

PXV

The new Pulse electronic expansion valve



- › Pilotable with Eliwell V800 driver
- › Optimises the injection of refrigerant into the evaporator, thus increasing its efficiency
- › Reduces the risk of fluid returning to the compressor
- › Improves the control of overheating when operating conditions change
- › Compatible with most commercially available refrigerants
- › New models for R290/R600 and R744 (CO₂) refrigerants
- › Hermetic closing: no need to install solenoid valve

APPLICATION

The PXV solenoid expansion valve regulates the flow of liquid refrigerant towards the evaporator by adjusting the opening time of its own obturator, thus allowing a large power variation interval to be established. Extremely precise and reliable regulation increases the efficiency of the entire system.

- 9 interchangeable power rating orifices are available, from 1 kW to 15 kW (R404a) & 24 kW (R410A).
- 7 interchangeable power rating orifices are available, from 3 kW to 62 kW (R744).
- 9 interchangeable power rating orifices are available, from 0,7 kW to 17,9kW (R290/R600) (see table 5).

This valve should be coupled with a coil (see table 3), controlled by a V800 electronic regulation device. It is typically used in refrigeration systems, especially the chiller cabinets utilised by retail purchasing consortiums, which use Group I liquid refrigerants such as R744/R290 and R600; Group II liquid refrigerants such as R22, R134a, R404A, R407C, R410A, R507 (as defined in Article 9, Points 2.1 and 2.2 of Directive 97/23/CE, with reference to Directive 67/548/CEE). In particular:

Commercial refrigeration

- hypermarkets, supermarkets, food stores
- hotels, restaurants

Industrial refrigeration

- food processing, distribution procedures

Public air-conditioning

- public air-conditioners, heat pumps with inverter compressors

The PXV valve can be used as an evaporator pressure regulating device, in refrigeration systems equipped with one or more evaporators and hot gas by-pass valve, as a way of controlling the capacity.

ADVANTAGES

- Optimises liquid refrigerant injection towards the evaporator, with a resulting increase in efficiency.
- Improves overheating control when the operating conditions vary.
- Reduces the risk of liquid returning to the compressor. Compatible with most commercially available refrigerants.
- Can be controlled using commercially available microprocessors and drivers.
- Airtight seal, solenoid valve installation is not required.
- Multifunctional.
- Payback in just a few months (based on kWh cost, unit running time, operating conditions).

FUNCTION

The PXV valve is a throttling device which receives liquid from the condenser and releases it into the evaporator, applying the necessary pressure change to the expansion nozzle.

It is an ON/OFF valve which should be adjusted in accordance with the **Pulse Width Modulation**, and

can be controlled using a relatively simple electronic system. According to this principle, once a reference period T has been set for the regulator, the refrigerant flow rate QT required by the evaporator in that period is supplied by the valve, within a time interval t which is shorter than period T , during which the maximum flow rate passes through (ON phase). During the remaining time interval $T - t$ the valve remains closed (OFF phase). For efficient regulation the PXV valve must therefore be sized so that, even under the most strenuous load conditions, it is able to supply a sufficient amount of refrigerant in order to fulfil the requirement; in these extreme conditions the valve will remain open for the entire period. The use of an electronic regulator offers more precise refrigerant dosage, improving performance in the long term (thereby significantly reducing machine running costs) and offering a quicker response to variations in the evaporator load.

CONSTRUCTION

The valve is supplied complete with an orifice; nine different orifices can be fitted to suit the same number of maximum outputs, increasing in volume from orifice 01 to orifice 09. The two digits in the valve code after the letter **S** identify which type of orifice has been fitted to the valve at the factory; for example, valve code **PXVB03S020000** identifies a valve with 3/8" soldered connections and an 02 type orifice. The orifices are interchangeable and can even be installed when the valve is soldered to the system; in this case, if you wish to change the orifice it will be necessary to purchase the corresponding kit, in accordance with the code listed in table 5.

COILS AND CONNECTORS

The coils suitable for use in conjunction with this valve are listed in table 3, which summarises the main features of the coils and of the connectors coupled with them.



TABLE 1: TECHNICAL SPECIFICATIONS

Voltage tolerance (V ac)	+6/-10%
IEC protection rating	IP65; IP68
Operating principle	Pulse Width Modulating
Regulation range (capacity range)	6 seconds
Minimum intervention time	1 second
Capacity (R404A)	15 kW
Regulation range (capacity range)	10...100%
Connections	soldered
	3/8"/1/2"; 10x12; 1/2"x5/8"; 12x16
TS temperature (Storage Temperature)	-40 - 100°C
Ambient temperature	-40 - 50°C
Leakage from the valve seat	<1 cc/min <0.03 of kv value
Min. opening pressure differential OPD	0 bar
Opening pressure differential MOPD	18 bar
Max. operating pressure	45 bar
Burst pressure	330/250 bar
Certification	97/23/EC
PED	Category II art. 3.3

TABLE 2a: General expansion valve features (common refrigerants)

Catalogue no.	ODS connections				Orifice hole [mm]	Kv factor [m3/h]
	[in]		[mm]			
	IN	OUT	IN	OUT		
PXVB03S010000	3/8"	1/2"	-	-	0.5	0.01
PXVBM10S0100	-	-	10	12		
PXVB03S020000	3/8"	1/2"	-	-	0.7	0.017
PXVBM10S0200	-	-	10	12		
PXVB03S030000	3/8"	1/2"	-	-	0.8	0.023
PXVBM10S0300	-	-	10	12		
PXVB03S040000	3/8"	1/2"	-	-	1.1	0.043
PXVBM10S0400	-	-	10	12		
PXVB03S050000	3/8"	1/2"	-	-	1.3	0.065
PXVBM10S0500	-	-	10	12		
PXVB03S060000	3/8"	1/2"	-	-	1.7	0.113
PXVBM10S0600	-	-	10	12		
PXVB04S070000	1/2"	5/8"	-	-	2.3	0.2
PXVBM12S0700	-	-	12	16		
PXVB04S080000	1/2"	5/8"	-	-	2.5	0.23
PXVBM12S080000	-	-	12	16		
PXVB04S090000	1/2"	5/8"	-	-	2.7	0.25
PXVBM12S090000	-	-	12	16		

TABLE 2b: General expansion valve features CO₂ (R744)

Catalogue no.	ODS connections				Orifice hole [mm]	Kv factor [m3/h]
	[in]		[mm]			
	IN	OUT	IN	OUT		
PXVE03S010000	3/8"	1/2"	-	-	0,5	0,01
PXVBM10S0100	-	-	10	12		
PXVE03S020000	3/8"	1/2"	-	-	0,7	0,017
PXVEM10S0200	-	-	10	12		
PXVE03S030000	3/8"	1/2"	-	-	0,8	0,023
PXVEM10S0300	-	-	10	12		
PXVE03S040000	3/8"	1/2"	-	-	1,1	0,043
PXVEM10S0400	-	-	10	12		
PXVE03S050000	3/8"	1/2"	-	-	1,3	0,065
PXVEM10S0500	-	-	10	12		
PXVE03S060000	3/8"	1/2"	-	-	1,7	0,113
PXVEM10S0600	-	-	10	12		
PXVE04S070000	1/2"	5/8"	-	-	2,3	0,2
PXVEM12S0700	-	-	12	16		

TABLE 2c: General expansion valve features (R290)

Catalogue no.	ODS connections				Orifice hole [mm]	Kv factor [m3/h]
	[in]		[mm]			
	IN	OUT	IN	OUT		
PXVV03S010000	3/8"	1/2"	-	-	0,5	0,01
PXVVM10S0100	-	-	10	12		
PXVV03S020000	3/8"	1/2"	-	-	0,7	0,017
PXVVM10S0200	-	-	10	12		
PXVV03S030000	3/8"	1/2"	-	-	0,8	0,023
PXVVM10S0300	-	-	10	12		
PXVV03S040000	3/8"	1/2"	-	-	1,1	0,043
PXVVM10S0400	-	-	10	12		
PXVV03S050000	3/8"	1/2"	-	-	1,3	0,065
PXVVM10S0500	-	-	10	12		
PXVV03S060000	3/8"	1/2"	-	-	1,7	0,113
PXVVM10S0600	-	-	10	12		
PXVV04S070000	1/2"	5/8"	-	-	2,3	0,2
PXVVM12S0700	-	-	12	16		
PXVV04S080000	1/2"	5/8"	-	-	2,5	0,23
PXVVM12S08000	-	-	12	16		
PXVV04S090000	1/2"	5/8"	-	-	2,7	0,25
PXVVM12S09000	-	-	12	16		

TABLE 3: General coil features

Coil type	Eliwell code	Voltage [V AC]	Voltage tolerance [%]	Frequency [Hz]	Rating [W]	Absorption [mA] at 20°C 50/60 Hz		Insulation class	Max. temperature		Connections	
						Pick-up	Operation		Average [°C]	Ambient [°C]	Protection rating IP65	Protection rating IP65/IP68
PXV	PXVB0ARA20000	24	+6 / -10	50/60	8	1490	700	F	110	50	connector DIN4365 p/n PXVB0ARA20000	Contact Eliwell Sales Office
PXV	PXVB0ARA60000	220/230				162	76					
PXV CO ₂	PXVE0ARA60000				22	190	110					

TABLE 4: Materials used

\	Material
Mobile core body and housing sleeve	brass EN 12164 - CW 614N-M
Fixed core	ferritic stainless steel EN 10088-3 - 1.4105
Mobile core	ferritic stainless steel EN 10088-3 - 1.4105
Filter	austenitic stainless steel EN 10088-3 - 1.4301
Orifice	austenitic stainless steel EN 10088-3 - 1.4305
Watertight seat seal	P.T.F.E.
Watertight seal against the outside environment	chloroprene rubber (CR)
Connections	copper pipe EN 12735-1

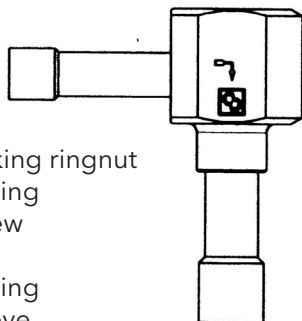
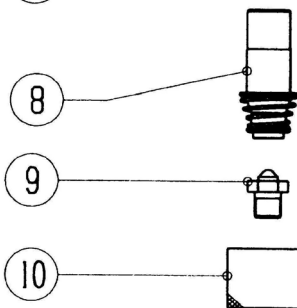
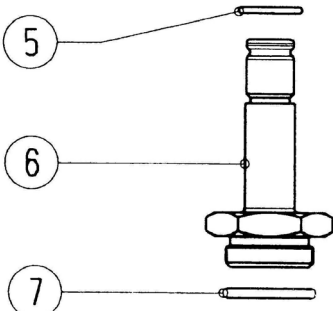
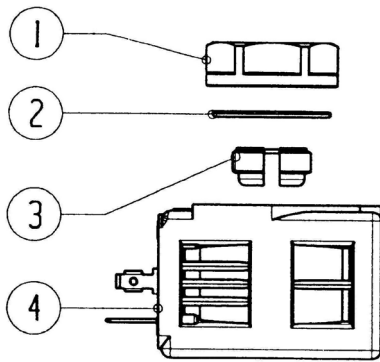
Table 5: Orifices - Outputs in kW

Orifice type	Orifice type	Orifice hole [mm]	Refrigerant				
			R22	R134a	R404A - R507	R407C	R410A
PXV*03S010000	01	0.5	1	0.9	0.8	1.1	1.3
PXV*M10S0100	01	0.5	1	0.9	0.8	1.1	1.3
PXV*03S020000	02	0.7	1.9	1.7	1.6	2	2.4
PXV*M10S0200	02	0.7	1.9	1.7	1.6	2	2.4
PXV*03S030000	03	0.8	2.5	2	1.9	2.4	3
PXV*M10S0300	03	0.8	2.5	2	1.9	2.4	3
PXV*03S040000	04	1.1	3.9	3.2	2.9	3.8	4.8
PXV*M10S0400	04	1.1	3.9	3.2	2.9	3.8	4.8
PXV*03S050000	05	1.3	6.7	5.6	5.1	6.7	8.4
PXV*M10S0500	05	1.3	6.7	5.6	5.1	6.7	8.4
PXV*03S060000	06	1.7	9.2	7.7	7	9.1	11.4
PXV*M10S0600	06	1.7	9.2	7.7	7	9.1	11.4
PXV*04S070000	07	2.3	14.7	12.2	11.3	15.3	18.2
PXV*M12S0700	07	2.3	14.7	12.2	11.3	15.3	18.2
PXV*04S080000	08	2.5	17.4	14.7	13.5	17.7	21.6
PXV*M12S08000	08	2.5	17.4	14.7	13.5	17.7	21.6
PXV*04S090000	09	2.7	19.3	16.3	15	19.6	24.1
PXV*M12S09000	09	2.7	19.3	16.3	15	19.6	24.1

* = 'B' → HFC, HCFC, 'E' → R744, 'V' → R290, R600; ° = 'B' → HFC, HCFC, 'V' → R290, R600

The nominal outputs refer to:

- Evaporation temperature $T_{\text{evap}} = +5^{\circ}\text{C}$ (R744: $T_{\text{evap}} -35^{\circ}\text{C}$)
- Condensing temperature $T_{\text{cond}} = +32^{\circ}\text{C}$ (R744: $T_{\text{cond}} 0^{\circ}\text{C}$)
- Temperature of the liquid at valve input $T_{\text{liq}} = +28^{\circ}\text{C}$ (R744: $T_{\text{liq}} 31^{\circ}\text{C}$)



- 1: locking ringnut
- 2: O-Ring
- 3: screw
- 4: coil
- 5: O-Ring
- 6: sleeve
- 7: O-Ring
- 8: mobile core
- 9: orifice
- 10: filter

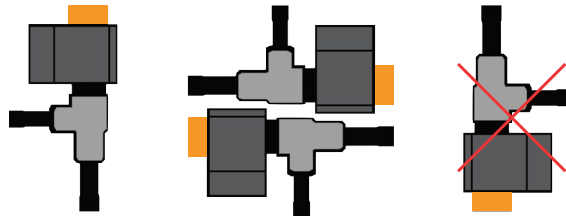
FITTING TO PIPING

1) Before connection to the piping, make sure that:

- The piping is perfectly clean. The valve seat seal will not work properly if it is dirty.
- The fluid flow direction corresponds to the direction of the arrow stamped on the body.
- The line voltage corresponds to the value stamped on the coil.

2) The valve may be fitted in any position as long as the coil is not pointing downwards.

3) The valve does not need to be removed during soldering. Protect the valve body with a wet cloth during this process, and make sure it does not come into direct contact with the flame.



MAINTENANCE

1) To replace coil **4**, loosen locking ringnut **1** (complete with O-Ring **2**) and remove screw **3**.

O-Ring **5** remains snugly fitted over sleeve **6**.

N.B.: The coil is only protected from damp if O-Ring **5** is fitted correctly and locking ringnut **1** is tightened to a torque setting of 1.2 - 1.4 Nm.

2) To replace orifice **9** and change the output of the valve, loosen sleeve **6** slowly, taking care not to let mobile core **8** drop out.

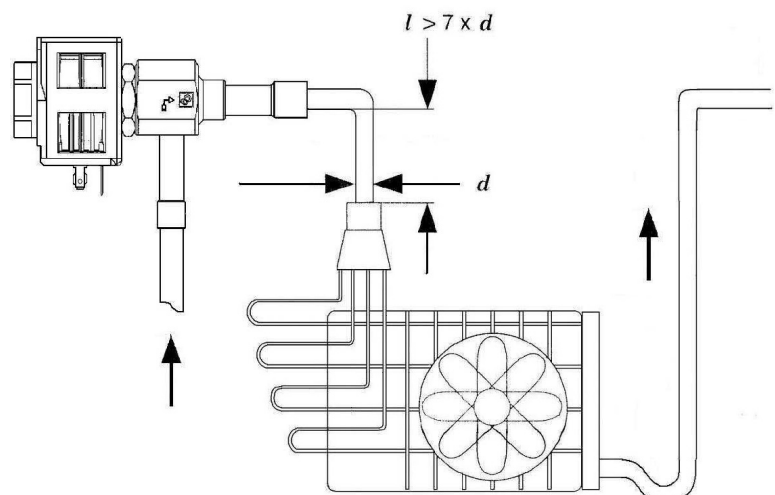
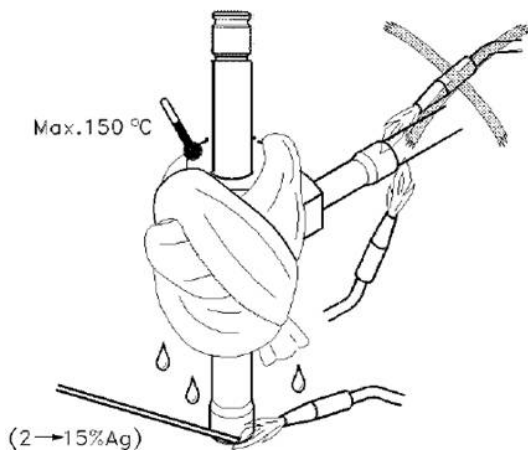
O-Ring **7** remains snugly fitted over the sleeve.

Next, loosen nozzle **9** and replace it with another one with a different cross-section, tightening it to a torque setting of 3,5 - 5,0 Nm. Before replacing the valve, make sure that:

- Filter **10** is perfectly clean.
- O-Ring **7** is in good condition; if it is not, replace it.
- O-Ring **7** is greased and its housing is perfectly clean.

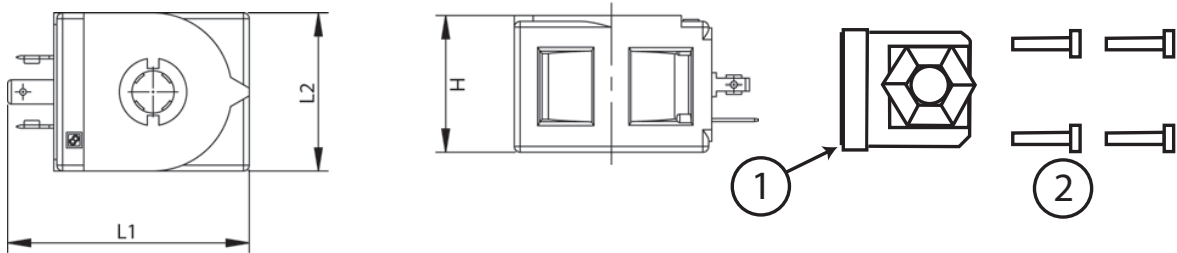
Screw on sleeve **6** again, tightening it to a torque setting of 31.5 - 35 Nm.

Re-fit coil **4** and screw **3**, and replace locking ringnut **1** (complete with O-Ring **2**) with the one supplied with the new orifice.



Bobina + connettore / Coil + connector

- 1
- Guarnizione / Gasket
- 2
- Coppia serraggio / Torque wrench setting 0.8 Nm max.
- L1
- 63mm (82mm R744)
- L2
- 41mm (61mm R744)
- H
- 35mm (35mm R744)

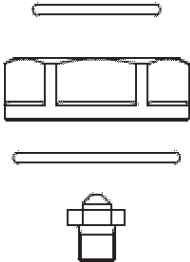


USE

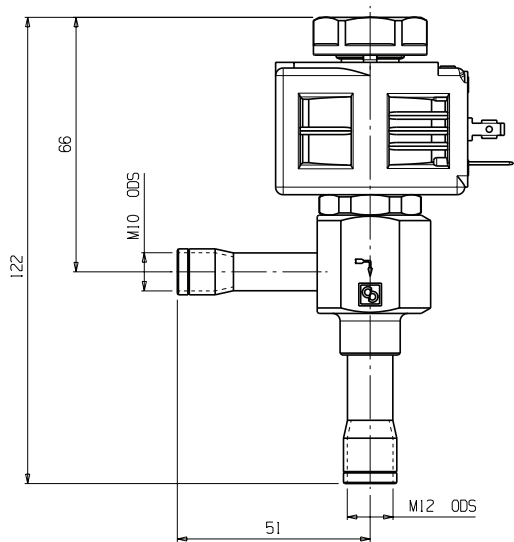
Use the table below when selecting coils and the relevant connectors.

TAB. 6: Models / Modelli

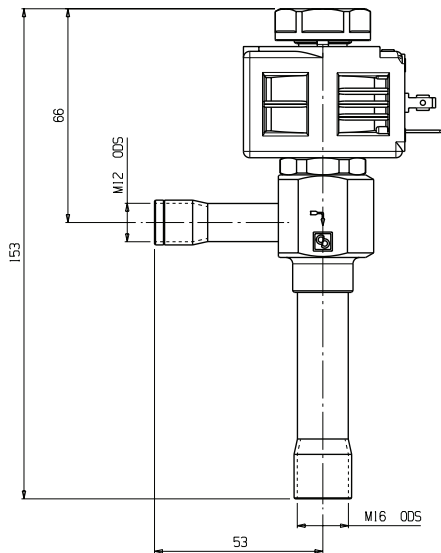
	Model / Modello	inches (mm)	P/N / Codice inches / pollici	P/N / Codice mm
COIL / BOBINA	EEV BODY COIL 220/230 AC 50/60Hz		PXVB0ARA60000	
COIL / BOBINA	EEV BODY COIL 24VAC 50/60Hz		PXVB0ARA20000	
COIL / BOBINA	CO2 EEV COIL 220/230 AC 50/60Hz		PXVE0ARA60000	
CONNECTOR / CONNETTORE	EEV BODY CONNECTOR IP65		PXVB0AR020000	
CONNECTOR / CONNETTORE	EEV BODY CONNECTOR IP68 (2) IP68 using connector + 4 screws (2) IP68 con connettore + 4 viti		Contact Eliwell Sales Department Contattare Ufficio Commerciale Eliwell	
* = 'B' → HFC, HCFC, 'E' → R744, 'V' → R290, R600; ° = 'B' → HFC, HCFC, 'V' → R290, R600				

ORIFICES / ORIFICI		P/N / Codice	ORIFICES / ORIFICI KIT
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N1	PXV*0AR630000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N2	PXV*0AR640000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N3	PXV*0AR650000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N4	PXV*0AR660000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N5	PXV*0AR670000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N6	PXV*0AR680000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N7	PXV*0AR690000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N8	PXV°0AR780000	
ORIFICE / ORIFICIO	EEV PULSE C ORIFICE N9	PXV°0AR790000	
* = 'B' → HFC, HCFC, 'E' → R744, 'V' → R290, R600; ° = 'B' → HFC, HCFC, 'V' → R290, R600			

ORIFICES from 1 to 6



ORIFICES from 7 to 9



SELECTION

To size a PXV valve for a refrigeration system correctly, the following design parameters must be available:

- Type of refrigerant
- Evaporator output; Q_e
- Evaporation temperature/pressure; T_e / p_e
- Minimum condensing temperature/pressure; T_c / p_c
- Temperature of the liquid refrigerant at the valve input; T_l
- Pressure drop in the liquid line, distributor, evaporator; Δp .

The procedure described below will assist in the correct sizing of expansion valves for refrigeration systems.

Step 1

Determining the pressure drop around the valve

The pressure drop is calculated using the formula:

$$\Delta p_{\text{tot}} = p_c - (p_e + \Delta p)$$

where:

p_c = condensing pressure

p_e = evaporation pressure

Δp = sum of the pressure drops in the liquid line, distributor, evaporator at the maximum flow rate, i.e. with the valve always open.

Step 2

Correcting the evaporator output in the event of subcooling

The evaporator output Q_e must be suitably corrected in accordance with the subcooling value. Subcooling is calculated using the formula:

$$\Delta_{\text{sub}} = T_c - T_l$$

In the table of subcooling correction factors, select the most suitable correction factor F_{sub} , which corresponds to the calculated value Δ_{sub} , then determine the valve output required using the formula:

$$Q_{\text{sub}} = F_{\text{sub}} \cdot Q_e$$

Step 3

Correcting the output in accordance with its application

For the valve to regulate correctly, it needs to be oversized so that it remains closed for 25 to 50% of the control period interval. The selection of this margin depends on valve application, which may involve variable peaks in flow rate, and on the control algorithm used by the electronic control unit.

In general, therefore, this correction factor F_{ev} is closely linked to the evaporation temperature T_e and can be considered as 125% for $T_e \geq -15^\circ\text{C}$ and 150% for $T_e < -15^\circ\text{C}$. These general values should nevertheless be checked in relation to each individual application.

The minimum valve capacity should therefore be calculated as follows:

$$Q_{\text{ev}} = F_{\text{evb}} \cdot Q_{\text{sub}}$$

Step 4

Determining the required orifice size

Use the pressure around the valve, the evaporation temperature and the correct output Q_{ev} (as calculated above) to select the most suitable orifice size from the output table in accordance with the refrigerant used.

Step 5

Sizing the liquid line

As the valve features on-off operation, during the opening phase the flow rate may increase considerably in relation to its average value within the period. For this reason, the planning technician should size the diameter of the pipes in the liquid line in accordance with the maximum flow rate passing through the orifice under the actual conditions of Δp_{tot} and so that the pressure drop does not lead to a reduction in the maximum valve output.

SIZING EXAMPLE

• Type of refrigerant	R404A
• Evaporator output	Q_e 2.8 kW
• Evaporation temperature	T_{evap} -5°C
• Minimum condensing temperature	T_{cond} +35°C
• Temperature of the liquid refrigerant	T_l +20°C
• Pressure drop in the liquid line, distributor, evaporator	Δp 2 bar

Step 1

Determining the pressure drop around the valve

- Condensing pressure at +35°C - p_c = 16.9 bar
- Evaporation pressure at -5°C - p_e = 5.14 bar

$$\Delta p_{\text{tot}} = 16.9 - (5.14 + 2) = 9.76 \text{ bar}$$

Step 2

Determining the required valve output

$$\Delta T_{\text{sub}} = 35 - 20 = 15^\circ\text{C}$$

In subcooling correction factors table 9, corresponding to the value $\Delta T_{\text{sub}} = 15^\circ\text{C}$, a correction factor F_{sub} of 0.83 is obtained. The required valve output is:

$$Q_{\text{sub}} = 0.83 \cdot 2.8 = 2.324 \text{ kW}$$

Step 3

Correcting the output in accordance with its application

On the basis of the abovementioned general criterion, we extend the calculated output by 25%:

$$Q_{\text{ev}} = 1.25 \cdot 2.324 = 2.91 \text{ kW}$$

Step 4

Determining the required orifice size

Using the output table for R404A refrigerant on page 8, enter the data:

- pressure drop around the valve = 9.73 bar
- evaporation temperature = -5°C
- calculated evaporator output = 2.91 kW

to select the corresponding orifice 04 (N.B.: the valve output must be equal to or slightly above the calculated evaporator output).

TABLE FOR AUTOMATIC SIZING OF VALVES

Abbreviation	Description	Value	UM	NOTES
R	Type of refrigerant	R404A		
Q_e	Evaporator output	2.8	kW	
T_e/P_e	Evaporation temperature/pressure	-5.0000	°C	
T_c/P_c	Minimum condensing temperature/pressure	37.0000	°C	
T_l	Temperature of the liquid refrigerant at the valve input	20.0000	°C	If not indicated, a value will be set in order to establish subcooling of 4°C
ΔP	Pressure drop - leakage	2.0000	bar	If not indicated, a value of 2 bar will be set
ODS	Size of the connections	mm	mm	
V	Coil voltage	220/230 ac	V	
f	Coil frequency	50/60	Hz	

SELECTED VALVE	PXVBM10S0400
SELECTED COIL	PXVB0ARA60000

CALCULATED VALUES

$\Delta P_{\text{tot}} = P_c - (P_e + \Delta P)$	Pressure drop around the valve	9.73	bar
		129.30	PSI
$\Delta T_{\text{sub}} = T_c - T_l$	Subcooling temperature	17.0	°C
		62.6	°F
$Q_{\text{sub}} = F_{\text{sub}} \times Q_e$	Evaporator output correction according to subcooling	2.324	kW
$Q_{\text{ev}} = Q_{\text{sub}} \times F_{\text{ev}}$	Evaporator output correction according to application	2.905	kW

Refrigerant - Outputs in kW

R22

Orifice type	Pressure drop around the valve [bar]								
	2	4	6	8	10	12	14	16	18
01	0.7	0.9	1.0	1.1	1.2	1.2	1.2	1.2	1.2
02	1.3	1.7	1.9	2.2	2.2	2.3	2.3	2.4	2.3
03	1.7	2.2	2.5	2.7	2.8	2.9	2.9	2.9	2.9
04	2.7	3.4	3.9	4.2	4.4	4.5	4.6	4.7	4.7
05	4.6	6.0	6.7	7.2	7.6	7.9	8.0	8.1	8.1
06	6.3	8.1	9.2	9.9	10.4	10.6	10.9	11.0	11.1
07	10.1	13.0	14.7	15.8	16.6	17.0	17.4	17.6	17.4
08	11.3	15.4	17.4	19.6	20.5	21.2	21.4	21.6	21.4
09	12.3	16.8	19.3	21.3	22.3	23	23.2	23.5	23.25

R134a

Orifice type	Pressure drop around the valve [bar]								
	2	4	6	8	10	12	14	16	18
01	0.6	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9
02	1.1	1.4	1.7	1.7	1.8	1.8	1.8	1.8	1.7
03	1.4	1.8	2.0	2.2	2.2	2.3	2.3	2.2	2.2
04	2.3	2.9	3.2	3.4	3.5	3.6	3.6	3.5	3.4
05	3.9	5.0	5.6	6.0	6.2	6.2	6.2	6.2	6.0
06	5.3	6.8	7.7	8.1	8.4	8.5	8.5	8.4	8.1
07	8.5	10.9	12.2	13.0	13.3	13.5	13.5	13.3	13
08	9.2	12.9	14.7	15.4	15.9	16.1	16.1	15.6	15.0
09	10.0	14.0	16.3	16.8	17.3	17.5	17.5	17.0	16.3

**R404A
R507**

Orifice type	Pressure drop around the valve [bar]								
	2	4	6	8	10	12	14	16	18
01	0.6	0.7	0.8	0.8	0.9	0.8	0.8	0.8	0.8
02	1.1	1.3	1.6	1.6	1.7	1.7	1.6	1.6	1.4
03	1.3	1.7	1.9	2.0	2.0	2.0	2.0	1.9	1.8
04	2.2	2.8	2.9	3.1	3.2	3.2	3.1	3.1	2.9
05	3.8	4.7	5.1	5.5	5.6	5.6	5.6	5.4	5.1
06	5.0	6.4	7.0	7.4	7.6	7.7	7.6	7.4	6.9
07	8.1	10.3	11.3	11.9	12.2	12.2	12.1	11.8	11.2
08	9.4	12.2	13.5	14.3	15.0	14.5	14.0	13.6	12.7
09	10.3	13.3	15.0	15.5	16.3	15.7	15.2	14.8	13.8

R407C

Orifice type	Pressure drop around the valve [bar]								
	2	4	6	8	10	12	14	16	18
01	0.7	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.2
02	1.4	1.8	2.0	2.0	2.3	2.3	2.4	2.4	2.3
03	1.7	2.3	2.4	2.7	2.8	2.9	2.9	2.9	2.9
04	2.9	3.6	3.8	4.3	4.5	4.6	4.7	4.7	4.7
05	4.9	6.2	6.7	7.5	7.8	7.9	8.1	8.1	8.0
06	6.7	8.5	9.1	10.2	10.5	10.8	11.0	11.0	10.9
07	10.7	13.6	15.3	15.7	16.9	17.2	17.6	17.6	17.2
08	11.5	16.1	17.7	19.1	20.5	20.7	21.2	21.2	20.7
09	12.5	17.5	19.6	20.8	22.3	22.5	23.0	23.0	22.5

Refrigerant - Outputs in kW

R410A	Orifice type	Pressure drop around the valve [bar]								
		2	4	6	8	10	12	14	16	18
	01	0.9	1.1	1.3	1.4	1.5	1.5	1.6	1.6	1.6
	02	1.7	2.2	2.4	2.6	2.8	2.9	3.0	3.0	3.0
	03	2.0	2.7	3.0	3.2	3.4	3.6	3.7	3.7	3.8
	04	3.2	4.2	4.8	5.2	5.5	5.7	5.9	6.0	6.1
	05	5.6	7.4	8.4	9.1	9.6	10.0	10.2	10.4	10.9
	06	7.7	10.0	11.4	12.3	13.1	13.5	13.9	14.1	14.3
	07	12.2	15.9	18.2	19.8	20.9	21.6	22.2	22.7	22.9
	08	12.9	18.2	21.6	23.7	25.3	26.2	27.1	27.4	27.8
	09	14.0	19.8	24.1	25.8	27.5	28.5	29.5	29.7	30.3

Refrigerant - Outputs in kW

R744 (CO2)	Orifice type	Pressure drop around the valve [bar]										
		4	6	8	10	12	14	16	18	20*	25	30
	01	1,4	1,7	2,0	2,2	2,4	2,6	2,8	2,9	3,1	3,5	3,8
	02	2,8	3,4	3,9	4,4	4,8	5,2	5,5	5,9	6,2	6,9	7,6
	03	3,7	4,5	5,2	5,8	6,4	6,9	7,3	7,8	8,2	9,2	10,1
	04	5,5	6,8	7,8	8,8	9,6	10,4	11,1	11,8	12,4	13,9	15,2
	05	9,7	11,9	13,7	15,3	16,8	18,1	19,4	20,6	21,7	24,2	26,6
	06	15,2	18,7	21,6	24,1	26,4	28,5	30,5	32,3	34,1	38,1	41,7
	07	27,7	33,9	39,2	43,8	48,0	51,8	55,4	58,8	62,0	69,3	75,9

evaporating temperature = -35°C [238 K] - 1,19Mpa [12 bar]

condensing temperature = 0°C [273 K] - 3,47Mpa [35 bar]

subcooling = 4°C

Superheat = 5°C

* nominal values

Refrigerant - Outputs in kW

R290 propane	Orifice type	Pressure drop around the valve [bar]								
		2	4	6*	8	10	12	14	16	18
	01	0,4	0,6	0,7	0,8	0,9	1,0	1,1	1,2	1,2
	02	0,8	1,2	1,4	1,7	1,8	2,0	2,2	2,3	2,5
	03	1,1	1,5	1,9	2,2	2,4	2,7	2,9	3,1	3,3
	04	1,7	2,3	2,9	3,3	3,7	4,0	4,4	4,7	5,0
	05	2,9	4,1	5,0	5,8	6,5	7,1	7,6	8,2	8,7
	06	4,5	6,4	7,9	9,1	10,2	11,1	12,0	12,8	13,6
	07	8,3	11,7	14,3	16,5	18,5	20,2	21,8	23,4	24,8
	08	9,5	13,4	16,4	19,0	21,2	23,3	25,1	26,9	28,5
	09	10,3	14,6	17,9	20,6	23,1	25,3	27,3	29,2	31,0

evaporating temperature = +5 = Pe 4,5 bar

condensing temperature = +35 = Pc 11,5

subcooling = 4°C

Superheat = 7°C

* nominal values

Refrigerant - Outputs in kW

**R600
bhutane**

Orifice type	Pressure drop around the valve [bar]								
	2*	4	6	8	10	12	14	16	18
01	0,5	0,7	0,9	1,0	1,1	1,2	1,3	1,4	1,5
02	1,0	1,4	1,7	1,9	2,2	2,4	2,6	2,8	3,0
03	1,3	1,9	2,3	2,6	2,9	3,2	3,5	3,7	3,9
04	2,0	2,8	3,4	4,0	4,4	4,9	5,2	5,6	6,0
05	3,5	4,9	6,0	6,9	7,8	8,5	9,2	9,8	10,4
06	5,5	7,7	9,5	10,9	12,2	13,4	14,4	15,4	16,4
07	9,9	14,0	17,2	19,8	22,2	24,3	26,2	28,1	29,8
08	11,4	16,1	19,8	22,8	25,5	27,9	30,2	32,3	34,2
09	12,4	17,5	21,5	24,8	27,7	30,4	32,8	35,1	37,2

evaporating temperature = +5 Pe = 0,24 bar

condensing temperature = +35 PC = 2,25 bar

subcooling = 4°C

Superheat = 7°C

* nominal values

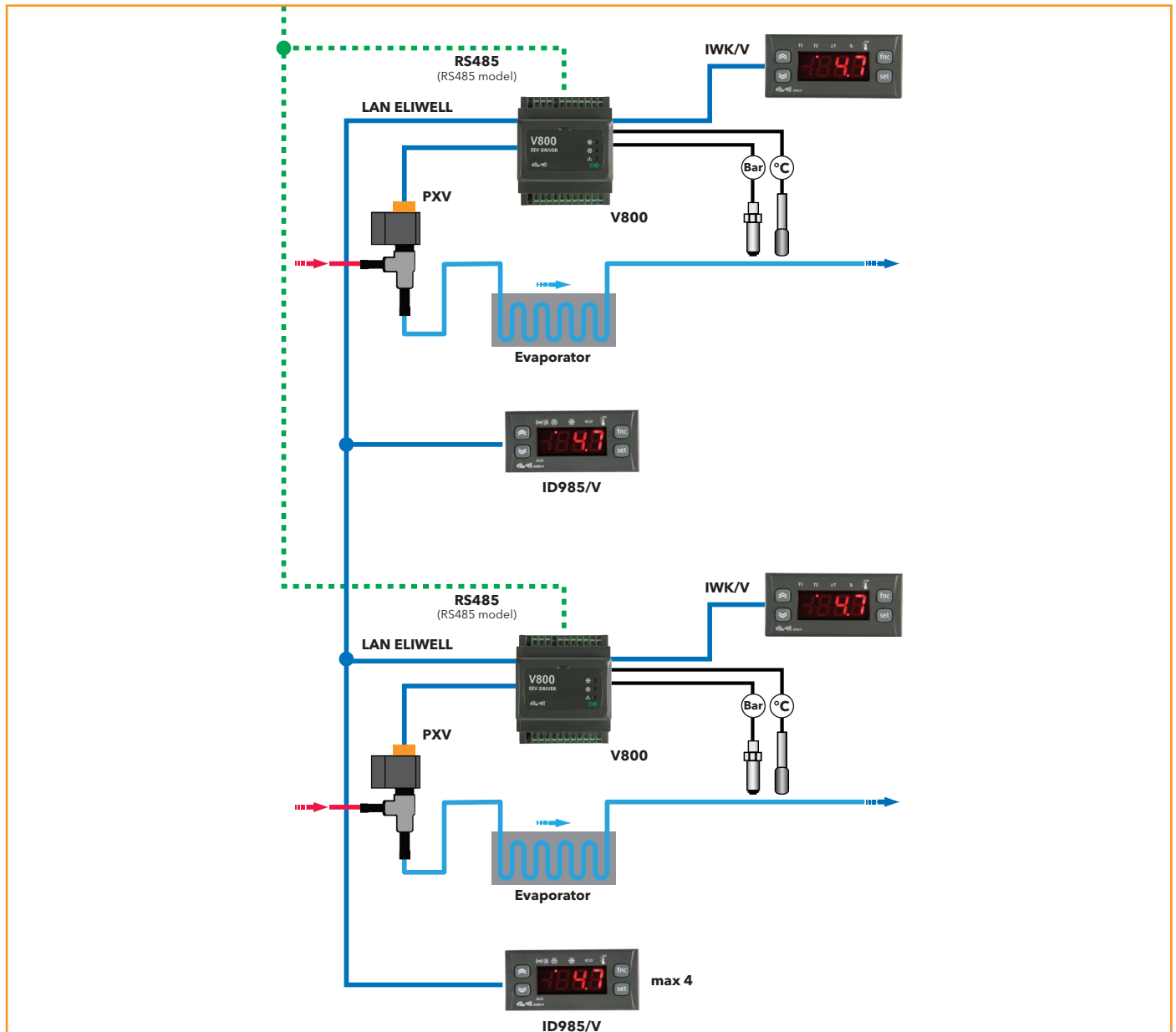
Subcooling correction factor $\Delta t_{sub} > 4^{\circ}\text{C}$

Refrigerants	4K	10K	15K	20K	25K	30K	35K	40K	45K	50K
R22	1	0,94	0,9	0,87	0,83	0,8	0,77	0,74	0,72	0,69
R134a	1	0,93	0,88	0,84	0,8	0,76	0,73	0,7	0,68	0,65
R404A/R507	1	0,91	0,83	0,78	0,73	0,68	0,65	0,61	0,59	0,56
R407C	1	0,93	0,88	0,83	0,79	0,75	0,72	0,69	0,66	0,64
R410A	1	0,95	0,9	0,85	0,81	0,77	0,73	0,7	0,67	0,64
CO2	1	0,95	0,90	0,85	0,81	0,77	0,73	0,70	0,67	0,64
R290	1	0,91	0,83	0,78	0,73	0,68	0,65	0,61	0,59	0,56
R600	1	0,91	0,83	0,78	0,73	0,68	0,65	0,61	0,59	0,56

When subcooling upstream of the valve is any value other than 4°C, correct the evaporator output by dividing it by the relevant correction factor as specified in the table.

Application example

- Multiple PXV valves/V800 drivers
- Multiple ID985/V devices
- Eliwell FAST temperature sensors
- Eliwell EWPA pressure transducers



Each V800 driver:

- controls the PXV valve connected to it
 - receives the PXV defrost and control commands from the relevant ID985/V devices via the Eliwell LAN.
- Network address configuration is set via a DipSwitch for each V800 and via a keyboard for each ID985/V. This configuration makes it possible to use a single shared pressure transducer.

The following are some of the sensors and transducers supplied by Eliwell:

Code

SN8DNB11502A0
SN8DAC11502AV
SN8DEB21502C0

Code

TD220050
TD240050
TD220007
TD240007

Code

TD320050
TD340050
TD320007
TD340007

Sonda NTC

1,5m 4x16 TPE BRACCIALE FAST IP67
1,5m 4x40 TPE STEEL FAST IP67
1,5m 6x20 TPE BRACCIALE IP68

Transducer (male connection)

EWPA 050M 4...20mA 0/50bar IP54
EWPA 050M 4...20mA 0/50bar IP67
EWPA 007M 4...20mA -0.5/7bar IP54
EWPA 007M 4...20mA -0.5/7bar IP67

Transducer (female connection)

EWPA 050F 4...20mA 0/50bar IP54
EWPA 050F 4...20mA 0/50bar IP67
EWPA 007F 4...20mA -0.5/7bar IP54
EWPA 007F 4...20mA -0.5/7bar IP67

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