

OPERATING INSTRUCTIONS FOR OIL-PRESSURE REGU- LATING VALVES

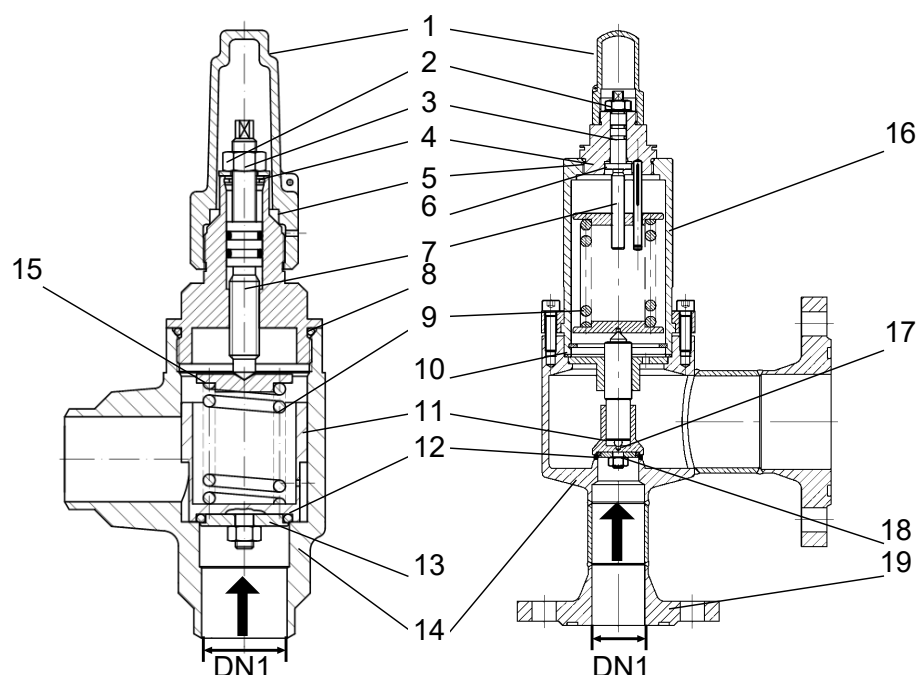
ORV (412, 414, 454)

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1 Overview of types

Type 412/414... DN 25 - DN 32 Type 454... DN 40 - DN 50



1 Cap	2 Lock nut
3 O-ring SP	4 Bonnet
5 O-ring D	6 Sliding washer
7 Stem	8 O-ring D
9 Compression spring	10 Flat sealing ring K
11 Sealing piston	12 O-ring S
13 Seat washer	14 Body
15 Spring plate	16 Cover
17 Ball	18 Nut
19 Flange	

2 Technical characteristics

Body material	Selection acc. to AD-2000 Series W
Steel	P235GH, S355J2
Low-temperature steel	P355NL1
Stainless steel	X5CrNi18-10 or equivalent

2.1 Pressure/temperature operating limits

ORV 412/414...							
PN	DN	TB (MWT) [C°]	-60 ²⁾	-60 ¹⁾	-10	+50	+150

ORV 412/414...							
25	25–32	PB (MWP) [bar]	18.7	25	25	25	25
40			30	40	40	40	40

When using screws of property class 8.8, the following values apply:

ORV 454...								
PN	DN	TB (MWT) [C°]	-60 ²⁾	-40 ¹⁾	-25	-10	+50	+150
25	40–50	PB (MWP) [bar]	6.25	12.5	18.7	25	25	25
40			10	25	30	40	40	40

When using screws of property class A2-70, the following values apply:

ORV 454...							
PN	DN	TB (MWT) [C°]	-60 ²⁾	-60 ¹⁾	-10	+50	+150
25	40–50	PB (MWP) [bar]	18.7	25	25	25	25
40			30	40	40	40	40

¹⁾ Load case I (low-temperature steel, stainless steel)

²⁾ Load case II (acc. to AD2000-W10, steel)

Permissible ambient temperature range (°C) -35 to +55

2.2 Operating media

All refrigerator oils approved for use in refrigeration systems.

Nominal size	Narrowest flow diameter [mm]	Narrowest flow cross- section [mm ²]	Pressure differential p [bar]
DN 25	28.5	638	0.1–28
DN 32	30	707	0.1–28
DN40/65	30.2	716	0.1–25
DN50/65	34.2	919	0.1–25

For spring pressure range, see spare parts list.

Installation position: vertical in accordance with AD2000 data sheet A2 and horizontal

External leakage <5g (refrigerant per year)

3 Safety instructions

4 Application

AWP oil pressure regulating valves are suitable for oil pressure regulation within the oil circuit of refrigerant screw compressor units. They comply with the equipment regulations of the Technical Inspection Associations -TÜV-.

5 Functional description

AWP oil pressure regulating valves are automatic mechanically acting control devices that regulate a constant pressure differential. Extremes such as start-up phases of the compressor units are taken into account. The valves are designed in angle-way form with flanges or welding ends. They essentially consist of the welded or

forged body, the sealing piston, the stem; the bonnet, the compression spring and the cap. The oil pressure regulating valve is located in the bypass line, which is arranged between the rear of the oil pump and the oil separator.

Depending on the various operating states, the oil quantities absorbed by the compressor vary, but are always lower than the oil quantity delivered by the oil pump. The excess oil quantity is returned to the oil separator via the bypass line (oil pressure regulating valve). The oil pressure regulating valve keeps the pressure differential between the oil pump discharge side and the oil separator nearly constant. If the oil quantity to the compressor decreases, this pressure differential increases, causing the oil pressure regulating valve to open further. If the oil quantity to the compressor increases, the oil pressure regulating valve closes until the pressure differential set at the oil separator is reached again. By regulating the pressure differential between the oil pressure after the oil pump and the oil separator, a simple stable oil supply to the screw compressor is achieved under all operating conditions. The seal at the valve seat is provided by an O-ring. After a defined indentation depth of the seat into the seal, it is stopped by a metal-to-metal stop.

6 Installation

1. Clean pipework and system components before installation.

NOTICE! The deviation from parallelism or perpendicularity of the welding ends or flange facings must not exceed 1°. Connecting flanges must be axially aligned. Components with transport or storage damage must not be installed. After removing the pipe plugs, the component can be welded in or installed. Observe the direction of flow (see arrow on the nameplate).

2. **NOTICE! When using modern welding processes (e.g. TIG, CO2 arc welding), do not dismantle weld-in valves.**
3. Tighten the mounting screws and nuts in a crisscross pattern and evenly.
4. Install the oil pressure regulating valves in positions ranging from vertical (cap at the top) to horizontal. Installation must be carried out at easily accessible locations.
5. Mount the valves so that they are protected against impact and are not subjected to axial forces, bending or torsional moments resulting from installation. **NOTICE! The valves must not serve as fixed points in the system.**
6. Provide sufficient space on the bonnet / hood side for the disassembly of the bonnet / hood.

DN1/DN2	25/25	32/32	40/65	50/65
Torque [Nm]	200	210	100	100

7 Maintenance

AWP oil pressure regulating valves operate maintenance-free. If functional defects occur, repair is possible. During the warranty period, repairs may only be carried out by AWP or, with their consent, by the system operator's trained maintenance personnel. AWP recommends checking oil pressure regulating valves every 5 years.

7.1 Changing the O-ring

Type 452 DN 25-32

1. Unscrew the cap from the bonnet.

Cap	
Nominal size	DN 25-32
Wrench size	24

2. Loosen the nut anti-clockwise.

Nut ISO 4032	
Nominal size	DN 25-32

Nut ISO 4032	
	M8
Wrench size	13

3. Unscrew the stem by turning it anti-clockwise. **CAUTION! Only as far as the stop provided by the retaining ring.**

4. Remove the retaining ring with suitable tools (e.g. screwdriver) and take out the stem.

5. Replace O-rings SP according to the spare parts list.

When installing the O-rings, ensure that they are not damaged by the stem thread. Clean individual parts before assembly and grease the stem thread (e.g. with RENOLIT UNITEMP2). Reassembly is carried out in reverse order.

7.2 Replacing the O-ring S/sealing piston/compression spring

1. Unscrew the bonnet by turning it anti-clockwise.

Bonnet	
Nominal size	DN 25-32
Wrench size	36

2. Remove the spring plate, compression spring and sealing piston.

3. Unscrew the valve disc nut and remove and replace O-ring S (see spare parts).

Nut ISO 4032	
Nominal size	DN 25-32
	M6
Wrench size	10

4. Before assembly, replace all damaged parts according to the spare parts overview. Grease the stem and bonnet threads (e.g. with RENOLIT UNITEMP2).

5. Lightly oil the outside of the sealing piston (e.g. with ANTICORIT 5F). Reassembly is carried out in reverse order.

Nominal size	DN 25-32
Wrench size	36
Tightening torque [Nm]	90

Re-adjust the differential pressure $[\Delta p]$ after every compression spring replacement. A dwell time of 48 hours must be ensured between assembly, where the compression spring is pre-tensioned, and setting.

7.3 Checking and correcting the differential pressure

1. Remove the seal.

2. Unscrew the cap from the bonnet and loosen the lock nut by turning it anti-clockwise.

	Cap	Nut ISO 4032	Stem
Nominal diameter DN1	25-32	25-32	25-32
Wrench size	30	8	5

3. Increase differential pressure by turning the stem clockwise. Decrease differential pressure by turning anti-clockwise. **CAUTION! Observe the set pressure range of the compression springs (see spare parts).**

Nominal diameter DN1	DN 25-32
Wrench size	5

7.4 Replacing the O-ring S/sealing piston/stem guide

1. Loosen socket head cap screws ISO 4762. **NOTICE! The setting of the compression spring is not affected. Do not break the seal. Watch out for any residual refrigerant escaping. Leave the bonnet loose in the body until pressure is fully equalised. Only then unscrew completely.**

Screws ISO 4762	
Nominal diameter DN1	DN 40-50
	M8x30
Wrench size	6

2. Unscrew socket head cap screws and remove bonnet.
3. Remove the flat sealing ring K, stem guide and sealing piston from the body.
4. Unscrew the valve disc nut (hexagon nut ISO 4032) and remove and replace O-ring S (see spare parts).

Nominal diameter DN1	DN 40-50
	M8
Wrench size	13

5. Optional: If the old sealing piston is damaged, insert a new sealing piston with a new stem guide (see spare parts).

Clean individual parts before assembly and lightly oil the stem (e.g. RENOLIT UNITEMP2). Then insert a new flat sealing ring K and fit the hood such that the tip of the stem engages in the centring point on the spring plate. Pull the stem slightly out of the stem guide if necessary to allow for secure centring. The socket head cap screws must be tightened evenly and crosswise.

Screws ISO 4762	
Nominal size	DN 40-50
	M8x30
Wrench size	6
Tightening torque for 8.8 screws [Nm]	25
Tightening torque for A2-70 screws [Nm]	16

After each disassembly of the sealing unit, install a new O-ring S. Check the differential pressure $[\Delta p]$ after every parts replacement. A dwell time of 48 hours in the assembled state must be ensured before checking

7.5 Replacing the compression spring

1. Loosen socket head cap screws ISO 4762. **NOTICE! Leave the sealing unit, complete and stem guide and stem untouched. Watch out for any residual refrigerant escaping. Leave the valve screws loose in the body until pressure is fully equalised. Only then unscrew completely.**

Screws ISO 4762	
Nominal diameter DN1	DN 40-50
	M8x30
Wrench size	6

2. Unscrew socket head cap screws and remove bonnet.
3. Remove seal, unscrew cap from the bonnet, loosen lock nut anti-clockwise and unscrew adjusting screw.

	Cap	Nut ISO 4032	Screw ISO 4762
Nominal diameter DN1	DN 40-50	DN 40-50	DN 40-50
		M20	M20 x 80

	Cap	Nut ISO 4032	Screw ISO 4762
Wrench size	60	30	30

- Remove retaining ring DIN 472 with suitable assembly pliers DIN 5256 ZGJ.

Retaining ring DIN 472	
Nominal size	DN 40-50
Retaining ring size	70x2.5

- Insert new compression spring acc. to the spare parts list, lightly oiled, and reassemble the bonnet.
- Clean individual hood parts before assembly.
- Lightly oil the bonnet in the sealing ring area.
- Then insert a new flat sealing ring K and fit the hood such that the tip of the stem engages in the centring point on the spring plate. Pull the stem slightly out of the stem guide if necessary to allow for secure centring.
- Tighten socket head cap screws evenly and crosswise.

Screws ISO 4762	
Nominal size	DN 40-50
	M8x30
Wrench size	6
Tightening torque for 8.8 screws [Nm]	25
Tightening torque for A2-70 screws [Nm]	16

Re-adjust the differential pressure $[\Delta p]$ after every compression spring replacement. A dwell time of 48 hours must be ensured between assembly, where the compression spring is pre-tensioned, and setting.

7.6 Checking and correcting the differential pressure

- Remove the lead seal, unscrew the cap from the bonnet and loosen the lock nut by turning it anti-clockwise.

	Cap	Nut ISO 4032	Screw ISO 4762
Nominal diameter DN1	DN 40-50	DN 40-50	DN 40-50
		M20	M20 x 80
Wrench size	60	30	30

- Increase the set pressure by turning the adjusting screw clockwise, and decrease the differential pressure by turning it anti-clockwise. **NOTICE! Observe the set pressure range of the compression springs.**

Screws ISO 4017		
DN1	40	50
SW	30	30

- Check the differential pressure by loading the valve from the inlet side DN1 with compressed air or a permitted operating medium equal to the differential pressure.

8 Transport, storage and disposal

AWP components are transported protected against impact and covered with foil.

- Storage must take place in dry rooms.
- Ensure that the connection ports are sealed intact.
- Contamination of any kind must be kept away from the interior.

- The external surfaces are provided with a corrosion protection coating for dry storage at room temperature, which is effective for at least 1 year.
- The corrosion protection coating CELEROL® Reaktionsgrund 918 is a good adhesion promoter for 1- and 2-component top coats.
- Dismantle for disposal.
- Collect lubricants during dismantling. The materials must be separated from one another and disposed of in accordance with local regulations.

9 **Warranty**

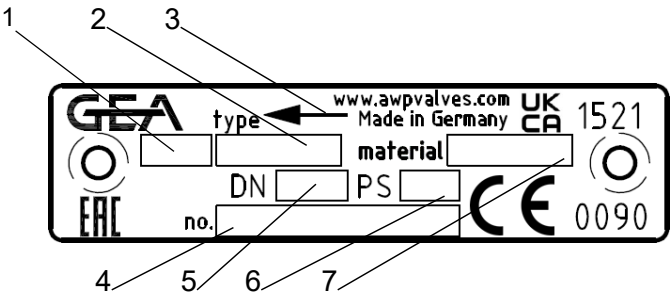
Unless agreed otherwise, the statutory warranty provisions apply. For further information, please also refer to our General Terms and Conditions, available on our website awpvalves.com.

10 **Spare parts**

Type	Nominal size	Seal kit	Repair kit
412	DN 25-32	41200.13.5/00019	41200.13.5/00029
414	DN 25-32	41400.13.5/00019	41400.13.5/00029
454	DN 40	45400.14.5/00019	45401B14.5110001
454	DN50	45400.15.5/00019	45401E15.5110001

11 **Marking**

The marking of the valves is carried out in accordance with Pressure Equipment Directive 2014/68/EU.
Nameplate on body



1 Type designation	2 Type no.
3 Flow direction	4 Serial number
5 Nominal size (DN)	6 Pressure rating (PS)
7 Material number	

PS [bar]	Max. permissible operating pressure
DN [mm]	Nominal size
DIN EN ISO 21922	Refrigerating valves, safety requirements, testing and marking

12 Note on residual hazards in accordance with Pressure Equipment Directive 2014/68/EU

NOTICE

- ▶ Do not loosen the bonnet (without authorisation) during operation or when under internal pressure.
- ▶ There may be defects in weld seams that could not be detected in previous inspections.
- ▶ Do not incorrectly assemble flange connections (inlet and outlet flanges, bonnets).
- ▶ Contamination in the operating medium or improper handling of internal components can lead to damage to gaskets.
- ▶ Observe operating limits and manufacturer's instructions in accordance with these operating instructions.

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