Long Line Guideline

INDEX TO TABLES

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 explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. 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 quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult 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 unit 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 power on. Observe all warning notices posted on 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 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.

There are 3 types of Ductless systems covered in this guideline:

1. High Wall Systems
2. In-Ceiling 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 because of differences in compressor type, metering device type and location . See Table1 for unit types and metering device descriptions. See Table 3 for long line information and requirements.

Table 1 – Ductless Systems Description

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
	40KMC018−036	Cassette Cooling Only	Piston / Outdoor	N/A
38QRF018−036	40QNQ018−036	High Wall Heat Pump	Piston / Outdoor	Piston / Outdoor
	40KMQ018−036	Cassette Heat Pump with electric heat	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
38HDV009, 012	40QNC009, 012	High Wall Cooling Only	Cap Tube / Outdoor	N/A
38QRV009, 012	40QNQ009, 012	High Wall Heat Pump	Cap Tube / Outdoor	Cap Tube / 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
38BCC018−024	(2) 40BNC009−012	High Wall Cooling only Multi−split (2 indoor, 1 outdoor)	Piston / Outdoor	N/A
38BCQ018−024	(2) 40BCQ018−024	High Wall Heat Pump Multi−split (2 indoor, 1 indoor)	Piston / Outdoor	N/A

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 2 – Ductless Long Line Accessories

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 Product Literature for requirements	
Accessory TXV	EA36YD021	40QAQ 024
	EA36YD041	40QAQ 036
	EA36YD091	40QAQ 048

NOTE: Accessories not required on some Ductless models.

Table 3 – 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 40KMC018–036	80	200	250	200	65	CCH LLS @ indoor (arrow facing indoor) Hard Start Kit See Table 2	Adjust cooling piston See Tables 4, 5, 14, & 16	0.3 oz/ft past 25 ft
38QRF018–035	40QNQ018–036 40KMQ018–036	80	200	250	200	65	CCH LLS@ outdoor (arrow facing indoor) Hard Start Kit See Table 2	Adjust cooling and heating pistons See Tables 4, 5, 6, 7, 14 &16	0.3 oz/ft past 25 ft
38HDR018–060	40QAC024–060	80 or over 20’ lift	200	250	200	Varies by equivalent length See Table 10	CCH Hard Start Kit See Table 2	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 Table 10	CCH TXV accy at indoor (See figures 1–4) Hard Start kit LLS@ outdoor (arrow facing outdoor) See Table 2	Adjust heating piston See Tables 8, 9,15 &16	0.6 oz/ft past 15 ft
38QRR060	40QAQ060	80 or over 20’ lift	200	250	200	Varies by equivalent length See Table10	CCH Hard Start LLS @ outdoor (arrow facing outdoor. TXV standard in 5 ton) See Table 2	Adjust heating piston See Tables 8, 9, 15 & 16	0.6 oz/ft past 15 ft
38HDV009–012	40QNC009–012	––	50	50	35	35	None	None	factory charge good up to 50’
38QRV009–012	40QNQ009–012	––	50	50	35	35	None	None	factory charge good up to 50’
38MVC009–012	40MVC009–012	25	65	65	35	35	CCH	None	0.1oz/ft past 25ft
38MVC018	40MVC018	25	100	100	50	50	CCH	None	0.1oz/ft past 25ft
38MVQ009–012	40MVQ009–012	25	65	65	35	35	CCH	None	0.1oz/ft past 25ft
38BCC009–018	(2)40BCC009–018	––	50	50	35	35	None	None	factory charge good up to 50’
38BCQ009–018	(2)40BCQ009–018	––	50	50	35	35	None	None	factory charge good up to 50’

-- These units do not have special considerations for long line applications. Factory charge is good up to longest line allowed.

Piston Changes:

For systems using pistons metering devices, compensation for line length and lift must be performed by changing the orifice diameter. Use appropriate table depending on the type of unit and direction of elevation change between indoor and outdoor units. To determine the piston change required, see Table 14 or 15 to determine existing piston. Add or subtract the change number in the charts below to the last 3 digits of the piston part number. An example piston part number is EA52PJ078. The last 3 digits represent size. If the charts below require a (-3) change, subtract 3 from the original piston number; 78-3=75. Your new piston part number should end with "075". See Table 16 for available piston sizes. If the required size is not available, round up to the next available size.

Table 4 – 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 5 – 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 6 – 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 7 – 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 8 – 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 9 – 38QRR Puron® Heat Pump Outdoor Piston Change – Outdoor Unit BELOW Indoor Unit

Btuh	Vertical Separation (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 10 – 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.

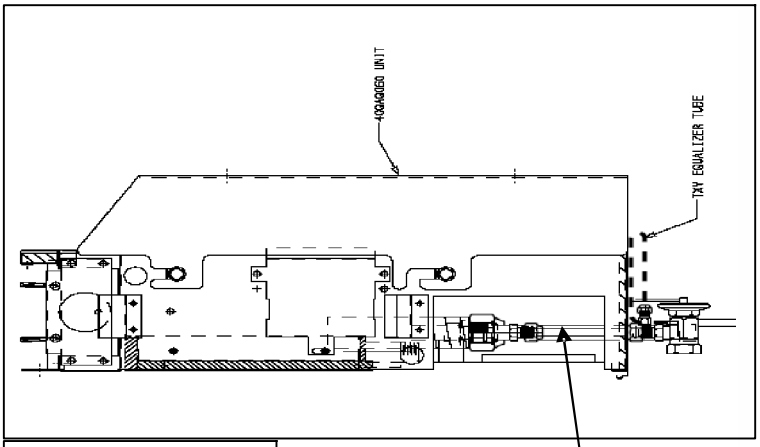

Figure 1

40QAQ024-048
TXV field mounted

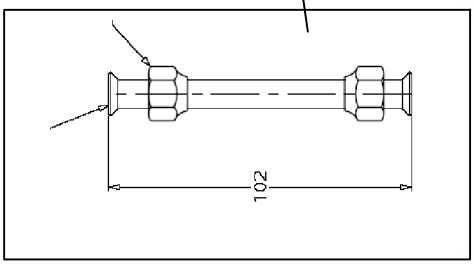

Figure 2

Field supplied tube to replace existing piston assembly inside cabinet (102 mm = 4 inches)

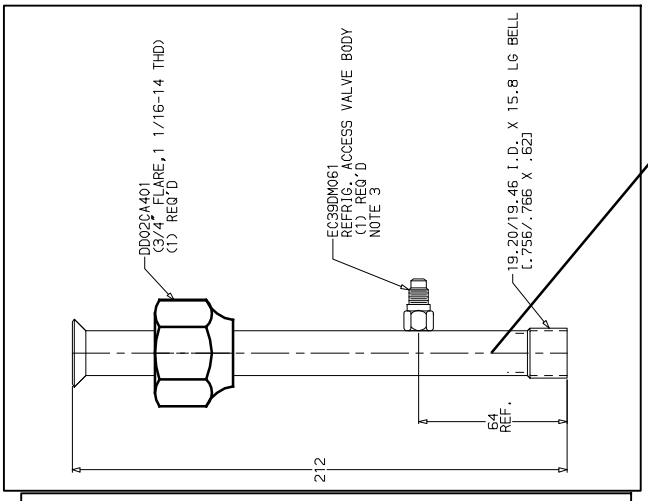

Figure 3

Field supplied suction tube for mounting of TXV equalizer line outside cabinet. Equalizer may also be brazed into suction tube if desired.

212 mm = 8.35 inches
64 mm = 2.5 inches

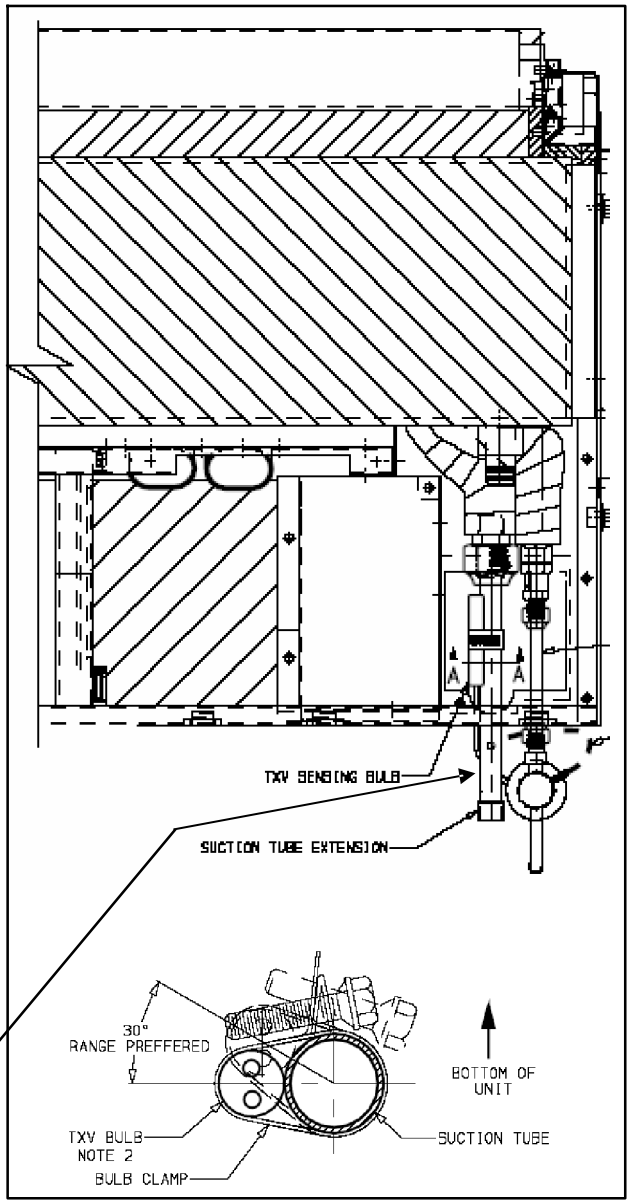

Figure 4

Locate TXV sensing bulb inside cabinet as shown. Bulb must be insulated.

Table 11 – 38HDF, HDR Capacity Loss by Total Equivalent Length (Puron Cooling Only)

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
	7/8	0	0	0	0	0	0	0	0	0	1
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
	1-1/8	0	0	0	0	0	0	0	0	0	1
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
	1-1/8	0	0	0	0	0	0	0	1	1	1
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 12 – 38QRF, QRR 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 13 – 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 14 – High Wall and Cassette Factory Supplied Pistons

High Wall Cooling System R410a	Cooling Piston	High Wall Heat Pump System R–410a	Cooling Piston	Heating Piston
40QNC01824 / 38HDF018	49	40QNQ018 / 38QRF018	49	45
40QNC01824 / 38HDF024	55	40QNQ024 / 38QRF024	55	49
40QNC030 / 38HDF030	63	40QNQ030 / 38QRF030	63	53
40QNC036 / 38HDF036	70	40QNQ036 / 38QRF036	70	63
Cassette Cooling and Heat/Cool System R410a	**Cooling Piston**	**Cassette Heat Pump System R410a**	**Cooling Piston**	**Heating Piston**
40KMC018 / 40KMQ01824 38HDF018	49	40KMQ01824 / 38QRF018	51	46
40KMC024 / 40KMQ01824 38HDF024	57	40KMQ01824 / 38QRF024	55	53
40KMC03036 / 40KMQ03036 38HDF030	61	40KMQ03036 / 38QRF030	63	55
40KMC03036 / 40KMQ03036 38HDF036	74	40KMQ03036 / 38QRF035	70	63
High Wall Cooling System R410a	**Cooling Piston**	**High Wall Heat Pump System R410a**	**Cooling Piston**	**Heating Piston**
619FNF018 / 619FNQ01824 538ENF018	49	619FNQ01824 / 538QNF018	51	46
619FNF024 / 619FNQ01824 538ENF024	57	619FNQ01824 / 538QNF024	55	53
619FNF03036 / 619FNQ03036 538ENF030	61	619FNQ03036 / 538QNF030	63	55
619FNF03036 / 619FNQ03036 538ENF036	74	619FNQ03036 / 538QNF035	70	63
Cassette Cooling and Heat/Cool System R410a	**Cooling Piston**	**Cassette Heat Pump System R410a**	**Cooling Piston**	**Heating Piston**
619FNF018 / 619FNQ01824 538ENF018	49	619FNQ01824 / 538QNF018	51	46
619FNF024 / 619FNQ01824 538ENF024	57	619FNQ01824 / 538QNF024	55	53
619FNF03036 / 619FNQ03036 538ENF030	61	619FNQ03036 / 538QNF030	63	55
619FNF03036 / 619FNQ03036 538ENF036	74	619FNQ03036 / 538QNF035	70	63

Table 15 – 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 16 – Common AccuRater - Piston Sizes Available Through RCD
(Part numbers all begin with EA52PJxxx. The last 3 digits represent piston size.)

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	

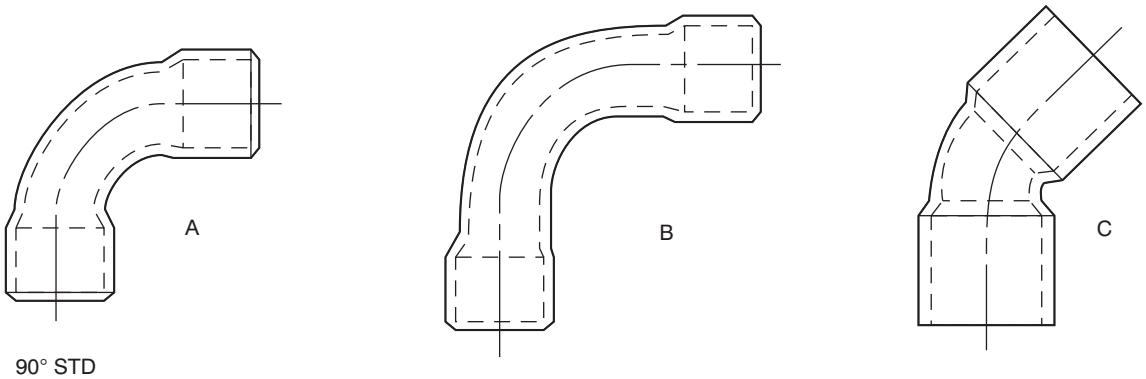

Table 17 – Fitting Losses in Equivalent Feet

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

Edition Date: 03/13

Catalog No:LLGDFS–3XA

Replaces: LLGDFS–2XA