

# Electric regulating valve

## PTS

## Description

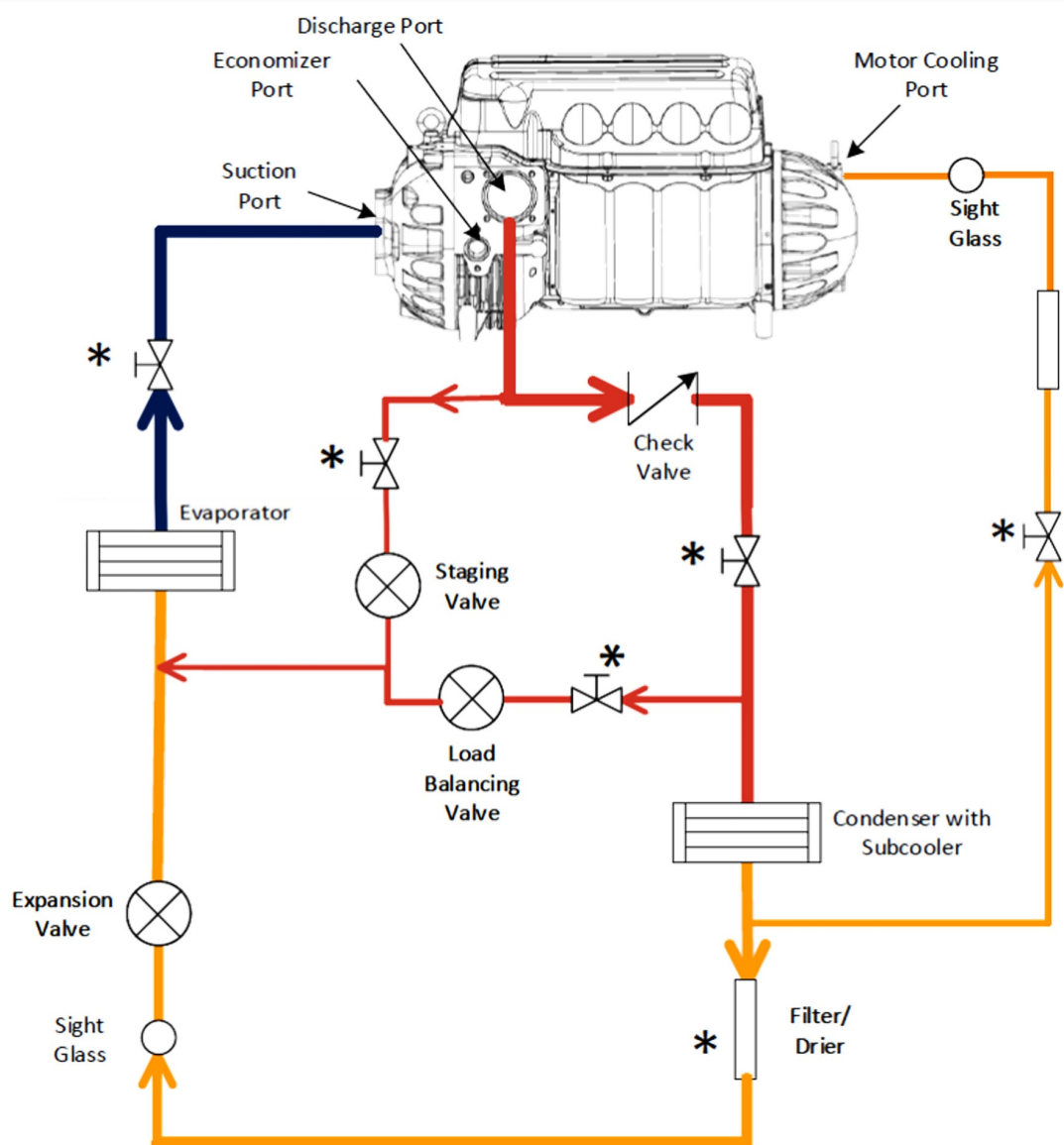
PTS is a series of stepper motor staging valves. Staging valve prevents compressor surge by quickly responding to surge conditions, ensuring stable operations and reducing the risk of damage to the compressor. PTS can also be used as load balancing valve.

## Features & Benefits

- High quality materials and construction, ensures durability and long-term reliability of the valves in oil free applications, reducing maintenance needs and operational costs
- Wide range for all common refrigerants including A2L
- Various sizes of valves available
- Capable of opening fast, which is expected from staging valve to ramp down the compressor pressure
- PTS valves are not closing in an instant

## Applications

Figure: Applications



\* Service valves are optional.

## Ordering

### Product code numbers

Table: Ordering PTS valves

Type	Built-in sight glass	K <sub>V</sub> value	Connections		Code no.	
			ODF x ODF	ODM x ODM	Single pack	Industrial pack
		(m <sup>3</sup> /h)	(in)	(mm)		
PTS 18L	Yes	18.5	1-5/8 x 1-5/8	–	034G3905	–
PTS 18L	Yes	18.5	2-1/8 x 2-1/8	–	034G3911	–
PTS 18L	Yes	18.5	2-3/8 x 2-3/8	–	034G3907	–
PTS 18L	Yes	18.5	–	35 x 35	034G3910	–
PTS 27L	Yes	27.1	2-1/8 x 2-1/8	–	034G3917	–
PTS 27L	Yes	27.1	2-3/8 x 2-3/8	–	034G3914	–
PTS 38P	Yes	38.4	3-1/8 x 3-1/8	–	034Z1029	–

Table: Selection of PTS valve size

Compressor Model	Recommended PTS valve size
TTS300	PTS 18L
TTS350	PTS 27L
TTS400	PTS 27L
TTS450	PTS 27L
TTS700	PTS 38P
TTH375	PTS 18L
TGS230	PTS 18L
TGS310	PTS 27L
TGS380	PTS 27L
TGS390	PTS 27L
TGS490	PTS 38P
TGS520	PTS 38P
TGH285	PTS 18L



### Valve sizing using calculation software

It is strongly recommended to use Coolselector®2 to find the correct valve for your application. The software can be downloaded from the Danfoss website. You can download it from <http://coolselectordanfoss.com>



Accessories code numbers

M12 cable

M12 female connector is intended for use with a standard M12 male connector, available on stepper motor valves. These cables are designed to offer high flexibility and small outer diameters with tensile strength. Each of M12 cables listed in the [Table: M12 cables - ordering table](#) consist of paired, twisted wires, which decreases mutual influence between signals transmitted along the cable and reduces influence of external sources of interference. These cables thus provides a higher degree of protection against lost steps compared to other cables.

Table: M12 cables ordering table

Cable length (L)	Cable insulation	Connector	Packing format	Code no.
2 m / 6.6 ft	PVC	Angleway	Single pack	034G7073
5 m / 16.4 ft	PVC	Angleway	Single pack	034G7120
8 m / 26.2 ft	PVC	Angleway	Single pack	034G7074
12.2 m / 40.0 ft	PVC	Angleway	Single pack	034G7119
12.2 m / 40.0 ft	PVC	Straightway	Single pack	034G7078
15 m / 49.2 ft	PVC	Angleway	Single pack	034G7129

Table: Specification

Future	Description
Jacket	PVC – black
Cable outer sheat	Oil - resistant
Water proof rating	IP 67
Operating temperature range	-40 – 80 °C
Wire type	Twisted pair, cross section 20 AWG / 0.5 mm <sup>2</sup>
Cable outer diameter	7.0 mm
Minimum bending radius	10 x cable diameter
Cable combustibility / test	Flame retardant / VW-1 / CSA FT – 1
M12 standard	EN 61076-2-101
Reference standard - wire	UL style 2464 and DIN VDE 0812
LVD directive	2014/35/EU

Figure: Identification



A	Product name
B	Product code no.
C	Cable length
D	Approvals
E	Data Matrix
F	Danfoss logo
G	Country of Origin
H	Place and date of production
I	Danfoss A/S address

Table: Connections

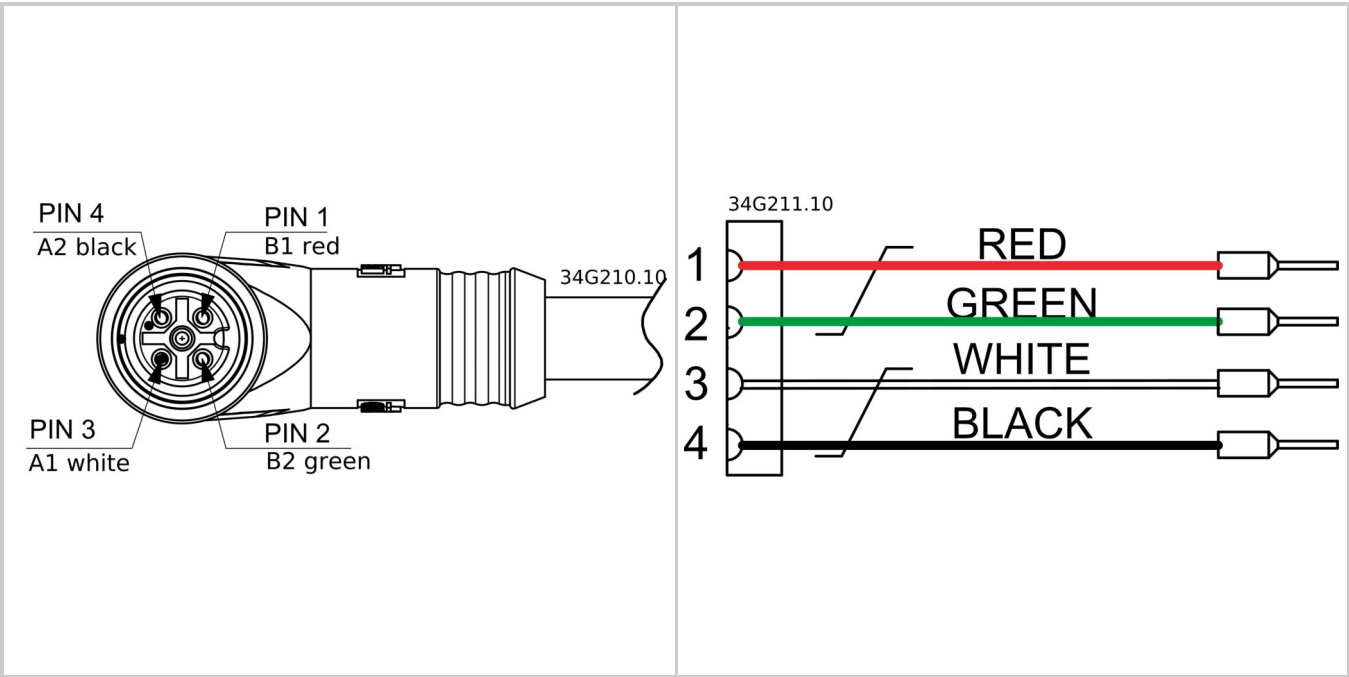


Figure: Dimensions (cable with angleway connector)

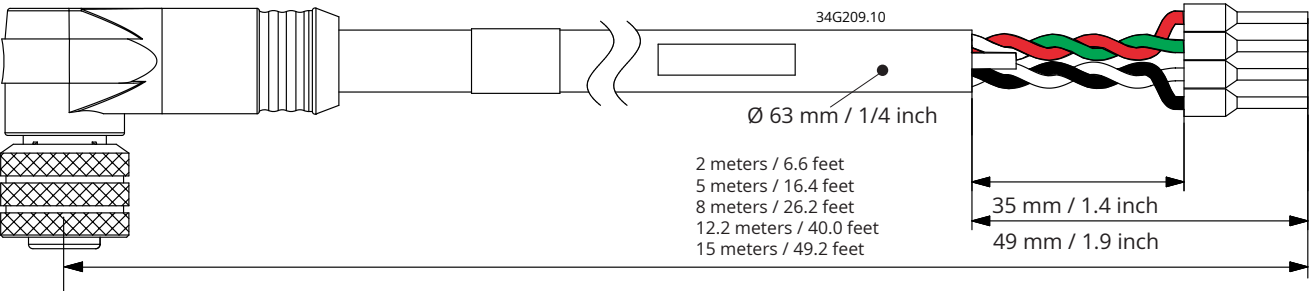
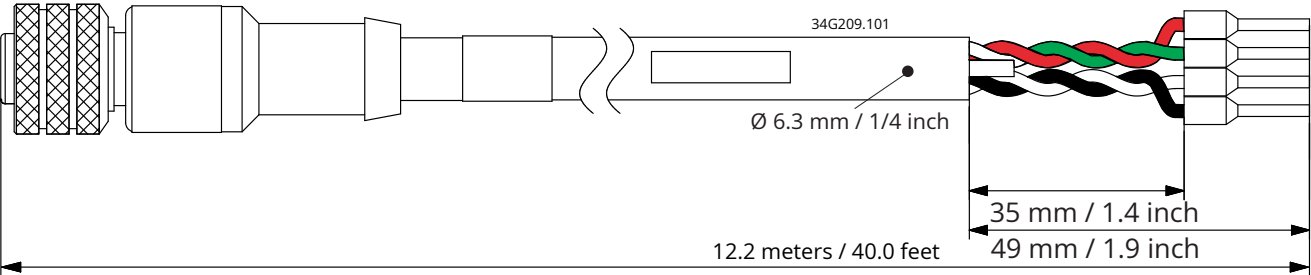


Figure: Dimensions (cable with straightway connector)



**WARNING:**

\* M12 cables shown in the datasheet are not ATEX approved. Kindly procure ATEX cable if needed from 3rd party manufacturer



Spare parts code numbers

Actuator kits

Table: Actuator kits

Code no.	034G3920	034G3921
Item	PTS 18L actuator kit	PTS 27L actuator kit
Parts		
1 pcs.	Actuator assembly	
1 pcs.	O-ring	
8 pcs.	Screw M6x25mm	

O-ring

Table: O-ring

Part	Quantity	Description	Code no.
O-ring	1 pc.	O-ring for PTS 18L – 27L – 38P (in PTS 38P two O-rings are used)	034G3643



Overview

Product portfolio

PTS is a staging valve series whose function is controlled through a Danfoss stepper motor valve driver Danfoss recommends the use of the EKF driver units or EKE 100 series Superheat controllers together with PTS 18L – 27L – 38P

Table: System product

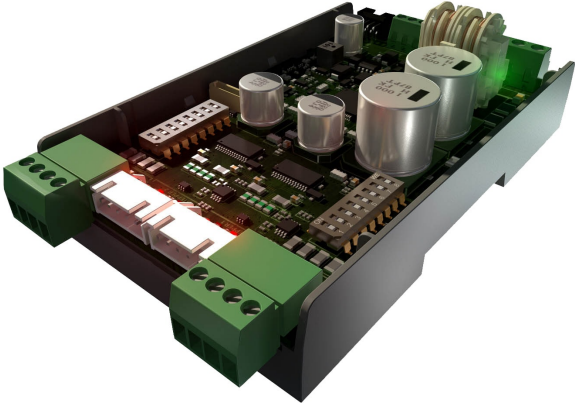



EKF 1A/2A Stepper Valve Driver	EKE 100 series (080G5051 is shown)
	
EKF series is an economical stepper valve driver that translates analog signal provided by master controller to valve driving sequence.	EKE 100 can be used as a driver for stepper motor valves typically in air conditioning, commercial and industrial heat pumps, commercial refrigeration, food retail and industrial application.

Table: Other products for use with PTS 18L – 27L – 38P

M12 cable (connector of 034G7073 is shown)	Backup power module EKE 2U
	
M12 female connector is intended for use with a standard M12 male connector available on stepper motor valves.	EKE 2U Backup power module ensures sufficient power in case of power failures to the controller to ensure closure of the electronic valves.

## Functions

### Valve operation

The PTS 18L – 27L – 38P valves modulate the flow through electronically controlled activation of the stepper motor. The motor is a type 2-phase bi-polar, which stays in position, unless power pulses from a driver initiate the two discrete sets of motor stator windings for rotation in either directions. The direction of the rotation of the spindle depends on the phase relationship of the power pulses. This is decisive for the travel of the piston.

The motor is operating the spindle, whose rotating movements are transformed into linear motion by the transmission in the cage assembly. The motor housing has a glass sealed M12 connection as standard, which can be connected with a M12 A code 4-pin connector.

Closing the valve by overdriving, ensures that the reference number in steps is always correct.

### NOTE:

Depending on the type of controller or driver, there will be limitations in cable length between valve actuator and driver. Both the actual cable length, the level of EMC emission on the location and driver circuit has an impact on the actual distortion of the current to the actuator motor.

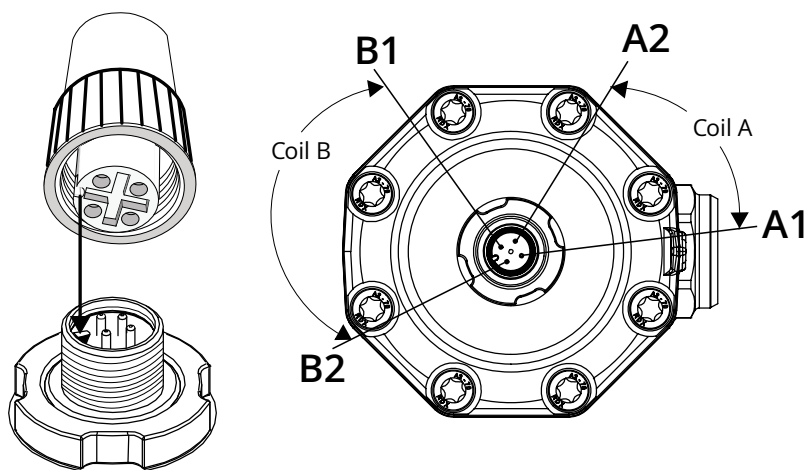
Do not overdrive the valve in open position. Please contact Danfoss for further information about how and when to apply this counter measure in cases of questionable cable length.

### Sight glass

PTS 18L – 27L – 38P are equipped with sight glass. The physical position of the valve can be checked through the sight glass.

### Electrical wiring

Figure: Electrical wiring scheme





PTS 18L / 27L / 38P

**NOTE:** Electrical check of stepper motor and wiring coil I = 29 ohm, coil II = 29 ohm





Table: Stepper motor switch sequence

<div> CLOSING</div>		Coil B		Coil A	
	Pin	B 1	B 2	A 1	A 2
	Wire color	Red	Green	White	Black
	STEP				
	1	+	-	+	-
<div>OPENING </div>	2	+	-	-	+
	3	-	+	-	+
	4	-	+	+	-
	1	+	-	+	-

Color code is only valid for Danfoss M12 cable

If the controller driving the PTS 18L – 27L – 38P valves is from another manufacturer than Danfoss or a custom design, the following must be considered in order to overcome potential step loss:

- To ensure complete closure of the valve, the controller should have a function to overdrive the valve in the closed direction. **PTS must overdrive 5% of the full step range on every close to fully close the valve, to ensure that the valve is tightly closed.** Overdrive should not be performed in open direction of the valve.



**WARNING:**

In case of power failure, if the PTS staging valve is closed, it will require a safety backup power device to open the valve and release the pressure at the discharge of the compressor Danfoss recommends the use of an EKE 2U Backup power module.

## Media

PTS series is designed to be used with the refrigerants listed below.

### Refrigerants

Table: Refrigerants

Media Data	Value
Refrigerants	R22, R134a, R404A, R407A, R407C, R407F, R407H, R410A, R417A, R422A, R422B, R422D, R438A, R442A, R448A, R449A, R449B, R450A, R452A, R463A, R507A, R513A, R513B, R515A, R515B, R1234ze(E)
Oil free application	Yes
Media temperature range	from -40 to 95 °C (from -40 to 203 °F)

#### Refrigerant safety class (ASHRAE Standard 34/ISO 817)

##### NOTE:

For flammable refrigerants R1234ze (E):

- This product is validated in accordance to EN 378, ISO 5149, ASHRAE 15 or equivalent standards.
- Ignition risk is evaluated in accordance to ISO 5149.
- See safety note below.

##### NOTE:

- The product can be applied on systems with R1234ze (E) as the working fluid.
- For countries where safety standards are not an indispensable part of the safety system Danfoss recommends the installer to get a third party approval of the system containing flammable refrigerant.
- Note, please follow specific selection criteria stated in the datasheet for these particular refrigerants.
- The valve must only be used in closed circuit refrigeration system, where no oxygen is present according to EN 378, ISO 5149 ASHRAE 15 or equivalent standards.

## Product details

### General data

### Valve technical specifications

Table: Electrical specification

Valve technical specification	Value
Motor type	Bi-Polar
Coil resistance @ 25C	29 ohm +- 10%
Phase current	Chopper drive is recommended with 500 mA RMS
Phase inductance	40 mH +- 20%
Power consumption	Voltage / current drive: 5.5 / 4.2 W (UL: NEC class 2)
Holding current	Not needed
Excitation methods	micro stepping (1/8) is recommended
Number of steps	PTS 18L: 800 steps PTS 27L: 1050 steps PTS 38P: 800 steps (each actuator)
Nominal step rate	max. 200 pps <sup>1)</sup>
Travel time	PTS 18L and 38P: 4 sec @ 200 pps PTS 27L: 5.25 sec @ 200 pps
Max duty cycle	100%
Dielectric strength	>100MΩ at 500VDC after 4 seconds
Reference position	Overdriving against the full close position
Valve configuration	Inline, Straightway
Electrical connections	M12 A-code 4 pin
Compatible Danfoss drivers	Danfoss EKE 100 series, EKF drivers <sup>2)</sup>

**NOTE:**

<sup>1)</sup> Please see information regarding MOPD in the table in the "Valve Specification" section below

<sup>2)</sup> **Warning!** Turbocor I/O board can not be used to drive PTS valves due to insufficient power resulting internal leakage when the valve cannot close. Danfoss recommends the use of the EKF driver units or EKE 100 series Superheat controllers together with PTS 18L – 27L – 38P.

### Valve Specification

Table: Valve Specification

Data		Value (SI units)	Value (IMP units)
Max working pressure (MWP)		37 barg	537 psig
Maximum operating pressure differential (MOPD, at 500 mA RMS)	PTS 18L and 38P	16 bar at 200 pps (18 bar possible, but at 100 pps)	232 psi at 200 pps (261 psi possible, but at 100 pps)
	PTS 27L	13 bar at 200 pps (15 bar possible, but at 100 pps)	188 psi at 200 pps (217 psi possible, but at 100 pps)
Ambient temperature		-40 °C to 70 °C	-40 °F to 158 °F
Ambient relative humidity		Max 95% RH	Max 95% RH
Inlet fluid temperature range		from -40 to 95 °C	from -40 to 203 °F
Flow direction		PTS valves can only be used in normal flow direction.	
Enclosure rating IP		IP67	



Installation data	Value
Installation orientation	Vertical +90°
Ex-factory delivery position	90% open position

Design

Table: Design elements

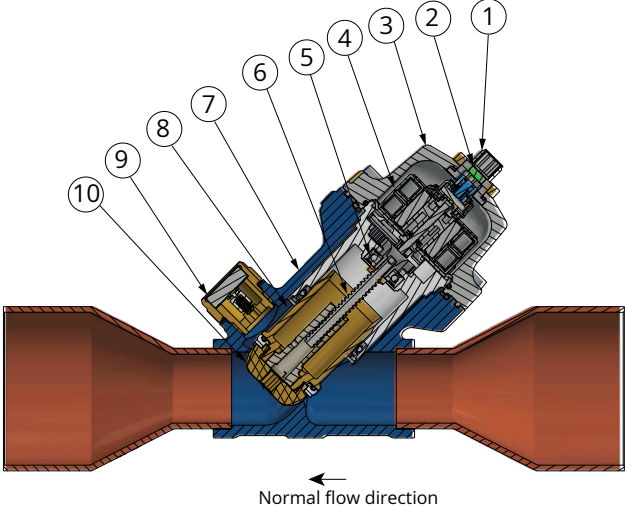
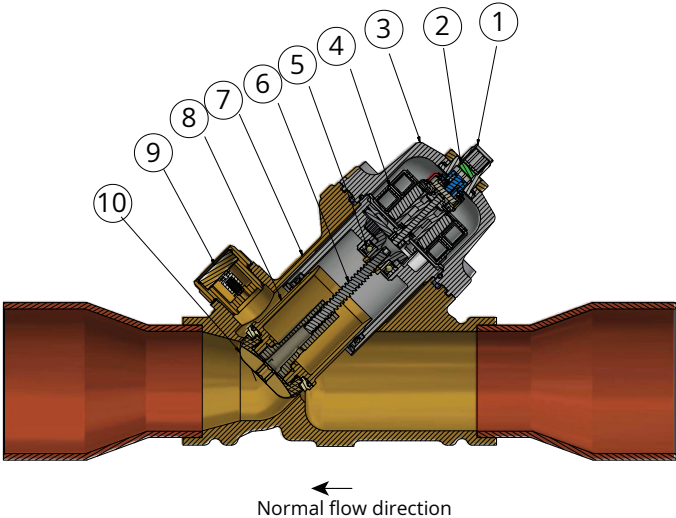
PTS 18L – 27L – 38P design	
 <p>Normal flow direction</p> <p>PTS 18L (PTS 18L is also used in PTS 38P)</p>	 <p>Normal flow direction</p> <p>PTS 27L</p>

Table: Design

Pos. no.	PTS 18L – 27L – 38P
1	M12 connector
2	Glass seal
3	Cover
4	Stepper motor
5	Bearing
6	Spindle
7	Valve housing
8	Piston
9	Sight glass
10	Cone

## Dimensions & weights

Figure: Dimensions PTS 18L

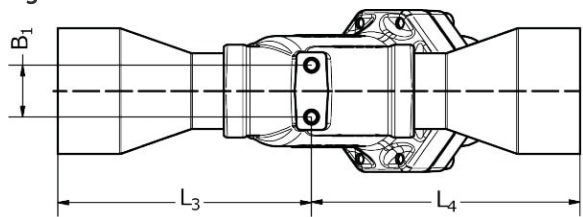


Figure: Dimensions PTS 27L

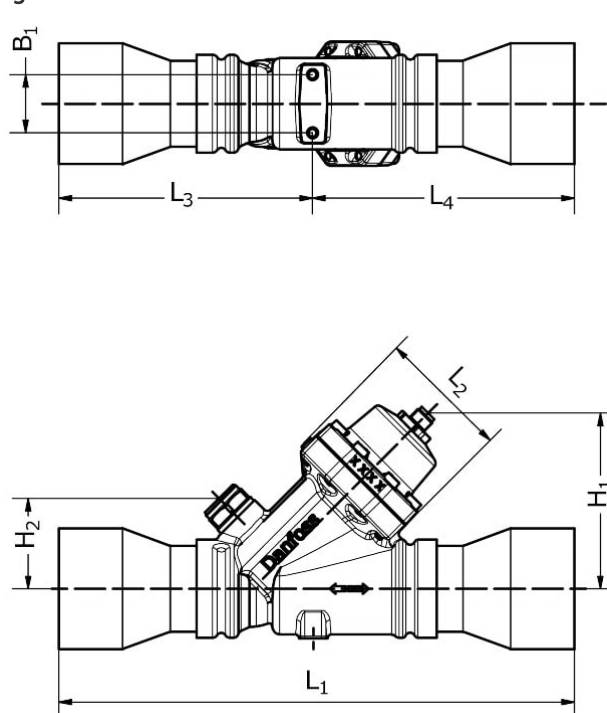


Figure: Dimensions PTS 38P

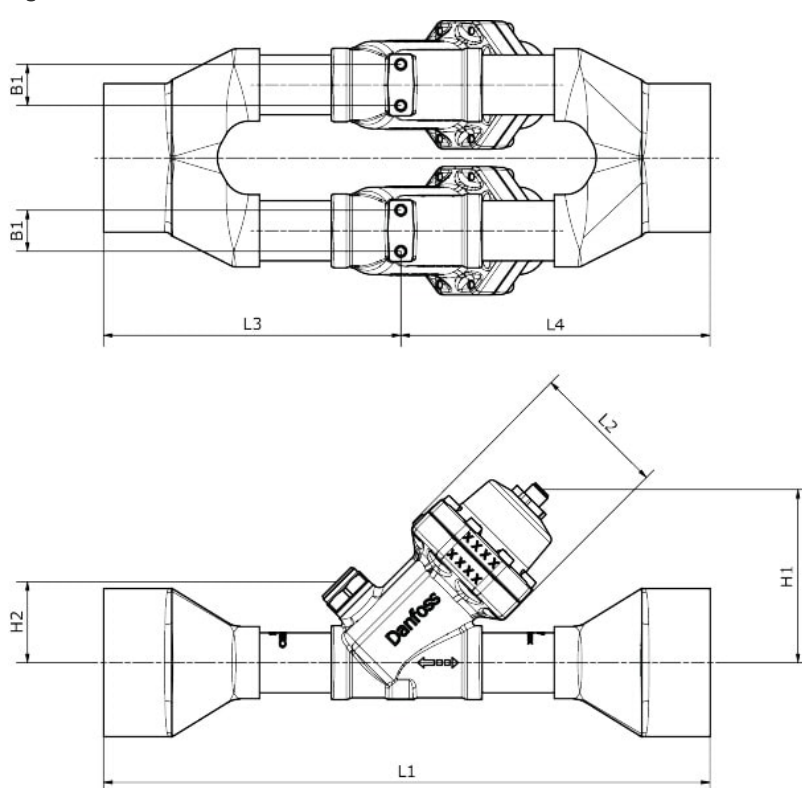


Table: Dimensions

Type	Built-in sight glass	Connections		B <sub>1</sub>		H <sub>1</sub>		H <sub>2</sub>		L <sub>1</sub>		L <sub>2</sub>		L <sub>3</sub>		L <sub>4</sub>		Net weight	
		ODF x ODF	ODM x ODM																
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	kg	lb
PTS 18L	Yes	1-5/8 x 1-5/8		0.9	24	4.0	102	1.9	47	7.9	202	3.1	78	3.8	98	4.1	105	2.35	5.18
	Yes	2-1/8 x 2-1/8		0.9	24	4.0	102	1.9	47	9.5	242	3.1	78	4.6	118	4.9	124	2.35	5.18
	Yes	2-3/8 x 2-3/8		0.9	24	4.0	102	1.9	47	10.7	272	3.1	78	5.2	132	5.5	139	2.65	5.84
PTS 27L	Yes	2-1/8 x 2-1/8		1.4	35	4.2	106	2.1	54	12.2	311	3.1	78	6.0	153	6.2	158	3.72	8.20
	Yes	2-3/8 x 2-3/8		1.4	35	4.2	106	2.1	54	12.2	311	3.1	78	6.0	153	6.2	158	3.72	8.20
PTS 38P	Yes	3-1/8 - 3-1/8		0.9	24	4.0	101	1.9	47	13.94	354	3.1	78	6.83	173.5	7.11	180.5	7.24	15.96

## Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
Export Control Declaration	<a href="#">Electronic expansion Valve &amp; Coil</a>	Danfoss	

### Approvals

CE		EAC	
----	---	-----	---

## Contact details

### Online support

Danfoss offers a wide range of support along with our products, including digital information, software, mobile apps and expert guidance. See the possibilities below.



#### The Danfoss Design center

Discover the Design Center, our advanced digital platform that streamlines product selection. With integrated tools and enhanced type pages, it's simpler than ever to access product information and documentation, and to select the right products. Check the availability of Danfoss products at partner locations and enjoy seamless transitions from selection to purchase with our basket-to-basket functionality. Whether you're buying from our distributors or directly from the Product Store, the Design Center simplifies your experience. Learn more at: [designcenterdanfoss.com](https://designcenterdanfoss.com).



#### The Danfoss product store

The Danfoss Product Store is a one-stop shop available 24/7 for our customers, no matter where you are in the world or what area of industry you work in. Browse our catalog, check product details and documentation, view your prices and product availability, and quickly finalize your purchase. Start browsing at: [store.danfoss.com](https://store.danfoss.com).



#### Danfoss Partner Portal/Product Data tool

Designed to support you with easy access to product data extracts, essential resources, tools, and information. The Partner Portal provides a centralized hub for product documentation, training materials, marketing assets, and technical support, ensuring you have everything you need to succeed and grow your business with Danfoss. The Partner Portal is available 24/7 at: [partnerdanfoss.com](https://partnerdanfoss.com) and is ready to support your business.



#### Find technical documentation

Find technical documentation you need to get your project up running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more. Start searching now at: [documentation.danfoss.com](https://documentation.danfoss.com).



#### Danfoss Learning

Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications industry topics, and trends that will help you do your job better. Find your local Danfoss website here: [learning.danfoss.com](https://learning.danfoss.com).



#### Get local information and support

Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest regional news, or connect with a nearby expert - all in your own language. Find your local Danfoss website here: [danfoss.com](https://danfoss.com).

#### Danfoss A/S

Climate Solutions . danfoss.com . +45 7488 2222

Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalogues description, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogues, brochures, videos and other material. Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the products. All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.