

Data sheet

Temperature regulating valve

Type ORV



ORV are 3-way industrial valves for maintaining a constant oil temperature in gas compressor systems, by mixing hot and cold oil in the lubricating system of e.g. screw or turbo type compressors.

The ORV valves are with few components and with extended cylindrical connections, to ensure ease of installation and service.

Features

- Stainless steel nickel plated thermostatic element.
- Butt-weld (DIN, ANSI) or socket weld (SOC) connection.
- No manual adjustment.
- Plug and Play design.
- Optimised flow characteristics.
- Sturdy construction.
- High resistance against vibrations or shock.
- Can be mounted in any direction.
- Service friendly. Easy to dismantle and service when required.
- Classification: DNV, CRN, BV, EAC etc.
To get an updated list of certification on the products please contact your local Danfoss Sales Company.

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Technical data

Oils:
Applicable to all common refrigeration oils.

Refrigerants:
Applicable to HC, HCFC, HFC, R717 (Ammonia) and R744 (CO₂).
For further information please refer to installation instruction for ORV.

Temperature range:
Minimum operating temperature:
≥ -10°C (+14°F)

Max. temperature limit based on the element temperature settings:

Types	Max limit
43°C / 110°F	77°C / 170°F
49°C / 120°F	82°C / 180°F
60°C / 140°F	93°C / 200°F
77°C / 170°F	110°C / 230°F

Pressure range:
The valves are designed for a max. working pressure of 40 bar g (580 psig)

Design

Connections
Available with the following connections:

- Butt weld DIN (EN 10220), DN 25-80 (1-3 in.)
- Butt weld ANSI (B 36.10 Schedule 80), DN 25 - 40 (1 - 1½ in.)
- Butt weld ANSI (B 36.10 Schedule 40), DN 50 - 80 (2 - 3 in.)
- Socket Weld (ANSI B 16.11), DN 25 - 50 (1 - 2 in.)

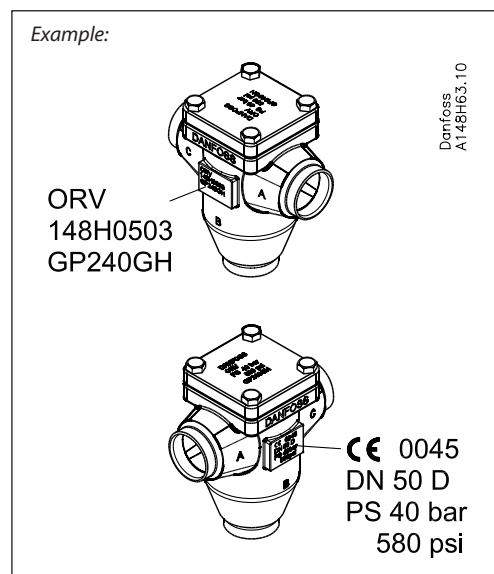
Housing
Made of special, cold resistant steel approved for low temperature operations.

Installation
Installation of the valve depends on the way it should operate.

Pressure Equipment Directive (PED)
ORV valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.
For further details / restrictions - see Installation Instruction.



Identification



Function

Mixing operation

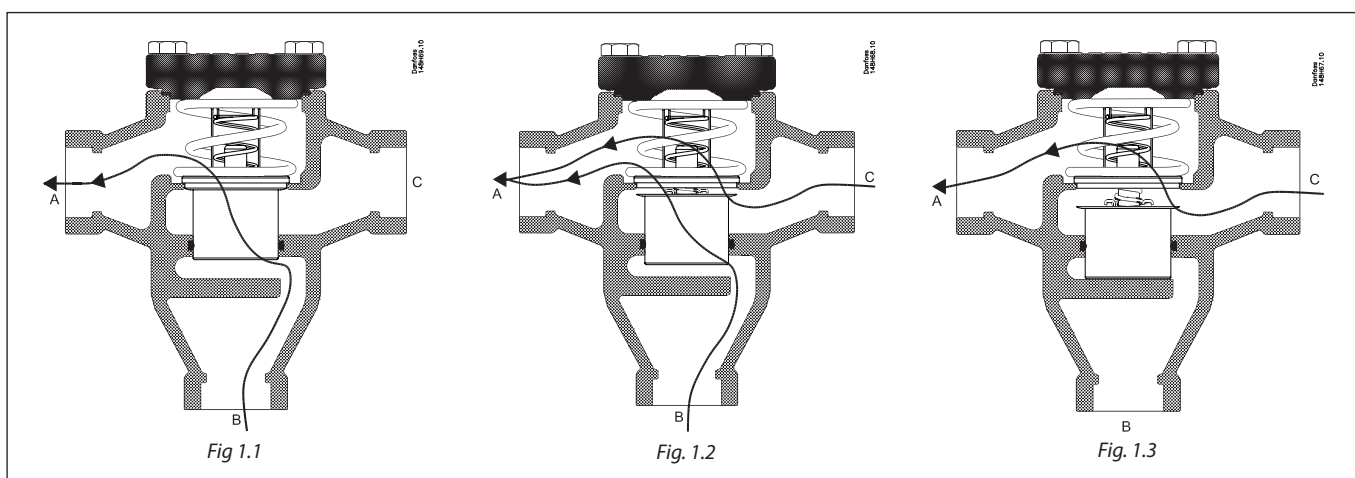
ORV valve can work as a mixing or diverting valve. The ORV temperature regulating valve utilises the high coefficient of thermal expansion of wax to create the internal movement necessary to have a cold and a hot inlet mixing to a common outlet. The outlet temperature will correspond to the nominal temperature of the thermostatic element.

The valve house has three ports:

- Port A is used for the common outlet
- Port B is for the hot inlet
- Port C is for the cold inlet

When the compressor unit is cold at start up, the thermostatic element will be contracted to let the full flow from port B pass until the nominal temperature (minus 5 K / 10°F) is reached (fig. 1.1). The thermostatic element will then begin to extract to let the outlet become a mixture of hot and cold oil.

When the nominal temperature is reached, the element is positioned in approximately half open position (fig. 1.2). If the temperature is reaching approximately the nominal temperature plus 5 K, the thermostatic element has been extracted to its fully open position (fig. 1.3). In this position the oil temperature will only come from the cold inlet port (C) from oil cooler.



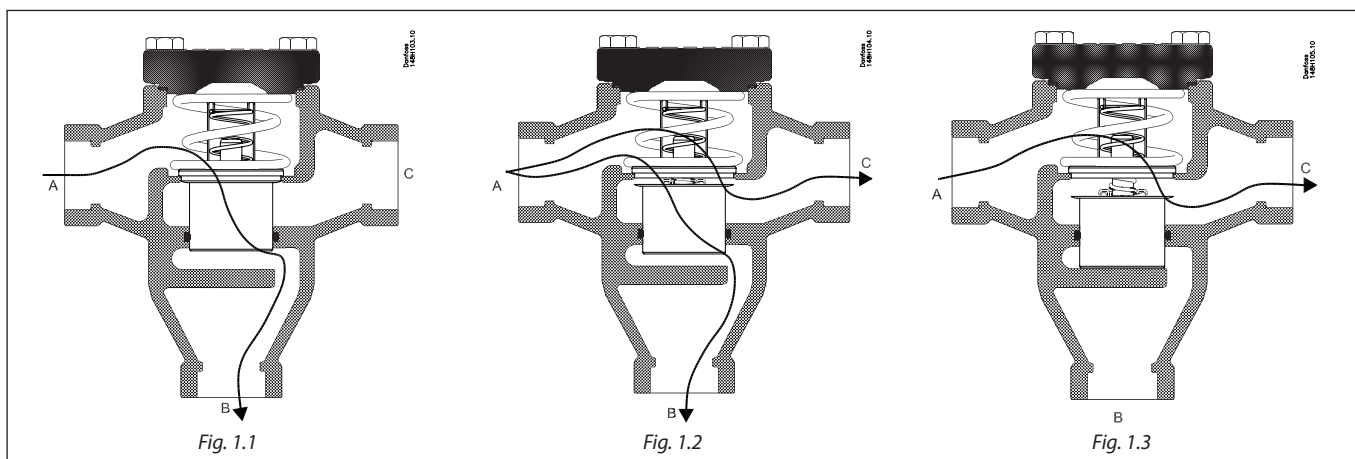
From figure 1, it can be seen how the sleeve on the element is sliding in a vertical movement. The thermostatic element is kept in position by a spring.

Diverting operation

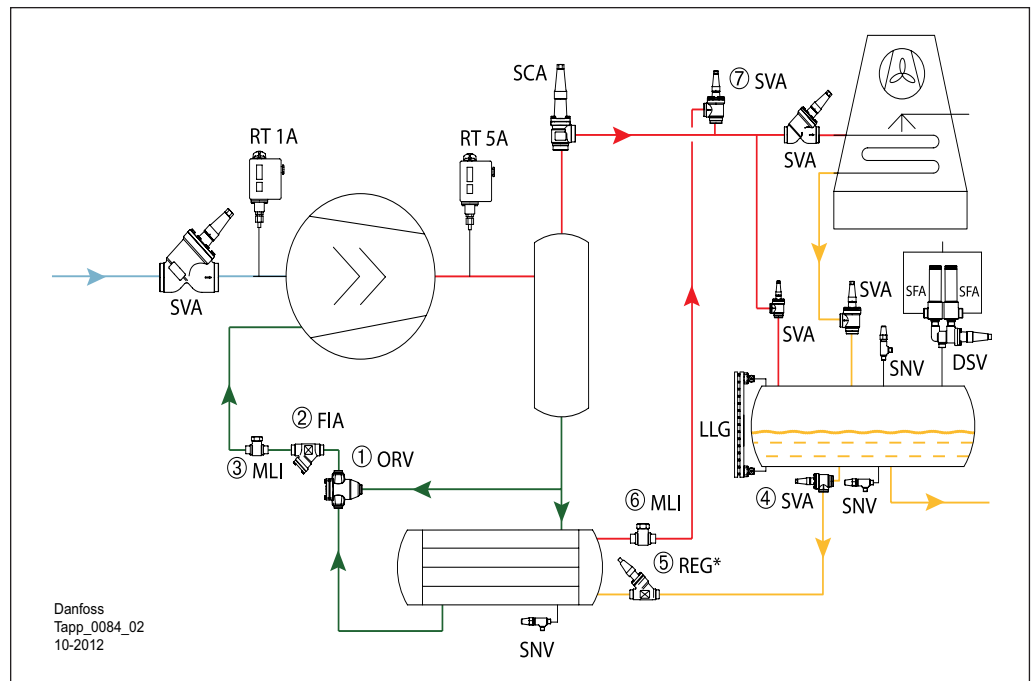
Diverting operation is similar to the mixing operation. It is carried out with separation in to two of the fluid with single temperature. Due to that the temperature on the inlet is very stable fact the regulation is very smooth. The inlet temperature would correspond to the nominal temperature of the thermostatic element.

The valve house has three ports:

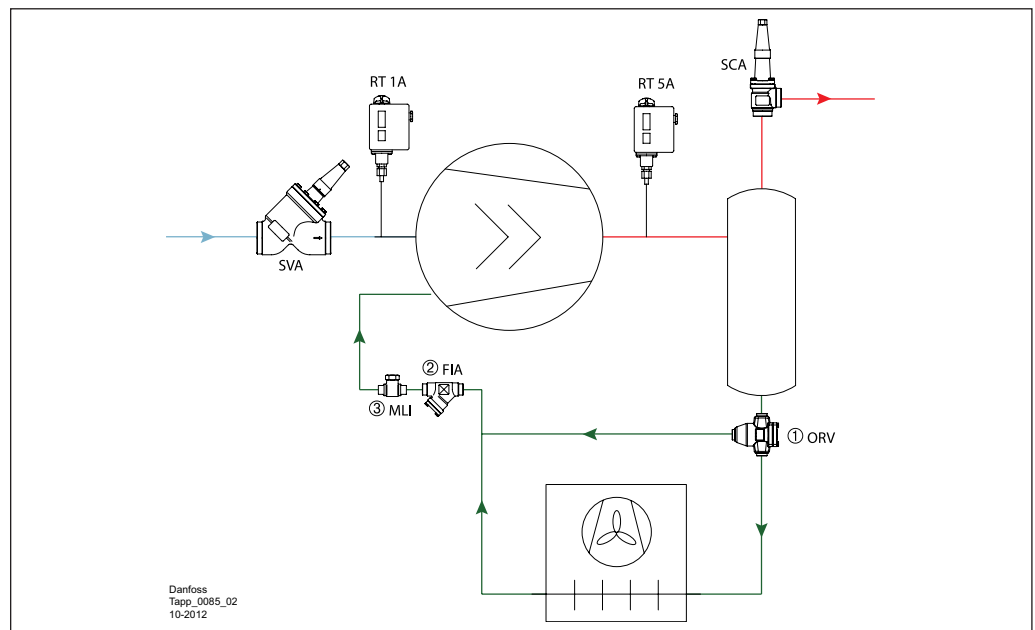
- Port A is used for the common inlet
 - Port B is for the cold outlet
 - Port C is for the warm outlet
- The diverting operation otherwise is similar to the mixing operation.



Application examples

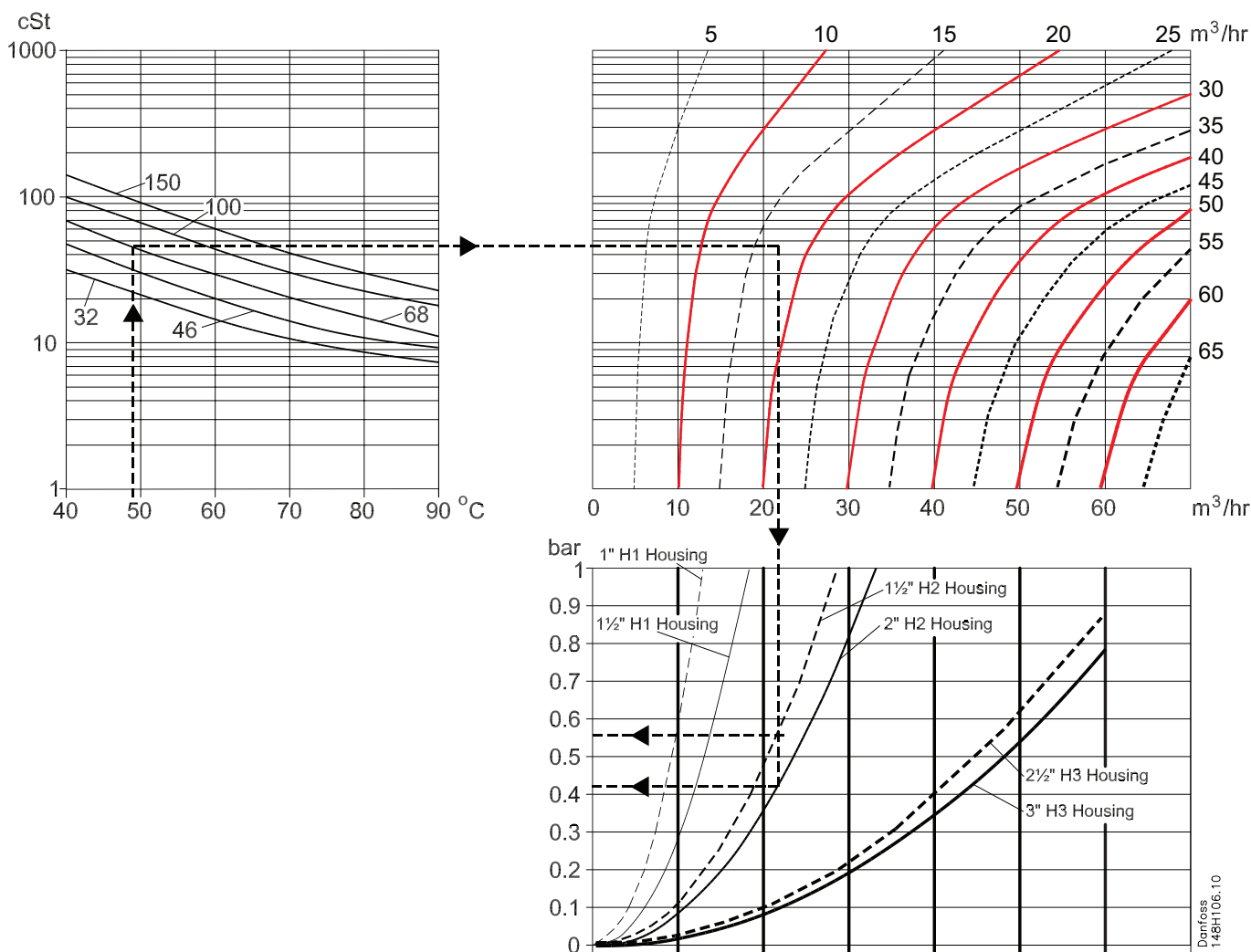


Example of the system with ORV for mixing operation.



Example of the system with ORV for diverting operation

Capacities
SI units



Selection example

Oil type: Grade 68
 Required flow: 17 m³/h
 Nominal oil temperature: 49°C
 Pipe dimension: 40 mm

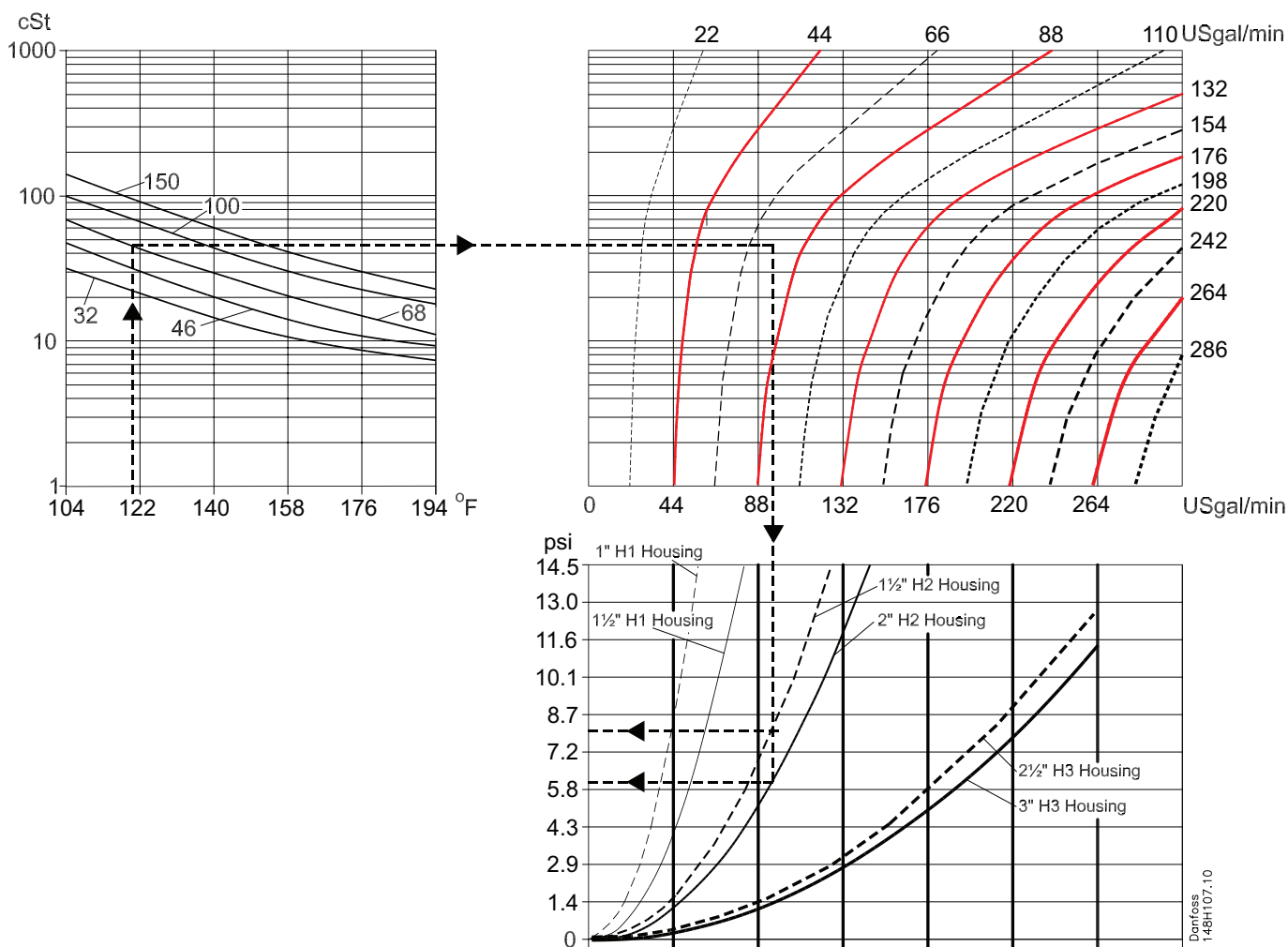
The upper left curve shows the viscosity of different grades of oil as a function of the temperature. The viscosity is continued into the upper right curve where the 17 m³/h must be found. The line is drawn vertically downwards into the capacity table for the ORV valve models.

As shown two selections can be made:

Either ORV 40 H2 with pressure drop at approx. 0.56 bar or ORV 50 H2 with pressure drop at 0.42 bar.

The final selection will depend on the available pressures in the system. If the pressures are low (or can be low at certain loads) the ORV 50 H2 might be preferred. If the pressures are constantly available the pipe dimension may be taken into account and the ORV 40 H2 might be preferred.

Capacities
US units



Selection example

Oil type: Grade 68
 Required flow: 75 USgal/min.
 Nominal oil temperature: 120°F
 Pipe dimension: 1½"

The upper left curve shows the viscosity of different grades of oil as a function of the temperature. The viscosity is continued into the upper right curve where the 75 USgal/min. must be found. The line is drawn vertically downwards into the capacity table for the ORV valve models.

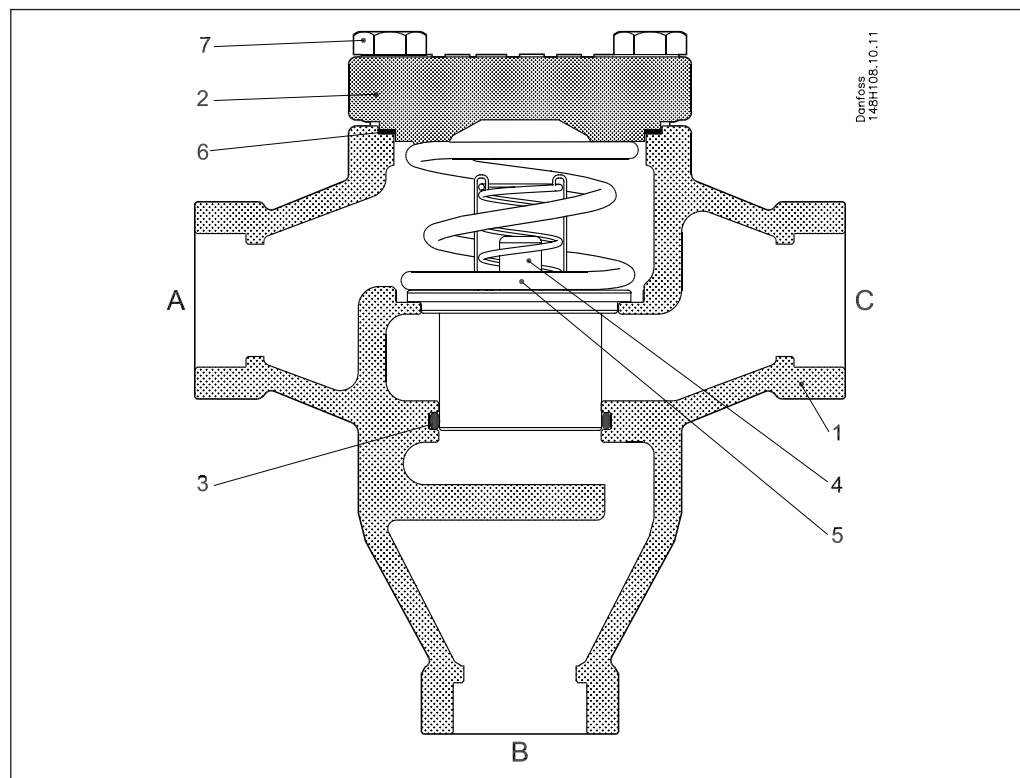
As shown two selections can be made:

- Either
- ORV 1½"H2 with pressure drop 8.2 psi or
 - ORV 2"H2 with pressure drop 6.2 psi

The final selection will depend on the available pressures in the system. If the pressures are low (or can be low at certain loads) the ORV 2" H2 might be preferred. If the pressures are constantly available the pipe dimension may be taken into account and the ORV 1½" H2 might be preferred.

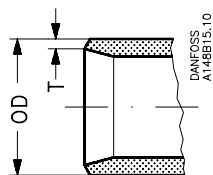
Material specification

ORV 25-80



No.	Part	Material	EN		ASTM standard	
1	Housing	Steel	GP240GH	10213-2	WCB	A 216
2	Cover	Steel	GP240GH	10213-2	WCB	A 216
			P285QH	10222-4		A 350
3	Glide ring	PTFE				
4	Element ^{*)}	Stainless steel and Ni plated parts				
5	Spring	Steel	DIN17223	10270-1		
6	Gasket	Non asbestos				
7	Bolts	Steel	Quality 8.8	ISO4017	Grade 5	

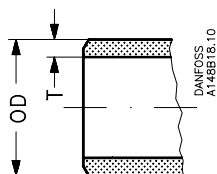
*) The thermostatic element may look differently from one shown on the picture. All types of thermostats used by Danfoss have the same function, temperature setting and P-band.

Data sheet | Temperature regulating valve, type ORV
Connections
DIN


Size mm	Size in	OD mm	T mm	OD in	T in			K_v / C_v H1 housing	K_v / C_v H2 housing	K_v / C_v H3 housing
25	1	33.7	2.6	1.327	0.103			15	17	-
40	1½	48.3	2.6	1.902	0.103			22	26	30
50	2	60.3	2.9	2.37	0.11			-	-	36
65	2½	76.1	2.9	3	0.11			-	-	65
80	3	88.9	3.2	3.5	0.13			-	-	75

Butt-weld DIN (EN10220)

Size mm	Size in	OD mm	T mm	OD in	T in			K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min
25	1	33.7	2.6	1.327	0.103			15	17	-	-	-	-
40	1½	48.3	2.6	1.902	0.103			22	26	30	35	-	-
50	2	60.3	2.9	2.37	0.11			-	-	36	42	-	-
65	2½	76.1	2.9	3	0.11			-	-	-	-	65	75
80	3	88.9	3.2	3.5	0.13			-	-	-	-	75	87

ANSI


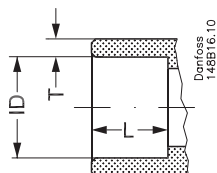
Size mm	Size in	OD mm	T mm	OD in	T in			K_v / C_v H1 housing	K_v / C_v H2 housing	K_v / C_v H3 housing
25	1	33.7	4.6	1.327	0.181			15	17	-
40	1½	48.3	5.1	1.902	0.201			22	26	30

Butt-weld ANSI (B 36.10 Schedule 80)

Size mm	Size in	OD mm	T mm	OD in	T in			K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min
25	1	33.7	4.6	1.327	0.181			15	17	-	-	-	-
40	1½	48.3	5.1	1.902	0.201			22	26	30	35	-	-

Butt-weld ANSI (B 36.10 Schedule 40)

Size mm	Size in	OD mm	T mm	OD in	T in			K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min
50	2	60.3	3.9	2.37	0.15			-	-	36	42	-	-
65	2½	73	5.2	2.87	0.2			-	-	-	-	65	75
80	3	88.9	5.5	3.5	0.22			-	-	-	-	75	87

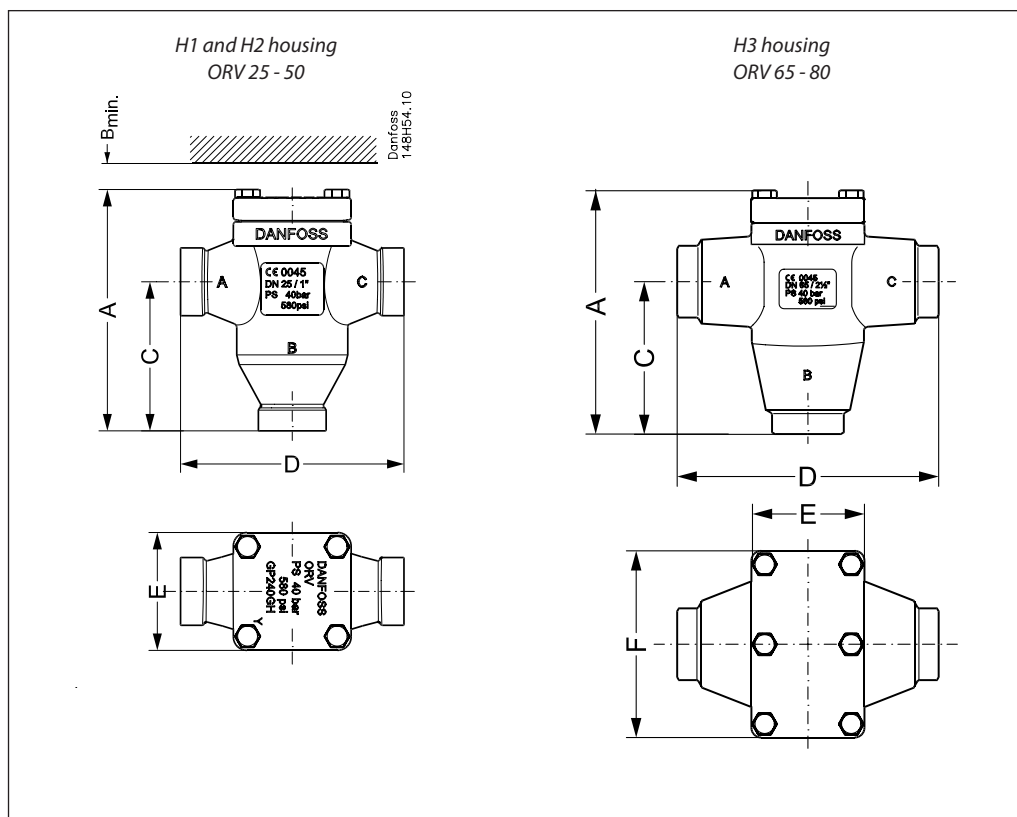
SOC


Size mm	Size in	ID mm	T mm	ID in	T in	L mm	L in	K_v / C_v H1 housing	K_v / C_v H2 housing	K_v / C_v H3 housing
25	1	33.9	7.2	1.335	0.284	13	0.51	15	17	-
40	1½	48.8	6.6	1.921	0.26	13	0.51	-	-	30
50	2	61.2	6.2	2.41	0.24	16	0.63	-	-	36

Socket welding ANSI (B 16.11)

Size mm	Size in	ID mm	T mm	ID in	T in	L mm	L in	K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min	K_v m³/h	C_v Usgal/min
25	1	33.9	7.2	1.335	0.284	13	0.51	15	17	-	-	-	-
40	1½	48.8	6.6	1.921	0.26	13	0.51	-	-	30	35	-	-
50	2	61.2	6.2	2.41	0.24	16	0.63	-	-	36	42	-	-

Dimensions and weights



Valve size	Valve size		A	B _{MIN.}	C	D	E	F	Weight
H1 housing	ORV 25-40	mm	178	75	110	165	87	-	4.5 kg
	(1-1½)	in.	7.00	3.00	4.33	6.50	3.43	-	10 lb
H2 housing	ORV 40-50	mm	215	80	138	196	110	-	9.0 kg
	(1½-2)	in.	8.46	3.15	5.43	7.72	4.33	-	20 lb
H3 housing	ORV 65-80	mm	252	80	155	266	115	190	18 kg
	(2½-3)	in.	9.92	3.15	6.10	10.47	4.53	7.48	40 lb

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Type codes

Valve type	ORV	Oil regulating valve, high specification			
Nominal size in mm (valve size measured on the connection diameter)	25 40 50 65 80	Available connections			
		DIN	ANSI	SOC	
		X	X	X	
		X	X	X	
		X	X	X	
		X	X		
Connection	A D SOC	Butt weld connection: ANSI Butt weld connection: DIN Socket welding			
Valve housing	3-WAY	3-WAY			

Important!

Where products need to be certified according to specific certification societies or where higher pressures are required, the relevant information should be included at the time of ordering.

Ordering ORV valves from the parts programme

Example:

ORV 40 DIN H2 49°C/120°F:

Thermostat element and cover gasket code number 148H3464

and

Complete valve housing code number 148H3402



Please note:

The thermostat code numbers do not include guide ring.

Gasket and guide ring are included when ordering the complete valve housing but can also be ordered separately as spare parts.

ORV parts programme

Thermostat		Code no.
Thermostat 43°C/110°F	ORV 25 and ORV 40 H1	148H3466
	ORV 40 and ORV 50 H2	148H3467
	ORV 65 and ORV 80 H3	148H3468 ¹⁾
Thermostat 49°C/120°F	ORV 25 and ORV 40 H1	148H3463
	ORV 40 and ORV 50 H2	148H3464
	ORV 65 and ORV 80 H3	148H3465 ¹⁾
Thermostat 60°C/140°F	ORV 25 and ORV 40 H1	148H3469
	ORV 40 and ORV 50 H2	148H3470
	ORV 65 and ORV 80 H3	148H3471 ¹⁾
Thermostat 77°C/170°F	ORV 25 and ORV 40 H1	148H3472
	ORV 40 and ORV 50 H2	148H3473
	ORV 65 and ORV 80 H3	148H3474 ¹⁾

Complete valve housing including gasket and guide ring but without thermostat	Code no.
ORV 25 DIN H1	148H3399
ORV 25 SOC H1	148H3400
ORV 25 ANSI H1	148H3401
ORV 40 DIN H1	148H3361
ORV 40 DIN H2	148H3402
ORV 40 SOC H2	148H3403
ORV 40 ANSI H1	148H3404
ORV 40 ANSI H2	148H3405
ORV 50 DIN H2	148H3406
ORV 50 SOC H2	148H3407
ORV 50 ANSI H2	148H3408
ORV 65 DIN H3	148H3409
ORV 65 ANSI H3	148H3410
ORV 80 DIN H3	148H3362
ORV 80 ANSI H3	148H3411

¹⁾ For valve housing size H3 the code number includes two H2 thermostats.

ORV spare parts

Part	Spare parts for	Code no.
Gasket and guide ring	ORV 25 and ORV 40 H1	148H3246
	ORV 40 and ORV 50 H2	148H3247
	ORV 65 and ORV 80 H3	148H3248 ²⁾

²⁾ Including two guide rings and one gasket.

