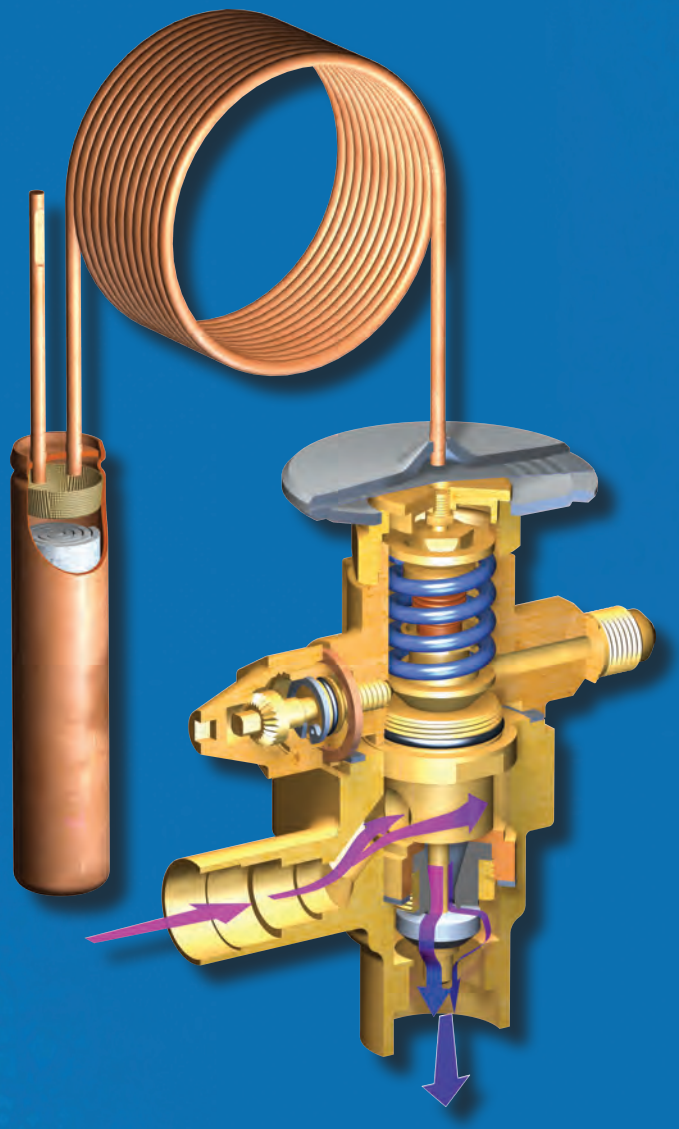
Product Catalogue

Honeywell



Cooling Components

- Electronic Controls
- Expansion Valves
- Hot Gas Bypass Valves
- Liquid Injection Valves
- Solenoid Valves
- Check Valves
- Sight Glasses
- Filter Driers
- Vibration Absorbers

Honeywell

Product Catalogue Cooling Components
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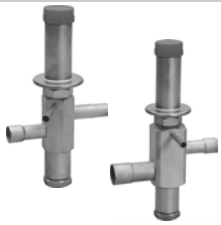
Product Overview

	Series	Description	Page
	**EEV**	**Electronic Expansion Valves** bipolar stepper motor and bidirectional flow direction	**9**
	**SHC**	**Electronic Superheat Controllers** Automatic adaptation to the evaporator's MSS Balancing of the lowest possible superheat Learning behavior with regards to the history of the operating points Automatic tracking of controller parameters	**15**
	**ESDR**	**Electronic Suction Pressure Regulation Valves** stepper motor operated, continuous control behaviour, Balanced Port, copper solder connections, low pressure drop, kv – value = 17 m³/h, equivalent to 38 kW cooling capacity R404A	**25**
	**PCR**	**Electronic Thermostats and Cold Store Controls** temperature- and cold store controls for snap-in installation and standard DIN-rail	**29**
	**PTI**	**Electronic Temperature Display** temperature display for snap-in installation	**35**
	**AMV**	**Automatic Expansion Valves** adjustable evaporating pressure, flare connections, internal pressure equalisation, interchangeable orifice cartridges	**37**
	**AMVX**	**Automatic Expansion Valves** adjustable evaporating pressure, flare connections, external pressure equalisation, interchangeable orifice cartridges	**37**
	**AEL**	**Automatic Expansion Valves** adjustable evaporating pressure, solder connections, internal pressure equalisation, fixed orifice, bypass optional	**41**
	**TMV**	**Thermostatic Expansion Valves** internal pressure equalisation, combi adsorber charge for several refrigerants, adjustable superheat set, flare connections, interchangeable orifice cartridges	**43**

	Series	Description	Page
	**TMVX**	**Thermostatic Expansion Valves** external pressure equalisation, combi adsorber charge for several refrigerants, adjustable superheat set, flare connections, interchangeable orifice cartridges	**43**
	**TMVBL**	**Thermostatic Expansion Valves** internal pressure equalisation, combi adsorber charge for several refrigerants, adjustable superheat setting, inlet flare connection, outlet solder connection, interchangeable orifice cartridges	**43**
	**TMVXBL**	**Thermostatic Expansion Valves** external pressure equalisation, combi adsorber charge for several refrigerants, adjustable superheat setting, inlet flare connection, outlet solder connection, interchangeable orifice cartridges	**43**
	**TMVL**	**Thermostatic Expansion Valves** part programme valve, one valve body head for solder base with internal (VLS) or external (VLSX) pressure equalisation, combi adsorber charge for several refrigerants, adjustable superheat setting, interchangeable orifice cartridges	**47**
	**VLS - D**	**Solder Base for Thermostatic Expansion Valves TMVL and NMVL** internal pressure equalisation, solder connections, two-way construction	**47**
	**VLSX - D**	**Solder Base for Thermostatic Expansion Valves TMVL and NMVL** external pressure equalisation, solder connections, two-way construction	**47**
	**VLS - W**	**Solder Base for Thermostatic Expansion Valves TMVL and NMVL** internal pressure equalisation, solder connections, angle construction	**47**
	**VLSX - W**	**Solder Base for Thermostatic Expansion Valves TMVL and NMVL** external pressure equalisation, solder connections, angle construction	**47**
	**VD**	**Orifice Cartridge for Thermostatic Expansion Valves TMV, TMVL and NMVL** for all expansion valves of series TMV, TMVX, TMVBL, TMVXBL, TMVL and NMVL, orifice size 0.3 to 4.75, equivalent to 0.5 - 21.5 kW cooling capacity R22	**43** **47**

Übersicht

	Series	Description	Page
	**TMX**	**Thermostatic Expansion Valves** part programme valve, valve body head can be combined with various bases and orifice cartridges, MOP – or liquid charge, warm thermal head, external pressure equaliser in the valve body, adjustable superheat setting, with Balanced-Port, interchangeable orifice cartridges	**51**
	**XLS**	**Solder Base for Thermostatic Expansion Valves TMX and NMX** solder connections, two-way or angle construction	**51**
	**XBS**	**Flare Base for Thermostatic Expansion Valves TMX and NMX** flare connections, two-way construction	**51**
	**XD**	**Orifice Cartridge for Thermostatic Expansion Valves TMX and NMX** for expansion valves of series TMX and NMX orifice size 4.5 to 10, equivalent to 16.3 - 72.1 kW cooling capacity R22	**51**
	**TLK**	**Thermostatic Expansion Valves** internal pressure equalisation, MOP charge, warm thermal head, fixed superheat setting, solder connections, fixed orifice, orifice size 0.3 to 2.0, equivalent to 0.5 - 3.9 kW cooling capacity R22, bypass optional	**55**
	**TLE 0.5 - 3.0**	**Thermostatic Expansion Valves** internal pressure equalisation, combi adsorber charge for several refrigerants, MOP charge at deep freeze applications, warm thermal head, adjustable superheat setting, solder connections, fixed orifice, orifice size 0.5 to 3.0, equivalent to 1 - 8.9 kW cooling capacity R22	**59**
	**TLEX 0.5 - 4.5**	**Thermostatic Expansion Valves** external pressure equalisation, combi adsorber charge for several refrigerants, MOP charge at deep freeze applications, warm thermal head, adjustable superheat setting, solder connections, fixed orifice, orifice size 0.5 to 4.5, equivalent to 1 - 16.3 kW cooling capacity R22	**59**
	**TBEX 0.5 - 4.5 D** **TBEX 0.5 - 4.5 W**	**Thermostatic Expansion Valves** on request, external pressure equalisation, combi adsorber charge or MOP charge, warm thermal head, two-way or angle construction, adjustable superheat setting at two-way construction, flare connections, fixed orifice, orifice size 0.5 to 4.5, equivalent to 1 - 16.3 kW cooling capacity R22	**63**

	Series	Description	Page
	**TOEX 0.5 -4.5 D** **TOEX 0.5 - 4.5 W**	**Thermostatic Expansion Valves** on request, external pressure equalisation, combi adsorber charge or MOP charge, warm thermal head, two-way or angle construction, adjustable superheat setting at two-way construction, o-ring connections, fixed orifice, orifice size 0.5 to 4.5, equivalent to 1 - 16.3 kW cooling capacity R22	**67**
	**TLESX 4.75 - 6**	**Thermostatic Expansion Valves** external pressure equalisation, MOP charge, warm thermal head, adjustable superheat setting, Single Port, solder connections, fixed orifice, orifice size 4.75 to 6, equivalent to 21.5 – 40.7 kW cooling capacity R22	**71**
	**TLEX 4.75 - 7** **TLEX 8 - 11**	**Thermostatic Expansion Valves** external pressure equalisation, MOP charge, warm thermal head, adjustable superheat setting, Balanced Port, solder connections, fixed orifice, orifice size 4.75 to 11, equivalent to 21.5 - 92 kW cooling capacity R22	**75** **79**
	**CVC**	**Hot Gas Bypass Valves** capacity regulator, internal pressure equalisation, adjustable suction pressure limitation 1 – 6 bar, solder connections, fixed orifice, orifice size 4, equivalent to 1 kW bypass capacity R134a	**83**
	**HLE**	**Hot Gas Bypass Valves** capacity regulator, internal pressure equalisation, adjustable suction pressure limitation 1 – 9 bar, solder connections, fixed orifice, orifice size 4.5S, equivalent to 1.5 kW bypass capacity R134a	**83**
	**HLEX 4.75 - 7** **HLEX 8 - 11**	**Hot Gas Bypass Valves** capacity regulator, external pressure equalisation, adjustable suction pressure limitation 1 - 9 bar, Balanced Port, solder connections, fixed orifice, orifice size 4.75 - 11, equivalent to 1 - 7.2 kW bypass capacity R134a	**85**
	**NMVL**	**Liquid Injection Valves** suction pressure controlled valve, part programme valve, only one valve body head is needed for solder base with internal (VLS) or external (VLSX) pressure equalisation, liquid charge, adjustable superheat setting, interchangeable orifice cartridges	**89**
	**NMX**	**Liquid Injection Valves** suction pressure controlled valve, part programme valve, valve body can be combined with various bases and orifice cartridges, liquid charge, warm thermal head, external pressure equalisation in the valve body head, adjustable superheat setting, with high pressure compensation (Balanced-Port), interchangeable orifice cartridges	**89**

	Series	Description	Page
	**MA**	**Solenoid Valves** normally closed, direct operated, angle construction, solder connections, kv-value = 0.17 m^3/h	**95**
	**MD**	**Solenoid Valves** normally closed, direct operated, two-way construction, solder or flare connections, kv-value = 0.17 – 0.23 m^3/h, valve complete with coil for 230V AC or as part programme valve without coil	**95**
	**MS**	**Solenoid Valves** normally closed, pilot operated, two-way construction, solder or flare connections, kv-value = 0.9 – 4 m^3/h, valve complete with coil for 230V AC or as part programme valve without coil	**95**
	**MC**	**Coil for Solenoid Valves MA, MD, MS** as spare part or for part programme	**95**
	**RV**	**Check Valves** brass housing, copper-plated solder connections, for installation in the liquid, hot gas or suction line	**103**
	**SBI**	**Sight Glasses** with moisture indicator, flare connections on both sides	**105**
	**SBIA**	**Sight Glasses** with moisture indicator, flare connections female / male thread	**105**
	**SLI**	**Sight Glasses** with moisture indicator, solder connections on both sides	**105**
	**FF**	**Filter Driers** for installation in liquid line, solder or flare connections, drier size 030 to 410	**109**
	**SA**	**Vibration Absorber** laser welded, stainless steel hose, copper fittings, frost resistant construction, suitable for vertical installation	**113**

Series EEV

ELECTRONIC EXPANSION VALVE
WITH STEPPER MOTOR

PRODUCT-DATA

Application

The electronic expansion valves EEV are designed to be installed in refrigeration circuits as expansion devices to expand the refrigerant. The electronic expansion valve will be driven by a controller which gets a pressure and temperature signal from the outlet of the evaporator to control the superheat of refrigerant.
To drive the EEV a Honeywell-Controller or a common stepper motor driver is recommended to be used.

Materials

Body	Brass, Stainless steel
Valve sealing	PTFE
Port Connections	Copper
Motor	Copper, electrical sheet

Features

- **Proportional Electronic Expansion Valve for usage in refrigeration circuits**
  Refrigerants:
  HCFC, HFC (R410A, R32, R407C, R134a, R404A, ...)
  HFOs (R1234yf, R1234ze) and blends
  Hydrocarbons (R600a, R290, ...)
  Further refrigerants on request
- **2-pole stepper motor with inside protected coil**
- **Hermetical construction**

Specification

Operating Temperature	Medium: -40 ... +75 °C (90 °C in reverse mode)
Ambient:	-50 ... +70 °C
Biflow	100 % cooling capacity in both directions
MOP (= PS)	47 bar (abs)
MOPD	42 bar
Total steps	473
Rangeability	1:15
Stator / Actuator	2 Phasen Bipolar
Nominal voltage	24 V DC +/- 10 %
Nominal phase current	0,2 A
Maximum phase current	0,75 A (short term) short term = 10 steps
Holding current	max 0,04 A
Nominal power	4,08 W
Stepper motor drive frequency	60 Hz (full step/sec)
Reliability	250.000 full strokes 120.000.000 steps

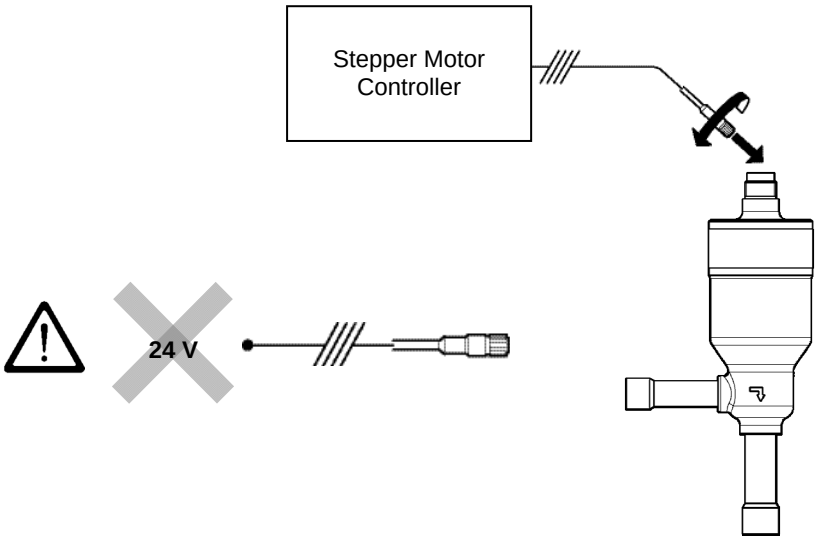
Cooling Capacity QN (kW)

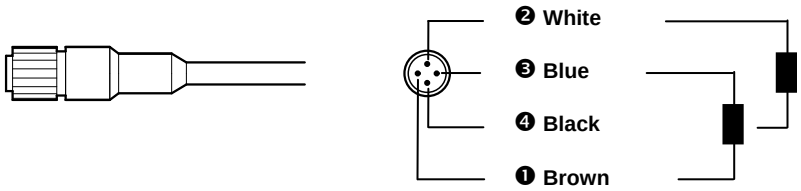
Operation Conditions:
Condensing temperature t_c: 38 °C;
Evaporating temperature t_o: 4 °C;
Subcooling: 1 K

Valve Type	Cooling Capacity QN (kW)						
	R134a	R450A	R1234yf	R407C	R407F	R290	R410A
EEV 5	3.3	2.9	2.4	4.4	4.6	4.4	5.0
EEV 10	6.6	5.8	4.8	8.7	9.2	8.9	10.0
EEV 20	14.0	12.2	10.1	18.3	19.4	18.65	21.0

The application-oriented valve calculation can take place in individual cases with the help of the selection tables.

Electrical Connections

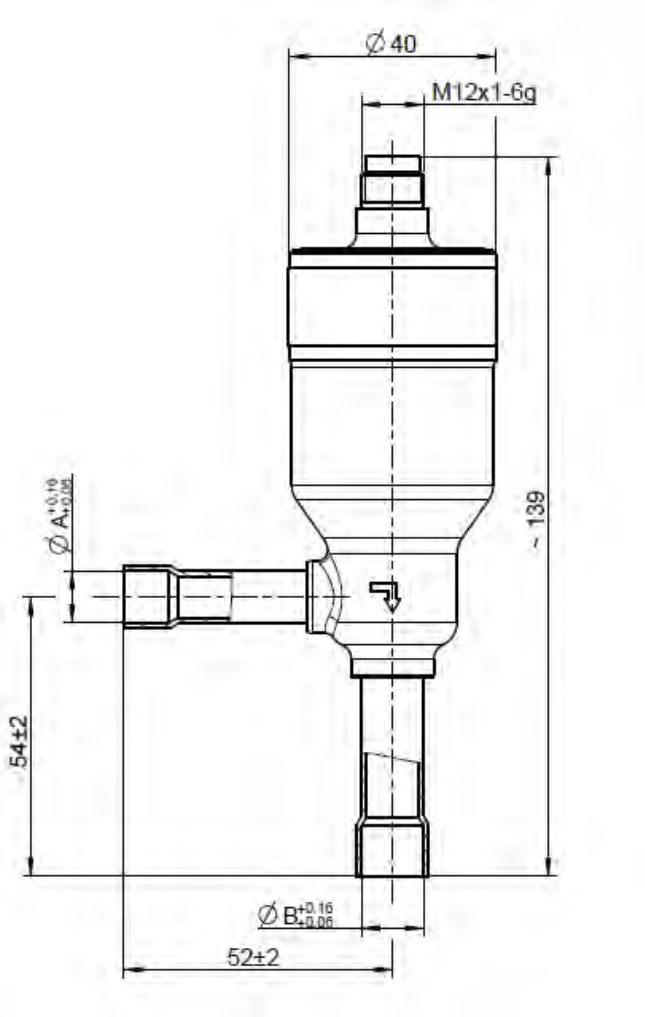




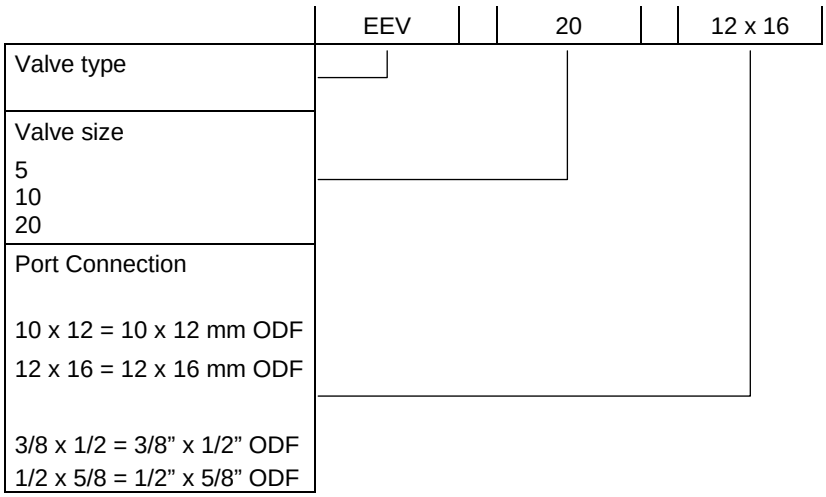
Step	❶	❷	❸	❹
1	+	-	-	+
2	-	-	+	+
3	-	+	+	-
4	+	+	-	-

Dimensions and Weights

Typ	Port Connections A - B	Weight (kg)
EEV 5	10 mm - 12 mm ODF	0,33
	3/8“ – 1/2" ODF	0,33
EEV 10	10 mm - 12 mm ODF	0,33
	3/8“ – 1/2" ODF	0,33
EEV 20	12 mm - 16 mm ODF	0,33
	1/2“ – 5/8" ODF	0,33



Type description



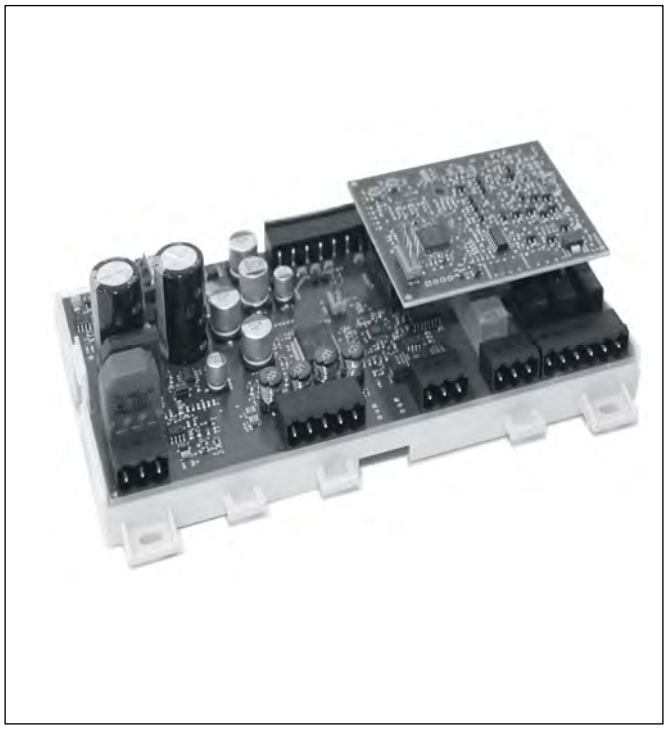
Assembly

- Respect the installation instruction!
- Main direction s. Valve body.
- Horizontal to vertical (connection on top)
- Protect EEV from humidity and dripping water.
    - Wrap a wet rag around on the valve and perform the welding without overheating the valve.
    - Aim the flame towards the ends of the fittings.
    - Let EEV cool down.
    - Connect pre-wired connector to the socket on the stepper motor and tighten the screw to a maximum torque of 0,6 Nm
    - Connect four-pin end of the cable to the corresponding terminals on the Honeywell controller according the wiring diagram of the controller.

Series SHC

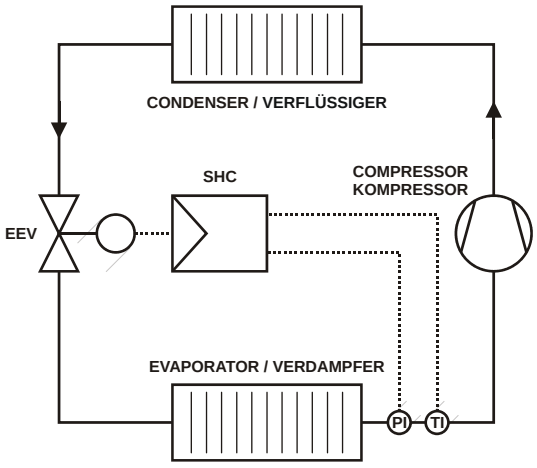
SUPERHEAT CONTROLLER – OEM VERSION

PRODUCT DATA



General

SHC Electronic Superheat Controllers are suitable for use in compression refrigeration plants and heat pumps for the control of electronic expansion valves of the type EEV. Generally, the suction line pressure and the temperature of the superheated refrigerant are the critical measurement values. The superheat of the refrigerant is regulated at the evaporator's outlet.



Features

- **Automatic adaptation to the evaporator's MSS**
- **Balancing of the lowest possible superheat**
- **Learning behavior with regards to the history of the operating points**
- **Automatic tracking of controller parameters**
- **Independent recognition of defrost requirements**
- **Termination of the defrost cycle commensurate with energy efficiency needs**
- **No external setpoint necessary!**

Specification

Analog outputs

Temperature	2X (PT1000, NTC10K, NTC20K)
Temperature/voltage	2X (PT1000, NTC10K, NTC20K, 0.5 … 4.5 V, 0 … 10 V)
Voltage/current	2X (0.5 … 4.5 V, 0 … 10 V, 4 … 20 mA)

Analog output

Voltage	1X (0 … 10 V)

Stepper motor outputs

For bipolar stepper motor	4X (12 V or 24 V, max. 800 mA per phase, max. 500 steps / sec)

Digital outputs

Relays	4X (230 VAC, 5 [2] A)

Battery input

Buffer	24 V, min. 1 Ah

Ambient Storage and Operating Conditions

Storage temperature	-25...+70 °C
Operating temperature	-25…+60 °C
Relative humidity	10…90% (non-condensing)
Protection Class	IP00 (no housing)

Power Supply

Current	24 VAC ± 20% or 24 VDC ± 10%
Max. power consumption	50 VA (when motor active)

Mounting

Mounting	DIN rail or wall mounting
Dimensions	181 mm X 110 mm X 45 mm
Weight	220 g

Function

The Honeywell SHC Controller operates with a 24 VAC/DC power supply. The controller uses the signals from the temperature sensor and the pressure sensor located at the evaporator outlet (alternatively: temperature sensors at the evaporator inlet and outlet) to determine the actual superheat of the refrigerant at the evaporator outlet and controls the EEV electronic expansion valve so as to ensure that the lowest possible superheat at the operating point is achieved.

To do this, the SHC Controller requires no external setpoint provided by operating personnel or another controller. The controller, itself, determines the optimal setpoint for the (given) operating point. By altering the operating point, the corresponding optimal setpoint for superheat of the refrigerant is determined and controlled. The SHC Controller always operates along the evaporator's Minimal Stable Signal (MSS).

For every operating point, the PID parameters of the controller are automatically tracked and the control behavior optimized.

Because of the ability of the Honeywell SHC Controller to store historical operating data, it "learns," over the course of time, the refrigeration circuit's evaporator characteristics (MSS). In the event of a change in load in the refrigeration circuit, the SHC Controller is capable of immediately achieving the optimal operating point. This yields very dynamic control and resultant high energy efficiency.

Valve Control

The Honeywell SHC Controller is capable of driving EEV electronic expansion valves with stepped motors from various different manufacturers. However, the use of Honeywell EEV valves of the type EV2, EV3, and EV4 is to be preferred. Alternatively, electronic control valves can be driven with standard 0…10 V signals via the controller's analog output. The control parameters of the given valve are to be adjusted at the controller.

Valve Parameters

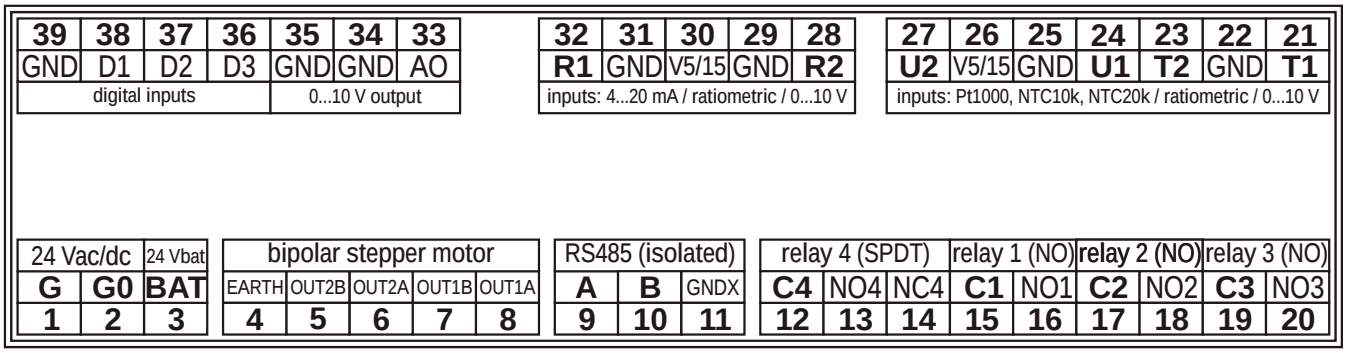
Type of Drive

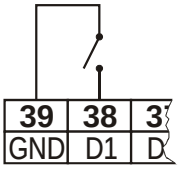
Type	Bipolar stepped motor, modulating actuator with 0…10 V analog output

Stepped Motor Parameters

Motor voltage	12 V or 24 V
Step frequency	10…500 steps/sec
Motor current	80…800 mA
Holding current	0…100% of the motor current, in approx. 10% steps
Max. no. of steps	1…10,000 steps
No. of opening steps	1…1,000 steps

Terminal Connection Diagram





CONNECTION OF THE RELEASE/ENABLER SIGNAL (DI1, FACTORY DEFAULT)
The SHC Controller is active when the contact is closed.

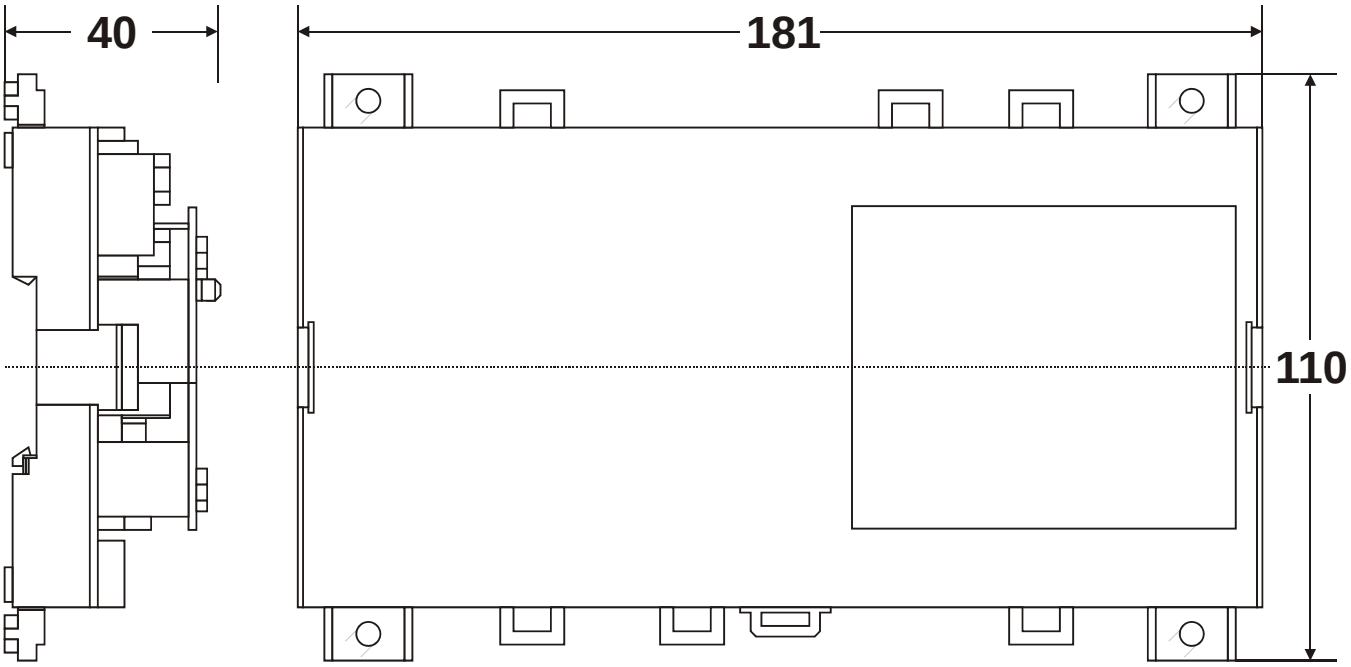
Terminal Assignment

term. #	name	description
1	G	voltage supply 24 VAC/DC (+)
2	G0	voltage supply 24 VAC/DC (-)
3	BAT	buffer battery module 24 V (+) with power level indicator
4	EARTH	earth / shielding
5	OUT2B	output 2B of stepped motor
6	OUT2A	output 2A of stepped motor
7	OUT1B	output 1B of stepped motor
8	OUT1A	output 1A of stepped motor
9	A	RS485, A + conductor
10	B	RS485, B – conductor
11	GNDX	RS485, isolated ground
12	C4	relay 4, change-over contact
13	NO4	relay 4, normally-open contact NOC
14	NC4	relay 4, normally-closed contact NCC
15	C1	relay 1, change-over contact
16	NO1	relay 1, normally-open contact NOC
17	C2	relay 2, change-over contact
18	NO2	relay 2, normally-open contact NOC
19	C3	relay 3, change-over contact
20	NO3	relay 3, normally-open contact NOC
21	T1	AIN1: temperature input 1 (NTC10K, NTC20K, Pt1000)
22	GND	AIN1/2: ground for temperature inputs 1 + 2
23	T2	AIN2: temperature input 2 (NTC10K, NTC20K, Pt1000)
24	U1	AIN3: universal input 1 (NTC10K, NTC20K, Pt1000, 0.5…4.5 V ratiometric, 0…10 V)
25	GND	AIN3/4: ground for universal inputs 1 + 2
26	V5/15	AIN3/4: sensor voltage supply for universal inputs 1 + 2
27	U2	AIN3: universal input 2 (NTC10K, NTC20K, Pt1000, 0.5…4.5 V ratiometric, 0…10 V)
28	R2	AIN6: current/voltage input 2 (0.5…4.5 V, 0…10 V, 4…20 mA)
29	GND	AIN6: ground for current/voltage input 2
30	V5/15	AIN5/6: sensor voltage supply for current/voltage inputs 1 + 2
31	GND	AIN5: ground for current/voltage input 1
32	R1	AIN5: current/voltage input 1 (0.5…4.5 V, 0…10 V, 4…20 mA)
33	AO	AO1: analog output 1 (0…10V)
34	GND	AO1: ground for analog output 1
35	GND	DI1/2/3: ground for digital inputs 1 + 2 + 3
36	D3	DI3: digital input 3 (log.1 = contact open or 24 VAC/DC, log.0 = short-circuit or < 2 VAC/DC)
37	D2	DI2: digital input 2 (log.1 = contact open or 24 VAC/DC, log.0 = short-circuit or < 2 VAC/DC)
38	D1	DI1: digital input 1 (log.1 = contact open or 24 VAC/DC, log.0 = short-circuit or < 2 VAC/DC)
39	GND	DI1/2/3: ground for digital inputs 1 + 2 + 3

LED Blink Coding

status LED (yellow)		alarm LED (red)	
ON	plant is switched OFF (safety position)	1 x	battery supply
1 x	switch ON phase or EEV active (opening/closing)	2 x	superheat too low
2 x	switch relay active, switch delay running	3 x	superheat too high
3 x	start-up function active (ramp, incl. holding time)	4 x	sensor failure
4 x	pump down active or compressor restart block	5 x	LOP active
5 x	MOP active	6 x	configuration failure
6 x	HIT active	7 x	communication failure
7 x	waiting for release conditions	8 x	Hardware self-test failure
8 x	EEV in manual mode		

Dimensions (mm)



Accessories

accessories	models	corresponding technical literature
Transformer	CRT / ETR	EN0B-0568GE51
Temperature Sensor	TS-NFN, TS-NFR, TS-RFH	EN0H-1950GE23
Pressure Sensor	PSR	EN0H-1949GE23
Differential Pressure Sensors	DPTM50-5000	EN0B-0466GE51
	DPTM50D-5000D	EN0B-0616GE51
Electronic Expansion Valve	EEV	EN0H-1945GE23

Honeywell

Series PSR

PRESSURE SENSOR TRANSMITTER
FOR REFRIGERATION AND HVAC APPLICATIONS

PRODUCT-DATA

Application

Pressure Sensor Transmitter Type PSR is used in refrigeration circuits to measure the refrigerant's pressure.

The Pressure Sensor Transmitter PSR can be used according to its measuring range in the liquid line, in the injection line, in the hot gas line and in the suction line of refrigeration circuits.

Materials

Housing	Brass, Stainless Steel
Sealing	CR70 (Chloroprene)
Port Connection	7/16-20 UNF-2B

Other appplications on request.

Features

- **Pressure Sensor Transmitter for usage in refrigeration and HVAC applications**
- **For installation in liquid line, injection line, hot gas line and suction line**
- **For usage of refrigerants R22, R134a, R404A, R407C, R410A, R502, R507; not for Ammonia**
- **Condensation-tight**
- **Type PSR - ** MS UB MP150:**
  - **Wetted parts of brass, CR70 (Chloroprene) and ceramic**
  - **Integrated ceramic thick-layer sensor**
- **Type PSR - ** VA UB MP150:**
  - **Wetted parts of stainless steel**
  - **Monolithic structure**
  - **Hermetically welded metallic, dry thin-film sensor element**

Specification

Pressure Range	see table on page 20
Maximum Pressure PS	see table on page 20
Electrical Output Signal	0.5…4.5 V ratiometric
Power Supply	5 ± 0.5 VDC
Supply Current	≤ 10 mA
Maximum Load	> 4.5 kΩ
Response Time (10…90%)	≤ 5 ms
Insulation Voltage	500 VDC
Medium Temperature	-40 °C … 80 °C
Ambient Temperature	-25 °C … 80 °C
Storage Temperature	-25 °C … 80 °C
Max. rel. Humidity	95 %
Electr. Protection degree	IP67

In plugged condition with connector of corresponding protection class

Technical Specification

Typ *Type*	PSR – 9 MS UB MP150	PSR – 16 MS UB MP150	PSR – 45 MS UB MP150	PSR – 9 VA UB MP150	PSR – 16 VA UB MP150	PSR – 45 VA UB MP150
Messbereich *Pressure range*	-1…9 bar(ü) *-1…9 bar(g)*	0…16 bar(ü) *0…16 bar(g)*	0…45 bar(ü) *0…45 bar(g)*	-1…9 bar(ü) *-1…9 bar(g)*	0…16 bar(ü) 0…16 bar(g)	0…45 bar(ü) 0…45 bar(g)
Überlastgrenze *Over pressure range*	20 bar	40 bar	100 bar	20 bar	32 bar	100 bar
Berstdruck *Burst pressure*	25 bar	50 bar	120 bar	100 bar	160 bar	400 bar
Genauigkeit *Accuracy*	-40 °C … -20 °C ≤ 1,5 %* -20 °C … +20 °C ≤ 1 %* * bezogen auf Taulinie von R410A ** related to dewpoint of R410A*			-40 °C … -20 °C ≤ 1,5 %* -20 °C … +20 °C ≤ 1 %* * bezogen auf Taulinie von R410A ** related to dewpoint of R410A*		
Stabilität pro Jahr *1-year stability*	≤ 0,3 % der Spanne (bei Referenzbedingungen) *≤ 0.3 % of span (at reference conditions)*					
Elektrische Schutzart *Protection degree*	IP67 in gestecktem Zustand mit Leitungsstecker entsprechender Schutzart					
Kurzschlussfestigkeit *Short-circuit protection*	S+ gegen 0V *S+ towards 0V*			S+ gegen U_{B-} *S+ towards U_{B-}*		
Verpolschutz *Reverse polarity protection*	UB gegen 0V *UB towards 0V*			UB+ gegen U_{B-} *UB+ towards U_{B-}*		
Überspannungsschutz *Overvoltage protection*	36 VDC					
Material *Material*	Messing, Keramik Al_2O_3 96 % O-Ring: CR70 (Chloropren) *Brass, Ceramic Al_2O_3 96 %* *O-Ring: CR70 (chloroprene)*			Edelstahl (316L) *Stainless steel (316L)*		
Gehäuse *Body*	Messing *Brass*			Edelstahl (316L) *Stainless steel (316L)*		
EMV-Richtlinie *EMC directive*	2004/108/EEC, EN 61 326 Emission (Group 1, Class B) and Immunity (industrial locations) *2004/108/EEC, EN 61 326 Emission (Group 1, Class B) and Immunity (industrial locations)*			2004/108/EEC, EN 61 326 Emission (Group 1, Class B) and Immunity (industrial locations) *2004/108/EEC, EN 61 326 Emission (Group 1, Class B) and Immunity (industrial locations)*		
Gewicht *Weight*	Ca. 0,08 kg *Appr. 0.08 kg*			Ca. 0,08 kg *Appr. 0.08 kg*		

Type Description

Pressure Sensor Transmitter

	PSR		-9		MS		UB		MP150

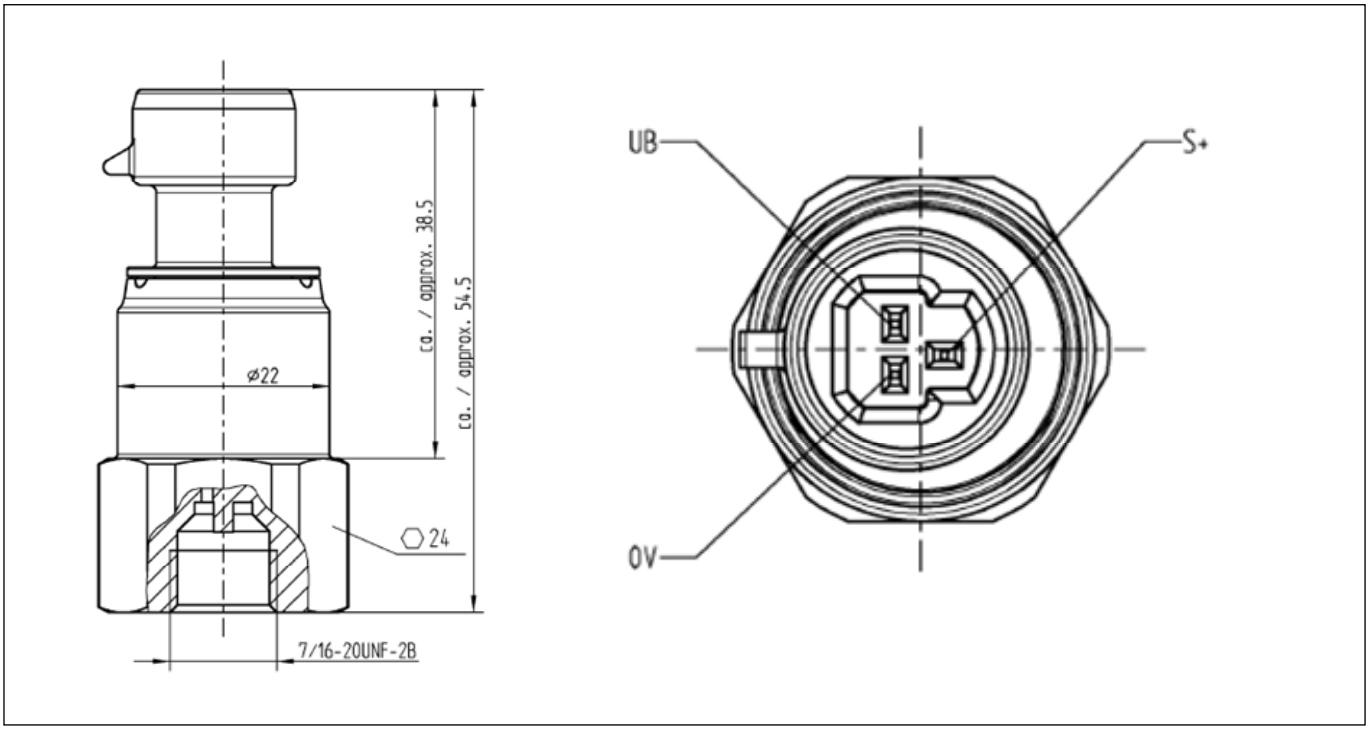
Pressure Sensor Type
Type: -9 = -1 … 9 bar(g) 16 = 0 … 16 bar(g) 45 = 0 … 45 bar(g)
Material: MS – Brass VA – Steinless Steel
Port Connection 7/16-20 UNF-2B, Schrader Internal Thread
MetriPack 150

Port Connections

Type	Port Connection
PSR – 9 MS UB MP150	7/16'' UNF
PSR – 16 MS UB MP150	7/16'' UNF
PSR – 45 MS UB MP150	7/16'' UNF
PSR – 9 VA UB MP150	7/16'' UNF
PSR – 16 VA UB MP150	7/16'' UNF
PSR – 45 VA UB MP150	7/16'' UNF

Electrical Connections

3-pole Connector Metri Pack Series 150
UB = B
0V = A
S+ = C



Function

The pressure prevailing within the application is transformed into a standardised electrical signal through the deflection of the diaphragm, which acts on the sensor element with the power supply fed to the transmitter. This electric signal changes in proportion to the pressure and can be evaluated correspondingly.

Remarks:

- Select the appropriate pressure transmitter with regard to scale range, performance and specific measurement conditions prior to installing and starting the instrument.
- Observe the relevant national regulations (e.g.: EN 50178) and observe the applicable standards and directives for special applications (e.g. with dangerous media such as acetylene, flammable gases or liquids and toxic gases or liquids and with refrigeration plants or compressors). **If you do not observe the appropriate regulations, serious injuries and/or damage can occur!**
- **Open pressure connections only after the system is without pressure!**
- Please make sure that the pressure transmitter is only used within the overload threshold limit all the time!
- Observe the ambient and working conditions outlined in section „Technical data".
- Ensure that the pressure transmitter is only operated in accordance with the provisions i.e. as described in the installation instructions.
- Do not interfere with or change the pressure transmitter in any other way than described in the operating instructions.
- Remove the pressure transmitter from service and mark it to prevent it from being used again accidentally, if it becomes damaged or unsafe for operation.
- **Take precautions with regard to remaining media in removed pressure transmitter. Remaining media in the pressure port may be hazardous or toxic!**
- Have repairs performed by the manufacturer only.

Assembly

- Required tools: wrench (flats 24), screw driver
- Use the pressure transmitter only if it is in a faultless condition as far as the safety-relevant features are concerned.
- When mounting the instrument, ensure that the sealing faces of the instrument and the measuring point are clean and undamaged.
- Screw in or unscrew the instrument only via the flats using a suitable tool and the prescribed torque. The appropriate torque depends on the dimension of the pressure connection. Do not use the case as working surface for screwing in or unscrewing the instrument.
- When screwing the transmitter in, ensure that the threads are not jammed.
- Connect the instrument to earth via the pressure connection.
- Use power supplies which guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1. Consider also the general requirements for PELV circuits in accordance with IEC/DIN EN 60204-1.
- Ingress protection per IEC 60529 (The ingress protection classes specified only apply while the pressure transmitter is connected with female connectors that provide the corresponding ingress protection).
- Please make sure that the ends of cables with flying leads do not allow any ingress of moisture.

Spare Parts

Cable

Description:

PSR-CAB300 MP150	Stecker mit Kabel für Drucksensor 3 m (IP67) Plug with cable for pressure sensor 3 m (IP67)
PSR-CAB600 MP150	Stecker mit Kabel für Drucksensor 6 m (IP67) Plug with cable for pressure sensor 6 m (IP67)

Colour of single wire:

A	Green	Earth Connection
B	Brown	Power Supply
C	White	Output Signal

Temperature Range: -40 °C … 85 °C

Series TS

TEMPERATURE SENSOR

FOR REFRIGERATION AND HVAC APPLICATIONS

PRODUCT-DATA

Application

Temperature Sensor Type TS is used in refrigeration circuits to measure the refrigerant's temperature.
The Temperature Sensor TS can be used according to its measuring range in the liquid line, in the injection line, in the hot gas line and in the suction line of refrigeration circuits.
Due to fast temperature capture in refrigeration circuits the signal can be communicated very fast.

Materials

Body	Stainless Steel, AISI 304
Cable	Thermical rubber poly.
Electrical Connection	Pins

Types

Description	Sensor Type	Temperature Range
TS - NFN	NTC 10K Fast	-50 °C … 110 °C
TS - NFR	NTC 10K Fast	-50 °C … 110 °C
TS - RFH	PT1000	-50 °C … 110 °C

Features

- **Pressure Sensor Transmitter for usage in refrigeration and HVAC applications**
- **For installation in liquid line, injection line, hot gas line and suction line**
- **For usage of refrigerants R22, R134a, R404A, R407C, R410A, R502, R507; not for Ammonia**
- **Condensation-tight body IP67**
- **Type TS – NFN & TS – NFR: NTC 10K**
- **Type TS – RFH: PT1000**

Specification (1)

Resistance Value:	
TS – NFN; TS – NFR	10 kΩ at 25 °C
TS – RFH	1 kΩ at 0 °C
Accuracy:	
TS – NFN	1 % Full scale
TS – NFR	± 0.2 °C
TS – RFH	Class A
Response Time:	K = 5 sec in liquid V = 2 m/s
Sensitivity:	
TS – NFN; TS – NFR	NTC 10K fast
TS – RFH	PT1000
Measuring Range:	-50 °C … +110 °C
Storage Temperature	-25 °C … 80 °C
Ambient Temperature	-25 °C … 80 °C
Electrical Connection	2-wire
Dimension	Ø 4 mm; l = 40 mm
Connecting Cable	3 m
Insulation Voltage	250 VAC
Electr. Protection degree:	IP67

Specification (2)

Type	TS – NFN	TS – NFR	TS – RFH
Element Type	NTC 10K 1% BETA 3435	NTC 10K BETA 3977 tolerance ± 0.2 °C	PT 1000 Class A
Cable Type	Thermical rubber poly	Thermical rubber poly	Thermical rubber poly
Cable colour	Black	Yellow	Green
Cable diameter	2x0.25 mm² Ø 3.3 mm	2x0.25 mm² Ø 3.3 mm	2x0.25 mm² Ø 3.3 mm
Connection	Pins	Pins	Pins
Filling	Polyuretanic resin	Polyuretanic resin	Polyuretanic resin

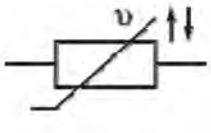
Type Description

Temperature Sensor

	TS		NFN
Type			
Type: NFN = NTC 10K 1% Beta 3435 NFR = NTC 10K Beta 3977 ±0.2°C RFH = Pt 1000 class A			

Electrical Connections

Connection of Temperature Sensors according below picture. Temperature Sensor is insensible against reverse polarity. TS Sensors have a 2-wire structure. To minimize electromagnetic perturbation the cable should be as short as possible.



Function

Due to temperature changes the resistance of temperature sensor will be changed. This change of resistance is changing proportional to the temperature and can be evaluated accordingly.

Remarks:

- Select the appropriate temperature sensor with regard to scale range, performance and specific measurement conditions prior to installing and starting the refrigeration system.
- Please make sure that the temperature sensor is only used within the valid measuring range.

Assembly

- Position the temperature sensor on the refrigerant pipe in the position between 10 and 14 o'clock (at horizontal pipe installation).
- Pay attention to install sensor to clean and intact surfaces at the measuring point.
- Provide sufficient thermal compound at the measuring point between temperature sensor and measuring surface.
- Fasten the temperature sensor by means of aluminum tape and/or fastening clips to the refrigerant pipe.
- Insulate the fastened temperature sensor with heat insulation material.
- Connect the temperature sensor according to the instructions of the evaluating equipment.
- Ensure that no humidity may enter at cable-ends.

Series ESDR

ELECTRONIC SUCTION PRESSURE REGULATION VALVE
STEPPER MOTOR OPERATED

PRODUCT DATA

ESDR 22

Application

Electronic suction pressure regulation valves series ESDR are used to control the refrigerant mass flow in the suction line of a refrigerating plant.

A stepper motor driven piston opens / closes the valve seat. With this continuous control behaviour it is possible to hold a defined temperature level in a cold store also with changing compressor working conditions.

It is also possible to handle different temperature levels in several cold stores with a common compressor pack by use of suction pressure regulation valves.

Furthermore an overload protection of the compressor or a capacity controller can be realised with ESDR valves.

Features

- **Stepper motor operated**
- **Continuous control behaviour**
- **High pressure compensation (Balanced port)**
- **Low pressure drop**
- **High cooling capacity**
- **Copper solder connections**
- **Refrigerant: R134a, R404A, R407C, R410A, R422D**

Technical Data

Nominal capacity	see table on page 26
Maximum pressure PS	35 bar
Maximum test pressure PF	38.5 bar
Min. operating temperature	-50 °C
Max. operating temperature	+65 °C
Max. ambient temperature	+100 °C

Electronic Data

Stepper motor type	2 phase bipolar
Nominal voltage	12 V chopper controlled
Nominal phase current	0,7 A
Max. phase current	1 A
Holding current max.	0,7 A
Step rate	300 Hz
Phase resistance	6 Ohm
Phase inductance	14 mH
Step angel	1.8 °

Material

Valve housing, internals	brass
Motor housing	stainless steel
Connections	copper
Valve sealing	PTFE
Motor	electrical sheet, copper

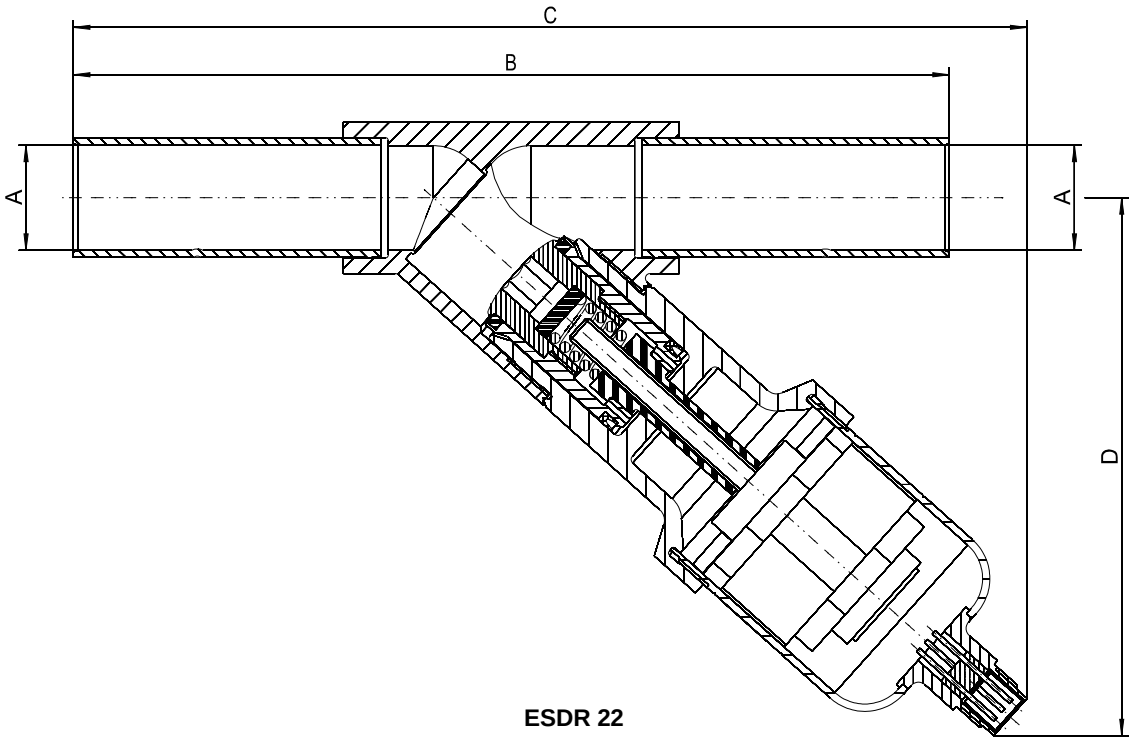
Nominal Capacity

Type	Valve size	kv – value (m^3/h)	Nominal capacity (kW)*				
			R134a	R404A	R407C	R410A	R422D
ESDR	22	17	34.9	37.8	42.7	55.5	34.5

* Capacities are based on evaporating temperature t_o = +4 °C, condensing temperature t_c = +38 °C und 1 K subcooled refrigerant, pressure drop over the valve 0.15 bar

Dimensions and Weights

Type	Valve size	Dimensions				Weight
		ØA	B	C	D	
ESDR	22	22 mm ODF	185 mm	201.4 mm	113.6 mm	approx. 1.05 kg
		28 mm ODF				

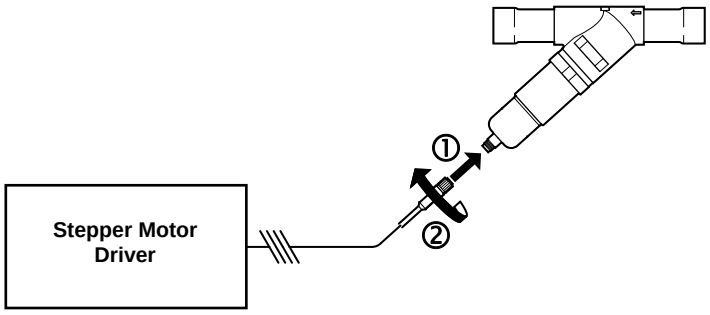


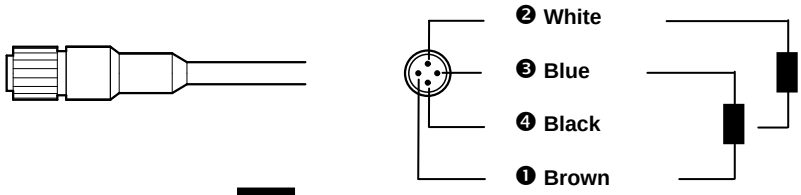
ESDR 22

Type Code / Order Information

	ESDR		22		22 x 22mm
Series					
Valve seat diameter / Valve size					
Solder connections ODF (Inlet x Outlet)					

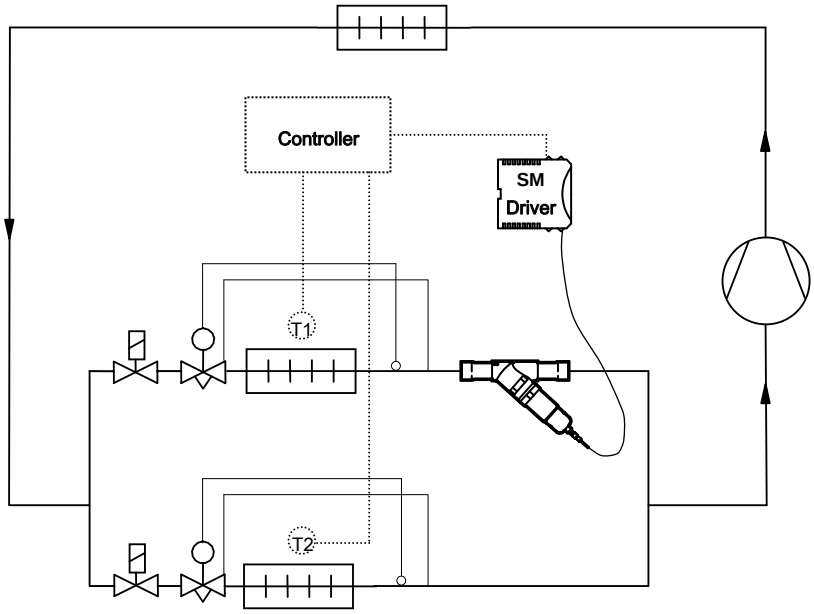
Wiring Schematic for Stepper Motor





Step	❶	❷	❸	❹	open	close
1	+	-	-	+		
2	-	-	+	+		
3	-	+	+	-		
4	+	+	-	-		

Application Sample



Installation

- Respect the installation instruction!
- Position of the stepper motor in a suspended arrangement.
- Flow direction must correspond with the arrow on the valve body.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Do not direct connect the stepper motor to power supply. Use a stepper motor driver to operate the stepper motor.
- The technical data of the stepper motor driver must correspond with the electrical and technical data of the valve.
- To open / close the valve via a stepper motor driver respect the sequence of polarity at the coils shown in the wiring schematic.
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:
The valve series ESDR can be customised to the requirements of our series device in an optimum way. Contact us!

Series PCR-100 / PCR-110

ELECTRONIC THERMOSTATS

PRODUCT DATA

PCR-100

PCR-110

Application

PCR-100 and PCR-110 are microprocessor-controlled thermostats for refrigeration, deep freeze systems and for general purpose use.

The electronic thermostats can be used for cooling and heating application in a temperature range of -55 °C to +50 °C.

Material

Housing	ABS-plastic, self-extinguishing

Features

- **User friendly programming**
- **Thermostat for refrigeration and heating**
- **Relay output**
- **Defrost option for plus cold stores with continuous operation of evaporator fan**
- **Alarm output relay**
- **Red digital display, good visibility**
- **PCR-100: Module housing for 35 mm standard DIN rail**
- **PCR-110: Snap-in installation housing for aperture 28.5 x 70.5 mm**
- **PTC sensors with stainless steel sleeves**
- **Mains transformer integrated**

Specification

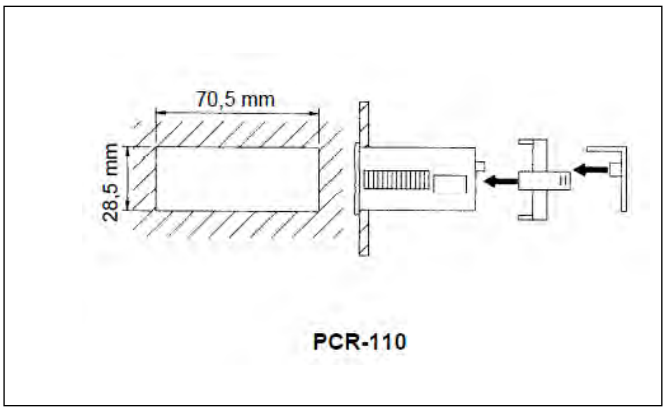
Power supply	230 V, ±10 %, 50/60 Hz
Power consumption	2.1 Watt
Control performance	on-off
Display	3-digit, 7-segment, LED red, height 14.2 mm
Resolution	1 K
Display accuracy	±0.5 K internally, ±1 digit at 25 °C
Measuring range	-55 °C to +50 °C
Input	1 PTC sensor
Outputs	**compressor or heater:** 1 relay with changeover contact, 8 A, 230 V AC resistive load **alarm:** 1 relay with N. O. contact, 5 A, 230 V AC, resistive load
Sensor	PTC sensor, cable length 2.5 m, accuracy ±2 % range of use: -30 °C to +80 °C cable not fixed -40 °C to +80 °C cable fixed
Ambient temperature/humidity	in operation: 0° to + 50 °C, 30 to 85 % R.H. excluding dew in storage: -20 °C to +80 °C
Data back up	Non-volatile memory EEPROM
Connectors	250V / 10 A screw-type terminal strips, max. 1.5 mm²
Protective rating	Housing: IP 20, front panel: IP 52, protection class 2

Dimensions and Weight

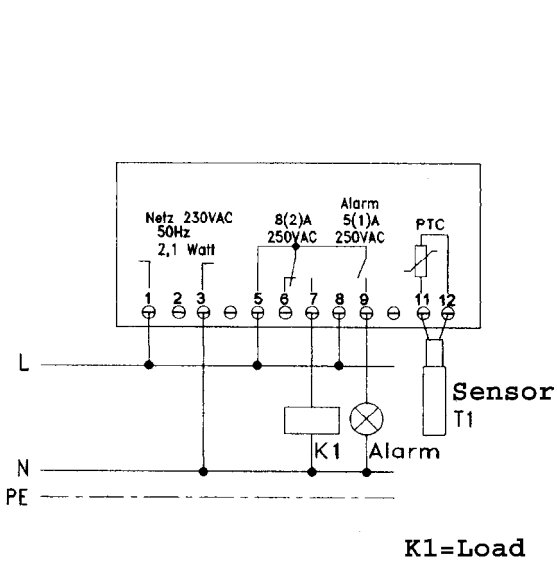
Type	Dimensions of housing (mm)			Weight (kg)
	W	H	D	
PCR-100	70	85	61	approx. 0.33
PCR-110	70	32	74	approx. 0.24

Installation

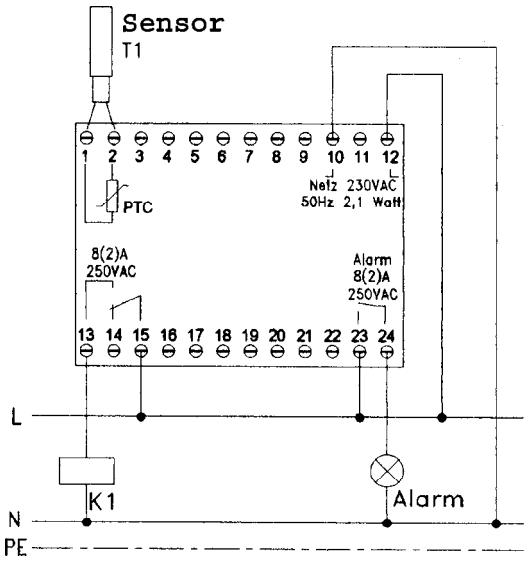
- Operate only in dry places
- Snap-in installation housing:
  - Fit unit in a recess 28.5 x 70.5 mm
  - maximum wall thickness: 22 mm
  - Secure housing with the mounting frame
- 4 DIN standard modular housing:
  - Open out the side mounting tabs
  - Clip the unit on to 35 mm rail
  - press tabs in again
- Respect the wiring diagram
- Tighten screws of connectors carefully



PCR-110



PCR-110



PCR-100

Series PCR-300/-310/-410/-300RC

ELECTRONIC COLD STORE CONTROLS

PRODUCT DATA

PCR-300

PCR-310

Application

PCR-300, PCR-310, PCR-410 and PCR-300RC are microprocessor-controlled cold store controls for refrigeration and deep freeze systems.

The control switch the compressor, evaporator fan and the defrost heating depending on the cold store temperature and the adjusted parameters.

Material

Housing	ABS-plastic, self-extinguishing

Features

- **User friendly programming**
- **Compressor control with delayed start-up**
- **Evaporator fan control; fan in combination with compressor, operating continuously or switched via the evaporator temperature.**
- **Defrost control for electrical heating or hot-gas defrosting; initiated via programmable time intervals, at PCR-300RC by real-time clock**
- **Alarm output (not for PCR-310)**
- **Red digital display, good visibility**
- **Module housing for 35 mm standard DIN rail at PCR-300 and PCR-300RC**
- **Snap-in installation housing at PCR-310 and PCR-410 for aperture 28.5 x 70.5 mm**
- **Mains transformer integrated at PCR-300, PCR-300RC**
- **External transformer at PCR-310, PCR-410**
- **2 PTC sensors with stainless steel sleeves for room temperature and defrost termination**

Specification (1)

Power supply	**PCR-300, PCR-300RC** mains transformer installed: 230 V, ±10 %, 50/60 Hz **PCR-310, PCR-410** 12 V AC ±10%, 50/60 Hz or 12 V DC ±10% external Transformer TR-310: Prim.: 230 V AC ±10%, 50/60 Hz Sec.: 12 V AC
Power consumption	2.5 Watt
Control performance	on/off
Display	3-digit, 7-segment, LED red, height 14.2 mm
Resolution	1 K
Display accuracy	±0.5 K internally, ±1 digit at 25 °C
Measuring range	-55 °C to +50 °C
Inputs	2 PTC sensors

Continued on page 32

Specification (2)

Outputs

compressor:
1 relay with changeover contact, 8 A, 230 V AC, resistive load

evaporator fan:
1 relay with N.O. contact, 8 A (5 A PCR-300RC), 230 V AC, resistive load

defrost heating:
1 relay with N.O. contact, 8 A (5 A PCR-300RC), 230 V AC, resistive load

alarm:
PCR-300, PCR-300RC
Opto-bidirectional triode thyristor, 250 VAC, min. load 40 mA, max. load 80 mA

PCR-410: 1 relay with N.O. contact, 8 A, 230 V AC, resistive load

Sensor
PTC sensor, cable length 2.5 m, accuracy ±2 %

range of use:
-30 °C to +80 °C cable not fixed
-40 °C to +80 °C cable fixed

Ambient temperature/humidity
in operation:
0° to 50 °C,
30 to 85 % R.H. excluding dew

in storage:
-20 °C to +80 °C

Data back up
Non-volatile memory EEPROM, Real time clock with back up battery (PCR-300RC)

Connectors
250V / 10 A screw-type terminal strips, max. 1.5 mm²

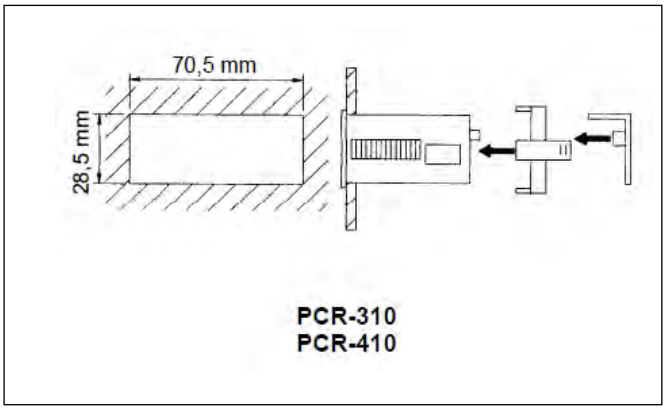
Protective rating
Housing: IP 20
front panel: IP 52,
protection class 2

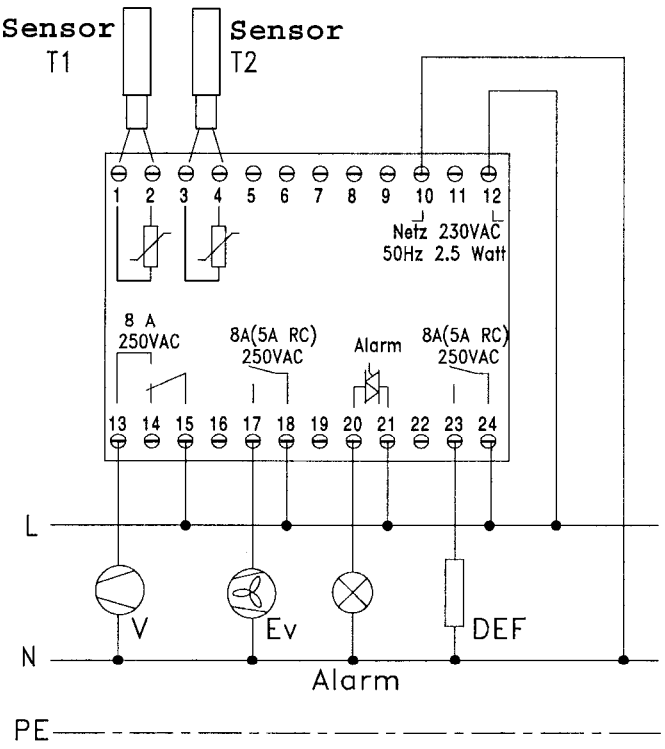
Dimensions and Weight

Type	Dimensions of housing (mm)			Weight (kg)
	W	H	D	
PCR-300	70	85	61	approx. 0.42
PCR-310 Transformer	70 52	32 47	74 34	approx. 0.52
PCR-410 Transformer	70 52	32 47	74 34	approx. 0.52
PCR-300RC	70	85	61	approx. 0.42

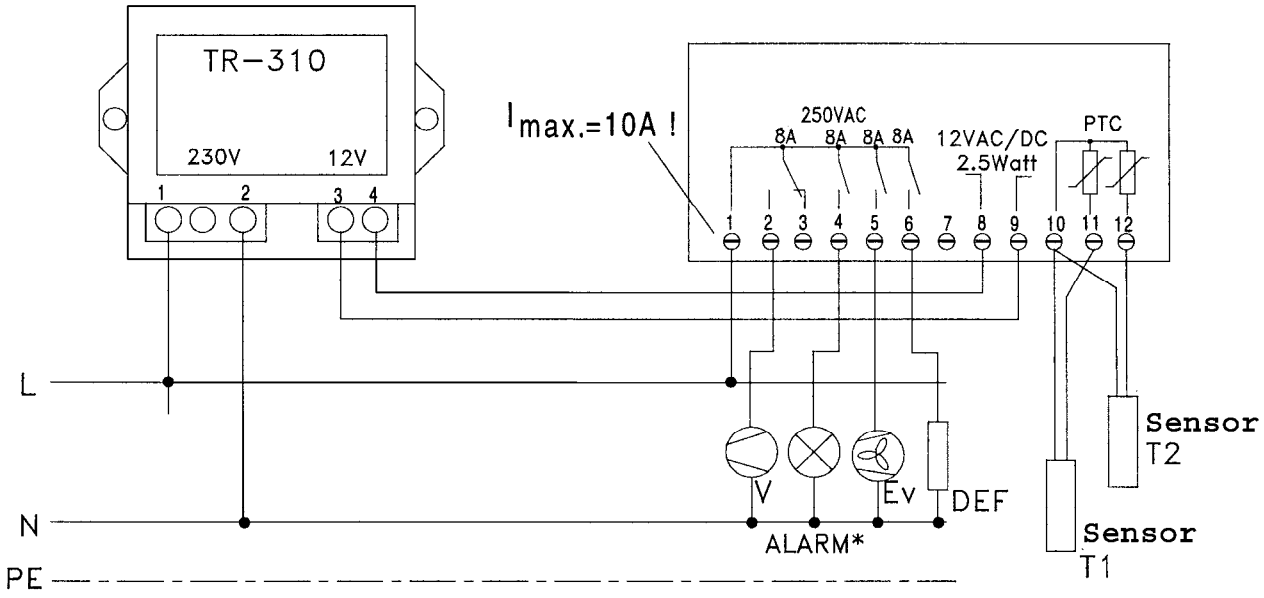
Installation

- Operate only in dry places
- Snap-in installation housing:
  - Fit unit in a recess 28.5 x 70.5 mm
  - maximum wall thickness: 22 mm
  - Secure housing with the mounting frame
- 4 DIN standard modular housing:
  - Open out the side mounting tabs
  - Clip the unit on to 35 mm rail
  - press tabs in again
- Respect the wiring diagram
- Tighten screws of connectors carefully





PCR-300
PCR-300RC



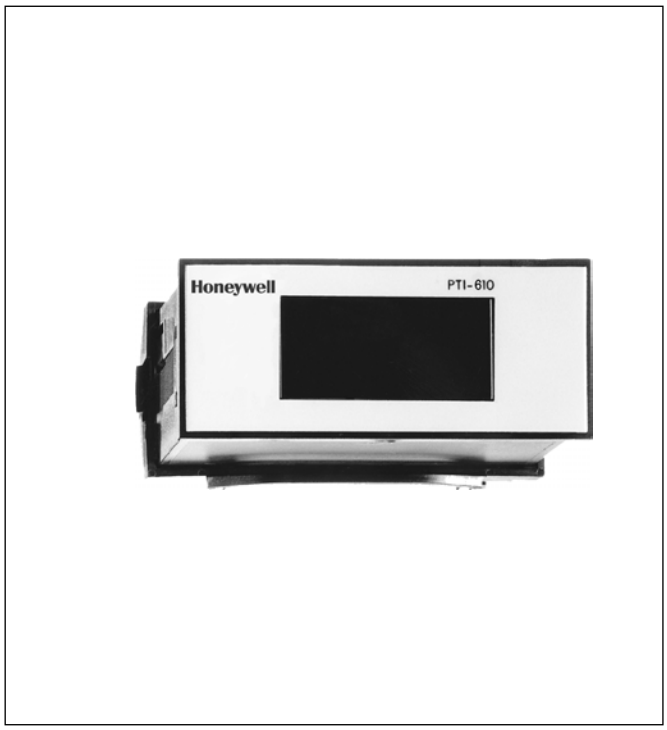
Alarm only PCR-410

PCR-310
PCR-410

Series PTI-610

ELECTRONIC TEMPERATURE DISPLAY

PRODUCT DATA



Application

PTI-610 is an electronic temperature display for general purpose use.

The display does have snap-in housing for installation in a control panel.

Material

Housing	ABS-plastic, self-extinguishing

Features

- **Red digital display, good visibility**
- **Display for °C and °F selectable**
- **Snap-in installation for aperture 28.5 x 70.5 mm**
- **Retaining frame for wall thickness up to 22 mm**
- **PTC sensors with stainless steel sleeves**
- **Electronic sensor-line up, if required**
- **Mains transformer integrated**

Specification

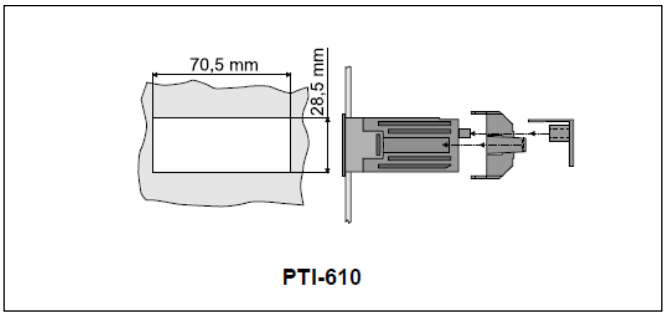
Power supply	230 V, ±10 %, 50/60 Hz
Power consumption	1.3 Watt
Display	3-digit, 7-segment, LED red, height 14.2 mm
Resolution	1 K
Display accuracy	±0.5 K internally, ±1 digit at 25 °C
Measuring range	-55 °C to +99 °C -67 °F to +99 °F
Input	analogue input for PTC sensor
Sensor	PTC sensor, cable length 2.5 m, accuracy ±2 % range of use: -30 °C to +80 °C cable not fixed -40 °C to +80 °C cable fixed
Ambient temperature/humidity	in operation: 0° to + 50 °C, 30 to 85 % R.H. excluding dew in storage: -20 °C to +80 °C
Connectors	10 A screw-type terminal strips, max. 1.5 mm
Protective rating	Housing: IP 20 front panel: IP 52, protection class 2

Dimensions and Weight

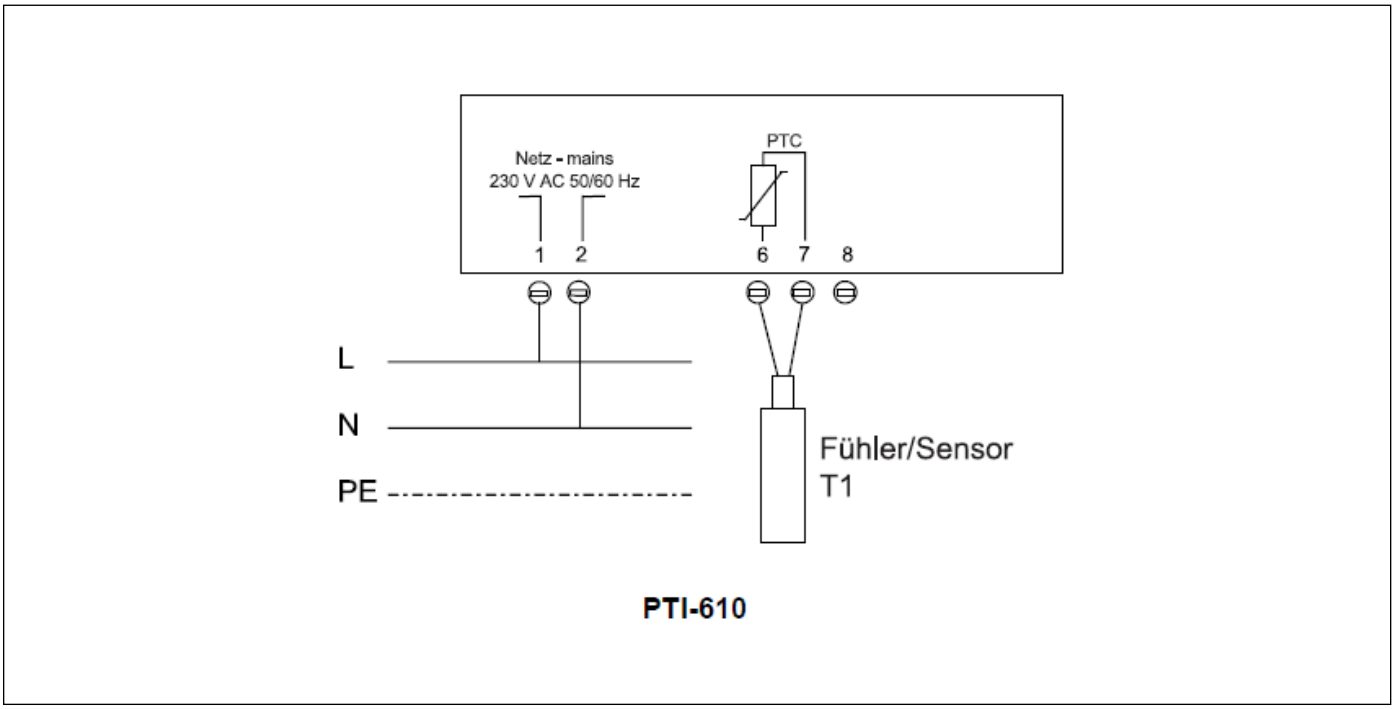
Type	Dimensions of housing (mm)			Weight (kg)
	W	H	D	
PTI-610	70	32	74	approx. 0.27

Installation

- Operate only in dry places
- Snap-in installation housing:
  - Fit unit in a recess 28.5 x 70.5 mm
  - maximum wall thickness: 22 mm
  - Secure housing with the mounting frame
- Respect the wiring diagram
- Tighten screws of connectors carefully



PTI-610



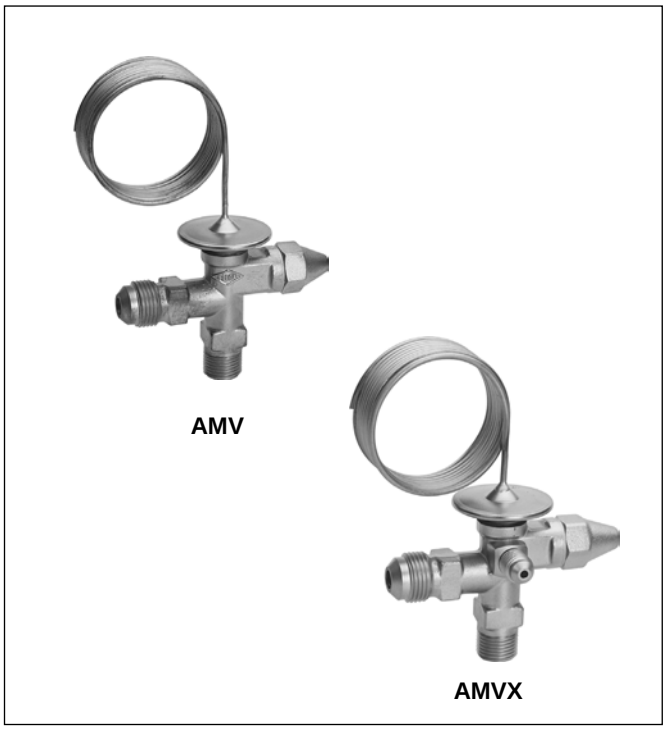
PTI-610

Series AMV

AUTOMATIC EXPANSION VALVES

INTERCHANGEABLE ORIFICE CARTRIDGE, ADJUSTABLE EVAPORATING PRESSURE

PRODUCT DATA



Application

Automatic expansion valves (constant pressure valves) series AMV are used in general refrigeration and for original equipment.

For plants like dehumidifiers, air driers, water coolers, ice-making machines or air conditioners.

Materials

Body	brass
Thermal head	stainless steel
Connection	brass

Features

- **AMV : with internal pressure equalisation; for single injection in installations with one or more cooling circuits**
- **AMVX: with external pressure equalisation; for optimal evaporation effectiveness in all applications. Obligatory for multiple injection by liquid distributors**
- **Adjustable evaporating pressure setting ± 0.5 bar within the evaporating pressure range**
- **Flare connections**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Interchangeable orifice cartridges**
- **Refrigerants: all CFC, HCFC, HFC HFO (e.g. R1234yf) and future Blends not for ammonia**

Specification

Nominal capacity range	0.52 to 22.4 kW R22 (small orifice graduation for optimal control behaviour, interchangeable orifice cartridges)
Evaporating pressure range	see table on page 38
Maximum pressure PS	29.0 bar(a)
Maximum test pressure PF	31.9 bar(a)
Max. ambient temperature	100 °C

Evaporating pressure

1. Automatic expansion valves with internal pressure equalisation

Type	OS number	Evaporating pressure range
AMV	AMV-00001	1.5 – 2.5 bar
	AMV-00002	2.5 – 3.5 bar
	AMV-00003	3.5 – 4.5 bar
	AMV-00004	4.5 – 5.5 bar

2. Automatic expansion valves with external pressure equalisation

Type	OS number	Evaporating pressure range
AMVX	AMVX-00001	1.5 – 2.5 bar
	AMVX-00002	2.5 – 3.5 bar
	AMVX-00003	3.5 – 4.5 bar
	AMVX-00004	4.5 – 5.5 bar

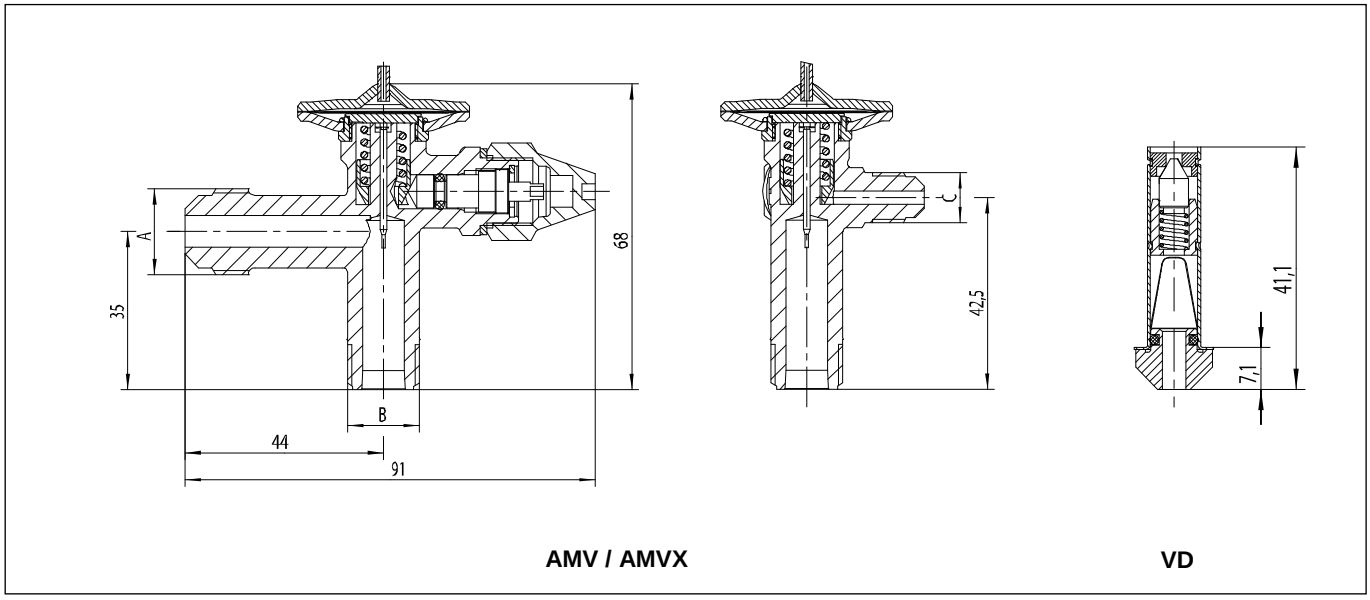
Capacities

Type	Orifice size	Nominal capacity (kW)*						
		R134a	R22	R407C	R422D	R404A	R507A	R410A
AMV AMVX	0.3	0.36	0.52	0.50	0.36	0.36	0.36	0.62
	0.5	0.69	0.99	0.95	0.67	0.68	0.69	1.2
	0.7	1.0	1.4	1.3	0.92	0.97	0.98	1.6
	1.0	1.4	2.0	1.9	1.3	1.4	1.4	2.4
	1.5	2.2	3.2	3.1	2.2	2.2	2.3	3.8
	2.0	2.9	4.0	3.9	2.7	2.8	2.9	4.8
	2.5	4.0	5.8	5.6	3.9	4.1	4.1	6.9
	3.0	6.6	9.3	8.9	6.3	6.5	6.6	11.1
	3.5	8.7	12.2	11.7	8.3	8.6	8.7	14.6
	4.5	11.8	17.0	16.4	11.3	12.0	12.1	20.3
	4.75	15.9	22.4	21.6	15.3	15.8	15.9	26.8

* Capacities are based on t_o= +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Connections			Weight (kg)
	Inlet (B)	Outlet (A)	Pressure equaliser (C)	
AMV	5/8" UNF	3/4" UNF	-	approx. 0.35
AMVX	5/8" UNF	3/4" UNF	7/16" UNF	approx. 0.36



AMV / AMVX **VD**

Type Code / Order Information (Part Programme)

1. Valve body

	AMV	X		BM 3.0		5/8" UNF x 3/4" UNF
Series						
Pressure equalisation: X = external () = internal						
Range middle evaporating pressure range (bar)						
Connection size (inlet x outlet)						

2. Orifice cartridge

	VD		0.5
Series			
Orifice size			

Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4” in diameter. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- When tightening flare nuts of the flare connections grip at wrench flats on the valve body.
- Constructive modifications at the valve are not allowed.

Evaporating pressure Adjustment

The evaporating pressure setting can be adjusted by ± 0.5 bar around the range middle of the evaporating pressure range.

Turning clockwise	=	reduced evaporating pressure
Turning counterclockwise	=	increased evaporating pressure

Special Accessory:

Adapter series LA for solder connection at the inlet for 6 mm, 10 mm, 1/4” and 3/8”.

Series AEL

AUTOMATIC EXPANSION VALVES
FIXED ORIFICE, ADJUSTABLE EVAPORATING PRESSURE

PRODUCT DATA

Application

Automatic expansion valves (constant pressure valves) series AEL are used in general refrigeration and for original equipment.

For plants with single injected evaporators and without a distributor, such as air conditioners, dehumidifiers, air driers, water coolers or ice-making machines.

Materials

Body	brass
Head	stainless steel, brass
Connection tubes	copper

Features

- **Smallest dimensions**
- **High performance**
- **Hermetic construction**
- **Wide evaporating pressure range**
- **Adjustable evaporating pressure setting**
- **Solder connections**
- **Internal pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Fixed orifice**
- **Bypass on request**
- **Refrigerants: all CFC, HCFC, HFC**
  HFO (e.g. R1234yf) and future Blends
  not for ammonia

Specification

Nominal capacity range	1.4 to 29.1 kW R22
Evaporating pressure range	1 - 7 bar(a)
Factory setting for evaporating pressure	2.2 bar(a)
Maximum pressure PS	25.5 bar(a)
Maximum test pressure PF	28 bar(a)
Max. ambient temperature	100 °C

Installation

- The valves may be installed in any position.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Remove plastic cap during soldering
- Constructive modifications at the valve are not allowed.

Adjustment

One complete revolution of the adjusting screw effects an alternation of the evaporating pressure by approx. 0.8 bar.

Turning clockwise	=	Higher evaporation pressure
Turning counterclockwise	=	Lower evaporation pressure

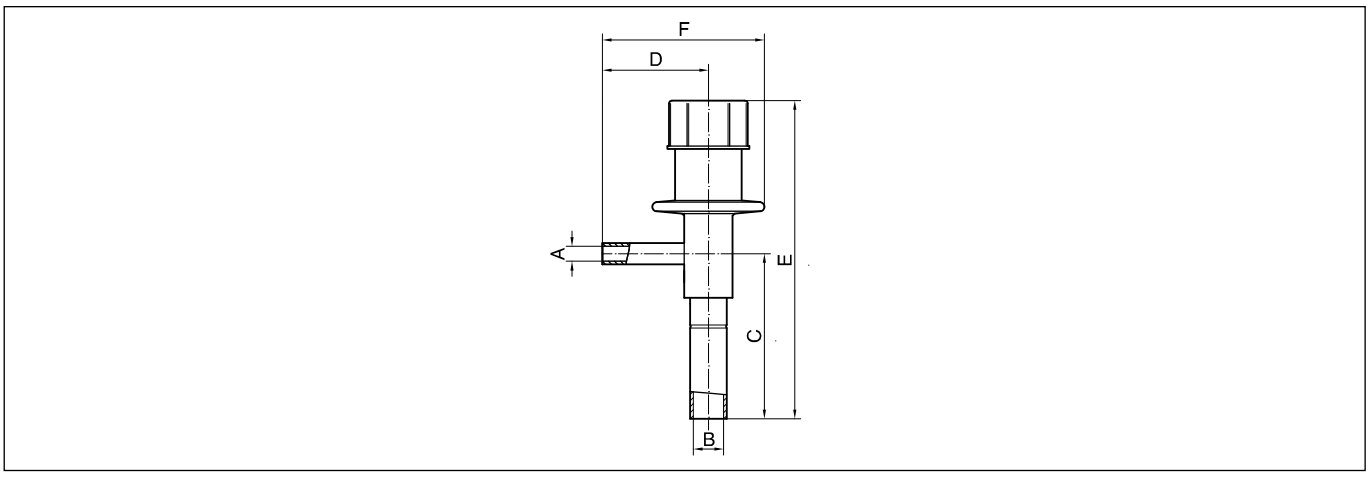
Capacities

Type	Valve size	Orifice size	Nominal capacity (kW)*			
			R22	R134a	R404A	R507A
AEL	0.5	0.7	1.4	1.0	0.97	0.98
	1.0	1.0	2.0	1.4	1.4	1.4
	2.0	2.0	4.0	2.9	2.8	2.9
	3.0	3.0	9.3	6.6	6.5	6.6
	4.0	3.5	12.2	8.7	8.6	8.7
	5	4.75	22.4	15.9	15.8	15.9
	6	5	29.1	20.0	20.5	20.7

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

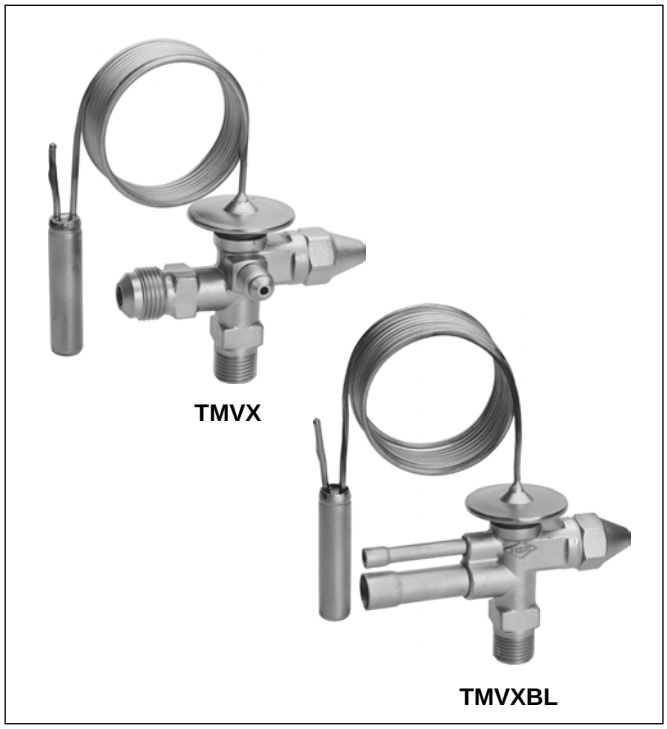
Type	Valve size	Connections		Dimensions (mm)				Weight (kg)
		Inlet (A)	Outlet (B)	C	D	E	F	
AEL	0.5 1.0 2.0	6 mm ODF	10 mm ODF	58	36	106	54	approx. 0.16
	3.0 4.0	1/4" ODF	3/8" ODF					
	5	3/8" ODF	5/8" ODF	64	47	122	69	approx. 0.28
	6	10 mm ODF	16 mm ODF					
		3/8" ODF	5/8" ODF					



Series TMV

THERMOSTATIC EXPANSION VALVES
INTERCHANGEABLE ORIFICE CARTRIDGE

PRODUCT DATA



TMVX

TMVXBL

Application

Thermostatic expansion valves series TMV are used in general refrigeration and for original equipment.

Plants with one or more circuits such as refrigerated cabinets even with cramped mounting conditions, ice and cream machines, milk cooling units, water chillers, vehicle air conditioning systems, cold stores, and air conditioning systems.

Materials

Body	brass
Thermal head	stainless steel
Connection	solder: copper flare: brass

Features

- **TMV / TMVBL: with internal pressure equalisation; for single injection in installations with one or more cooling circuits**
- **TMVX / TMVXBL: with external pressure equalisation; for optimal evaporation effectiveness in all applications. Obligatory for multiple injection by liquid distributors**
- **Combi adsorber charge**
  - **The same valve can be used for different refrigerants (see table on page 44)**
  - **Controller charge is high sensitive and responsive thus lowest possible level of superheat can be achieved**
  - **Charge is not sensitive to effects of temperature on the capillary tube and valve head**
  - **Damping characteristic results in stable control behaviour**
- **Suitable for systems with hot gas defrosting**
- **Adjustable superheat setting**
- **Flare connections: TMV, TMVX**
- **Flare / solder connections: TMVBL, TMVXBL**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Interchangeable orifice cartridges**
- **Refrigerants: R134a, R401A**
  R22, R407C, R407A, R422D
  R404A, R507A, R402A, R407B
  R410A. R407F
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	0.52 to 22.4 kW R22 (small orifice graduation for optimal control behaviour, interchangeable orifice cartridges)
Evaporating temperature range	see table on page 44
Maximum pressure PS	see table on page 44
Maximum test pressure PF	see table on page 44
Max. ambient temperature	100 °C
Max. bulb temperature	140 °C
Static superheat	approx. 3 K
Length of capillary tube	1.5 m
Bulb diameter	12 mm

Thermal Charges and Temperature Ranges

1. Adsorber charge

Refrigerant	Evaporation temperature range	PS (bar(a))	PF (bar(a))
R134a, R401A	+15 °C to -30 °C	34	37.4
R22, R407C, R407A, R422D	+15 °C to -45 °C	36	39.6
R404A, R507A, R402A, R407B	±0 °C to -50 °C	36	39.6
	+15 °C to -30 °C	36	39.6
R407C	+15 °C to -30 °C	36	39.6
R407F	±0 °C to -45 °C	36	39.6
R410A	+15 °C to -20 °C	40	44

Further refrigerants on request.

Thermal systems with adsorber charge are completely insensitive to effects of temperature on the capillary tube and valve head. It reacts only according to the temperature of the bulb.

Thus, Honeywell TMV valves with combi adsorber charge work absolutely reliable, even in icy condition or while defrosting using hot gas.

2. Adsorber charge with pressure limiting performance MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R134a, R401A	+5 °C to -30 °C	MOP A +15 °C	34	37.4
	-10 °C to -30 °C	MOP A ±0 °C	29	31.9
R22, R407C, R407A, R422D	+5 °C to –45 °C	MOP A +15 °C	36	39.6
	-10 °C to -45 °C	MOP A ±0 °C	29	31.9
	-27 °C to -45 °C	MOP A -18 °C	29	31.9
R404A, R507A, R402A, R407B	-10 °C to -50 °C	MOP A ±0 °C	36	39.6
	-20 °C to -50 °C	MOP A -10 °C	34	37.4
	-27 °C to -50 °C	MOP A -18 °C	34	37.4
R407F	27 °C to -45 °C	MOP A -18 °C	29	31.9

Further refrigerants and MOP on request.

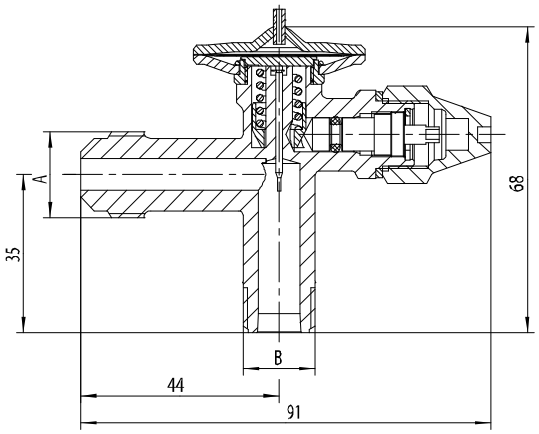
Capacities

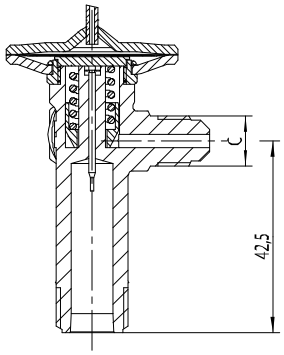
Type	Orifice size	Nominal capacity (kW)*						
		R134a	R22	R407C	R407F	R404A	R507A	R410A
TMV TMVX TMVBL TMVXBL	0.3	0.36	0.52	0.50	0.56	0.36	0.36	0.62
	0.5	0.69	0.99	0.95	1.1	0.68	0.69	1.2
	0.7	1.0	1.4	1.3	1.5	0.97	0.98	1.6
	1.0	1.4	2.0	1.9	2.2	1.4	1.4	2.4
	1.5	2.2	3.2	3.1	3.5	2.2	2.3	3.8
	2.0	2.9	4.0	3.9	4.3	2.8	2.9	4.8
	2.5	4.0	5.8	5.6	6.3	4.1	4.1	6.9
	3.0	6.6	9.3	8.9	10.1	6.5	6.6	11.1
	3.5	8.7	12.2	11.7	13.2	8.6	8.7	14.6
	4.5	11.8	17.0	16.4	18.5	12.0	12.1	20.3
	4.75	15.9	22.4	21.6	24.3	15.8	15.9	26.8

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

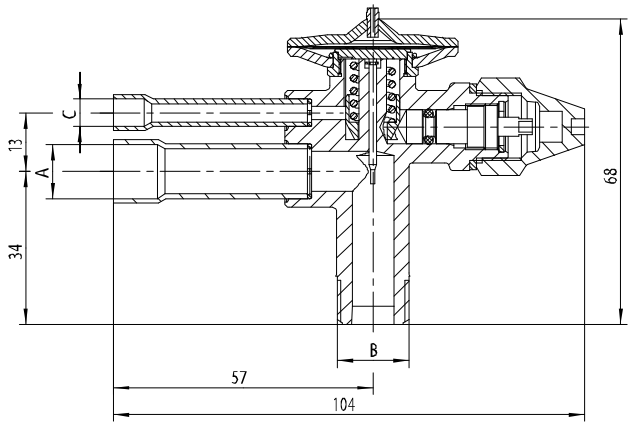
Dimensions and Weights

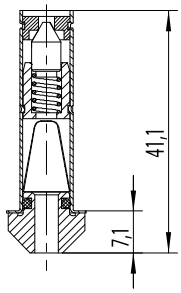
Type	Connections			Weight (kg)
	Inlet (B)	Outlet (A)	Pressure equaliser (C)	
TMV	5/8" UNF	3/4" UNF	-	approx. 0.35
TMVX	5/8" UNF	3/4" UNF	7/16" UNF	approx. 0.36
TMVBL	5/8" UNF	12 mm ODF	-	approx. 0.33
	5/8" UNF	1/2" ODF	-	
TMVXBL	5/8" UNF	12 mm ODF	6 mm ODF	approx. 0.34
	5/8" UNF	1/2" ODF	1/4" ODF	





TMV / TMVX





TMVBL / TMVXBL **VD**

Type Code / Order Information (Part Programme)

1. Valve body

	TMV	X	BL		R134a		MOP A +15 °C		5/8" UNF x 1/2" ODF
Series									
Pressure equalisation: X = external () = internal									
BL = flare x solder connection () = flare connection									
Refrigerant									
Adsorber charge with MOP () = without MOP									
Connection size (inlet x outlet)									

2. Orifice cartridge

	VD		0.5
Series			
Orifice size			

Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4” in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- Do not bend or squeeze the bulb when tightening the bulb clamp!
- When soldering the valve, the valve body must not get warmer than 100 °C.
- When tightening flare nuts of the flare connections grip at wrench flats on the valve body.
- Constructive modifications at the valve are not allowed.

Superheat Adjustment

In general the Honeywell valves should be installed with the factory setting for the used refrigerant unaltered.

At combi adsorber valves the label on the capillary tube indicates how to adjust the adjusting spindle (with arrow for direction), depending on the refrigerant used. This correction of the adjustment is essential to ensure that the control performance of the valve is correct. The refrigerant used must be marked on the label.

This superheat adjustment is calibrated for lowest superheating and optimum evaporator utilisation. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of adjusting spindle alters superheat setting by approx. 0.55 bar. Increase of superheat setting results in a lower MOP-value and vice versa.

Special Accessory:

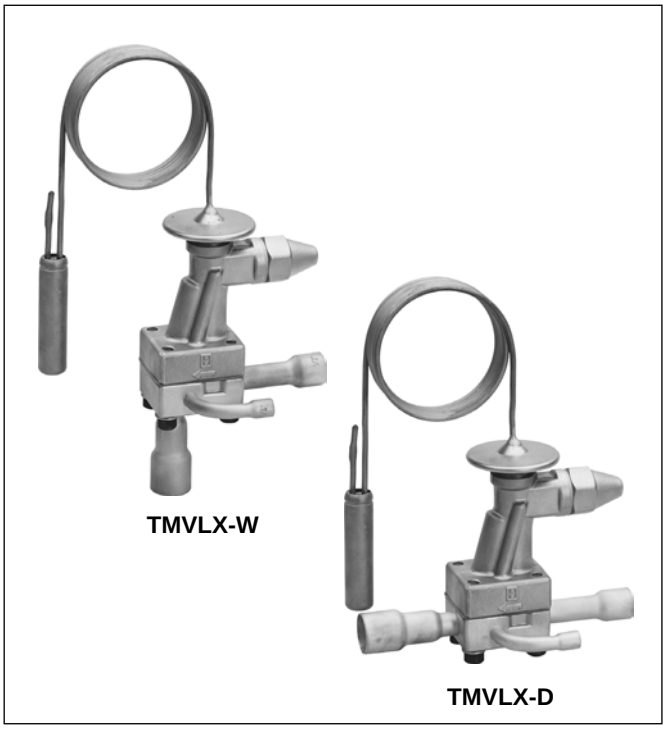
Adapter series LA for solder connection at the inlet for 6 mm, 10 mm, 1/4”, 3/8”.

Series TMVL

THERMOSTATIC EXPANSION VALVES

INTERCHANGEABLE ORIFICE CARTRIDGE, SEPARATE SOLDER BASE

PRODUCT DATA



TMVLX-W

TMVLX-D

Application

Thermostatic expansion valves series TMVL are used in general refrigeration and for original equipment.
Plants with one or more refrigerant circuits such as refrigerated cabinets even with cramped mounting conditions, ice and cream machines, milk cooling systems, cold stores, air conditioning systems and heat pumps.

Materials

Body	brass
Thermal head	stainless steel
Connection tubes	copper

Features

- **Only one valve body necessary for internal and external pressure equalisation. Connection for pressure coupler is integrated in the solder base.**
- **TMVL: Valve body and solder base with internal pressure equalisation; for single injection in installations with one or more cooling circuits.**
- **TMVLX: Valve body and solder base with external pressure equalisation; for optimal evaporation effectiveness in all applications. Obligatory for multiple injection by liquid distributors.**
- **Combi adsorber charge**
  - **The same valve can be used for different refrigerants (see table on page 48)**
  - **Controller charge is high sensitive and responsive thus lowest possible level of superheat can be achieved**
  - **Charge is not sensitive to effects of temperature on the capillary tube and valve head**
  - **Damping characteristic results in stable control behaviour**
- **Suitable for systems with hot gas defrosting**
- **Adjustable superheat setting**
- **Solder connections**
- **Solder base available in two-way construction and in angle construction**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Interchangeable orifice cartridges**
- **Refrigerants: R134a, R401A**
  R22, R407C, R407A, R422D
  R404A, R507A, R402A, R407B
  R124, R227, R410A, R236fa, R407F
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	0.52 to 22.4 kW R22 (small orifice graduation for optimal control behaviour, inter-changeable orifice cartridges)
Evaporating temp. range	see table on page 48
Maximum pressure PS	see table on page 48
Maximum test pressure PF	see table on page 48
Max. ambient temperature	100 °C
Max. bulb temperature	140 °C
Static superheat	approx. 3 K
Length of capillary tube	1.5 m
Bulb diameter	12 mm

Thermal Charges and Temperature Ranges

1. Adsorber charge

Refrigerant	Evaporation temperature range	PS (bar(a))	PF (bar(a))
R134a, R401A	+15 °C to -30 °C	34	37.4
R22, R407C, R407A, R422D	+15 °C to -45 °C	36	39.6
R404A, R507A, R402A, R407B	±0 °C to -50 °C	36	39.6
	+15 °C to -30 °C	36	39.6
R124	+20 °C to -30 °C	29	31.9
R227	+20 °C to -30 °C	29	31.9
R236fa	+30 °C to -10 °C	29	31.9
R407C	+15 °C to -30 °C	36	39.6
R410A	+15 °C to -20 °C	40	44
R407F	±0 °C to -45 °C	36	39.6

Further refrigerants on request.

Thermal systems with adsorber charge are completely insensitive to effects of temperature on the capillary tube and valve head. It reacts only according to the temperature of the bulb.

Thus, Honeywell TMVL valves with combi adsorber charge work absolutely reliable, even in icy condition or while defrosting using hot gas.

2. Adsorber charge with pressure limiting performance MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R134a, R401A	+5 °C to -30 °C	MOP A +15 °C	34	37.4
	-10 °C to -30 °C	MOP A ±0 °C	29	31.9
R22, R407C, R407A, R422D	+5 °C to -45 °C	MOP A +15 °C	36	39.6
	-10 °C to -45 °C	MOP A ±0 °C	29	31.9
	-27 °C to -45 °C	MOP A -18 °C	29	31.9
R404A, R507A, R402A, R407B	-10 °C to -50 °C	MOP A ±0 °C	36	39.6
	-20 °C to -50 °C	MOP A -10 °C	34	37.4
	-27 °C to -50 °C	MOP A -18 °C	34	37.4
R407F	-27 °C to -45 °C	MOP A -18 °C	29	31.9

Further refrigerants and MOP on request.

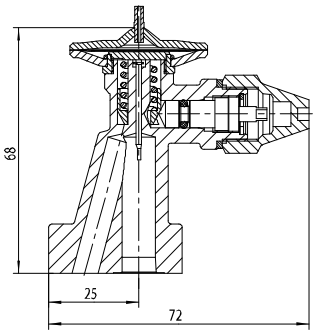
Capacities

Type	Orifice size	Nominal capacity (kW)*						
		R134a	R22	R407C	R407F	R404A	R507A	R410A
TMVL	0.3	0.36	0.52	0.50	0.56	0.36	0.36	0.62
	0.5	0.69	0.99	0.95	1.1	0.68	0.69	1.2
	0.7	1.0	1.4	1.3	1.5	0.97	0.98	1.6
	1.0	1.4	2.0	1.9	2.2	1.4	1.4	2.4
	1.5	2.2	3.2	3.1	3.5	2.2	2.3	3.8
	2.0	2.9	4.0	3.9	4.3	2.8	2.9	4.8
	2.5	4.0	5.8	5.6	6.3	4.1	4.1	6.9
	3.0	6.6	9.3	8.9	10.1	6.5	6.6	11.1
	3.5	8.7	12.2	11.7	13.2	8.6	8.7	14.6
	4.5	11.8	17.0	16.4	18.5	12.0	12.1	20.3
	4.75	15.9	22.4	21.6	24.3	15.8	15.9	26.8

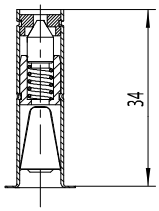
* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

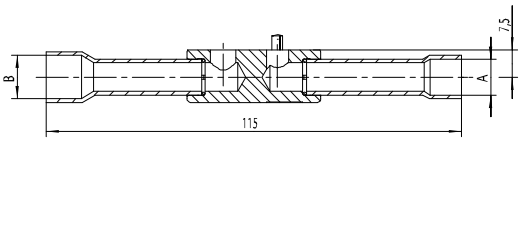
Type	Connections			Weight (kg)
	Inlet (A)	Outlet (B)	Pressure equaliser (C)	
TMVL	-	-	-	approx. 0.43
VLS angle construction	6 mm ODF	10 mm ODF	-	approx. 0.16
	1/4" ODF	3/8" ODF	-	
	10 mm ODF	12 mm ODF	-	
	3/8" ODF	1/2" ODF	-	
	12 mm ODF	16 mm ODF	-	
	1/2" ODF	5/8" ODF	-	
VLSX angle construction	6 mm ODF	10 mm ODF	6 mm ODF	approx. 0.17
	1/4" ODF	3/8" ODF	1/4" ODF	
	10 mm ODF	12 mm ODF	6 mm ODF	
	3/8" ODF	1/2" ODF	1/4" ODF	
	12 mm ODF	16 mm ODF	6 mm ODF	
	1/2" ODF	5/8" ODF	1/4" ODF	
VLS two-way construction	10 mm ODF	12 mm ODF	-	approx. 0.16
	3/8" ODF	1/2" ODF	-	
	12 mm ODF	16 mm ODF	-	
	1/2" ODF	5/8" ODF	-	
VLSX two-way construction	10 mm ODF	12 mm ODF	6 mm ODF	approx. 0.17
	3/8" ODF	1/2" ODF	1/4" ODF	
	12 mm ODF	16 mm ODF	6 mm ODF	
	1/2" ODF	5/8" ODF	1/4" ODF	

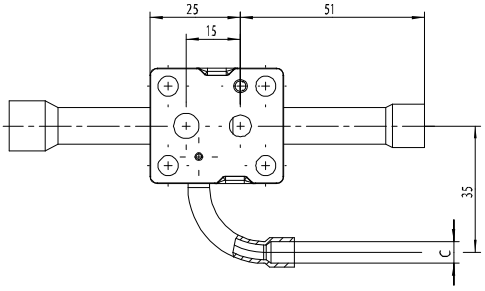


TMVL

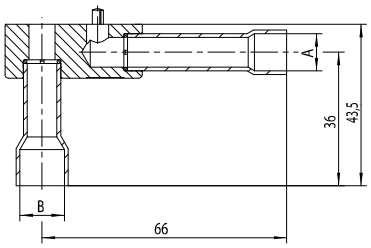


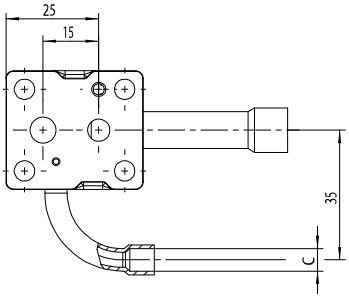
VD





VLS(X) – two-way





VLS(X) - angle

Type Code / Order Information (Part Programme)

1. Valve body

	TMVL		R22		MOP A -18 °C
Series					
Refrigerant					
Adsorber charge with MOP () = without MOP					

2. Solder base

	VLS	X		10 mm x 12 mm		W
Series						
Pressure equalisation: X = external () = internal						
Solder connection ODF (inlet x outlet)						
D = two-way construction W = angle construction						

3. Orifice cartridge

	VD		0.5
Series			
Orifice size			

Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4" in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- Do not bend or squeeze the bulb when tightening the bulb clamp!
- The screws fixing the valve body to the solder base must be tightened in diagonal sequence (torque 12^{+1} Nm).
- Constructive modifications at the valve are not allowed.
- Never quench the solder base with water after soldering, this may cause cracks and distort the sealing surfaces.

Superheat Adjustment

In general the Honeywell valves should be installed with the factory setting for the used refrigerant unaltered.

At combi adsorber valves the label on the capillary tube indicates how to adjust the adjusting spindle (with arrow for direction), depending on the refrigerant used. This correction of the adjustment is essential to ensure that the control performance of the valve is correct. The refrigerant used must be marked on the label.

This superheat adjustment is calibrated for lowest superheating and optimum evaporator utilisation. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

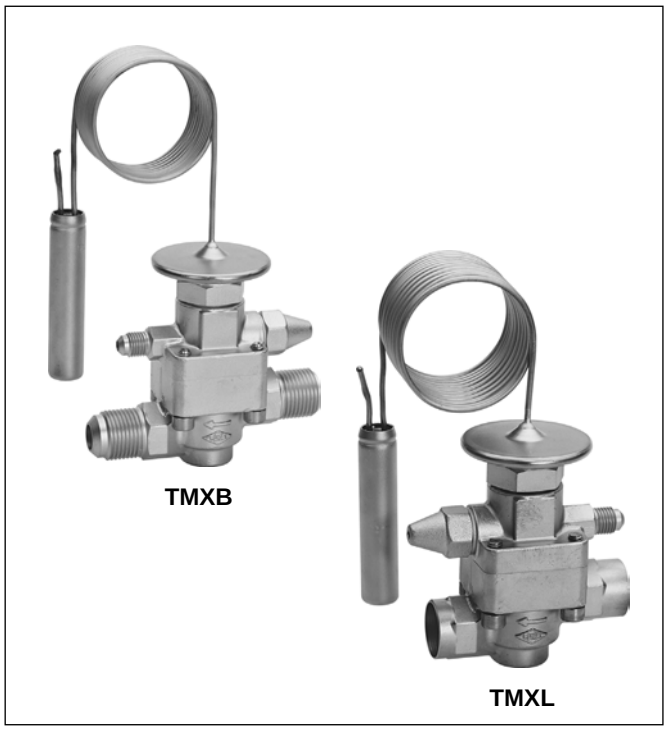
One turn of adjusting spindle alters superheat setting by approx. 0.55 bar. Increase of superheat setting results in a lower MOP-value and vice versa.

Series TMX

THERMOSTATIC EXPANSION VALVES

INTERCHANGEABLE ORIFICE CARTRIDGE, BALANCED PORT

PRODUCT DATA



TMXB

TMXL

Application

Thermostatic expansion valves series TMX are used in general refrigeration and for original equipment.

Plants with one or more refrigerant circuits such as refrigerated cabinets, deep freezing plants, milk cooling units, water chillers, air conditioning systems, cold stores and heat pumps. For plants with single and multiple injections, with high or low flow resistance, for all kind of distributors.

Materials

Body	brass
Thermal head	stainless steel
Base	brass

Features

- **TMXL: TMX and solder base, two-way construction or angle construction**
- **TMXB: TMX and flare base, two way construction**
- **Damped gas charge with pressure limiting MOP**
- **Liquid charge**
- **Adjustable superheat setting**
- **Solder connections or flare connections**
- **External pressure equalisation is integrated in the valve body**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Balanced port construction**
- **Interchangeable orifice cartridges**
- **Refrigerants: R22, R23, R134a, R227, R236fa, R401A, R404A, R407C, R410A, R422D, R507A, R508B, ISC89, R407F HFO (e.g. R1234yf) and future Blends Further refrigerants on request**.

Specification

Nominal capacity range	17.0 to 75.1 kW R22
Evaporating temperature range	see table on page 52
Maximum pressure PS	see table on page 52
Maximum test pressure PF	see table on page 52
Max. ambient temperature	100 °C
Max. bulb temperature	gas charge: 140 °C liquid charge: 70 °C
Static superheat	approx. 3.5 K
Length of capillary tube	2 m
Bulb diameter	16 mm

Thermal Charges and Temperature Ranges

1. Gas charge with pressure limiting MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
Commercial refrigerants				
R22	+15 °C to -45 °C	MOP +15 °C	36	39.6
	+10 °C to -45 °C	MOP +10 °C	36	39.6
	±0 °C to -45 °C	MOP ±0 °C	29	31.9
	-10 °C to -45 °C	MOP -10 °C	29	31.9
	-18 °C to -45 °C	MOP -18 °C	29	31.9
R134a	+25 °C to -40 °C	MOP +25 °C	34	37.4
	+20 °C to -40 °C	MOP +20 °C	34	37.4
	+15 °C to -40 °C	MOP +15 °C	34	37.4
	+10 °C to -40 °C	MOP +10 °C	34	37.4
	±0 °C to -40 °C	MOP ±0 °C	29	31.9
R401A	+10 °C to -40 °C	MOP +10 °C	34	37.4
R404A	+10 °C to -50 °C	MOP +10 °C	36	39.6
	±0 °C to -50 °C	MOP ±0 °C	36	39.6
	-10 °C to -50 °C	MOP -10 °C	34	37.4
	-18 °C to -50 °C	MOP -18 °C	34	37.4
	-30 °C to -50 °C	MOP -30 °C	29	31.9
R407C	+15 °C to -30 °C	MOP +15 °C	36	39.6
	+10 °C to -30 °C	MOP +10 °C	36	39.6
	±0 °C to -30 °C	MOP ±0 °C	29	31.9
R410A	+15 °C to -50 °C	MOP +15 °C	40	44.0
	-10 °C to -50 °C	MOP -10 °C	29	31.9
	-15 °C to -50 °C	MOP -15 °C	29	31.9
	-20 °C to -50 °C	MOP -20 °C	29	31.9
R422D	+15 °C to -45 °C	MOP +15 °C	36	39.6
	-18 °C to -45 °C	MOP -18 °C	29	31.9
R507A	+10 °C to -50 °C	MOP +10 °C	36	39.6
	±0 °C to -50 °C	MOP ±0 °C	36	39.6
	-18 °C to -50 °C	MOP -18 °C	34	37.4
R407F	+10 °C to -45 °C	MOP +10 °C	36	39.6
	-18 °C to -45 °C	MOP -18 °C	29	31.9

Further refrigerants and MOP on request.

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
Deep freeze refrigerants				
R23	-40 °C to -80 °C	MOP -40 °C	29	31.9
	-55 °C to -80 °C	MOP -55 °C	29	31.9
R410A	-40 °C to -70 °C	MOP -40 °C	29	31.9
R508B	-55 °C to -100 °C	MOP -55 °C	29	31.9
Isceon 89	-40 °C to -70 °C	MOP -40 °C	29	31.9

Further refrigerants and MOP on request.

MOP valves protect the compressor by limiting the increase of suction pressure.

The MOP value should be chosen for the max. permissible suction pressure of the compressor or min. 5 K higher than the required evaporating temperature of the system.

For orders without any MOP indication a valve with MOP + 10 C will be delivered.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TMX series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

2. Flüssigfüllung

Refrigerant	Evaporation temperature range	PS (bar(a))	PF (bar(a))
R22	+30 °C to -45 °C	36	39.6
R134a	+20 °C to -40 °C	34	37.4
R227	+40 °C to -10 °C	29	31.9
R236fa	+30 °C to -10 °C	29	31.9
R404A	+10 °C to -50 °C	36	39.6
R407C	+30 °C to -30 °C	36	39.6

Further refrigerants on request.

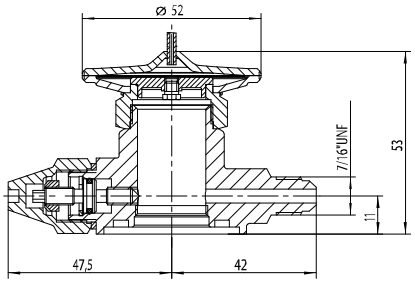
Capacities

Type	Orifice size	Nominal capacitiy (kW)*									
		R22	R134a	R404A	R407C	R407F	R410A	R507A	R124	R227	R236fa
	4.5	17.0	11.8	12.0	16.4	18.5	20.3	12.1	9.4	6.6	6.0
TMXL	4.75	22.4	15.9	15.8	21.6	24.3	26.8	15.9	12.4	8.7	8.0
	5	29.1	20.0	20.5	28.0	31.6	34.8	20.7	16.1	11.3	10.3
and	6	42.4	27.6	29.8	40.8	46.0	50.8	30.1	23.5	16.4	15.1
	7	54.5	35.3	38.3	52.5	59.1	65.3	38.7	30.2	21.1	19.4
TMXB	8	64.1	43.3	45.1	61.8	69.6	76.9	45.6	35.6	24.9	22.8
	10	75.1	51.0	52.8	72.3	81.5	90.0	53.3	41.7	29.1	26.7

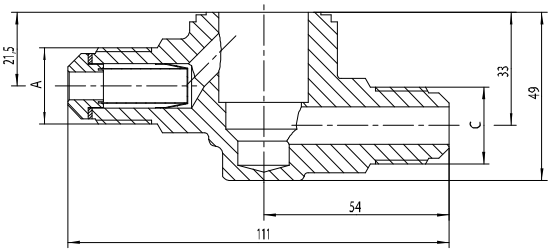
* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For refrigerant R124, R227 and 236fa: Capacities are based on t_o = +10 °C, t_c = +50 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

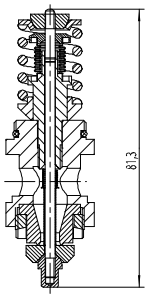
Dimensions and Weights

Type	Connections			Weight (kg)
	Inlet (A) + (B)	Outlet (C) + (D)	Pressure equaliser	
TMX	-	-	7/16" UNF	approx. 0.60
XD	-	-	-	approx. 0.14
XLS two-way construction	12 + 16 mm ODF	16 + 22 mm ODF	-	approx. 0.41
	1/2" + 5/8" ODF	5/8" + 7/8" ODF	-	
XLS angle construction	12 + 16 mm ODF	16 + 22 mm ODF	-	approx. 0.32
	1/2" + 5/8" ODF	5/8" + 7/8" ODF	-	
XBS two-way construction	7/8" UNF	7/8" UNF	-	approx. 0.49

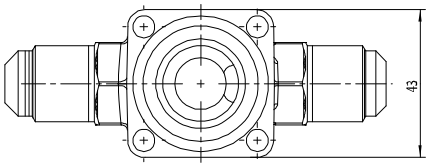


TMX

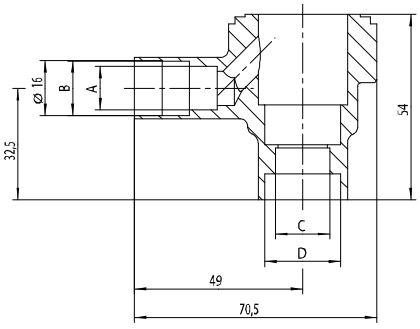


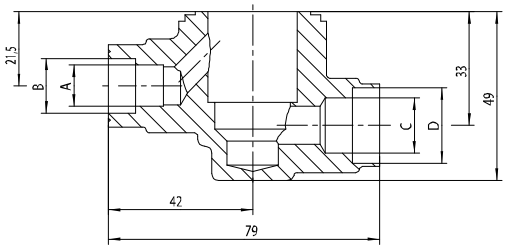


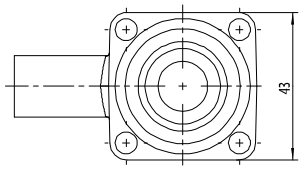
XD



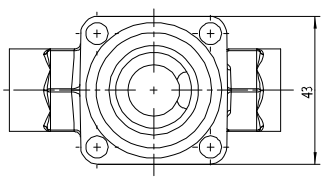
XBS – two-way







XLS - angle



XLS – two-way

Type Code / Order Information (Part Programme)

1. Valve body

	TMX		R134a		MOP +10 °C
Series					
Refrigerant					
Pressure limiting MOP () = without MOP					

2. Solder / Flare base

	XLS		16 mm x 22 mm		W
Series XLS = solder connection XBS = flare connection					
Connection size					
D = two-way construction W = angle construction					

3. Orifice cartridge

	XD		10
Series			
Orifice size			

Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4” in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- Do not bend or squeeze the bulb when tightening the bulb clamp!
- Never quench the base with water after soldering, this may cause cracks and distort the sealing surfaces.
- The screws fixing the valve body to the solder base must be tightened in diagonal sequence (torque 16^{+1} Nm).
- Constructive modifications at the valve are not allowed.

Superheat Adjustment

In general the Honeywell valves should be installed with the factory setting for the used refrigerant unaltered.

This superheat adjustment is calibrated for lowest superheating and optimum evaporator utilisation. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of adjusting spindle alters superheat setting by approx. 0.3 bar. Increase of superheat setting results in a lower MOP-value and vice versa.

Series TLK

THERMOSTATIC EXPANSION VALVES
FIXED ORIFICE, FIXED SUPERHEAT SETTING

PRODUCT DATA

Application

Thermostatic expansion valves series TLK are used for serial produced systems such as drink dispensers, beer coolers, ice cream machines, milk cooling units, water chillers and vehicle air conditioning systems. For single injected evaporators.

Materials

Body	brass
Thermal head	stainless steel
Connection tubes	copper

Features

- **Gas charge with MOP for quick response time adapted to small evaporators**
- **Wide evaporating temperature range**
- **Smallest dimensions**
- **Fixed superheat setting**
- **Warm thermal head provides best reliability**
- **Solder connections**
- **Internal pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Fixed orifice**
- **Bypass on request**
- **Refrigerants: R134a, R22, R404A, R407C, R507A HFO (e.g. R1234yf) and future Blends Further refrigerants on request.**

Specification

Nominal capacity range	0.52 to 4.0 kW R22
Evaporating temperature range	see table on page 56
Maximum pressure PS	see table on page 56
Maximum test pressure PF	see table on page 56
Max. ambient temperature	100 °C
Max. bulb temperature	140 °C
Static superheat	approx. 4 K
Length of capillary tube	1 m
Bulb diameter	12 mm

Thermal Charges and Temperature Ranges

1. Gas charge with pressure limiting MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R134a	+15 °C to -40 °C	MOP +15 °C	34	37.4
	+10 °C to -40 °C	MOP +10 °C	34	37.4
	±0 °C to -40 °C	MOP ±0 °C	29	31.9
R22	+15 °C to -45 °C	MOP +15 °C	36	39.6
	+10 °C to -45 °C	MOP +10 °C	36	39.6
	± 0 °C to -45 °C	MOP ±0 °C	29	31.9
	-18 °C to -45 °C	MOP -18 °C	29	31.9
R404A	+10 °C to -50 °C	MOP +10 °C	36	39.6
	±0 °C to -50 °C	MOP ±0 °C	36	39.6
	-18 °C to -50 °C	MOP -18 °C	34	37.4
R407C	+15 °C to -30 °C	MOP +15 °C	36	39.6
	+10 °C to -30 °C	MOP +10 °C	36	39.6
R507A	+10 °C bis -50 °C	MOP +10 °C	36	39.6

Further refrigerants and MOP on request.

MOP valves protect the compressor by limiting the increase of suction pressure.

The MOP value should be chosen for the max. permissible suction pressure of the compressor or min. 5 K higher than the required evaporating temperature of the system.

For orders without any MOP indication a valve with MOP + 10°C will be delivered.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TLK series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

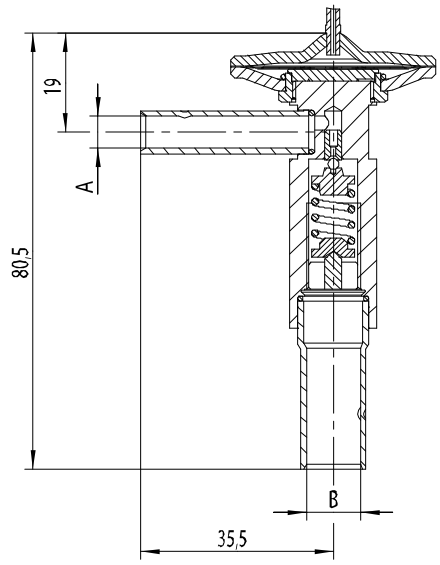
Capacities

Type	Orifice size	Nominal capacity (kW)*				
		R134a	R22	R404A	R407C	R507A
TLK	0.3	0.36	0.52	0.36	0.50	0.36
	0.5	0.69	0.99	0.68	0.95	0.69
	0.7	1.0	1.4	0.97	1.3	0.98
	1.0	1.4	2.0	1.4	1.9	1.4
	1.5	2.2	3.2	2.2	3.1	2.3
	2.0	2.9	4.0	2.8	3.9	2.9

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Orifice size	Connections		Weight (kg)
		Inlet (A)	Outlet (B)	
TLK	0.3 0.5 0.7	6 mm ODF	10 mm ODF	approx. 0.18
	1.0 1.5	1/4" ODF	3/8" ODF	
	2.0	10 mm ODF	12 mm ODF	approx. 0.19
		3/8" ODF	1/2" ODF	



TLK

Type Code / Order Information

	TLK	0.5	R22	MOP +10 °C	6 mm x 10 mm
Series					
Orifice size					
Refrigerant					
Gas charge with MOP					
Solder connection ODF (inlet x outlet)					

Installation

- The valves may be installed in any position.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- In case of ice formation at the mounting site of the bulb, we advise to use a bulb clamp instead of clips.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Do not bend or squeeze the bulb!
- Constructive modifications at the valve are not allowed.

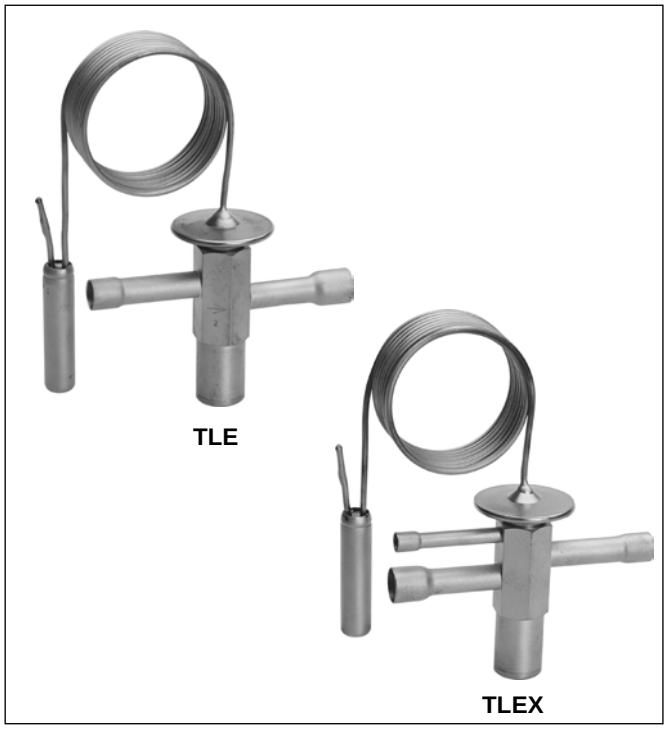
Information for original equipment manufacturers:
The valve series TLK can be customised to the requirements of your series device in an optimum way. Contact us!

Series TLE

THERMOSTATIC EXPANSION VALVES

FIXED ORIFICE, ADJUSTABLE SUPERHEAT SETTING

PRODUCT DATA



Application

Thermostatic expansion valves series TLE and TLEX are used in plants with one or more refrigerant circuits, in particular for series systems such as heat pumps, refrigerated cabinets, deep freeze chests, freezers, fermentation interrupters, ice and cream machines, compact systems in refrigeration and air conditioning.

Materials

Body	brass
Thermal head	stainless steel
Connection tubes	copper

Features

- **TLE: with internal pressure equalisation; for single injection in installations with one or more cooling circuits.**
- **TLEX: with external pressure equalisation; for optimal evaporation effectiveness in all applications. Obligatory for multiple injection by liquid distributors.**
- **Combi adsorber charge as standard**
  - **The same valve can be used for different refrigerants (see table on page 60)**
  - **Controller charge is high sensitive and responsive thus lowest possible level of superheat can be achieved**
  - **Charge is not sensitive to effects of temperature on the capillary tube and valve head**
  - **damping characteristic results in stable control behaviour**
- **Gas charge for deep freeze applications**
- **Adjustable superheat setting**
- **Warm thermal head provides best reliability**
- **Solder connections**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Fixed orifice**
- **Refrigerants: R134a, R401A**
  R22, R407C, R407A, R422D
  R404A, R507A, R402A, R407B
  R410A
  R23, ISC 89, R508A, R508B
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	0.99 to 17.0 kW R22 (small orifice graduation for optimal control behaviour)
Evaporating temperature range	see table on page 60
Maximum pressure PS	see table on page 60
Maximum test pressure PF	see table on page 60
Max. ambient temperature	100 °C
Max. bulb temperature	140 °C
Static superheat	approx. 3 K
Length of capillary tube	1.5 m
Bulb diameter	12 mm

Thermal Charges and Temperature Ranges

1. Adsorber charge

Refrigerant	Evaporation temperature range	PS (bar(a))	PF (bar(a))
R134a, R401A	+15 °C to -30 °C	34	37.4
R22, R407C, R407A, R422D	+15 °C to -45 °C	36	39.6
R404A, R507A, R402A, R407B	±0 °C to -50 °C	36	39.6
R410A	+15 °C to -20 °C	40	44.0

Further refrigerants on request.

Thermal systems with adsorber charge are completely insensitive to effects of temperature on the capillary tube and valve head. It reacts only according to the temperature of the bulb.

Thus, Honeywell TLE and TLEX valves with combi adsorber charge work absolutely reliable, even in icy condition or while defrosting using hot gas.

2. Adsorber charge with pressure limiting performance (MOP)

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R134a, R401A	+5 °C to -30 °C	MOP A +15 °C	34	37.4
	-10 °C to -30 °C	MOP A ±0 °C	29	31.9
R22, R407C, R407A, R422D	+5 °C to -45 °C	MOP A +15 °C	36	39.6
	-10 °C to -45 °C	MOP A ±0 °C	29	31.9
	-27 °C to -45 °C	MOP A -18 °C	29	31.9
R404A, R507A, R402A, R407B,	-10 °C to -50 °C	MOP A ±0 °C	36	39.6
	-20 °C to -50 °C	MOP A -10 °C	34	37.4
	-27 °C to -50 °C	MOP A -18 °C	34	37.4

Further refrigerants and MOP on request.

3. Gas charge

Refrige rant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
ISC 89	-40 °C to -70 °C	MOP -40 °C	29	31.9
	-55 °C to -70 °C	MOP -55 °C	29	31.9
R23	-40 °C to -80 °C	MOP -40 °C	29	31.9
	-55 °C to -80 °C	MOP -55 °C	29	31.9
R407C	+10 °C to -30 °C	MOP +10 °C	36	39.6
R410A	+15 °C to -50 °C	MOP +15 °C	40	44.0
R508A	-40 °C to -90 °C	MOP -40 °C	29	31.9
	-55 °C to -90 °C	MOP -55 °C	29	31.9
R508B	-40 °C to -100 °C	MOP -40 °C	29	31.9
	-55 °C to -100 °C	MOP -55 °C	29	31.9

Further refrigerants and MOP on request.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TLE and TLEX series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

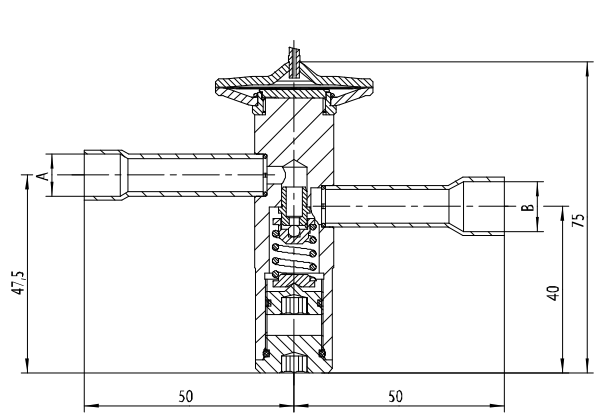
Capacities

Type	Orifice size	Nominal capacity (kW)*					
		R134a	R22	R407C	R410A	R404A	R507A
TLE TLEX	0.5	0.69	0.99	0.95	1.2	0.68	0.69
	0.7	1.0	1.4	1.3	1.6	0.97	0.98
	1.0	1.4	2.0	1.9	2.4	1.4	1.4
	1.5	2.2	3.2	3.1	3.8	2.2	2.3
	2.0	2.9	4.0	3.9	4.8	2.8	2.9
	2.5	4.0	5.8	5.6	6.9	4.1	4.1
	3.0	6.6	9.3	8.9	11.1	6.5	6.6
	3.5	8.7	12.2	11.7	14.6	8.6	8.7
	4.5	11.8	17.0	16.4	20.3	12.0	12.1

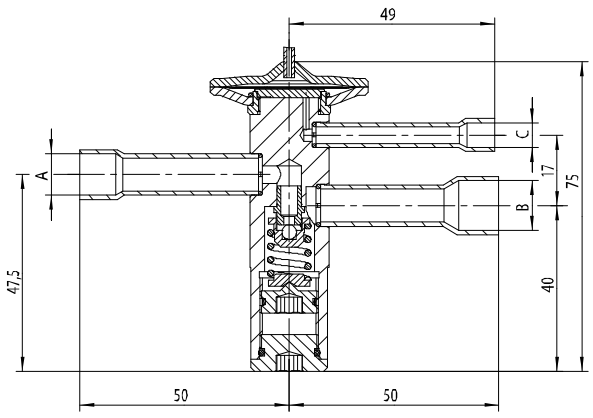
* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Orifice size	Connections			Weight (kg)
		Inlet (A)	Outlet (B)	Pressure equaliser (C)	
TLE TLEX	0.5 0.7 1.0	6 mm ODF	12 mm ODF	6 mm ODF	approx. 0.32
		1/4" ODF	1/2" ODF	1/4" ODF	
	1.5 2.0 2.5 3.0 3.5	10 mm ODF	12 mm ODF	6 mm ODF	
		3/8" ODF	1/2" ODF	1/4" ODF	
	4.5	10 mm ODF	16 mm ODF	6 mm ODF	
		3/8" ODF	5/8" ODF	1/4" ODF	
		12 mm ODF	16 mm ODF	6 mm ODF	
		1/2" ODF	5/8" ODF	1/4" ODF	



TLE 0.5 – 4.5



TLEX 0.5 – 4.5

Type Code / Order Information

	TLE		X		0.7		R22		MOP A -18 °C		3/8“ x 1/2“
Series											
Pressure equalisation: X = external () = internal											
Orifice size											
Refrigerant											
Charge type, MOP, evaporation temperature range											
Solder connection ODF (inlet x outlet)											

Installation

- The valves may be installed in any position.
- The external pressure equaliser line (TLEX) should be 6 mm or 1/4" in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Do not bend or squeeze the bulb when tightening the bulb clamp!
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:
The valve series TLE can be customised to the requirements of your series device in an optimum way. Contact us!

Superheat Adjustment

In general the Honeywell valves should be installed with the factory setting for the used refrigerant unaltered.

At combi adsorber valves the label on the capillary tube indicates how to adjust the adjusting spindle (with arrow for direction), depending on the refrigerant used. This correction of the adjustment is essential to ensure that the control performance of the valve is correct. The refrigerant used must be marked on the label.

This superheat adjustment is calibrated for lowest superheating and optimum evaporator utilisation. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of adjusting spindle alters superheat setting by approx. 0.25 bar. Increase of superheat setting results in a lower MOP-value and vice versa.

Series TBE

THERMOSTATIC EXPANSION VALVES
FIXED ORIFICE, FLARE CONNECTIONS

PRODUCT DATA

TBEX 0.5 - 4.5 two-way

TBEX 0.5 - 4.5 angle

Application

Thermostatic expansion valves series TBE are used in plants with one or more refrigerant circuits, especially for series installations mobile air-conditioning and cooling units with flare connection, e. g. bus AC, train AC, transport cooling.

Materials

Body	brass
Thermal head	stainless steel
Connections	brass

Features

- **TBE: with internal pressure equalisation; for single injection in installations with one or more cooling circuits.**
- **TBEX: with external pressure equalisation; for optimal evaporation effectiveness in all applications. Obligatory for multiple injection by liquid distributors.**
- **Combi adsorber charge as standard**
  - **The same valve can be used for different refrigerants (see table on page 64)**
  - **Controller charge is high sensitive and responsive thus lowest possible level of superheat can be achieved**
  - **Charge is not sensitive to effects of temperature on the capillary tube and valve head**
  - **damping characteristic results in stable control behaviour**
- **Optional available with gas charge and MOP**
- **Adjustable superheat for two-way construction**
- **Fixed superheat setting for angle construction**
- **Warm thermal head provides best reliability**
- **Flare connections**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Fixed orifice**
- **Refrigerants: R134a, R401A**
  R22, R407C, R407A, R422D
  R404A, R507A, R402A, R407B
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	0.99 to 17.0 kW R22 (small orifice graduation for optimal control behaviour)
Evaporating temperature range	see table on page 64
Maximum pressure PS	see table on page 64
Maximum test pressure PF	see table on page 64
Max. ambient temperature	100 °C
Max. bulb temperature	140 °C
Static superheat	approx. 3 K
Length of capillary tube	1.5 m
Bulb diameter	12 mm

Thermal Charges and Temperature Ranges

1. Adsorber charge

Refrigerant	Evaporation temperature range	PS (bar(a))	PF (bar(a))
R134a, R401A	+15 °C to -30 °C	34	37.4
R22, R407C, R407A, R422D	+15 °C to -45 °C	36	39.6
R404A, R507A, R402A, R407B	±0 °C to -50 °C	36	39.6

Further refrigerants on request.

Thermal systems with adsorber charge are completely insensitive to effects of temperature on the capillary tube and valve head. It reacts only according to the temperature of the bulb.

Thus, Honeywell TBE(X) valves with combi adsorber charge work absolutely reliable, even in icy condition or while defrosting using hot gas.

2. Adsorber charge with pressure limiting performance (MOP)

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R134a, R401A	+5 °C to -30 °C	MOP A +15 °C	34	37.4
	-10 °C to -30 °C	MOP A ±0 °C	29	31.9
R22, R407C, R407A, R422D	+5 °C to -45 °C	MOP A +15 °C	36	39.6
	-10 °C to -45 °C	MOP A ±0 °C	29	31.9
	-27 °C to -45 °C	MOP A -18 °C	29	31.9
R404A, R507A, R402A, R407B	-10 °C to -50 °C	MOP A ±0 °C	36	39.6
	-20 °C to -50 °C	MOP A -10 °C	34	37.4
	-27 °C to -50 °C	MOP A -18 °C	34	37.4

Further refrigerants and MOP on request.

3. Gas charge

Refrigerants and MOP on request.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TBE series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

Capacities

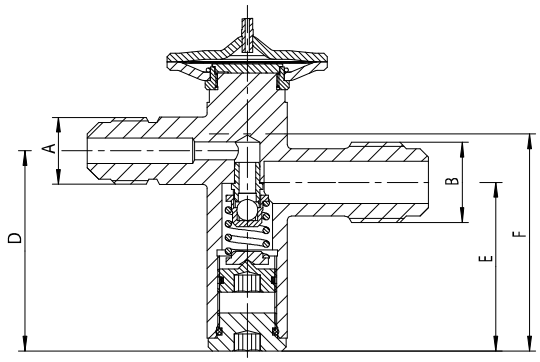
Type	Orifice size	Nominal capacity (kW)*					
		R134a	R22	R407C	R422D	R404A	R507A
TBE TBEX	0.5	0.69	0.99	0.95	0.67	0.68	0.69
	0.7	1.0	1.4	1.3	0.92	0.97	0.98
	1.0	1.4	2.0	1.9	1.3	1.4	1.4
	1.5	2.2	3.2	3.1	2.2	2.2	2.3
	2.0	2.9	4.0	3.9	2.7	2.8	2.9
	2.5	4.0	5.8	5.6	3.9	4.1	4.1
	3.0	6.6	9.3	8.9	6.3	6.5	6.6
	3.5	8.7	12.2	11.7	8.3	8.6	8.7
	4.5	11.8	17.0	16.4	11.3	12.0	12.1

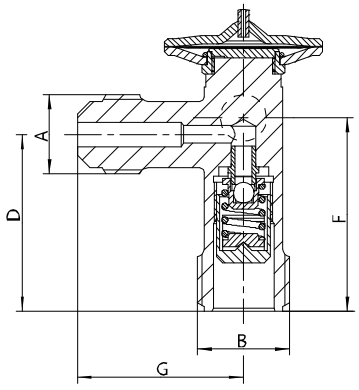
* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

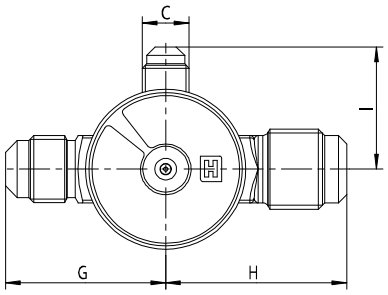
Dimensions and Weights

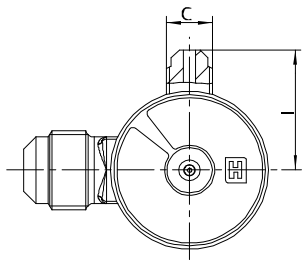
Type	Connections			Dimensions (mm)						Weight (kg)
	Inlet (A)	Outlet (B)	Pressure equalisation (C)	D	E	F	G	H	I	
Two-way construction	5/8" UNF	3/4" UNF	7/16" UNF	47.5	40	51.5	38	43	29	approx. 0.34
Angle construction	3/4" UNF	7/8" UNF	7/16" UNF	42.5	-	46.5	40	-	29	approx. 0.34

Connection = size of UNF thread









TBE(X) 0.5 - 4.5 two-way

TBEX 0.5 - 4.5 angle

Type Code / Order Information

	TBE	X		4.5		R134a	MOP A +15 °C		5/8“ x 3/4“		D
Series											
Pressure equalisation: X = external () = internal											
Orifice size											
Refrigerant											
Charge type, MOP, evaporation temperature range											
Flare connection UNF (inlet x outlet)											
D = two-way construction W = angle construction											

Installation

- The valves may be installed in any position.
- The external pressure equaliser line (TBEX) should be 6 mm or 1/4" in diameter and is to be connected down-stream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- When tightening flare nuts of the flare connections grip at wrench flats on the valve body.
- Do not bend or squeeze the bulb when tightening the bulb clamp!
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:
The valve series TBE can be customised to the requirements of your series device in an optimum way. Contact us!

Superheat Adjustment (Two-way Valve)

In general the Honeywell valves should be installed with the factory setting for the used refrigerant unaltered.

This superheat adjustment is calibrated for lowest superheating and optimum evaporator utilisation. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of adjusting spindle alters superheat setting by approx. 0.25 bar. Increase of superheat setting results in a lower MOP-value and vice versa.

With TBEX angle construction there is no superheat setting in built-in condition possible, use factory setting.

Series TOE

THERMOSTATIC EXPANSION VALVES
FIXED ORIFICE, O-RING CONNECTIONS

PRODUCT DATA

TOEX 0.5 - 4.5 two-way

TOEX 0.5 - 4.5 angle

Application

Thermostatic expansion valves series TOE(X) are used in plants with one or more refrigerant circuits, especially for series installations, mobile air-conditioning and cooling units with O-ring connection, e. g. bus AC, train AC, transport cooling.

Materials

Body	brass
Thermal head	stainless steel
Connections	brass

Features

- **TOE: with internal pressure equalisation; for single injection in installations with one or more cooling circuits.**
- **TOEX: with external pressure equalisation; for optimal evaporation effectiveness in all applications. Obligatory for multiple injection by liquid distributors.**
- **Combi adsorber charge as standard**
  - **The same valve can be used for different refrigerants (see table on page 68)**
  - **Controller charge is high sensitive and responsive thus lowest possible level of superheat can be achieved**
  - **Charge is not sensitive to effects of temperature on the capillary tube and valve head**
  - **damping characteristic results in stable control behaviour**
- **Optional available with gas charge and MOP**
- **Adjustable superheat for two-way construction**
- **Fixed superheat setting for angle construction**
- **Warm thermal head provides best reliability**
- **O-ring connections**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Fixed orifice**
- **Refrigerants: R134a**
  R22, R407C, R422D
  R404A, R507A
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	0.99 to 17.0 kW R22 (small orifice graduation for optimal control behaviour)
Evaporating temperature range	see table on page 68
Maximum pressure PS	see table on page 68
Maximum test pressure PF	see table on page 68
Max. ambient temperature	100 °C
Max. bulb temperature	140 °C
Static superheat	approx. 3 K
Length of capillary tube	1.5 m
Bulb diameter	12 mm

Thermal Charges and Temperature Ranges

1. Adsorber charge

Refrigerant	Evaporation temperature range	PS (bar(a))	PF (bar(a))
R134a	+15 °C to -30 °C	34	37.4
R22, R407C, R422D	+15 °C to -30 °C	36	39.6
R404A, R507A	±0 °C to -30 °C	36	39.6

Further refrigerants on request.

Thermal systems with adsorber charge are completely insensitive to effects of temperature on the capillary tube and valve head. It reacts only according to the temperature of the bulb.

Thus, Honeywell TOE(X) valves with combi adsorber charge work absolutely reliable, even in icy condition or while defrosting using hot gas.

2. Adsorber charge with pressure limiting performance (MOP)

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R134a	+5 °C to -30 °C	MOP A +15 °C	34	37.4
	-10 °C to -30 °C	MOP A ±0 °C	29	31.9
R22, R407C, R422D	+5 °C to -30 °C	MOP A +15 °C	36	39.6
	-10 °C to -30 °C	MOP A ±0 °C	29	31.9
R404A, R507A	-10 °C to -30 °C	MOP A ±0 °C	36	39.6
	-20 °C to -30 °C	MOP A -10 °C	34	37.4

Further refrigerants and MOP on request.

3. Gas charge

Refrigerants and MOP on request.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TOE series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

Capacities

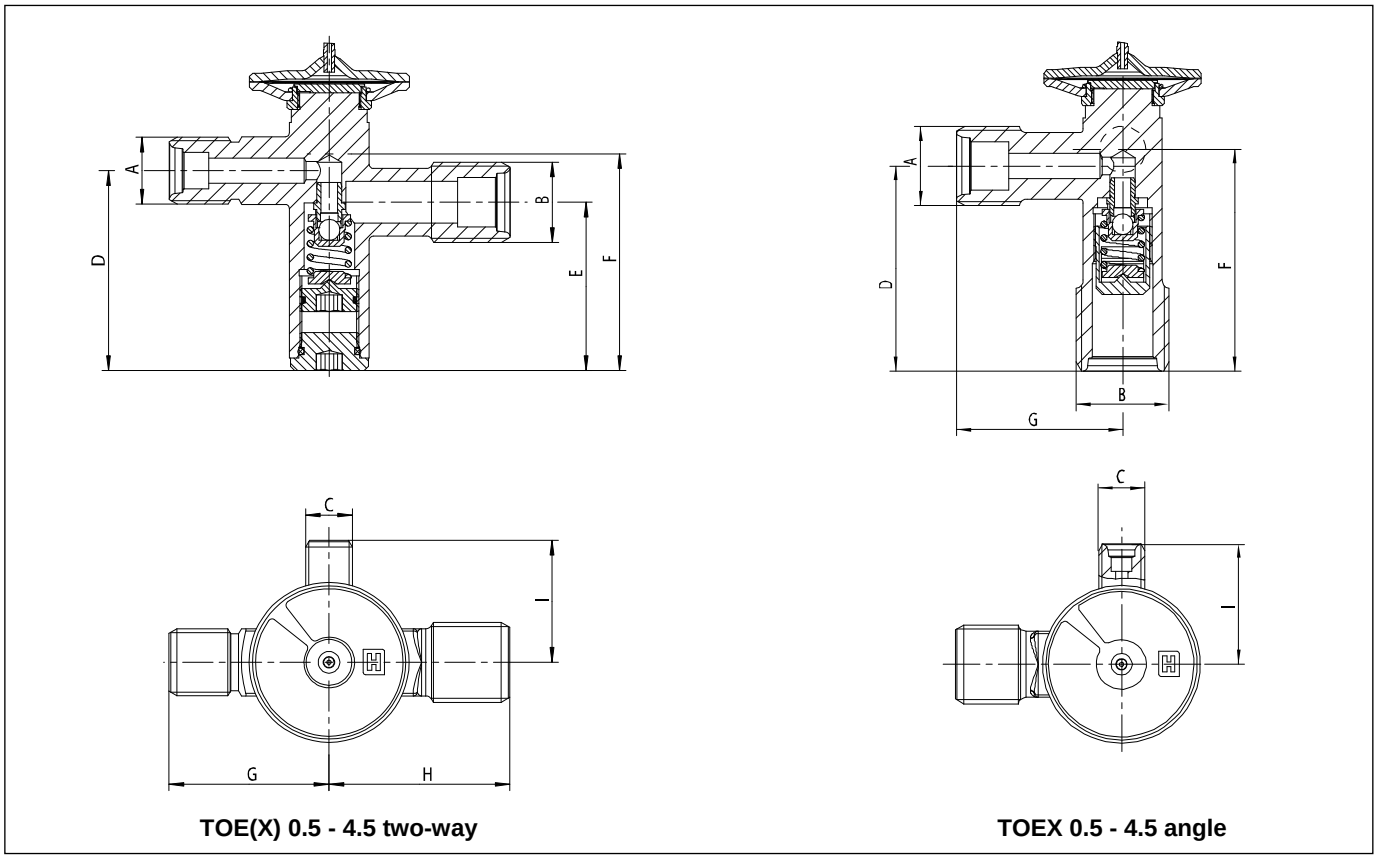
Type	Orifice size	Nominal capacity (kW)*					
		R134a	R22	R407C	R422D	R404A	R507A
TOE TOEX	0.5	0.69	0.99	0.95	0.67	0.68	0.69
	0.7	1.0	1.4	1.3	0.92	0.97	0.98
	1.0	1.4	2.0	1.9	1.3	1.4	1.4
	1.5	2.2	3.2	3.1	2.2	2.2	2.3
	2.0	2.9	4.0	3.9	2.7	2.8	2.9
	2.5	4.0	5.8	5.6	3.9	4.1	4.1
	3.0	6.6	9.3	8.9	6.3	6.5	6.6
	3.5	8.7	12.2	11.7	8.3	8.6	8.7
	4.5	11.8	17.0	16.4	11.3	12.0	12.1

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Connections			Dimensions (mm)						Weight (kg)
	Inlet (A)	Outlet (B)	Pressure equalisation (C)	D	E	F	G	H	I	
Two-way construction	5/8" UNF	3/4" UNF	7/16" UNF	47.5	40	51.5	38	43	29	approx. 0.34
Angle construction	3/4" UNF	7/8" UNF	7/16" UNF	42.5	-	46.5	40	-	29	approx. 0.34

Connection = size of UNF thread



Type Code / Order Information

	TOE	X		4.5		R134a		MOP A +15 °C		5/8“ x 3/4“		D
Series												
Pressure equalisation: X = external () = internal												
Orifice size												
Refrigerant												
Charge type, MOP, evaporation temperature range												
O-ring connection UNF (inlet x outlet)												
D = two-way construction W = angle construction												

Installation

- The valves may be installed in any position.
- The external pressure equaliser line (TOEX) should be 6 mm or 1/4" in diameter and is to be connected down-stream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- When tightening flare nuts of the flare connections grip at wrench flats on the valve body.
- Do not bend or squeeze the bulb when tightening the bulb clamp!
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:
The valve series TOE can be customised to the requirements of your series device in an optimum way. Contact us!

Superheat Adjustment (Two-way Valve)

In general the Honeywell valves should be installed with the factory setting for the used refrigerant unaltered.

This superheat adjustment is calibrated for lowest superheating and optimum evaporator utilisation. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of adjusting spindle alters superheat setting by approx. 0.25 bar. Increase of superheat setting results in a lower MOP-value and vice versa.

With TOEX angle construction there is no superheat setting in built-in condition possible, use factory setting.

Series TLESX

THERMOSTATIC EXPANSION VALVES

FIXED ORIFICE, ADJUSTABLE SUPERHEAT SETTING, SINGLE PORT

PRODUCT DATA

Application

Thermostatic expansion valves series TLESX are used in plants with one or more refrigerant circuits, in particular for series installations such as bus and train air-conditioning units, mobile air-conditioning and cooling units, chiller units and heat pumps.

Materials

Body	brass
Thermal head	stainless steel
Connection tubes	copper

Features

- **Damped gas charge with MOP as standard**
- **Optional available with liquid charge**
- **Adjustable superheat setting**
- **Warm thermal head provides best reliability**
- **Solder connections**
- **External pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Single port construction, without high pressure compensation**
- **Fixed orifice**
- **Refrigerants: R22, R134a, R404A, R407C, R410A**
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	22.4 to 42.4 kW R22
Evaporating temperature range	see table on page 72
Maximum pressure PS	see table on page 72
Maximum test pressure PF	see table on page 72
Max. ambient temperature	100 °C
Max. bulb temperature	gas charge: 140 °C
	liquid charge: 70 °C
Static superheat	approx. 3 K
Length of capillary tube	2 m
Bulb diameter	16 mm

Thermal Charges and Temperature Ranges

1. Gas charge with pressure limiting MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R22	+15 °C to -45 °C	MOP +15 °C	36	39.6
R134a	+15 °C to -40 °C	MOP +15 °C	34	37.4
R404A	+10 °C to -50 °C	MOP +10 °C	36	39.6
R407C	+10 °C to -30 °C	MOP +10 °C	36	39.6
	+15 °C to -30 °C	MOP +15 °C	36	39.6
R410A	+15 °C to -30 °C	MOP +15 °C	40	44

Further refrigerants and MOP on request.

MOP valves protect the compressor by limiting the increase of suction pressure.

The MOP value should be chosen for the max. permissible suction pressure of the compressor or min. 5 K higher than the required evaporating temperature of the system.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TLESX series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

2. Liquid charge

Refrigerants on request.

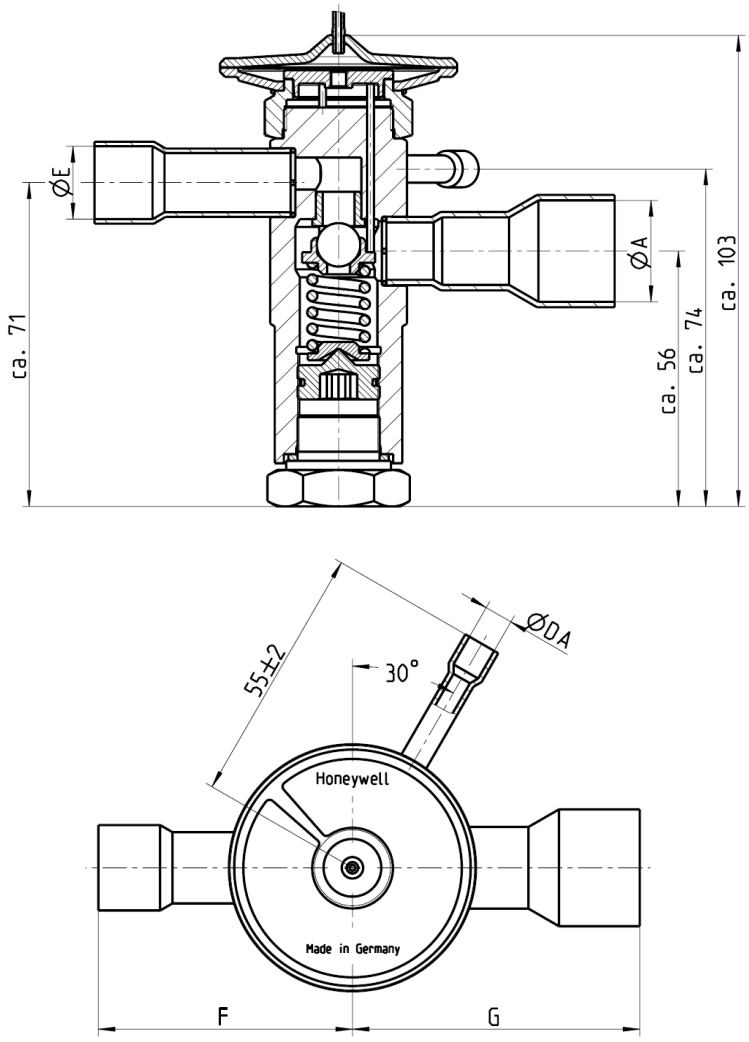
Capacities

Type	Orifice size	Nominal capacity (kW)*				
		R22	R134a	R404A	R407C	R410A
TLESX	4.75	22.4	15.9	15.8	21.6	26.8
	5	29.1	20.0	20.5	28.0	34.8
	6	42.4	27.6	29.8	40.8	50.8

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Connections			Dimensions (mm)		Weight (kg)
	Inlet (ØE)	Outlet (ØA)	Pressure equalizer (ØDA)	F	G	
TLESX	12 mm ODF	16 mm ODF	6 mm ODF	54	54	approx. 0.8
	1/2‘‘ ODF	5/8‘‘ ODF	1/4‘‘ ODF			
	16 mm ODF	22 mm ODF	6 mm ODF		61	
	5/8‘‘ ODF	7/8‘‘ ODF	1/4‘‘ ODF			

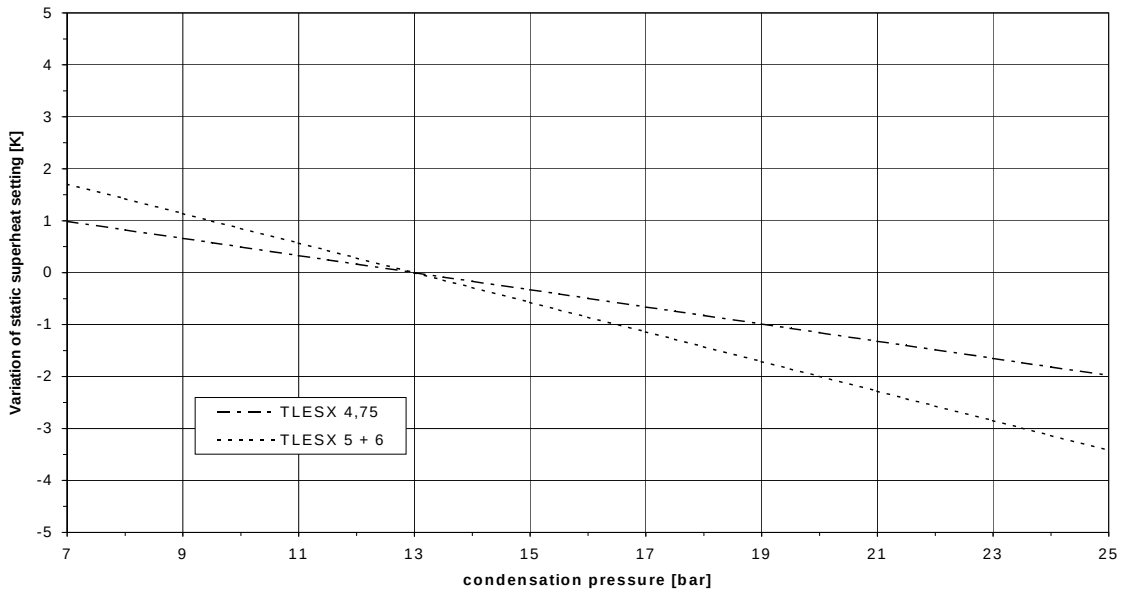


TLESX

Type Code / Order Information

	TLESX		5		R134a		MOP +15 °C		12 mm x 16 mm
Series									
Orifice size									
Refrigerant									
MOP, evaporation temperature range									
Solder connection ODF (inlet x outlet)									

Influence of Condensation Pressure to the Static Superheat Setting



Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4" in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Do not bend or squeeze the bulb when thightening the bulb clamp!
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:
The valve series TLESX can be customised to the requirements of your series device in an optimum way. Contact us!

Superheat Adjustment

In general the valves should be installed with the factory setting for the used refrigerant unaltered. This setting is calibrated for lowest superheating and optimum evaporator utilization. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of the adjusting spindle alters superheat setting by approx. 0.3 bar. Increase of superheat setting results in a lower MOP value and vice versa.

Series TLEX

THERMOSTATIC EXPANSION VALVES

FIXED ORIFICE, ADJUSTABLE SUPERHEAT SETTING, BALANCED PORT

PRODUCT DATA

Application

Thermostatic expansion valves series TLEX are used in plants with one or more refrigerant circuits, in particular for series installations such as chiller units, heat pumps, and transport cooling.

Materials

Body	brass
Thermal head	stainless steel
Connection tubes	copper

Features

- **Damped gas charge with MOP as standard**
- **Optional available with liquid charge**
- **Adjustable superheat setting**
- **Warm thermal head provides best reliability**
- **Solder connections**
- **External pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Balanced port construction**
- **Fixed orifice**
- **Refrigerants: R22, R134a, R404A, R407C, R410A HFO (e.g. R1234yf) and future Blends Further refrigerants on request.**

Specification

Nominal capacity range	22.4 to 54.5 kW R22
Evaporating temperature range	see table on page 76
Maximum pressure PS	see table on page 76
Maximum test pressure PF	see table on page 76 (simultaneous on all connections)
Max. ambient temperature	100 °C
Max. bulb temperature	gas charge: 140 °C liquid charge: 70 °C
Static superheat	approx. 3.5 K
Length of capillary tube	2 m
Bulb diameter	16 mm

Thermal Charges and Temperature Ranges

1. Gas charges with pressure limiting MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R22	+15 °C to -45 °C	MOP +15 °C	36	39.6
	+10 °C to -45 °C	MOP +10 °C	36	39.6
R134a	+20 °C to -40 °C	MOP +20 °C	34	37.4
	+15 °C to -40 °C	MOP +15 °C	34	37.4
	+10 °C to -40 °C	MOP +10 °C	34	37.4
R404A	+10 °C to -45 °C	MOP +10 °C	36	39.6
	±0 °C to -45 °C	MOP ±0 °C	36	39.6
R407C	+15 °C to -30 °C	MOP +15 °C	36	39.6
	+15 °C to -45 °C	MOP +15 °C	36	39.6
R410A	+15 °C to -30 °C	MOP +15 °C	40	44

Further refrigerants and MOP on request.

MOP valves protect the compressor by limiting the increase of suction pressure.

The MOP value should be chosen for the max. permissible suction pressure of the compressor or min. 5 K higher than the required evaporating temperature of the system.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

2. Liquid charge

Refrigerants on request.

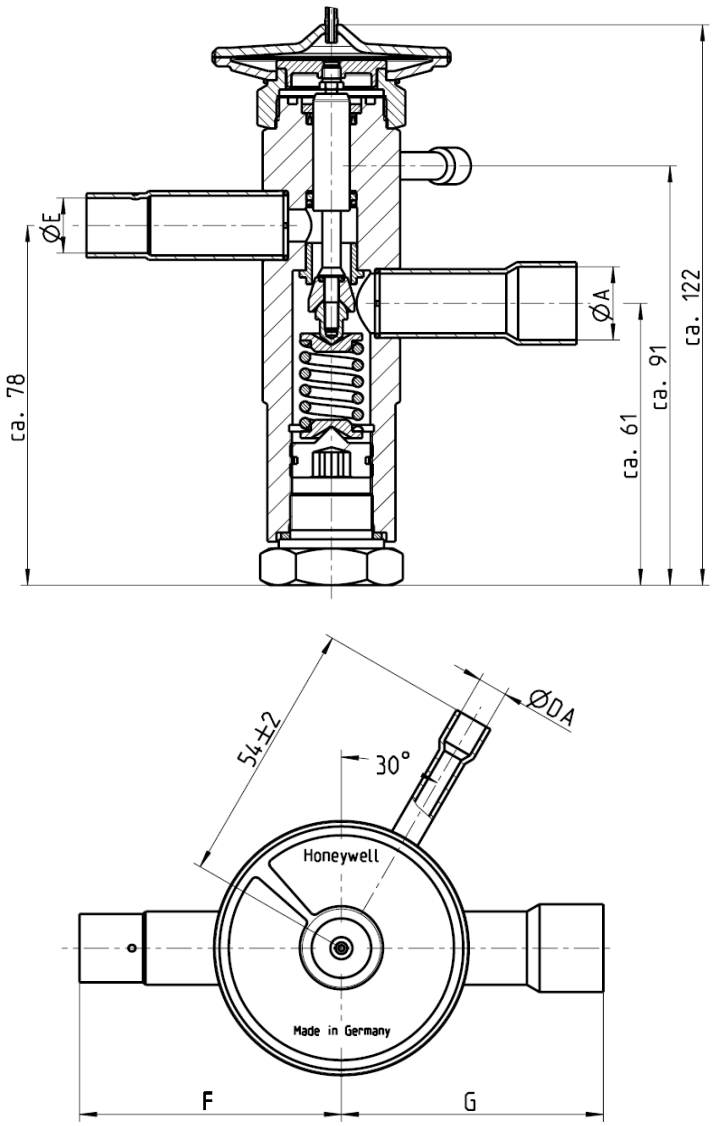
Capacities

Type	Orifice size	Nominal capacity (kW)*				
		R22	R134a	R404A	R407C	R410A
TLEX	4.75	22.4	15.9	15.8	21.6	26.8
	5	29.1	20.0	20.5	28.0	34.8
	6	42.4	27.6	29.8	40.8	50.8
	7	54.5	35.3	38.3	52.5	65.3

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Orifice size	Connections			Dimensions (mm)		Weight (kg)
		Inlet (ØE)	Outlet (ØA)	Pressure equalizer (ØDA)	F	G	
TLEX	4.75	12 mm ODF	16 mm ODF	6 mm ODF	54±2	54±2	Approx. 0.86
	5	1/2" ODF	5/8" ODF	1/4" ODF		54±2	
	6	16 mm ODF	22 mm ODF	6 mm ODF		61±2	
	7	5/8" ODF	7/8" ODF	1/4" ODF		61±2	



TLEX 4.75 - 7

Type Code / Order Information

	TLEX		6		R22		MOP +15 °C		16 mm x 22 mm
Series									
Orifice size									
Refrigerant									
MOP, evaporation temperature range									
Solder connection ODF (inlet x outlet)									

Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4" in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Do not bend or squeeze the bulb when thightening the bulb clamp!
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:

The valve series TLEX can be customised to the requirements of your series device in an optimum way. Contact us!

Superheat Adjustment

In general the valves should be installed with the factory setting for the used refrigerant unaltered. This setting is calibrated for lowest superheating and optimum evaporator utilization. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of the adjusting spindle alters superheat setting by approx. 0.3 bar. Increase of superheat setting results in a lower MOP value and vice versa.

Series TLEX 8 - 11

THERMOSTATIC EXPANSION VALVES

FIXED ORIFICE, ADJUSTABLE SUPERHEAT SETTING, BALANCED PORT

PRODUCT DATA

Application

Thermostatic expansion valves series TLEX are used in plants with one or more refrigerant circuits, in particular for series installations such as air conditioning units, chiller units and heat pumps.

Materials

Body	brass
Thermal head	stainless steel
Connection tubes	copper

Features

- **Damped gas charge with MOP as standard**
- **Optional available with liquid charge**
- **Adjustable superheat setting**
- **Warm thermal head provides best reliability**
- **Solder connections**
- **External pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Balanced port construction**
- **Fixed orifice**
- **Refrigerants: R22, R134a, R404A, R407C, R410A HFO (e.g. R1234yf) and future Blends Further refrigerants on request.**

Specification

Nominal capacity range	64.1 to 95.8 kW R22
Evaporating temperature range	see table on page 80
Maximum pressure PS	see table on page 80
Maximum test pressure PF	see table on page 80 (simultaneous on all connections)
Max. ambient temperature	100 °C
Max. bulb temperature	gas charge: 140 °C liquid charge: 70 °C
Static superheat	approx. 3.5 K
Length of capillary tube	2 m
Bulb diameter	16 mm

Thermal Charges and Temperature Ranges

1. Gas charge with pressure limiting MOP

Refri-gerant	Evaporation temperature range	MOP	PS (bar(a))	PF (bar(a))
R22	+15 °C to -45 °C	MOP +15 °C	36	39.6
R134a	+15 °C to -40 °C	MOP +15 °C	34	37.4
R404A	+10 °C to -50 °C	MOP +10 °C	36	39.6
R407C	+15 °C to -30 °C	MOP +15 °C	36	39.6
R410A	+15 °C to -30 °C	MOP +15 °C	40	44

Further refrigerants and MOP on request.

MOP valves protect the compressor by limiting the increase of suction pressure.

The MOP value should be chosen for the max. permissible suction pressure of the compressor or min. 5 K higher than the required evaporating temperature of the system.

With gas charged valves and MOP it is under all operating conditions necessary that the bulb is always colder than the capillary tube and the thermal head!

With the Honeywell TLEX series the thermal head is heated advantageously by the liquid refrigerant. The warm thermal head is on the safe side at any time.

2. Liquid charge

Refrigerants on request.

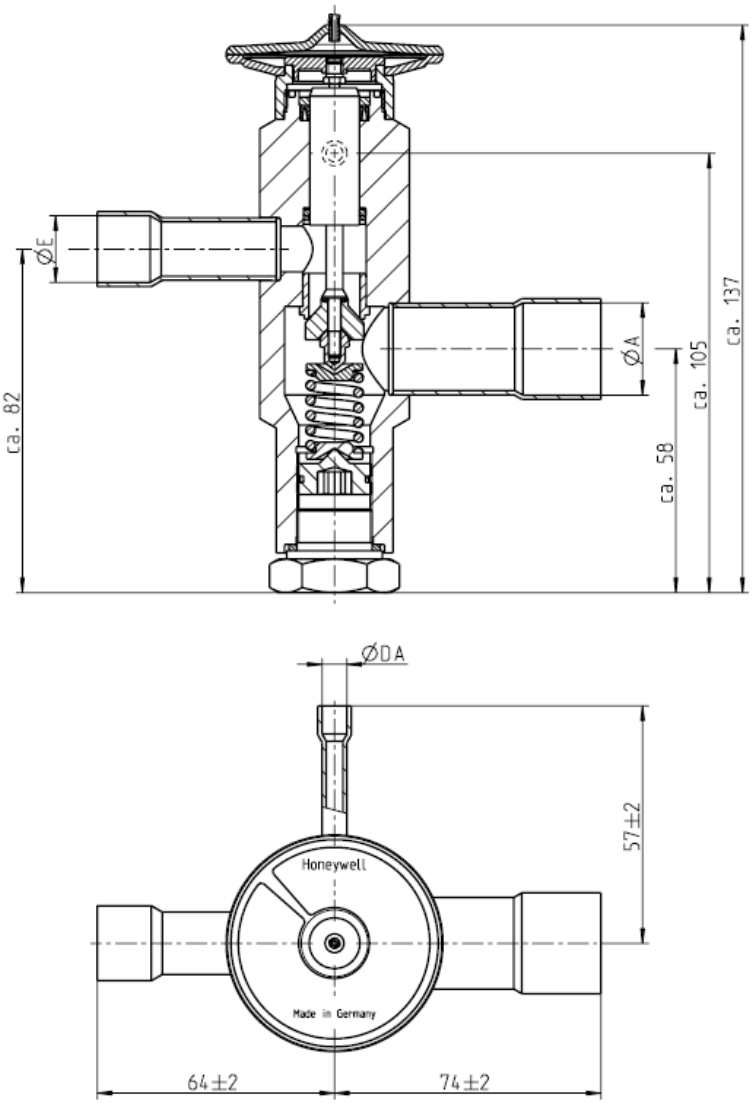
Capacities

Type	Orifice size	Nominal capacity (kW)*				
		R22	R134a	R404A	R407C	R410A
TLEX	8	64.1	43.3	45.1	61.8	76.9
	10	75.1	51.0	52.8	72.3	90.0
	11	95.8	65.0	67.4	92.3	115

* Capacities are based on t_o = +4 °C, t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

Dimensions and Weights

Type	Orifice size	Anschlüsse			Weight (kg)
		Inlet (ØE)	Outlet (ØA)	Pressure equalizer (ØDA)	
TLEX	8	22 mm ODF	28 mm ODF	6 mm ODF	approx. 1.3
	10	22 mm ODF	35 mm ODF	6 mm ODF	
	11	7/8" ODF	1 1/8" ODF	1/4" ODF	
		7/8" ODF	1 3/8" ODF	1/4" ODF	



TLEX 8 - 11

Type Code / Order Information

	TLEX		8		R134a		MOP +15 °C		22 mm x 28 mm
Series									
Orifice size									
Refrigerant									
MOP, evaporation temperature range									
Solder connection ODF (inlet x outlet)									

Installation

- The valves may be installed in any position.
- The external pressure equaliser line should be 6 mm or 1/4" in diameter and is to be connected downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of expansion valves should be insulated to prevent them being affected by the ambient temperature.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Do not bend or squeeze the bulb when thightening the bulb clamp!
- Constructive modifications at the valve are not allowed.

Information for original equipment manufacturers:

The valve series TLEX can be customised to the requirements of your series device in an optimum way. Contact us!

Superheat Adjustment

In general the valves should be installed with the factory setting for the used refrigerant unaltered. This setting is calibrated for lowest superheating and optimum evaporator utilization. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of adjusting spindle alters superheat setting by approx. 0.3 bar. Increase of superheat setting results in a lower MOP value and vice versa.

Series CVC and HLE

HOT GAS BYPASS VALVES

FIXED ORIFICE, ADJUSTABLE SUCTION PRESSURE LIMITATION

PRODUCT DATA

Application

Hot gas bypass valves series CVC and HLE are used to adjust the compressor capacity to the actual evaporator capacity in a refrigerating plant.

The hot gas bypass valve can be installed in a bypass tube between the hot gas line and suction line. The suction pressure is downward limited by flowing hot gas from the high pressure to the low pressure side.

For plants in general refrigeration and for original equipment such as dehumidifiers, air driers, water coolers or ice-making machines.

Materials

Body	brass
Head	stainless steel, brass
Connection tubes	copper

Features

- **CVC: Orifice size 4.0, equivalent to 1 kW bypass capacity R134a**
- **HLE: Orifice size 4.5S, equivalent to 1.5 kW bypass capacity R134a**
- **Smallest dimensions**
- **High performance**
- **Hermetic construction**
- **Adjustable suction pressure limitation**
- **Solder connections**
- **Internal pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Fixed orifice**
- **Refrigerants: all CFC, HCFC, HFC HFO (e.g. R1234yf) and future Blends not for ammonia**

Specification

Nominal capacity	see table on page 84
Adjusting range for suction pressure limitation	1 - 6 bar(a) (CVC) 1 - 9 bar(a) (HLE)
Factory setting	3.2 bar(a) (CVC) 3.5 bar(a) (HLE)
Maximum pressure PS	25.5 bar(a)
Maximum test pressure PF	28 bar(a)
Max. ambient temperature	100 °C

Installation

- The valves may be installed in any position.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Remove plastic cap during soldering
- Constructive modifications at the valve are not allowed.

Adjustment

One complete revolution of the adjusting screw effects an alternation of the suction pressure limitation by approx. 0.5 bar (CVC) resp. 0.4 bar (HLE).

Turning clockwise	=	Higher suction pressure
Turning counterclockwise	=	Lower suction pressure

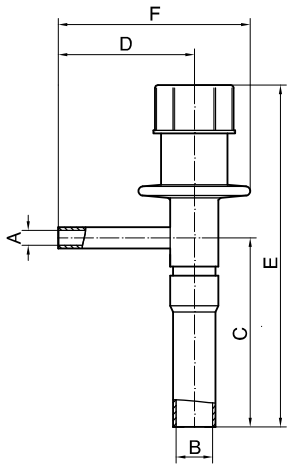
Capacities

Type	Valve size	Condensing temperature t_c (°C)	Δp_{offset} (bar)	Bypass-capacity Q_N (kW)		
				R134a	R407C	R404A
CVC	4.0	35	0.5	0.62	1.05	0.88
			0.7	0.85	1.45	1.20
		50	0.5	0.71	1.16	0.88
			0.7	1.00	1.60	1.20
HLE	4.5S	35	0.5	0.98	1.67	1.40
			0.7	1.37	2.33	1.95
		50	0.5	1.13	1.86	1.41
			0.7	1.57	2.60	1.97

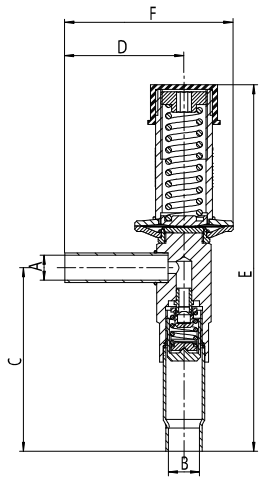
Evaporating temperature t_o: 0 °C; Hot gas superheat Δtv_{2oh}: 25 K

Dimensions and Weights

Type	Valve size	Connections		Dimensions (mm)				Weight (kg)
		Inlet (A)	Outlet (B)	C	D	E	F	
CVC	4.0	6 mm ODF	12 mm ODF	64	43	113	61	approx. 0.16
		1/4" ODF	1/2" ODF					
HLE	4.5S	10 mm ODF	12 mm ODF	71	46	142	65	approx. 0.3
		3/8" ODF	1/2" ODF					



CVC



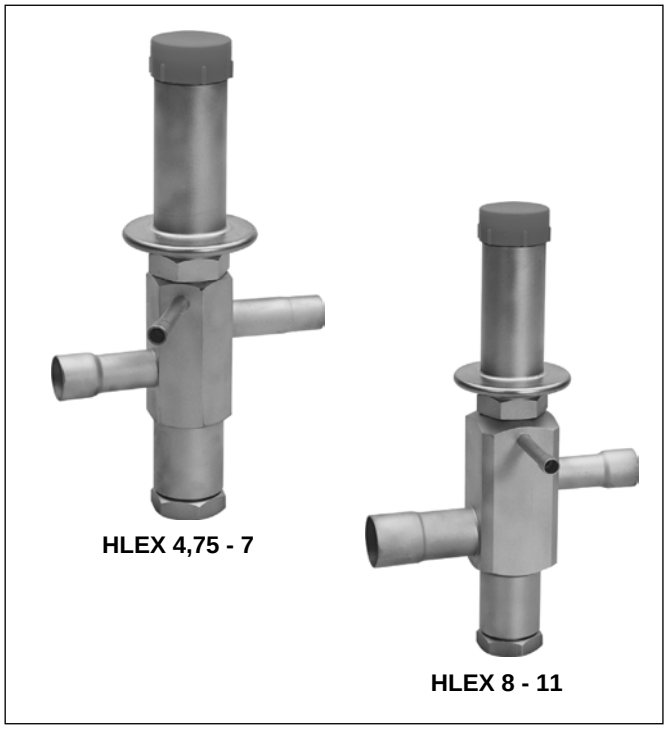
HLE

Series HLEX 4.75 - 7 and HLEX 8 - 11

HOT GAS BYPASS VALVES

FIXED ORIFICE, ADJUSTABLE SUCTION PRESSURE LIMITATION

PRODUCT DATA



HLEX 4,75 - 7

HLEX 8 - 11

Application

Hot gas bypass valves series HLEX are used to adjust the compressor capacity to the actual evaporator capacity in a refrigerating plant.

The hot gas bypass valve can be installed in a bypass tube between the hot gas line and suction line. The suction pressure is downward limited by flowing hot gas from the high pressure to the low pressure side.

For plants in general refrigeration and for original equipment such as dehumidifiers, air driers, water coolers or ice-making machines.

Materials

Body	brass
Head	stainless steel, brass
Connection tubes	copper

Features

- **Compact design**
- **High performance**
- **Hermetic construction**
- **Adjustable suction pressure limitation**
- **Solder connections**
- **External pressure equalisation**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Balanced port construction**
- **Fixed orifice**
- **Refrigerants: all CFC, HCFC, HFC**
  HFO (e.g. R1234yf) and future Blends
  not for ammonia

Specification

Nominal capacity	see table on page 86
Adjusting range for suction pressure limitation	1 - 9 bar(a)
Factory setting	3.7 bar(a)
Maximum pressure PS	29 bar(a)
Maximum test pressure PF	32 bar(a) (simultanous on all connections)
Max. ambient temperature	100 °C

Installation

- The valves may be installed in any position.
- When soldering the valve, the valve body must not get warmer than 100 °C.
- Remove plastic cap during soldering
- Constructive modifications at the valve are not allowed.

Adjustment

One complete revolution of the adjusting screw effects an alternation of the suction pressure limitation by approx. 0.5 bar.

Turning clockwise	=	Higher suction pressure
Turning counterclockwise	=	Lower suction pressure

Capacities

Type	Orifice size	Condensing temperature t_c (°C)	Δp_{Offset} (bar)	Bypass-capacity Q_N (kW)		
				R134a	R407C	R404A
HLEX	4.75	35	0.5	0.98	1.67	1.40
			0.7	1.37	2.33	1.95
		50	0.5	1.13	1.86	1.41
			0.7	1.57	2.60	1.97
	5	35	0.5	1.29	2.18	1.83
			0.7	1.79	3.04	2.55
		50	0.5	1.47	2.43	1.84
			0.7	2.05	3.39	2.57
	6	35	0.5	1.92	3.26	2.73
			0.7	2.68	4.54	3.81
		50	0.5	2.20	3.64	2.75
			0.7	3.07	5.07	3.83
	7	35	0.5	2.35	3.98	3.34
			0.7	3.27	5.55	4.65
		50	0.5	2.69	4.44	3.36
			0.7	3.75	6.19	4.68
	8	35	0.5	2.66	4.52	3.79
			0.7	3.72	6.31	5.29
		50	0.5	3.05	5.04	3.81
			0.7	4.26	7.04	5.32
	10	35	0.5	3.29	5.57	4.67
			0.7	4.58	7.77	6.52
		50	0.5	3.76	6.22	4.70
			0.7	5.25	8.67	6.56
	11	35	0.5	4.50	7.63	6.40
			0.7	6.29	10.66	8.94
		50	0.5	5.16	8.52	6.45
			0.7	7.20	11.90	9.00

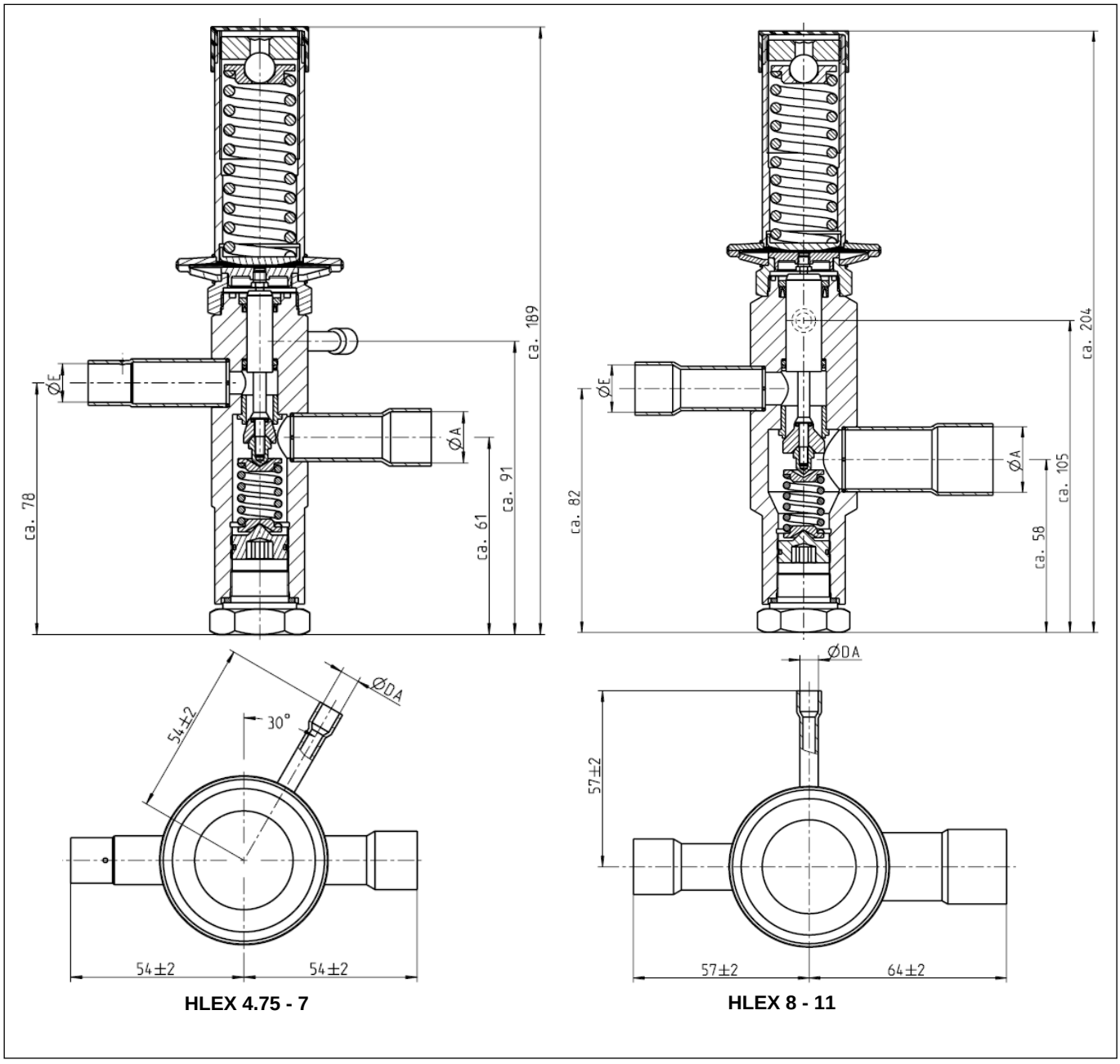
Evaporating temperature t_o: 0 °C; hot gas superheat Δt_{V2oh}: 25 K

Type Code / Order Information

	HLEX		5		12 mm x 16 mm
Series					
Orifice size					
Solder connections ODF (inlet x outlet)					

Dimensions and Weights

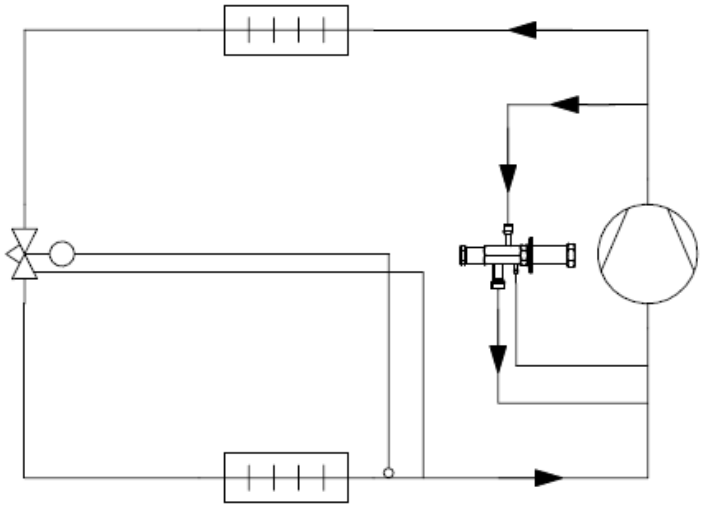
Type	Orifice size	Connections			Weight (kg)
		Inlet (ØE)	Outle (ØA)	Pressure equalizer (ØDA)	
HLEX	4,75 5 6 7	12 mm ODF	16 mm ODF	6 mm ODF	approx. 0.9
		1/2‘‘ ODF	5/8‘‘ ODF	1/4‘‘ ODF	
	8 10 11	16 mm ODF	22 mm ODF	6 mm ODF	approx. 1.3
		5/8‘‘ ODF	7/8‘‘ ODF	1/4‘‘ ODF	



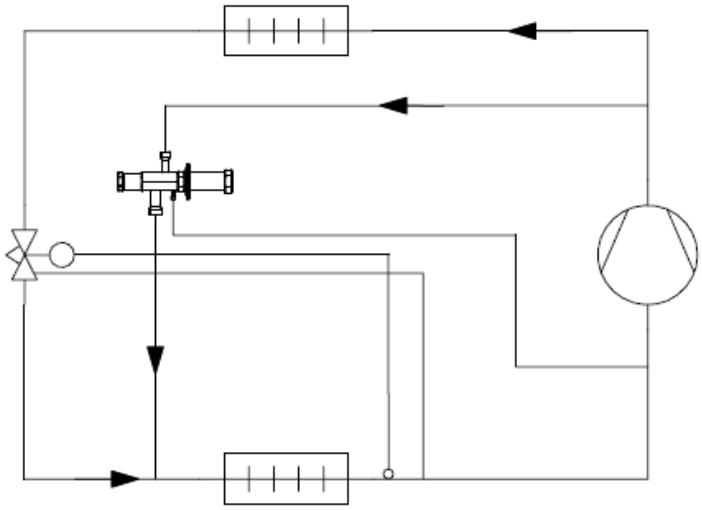
HLEX 4.75 - 7

HLEX 8 - 11

Application Samples



Hot gas bypass in the suction line



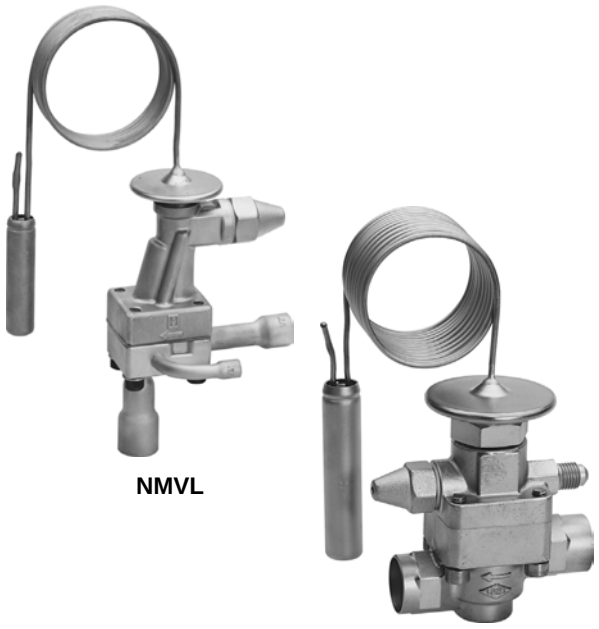
Hot gas bypass in the evaporator inlet

Series NMVL and NMX

LIQUID INJECTION VALVES

SUCTION PRESSURE CONTROLLED, INTERCHANGEABLE ORIFICE CARTRIDGES

PRODUCT DATA



NMVL

NMX

Application

Honeywell thermostatic liquid injection valves series NMVL and NMX are used in refrigeration applications to reduce the temperature of the suction gas.
Depending on the superheat of the compressor suction gas, liquid refrigerant is injected into the suction line. The refrigerant is evaporating and thereby the suction gas is cooled down.
Suitable for plants in general refrigeration and for serial products such as air driers, dehumidifiers, chiller units or ice-making machines with hot gas bypass control valves, for temperature reduction in multiple stage units and for suction gas cooled compressors.

Materials

Body, base	brass
Thermal head	stainless steel
Connections	copper or brass

Features

- **Suction gas controlled liquid injection valves**
- **Part programme containing:**
  Valve body head, orifice cartridge, connection base
- **Honeywell NMVL:**
  - **Only one valve body head needed both for internal and external pressure equalisation**
  - **Connection for pressure coupler integrated in the solder base**
  - **solder base two-way or angle construction**
- **Honeywell NMX:**
  - **Balanced port**
  - **External pressure equalisation integrated in the valve body head**
  - **solder base two-way or angle construction**
  - **flare base two way construction**
- **Adjustable superheat setting**
- **Extreme durable due to stainless steel head and stainless steel diaphragm welded using protective gas**
- **Interchangeable orifice cartridges**
- **Liquid charge**
- **Refrigerants: R134a, R22, R404A, R407C, R507A**
  HFO (e.g. R1234yf) and future Blends
  Further refrigerants on request.

Specification

Nominal capacity range	0.52 to 75.1 kW R22 (small orifice graduation for optimal control behaviour)
Temperature range	-50 °C to +65 °C
Maximum pressure PS	See table on page 90
Maximum test pressure PF	See table on page 90
Max. ambient temperature	70 °C
Max. bulb temperature	70 °C
Static superheat	See table on page 90
Length of capillary tube	NMVL: 1.5 m NMX: 3.0 m
Bulb diameter	NMVL: 12 mm NMX: 16 mm

Thermal Charges and Static Superheat

Code for thermal charge	Superheat					PS	PF
	R134a	R22	R404A	R407C	R507A	(bar(a))	(bar(a))
DA	-	15 K	21 K	12 K	21 K	34	37.4
TA	15 K	30 K	35 K	26 K	35 K	29	31.9
LB	30 K	45 K	-	40 K	-	29	31.9

Further refrigerants on request.
The superheat is based on t_o = +0 °C.

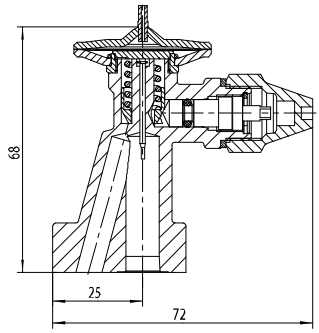
Capacities

Type	Orifice size	Nominal capacity (kW)*				
		R134a	R22	R404A	R407C	R507A
NMVL	0.3	0.36	0.52	0.36	0.50	0.36
	0.5	0.69	0.99	0.68	0.95	0.69
	0.7	0.96	1.4	0.97	1.3	0.98
	1.0	1.4	2.0	1.4	1.9	1.4
	1.5	2.2	3.2	2.2	3.1	2.3
	2.0	2.9	4.0	2.8	3.9	2.9
	2.5	4.0	5.8	4.1	5.6	4.1
	3.0	6.6	9.3	6.5	8.9	6.6
	3.5	8.7	12.2	8.6	11.7	8.7
	4.5	11.8	17.0	12.0	16.4	12.1
	4.75	15.9	22.4	15.8	21.6	15.9
NMX	4.5	11.8	17.0	12.0	16.4	12.1
	4.75	15.9	22.4	15.8	21.6	15.9
	5	20.0	29.1	20.5	28.0	20.7
	6	27.6	42.4	29.8	40.8	30.1
	7	35.3	54.5	38.3	52.5	38.7
	8	43.3	64.1	45.1	61.8	45.6
	10	51.0	75.1	52.8	72.3	53.3

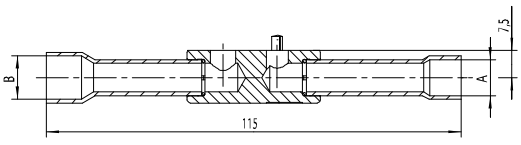
* Capacities are based on t_o = +4 °C. t_c = +38 °C and 1 K subcooled liquid refrigerant entering the valve.
For other operating conditions see capacity charts in Honeywell catalogue or consult the Honeywell software.

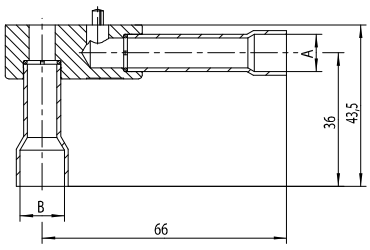
Dimensions and Weights

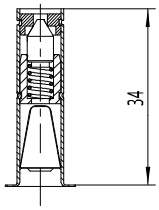
Type	Connections			Weight (kg)
	Inlet (A)	Outlet (B)	Pressure equalizer (C)	
NMVL	-	-	-	approx. 0.43
VD	-	-	-	approx. 0.02
VLS angle	6 mm ODF	10 mm ODF	-	approx. 0.16
	1/4" ODF	3/8" ODF	-	
	10 mm ODF	12 mm ODF	-	
	3/8" ODF	1/2" ODF	-	
	12 mm ODF	16 mm ODF	-	
	1/2" ODF	5/8" ODF	-	
VLSX angle	6 mm ODF	10 mm ODF	6 mm ODF	approx. 0.17
	1/4" ODF	3/8" ODF	1/4" ODF	
	10 mm ODF	12 mm ODF	6 mm ODF	
	3/8" ODF	1/2" ODF	1/4" ODF	
	12 mm ODF	16 mm ODF	6 mm ODF	
	1/2" ODF	5/8" ODF	1/4" ODF	
VLS two-way	10 mm ODF	12 mm ODF	-	approx. 0.16
	3/8" ODF	1/2" ODF	-	
	12 mm ODF	16 mm ODF	-	
	1/2" ODF	5/8" ODF	-	
VLSX two-way	10 mm ODF	12 mm ODF	6 mm ODF	approx. 0.17
	3/8" ODF	1/2" ODF	1/4" ODF	
	12 mm ODF	16 mm ODF	6 mm ODF	
	1/2" ODF	5/8" ODF	1/4" ODF	



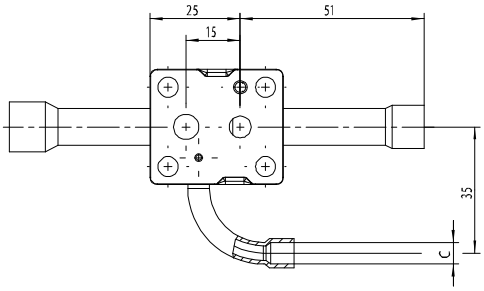
NMVL



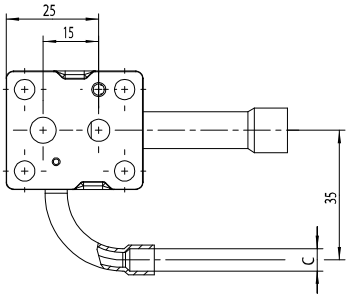




VD

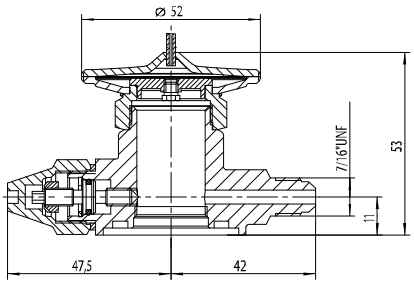


VLS(X) – two-way

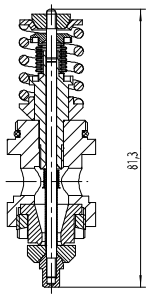


VLS(X) - angle

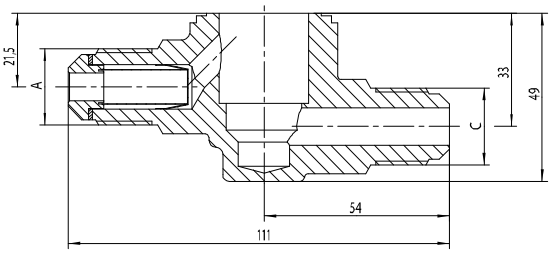
Type	Connections			Weight (kg)
	Inlet (A) + (B)	Outlet (C) + (D)	Pressure equalizer	
NMX	-	-	7/16" UNF	approx. 0.6
XD	-	-	-	approx. 0.14
XLS two-way	12 + 16 mm ODF	16 + 22 mm ODF	-	approx. 0.41
	1/2" + 5/8" ODF	5/8" + 7/8" ODF	-	
XLS angle	12 + 15 mm ODF	16 + 22 mm ODF	-	approx. 0.32
	1/2" + 5/8" ODF	5/8" + 7/8" ODF	-	
XBS two-way	7/8" UNF	7/8" UNF	-	approx. 0.49

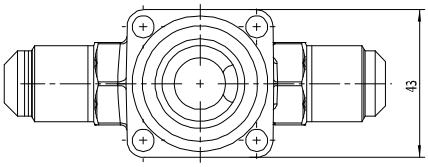


NMX

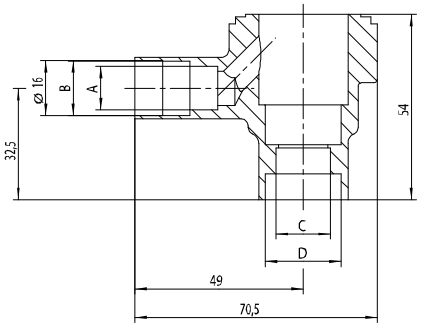


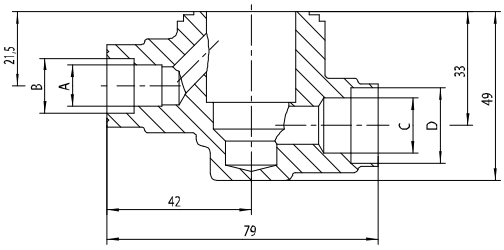
XD

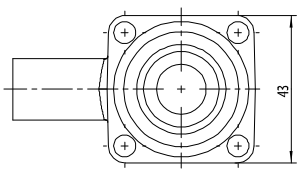




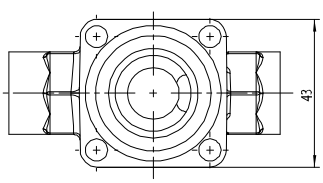
XBS – two-way







XLS - angle



XLS - two-way

Type Code / Order Information (Part Programme)

1. Valve body head

	NMVL		DA
Series (NMVL, NMX)			
Code for thermal charge			

2. Orifice cartridge

	VD		0.5
Series (VD, XD)			
Orifice size			

3. Connection base

	VLS	X		10 mm ODF x 12 mm ODF		W
Series (VLS, XLS, XBS)						
Pressure equalizer VLS: X = external () = internal						
Connection size (Inlet x Outlet)						
D = two-way construction W = angle construction						

Installation

- The valves may be installed in any position.
- The external pressure equaliser line (VLSX and NMX) should be 6 mm or 1/4" in diameter. It is connected to the suction line downstream of the remote bulb. An overbow is recommended in order to prevent the ingress of oil into the equaliser line.
- The bulb should preferably be positioned on the upper half of a horizontal suction line but never after a liquid trap. As a general rule, bulbs of liquid injection valves should be insulated to prevent them being affected by the ambient temperature.
- Do not bend or squeeze the bulb when tightening the bulb clamp.
- Never quench the solder base with water after soldering, this may cause cracks and distort the sealing surfaces.
- When tightening flare nuts of the flare connections grip at wrench flats on the valve body.
- The screws fixing the valve body head to the base must be tightened in diagonal sequence. Torque 12^{+1} Nm for NMVL and 16^{+1} Nm for NMX.
- Constructive modifications at the valve are not allowed.

Superheat Adjustment

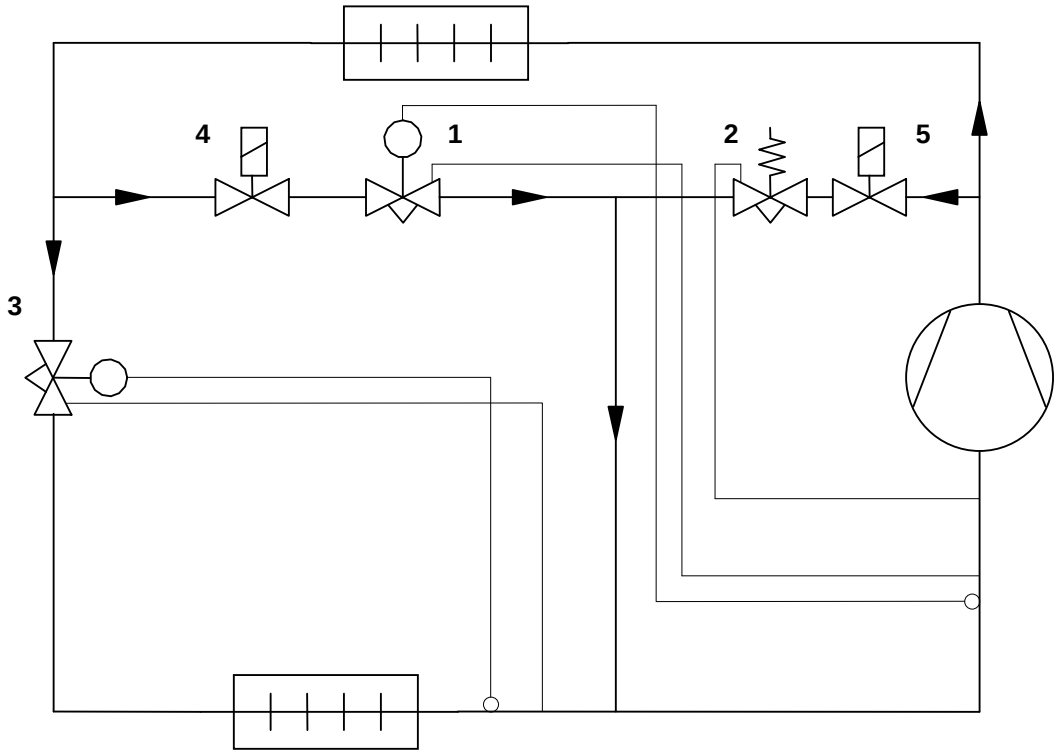
In general the Honeywell liquid injection valves should be installed with the factory setting for the used refrigerant unaltered.

This superheat adjustment is calibrated for the above mentioned superheat and optimal control behaviour. However, should it be necessary to adjust the superheat, turn the adjusting spindle as follows:

Turning clockwise	=	reduced refrigerant mass flow, increase of superheat
Turning counterclockwise	=	increased refrigerant mass flow, decrease of superheat

One turn of the adjusting spindle alters superheat setting by approx. 0.55 bar for NMVL and 0.3 bar for NMX.

Application Sample



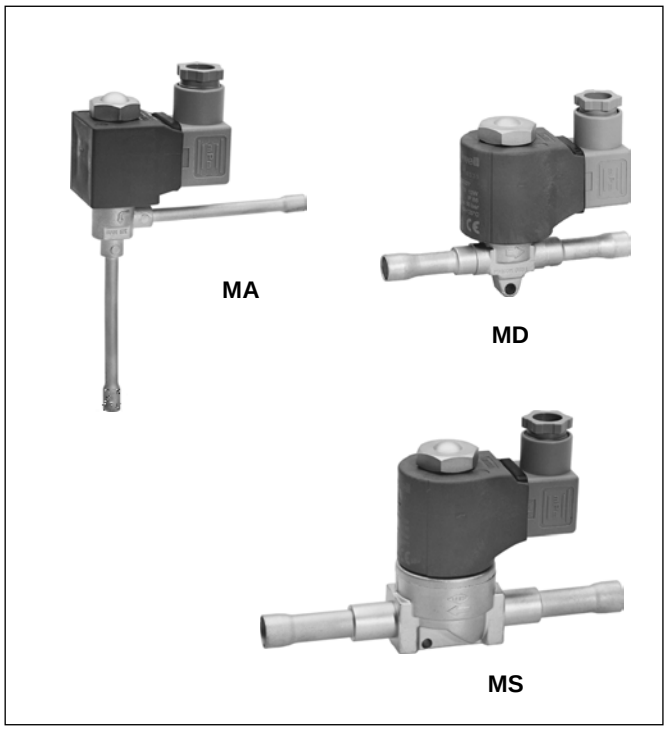
Power control with hot gas bypass valve and temperature reduction of suction gas with liquid injection valve

1 Liquid Injection Valve
2 Hot gas bypass Valve
3 Thermostatic Expansion Valve
4 Liquid - Solenoid Valve
5 Hot gas - Solenoid Valve

Series M

SOLENOID VALVES
NORMALLY CLOSED

PRODUCT DATA



Application

Solenoid valves series M are used in general refrigeration and for original equipment to cut off/activate the refrigerant flow in a refrigerating plant.

The solenoid valves can be installed in the liquid line, hot gas line and suction line of a refrigerating unit.

Materials

Body	brass, stainless steel
Seal material	PTFE
Connection tubes	solder: copper flare: brass
Coil	copper, steel, Crastin

Features

- **MA: direct operated, angle construction**
- **MD: direct operated, two way construction**
- **MS: pilot operated, two way construction**
- **Normally closed**
- **Hermetic construction**
- **Low pressure drop**
- **High performance**
- **Direct operated: no minimum pressure differential required to open the valve**
- **Pilot operated: minimum pressure differential of 0.05 bar required to open the valve**
- **Solder and flare connections**
- **Coils for AC and DC**
- **Refrigerants: all CFC, HCFC, HFC**
  HFO (e.g. R1234yf) and future Blends
  not for ammonia

Specification

Nominal capacity	see tables on page 96
Maximum pressure PS	35 bar(a)
Maximum test pressure PF	50 bar(a)
Min. pressure differential	MA, MD: 0 bar MS: 0.05 bar
Max. pressure differential	MS: 2 bar
Max. opening pressure differential MOPD	AC-coil: MA, MD: 25 bar MS: 30 bar DC-coil: MA, MD: 21bar MS: 21 bar
Max. medium temperature	125 °C
Min. medium temperature	-45 °C
Max. ambient temperature	80 °C
Min. ambient temperature	-40 °C
Number of operating cycles	> 1,5 million
Standard coil voltages	AC: 230V, 110V, 24V DC: 230V, 24V further voltages on request
Voltage tolerance	AC: ±10% DC: +10%, -5%

Nominal Capacity QN (kW)

Typ	k_V-value (m^3/h)	Liquid				Hot gas				Suction gas			
		R134a	R22	R407C	R404A R507A	R134a	R22	R407C	R404A R507A	R134a	R22	R407C	R404A R507A
Direct operated													
MA 062	0.17	5.21	5.62	5.39	3.87	1.14	1.47	1.45	1.29	-	-	-	-
MD 062	0.17	5.21	5.62	5.39	3.87	1.14	1.47	1.45	1.29	-	-	-	-
MD 103	0.23	7.05	7.61	7.29	5.24	1.54	1.99	1.96	1.75	-	-	-	-
Pilot operated													
MS 103	0.9	27.6	29.8	28.5	20.5	6.04	7.78	7.67	6.83	1.54	2.06	1.92	1.80
MS 104	0.9	27.6	29.8	28.5	20.5	6.04	7.78	7.67	6.83	1.54	2.06	1.92	1.80
MS 124	1.6	49.0	52.9	50.7	36.4	10.7	13.8	13.6	12.1	2.74	3.66	3.42	3.19
MS 125	1.6	49.0	52.9	50.7	36.4	10.7	13.8	13.6	12.1	2.74	3.66	3.42	3.19
MS 165	2	61.3	66.1	63.4	45.5	13.4	17.3	17.1	15.2	3.42	4.57	4.27	3.99
MS 167	2	61.3	66.1	63.4	45.5	13.4	17.3	17.1	15.2	3.42	4.57	4.27	3.99
MS 227	4	123	132	127	91.1	26.8	34.6	34.1	30.4	6.85	9.14	8.54	7.98

The nominal capacity QN is based on the following conditions

Medium	Evaporating temperature t_o (°C)	Condensing temperature t_c (°C)	Subcooling Δt_{c2u} (K)	Hot gas temperature t_H (°C)	Pressure loss across valve Δp (bar)
Liquid	-10	25	1	-	0.4
Hot gas	-10	25	1	50 °C	1
Suction gas	-10	25	1	-	0.15

Valve selection for other operating conditions see the following tables or consult the Honeywell software

Valve size calculation for the liquid line

Refrigeration capacity Q_0, multiplied with correcting factor f_{TF}, multiplied with correcting factor $f_{\Delta PF}$ results in the required nominal capacity Q_N.

$$Q_N = Q_o \times f_{TF} \times f_{\Delta PF}$$

Q_N nominal capacity (according to table on page 96)
Q_o refrigeration capacity
f_{TF} correcting factor for evaporating and liquid temperature
$f_{\Delta PF}$ correcting factor for pressure loss across the valve

Correcting factor fTF for the change of capacity according to the operating temperatures

t_L* (°C)	Evaporating temperature t_o (°C)																							
	R134a						R22						R407C					R404A, R507A						
	+10	±0	-10	-20	-30	-40	+10	±0	-10	-20	-30	-40	+10	±0	-10	-20	-30	+10	±0	-10	-20	-30	-40
0	-	-	0.80	0.83	0.85	0.88	-	-	0.82	0.83	0.85	0.88	-	-	0.80	0.80	0.80	-	-	0.73	0.76	0.79	0.83
+5	-	-	0.83	0.86	0.89	0.93	-	-	0.85	0.87	0.89	0.91	-	0.80	0.80	0.80	0.90	-	-	0.77	0.8	0.84	0.88
+10	-	0.84	0.87	0.91	0.94	0.97	-	0.86	0.88	0.90	0.92	0.95	-	0.80	0.90	0.90	0.90	-	0.79	0.82	0.85	0.89	0.94
+15	-	0.88	0.91	0.94	0.98	1.02	-	0.90	0.92	0.94	0.96	0.99	0.90	0.90	0.90	0.90	1.00	-	0.84	0.87	0.91	0.95	1.00
+20	0.89	0.92	0.95	0.99	1.03	1.08	0.92	0.94	0.96	0.98	1.00	1.03	0.90	0.90	0.90	1.00	1.00	0.86	0.89	0.93	0.97	1.02	1.08
+25	0.94	0.96	1.00	1.05	1.09	1.14	0.96	0.98	1.00	1.03	1.05	1.09	0.90	1.00	1.00	1.00	1.10	0.92	0.96	1.05	1.05	1.11	1.18
+30	0.99	1.02	1.06	1.12	1.16	1.22	1.01	1.02	1.05	1.08	1.10	1.14	1.00	1.00	1.00	1.10	1.20	0.99	1.03	1.08	1.14	1.21	1.29
+35	1.04	1.08	1.12	1.18	1.24	1.30	1.05	1.07	1.10	1.13	1.16	1.20	1.10	1.10	1.10	1.20	1.20	1.08	1.13	1.19	1.26	1.34	1.44
+40	1.10	1.14	1.19	1.26	1.32	1.39	1.10	1.12	1.15	1.19	1.22	1.26	1.10	1.20	1.20	1.30	1.30	1.18	1.24	1.32	1.40	1.50	1.63
+45	1.18	1.22	1.28	1.35	1.42	1.50	1.17	1.19	1.22	1.26	1.29	1.34	1.20	1.30	1.30	1.40	1.40	1.32	1.39	1.48	1.59	1.72	1.88
+50	1.25	1.24	1.37	1.45	1.53	1.62	1.23	1.26	1.29	1.33	1.37	1.42	1.30	1.40	1.40	1.50	1.60	1.50	1.59	1.7	1.85	2.02	2.23
+55	1.35	1.41	1.48	1.58	1.67	1.78	1.30	1.33	1.37	1.42	1.46	1.52	1.40	1.50	1.60	1.70	1.80	1.74	1.87	2.02	2.22	2.47	2.79
+60	1.46	1.55	1.61	1.73	1.84	1.97	1.38	1.41	1.46	1.51	1.56	1.63	-	-	-	-	-	-	-	-	-	-	-

* Temperature of liquid refrigerant at valve inlet.

Correcting factor fΔPF for the change of capacity according to the chosen pressure loss across the valve

Pressure loss across valve Δp (bar)	**0.05**	**0.10**	**0.15**	**0.20**	**0.25**	**0.30**	**0.35**	**0.40**	**0.45**	**0.50**	**0.55**	**0.60**	**0.65**	**0.70**
Correcting factor $f_{\Delta PF}$	2.83	2.00	1.63	1.41	1.26	1.15	1.07	1.00	0.94	0.89	0.85	0.82	0.78	0.76

Valve capacity for the hot gas line

Type	Pressure loss across valve	Capacity (kW)*																	
		Condensing temperature t_c (°C)																	
		R134a					R22					R407C				R404A, R507A			
	Δp (bar)	+25	+30	+40	+50	+60	+25	+30	+40	+50	+60	+25	+30	+40	+50	+25	+30	+40	+50
Direct operated																			
MA 062 MD 062	0.2	0.54	0.55	0.57	0.58	0.57	0.68	0.70	0.74	0.76	0.78	0.62	0.65	0.68	0.70	0.60	0.60	0.58	0.53
	0.5	0.83	0.86	0.89	0.90	0.89	1.06	1.10	1.15	1.19	1.22	0.98	1.02	1.08	1.11	0.93	0.93	0.90	0.83
	1.0	1.12	1.17	1.23	1.25	1.24	1.46	1.51	1.60	1.67	1.70	1.39	1.44	1.52	1.57	1.29	1.29	1.26	1.16
	1.5	1.31	1.38	1.47	1.50	1.50	1.74	1.81	1.93	2.01	2.06	1.71	1.77	1.87	1.93	1.54	1.55	1.52	1.41
	2.0	1.44	1.52	1.64	1.70	1.70	1.94	2.04	2.19	2.29	2.34	1.96	2.04	2.15	2.22	-	-	-	-
MD 103	0.2	0.72	0.75	0.78	0.78	0.77	0.80	0.95	1.00	1.03	1.05	0.84	0.87	0.92	0.95	0.80	0.80	0.78	0.71
	0.5	1.12	1.16	1.21	1.22	1.21	1.43	1.48	1.56	1.62	1.65	1.33	1.38	1.46	1.50	1.26	1.26	1.22	1.12
	1.0	1.51	1.58	1.67	1.69	1.68	1.98	2.05	2.17	2.25	2.30	1.88	1.95	2.06	2.13	1.74	1.74	1.70	1.57
	1.5	1.77	1.86	1.98	2.03	2.02	2.35	2.45	2.61	2.72	2.78	2.31	2.39	2.52	2.61	2.08	2.09	2.05	1.90
	2.0	1.94	2.06	2.22	2.30	2.30	2.64	2.76	2.96	3.10	3.17	2.66	2.76	2.91	3.01	-	-	-	-
Pilot operated																			
MS 103 MS 104	0.2	2.83	2.93	3.04	3.06	3.02	4.20	4.33	4.55	4.70	4.79	3.60	3.71	3.90	4.03	3.09	3.09	3.00	2.74
	0.5	4.37	4.53	4.73	4.78	4.72	6.55	6.76	7.13	7.38	7.52	5.61	5.79	6.11	6.33	4.89	4.89	4.80	4.37
	1.0	5.93	6.19	6.52	6.63	6.57	9.02	9.35	9.91	10.3	10.5	7.73	8.01	8.49	8.83	6.77	6.86	6.69	6.09
	1.5	6.93	7.29	7.77	7.95	7.92	10.8	11.2	11.9	12.4	12.7	9.26	9.60	10.2	10.6	8.14	8.14	8.06	7.37
	2.0	7.60	8.07	8.66	9.00	9.00	12.1	12.6	13.5	14.2	14.5	10.4	10.8	11.6	12.2	-	-	-	-
MS 124 MS 125	0.2	5.04	5.21	5.40	5.44	5.36	6.40	6.60	6.94	7.17	7.30	5.86	6.07	6.41	6.62	5.60	5.60	5.44	4.96
	0.5	7.77	8.07	8.40	8.50	8.39	9.97	10.3	10.9	11.2	11.5	9.27	9.6	10.1	10.5	8.76	8.76	8.52	7.80
	1.0	10.5	11.0	11.6	11.8	11.7	13.7	14.3	15.1	15.7	16.0	13.1	13.6	14.3	14.8	12.1	12.1	11.8	10.9
	1.5	12.3	13.0	13.8	14.1	14.1	16.4	17.1	18.2	19.0	19.4	16.1	16.6	17.6	18.1	14.5	14.6	14.3	13.2
	2.0	13.5	14.3	15.5	16.0	16.0	18.4	19.2	20.6	21.6	22.1	18.5	19.2	20.3	20.9	-	-	-	-
MS 165 MS 167	0.2	6.29	6.51	6.76	6.80	6.70	8.00	8.25	8.68	8.96	9.12	7.33	7.59	8.01	8.28	7.00	7.00	6.80	6.20
	0.5	9.72	10.1	10.5	10.6	10.5	12.5	12.9	13.6	14.1	14.3	11.6	12.0	12.7	13.1	10.9	10.9	10.6	9.70
	1.0	13.2	13.7	14.5	14.7	14.6	17.2	17.8	18.9	19.6	20.0	16.4	17.0	17.9	18.5	15.1	15.2	14.8	13.6
	1.5	15.4	16.2	17.2	17.7	17.6	20.5	21.3	22.7	23.7	24.2	20.1	20.8	22.0	22.7	18.1	18.2	17.9	16.5
	2.0	16.9	17.9	19.3	20.0	20.0	23.0	24.0	25.7	27.0	27.6	23.2	24.0	25.3	26.2	-	-	-	-
MS 227	0.2	12.6	13.0	13.5	13.6	13.4	16.0	16.5	17.4	17.9	18.2	14.7	15.2	16.0	16.6	14.0	14.0	13.6	12.4
	0.5	19.4	20.1	21.0	21.2	21.0	24.9	25.8	27.1	28.1	28.6	23.2	24.0	25.3	26.2	21.9	21.9	21.3	19.5
	1.0	26.3	27.5	29.0	29.5	29.2	34.4	35.6	37.8	39.2	40.0	32.8	33.9	35.8	37.0	30.3	30.4	29.7	27.3
	1.5	30.8	32.4	34.5	35.3	35.2	41.0	42.6	45.4	47.4	48.4	40.1	41.6	43.9	45.3	36.3	36.5	35.8	33.1
	2.0	33.8	35.9	38.7	39.9	40.0	45.9	48.0	51.5	53.9	55.2	46.3	48.0	50.7	52.4	-	-	-	-

* Capacities are based on evaporating temperature t_o = -10 °C, hot gas temperature t_H = +25 °C and 1 K subcooled refrigerant.

If the hot gas temperature is changed by ±10 °C the valve capacity changes (inversely proportional) by ±2,5 %.

With other evaporating temperatures t_o the capacities above should be multiplied by the following correcting factors:

t_o (°C)	-50	-40	-30	-20	-10	±0	+10
R134a	-	0.85	0.90	0.95	1.00	1.05	1.09
R22	0.88	0.91	0.95	0.97	1.00	1.03	1.05
R407C	0.83	0.88	0.92	0.95	1.00	1.01	1.06
R404A, R507	0.75	0.81	0.88	0.13	1.00	1.05	-

Valve size calculation for the suction line

Refrigeration capacity Q_o, multiplied with correcting factor f_{TS}, multiplied with correcting factor $f_{\Delta PS}$ results in the required nominal capacity Q_N.

$$Q_N = Q_o \times f_{TS} \times f_{\Delta PS}$$

Q_N nominal capacity (according to table on page 96)
Q_o refrigeration capacity
f_{TS} correcting factor for evaporating and liquid temperature
$f_{\Delta PS}$ correcting factor for pressure loss across the valve

Correcting factor fTS for the change of capacity according to the operating temperatures

Evaporating temperature t_o (°C)	**Condensating temperature t_c (°C)**				
	+60	**+50**	**+40**	**+30**	**+20**
	For refrigerant R134a, R22, R407C				
+10	0.98	0.86	0.78	0.71	0.66
±0	1.19	1.05	0.95	0.86	0.79
-10	1.48	1.29	1.16	1.05	0.96
-20	1.88	1.62	1.44	1.31	1.19
-30	2.42	2.08	1.83	1.65	1.59
-40	3.20	2.71	2.37	2.13	1.92
	For refrigerant R404A, R507A				
+10	-	1.14	0.82	0.71	0.63
±0	-	1.24	1.01	0.87	0.77
-10	-	1.57	1.26	1.07	0.94
-20	-	2.02	1.60	1.35	1.17
-30	-	2.67	2.07	1.72	1.49
-40	-	3.62	2.74	2.25	1.93

Correcting factor fΔPS for the change of capacity according to the chosen pressure loss across the valve

Pressure loss across valve Δp (bar)	**0.05**	**0.075**	**0.10**	**0.15**	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**
Correcting factor $f_{\Delta PS}$	1.73	1.41	1.22	1.00	0.87	0.71	0.61	0.55	0.50

Type Code / Order Information

1. Solenoid Valve

	M		S		16		5		S		230 V AC
Series											
Type: A = direct operated, angle D = direct operated S = pilot operated											
Valve size											
Connection size in 1/8”											
() = flare connection MMS = solder, metric S = solder, inch											
Voltage () = without coil											

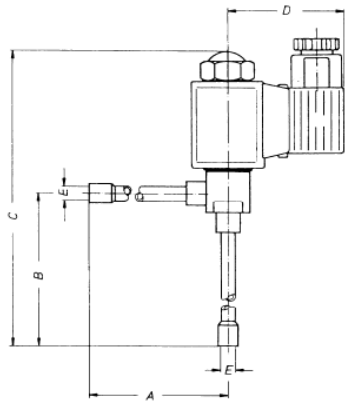
2. Solenoid Coil

Type of coil, capacity	For Solenoid Valve	Voltage, frequency	Voltage tolerance
MC 062, 8 W	MA 062(S)(MMS) MD 062(S)(MMS)	230 V, 50/60 Hz 110 V, 50/60 Hz 24 V, 50/60 Hz	±10 %
MC 102-227, 13 W	MD 103(S)(MMS) MS 103-227(S)(MMS)	230 V, 50/60 Hz 110 V, 50/60 Hz 24 V, 50/60 Hz	±10 %
MC 102-227, 20 W	MD 103(S)(MMS) MS 103-227(S)(MMS)	24 V DC 230 V DC	+10 % -5 %

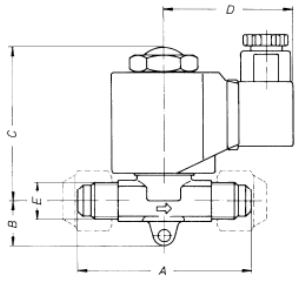
International protection rating IP65, coil incl. e.l.c.b.-protected plug to DIN 43650 with cable gland; conduit thread PG11.

Dimensions and Weights

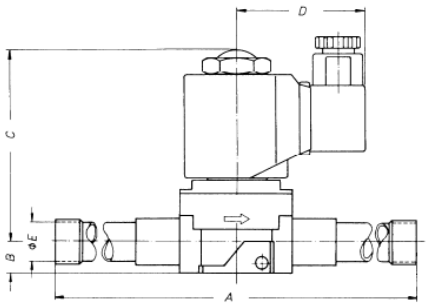
Type	Connections (E)	For tube diameter	Dimensions (mm)				Weight (kg)	
			A	B	C	D	without coil 230 V AC	with coil 230 V AC
Direct operated								
MA 062MMS	6 mm ODF	6 mm	88	88	142	47	0.15	0.30
MA 062S	1/4" ODF	1/4"	88	88	142	47	0.15	0.30
MD 062	7/16" UNF	6 mm, 1/4"	65	17	57	47	0.19	0.33
MD 062MMS	6 mm ODF	6 mm	112	17	57	47	0.17	0.31
MD 062S	1/4" ODF	1/4"	112	17	57	47	0.17	0.31
MD 103	5/8" UNF	10 mm, 3/8"	71	19	64	54	0.28	0.52
MD 103MMS	10 mm ODF	10 mm	118	19	64	54	0.25	0.49
MD 103S	3/8" ODF	3/8"	118	19	64	54	0.25	0.49
Pilot operated								
MS 103	5/8" UNF	10 mm, 3/8"	84	12	79	54	0.51	0.75
MS 103MMS	10 mm ODF	10 mm	159	12	79	54	0.55	0.79
MS 103S	3/8" ODF	3/8"	159	12	79	54	0.55	0.79
MS 104 MMS	12 mm ODF	12 mm	159	12	79	54	0.56	-
MS 104S	1/2" ODF	1/2"	159	12	79	54	0.56	-
MS 124	3/4" UNF	12 mm, 1/2"	91	12	79	54	0.54	0.77
MS 124MMS	12 mm ODF	12 mm	159	12	79	54	0.56	0.79
MS 124S	1/2" ODF	1/2"	159	12	79	54	0.56	0.79
MS 125S	16 mm, 5/8" ODF	16 mm, 5/8"	159	12	79	54	0.56	-
MS 165	7/8" UNF	16 mm, 5/8"	97	12	79	54	0.57	0.80
MS 165S	16 mm, 5/8" ODF	16 mm, 5/8"	159	12	79	54	0.59	0.82
MS 167S	22 mm, 7/8" ODF	22 mm, 7/8"	173	12	79	54	0.59	-
MS 227S	22 mm, 7/8" ODF	22 mm, 7/8"	262	22	88	54	1.45	1.65



MA



MD



MS

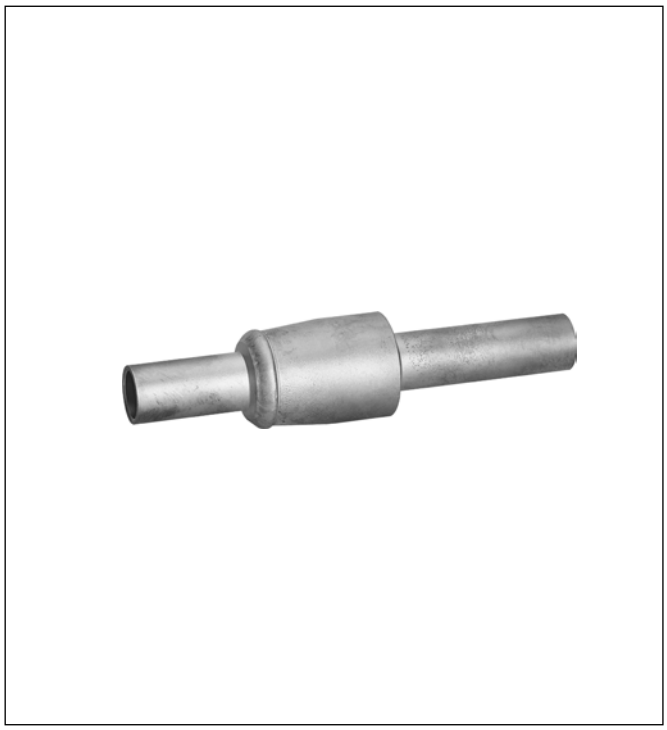
Installation

- Position of plunger tube should be from upright to horizontal position.
- Arrow on valve body must correspond with flow direction.
- Keep 45 mm distance clear above the valve for assembly/disassembly of coil.
- Fit solenoid valve so that it is drip proof.
- **Solder valves:**
  - Remove cap nut, coil and gaskets before soldering.
  - Max. temperature of valve body: 125 °C.
  - When soldering, always point flame away from valve body.
  - When assembling after soldering, fit the coil's top and bottom seal rings.
- **Flare valves:**
  - When tightening flare nuts grip at wrench flats on the valve body provided for this purposes.
  - Do not use coil and plunger tube as lever (thin-walled plunger tube).
  - When installing direct operated valves with 20 W DC coil, the flare nut must be tightened in that way that one flat of the nut is in parallel with the lower surface of the coil.
- Voltage of coil and network must correspond.
- The flat spade terminals is the earth connection. The protective conductor must also be connected at the plant.
- Do not energize the coil before assembling on the valve body.
- All gaskets must be fitted carefully in order to achieve protection to IP65.
- Tighten fixing screw of connector.
- Constructive modifications at the valve are not allowed.

Series RV

CHECK VALVES
FOR ALL FLUORINATED REFRIGERANTS

PRODUCT DATA



Features

- **Hermetically welded type**
- **Low pressure drop**
- **Copper plated solder connections**
- **Refrigerants: all CFC, HCFC, HFC**
  HFO (e.g. R1234yf) and future Blends
  not for ammonia

Specification

Nominal capacity range	see table on page 104
Maximum pressure PS	43 bar(a) 32.5 bar(a) (RV-07S) 11 bar(a) at t < -20 °C
Maximum test pressure PF	61.5 bar(a) 46.5 bar(a) (RV-07S) 15.7 bar(a) at t < -20 °C
Maximum temperature	120 °C
Minimum temperature	-40 °C

Application

Check valves series RV are installed in the liquid line, hot gas line or suction line of a refrigerated plant to permit the flow of the refrigerant only in one direction. This is realised by a spring-loaded piston which opens the valve only in one direction.

Materials

Housing, piston	brass
Sealing material	Teflon
Connection tubes	copper plated brass

Capacities

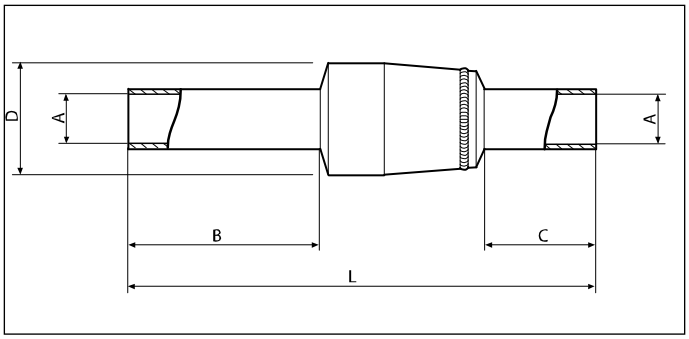
Type	ΔP* (bar)	kv-value (m^3/h)	Q_N (kW)											
			Liquid line				Suction gas line				Hot gas line			
			R22	R134a	R404A R507A	R407C R410A	R22	R134a	R404A R507A	R407C R410A	R22	R134a	R404A R507A	R407C R410A
RV-02 MMS RV-02 S	0.06	0.37	6.7	6.2	4.4	6.2	1.0	0.8	0.8	1.0	4.4	3.2	3.7	4.7
RV-03 MMS RV-03 S	0.06	1.75	31.7	29.3	20.8	29.2	4.7	3.8	3.8	4.5	20.8	15.1	17.5	22.2
RV-04 MMS RV-04 S	0.05	3.27	59.2	54.8	38.9	54.6	8.8	7.1	7.1	8.4	38.0	28.3	32.7	40.6
RV-05 S	0.05	3.64	65.9	61.0	43.3	60.7	9.8	7.9	7.9	9.3	43.3	31.5	36.4	46.3
RV-07 S	0.03	7.50	136.4	126.4	89.5	125.7	20.5	16.3	17.0	19.5	87.5	63.8	75.0	93.5

* ΔP = min. pressure drop at which the valve is completely open

The nominal capacity Q_N as mentioned in table above refers to the following conditions:

Liquid and suction gas:
- evaporating temperature t_o: +4 °C
- condensing temperature t_c: +38 °C
- pressure drop: 0.15 bar

Hot gas:
- temperature of hot gas: +85 °C
- pressure drop: 1.0 bar



Dimensions and Weights

Type	Connection (A)	Dimensions (mm)				Weight (kg)
		B	C	D	L	
RV-02 MMS	6 mm ODF	42	22	18	95	approx. 0.05
RV-02 S	1/4" ODF	42	22	18	95	
RV-03 MMS	10 mm ODF	42	22	18	95	approx. 0.05
RV-03 S	3/8" ODF	42	22	18	95	
RV-04 MMS	12 mm ODF	48	28	27	117	approx. 0.15
RV-04 S	1/2" ODF	48	28	27	117	
RV-05 S	16 mm ODF 5/8" ODF	48	28	27	117	approx. 0.20
RV-07 S	22 mm ODF 7/8" ODF	72	72	35.5	186	approx. 0.25

Series SLI/SBI

SIGHT GLASSES

WITH MOISTURE INDICATOR

PRODUCT DATA

SLI

SBI

SBIA

Application

Sight glasses series SLI/SBI/SBIA show the condition of the refrigerant flowing through the lines in the refrigerating plant, for example it is possible to see if the refrigerant in the liquid line is free of bubbles.

The moisture indicator shows the moisture content in the refrigerant.

Materials

Housing	brass
Display area	pressure resistant glass, indicator paper
Connection tubes	Solder: copper Flare: brass

Features

- **Large display area**
- **Moisture indicator**
- **Low pressure loss**
- **SLI with solder connections on both sides**
- **SBI with flare connections on both sides**
- **SBIA with flare connections, female thread x male thread**
- **Refrigerants: all CFC, HCFC, HFC, HFO (e.g. R1234yf) and future Blends not for R12, R502 and ammonia**

Specifications

Moisture indicator range	see table on page 106
Max. ambient temperature TS	80 °C
Diameter display area	22.5 mm

Type	Maximum pressure PS	Maximum test pressure PF
SLI 6; SLI 1/4 SLI 10; SLI 3/8 SLI 12; SLI 1/2 SLI 15 SLI 16 (5/8)	44 bar(a)	63 bar(a)
SLI 18; SLI 3/4 SLI 22 (7/8) SBI SBIA	36 bar(a)	51.5 bar(a)
SLI 28; SLI 1 1/8	35 bar(a)	50 bar(a)

Moisture Indicator

The colour of the indicator is a measure for the moisture load of the refrigerant inside the plant.

The range of indication depends on the refrigerant:

Refrigerant	Indication Range		
	dry (green)	Transition	wet (yellow)
R22	< 30 ppm	30 – 150 ppm	> 150 ppm
R134a	< 60 ppm	60 – 100 ppm	> 100 ppm
R404A	< 20 ppm	20 – 100 ppm	> 100 ppm
R407C	< 20 ppm	20 – 130 ppm	> 130 ppm
R410A	< 40 ppm	40 – 150 ppm	> 150 ppm
R507A	< 20 ppm	20 – 100 ppm	> 100 ppm

Indication temperature: 30 °C

Green colour: Moisture free.

Only a moisture-free refrigerant assures no trouble with the expansion valve coming from humidity.

Transition range:

When the green colour begins to fade, it is an indication that small quantities of moisture are present. It is recommended to change the filter drier.

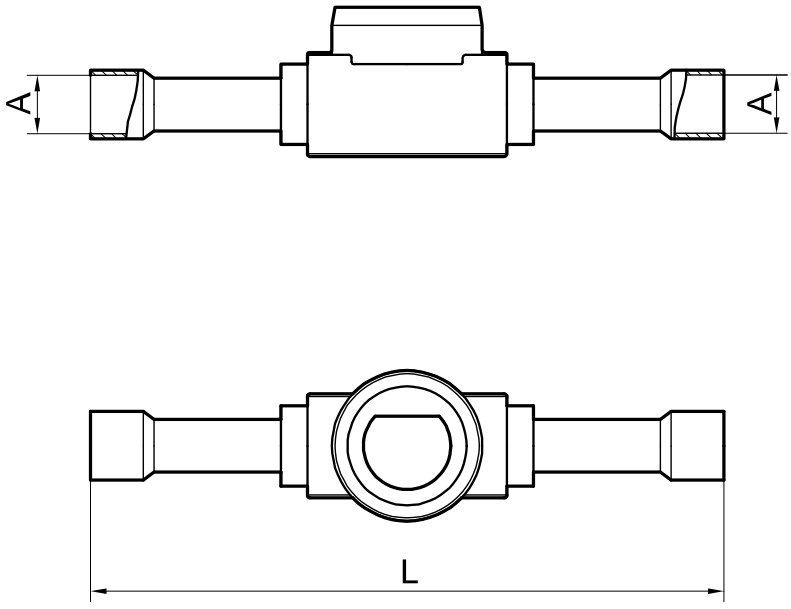
Yellow colour: Wet.

The refrigerant is loaded with moisture higher than the stated values. A change of the filter drier is required.

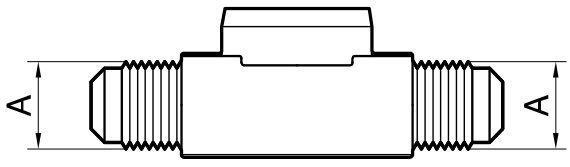
Due to the humidity in the air, the indicator is yellow on delivery. After the installation inside the plant, the indicator will change to green when filling the system with dry refrigerant.

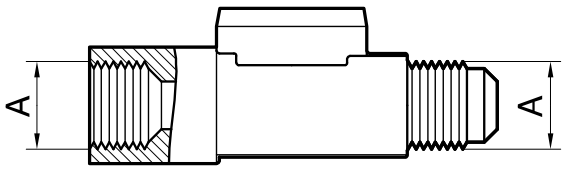
Dimensions and Weights

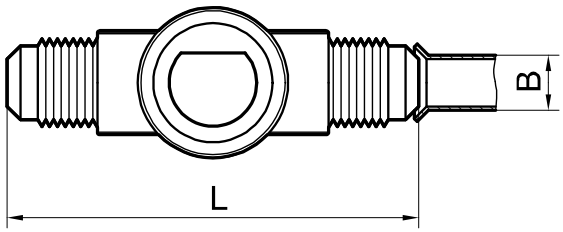
Type	Dimensions				Weight approx. (kg)
	Connection (A)	Pipe diameter (B)		Length (L)	
SLI 6	6 mm ODF	6 mm		106 mm	0.15
SLI 10	10 mm ODF	10 mm		119 mm	0.15
SLI 12	12 mm ODF	12 mm		144 mm	0.20
SLI 15	15 mm ODF	15 mm		146 mm	0.17
SLI 16	16 mm; 5/8" ODF	16 mm; 5/8" ODF		146 mm	0,17
SLI 18	18 mm ODF	18 mm		183 mm	0.22
SLI 22	22 mm; 7/8" ODF	22 mm; 7/8" ODF		183 mm	0,24
SLI 1/4	1/4" ODF	1/4"		106 mm	0.15
SLI 3/8	3/8" ODF	3/8"		119 mm	0.15
SLI 1/2	1/2" ODF	1/2"		144 mm	0.19
SLI 3/4	3/4" ODF	3/4"		183 mm	0.22
SLI 1 1/8	1 1/8" ODF	1 1/8"		188 mm	0.48
SBI 6	7/16" UNF	6 mm	1/4"	70 mm	0.15
SBI 10	5/8" UNF	10 mm	3/8"	76 mm	0.15
SBI 12	3/4" UNF	12 mm	1/2"	88 mm	0.17
SBI 16	7/8" UNF	16 mm	5/8"	98 mm	0.29
SBIA 6	7/16" UNF	6 mm	1/4"	60 mm	0.30
SBIA 10	5/8" UNF	10 mm	3/8"	76 mm	0.15
SBIA 12	3/4" UNF	12 mm	1/2"	74 mm	0.19
SBIA 16	7/8" UNF	16 mm	5/8"	78 mm	0.31



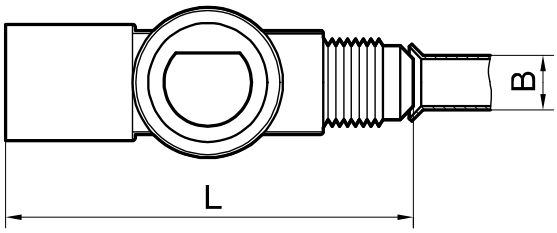
SLI







SBI



SBIA

Type Code / Order Information

	S	B	I	A		12
Series						
Connection type: B = flare L = solder						
Indicator						
A = Inner and outer connection ()						
Tube connection size (mm, inch)						

Series FF

FILTER DRIERS

PRODUCT DATA

Application

Filter driers series FF are used for filtration of impurities by microscopic filters and to take away moisture from the refrigerant.

The filter driers are placed in the liquid line of airconditioning, refrigeration and deep freeze systems.

Materials

Housing	steel	
Internals	steel	
Drier	molekularsieve, activated alumina	
Connections	solder:	copper, copper plated steel or steel**
	flare:	nickel plated steel

Features

- **Liquid line filter drier**
- **Drying agent in bulk**
- **Low pressure drop**
- **High performance**
- **Hermetic construction**
- **Solder or flare connections**
  - **FF ...MMS: solder connection in mm**
  - **FF ...S: solder connection in inch**
  - **FF ...: flare connection**
- **Refrigerants: all CFC, HCFC, HFC**
  HFO (e.g. R1234yf) and future Blends
  not for ammonia

Specification

Nominal capacity	see tables on page 110
Water adsorption	see table on page 111
Maximum pressure PS	43 bar(a) 40 bar(a) (for FF 410) 11 bar(a) at t < -20 °C
Maximum test pressure PF	61.5 bar(a) 57.2 bar(a) (for FF 410) 15.7 bar(a) at t < -20 °C
Max. operating temperature	80 °C
Min. operating temperature	-40 °C

Installation

- Any mounting position in the liquid line.
- Flow in direction of arrow!
- When soldering the filter drier, the housing must not get warmer than 160 °C.
- Constructive modifications at the filter drier are not allowed.

Capacities, Dimensions and Weights

Filter drier with solder connections

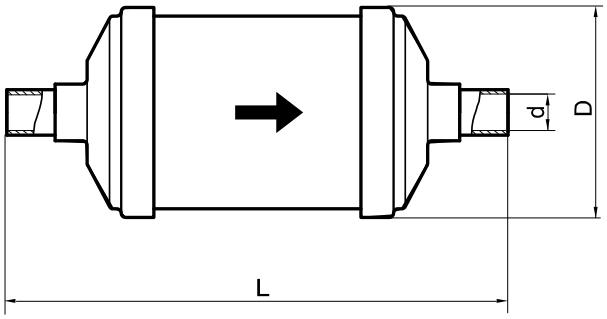
Type	Nominal cooling capacity (kW)*					Connections ODF (d)	Dimensions			Weight (kg)
	R134a	R22	R404A R507A	R407C	R410A		D (mm)	L (mm)	V_F (dm^3)	
FF 032MMS	9.8	10.7	7.0	10.1	10.6	6 mm	52	98.5	0.1	0.26
FF 032S	9.8	10.7	7.0	10.1	10.6	1/4"	52	98.5	0.1	0.26
FF 052MMS	9.6	10.5	6.8	9.9	10.4	6 mm	52	111.5	0.1	0.295
FF 052S	9.6	10.5	6.8	9.9	10.4	1/4"	52	111.5	0.1	0.295
FF 053MMS	23.3	25.4	16.6	23.9	25.0	10 mm	52	111.5	0.1	0.325
FF 053S	23.3	25.4	16.6	23.9	25.0	3/8"	52	111.5	0.1	0.325
FF 082MMS	9.1	9.9	6.5	9.3	9.7	6 mm	52	139.5	0.2	0.37
FF 082S	9.1	9.9	6.5	9.3	9.7	1/4"	52	139.5	0.2	0.37
FF 083MMS	22.7	24.8	16.1	23.3	24.4	10 mm	52	139.5	0.2	0.405
FF 083S	22.7	24.8	16.1	23.3	24.4	3/8"	52	139.5	0.2	0.405
FF 084MMS	30.2	33.0	21.5	31.1	32.6	12 mm	52	139.5	0.2	0.465
FF 084S	30.2	33.0	21.5	31.1	32.6	1/2"	52	139.5	0.2	0.465
FF 162MMS	8.8	9.6	6.2	9.0	9.4	6 mm	74	159	0.4	0.825
FF 162S	8.8	9.6	6.2	9.0	9.4	1/4"	74	159	0.4	0.825
FF 163MMS	22.7	24.8	16.1	23.3	24.4	10 mm	74	159	0.4	0.875
FF 163S	22.7	24.8	16.1	23.3	24.4	3/8"	74	159	0.4	0.875
FF 164MMS	33.6	36.6	23.9	34.5	36.1	12 mm	74	159	0.4	0.93
FF 164S	33.6	36.6	23.9	34.5	36.1	1/2"	74	159	0.4	0.93
FF 165S	47.8	52.1	34.0	49.1	51.4	16 mm - 5/8"	74	163	0.4	0.96
FF 303MMS	22.7	24.8	16.1	23.3	24.4	10 mm	74	235.5	0.6	1.305
FF 303S	22.7	24.8	16.1	23.3	24.4	3/8"	74	235.5	0.6	1.305
FF 304MMS	33.6	36.6	23.9	34.5	36.1	12 mm	74	235.5	0.7	1.35
FF 304S	33.6	36.6	23.9	34.5	36.1	1/2"	74	235.5	0.7	1.35
FF 305S	47.8	52.1	34.0	49.1	51.4	16 mm - 5/8"	74	239.5	0.7	1.41
FF 307S**	64.7	70.6	46.0	66.5	69.7	22 mm - 7/8"	74	259.5	0.6	1.45
FF 414MMS	38.8	42.4	27.6	39.9	41.8	12 mm	93	232.5	1.1	2.035
FF 414S	38.8	42.4	27.6	39.9	41.8	1/2"	93	232.5	1.1	2.035
FF 415S	60.5	66.0	43.0	62.2	65.1	16 mm - 5/8"	93	245.5	1.1	2.105
FF 417S**	84.1	91.7	59.8	86.4	90.5	22 mm - 7/8"	93	278.5	1.2	2.110

Filter drier with flare connections

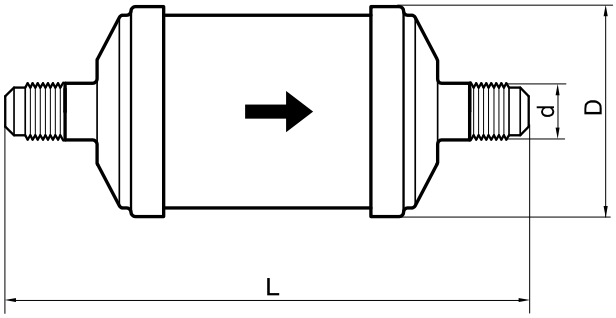
Type	Nominal cooling capacity (kW)*					Connectios UNF (d)	Dimensions			Weight (kg)
	R134a	R22	R404A R507A	R407C	R410A		D (mm)	L (mm)	V_F (dm^3)	
FF 032	5.7	6.3	4.1	5.9	6.2	7/16"	52	108.5	0.1	0.26
FF 052	5.6	6.1	4.0	5.8	6.1	7/16"	52	121.5	0.1	0.295
FF 053	18.6	20.3	13.3	19.2	20.1	5/8"	52	127.5	0.1	0.325
FF 082	5.3	5.8	3.8	5.5	5.8	7/16"	52	149.5	0.2	0.37
FF 083	18.1	19.8	12.9	18.7	19.6	5/8"	52	155.5	0.2	0.405
FF 084	28.7	31.4	20.4	29.5	30.9	3/4"	52	159.5	0.2	0.465
FF 162	5.2	5.7	3.7	5.3	5.6	7/16"	74	169	0.4	0.825
FF 163	17.7	19.3	12.6	18.2	19.1	5/8"	74	175	0.4	0.875
FF 164	31.1	33.9	22.1	32.0	33.5	3/4"	74	179.5	0.4	0.93
FF 165	44.4	48.4	31.6	45.6	47.8	7/8"	74	183.5	0.4	0.96
FF 303	17.7	19.3	12.6	18.2	19.1	5/8"	74	251.5	0.6	1.305
FF 304	31.1	33.9	22.1	32.0	33.5	3/4"	74	255.5	0.7	1.35
FF 305	44.4	48.4	31.6	45.6	47.8	7/8"	74	259.5	0.7	1.41
FF 414	36.3	39.7	25.9	37.4	39.2	3/4"	93	252.5	1.1	2.035
FF 415	56.6	61.8	40.3	58.2	61.0	7/8"	93	265.5	1.1	2.105

* Capacities are based on t_o = -15 °C, t_c = +30 °C and pressure drop Δp = 0.07 bar.

** Steel connections



Filter drier with solder connections



Filter drier with flare connections

Water adsorption rate

Water adsorption rate (g)

Refrigerant		**R134a**		**R22**		**R404A R507A**		**R407C**		**R410A**	
Final moisture		**50 ppm**		**60 ppm**		**50 ppm**		**50 ppm**		**50 ppm**	
Liquid temperature		**24 °C**	**52 °C**	**24 °C**	**52 °C**	**24 °C**	**52 °C**	**24 °C**	**52 °C**	**24 °C**	**52 °C**
Type	030	4.0	3.7	3.9	3.6	4.3	4.0	3.6	3.1	2.5	2.3
	050	7.8	7.2	7.5	6.9	8.3	7.7	7.0	5.9	4.8	4.4
	080	12.6	11.6	12.1	11.1	13.4	12.4	11.2	9.6	7.7	7.0
	160	25.1	23.2	24.1	22.2	26.7	24.8	22.4	19.1	15.3	14.1
	300	48.5	44.8	46.7	42.9	51.7	47.9	43.2	37.0	29.7	27.2
	410	67.2	62.0	64.6	59.4	71.6	66.4	59.9	51.2	41.0	37.7

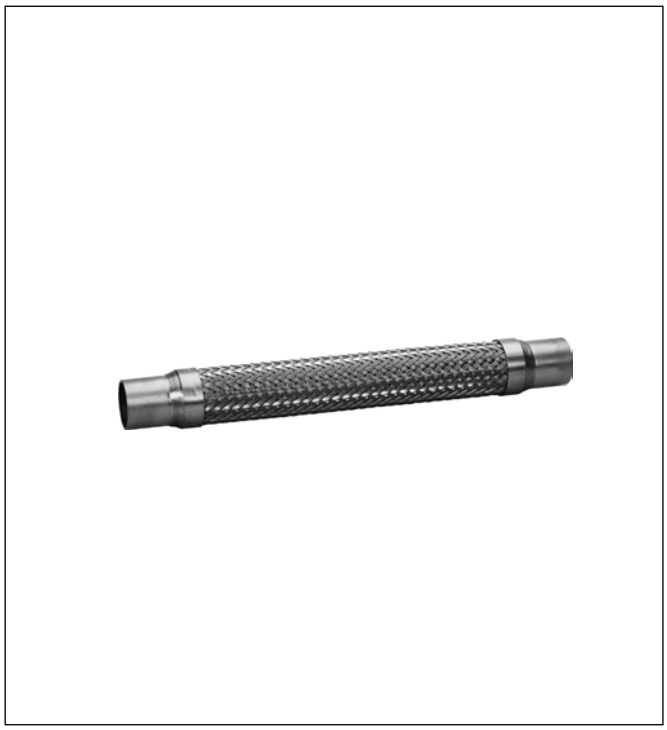
Type Code / Order Information

	FF	16	4	MMS
Series				
Filter size				
Tube connection size in 1/8‘‘				
Connection type: () = flare S = solder in inch MMS = solder in mm				

Series SA

VIBRATION ABSORBERS
FROST RESISTANT CONSTRUCTION, LASER WELDED

PRDUCT DATA



Features

- **Short connection fittings**
- **Compact construction**
- **Flexible pipe, braid and shoulder made of stainless steel**
- **Frost resistant construction - no collecting of condensation water within the corrugated area**
- **Suitable for vertical installation**
- **Laser welded**
- **Connection fittings made of copper**
- **No preventive measures from overheating necessary when soldering**
- **Refrigerants: all CFC, HCFC, HFC**
  HFO (e.g. R1234yf) and future Blends
  not for ammonia

Specification

Maximum pressure PS	35 bar(a)
Maximum test pressure PF	1.5 x PS
Maximum temperature	250 °C
Minimum temperature	-100 °C

Application

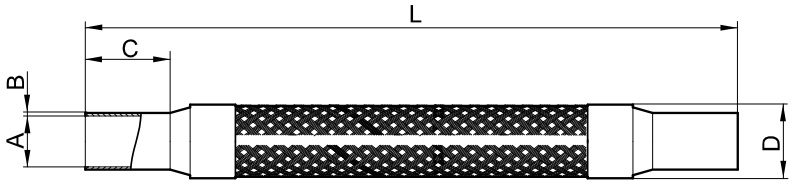
Vibration absorbers series SA are installed in refrigerated plants to minimize vibrations on the pipes caused by the compressor. Furthermore they decrease noise and compensate small thermal displacements.

Materials

Flexible pipe	stainless steel
Braid	stainless steel
Shoulder	stainless steel
Connection fittings	copper

Dimensions and Weight

Type	Connection (A)	Dimensions (mm)				Weight (kg)
		B	C	D	L	
SA06-1/4	6 mm ODF 1/4" ODF	1.0	20	19	230	approx. 0.11
SA08	8 mm ODF	1.0	20	19	230	approx. 0.11
SA3/8	3/8" ODF	1.0	20	19	230	approx. 0.11
SA10	10 mm ODF	1.0	20	19	230	approx. 0.12
SA12	12 mm ODF	1.0	20	21	230	approx. 0.13
SA1/2	1/2" ODF	1.0	20	21	230	approx. 0.13
SA15	15 mm ODF	1.0	25	27	255	approx. 0.17
SA16-5/8	16 mm ODF 5/8" ODF	1.0	25	27	255	approx. 0.17
SA18	18 mm ODF	1.0	25	27	255	approx. 0.17
SA3/4	3/4" ODF	1.0	25	27	255	approx. 0.17
SA22-7/8	22 mm ODF 7/8" ODF	1.5	25	32	290	approx. 0.28
SA28-1 1/8	28 mm ODF 1 1/8" ODF	1.5	25	39	330	approx. 0.44
SA35-1 3/8	35 mm ODF 1 3/8" ODF	2.0	30	48	375	approx. 0.72
SA42-1 5/8	42 mm ODF 1 5/8" ODF	2.0	35	58	430	approx. 1.35
SA54-2 1/8	54 mm ODF 2 1/8" ODF	2.5	45	70	510	approx. 1.68



Notes

Notes

Notes

Notes

Nomenclature

Solenoid valves

M	**A**	**06**	**2**	**MMS**
M	**D**	**10**	**3**	**S**
M	**S**	**16**	**5**	

MA

MD

MS

() = Flare, **MMS** = solder in mm, **S** = solder in inch

Connections — Connection size in 1/8“

Valve size

Type — **A** = angle – direct operated, **D** = direct operated, **S** = pilot operated

Product — **S**olenoid valve

Sight glasses

S	**L**	**I**		**1/2**
S	**B**	**I**		**10**
S	**B**	**I**	**A**	**12**

SLI

SBI

SBIA

Connection size (mm, inch)

A = inner and outer

Indicator

Connections — **L** = solder, **B** = flare

Product — **S**ight glass

Filter driers

FF	**05**	**2**	
FF	**08**	**3**	**S**
FF	**16**	**4**	**MMS**

FF

() = Flare, **MMS** = solder in mm, **S** = solder in inch

Connection — Connection size in 1/8“

Filter size

Product — **F**ilter drier

Electronic Controls

P	**TI**	**6**	**10**	
P	**CR**	**1**	**10**	
P	**CR**	**3**	**00**	**RC**
P	**CR**	**4**	**10**	

PCR-110

PCR-100

PTI-610

Real time **C**lock

installation type — **00** = DIN rail, **10** = snap-in

no. of outputs (not for PTI)

Temperature **I**ndicator, **C**ont**R**oller

Product — **P** = electronic controller series

Automatic Expansion Valves

A	E		L
A	MV	X	
A	MV		


AEL

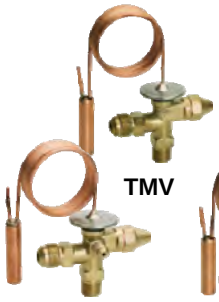

AMVX


AMV

- Connections — **L** = solder — AMV(X) only flare connections
- Pressure equaliser — () = internal, e**X**ternal
- Series of valve — **E** — **MV**
- Product — **A**utomatic Expansion Valve

Thermostatic Expansion Valves with interchangeable orifice

T	MV		
T	MV	X	
T	MV		BL
T	MV	X	BL
T	MV		L
T	M	X	


TMV


TMVBL


TMVL

TMVX


TMVXBL


TMX

Orifice cartridges
AMV(X)
TMV(X)
TMV(X)BL
TMVL
NMVL


VD

Orifice cartridges
TMX
NMX


XD

- Connections — **L** = solder, **B** = flare
- Pressure equaliser — () = internal, e**X**ternal
- Series of valve — **MV** — **M**
- Product — **T**hermostatic Expansion Valve

Solder bases for series TMVL and NMVL

two-way


VLS

VLSX

angle


VLSX

VLS

Löt/Bördelsockel für Typenreihe TMX und NMX

Two-way


XBS


XLS

angle


XLS

Thermostatic Expansion Valves with fixed orifice

T	L	K	
T	L	E	
T	L	E	X
T	B	E	X
T	O	E	X
T	L	ES	X


TLK


TLEX 0.5-4.5


TBEX


TLEX 4.75-7


TLE

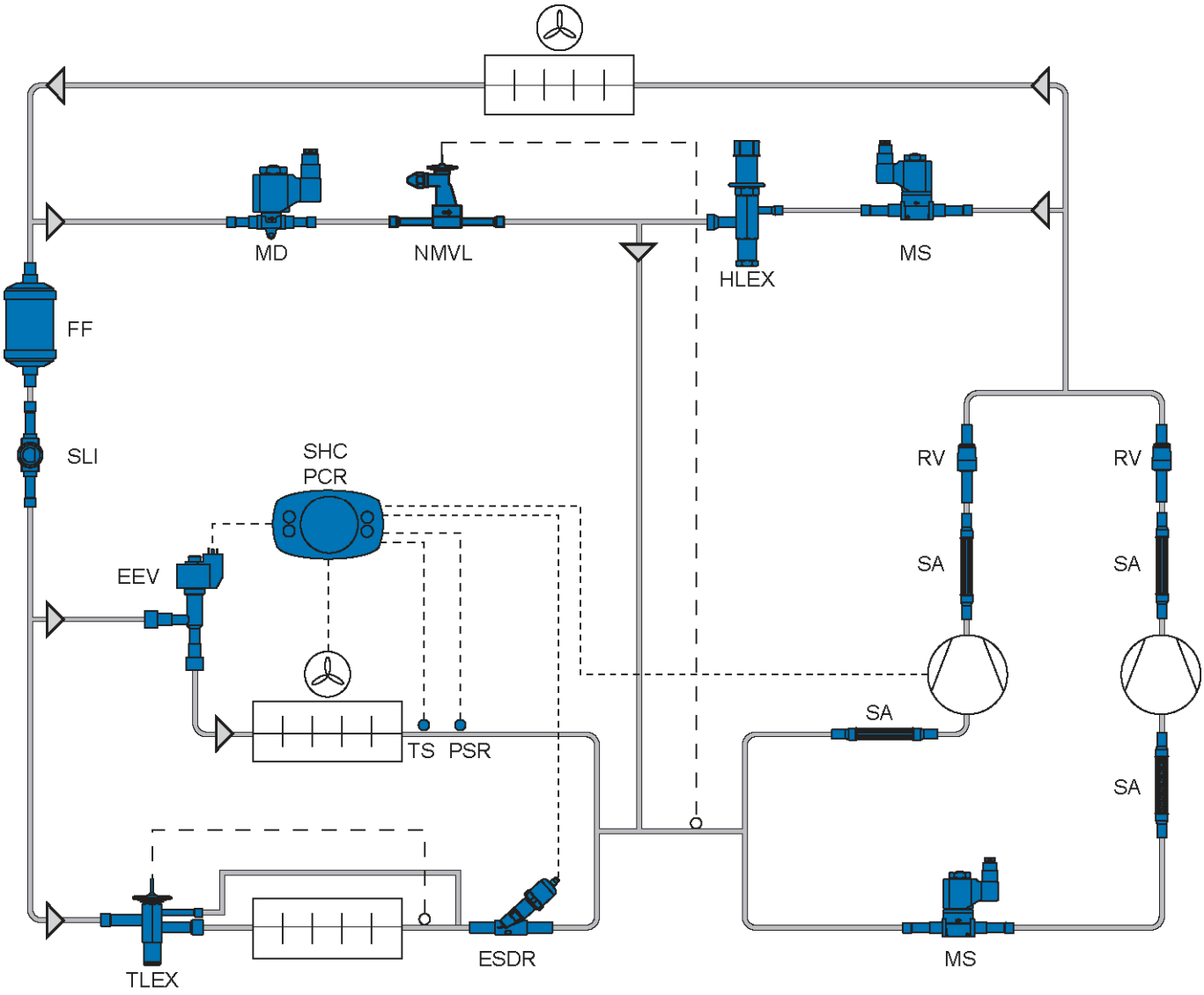

TOEX


TLEX 8-11


TLESX

- Pressure equaliser — () = internal, e**X**ternal
- Series of valve — **K** — **E** — **ES**
- Connections — **L** = solder, **B** = flare, **O** =O-Ring
- Product — **T**hermostatic Expansion Valve

Honeywell Product Portfolio



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