

Long Line Guideline

TABLE OF CONTENTS

Safety Considerations	2
Introduction	3
Ductless Systems	4
Piston Change for 40QAQ Units Sizes 24 to 48	9
Vapor Line Sizing and Cooling Capacity Loss	10
Equal-Level Outdoor/Indoor Unit	13
TXV Kit for High Walls 40MK*B Long Line Applications	16
Interconnecting Tubing and Fitting Losses	18

APPLICATIONS

Equal-Level Outdoor/Indoor Unit	13
Outdoor Unit Below Indoor Unit	14
Outdoor Unit Above Indoor Unit	15

INDEX TO TABLES


TABLE 1	24AHA4/124ANS with 40MKC* units AC with PURON® Refrigerant Long Line Description ft. (m)	3
TABLE 2	25HHA4/224ANS with 40MKQ* units HP with PURON® Refrigerant Long Line Description ft. (m)	3
TABLE 3	Ductless Systems Descriptions	4
TABLE 4	Long Line Accessory	5
TABLE 5	24AHA4/124ANS and 25HHA4/224ANS with 40MK Indoor Units Long Line Accessory Requirements	5
TABLE 6	Ductless Long Line Information	6
TABLE 7	38HDF, QRF 018-036 Cooling Piston Change (Outdoor Unit Above Indoor Unit)	7
TABLE 8	38HDF, QRF 018-036 Cooling Piston Change (Outdoor Unit Below Indoor Unit)	7
TABLE 9	TXV Kit Part Numbers-40MK*B High Wall Units	7
TABLE 10	38QRF Heating Piston Change (Outdoor Unit Above Indoor Unit)	8
TABLE 11	38QRF Heating Piston Change (Outdoor Unit Below Indoor Unit)	8
TABLE 12	38QRR Puron® Heat Pump Outdoor Piston Change-Outdoor Unit Above Indoor Unit	8
TABLE 13	38QRR Puron® Heat Pump Outdoor Piston Change-Outdoor Unit Below Indoor Unit	8
TABLE 14	38HDR/QRR Maximum Total Equivalent Length Outdoor Unit Below Indoor Unit**	8
TABLE 15	Vapor Line Sizing & Cooling Capacity Losses 24AHA4/12ANS w/40MKC* Indoor Units-Puron® Refrigerant Single Stage Air Conditioner	10
TABLE 16	Vapor Line Sizing & Cooling Capacity Losses for 25HHA4/224ANS w/40MKQ* Indoor Units-Puron® Refrigerant Single-Stage Heat Pump	10
TABLE 17	38QRF, 38QRR Capacity Loss by Total Equivalent Length (Puron Heat Pump)	11
TABLE 18	38MVC / MVQ Capacity, % Loss	11
TABLE 19	40QN High Wall Factory Supplied Pistons	11
TABLE 20	40QA Under Ceiling Factory Supplied Pistons	11
TABLE 21	Common AccuRater-Piston Sizes Available Through RCD	12
TABLE 22	Common AccuRater-Piston Sizes Available Through RCD	12
TABLE 23	Maximum Total Equivalent Length Equal Level or Outdoor Unit Below Indoor	13
TABLE 24	AC / HP with Puron® Refrigerant Long Line Description ft. (m) Beyond these lengths, long line accessories are required	13
TABLE 25	24AHA4/124ANS & 25HHA4/224ANS w/40MK Indoor Units Max. Total Equivalent Length Outdoor Unit Below Indoor Unit	14
TABLE 26	24AHA4/124ANS & 25HHA4/224ANS w/40MK Indoor Units AC/HP w/ Puron® Refrigerant Long Line Description ft. (m)	14
TABLE 27	25HHA4/224ANS Puron® Refrigerant Heat Pump Outdoor Piston Change - Outdoor Unit Below the Indoor Unit	14
TABLE 28	24AHA4/124ANS & 25HHA4/224ANS w/40MK Indoor Units Puron Refrigerant Maximum Total Equivalent Length Outdoor Unit Above Indoor Unit	15
TABLE 29	24AHA4/124ANS & 25HHA4/224ANS w/40MK indoor units AC/HP w/Puron® Refrigerant Long Line Description ft. (m)	15
TABLE 30	25HHA4/224ANS Heat Pump Outdoor Piston Change-Outdoor Unit Above Indoor Unit	16
TABLE 31	TXV Kits Part Number	16
TABLE 32	Pipe Sizes	16
TABLE 33	Charge Requirements	16
TABLE 34	Fitting Losses in Equivalent Feet	18

SAFETY CONSIDERATIONS

Only trained service technicians, familiar with standard service instructions and training materials, should attempt installation, service, and repair of these units. Improper installation, adjustment, alteration, service, maintenance, or use can cause an explosion, fire, electrical shock, or other conditions which may result in personal injury, property damage or even death. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory–authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use a quenching cloth for brazing operations. Have a fire extinguisher available.

Read these instructions thoroughly and follow all warnings or cautions included in the literature and attached to the unit. Consult the local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety–alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; **DANGER**, **WARNING**, and **CAUTION**.

These words are used with the safety–alert symbol. **DANGER** identifies the most serious hazards which **will** result in severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

All equipment should be installed in accordance with accepted practices and the unit's Installation Instructions, and in compliance with all national and local codes. Power should be turned off when servicing or repairing electrical components. Extreme caution should be observed when troubleshooting electrical components with the power on. Observe all warning notices posted on the equipment and in instructions or manuals.

WARNING

EXPLOSION AND PERSONAL SAFETY HAZARD

Failure to follow this warning could result in personal injury, equipment damage or improper operation.

Refrigeration systems contain refrigerant under pressure. Puron® refrigerant (R–410A) systems operate at a higher pressure than standard R–22 systems. Use only service equipment and components rated for Puron® refrigerant. Extreme caution should be observed when handling refrigerants. Wear safety glasses and gloves to prevent personal injury. During normal system operations, some components are hot and can cause burns. Rotating fan blades can cause personal injury. Appropriate safety considerations are posted throughout this manual where potentially dangerous techniques are addressed.

INTRODUCTION

An application is considered long line, when the refrigerant level in the system requires the use of accessories to maintain acceptable refrigerant management for the systems reliability. Defining a system as long line depends on the liquid line diameter, actual length of the tubing, and vertical separation between the indoor and outdoor units.

For air conditioner systems, Table 1 shows when an application is considered a long line.

Table 1 – 24AHA4/124ANS with 40MKC* units AC with PURON® Refrigerant Long Line Description ft. (m)

LIQUID LINE SIZE	UNITS ON SAME LEVEL	OUTDOOR BELOW UNIT	OUTDOOR ABOVE UNIT
1/4	No accessories needed within allowed lengths	No accessories needed within allowed lengths	175 (53.3)
5/16	120 (36.6)	50 (15.2) vertical or 120 (36.6) total	120 (36.6)
3/8	80 (24.4)	35 (10.7) vertical or 80 (24.4) total	80 (24.4)

NOTE: Beyond these lengths, long line accessories are required.

For heat pump systems, Table 2 shows when an application is considered long line.

Table 2 – 25HHA4/224ANS with 40MKQ* units HP with PURON® Refrigerant Long Line Description ft. (m)

LIQUID LINE SIZE	UNITS ON SAME LEVEL	OUTDOOR BELOW UNIT	OUTDOOR ABOVE UNIT
3/8	80 (24.4)	20 (6.1) vertical or 80 (24.4) total	80 (24.4)

NOTE: Beyond these lengths, long line accessories are required.

Long line applications are clearly defined in this guideline, and must be treated differently from standard systems. A long line system requires special consideration for the following reasons:

- Additional refrigerant charge
- Refrigerant migration control
- Oil return concerns
- Capacity losses
- Metering device adjustments

Longer line sets require an additional refrigerant charge which must be managed throughout the entire range of possible ambient conditions. Off-cycle refrigerant migration that results in excess refrigerant in the compressor at start up, or condensed liquid refrigerant in the suction line at start up must be avoided for compressor reliability. Follow all accessory requirements in this guideline to control off-cycle refrigerant migration (see Table 5).

Another concern is proper line set sizing and construction to control oil return to the compressor, and minimize capacity losses. In residential applications, proper suction line sizing is critical to achieve adequate oil return, and maintain expected system performance. Oil return in the heating mode is different from the cooling mode thus, in some cases, heat pumps have additional line set limitations from the air conditioning units. Tables 15 and 16 in this guideline can be used to properly size suction lines. Follow all suction line sizing recommendations to ensure system performance and adequate oil return for compressor lubrication.

The third concern is refrigerant metering. Elevation changes affect pressure drop in refrigerant lines. These effects must be considered when sizing liquid lines and orifice-metering devices. Since the 40MK*B high wall indoor units utilize a piston for cooling mode metering, it is required that this piston be replaced by a TXV kit (see Table 9 for the TXV kit part number). Piston sizing is a concern for the heat pump heating operation. Follow the piston change recommendations in this guideline for proper heat pump heating operation (see Tables 27 and 30).

The limiting factor when sizing liquid lines is pressure drop. Equivalent length and vertical separation both contribute to the pressure drop in a liquid line. The liquid line sizing charts in this guideline have been developed based on a TXV metering device on the indoor coil. Staying within these guidelines and charging to a minimum of 10°F (5.6°C) sub-cooling ensures a column of liquid is present at the TXV. There are no capacity or efficiency changes to the system performance when staying within these guidelines.

NOTE: When an application is long line the accessories in Table 5 are mandatory.

DUCTLESS SYSTEMS

This guideline covers the following three ductless systems:

1. High wall systems
2. Cassette systems
3. Under-ceiling systems

Long line applications for ductless systems differ by equipment type and model number, and in some cases, by size. This is due to differences in compressor type, metering device type and location. See Table 3 for unit types and metering device descriptions. See Table 3 for long line information and requirements.

Table 3 – Ductless Systems Descriptions

OUTDOOR UNIT		INDOOR UNIT	INDOOR UNIT /TYPE	COOLING METERING DEVICE/ LOCATION	HEATING METERING DEVICE/ LOCATION
38HDF018–036		40QNC018–036	High Wall Cooling Only	Piston / Outdoor	N/A
38QRF018–036		40QNQ018–036	High Wall Heat Pump	Piston / Outdoor	Piston / Outdoor
38HDR018–060		40QAC024–060	Under Ceiling Cooling Only	TXV / Indoor	N/A
38QRR018–048		40QAQ024–048	Under Ceiling Heat Pump with Electric Heat	Piston / Indoor	Piston / Outdoor
38QRR060		40QAQ060	Under Ceiling Heat Pump with Electric Heat	TXV / Indoor	Piston / Outdoor
38MVC009–024		40MVC009–024	High Wall Cooling Only	Cap Tube / Outdoor	N/A
38MVQ009–024		40MVQ009–024	High Wall Heat Pump	Cap Tube / Outdoor	Cap Tube / Outdoor
24AHA418A	124ANS018	40MKCB18B--3	High Wall Cooling Only	Piston / Indoor	N/A
24AHA424A	124ANS024	40MKCB22B--3	High Wall Cooling Only	Piston / Indoor	N/A
24AHA430A	124ANS030	40MKCB28B--3	High Wall Cooling Only	Piston / Indoor	N/A
24AHA436A	124A(N,P,E)S036	40MKCB32B--3	High Wall Cooling Only	Piston / Indoor	N/A
25HHA424A	224ANS024	40MKQB24B--3	High Wall Heat Pump	Piston / Indoor	Piston / Outdoor
25HHA430A	224ANS030	40MKQB28B--3	High Wall Heat Pump	Piston / Indoor	Piston / Outdoor
24AHA418A	124ANS018	40MKCB18C--3	Cassette Cooling Only	TXV Kit / Indoor	N/A
24AHA424A	124ANS024	40MKCB34C--3	Cassette Cooling Only	TXV Kit / Indoor	N/A
24AHA430A	124ANS030	40MKCB34C--3	Cassette Cooling Only	TXV Kit / Indoor	N/A
24AHA436A	124A(N,P,E)S036	40MKCB34C--3	Cassette Cooling Only	TXV Kit / Indoor	N/A
25HHA424A	224ANS024	40MKQB34C--3	Cassette Heat Pump	TXV Kit / Indoor	Piston / Outdoor
25HHA430A	224ANS030	40MKQB34C--3	Cassette Heat Pump	TXV Kit / Indoor	Piston / Outdoor
25HHA436A	224A(N,P,E)S036	40MKQB34C--3	Cassette Heat Pump	TXV Kit / Indoor	Piston / Outdoor
24AHA418A	124ANS018	40MKCB18F--3	Console / Under Ceiling Cooling Only	TXV Kit / Indoor	N/A
24AHA424A	124ANS024	40MKCB34F--3	Console / Under Ceiling Cooling Only	TXV Kit / Indoor	N/A
24AHA430A	124ANS030	40MKCB34F--3	Console / Under Ceiling Cooling Only	TXV Kit / Indoor	N/A
24AHA436A	124A(N,P,E)S036	40MKCB34F--3	Console / Under Ceiling Cooling Only	TXV Kit / Indoor	N/A
24AHA448A	124A(N,P,E)S048	40MKCB54F--3	Console / Under Ceiling Cooling Only	TXV Kit / Indoor	N/A
24AHA460A	124A(N,P,E)S060	40MKCB54F--3	Console / Under Ceiling Cooling Only	TXV Kit / Indoor	N/A
25HHA430A	224ANS030	40MKQB36F--3	Console / Under Ceiling Heat Pump	TXV Kit / Indoor	Piston / Outdoor
25HHA436A	224A(N,P,E)S036	40MKQB36F--3	Console / Under Ceiling Heat Pump	TXV Kit / Indoor	Piston / Outdoor
25HHA448A	224A(N,P,E)S048	40MKQB48F--3	Console / Under Ceiling Heat Pump	TXV Kit / Indoor	Piston / Outdoor

Ductless Long Line Accessories

Certain accessories are required in long line applications to ensure trouble free and reliable system operation. The accessory requirements are specific to the system and are slightly different from standard residential systems. Since most ductless systems do not contain a TXV, a liquid line solenoid may be required on cooling only and heat pump systems to stop refrigerant migration in the off cycle.

Table 4 – Long Line Accessory

LONG LINE ACCESSORY	PART NUMBER	USED ON MODELS
Liquid Line Solenoid (LLS)	KHALS0401LLS	38HDF – all sizes 38HDR – all sizes 38QRF – all sizes 38QRR – all sizes
Start Capacitor and Relay (Hard Start Kit)	KSAHS1701AAA	
Crankcase Heater (CCH)	See the Product Literature for requirements	
Accessory TXV	EA36YD021	40QAAQ 024
	EA36YD041	40QAAQ 036
	EA36YD091	40QAAQ 048

NOTE: Accessories not required on some ductless models.

General Limitations Liquid Lines – AC Only

Liquid line diameters of 1/4" and 5/16" and 3/8" are allowed for cooling only systems and limitations are provided. Using smaller liquid lines affects the maximum allowable equivalent length and when the application qualifies as long line. Elevation changes between the indoor and outdoor units also affect allowable equivalent lengths. See Tables 25 and 28 to properly size liquid lines.

NOTE: Using 1/4 and 5/16" liquid lines within the limits provided, result in no capacity or efficiency changes to the system.

Table 5 – 24AHA4/124ANS and 25HHA4/224ANS with 40MK Indoor Units Long Line Accessory Requirements

ACCESSORY	OUTDOOR UNIT ABOVE		OUTDOOR UNIT BELOW		NO ELEVATION CHANGE	
	AC	HP	AC	HP	AC	HP
Liquid line solenoid (LLS) at outdoor	No	Yes KHALS0401LLS	No	Yes KHALS0401LLS	No	Yes KHALS0401LLS
TXV on indoor (standard for 40MK°C cassette and 40MK°F console type fan coils)	Yes	Yes	Yes	Yes	Yes	Yes
Crankcase heater (if not factory supplied)	Yes	Yes	Yes	Yes	Yes	Yes
Start capacitor and relay	Yes	Yes	Yes	Yes	Yes	Yes
Heating piston change	N/A	Yes See Table 30	N/A	Yes See Table 27	N/A	No
Inverted trap	N/A	N/A	Yes See Fig. 6	Yes See Fig. 6.	N/A	N/A

Liquid Lines – Heat Pump

Liquid line sizing for heat pumps is currently limited to "3/8".

Suction Lines

Use Tables 15 and 16 to properly size suction lines. Acceptable suction line sizes are shown for each size and type system. Air conditioners and heat pumps have separate charts due to oil return needs for heat pumps in heating mode.

⚠ CAUTION

COMPONENT FAILURE HAZARD

Failure to follow this caution may result in unit component failure.

For proper oil return and minimizing capacity losses, only use vapor lines listed in Tables 15 and 16.

Table 6 – Ductless Long Line Information

OUTDOOR UNIT	INDOOR UNIT	LONG LINE WHEN LONGER THAN (FT-LINEAR)	MAXIMUM LINEAR LENGTH (FT)	MAXIMUM TOTAL EQUIVALENT LENGTH (FT)	MAXIMUM VERTICAL (FT-LINEAR)		REQUIRED ACCESSORIES	PISTON ADJUSTMENTS	ADDITIONAL CHARGE
					OD Above (Drop)	OD Below (Lift)			
38HDF018-036	40QNC018-036	80	200	250	200	65	CCH LLS @ indoor (arrow facing indoor) Hard Start Kit	Adjust cooling piston (see Tables 7, 8, 19 & 20)	0.3 oz/ft. past 25 ft.
38QRF018-035	40QNQ018-036	80	200	250	200	65	CCH LLS@ outdoor (arrow facing indoor) Hard Start Kit	Adjust cooling and heating pistons (see Tables 7, 8, 19 & 20)	0.3 oz/ft. past 25 ft.
38HDR018-060	40QAC024-060	80 or over 20' lift	200	250	200	Varies by equivalent length (see Tables 25 & 28)	CCH Hard Start Kit	None (TXV Standard)	0.6 oz/ft. past 15 ft.
38QRR018-048	40QAQ024-048	50 or over 20' lift	200	250	200	Varies by equivalent length (see Tables 25 & 28)	CCH TXV accy at indoor Hard Start kit LLS@ outdoor (arrow facing outdoor)	Adjust heating piston (see Tables 19 & 20)	0.6 oz/ft. past 15ft.
38QRR060	40QAQ060	80 or over 20' lift	200	250	200	Varies by equivalent length (see Tables 25 & 28)	CCH Hard Start LLS @ outdoor (arrow facing outdoor. TXV standard in 5 ton)	Adjust heating piston (see Tables 19 & 20)	0.6 oz/ft. past 15 ft.
38MVC009-012	40MVC009-012	25	65	65	35	35	CCH	None	0.1oz/ft .past 25 ft.
38MVC018	40MVC018	25	100	100	50	50	CCH	None	0.1oz/ft .past 25 ft.
38MVQ009-012	40MVQ009-012	25	65	65	35	35	CCH	None	0.1oz/ft. past 25 ft.

Piston Changes

For systems using pistons metering devices, compensation for line length and lift must be made by changing the orifice diameter. Use the appropriate table depending on the unit type and direction of the elevation change between the indoor and outdoor units. To determine the piston change required, see Table 7 or 8 to determine the existing piston.

Add or subtract the change number in Table 21 to the last 3 digits of the piston part number. An example piston part number is **EA52PJ078** (last 3 digits represent the size). If the charts below require a (-3) change, subtract 3 from the original piston number.

$$\text{Ex. } 78-3 = 75$$

Your new piston part number should end with “**075**”.

See Table 19 for the available piston sizes. If the required size is not available, round up to the next available size.

Piston Sizing – 25HHA4/224ANS Heat Pumps Only

An AccuRater™ (fixed orifice) is used for refrigerant metering in the heating mode. This fixed expansion device must be changed from the factory-supplied AccuRater™ based on indoor/outdoor vertical separation and system capacity. For horizontal applications up to 200 ft. (61 m) linear length and 250 ft. (76 m) total equivalent length, no heating piston change is necessary.

When sizing the heating piston for installations where the outdoor unit is below the indoor unit, use Table 27. When the outdoor unit is located above the indoor unit, use Table 30.

Example: The factory supplied AccuRater™ for a single-stage 3-ton heat pump is number 57. A system is installed with 200 equivalent feet of the line set. Approximately 60 ft. (18.3 m) is horizontal and the outdoor unit is 140 ft. (42.7 m) above the indoor unit.

Table 30 shows the AccuRater™ piston change to be **+6**. The new piston size is **57+6 = 63**. If the number **63** is not produced, round up to the next larger available piston size.

On the same heat pump, if the outdoor unit was located at 49 ft. (14.9 m) below the indoor unit, Table 27 shows the piston change as **57-2 = 55**. If a **55** piston is not produced, round up to the next available size.

Liquid Line Solenoid – Long Line Heat Pump Heating

Since the AccuRater™ does not provide off-cycle refrigerant migration protection in the heating mode, a liquid line solenoid is required for the single-stage 25HHA4/224ANS heat pump long line applications. Bi-flow solenoid valves provide flow control protection only in the direction of the arrow molded into the valve. The arrow must point toward the outdoor unit for off-cycle refrigerant control in the heating mode.

The arrow shows the flow control direction. The solenoid should be installed within 2 ft. of the outdoor unit. The liquid line solenoid kit number for a heat pump is **KHALS0401LLS**.

NOTE: An equivalent length of the liquid line solenoid should be added to the total equivalent length of the tubing (see Table 34).

Charging Information

Use sub-cooling as the primary method for charging long line applications. When using different length diameter liquid lines, charge adjustments are required. Review the unit’s installation instructions for the proper charging procedure.

For all long line applications, pressure drop and sub-cooling loss is a concern. In these applications, a minimum of 10°F (5.6°C) of sub-cooling is required for all liquid line diameters to ensure no refrigerant flashing occurs before the TXV metering device. Systems should be charged to 10° sub-cooling or rating plate sub-cooling, whichever is greater.

The amount of factory-charge can be found on the unit rating plate or in the product data literature.

NOTE: Long line applications do not require an additional oil charge.

Metering Device – Long Line Cooling

The 40MK*B high wall indoor units utilize a piston for cooling mode metering and it is required that this piston be replaced by a TXV kit. This provides adequate refrigerant migration protection for all cooling applications. See Table 9 for the TXV kit part number.

Table 7 – 38HDF, QRF 018–036 Cooling Piston Change (Outdoor Unit Above Indoor Unit)

LINE LENGTH	VERTICAL SEPARATION (FT) OUTDOOR ABOVE INDOOR			
	0–50	51–100	101–150	151–200
81–100	-3	-2	--	--
101–150	-4	-3	-2	--
151–200	-5	-4	-3	-2

Table 8 – 38HDF, QRF 018–036 Cooling Piston Change (Outdoor Unit Below Indoor Unit)

LINE LENGTH	VERTICAL SEPARATION (FT) OUTDOOR BELOW INDOOR	
	0–20	21–50
26–80	0	-2
81–100	-3	-3
101–150	-4	-4
151–200	-5	-5

Table 9 – TXV Kit Part Numbers – 40MK*B High Wall Units

INDOOR UNIT	OUTDOOR UNIT	TXV KIT PN	
40MKCB18B--3	24AHA418	12222500000762	
	124ANS018		
40MKCB22B--3	24AHA424		
	124ANS024		
40MKCB28B--3	24AHA430		
	124ANS030		
40MKCB32B--3	24AHA436		12222500000761
	124ANS036		
40MKQB22B--3	25HHA424		
	224ANS024		
40MKQB28B--3	25HHA430		
	224ANS030		

Table 10 – 38QRF Heating Piston Change (Outdoor Unit Above Indoor Unit)

UNIT SIZE	EQUIVALENT LENGTH	VERTICAL SEPARATION (FT.) OUTDOOR ABOVE INDOOR				
		0 – 20	21 – 50	51 – 100	101 – 150	151 – 200
38QRF018	0–25	0	0	–	–	–
	26–80	+2	+2	+2	–	–
	81–100	+3	+3	+3	+3	–
	101–150	+5	+5	+5	+5	+4
	151–200	+6	+6	+6	+5	+5
38QRF024	0–25	0	0	–	–	–
	26–80	+1	+1	+1	–	–
	81–100	+2	+2	+2	+2	–
	101–150	+4	+3	+3	+3	+3
	151–200	+4	+4	+4	+4	+3
38QRF030	0–25	0	0	–	–	–
	26–80	+1	+1	+1	–	–
	81–100	+1	+1	+1	+1	–
	101–150	+2	+2	+2	+1	+1
	151–200	+3	+2	+2	+2	+2
38QRF036	0–25	0	0	–	–	–
	26–80	0	0	0	–	–
	81–100	0	0	0	0	–
	101–150	0	0	0	0	0
	151–200	+1	+1	+1	0	0

Table 11 – 38QRF Heating Piston Change (Outdoor Unit Below Indoor Unit)

UNIT SIZE	EQUIVALENT LENGTH	VERTICAL SEPARATION (FT.) OUTDOOR BELOW INDOOR	
		0-20	21-50
38QRF018	0-25	0	0
	26-80	+2	+2
	81-100	+3	+3
	101-150	+5	+5
	151-200	+6	+6
38QRF024	0-25	0	0
	26-80	+1	+1
	81-100	+2	+2
	101-150	+4	+4
	151-200	+4	+4
38QRF030	0-25	0	0
	26-80	+1	+1
	81-100	+1	+2
	101-150	+2	+2
	151-200	+3	+3
38QRF036	0-25	0	0
	26-80	0	0
	81-100	0	0
	101-150	0	+1
	151-200	+1	+1

Table 12 – 38QRR Puron® Heat Pump Outdoor Piston Change – Outdoor Unit Above Indoor Unit

Btuh	VERTICAL SEPARATION (ft.) - OUTDOOR ABOVE INDOOR UNIT							
	20-25	26-50	51-75	76-100	101-125	126-150	151-175	176-200
18,000	+1	+1	+2	+3	+3	+4	+5	+6
24,000	+1	+1	+2	+3	+4	+5	+6	+7
30,000	+1	+2	+2	+4	+5	+6	+8	+9
36,000	+1	+2	+2	+4	+5	+6	+8	+9
42,000	+1	+2	+3	+4	+5	+7	+8	+10
48,000	+1	+2	+3	+4	+5	+7	+9	+10
60,000	+1	+2	+3	+5	+6	+8	+10	+12

Table 13 – 38QRR Puron® Heat Pump Outdoor Piston Change – Outdoor Unit Below Indoor Unit

Btuh	VERTICAL SEPERATION (ft.) - OUTDOOR BELOW INDOOR UNIT						
	0 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 80
18,000	0	-1	-1	-2	-2	-2	-2
24,000	0	-1	-1	-2	-2	-3	-3
30,000	0	-1	-1	-2	-2	-3	-3
36,000	0	-1	-2	-2	-2	-3	-3
42,000	0	-1	-2	-2	-3	-3	-4
48,000	0	-1	-2	-2	-3	-3	—
60,000	0	-1	-2	-3	-3	—	—

Table 14 – 38HDR/QRR Maximum Total Equivalent Length Outdoor Unit Below Indoor Unit**

Btuh	VERTICAL SEPARATION (ft.) OUTDOOR BELOW INDOOR							
	0-20	21-30	31-40	41-50	51-60	61-70	71-80	
18,000	250	250	250	250	250	250	250	
24,000	250	250	250	250	250	250	250	
30,000	250	250	250	250	250	250	250	
36,000	250	250	250	250	250	250	250	
42,000	250	250	250	250	250	250	150	
48,000	250	250	250	250	230	160	—	
60,000	250	225	190	150	110	—	—	

** Maximum actual length is 200 ft.

PISTON CHANGE FOR 40QAQ UNITS SIZES 24 TO 48

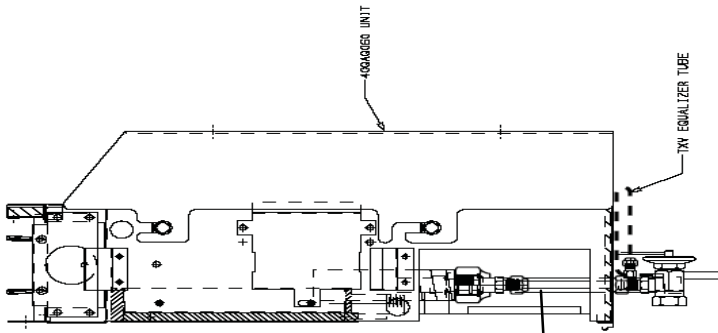


Fig. 1 - TXV Field Mounted (40QAQ024-048)

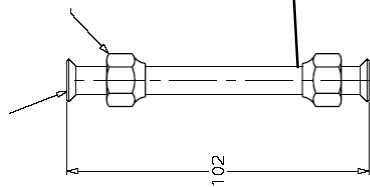


Fig. 2 - Field Supplied Tube

*Replaces existing piston assembly inside the cabinet
(102mm=4 inches)

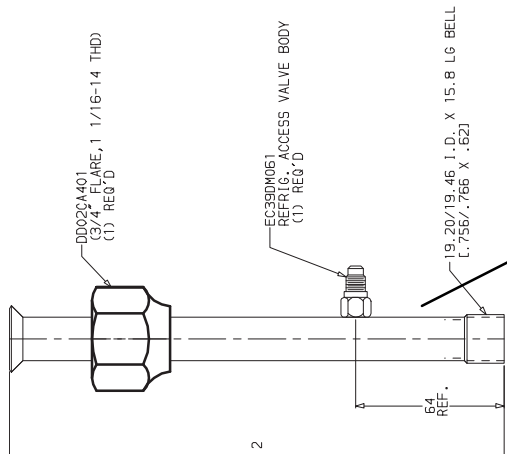
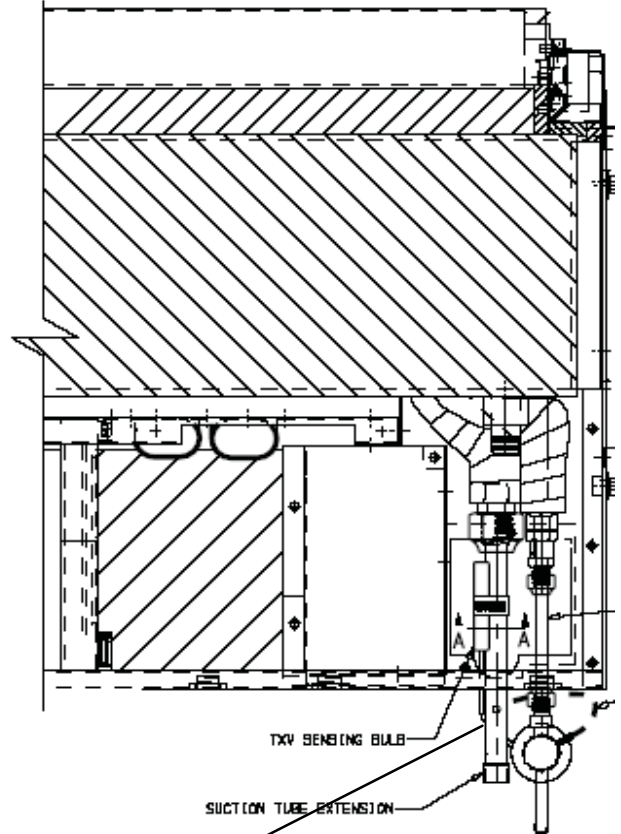


Fig. 3 - Field Supplied Suction Tube

*Field supplied suction tube for mounting the TXV equalizer line is outside the cabinet. The equalizer may also be brazed into a suction tube if desired.

*212 mm = 8.35 inches
*64 mm = 2.5 inches

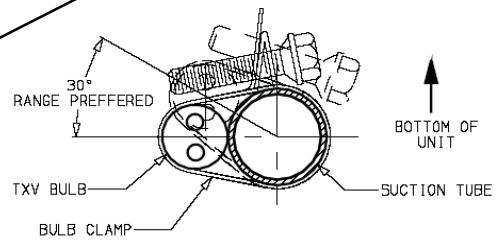


Fig. 4 - TXV Sensing Bulb

*Locate the TXV Sensing Bulb inside the cabinet as shown above. The bulb must be insulated.

VAPOR LINE SIZING AND COOLING CAPACITY LOSS

Acceptable vapor line diameters provide adequate oil return to the compressor while avoiding excessive capacity loss. The suction line diameters shown in Tables 15 and 16 are acceptable for AC and HP systems with Puron refrigerant.

Table 15 – Vapor Line Sizing and Cooling Capacity Losses 24AHA4/12ANS w/40MKC* Indoor Units – Puron® Refrigerant Single Stage Air Conditioner Applications

Unit Nominal Size (Btuh)	Maximum Liquid Line Diameters (In. OD)	Vapor Line Diameters (In. OD)	COOLING CAPACITY LOSS (%) Total Equivalent Line Length ft. (m)								
			26-50 (7.9-15.2)	51-80 (15.5-24.4)	81-100 (24.7-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-53.3)	176-200 (53.6-61.0)	201-225 (61.3-68.6)	226-250 (68.9-76.2)
18000 1 Stage AC w/Puron	3/8	1/2	1	2	3	5	6	7	8	9	11
		5/8	0	1	1	1	2	2	2	3	3
		3/4	0	0	0	0	1	1	1	1	1
24000 1 Stage AC w/Puron	3/8	5/8	0	1	2	2	3	3	4	5	5
		3/4	0	0	1	1	1	1	1	2	2
		7/8	0	0	0	0	0	1	1	1	1
30000 1 Stage AC w/Puron	3/8	5/8	1	2	3	3	4	5	6	7	8
		3/4	0	0	1	1	1	2	2	2	3
		7/8	0	0	0	0	1	1	1	1	1
36000 1 Stage AC w/Puron	3/8	5/8	1	2	4	5	6	8	9	10	12
		3/4	0	1	1	2	2	3	3	4	4
		7/8	0	0	0	1	1	1	1	2	2
42000 1 Stage AC w/Puron	3/8	3/4	0	1	2	2	3	4	4	5	6
		7/8	0	0	1	1	1	2	2	2	3
		1 1/8	0	0	0	0	0	0	0	0	0
48000 1 Stage AC w/Puron	3/8	3/4	0	1	2	3	4	5	5	6	7
		7/8	0	0	1	1	2	2	2	3	3
		1 1/8	0	0	0	0	0	0	0	1	1
60000 1 Stage AC w/Puron	3/8	3/4	1	2	4	5	6	7	9	10	11
		7/8	0	1	2	2	3	4	4	5	5
		1 1/8	0	0	0	1	1	1	1	1	1

Applications in this area may be long line and may have height restrictions.

Table 16 – Vapor Line Sizing and Cooling Capacity Losses for 25HHA4/224ANS w/ 40MKQ* Indoor Units – Puron® Refrigerant Single – Stage Heat Pump Applications

Unit Nominal Size (Btuh)	Maximum Liquid Line Diameters (In. OD)	Vapor Line Diameters (In.) OD	COOLING CAPACITY LOSS (%) Total Equivalent Line Length ft. (m)								
			Standard Application		Long Line Application Requires Accessories						
			26-50 (7.9-15.2)	51-80 (15.5-24.4)	81-100 (24.7-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-50.3)	176-200 (53.6-60.0)	201-225 (61.3-68.6)	226-250 (68.9-76.2)
18,000 1-Stage HP w/ Puron	3/8	1/2	1	2	3	4	6	7	8	9	10
		5/8	0	0	1	1	1	2	2	3	3
24,000 1-Stage HP w/ Puron	3/8	5/8	0	1	1	2	3	3	4	4	5
		3/4	0	0	0	0	1	1	1	1	1
30,000 1-Stage HP w/ Puron	3/8	5/8	1	2	3	3	4	5	6	7	8
		3/4	0	0	1	1	1	2	2	2	3
		7/8	0	0	0	0	1	1	1	1	1
36,000 1-Stage HP w/ Puron	3/8	5/8	1	2	4	5	6	7	9	10	11
		3/4	0	0	1	1	2	2	3	3	4
		7/8	0	0	0	0	1	1	1	1	2
42,000 1-Stage HP w/ Puron	3/8	3/4	0	1	2	2	3	4	4	5	6
		7/8	0	0	1	1	1	2	2	2	3
48,000 1-Stage HP w/ Puron	3/8	3/4	0	1	2	3	4	5	5	6	7
		7/8	0	0	1	1	2	2	2	3	3

*Standard Length = 80 ft. (24.4 m) or less total equivalent length (applications in this area are long line). Accessories are required as shown on the Long Line Application Guidelines. Applications in this area may have height restrictions that limit allowable total equivalent length when the outdoor unit is below the indoor unit. See the Long Line Application Guidelines for more information.

Table 17 – 38QRF, 38QRR Capacity Loss by Total Equivalent Length (Puron Heat Pump)

UNIT NOMINAL SIZE (Btuh)	ACCEPTABLE VAPOR LINE DIAMETERS (In. O.D.)	COOLING CAPACITY LOSS (%) TOTAL EQUIVALENT LINE LENGTH (ft.)									
		25	50	80	100	125	150	175	200	225	250
18,000	1/2	1	2	3	4	6	7	8	9	10	12
	5/8	0	0	1	1	1	2	2	3	3	3
24,000	5/8	0	1	1	2	3	3	4	4	5	6
	3/4	0	0	0	0	1	1	1	1	1	2
30,000	5/8	1	2	3	3	4	5	6	7	8	9
	3/4	0	0	1	1	1	2	2	2	3	3
	7/8	0	0	0	0	1	1	1	1	1	1
36,000	5/8	1	2	4	5	6	7	9	10	11	13
	3/4	0	0	1	1	2	2	3	3	4	4
	7/8	0	0	0	0	1	1	1	1	2	2
42,000	3/4	0	1	2	2	3	4	4	5	6	6
	7/8	0	0	1	1	1	2	2	2	3	3
48,000	3/4	0	1	2	3	4	5	5	6	7	8
	7/8	0	0	1	1	2	2	2	3	3	4
60,000	3/4	1	2	4	5	6	7	9	10	11	12
	7/8	0	1	2	2	3	4	4	5	5	6
	1-1/8	0	0	0	1	1	1	1	1	1	2

Table 18 – 38MVC / MVQ Capacity, % Loss

LINE LENGTH, ft	25	45	65	100
Cooling:				
9 & 12 KBTU/H models	0%	2%	5%	--
18 & 24 KBTU/H models	0%	2%	4%	7%
Heating:				
9 & 12 KBTU/H models	0%	7%	11%	--15%
18 & 24 KBTU/H models	0%	7%	11%	--15%

Table 19 – 40QN High Wall Factory Supplied Pistons

HIGH WALL COOLING SYSTEM R410a	COOLING PISTON	HIGH WALL HEAT PUMP SYSTEM R-410a	COOLING PISTON	HEATING PISTON
40QNC01824 / 38HDF018	49	40QNC018 / 38QRF018	49	45
40QNC01824 / 38HDF024	55	40QNC024 / 38QRF024	55	49
40QNC030 / 38HDF030	63	40QNC030 / 38QRF030	63	53
40QNC036 / 38HDF036	70	40QNC036 / 38QRF036	70	63

Table 20 – 40QA Under Ceiling Factory Supplied Pistons

UNIT SIZE	COOLING PISTON	HEATING PISTON
38QRR018 / 40QAQ024	EA52PJ055	EA52PJ040
38QRR024 / 40QAQ024	EA52PJ055	EA52PJ049
38QRR030 / 40QAQ036	EA52PJ070	EA52PJ055
38QRR036 / 40QAQ036	EA52PJ070	EA52PJ063
38QRR048 / 40QAQ048	EA52PJ082	EA52PJ073
38QRR060 / 40QAQ060	TXV	EA52PJ080

Table 21 – Common AccuRater – Piston Sizes Available Through RCD

EA52PJ032	055	082
033	057	084
035	059	086
036	061	090
037	062	093
040	063	096
042	065	099
043	067	101
045	070	
047	073	
049	074	
051	078	
052	080	
053	081	

NOTE: (In Table 21, all part numbers begin with **EA52PJxxx**. The last 3 digits represent the piston size.)

Table 22 – Common AccuRater – Piston Sizes Available Through RCD

EA52PH032	063	093
035	065	096
037	067	098
038	068	101
040	070	104
042	073	106
043	076	109
046	078	110
049	080	113
052	082	116
055	084	120
057	086	125
059	088	128
061	090	

NOTE: (In Table 22, all part numbers are **EA52PHxxx**. The last 3 digits represent the piston size.)

EQUAL-LEVEL OUTDOOR/INDOOR UNIT

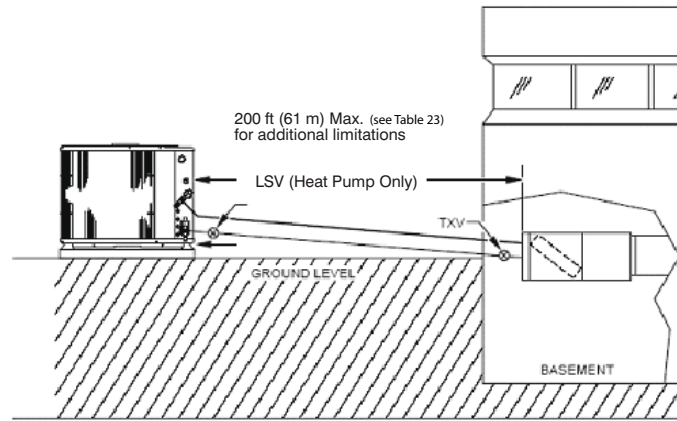


Fig. 5 – Equal-Level Outdoor/Indoor Unit

- A hard-shutoff TXV must be installed at the indoor unit when the application qualifies as long line (see Table 24).
- A Hard Start Kit (start capacitor and relay) must be installed on the outdoor unit when the application qualifies as a long line (see Table 24).
- A crankcase heater must be installed on the compressor when the application qualifies as a long line (see Table 24).
- The vapor line should slope towards indoor unit.
- The maximum actual liquid line is up to 200 ft. (61 m) (see Table 23).
- The maximum total equivalent length is up to 250 ft. (76.2 m) (see Table 23).
- A heat pump only – bi-flow liquid line solenoid must be installed within 2 ft. (0.61 m) of the outdoor unit with an arrow pointing towards the outdoor unit.
- A heat pump heating mode metering – Outdoor AccuRater™ adjustment is not required.
- Use a vapor line (see Tables 15 and 16).
- Use liquid lines (see Table 23).

Table 23 – Maximum Total Equivalent Length Equal Level or Outdoor Unit Below Indoor

Size	System Type	Liquid Line Diameter w/ TXV	Maximum Total Equivalent Length †: Outdoor unit BELOW Indoor Vertical Separation ft. (m)								
			0–5 (0–1.5)	6–10 (1.8–3.0)	11–20 (3.4–6.1)	21–30 (6.4–9.1)	31–40 (9.4–12.2)	41–50 (12.5–15.2)	51–60 (15.5–18.3)	61–70 (18.6–21.3)	71–80 (21.6–24.4)
18000	AC Only	1/4	150	150	125	100	100	75	---	---	---
	AC Only	5/16	250*	250*	250*	250*	250*	250*	250*	225*	150
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
24000	AC Only	1/4	75	75	75	50	50	---	---	---	---
	AC Only	5/16	250*	250*	250*	250*	250*	225*	175	125	100
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
30000	AC Only	1/4	30	---	---	---	---	---	---	---	---
	AC Only	5/16	175	225*	200	175	125	100	75	---	---
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
36000	AC Only	5/16	175	150	150	100	100	100	75	---	---
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
42000	AC Only	5/16	125	100	100	75	75	50	---	---	---
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	150
48000	AC/HP	3/8	250*	250*	250*	250*	250*	250*	230	160	---
60000	AC/HP	3/8	250*	250*	250*	225*	190	150	110	---	---

* Maximum actual length not to exceed 200 ft. (61 m)

† Total equivalent length accounts for losses due to elbows or fitting. See the Table 34 for details.

--- = outside acceptable range

Table 24 – AC / HP with Puron® Refrigerant Long Line Description ft. (m) Beyond these lengths, long line accessories are required

AC	AC Liquid Line Size		Units On Same Level	
	1/4		No accessories needed within allowed lengths	
	5/16		120 (36.6)	
	3/8		80 (24.4)	
HP	HP Liquid Line Size		Units On Same Level	
	3/8		80 (24.4)	

OUTDOOR UNIT BELOW INDOOR UNIT

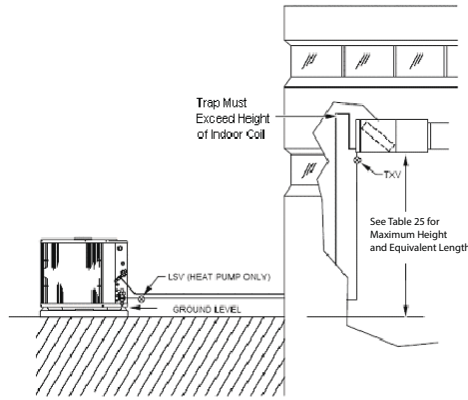


Fig. 6 – Outdoor Unit Below Indoor Unit

- The unit must be charged to 10° sub-cooling or nameplate sub-cooling or whichever is greater.
- A hard-shutoff TXV must be installed at the indoor unit when the application qualifies as a long line (see Table 26).
- A crankcase heater must be installed on the compressor when the application qualifies as a long line (see Table 26).
- A Hard Start Kit (start capacitor and relay) must be installed in the outdoor unit when the application qualifies as a long line (see Table 26).
- An inverted vapor-line trap must be installed at the indoor unit. The trap's top peak must be greater than the indoor coil height.
- The maximum actual liquid line length is up to 200 ft. (61 m). See Table 25 for the maximum total equivalent length.
- **(Heat pump only)** – A bi-flow liquid line solenoid must be installed within 2 ft. (0.61 m) of the outdoor unit with the arrow pointing towards the outdoor unit.
- Heat pump heating mode metering (adjust outdoor piston per Table 27).
- Use a vapor line (see Tables 15 and 16).
- Use liquid lines (see Table 25).

Table 25 – 24AHA4/124ANS & 25HHA4/224ANS w/40MK Indoor Units Max. Total Equivalent Length Outdoor Unit Below Indoor Unit

SIZE	SYSTEM TYPE	LIQUID LINE DIAMETER w/TXV	Maximum Total Equivalent Length † : Outdoor unit BELOW Indoor Vertical Separation ft. (m)								
			0–5 (0–1.5)	6–10 (1.8–3.0)	11–20 (3.4–6.1)	21–30 (6.4–9.1)	31–40 (9.4–12.2)	41–50 (12.5–15.2)	51–60 (15.5–18.3)	61–70 (18.6–21.3)	71–80 (21.6–24.4)
18000	AC Only	1/4	150	150	125	100	100	75	---	---	---
	AC Only	5/16	250*	250*	250*	250*	250*	250*	250*	225*	150
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
24000	AC Only	1/4	75	75	75	50	50	---	---	---	---
	AC Only	5/16	250*	250*	250*	250*	250*	225*	175	125	100
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
30000	AC Only	1/4	30	---	---	---	---	---	---	---	---
	AC Only	5/16	175	225*	200	175	125	100	75	---	---
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
36000	AC Only	5/16	175	150	150	100	100	100	75	---	---
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
42000	AC Only	5/16	125	100	100	75	75	50	---	---	---
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	150
48000	AC/HP	3/8	250*	250*	250*	250*	250*	250*	230	160	---
60000	AC/HP	3/8	250*	250*	250*	225*	190	150	110	---	---

NOTES: * Maximum actual length not to exceed 200 ft. (61 m).

† = Total equivalent length accounts for losses due to elbows or fitting. See Table 34 for details.

--- = outside acceptable range

Table 26 – 24AHA4/124ANS & 25HHA4/224ANS w/40MK Indoor Units AC/HP w/ Puron® Refrigerant Long Line Description ft. (m)

AC	AC Liquid Line Size	Outdoor Below Indoor
	1/4	No accessories needed within allowed lengths
5/16	50 (15.2) vertical or 120 (36.6) total	
3/8	35 (10.7) vertical or 80 (24.4) total	
HP	HP Liquid Line Size	Outdoor Below Indoor
	3/8	20 (6.1) vertical or 80 (24.4) total

NOTE: Beyond these lengths, long line accessories are required.

Table 27 – 25HHA4/224ANS Puron® Refrigerant Heat Pump Outdoor Piston Change – Outdoor Unit Below the Indoor Unit

Btuh	Vertical Separation ft. (m) – Outdoor BELOW Indoor Unit)						
	0–19 (0–5.8)	20–29 (6.1–8.8)	30–39 (9.1–11.9)	40–49 (12.2–14.9)	50–59 (15.2–18.0)	60–69 (18.3–21.0)	70–80 (21.3–24.4)
18,000	0	-1	-1	-2	-2	-2	-2
24,000	0	-1	-1	-2	-2	-3	-3
30,000	0	-1	-1	-2	-2	-3	-3
36,000	0	-1	-2	-2	-2	-3	-3
42,000	0	-1	-2	-2	-3	-3	-4
48,000	0	-1	-2	-2	-3	-3	---
60,000	0	-1	-2	-3	-3	---	---

NOTE: (---) Indicates the vertical separation exceeds the allowable limits.

— Example 1: On a 4 ton system, the outdoor unit is 60 ft. (18.3 m) below the indoor unit. This is acceptable **only** if the total equivalent length is 230 ft. (70.1 m) or less. The heating piston must be re-sized (-3).

— Example 2: On a 3-ton system, the outdoor unit is 80 ft. (24.4 m) below the indoor unit. This is acceptable up to 250 ft. (76.2 m) total equivalent length. The heating piston must be re-sized (-3).

OUTDOOR UNIT ABOVE INDOOR UNIT

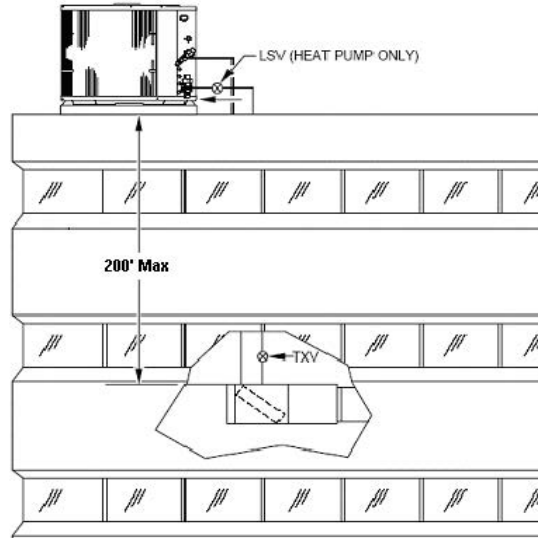


Fig. 7 – Outdoor Unit Above Indoor Unit

- A hard-shutoff TXV must be installed at the indoor unit when the application qualifies as a long line (see Table 29).
- A crankcase heater must be installed on the compressor when the application qualifies as a long line (see Table 29).
- A Hard Start Kit (start capacitor and relay) must be installed in the outdoor unit when the application qualifies as a long line (see Table 29).
- Heat pump heating mode metering (heating piston must be changed as shown in Table 30).
- The maximum actual liquid line length is up to 200 ft. (61 m) (see Table 28).
- The maximum total equivalent length is up to 250 ft. (61 m) (see Table 28).
- (Heat pump only) A bi-flow liquid line solenoid must be installed within 2 ft. (0.61 m) of the outdoor unit with an arrow pointing towards the outdoor unit.
- Use vapor line sizes (see Tables 15 and 16).
- Use liquid lines (see Table 28).
- Vapor line traps are not required.

Table 28 – 24AHA4/124ANS & 25HHA4/224ANS w/ 40MK Indoor Units Puron Refrigerant Maximum Total Equivalent Length Outdoor Unit Above Indoor Unit

SIZE	SYSTEM TYPE	LIQUID LINE DIAMETER	Vertical Separation ft. (m) Outdoor Unit Above indoor unit								
			25 (7.6)	26-50 (7.9-15.2)	51-75 (15.5-22.9)	76-100 (23.2-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-53.3)	176-200 (53.6-61.0)	
18000	AC Only	1/4	175	250*	250*	250*	250*	250*	250*	250*	250*
	AC Only	5/16	250*	250*	250*	250*	250*	250*	250*	250*	250*
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
24000	AC Only	1/4	100	125	175	200	225*	250*	250*	250*	250*
	AC Only	5/16	250*	250*	250*	250*	250*	250*	250*	250*	250*
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
30000	AC Only	1/4	30	--	--	--	--	--	--	--	--
	AC Only	5/16	250*	250*	250*	250*	250*	250*	250*	250*	250*
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
36000	AC Only	5/16	225*	250*	250*	250*	250*	250*	250*	250*	250*
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
42000	AC Only	5/16	175	200	250*	250*	250*	250*	250*	250*	250*
	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
48000	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
60000	AC/HP	3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*

-- = outside acceptable range

*Maximum Actual Length Not to Exceed 200 ft. (61 m)

Table 29 – 24AHA4/124ANS & 25HHA4/224ANS w/ 40MK indoor units AC/HP w/ Puron® Refrigerant Long Line Description ft. (m)

AC	AC Liquid Line Size	Outdoor Above Indoor
	1/4	175 (53.3)
5/16	120 (36.6)	
3/8	80 (24.4)	
HP	AC Liquid Line Size	Outdoor Above Indoor
	3/8	80 (24.4)

Beyond these lengths, long line accessories are required.

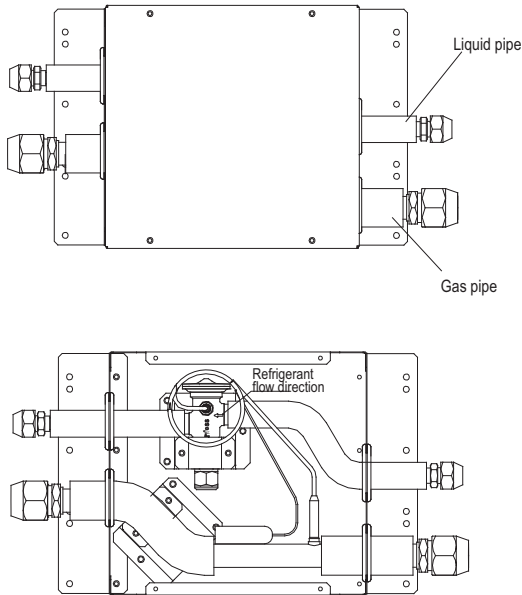
Table 30 – 25HHA4/224ANS Heat Pump Outdoor Piston Change – Outdoor Unit Above Indoor Unit

Btuh	Vertical Separation ft. (m) - Outdoor Above Indoor Unit							
	20-25 (6.1-7.6)	26-50 (7.9-15.2)	51-75 (15.5-22.9)	76-100 (23.2-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-53.3)	176-200 (53.6-61.0)
18,000	+1	+1	+2	+3	+3	+4	+5	+6
24,000	+1	+1	+2	+3	+4	+5	+6	+7
30,000	+1	+2	+2	+4	+5	+6	+8	+9
36,000	+1	+2	+2	+4	+5	+6	+8	+9
42,000	+1	+2	+3	+4	+5	+7	+8	+10
48,000	+1	+2	+3	+4	+5	+7	+9	+10
60,000	+1	+2	+3	+5	+6	+8	+10	+12

TXV KIT FOR HIGH WALLS 40MK*B LONG LINE APPLICATIONS

TXV Kit

When the 40MK*B high wall units are paired with the horizontal discharge units (24AHA/124ANS and 25HHA4/224ANS) for the long line application, a TXV kit is required. If the kit is not available, order the kit and then install the system once the kit is received. Fig. 8 provides examples of what the kit looks like.



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Fig. 8 – TXV Kit

TXV Kits Part Number

Table 31 contains the TXV kit part numbers that can be ordered through the replacement components division.

Table 31 – TXV Kits Part Number

INDOOR UNIT	OUTDOOR UNIT	TXV KIT PN
40MKCB18B--3	24AHA418 124ANS018	12222500000762
40MKCB22B--3	24AHA424 124ANS024	12222500000761
40MKCB28B--3	24AHA430 124ANS030	
40MKCB32B--3	24AHA436 124ANS036	
40MKQB22B--3	25HHA424 224ANS024	
40MKQB28B--3	25HHA430 224ANS030	

Pipe Sizes Requirements

For some models, indoor unit and/or outdoor unit pipe sizes may differ from those in TXV connections. A field-supplied coupling is needed in these cases. Table 32 provides a complete list of tube sizes to identify coupling needs.

Table 32 – Pipe Sizes

Indoor Unit	Outdoor Unit	Indoor Unit Tube Sizes (in)		TXV Kit Tube Sizes (in)		Outdoor Unit Tube Size (in)	
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
40MKCB18B--3	24AHA418 124ANS018		5/8		5/8		5/8
40MKCB22B--3	24AHA424 124ANS024		3/4		3/4		3/4
40MKCB28B--3	24AHA430 124ANS030	3/8	3/4	3/8	3/4	3/8	3/4
40MKCB32B--3	24AHA436 124ANS036		7/8		3/4		7/8
40MKQB22B--3	25HHA424 224ANS024		3/4		3/4		3/4
40MKQB28B--3	25HHA430 224ANS030		3/4		3/4		3/4

Charge Requirements

Charge to sub-cooling delta from Rating Plate Value as stated below. If adjustments are necessary, the TXV inside the TXV kit case is adjustable.

Table 33 – Charge Requirements

System Type	Nominal Capacity	Outdoor Unit		Indoor Unit	Charge to Sub-cooling Delta from Rating Plate Value
Cooling Only	018	24AHA418A003	124ANS018000	40MKCB18B--3	12
	022	24AHA424A003	124ANS024000	40MKCB22B--3	12
	028	24AHA430A003	124ANS030000	40MKCB28B--3	12
	032	24AHA436A003/5/6	124ANS036000	40MKCB32B--3	8
Heat Pump	024	25HHA424A003	224ANS024000	40MKQB24B--3	14
	028	25HHA430A003	224ANS030000	40MKQB28B--3	11

TXV Kit Installation

Remove the piston body assembly provided with the indoor unit assembly.

Location – The TXV kit can be secured between 12 to 18 inches from the indoor unit pipe connection.

⚠ CAUTION

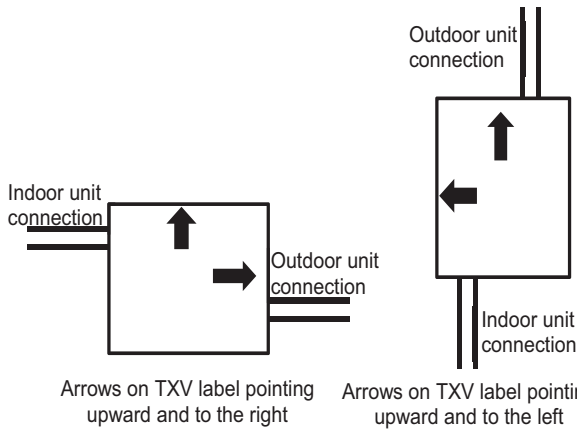
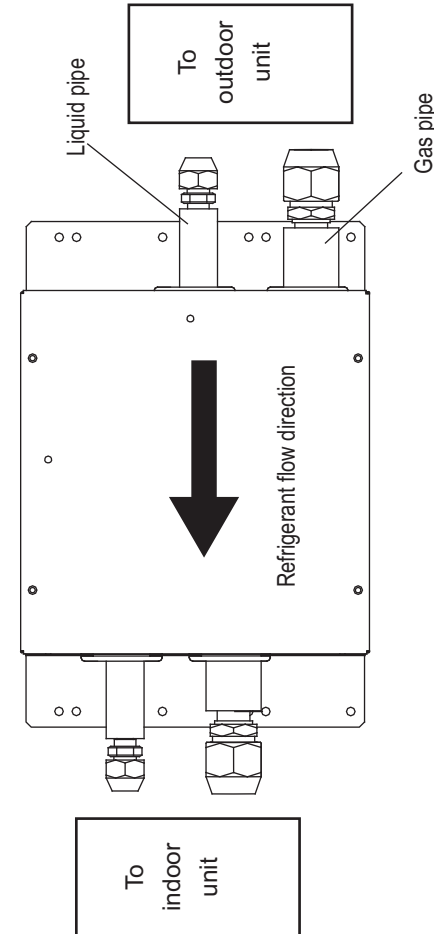
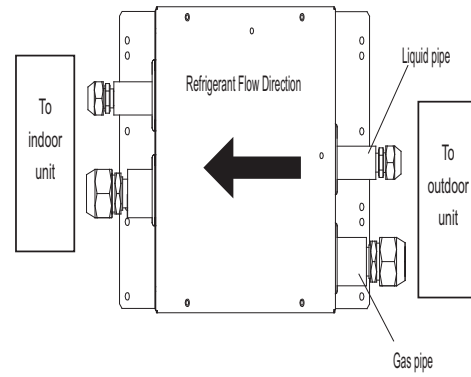
Failure to follow the following caution may result in equipment damage or improper operation.

The TXV kit needs to be installed 12 to 18 inches, at most, from the indoor unit pipe connection.

The TXV kit contains a label specifying the allowed flow direction.

⚠ CAUTION

Failure to follow the following caution may result in equipment damage or improper operation. One of the two arrows on the TXV part number label must point upward when installed. Install the unit so the refrigerant flow directions are in either of the two allowed directions.



Arrows on TXV label pointing upward and to the right Arrows on TXV label pointing upward and to the left

Fig. 9 – Allowed TXV installation direction per label attached to TXV

Fig. 11 – Allowed Refrigerant Flow Direction

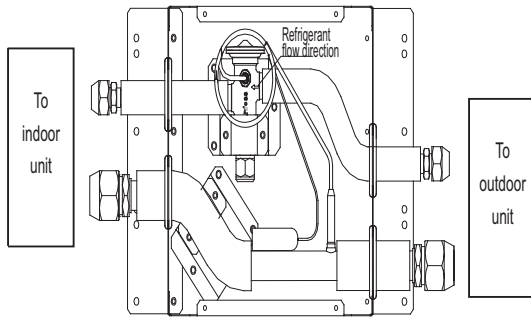


Fig. 10 – TXV

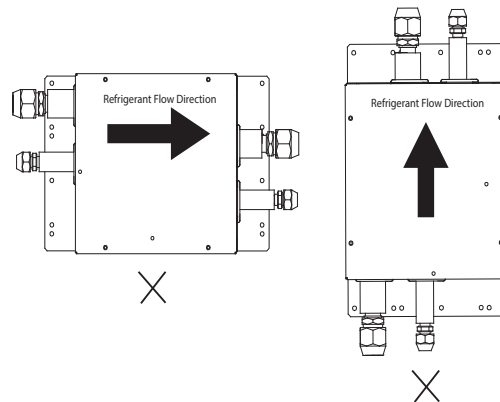


Fig. 12 – Refrigerant Flow Direction Not Allowed

⚠ CAUTION

COMPONENT FAILURE HAZARD

Failure to follow this caution may result in unit component failure. For proper oil return and minimizing capacity losses, only use vapor line sizes listed in Tables 15 and 16.

INTERCONNECTING TUBING AND FITTING LOSSES

Choosing the proper tubing diameters is critical for reliable long line applications. For proper suction line sizing, see Table 15 and 16. These charts show all acceptable suction line diameters and related performance data based on total equivalent length. See Tables 23, 25 and 28 for the allowable liquid tubing diameters for the single-stage 24AHA4/124ANS & 25HHA4/224ANS units.

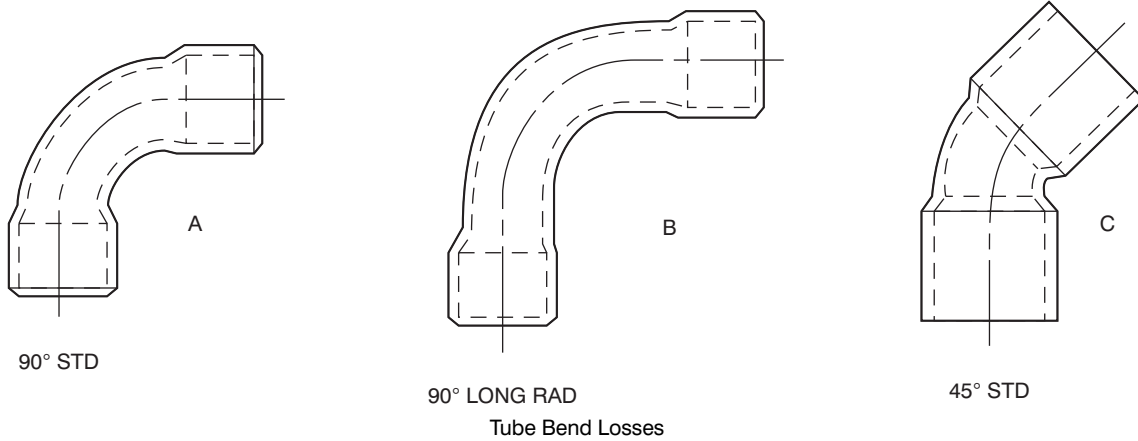
Refrigerant tubing must be measured both in terms of actual length and equivalent length. Use the actual length for limitations and refrigerant charge calculation. The maximum liquid line length varies depending on diameter and elevation change between the indoor and outdoor units.

Equivalent length takes into account pressure losses from both the tubing length and losses due to fittings and accessories, such as elbows, a liquid line solenoid and the filter drier. Losses from fittings are expressed in equivalent length, meaning the length of straight tubing that would have the same pressure loss as the fitting. See Table 34 for equivalent lengths of commonly used fittings and accessories; maximum equivalent length allowed is up to 250 ft. (76.2 m). See Tables 23, 25 and 28 for the maximum total equivalent length.

Calculate the total equivalent length by adding the linear (actual) length of the tubing required and the equivalent length of all elbows and accessories used. See Tables 15 and 16 to determine the capacity loss of the system due to equivalent length losses and subtract them from the published system capacity for the particular outdoor/indoor unit combination. This data is found in the outdoor unit product data.

Example: A 4-ton system using a 7/8 in. diameter line set has a total tubing length of 165 ft (50.3 m). The tubing configuration uses four standard 90° elbows and two 90° long-radius elbows. According to Table 34, the total equivalent length is calculated as:

$$165 \text{ ft. straight tubing} + (\text{four standard } 90^\circ \text{ elbows} \times 2 \text{ ft.}) + (\text{two long-radius } 90^\circ \text{ elbows} \times 1.4 \text{ ft.}) = 165 \text{ ft.} + 8 \text{ ft.} + 2.8 \text{ ft.} = 175.8 \text{ ft. total equivalent length.}$$



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Table 34 – Fitting Losses in Equivalent Feet

TUBE SIZE O.D. (in.)	FITTING REFERENCE		
	90° Std. (A)	90° Long-Rad (B)	45° Std. (C)
1/2	1.2	0.8	0.6
5/8	1.6	1.0	0.8
3/4	1.8	1.2	0.9
7/8	2.0	1.4	1.0
1-1/8	2.6	1.7	1.3
Liquid Line Solenoid (LLS)	12		
Filter Drier	6		

General Requirements

All Long Line Applications

- A hard-shutoff TXV must be installed on the indoor unit.
- A Hard Start Kit (start capacitor and relay) must be installed on the outdoor unit.
- A crankcase heater must be installed on the compressor.
- Use a liquid line (see Tables 23, 25 and 28).
- Only use vapor line sizes listed in Tables 15 and 16.
- Charge system to 10° sub-cooling or to rating plate sub-cooling, whichever is greater.

Heat Pumps Only

- A bi-flow liquid line solenoid must be installed within 2 ft. (0.61 m) of the outdoor unit with the arrow pointing towards the outdoor unit.

Equal-level Outdoor/Indoor unit

- The outdoor unit and the indoor unit must be within the +/- 20 ft. (6.1 m) vertical separation range.
- The vapor line should slope towards the indoor unit.

Heat Pumps Only

- No outdoor AccuRater™ adjustment is required with less than a 20 ft. (6.1 m) vertical separation.

Outdoor unit BELOW indoor unit

- See Tables 26 and 29 for the long line thresholds.
- A inverted vapor-line trap must be installed at the indoor unit. The top peak of the trap must be greater than the height of the indoor coil (see Fig. 6).
- The vertical separation and the line set equivalent length must not exceed the requirements listed in Tables 25.

Heat Pumps Only

- Adjust the outdoor AccuRater™ per Table 27.

Outdoor unit ABOVE indoor unit

- The maximum vertical separation is 200 ft. (61 m).
- The maximum actual line length is 200 ft. (61 m).
- The maximum total equivalent length is 250 ft. (76.2 m) (see Table 28).
- Vapor line traps are not required.

Heat Pumps Only

- Adjust the outdoor AccuRater™ per Table 30.

Air Conditioner and Heat Pump with Puron® Refrigerant – Quick Reference Guide

- Puron® refrigerant operates at 50–70 percent (%) higher pressures than R–22. Ensure the servicing equipment and replacement components are designed to operate with Puron® refrigerant.
- Puron® refrigerant cylinders are rose colored.
- The recovery cylinder service pressure rating must be 400 psig, DOT 4BA400 or DOT BW400.
- Puron® refrigerant systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose when charging in the suction line with a compressor operating.
- The manifold sets should be 700 psig high side and 180 psig low side with 550 psig low-side retard.
- Use hoses with a 700 psig service pressure rating.
- Leak detectors should be designed to detect HFC refrigerant.
- Puron® refrigerant, as with other HFCs, is only compatible with POE oils.
- Vacuum pumps will not remove moisture from oil.
- Do not use liquid-line filter driers with rated working pressures lower than 600 psig.
- Do not leave Puron® suction line filter driers in line more than 72 hours.
- Do not install a suction-line filter drier in the liquid line.
- POE oils absorb moisture rapidly. Do not expose oil to the atmosphere.
- POE oils may cause damage to certain plastics and roofing materials.
- Wrap all filter driers and service valves with wet cloth when brazing.
- A factory approved liquid-line filter drier is required on every unit.
- Do NOT use a R–22 TXV.
- If the indoor unit is equipped with a R–22 TXV or piston metering device, it must be changed to a hard shutoff Puron® TXV.
- Never open a system to the atmosphere while it is under a vacuum.
- When a system must be opened for service, recover the refrigerant, evacuate then break the vacuum with dry nitrogen and replace the filter driers. Evacuate to 500 microns prior to recharging.
- Do not vent Puron® refrigerant into the atmosphere.
- Do not use capillary tube coils.
- Observe all warnings, cautions, and bold text.
- All indoor coils must be installed with a hard shutoff Puron® TXV metering device.

