MAKING MODERN LIVING POSSIBLE

Technical brochure

Oil regulating valve
ORV 25-80 (1-3 in.)



www.danfoss.com/ir

Contents

	Page
Introduction	3
Features	3
Technical data	3
Design	4
Function	4
Function	5
Application example	5
Application example	6
Capacities	6
SI units	6
US units	7
Material specification	8
Connections	9
Dimensions and weights	10
Ordering	11
Code numbers	11
Spare parts	12

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

Introduction

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.

The thermostatic element has a built-in temperature setting of 49°C (120°F) as standard.
For other temperatures please see page 11.



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.

Technical data

Oils:
Applicable to all common refrigeration oils.

Refrigerants:
Applicable to all common refrigerants, including R717 and noncorrosive gases/liquids dependent on sealing material compatibility.

For further information please refer to installation instruction for ORV.

Temperature range:
Minimum operating temperature:
≥ –10°C (+14°F)
Continuous operation:
≤ +85°C (+185°F)
Short operating periods:
≤ +120°C (+248°F)

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

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

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.)

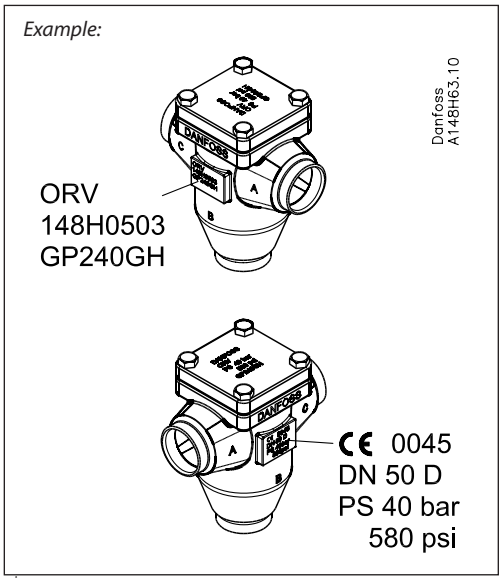
Housing
Made of special, cold resistant steel approved for low temperature operations.

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

Example:



Function

Mixing operation

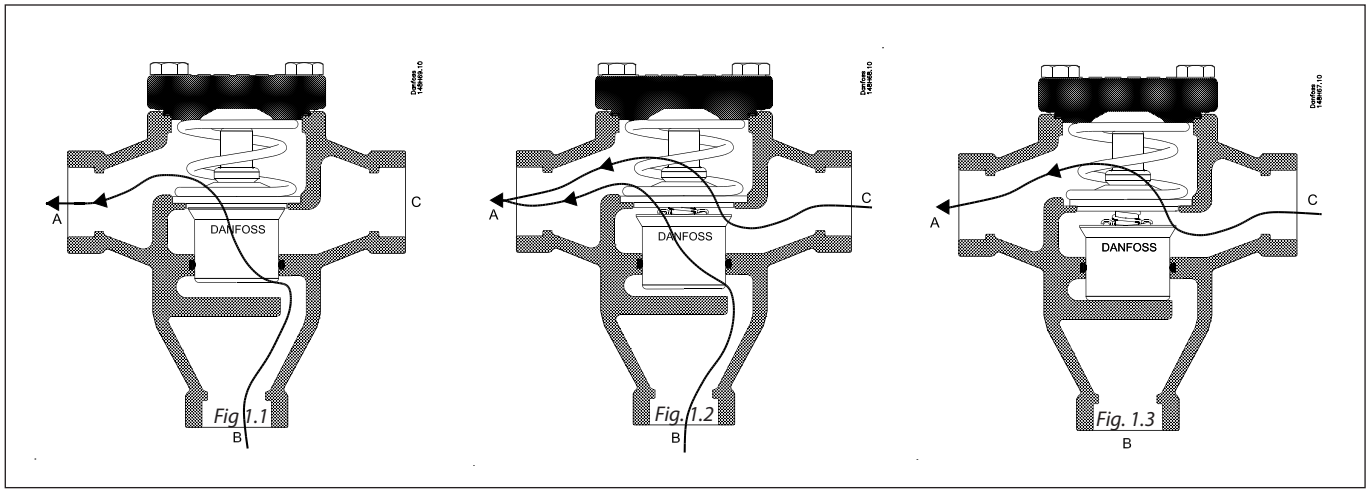
ORV valve can work as a mixing or diverting valve. The ORV oil regulating valve utilises the high coefficient of thermal expansion of wax to create the internal movement necessary to have a cold and a hot inlet mixing to a common outlet. The outlet temperature will correspond to the nominal temperature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

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

Function

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.

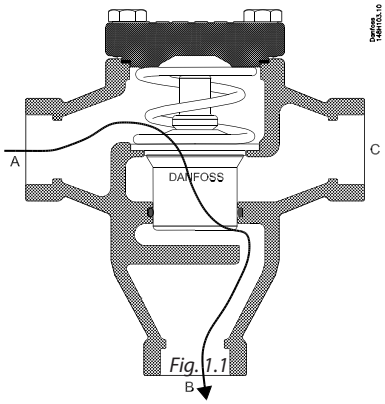


Fig. 1.1

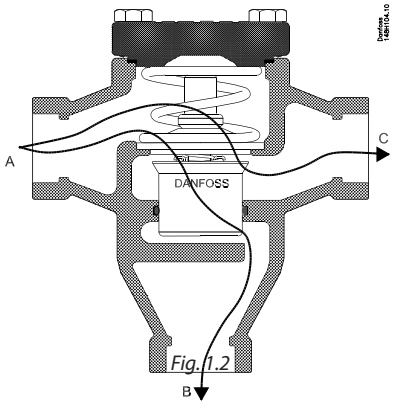


Fig. 1.2

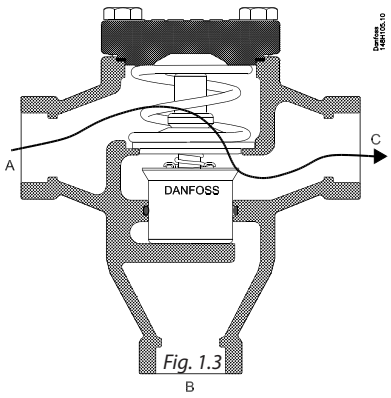
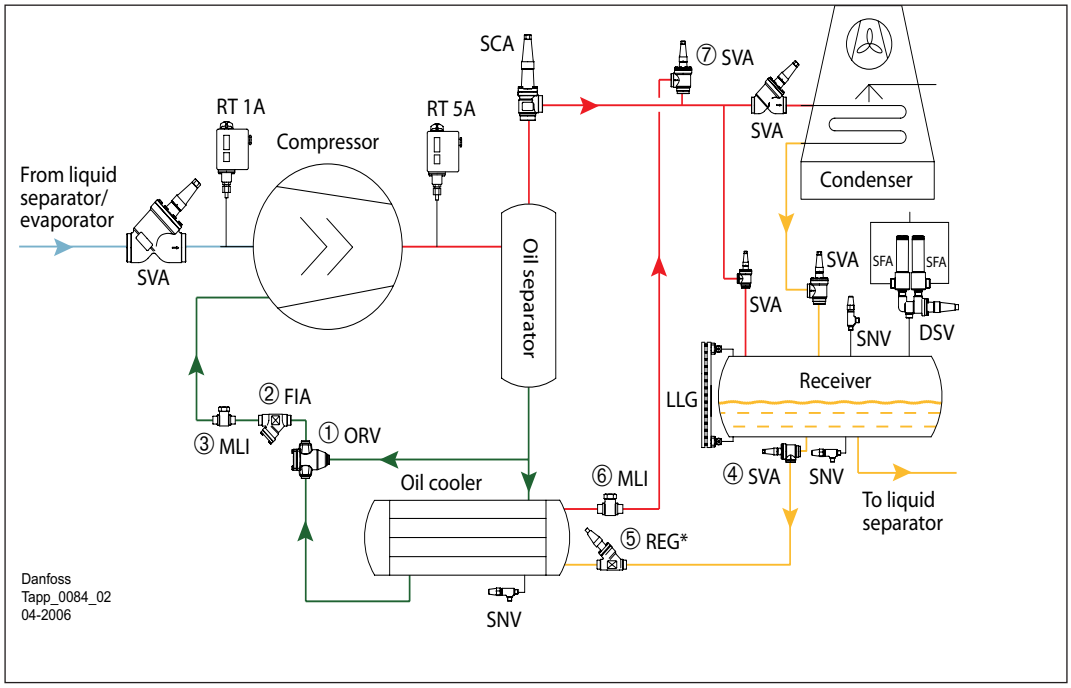


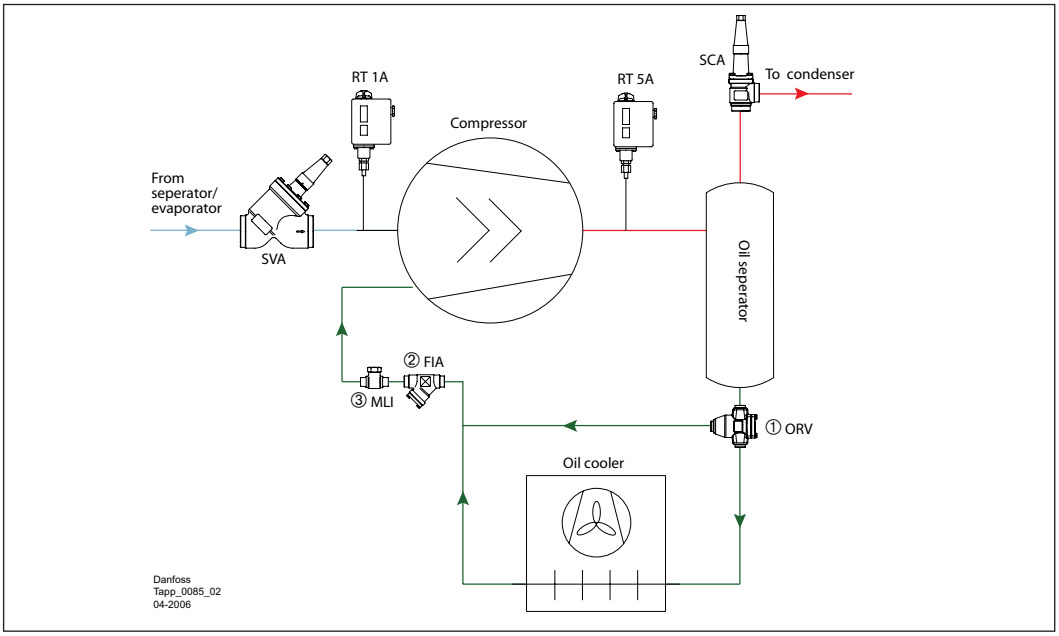
Fig. 1.3

Application example



Example of the system with ORV for mixing operation.

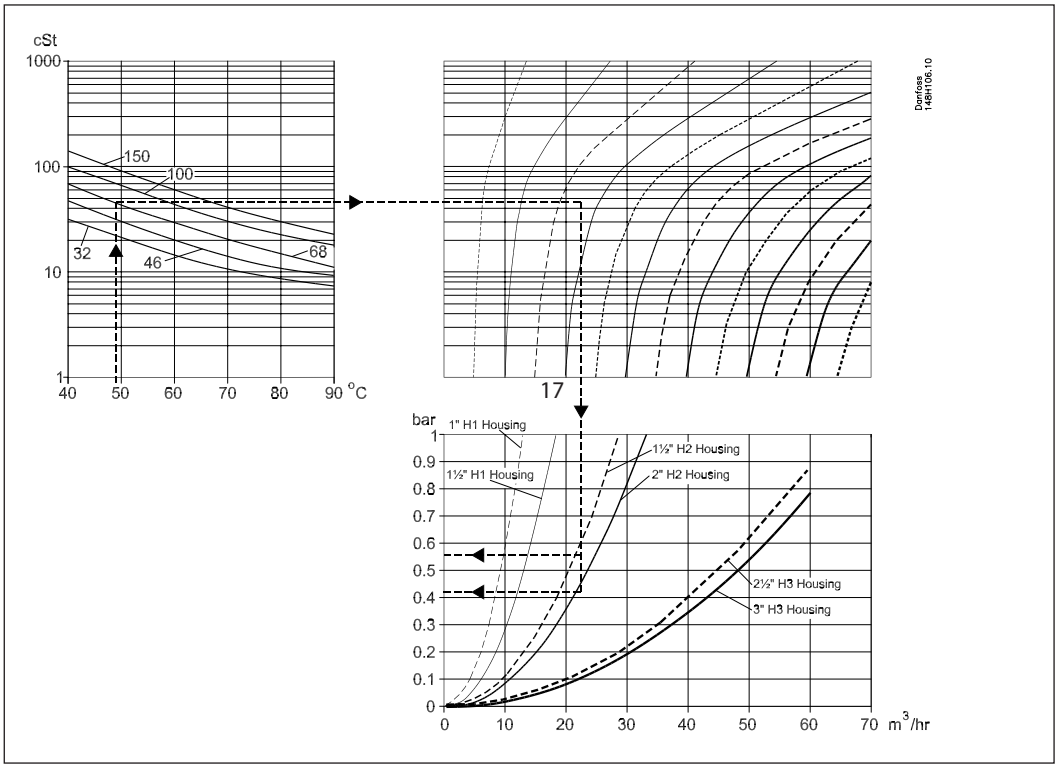
Application example



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.

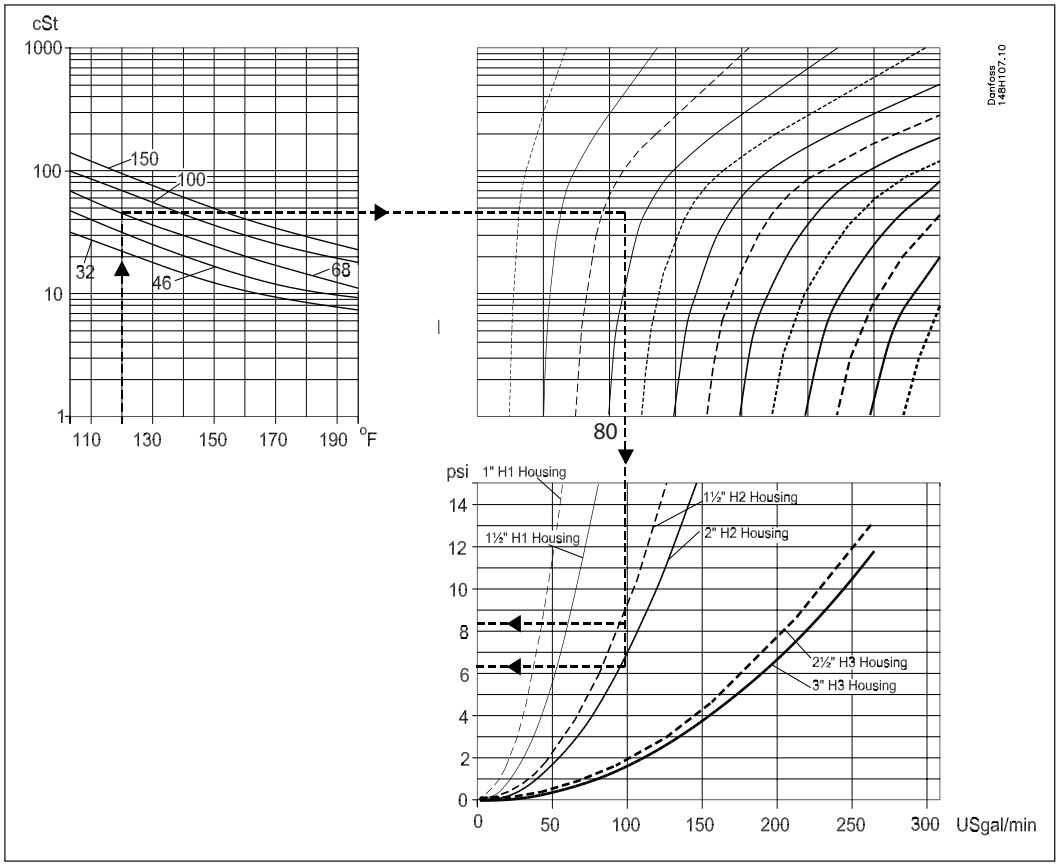
As shown two selections can be made:
Either ORV 40 H2 with pressure drop at approx. 0.56 bar or ORV 50 H2 with pressure drop at 0.42 bar.

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.

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

Capacities

US units



Selection example

Oil type:	Grade 68
Required flow:	80 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 80 USgal/min. must be found. The line is drawn vertically downwards into the capacity table for the ORV valve models.

As shown three selections can be made:
Either
- ORV 1½"H1 with pressure drop 6.2 psi or
- ORV 1½H2 with pressure drop 3 psi or
- ORV 2"H2 with pressure drop 2.2 psi

The fourth possible selection of ORV 1"H1 with pressure drop of more than 10 psi could not be recommended. The recommended operational span would be from 2 to 7 psi.

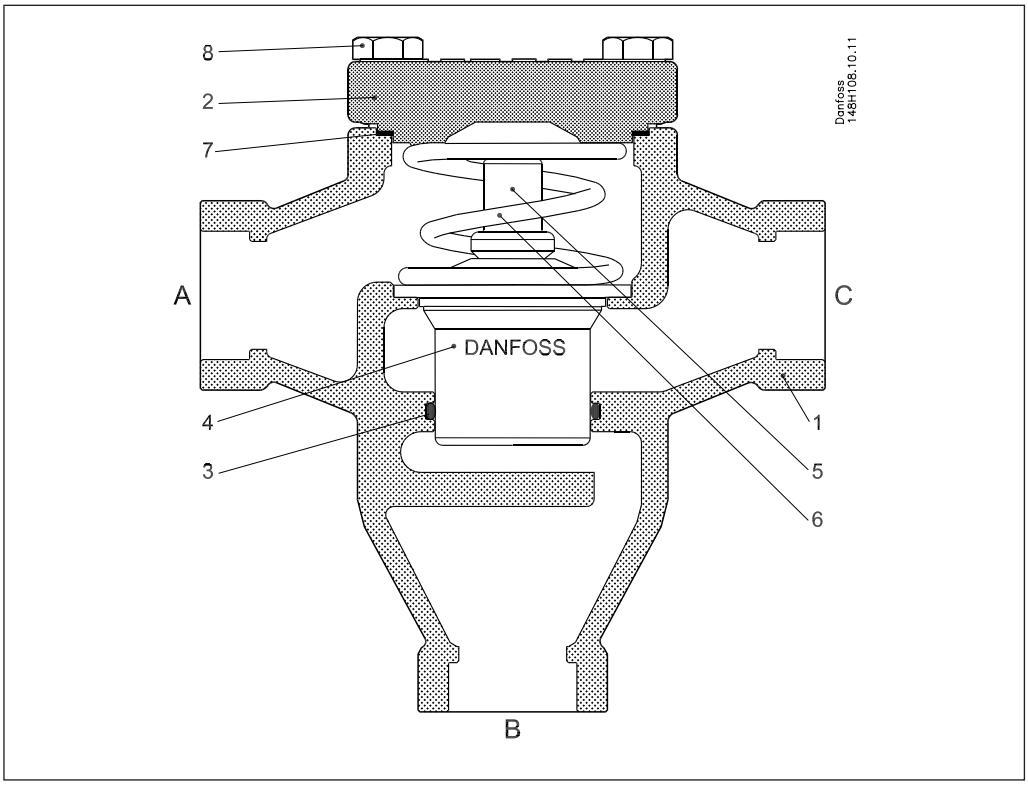
Unless the pipeline was 2" the ORV 2"H2 would not be a practical selection.

The selection between the 1½"H1 or 1½"H2 house would be a consideration of the available pressure in the system. If the pressures are constantly at a high level the H1 house would be sufficient, but if the pressure at any given operating condition could be low, the bigger H2 house with lesser pressure drop would be preferred.

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

Material specification

ORV 25-80



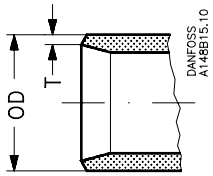
No.	Part	Material	EN		ASTM standard		JIS standard	
1	Housing	Steel	GP240GH	10213-2	WCB	A 216	SCPH 1	G 5151
2	Cover	Steel	GP240GH	10213-2	WCB	A 216	SCPH 1	G 5151
3	Guiding tape	PTFE						
4	Element*)	Stainless steel						
5	Element top	Ni plated Cu plated						
6	Spring	Steel	DIN17223	10270-1				
7	Gasket	Non asbestos						
8	Bolts	Steel	Quality 8.8	ISO4017	Grade 5		8.8	B 1051

*) 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.

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

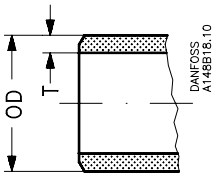
Connections

DIN



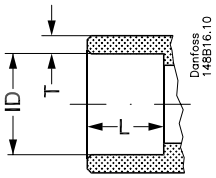
Size mm	Size in	OD mm	T mm	OD in	T in			K_v / C_v H1 housing		K_v / C_v H2 housing		K_v / C_v H3 housing	
Butt-weld DIN (EN10220)								K_v m^3/h	C_v Usgal/min	K_v m^3/h	C_v Usgal/min	K_v m^3/h	C_v Usgal/min
25	1	33.7	2.6	1.327	0.103			15	17	-	-	-	-
40	1½	48.3	2.6	1.902	0.103			22	26	30	35	-	-
50	2	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	
Butt-weld ANSI (B 36.10 Schedule 80)								K_v m^3/h	C_v Usgal/min	K_v m^3/h	C_v Usgal/min	K_v m^3/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)								K_v m^3/h	C_v Usgal/min	K_v m^3/h	C_v Usgal/min	K_v m^3/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

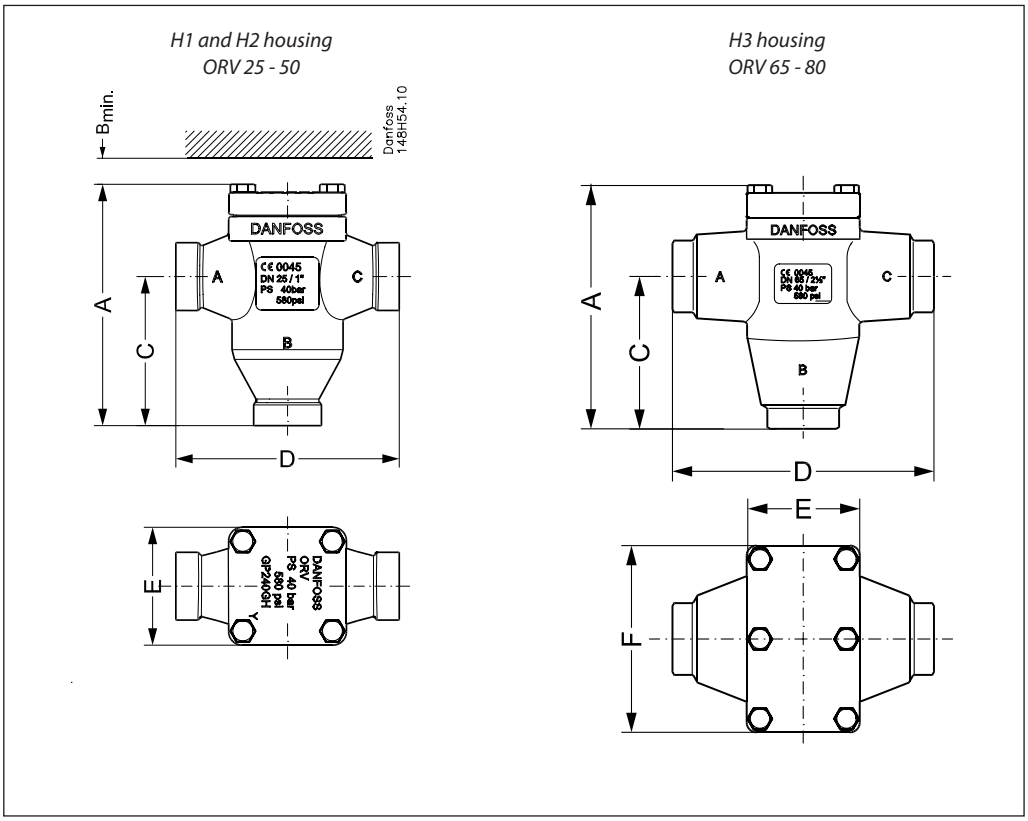
SOC



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	
Socket welding ANSI (B 16.11)								K_v m^3/h	C_v Usgal/min	K_v m^3/h	C_v Usgal/min	K_v m^3/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	-	-

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

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

© Danfoss A/S (AC-SMC/MWA), 10 - 2010

Ordering

Type codes

Valve type	ORV	Oil regulating valve, high specification			
Nominal size in mm (valve size measured on the connection diameter)			Available connections		
			DIN	ANSI	SOC
	25		X	X	X
	40		X	X	X
	50		X	X	X
	65		X	X	
	80		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.

Code numbers

Example:
ORV 40 DIN H2 49°C/120°F = **148H3230**

	43°C / 110°F	49°C / 120°F	54°C / 130°F	60°C / 140°F	66°C / 150°F	77°C / 170°F
25 DIN H1 (1")	**148H3320**	**148H3227**	**148H3258**	**148H3321**	**148H3259**	**148H3322**
25 SOC H1 (1")	**148H3327**	**148H3229**	**148H3328**	**148H3329**	**148H3330**	
25 ANSI H1 (1")	**148H3323**	**148H3228**			**148H3325**	
40 DIN H1 (1½")	**148H3364**	**148H3241**			**148H3260**	
40 DIN H2 (1½")	**148H3332**	**148H3230**	**148H3333**	**148H3334**		**148H3336**
40 SOC H2 (1½")		**148H3232**	**148H3338**	**148H3339**	**148H3340**	**148H3341**
40 ANSI H1 (1½")		**148H3242**				
40 ANSI H2 (1½")		**148H3231**				
50 DIN H2 (2")	**148H3342**	**148H3233**	**148H3343**		**148H3345**	**148H3261**
50 SOC H2 (2")	**148H3346**	**148H3235**	**148H3347**	**148H3348**	**148H3349**	
50 ANSI H2 (2")		**148H3234**				
65 DIN H3 (2½")	**148H3351**[1)]	**148H3236**[1)]				
65 ANSI H3 (2½")	**148H3356**[1)]	**148H3237**[1)]	**148H3357**[1)]	**148H3358**[1)]	**148H3359**[1)]	
80 DIN H3 (3")		**148H3239**[1)]				
80 ANSI H3 (3")		**148H3240**[1)]				

D = Butt-weld DIN
A = Butt-weld ANSI
SOC = Socket welding

[1)] For valve housing H3 there are two thermostats and one seal

Code numbers

Spare parts

Part	Spare parts for	Code no.
Thermostat 43°C/110°F and gasket + guide ring	ORV 25 and ORV 40 H1	**148H3250**
	ORV 40 and ORV 50 H2	**148H3254**
	ORV 65 and ORV 80 H3	**148H3393**[1)]
Thermostat 49°C/120°F and gasket + guide ring	ORV 25 and ORV 40 H1	**148H3243**
	ORV 40 and ORV 50 H2	**148H3244**
	ORV 65 and ORV 80 H3	**148H3245**[1)]
Thermostat 54°C/130°F and gasket + guide ring	ORV 25 and ORV 40 H1	**148H3251**
	ORV 40 and ORV 50 H2	**148H3255**
Thermostat 60°C/140°F and gasket + guide ring	ORV 25 and ORV 40 H1	**148H3252**
	ORV 40 and ORV 50 H2	**148H3256**
Thermostat 66°C/150°F and gasket + guide ring	ORV 25 and ORV 40 H1	**148H3276**
	ORV 40 and ORV 50 H2	**148H3298**
	ORV 65 and ORV 80 H3	**148H3366**[1)]
Thermostat 77°C/170°F and gasket + guide ring	ORV 25 and ORV 40 H1	**148H3253**
	ORV 40 and ORV 50 H2	**148H3257**

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**[1)]

[1)] For valve housing size H3 the code number includes two thermostats, two guide rings, and one seal.

Part	Spare parts for	Code no.
Complete valve housing without an element	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**
	OVR 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**

www.danfoss.com/IR

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed.
All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.

© Danfoss A/S (AC-SMC/MWA), 10 - 2010