HRU
1040 ≤ A	Φ19.1	Φ41.3	Φ28.6	TRDK573HRU

Notes:

- Choose indoor main pipes from the above table in accordance with total downstream indoor capacity, which is the total capacity of all the indoor units, exclude HT hydro module, connected downstream.
- If there are HT hydro module connected to the system, the pipes (L9, n, o), only HT hydro module connected downstream, are selected according to Table 3-4.10.

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Table 3-4.10: HT hydro module pipes (L9, n, o) and branch joint kits (only HT hydro module connected downstream)

Total capacity of downstream HT hydro module ( $\times 100W$ )	Pipe Diameter (mm OD)		Branch joint kit
	Liquid pipe	Gas Pipe	
$< 168$	$\Phi 9.53$	$\Phi 12.7$	TRDK057HRU
$168 \leq B < 224$	$\Phi 9.53$	$\Phi 15.9$	TRDK112HRU
$224 \leq B < 330$	$\Phi 9.53$	$\Phi 19.1$	TRDK112HRU
$330 \leq B < 470$	$\Phi 12.7$	$\Phi 19.1$	TRDK242HRU
$470 \leq B < 710$	$\Phi 15.9$	$\Phi 28.6$	TRDK242HRU
$710 \leq B < 1040$	$\Phi 19.1$	$\Phi 28.6$	TRDK354HRU
$1040 \leq B$	$\Phi 19.1$	$\Phi 28.6$	TRDK573HRU

Notes:

- One or more HT hydro modules can be connected in the TVR Ultra HR system, HT hydro modules should be connecting to the first branch joint or its downstream branch joints, never connecting to the MS or header branches.
- Choose HT hydro module pipes from the above table in accordance with total downstream HT hydro module capacity, which is the total capacity of all the HT hydro module connected downstream.

Table 3-4.11: Indoor unit auxiliary pipes (a to m) and branch joint kits between MS and downstream indoor units

Capacity of indoor units ( $\times 100W$ )	Pipe Diameter (mm OD)		Branch joint kit
	Liquid pipe (mm)	Gas pipe (mm)	
$A < 56$	$\Phi 6.35$	$\Phi 12.7$	TRDK056HP
$56 \leq A < 160$	$\Phi 9.53$	$\Phi 15.9$	TRDK056HP
$160 \leq A < 224$	$\Phi 9.53$	$\Phi 19.1$	TRDK056HP
$224 \leq A \leq 280$	$\Phi 9.53$	$\Phi 22.2$	TRDK112HP

Notes:

- The branch joint kits are required only when two or more indoor units are connected to 1 port of MS.
- Indoor units with a capacity more than 16 kW should be connected to 2 ports merged in a multi MS unit using branch joints (TRIJ095HRU). Merged ports must start on an odd number and with the next sequential even number (i.e. 1, 2 or 3, 4 and so on). And if the single MS is used, the downstream Indoor units can be up to a maximum capacity of 32 kW.

## 4.5 Mode Selection Box Selection and Piping

MS should be selected according to Table 3-4.12.

Table 3-4.12: MS box

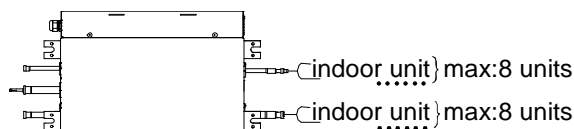
Model name		TMSBOX01E	TMSBOX04E	TMSBOX06E	TMSBOX08E	TMSBOX10E	TMSBOX12E
Max. number of indoor unit groups		1	4	6	8	10	12
Max. number of units per group		8	5	5	5	5	5
Max. number of downstream indoor units		8	20	30	40	47	47
Max. capacity of each group of indoor units	kW	32	16	16	16	16	16
Total capacity of downstream indoor units	kW	≤32	≤49	≤63	≤85	≤85	≤85

Table 3-4.13: Pipe size of MS

Model			TMSBOX01E	TMSBOX04E	TMSBOX06E	TMSBOX08E	TMSBOX10E	TMSBOX12E
Connect to outdoor unit	Liquid pipe	mm	Ø9.53	Ø15.9	Ø15.9	Ø15.9	Ø15.9	Ø15.9
	Low pressure gas pipe	mm	Ø15.9	Ø28.6	Ø28.6	Ø28.6	Ø28.6	Ø28.6
	High pressure gas pipe	mm	Ø12.7	Ø22.2	Ø22.2	Ø22.2	Ø22.2	Ø22.2
Connect to indoor unit	Liquid pipe	mm	Ø9.53	Ø9.53	Ø9.53	Ø9.53	Ø9.53	Ø9.53
	Gas pipe	mm	Ø15.9	Ø15.9	Ø15.9	Ø15.9	Ø15.9	Ø15.9

### MS01 connection

Figure 3-4.7: MS Connecting to indoor unit ≤ 32kW



#### Notes:

1. If auto mode function is required, only one indoor unit is can be connected.
2. All the indoor units connect to the same MS01 should operate the same mode to avoid mode conflict.

### MS04-12 connection

Figure 3-4.8: MS Connecting to indoor unit ≤ 16kW

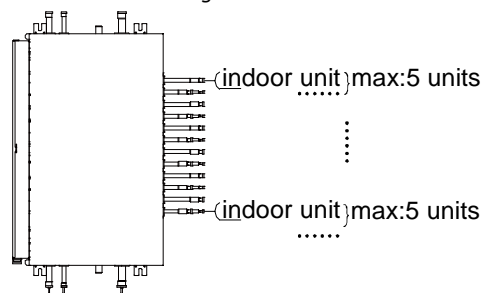
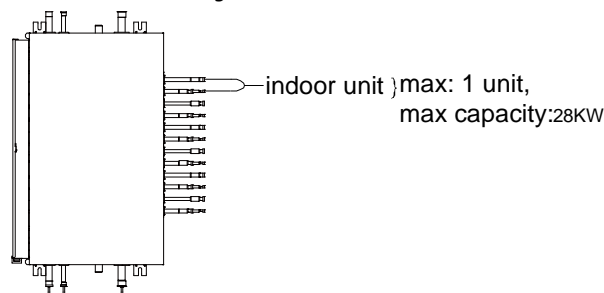


Figure 3-4.9: MS Connecting to indoor unit 16-28KW



#### Notes:

1. If auto mode function is required, only one indoor unit is can be connected to one branch.
2. All the indoor units connect to the same MS branch should operate the same mode to avoid mode conflict.
3. Use optional branch pipe (Model: TRIJ095HRU) and merge the two ports to one, then large capacity (16-28KW) indoor unit can be connect to MS04-12.
4. The allowed ports merge: No.1&No.2, No.3& No.4, No.5&No.6, No.7&No.8, No.9&No.10, No.11&No.12. Other ports is not allowed to merge.

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Figure 3-4.10: Right ports merge example

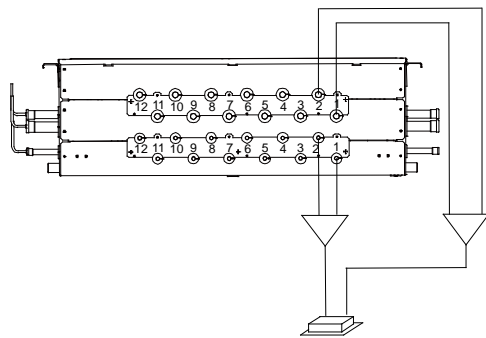
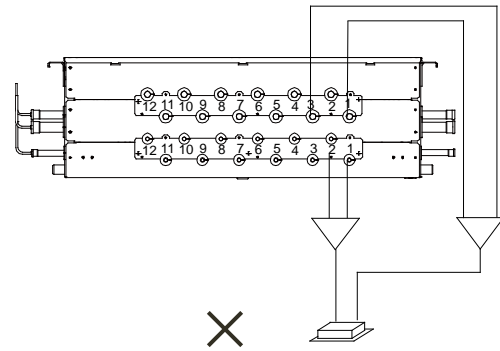


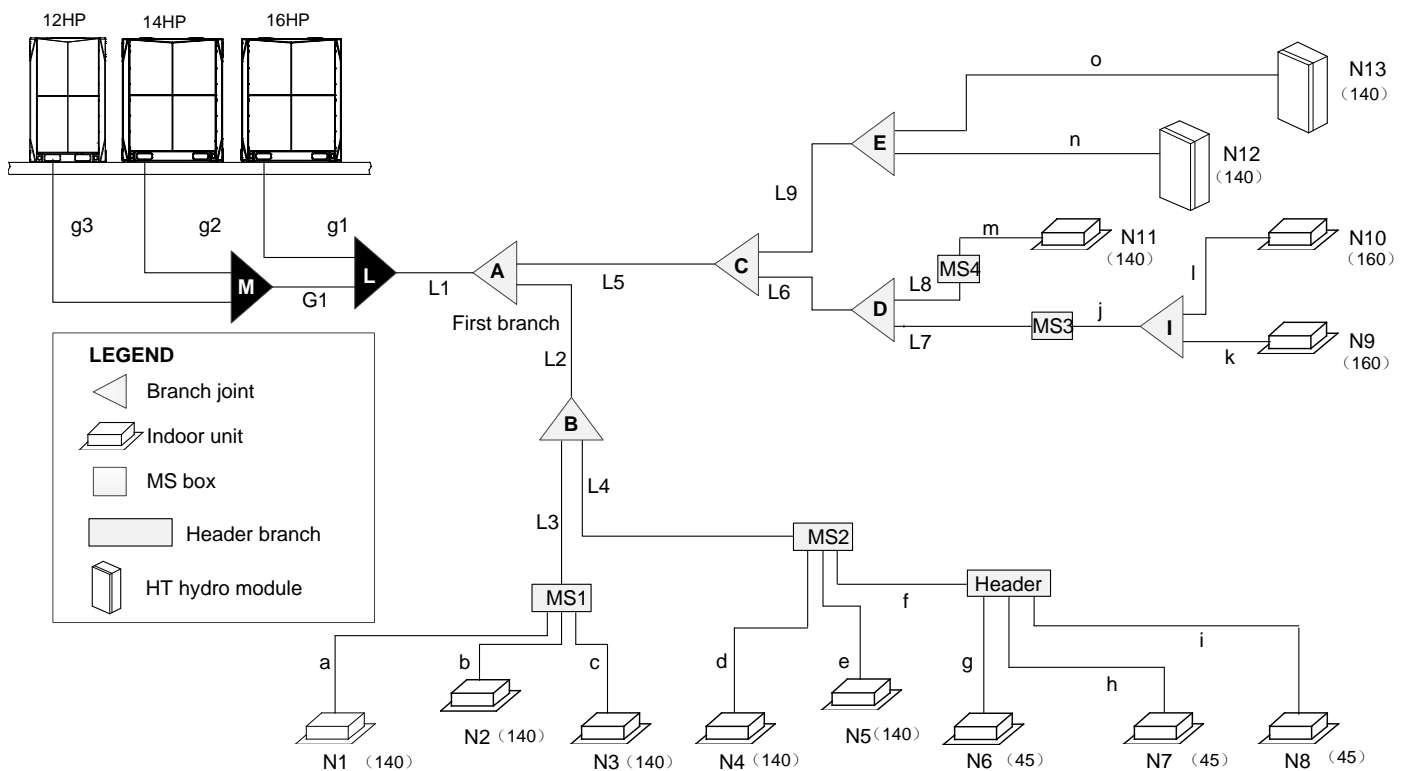
Figure 3-4.11: Wrong ports merge example



### 4.6 Selection Example

The example below illustrates the piping selection procedure for a system consisting of three outdoor units (16HP + 14HP + 12HP) and 11 TVR indoor units and 2 HT hydro modules. The system's equivalent length of all liquid pipes is not in excess of 90m. Rooms install indoor unit N9, N10 and N11 need add refrigerant leak detection sensor.

Figure 3-4.12: Refrigerant piping selection example



Legend	
L1	Main pipe
L2 to L9	Indoor main pipes
a to o	Indoor auxiliary pipes
A to E	Indoor branch joints
L, M	Outdoor branch joints
g1 to g3, G1	Outdoor connection pipes
N12 to N13	Hydronic module
MS1 to MS4	Mode switch box

Figures in parentheses indicate indoor unit capacity indexes.

#### Step 1: Select indoor auxiliary pipes

- Indoor units N1 to N5 and N11 are of capacity 14kW. Refer to Table 3-4.8. Indoor auxiliary pipes a to e and m are  $\Phi 15.9 / \Phi 9.53$ .
- Indoor units N6 and N8 are of capacity 4.5kW. Refer to Table 3-4.8. Indoor auxiliary pipes g and l are  $\Phi 12.7 / \Phi 6.35$ .

- Indoor units N9 to N10 are of capacity 16kW. Refer to Table 3-4.8. Indoor auxiliary pipes g and l are  $\Phi 15.9 / \Phi 9.53$ .
- HT Hydro modules N12 to N13 are of capacity 14kW. Refer to Table 3-4.8. Indoor auxiliary pipes n and o are  $\Phi 15.9 / \Phi 9.53$ .

#### Step 2: Select indoor branch joints between MS box and indoor units

- Refer to Table 3-4.8. Branch joint l are TRDK056HP.

#### Step 3: Select indoor main pipes and MS box and indoor branch joints B to E

- The indoor units (N1 to N3) downstream of MS box MS1 have total capacity of  $14 \times 3 = 42\text{kW}$ . Refer to Table 3-4.4. Indoor main pipe L3 is  $\Phi 12.7 / \Phi 28.6 / \Phi 19.1$ . Refer to Table 3-4.12. MS box MS1 is TMSBOX04E.
- The indoor units (N4 to N8) downstream of MS box MS2 have total capacity of  $14 \times 2 + 4.5 \times 3 = 41.5\text{kW}$ . Refer to Table 3-4.4. Indoor main pipe L7 is  $\Phi 12.7 / \Phi 28.6 / \Phi 19.1$ . Refer to Table 3-4.12. MS box MS2 is TMSBOX04E.
- The indoor units (N9 to N10) downstream of MS box MS3 have total capacity of  $16 \times 2 = 32\text{kW}$ . Refer to Table 3-4.4. Indoor main pipe L3 is  $\Phi 12.7 / \Phi 28.6 / \Phi 19.1$ . Refer to Table 3-4.12. MS box MS3 is TMSBOX01E.
- The indoor units (N11) downstream of MS box MS4 have total capacity 14kW. Refer to Table 3-4.4. Indoor main pipe L8 is  $\Phi 9.53 / \Phi 15.9 / \Phi 12.7$ . Refer to Table 3-4.12. MS box MS4 is TMSBOX01E.

#### Step 4: Select main pipe and indoor branch joint A

- The total capacity of the outdoor units is  $16 + 14 + 12 = 42\text{HP}$ . The system's equivalent total piping length is not in excess of 90m. Refer to Tables 3-4.4. Main pipe L1 is  $\Phi 41.3 / \Phi 34.9 / \Phi 19.1$ . Indoor branch joint A is TRDK573HRU.

#### Step 5: Select outdoor connection pipes and outdoor branch joints

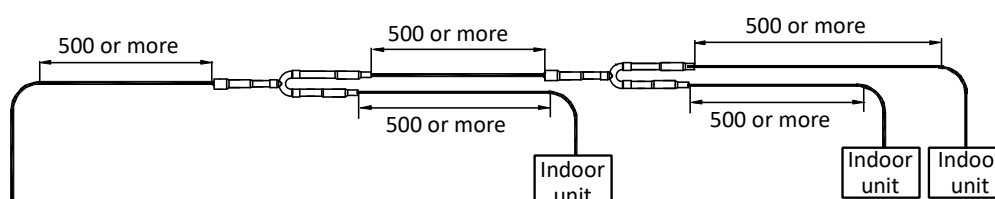
- The master unit is 16HP and the slave units are 14HP and 12HP. Refer to Table 3-4.6. Outdoor connection pipes g1 and g2 are  $\Phi 28.6 / \Phi 22.2 / \Phi 12.7$  and outdoor connection pipe g3 is  $\Phi 28.6 / \Phi 19.1 / \Phi 12.7$
- Refer to Table 3-4.6. Outdoor connection pipe G1 is  $\Phi 41.3 / \Phi 34.9 / \Phi 19.1$ .
- There are three outdoor units in the system. Refer to Table 3-4.7. Outdoor branch joints L and M are TODK003HRU.

### 4.7 Branch Joints

Branch joint design should take account of the following:

- U-shaped branch joints should be used – tee joints are not suitable. Branch joint dimensions are given in Tables 3-4.14 and 3-4.15.
- To avoid accumulation of oil in the outdoor units, outdoor branch joints should be installed horizontally and must not be higher than the outdoor unit refrigerant outlets. Refer to Figure 3-5.9 in Part 3, 5.6 “Branch Joints”. Indoor branch joints may be installed either horizontally or vertically.
- To ensure even distribution of refrigerant, branch joints should not be installed within 500mm of a 90° bend, another branch joint or the straight section of piping leading to an indoor unit, with the minimum 500mm being measured from the point where the branch joint is connected to the piping, as shown in Figure 3-4.13.

Figure 3-4.13: Branch joint spacing and separation from bends (unit: mm)



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Table 3-4.14: Indoor branch joint dimensions (unit: mm)

Model	Low-pressure gas side joints	High-pressure gas side joints	Liquid side joints
TRDK057 HRU			
TRDK112 HRU			
TRDK242 HRU			
TRDK354 HRU			
TRDK573 HRU			

Table 3-4.15: Outdoor branch joint dimensions (unit: mm)

Model	Low-pressure gas side joints	High-pressure gas side joints	Liquid side joints
TODK002HRU			
TODK003HRU			



#### 4.8 Refrigerant Leakage Precautions

R410A refrigerant is not flammable in air at temperatures up to 100°C at atmospheric pressure and is generally considered a safe substance to use in air conditioning systems. Nevertheless, precautions should be taken to avoid danger to life in the unlikely event of a major refrigerant leakage. Precautions should be taken in accordance with all applicable legislation. Where no applicable legislation exists, the following may be used as a guide:

- Air conditioned rooms should be large enough that if leakage of all the refrigerant in the system occurs, the concentration of the refrigerant in the room does not reach a level dangerous to health.
- A critical concentration (at which point R410A becomes dangerous to human health) of 0.44 kg/m<sup>3</sup> can be used.
- The potential concentration of refrigerant in a room following a leak can be calculated as follows:
  - Calculate the total amount in of refrigerant in the system ("A") as the nameplate charge (the charge in the system when delivered from the factory) plus the additional charge added as per Part 3, 8.1 "Calculating Additional Refrigerant Charge".
  - Calculate the total volume ("B") of the smallest room into which refrigerant could potentially leak.
  - Calculate the potential refrigerant concentration as A divided by B.
  - If A/B is not less than 0.44 kg/m<sup>3</sup>, countermeasures such installing mechanical ventilators (either ventilating regularly or controlled by refrigerant leakage detectors) should be taken.
- Since R410A is heavier than air, particular consideration should be given to leak scenarios in basement rooms.

Figure 3-4.14: Potential refrigerant leak scenario

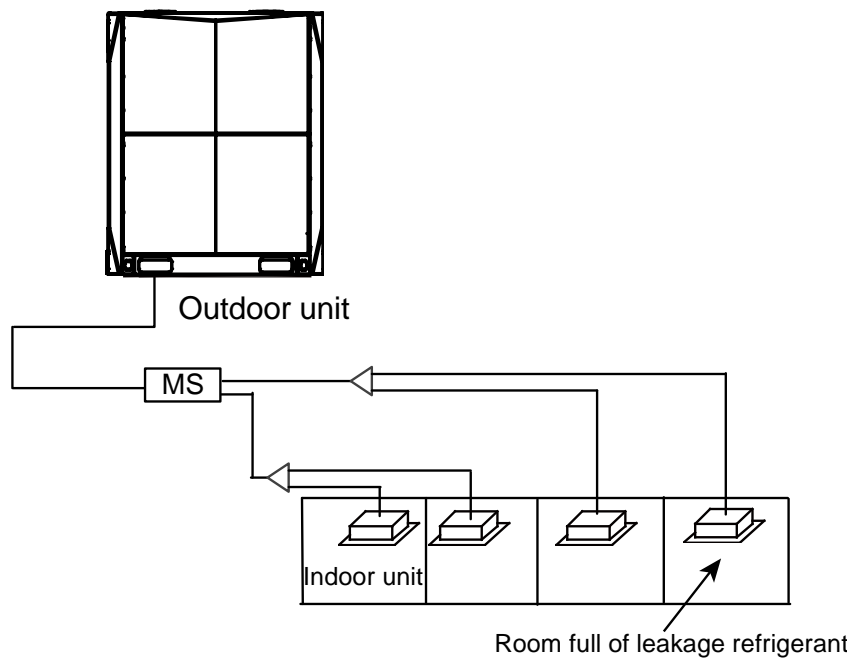
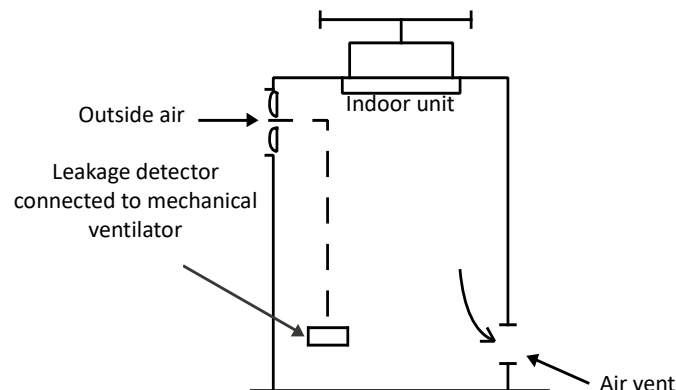


Figure 3-4.15: Mechanical ventilator controlled by refrigerant leak detector



## 5 Refrigerant Piping Installation

### 5.1 Procedure and Principles

#### 5.1.1 Installation procedure

##### Notes for installers



Installation of the refrigerant piping system should proceed in the following order:



Note: Pipe flushing should be performed once the brazed connections have been completed with the exception of the final connections to the indoor units. That is, flushing should be performed once the outdoor units have been connected but before the indoor units are connected.

#### 5.1.2 Three principles for refrigerant piping

	Reasons	Measures
<b>CLEAN</b>	Particles such as oxide produced during brazing and/or building dust can lead to compressor malfunction	<ul style="list-style-type: none"> <li>Seal piping during storage<sup>1</sup></li> <li>Flow nitrogen during brazing<sup>2</sup></li> <li>Pipe flushing<sup>3</sup></li> </ul>
<b>DRY</b>	Moisture can lead to ice formation or oxidization of internal components leading to abnormal operation or compressor damage	<ul style="list-style-type: none"> <li>Pipe flushing<sup>3</sup></li> <li>Vacuum drying<sup>4</sup></li> </ul>
<b>SEALED</b>	Imperfect seals can lead to refrigerant leakage	<ul style="list-style-type: none"> <li>Pipe manipulation<sup>5</sup> and brazing<sup>2</sup> techniques</li> <li>Gastightness test<sup>6</sup></li> </ul>

##### Notes:

- See Part 3, 5.2.1 "Pipe delivery, storage and sealing".
- See Part 3, 5.5 "Brazing".
- See Part 3, 5.8 "Pipe Flushing".
- See Part 3, 5.10 "Vacuum Drying".
- See Part 3, 5.3 "Manipulating Copper Piping".
- See Part 3, 5.9 "Gastightness Test".

## 5.2 Storing Copper Piping

### 5.2.1 Pipe delivery, storage and sealing

#### Notes for installers



- Ensure that piping does not get bent or deformed during delivery or whilst stored.
- On construction sites store piping in a designated location.
- To prevent dust or moisture entering, piping should be kept sealed whilst in storage and until it is about to be connected. If piping is to be used soon, seal the openings with plugs or adhesive tape. If piping is to be stored for a long time, charge the piping with nitrogen at 0.2-0.5MPa and seal the openings by brazing.
- Storing piping directly on the ground risks dust or water ingress. Wooden supports can be used to raise piping off the ground.
- During installation, ensure that piping to be inserted through a hole in a wall is sealed to ensure dust and/or fragments of wall do not enter.
- Be sure to seal piping being installed outdoors (especially if being installed vertically) to prevent rain entering.

## 5.3 Manipulating Copper Piping

### 5.3.1 De-oiling

#### Notes for installers



- Lubrication oil used during some copper pipe manufacturing processes can cause deposits to form in R410A refrigerant systems, causing system errors. Oil-free copper piping should therefore be selected. If ordinary (oily) copper piping is used, it must be cleaned with gauze dipped in tetrachloroethylene solution prior to installation.

#### Caution

- Never use carbon tetrachloride (CCl<sub>4</sub>) for pipe cleansing or flushing, as doing so will seriously damage the system.

### 5.3.2 Cutting copper piping and removing burrs

#### Notes for installers



- Use a pipe cutter rather than a saw or cutting machine to cut piping. Rotate the piping evenly and slowly, applying even force to ensure that the piping does not become deformed during cutting. Using a saw or cutting machine to cut piping runs the risk of copper shavings entering the piping. Copper shavings are difficult to remove and pose a serious risk to the system if they enter the compressor or block the throttling unit.
- After cutting using a pipe cutter, use a reamer/scrapper to remove any burrs that have formed at the opening, keeping the opening of the piping downwards to avoid copper shavings from entering the piping.
- Remove burrs carefully to avoid scratches, which may prevent a proper seal being formed and lead to refrigerant leakage.

5.3.3 Expanding copper piping ends

Notes for installers

- Ends of copper piping can be expanded so that another length of piping can be inserted and the joint brazed.
- Insert the expanding head of the pipe expander into the pipe. After completing pipe expansion, rotate the copper pipe a few degrees to rectify the straight line mark left by the expanding head.

**Caution**

- Ensure that the expanded section of piping is smooth and even. Remove any burrs that remain after cutting.

*Figure 3-5.1: Expanding copper piping ends*

5.3.4 Flared joints

Flared joints should be used where a screw thread connection is required.

Notes for installers

- Before flaring 1/2H (half hard) piping, anneal the end of the pipe to be flared.
- Remember to place the flare nut on the piping before flaring.
- Ensure the flared opening is not cracked, deformed or scratched, otherwise it will not form a good seal and refrigerant leakage may occur.
- The diameter of the flared opening should be within the ranges specified in Table 3-5.1. Refer to Figure 3-5.2.

*Table 3-5.1: Flared opening size ranges*

Pipe (mm)	Flared opening diameter (A) (mm)
Φ6.35	8.7 - 9.1
Φ9.53	12.8 - 13.2
Φ12.7	16.2 - 16.6
Φ15.9	19.3 - 19.7
Φ19.1	23.6 - 24.0

*Figure 3-5.2: Flared opening*

- When connecting a flared joint, apply some compressor oil to the inner and outer surfaces of the flared opening

### 5.3.5 Bending piping

Bending copper piping reduces the number of brazed joints required and can improve quality and save material.

#### Notes for installers



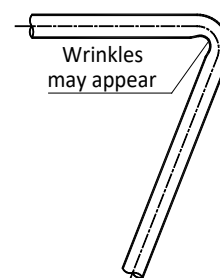
##### Piping bending methods

- Hand bending is suitable for thin copper piping ( $\Phi 6.35\text{mm}$  -  $\Phi 12.7\text{mm}$ ).
- Mechanical bending (using a bending spring, manual bending machine or powered bending machine) is suitable for a wide range of diameters ( $\Phi 6.35\text{mm}$  -  $\Phi 54.0\text{mm}$ ).

##### Caution

- When using a spring bender, ensure that the bender is clean before inserting it in the piping.
- After bending a copper pipe, ensure that there are no wrinkles or deformation on either side of the pipe.
- Ensure that bend angles do not exceed  $90^\circ$ , otherwise wrinkles may appear on the inner side of the pipe, and the pipe may buckle or crack. Refer to Figure 3-5.3.
- Do not use a pipe that has buckled during the bending process; ensure that the cross section at the bend is greater than  $2/3$  of the original area.

Figure 3-5.3: Pipe bending in excess of  $90^\circ$



### 5.4 Refrigerant Piping Supports

When the air conditioning is running, the refrigerant piping will deform (shrink, expand, droop). To avoid damage to piping, hangers or supports should be spaced as per the criteria in the Table 3-5.2. In general, the gas and liquid pipes should be suspended in parallel and the interval between support points should be selected according to the diameter of the gas pipe.

Table 3-5.2: Refrigerant piping support spacings

Pipe (mm)	Interval between support points (m)	
	Horizontal Piping	Vertical Piping
$< \Phi 20$	1	1.5
$\Phi 20 - \Phi 40$	1.5	2
$> \Phi 40$	2	2.5

Suitable insulation should be provided between the piping and the supports. If wooden dowels or blocks are to be used, use wood that has undergone preservative treatment.

Changes in refrigerant flow direction and refrigerant temperature result in movement, expansion and shrinkage of the refrigerant piping. Piping should therefore not be fixed too tightly, otherwise stress concentrations may occur in the piping, with the potential for rupturing.

### 5.5 Brazing

Care must be taken to prevent oxide forming on the inside of copper piping during brazing. The presence of oxide in a refrigerant system adversely affects the operation of valves and compressors, potentially leading to low efficiency or even compressor failure. To prevent oxidation, during brazing nitrogen should be flowed through the refrigerant piping.

#### Notes for installers

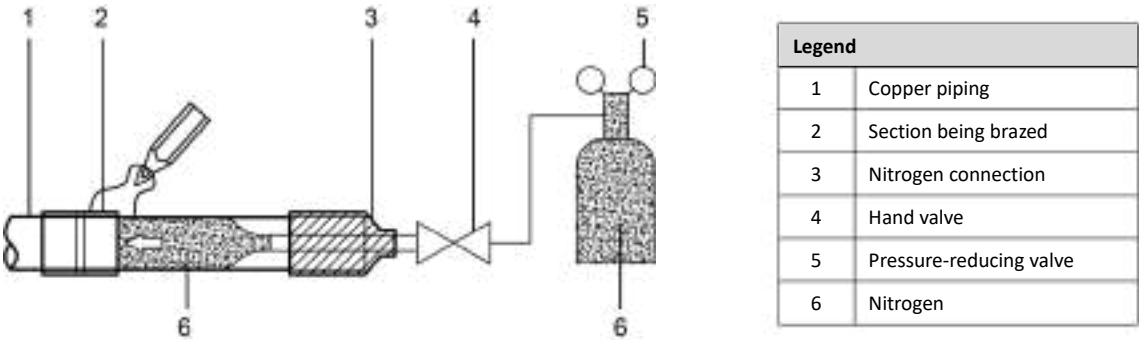
##### Warning

- Never flow oxygen through piping as doing so aids oxidation and could easily lead to explosion and as such is extremely dangerous.
- Take appropriate safety precautions such as having a fire extinguisher to hand whilst brazing.

##### Flowing nitrogen during brazing

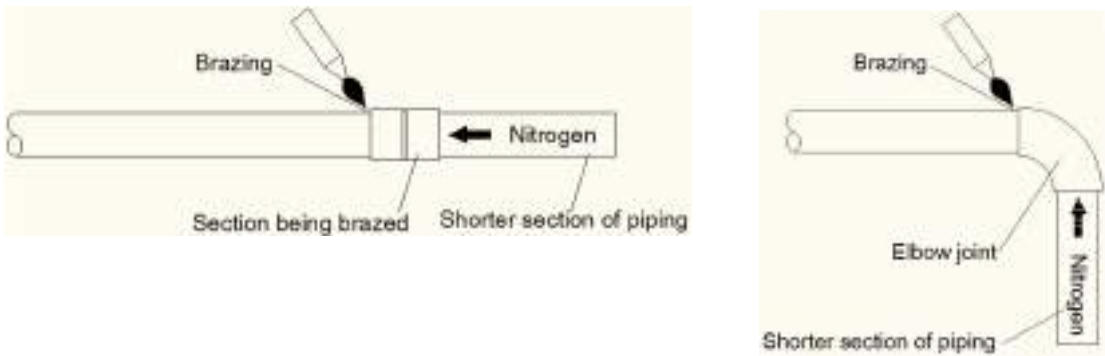
- Use a pressure reducing valve to flow nitrogen through copper piping at 0.02-0.03MPa during brazing.
- Start the flow before brazing starts and ensure that the nitrogen continuously passes through the section being brazed until the brazing is complete and the copper has cooled down completely.

Figure 3-5.4: Flowing nitrogen through piping during brazing



- When joining a shorter section of piping to a longer section, flow nitrogen from the shorter side to allow better displacement of air with nitrogen.
- If the distance from the point where nitrogen enters the piping to the joint to be brazed is long, ensure that the nitrogen is flowed for sufficient time to discharge all the air from the section to be brazed before commencing brazing.

Figure 3-5.5: Flowing nitrogen from shorter side during brazing



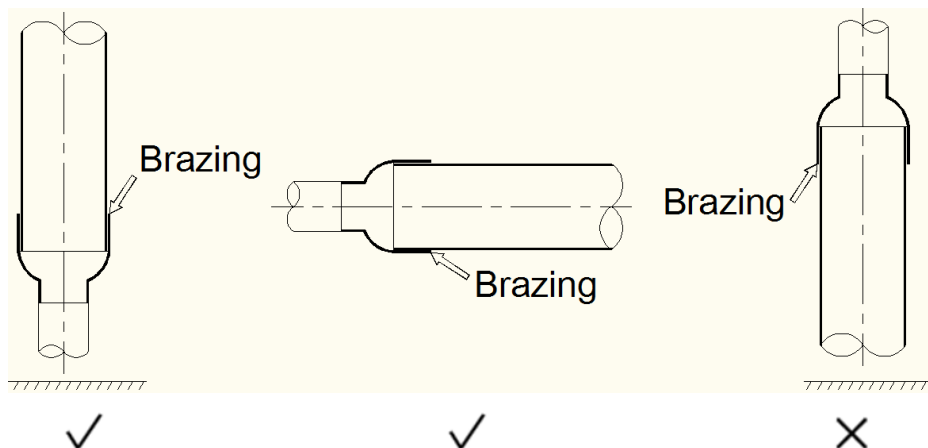
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### Piping orientation during brazing

Brazing should be conducted downwards or horizontally to avoid filler leakage.

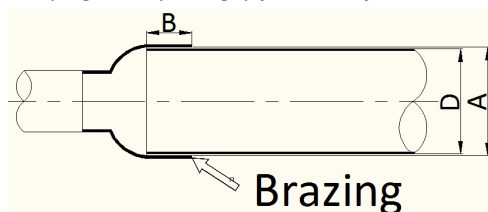
Figure 3-5.6: Piping orientation during brazing



### Piping overlap during brazing

Table 3-5.3 specifies the minimum permissible piping overlap and the range of permissible gap sizes for brazed joints on piping of different diameters. Refer also to Figure 3-5.7.

Figure 3-5.7: Piping overlap and gap for brazed joints



Legend	
A	Inner diameter of larger pipe
D	Outer diameter of smaller pipe
B	Inlaid depth (overlap)

Table 3-5.3: Piping overlap and gap for brazed joints<sup>1</sup>

D (mm)	Minimum permissible B (mm)	Permissible A – D (mm)
5 < D < 8	6	0.05 - 0.21
8 < D < 12	7	
12 < D < 16	8	0.05 - 0.27
16 < D < 25	10	
25 < D < 35	12	0.05 - 0.35
35 < D < 45	14	

Notes:

1. A, B, D refer to the dimensions shown in Figure 3-5.7.

### Filler

- Use a copper/phosphorus brazing alloy (BCuP) filler that does not require flux.
- Do not use flux. Flux can cause corrosion of piping and can affect the performance of compressor oil.
- Do not use anti-oxidants when brazing. Residue can clog piping and damage components.

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### 5.6 Branch Joints

#### Notes for installers



- Use U-shaped branch joints as specified on the construction drawings – do not replace U-shaped branch joints with tee joints.
- To avoid accumulation of oil in the outdoor units, outdoor branch joints should be installed horizontally and must not be higher than the outdoor unit refrigerant outlets. Refer to Figure 3-5.9.
- Indoor branch joints may be installed either horizontally or vertically. Horizontal branch joints must be installed at an angle to the horizontal not exceeding  $10^\circ$  in order to avoid uneven distribution of refrigerant and possible malfunction. Refer to Figure 3-5.8.

Figure 3-5.8: Branch joint orientation

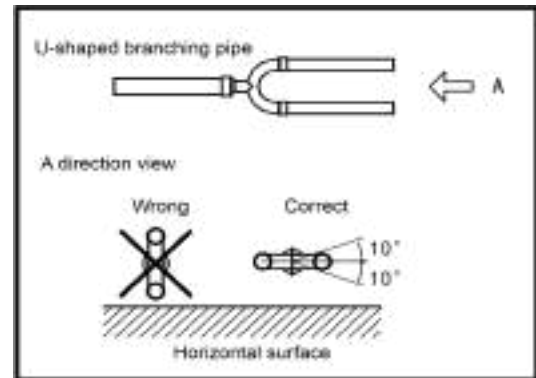
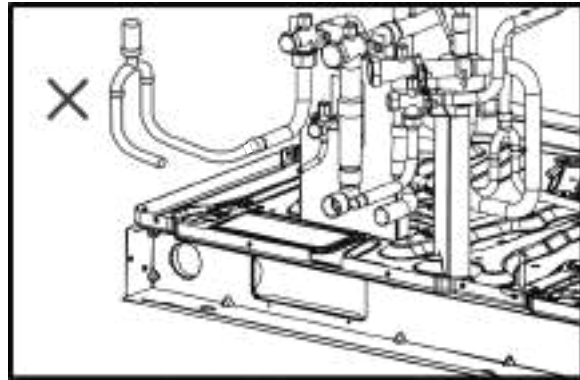
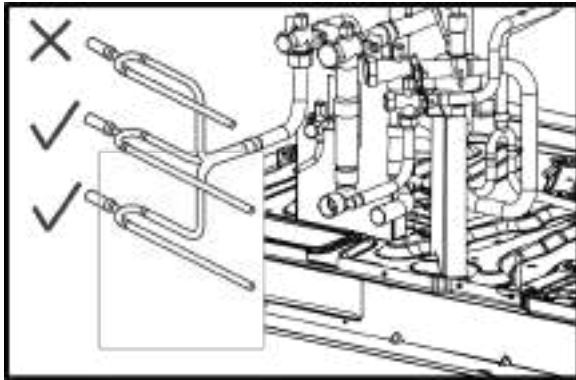


Figure 3-5.9: Installation of outdoor branch joints



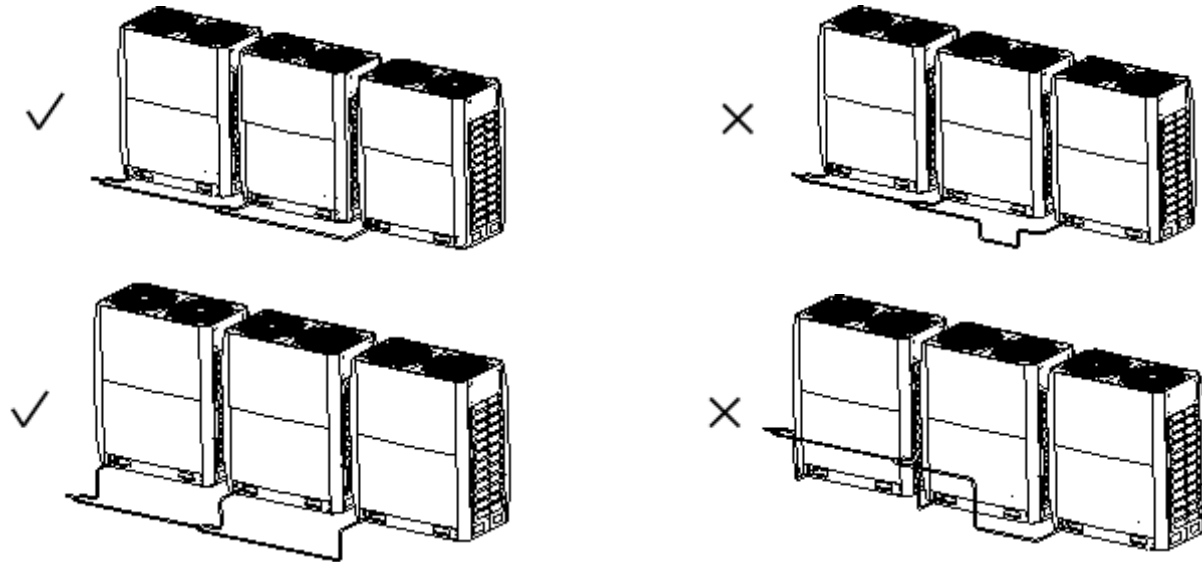
- To ensure even distribution of refrigerant, a limitation is placed on how close branch joints may be installed to bends, other branch joints and the straight sections of piping leading to indoor units. Refer to Part 3, 0 "Branch Joints".



## 5.7 Piping Connections between Outdoor Units

The piping connecting the outdoor units should be horizontal and must not be higher than the refrigerant outlets. If necessary, to avoid obstacles the piping may be vertically offset below the outlets. When inserting a vertical offset to avoid an obstacle, the whole outdoor piping should be offset, rather than just the section adjacent to the obstacle. Refer to Figure 3-5.10.

Figure 3-5.10: Piping connections between outdoor units



Outdoor piping should be installed in a metal casing to protect against exposure to sunlight, rain, wind and other potential causes of damage.

## 5.8 Pipe Flushing

### 5.8.1 Purpose

To remove dust, other particles and moisture, which could cause compressor malfunction if not flushed out before the system is run, the refrigerant piping should be flushed using nitrogen. As described in Part 3, 5.1.1 "Installation procedure", pipe flushing should be performed once the piping connections have been completed with the exception of the final connections to the indoor units and to the MS box. That is, pipe flushing should be performed before connecting refrigerant piping to MS box and indoor units to prevent impurities from blocking the MS box and indoor units.

## Notes for installers

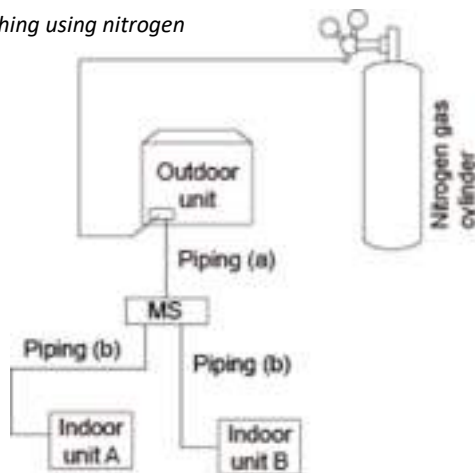
**Warning**

Only use nitrogen for flushing. Using carbon dioxide risks leaving condensation in the piping. Oxygen, air, refrigerant, flammable gases and toxic gases must not be used for flushing. Use of such gases may result in fire or explosion.

**Procedure**

1. Braze the refrigerant piping and branch joints between outdoor unit(s) and MS box (piping (a) in Fig. 5-16), but not connect piping (a) to MS box.
2. Flush piping (a) with nitrogen, and then connect piping (a) to MS box according to the description of 5.4.8.
3. Braze the refrigerant piping and branch joints between MS and indoor units (piping (b) in Figure 5.16), but not connect piping (b) to MS box.
4. Flush piping (b) with nitrogen, and then connect piping (b) to MS box according to the description of 5.4.8.
5. Flush all refrigerant piping from outdoor unit stop valves to ensure no impurities remained.

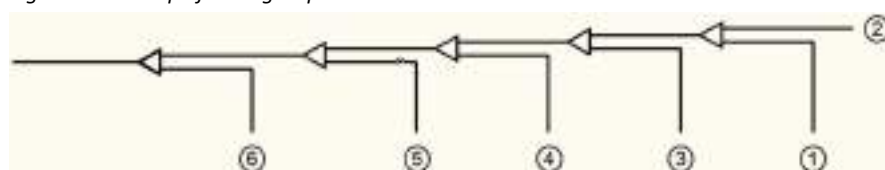
Figure 3-5.11: Pipe flushing using nitrogen

**Pipe Flush Procedure**

The liquid and gas sides can be flushed simultaneously; alternatively, one side can be flushed first and then Steps 1 to 8 repeated, for the other side. The flushing procedure is as follows:

1. Cover the inlets and outlets of the indoor units to prevent dirt getting blown in during pipe flushing. (Pipe flushing should be carried out before connecting the indoor units to the piping system.)
2. Attach a pressure reducing valve to a nitrogen cylinder.
3. Connect the pressure reducing valve outlet to the inlet on the liquid (or gas) side of the outdoor unit.
4. Use blind plugs to block all liquid (gas) side openings, except for the opening at the indoor unit which is furthest from the outdoor units ("Indoor unit A" in Figure 3-5.11).
5. Start to open the nitrogen cylinder valve and gradually increase the pressure to 0.5MPa.
6. Allow time for nitrogen to flow as far as the opening at indoor unit A.

Figure 3-5.12: Pipe flushing sequence<sup>1</sup>



Notes:

1. 1-2-3-4-5-6 working towards the MS box

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7. Flush the first opening:
  - a) Using suitable material, such as a bag or cloth, press firmly against the opening at indoor unit A.
  - b) When the pressure becomes too high to block with your hand, suddenly remove your hand allowing gas to rush out.
  - c) Repeatedly flush in this manner until no further dirt or moisture is emitted from the piping. Use a clean cloth to check for dirt or moisture being emitted. Seal the opening once it has been flushed.
8. Flush the other openings in the same manner, working in sequence from indoor unit A towards the outdoor units. Refer to Figure 3-5.12.
9. Once flushing is complete, seal all openings to prevent dust and moisture from entering.

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### 5.9 Gastightness Test

#### 5.9.1 Purpose

To prevent faults caused by refrigerant leakage, a gastightness test should be performed before system commissioning.

#### 5.9.2 Procedure

##### Notes for installers



##### Warning

Only dry nitrogen should be used for gastightness testing. Oxygen, air, flammable gases and toxic gases must not be used for gastightness testing. Use of such gases may result in fire or explosion.

##### Procedure

The gastightness test procedure is as follows:

##### Step 1

- Once the piping system is complete and the indoor and outdoor units have been connected, vacuum the piping to -0.1MPa.

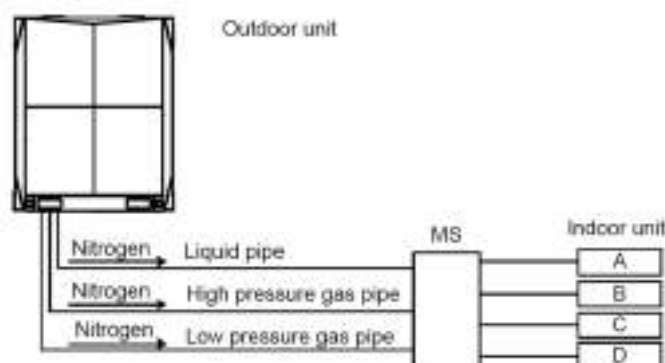
##### Step 2

- Charge the indoor piping with nitrogen at 0.3MPa through the needle valves on the liquid and gas stop valves and leave for at least 3 minutes (do not open the liquid or gas stop valves). Observe the pressure gauge to check for large leakages. If there is a large leakage, the pressure gauge will drop quickly.
- If there are no large leakages, charge the piping with nitrogen at 1.5MPa and leave for at least 3 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
- If there are no small leakages, charge the piping with nitrogen at 4.2MPa and leave for at least 24 hours to check for micro leakages. Micro leakages are difficult to detect. To check for micro leakages, allow for any change in ambient temperature over the test period by adjusting the reference pressure by 0.01MPa per 1°C of temperature difference. Adjusted reference pressure = Pressure at pressurization + (temperature at observation – temperature at pressurization) x 0.01MPa. Compare the observed pressure with the adjusted reference pressure. If they are the same, the piping has passed the gastightness test. If the observed pressure is lower than the adjusted reference pressure, the piping has a micro leakage.
- If the leakage is detected, refer to Part 3, 5.9.3 “Leak detection”. Once the leak has been found and fixed, the gastightness test should be repeated.

##### Step 3

- If not continuing straight to vacuum drying (see Part 3, 5.10 “Vacuum Drying”) once the gastightness test is complete, reduce the system pressure to 0.5-0.8MPa and leave the system pressurized until ready to carry out the vacuum drying procedure.

Figure 3-5.13: Gastightness test



### 5.9.3 Leak detection

#### Notes for installers



The general methods for identifying the source of a leak are as follows:

1. Audio detection: relatively large leaks are audible.
2. Touch detection: place your hand at joints to feel for escaping gas.
3. Soapy water detection: small leaks can be detected by the formation of bubbles when soapy water is applied to a joint.
4. Refrigerant leak detection: for leaks that are difficult to detect, refrigerant leak detection may be used as follows:
  - a) Pressurize the piping with nitrogen at 0.3MPa.
  - b) Add refrigerant into the piping until the pressure reaches 0.5MPa.
  - c) Use a halogen refrigerant detector to find the leak.
  - d) If the leak source cannot be found, continuing charging with refrigerant to a pressure of 4MPa and then search again.

## 5.10 Vacuum Drying

### 5.10.1 Purpose

Vacuum drying should be performed in order to remove moisture and non-condensable gases from the system. Removing moisture prevents ice formation and oxidization of copper piping or other internal components. The presence of ice particles in the system would cause abnormal operation, whilst particles of oxidized copper can cause compressor damage. The presence of non-condensable gases in the system would lead to pressure fluctuations and poor heat exchange performance.

Vacuum drying also provides additional leak detection (in addition to the gastightness test).

## 5.10.2 Procedure

## Notes for installers



During vacuum drying, a vacuum pump is used to lower the pressure in the piping to the extent that any moisture present evaporates. At 5mmHg (755mmHg below typical atmospheric pressure) the boiling point of water is 0°C. Therefore a vacuum pump capable of maintaining a pressure of -756mmHg or lower should be used. Using a vacuum pump with a discharge in excess of 4L/s and a precision level of 0.02mmHg is recommended.

**Caution**

- Before performing vacuum drying, make sure that all the outdoor unit stop valves are firmly closed.
- Once the vacuum drying is complete and the vacuum pump is stopped, the low pressure in the piping could suck vacuum pump lubricant into the air conditioning system. The same could happen if the vacuum pump stops unexpectedly during the vacuum drying procedure. Mixing of pump lubricant with compressor oil could cause compressor malfunction and a one-way valve should therefore be used to prevent vacuum pump lubricant seeping into the piping system.

**Procedure**

The vacuum drying procedure is as follows:

**Step 1**

- Connect the vacuum pump through a manifold with a pressure gauge to the master unit's all stop valves.

**Step 2**

- Start the vacuum pump and then open the manifold valves to start vacuuming the system.
- After 30 minutes, close the manifold valves.
- After a further 5 to 10 minutes check the pressure gauge. If the gauge has returned to zero, check for leakages in the refrigerant piping.

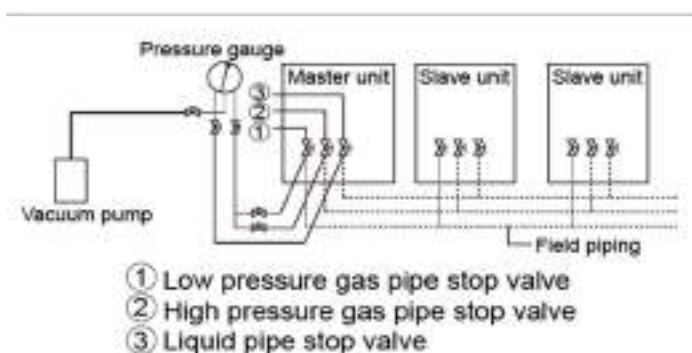
**Step 3**

- Re-open the manifold valves and continue vacuum drying for at least 2 hours and until a pressure difference of 756mmHg or more has been achieved. Once the pressure difference of at least 756mmHg has been achieved, continue vacuum drying for 2 hours.

**Step 4**

- Close the manifold valves and then stop the vacuum pump.
- After 1 hour, check the pressure gauge. If the pressure in the piping has not increased, the procedure is finished. If the pressure has increased, check for leakages.
- After vacuum drying, keep the manifold connected to the master unit stop valves, in preparation for refrigerant charging. (see Part 3, 8 "Charging Refrigerant").

Figure 3-5.14: Vacuum drying



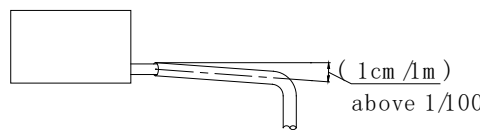
## 6 Drain Piping

### 6.1 Design Considerations

Drain piping design should take account of the following considerations:

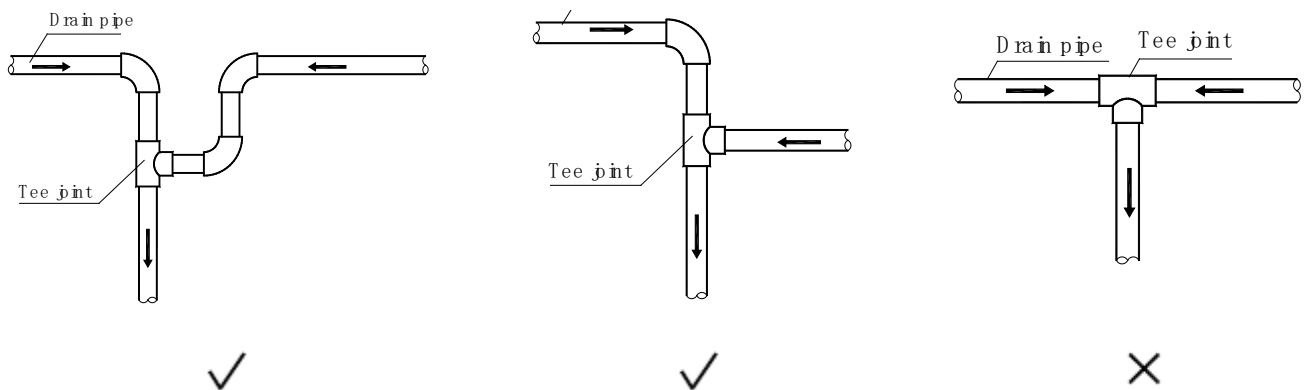
- Indoor unit condensate drain piping needs to be of sufficient diameter to carry the volume of condensate produced at the indoor units and installed at a slope sufficient to allow drainage. Discharge as close as possible to the indoor units is usually preferable.
- To prevent the drain piping becoming excessively long, consideration should be given to installing multiple drain piping systems, with each system having its own drainage point and providing drainage for a subset of the overall set of indoor units.
- The routing of drain piping should take into consideration the need to maintain sufficient slope for drainage whilst avoiding obstacles such as beams and ducting. The drain piping slope should be at least 1:100 away from indoor units. Refer to Figure 3-6.1.

Figure 3-6.1: Drain piping minimum slope requirement



- To avoid backflow and other potential complications, two horizontal drain pipes should not meet at the same level. Refer to the Figure 3-6.2 for suitable connection arrangements. Such arrangements also allow the slope of the two horizontal pipes to be selected independently.

Figure 3-6.2: Drain piping joints – correct and incorrect configurations



- Branch drain piping should join main drain piping from the top, as shown in Figure 3-6.3.
- Recommended support/hanger spacing is 0.8 – 1.0m for horizontal piping and 1.5 – 2.0m for vertical piping. Each vertical section should be fitted with at least two supports. For horizontal piping, spacing greater than those recommended leads to sagging and deformation of the pipe profile at the supports which impedes water flow and should therefore be avoided.
- Air vents should be fitted at the highest point of each drain piping system to ensure that condensation is discharged smoothly. U-bends or elbow joints should be used such that the vents face downwards, to prevent dust entering the piping. Refer to Figure 3-6.5. Air vents should not be installed too close to indoor unit lift pumps.

Figure 3-6.3: Branch drain piping joining main drain piping

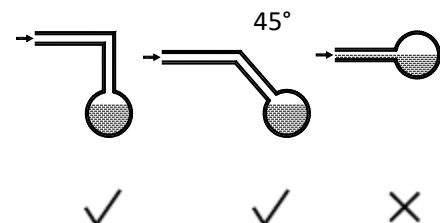


Figure 3-6.4: Effect of insufficient drain piping support

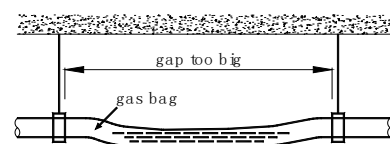
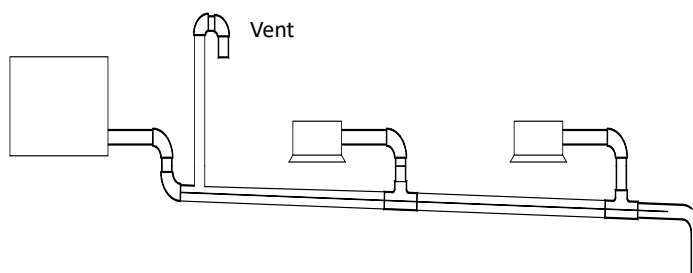


Figure 3-6.5: Drain piping air vents

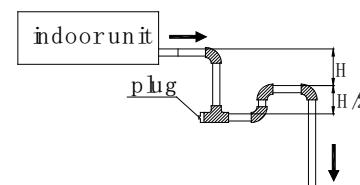


- Air conditioner drain piping should be installed separately from waste, rainwater and other drain piping and should not come into direct contact with the ground.
- Drain piping diameter should be not less than the indoor units' drain piping connection.
- To allow inspection and maintenance, the piping clamps shipped with units should be used to attach drain piping to indoor units – adhesive should not be used.
- Thermal insulation should be added to drain piping to prevent condensation forming. Thermal insulation should extend all the way to the connection with the indoor unit.
- Units with drain pumps should have separate drain piping systems from systems that use natural drainage.

## 6.2 Water Traps

For indoor units with a high negative pressure differential at the outlet of the drainage pan, a trap should be fitted to the drain piping to prevent poor drainage and/or water being blown back into the drainage pan. Traps should be arranged as in Figure 3-6.6. The vertical separation  $H$  should be in excess of 50mm. A plug may be fitted to allow cleaning or inspection.

Figure 3-6.6: Drain piping water traps



## 6.3 Selecting Piping Diameters

Select branch drainage piping (the drain piping connection to each unit) diameters according to indoor unit flow volume and select main drainage piping diameters according to the combined flow volume of the upstream indoor units. Use a design assumption of 2 liters of condensate per horsepower per hour. For example, the combined flow volume of three 2HP units and two 1.5HP units would be calculated as follows:

$$\begin{aligned} \text{Combined flow volume} &= 3 \times 2 \text{ L/HP/h} \times 2\text{HP} + 2 \times 2 \text{ L/HP/h} \times 1.5\text{HP} = 18 \text{ L/h} \end{aligned}$$

Tables 3-6.1 and 3-6.2 specify the required piping diameters for horizontal and vertical branch piping and for main piping. Note that main piping should use PVC40 or larger.

Table 3-6.1: Horizontal drain piping diameters

PVC piping	Nominal diameter (mm)	Capacity (L/h)		Remarks
		Slope 1:50	Slope 1:100	
PVC25	25	39	27	Branch piping only
PVC32	32	70	50	
PVC40	40	125	88	Branch or main piping
PVC50	50	247	175	
PVC63	63	473	334	



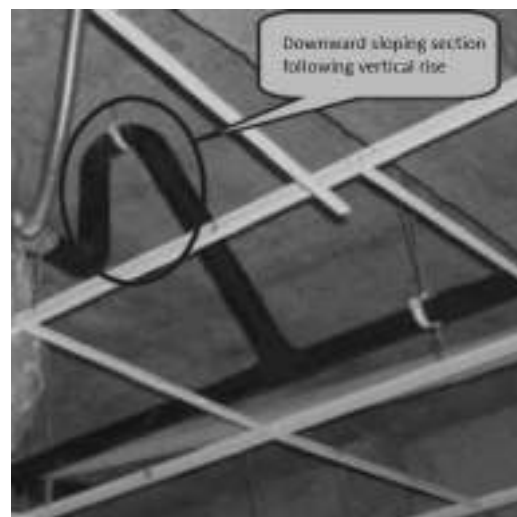
*Table 3-6.2: Vertical drain piping diameters*

PVC piping	Nominal diameter (mm)	Capacity (L/h)	Remarks
PVC25	25	220	Branch piping only
PVC32	32	410	
PVC40	40	730	
PVC50	50	1440	Branch or main piping
PVC63	63	2760	
PVC75	75	5710	
PVC90	90	8280	

## 6.4 Drain Piping for Units with Lift Pumps

Drain piping for units with lift pumps should take account of the following additional considerations:

- A downward sloping section should immediately follow the vertically rising section adjacent to the unit, otherwise a water pump error will occur. Refer to Figure 3-6.7.
- Air vents should not be installed on vertically rising sections of drain piping, otherwise water may be discharged through the air vent or water flow may be impeded.

*Figure 3-6.7: Downward sloping section of drain piping*


## 6.5 Drain Piping Installation

### Notes for installers



Installation of the drain piping should proceed in the following order:

Indoor unit installation

Drain piping  
installation

Watertightness  
test

Drain piping insulation

### Caution

- Ensure that all joints are firm and once the drain piping is all connected conduct a watertightness test and water flow test.
- Do not connect air conditioner drain piping to waste, rainwater or other drain piping and do not let air conditioner drain piping come into direct contact with the ground.
- For units with drain pumps, test that the drain pump functions properly by adding water to the unit's drainage pan and running the unit. To allow inspection and maintenance, the pipe clamps shipped with units should be used to attach drain piping to indoor units – adhesive should not be used.

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### 6.6 Watertightness Test and Water Flow Test

Once installation of a drainage piping system is completed, watertightness and water flow tests should be performed.

#### Notes for installers



##### Watertightness test

- Fill the piping with water and test for leakages over a 24-hour period.

##### Water flow test (natural drainage test)

- Slowly fill the drainage pan of each indoor unit with at least 600ml of water through the inspection port and check that the water is discharged through the outlet of the drain piping.

##### Caution

- The drain plug in the drainage pan is for removing accumulated water prior to performing indoor unit maintenance. During normal operation, the drain should be plugged to prevent leakage.

## 7 Insulation

### 7.1 Refrigerant Piping Insulation

#### 7.1.1 Purpose

During operation, the temperature of the refrigerant piping varies. Insulation is required to ensure unit performance and compressor lifespan. During cooling, the gas pipe temperature can be very low. Insulation prevents condensation forming on the piping. During heating, the gas pipe temperature can rise to as high as 100°C. Insulation serves as necessary protection from burns.

#### 7.1.2 Selecting insulation materials

Refrigerant piping insulation should be closed-cell foam of B1 fire resistance rating that can withstand a constant temperature of over 120°C and that complies with all applicable legislation.

#### 7.1.3 Thickness of insulation

Minimum thicknesses for refrigerant piping insulation are specified in Table 3-7.1. In hot, humid environments, the thickness of insulation should be increased over and above the specifications in Table 3-7.1.

Table 3-7.1: Refrigerant piping insulation thickness

Pipe outer diameter (mm)	Minimum insulation thickness (mm) Humidity < 80%RH	Minimum insulation thickness (mm) Humidity ≥ 80%RH
Φ6.35	15	20
Φ9.53		
Φ12.7		
Φ15.9		
Φ19.1		
Φ22.2		
Φ25.4		
Φ28.6		
Φ31.8		
Φ38.1		
Φ41.3	20	25
Φ44.5		
Φ54.0		

### 7.1.4 Installation of piping insulation

With the exception of joint insulation, insulation should be applied to piping before fixing the piping in place. Insulation at joints in refrigerant piping should be applied after the gastightness test has been completed.

#### Notes for installers



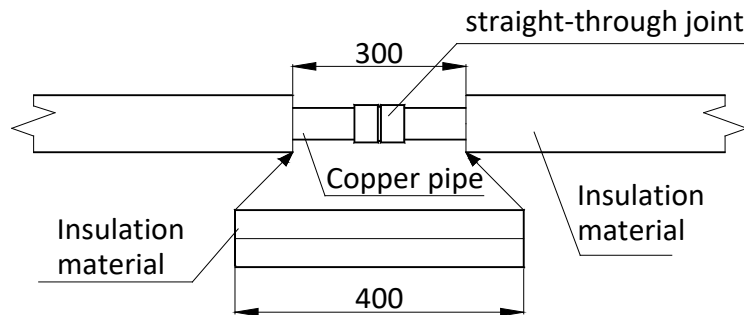
- Installation of insulation should be carried out in a manner suited to the type of insulation material being used.
- Ensure there are no gaps at the joints between sections of insulation.
- Do not apply tape too tightly as doing so may shrink insulation, reducing its insulating properties leading to condensation and loss of efficiency.
- Insulate gas and liquid pipes separately, otherwise heat exchange between the two sides will greatly impact efficiency.
- Do not bind the separately insulated gas and liquid pipes together too tightly as doing so can damage the joints between sections of insulation.

### 7.1.5 Installation of joint insulation

Insulation at joints in the refrigerant piping should be installed after the gastightness test has been successfully completed. The procedure at each joint is as follows:

1. Cut a section of insulation 50 to 100mm longer than the gap to be filled. Ensure that the cross-sectional and longitudinal openings are all cut evenly.
2. Embed the section into the gap ensuring that the ends abut tightly to the sections of insulation either side of the gap.
3. Glue the longitudinal cut and the joints with the sections of insulation either side of the gap.
4. Seal the seams with tape.

Figure 3-7.1: Installation of joint insulation (unit: mm)



### 7.2 Drain Piping Insulation

- Use rubber/plastic insulating tube with a B1 fire resistance rating.
- The insulation should typically be in excess of 10mm thick.
- For drain piping installed inside a wall, insulation is not required.
- Use suitable adhesive to seal seams and joints in the insulation and then bind with cloth reinforced tape of width not less than 50mm. Ensure tape is fixed firmly to avoid condensation.
- Ensure the drain piping insulation adjacent to the indoor unit drainage water outlet is fixed to the unit itself using adhesive, to prevent condensation and dripping.

### 7.3 Ducting Insulation

- Suitable insulation should be added to ducting in according with all applicable legislation.

## 8 Charging Refrigerant

### 8.1 Calculating Additional Refrigerant Charge

Based on the field installed refrigerant pipe and system layout, additional refrigerant charge may be required. Please add additional refrigerant according to the calculation below. Record the size of each liquid pipe from outdoor unit to indoor units. Record the amount of refrigerant that was charged on the outdoor unit for future reference.

The additional refrigerant charge depends on outdoor unit model, MS model and the lengths and diameters of the outdoor and indoor liquid pipes. Table 3-8.1 shows the additional refrigerant charge R1 required each TVR Ultra HR outdoor unit for models.

Table 3-8.1: Additional refrigerant charge R1 - TVR Ultra HR outdoor unit

Outdoor unit model	Additional refrigerant charge per model (kg)
8HP	2
10HP	2
12HP	2.6
14HP	4.9
16HP	5.5
18HP	5.7
20HP	5.7

Table 3-8.2 shows the additional refrigerant charge requirement each MS box for different MS box models. The additional charge requirement for the MS box is obtained by summing all the MS box, through the following formula, which  $M_1$  to  $M_6$  represent the number of MS box of each different model.

$$\begin{aligned}
 \text{Additional refrigerant charge } R_2 \text{ (kg)} &= M_1 \times 0.1 \\
 &+ M_2 \times 0.5 \\
 &+ M_3 \times 0.5 \\
 &+ M_4 \times 1.0 \\
 &+ M_5 \times 1.0 \\
 &+ M_6 \times 1.0
 \end{aligned}$$

Table 3-8.2: Additional refrigerant charge – MS box

Model	Additional refrigerant charge per box (kg)
TMSBOX01E	0.1
TMSBOX04E	0.5
TMSBOX06E	
TMSBOX08E	1.0
TMSBOX10E	
TMSBOX12E	

Table 3-8.1 shows the additional refrigerant charge required per meter of equivalent pipe length for different diameters of pipe. The total additional refrigerant charge is obtained by summing all the outdoor and indoor liquid pipes, through the following formula, where  $L_1$  to  $L_8$  represent the equivalent lengths of the pipes of different diameters. Assume 0.5m for the equivalent pipe length of each branch joint.

$$\begin{aligned}
 \text{Additional refrigerant charge } R_3 \text{ (kg)} &= L_1 (\Phi 6.35) \times 0.022 \\
 &+ L_2 (\Phi 9.53) \times 0.057 \\
 &+ L_3 (\Phi 12.7) \times 0.110 \\
 &+ L_4 (\Phi 15.9) \times 0.170 \\
 &+ L_5 (\Phi 19.1) \times 0.260 \\
 &+ L_6 (\Phi 22.2) \times 0.360 \\
 &+ L_7 (\Phi 25.4) \times 0.520 \\
 &+ L_8 (\Phi 28.6) \times 0.680
 \end{aligned}$$

Table 3-8.3: Additional refrigerant charge-liquid pipes

Liquid side piping (mm)	Additional refrigerant charge per meter of equivalent length of piping (kg)
Φ6.35	0.022
Φ9.53	0.057
Φ12.7	0.110
Φ15.9	0.170
Φ19.1	0.260
Φ22.2	0.360
Φ25.4	0.520
Φ28.6	0.680

Calculate the total additional refrigerant charge amount to be charged according to the formula  $R \text{ (kg)} = R_1 + R_2 + R_3$ .

## 8.2 Adding Refrigerant

## Notes for installers

**Caution**

- Charge refrigerant after performing a gastightness test and vacuum drying only.
- Never charge more refrigerant than required as doing so can lead to liquid hammering.
- Only use refrigerant R410A - charging with an unsuitable substance may cause explosions or accidents.
- Use tools and equipment designed for use with R410A to ensure required pressure resistance and to prevent impurity from entering the system.
- Refrigerant must be treated in accordance with applicable legislation.
- Always use protective gloves and protect your eyes when charging refrigerant.
- Open refrigerant containers slowly.

**Procedure**

The procedure for adding refrigerant is as follows:

**Step 1**

- Calculate additional refrigerant charge R (kg) (see Part 3, 8.1 "Calculating Additional Refrigerant Charge")

**Step 2**

- Place a tank of R410A refrigerant on a weighing scale. Turn the tank upside down to ensure refrigerant is charged in a liquid state. (R410A is a blend of two different chemicals compounds. Charging gaseous R410A into the system could mean that the refrigerant charged is not of the correct composition).
- After vacuum drying (see Part 3, 5.10 "Vacuum Drying"), the blue and red pressure gauge hoses should still be connected to the pressure gauge and to the master unit stop valves.
- Connect the yellow hose from the pressure gauge to the R410A refrigerant tank.

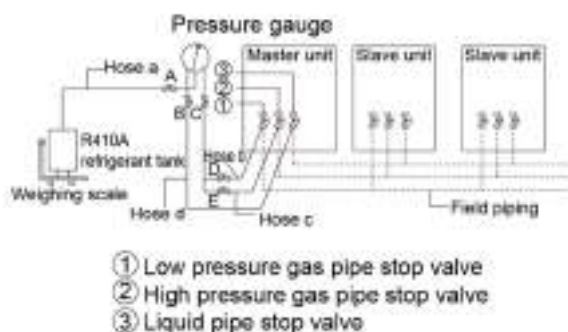
**Step 3**

- Open the valve where the yellow hose meets the pressure gauge, and open the refrigerant tank slightly to let the refrigerant eliminate the air. Caution: open the tank slowly to avoid freezing your hand.
- Set the weighing scale to zero.

**Step 4**

- Open the three valves on the pressure gauge to begin charging refrigerant.
- When the amount charged reaches R (kg), close the three valves. If the amount charged has not reached R (kg) but no additional refrigerant can be charged, close the three valves on the pressure gauge, run the outdoor units in cooling mode, and then open the yellow and blue hose valves. Continue charging until the full R (kg) of refrigerant has been charged, then close the yellow and blue hose valves. Note: Before running the system, be sure to complete all the pre-commissioning checks as listed in Part 3, 11.4 "Pre-commissioning Checks" and be sure to open all stop valves as running the system with the stop valves closed would damage the compressor.

Figure 3-8.1: Charging refrigerant



Pressure gauge

## 9 Electrical Wiring

### 9.1 General

#### Notes for installers



##### Caution

- All installation and wiring must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Electrical systems should be grounded in accordance with all applicable legislation.
- Overcurrent circuit breakers and residual-current circuit breakers (ground fault circuit interrupters) should be used in accordance with all applicable legislation.
- Wiring patterns shown in this data book are general connection guides only and are not intended for, or to include all details for, any specific installation.
- The refrigerant piping, power wiring and communication wiring are typically run in parallel. However, the communication wiring should not be bound together with the refrigerant piping or power wiring. To prevent signal interference, the power wiring and communication wiring should not be run in the same conduit. If the power supply is less than 10A, a separation of at least 300mm between power wiring and communication wiring conduits should be maintained; if the power supply is in the range 10A to 50A then a separation of at least 500mm should be maintained.

### 9.2 Power Supply Wiring

Power supply wiring design and installation should adhere to the following requirements:

- Indoor units or MS boxes in the same system must be powered by the same power supply, in order not to damage the system.
- Power supply for the indoor units or MS boxes should separate from outdoor units.
- Make sure an electric leakage protection device is installed to prevent electric shocks or fires.
- All the indoor units and MS box in a system (i.e. all the indoor units and MS box connected to the same set of outdoor units) should be tied into the same power circuit with the same power supply, overcurrent and residual current protection (leakage protection) and manual switch. Do not install separate protectors or manual switches for each indoor unit and MS box. Powering on and shutting down all indoor units in a system should be done simultaneously. The reason for this is that if an indoor unit that is running were to suddenly power off whilst the other indoor units continued running, the evaporator of the powered-off unit would freeze since refrigerant would continue flowing to that unit (its expansion valve would still be open) but its fan would have stopped. The indoor units that remain running would not get sufficient refrigerant so their performance would suffer. Additionally, liquid refrigerant returning directly to the compressor from the powered-off unit would cause liquid hammering, potentially damaging the compressor.
- To select the size of the power wiring and circuit breaker for the outdoor units, please refer to the Table 2-7.1 in Part 2, 7 “Electrical Characteristics”.
- The power, electrical leakage protectors and operation switches for each indoor unit that are connected to the same outdoor unit and the MS box should be used by both.
- The MS box power wiring should be connected to the terminals with the label “L,N, ”.
- For MS box power wire sizing and circuit breaker sizing, refer to Table 2-7.2 in Part 2, 7 “Electrical Characteristics”.
- If HT hydro module connects to the system, please refer to the installation manual of the HT hydro module.

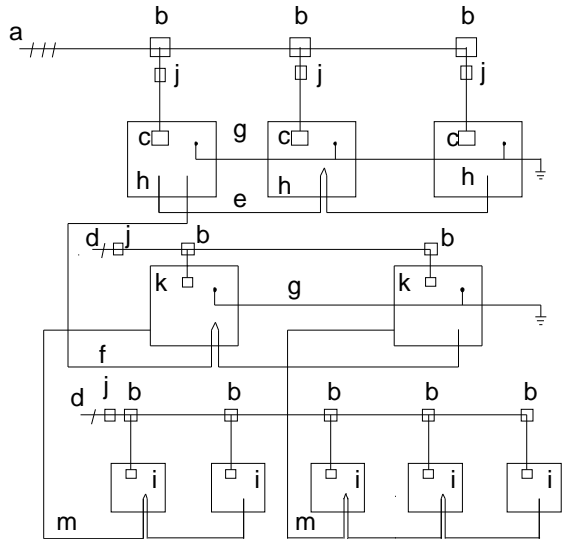
Wiring layout comprises of the power wiring and communication wiring between the indoor, MS box and outdoor units. These include the earth wiring, and the shielded layer of the earth wiring of the indoor units in the P, Q, E communication

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wring. The TVR Ultra HR system wiring overview refer to Figure 2-9.1.

Figure 3-9.1: Overview of TVR Ultra HR system wiring



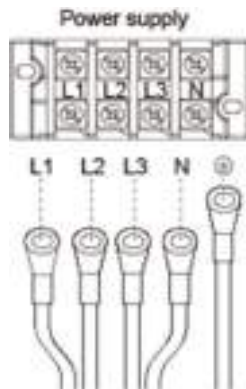
Legend	
a	Three-phase power supply (with earth wiring and leakage protection)
b	Power distribution box
c	Power supply terminal of outdoor unit
d	Single phase power supply (with earth wiring and leakage protection)
e	H1, H2 and E communication wire (with shielded layer) between outdoor unit and outdoor unit
f	P,Q and E communication wire(with shielded layer) between outdoor unit and MS box
g	Earth wiring
h	Outdoor unit
i	TVR indoor unit
j	Main switch (with leakage protection)
k	MS box
m	P, Q and E communication wire (with shielded layer) between MS box and Indoor unit

## Notes for installers



The 3-phase, 380-415V, 50 or 60Hz of power supply should be connected to the outdoor unit power supply terminals as shown in Figure 3-9.2.

Figure 3-9.2: Outdoor unit 3-phase power supply terminals





### 9.3 Communication Wiring

Communication wiring design and installation should adhere to the following requirements:

- Three-core shielded cable should be used for communication wiring. The cross-sectional area of each core of the communication wiring is not less than 0.75 mm<sup>2</sup>, and the length must not exceed 1200 m. Using other types of cable can lead to interference and malfunction.
- **Indoor communication wiring:**
  - The P Q E communication wires should be connected one unit after another in a daisy chain from the outdoor unit to the final indoor unit as shown in Figure 3-9.4 and Figure 3-9.5. At the final indoor unit (or HT hydro module), a 120Ω resistor should be connected between the P and Q terminals. After the final indoor unit (or HT hydro module), the communication wiring should NOT be continued back to the outdoor unit – that is, do not attempt to form a closed loop.
  - The shielding nets of the communication wires should be connected together and grounded. Grounding can be achieved by connecting to the metal casing adjacent to the P Q E terminals of the outdoor unit electrical control box.
- **Outdoor communication wiring:**
  - The H1 H2 E communication wires should be connected one unit after another in a daisy chain from the master outdoor unit to the last slave outdoor unit.

#### Notes for installers



The communication wires should be connected to the master outdoor unit terminals indicated in Figure 3-9.3 and Table 3-9.1.

#### Caution

- Communication wiring has polarity. Care should be taken to connect the poles correctly.
- 

Figure 3-9.3: Master outdoor unit communication terminals

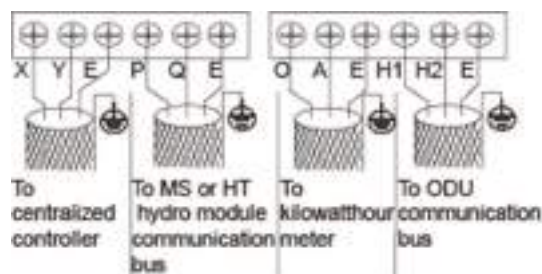


Table 3-9.1: Communication connections

Terminals	Connection
X Y E	Connect to centralized controller
P Q E	Connect between MS or high temperature hydro module and master outdoor unit
O A E	Connect to digital energy meter
H1 H2 E	Connect between outdoor units

#### MS communication wiring:

- MS box communication wires should be connected to the position with the label “P, Q, E” and correspond to the “P, Q, E” wiring position for the outdoor and indoor units.

Figure 3-9.4: Communication wiring of single outdoor unit

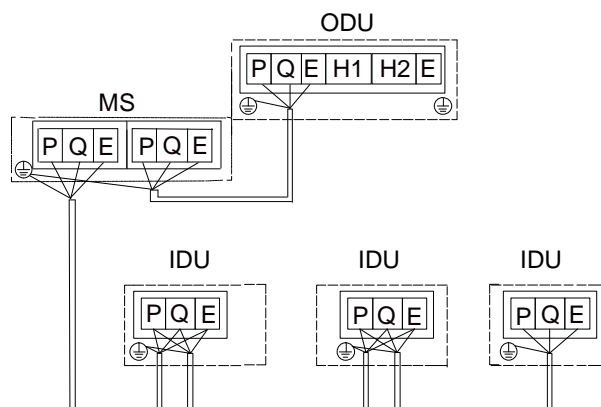
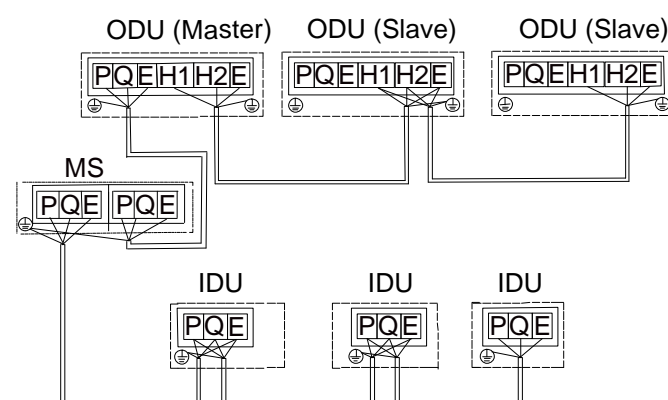


Figure 3-9.5: Communication wiring of multi outdoor unit

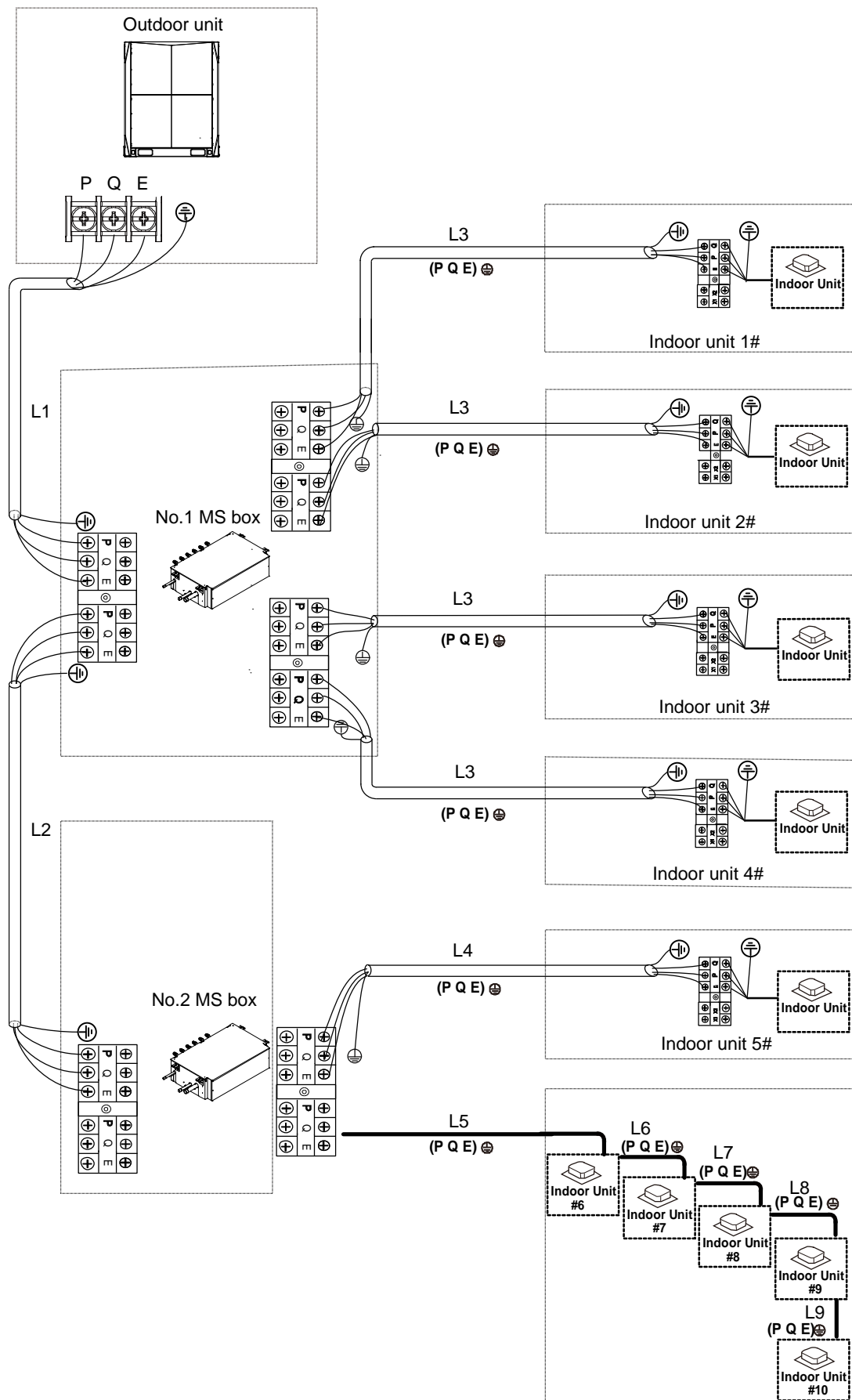


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## ▪ Example of communication wiring:

Figure 3-9.6: Communication wiring example



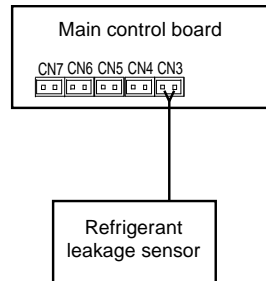
### Notes:

1. One port of the MS04-12 box allows for connection of up to five IDUs in series.
2. One port of the MS01 box allows for connection of up to eight IDUs in series.
3.  $L1+L2 \leq 1200$  m;  $L3 \leq 1200$  m;  $L4 \leq 1200$  m;  $L5+L6+L7+L8+L9 \leq 1200$  m

## Refrigerant leakage sensor connection and settings for MS01

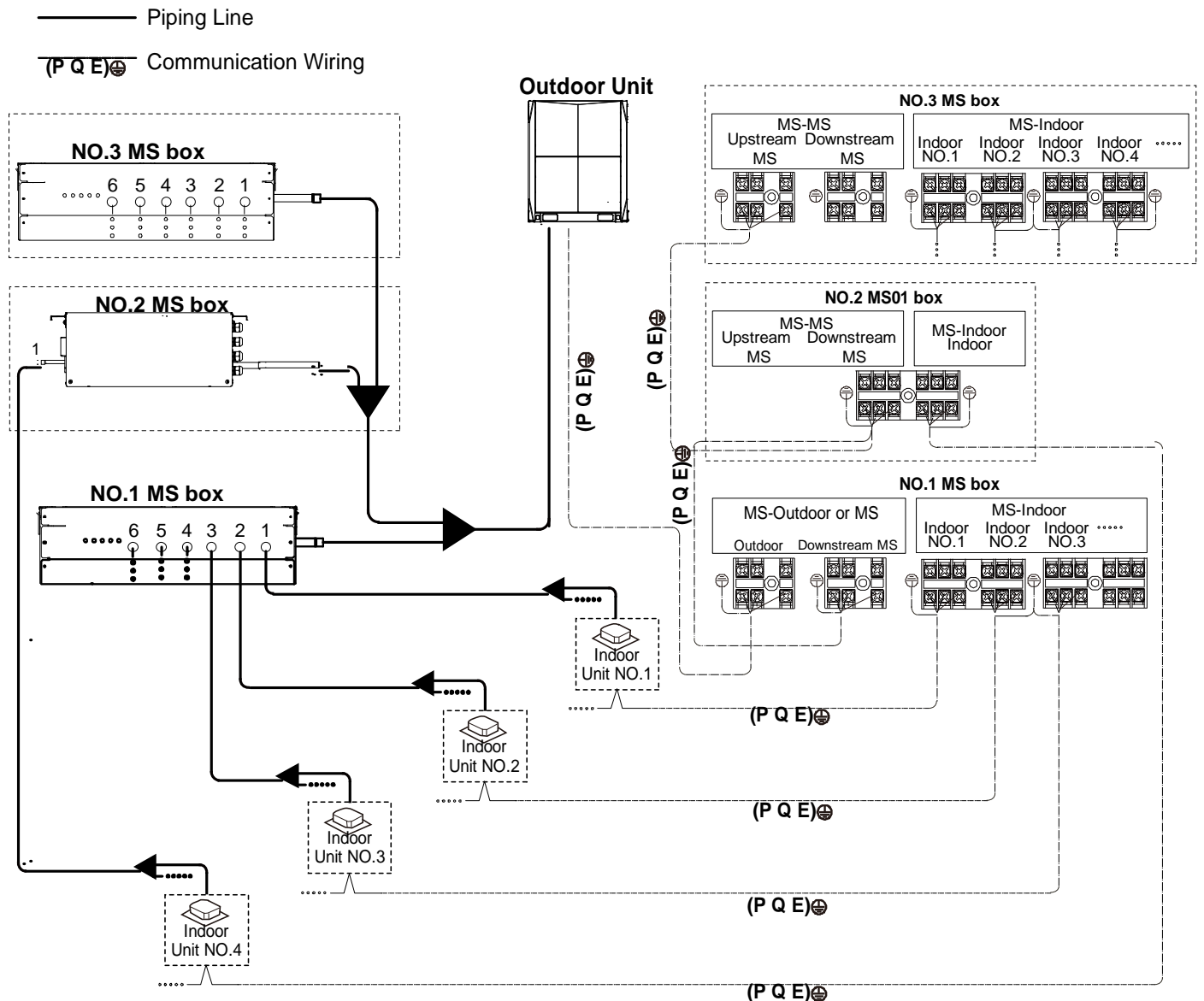
- Shut off power before connect the refrigerant leakage sensor to the corresponding port on the MS main board.
- Max. 5 refrigerant leakage sensors can be connected to one MS01, and the connection port number of refrigerant sensor is CN3 ~ CN7 on the main board.
- Setting the correct numbers of the connected sensors with the ENC1 in the main control board.
- S1-1 switch should be set to "ON" position.

Figure 3-9.7: Refrigerant leakage sensor connection



## 9.4 Wiring Example

Figure 3-9.8: Wiring of piping lines and communication wires



## 10 Installation in Areas of High Salinity

### 10.1 Caution

Do not install outdoor units where they could be directly exposed to sea air. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient performance.

Outdoor units installed in seaside locations should be placed such as to avoid direct exposure to the sea air and additional anticorrosion treatment options should be selected, otherwise the service life of the outdoor units will be seriously affected.

Air conditioning installed in seaside locations should be run regularly as the running of the outdoor unit fans helps prevent build-up of salt on the outdoor unit heat exchangers.

### 10.2 Placement and Installation

Outdoor units should be installed 300m or more from the sea. If possible, well-ventilated indoor locations should be chosen. (When installing outdoor units indoors, outdoor unit discharge ducts should be added. See Part 3, 3 “Outdoor Unit Ducting and Shielding”.) Refer to Figure 3-10.1. If it is necessary to install outdoor units outside, direct exposure to the sea air should be avoided. A canopy should be added to shield the units from sea air and rain, as shown in Figure 3-10.2.

Ensure that base structures drain well so that outdoor unit footings do not become waterlogged. Check that outdoor unit casing drainage holes are not blocked.

Figure 3-10.1: Installation in a well-ventilated indoor area

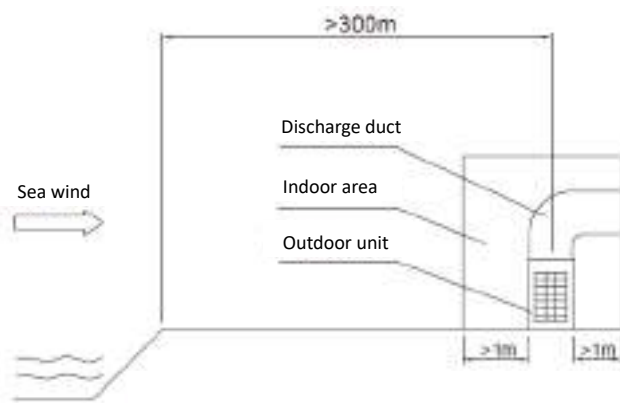
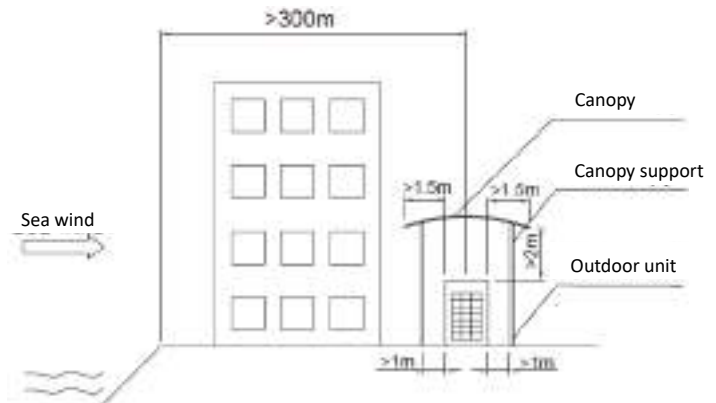


Figure 3-10.2: Installation outdoors under a canopy



### 10.3 Inspection and maintenance

In addition to standard outdoor unit servicing and maintenance, the following additional inspections and maintenance should be undertaken for outdoor units installed in seaside locations:

- A comprehensive post-installation inspection should check for any scratches or other damage to painted surfaces and any damaged areas should be repainted/repaired immediately.
- The units should be regularly cleaned using (non-salty) water to remove any salt that has accumulated. Areas cleaned should include the condenser, the refrigerant piping system, the outside surface of the unit casing and the outside surface of the electric control box.
- Regular inspections should check for corrosion and if necessary corroded components should be replaced and/or anti-corrosion treatments should be added.

## 11 Commissioning

### 11.1 Outdoor Unit Address and Capacity Settings

Make sure all the settings you need to configure are completed. Refer to part 4 “Field settings” in “TVR Service Manual”. Before running a system for the first time, set each outdoor unit’s address on switch ENC1 on each outdoor unit’s data transfer module. Data Transfer Module is an additional auxiliary small PCB installed on the side columns of the outdoor unit. Refer to Table 3-11.1. The capacity of each outdoor unit (on switch ENC2 on each outdoor unit’s main PCB) is factory-set and should not need changing. Check that the capacity settings are correct. Refer to Table 3-11.1.

Table 3-11.1: Outdoor unit address and capacity settings

Address settings		Capacity settings	
0	Master unit	0	8HP
1	Slave unit 1	1	10HP
2	Slave unit 2	2	12HP
≥3	Invalid	3	14HP
		4	16HP
		5	18HP
		6	20HP

### 11.2 MS Box Address and PCB Number Settings

Refer to part 4 “Field settings” in “TVR Service Manual”. Before running a system for the first time, set each MS box’s address. The MS unit can be automatic addressed, also the address can be set manually. Manually MS address setting is the MS box first PCB (ENC2 switches positions “0”). The PCB number of each MS box (on switch ENC2 on each MS box’s main PCB) is factory-set and should not need changing. Check that the capacity settings are correct. Refer to Table 3-11.2

Table 3-11.2: MS box PCB number settings

PCB number settings	
0	The first PCB of MS box
1	The second PCB of MS box
2	The third PCB of MS box

### 11.3 Multi-system Projects

For projects with multiple refrigerant systems, each independent refrigeration system (i.e. each system of up to three outdoor units and their connected indoor units) should be given a test run independently, before the multiple systems that make up a project are run simultaneously.

### 11.4 Pre-commissioning Checks

Before turning on the power to the indoor and outdoor units, ensure the following:

1. All indoor and outdoor refrigeration piping and communication wiring has been connected to the correct refrigeration system and the system to which each indoor and outdoor unit belongs is clearly marked on each unit or recorded in some other suitable place.
2. Pipe flushing, gastightness testing and vacuum drying have been satisfactorily completed as per instructions.
3. All condensate drain piping is complete and a watertightness test has been satisfactorily completed.
4. All power and communication wiring is connected to the correct terminals on units and controllers. (Check that the different phases of the 3-phase power supplies have been connected to the correct terminals).
5. No wiring has been connected in a short-circuit.
6. The power supplies to indoor and outdoor units have been checked and the power supply voltages are within  $\pm 10\%$  of the rated voltages for each product.
7. All control wiring is 0.75mm<sup>2</sup> three-core shielded cable and the shielding has been grounded.
8. The outdoor units’ address and capacity switches are set correctly (see Part 3, 11.1 “Outdoor Unit Address and

## TVR Ultra HR 50/60Hz



Capacity Settings”) and all other indoor and outdoor unit field settings have been set as required.

9. The additional refrigerant charge has been added as per Part 3, 8 “Charging Refrigerant”. Note: In some circumstances it may be necessary to run the system in cooling mode during the refrigerant charging procedure. In such circumstances, points 1 to 8 above should be checked before running the system for the purpose of charging refrigerant and the outdoor unit liquid and gas valves should be opened.

During commissioning, it is important that you:

- Keep a supply of R410A refrigerant at hand.
- Keep the system layout, system piping and control wiring diagrams at hand.

### 11.5 Commissioning Trial Runs

#### 11.5.1 Commissioning test run of single refrigerant system

Once all the pre-commissioning checks in Part 3, 11.4 “Pre-commissioning Checks” have been completed, a test run should be performed as described below and a TVR Ultra HR Series System Commissioning Report (see Part 3, 12 “Appendix to Part 3 – System Commissioning Report”) should be completed as a record of the operating status of the system during commissioning.

Note: When running the system for commissioning test runs, if the combination ratio is 100% or less, run all the indoor units and if the combination ratio is more than 100%, run indoor units with total capacity equal to the total capacity of the outdoor units.

The test run procedure is as follows:

1. Open the outdoor unit liquid, low pressure gas and high pressure gas stop valves.
2. Turn on the power to the indoor units, MS box and outdoor units.
3. If manual addressing is being used, set the addresses of each indoor unit and MS box, refer to part 4 “Field settings” in “TVR Service Manual”.
4. Use the menu mode “n11” to enter the test run according to the method in part 4 “Field settings” in “TVR Service Manual”.
5. Leave the power on for a minimum of 12 hours prior to running the system to ensure that the crankcase heaters have heated the compressor oil sufficiently.
6. Run the system:
  - a) Run the system in cooling mode with the following settings: temperature 17°C; fan speed high.
  - b) After one hour, complete Sheet A of the system commissioning report then:
    - i. Check the system parameters using system check button on each outdoor unit’s data transfer module and complete the cooling mode columns of one Sheet E and one Sheet F of the system commissioning report for each outdoor unit.
    - ii. Check the MS box parameters using the spot check buttons on each MS box’s PCB and complete the cooling mode columns of one Sheet G of the system commissioning report for each group of indoor units downstream of each MS box.
  - c) Run the system in heating mode with the following settings: temperature 30°C; fan speed high.
  - d) After one hour, complete Sheet B of the system commissioning report then:
    - i. Check the system parameters using system check button on each outdoor unit’s data transfer module and complete the heating mode columns of one Sheet E and one Sheet F of the system commissioning report for each outdoor unit.
    - ii. Check the MS box parameters using the spot check buttons on each MS box’s PCB and complete the heating mode columns of one Sheet G of the system commissioning report for each group of indoor units downstream of each MS box.
  - e) Run the system in mixed mode with the following settings:

- i. Run 50% of the indoor units in cooling mode: temperature 17°C; fan speed high.
- ii. Run 50% of the indoor units in heating mode: temperature 30°C; fan speed high.
- f) After one hour, complete Sheet C of the system commissioning report then:
  - i. Check the system parameters using system check button on each outdoor unit's data transfer module and complete the mixed mode columns of one Sheet E and one Sheet F of the system commissioning report for each outdoor unit.
  - ii. Check the MS box parameters using the spot check buttons on each MS box's PCB and complete either the cooling mode or heating mode columns (as appropriate) of one Sheet G of the system commissioning report for each group of indoor units downstream of each MS box.
7. Finally, complete Sheet D of the system commissioning report.
8. The test run is considered complete when there is no error code on the user interface or the outdoor unit display. When an error code is displayed, rectify the operation based on the description in the error code table. Try to conduct the test run again to check that the exception has been corrected.

### 11.5.2 Commissioning test run of multiple refrigerant systems

Once the commissioning test run of each refrigerant system has been satisfactorily completed as per Part 3, 11.5.1 "Commissioning test run of single refrigerant system", run the multiple systems that make up a project simultaneously and check for any abnormalities.

### 12 Appendix to Part 3 – System Commissioning Report

A total of up to 7 report sheets should be completed for each system:

- One Sheet A, one Sheet B and one Sheet C per system.
- One Sheet D and one Sheet E per outdoor unit.
- One Sheet G per group of indoor units downstream of each MS box.





## Part 3 - System Design and Installation

	OUTDOOR UNIT INFORMATION			
	Master unit	Slave unit 1	Slave unit 2	Slave unit 3
Model				
Serial no.				

**COOLING MODE PARAMETER RECORD**  
(After running in cooling mode for one hour)

## TVR ULTRA HR Series System Commissioning Report – Sheet B

Project name and location		System name	
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<b>HEATING MODE PARAMETER RECORD</b> (After running in heating mode for one hour)	<b>OUTDOOR UNITS</b>												
		<b>Master unit</b>			<b>Slave unit 1</b>			<b>Slave unit 2</b>			<b>Slave unit 3</b>		
	Compressor suction pipe temperature												
	System pressure at check port												
		<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>
	Phase currents (A)												
	Within normal range?												
	<b>INDOOR UNITS</b>												
	(Sample of over 20% of the indoor units including the unit farthest from the outdoor units)												
	<b>Room no.</b>	<b>Model</b>	<b>Address</b>	<b>Set temp. (°C)</b>	<b>Inlet temp. (°C)</b>	<b>Outlet temp. (°C)</b>	<b>Drainage OK?</b>	<b>Abnormal noise/vibration?</b>					

**TVR ULTRA HR Series System Commissioning Report – Sheet C**

Project name and location		System name	
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RECORD OF ISSUES SEEN DURING COMMISSIONING				
No.	Description of observed issue	Suspected cause	Troubleshooting undertaken	Serial no. of relevant unit
1				
2				
3				

OUTDOOR UNIT FINAL CHECKLIST				
	Master unit	Slave unit 1	Slave unit 2	Slave unit 3
System check performed?				
Any abnormal noise?				
Any abnormal vibration?				
Fan rotation normal?				

	Commissioning engineer	Dealer	Trane representative
Name:			
Signature:			
Date:			

## TVR ULTRA HR Series System Commissioning Report – Sheet D

Project name and location			System name	
			Observed values	
DSP1 content	Parameters displayed on DSP2	Remarks	Cooling mode	Heating mode
0.--	Unit address	Master unit: 0; slave units: 1, 2		
1.--	Single module capacity	8-20HP		
2.--	Number of outdoor units	Displayed on master unit PCB only		
3.--	Number of indoor units as set on PCB	Displayed on master unit PCB only		
4.--	Total capacity of outdoor unit	Only available for master unit, displayed on slave units has no sense		
5.--	Single module compressor frequency	Displayed on master unit PCB only		
6.--	System compressor frequency	Actual value = value displayed × 10		
7.--	System operating mode	0: off; 2: cooling; 3: heating; 4: main heating; 5: main cooling.		
8.--	Fan A speed index	Refer to Note 1		
9.--	Fan B speed index	Refer to Note 1		
10.--	Indoor heat exchanger pipe (T2) temperature (°C)	Actual value = value displayed		
11.--	Indoor heat exchanger pipe (T2B) temperature (°C)	Actual value = value displayed		
12.--	Main heat exchanger pipe (T3) temperature (°C)	Actual value = value displayed		
13.--	Outdoor ambient (T4) temperature (°C)	Actual value = value displayed		
14.--	Outdoor liquid pipe (T5) temperature (°C)	Actual value = value displayed		
15.--	Plate heat exchanger cooling refrigerant inlet (T6A) temperature (°C)	Actual value = value displayed		
16.--	Plate heat exchanger cooling refrigerant outlet (T6B) temperature (°C)	Actual value = value displayed		
17.--	Inverter compressor discharge (T7C1) temperature (°C)	Actual value = value displayed		
18.--	Outdoor heat exchanger gas pipe (T8) temperature (°C)	Actual value = value displayed		
19.--	Compressor inverter module internal (Ntc) temperature (°C)	Actual value = value displayed		
20.--	Inverter module heatsink (T9)temperature (°C)	Actual value = value displayed		
21.--	Outdoor heat exchanger liquid pipe (TL) temperature (°C)	Actual value = value displayed		
22.--	Compressor suction (T7) temperature (°C)	Actual value = value displayed		
23.--	Discharge superheat degree (°C)	Actual value = value displayed		
24.--	Primary current (A)	Actual value = value displayed		
25.--	EXVA position	Actual value = value displayed × 24		
26.--	EXVC position	Actual value = value displayed × 4		
27.--	Compressor discharge pressure (MPa)	Actual value = value displayed/10		
28.--	Compressor suction pressure (MPa)	Actual value = value displayed/100		
29.--	Number of indoor units currently in communication with master unit	Displayed on master unit PCB only		
30.--	Number of indoor units currently operating	Displayed on master unit PCB only		
31.--	Heat exchanger status	0-OFF; 1-Condenser; 2-Condenser (Not used); 3-Evaporator; 4-Evaporator (Not used)		
32.--	System startup status	2~4-Startup control; 6-PI control;		
33.--	Silent setting	Refer to Note 2		

Table continued on next page ...

**TVR ULTRA HR Series System Commissioning Report – Sheet E**

<b>Project name and location</b>		<b>System name</b>	
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... table continued from previous page

DSP1 content	Parameters displayed on DSP2	Remarks	Observed values	
			Cooling mode	Heating mode
34.--	Static pressure mode	0: 0 Pa; 1: 20Pa; 2: 40Pa; 3: 60Pa; 4: 80Pa.		
35.--	TES(°C)	Actual value = value displayed		
36.--	TCS(°C)	Actual value = value displayed - 25		
37.--	DC voltage A	Actual value = value displayed × 10		
38.--	AC voltage B	Actual value = value displayed × 2		
39.--	Number of indoor units for cooling operation	Actual value = value displayed		
40.--	Number of indoor units for heating operation	Excluding HT hydro module		
41.--	Number of high temperature HT hydro modules running	Actual value = value displayed		
42.--	Total capacity of indoor units for cooling operation			
43.--	Total capacity of indoor units for heating operation	Excluding HT hydro module		
44.--	Total capacity of high temperature hydro modules running			
45.--	Fan's failure history			
46.--	Software version			
47.--	Power limitation mode settings			
48.--	Reserved			
49.--	Reserved			
50.--	Reserved			
51.--	Most recent error or protection code	"--" is displayed if no error or protection events have occurred since start-up		
-- --	--	End		

Notes:

- The fan speed index is related to the fan speed in rpm and can take any integer value in the range 1 (slowest) to 30 (fastest).
- Silent mode:
  - 0: night silent time 6h/10h; 1: night silent time 6h/12h; 2: night silent time 8h/10h; 3: night silent time 8h/12h; 4: no silent mode; 8: Silent; 10: Ultra-silent

## TVR ULTRA HR Series System Commissioning Report – Sheet G

Project name and location			System name	
			Observed values	
No.	Parameters displayed on DSP1	Remarks	Cooling mode	Heating mode
1	Operation IDU quantity	Actual value		
2	System operation mode	0-OFF; 2-Cooling Only; 3-Heating Only; 5-Main Cooling Mode; 6-Main Heating Mode		
3	High pressure (MPa)	Actual value = value displayed $\times 0.1$		
4	Low pressure (MPa)	Actual value = value displayed $\times 0.01$		
5	Subcooler outlet temperature	Actual value = value displayed		
6	Subcooler inlet temperature	Actual value = value displayed		
7	EEV position	Actual value = value displayed $\times 10$		
8	Software version			
9	MS Address	Actual value = value displayed		
10	EBVA position <sup>1</sup>	Actual value = value displayed $\times 10$		
11	EBVB position <sup>1</sup>	Actual value = value displayed $\times 10$		
12	EBVC position <sup>1</sup>	Actual value = value displayed $\times 10$		
13	Port No. for refrigerant leakage alarm <sup>1</sup>	Actual value = value displayed If there are multiple alarms at the same time, only the minimum port number is displayed		
14	Number of ports for refrigerant leakage alarm <sup>1</sup>	Actual value = value displayed		
15	Min (T2, T2B) of cooling operation IDU under the MS <sup>1</sup>	Actual value = value displayed If there is no cooling operation of the indoor unit, the digital display "-"		

Notes:

- Number 10 to 15 are only for MS01.