

**screw compressor package**  
**GEA Grasso SP1 HP-1B**



**Project „OLAM\_4\_Pos03 “**  
**Build number 14345**  
**Product Description**

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herein after referred to as the **manufacturer**. This restriction also applies to the drawings and diagrams contained in the documentation.

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| 990339 | oil heater                          |
| Kracht | oil pump                            |
| 990261 | coupling/ coupling housing          |
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| 990215 | resistance thermometer              |
| 990308 | overflow valve                      |
| 990331 | safety pressure limiter             |
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| 990380 | stop valve                          |
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## MAIN PART

### Oil separators

## 1 OIL SEPARATOR

The oil separators are used in screw compressor packages and chillers of Medium and Large series, single stage and DuoPack designs.

### 1.1 Function

The oil separator is selected depending on the project conditions, the refrigerant used, the oil brand used, and the degree of separation required.

Oil separators with oil fine separation cartridges are used as standard version for all refrigerants.

#### Oil separation

The refrigerant-oil mixture is led into the lower part of the vertical oil separator.

There, the first step of oil separation is performed.

The lower part of the oil separator is also used as an oil receiver.

The fine separation of the aerosol-type oil portion from the refrigerant is carried out in the upper part of the oil separator by means of coalescing cartridges.

The oil separated in the fine separation section of the oil separator is returned to the low-pressure side via the connection for oil return.

### 1.2 Maintenance

The oil fine separation cartridges should be replaced at the latest after 20000 hours of operation or after three years.

An earlier replacement is required if an increased amount of oil is splashed (oil is recharged at unusually short intervals).

### 1.3 Construction

The oil separators design is standardised.

Nominal sizes are defined according to the project and depends on oil separators size as well as used compressor type.

#### Changing the fine oil separation cartridges

##### Oil separators with diameters of 508 mm ...

**1400 mm:** The cartridges for oil fine separation are replaced through the refrigerant outlet port.

For this purpose, remove the pipe bend mounted on the oil separator.



#### Caution!

**Compensate the pressure and remove the refrigerant before starting the replacement!**

Afterwards, follow the Maintenance Instructions for screw compressor units.

#### Equipment of Grasso screw compressor packages/ chillers

| Oil separator diameter<br>(in mm) | max. number of oil fine<br>separation cartridges |
|-----------------------------------|--|
| 508                               | 4 x type I                                       |
| 610                               | 7 x type I                                       |
| 711                               | 9 x type I                                       |
| 813                               | 13 x type I                                      |
| 914                               | 16 x type I                                      |
| 1016                              | 19 x type I                                      |
| 1200                              | 19 x type I                                      |
| 1400                              | 19 x type I                                      |

### MAIN PART Oil separators

#### 1.3.1 Oil separator Ø 508, Ø 610, Ø 711, Ø 813, Ø 914

View

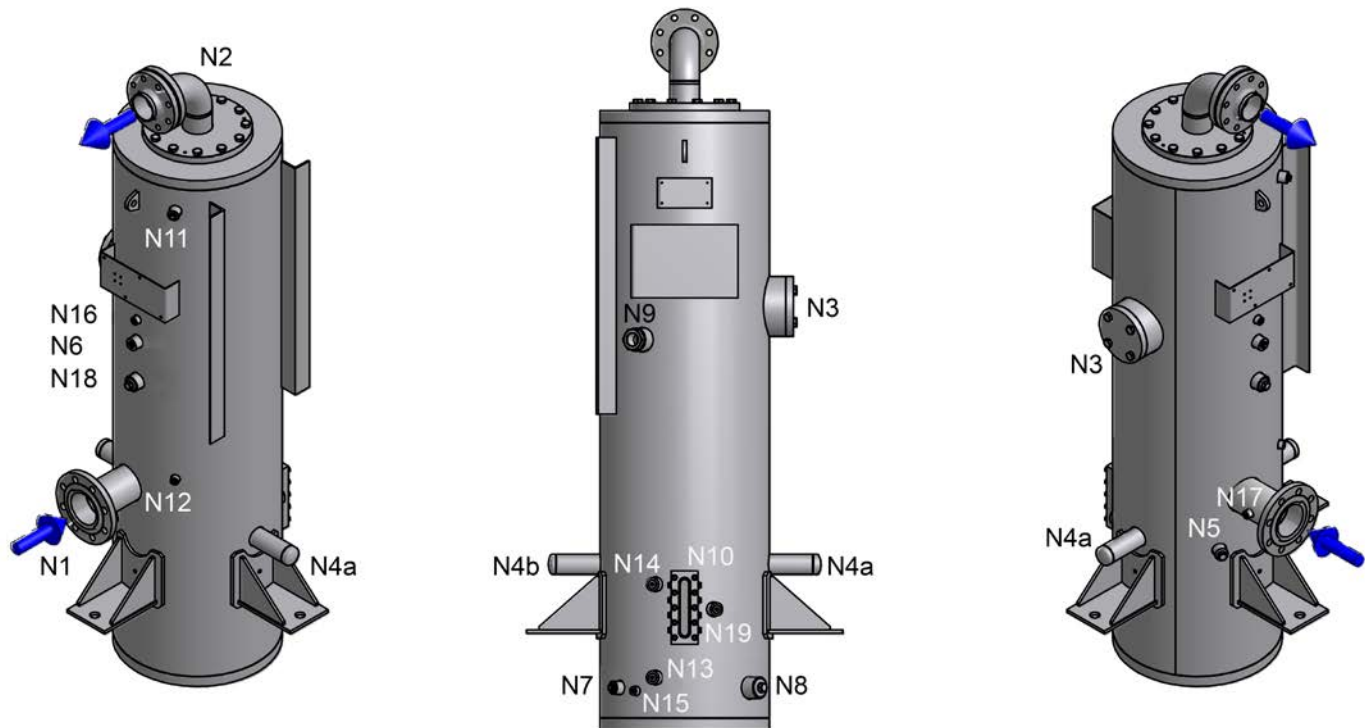


fig. 1: View of oil separators Ø 508, Ø 610, Ø 711, Ø 813, Ø 914

|     |  |
|-----|--|
| N1  | Refrigerant inlet  |
| N2  | Refrigerant outlet   |
| N3  | Overflow valve/ safety valve                                       |
| N4a | Oil outlet to oil cooler   |
| N4b | Oil outlet to OMC-block (oil filter)                               |
| N5  | Gas pulsation protection   |
| N6  | Oil return from oil fine separation stage to the low pressure side |
| N7  | Oil drain  |
| N8  | Oil heater   |
| N9  | Sight glass – oil fine separation stage                            |
| N10 | Sight glass – oil level in oil receiver                            |
| N11 | Measuring line/ bypass line SFC - check valve                      |
| N12 | Pressure transmitter discharge pressure                            |
| N13 | Level controller MIN   |
| N14 | Level controller MAX   |
| N15 | Oil temperature – oil receiver                                     |
| N16 | Safety pressure limiter  |
| N17 | Oil temperature - discharge temperature                            |
| N18 | Pressure test  |
| N19 | Level controller MID   |

## MAIN PART Oil separators

### Spare parts - for NH<sub>3</sub>-Standard <sup>1</sup>

| Spare part  | Grasso Ident                   | Dimensions     | Quantity       |
|---|--------------------------------|----------------|----------------|
| Fine oil separation cartridge (optionally)                            | 362698044 (N)<br>362698047 (N) |                | 2, 3           |
| O-Ring refrigerant inlet flange NB 100 (for units of Medium series)   | 762925137 (N)                  | 125 x 5        | 1              |
| O-Ring refrigerant inlet flange NB 150 (for units of Large series)    | 762925149 (N)                  | 180 x 5        | 1              |
| O-Ring refrigerant outlet, oil separator diameter 508                 | 762925159 (N)                  | 230 x 5        | 1              |
| O-Ring refrigerant outlet, oil separator diameter 610, 711, 813, 914  | 762998098 (N)                  | 330 x 5        | 1              |
| Gasket, refrigerant outlet, when connecting combined stop/check valve |                                |                | 1              |
| Nominal flange diameter NB 40   | 763000048                      | TG40/ EN1514-1 |                |
| Nominal flange diameter NB 50   | 763000049                      | TG50/ EN1514-1 |                |
| Nominal flange diameter NB 65   | 763000050                      | TG65/ EN1514-1 |                |
| Nominal flange diameter NB 80   | 763000051                      | TG80/ EN1514-1 |                |
| Nominal flange diameter NB 100  | 763000052                      | TG100/EN1514-1 |                |
| Nominal flange diameter NB 125  | 763000053                      | TG125/EN1514-1 |                |
| Nominal flange diameter NB 150  | 763000054                      | TG150/EN1514-1 |                |
| Nominal flange diameter NB 200  | 763000056                      | TG150/EN1514-1 |                |
| O-ring, refrigerant outlet with separate check valve                  |                                |                | 1 <sup>4</sup> |
| Nominal flange diameter NB 40   | 762925121 (N)                  | 60 x 5         |                |
| Nominal flange diameter NB 50   | 762925128 (N)                  | 80 x 5         |                |
| Nominal flange diameter NB 65   | 762925132 (N)                  | 100 x 5        |                |
| Nominal flange diameter NB 80   | 762925134 (N)                  | 110 x 5        |                |
| Nominal flange diameter NB 100  | 762925138 (N)                  | 130 x 5        |                |
| Nominal flange diameter NB 125  | 762925147 (N)                  | 170 x 5        |                |
| Nominal flange diameter NB 150  | 762925148 (N)                  | 190 x 5        |                |
| Nominal flange diameter NB 200  | 762925182 (N)                  | 240 x 5        |                |
| O-ring connection overflow valve, safety valve                        | 762925130 (N)                  | 90 x 5         | 1              |
| Gasket connection of level controller MAX                             | 438698032                      | A20 x 24       | 3              |
| Gasket for sight glass N9   | 438698077                      | A52 x 60       | 1              |
| O-ring cover gasket of oil fine separation cartridge                  | 762925132 (N)                  | 100 x 5        | 5              |
| Gasket for cartridge fixing   | 438698023 (N)                  | A14 x 20       | 5              |
| O-Ring integrated check valve, oil separator diameter 508             | 762925155 (N)                  | 210 x 5        | 6              |
| O-Ring refrigerant outlet, oil separator diameter 610, 711, 813, 914  | 762998097 (N)                  | 310 x 5        | 7              |

(N) = HNBR-design possible, dependent on refrigerant and oil

<sup>1</sup> Spare parts for oil separators for alternative refrigerants (freons) and for oil separators for chemical engineering on request

<sup>2</sup> In compliance with the number of oil fine separation cartridges used (cf. Customer parts list)

<sup>3</sup> Standard application, other designs for further refrigerants possible on request

<sup>4</sup> Dimensions of O-ring valid only when Grasso connection- and companion flanges are used

<sup>5</sup> In compliance with the number of oil fine separation cartridges used (cf. Customer parts list)

<sup>6</sup> O-ring – for this optional equipment type only

<sup>7</sup> O-ring – for this optional equipment type only

### MAIN PART Oil separators

#### 1.3.2 Oil separator diameters 1016, 1200 and 1400

View

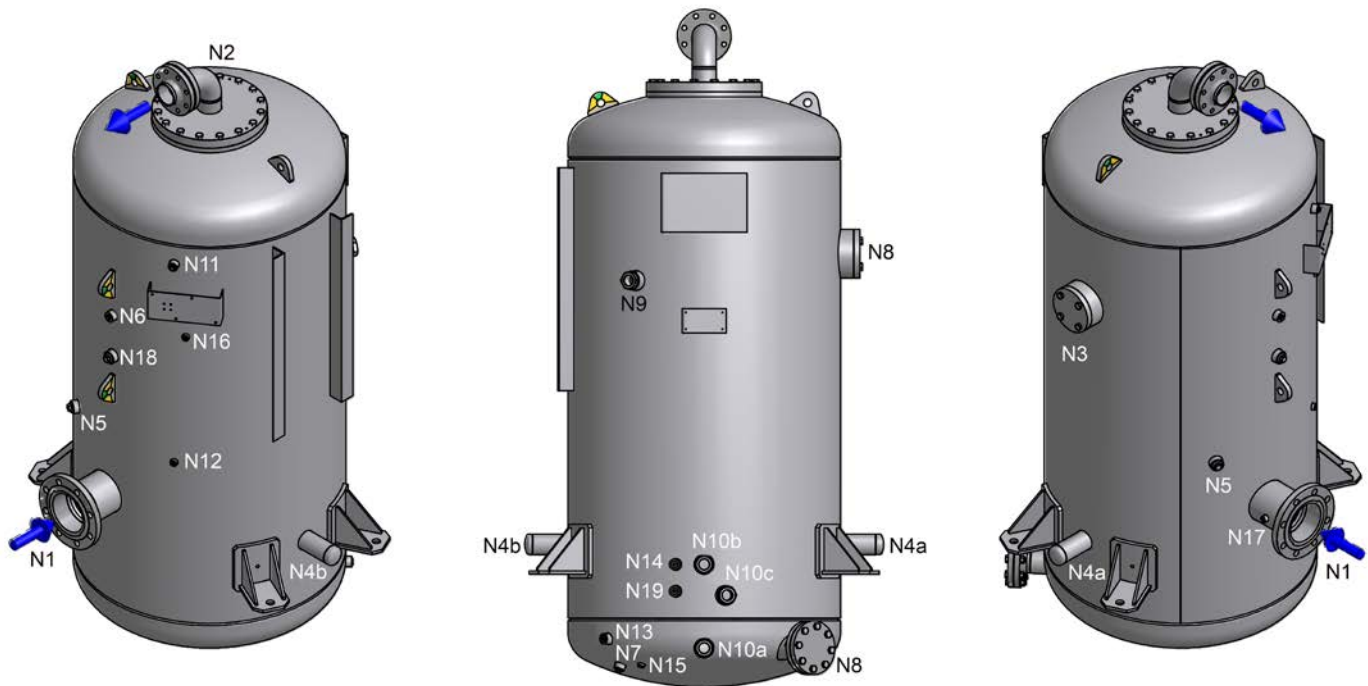


fig. 2: View of oil separator, diameters 1016, 1200 and 1400

|      |   |
|------|---|
| N1   | Refrigerant inlet   |
| N2   | Refrigerant outlet  |
| N3   | Safety valve/ overflow valve  |
| N4a  | Oil outlet to oil cooler  |
| N4b  | Oil outlet to OMC-block (oil filter)                                    |
| N5   | Gas pulsation protection  |
| N6   | Oil return from from oil fine separation stage to the low pressure side |
| N7   | Oil drain   |
| N8   | Oil heater  |
| N9   | Sight glass – oil fine separation stage                                 |
| N10a | Sight glass - MIN   |
| N10b | Sight glass - MID   |
| N10c | Sight glass - MAX   |
| N11  | Measuring line/ bypass line SFC - check valve                           |
| N12  | Pressure transmitter discharge pressure                                 |
| N13  | Level controller MIN  |
| N14  | Level controller MAX  |
| N15  | Oil temperature – oil receiver  |
| N16  | Safety pressure limiter   |
| N17  | Oil temperature - discharge temperature                                 |
| N18  | Pressure test   |

## MAIN PART Oil separators

|     |                      |
|-----|----------------------|
| N19 | Level controller MID |
|-----|----------------------|

### Spare parts - for NH<sub>3</sub>-Standard <sup>8</sup>

| Spare part  | Grasso Ident                   | Dimensions     | Quantity        |
|---|--------------------------------|----------------|-----------------|
| Fine oil separation cartridge (optionally)                            | 362698044 (N)<br>362698047 (N) |                | 9, 10           |
| O-Ring refrigerant inlet flange NB 150 (for units type P ... XA)      | 762925149 (N)                  | 180 x 5        | 1               |
| O-Ring refrigerant inlet flange NB 200 (for units type XB ... XD)     | 762925182 (N)                  | 240 x 6        | 1               |
| O-Ring refrigerant outlet   | 762998098 (N)                  | 330 x 5        | 1               |
| Gasket, refrigerant outlet, when connecting combined stop/check valve |                                |                | 1               |
| Nominal flange diameter NB 150  | 763000054                      | TG150/EN1514-1 |                 |
| Nominal flange diameter NB 200  | 763000056                      | TG150/EN1514-1 |                 |
| O-ring, refrigerant outlet with separate check valve                  |                                |                | 1 <sup>11</sup> |
| Nominal flange diameter NB 150  | 762925148 (N)                  | 190 x 5        |                 |
| Nominal flange diameter NB 200  | 762925182 (N)                  | 240 x 5        |                 |
| Nominal flange diameter NB 250  | 762925190 (N)                  | 310 x 8        |                 |
| Nominal flange diameter NB 300  | 762925195 (N)                  | 360 x 5        |                 |
| O-ring connection overflow valve, safety valve                        | 762925130                      | 90 x 5         | 1               |
| Gasket connection of level controller MAX                             | 762925096                      | A20 x 24       | 3               |
| Gasket for sight glasses N9, N10                                      | 438698077                      | A52 x 60       | 4               |
| O-ring cover gasket of oil fine separation cartridge                  | 762925132 (N)                  | 100 x 5        | 12              |
| Gasket for cartridge fixing   | 438698023 (N)                  | A14 x 20       | 12              |
| O-Ring integrated check valve, oil separator                          | 762998097 (N)                  | 310 x 5        | 13              |

<sup>8</sup> Spare parts for oil separators for alternative refrigerants (freons) and for oil separators for chemical engineering on request

<sup>9</sup> In compliance with the number of oil fine separation cartridges used (cf. Customer parts list)

<sup>10</sup> Standard application, other designs for further refrigerants possible on request

<sup>11</sup> Dimensions of O-ring valid only when Grasso connection- and companion flanges are used

<sup>12</sup> In compliance with the number of oil fine separation cartridges used (cf. Customer parts list)

<sup>13</sup> O-ring – for this optional equipment type only



# 1 OMC-BLOCK I, SIMPLEX FILTER SYSTEM

## 1.1 View

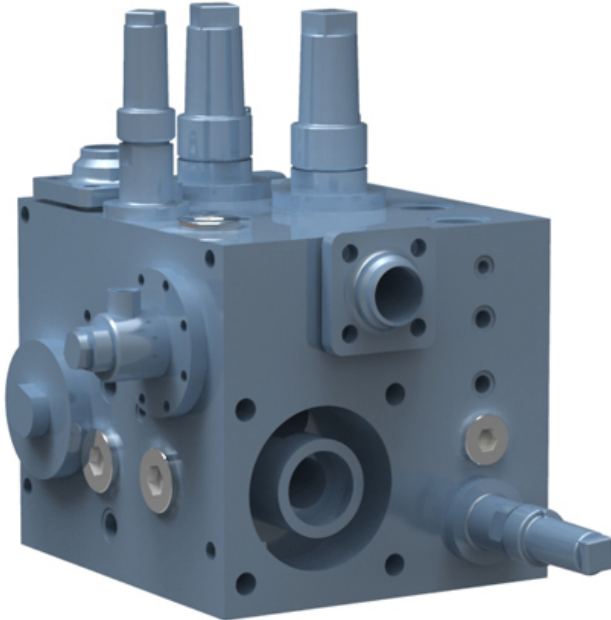


fig.1: OMC-block, view

## 1.2 Features

The OMC-block is a main component of the screw compressor packages and liquid chillers of GEA Refrigeration Germany GmbH. With its functionalities, it forms the oil circuit necessary for the respective application. This guarantees a high operational safety of the components and all the products. The various connection possibilities and types cover a broad range of application. The OMC-block is combined with a standardised filter system and oil pump units and forms the central control and operator unit in the oil circuit.

The selection of the OMC block version depends on the following operating conditions:

- *Type of screw compressor*  
Operation with external or internal oil pump
- *Type of screw compressor unit / liquid chiller unit*  
Operation as single-stage, two-stage or as Duo-Pack
- Operation with external oil cooler or refrigerant injection for oil cooling
- maximum oil volume flow

- Type of oil
- Refrigerant

It is possible that due to special operating conditions and installations there may be an overlapping as regards the type selection in the predefined and optimal design and selection.

The OMC-block including the main components to be connected can be used by external component factories, which use Grasso screw compressors in their products. For this, however, a coordination with GEA Refrigeration Germany GmbH is necessary.

## 1.3 Safety Instructions

This installation and operation manual is an essential component of the OMC-block delivery. Always keep this manual in a readily accessible place near the filter.

The German version of this manual is the predominant and binding version. Take care that all persons being charged with the installation, operation, maintenance and repair of the coupling have read and understood this manual and that all instructions contained therein are carefully observed in order to:

- Avoid danger to life and limb of the user or third persons
- Ensure the operational safety of the OMC-block
- Preclude operation failures and environmental damages due to wrong handling and mis-use

The relevant instructions and regulations regarding safety at work and environmental protection have to be observed while transporting, mounting and dismounting the coupling.

The OMC-block shall be operated, mounted, maintained and repaired by authorized, trained and instructed personnel only. We do not assume any liability or warranty for any damages resulting from the use of accessories and parts that are not originally delivered by GEA Refrigeration Germany GmbH.

**Special safety instructions for dismantling the valve caps****Caution!**

The valve inserts on the spanner flat must be countered using a suitable tool, when the valve caps of valve inserts should be dismantled. This certainly prevents a screw off the valve inserts from the OMC block.

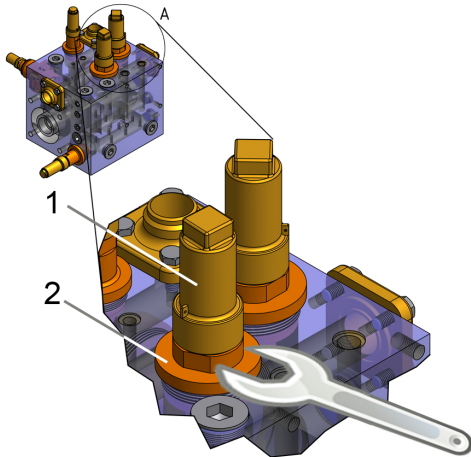


fig.2: Tool usage when dismantling the valve caps

|   |                              |
|---|------------------------------|
| 1 | Valve cap                    |
| 2 | Spanner flat of valve insert |

See the following tables for wrench sizes of different diameters of covers and caps:

| Cover          |             |
|----------------|-------------|
| Cover diameter | Wrench size |
| DN25-32        | SW36        |
| DN40-50        | SW55        |
| DN65           | SW55        |

| Cap          |             |
|--------------|-------------|
| Cap diameter | Wrench size |
| DN25-32      | SW24        |
| DN40-65      | SW32        |

**1.4 Intended use**

The following conditions must be met for the intended use:

- The OMC-block must only be operated in normal industrial atmospheres. Aggressive media may attack the components, screws and elastic buffer rings. So the aggressive media represent a risk for the operational safety of the OMC-block.
- The OMC-block shall only be used and operated within the frame of the conditions as defined in the performance or delivery contract.

**Warning!**

The OMC-block is for use at a maximum operating pressure of 28 bar g.p. provided.

- Any change in the operation conditions or service parameters requires the verification of the design.

**1.5 Storage**

On receipt of the goods, immediately check that all parts are on hand and are as ordered. Eventual shipping damages and/or missing parts have to be reported in writing.

The OMC-block can be stored in a dry place under roof at normal ambient temperatures for a time period of 6 months. Storage for a longer period requires the application of a long-term preservation.

The OMC-Block must not be exposed to any aggressive products, extreme temperatures or humidity. Do not store the OMC-block along with acids, alkaline solutions or other caustic chemicals. The place of storage should be dry and free from dust. The air humidity should not exceed 65% and condensation is not permissible

**1.6 Technical data**

Features of the OMC-block series:

- prepared for mounting directly flange-mounted oil pump units or external oil pump units  
**can be directly flange-mounted** – particularly Grasso oil pump units - see separate documentation  
**external** - particularly Grasso oil pump units - see separate documentation or products of other manufacturers

- prepared for mounting a simplex filter system with standardised oil filter element
  - easy replacement due to standardised flange dimension in the block mounting and inspection cover
  - low pressure drops in the OMC-block due to optimised ducting for oil distribution
  - universal overall system when using diverse refrigerants and oil circuit systems
  - prepared for the installation of 3-way valve element with different temperature control ranges
- see table "Selection range: Inserts for thermostatic 3-way valve"
  - simplified spare part management world-wide
  - simplified inventory management
  - Assurance of a long service interval
  - easy assembly on base frames due to standardised mounting points
  - simplified maintenance

|                                   |  |                 |
|-----------------------------------|--|-----------------|
| Fluids:                           | Lubricating oils with refrigerants NH <sub>3</sub> , R134a, R404A, R507 (others on request) in accordance with EN 378        |                 |
| Max. operating pressure:          | 28 bar g.p.  |                 |
| Max. operating temperature:       | 120 °C   |                 |
| Oil viscosity:                    | approx. 30 cSt - during operation<br>max. 500 cSt for a short time during starting of the screw compressor unit/chiller unit |                 |
| Filter element:                   | see separate documentation<br>Standard: Glass fibre filter element, mesh size 25 µm  |                 |
| Weight (without filter):          | OMC I - 32   | 60 kg           |
|                                   | OMC I - 40   | 72 kg           |
|                                   | OMC I - 50   | 84 kg           |
|                                   | OMC I - 65   | 136 kg          |
| Main dimensions L x W x H (in mm) | OMC I - 32   | 520 x 425 x 435 |
|                                   | OMC I - 40   | 525 x 455 x 435 |
|                                   | OMC I - 50   | 525 x 455 x 505 |
|                                   | OMC I - 65   | 600 x 525 x 600 |
| Approval:                         | CE in accordance with DGRL 97/23/EC, Work's acceptance (others on request)   |                 |

## 1.7 Function and design

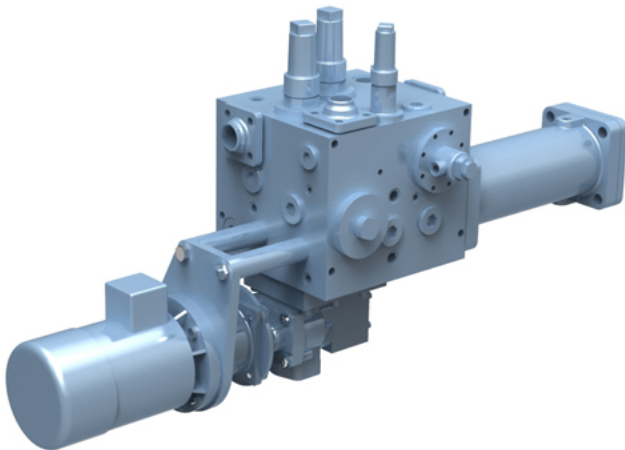


fig.3: OMC-block I, construction  
The view shows an OMC-block I with directly flange-mounted oil pump unit and block mounting filter

The OMC-block includes the oil distribution system of the oil circuit of Grasso screw compressor units and chiller units. Necessary control and shutoff fittings are integrated in the OMC-block. Connections for temperature and pressure sensors as well as service ports are present. Oil pump unit and block mounted filter are configured separately depending upon the size of the OMC-block.

**The OMC-block I series is used in oil circuits with external oil cooler.**

Optionally the OMC-block can be equipped with a 3-way valve element (for ensuring a minimum oil temperature when starting the compressor).

## 1.8 Quality and Standardization

The OMC-blocks for applications with fluids of groups 1 and 2 are pressurized items in line with the Pressure Equipment Directive 97/23/EC (DGRL). They are given CE marks and approval in line with the requirements according to category I.

Approval by classification companies and according to non-EU regulations on request.

The OMC-block is not a device or component in the sense of the ATEX product directive 94/9/EC and therefore does not have a CE mark.

**The use in potentially explosive atmospheres in accordance with directive 94/9/EC (ATEX) is possible only on request.**

In the event that the OMC-block is used in potentially explosive atmospheres, potential compensation must be ensured.

## 1.9 Numbering and abbreviations

| Position numbers of the R+I flow charts and component overviews |  |
|---|--|
| Position number   | Component  |
| 35 + 36   | Oil filter housing with fine filter element – see separate documentation         |
| 65  | Stop valve - oil circuit (connection of oil separator)                           |
| 70  | combined stop/ check valve - functional oil                                      |
| 75  | Oil pressure relief valve (adjustment of oil pump pressure)                      |
| 80  | Control valve – injection oil with integrated check valve function               |
| 90  | Stop valve - oil drain and oil charging (integrated into the oil filter housing) |
| 110   | Pressure transducer - pressure after oil pump unit (functional oil)              |
| 125   | Resistance thermometer – oil temperature   |
| 135   | Stop valve - venting (integrated into the oil filter housing)                    |

| Position numbers of the R+I flow charts and component overviews |   |
|---|---|
| Position number   | Component   |
| 215 + 216   | thermostatic 3-way valve with control element   |
| 220   | Stop valve - oil circuit (bypass port of the oil cooler)  |
| 395   | Pressure transducer - pressure after oil filter (injection oil)   |
| 415   | Stop valve - pressure transducer (pos. 110)   |
| 420   | Stop valve - pressure transducer (pos. 395)   |
| 460   | Stop valve - service injection oil  |
| 465   | Stop valve - service functional oil   |
| 1675  | Oil pressure control valve<br><i>Factory default setting 4 bar - sealed, only for Grasso SPduo with FU-controlled oil pump unit</i> |

| Connections of the R+I flow charts and component overviews |   |
|--|---|
| Code   | Remark  |
| A12 + C12  | Functional oil Grasso SP1 and Grasso SP2  |
| AD + CD  | Functional oil Grasso SPduo   |
| B  | Oil injection   |
| BB   | Bore hole for fixing - 4x M16   |
| B1   | Additional oil injection  |
| BOP  | Bore hole for fixing flange-mounted oil pump unit   |
| DP   | Connection for capacity control Grasso SP2 and/or balancing piston (with oil pump pressure) |
| DU   | Balancing piston (without oil pump pressure)  |
| IC   | Oil inlet from oil cooler   |
| IO   | Oil inlet from oil separator  |
| M  | Oil drain and oil charging in the oil filter housing (mounting position below)              |

| Connections of the R+I flow charts and component overviews |  |
|--|--|
| Code   | Remark   |
| OP1  | Oil pressure before oil filter   |
| OP2  | Oil pressure after oil filter (injection oil)  |
| OP4  | Oil pressure after oil pump unit (functional oil)  |
| OPI  | Suction side oil pump unit<br>(Connection of directly flanged oil pump of OMCI) <sup>1</sup> DN 32 and DN 40 // <sup>2</sup> DN 50 and DN 65   |
| OPO  | Discharge side oil pump unit<br>(Connection of directly flanged oil pump of OMCI) <sup>1</sup> DN 32 and DN 40 // <sup>2</sup> DN 50 and DN 65 |
| OT   | Temperature sensor oil temperature   |
| S2   | Service injection oil  |
| S4   | Service functional oil   |
| TB   | Bore hole stop and transportation - M16  |
| U1 + U2  | Reference line for oil pressure = final pressure   |
| V  | Venting in the oil filter housing (mounting position above)  |

## 1.10 Ausführung OMC-Block: OMC I SP1-2 with oil pump unit and simplex filter system

Application in screw compressor packages of series Grasso SP1 Medium, Grasso SP1 Large and Grasso SP2

| nominal width | Grasso Ident  |
|---------------|---------------|
| DN 32         | 352198262 (N) |
| DN 40         | 352198263 (N) |
| DN 50         | 352198264 (N) |
| DN 65         | 352198265 (N) |

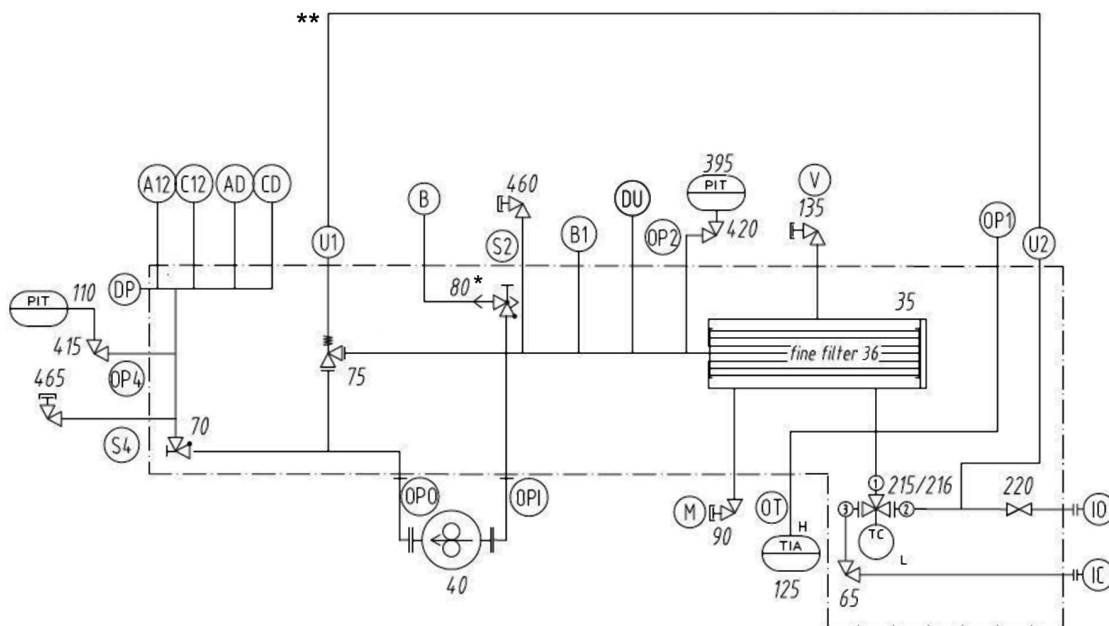


fig.4: R+I flow charts OMC I SP1-2 with oil pump unit and simplex filter system

|    |  |
|----|--|
| *  | fully opened for Grasso SP2                        |
| ** | Install reference line when mounting the OMC-block |

## 1.11 Design of the OMC-Block: OMC I SP1 with oil pump unit integrated into compressor and simplex filter system

Application in screw compressor packages Grasso SP1 medium

| nominal width | Grasso Ident  |
|---------------|---------------|
| DN 32         | 352198260 (N) |
| DN 40         | 352198261 (N) |

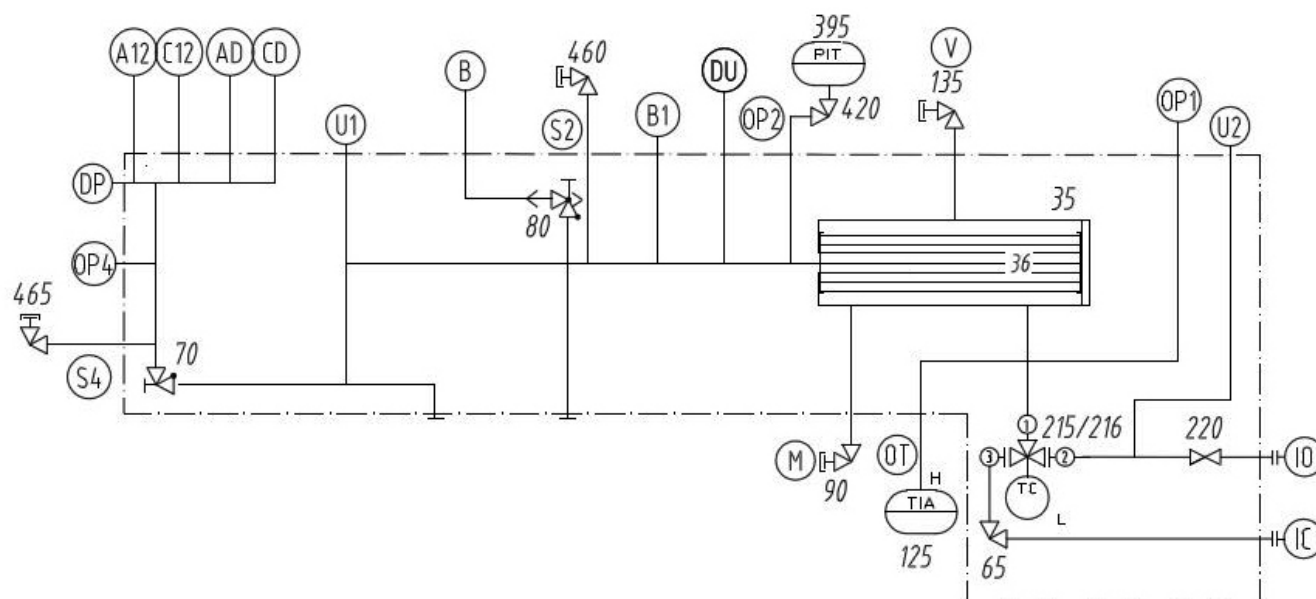


fig.5: R+I flow chart OMC I SP1 with oil pump unit integrated into compressor and simplex filter system

## 1.12 Design of the OMC-Block: OMC I SPduo with oil pump unit and simplex filter system

Application in screw compressor packages of series Grasso SPduo Medium and Grasso SPduo Large

| nominal width | Grasso Ident  |
|---------------|---------------|
| DN 40         | 352198274 (N) |
| DN 50         | 352198275 (N) |
| DN 65         | 352198276 (N) |

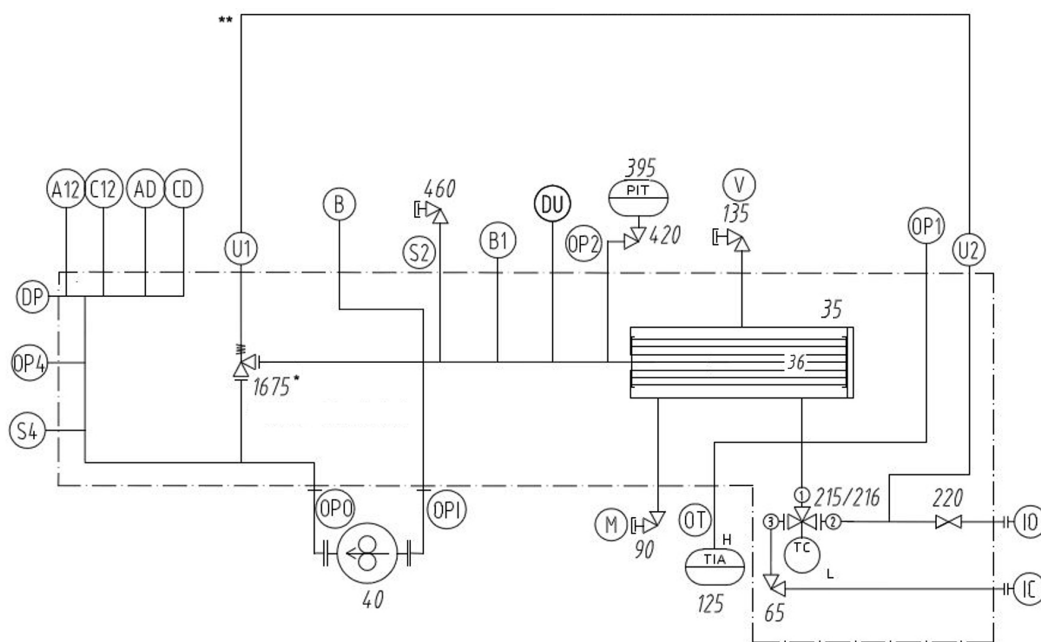


fig.6: R+I flow chart OMC I SPduo with oil pump unit and simplex filter system

|    |  |
|----|--|
| *  | $\Delta p = 4 \text{ bar}$ , sealed                |
| ** | Install reference line when mounting the OMC-block |

### 1.13 Design of the OMC-Block: OMC I SPduo with oil pump unit integrated into compressor and simplex filter system

Application in screw compressor packages of the series Grasso SPduo medium

| nominal width | Grasso Ident  |
|---------------|---------------|
| DN 40         | 352198272 (N) |
| DN 50         | 352198273 (N) |

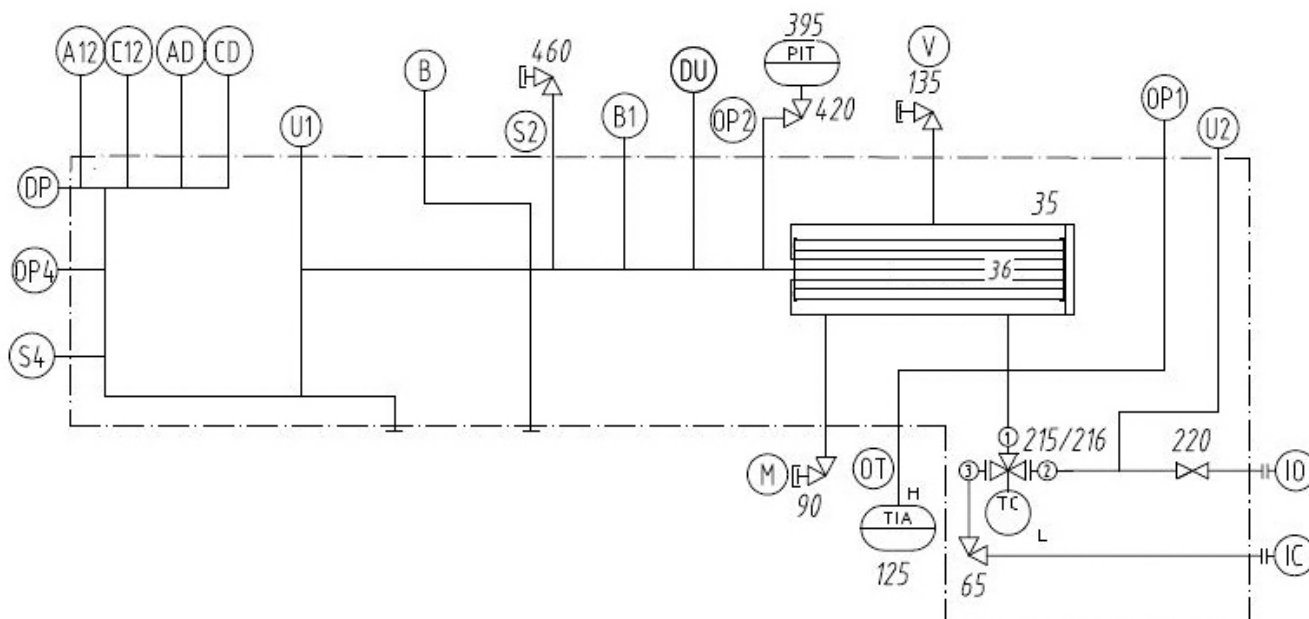


fig.7: R-I flow chart OMC I SPduo with oil pump unit and simplex filter system

## 1.14 General assembly drawings

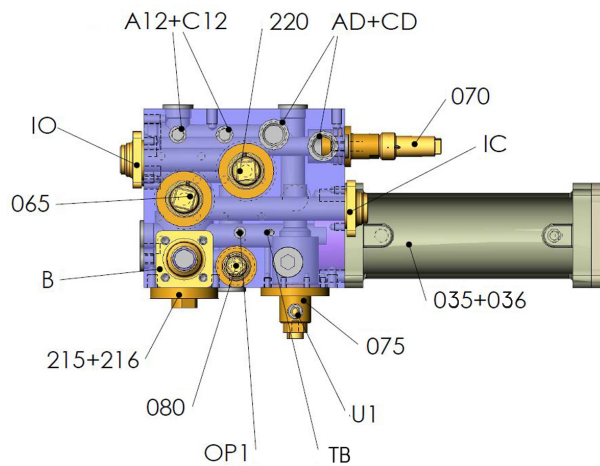


fig.8: OMC-Block I, general assembly drawing 1

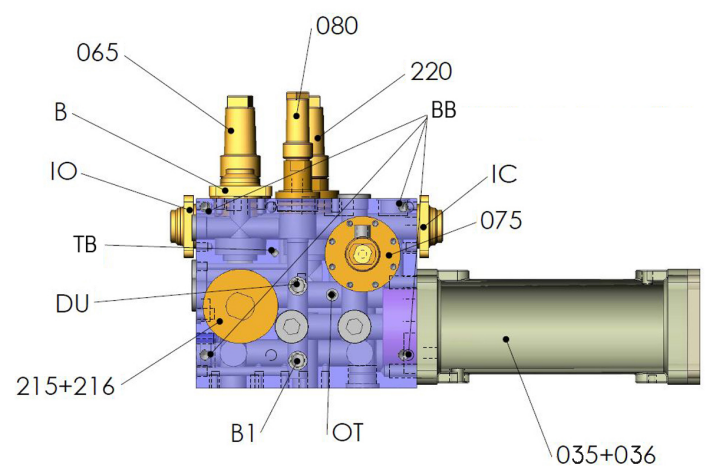


fig.9: OMC-Block I, general assembly drawing 2

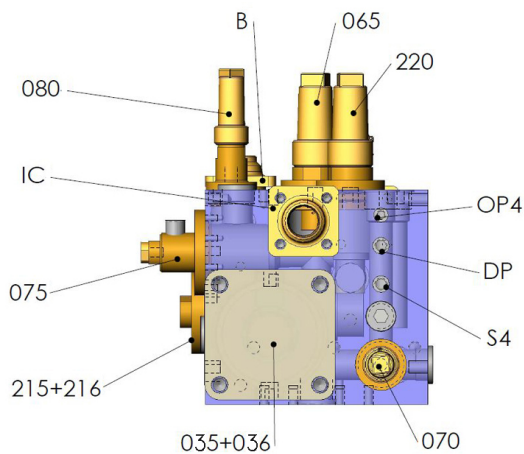


fig.10: OMC-Block I, general assembly drawing 3

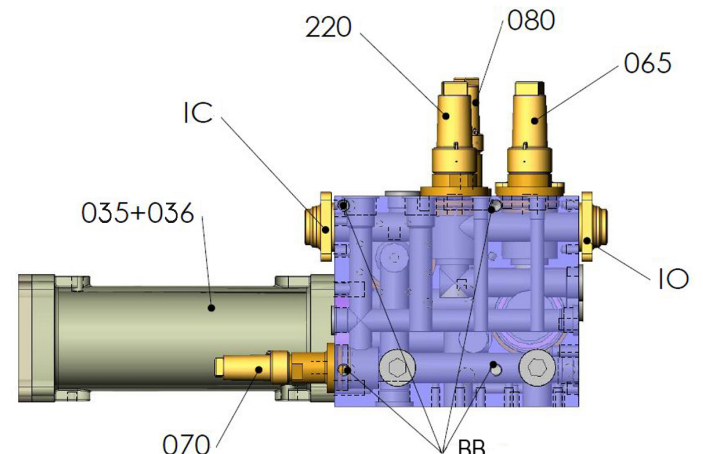


fig.11: OMC-Block I, general assembly drawing 4

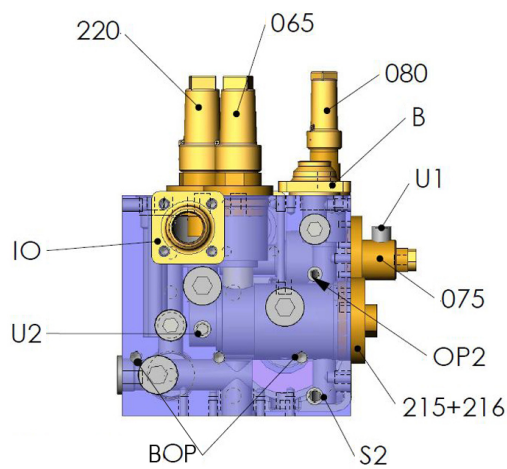


fig.12: OMC-Block I, general assembly drawing 5

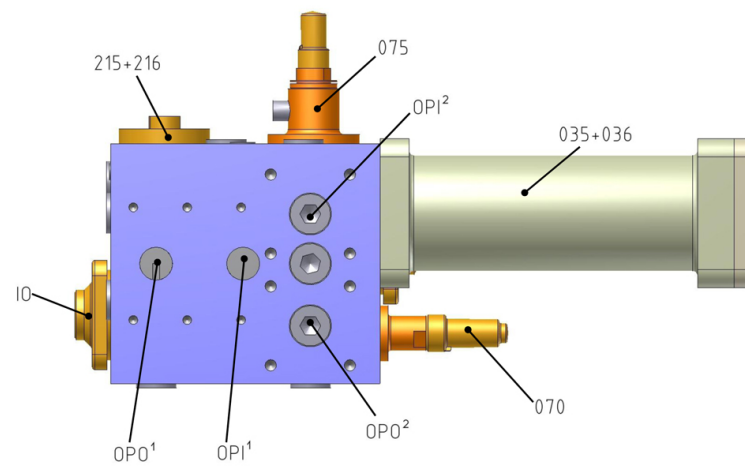


fig.13: OMC-Block I, general assembly drawing 6

## 1.15 Types

| Nominal guide value | Oil pump integrated into the compressor | Oil pump External | Application in           | simplex filter system | Max. oil volume flow (l/min) | Designation<br>Grasso Ident (CR)<br>Grasso Ident (HNBR) |
|---------------------|---|-------------------|--------------------------|-----------------------|------------------------------|---|
| DN 32               | X                                       |                   | Grasso SP1               | X                     | 80                           | <b>OMCI-32SP1-S</b><br>352198260<br>352198260N          |
| DN 40               | X                                       |                   | Grasso SP1               | X                     | 180                          | <b>OMCI-40SP1-S</b><br>352198261<br>352198261N          |
| DN 40               | X                                       |                   | Grasso SPduo             | X                     | 180                          | <b>OMCI-40SPD-S</b><br>352198272<br>352198272N          |
| DN 50               | X                                       |                   | Grasso SPduo             | X                     | 240                          | <b>OMCI-50SPD-S</b><br>352198273<br>352198273N          |
| DN 32               |   | X                 | Grasso SP1               | X                     | 80                           | <b>OMCI-32SP1-S-P</b><br>352198262<br>352198262N        |
| DN 40               |   | X                 | Grasso SP1<br>Grasso SP2 | X                     | 180                          | <b>OMCI-40SP12-S-P</b><br>352198263<br>352198263N       |
| DN 40               |   | X                 | Grasso SPduo             | X                     | 180                          | <b>OMCI-40SPD-S-P</b><br>352198274<br>352198274N        |
| DN 50               |   | X                 | Grasso SP1<br>Grasso SP2 | X                     | 240                          | <b>OMCI-50SP12-S-P</b><br>352198264<br>352198264N       |
| DN 50               |   | X                 | Grasso SPduo             | X                     | 240                          | <b>OMCI-50SPD-S-P</b><br>352198275<br>352198275N        |
| DN 65               |   | X                 | Grasso SP1<br>Grasso SP2 | X                     | 340                          | <b>OMCI-65SP12-S-P</b><br>352198265<br>352198265N       |
| DN 65               |   | X                 | Grasso SPduo             | X                     | 340                          | <b>OMCI-65SPD-S-P</b><br>352198276<br>352198276N        |

## 1.16 Main components and dimensioning of connection port



### Hint!

Screwed connections with moulded profiled ring are additionally to be covered with Loctite.

| Position number<br>P+I diagram     | Name  | Nennweite<br>OMC-block | OMC I SP1-2<br>External oil<br>pump<br>Grasso Ident  | OMC I SP1<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident | OMC I SPduo<br>External oil<br>pump<br>Grasso Ident | OMC I SPduo<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident |
|------------------------------------|---|------------------------|--|---|---|---|
| 35+36                              | Oil filter housing<br>complete with oil<br>filter element,                      |                        | see technical documentation 990361 for overall picture   |   |   |   |
| 36 <sup>1</sup>                    | Oil fine filter ele-<br>ment  | DN 32                  | 352100411-H20-CR<br>352100411-H20-HNBR   |   | not used  |   |
|                                    |   | DN 40                  | 352100413-H20-CR<br>352100413-H20-HNBR   |   |   |   |
|                                    |   | DN 50                  | 352100415-H20-<br>CR<br>352100415-H20-<br>HNBR   | not used  | 352100415-H20-<br>CR<br>352100415-H20-<br>HNBR      | 352100415-H20-<br>CR<br>352100415-H20-<br>HNBR                      |
|                                    |   | DN 65                  | 352100417-H20-<br>CR<br>352100417-H20-<br>HNBR   |   | 352100417-H20-<br>CR<br>352100417-H20-<br>HNBR      | not used  |
| IC + IO                            | Oil inlet from oil<br>cooler<br>Oil inlet from oil<br>separator                 | DN 32                  | Tube connection 42.4x2.6   |   | Block not available                                 |   |
|                                    |   | DN 40                  | Tube connection 48.3x2.6   |   |   |   |
|                                    |   | DN 50                  | Tube connection<br>60.3x2.9  | Block not availa-<br>ble  | Tube connection 60.3x2.9                            |   |
|                                    |   | DN 65                  | Tube connection<br>76.1x2.9  |   | Tube connection<br>76.1x2.9                         | Block not availa-<br>ble  |
| 216 <sup>4</sup>                   | control element<br>for thermostatic<br>3-way-valve pos.<br>215                  | NB 32 - NB 65          | see data sheet 990423 for an overview of control elements<br>Control elements of type DN 50 for all versions of OMC-block<br>1x control element for OMC-blocks DN 32 - DN 50<br>2x control element for OMC-block DN 65 |   |   |   |
| 65 <sup>2</sup> + 220 <sup>2</sup> | stop valve – oil<br>cooler oil inlet<br>stop valve - oil<br>separator oil inlet | DN 32                  | AVR - DN 32  |   | Block not available                                 |   |
|                                    |   | DN 40                  | AVR - DN 40  |   |   |   |
|                                    |   | DN 50                  | AVR - DN 50  | Block not availa-<br>ble  | AVR - DN 50   |   |
|                                    |   | DN 65                  | AVR - DN 65  |   | AVR - DN 65   | Block not availa-<br>ble  |

| Position number<br>P+I diagram | Name   | Nennweite<br>OMC-block | OMC I SP1-2<br>External oil<br>pump<br>Grasso Ident   | OMC I SP1<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident | OMC I SPduo<br>External oil<br>pump<br>Grasso Ident | OMC I SPduo<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident |
|--------------------------------|--|------------------------|---|---|---|---|
| M-90 <sup>3</sup>              | Connection and<br>stop valve for oil<br>draining and oil<br>charging | NB 32 - NB 65          | Threaded connection M 22x1.5 in the oil filter housing for screw-in threaded connection or prepared for direct installation of the Grasso service valve (Grasso Ident 501306625awp63) with G1/2" connection thread (see documentation 990320) |   |   |   |
| V-135 <sup>3</sup>             | Connection and<br>stop valve for<br>venting                          | NB 32 - NB 65          | Threaded connection M 16x1.5 in the oil filter housing for screw-in threaded connection or prepared for direct installation of the Grasso service valve (Grasso Ident 501306623awp63) with G1/2" connection thread (see documentation 990320) |   |   |   |
| B                              | Oil injection  | DN 32                  | Tube connection 33.7x2.6  |   | Block not available                                 |   |
|                                |  | DN 40                  | Tube connection 42.4x2.6  |   |   |   |
|                                |  | DN 50                  | Tube connection<br>48.3x2.6   | Block not availa-<br>ble  | Tube connection 48.3x2.6                            |   |
|                                |  | DN 65                  | Tube connection<br>60.3x2.9   |   | Tube connection<br>60.3x2.9                         | Block not availa-<br>ble  |
| B1                             | Additional oil<br>injection  | DN 32                  | Threaded connection M 16x1.5  |   | Block not available                                 |   |
|                                |  | DN 40                  | Threaded connection M 22x1.5  |   |   |   |
|                                |  | DN 50                  | Threaded con-<br>nection M 26x1.5   | Block not availa-<br>ble  | Threaded connection M 26x1.5                        |   |
|                                |  | DN 65                  | Threaded con-<br>nection M 33x2.0   |   | Threaded con-<br>nection M 33x2.0                   | Block not availa-<br>ble  |
| 80 <sup>2</sup>                | Control valve<br>Injection oil                                       | DN 32                  | RVAK - DN 25  |   | Block not available                                 |   |
|                                |  | DN 40                  | RVAK - DN 32  | Block not availa-<br>ble  | without valve                                       |   |
|                                |  | DN 50                  | RVAK - DN 40  |   |   |   |
|                                |  | DN 65                  | RVAK - DN 50  |   | without valve                                       | Block not availa-<br>ble  |
| A12 + C12                      | Functional oil<br>SP1 and SP2  | DN 32                  | Threaded connection M 22x1.5<br>Threaded connection M 22x1.5  |   | Block not available                                 |   |
|                                |  | DN 40                  |   |   | closed tight  |   |
|                                |  | DN 50                  | Threaded con-<br>nection M 33x2.0   | Block not availa-<br>ble  |   |   |
|                                |  | DN 65                  | Threaded con-<br>nection M 42x2.0   |   | closed tight  | Block not availa-<br>ble  |
| AD + CD                        | Functional oil<br>SPduo  | DN 32                  | closed tight  | closed tight  | Block not availa-<br>ble                            | Block not availa-<br>ble  |

| Position number<br>P+I diagram | Name   | Nennweite<br>OMC-block | OMC I SP1-2<br>External oil<br>pump<br>Grasso Ident   | OMC I SP1<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident | OMC I SPduo<br>External oil<br>pump<br>Grasso Ident   | OMC I SPduo<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident |
|--------------------------------|--|------------------------|---|---|---|---|
|                                |  | DN 40                  |   |   | Threaded connection M 42x2.0  |   |
|                                |  | DN 50                  |   |   | Threaded connection M 48x2.0  |   |
|                                |  | DN 65                  |   | Block not availa-<br>ble  | Flange AWP-<br>standard with<br>groove and<br>spring<br>Tube connection<br>48.3x2.6   | Block not availa-<br>ble  |
| 70 <sup>2</sup>                | Shutable check<br>valve                                | NB 32 - NB 40          | RVA - DN25/32   |   | without valve   |   |
|                                |  | NB 50 - NB 65          | RVA - DN40/50   | Block not availa-<br>ble  |   |   |
| 75 <sup>2</sup>                | Oil pressure con-<br>trol valve                        | NB 32 - NB 65          | RVD - DN40/50   | without valve   |   |   |
| 1675 <sup>2</sup>              | Oil pressure con-<br>trol valve                        | NB 40 - NB 65          | blind flanged   |   | RVD - DN40/50   | without valve   |
| OPI + OPO                      | Suction side oil<br>pump<br>Discharge side oil<br>pump | NB 32 - NB 40          | Connection<br>adapter flange<br>component oil<br>pump (Oil Pump<br>Documentation)<br>or flange AWP-<br>standard with O-<br>ring gasket tube<br>connection<br>48.3x2.6 | blind flanged   | Connection<br>adapter flange<br>component oil<br>pump (Oil Pump<br>Documentation)<br>or flange AWP-<br>standard with O-<br>ring gasket tube<br>connection<br>48.3x2.6 | blind flanged   |
|                                |  | NB 50 - NB 65          | Connection<br>adapter flange<br>component oil<br>pump (Oil Pump<br>Documentation)<br>or flange AWP-<br>standard with O-<br>ring gasket tube<br>connection<br>60.3x2.9 | blind flanged   | Connection<br>adapter flange<br>component oil<br>pump (Oil Pump<br>Documentation)<br>or flange AWP-<br>standard with O-<br>ring gasket tube<br>connection<br>60.3x2.9 | blind flanged   |
| OT-125 <sup>3</sup>            | Oil temperature<br>connection                          | NB 32 - NB 65          | Threaded connection M 12x1.5 or prepared for direct installation of the<br>Grasso temperature sensor PT100 / PT1000 (see documentation 990215 /<br>990216)            |   |   |   |
| DP                             | Capacity control<br>connection SP2                     | NB 32 - NB 65          | Threaded connection M 16x1.5 for screw-in threaded connection   |   |   |   |
| DU                             | Balance piston<br>connection with-<br>out a pump       | NB 32 - NB 65          | Threaded connection M 22x1.5 for screw-in threaded connection   |   |   |   |

| Position number<br>P+I diagram | Name   | Nennweite<br>OMC-block | OMC I SP1-2<br>External oil<br>pump<br>Grasso Ident  | OMC I SP1<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident | OMC I SPduo<br>External oil<br>pump<br>Grasso Ident                           | OMC I SPduo<br>Oil pump<br>Compressor<br>integrated<br>Grasso Ident |
|--------------------------------|--|------------------------|--|---|---|---|
| U1 + U2                        | Reference line<br>connection oil<br>pressure = dis-<br>charge pressure | NB 32 - NB 65          | Threaded con-<br>nection M 16x1.5<br>for screw-in<br>threaded connec-<br>tion  | blind flanged   | Threaded con-<br>nection M 16x1.5<br>for screw-in<br>threaded connec-<br>tion | blind flanged   |
| OP1 <sup>3</sup>               | Oil pressure<br>before oil filter                                      | NB 32 - NB 65          | Threaded connection G 1/4" for screw-in threaded connection or prepared for direct installation of the Grasso service valve (Grasso Ident 501306625awp63) with G1/4" connection thread (see documentation 990320) for fitting Grasso pressure sensor (see documentation 990293 / 990294) or for direct installation of the Grasso service valve (double valve pressure sensor + service port) Grasso Ident 501306661awp63 (see documentation 990320) |   |   |   |
| OP2 <sup>3</sup>               | Oil pressure after<br>oil filter                                       |                        |  |   |   |   |
| OP4 <sup>3</sup>               | Oil pressure after<br>oil pump   |                        |  |   |   |   |
| S2 <sup>3</sup>                | Service valve<br>Injection oil   | NB 32 - NB 65          | Threaded connection M 16x1.5 for screw-in threaded connection or prepared for direct installation of the Grasso service valve (Grasso Ident 501306623awp63) with tube connection 12x1.5 (see separate documentation)   |   |   |   |
| S4 <sup>3</sup>                | Service valve<br>Functional oil  |                        |  |   |   |   |

<sup>1</sup> - Defined assignment of the size of the oil filter element. The use of larger oil filters on same size OMC-block is allowed. Standard: Filter material glass fibre , 25 micron. Other filter materials on request.

<sup>2</sup> - Component is included in the OMC-block.

<sup>3</sup> - Screw-in part, not included in the scope of delivery of the OMC-block.

<sup>4</sup> - Installation possibility for the 3-way valve element exists in all types of OMC. Use optional, depending on the application.

## 1.17 Installation instructions

### Installation of connecting fittings and valves

The OMC-block I is fully made from an aluminium alloy.

Utmost care must be taken when screwing the connection fittings and valves.

It is recommended that all screw-in parts are additionally glued to the threads with a suitable adhesive - preferably Loctite.

The max. tightening torques defined in the table must not be exceeded.

| Maximum tightening torques for screwing in C-steel in aluminium |                        |
|---|------------------------|
| Flange or fastening screws                                      | Tightening torque [Nm] |
| M8  | 25                     |
| M12   | 85                     |
| M16   | 210                    |
| M20   | 425                    |

| Screwed connections with moulded profile rings | Tightening torque [Nm] |
|--|------------------------|
| G 1/4"   | 25                     |
| M12x1,5  | 25                     |
| M16x1,5  | 70                     |
| M22x1,5  | 130                    |
| M26x1,5  | 180                    |
| M33x2  | 250                    |
| M42x2  | 330                    |
| M48x2  | 500                    |

| Valve elements    | Tightening torque [Nm] |
|-------------------|------------------------|
| DN25 - DN32 M60x2 | 625                    |
| DN40 - DN50 M80x3 | 760                    |
| DN65 M100x3       | 890                    |

### Colour-Coding

Mark the main valves on the valve stem using colour coding methods according to their functionality (under the protective cap, see photo).

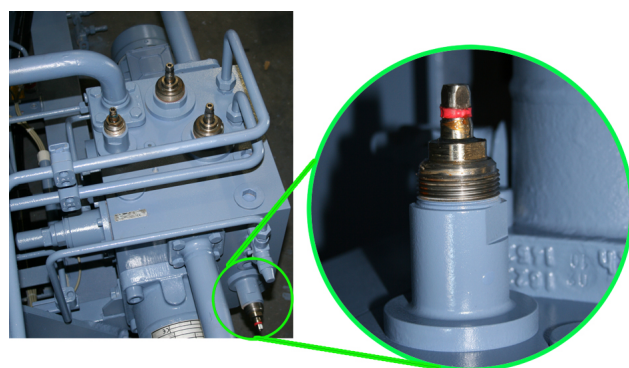


fig.14: Marking of the main valves using colour coding methods

| Valve type   | Item    | Colour |
|--|---------|--------|
| Isolating valve AVR                                | 65, 220 | black  |
| combined stop/ check valve RVA                     | 70      | red    |
| Control valve with integrated check valve function | 80      | Blue   |

## 1.18 Information on further risks

Information on further risks in conformance to pressure appliance directive (97/23/EG).

Remaining risks which can not be avoided by the manufacturer arise because of:

- Unauthorised loosening of the screw bushing without examination whether spindle until it stops in the highest position was driven.
- Incorrect assembly of threaded joints.

- The valve inserts on the spanner flat must be countered using a suitable tool, when the valve caps of valve inserts should be dismantled. This certainly prevents a screw off the valve inserts from the OMC block.
- Dirt in the service medium may cause damage the stem.
- Ignore operating range and manufacturer rules acc. to this component documentation.
- Connecting a manometer at open valve.

## 1.19 Spare parts

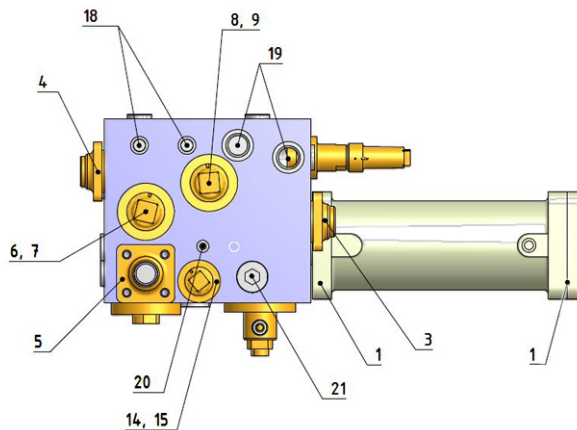


fig.15: OMC-block I, spare parts view 1

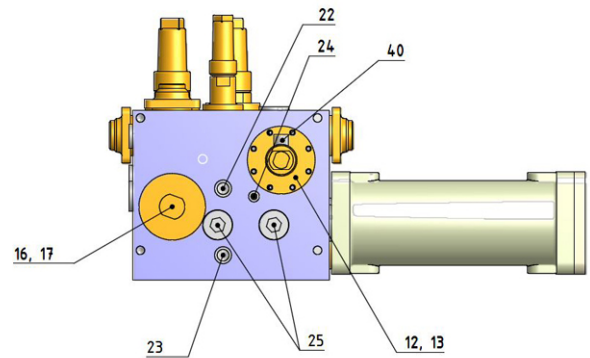


fig.16: OMC-block I, spare parts view 2

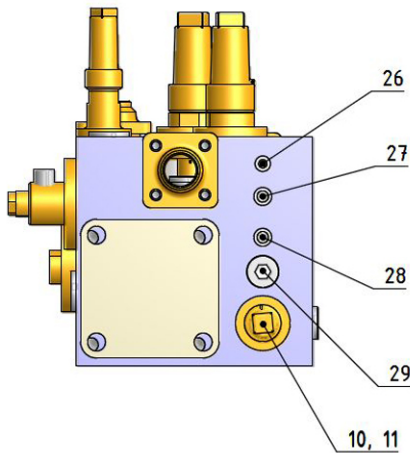


fig.17: OMC-block I, spare parts view 3

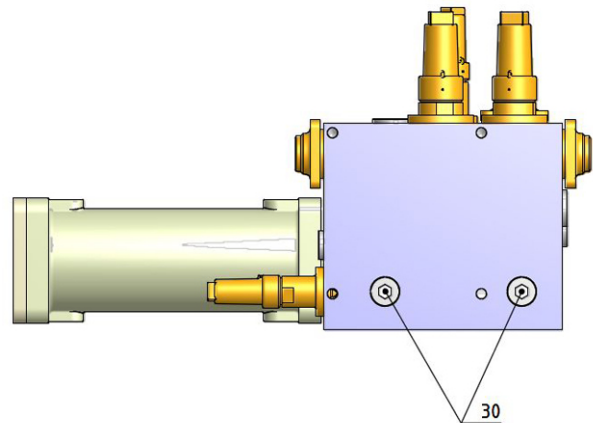


fig.18: OMC-block I, spare parts view 4

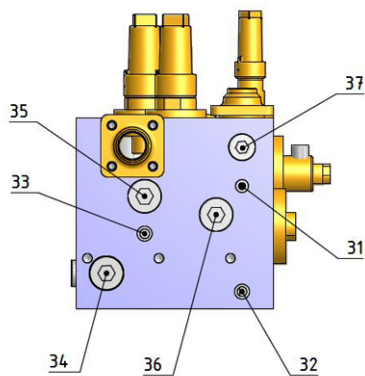


fig.19: OMC-block I, spare parts view 5

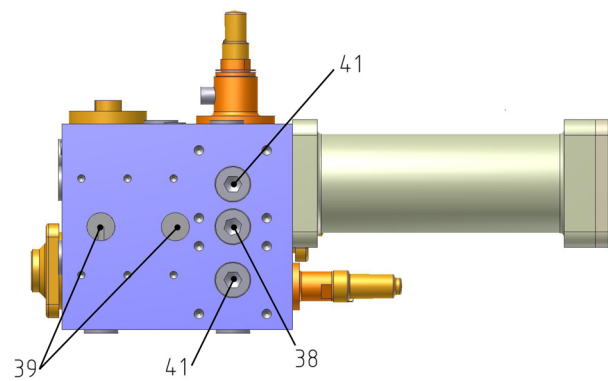


fig.20: OMC-block I, spare parts view 6

### 1. Spare part filter element

see item no. 36 in the table "Main components" or in the project related customer part list.

**2. Spare part valve element for thermostatic 3-way-valve:**

see table "Selection range of valve elements" or item no. 216 in the project related customer part list

**Hint!**

The OMC-block I of types DN32, DN40 and DN50 is prepared for the installation of a thermostatic 3-way-valve element DN50.

The OMC-block I DN65 is prepared for the installation of 2 thermostatic 3-way-valve elements DN50.

**3. Spare parts overview of gaskets and fastening material****Hint!**

When applying HNBR use the corresponding gasket quality!

| Gaskets and fastening material |          |  |   |                                  |                                    |                                    |
|--------------------------------|----------|--|---|----------------------------------|------------------------------------|------------------------------------|
| Item                           | Quantity | Designation  | OMC I - SP1-2<br>External oil pump  | OMC I - SP1<br>internal oil pump | OMC I - SPduo<br>External oil pump | OMC I - SPduo<br>internal oil pump |
|                                |          |  | Size / Type / Grasso Ident  |                                  |                                    |                                    |
| 1                              | 2        | O-Ring flange fine filter  | DN32/ DN40/ DN50/ DN65<br>O-ring 140x5<br>CR-type: 762925140 // HNBR-design: 762925140N   |                                  |                                    |                                    |
| 2                              | 2        | O-ring flange dirt filter  | not used in OMC-block I   |                                  |                                    |                                    |
| 3+4                            | 1 each   | Gasket flange oil cooler inlet<br>IC / oil separator inlet IO        | DN32/ DN40 - O-ring 45x3<br>CR-type: 762925068 // HNBR-design: 762925068N<br>DN50/ DN65 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N  |                                  |                                    |                                    |
| 5                              | 1        | Gasket - flange oil injection  | DN32/ DN40/ DN50 - O-ring 45x3<br>CR-type: 762925068 // HNBR-design: 762925068N<br>DN65 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N  |                                  |                                    |                                    |
| 6+8                            | 1        | Valve element stop valve item<br>no. 65 / stop valve item no.<br>220 | DN32<br>CR-type: 49400E13.5110A01 - 505698314<br>HNBR-type: 49400E13.5110C01 - 505698314N<br>DN40/ DN50<br>CR-type: 49400E15.5110A01 - 505698315<br>HNBR-type: 49400E15.5110C01 - 505698315N<br>DN65<br>CR-type: 49400E17.5110A01 - 505698316<br>HNBR-type: 49400E17.5110C01 - 505698316N |                                  |                                    |                                    |

| Gaskets and fastening material |               |  |   |                                  |                                    |                                    |
|--------------------------------|---------------|--|---|----------------------------------|------------------------------------|------------------------------------|
| Item                           | Quan-<br>tity | Designation  | OMC I - SP1-2<br>External oil pump  | OMC I - SP1<br>internal oil pump | OMC I - SPduo<br>External oil pump | OMC I - SPduo<br>internal oil pump |
| 7+9                            | 1 each        | Gasket valve element com-<br>bined stop/ check valve pos.<br>220                           | DN32 - O-ring 50x3<br>CR-type: 762925100 // HNBR-design: 762925100N<br>DN40/ DN50 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N<br>DN65 - O-ring 95x3<br>CR-type: 762925528 // HNBR-design: 762925528N     |                                  |                                    |                                    |
| 10                             | 1             | Valve element combined stop/<br>check valve Pos. 70  | DN32/ DN40/ DN50<br>CR-type: 49400E13.5110R01 -<br>505698317<br>HNBR-type: 49400E13.511CR01 –<br>505698317N<br>DN65<br>CR-type: 49400E15.5110R01 -<br>505698318<br>HNBR-type: 49400E15.511CR01 -<br>505698318N              |                                  | not available                      |                                    |
| 11                             | 1             | Gasket valve element com-<br>bined stop/ check valve item<br>no. 70 or blank flange gasket | DN32/ DN40/ DN50 - O-ring 50x3<br>CR-type: 762925100 // HNBR-design: 762925100N<br>DN65 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N  |                                  |                                    |                                    |
| 12                             | 1             | Valve element oil pressure<br>reg. valve Pos. 75 (SP1-2)                                   | DN32<br>CR-type:<br>49400B13.5110D0<br>1 - 505698319<br>HNBR-type:<br>49400B13.511CD0<br>1 505698319N<br>DN40/ DN50/<br>DN65<br>CR-type:<br>49404B15.5110D0<br>1 505698323<br>HNBR-type:<br>49404B15.511CD0<br>1 505698323N | not available                    | not available                      | not available                      |
|                                | 1             | Spring for valve insert, sepa-<br>rately   | DN32<br>Type: 562070<br>505698473<br>DN40/50/65<br>Type: 562055<br>505698474  |                                  |                                    |                                    |

| Gaskets and fastening material |               |   |  |                                  |   |                                    |
|--------------------------------|---------------|---|--|----------------------------------|---|------------------------------------|
| Item                           | Quan-<br>tity | Designation   | OMC I - SP1-2<br>External oil pump   | OMC I - SP1<br>internal oil pump | OMC I - SPduo<br>External oil pump  | OMC I - SPduo<br>internal oil pump |
|                                | 1             | Valve element oil pressure regulating valve Pos. 1675 (SPduo)<br><b>Attention:</b> Spare part, default setting (differential pressure) 4 bar on site. Sealing after installation necessary. | not available  |                                  | DN32<br>CR-type:<br>49400B13.5110D0<br>1 505698324<br>HNBR-type:<br>49400B13.511CD0<br>1 505698324N<br>DN40/ DN50/<br>DN65<br>CR-type:<br>49404B15.5110D0<br>1 505698325<br>HNBR-type:<br>49404B15.511CD0<br>1 505698325N |                                    |
|                                | 1             | Spring for valve insert, separately   |  |                                  | DN32<br>Type: 562070<br>505698473<br>DN40/50/65<br>Type: 562055<br>505698474  |                                    |
| 13                             | 1             | Gasket valve-element oil pressure regulating valve item no. 75 (SP1-2) or item no. 1675 (SPduo) or blank flange gasket  | DN32 - flat sealing ring 56x64x1.5 - AFM30 - 438698207<br>DN40/ DN50/ DN65 - flat sealing ring 76x84,8x1.5 - AFM30 - 438698208   |                                  |   |                                    |
| 14                             | 1             | Valve element control valve item no. 80   | DN32/ DN40<br>CR-type: 49400E13.5110K01 – 505698321<br>HNBR-type: 49400E13.511CK01 – 505698321N<br>DN50/ DN65<br>CR-type: 49400E15.5110K01 – 505698322<br>HNBR-type: 49400E15.511CK01 – 505698322N |                                  | not available   |                                    |
| 15                             | 1             | Gasket valve-element control valve item no. 80 or blank flange gasket   | DN32/ DN40 - O-ring 50x3<br>CR-type: 762925100 // HNBR-design: 762925100N<br>DN50/ DN65 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N   |                                  |   |                                    |
| 16                             | 1             | Valve element thermostatic 3way-valve item no. 215/216  | DN50, see data sheet 990423<br>Selection and element dependent on the application and the operating conditions   |                                  |   |                                    |
| 17                             | 1             | Gasket valve element thermo-<br>static 3-way-valve item no. 215/216   | DN32/ DN40/ DN50/ DN65 - O-ring 95x3<br>CR-type: 762925528 // HNBR-design: 762925528N  |                                  |   |                                    |

| Gaskets and fastening material                |               |  |  |                                  |   |                                    |
|---|---------------|--|--|----------------------------------|---|------------------------------------|
| Item  | Quan-<br>tity | Designation  | OMC I - SP1-2<br>External oil pump   | OMC I - SP1<br>internal oil pump | OMC I - SPduo<br>External oil pump  | OMC I - SPduo<br>internal oil pump |
| 18  | 2             | Gasket connection functional<br>oil SP1 and SP2<br>A12 + C12                                     | DN32/ DN40 - sealing ring nominal size 22<br>CR-type: 762998222 // HNBR-design: 762998322<br><br>DN50 - sealing ring nominal size 33<br>CR-type: 762998223 // HNBR-design: 762998323<br><br>DN65 - sealing ring nominal size 42<br>CR-type: 762998243 // HNBR-design: 762998343  |                                  | not available   |                                    |
| 19  | 2             | Gasket connection functional<br>oil SPduo<br>AD + CD   | not available  |                                  | DN32 - not available<br>DN40 - sealing ring nominal size 42<br>CR-type: 762998243 // HNBR-design: 762998343<br><br>DN50 - sealing ring nominal size 48<br>CR-type: 762998249 // HNBR-design: 762998349<br><br>DN65 - gasket flange - O-ring 45x3<br>CR-type: 762925068 // HNBR-design: 762925068N |                                    |
| 20+26+<br>31                                  | 1             | Gasket connection<br>Oil pressure before oil filter<br>OP1<br>Oil pressure after oil pump<br>OP4 | DN32/ DN40/ DN50/ DN65 - gasket ring nominal size 14<br>CR-type: 762998213 // HNBR-design: 762998313   |                                  |   |                                    |
| 21+25+<br>30+34<br><br>34+35+<br>36+37+<br>38 | 1 each        | Gasket screw plug  | Sealing ring nominal size 33<br>CR-type: 762998234 // HNBR-design: 762998334<br><br>Sealing ring nominal size 42<br>CR-type: 762998243 // HNBR-design: 762998343<br><br>Sealing ring nominal size 48<br>CR-type: 762998249 // HNBR-design: 762998349<br><br>Sealing ring nominal size 56<br><br>Flat gasket 56 x 64 x 2 AFM30 - 438698209                            |                                  |   |                                    |
| 22  | 1             | Gasket connection DU   | DN32/ DN40/ DN50/ DN65 - gasket ring nominal size 22<br>CR-type: 762998222 // HNBR-design: 762998322   |                                  |   |                                    |
| 23  | 1             | Gasket connection additional<br>oil injection B1   | DN32 - sealing ring nominal size 16<br>CR-type: 762998216 // HNBR-design: 762998316<br><br>DN40 - sealing ring nominal size 22<br>CR-type: 762998222 // HNBR-design: 762998322<br><br>DN50 - sealing ring nominal size 26<br>CR-type: 762998223 // HNBR-design: 762998323<br><br>DN65 - sealing ring nominal size 33<br>CR-type: 762998234 // HNBR-design: 762998334 |                                  |   |                                    |

| Gaskets and fastening material |               |   |   |                                  |                                    |                                    |
|--------------------------------|---------------|---|---|----------------------------------|------------------------------------|------------------------------------|
| Item                           | Quan-<br>tity | Designation   | OMC I - SP1-2<br>External oil pump  | OMC I - SP1<br>internal oil pump | OMC I - SPduo<br>External oil pump | OMC I - SPduo<br>internal oil pump |
| 24                             | 1             | Gasket connection oil temper-<br>ature OT   | DN32/ DN40/ DN50/ DN65 - gasket ring nominal size 12<br>CR-type: 762998212 // HNBR-design: 762998312  |                                  |                                    |                                    |
| 27                             | 1             | Gasket connection balancing<br>piston without pump DP   | DN32/ DN40/ DN50/ DN65 - gasket ring nominal size 16<br>CR-type: 762998216 // HNBR-design: 762998316  |                                  |                                    |                                    |
| 28+32                          | 1             | Gasket connection<br>Service oil pressure after oil<br>pump S4<br>Service oil pressure after oil<br>pump S2 | DN32/ DN40/ DN50/ DN65 - gasket ring nominal size 16<br>CR-type: 762998216 // HNBR-design: 762998316  |                                  |                                    |                                    |
| 29                             | 1             | Gasket screw plug   | DN32/ DN40/ DN50 - gasket ring nominal size 33<br>CR-type: 762998234 // HNBR-design: 762998334<br>DN65 - sealing ring nominal size 48<br>CR-type: 762998249 // HNBR-design: 762998349 |                                  |                                    |                                    |
| 33                             | 1             | Gasket connection reference<br>line U2  | DN32/ DN40/ DN50/ DN65 - gasket ring nominal size 16<br>CR-type: 762998216 // HNBR-design: 762998316  |                                  |                                    |                                    |
| 39                             | 2             | Gasket connection oil pump<br>directly flange mounted   | O-ring 48x3<br>CR-type: 762925069 // HNBR-design: 762925069N  |                                  |                                    |                                    |
|                                | 2             | Gasket connection oil pump<br>external flange   | DN32/ DN40 - O-ring 45x3<br>CR-type: 762925068 // HNBR-design: 762925068N   |                                  |                                    |                                    |
|                                |               |   | DN50/ DN65 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N   |                                  |                                    |                                    |
| 40                             | 1             | Gasket connection reference<br>line U1 on the oil pressure<br>regulating valve item no. 80                  | DN32/ DN40/ DN50/ DN65 - gasket ring<br>nominal size 16<br>CR-type: 762998216 // HNBR-design:<br>762998316  |                                  | not available                      |                                    |
| 41                             | 2             | Gasket connection oil pump<br>external flange   | DN50/ DN65 - O-ring 75x3<br>CR-type: 762925080 // HNBR-design: 762925080N   |                                  |                                    |                                    |

### MAIN PART

#### Block mounting filter

## 1 BLOCK MOUNTING FILTER

### 1.1 View

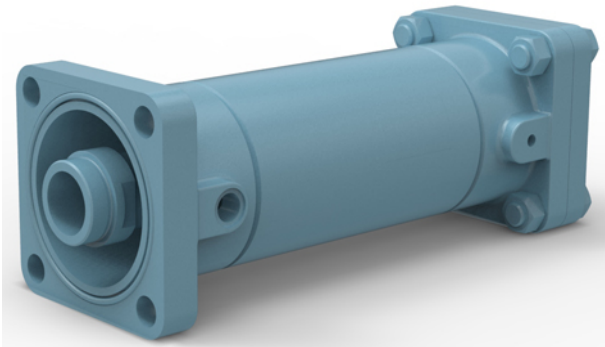


fig. 1: Block mounting filter

### 1.2 Safety Instructions

This installation and operation manual is an essential component of the filter delivery. Always keep this manual in a readily accessible place near the filter.

The German version of this manual is the predominant and binding version. Take care that all persons being charged with the installation, operation, maintenance and repair of the coupling have read and understood this manual and that all instructions contained therein are carefully observed in order to:

- Avoid danger to life and limb of the user or third persons
- Ensure the operational safety of the block mounting filter
- Preclude operation failures and environmental damages due to wrong handling and mis-use

The relevant instructions and regulations regarding safety at work and environmental protection have to be observed while transporting, mounting and dismounting the coupling.

The block mounting filter shall be operated, mounted, maintained and repaired by authorized, trained and instructed personnel only. We do not assume any liability or warranty for any damages resulting from the use of accessories and parts that are not originally delivered by GEA Refrigeration Germany GmbH.

### 1.3 Intended use

The following conditions must be met for the intended use:

- The block mounting filter must only be operated in normal industrial atmospheres. Aggressive

media may attack the components, screws and elastic buffer rings. So the aggressive media represent a risk for the operational safety of the block mounting filter.

- The block mounting filter shall only be used and operated within the frame of the conditions as defined in the performance or delivery contract.



#### Warning!

**The block mounting filter is for use at a maximum operating pressure of 28 bar g.p. provided.**

- Any change in the operation conditions or service parameters requires the verification of the filter design.

### 1.4 Storage

On receipt of the goods, immediately check that all parts are on hand and are as ordered. Eventual shipping damages and/or missing parts have to be reported in writing.

The block mounting filter can be stored in a dry place under roof at normal ambient temperatures for a time period of 12 months. Storage for a longer period requires the application of a long-term preservation.

The block mounting filter must not be exposed to any aggressive products, extreme temperatures or humidity. Do not store the block mounting filter along with acids, alkaline solutions or other caustic chemicals. The place of storage should be dry and free from dust. The air humidity should not exceed 65% and condensation is not permissible

### 1.5 Function and design

The block mounting filter is suitable for being directly mounted onto OMC block of GEA Refrigeration Germany GmbH. The block mounting filter is installed in the oil circuit of the screw packages and chillers. The block mounting filter prevents impurities entrained in the oil stream from entering the compressor. The streamlined casing, in conjunction with an optimal filter surface allows low pressure drops.

The flow direction from outside to inside makes the block mounting filter easy to maintain. The block mounting filter can be replaced quickly and without return of dirt.

## MAIN PART

### Block mounting filter

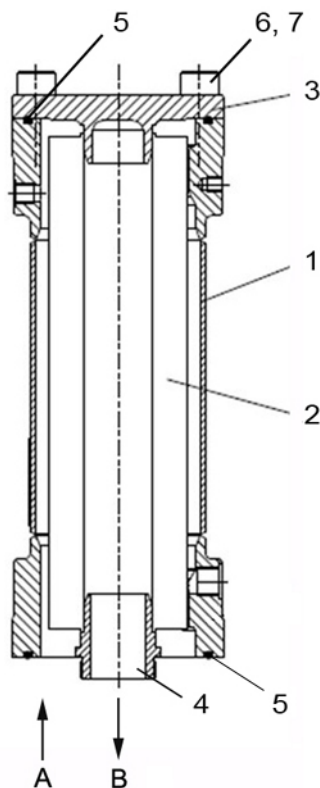


fig. 2: Block mounting filter, cross section

|   |   |
|---|---|
| 1 | Oil filter housing  |
| 2 | Filter element (delivered separately)   |
| 3 | Cover   |
| 4 | Mounting adapter  |
| 5 | O-ring, gasket  |
| 6 | 4 pcs. of screw M20 x 80, A2-70, stainless steel  |
| 7 | 4 pcs. of screw nut M20, A2-70, stainless steel   |
| 8 | 4 pcs. of screw M20 x 55, A2-70, stainless steel (not shown, please provide separately) |

The block mounting filters consists mainly of the main components shown in the figure. The flow which must be filtered, comes through the connection A to the filter element (2) and here is cleaned. The flow direction is set from the outside to the inside.

The clean oil returns to the oil circuit via the connection B. The block mounting filter and all the connection elements are designed so that pressure peaks – as can occur, for example, when large control valves are opened suddenly, due to the accelerated quantity of oil – can be safely absorbed.

This block mounting filter is directly flanged onto the OMC-block. Before mounting the adapter (4) is screwed in the OMC block.

Change the filter change after start-up always by the cover (3) with gasket (5).



**Hint!**

**Mounting adapter**

**Order number: 352100418**

## 1.6 Features

The block mounting filter has the following characteristics:

- Highly efficient, special filter media, compatible with refrigeration machine oils of viscosity grades VG 46 and VG 6 (oils of higher viscosity grades on request)
- Absorption of the finest particles over a wide differential pressure range
- High dirt absorption capacity due to large specific filter area
- Chemically resistant to the media used, in particular to ammonia
- Filter elements have a high level of resistance to collapsing  
(e. g. on cold start up to  $\Delta p = 10$  bar)
- Mesh size: see Technical Data or on request
- Media: refrigerant (gaseous and liquid) acc. to EN378 and technically known refrigeration oils (mineral and synthetic)
- Calculation according to AD2000 for fluid group 1 and 2 DGRL 97/23/EC
- Certificates: CE, CF, others on request

## MAIN PART

### Block mounting filter

#### 1.7 Technical data

|  |                  |   |      |      |     |
|--|------------------|---|------|------|-----|
| <b>Installation</b>  |                  | horizontal to the OMC block   |      |      |     |
| <b>Weight</b>  | NG               | 80  | 180  | 240  | 340 |
|  | kg               | 20  | 24.5 | 31.7 | 37  |
| <b>Housing material</b>  | Filter casing    | GJS 400-18LT  |      |      |     |
|  | screws           | A2-70   |      |      |     |
| <b>Maximum overpressure</b>                                    | bar              | 1 to 28   |      |      |     |
| <b>Maximum calculation temperature</b>                         | °C               | -10 to +120   |      |      |     |
| <b>Filter element 1</b>  | Glass-fibre veil | resistant to refrigerant, in particular to ammonia absolutely, not cleanable<br>Filter element, mesh size 20 micron |      |      |     |
|  | Wire mesh        | nominal size, not cleanable<br>Wire mesh, mesh size 25 micron and 80 micron   |      |      |     |
| <b>Allowable pressure difference across the filter element</b> | bar              | 10  |      |      |     |

1 other types on request

## MAIN PART

### Block mounting filter

#### 1.8 Block mounting filter, preferred types

Block mounting filter, Certification CE and CF

| Litres<br>VG 46/48<br>l/min | Filter<br>type | Seal | Approval | Type          | Grasso Ident<br>Filter (complete) | Grasso Ident<br>Filter element |
|-----------------------------|----------------|------|----------|---------------|-----------------------------------|--------------------------------|
| up to 80                    | 080            | CR   | CE       | 080-OMC-28bar | 352100410CE                       | 352100411H20CR                 |
|                             |                |      | CF       |               | 352100410CF                       | 352100411G25CR                 |
|                             |                | HNBR | CE       |               | 352100410CE                       | 352100411H20N                  |
|                             |                |      | CF       |               | 352100410CF                       | 352100411G25N                  |
| 80 - 180                    | 180            | CR   | CE       | 180-OMC-28bar | 352100412CE                       | 352100413H20CR                 |
|                             |                |      | CF       |               | 352100412CF                       | 352100413G25CR                 |
|                             |                | HNBR | CE       |               | 352100412CE                       | 352100413H20N                  |
|                             |                |      | CF       |               | 352100412CF                       | 352100413G25N                  |
| 180 - 240                   | 240            | CR   | CE       | 240-OMC-28bar | 352100414CE                       | 352100415H20CR                 |
|                             |                |      | CF       |               | 352100414CF                       | 352100415G25CR                 |
|                             |                | HNBR | CE       |               | 352100414CE                       | 352100415H20N                  |
|                             |                |      | CF       |               | 352100414CF                       | 352100415G25N                  |
| 240 - 340                   | 340            | CR   | CE       | 340-OMC-28bar | 352100416CE                       | 352100417H20CR                 |
|                             |                |      | CF       |               | 352100416CF                       | 352100417G25CR                 |
|                             |                | HNBR | CE       |               | 352100416CE                       | 352100417H20N                  |
|                             |                |      | CF       |               | 352100416CF                       | 352100417G25N                  |

## MAIN PART

### Block mounting filter

#### 1.9 Dimensions

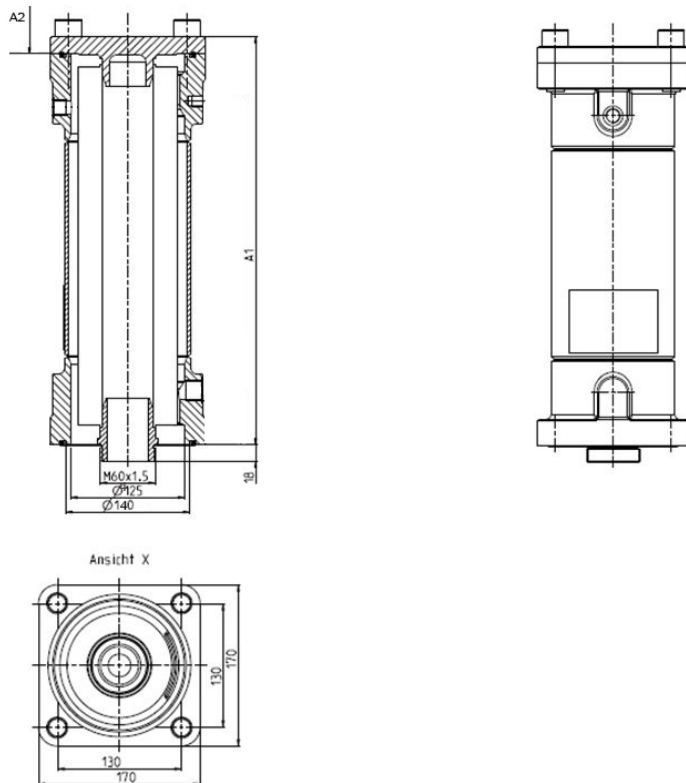


fig. 3: Dimensions of the block mounting filter

#### Dimensions of the filter housing

| Type | Content in l | A1  | A2 2 |
|------|--------------|-----|------|
| 080  | 3.5          | 314 | 247  |
| 180  | 5.3          | 464 | 397  |
| 240  | 7.4          | 632 | 565  |
| 340  | 11.0         | 925 | 858  |

#### Connections for draining, venting and fixing

| C1 - draining  | C2 - venting  | C3 - fixing |
|--|---|-------------|
| M 22x1,5   | M 16x1,5  | M 12        |
| Drain valve<br>Ident: 501306625awp63 (OMC I block)<br>Ident: 501306621awp63 (OMC II block) | Vent valve<br>Ident: 501306623awp63 (OMC I block)<br>Ident: 501306639awp63 (OMC II block) |             |

2 Measurement for removal the filter element

### MAIN PART

#### Block mounting filter



#### Hint!

Improved vent and drain valves of GEA Refrigeration Germany GmbH are available. See table for order numbers. See data sheet 990320 for more information on the valves.

### 1.10 Spare parts

Use the Grasso Ident overview "Block mounting filter, preferred types" to order the replacement filter elements.

**Table: Grasso Ident gasket (O-ring) of the housing cover and OMC-block mounting flange**

| Gasket (O-ring) for item 5 | Grasso Ident |
|----------------------------|--------------|
| 140 x 5 CR                 | 762925140    |
| 140 x 5HNBR                | 762925140N   |

### 1.11 Installation and Maintenance

#### Filter installation

1. Compare operating overpressure with the specification on the rating plate.
2. Remove plug on the filter inlet and outlet.
3. Screw the adapter (4) in the OMC block.
4. Mount filter housing to the OMC-block with screws M 20x55 (4 pieces), stainless steel A2-70.

Ensure that installation occurs without mechanical tension. Take the removal height and length of the filter element into consideration.

5. Assemble the filter element (2).
6. Close the housing (1) with cover (3) by using gasket (5), screws (6) and screw nuts (7).



#### Hint!

#### When must the filter element be replaced or cleaned?

The oil filter element is to be replaced by the user as specified in the maintenance instructions for the total product from GEA Refrigeration Germany GmbH.

Loss in pressure during operation is monitored by the internal control – including a preliminary alarm function for preventative replacement.

The following applies as a guide value for replacement: The filter element should be replaced after every 5000 operating hours or once each year.

#### Changing the filter element

1. Shut off the Screw Package/ Chiller and relieve the pressure on the filter side.
2. Remove the filter cover by loosening the four cover screws.
3. Remove the filter element by slightly turning the mounting pin in the filter head.
4. Check the O-ring and support ring in the filter bowl for damage and correct positioning. Replace parts if required.
5. Replace glass fibre element, clean or replace wire mesh.

The efficiency of the cleaning depends on the type of dirt and the level of differential pressure before replacing the filter element. If, after replacing the filter element, the differential pressure is more than 50% of the value before replacing the filter element, wire mesh must also be replaced.

6. Check whether the type designation/ Grasso ident number on the replacement element matches the type designation/ Grasso Ident number on the filter's rating plate.
7. Place the replaced or cleaned filter element back on the mounting pin by turning it slightly.

### MAIN PART

#### Block mounting filter

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8. Reposition the filter cover and tighten the four cover screws. Ensure that installation occurs without mechanical tension.
9. Vent the housing of the block mounting filter.

#### 1.12 Quality and Standardization

The block mounting filter for applications with fluids of groups 1 and 2 are pressurized items in line with the Pressure Equipment Directive 97/23/EC (DGRL). They are given CE marks and approval in line with the requirements according to category II and III.

Approval by classification companies and according to non-EU regulations on request.

#### **Use in potentially explosive atmospheres in accordance with directive 94/9/EC (ATEX)**

The block mounting filters are not devices or components in the sense of directive 94/9/EC and therefore do not have a CE mark. The design is suitable for use in group II category 2 in line with DIN 13463.

In the event that the block mounting filters are used in potentially explosive atmospheres, potential compensation must be ensured.



# 1 TEMPERATURE CONTROLLER

The thermostatic inserts for 3-way valves are used in the oil circuits for screw compressor packages and chillers produced by GEA Refrigeration Germany GmbH.

Installation takes place in the Oil Management Center (OMC) or in separate 3-way valve housings.



## Hint!

**Selection is made by GEA Refrigeration Germany GmbH in accordance with the specified project conditions!**

## 1.1 View and the principle "mixing operation"

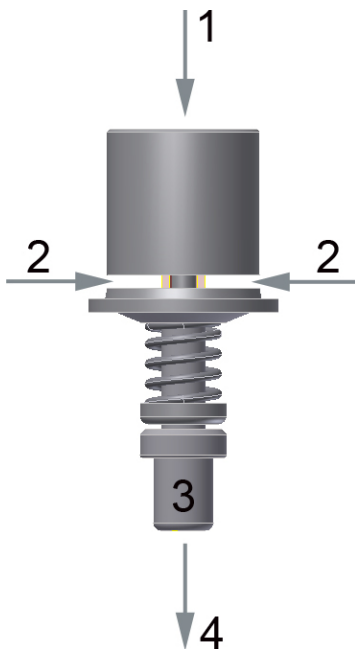


Fig.1: Principle "mixing operation"

|   |  |
|---|--|
| 1 | un-cooled oil from oil separator   |
| 2 | cooled oil from oil cooler   |
| 3 | measuring cell (dependent on temperature according to the defined control range) |
| 4 | to the compressor  |

## 1.2 Function

The thermostatic 3-way valves work without auxiliary power and, in the particular function used, are mixing valves.

After start-up of the screw compressor, the thermostatic insert is closed; only the uncooled oil flow from the oil separator is directed through the valve. This ensures that the start-up of the screw compressor can even take place with cold oil from the oil cooler.

The 3-way valve insert is selected as such that it is already fully open according to its control characteristics before reaching the planned oil temperature of the oil circuit.

The control of the valve insert is independent of the operating pressure up to a maximum pressure difference of 0.6 bar between the inlet of uncooled oil and the inlet of cooled oil. In the event of larger pressure differences, the supply line to the inlet of uncooled oil must be throttled.

The temperature control inserts are maintenance-free. If regulation deviations occur after years of operation, the temperature controller inserts can only be replaced with a new component. (see Grasso Ident no. Page 2).



## Hint!

**When selecting the valve insert, please ensure that the selected types are compatible with the refrigerants in use.**

**Essentially, a differentiation must be made between NH<sub>3</sub> and all other known refrigerants.**

**The types of oil, mineral or synthetic, have no influence on the selection of the temperature.**

**The component size to be used and the number of valve inserts to be installed are determined by the selection of the Oil Management Centre integrated into the system or by means of a separate valve housing (see project-related customer parts list).**

## 1.3 Specifications

| Selection range for refrigerant ammonia |              |               |                  |                  |
|---|--------------|---------------|------------------|------------------|
| Diameter nominal                        | Designation  | Control range | Mean temperature | Grasso Ident no. |
| DN32/ DN40                              | 5435P085-CCV | 26 - 34°C     | 085 F / 29°C     | 637699197        |
|   | 5435P095-CCV | 30 - 40°C     | 095 F / 35°C     | 637699167        |
|   | 5435P110-CCV | 38 - 47°C     | 110 F / 43°C     | 637699168        |
|   | 5435P120-CCV | 45 - 55°C     | 120 F / 48°C     | 637699170        |
|   | 5435P130-CCV | 49 - 60°C     | 130 F / 54°C     | 637699171        |
|   | 5435P140-CCV | 54 - 66°C     | 140 F / 60°C     | 637699173        |
|   | 5435P150-CCV | 60 - 71°C     | 150 F / 65°C     | 637699175        |
| DN50                                    | 1096P075     | 20 - 30°C     | 075 F / 24°C     | 637699153        |
|   | 1096P095     | 30 - 40°C     | 095 F / 35°C     | 637699154        |
|   | 1096P105     | 35 - 45°C     | 105 F / 41°C     | 637699157        |
|   | 1096P110     | 38 - 47°C     | 110 F / 43°C     | 637699158        |
|   | 1096P115     | 40 - 50°C     | 115 F / 46°C     | 637699159        |
|   | 1096P120     | 43 - 54°C     | 120 F / 49°C     | 637699160        |
|   | 1096P130     | 51 - 60°C     | 130 F / 54°C     | 637699161        |
|   | 1096P135     | 54 - 63°C     | 135 F / 57°C     | 637699162        |
|   | 1096P140     | 57 - 66°C     | 140 F / 60°C     | 637699163        |
|   | 1096P145     | 60 - 69°C     | 145 F / 63°C     | 637699164        |
|   | 1096P150     | 63 - 71°C     | 150 F / 66°C     | 637699165        |
|   | 1096P155     | 65 - 74°C     | 155 F / 68°C     | 637699155        |

| Selection range for refrigerant HFC |              |               |                  |                  |
|-------------------------------------|--------------|---------------|------------------|------------------|
| Diameter nominal                    | Designation  | Control range | Mean temperature | Grasso Ident no. |
| DN32/ DN40                          | 5435X085-CCV | 26 - 34°C     | 085 F / 29°C     | 637699196        |
|                                     | 5435X095-CCV | 30 - 40°C     | 095 F / 35°C     | 637699186        |
|                                     | 5435X110-CCV | 38 - 47°C     | 110 F / 43°C     | 637699188        |
|                                     | 5435X120-CCV | 45 - 55°C     | 120 F / 48°C     | 637699190        |
|                                     | 5435X130-CCV | 49 - 60°C     | 130 F / 54°C     | 637699191        |
|                                     | 5435X140-CCV | 54 - 66°C     | 140 F / 60°C     | 637699193        |
|                                     | 5435X150-CCV | 60 - 71°C     | 150 F / 65°C     | 637699195        |
| DN50                                | 1096X075     | 20 - 30°C     | 075 F / 24°C     | 637699192        |
|                                     | 1096X090     | 27 - 35°C     | 090 F / 32°C     | 637699198        |
|                                     | 1096X095     | 30 - 40°C     | 095 F / 35°C     | 637699194        |
|                                     | 1096X105     | 35 - 45°C     | 105 F / 41°C     | 637699177        |
|                                     | 1096X110     | 38 - 47°C     | 110 F / 43°C     | 637699178        |
|                                     | 1096X115     | 40 - 50°C     | 115 F / 46°C     | 637699179        |
|                                     | 1096X120     | 43 - 54°C     | 120 F / 49°C     | 637699180        |
|                                     | 1096X130     | 51 - 60°C     | 130 F / 54°C     | 637699181        |
|                                     | 1096X135     | 54 - 63°C     | 135 F / 57°C     | 637699182        |
|                                     | 1096X140     | 57 - 66°C     | 140 F / 60°C     | 637699183        |
|                                     | 1096X145     | 60 - 69°C     | 145 F / 63°C     | 637699184        |
|                                     | 1096X150     | 63 - 71°C     | 150 F / 66°C     | 637699185        |
|                                     | 1096X155     | 65 - 74°C     | 155 F / 68°C     | 637699199        |



# 1 REFRIGERANT COOLED OIL COOLER

## 1.1 View

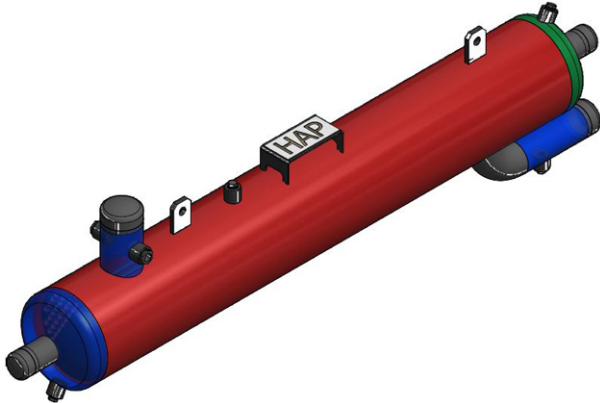


fig.1: refrigerant cooled oil cooler, view

## 1.2 General Information

The refrigerant cooled oil cooler variants described in this documentation are used in applications of the GEA Refrigeration Germany GmbH.

These oil coolers can also be used by external factories that use GEA screw compressors in their products. For this, however, a coordination with GEA Refrigeration Germany GmbH is required.

## 1.3 Features

The oil cooler is a main component of the screw compressor packages and liquid chillers of GEA Refrigeration Germany GmbH. The oil cooler contributes to the reliability of the components and the function of the overall product.

The selection of the refrigerant cooled oil cooler version depends on the following operating conditions:

- Oil cooling capacity
- Refrigerant
- Oil type and viscosity
- Condensing temperature
- Oil inlet and outlet temperatures, acc. to operating conditions

## 1.4 Safety Instructions

This installation and operation description is an essential component of the oil cooler delivery. Always keep this description in a readily accessible place near the component.

The German version of this description is the predominant and binding version. Take care that all persons being charged with the installation, operation, maintenance and repair have read and understood this description and that all instructions contained therein are carefully observed in order to:

- Avoid danger to life and limb of the user or third persons
- Ensure the operational safety of the refrigerant cooled oil cooler
- Preclude operation failures and environmental damages due to wrong handling and mis-use

The relevant instructions and regulations regarding safety at work and environmental protection have to be observed while transporting, mounting and dismantling.

The refrigerant cooled oil cooler shall be mounted by authorized, trained and instructed personnel only.

## 1.5 Intended use

The following conditions must be met for the intended use:

- The refrigerant cooled oil cooler must be operated in normal industrial atmospheres only.
- The refrigerant cooled oil cooler shall only be used and operated within the frame of the conditions as defined in the performance or delivery contract.



### Warning!

**The refrigerant cooled oil cooler is for use at a maximum operating pressure of 28 bar g.p. provided.**

- Any change in the operation conditions or service parameters requires the verification of the design.

## 1.6 Function and design

The oil cooler is a completely welded heat exchanger and operates according to the Thermosyphon principle.

The oil, which must be cooled, is passing the pipes. The evaporation of the refrigerant is taking place in the shell side. This ensures minimum pressure losses and allows a low supply level inside the Thermosyphon system.

The pipes are fitted with additional turbulators, which guarantee an effective heat transfer.

The installation and fixing of the oil cooler to shell diameter DN400 is realized with U-bolts according to DIN 3570.

Oil cooler with larger diameters have welded foot elements outside of the shell.

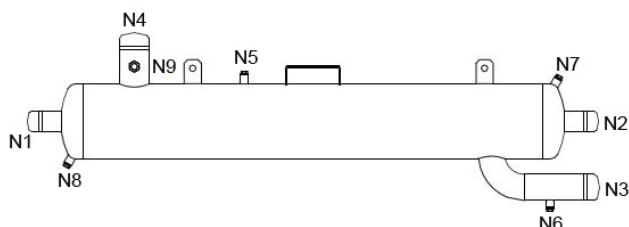


fig.2: Design of the refrigerant cooled oil cooler

|    |  |
|----|--|
| N1 | Oil inlet                                    |
| N2 | Oil outlet                                   |
| N3 | Refrigerant inlet                            |
| N4 | Refrigerant outlet                           |
| N5 | Venting - refrigerant side                   |
| N6 | Draining - refrigerant side                  |
| N7 | Venting - oil side                           |
| N8 | Draining - oil side                          |
| N9 | Monitoring sight glass at refrigerant outlet |

## 1.7 Storage

On receipt of the goods, immediately check that all parts are on hand and are as ordered. Eventual shipping damages and/or missing parts have to be reported in writing.

The oil cooler can be stored in a dry place under roof at normal ambient temperatures. Storage for a longer period requires the application of a long-term preservation.

The oil cooler must not be exposed to any aggressive products, extreme temperatures or humidity. Do not store the oil cooler along with acids, alkaline solutions or other caustic chemicals. The place of storage should be dry and free from dust. The air humidity should not exceed 65% and condensation is not permissible.

## 1.8 Quality and Standardization

The refrigerant cooled oil cooler for applications with fluids of groups 1 and 2 is a pressurised component in line with the Pressure Equipment Directive (97/23/EC /DGRL). The oil cooler is labelled by a CE mark.

Approval by other classification companies and according to non-EU regulations is possible on request.



### Hint!

**The use in potentially explosive atmospheres in accordance with directive 94/9/EC (ATEX) is possible only on request.**

**In the event that the oil cooler is used in potentially explosive atmospheres, potential compensation must be ensured.**

## 1.9 Specifications

|                         |   |
|-------------------------|---|
| Media                   | Refrigerant in accordance with EN 378,<br>e.g. NH <sub>3</sub> (ammonia), R134a, R404a, R507,<br>others on request, refrigerating machine oils                                  |
| max. Operating pressure | -1/ +28 bar g.p.<br>higher operating pressures on request   |
| Operating temperatures  | -10 / +120°C (shell- and tube side)   |
| Approval                | CE mark in line with the Pressure Equipment Directive (DGRL 97/23/EG),<br>AD2000<br>Factory acceptance test (FAT), Approvals TR label and CE mark<br>other approvals on request |
| Material (gaskets)      | no gaskets applicable<br>The oil cooler is completely welded  |
| Pipe dimensions         | Pipe 16 x 1,5 mm, welded into tube plate  |
| Filling                 | see table   |
| Weight                  | see table   |

| Types, Diameter nominal |        |     |     |         |
|-------------------------|--------|-----|-----|---------|
| Oil cooler type         | N1/ N2 | N3  | N4  | N5-N8   |
| 125/1300/3-40/40/50     | 40     | 40  | 50  | M16x1,5 |
| 150/1300/3-40/50/65     | 40     | 50  | 65  | M16x1,5 |
| 200/1300/3-50/65/80     | 50     | 65  | 80  | M16x1,5 |
| 200/2000/2-50/65/80     | 50     | 65  | 80  | M16x1,5 |
| 250/2000/2-50/80/100    | 50     | 80  | 100 | M16x1,5 |
| 300/2000/2-50/80/100    | 50     | 80  | 100 | M16x1,5 |
| 300/3000/1-65/100/150   | 65     | 100 | 150 | M16x1,5 |
| 350/3000/1-80/100/150   | 80     | 100 | 150 | M16x1,5 |
| 350/3500/1-100/100/150  | 100    | 100 | 150 | M16x1,5 |
| 400/3500/1-100/150/200  | 100    | 150 | 200 | M16x1,5 |

| Types, Diameter nominal |        |     |     |         |
|-------------------------|--------|-----|-----|---------|
| Oil cooler type         | N1/ N2 | N3  | N4  | N5-N8   |
| 300/2500/1-65/80/100    | 65     | 80  | 100 | M16x1,5 |
| 450/3500/1-100/100/150  | 100    | 100 | 150 | M16x1,5 |
| 500/3000/1-150/150/200  | 150    | 150 | 200 | M16x1,5 |
| 550/3500/1-100/150/200  | 100    | 150 | 200 | M16x1,5 |
| 500/3500/1-150/150/200  | 150    | 150 | 200 | M16x1,5 |
| 550/3000/1-100/150/200  | 100    | 150 | 200 | M16x1,5 |

| Types, Charging quantities, Weights, Ident Number |                        |                |                             |                          |           |
|---|------------------------|----------------|-----------------------------|--------------------------|-----------|
| Oil cooler type                                   | Refrigerant charge (l) | Oil charge (l) | Weight without filling (kg) | Weight in operation (kg) | Ident     |
| 125/1300/3-40/40/50                               | 11                     | 6              | 49                          | 67                       | 362598630 |
| 150/1300/3-40/50/65                               | 15                     | 10             | 77                          | 92                       | 362598631 |
| 200/1300/3-50/65/80                               | 25                     | 19             | 110                         | 135                      | 362598632 |
| 200/2000/2-50/65/80                               | 38                     | 26             | 167                         | 205                      | 362598633 |
| 250/2000/2-50/80/100                              | 58                     | 50             | 255                         | 314                      | 362598634 |
| 300/2000/2-50/80/100                              | 80                     | 64             | 362                         | 441                      | 362598635 |
| 300/3000/1-65/100/150                             | 118                    | 89             | 515                         | 633                      | 362598636 |
| 350/3000/1-80/100/150                             | 146                    | 107            | 641                         | 785                      | 362598637 |
| 350/3500/1-100/100/150                            | 171                    | 121            | 744                         | 912                      | 362598638 |
| 400/3500/1-100/150/200                            | 214                    | 165            | 861                         | 1118                     | 362598639 |
| 300/2500/1-65/80/100                              | 100                    | 85             | 430                         | 615                      | 362598640 |
| 450/3500/1-100/100/150                            | 266                    | 218            | 1249                        | 1512                     | 362598641 |
| 500/3000/1-150/150/200                            | 291                    | 230            | 1310                        | 1830                     | 362598642 |
| 550/3500/1-100/150/200                            | 381                    | 334            | 1890                        | 2600                     | 362598643 |

| Types, Charging quantities, Weights, Ident Number |                        |                |                             |                          |           |
|---|------------------------|----------------|-----------------------------|--------------------------|-----------|
| Oil cooler type                                   | Refrigerant charge (l) | Oil charge (l) | Weight without filling (kg) | Weight in operation (kg) | Ident     |
| 500/3500/1-150/150/200                            | 340                    | 260            | 1297                        | 2588                     | 362598644 |
| 550/3000/1-100/150/200                            | 327                    | 296            | 1942                        | 2323                     | 362598645 |



# 1 OIL HEATER, SCREW-IN HEATER

R 1 1/2", conical, for use in oil separators diameter 508mm, 610mm, 711mm, 813mm and 914mm, PN40

## 1.1 View

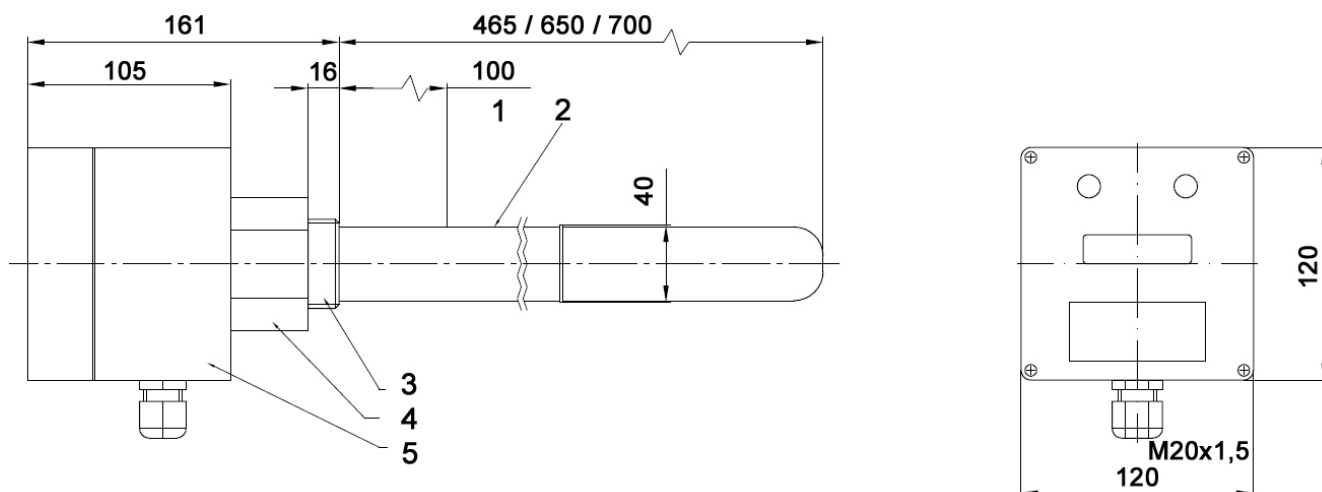


Fig.1: Oil heating (screw-in heater), view

|   |   |
|---|---|
| 1 | unheated  |
| 2 | Heating bundle (1.4571) welded-in               |
| 3 | Thread DIN 3858, Spigot DIN 3852 Part 2, Form C |
| 4 | Threaded connection R 1 1/2 -K-2 / SW 60        |
| 5 | Connection housing IP 54                        |



### Hint!

**The installation must be professionally made according to the intended use with the required means and tools.**

Required gasket material - preferably Teflon strip - must be provided by the customer.

The heater is equipped with an overheating protection to protect against overheating (also in case of low oil level).

## 1.2 Technical specifications

|                       |   |
|-----------------------|---|
| Degree of protection: | IP 54 (DIN 40050/ IEC 529)              |
| Protection class:     | 1 (VDE 0721 Part 1/11.75)               |
| Voltage:              | depending on demand 110 V - 690 V       |
| Capacity:             | depending on demand                     |
| Thermal safety:       | DIN EN 60519-2:2007, VDE 0721-2:2007-05 |

|                                     |   |
|-------------------------------------|---|
| Temperature controller:             | Type 716 RU (20 °C - 150 °C) <b>preadjusted (by factory) to 60 °C</b>                                 |
| Temperature limiter:                | Safety temperature limiter Heat Therm, Type 602031/81 (20 °C - 150 °C) <b>fixe adjusted to 150 °C</b> |
| Test pressure:                      | 40 bar g.p.   |
| Number of tubular heating elements: | depending on demand 2 - 3 pieces, diameter 8.5 mm   |
| Length of tubular heating elements: | depending on demand 465 - 650 - 700 mm  |
| Spacer discs:                       | Diameter 40 mm  |
| Connection housing:                 | 120 x 120 x 105 mm plastic  |
| min./ max. Ambient temperature:     | -40 °C ... +80 °C   |
| Green signal lamp:                  | = Heating   |
| Red signal lamp:                    | = Failure active  |
| Type plate:                         | GEA Grasso  |

**Hint!**

**Controller, limiter as well as signal lamps wired to terminals for directly switching.  
The connecting diagram is placed in the cover of heater.**

### 1.3 Applications

The heating element serves for heating refrigerating oils that are mixed with ammonia or other alternative refrigerants.

**Danger to life!**

**Do not use in hazardous areas!**

**Use**

| Installation length (in mm) | Oil separator Ø (in mm)    |
|-----------------------------|----------------------------|
| 465                         | 508, 610                   |
| 650                         | 711 (vertical design only) |
| 700                         | 711, 813, 914              |

## 1.4 Electrical connection

The electrical connection to the terminals provided must be carried out with cables or leads to VDE 0250 or VDE 0282, cross section for connection according to the current consumption (VDE 0100 Part 523) min. 1.5 mm<sup>2</sup>.

The sealing ring of the lead-in must match the cable diameter.

The feed cables must be protected with fuses.

### 1.4.1 Circuit diagrams

**Circuit diagram: 232024:19000**

**Voltage: 460 V ... 690 V, 2-phase**

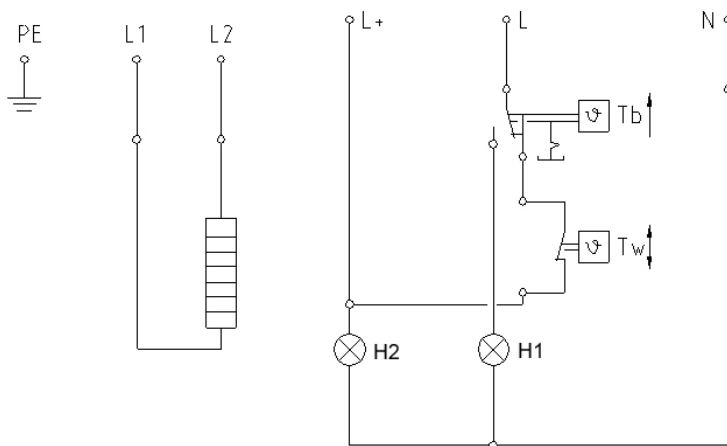


Fig.2: Circuit diagram of oil heating (232024)

|    |                 |
|----|-----------------|
| H1 | Fault (red)     |
| H2 | Heating (green) |

**Circuit diagram: 232025:19000**

**Voltage: 380 V - 440 V, 2-phase**

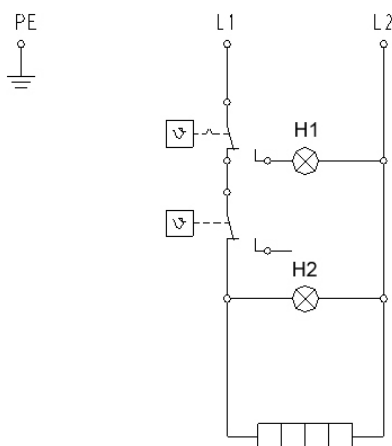


Fig.3: Circuit diagram of oil heating (232025)

|    |                 |
|----|-----------------|
| H1 | Fault (red)     |
| H2 | Heating (green) |

#### Circuit diagram: 232026:19000

Voltage: 110 V - 240 V, 1-phase, max. 16 A

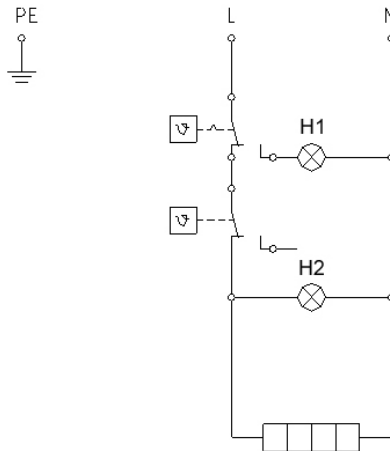


Fig.4: Circuit diagram of oil heating (232026)

|    |                 |
|----|-----------------|
| H1 | Fault (red)     |
| H2 | Heating (green) |

#### Circuit diagram: 232027:19000

Voltage: 110 V, 1-phase, max. 20 A

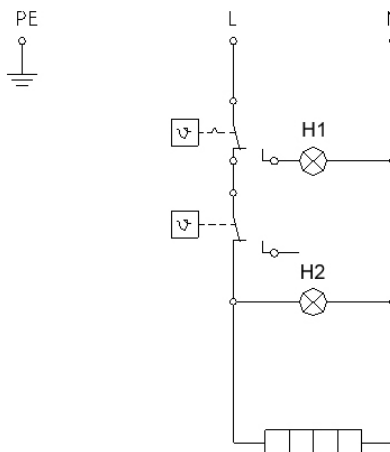


Fig.5: Circuit diagram of oil heating (232027)

|    |                 |
|----|-----------------|
| H1 | Fault (red)     |
| H2 | Heating (green) |

## 1.5 Settings

The oil heater is equipped with one temperature controller and one temperature limiter as well as with function indicators "Operation / Failure".

The required oil temperature can be adjusted on the adjustment pin of the temperature controller (in the connecting housing).

The operating mode **"Heating"** is indicated by the **green signal lamp**.

When the heating is off, the signal lamp does not light up.

In case of a failure (temperature on the heating elements too high) the safety temperature limiter switches the heating permanently off and the **red signal lamp** indicating **"Failure"** lights up.

After cooling down, the limiter can be reset by pressing the red Reset button; the red signal lamp goes out.

In this case the cause of the failure must be determined and eliminated.

## 1.6 Maintenance, Repair

No special maintenance work is required for proper operation.

Check the temperature monitor for correct functioning → annually.

Check the electrical connections for their firm fixing → annually.



### Hint!

**Repairs must only be carried out by the specialized electric staff!**

## 1.7 Ident numbers

| Voltage  | Power                               | Installation length | Amperage                             | Circuit diagram | Grasso Ident |
|--|-------------------------------------|---------------------|--------------------------------------|-----------------|--------------|
| 380 V-2Ph<br>400 V-2Ph<br>415 V-2Ph<br>440 V-2Ph | 450 W<br>500 W<br>540 W<br>605 W    | 465 mm              | 1.20 A<br>1.25 A<br>1.30 A<br>1.40 A | 232025:19000    | 677398800    |
| 460 V-2Ph<br>480 V-2Ph<br>500 V-2Ph              | 460 W<br>500 W<br>540 W             | 465 mm              | 1.00 A<br>1.04 A<br>1.10 A           | 232024:19000    | 677398801    |
| 690 V-2Ph  | 540 W                               | 465 mm              | 0.80 A                               | 232024:19000    | 677398802    |
| 200 V-1Ph<br>220 V-1Ph<br>230 V-1Ph<br>240 V-1Ph | 380 W<br>455 W<br>500 W<br>545 W    | 465 mm              | 1.90 A<br>2.10 A<br>2.20 A<br>2.30 A | 232026:19000    | 677398803    |
| 110 V-1Ph  | 500 W                               | 465 mm              | 4.50 A                               | 232026:19000    | 677398804    |
| 200 V-2Ph<br>230 V-2Ph                           | 500 W<br>660 W                      | 465 mm              | 2.50 A<br>2.90 A                     | 232025:19000    | 677398822    |
| 380 V-2Ph<br>400 V-2Ph<br>415 V-2Ph<br>440 V-2Ph | 900 W<br>1000 W<br>1080 W<br>1210 W | 650 mm              | 2.37 A<br>2.50 A<br>2.60 A<br>2.75 A | 232025:19000    | 677398440    |

| Voltage  | Power                               | Installation length | Amperage                             | Circuit diagram | Grasso Ident |
|--|-------------------------------------|---------------------|--------------------------------------|-----------------|--------------|
| 380 V-2Ph<br>400 V-2Ph<br>415 V-2Ph<br>440 V-2Ph | 900 W<br>1000 W<br>1080 W<br>1210 W | 700 mm              | 2.37 A<br>2.50 A<br>2.60 A<br>2.75 A | 232025:19000    | 677398805    |
| 460 V-2Ph<br>480 V-2Ph<br>500 V-2Ph              | 920 W<br>1000 W<br>1080 W           | 650 mm              | 2.00 A<br>2.10 A<br>2.20 A           | 232024:19000    | 677398941    |
| 460 V-2Ph<br>480 V-2Ph<br>500 V-2Ph              | 920 W<br>1000 W<br>1080 W           | 700 mm              | 2.00 A<br>2.10 A<br>2.20 A           | 232024:19000    | 677398806    |
| 690 V-2Ph  | 1000 W                              | 650 mm              | 1.45 A                               | 232024:19000    | 677398642    |
| 690 V-2Ph  | 1000 W                              | 700 mm              | 1.45 A                               | 232024:19000    | 677398807    |
| 200 V-1Ph<br>220 V-1Ph<br>230 V-1Ph<br>240 V-1Ph | 755 W<br>915 W<br>1000 W<br>1090 W  | 650 mm              | 3.80 A<br>4.20 A<br>4.40 A<br>4.60 A | 232026:19000    | 677398643    |
| 200 V-1Ph<br>220 V-1Ph<br>230 V-1Ph<br>240 V-1Ph | 755 W<br>915 W<br>1000 W<br>1090 W  | 700 mm              | 3.80 A<br>4.20 A<br>4.40 A<br>4.60 A | 232026:19000    | 677398808    |
| 110 V-1Ph  | 1000 W                              | 650 mm              | 9.10 A                               | 232026:19000    | 677398644    |
| 110 V-1Ph  | 1000 W                              | 700 mm              | 9.10 A                               | 232026:19000    | 677398809    |
| 200 V-2Ph<br>230 V-2Ph                           | 1000 W<br>1320 W                    | 650 mm              | 5.00 A<br>5.73 A                     | 232025:19000    | 677398645    |
| 200 V-2Ph<br>230 V-2Ph                           | 1000 W<br>1320 W                    | 700 mm              | 5.00 A<br>5.73 A                     | 232025:19000    | 677398823    |
| 380 V-2Ph<br>400 V-2Ph                           | 1350 W<br>1500 W                    | 465 mm              | 3.60 A<br>3.80 A                     | 232025:19000    | 677398810    |
| 415 V-2Ph<br>440 V-2Ph                           | 1340 W<br>1500 W                    | 465 mm              | 3.20 A<br>3.40 A                     | 232025:19000    | 677398811    |

| Voltage  | Power                                | Installation length | Amperage                             | Circuit diagram | Grasso Ident |
|--|--------------------------------------|---------------------|--------------------------------------|-----------------|--------------|
| 460 V-2Ph<br>480 V-2Ph<br>500 V-2Ph              | 1265 W<br>1380 W<br>1500 W           | 465 mm              | 2.80 A<br>2.90 A<br>3.00 A           | 232024:19000    | 677398812    |
| 690 V-2Ph  | 1500 W                               | 465 mm              | 13.60 A                              | 232024:19000    | 677398813    |
| 200 V-1Ph<br>220 V-1Ph<br>230 V-1Ph<br>240 V-1Ph | 1040 W<br>1260 W<br>1375 W<br>1500 W | 465 mm              | 5.20 A<br>5.70 A<br>6.00 A<br>6.30 A | 232026:19000    | 677398814    |
| 110 V-1Ph  | 1500 W                               | 465 mm              | 13.60 A                              | 232026:19000    | 677398815    |
| 200 V-2Ph  | 1500 W                               | 465 mm              | 7.50 A                               | 232025:19000    | 677398824    |
| 230 V-2Ph  | 1500 W                               | 465 mm              | 7.50 A                               | 232025:19000    | 677398844    |
| 380 V-2Ph<br>400 V-2Ph<br>415 V-2Ph              | 1980 W<br>2200 W<br>2360 W           | 650 mm              | 5.20 A<br>5.50 A<br>5.70 A           | 232025:19000    | 677398946    |
| 380 V-2Ph<br>400 V-2Ph<br>415 V-2Ph              | 1980 W<br>2200 W<br>2360 W           | 700 mm              | 5.20 A<br>5.50 A<br>5.70 A           | 232025:19000    | 677398816    |
| 440 V-2Ph  | 1845 W                               | 650 mm              | 4.20 A                               | 232025:19000    | 677398947    |
| 440 V-2Ph  | 1845 W                               | 700 mm              | 4.20 A                               | 232025:19000    | 677398817    |
| 460 V-2Ph<br>480 V-2Ph<br>500 V-2Ph              | 2015 W<br>2200 W<br>2380 W           | 650 mm              | 4.40 A<br>4.60 A<br>4.80 A           | 232024:19000    | 677398948    |
| 460 V-2Ph<br>480 V-2Ph<br>500 V-2Ph              | 2015 W<br>2200 W<br>2380 W           | 700 mm              | 4.40 A<br>4.60 A<br>4.80 A           | 232024:19000    | 677398818    |
| 690 V-2Ph  | 2200 W                               | 650 mm              | 3.20 A                               | 232024:19000    | 677398949    |
| 690 V-2Ph  | 2200 W                               | 700 mm              | 3.20 A                               | 232024:19000    | 677398819    |

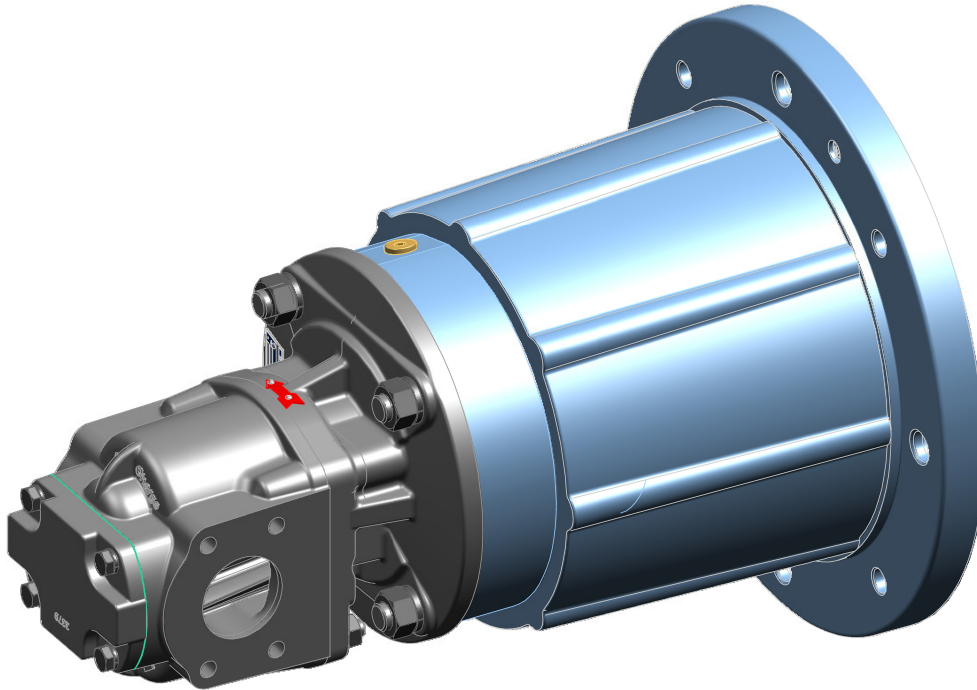
| Voltage  | Power                                | Installation length | Amperage                              | Circuit diagram | Grasso Ident |
|--|--------------------------------------|---------------------|---------------------------------------|-----------------|--------------|
| 200 V-1Ph<br>220 V-1Ph<br>230 V-1Ph<br>240 V-1Ph | 1670 W<br>2020 W<br>2200 W<br>2400 W | 650 mm              | 8.40 A<br>9.20 A<br>9.60 A<br>10.00 A | 232026:19000    | 677398950    |
| 200 V-1Ph<br>220 V-1Ph<br>230 V-1Ph<br>240 V-1Ph | 1670 W<br>2020 W<br>2200 W<br>2400 W | 700 mm              | 8.40 A<br>9.20 A<br>9.60 A<br>10.00 A | 232026:19000    | 677398820    |
| 110 V-1Ph  | 2200 W                               | 650 mm              | 20.00 A                               | 232027:19000    | 677398951    |
| 110 V-1Ph  | 2200 W                               | 700 mm              | 20.00 A                               | 232027:19000    | 677398821    |
| 200 V-2Ph  | 2200 W                               | 650 mm              | 11.00 A                               | 232025:19000    | 677398952    |
| 200 V-2Ph  | 2200 W                               | 700 mm              | 11.00 A                               | 232025:19000    | 677398825    |
| 230 V-2Ph  | 2200 W                               | 650 mm              | 11.00 A                               | 232025:19000    | 677398953    |
| 230 V-2Ph  | 2200 W                               | 700 mm              | 11.00 A                               | 232025:19000    | 677398845    |

## 1.8 Spare parts

| Spare part                     | Grasso Ident |
|--------------------------------|--------------|
| Temperature controller 716 RU  | 677398558    |
| Temperature limiter Heat Therm | 677398560    |

# D.0034510002

## Operating instructions (Translation)



Gear pump KF 3/. - KF 6/. with magnetic coupling

88034510002-03

Englisch

2015-12-15

**KRACHT**

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# 1 General

## 1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the following device:

### **Gear pump KF 3/. - KF 6/. with magnetic coupling**

The device is manufactured in different versions. Information about the version concerned in the individual case can be found on the device's type plate.

These operating instructions are a component of the device and must be kept accessible for the personnel near the device at all times.

If you have any questions about these operating instructions, please contact the manufacturer.

## 1.2 Manufacturer's address

KRACHT GmbH  
Gewerbestraße 20  
DE 58791 Werdohl  
phone: +49 2392 935-0  
fax: +49 2392 935-209  
email: [info@kracht.eu](mailto:info@kracht.eu)  
web: [www.kracht.eu](http://www.kracht.eu)

## 1.3 Applicable documents

1. KTR Kupplungstechnik GmbH, DE 48407 Rheine
  - KTR-N 46510: Operating/installation instructions for magnetic coupling
  - KTR-N 41010: Bell housing assembly instruction

Excerpts from these documents are included in these operating instructions.

If required, the original documents can be requested from the respective manufacturer.

## 1.4 Symbolism



### DANGER

Identification of an immediate hazard, which would result in death or severe bodily injury if not avoided.



### WARNING

Identification of a potential medium risk hazard, which would lead to death or severe bodily injury if not avoided.



### CAUTION

Identification of a low risk hazard, which could lead to minor or medium bodily injury if not avoided.



### NOTICE

Flagging of notices to prevent property damage.



Identification of basic safety instructions. Non-compliance can lead to hazards for people and the device.



Flagging of special user tips and other especially useful or important information.

## 2 Safety

### 2.1 Intended use

1. The device has been designed for operation with fluid. Dry operation is not permitted.
2. The device may be operated in filled condition only.  
The medium must be compatible with the materials used in the device. The chemical competence is necessary for this. Be careful with ethylene oxide or other cathalytic or exothermic or self-decomposing materials. Please consult the manufacturer in cases of doubt.
3. The device may be operated only in usual industrial atmospheres. If there are any aggressive substances in the air, always ask the manufacturer.
4. Operation of the device is only permissible when complying with the operating instructions.  
Deviating operating conditions require the express approval of the manufacturer.
5. In case of any use of the device not according to specification, any warranty is voided.

### 2.2 Personnel qualification and training

The staff designated to assemble, operate and service the device must be properly qualified. This can be through training or specific instruction. Personnel must be familiar with the contents of this operating instructions.



Read the operating instructions thoroughly before use.

### 2.3 Basic safety instructions



1. Comply with existing regulations on accident prevention and safety at work along with any possible internal operator regulations.
2. Pay attention to the greatest possible cleanliness.
3. Wear suitable personal protection equipment.
4. Do not remove, make illegible or obliterate type plates or other references on the device.
5. Do not make any technical changes on the device.
6. Maintain and clean the device regularly.
7. Use spare parts approved by the manufacturer only.

## 2.4 Basic hazards



### DANGER

#### **Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.



### DANGER

#### **Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



### WARNING

#### **Rotating parts!**

Danger of injury from flying parts.

1. Enclose rotating parts so as to avoid any danger from flying parts in the event of breakage or malfunction.



### WARNING

#### **Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.



**WARNING**

**Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Use only connections and lines approved for the expected pressure range.
2. Securely prevent exceeding the permissible pressure, e.g. by using pressure relief valves or rupture discs.
3. Design pipework so that no tensions, e.g. caused by changes in length due to fluctuations in temperature, are transmitted to the device.



**WARNING**

**Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Do not operate the device against closed shut-off devices.
2. Do not operate the device in the false direction of rotation.

## 2.5 Special hazards



### DANGER

#### Powerful magnetic field

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).



### WARNING

#### Powerful magnetic field

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.



### NOTICE

#### Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

## 2.6 Labelling on equipment



Magnetic field



No entry for persons with cardiac pacemakers or implanted defibrillators

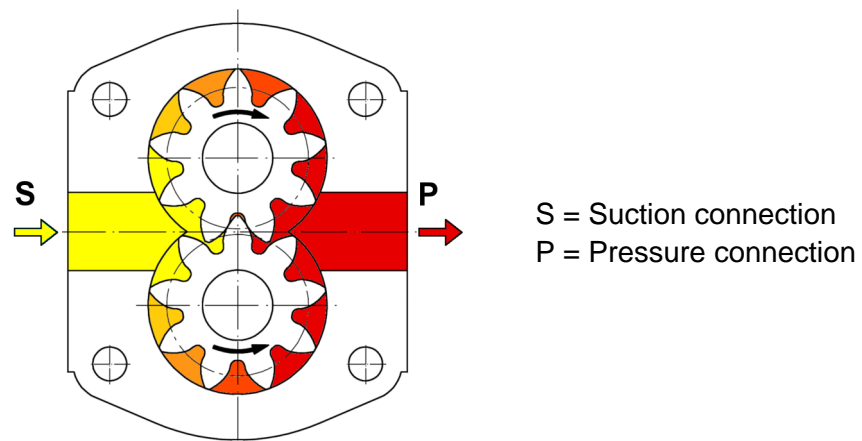


Grounding

### 3 Device description

#### 3.1 Functional principle

KF series pumps are external gear pump types that work according to the positive displacement principle.



When rotated, two gearwheels meshing together produce a volume enlargement as a result of the opening of the tooth spaces on the suction side (S), so that medium can flow in and so that a corresponding volume is displaced simultaneously by immersion of the teeth into the filled tooth spaces on the pressure side (P). Fluid transport takes place through entrainment in the tooth gaps along the wall of the wheel chamber. The so-called geometric flow rate  $V_g$  is being displaced per wheel rotation. A value that is stated in technical documents as rated volume  $V_{gn}$  to specify the pump size.

The actually delivered amount of liquid does not correspond with the theoretical value, it is being reduced through losses due to the necessary tolerances. The losses are less the lower the operating pressure and the higher the viscosity of the medium.

Gear pumps are self-priming within wide limits. The displacement cycle describe initially takes place without exhibiting appreciable pressure build-up. Only after setting external loads, for example, through delivery heights, flow resistances, line elements, etc. will the required working pressure arise to overcome these resistances.

As usual with non-axial play compensated pumps, the lateral clearance between gear and front face has been set in such a way that the maximum allowable operating pressure is managed in an adequate and secure way.

Bearing and shaft seal of the device are lubricated by the media. The device's operating life will be reduced if the medium contains abrasive ingredients.

The shaft seal chamber is connected to the device's suction side. The pressure occurring at the shaft seal therefore corresponds to the pressure at the suction connection of the device.

## Magnetic coupling

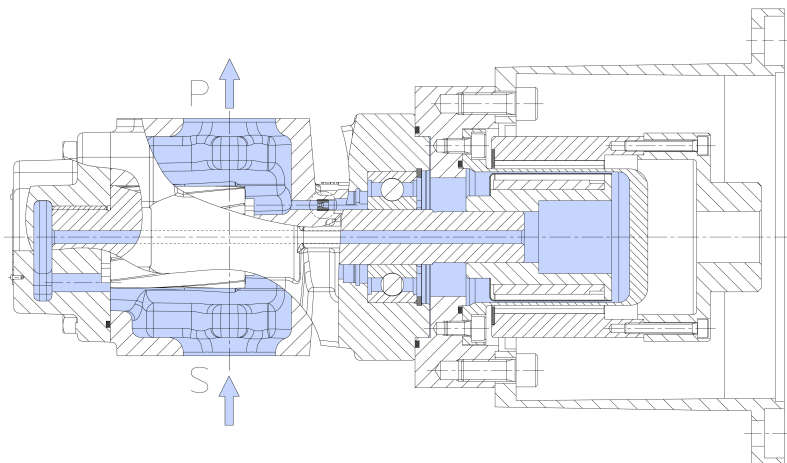
Versions with magnetic coupling are used when absolute leak-proofness is required on the shaft seal or when being operated with supply pressure on the suction side. The magnetic coupling is leak-proof within the permissible technical limits.

This magnetic coupling has the exterior rotor installed on the motor shaft and the interior rotor on the pump shaft. The torque is transmitted between the two rotors via magnetic force. A separating can installed in-between the two rotors provides hermetic sealing of the pump.

The device can be used in vacuum mode, e.g. for filling brake fluid, while doing so, the penetration of air into the system is reliably prevented. Leakage-free operation is ensured during operation in closed systems that have the system pressure applied on the suction side.

On versions with rinsing, an internal forced rinsing of the interior rotor by the pumping medium is provided for continuous removal of the heat developing in the air gap. The magnetic coupling is cooled by a substream of the pumping medium.

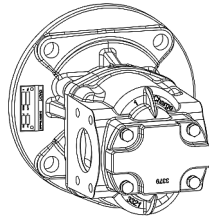
## Cooling circuit



S = Suction connection  
P = Pressure connection

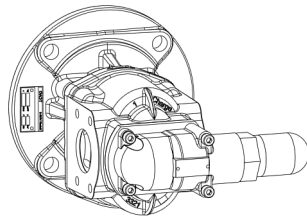
### 3.2 Variants

#### **Gear pump with end cover**



Standard

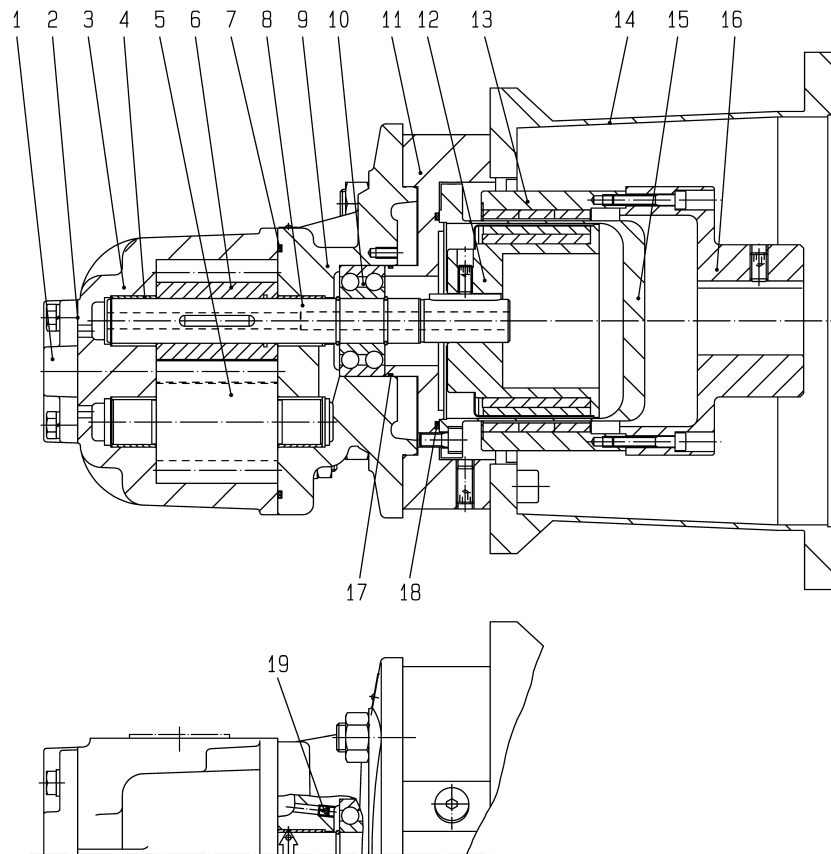
#### **Gear pump with pressure relief valve**



Directly attached pressure relief valves of the series "D" are used exclusively for protection of the pumps and may respond on a short-term basis only. Constant triggering of the valve can destroy the pump due to overheating.

## 3.3 Basic construction

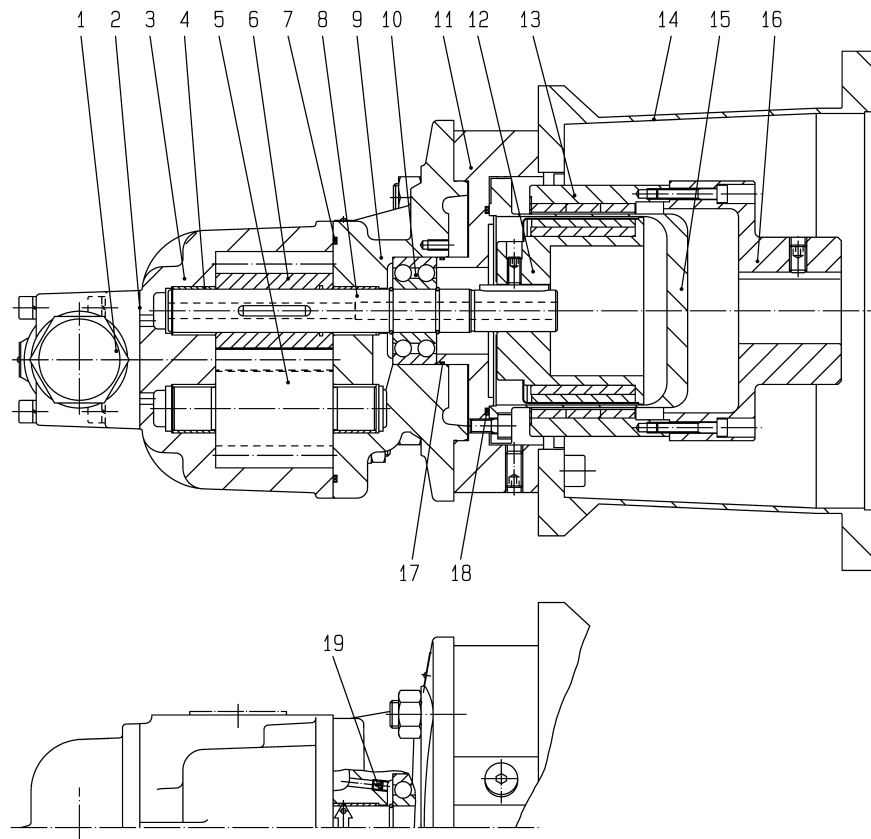
### 3.3.1 Gear pump with end cover



#### Explanation

- |                       |                                      |
|-----------------------|--------------------------------------|
| 1. End cover          | 11. Adapter flange                   |
| 2. Seal               | 12. Internal rotor                   |
| 3. Housing            | 13. External rotor                   |
| 4. Plain bearing bush | 14. Bell housing                     |
| 5. Driven shaft       | 15. Containment shroud               |
| 6. Gear               | 16. Flange hub                       |
| 7. O-Ring             | 17. O-Ring                           |
| 8. Shaft              | 18. O-Ring                           |
| 9. Flange cover       | 19. Nozzle                           |
| 10. Outboard bearing  | (Only design variants with rinsing.) |

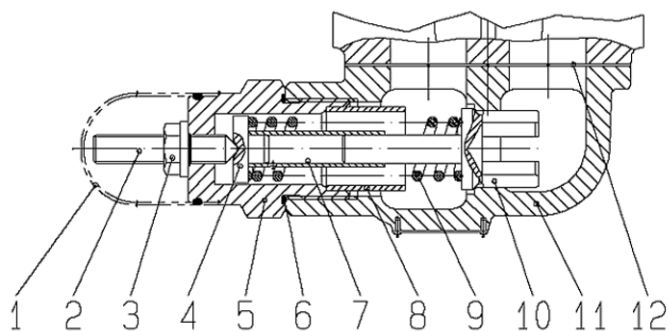
### 3.3.2 Gear pump with pressure relief valve



#### Explanation

- |                          |                                      |
|--------------------------|--------------------------------------|
| 1. Pressure relief valve | 11. Adapter flange                   |
| 2. Seal                  | 12. Internal rotor                   |
| 3. Housing               | 13. External rotor                   |
| 4. Plain bearing bush    | 14. Bell housing                     |
| 5. Driven shaft          | 15. Containment shroud               |
| 6. Gear                  | 16. Flange hub                       |
| 7. O-Ring                | 17. O-Ring                           |
| 8. Shaft                 | 18. O-Ring                           |
| 9. Flange cover          | 19. Nozzle                           |
| 10. Outbord bearing      | (Only design variants with rinsing.) |

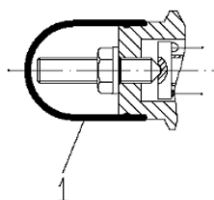
## Basic set-up Pressure relief valve



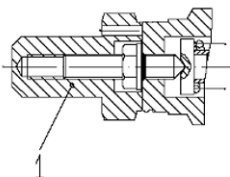
### Explanation

- |                     |                       |
|---------------------|-----------------------|
| 1. cover            | 7. Guide sleeve       |
| 2. Adjustment screw | 8. Distance tube      |
| 3. Seal nut         | 9. Compression spring |
| 4. Spring guide     | 10. Valve cone        |
| 5. Cap screw        | 11. Housing           |
| 6. O-Ring           | 12. Seal              |

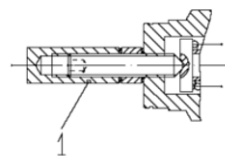
### Variants cover



Thread protective cap



Cap nut



Cap nut KN17

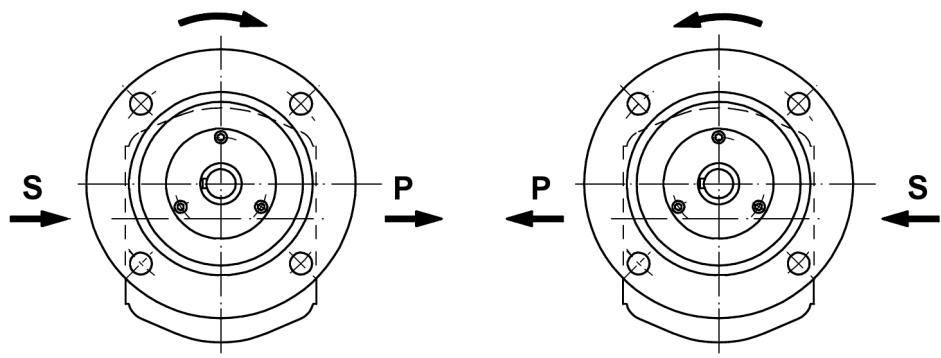
### 3.4 Rotation and delivery direction

The following definition applies with respect to the rotation and delivery direction of external gear pumps for pump connections positioned below the drive shaft:

Looking at the pump shaft end, the pumping flow is from left to right when the shaft is moving clockwise.

Looking at the pump shaft end, the pumping flow is from right to left when the shaft is moving counterclockwise.

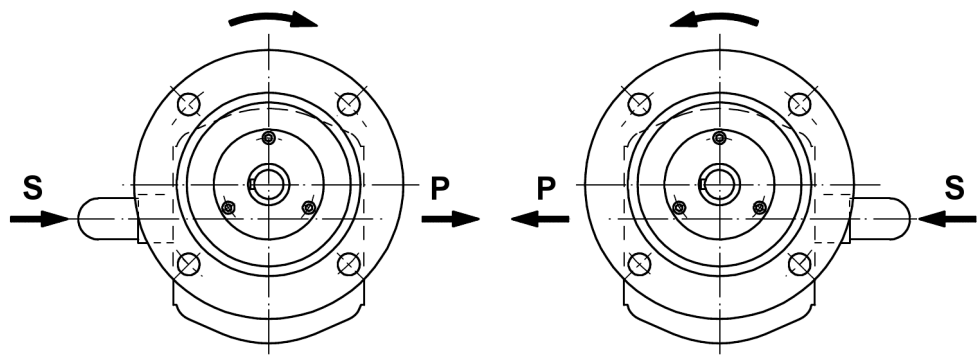
#### Gear pump with end cover



S = Suction connection

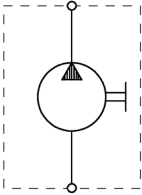
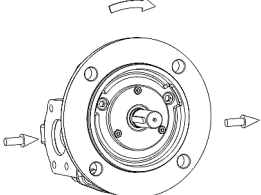
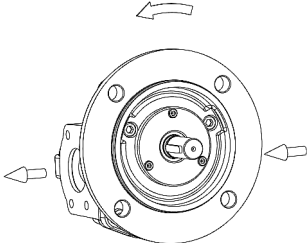
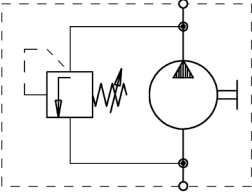
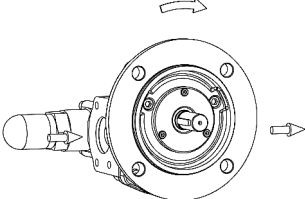
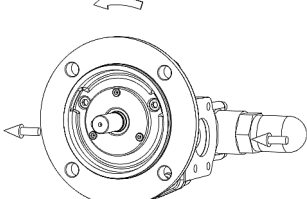
P = Pressure connection

#### Gear pump with pressure relief valve



S = Suction connection

P = Pressure connection

| Hydraulic symbol  | Flange mounting   |   |
|---|---|---|
|  | Gear pump with end cover  |   |
|   |  |  |
|   | KF ./. .10B   | KF ./. .20B   |
|  | Gear pump with pressure relief valve  |   |
|   |  |  |
|   | KF ./. .10B .+DKF .   | KF ./. .20B .+DKF .   |

### 3.5 Type key

| Ordering example KF 3/. - KF 6/. |    |    |    |    |    |    |    |    |     |     |     |     |     |      |   |       |     |     |
|----------------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|------|---|-------|-----|-----|
| KF                               | 3/ | 63 | F  | 1  | 0  | B  | N  | 0  | 0   | 7   | D   | P   | 65  | /197 | + | DKF 3 | D   | 04  |
| 1.                               | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15.  |   | 16.   | 17. | 18. |

| with magnetic coupling |       |   |     |     |   |     |
|------------------------|-------|---|-----|-----|---|-----|
| +                      | MSB75 | - | A   | 4   | - | ... |
|                        | 19.   |   | 20. | 21. |   | 22. |

| Explanation of type key KF 3/. - KF 6/. with magnetic coupling |  |  |   |   |
|--|--|--|---|---|
| 1.   | Product name   |  |   |   |
| 2.   | Size   |  |   |   |
|  | 3  |  | 5 |   |
|  | 4  |  | 6 |   |
| 3.   | Nominal size (Rated volume)                          |  |   |   |
|  | V <sub>gn</sub>                                      | KF 3/: 63; 80; 100; 112<br>KF 4/: 125; 150; 180<br>KF 5/: 200; 250; 315<br>KF 6/: 400; 500; 630; 730 |   |   |
| 4.   | Flange mounting cover                                |  |   |   |
|  | F  | KF 3/.   | H | KF 5/.<br>KF 6/.                              |
|  | G  | KF 4/.   |   |   |
| 5.   | Direction of rotation                                |  |   |   |
|  | 1  | Clockwise  | 2 | Counterclockwise                              |
| 6.   | Outboard flange                                      |  |   |   |
|  | 0  | Without mounting flange  |   |   |
| 7.   | Construction of housing                              |  |   |   |
|  | B  | Housing with flange connection   |   |   |
| 8.   | Shaft end  |  |   |   |
|  | N  | Cylindrical shaft end with outboard bearing  |   |   |
| 9.   | 2nd shaft end  |  |   |   |
|  | 0  | Without 2nd shaft end  |   |   |
| 10.  | End cover  |  |   |   |
|  | A  | For direction of rotation 1 or 2   | 0 | Without end cover<br>(for valve installation) |
|  | 11. Design serial number (specified by manufacturer) |  |   |   |

| Explanation of type key KF 3/. - KF 6/. with magnetic coupling |                                    |   |       |   |
|--|------------------------------------|---|-------|---|
| 12.  | Housing material and plain bearing |   |       |   |
|  | D                                  | EN-GJL-250 (GG-25)<br>Multi layer friction bearings contains lead | V     | EN-GJS-400-15 (GGG-40)<br>Multi layer friction bearings contains lead |
| 13.  | Gears version                      |   |       |   |
|  | P                                  | Helical gear  |       |   |
| 14.  | Seal type                          |   |       |   |
|  | 60                                 | Magnetic coupling without flushing<br>O-Ring EPDM                 | 66    | Magnetic coupling without flushing<br>O-Ring HNBR                     |
|  | 61                                 | Magnetic coupling without flushing<br>O-Ring FKM                  | 67    | Magnetic coupling with flushing<br>O-Ring HNBR                        |
|  | 62                                 | Magnetic coupling with flushing<br>O-Ring CR                      | 68    | Magnetic coupling with flushing<br>O-Ring FEP                         |
|  | 63                                 | Magnetic coupling without flushing<br>O-Ring FEP                  | 90    | Magnetic coupling with flushing<br>O-Ring EPDM                        |
|  | 65                                 | Magnetic coupling with flushing<br>O-Ring FKM                     |       |   |
| 15.  | Special number                     |   |       |   |
|  |                                    | See <a href="#">section 3.6 “Important special numbers”</a>       |       |   |
| 16.  | Pressure relief valve              |   |       |   |
|  | DKF 3                              | for KF 3/.  | DKF 5 | for KF 5/.  |
|  | DKF 4                              | for KF 4/.  | DKF 6 | for KF 6/.  |
| 17.  | Version DKF                        |   |       |   |
|  | A                                  | Housing material: EN-GJL-250                                      | H     | Housing material: EN-GJL-250  |
|  |                                    | Seal: NBR   |       | Seal: NBR   |
|  |                                    | cover: Thread protective cap                                      |       | cover: Cap nut  |
|  | C                                  | Housing material: EN-GJL-250                                      | K     | Housing material: EN-GJL-250  |
|  |                                    | Seal: Kupfer  |       | Seal: FKM   |
|  |                                    | cover: Cap nut KN17   |       | cover: Cap nut  |
|  | D                                  | Housing material: EN-GJL-250                                      | L     | Housing material: EN-GJS-400-15                                       |
|  |                                    | Seal: FKM   |       | Seal: FKM   |
|  |                                    | cover: Thread protective cap                                      |       | cover: Cap nut  |
|  | G                                  | Housing material: EN-GJS-400-15                                   | N     | Housing material: EN-GJS-400-15                                       |
|  |                                    | Seal NBR  |       | Seal: Kupfer  |
| cover: Cap nut   |                                    | cover: Cap nut KN17   |       |   |
| 18.  | Pressure setting ranges            |   |       |   |
|  | 04                                 | 2 - 4 bar   | 16    | 8 - 16 bar  |
|  | 08                                 | 4 - 8 bar   | 25    | 16 - 25 bar   |

| Explanation of type key KF 3/. - KF 6/. with magnetic coupling |   |        |                 |
|--|---|--------|-----------------|
| 19.  | <b>Magnetic coupling size</b>   |        |                 |
|  | MSB75; MSC75<br>MSB110; MSC110; MSC110S<br>MSC135; MSC135S; MSD135; MSD135S<br>MSD165; MSE165 |        |                 |
| 20.  | <b>Maximum operating temperature of magnetic coupling</b>                                     |        |                 |
|  | <b>A</b>  | 150 °C | <b>B</b> 300 °C |
| 21.  | <b>Magnetic coupling pressure range</b>   |        |                 |
|  | <b>1</b>  | 16 bar | <b>3</b> 40 bar |
|  | <b>2</b>  | 25 bar | <b>4</b> 60 bar |
| 22.  | <b>Additional information on magnetic coupling</b>  |        |                 |

### 3.6 Important special numbers

| Special number | Description   |
|----------------|---|
| <b>197</b>     | Noise-optimized version for aerated oils and vacuum <sup>(1)</sup>  |
| <b>273</b>     | Noise-optimized version for aerated oils and vacuum <sup>(1)</sup> <b>(197)</b><br>White metal bearing, $\Delta p_{\max} = 10$ bar  |
| <b>304</b>     | Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{\max} = 10$ bar  |
| <b>332</b>     | Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{\max} = 10$ bar<br><b>(304)</b>  |
| <b>346</b>     | Plastic plain bearings Iglidur® G (non-ferrous metal-free), $\Delta p_{\max} = 10$ bar (KF 3/.)<br>Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{\max} = 10$ bar (KF 4/.; KF 5/.) <b>(304)</b><br>Plastic plain bearings Iglidur® H370 (non-ferrous metal-free), $\Delta p_{\max} = 10$ bar (KF 6/.) |

<sup>(1)</sup> Measures for noise optimisation are only possible for one rotational direction and only effective for aerated oils or vacuum. Can lead to a reduction of delivery rate.

## 4 Technical data

### 4.1 General information

| General information KF 3/. - KF 6/. with magnetic coupling |                                  |  |                                    |
|--|----------------------------------|--|------------------------------------|
| Construction   |                                  | External gear pump   |                                    |
| Fixing type  |                                  | Flange mounting  |                                    |
| End of drive shaft   |                                  | Cylindrical  |                                    |
| Housing connection   |                                  | KF 3/.   | Flange connection SAE 1 1/2" - M10 |
|  |                                  | KF 4/.   | Flange connection SAE 2"           |
|  |                                  | KF 5/200   | Flange connection SAE 2 1/2"       |
|  |                                  | KF 5/250; KF 5/315   | Flange connection SAE 3" -M12      |
|  |                                  | KF 6/.   | Flange connection SAE 4"           |
| Mounting position  |                                  | Any  |                                    |
| Viscosity  | v <sub>min</sub>                 | See <a href="#">section 4.6.3 “Differential pressure - viscosity assignment”</a>   |                                    |
|  | v <sub>max</sub>                 | 5000 mm <sup>2</sup> /s  |                                    |
| Speed  | n                                | See <a href="#">section 4.2 “Overview nominal sizes”</a> + <a href="#">section 4.4 “Viscosity - Rotation speed assignment”</a> |                                    |
| Operating pressure   | p <sub>e</sub><br>p <sub>b</sub> | See <a href="#">section 4.6 “Permissible pressure range”</a>   |                                    |
| Ambient temperature  | ϑ <sub>u</sub>                   | See <a href="#">section 4.7 “Permissible temperature range”</a>  |                                    |
| Fluid temperature  | ϑ <sub>m</sub>                   |  |                                    |
| External loads on shaft end                                |                                  | See <a href="#">section 4.2 “Overview nominal sizes”</a>   |                                    |
| Material   |                                  | See <a href="#">section 4.5 “Material data”</a>  |                                    |
| Filtering  |                                  | Filter porosity ≤ 60 μm  |                                    |
| Permissible media  |                                  | Lubricating fluids without abrasive components.<br>Petrols, solvents, etc. are not permissible.                                |                                    |

## 4.2 Overview nominal sizes

| Nominal size<br>$V_{gn}$ | Geom. displacement<br>$V_g$ [cm <sup>3</sup> /rev.] | Speed <sup>(1)</sup> |                                   | Perm. radial force <sup>(2)</sup><br>$F_{radial}$ [N]<br>(n = 1500 rpm) | Permissible axial force <sup>(2)</sup><br>$F_{axial}$ [N]<br>(n = 1500 rpm) | Sound pressure level <sup>(3)</sup><br>$L_{pA}$ [dBA] | Mass inertia x10 <sup>-4</sup><br>J [kg m <sup>2</sup> ] |
|--------------------------|---|----------------------|-----------------------------------|---|---|---|--|
|                          |   | $n_{min}$<br>[rpm]   | $n_{max}$<br>[rpm] <sup>(4)</sup> |   |   |   |  |
| <b>3/63</b>              | 63,8  | 200                  | 2000                              | 1500  | 200   | ≤ 75  | 4,25   |
| <b>3/80</b>              | 81,3  |                      |                                   |   |   | ≤ 76  | 5  |
| <b>3/100</b>             | 100,8   |                      |                                   |   |   | ≤ 76  | 6,75   |
| <b>3/112</b>             | 112,6   |                      |                                   |   |   | ≤ 77  | 7,5  |
| <b>4/125</b>             | 129   |                      |                                   |   |   | ≤ 78  | 13,75  |
| <b>4/150</b>             | 153   |                      |                                   |   |   | ≤ 79  | 16   |
| <b>4/180</b>             | 184   |                      |                                   |   |   | ≤ 80  | 19,25  |
| <b>5/200</b>             | 204   |                      |                                   | 2000  | 300   | ≤ 81  | 27,5   |
| <b>5/250</b>             | 255   |                      |                                   |   |   | ≤ 82  | 34,5   |
| <b>5/315</b>             | 321   |                      |                                   |   |   | ≤ 82  | 43   |
| <b>6/400</b>             | 405   |                      |                                   | 3000  | 500   | ≤ 82  | 105  |
| <b>6/500</b>             | 505   |                      |                                   |   |   | ≤ 83  | 130  |
| <b>6/630</b>             | 629   |                      |                                   |   |   | ≤ 84  | 160  |
| <b>6/730</b>             | 730   |                      | 1500                              |   |   | ≤ 85  | 195  |

<sup>(1)</sup> Comply with media-specific properties.

<sup>(2)</sup> Outside forces are only permissible in combination with an outboard bearing.  $F_{radial}$  on central shaft end.

<sup>(3)</sup>  $n = 1500$  rpm ;  $v = 34$  mm<sup>2</sup>/s ;  $p = 5 - 25$  bar.

<sup>(4)</sup> Pay attention to the viscosity.

## 4.3 Torques Magnetic coupling

| Size           | Torque [Nm] <sup>(1)</sup> |                  |                  |                  |
|----------------|----------------------------|------------------|------------------|------------------|
|                | Pressure range 1           | Pressure range 2 | Pressure range 3 | Pressure range 4 |
| <b>MSB75</b>   | 24                         | 24               | -                | 24               |
| <b>MSC75</b>   | 40                         | 40               | -                | 40               |
| <b>MSB110</b>  | -                          | 60               | 60               | -                |
| <b>MSC110</b>  | -                          | 95               | 95               | -                |
| <b>MSC110S</b> | -                          | -                | -                | 77               |
| <b>MSC135</b>  | 145                        | 145              | -                | -                |
| <b>MSC135S</b> | -                          | -                | -                | 125              |
| <b>MSD135</b>  | -                          | 200              | -                | -                |
| <b>MSD135S</b> | -                          | -                | -                | 160              |
| <b>MSD165</b>  | -                          | 280              | -                | -                |
| <b>MSE165</b>  | -                          | 370              | -                | -                |

<sup>(1)</sup>  $\vartheta_u = 20\text{ °C}$

## 4.4 Viscosity - Rotation speed assignment

| Kinematic viscosity $\nu$ [mm <sup>2</sup> /s] |      |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|
| 100  | 200  | 300  | 500  | 1000 | 2000 | 3000 | 5000 |
| 3600   | 2900 | 2300 | 1800 | 1200 | 800  | 650  | 500  |
| Recommended rpm $n$ [rpm]                      |      |      |      |      |      |      |      |



Select the speed of rotation so that complete filling of the pump is ensured. This is given if the pressure on the suction side does not fall below the permissible pressure  $p_{e\text{ min.}}$

## 4.5 Material data

### 4.5.1 Material Gear pump

| Seal type | O-rings | enclosure/<br>flange cover/<br>Cover                        | Pres-<br>sure re-<br>lief<br>valve               | Gears                                | Bearing  |
|-----------|---------|---|--|--------------------------------------|--|
| 60        | EPDM    | EN-GJL-250<br>(GG-25)<br>- - -<br>EN-GJS-400-15<br>(GGG-40) | See <a href="#">section 3.5</a><br>“Type<br>key” | Case-hard-<br>ened steel<br>(1.7139) | Multi layer friction bearings contains<br>lead (Standard)<br>DU, P10<br>(Steel, CuSn, PTFE, Pb)<br>- - -<br>Plastic plain bearings non-ferrous<br>metal-free<br>Iglidur®<br>- - -<br>Multi layer friction bearings lead free<br>DP4<br>(Steel, CuSn, PTFE) |
| 61        | FKM     |   |  |                                      |  |
| 62        | CR      |   |  |                                      |  |
| 63        | FEP     |   |  |                                      |  |
| 65        | FKM     |   |  |                                      |  |
| 66        | HNBR    |   |  |                                      |  |
| 67        | HNBR    |   |  |                                      |  |
| 68        | FEP     |   |  |                                      |  |
| 90        | EPDM    |   |  |                                      |  |

### 4.5.2 Material Magnetic coupling

| Version    | Material            |                    |                    |                               |                 |
|------------|---------------------|--------------------|--------------------|-------------------------------|-----------------|
|            | Internal rotor      | External rotor     | Containment shroud | Bell housing                  | Other materials |
| A (150 °C) | 1.4571/NdFeB<br>--- | Steel/NdFeB<br>--- | 1.4571<br>---      | Al (mass fraction Mg ≤ 7,5 %) | Steel           |
|            | 1.4571/Sm2Co17      | Steel/Sm2Co17      | 1.4571/Hastelloy   |                               |                 |
| B (300 °C) | 1.4571/Sm2Co17      | Steel/Sm2Co17      |                    |                               |                 |

## 4.6 Permissible pressure range

### 4.6.1 Operating pressure at suction side

| Pressure range<br>Magnetic coupling | Housing material | Operating pressure <sup>(1) (2)</sup>                                |                    |   |
|-------------------------------------|------------------|--|--------------------|---|
|                                     |                  | Suction side   |                    | Pressure side   |
|                                     |                  | $p_{e \min}$ [bar abs.]  | $p_{e \max}$ [bar] | $p_b$ [bar]<br>(perm. continuous pressure)                              |
| 1                                   | EN-GJL-250       | 0,6 <sup>(3)</sup><br>Vacuum equipment:<br>0,08<br>Standing still: 0 | 16                 | See <a href="#">section 4.6.2</a> "Operating pressure at pressure side" |
|                                     | EN-GJS-400-15    |  |                    |   |
| 2                                   | EN-GJL-250       |  | 25                 |   |
|                                     | EN-GJS-400-15    |  |                    |   |
| 3                                   | EN-GJL-250       |  | 40                 |   |
|                                     | EN-GJS-400-15    |  |                    |   |
| 4                                   | EN-GJL-250       |  | 25                 |   |
|                                     | EN-GJS-400-15    |  | 60                 |   |

<sup>(1)</sup> bar abs.: absolute pressure, bar: relative pressure

<sup>(2)</sup> Comply with permissible differential pressure (see [section 4.6.3](#) "Differential pressure - viscosity assignment").

<sup>(3)</sup> Start-up condition: 0,4 bar absolute (max. 30 minutes)

#### 4.6.2 Operating pressure at pressure side

| Nominal size<br>$V_{gn}$ | Operating pressure Pressure side           |               |
|--------------------------|--|---------------|
|                          | $p_b$ [bar]<br>(perm. continuous pressure) |               |
|                          | Housing material                           |               |
|                          | EN-GJL-250                                 | EN-GJS-400-15 |
| 3/63                     | 25   | 60            |
| 3/80                     |  |               |
| 3/100                    |  |               |
| 3/112                    |  |               |
| 4/125                    |  |               |
| 4/150                    |  |               |
| 4/180                    |  |               |
| 5/200                    |  |               |
| 5/250                    | 20   | 35            |
| 5/315                    | 16   |               |
| 6/400                    | 25   |               |
| 6/500                    | 20   |               |
| 6/630                    | 16   |               |
| 6/730                    | 14   |               |

#### 4.6.3 Differential pressure - viscosity assignment

| Bearing  | $\Delta p_{max}$ [bar]             |                                  |                                   |
|--|------------------------------------|----------------------------------|-----------------------------------|
|  | $v \geq 1,4 \text{ mm}^2/\text{s}$ | $v \geq 6 \text{ mm}^2/\text{s}$ | $v \geq 12 \text{ mm}^2/\text{s}$ |
| Multi layer friction bearings contains lead<br>(Standard)<br>DU, P10 | 3                                  | 12                               | 25                                |
| Multi layer friction bearings lead free<br>DP4                       |                                    |                                  |                                   |
| Plastic plain bearings<br>Iglidur® G; X; H370                        | -                                  | 6                                | 10                                |
| White-metalled bearing<br>TEGO® V738                                 |                                    |                                  |                                   |

#### 4.7 Permissible temperature range

| Sealing material | Fluid temperature $\vartheta_m$ |                              |     |
|------------------|---------------------------------|------------------------------|-----|
|                  | $\vartheta_{m \min}$ [°C]       | $\vartheta_{m \max}$ [°C]    |     |
|                  |                                 | Version<br>Magnetic coupling |     |
|                  |                                 | A                            | B   |
| FKM              | -10                             | 130                          | 150 |
| CR               |                                 | 100                          | -   |
| HNBR             |                                 |                              |     |
| EPDM             |                                 | 130                          | 200 |
| FEP              |                                 |                              |     |

| Sealing material | Ambient temperature $\vartheta_u$                |  |
|------------------|--|--|
|                  | $\vartheta_{u \text{ min. }} [^{\circ}\text{C}]$ | $\vartheta_{u \text{ max. }} [^{\circ}\text{C}]$ |
| FKM              | -15  | 60   |
| CR               | -20  |  |
| HNBR             |  |  |
| EPDM             |  |  |
| FEP              |  |  |

## 4.8 Weights

### 4.8.1 Weight of gear pump

| Nominal size<br>$V_{gn}$ | Gear pump<br>[kg] |                |
|--------------------------|-------------------|----------------|
|                          | with end cover    | with DKF valve |
| <b>3/63</b>              | 12,0              | 13,5           |
| <b>3/80</b>              |                   |                |
| <b>3/100</b>             | 13,5              | 15,0           |
| <b>3/112</b>             |                   |                |
| <b>4/125</b>             | 18,5              | 20,0           |
| <b>4/150</b>             | 20,0              | 21,5           |
| <b>4/180</b>             | 21,0              | 22,5           |
| <b>5/200</b>             | 28,0              | 30,0           |
| <b>5/250</b>             | 33,0              | 35,0           |
| <b>5/315</b>             |                   |                |
| <b>6/400</b>             | 51,0              | 59,0           |
| <b>6/500</b>             | 55,0              | 63,0           |
| <b>6/630</b>             | 65,0              | 73,0           |
| <b>6/730</b>             |                   |                |

### 4.8.2 Weight of attachments

The weights of the magnetic couplings can be found in the relevant technical data sheets.

## 4.9 Dimensions

Dimensions of the device can be found in the relevant technical data sheets.

## 5 Transport and storage

### 5.1 Special hazards



#### DANGER

##### Powerful magnetic field

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).



#### WARNING

##### Powerful magnetic field

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.



#### NOTICE

##### Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

### 5.2 General

- After receipt, check the device for transport damages.
- If transport damage is noticed, report this immediately to the manufacturer and the carrier. The device must then be replaced or repaired.
- Dispose of packing material and used parts in accordance with the local stipulations.

### 5.3 Transport



#### **WARNING**

##### **Falling or overturning loads!**

Danger of injury while transporting large and heavy loads.

1. Use only suitable means of conveyance and lifting tackle with sufficient load-bearing capacity.
2. Attach lifting tackle only to suitable load points.
3. Attach the lifting tackle in such a manner that it cannot slip.
4. Pay attention to the load balance point.
5. Always avoid jerks, impacts and strong vibrations during transportation.
6. Never walk under suspended loads, never work under suspended loads.

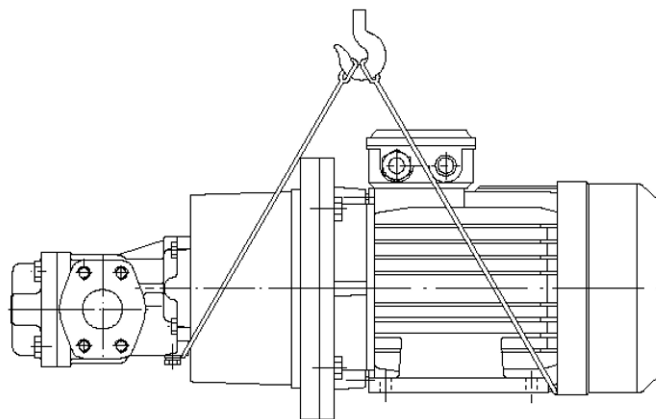


#### **WARNING**

##### **Falling or overturning loads!**

Danger of injury while transporting large and heavy loads.

1. Lifting eyes on motors are designed solely for the motor weight. Do not attach any additional loads.
2. Connect a unit comprising a pump and motor for lifting both the pump as well as the motor side.



### 5.4 Storage

The device's function is tested in the plant with mineral hydraulic oil. Then all connections are closed. The remaining residual oil preserves the interior parts for up to 6 months.

Metallic exposed exterior parts are protected against corrosion by suitable conservation measures, also up to 6 months.

In case of storage, a dry, dust-free and low-vibration environment is to be ensured. The device is to be protected against influences from weather, moisture and strong fluctuations of temperature. The recommended storage conditions are to be adhered to.

Below the permissible ambient temperature  $\vartheta_u$  elastomer seals lose their elasticity and mechanical loading capacity, since the glass transition temperature is fallen below. This procedure is reversible. A force action on the device is to be avoided in case of storage below the permissible ambient temperature  $\vartheta_u$ .

Devices with EPDM seals are not mineral-oil resistant and are not tested for their function. There is no preservation of the interior parts. If the device is not taken into operation immediately, all corrosion-prone surfaces are to be protected by suitable conservation measures. The same applies for devices which are not tested for other reasons.

When storing for a long period of time (> 6 months), treat all surfaces at risk of corrosion again with suitable preserving agents.

If high air humidity or aggressive atmospheres are expected, take additional corrosion-preventing measures.



Storage in corrosion protection bags (VCI) maximum of 6 months.



## NOTICE

### Corrosion/chemical impact

Improper storage can render the device useless.

1. Protect endangered surfaces by means of suitable conservation measures.
2. Comply with recommended storage conditions.



### Recommended storage conditions

1. Storage temperature: 5 °C - 25 °C
2. Relative air humidity: < 70 %
3. Protect elastomer parts from light, especially direct sunlight.
4. Protect elastomer parts from oxygen and ozone.
5. Comply with maximum storage times of elastomeric parts:
  - 5 Years: AU
  - 7 Years: NBR, HNBR, CR
  - 10 Years: EPM, EPDM, FEP/PTFE, FEP, FKM, FFKM, VMQ, FVMQ

## 6 Installation

### 6.1 Safety instructions for installation



#### DANGER

**Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.



#### DANGER

**Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



#### DANGER

**Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Take measures against accidental touching of rotating parts.



#### WARNING

**Rotating parts!**

Danger of injury from flying parts.

1. Enclose rotating parts so as to avoid any danger from flying parts in the event of breakage or malfunction.



#### WARNING

**Unshielded gearwheels!**

Gearwheels can trap and crush fingers and hands.

1. Do not engage gearwheels.



## WARNING

### Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.

## 6.1.1 Special hazards



## DANGER

### Powerful magnetic field

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).



## WARNING

### Powerful magnetic field

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.



## NOTICE

### Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

## 6.2 Noise reduction



### Measures for noise reduction

1. Use suction and pressure hoses.
2. Use bell housings with high damping properties (plastic or cast iron).
3. Use of damping rings and damping rods for separation of structure-borne noise.

## 6.3 Mechanical installation

### 6.3.1 Preparation

- Check the device for transport damage and dirt.
- Check the device for freedom of movement.
- Remove existing preservatives.
  - Use only those cleaning agents that are compatible with the materials used in the device.
  - Do not use cleaning wool.
- Compare the environmental and ambient conditions at the place of installation to the permissible conditions.
  - Ensure a sufficiently stable and level foundation.
  - Expose the device only to small vibrations, see IEC 60034-14.
  - Secure sufficient access for maintenance and repair.

### 6.3.2 Gear pump with magnetic coupling

The prerequisite for trouble-free operation is suitable load transmission between the pump and the drive. This pump may only be operated in combination with a magnetic coupling.

- Clean assembly area.
- Remove parts that could become magnetised.
- Remove magnetic dust.
- Follow the manufacturer's instructions when installing the coupling components.



The mounting dimensions of the coupling must be observed at all times to guarantee proper torque transmission. See the respective assembly drawing for the mounting dimensions.



For assembly, the coupling halves can be heated to approx. 80 °C and pushed onto the shaft ends while warm.



#### CAUTION

##### Hot surfaces!

Burn injury to skin if touched.

1. Wear protective gloves at temperatures  $\geq 48^{\circ}\text{C}$ .

- Position the pumps and the drive with respect to each other.
  - Comply with the permissible mounting position.
  - Comply with the permissible direction of rotation.



Rotation and delivery direction: See [chapter 3 "Device description"](#)

- Join pump and drive slowly to prevent the exterior rotor striking the separating can.



## WARNING

### Strong magnetic forces

Risk of crushing by suddenly engaging magnets.

1. Join pump and drive slowly.

- Tighten all fastening screws with the specified torque.
  - Pay attention to sufficient screw-in depth of the fastening screws.
  - Rule out any distortion of the device.

### Tightening torques [Nm]

| Thread size <sup>(1)</sup>     | M6  | M8 | M10 | M12 | M16 | M20 | M24 |
|--------------------------------|-----|----|-----|-----|-----|-----|-----|
| Counter-thread Aluminium       | 4,6 | 11 | 22  | 39  | 95  | 184 | 315 |
| Counter-thread Cast iron/Steel | 10  | 25 | 49  | 85  | 210 | 425 | 730 |

<sup>(1)</sup> Screws/Nuts with min. strength class 8.8/8

- Make sure no foreign bodies can get into the device.
- Take measures against accidental touching of rotating parts.
- Take measures against accidental touching of hot surfaces (> 60 °C).
- Mount the specified monitoring units as per the manufacturer's instructions.

## 6.4 Connection lines

### 6.4.1 General



## WARNING

### Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Use only connections and lines approved for the expected pressure range.
2. Securely prevent exceeding the permissible pressure, e.g. by using pressure relief valves or rupture discs.
3. Design pipework so that no tensions, e.g. caused by changes in length due to fluctuations in temperature, are transmitted to the device.



### Additional connections

1. Provide measurement connections for pressure and temperature as close as possible to device.
2. If necessary, provide a facility to fill or empty the device and the line system.
3. If necessary, provide a facility to vent the device and the line system.

## 6.4.2 Suction line design

A less than optimally planned suction line can lead to increased noise emission, cavitation as well as reduction of the delivery rate (caused by not complete filling of the pump).

When designing the line, take the following points into consideration:

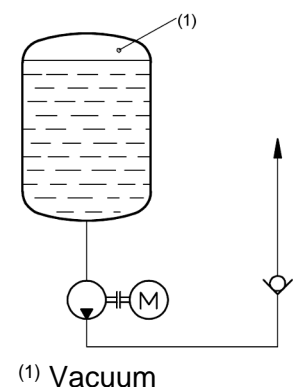
- The suction line must be piped as short as possible and in a straight line.
  - Stipulate the nominal width of the suction line so that the permissible operating pressure  $p_{e\ min}$  is not exceeded on the suction side.
  - Avoid large suction heights.
  - Avoid additional pressure loss through line resistances such as fittings, screwed connections, formed parts or suction filters/suction baskets.
- Ensure that all technically required suction filters/suction baskets are appropriately dimensioned.
- Make sure there is sufficient clearance of the suction port to the bottom and walls of the media container.
  - Make sure that the suction opening lies underneath the lowest fluid level in all operating situations.
  - When hose lines are used, ensure sufficient stability of the hoses so that they cannot become constricted through the sucking action.
  - Comply with the recommended flow velocity in the suction line (max. 1.5 m/s).

### Suction line at vacuum operation

If suction from a tank under vacuum is desired, the pump must be arranged approx. 1 m below the tank. The suction line must run in a straight line and without any resistances.

The tank may be subjected to vacuum only then when the pipework and the pump have been filled with liquid.

For this application, only pumps suitable for vacuum operation may be used.





## NOTICE

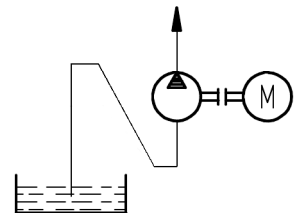
### Cavitation damage

Undercutting the permissible suction port pressure results in cavitation.

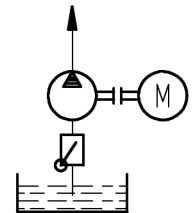
1. Design the suction line so that the pressure arising in operation on the suction side is always higher than the vapour pressure of the pumped medium. At the same time, comply with the installation altitude of the device above mean sea level.
2. For aqueous fluids, mount the device underneath the fluid level, set the operating temperature to 50 °C and limit the speed to 1500 rpm.

### Prevention of suction problems

If there is a possibility that the suction line can run dry if the pump stops, piping the suction line as siphon is an option to avoid suction problems. This way, the pump will remain permanently filled after initial commissioning.



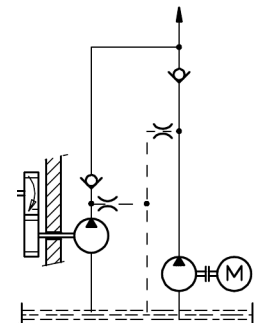
It is appropriate to employ a foot valve or a non-return valve in case of longer suction lines that can run dry while the pump is at rest. These must have been designed for use in suction lines and should offer as low a flow resistance as possible.



During operation of a pump that has to pump media via a non-return valve in a pressurized circuit (e.g. reserve pump in a lubricant circuit), suction problems can occur if the suction line is filled with air.

In this case the pressure pipe must be bled directly upstream of the non-return valve.

If no vent nozzle is used, the volume of the pressure pipe between the pump and the non-return valve must be at least 75 % of the suction line volume.



## 6.4.3 Pressure line design

When designing the line, take the following points into consideration:

- Select the nominal width of the pressure line so that the maximum permissible pressures are not exceeded.
- If necessary, provide a vent nozzle to prevent suction problems.

#### 6.4.4 Mounting Connection lines



Position of the device connections: See [chapter 3 “Device description”](#)

- Clean all lines.
  - Do not use cleaning wool.
  - Pickle and flush welded pipes.
- Remove the protective plugs.
- Mount the lines.
  - Comply with the manufacturer's information.
  - Do not use sealants such as hemp or filler.

## 6.5 Change of the direction of rotation



### DANGER

#### Rotating parts!

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



### WARNING

#### Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.



### NOTICE

#### Leaks or increased wear

Damaged sealing surfaces or supports lead to lack of sealing and/or faults in later operation.

1. When assembling or disassembling housing components, be sure not to damage the bearings, e.g. by tilting.
2. When disassembling housing components, do not use screwdrivers or the like as a lever to separate the joints.
3. Do not remove, damage or jam seals.



Design variants with internal rinsing do not allow for the rotation direction to be reversed. Unit must be replaced.

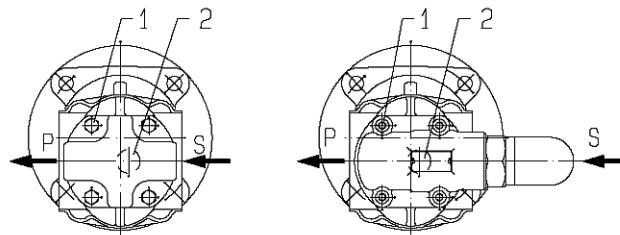


The gear pump type KF 6/370 does not allow for the rotation direction to be reversed. Unit must be replaced.

### 6.5.1 Gear pump without noise optimisation

When using pump type KF ./., rotation direction 1 or 2, reversing the direction is only possible by converting the pump.

The manufacturer normally carries out the conversion work and the customer should do this only in exceptional cases. Please consult the manufacturer about this.



S = Suction connection  
P = Pressure connection

1. Fastening screws  
2. Leak oil hole

When reversing the pump's rotation direction, the end cover and the pressure relief valve must be turned 180°.

- Loose fastening screws.
- Remove the end cover or the pressure relief valve respectively from the pump housing and put it back on rotated by 180°.
- Tighten the fastening screws with the stated torque.

| Fastening screws KF 3/. - KF 6/. |                |                |
|----------------------------------|----------------|----------------|
| Nominal size                     | KF 3/.; KF 4/. | KF 5/.; KF 6/. |
| Tightening torques [Nm]          | 25             | 49             |

**When checking, pay attention to the following points:**

1. Pumps without pressure relief valve must have the leak oil hole in the end cover on the inlet side.
2. Pumps with pressure relief valve must have their pressure relief valve adjusting screw point toward the pump's suction side.

### 6.5.2 Gear pumps in noise-optimized design variants

Please consult the manufacturer about this.

## 7 Operation start-up

### 7.1 Safety instructions for start-up



#### **DANGER**

##### **Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.



#### **WARNING**

##### **Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Do not operate the device against closed shut-off devices.
2. Do not operate the device in the false direction of rotation.



#### **CAUTION**

##### **Hot surfaces!**

Burn injury to skin if touched.

1. Wear protective gloves at temperatures  $\geq 48^{\circ}\text{C}$ .

#### 7.1.1 Special hazards



#### **DANGER**

##### **Powerful magnetic field**

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).

**WARNING****Powerful magnetic field**

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

**NOTICE****Powerful magnetic field**

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

## 7.2 Preparation

- Before starting the system make sure that a sufficient quantity of the operating fluid is extant to avoid dry running.  
Take this into consideration especially with high output volumes.
- Check all fastening screws on the device.
- Fill pump and the suction line with medium.

## 7.3 Pressure relief valve adjustment

Directly attached pressure relief valves of the series "D" are used exclusively for protection of the pumps and may respond on a short-term basis only.

The valves are factory set to the rated pressure of each pressure stage. Setting pressures that deviate from this are stated on the rating plate.

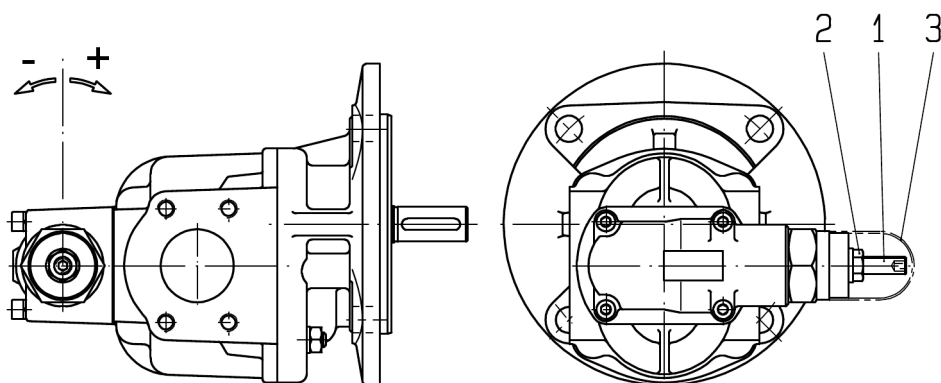


### NOTICE

#### Failure of the pump

Long triggering of the valve can cause the pump to overheat.

1. Only allow intermittent triggering of the valve.



- Lower response pressure  
+ Higher response pressure

1. Adjustment screw
2. Hexagonal nut
3. Thread protective cap

#### Pressure setting:

- Remove the thread protective cap
- Remove hexagon nut
- Set the response pressure using the adjusting screw
- Secure the adjusting screw with hexagon nut
- Attach the thread protective cap



### WARNING

#### Failure of load-carrying parts due to overload!

Danger of injury from flying parts.  
Danger of injury from spurting fluids.

1. Consider the permissible pressure setting range of the valve.

## 7.4 Further operation start-up

- Open existing shut-off elements upstream and downstream of the device.
- Adjust pressure relief valves in the system installed for lowest opening pressure.
- Allow the device start without or with a low pressure load (jog mode).
  - Flow should have developed after 30 s at the latest.
- Run the device for a few minutes depressurised or with low pressure.
- Vent the system at the highest possible point.
- Gradually increase the pressure load up to the desired operating pressure.
- Operate the system for so long until the final operating state is achieved.
- Check the operating data such as:
  - Discharge flow
  - Operating pressure (as close as possible to device)
  - Fluid temperature (as close as possible to device)
  - Device temperature (in particular in the area of the bearing points)
  - ...
- Document the operating data of the initial start-up for later comparison.
- Check the level of the operating medium in the system.
- Check the filling level of the liquid seal (if existing).
- Check the device for leaks.
- Check all threaded connections for leaks and retighten if necessary.



In order to ensure a constant and reliable function of the device, an initial maintenance of the device is recommended after several hours warm-up time (max. 24 h). Faults can thus be identified at an early stage.

## 8 Removal

### 8.1 Safety instructions for removal



#### DANGER

##### **Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.



#### DANGER

##### **Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



#### WARNING

##### **Unshielded gearwheels!**

Gearwheels can trap and crush fingers and hands.

1. Do not engage gearwheels.



#### WARNING

##### **Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.



#### CAUTION

##### **Hot surfaces!**

Burn injury to skin if touched.

1. At temperatures  $\geq 48^{\circ}\text{C}$  the device must be allowed to cool down first.

**NOTICE****Blocking of the device through hardening medium**

Hardening medium can mechanically jam the device and make it unusable.

1. Clean device immediately after operating with a hardening medium.

### 8.1.1 Special hazards

**DANGER****Powerful magnetic field**

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).

**WARNING****Powerful magnetic field**

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.

**NOTICE****Powerful magnetic field**

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

## 8.2 Removal

- Depressurise and de-energize the system.
- Close existing shut-off elements upstream and downstream of the device.
- Open existing drain elements and loosen connection lines. Collect and dispose of discharging medium so that no hazard arises for persons or environment.
- Dismantle the device.
- Clean the device.
- Close the device connections and lines to prevent dirt penetration.

## 9 Maintenance

### 9.1 Safety instructions for maintenance



#### DANGER

##### **Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.



#### DANGER

##### **Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



#### WARNING

##### **Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.



#### CAUTION

##### **Hot surfaces!**

Burn injury to skin if touched.

1. At temperatures  $\geq 48^{\circ}\text{C}$  the device must be allowed to cool down first.

### 9.1.1 Special hazards



#### **DANGER**

##### **Powerful magnetic field**

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).



#### **WARNING**

##### **Powerful magnetic field**

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.



#### **NOTICE**

##### **Powerful magnetic field**

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

## 9.2 Maintenance work



### Checking and documentation of the operating data

Regular checking and documentation of all operating data such as pressure, temperature, current consumption, degree of filter soiling, etc. contributes to early problem detection.

- Perform maintenance according to specification.
- Replace defective and worn components.
- If required, request spare parts lists and assembly drawings from the manufacturer.
- Document the type and scope of the maintenance work along with the operating data.
- Compare the operating data with the values of the first commissioning. Determine the cause in case of major non-compliances (> 10 %).
- Dispose of packing material and used parts in accordance with the local stipulations.



### Barriers and instructions

All barriers and warning signs removed during this must be attached to their original position on completing maintenance and/or repairs.

### 9.3 Maintenance instructions

The following information provides recommendations on maintenance work and maintenance intervals for the device being used.

Depending on the actually occurring loads in operation, the type, scope and interval of the maintenance work can deviate from the recommendations. The equipment builder/operator shall write an obligatory maintenance plan.



Within the framework of preventive maintenance, it is appropriate to replace wear parts before reaching the wear limit.

With corresponding expertise and sufficient equipment, the replacement can be carried out by the equipment builder/operator. Please consult the manufacturer about this.



#### Warranty

In case of improper implementation, any warranty is voided.

| Maintenance recommendations Gear pump |   |           |                      |
|---------------------------------------|---|-----------|----------------------|
| Interval                              | Maintenance work  | Employees | Duration approx. [h] |
| <b>Firstly:<br/>after max. 24 h</b>   | Inspection: Discharge flow  | 1         | 1                    |
|                                       | Inspection: Operating pressure  |           |                      |
|                                       | Inspection: Fluid temperature   |           |                      |
|                                       | Inspection: Device temperature  |           |                      |
|                                       | Inspection: Add-on valve function (if existing)   |           |                      |
|                                       | Inspection: Check potential equalisation for firm seating and functionality (if existing) |           |                      |
|                                       | Inspection: Condition of operating fluid  |           |                      |
| <b>Daily</b>                          | Audiometric monitoring: Unusual noise   | 1         | 0,1                  |
|                                       | Cleaning: Remove dust deposits and dirt with a moist cloth                                |           |                      |
|                                       | Visual inspection: Leakages   |           |                      |
|                                       | Visual inspection: Filling level of liquid seal (if existing)                             |           |                      |

| Maintenance recommendations Gear pump |   |            |                      |
|---------------------------------------|---|------------|----------------------|
| Interval                              | Maintenance work  | Employ-ees | Duration approx. [h] |
| <b>3000 Operating hours</b>           | Inspection: Discharge flow  | 1          | 1                    |
|                                       | Inspection: Operating pressure  |            |                      |
|                                       | Inspection: Fluid temperature   |            |                      |
|                                       | Inspection: Device temperature  |            |                      |
|                                       | Inspection: Add-on valve function (if existing)   |            |                      |
|                                       | Inspection: Check potential equalisation for firm seating and functionality (if existing) |            |                      |
|                                       | Inspection: Condition of operating fluid  |            |                      |
| <b>6000 Operating hours</b>           | Visual inspection: Condition of gears   | 1          | 2                    |
|                                       | Visual inspection: Condition of housing parts   |            |                      |
|                                       | Visual inspection: Condition of plain bearings  |            |                      |
|                                       | Visual inspection: Condition of shaft seal  |            |                      |
|                                       | Visual inspection: Condition of outboard bearings (if existing)                           |            |                      |
| <b>As required</b>                    | Replace: Plain bearings (only by manufacturer)  | 1          | 2                    |
|                                       | Replace: Outboard bearing (if existing)   |            |                      |
|                                       | Replace: Shaft seal   |            |                      |
|                                       | Replace: Other seals  |            |                      |

## 10 Repairs

### 10.1 Safety instructions for repair

#### DANGER

**Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.

#### DANGER

**Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.

#### WARNING

**Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.

#### CAUTION

**Hot surfaces!**

Burn injury to skin if touched.

1. At temperatures  $\geq 48^{\circ}\text{C}$  the device must be allowed to cool down first.

## 10.1.1 Special hazards



### DANGER

#### Powerful magnetic field

Danger of death for people with heart pacemakers.

1. Maintain a safety clearance of at least 2 m to the unmounted components of the magnetic coupling.
2. Maintain a safety clearance of at least 0.5 m to assembled couplings with axially aligned magnetic rotors and surrounding coupling housing (bell housing).



### WARNING

#### Powerful magnetic field

Danger of injury due to uncontrolled mutual attraction of magnetic parts or parts that can be magnetized.

1. When performing any work, bear in mind the magnetic forces which occur, especially within 0.5 m of the magnetic coupling.



### NOTICE

#### Powerful magnetic field

Magnetic data carriers (discs, credit cards, etc.) can be damaged or erased by magnetic fields.

1. Maintain a minimum clearance of 1 m to the magnetic field.

## 10.2 General

### The repairs covers:

1. Troubleshooting  
Determination of damage, pinpointing and localisation of the damage cause.
2. Elimination of damage  
Elimination of the primary causes and replacement or repair of defective components. The repair is generally made by the manufacturer.

### Repairs by manufacturer

- Before returning the device, fill in the *return notification* form. The form can be filled in online and is available as a pdf file download.



#### Device contains hazardous material

If the device was operated with dangerous liquids, it must be cleaned before the return. If this should not be possible, the safety data sheet of the hazardous material is to be provided beforehand.

### Repair by equipment builder/operator

If corresponding expertise and sufficient equipment is available, the equipment builder/operator can also make the repairs. Please consult the manufacturer about this.

- If required, request spare parts lists and assembly drawings from the manufacturer.
- Use spare parts approved by the manufacturer only.
- Dispose of packing material and used parts in accordance with the local stipulations.



#### Warranty

In case of improper implementation, any warranty is voided.



#### Barriers and instructions

All barriers and warning signs removed during this must be attached to their original position on completing maintenance and/or repairs.

## 10.3 Detecting and eliminating failures

| Failure |   | Potential causes   | Possible measures  |
|---------|---|--|--|
| 1.1     | <b>Increased noise</b><br><i>Pump cavitation</i>          | Excessive negative pressure (not complete filling of the pump) | Check suction line design<br>Use noise-optimised pump                |
|         |   | Suction line plugged   | Clean the suction line   |
|         |   | Suction filter plugged or too small                            | Clean suction filter or use a larger filter                          |
|         |   |  | Replace filter element   |
|         |   | Suction bascet plugged or too small                            | Clean intake strainer or dimension larger                            |
|         |   | Fluid temperature too low                                      | Adjust the temperature of medium                                     |
| 1.2     | <b>Increased noise</b><br><i>Foaming or air in medium</i> | Pump sucks air   | Check oil level in the tank  |
|         |   |  | Check suction line   |
|         |   |  | Check the shaft seal   |
|         |   | Shaft seal defective   | Replace shaft seal   |
|         |   | Suction connection leaking                                     | Retighten or replace threaded connections                            |
|         |   |  | Replace seals  |
|         |   | System not vented  | Vent system  |
|         |   | Return line ends above the fluid level                         | Extend return line   |
| 1.3     | <b>Increased noise</b><br><i>Mechanical vibrations</i>    | Incorrectly aligned and/or loose coupling                      | Correct the alignment of the coupling and secure the coupling halves |
|         |   | Incorrectly and/or insufficient line fastening                 | Fixate lines with suitable fastening material (e.g. pipe clamps)     |
|         |   | Wobbling pressure relief valve (if existing)                   | Increase valve opening pressure                                      |
|         |   | Not a noise-reducing setup                                     | Use dampers  |

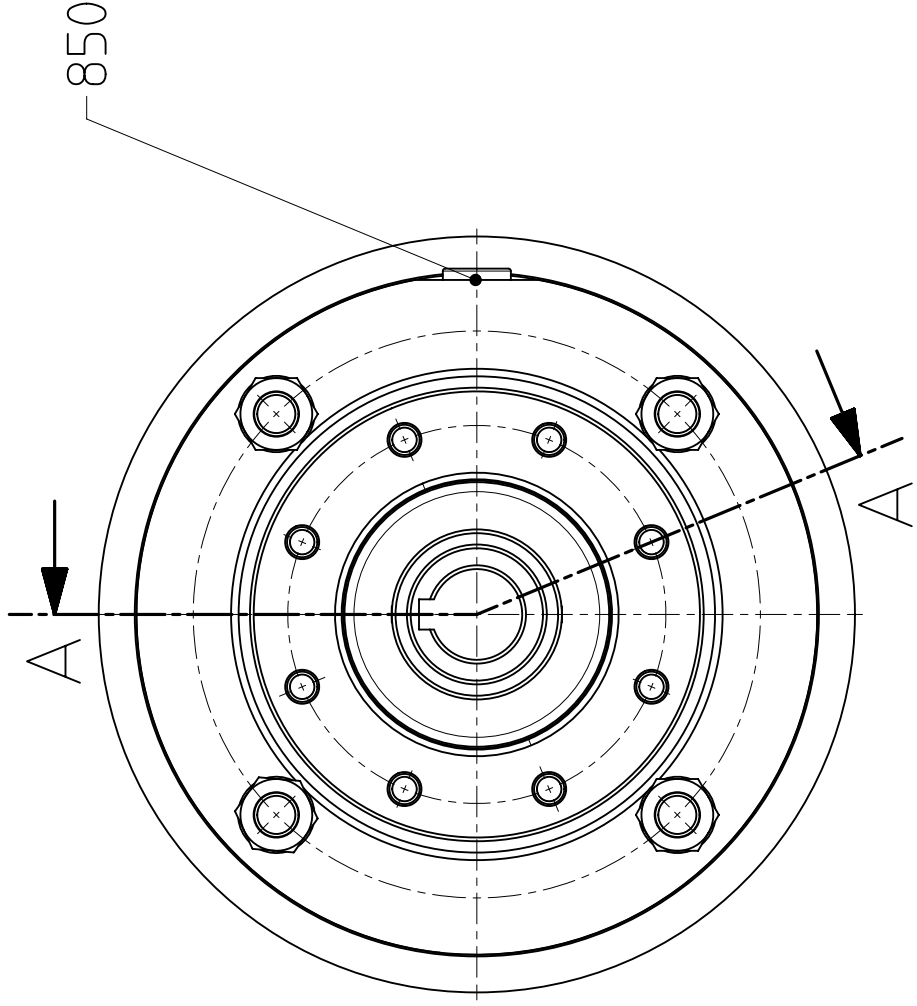
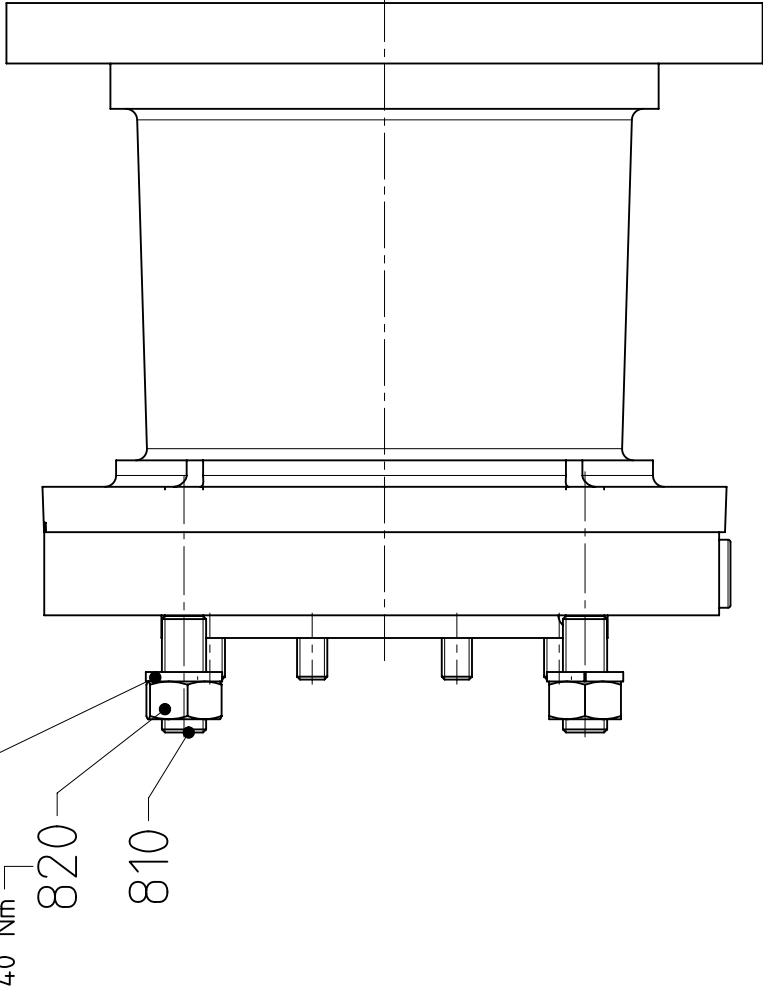
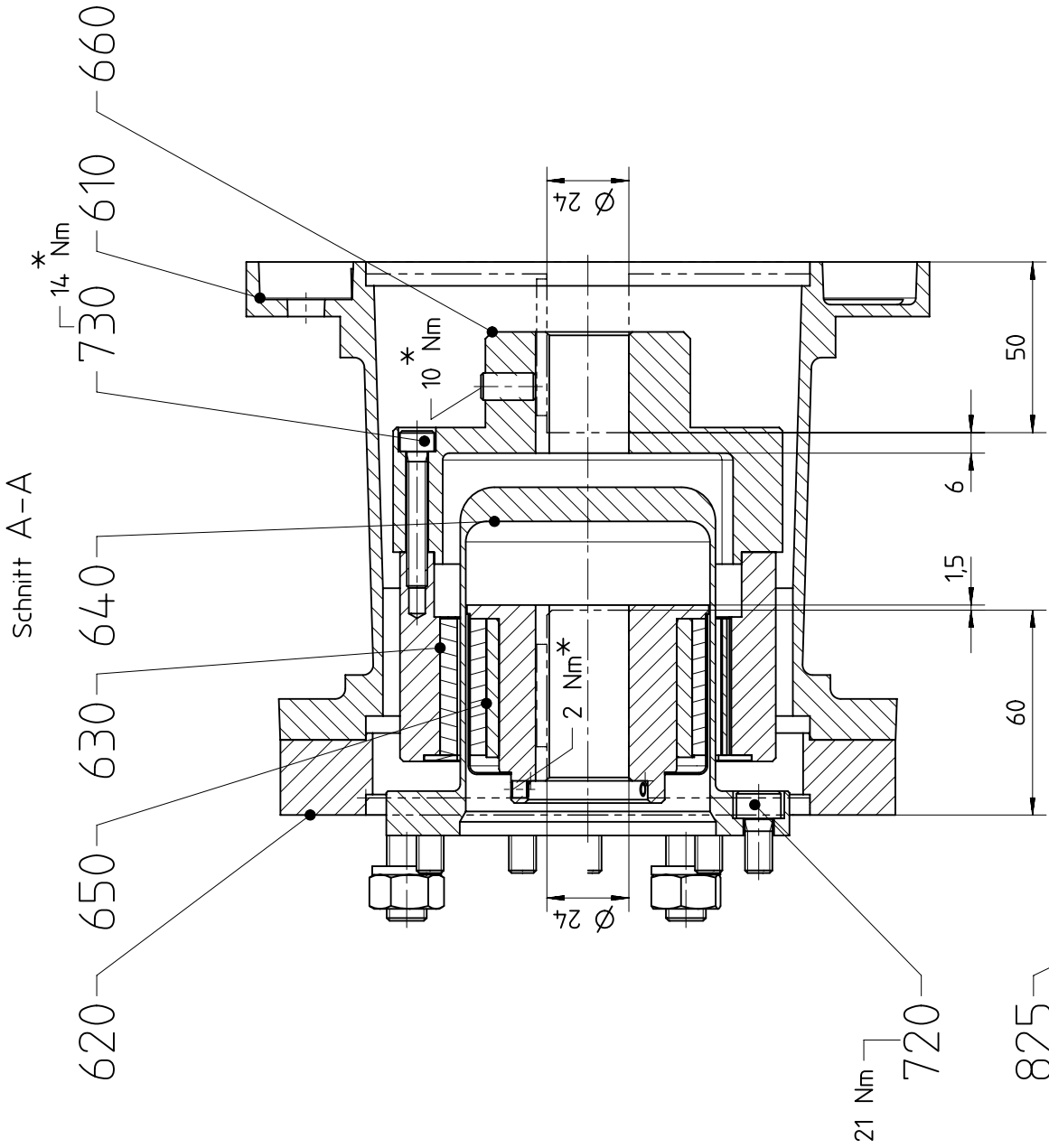
| Failure |                    | Potential causes  | Possible measures   |
|---------|--------------------|---|---|
| 2       | Pump does not suck | Dry run   | Fill pump and the suction line with medium.                             |
|         |                    | Minimum filling level in the supply tank undercut                     | Top up medium   |
|         |                    | False direction of rotation of the pump                               | Correct the direction of rotation                                       |
|         |                    | Closed shut-off element in the suction line                           | Open the shut-off element   |
|         |                    | Suction line plugged  | Clean the suction line  |
|         |                    | The air in the suction line cannot be compressed in the pressure line | Reduce the start-up pressure  |
|         |                    |   | Vent the pressure line  |
|         |                    |   | Increase volume of the pressure line                                    |
|         |                    | Speed of the pump is too low  | Check the pump design   |
|         |                    |   | During frequency inverter operation: Check the operation/line frequency |
|         |                    | Geodetic suction head too high  | Check installation location   |
|         |                    |   | Provide pre-filling pump  |

| Failure |   | Potential causes  | Possible measures   |
|---------|---|---|---|
| 3       | <b>Insufficient pressure<br/>Insufficient pumping flow rate</b> | Excessive negative pressure (not complete filling of the pump)                            | Check suction line design   |
|         |   | Viscosity too high  | Provide pre-filling pump  |
|         |   | Speed of the pump is too low  | Check the pump design   |
|         |   |   | During frequency inverter operation: Check the operation/line frequency |
|         |   | Throttled shut-off element in the suction line  | Open the shut-off element   |
|         |   | Suction line plugged  | Clean the suction line  |
|         |   | Suction filter plugged or too small   | Clean suction filter or use a larger filter                             |
|         |   |   | Replace filter element  |
|         |   | Suction bascet plugged or too small   | Clean intake strainer or dimension larger                               |
|         |   | Constant triggering of pressure relief valve (if existing)                                | Increase valve opening pressure   |
|         |   | Pump sucks air  | Check oil level in the tank   |
|         |   |   | Check suction line  |
|         |   |   | Check the shaft seal  |
|         |   | Wear  | Replace the device  |
| 4       | <b>Excessive operating temperature</b>                          | Cooling and heat dissipation insufficient   | Increase the cooling capacity   |
|         |   | Not sufficient oil in the system  | Check the container layout  |
|         |   | Excess fluid is being delivered into the supply tank via pressure relief valve under load | Check the pump design   |
| 5       | <b>Impermissible pump heating</b>                               | Constant triggering of a directly attached pressure relief valve (if existing)            | Increase valve opening pressure   |
|         |   | Pressure too high in association with a media viscosity that is too low                   | Check the system design   |
|         |   | Speed too fast in connection with media viscosity that is too high                        | Check the system design   |
|         |   | Suction pressure too high   | Reduce the pressure   |
|         |   | Wear  | Replace the device  |

| Failure |  | Potential causes  | Possible measures  |
|---------|--|---|--|
| 6       | <b>Leakages</b><br><i>Seal failure</i>   | Poor maintenance  | Comply with maintenance plan<br>Replace seals                  |
|         |  | Mechanical damage   | Replace seals  |
|         |  | Thermal overload  | Check the operating datas<br>Replace seals                     |
|         |  | Pressure too high   | Check the operating datas<br>Replace seals                     |
|         |  | Gas content in medium too high  | Check the operating datas<br>Replace seals                     |
|         |  | Corrosion/chemical impact   | Check the material compatibility<br>Replace seals              |
|         |  | Wrong direction of rotation   | Correct the direction of rotation<br>Replace seals             |
|         |  | Contaminated medium   | Provide filtration<br>Replace seals                            |
|         |  | Loose threaded connections  | Retighten or replace threaded connections                      |
| 7.1     | <b>Magnetic coupling</b><br><i>Change in operating noise and/or the occurrence of vibrations</i> | Alignment error   | See: Operating/installation instructions for magnetic coupling |
|         |  | Breakdown of the magnetic forces  |  |
|         |  | Damaged exterior magnets due to assembly error (external rotor striking the containment shroud) |  |
| 7.2     | <b>Magnetic coupling</b><br><i>Repeated breakdown of the magnetic forces</i>                     | Operating parameters do not match the coupling power  |  |
|         |  | Excessive operating temperature   |  |
|         |  | Abrasive particles in the pumping medium that block the pump                                    |  |
| 8       | <b>Motor protection switch tripped</b>   | Driving power too low   | Check the drive design   |
|         |  | Motor incorrectly connected   | Check motor connection   |
|         |  | Phase failure   | Check feed/supply  |
|         |  | Current consumption too high  | Check the operating datas                                      |
|         |  |   | Check direction of rotation                                    |
|         |  | Motor circuit breaker incorrectly designed  | Check the operating datas                                      |

| Failure   | Potential causes | Possible measures |
|---|------------------|-------------------|
| Consult the manufacturer for all unidentifiable failures. |                  |                   |

Schnitt A-A



\* Gesichert mit Loctite 243 (Pos. 350)  
Secured with loctite 243 (item 350)

Montageanleitung: D.003040...  
mounting instruction:

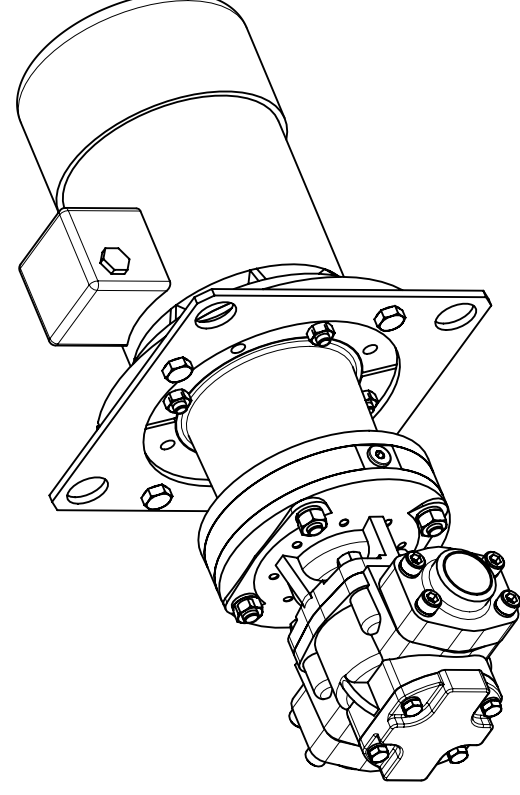
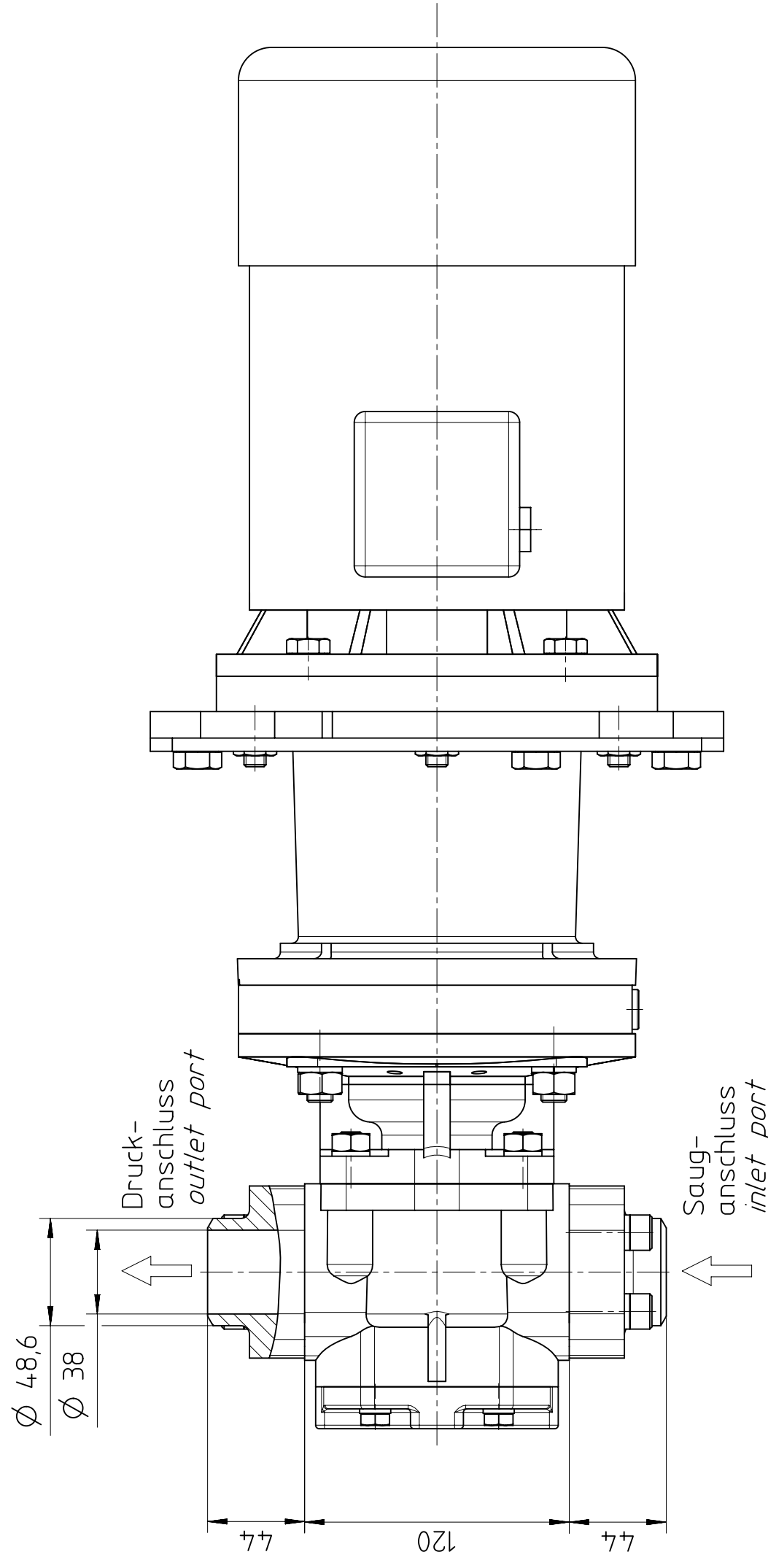
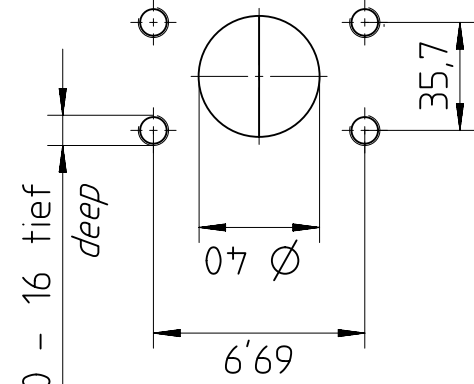
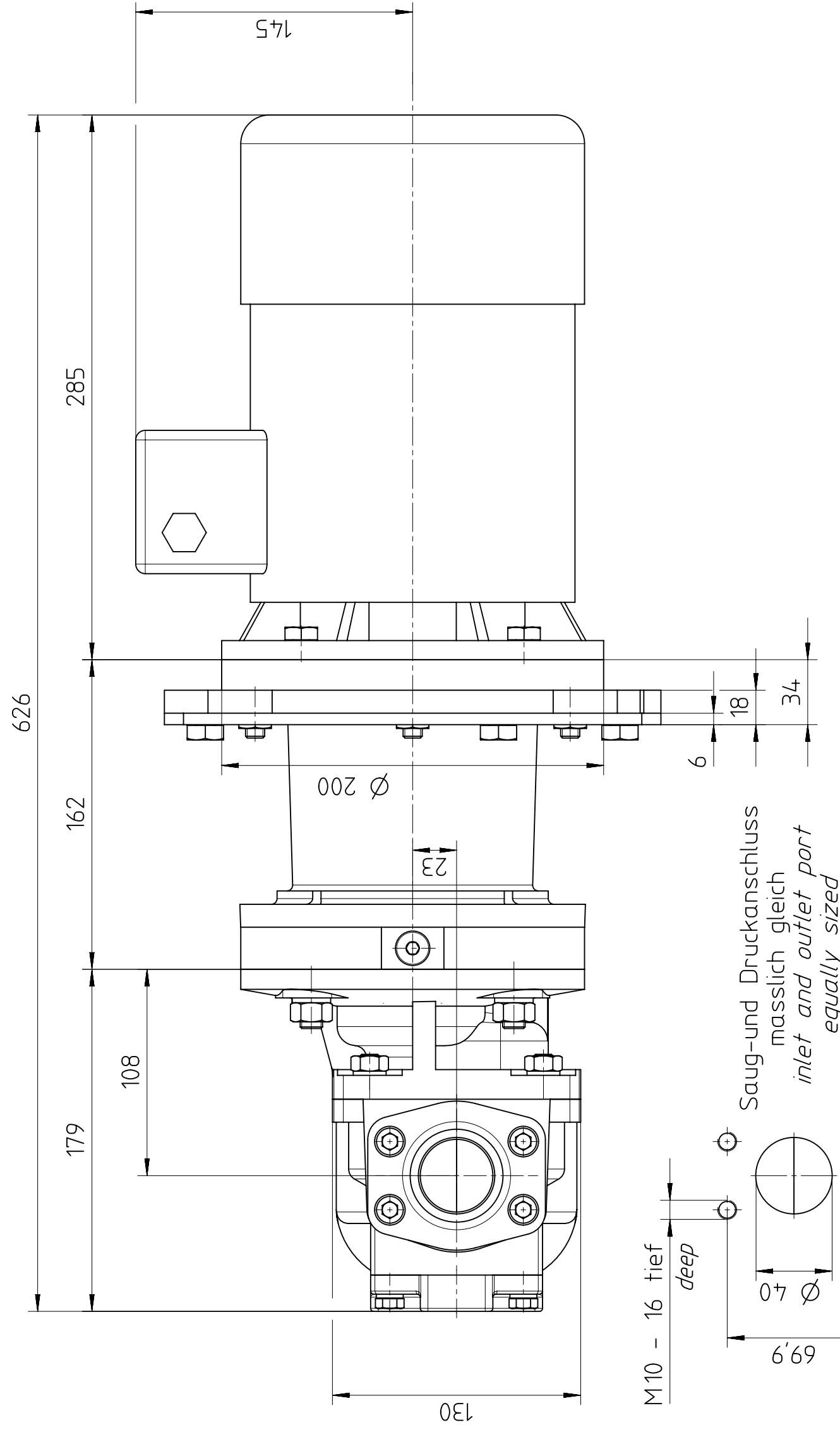
Bezeichnung / description  
MSB75-A4-IEC90-KF3I.

|                             |              |            |                      |                 |              |            |           |
|-----------------------------|--------------|------------|----------------------|-----------------|--------------|------------|-----------|
| 02                          | ---x         | ----       | Montagemaße ergaenzt |                 |              | 15.07.2015 | Brascheit |
| Ae-Ind                      | Ae-Nr        | Ae-Ind     | Ae-Nr                | Ae-Ind          | Ae-Nr        | Datum      | Name      |
| Massstab                    | Scale        | 1:2        | Werkstoff            | DIN-Designation | Werkstoff    | Blank-No   |           |
| Gewicht                     | Weight       | 9,99 kg    | W.-stoff-Nr.         | Material-No     | W.-stoff-Nr. | Drw-No     |           |
| Bearb. Drawn                | Datum        | 07.08.2013 | Freigabevermerk      | Serie           | 24.07.2015   |            |           |
| Gepr. Checked               | 07.08.2013   | HoKi       | Neuteilmeldung-Nr.   |                 |              |            |           |
| Form- & Lagetol. nach       | DIN ISO 1101 |            |                      |                 |              |            |           |
| Tol. of Form & Pos. acc. to |              |            |                      |                 |              |            |           |
| Freimassfol. nach           |              |            |                      |                 |              |            |           |
| No specified Tol. acc. to   |              |            |                      |                 |              |            |           |
| Urheberschutz nach          | DIN 34       |            |                      |                 |              |            |           |
| Copyright acc. to           |              |            |                      |                 |              |            |           |
| Oberflächenrauheit nach     | DIN ISO 1302 |            |                      |                 |              |            |           |
| Surface Roughness acc. to   |              |            |                      |                 |              |            |           |
| Masse in mm                 | Ø = Diameter |            |                      |                 |              |            |           |
| Dimensions in mm            |              |            |                      |                 |              |            |           |

Benennung & Verwendung Description & Application  
BG-Magnetkupplung  
Assembly magnetic coupling

Zeichn.-Nr. 3120014.0029/3  
Drawing-No.  
Teile-Nr. B020014.0029  
Part-No.  
Ersatz fuer Replacement for

02

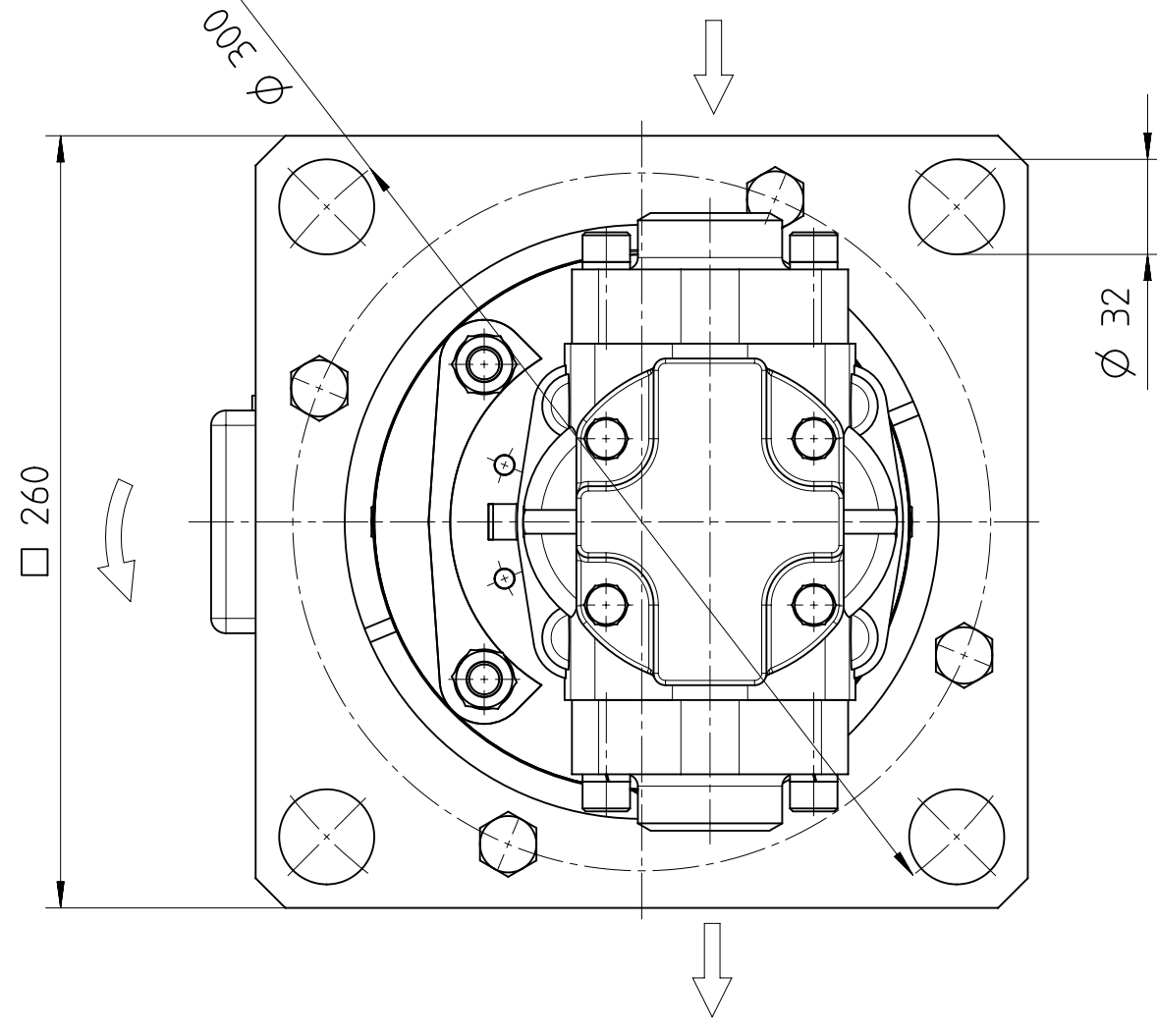


|                     |  |
|---------------------|--|
| <u>Techn. Daten</u> | <u>technical data</u>  |
| Betriebsdruck       | operating pressure   |
|                     | Saugseite <i>inlet port</i> p max = 60 bar                   |
|                     | Druckseite <i>outlet port</i> p max = 63 bar                 |
|                     | Δ p max = 6 bar  |
| Foerderstrom        | discharge flow   |
|                     | Q = 82 / 100 l/min ( Δ p = 3 bar, ν = 34 mm <sup>2</sup> /s) |
| Gesamtgewicht       | total weight   |
|                     | 47 kg  |

|                           |  |                             |  |                   |  |        |  |
|---------------------------|--|-----------------------------|--|-------------------|--|--------|--|
|                           |  | X                           |  |                   |  | Remark |  |
| Ae-Ind                    |  | Ae-Nr                       |  | Aenderungsvermerk |  |        |  |
| Massstab                  |  | Scale                       |  | 1:2,5             |  |        |  |
| Gewicht                   |  | Weight                      |  | kg                |  |        |  |
| Datum                     |  | Name                        |  |                   |  |        |  |
| Bearb. Drawn              |  | 23.07.2015                  |  | Blir              |  |        |  |
| Gepr. checked             |  | 23.07.2015                  |  | Klaas             |  |        |  |
| Form- & Lagerl. nach      |  | Tot. of Form & Pos. acc. to |  | DIN ISO 1101      |  |        |  |
| Freimasst. nach           |  | No specified Tol. acc. to   |  |                   |  |        |  |
| Unrueberschutz nach       |  | Copyright acc. to           |  |                   |  |        |  |
| Quertagelienrauhheit nach |  | Surface roughness to        |  | DIN ISO 1302      |  |        |  |
| Maasse in mm              |  | Dimensions in mm            |  | Ø = Diameter      |  |        |  |
|                           |  |                             |  |                   |  |        |  |

PE-KF 3/63 F10B N0A 7VP62/346  
+ MSB75-A4-IEC90-KF3/

|                  |                      |  |
|------------------|----------------------|--|
| Motorfabrikat    | motor make           | : ADDA   |
| Type             | type                 | : TFC 90L-4 - IE2                                      |
| Baugroesse       | frame size           | : 90 L   |
| Bauform          | mounting arrangement | : IM V1  |
| Schutzart        | protection class     | : IP 55  |
| Stromart         | kind of current      | : 3~   |
| Frequenz         | frequency            | : 50/60 Hz   |
| Drehzahl         | speed                | : 14,50/1720 1/min                                     |
| Leistung         | power                | : 1,5/1,73 kW  |
| Spannung         | voltage              | : 220-245/380-420V<br>220-280/380-480V<br>50Hz<br>60Hz |
| Rechteckflansch  | rectangular flange   | : E.0231310001   |
| Adapterflansch   | adapter flange       | : E.0231300001   |
| Schweissflansch  | welding flange       | : SAE 1 1/2"-S   |
| Dichtungen       | seals                | : CR   |
| Grasso-Ident-Nr. | 456098138            |  |









TECHTOP ADDA MOTOR GmbH



ISTRUZIONI D'USO E  
MANUTENZIONE  
DEI MOTORI ASINCRONI

OPERATING AND  
MAINTENANCE INSTRUCTIONS  
FOR ASYNCHRONOUS MOTORS

BETRIEBS-UND  
WARTUNGSANLEITUNG  
FÜR ASYNCHRONMOTOREN

MODES D'EMPLOI  
ET ENTRETIEN  
POUR MOTEURS ASYNCHRONES

INSTRUCCIONES PARA  
EMPLEO Y MANUTENCIÓN DE  
LOS MOTORES ASÍNCRONOS

# MACCHINE ELETTRICHE ROTANTI • ELECTRIC ROTARY MACHINES • ROTIERENDE ELEKTRISCHE DREHMASCHINEN • MACHINES ÉLECTRIQUES TOURNANTES • MAQUINAS ELÉCTRICAS ROTATORIAS



**Motori asincroni trifasi con rotore a gabbia.** Costruzione chiusa. Ventilazione esterna. Grandezze 56 ÷ 560. Potenze 0,06 ÷ 1000 kW.

**Asynchronous three-phase motors with squirrel cage rotor.** Enclosed construction. External ventilation. Sizes 56 to 560. Power 0,06 to 1000 kW.

**Drehstrom-Asynchronmotoren mit Käfigläufer.** Geschlossene Ausführung. Oberflächenkühlung. Baugrößen 56 bis 560. Leistung 0,06 ÷ 1000 kW.

**Moteurs asynchrones triphasés avec rotor à cage.** Construction fermée. Ventilation extérieure. Hauteur d'axe 56 ÷ 560. Puissances 0,06 ÷ 1000 kW.

**Motores asíncronos trifásicos con rotor en jaula.** Construcción cerrada. Ventilación exterior. Tamaños 56 ÷ 560. Potencias 0,06 ÷ 1000 kW.



**Motori asincroni trifasi autofrenanti.** Costruzione chiusa. Ventilazione esterna. Con freno elettromagnetico in corrente alternata. Grandezze 63 ÷ 200. Potenze 0,15 ÷ 37 kW.

**Asynchronous three-phase brake motors.** Enclosed construction. External ventilation. With alternate current electromagnetic brake. Size

63 to 200. Power 0,15 to 37 kW.

**Drehstrom-Asynchronmotoren mit angebauter Bremse.** Geschlossene Ausführung. Oberflächenkühlung. Mit elektromagnetischer Drehstrom-Federdruck-Scheibenbremse. Baugrößen 63 bis 200. Leistung 0,15 bis 37 kW.

**Moteurs asynchrones triphasés avec frein.** Construction fermée. Ventilation extérieure. Frein électromagnétique en courant alternatif. Hauteur d'axe 63 ÷ 200. Puissances 0,15 ÷ 37 kW.

**Motores asíncronos trifásicos autofrenantes.** Construcción cerrada. Ventilación exterior. Con freno electromagnético en corriente alterna. Tamaños 63 ÷ 200. Potencias 0,15 ÷ 37 kW.



**Motori asincroni trifasi autofrenanti.** Costruzione chiusa. Ventilazione esterna. Con freno elettromagnetico in corrente continua. Grandezze 63 ÷ 160. Potenze 0,15 ÷ 15 kW.

**Asynchronous three-phase brake motors.** Enclosed construction. External ventilation. With direct current electromagnetic brake. Sizes 63

to 160. Power 0,15 to 15 kW.

**Drehstrom-Asynchronmotoren mit angebauter Bremse.** Geschlossene Ausführung. Oberflächenkühlung. Mit elektromagnetischer Gleichstrom-Einflächen-Scheibenbremse. Baugrößen 63 bis 160. Leistung 0,15 bis 15 kW.

**Moteurs asynchrones triphasés avec frein.** Construction fermée. Ventilation extérieure. Frein électromagnétique en courant continu. Hauteur d'axe 63 ÷ 160. Puissances 0,15 ÷ 15 kW.

**Motores asíncronos trifásicos autofrenantes.** Construcción cerrada. Ventilación exterior. Con freno electromagnético en corriente continua. Tamaños 63 ÷ 160. Potencias 0,15 ÷ 15 kW.



**Motori asincroni trifasi autofrenanti.** Costruzione chiusa. Ventilazione esterna. Con freno elettromagnetico in corrente continua ad alta coppia. Grandezze 63 ÷ 112 – Potenze 0,15 ÷ 5,5 kW.

**Asynchronous three-phase brake motors.** Enclosed construction. External ventilation. With direct current electromagnetic brake with high torque. Sizes 63 to 112 – Power 0,5 to 5,5 kW.

**Drehstrom-Asynchronmotoren mit angebauter Bremse.** Geschlossene Ausführung. Oberflächenkühlung. Mit elektromagnetischer Gleichstrom-Einflächen-Scheibenbremse mit höherem Bremsmoment. Baugrößen 63 bis 112 - Leistung 0,15 bis 5,5 kW.

**Moteurs asynchrones triphasés avec frein.** Construction fermée. Ventilation extérieure. Frein électromagnétique en courant continu avec couple élevé. Hauteur d'axe 63 ÷ 112 - Puissances 0,15 ÷ 5,5 kW.

**Motores asíncronos trifásicos autofrenantes.** Construcción cerrada. Ventilación exterior. Con freno electromagnético en corriente continua con alta torsión. Tamaños 63 ÷ 112 - Potencias 0,15 ÷ 5,5 kW.



**Motori asincroni trifasi autofrenanti.** Costruzione chiusa. Ventilazione esterna. Con freno elettromagnetico in corrente continua ad alta coppia e bassa rumorosità. Grandezze 63 ÷ 180 - Potenze 0,18 ÷ 25 kW.

**Asynchronous three-phase brake motors.** Enclosed construction. External ventilation. With direct current electromagnetic brake with high torque and low noise execution. Sizes 63 to 180 - Power 0,18 to 25 kW.

**Drehstrom-Asynchronmotoren mit angebauter Bremse.** Geschlossene Ausführung. Oberflächenkühlung. Mit elektromagnetischer Gleichstrom-Einflächen-Scheibenbremse mit höherem Bremsmoment und geräuscharmer Ausführung. Baugrößen 63 bis 180 - Leistung 0,18 bis 25 kW.

**Moteurs asynchrones triphasés avec frein.** Construction fermée. Ventilation extérieure. Frein électromagnétique en courant continu avec couple élevé et bruit réduit. Hauteur d'axe 63 ÷ 180 - Puissances 0,18 ÷ 25 kW.

**Motores asíncronos trifásicos autofrenantes.** Construcción cerrada. Ventilación exterior. Con freno electromagnético en corriente continua con alta torsión y ruido reducido. Tamaños 63 ÷ 180 - Potencias 0,18 ÷ 25 kW.



**Motori asincroni monofasi con rotore a gabbia.** Costruzione chiusa. Ventilazione esterna. Grandezze 56 ÷ 112. Potenze 0,06 ÷ 4 kW.

**Asynchronous single-phase motors with squirrel cage rotor.** Enclosed construction. External ventilation. Sizes 56 to 112 - Power 0,06 to 4 kW.

**Einphasen-Wechselstrommotoren mit Käfigläufer.** Geschlossene Ausführung. Oberflächenkühlung. Baugrößen 56 bis 112 - Leistung 0,06 bis 4 kW.

**Moteurs asynchrones monophasés avec rotor à cage.** Construction fermée. Ventilation extérieure. Hauteur d'axe 56 ÷ 112 - Puissances 0,06 ÷ 4 kW.

**Motores asíncronos monofásicos con rotor en jaula.** Construcción cerrada. Ventilación exterior. Tamaños 56 ÷ 112 - Potencias 0,06 ÷ 4 kW.



**Motori asincroni trifasi con rotore a gabbia antideflagranti.** Costruzione chiusa. Ventilazione esterna. Serie PE-EEx d. Grandezze 71 ÷ 200 - Potenze 0,37 ÷ 37 kW.

**Explosion-proof asynchronous three-phase motors with squirrel cage rotor.** Enclosed construction. External ventilation. Series PE-EEx d. Sizes 71 to 200 - Power 0,37 to 37 kW.

**Drehstrom-Asynchronmotoren mit Käfigläufer - Explosionsgeschützt, druckfeste Kapselung.** Geschlossene Ausführung. Oberflächenkühlung. Typenreihe PE-EEx d. Baugrößen 71 bis 200 - Leistung 0,37 bis 37 kW.

**Moteurs asynchrones triphasés avec rotor à cage antidéflagrants.** Construction fermée. Ventilation extérieure. Série PE-EEx d. Hauteur d'axe 71 ÷ 200 - Puissances 0,37 ÷ 37 kW.

**Motores asíncronos trifásicos con rotor en jaula antideflagrantes.** Construcción cerrada. Ventilación exterior. Serie PE-EEx d. Tamaños 71 ÷ 200 - Potencias 0,37 ÷ 37 kW.



**Motori asincroni trifasi con rotore avvolto.** Costruzione chiusa. Ventilazione esterna. Grandezze 100 ÷ 500 - Potenze 0,75 ÷ 530 kW.

**Asynchronous three-phase motors with wound rotor.** Enclosed construction. External ventilation. Sizes 100 to 500 - Power 0,75 to 530 kW.

**Drehstrom-Schleifringläufermotoren.** Geschlossene Ausführung. Oberflächenkühlung. Baugrößen 100 bis 500 - Leistung 0,75 bis 530 kW.

**Moteurs asynchrones triphasés avec rotor bobiné.** Construction fermée. Ventilation extérieure. Hauteur d'axe 100 ÷ 500 - Puissances 0,75 ÷ 530 kW.

**Motores asíncronos trifásicos con rotor enrollando.** Construcción cerrada. Ventilación exterior. Tamaños 100 ÷ 500 - Potencias 0,75 ÷ 530 kW.



## **MACCHINE AD ALTA FREQUENZA**

**6\* Convertitori di frequenza asincroni trifasi.** Costruzione chiusa. Ventilazione esterna. Grandezze 100 ÷ 355 - Potenze 0,5 ÷ 110 kVA.

**6<sup>◇</sup> Motori ad Alta Frequenza.** Costruzione chiusa. Costruzione chiusa e ventilata.

## **HIGH-FREQUENCY MACHINES**

**6\* Asynchronous three-phase frequency converters.** Enclosed construction. External ventilation. Sizes 100 to 355 - Power 0,5 to 110 kVA.

**6<sup>◇</sup> High-frequency motors.** Enclosed construction. Enclosed and ventilated construction.

## **HOCHFREQUENZMASCHINEN.**

**6\* Rotierende Drehstrom-Frequenzumformer.** Geschlossene Ausführung. Oberflächenkühlung. Baugrößen 100 bis 355 - Leistung 0,5 bis 110 kVA.

**6<sup>◇</sup> Hochfrequenzmotoren.** Geschlossene Ausführung. Geschlossene Ausführung mit Oberflächenkühlung.

## **MACHINES À HAUTE FRÉQUENCE**

**6\* Convertisseurs de fréquences asynchrones triphasés.** Construction fermée. Ventilation extérieure. Hauteur d'axe 100 ÷ 355 - Puissances 0,5 ÷ 110 kVA.

**6<sup>◇</sup> Moteurs à haute fréquence.** Construction fermée. Construction fermée et avec ventilation.

## MÁQUINAS DE ALTA FRECUENCIA

**6\* Convertidores de frecuencia asíncronos trifásicos.** Construcción cerrada. Ventilación exterior. Tamaños 100 ÷ 355 - Potencias 0,5 ÷ 110kVA.

**6<sup>◊</sup> Motores de alta frecuencia.** Construcción cerrada. Construcción cerrada y con ventilación.



**Motori asincroni trifasi per seghe circolari.** Costruzione chiusa. Ventilazione esterna. Grandezze 71 ÷ 125 - Potenze 0,75 ÷ 25,8 kW.

**Asynchronous three-phase motors for circular saws.** Enclosed construction. External ventilation. Sizes 71 to 125 - Power 0,75 to 25,8 kW.

**Drehstrom-Flachmotoren (Spezialkreissägemotoren) in der Holz-Kunststoff und Metallverarbeitung.** Geschlossene Ausführung. Oberflächenkühlung. Baugrößen 71 bis 125 - Leistung 0,75 bis 25,8 kW.

**Moteurs asynchrones triphasés pour scies circulaires.** Construction fermée. Ventilation extérieure. Hauteur d'axe 71 ÷ 125 - Puissances 0,75 ÷ 25,8 kW.

**Motores asíncronos trifásicos para sierras circulares.** Construcción cerrada. Ventilación exterior. Tamaños 71 ÷ 125 - Potencias 0,75 ÷ 25,8 kW.



**Motori asincroni trifasi con rotore a gabbia antishock.** Costruzione chiusa. Ventilazione esterna. Esecuzione speciale antishock a norme M.M.I. Grandezze 71 ÷ 355 - Potenze 0,15 ÷ 250 kW.

**Asynchronous three-phase motors with shock-free cage motor.** Enclosed construction. External ventilation. Special shock-free design to Italian Navy standards. Sizes 71 to 355 - Power 0,15 to 250 kW.

**Drehstrom-Asynchronmotoren mit Käfigläufer, schockfest.** Geschlossene Ausführung. Oberflächenkühlung. Schockfeste Spezialausführung nach den Normen der italienischen Kriegsmarine M.M.I. Baugrößen 71 bis 355 - Leistung 0,15 bis 250 kW.

**Moteurs asynchrones triphasés avec rotor à cage antishock.** Construction fermée. Ventilation extérieure. Exécution spéciale antishock suivant normes M.M.I. Hauteur d'axe 71 ÷ 355 - Puissances 0,15 ÷ 250 kW.

**Motores asíncronos trifásicos con rotor en jaula antishock.** Construcción cerrada. Ventilación exterior. Ejecución especial antishock según normas M.M.I. Tamaños 71 ÷ 355 - Potencias 0,15 ÷ 250 kW.



**Altre costruzioni:** Motori mandrino. Variatori di tensione. Rulli ruotanti. Elettroventilatori. Convertitori statici di frequenza.

**Other constructions:** Spindle motors. Voltage changers. Rotary rollers. Electric fans. Frequency inverters.

**Andere Anfertigungen:** Spindelmotoren. Spannungsregler. Trommelmotoren/Aussenläufer. Ventilatoren. Statische Frequenzumrichter.

**Autres constructions:** Moteurs mandrin. Variateurs de tension. Rouleaux rotatifs. Electroventilateurs. Convertisseurs de fréquence statiques.

**Otras construcciones:** Motores mandril. Variadores de tensión. Rodillos giratorios. Electroventiladores. Convertidores de frecuencia estáticos.

## MOTORI ELETTRICI ASINCRONI TRIFASI

**Istruzioni d'esercizio e manutenzione.** Le condotte e su tendi-cinghia per poter presenti istruzioni hanno lo scopo di regolare la tensione delle cinghie. Tenere indicare agli installatori ed agli utilizzatori ben presente che una tensione eccessiva le corrette condizioni d'impiego e di è nociva alla durata dei cuscinetti e, nei manutenzione di motori asincroni trifasi casi più gravi, può provocare la rottura chiusi con ventilazione esterna e rotore a dell'albero.

**Come si ricevono e si immagazzinano i motori.** Il motore esce dalla fabbrica dopo controlli di qualità durante il ciclo di produzione e un collaudo finale per accertarne la rispondenza alle specifiche di progetto, pronto per l'installazione. Al momento della ricezione si raccomanda di esaminare il motore per verificare che non abbia subito danni durante il trasporto. Se il motore non viene posto immediatamente in servizio dovrà essere immagazzinato in un luogo coperto, pulito, privo di umidità e vibrazioni.

**Installazione.** Installare il motore in un locale ventilato, evitando che le vicinanze di pareti o di altre macchine impedisca la ventilazione. Prevedere la possibilità di ispezioni e manutenzioni durante il funzionamento. La fondazione del motore deve essere piana, robusta in modo d'assorbire le vibrazioni, sufficientemente rigida da mantenere l'allineamento.

**Allineamento.** Il motore deve essere sempre ben allineato, soprattutto se accoppiato direttamente alla macchina condotta. In caso di vibrazioni o guasti dei cuscinetti controllare immediatamente l'allineamento che potrebbe essere disassato.

**Accoppiamenti.** La trasmissione di potenza alla macchina operatrice può avvenire con accoppiamento diretto o con cinghie di trasmissione. Nel caso di accoppiamento diretto si deve usare un giunto elastico o un giunto flessibile, che eviti la trasmissione di eventuali spinte assiali ai cuscinetti. Nel caso di accoppiamento con cinghie di trasmissione installare il motore con l'albero parallelo a quello della macchina

**Equilibratura e montaggio degli accoppiamenti e delle pulegge.** Salvo diversa indicazione, il rotore è equilibrato dinamicamente con mezza chiavetta nell'estremo libero dell'albero.

I massimi livelli di vibrazione sono:

| Grandezza motore | Valore efficace livello di vibrazione mm/s a 600-3600 g/m |
|------------------|---|
| 80 – 132         | 1,8   |
| 160 – 225        | 2,8   |
| 250 – 400        | 4,5   |

Bilanciare accuratamente l'organo di trasmissione con mezza chiavetta prima del montaggio.

Il montaggio degli accoppiamenti e delle pulegge deve essere fatto con particolari precauzioni al fine di evitare urti che possano danneggiare i cuscinetti.

**Prova di isolamento.** Prima della messa in servizio e dopo lunghi periodi di inattività o immagazzinamento è consigliabile la misura della resistenza d'isolamento dell'avvolgimento che dovrà essere maggiore di 5 M  $\Omega$  con temperatura ambiente di 25 ° C.

Se non si riscontra il valore indicato l'avvolgimento è umido e lo si dovrà essiccare ricorrendo ad una ditta specializzata.

**Collegamento elettrico.** Per il collegamento elettrico rispettare le norme di sicurezza vigenti e verificare che i dati di targa siano conformi alle caratteristiche del circuito a cui il motore deve essere collegato.

Eseguire il collegamento secondo gli schemi **1 2 3 4 5**

**Collegamento a terra.** All'interno della scatola morsetti o vicino ad essa è collocato in posizione visibile il morsetto per il collegamento a terra che deve essere fatto tramite un filo di rame di sezione adeguata secondo le norme vigenti.

**Senso di rotazione.** I motori di serie posso funzionare indifferentemente nei due sensi di rotazione. Se si collega la rete ai morsetti U1 V1 W1 e se la sequenza di fase della rete è 1,2,3, il motore gira in senso orario guardando dal lato accoppiamento.

Si può invertire il senso di rotazione scambiando tra loro due qualsiasi dei tre conduttori collegati al motore.

**Protezioni elettriche.** I motori devono essere protetti contro gli effetti dei corto circuiti, dei sovraccarichi che si verificano in esercizio, della marcia monofase installando a monte un interruttore opportunamente dimensionato provvisto di relè termico tarato per la corrente nominale di targa.

Per aumentare la sicurezza di esercizio in caso di servizi particolarmente gravosi si possono installare, a richiesta, negli avvolgimenti sensori termici: Klixon, Termistori, Termorilevatori.

**Avviamento.** I motori asincroni trifasi con rotore a gabbia possono nella maggioranza dei casi essere messi in esercizio con avviamento diretto, verificando l'impianto in relazione alla corrente assorbita allo spunto. L'avviamento stella-triangolo si deve impiegare quando si richiedono coppie e correnti di spunto molto basse, nell'ordine del 25%-30% dei valori che si hanno con l'inserzione diretta.

La coppia resistente durante l'avviamento deve essere sufficientemente minore della coppia motrice.

La commutazione da stella a triangolo deve avvenire in prossimità della velocità nominale. Non verificandosi queste condizioni l'avviamento può essere effettuato riducendo la tensione ai morsetti del motore mediante

trasformatore, resistenze o reattanze statoriche. In quel modo si può avere una riduzione della curva di corrente linearmente con la tensione.

**Manutenzione.** Il motore e gli eventuali accessori devono essere sempre tenuti puliti in modo che non presentino tracce di polvere, sporcizia, olio o altre impurità. E' buona regola verificare periodicamente che il motore funzioni senza vibrazioni o rumori anomali, che la tensione di eventuali cinghie di trasmissione sia corretta, che l'ingresso del circuito di ventilazione non sia ostruito con possibilità di surriscaldamento degli avvolgimenti.

**Cuscinetti – Lubrificazione.** I motori con cuscinetti stagni autolubrificati a vita non richiedono lubrificazione. La durata dei cuscinetti varia dai 3 ai 5 anni secondo i carichi assiali e radiali applicati all'albero e secondo le condizioni ambientali di impiego del motore.

I motori previsti con il dispositivo di lubrificazione dei cuscinetti devono essere lubrificati con il motore in moto secondo gli intervalli di lubrificazione, il tipo di grasso e la quantità indicati nella tabella 7.

Gli intervalli di lubrificazione si riferiscono ad un motore installato in un ambiente normale. Se le condizioni ambientali sono gravose per la presenza di polvere, acqua, elevate temperature, gli intervalli devono essere ridotti.

Nella tabella 6 sono indicati i cuscinetti montati sui motori di serie normali. Alle pagine 19 – 20 – 21 sono indicate le parti di ricambio per le varie tipologie di motori normali di serie.

Per altri problemi relativi all'esercizio e alla manutenzione delle macchine elettriche rivolgersi al Servizio Tecnico Electro Adda.

# ASYNCHRONOUS THREE-PHASE ELECTRIC MOTORS

## **Operating and maintenance instructions.**

Object of these instructions is to give the installers and users correct operating and maintenance conditions concerning asynchronous three-phase motors with enclosed construction, external ventilation and squirrel cage rotor.

**Receipt and storage of motors.** Every motor is despatched from the factory ready for installation, after quality control during manufacture as well as a final test, that is to verify if the motor is in accordance with all required standards.

On receipt it is recommended to inspect it to find out whether it has got damages during transportation.

Should the motor not be installed immediately, it should be kept indoor, in a clean, dry and vibrationless place.

**Installation.** Set up the motor in a well cooled place.

Care should be taken to assure that cooling is not hindered by any walls or other machines next to it.

The possibility of inspections and maintenance when operating is to be considered. The motor foundation should be even, solid in order to absorb vibrations, and sufficiently rigid in order to keep alignment.

**Alignment.** The motor must always be carefully aligned, particularly when coupled direct to the driven machine.

Should any vibrations or bearing failures be observed, check the alignment immediately, as it might be faulty.

**Couplings.** Output transmission to the driven machine may be provided by either direct coupling or by driving belts.

In case of a direct coupling, a flexible coupling is to be used, which avoids any transmission of axial thrusts on the bearings. In case of coupling by driving belts, set up the motor with shaft parallel to that of the driven machine and on belt tensioning slides, in order to adjust belt tension.

An excessive belt tension might cause the bearings to wear out quickly and, in most serious cases, the shaft to break.

**Balancing and installation of couplings and pulleys.** Any different indications excepted, the rotor is dynamically balanced by a half-key in the free shaft end.

The maximum levels of vibration are as follows:

| Motor Size | Vibration level<br>in mm/s, rms value at<br>600-3600 rpm |
|------------|--|
| 80 – 132   | 1,8  |
| 160 – 225  | 2,8  |
| 250 – 400  | 4,5  |

Carefully balance the transmission by a half-key before fitting.

Couplings and pulleys are to be fitted with greatest care, in order to avoid any impacts which may damage the bearings.

**Insulation test.** Before starting the motor and after long periods of inactivity or storage, the insulation resistance of the winding is to be measured that should be higher than 5 M  $\Omega$  at 25° C ambient temperature.

If this value cannot be obtained, the winding is damp and must be dried by a skilled company.

**Electric connection.** As to the electric connection, the security ruling standards are to be complied with. Check that data on the plate are according to the circuit features, to which the motor is to be connected.

Connect according to wiring diagrams **1 2 3 4 5**.

**Earthing.** Inside the terminal box or next to it, it is connected, in a visible position, a terminal for earthing the motor, this operation should be done by means of a copper lead with adequate section according to the ruling standards.

**Direction of rotation.** Standard motors can indifferently run in both rotation directions. If terminals U1 V1 W1 are connected to the mains and if the connecting phase sequence of the mains is 1,2,3, the motor runs clockwise, if seen from the driving end.

The rotation direction can be reversed by exchanging any two of three leads which are connected to the motor.

**Electric protections.** Motors must be protected against any consequences of short circuits, of operating overloading, of single-phase running, by installing before them a suitably sized switch that must be provided with a temperature relay and calibrated for the rated current.

In order to increase the operating security in case of particularly heavy duties, temperature sensors may be installed in the windings, upon request: Klixon, Thermistors, Heating measuring elements.

**Starting the motor.** In the majority, asynchronous three-phase motors with squirrel cage rotor can be operated with direct starting, checking the plant according to the absorbed current at the start.

Star-delta connection is to be used when very low starting torques and currents are required, that is 25%-30% of the values it would have in case of direct-on-line starting.

When starting the stall torque is to be sufficiently lower than the starting torque.

The commutation from star to delta is to be converted approaching the rated speed.

Should such conditions not take place, starting is to be done by reducing the voltage on the motor terminals by transformer, resistors or stator reactors.

In this way a reduction of the torque curve by the voltage square and of the current curve in accordance with the voltage can be obtained.

**Maintenance.** The motor as well as the possible accessories should always be kept clean, free of dust traces, dirt, oil or other grime.

As a good rule it is recommended to periodically check whether the motor operates without any vibrations or

anomalous noises, the tension of possible driving belts is correct, the inlet of the ventilation circuit is not obstructed causing overheating of the windings.

**Bearings - Lubrication.** Motors with staunch bearings, that are self-lubricating for life, do not require any lubrication. Bearings life vary from 3 up to 5 years according to the axial and radial loads that are charged on the shaft and to the environmental conditions the motor is used in.

Motors provided with the bearings lubrication device are to be lubricated while running according to the lubricating intervals, the grease type and quality as per table 7.

The lubricating intervals apply to a motor set up in normal surrounding.

If the environmental conditions are particularly severe owing to dust, water, high temperatures, the intervals are to be reduced.

Table 6 shows bearings mounted on normal standard motor types.

Pages 19-20-21 show the spare parts for the different normal standard motor types.

Should problems in connection with operating and maintenance of the electric machines arise, please contact Electro Adda Engineering Service.

# DREHSTROM-ASYNCHRONMOTOREN MIT KÄFIGLÄUFER

**Betriebs- und Wartungsanleitung.** Die folgenden Anweisungen sollen Monteuren und Benutzern rotierender elektrischer Maschinen wichtige Hinweise zu Drehstrom-Asynchronmotoren mit Käfigläufer und Oberflächenkühlung geben.

**Eingang und Lagerung der Motoren.** Die Motoren verlassen die Produktionsstätte nach eingehenden Qualitätskontrollen während des Fertigungsprozesses und einer sorgfältigen Endkontrolle, welche die Übereinstimmung der Motoren mit der geforderten (elektrischen und mechanischen) Auslegung gewährleisten. Die Motoren werden vom Herstellerwerk montagefertig versandt. Es empfiehlt sich, die Motoren sofort nach ihrem Eingang auf eventuell während des Transportes entstandene Schäden zu untersuchen. Wird der Motor nicht sofort montiert und in Betrieb genommen, sollte er in einem geschlossenen und sauberen Lagerraum aufbewahrt werden. Man vermeide größere Temperaturunterschiede und die damit verbundene Bildung von Feuchtigkeit sowie das Auftreten von Schwingungen und Erschütterungen in der Nähe der Motoren.

**Aufstellung.** Der Motor ist in einem gut belüfteten Raum aufzustellen. Man achte darauf, daß in der Nähe befindliche Mauern oder andere Maschinen die Luftzufuhr für den Motor nicht behindern. Alle Bedienungsöffnungen und Schmierstellen müssen für Kontroll- und Wartungszwecke während des Betriebes leicht zugänglich sein. Die Fundamentierung des Motors muß eben, robust und so dimensioniert sein, daß sie eventuell auftretende Schwingungen aufnehmen kann. Aber sie muß auch starr und hart genug sein, um eine genaue Ausrichtung zu gewährleisten.

**Ausrichtung des Motors.** Der Motor muß immer genau ausgerichtet sein; ganz besonders in den Fällen, in denen er direkt an die anzutreibende Maschine angekuppelt wird. Treten anormale Schwingungen oder Lagerschäden auf, sollte unbedingt sofort die Ausrichtung von Motorwelle zu angetriebener Riemenscheibe kontrolliert werden. Es könnte sein, daß sie nicht mehr fluchten.

**Kraftübertragung.** Die Kraftübertragung zwischen Motor und Arbeitsmaschine kann über Direktkupplung oder über Riementrieb erfolgen. Bei Direktkupplung sollte entweder eine elastische oder eine flexible Kupplung verwendet werden, um die Übertragung eventuell auftretender axialer Kräfte auf die Lager zu verhindern. Bei Riemenkupplung über Treibriemen muß darauf geachtet werden, daß

antreibende Welle und angetriebene Welle absolut parallel, also genau fluchtend, ausgerichtet werden. Der Riemenzug muß über Spannrollen kontrolliert werden. Man sollte bedenken, daß eine zu hohe Riemen Spannung und im schlimmsten Fall zu einem Wellenbruch führen können.

**Auswuchtung und Befestigung der Kupplungs- und Riemenscheibe.** Falls keine anderslautenden Angaben gemacht werden, so ist das freie Wellenende des Motors mit halber Paßfeder dynamisch ausgewuchtet. Die maximal zulässigen Schwingungswerte sind folgende:

| Motorbaugröße | Effektiver Wert des Schwingungspegels mm/s bei 600-3600 1/min |
|---------------|---|
| 80 – 132      | 1,8   |
| 160 – 225     | 2,8   |
| 250 – 400     | 4,5   |

Man achte darauf, daß vor der Montage das Teil, welches die Kraft überträgt, sehr sorgfältig mit halber Paßfeder ausgerichtet wird. Das Aufziehen der Kupplungs- und Riemenscheibe sollte mit der notwendigen Sorgfalt und Vorsicht geschehen, um Schläge und Unwuchten zu vermeiden, welche leicht zu Lagerschäden führen können.

**Messung des Isolationswiderstandes.** Als letzte Arbeit vor der Inbetriebnahme einer neuen Maschine oder nach längeren Stillstands- oder Lagerzeiten empfiehlt es sich, den Isolationswiderstand der Wicklungen zu überprüfen. Dieser sollte bei einer Umgebungstemperatur von 25° C höher als 5 Megaohm sein. Ergibt sich bei der Messung nicht der angegebene Wert, liegt der Grund darin, daß sich Feuchtigkeit in den Wicklungen befindet. Das Trocknen der Wicklungen sollte in einer dafür eingerichteten kompetenten Werkstatt ausgeführt werden.

**Elektrische Schaltung der Motoren.** Die elektrische Schaltung der Motoren sollte gemäß den geltenden Sicherheitsbestimmungen erfolgen. Man achte darauf, daß die Leistungsdaten auf dem Typenschild mit den elektrischen Daten des Stromnetzes, an dem der Motor angeschlossen wird, übereinstimmen. Man führe den Anschluß gemäß den Schaltplänen **1 2 3 4 5** aus.

**Anschluß von Schutz- und Erdungsleitern.** Im Innern des Klemmenkastens oder in seiner Nähe am Gehäuse befindet sich - gut sichtbar - die

Anschlußklemme für den Erdungsleiter. Die Erdung sollte in Übereinstimmung mit den geltenden Vorschriften mit einem entsprechend dimensionierten Kupferkabel ausgeführt werden.

**Drehrichtung.** Die Motoren der Serienproduktion können problemlos in beiden Drehrichtungen betrieben werden. Schließt man das Stromnetz an die Klemmen U1, V1 und W1 an und ist die Phasensequenz des Netzes gleich 1,2,3, dreht sich der Motor im Uhrzeigersinn (von der Antriebsseite aus gesehen). Die Drehrichtung kann umgekehrt werden, indem man zwei beliebige der drei anderen am Motor angeschlossenen Kabel untereinander tauscht.

**Motorschutzeinrichtungen.** Die Motoren müssen gegen Schäden geschützt werden wie sie durch Kurzschlüsse, Überlastbetrieb oder einphasigen Lauf des Motors auftreten können, indem ausreichend dimensionierte Motorschutzschalter oder Schütze mit thermischem Überstromrelais zwischengeschaltet werden. Das thermische Überstromrelais ist für den auf dem Typenschild des Motors angegebenen Nennstrom ausgelegt. Bei besonderen Anwendungsfällen kann die Betriebssicherheit durch zusätzlich montierte Wärmeschutzschalter oder -fühler (Bimetallfühler, Kaltleiter, usw.) erhöht werden (auf Anfrage).

**Anlauf von Käfigläufermotoren.** In den meisten Fällen empfiehlt sich für Drehstrom-Asynchronmotoren mit Käfigläufer das direkte Einschalten als Anlaßverfahren. Die Anlage sollte in diesem Fall leistungsfähig genug sein, um den hohen Anlaufstrom zu vertragen. Auf den Stern-Dreieck-Anlauf wird dann zurückgegriffen, wenn sehr niedrige Anlaufströme und -momente erforderlich sind. Die Werte von Anlaufstrom und Anlaufmoment sind im Vergleich zu den Werten bei der direkten Einschaltung etwa um 25%-30% reduziert. Das Widerstandsmoment muß während des Anschaltens entsprechend niedriger als das Drehmoment sein. Die Umschaltung von der Stern- in die Dreieck-Schaltung sollte in der Nähe der Nenndrehzahl erfolgen. Liegen diese Bedingungen nicht vor, kann der Motor durch Einsatz von Anlaßtransformatoren, Vorschaltwiderständen oder Statorwiderständen, welche die Spannung an den Anschlußklemmen herabsetzen, angelassen werden. So erreicht man eine Reduzierung des Drehmoments mit dem Quadrat der Spannung und des Nennstroms linear mit der Spannung.

**Wartung.** Der Elektromotor und eventuell vorhandene Zubehörteile sollten immer sauber gehalten werden, sodaß weder Staub, Schmutz, Öl oder sonstige Verunreinigungen den

einwandfreien Betrieb stören könnten. Zur Wartung gehört z. B. die Kontrolle daß der Motor ohne starke Schwingungen oder anomale Geräussentwicklung funktioniert, daß die Zugspannung des möglicherweise eingesetzten Treibriemens korrekt eingestellt ist und auch daß Ansaug- und Ausblasöffnungen für die Kühlluftzufuhr nicht zugestellt oder verengt sind, da dies zu einer unnötig hohen Wärmebildung in den Wicklungen führen könnte.

**Lagerung - Lagerschmierung.** Bei Motoren, die mit Lagern mit Fettdauerschmierung ausgestattet sind, ist keine Nachschmierung erforderlich. Die Lebensdauer beträgt erfahrungsgemäß drei bis fünf Jahre in Abhängigkeit von den auf die Welle einwirkenden Axial- und Radialkräften und den Umgebungs- und Betriebsbedingungen des Motors. Bei Motoren mit Nachschmiereinrichtung müssen die Lager während des Betriebes des Motors nachgeschmiert werden.

Nachschmierintervalle, Fettsorte und Fettqualität können aus der Tabelle 7 entnommen werden. Die Nachschmierfristen beziehen sich auf Motoren, die unter normalen Betriebsbedingungen laufen. Bei besonders ungünstigen Betriebsbedingungen, wie z. B. starker Staubanfall, hohe Luftfeuchtigkeit oder extrem hohe Umgebungstemperaturen, sind die Nachschmierintervalle zu verkürzen. Tabelle 6 zeigt die bei normalen Serienmotoren verwendeten Lagertypen. Auf Seiten 19, 20 und 21 sind die Ersatzteile für die verschiedenen Standardmotoren der Serienproduktion zusammengestellt. Sollten Sie weitere spezifische Fragen zum Betrieb und zur Wartung unserer Elektromotoren haben, empfehlen wir, sich an unser Technisches Büro zu wenden.

# MOTEURS ASYNCHRONES ELECTRIQUES TRIPHASES

**Modes d'emploi et entretien.** L'objet de ces instructions est d'indiquer aux installateurs et aux utilisateurs les correctes conditions d'emploi et d'entretien concernant moteurs asynchrones triphasés avec construction fermée à ventilation extérieure et rotor a cage.

**Réception et stockage des moteurs.** Le moteur est expédié par le constructeur prêt à l'installation, après des contrôles de qualité pendant le cycle de production ainsi qu'un essai final afin d'en constater la conformité aux spécifications du projet.

Dès la réception on recommande d'examiner le moteur afin de vérifier qu'il n'a pas été endommagé pendant le transport. Au cas où le moteur ne doit pas être mis en service immédiatement, il faut le stocker dans un endroit couvert, propre, sec et sans vibrations.

**Installation.** Le moteur doit être installé dans un endroit bien ventilé. Il faut éviter que la ventilation soit empêchée par des murs ou d'autres machines en proximité.

Il faut prévoir la possibilité d'inspections et d'entretiens pendant le fonctionnement.

La fondation du moteur doit être plane, robuste afin d'absorber les vibrations, suffisamment rigide pour maintenir l'alignement.

**Alignement.** L'alignement du moteur doit se faire toujours avec le plus grand soin, surtout lorsqu'il est accouplé directement à la machine entraînée.

Dès qu'on observe des vibrations ou des dommages aux roulements, il y a tout lieu de croire que l'alignement est défectueux: il faut alors le vérifier immédiatement.

**Accouplements.** La transmission de la puissance à la machine entraînée a lieu soit par accouplement direct soit par des courroies.

En cas d'accouplement direct on conseille d'employer un joint élastique ou un joint flexible afin d'éviter la transmission de toutes poussées axiales sur les roulements.

En cas d'accouplement avec courroies il faut installer le moteur avec l'axe parallèle à celui de la machine entraînée et sur des chariots

tendeurs de courroies afin de pouvoir régler la tension des courroies.

Il faut tenir compte qu'une tension excessive peut occasionner une détérioration rapide des roulements et, dans un cas extrême, la rupture de l'arbre.

**Equilibrage et montage des accouplements et des poulies.** Sauf indication différente, le rotor est équilibré dynamiquement avec une demi-clavette à l'extrémité libre de l'arbre.

Les niveaux maximums de vibration sont les suivants:

| Hauteur d'axe moteur | Valeur efficace niveau de vibration mm/s à 600-3600 tr/mm |
|----------------------|---|
| 80 – 132             | 1,8   |
| 160 – 225            | 2,8   |
| 250 – 400            | 4,5   |

Il faut équilibrer soigneusement la transmission avec une demi-clavette avant le montage.

Le montage des accouplements et des poulies doit être effectué avec tout soin, afin d'éviter des chocs qui peuvent endommager les roulements.

**Essai d'isolation.** Avant la mise en service et après de longues périodes d'inactivité ou de stockage, on conseille de mesurer la résistance d'isolation du bobinage qui devra être au dessus de 5 M  $\Omega$  à une température ambiante de 25° C.

Si l'on ne peut pas obtenir cette valeur, c'est que le bobinage est humide et il faut le sécher en s'adressant à une Maison spécialisée.

**Connexion électrique.** En ce qui concerne la connexion électrique, il vaut bien respecter les dispositions de sécurité en vigueur et s'assurer que les données nominales soient en conformité aux caractéristique du circuit auquel le moteur doit être connecté.

La connexion doit être effectuée conformément aux schémas **12345**.

**Mise à la terre.** A l'intérieur de la boîte à bornes ou près de celle-ci se trouve en position visible la borne servant à la connexion à la terre, qui doit être effectuée par un conducteur de cuivre avec section carrée suivant les normes en vigueur.

**Sens de rotation.** Les moteurs de série peuvent fonctionner indifféremment dans les deux sens de rotation. Si la ligne d'alimentation est connectée aux bornes U1 V1 W1, et si la séquence de phase de la ligne est 1,2,3, le moteur tournera dans le sens horaire, vu du côté de l'accouplement.

Pour faire tourner le moteur dans le sens contraire, interchanger n'importe quels deux des trois conducteurs connectés au moteur.

**Protections électriques.** Les moteurs doivent être protégés contre les effets des courts-circuits, des surcharges qui se produisent pendant le service, de la marche monophasée, en installant avant eux un interrupteur conformément dimensionné, pourvu de relais thermique calibré pour le courant nominal de plaque.

Afin d'augmenter la sécurité de fonctionnement en cas de services particulièrement lourds, on peut installer, sur demande, dans les enroulements des thermostats: Klixon, Thermistors, Eléments de mesure de la température.

**Démarrage.** La plupart des moteurs asynchrones triphasés avec rotor à cage peut être mise en service avec démarrage direct, en vérifiant l'installation selon le courant absorbé au démarrage.

Le démarrage étoile-triangle doit être utilisé quand on demande des couples et des courants de démarrage très bas, c'est-à-dire 25%-30% des valeurs qu'il aurait en cas de démarrage direct. Le couple résistant pendant le démarrage doit être suffisamment inférieur au couple de démarrage.

La commutation de étoile à triangle doit être effectuée en proximité de la vitesse nominale. Ces conditions ne se vérifiant pas, le démarrage peut se faire en réduisant la tension aux bornes du moteur par transformateur, résistances ou réactances statoriques.

De cette façon, on peut obtenir une réduction de la courbe de couple avec le carré de la

tension et de la courbe de courant conformément à la tension.

**Entretien.** Le moteur et les éventuels appareils doivent être toujours gardés propres et exempts de poussière, saletés, huile ou d'autres souillures.

C'est bonne règle de vérifier périodiquement que le moteur fonctionne sans vibrations ou bruits anormaux, que la tension d'éventuelles courroies de transmission soit correcte, que l'entrée du circuit de ventilation ne soit pas obstruée avec possibilité de surchauffage des bobinages.

**Roulements - Graissage.** Les moteurs avec des roulements étanches autograissés à vie ne demandent pas de graissage. La durée des roulements varie de 3 à 5 ans selon les charges axiales et radiales appliquées à l'arbre et selon les conditions ambiantes où le moteur est utilisé.

Les moteurs prévus avec dispositif de graissage de roulements doivent être graissés lorsqu'ils tournent, selon les intervalles de graissage, le type de la graisse et la qualité indiqués au tableau 7.

Les intervalles de graissage se réfèrent à un moteur installé dans une ambiance normale. Si les conditions ambiantes sont difficiles à cause de la présence de poussière, d'eau, d'hautes températures, les intervalles doivent être réduits.

Dans le tableau 6 on a indiqué les roulements montés sur des moteurs normaux de série.

Aux pages 19-20-21 on a indiqué les pièces de rechange pour les différents types de moteurs normaux de série. En cas de problèmes concernant le service et l'entretien des machines électriques, prière prendre contact avec le Service Engineering de Electro Adda.

# MOTORES ELECTRICOS ASINCRONOS TRIFASICOS

**Instrucciones para el empleo y la manutención.** Estas instrucciones tienen el objeto de indicar a los instaladores y a los utilizadores las correctas condiciones de empleo y de manutención de motores asíncronos trifásicos cerrados con ventilación exterior y rotor en jaula.

## **Llegada y almacenaje de los motores.**

Desde la fábrica el motor sale, listo para la instalación, después de controles de calidad efectuados durante el ciclo de producción y después de una prueba final hecha para comprobar la conformidad a las especificaciones del proyecto.

Una vez llegado, sírvanse examinar el motor para verificar que no se haya daño durante el transporte.

Si el motor no es puesto en función de inmediato, el tiene que ser almacenado en un sitio cubierto, limpio, sin humedad y vibraciones.

**Instalación.** Instalar el motor en sitio bien ventilado, evitar que la proximidad de muros o de otras máquinas impida la ventilación.

Prever la posibilidad de inspecciones y manutención durante el funcionamiento.

La fundación del motor debe ser plana, resistente para absorber las vibraciones y bastante rígida para mantener la alineación.

**Alineación.** El motor tiene que ser siempre bien alineado, especialmente si el mismo está acoplado directamente a la máquina accionada.

Caso que relevan vibraciones o averías en los cojinetes, la alineación tiene que ser controlada de inmediato porque podría ser desalineada.

**Acoplamientos.** La transmisión de potencia a la máquina de trabajo puede conseguirse por acoplamiento directo o mediante bandas de transmisión.

En caso de acoplamiento directo tiene que ser empleado un manchón elástico o un manchón flexible para evitar la transmisión de eventuales empujes axiales en los

cojinetes. En caso de acoplamiento mediante bandas de transmisión, instalar el motor con el eje paralelo al eje de la máquina accionada y sobre correderas para tensar la correa por fin de poder regular la tensión de las bandas. Tener presente que una tensión demasiado fuerte perjudica la duración de los cojinetes y en los casos más graves puede aún producir la ruptura del eje.

## **Equilibración y montaje de los acoplamientos y de las poleas.**

Excepto indicaciones diferentes, el rotor es equilibrado dinámicamente con media chaveta en la extremidad libre del eje.

Los niveles máximos de vibración son los siguientes:

| Tamaño motor | Valor eficaz nivel de vibración<br>mm/s a 600-3600 rpm |
|--------------|--|
| 80 – 132     | 1,8  |
| 160 – 225    | 2,8  |
| 250 – 400    | 4,5  |

El órgano de transmisión tiene que ser equilibrado con mucho cuidado con media chaveta antes del montaje. El montaje de los acoplamientos tiene que ser hecho con cautela particular por fin de evitar choques que pueden ocasionar daños a los cojinetes.

**Prueba de aislamiento.** Antes de la puesta en función y después de largos períodos de inactividad o almacenaje, se aconseja de medir la resistencia de aislamiento del bobinado que tiene que ser superior a 5 M  $\Omega$  con temperatura ambiente de 25° C.

Si no se consigue el valor indicado, el bobinado está húmedo y tiene que ser secado por una empresa especializada.

**Conexión eléctrica.** Para la conexión eléctrica tienen que cumplir con las normas de seguridad en vigor y comprobar que los datos de placa sean conformes a las características del circuito al cual tiene que

conectarse el motor. La conexión tiene que hacerse conformemente a los esquemas **1 2 3 4 5**.

**Conexión a tierra.** Interiormente a la caja de bornes o cerca de la misma está conectado en posición visible el borne para la conexión a tierra que tiene que hacerse por medio de un conductor en cobre que tenga una sección proporcionada, conformemente a las normas en vigor.

**Sentido de rotación.** Los motores normales pueden funcionar indiferentemente en los dos sentidos de rotación. El motor gira en sentido de las agujas del reloj mirándolo desde el lado acoplamiento, si la red está conectada a los bornes U1 V1 W1 y si la secuencia de fase de la red es 1,2,3. El sentido de rotación puede ser invertido intercambiando entre ellos dos cualquiera de los tres conductores que están conectados al motor.

**Protecciones eléctricas.** Los motores tienen que ser protegidos contra los efectos de los cortocircuitos, de las sobrecargas que ocurren en el funcionamiento, de la marcha monofásica, montando antes del motor un interruptor correctamente dimensionado, provisto de relé térmico calibrado para la corriente nominal de placa. La seguridad de funcionamiento puede ser aumentada en el caso de servicios particularmente pesados, instalando, sobre pedido, catpadores térmicos en el bobinado como: Klixon, Termistores, Termodetectores.

**Arranque.** Los motores asíncronos trifásicos con rotor en jaula en la mayoría de los casos pueden ser puestos en funcionamiento con arranque directo, comprobando la instalación en relación a la corriente absorbida al arranque. El arranque estrella-triángulo tiene que emplearse cuando necesitan momentos o corrientes de arranque muy bajas, en el orden de 25%-30% de los valores que son obtenidos con la conexión directa. La torsión de reposición durante el arranque tiene que ser suficientemente menor que el momento de torsión desviador.

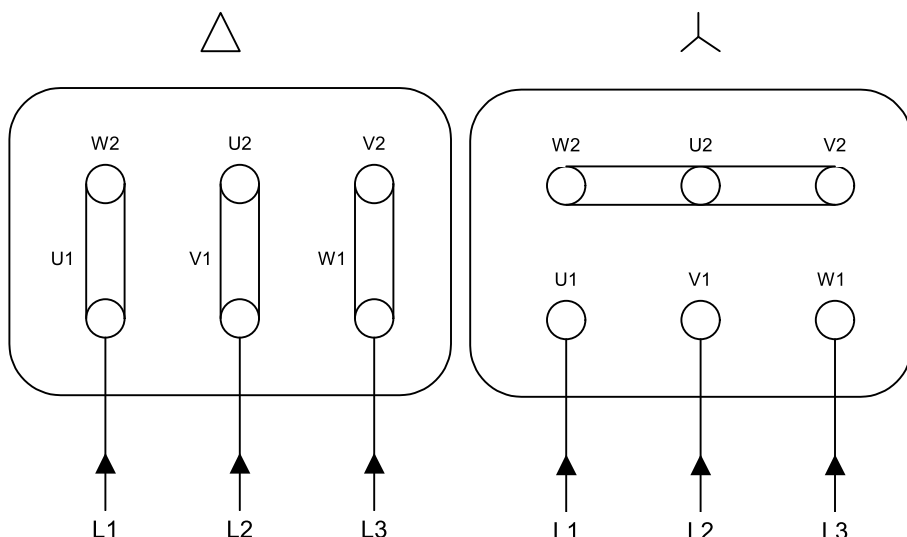
La conmutación de estrella a triángulo tiene que sobrevenir en proximidad de la velocidad nominal. Si no hay estas condiciones, puede efectuarse el arranque disminuyendo la tensión a los bornes del motor por medio de transformador, resistencias o reactancias estatóricas. De esta manera es posible conseguir una reducción de la curva de momento torsional con el cuadrado de la tensión y de la curva de corriente linealmente con la tensión.

**Manutención.** El motor y sus acesorios eventuales tienen que estar siempre limpios y no llevar residuos de polvo, suciedad, aceite u otras impuridades. Es una buena regla la de comprobar periódicamente si el motor marcha sin vibraciones o ruidos anormales, que la tensión de eventuales bandas de transmisión sea correcta, que la entrada del circuito de ventilación no sea obstruida, con posibilidad de sobrecalentamiento de los bobinados.

**Cojinetes – Lubricación.** Los motores provistos de cojinetes estancos auto-lubricados a vida no necesitan de lubricación. La duración de los cojinetes puede variar desde 3 hasta 5 años según las cargas axiales y radiales aplicadas al eje y según las condiciones ambientales de utilización del motor. Los motores planeados con dispositivo de lubricación de los cojinetes tienen que ser lubricados cuando el motor está en marcha según los intervalos de lubricación, el tipo de grasa y la calidad indicados en la tabla **7**. Los intervalos de lubricación se refieren a un motor instalado en ambiente normal. Si las condiciones ambientales son gravosas debidas a presencia de polvo, agua, temperaturas elevadas, los intervalos tienen que reducirse.

En la tabla **6** está la indicación de los cojinetes montados en los motores normales. A pág. 19-20-21 está las indicación de las piezas de repuesto para los diferentes tipos de motores normales. En caso de otros problemas relativos al funcionamiento y manutención de las máquinas eléctricas sírvanse dirigirse al Servicio Técnico Electro Adda.

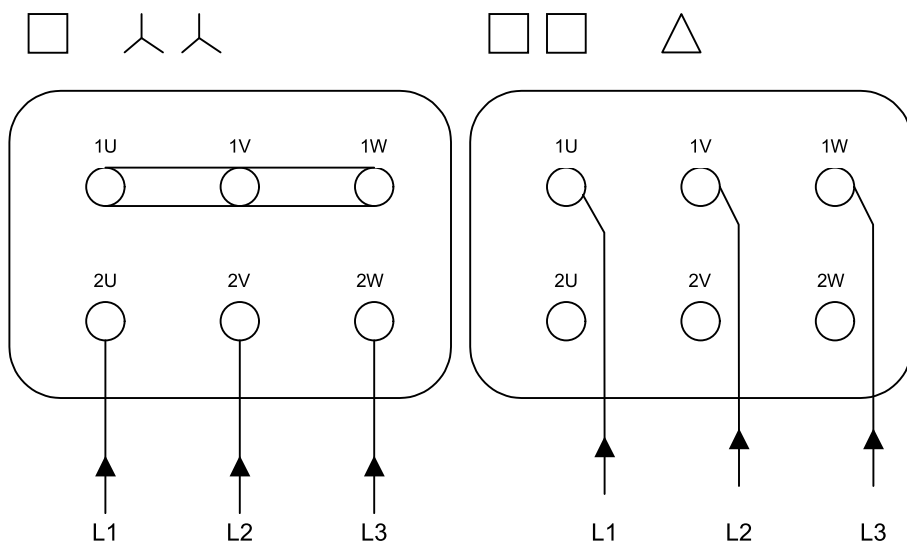
1



Motori ad una velocità coll.  $\Delta / Y$   
 Single speed motors conn.  $\Delta / Y$   
 Motoren mit einer Drehzahl Schalt.  $\Delta / Y$

Moteurs à une vitesse conn.  $\Delta / Y$   
 Motores de una velocidad con.  $\Delta / Y$

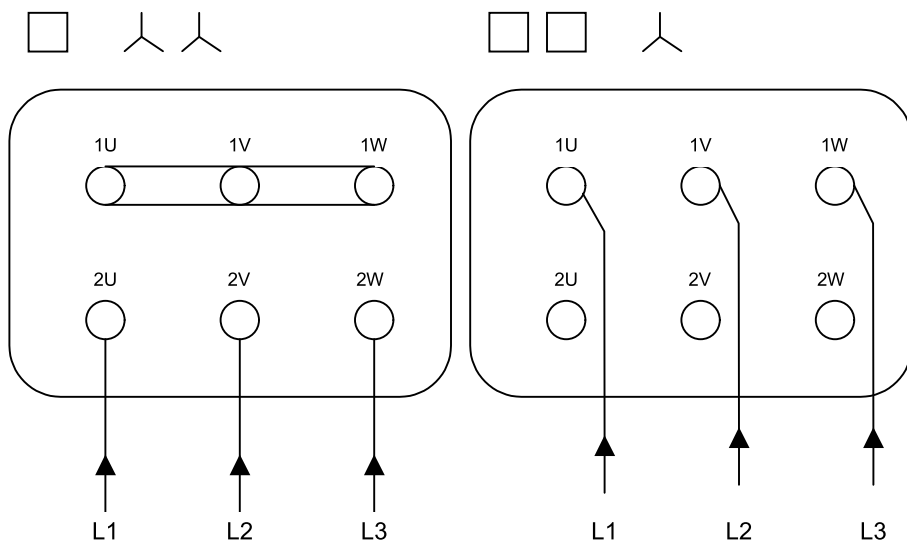
2



Motori a due velocità, unico avvolgimento coll.  $YY / \Delta$   
 Two-speed motors, single winding conn.  $YY / \Delta$

Polumschaltbare Motoren mit einer Wicklung Schalt.  $YY / \Delta$   
 Moteurs à deux vitesses, un seul bobinage conn.  $YY / \Delta$   
 Motores de dos velocidades, bobinado único con.  $YY / \Delta$

3

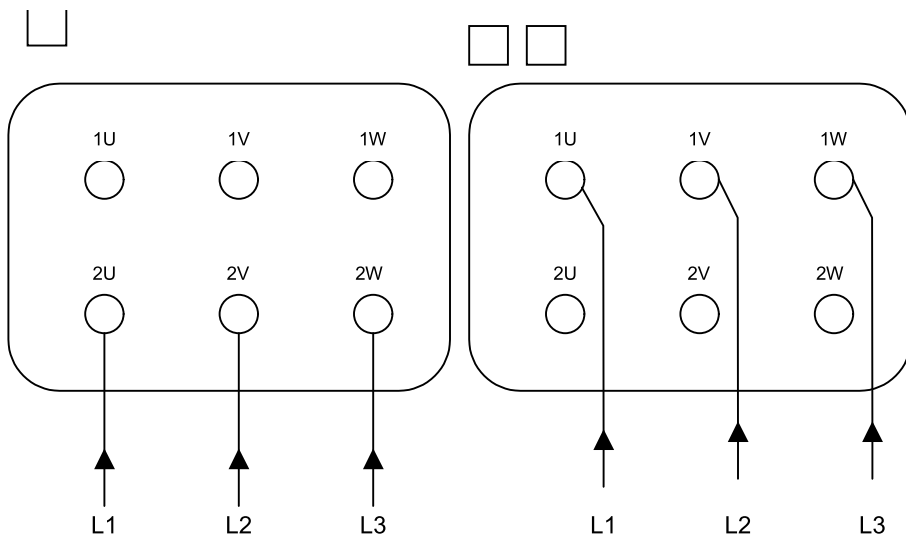


Motori a due velocità, per azionamento ventilatori, unico avvolgimento coll.  $YY / Y$

Two-speed motors for fan drive, single winding conn.  $YY / Y$   
 Polumschaltbare Motoren für Lüfterantrieb, mit einer Wicklung Schalt.  $YY / Y$

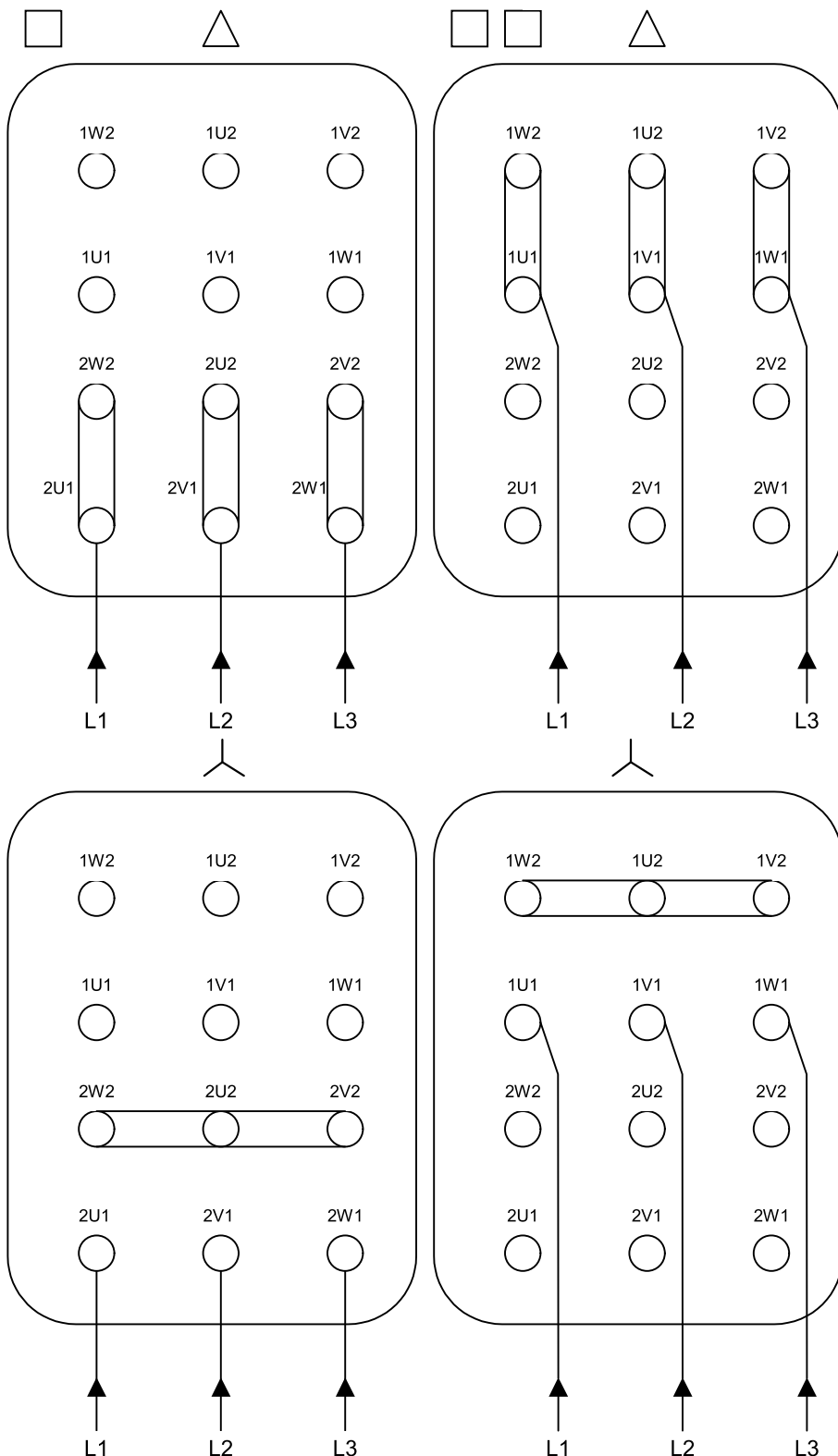
Moteurs à deux vitesses pour entraînement ventilateurs, un seul bobinage conn.  $YY / Y$   
 Motores de dos velocidades para accionar ventiladores, bobinado único con.  $YY / Y$

4



Motori a due velocità, doppio avvolgimento  
Two-speed motors, double winding  
Polumschaltbare Motoren mit zwei getrennten Wicklungen  
Moteurs à deux vitesses, double bobinage  
Motores de dos velocidades, bobinado doble

5



Motori a due velocità, doppio avvolgimento doppia tensione coll.  $\Delta / \text{Y}$   
Two-speed motors, double winding double voltage conn.  $\Delta / \text{Y}$   
Polumschaltbare Motoren mit zwei getrennten Wicklungen zwei Spannungen Schalt.  $\Delta / \text{Y}$   
Moteurs à deux vitesses, double bobinage double tension conn.  $\Delta / \text{Y}$   
Motores de dos velocidades, bobinado doble tensión doble con.  $\Delta / \text{Y}$

☐ Alta velocità  
High speed  
Höhere Drehzahl  
Grande vitesse  
Velocidad alta

☐ ☐ Bassa velocità  
Low speed  
Niedrigere Drehzahl  
Petite vitesse  
Velocidad baja

**CUSCINETTI – BEARINGS – LAGER – ROULEMENTS – COJINETES**

| 1           | 2       | 3                             | 4                                      |
|-------------|---------|-------------------------------|--|
| Motore tipo | Poli    | Cuscinetto lato accoppiamento | Cuscinetto lato opposto accoppiamento  |
| Motor Type  | Poles   | Bearing coupling side         | Bearing opposite coupling side         |
| Motor Typ   | Polzahl | Lager A-Seite                 | Lager B-Seite                          |
| Moteur type | Pôles   | Roulement côté accouplement   | Roulement côté opposé à l'accouplement |
| Motor tipo  | Polos   | Cojinete lado acoplamiento    | Cojinete lado opuesto a l'acoplamiento |

| 1      | 2     | 3       | 4       | 1      | 2     | 3       | 4       |
|--------|-------|---------|---------|--------|-------|---------|---------|
| 56     | 2 - 8 | 6201-2Z | 6201-2Z | 250M-T | 2     | 6313-C3 | 6313-C3 |
| 63     | 2 - 8 | 6202-2Z | 6202-2Z | 250M-T | 4 - 8 | 6314-2Z | 6314-2Z |
| 71     | 2 - 8 | 6203-2Z | 6203-2Z | 280S-T | 2     | 6314-C3 | 6314-C3 |
| 80     | 2 - 8 | 6204-2Z | 6204-2Z | 280M-T | 2     | 6314-C3 | 6314-C3 |
| 90S    | 2 - 8 | 6205-2Z | 6205-2Z | 280S-T | 4 - 8 | 6316-C3 | 6314-C3 |
| 90L    | 2 - 8 | 6205-2Z | 6205-2Z | 280M-T | 4 - 8 | 6316-C3 | 6314-C3 |
| 100L   | 2 - 8 | 6206-2Z | 6206-2Z | 315S-T | 2     | 6314-C3 | 6314-C3 |
| 112M-T | 2 - 8 | 6206-2Z | 6206-2Z | 315S-T | 4 - 8 | 6317-C3 | 6314-C3 |
| 132S   | 2 - 8 | 6208-2Z | 6208-2Z | 315M   | 2     | 6314-C3 | 6314-C3 |
| 132M   | 2 - 8 | 6208-2Z | 6208-2Z | 315M   | 4 - 8 | NU317   | 6317-C3 |
| 160M-T | 2 - 8 | 6309-2Z | 6308-2Z | 315M-n | 4 - 8 | NU320   | 6317-C3 |
| 160M   | 2 - 8 | 6309-2Z | 6309-2Z | 355L-T | 2     | 6317-C3 | 6317-C3 |
| 160L   | 2 - 8 | 6309-2Z | 6309-2Z | 355L-a | 2     | 6317-C3 | 6317-C3 |
| 180M-T | 2 - 8 | 6310-2Z | 6309-2Z | 355L-b | 2     | 6317-C3 | 6317-C3 |
| 180L-T | 2 - 8 | 6310-2Z | 6309-2Z | 355L-T | 4 - 8 | NU322   | 6320-C3 |
| 200L-T | 2 - 8 | 6312-2Z | 6311-2Z | 355L-a | 4 - 8 | NU322   | 6320-C3 |
| 225M-T | 2     | 6312-C3 | 6312-C3 | 355L-b | 4 - 8 | NU322   | 6320-C3 |
| 225S-T | 4 - 8 | 6313-2Z | 6313-2Z | 400L   | 4 - 8 | NU324   | 6322-C3 |
| 225M-T | 4 - 8 | 6313-2Z | 6313-2Z |        |       |         |         |

| INTERVALLI DI LUBRIFICAZIONE IN ORE             | Cuscinetto tipo | 2-Poli  | 4-Poli  | 6-Poli  | 8-Poli                      | Quantità di grasso in g. |
|---|-----------------|---------|---------|---------|-----------------------------|--------------------------|
| Bearing type                                    | 2-Poles         | 4-Poles | 6-Poles | 8-Poles | Grease qty. in grs.         |                          |
| Lager typ                                       | 2-Polig         | 4-Polig | 6-Polig | 8-Polig | Fettmenge in G.             |                          |
| Roulement type                                  | 2-Pôles         | 4-Pôles | 6-Pôles | 8-Pôles | Quantité de graisse en grs. |                          |
| Cojinete tipo                                   | 2-Polos         | 4-Polos | 6-Polos | 8-Polos | Cantidad de grasa en G.     |                          |
| LUBRICATION INTERVALS IN HOURS                  | 6312-C3         | 1400    | —       | —       | —                           | 20                       |
|   | 6313-C3         | 1200    | —       | —       | —                           | 32                       |
|   | 6314-C3         | 1100    | 3300    | 5500    | 7700                        | 26                       |
| NACHSCHMIE-<br>RINTERVALLE IN<br>STD.           | 6316-C3         | 800     | 2800    | 4900    | 7000                        | 33                       |
|   | 6317-C3         | 650     | 2600    | 4600    | 6600                        | 37                       |
|   | 6320-C3         | —       | 2100    | 3900    | 5800                        | 51                       |
| INTERVALLES<br>DE<br>LUBRIFICATION<br>EN HEURES | 6322-C3         | —       | 1700    | 3500    | 5300                        | 60                       |
|   | NU317           | —       | 1300    | 2300    | 3300                        | 37                       |
|   | NU320           | —       | 1000    | 1900    | 2900                        | 51                       |
| INTERVALOS DE<br>LUBRICACIÓN<br>EN HORAS        | NU322           | —       | 890     | 1700    | 2600                        | 60                       |
|   | NU324           | —       | 730     | 1500    | 2400                        | 72                       |

Grasso – Grease – Schmierfett – Graisse – Grasa : **ESSO BEACON 3 SKF LGHT3**  
 O corrispondenti – Or corresponding – Oder entsprechende – Ou correspondants – O correspondientes

## Lubrication intervals according to L1 principle

| Frame size   | Amount of grease g/bearing | kW    | 3000 rpm | kW  | 1500 rpm | kW  | 1000 rpm | kW  | 500-900 rpm |
|--|----------------------------|-------|----------|-----|----------|-----|----------|-----|-------------|
| Ball bearings -- Lubrication intervals in duty hours |                            |       |          |     |          |     |          |     |             |
| 112  | 10                         | all   | 13000    | all | 21000    | all | 25000    | all | 28000       |
| 132  | 15                         | all   | 11000    | all | 19000    | all | 23000    | all | 26500       |
| 160  | 25                         | ≤18.5 | 12000    | ≤15 | 21500    | ≤11 | 24000    | all | 24000       |
| 160  | 25                         | >18.5 | 10000    | >15 | 18000    | >11 | 22500    | all | 24000       |
| 180  | 30                         | ≤22   | 9000     | ≤22 | 18500    | ≤15 | 24000    | all | 24000       |
| 180  | 30                         | >22   | 8500     | >22 | 17000    | >15 | 21000    | all | 24000       |
| 200  | 40                         | ≤37   | 8000     | ≤30 | 17500    | ≤22 | 23000    | all | 24000       |
| 200  | 40                         | >37   | 5500     | >30 | 12000    | >22 | 16000    | all | 20000       |
| 225  | 50                         | ≤45   | 6500     | ≤45 | 16500    | ≤30 | 22000    | all | 24000       |
| 225  | 50                         | >45   | 2500     | >45 | 6000     | >30 | 8000     | all | 10000       |
| 250  | 60                         | ≤55   | 4000     | ≤55 | 11500    | ≤37 | 15000    | all | 18000       |
| 250  | 60                         | >55   | 1500     | >55 | 4500     | >37 | 6000     | all | 7000        |
| 280  | 60                         | all   | 3500     | -   | -        | -   | -        | -   | -           |
| 280  | 60                         | -     | -        | all | 10500    | all | 14000    | all | 17000       |
| 280  | 35                         | all   | 3200     | -   | -        | -   | -        | -   | -           |
| 280  | 40                         | -     | -        | all | 9600     | all | 13900    | all | 15000       |
| 315  | 35                         | all   | 3200     | -   | -        | -   | -        | -   | -           |
| 315  | 55                         | -     | -        | all | 7600     | all | 11800    | all | 12900       |
| 355  | 35                         | all   | 3200     | -   | -        | -   | -        | -   | -           |
| 355  | 70                         | -     | -        | all | 5600     | all | 9600     | all | 10700       |

| Frame size   | Amount of grease g/bearing | kW    | 3000 rpm | kW  | 1500 rpm | kW  | 1000 rpm | kW  | 500-900 rpm |
|--|----------------------------|-------|----------|-----|----------|-----|----------|-----|-------------|
| Roller bearings -- Lubrication intervals in duty hours |                            |       |          |     |          |     |          |     |             |
| 160  | 25                         | ≤18.5 | 6000     | ≤15 | 10500    | ≤11 | 12000    | all | 12000       |
| 160  | 25                         | >18.5 | 5000     | >15 | 9000     | >11 | 11000    | all | 12000       |
| 180  | 30                         | ≤22   | 4500     | ≤22 | 9000     | ≤15 | 12000    | all | 12000       |
| 180  | 30                         | >22   | 4000     | >22 | 8500     | >15 | 10500    | all | 12000       |
| 200  | 40                         | ≤37   | 4000     | ≤30 | 8500     | ≤22 | 11500    | all | 12000       |
| 200  | 40                         | >37   | 2500     | >30 | 6000     | >22 | 8000     | all | 10000       |
| 225  | 50                         | ≤45   | 3000     | ≤45 | 8000     | ≤30 | 11000    | all | 12000       |
| 225  | 50                         | >45   | 1250     | >45 | 3000     | >30 | 4000     | all | 5000        |
| 250  | 60                         | ≤55   | 2000     | ≤55 | 5500     | ≤37 | 7500     | all | 9000        |
| 250  | 60                         | >55   | 750      | >55 | 2000     | >37 | 3000     | all | 3500        |
| 280  | 60                         | all   | 1750     | -   | -        | -   | -        | -   | -           |
| 280  | 60                         | -     | -        | all | 5250     | all | 7000     | all | 8500        |
| 280  | 35                         | all   | 1600     | -   | -        | -   | -        | -   | -           |
| 280  | 40                         | -     | -        | all | 5300     | all | 7000     | all | 8500        |
| 315  | 35                         | all   | 1600     | -   | -        | -   | -        | -   | -           |
| 315  | 55                         | -     | -        | all | 3800     | all | 5900     | all | 6500        |
| 355  | 35                         | all   | 1600     | -   | -        | -   | -        | -   | -           |
| 355  | 70                         | -     | -        | all | 2800     | all | 4800     | all | 5400        |

### **WARNING**

*Do not mix different types of grease.  
Incompatible lubricants may cause bearing damage.*

### **When regreasing, use only special ball bearing grease with the following properties:**

- good quality grease with lithium complex soap and with mineral- or PAO-oil
- base oil viscosity 100-160 cST at 40°C
- consistency NLGI grade 1.5 - 3\*
- temperature range -30°C - +120°C, continuously.

*\*J) For vertical mounted motors or in hot conditions a stiffer end of scale is recommended.*

The above mentioned grease specification is valid if the ambient temperature is above -30°C or below +55°C, and the bearing temperature is below 110°C.

Grease with the correct properties is available from all the major lubricant manufacturers.

Admixtures are recommended, but a written guarantee must be obtained from the lubricant manufacturer, especially concerning EP admixtures, that admixtures do not damage bearings or the properties of lubricants at the operating temperature range.

### **WARNING**

*Lubricants containing EP admixtures are not recommended in high bearing temperatures in frame sizes 280 to 450.*

### **The following high performance greases can be used:**

- Esso Unirex N2 or N3 (lithium complex base)
- Mobil Mobilith SHC 100 (lithium complex base)
- Shell Albida EMS 2 (lithium complex base)
- Klüber Klüberplex BEM 41-132 (special lithium base)
- FAG Arcanol TEMP110 (lithium complex base)
- Lubcon Turmogrease L 802 EP PLUS
- Total Multiplex S 2 A (lithium complex base)

### **NOTE!**

*Always use high speed grease for high speed 2-pole machines where the speed factor is higher than 480,000 (calculated as  $Dm \times n$  where  $Dm$  = average bearing diameter, mm;  $n$  = rotational speed, r/min).*

### **The following greases can be used for high speed cast iron motors but not mixed with lithium complex greases:**

- Klüber Klüber Quiet BQH 72-102 (polyurea base)
- Lubcon Turmogrease PU703 (polyurea base)

### **If other lubricants are used:**

Check with the manufacturer that the qualities correspond to those of the above mentioned lubricants.

# UNEL 13113-71

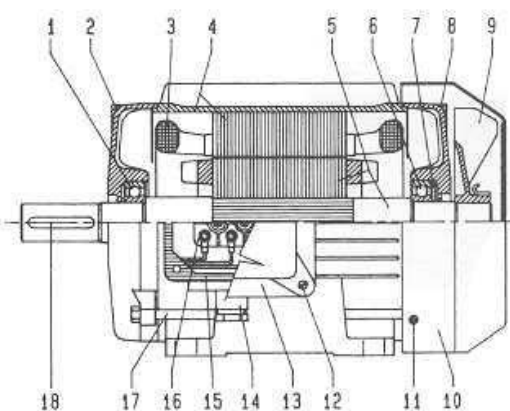
Tipo C - Forma B3

Type C - Frame B3

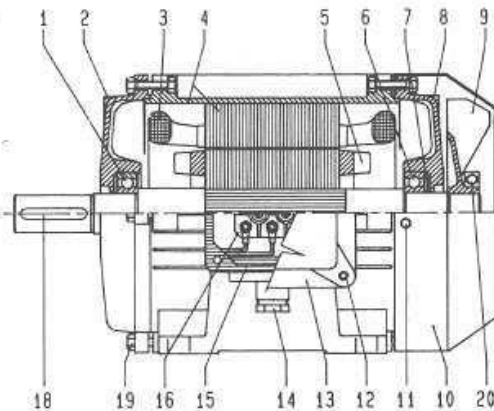
Typ C - Bauart B3

Type C - Forme B3

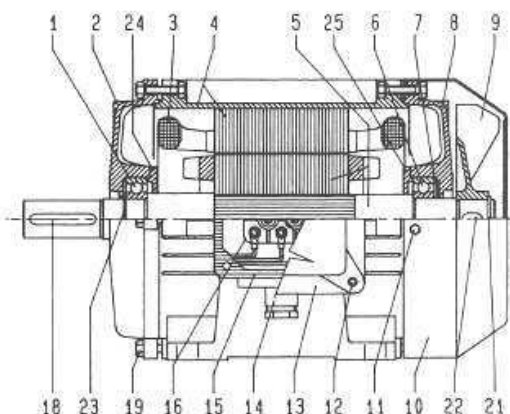
Tipo C - Forma B3



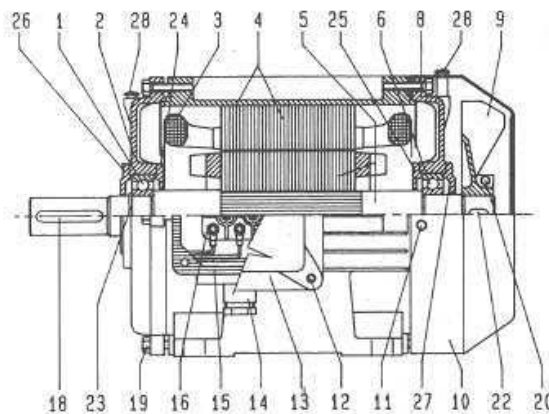
Grandezze - Sizes - Baugrößen  
- Tailles - Tamaños: **56—112**



Grandezze - Sizes - Baugrößen  
- Tailles - Tamaños: **132—200**



Grandezze - Sizes - Baugrößen  
- Tailles - Tamaños: **225—250**



Grandezze - Sizes - Baugrößen  
- Tailles - Tamaños: **280—400**

## PARTI DI RICAMBIO

1. Cuscinetto anteriore
2. Vite fissaggio scudo
3. Avvolgimento
4. Carcassa con pacco statore
5. Albero con rotore
6. Cuscinetto posteriore
7. Molla di compensazione
8. Scudo posteriore
9. Ventola di raffreddamento
10. Calotta copriventola
11. Vite fissaggio copriventola
12. Vite fissaggio coprिमorsettiera
13. Scatola coprिमorsettiera
14. Pressacavo

15. Guarnizione
16. Morsettiera
17. Tirante
18. Linguetta lato accoppiamento
19. Vite fissaggio scudo
20. Vite fissaggio ventola
21. Anello elastico Seeger
22. Linguetta lato ventola
23. Anello elastico Seeger
24. Coperchietto paragrasso anteriore interno
25. Coperchietto paragrasso posteriore interno
26. Coperchietto paragrasso anteriore esterno
27. Coperchietto paragrasso posteriore esterno
28. Ingrassatore "Tecalomit"
29. Scudo flangiato

# UNEL 13117-71

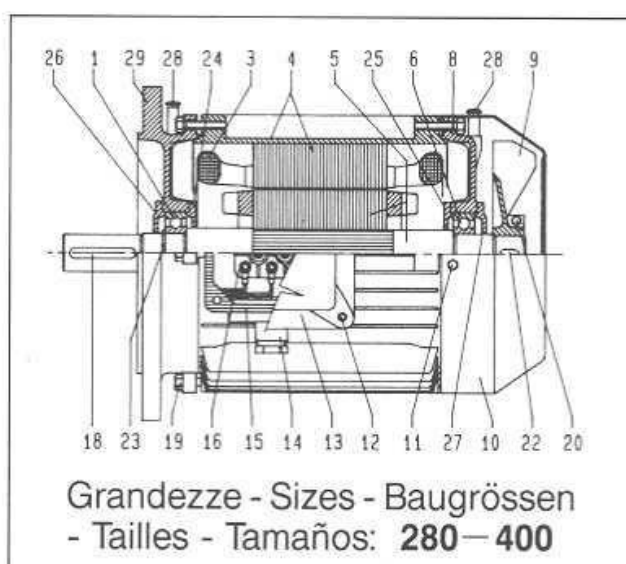
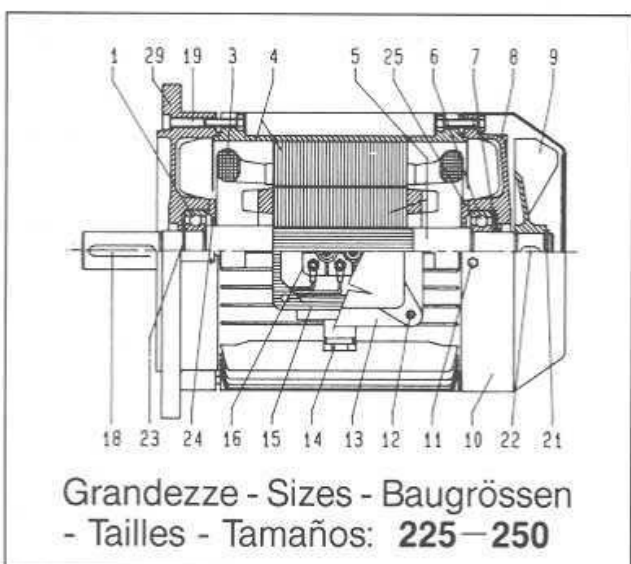
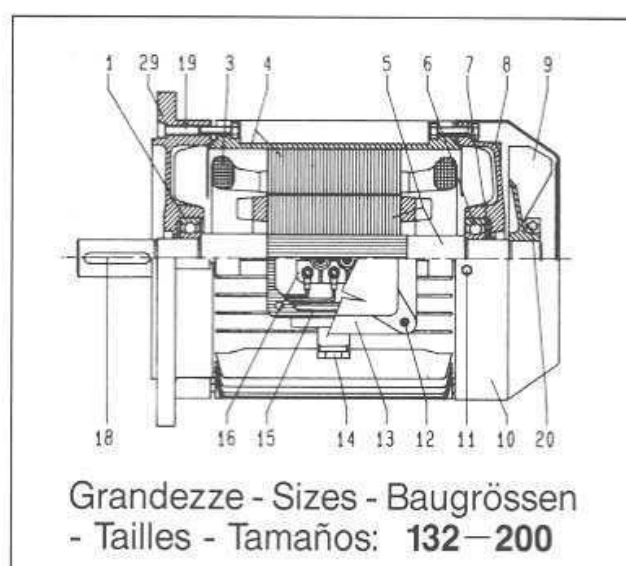
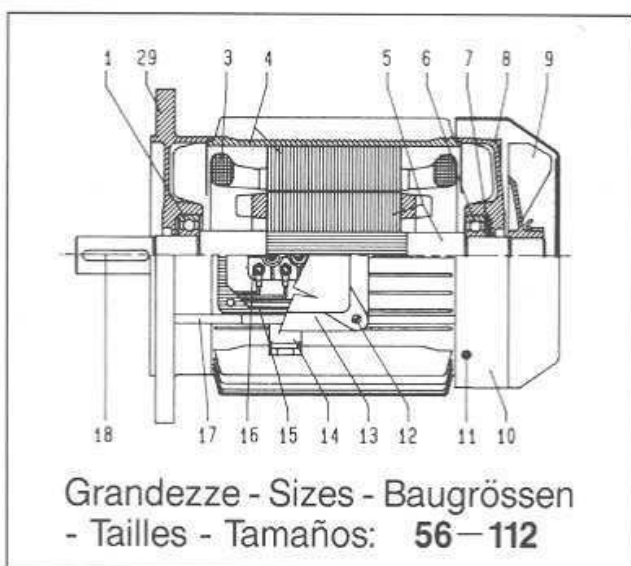
Tipo FC - Forma B5

Type FC - Frame B5

Typ FC - Bauart B5

Type FC - Forme B5

Tipo FC - Forma B5



## SPARE PARTS

1. Front bearing
2. Fixing screw for shield
3. Winding
4. Frame with stator package
5. Shaft with rotor
6. Rear bearing
7. Compensating spring
8. Rear shield
9. Cooling fan
10. Fan hood
11. Fixing screw for fan hood
12. Fixing screw for terminal-box
13. Terminal-box
14. Cable-holder

15. Packing
16. Terminal block
17. Tie-bolt
18. Coupling side key
19. Fixing screw for shield
20. Fixing screw for fan
21. Seeger elastic ring
22. Fan side key
23. Seeger elastic ring
24. Inner front side grease-guard cover
25. Inner rear side grease-guard cover
26. Outer front side grease guard cover
27. Outer rear side grease guard cover
28. "Tecalmit" lubricator
29. Shield with flange

## **Sicherheits- und Inbetriebnahmehinweise für Niederspannungs-Asynchronmotoren**

### **Qualifiziertes Personal**

Montagearbeiten, Inbetriebsetzung und Betrieb von Motoren dürfen nur von Fachpersonal ausgeführt werden, das auf Grund fachlicher Ausbildung, Erfahrung und Unterweisung ausreichende Kenntnisse über

- Sicherheitsvorschriften,
- Unfallverhütungsvorschriften,
- Richtlinien und anerkannte Regeln der Technik (z.B. VDE-Bestimmungen, Normen) hat.

Das Fachpersonal muss die ihnen übertragenen Arbeiten beurteilen, mögliche Gefahren erkennen und vermeiden können. Es muss von dem für die Sicherheit der Anlage Verantwortlichen ermächtigt sein, die erforderlichen Arbeiten und Tätigkeiten auszuführen.

Die Passfeder im Wellenende ist durch die Wellenschutzhülse nur für Transport und Lagerung gesichert, eine Inbetriebnahme bzw. ein Probelauf mit nur durch die Wellenschutzhülse gesicherter Passfeder ist aufgrund der Schleudergefahr der Passfeder strengstens untersagt.

Beim Aufziehen des Übertragungselementes (wie Kupplung, Ritzel oder Riemenscheibe) sind Aufziehvorrichtungen zu benutzen, oder das aufzuziehende Teil ist zu erwärmen. Zum Aufziehen besitzen die Wellenenden Zentrierungen mit Gewindebohrungen nach DIN 332 Teil 2. Das Aufschlagen von Übertragungselementen auf die Welle ist unzulässig, da Welle, Lager und andere Teile des Motors beschädigt werden können.

Alle am Wellenende anzubauenden Elemente sind entsprechend Wuchtsystem des Motors (ganze oder halbe Passfeder) sorgfältig dynamisch zu wuchten. Die Läufer der Motoren sind mit halber Passfeder gewuchtet. Die Motoren sind möglichst schwingungsfrei aufzustellen. Der Betreiber hat nach Abschluss der Montage für den Schutz beweglicher Teile zu sorgen und die Betriebssicherheit herzustellen.

Bei direktem Kuppeln mit der angetriebenen Maschine ist besonders genau auszurichten. Die Achsen beider Maschinen müssen fluchten. Die Achshöhe ist durch entsprechende Beilagen der angetriebenen Maschine anzugleichen.

Riementriebe belasten den Motor durch relativ große Radialkräfte. Bei der Dimensionierung von Riementrieben ist neben den Vorschriften und Berechnungsprogrammen der Riemenhersteller zu beachten, dass die nach unseren Angaben am Wellenden des Motors zulässige Radialkraft durch Riemenzug und -vorspannung nicht überschritten wird. Insbesondere ist bei der Montage die Riemenvorspannung genau nach den Vorschriften der Riemenhersteller einzustellen.

Durch den Einsatz von Zylinderrollenlagern können relativ große Radialkräfte oder Massen am Motorwellenende aufgenommen werden. Die Mindestradialkraft am Wellenende muss ein Viertel der zulässigen Radialkraft betragen. Die zulässige Wellenendenbelastung ist zu berücksichtigen. Die Angaben können den Tabellen und Diagrammen in den konstruktiven Auswahldaten entnommen werden.

Eine Unterschreitung der Mindestradialkraft kann innerhalb weniger Stunden zu Lagerschäden führen. Probelläufe im unbelasteten Zustand dürfen nicht erfolgen.

### **Motoranschluss**

Der Anschluss ist von einem Fachmann nach den geltenden Sicherheitsbestimmungen vorzunehmen. Außerhalb Deutschlands sind die entsprechenden Landesvorschriften anzuwenden. Typenschildangaben sind unbedingt zu beachten!

Beim Anschließen der Motoren ist besonders auf sorgfältige Herstellung der Anschlussverbindungen im Anschlusskasten zu achten. Die Muttern der Anschlussschrauben sind ohne Gewaltanwendung fest anzuziehen. Vor dem Anschluss der Netzzuleitungen sind die bestehenden Motoranschlüsse gegebenenfalls nachzuziehen.

Vor dem Einschalten des Motors ist zu überprüfen, dass alle Sicherheitsbestimmungen eingehalten werden, die Maschine ordnungsgemäß montiert und ausgerichtet ist, alle Befestigungsteile und Erdungsanschlüsse fest angezogen sind, die Hilfs- und Zusatzeinrichtungen funktionsfähig und ordnungsgemäß angeschlossen sind und die Passfeder eines eventuell vorhandenen zweiten Wellenendes gegen Wegschleudern gesichert ist.

Der Motor ist, falls möglich, ohne Last einzuschalten. Läuft er ruhig und ohne abnormale Geräusche, wird der Motor mit der Arbeitsmaschine belastet. Bei der Inbetriebnahme empfiehlt sich eine Beobachtung der aufgenommenen Ströme, wenn der Motor mit seiner Arbeitsmaschine belastet ist, damit mögliche Überlastungen und netzseitige Asymmetrien sofort erkennbar sind.

### **Hauptinspektion**

Gemäß den Vorgaben soll einmal jährlich nach ca. 10.000 Betriebsstunden am Motor eine Hauptinspektion durchgeführt werden.

Folgende Untersuchungen werden bei Stillstand der Maschine durchgeführt:

- Überprüfung des Fundaments. Es dürfen keine Risse oder andere Beschädigungen wie Senkungen oder ähnliches auftreten.
- Überprüfung der Ausrichtung des Motors. Die Ausrichtung des Motors muss innerhalb der vorgegebenen Toleranzen liegen.
- Überprüfung der Befestigungsschrauben. Alle Schrauben, die zur Befestigung von mechanischen und elektrischen Verbindungen verwendet werden, müssen fest angezogen sein. Überprüfung der Leitungen und des Isolationsmaterials. Bei der Überprüfung wird festgestellt, ob die Leitungen und die verwendeten Isolationsmaterialien in ordnungsgemäßem Zustand sind. Sie dürfen keine Verfärbungen oder gar Brandspuren aufweisen und dürfen nicht gebrochen, gerissen oder auf andere Weise defekt sein.
- Überprüfung des Isolationswiderstands. Der Isolationswiderstand der Wicklung muss kontrolliert werden.
- Je nach Fettqualität und Lagerung des Motors kann nach 10.000 Betriebsstunden auch ein Fettwechsel der Wälzlager notwendig. Ansonsten müssen die notwendigen Nachschmierfristen für Wälzlager gesondert beachtet werden, denn sie weichen von den Inspektionsintervallen ab.

Folgende Untersuchungen werden bei laufendem Motor durchgeführt:

- Überprüfung der elektrischen Kenngrößen.
- Überprüfung der Lagertemperaturen. Es wird festgestellt, ob die zulässigen Lagertemperaturen beim Betrieb des Motors überschritten werden.
- Überprüfung der Laufgeräusche. Beim Betrieb des Motors wird akustisch überprüft, ob sich die Laufruhe des Motors verschlechtert hat.

Werden bei der Untersuchung Abweichungen von den in der Bedienungs- und Wartungsanleitung gegebenen Werten oder andere Defekte und Fehler festgestellt, so sind diese umgehend zu beheben.

Wartungsarbeiten (außer Nachschmierarbeiten) sind nur im Stillstand der Maschine durchzuführen. Es ist sicher zu stellen, dass die Maschine gegen Einschalten gesichert und durch ein entsprechendes Hinweisschild gekennzeichnet ist.

Benachbarte, unter Spannung stehende Teile sind abzudecken! Es ist sicher zu stellen, dass die Hilfsstromkreise, z.B. Stillstandsheizung, spannungsfrei geschaltet sind.

### **Säuberung**

Um die Wirkung der Kühlluft nicht zu beeinträchtigen, sind alle Teile des Motors regelmäßig einer Reinigung zu unterziehen. Meistens genügt das Ausblasen mit wasser- und ölfreier Pressluft. Insbesondere sind die Lüftungsöffnungen und Rippenzwischenräume sauber zu halten. Es empfiehlt sich, bei den regelmäßigen Durchsichten der Arbeitsmaschine die Elektromotoren einzubeziehen.

### Thermischer Motorschutz

Bei eventuell notwendiger Nachmessung des Kaltwiderstandes (bei UT. ca. 20 °C), des Fühlerkreises darf die Messspannung 2,5 V Gleichstrom nicht überschreiten.

Der Kaltwiderstand des Fühlerkreises darf 250 Ohm nicht überschreiten, eine Messung des Warmwiderstandes ist nicht erforderlich.

Bei Motoren mit thermischem Wicklungsschutz müssen Vorkehrungen getroffen werden, dass nach Ansprechen des thermischen Wicklungsschutzes und anschließender Abkühlung des Motors durch unbeabsichtigtes automatisches Wiedereinschalten keine Gefährdungen auftreten können.

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Web: [www.techtop.com](http://www.techtop.com) / [www.electroadda.com](http://www.electroadda.com)

Type T2A 90L1-4

Cod. I0900401,535A5A0TAMT

Mounting position

|    |      |
|----|------|
| IM | B35  |
| IM | 2001 |

| Electrical data             |       |         |                        |
|-----------------------------|-------|---------|------------------------|
| Rated motor power           | 1.5   |         | Kw                     |
| Rated motor speed           | 1440  |         | min <sup>-1</sup> 50Hz |
|                             | 1730  |         | min <sup>-1</sup> 60Hz |
| Rated motor frequency       | 50    |         | Hz                     |
| Rated motor voltage(+/-10%) | 230   |         | VΔ/50Hz                |
|                             | 400   |         | VY/50Hz                |
|                             | 280   |         | VΔ/60Hz                |
|                             | 480   |         | VY/60Hz                |
| Rated motor torque          | 10.09 |         | Nm (Mn)                |
| Rated motor current         | 6.15  | VΔ/50Hz | A (In)                 |
|                             | 3.55  | VY/50Hz | A (In)                 |
| Starting motor current      | 6.5   |         | xIn                    |
| Starting motor torque       | 3.1   |         | xMn                    |
| Breakdown motor torque      | 3.2   |         | xMn                    |
| Starting                    |       |         | D.O.L.                 |
| Efficiency class            | IE2   |         |                        |
| Efficiency                  | 50Hz  | 60Hz    |                        |
|                             | 82.8  | 85.8    | 100% load              |
|                             | 83.4  | 85.7    | 75% load               |
|                             | 81.8  | 83.5    | 50% load               |
| Power factor cosφ           | 0.74  | 0.74    | 100% load              |

| General data                      |                    |      |           |
|-----------------------------------|--------------------|------|-----------|
| Frame size                        | 90                 |      |           |
| Mounting                          | B35                |      |           |
| Weight                            | 17.05              |      | Kg        |
| Casing material                   | Aluminum           |      |           |
| Protection                        | IP                 |      | 55        |
| Insulation class/Temperature rise | F                  | /    | B         |
| Tropicalization                   | Yes                |      |           |
| Vibration class                   | N                  |      |           |
| Duty                              | S1                 |      |           |
| Direction of rotation             | Bidirectional      |      |           |
| Method of cooling                 | IC                 |      | 411       |
| Cable entry                       | 1-M20x1,5          |      |           |
| Standards                         | IEC/DIN/ISO/VDE/EN |      |           |
| Execute at Standard               | IEC 60034-1        |      |           |
| Feet removable                    | Yes                |      |           |
| Paintwork                         | RAL                | 7024 | dark grey |
| Thermal protections               | n/a                |      |           |

| Site conditions          |                     |
|--------------------------|---------------------|
| Ambient temperature      | from -20°C to +40°C |
| Altitude above sea level | 1000 m              |

| Mechanical data         |   |    |                  |                                       |                   |
|-------------------------|---|----|------------------|---------------------------------------|-------------------|
| Noise level             | LpA   | 70 | dB(A)            | Bearing DE side                       | 6205-2RS-C3       |
|                         | LwA   | 80 | dB(A)            | Bearing NDE side                      | 6205-2RS-C3       |
| Moment of inertia       | 0.00419   |    | Kgm <sup>2</sup> | Average bearing lifetime              | 40000 h           |
| Bearings type           |   |    | NSK              | Relubrication interval L1 DE bearing  | life h            |
| Lubricants for bearings | See installation and maintenance manual page 12 |    |                  | Relubrication interval L1 NDE bearing | life h            |
|                         |   |    |                  | Compensation ring                     | NDE SIDE standard |

### MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

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## 1 COUPLINGS POSIMIN NZNMIN

**Torsionally rigid coupling with clamping hub on compressor side and hub with adjusting screw on motor side, half key balancing**

### 1.1 Safety Instructions

This installation and operating manual is an essential component of the coupling delivery. Always keep this manual in a readily accessible place near the coupling.

The German version of this manual is the predominant and binding version. Take care that all persons being charged with the installation, operation, maintenance and repair of the coupling have read and understood this manual and that all instructions contained therein are carefully observed in order to:

- Avoid danger to life and limb of the user or third persons
- Ensure the operational safety of the coupling
- Preclude operation failures and environmental damages due to wrong handling and mis-use

The relevant instructions and regulations regarding safety at work and environmental protection have to be observed while transporting, mounting and dismounting the coupling.

The coupling shall be operated, mounted, maintained and repaired by authorized, trained and instructed personnel only. We do not assume any liability or warranty for any damages resulting from the use of accessories and parts that are not originally delivered by GEA Refrigeration Germany GmbH.

### 1.2 Function



fig. 1: Coupling POSIMIN NZNmin

The coupling is a torsionally rigid steel disk coupling. It compensates angular, radial and axial shaft misalignments within defined ranges. The coupling transmits torque without backlash through flexible steel disks loaded in tension. The spacer can be radially mounted and dismantled without having to move the connected machines (screw compressor and electric motor). The distance dimension "E" between the flange hubs can be used, for example, to service connected machines. When the spacer is dismantled, a check of the rotational direction of the drive can easily be performed.

### 1.3 Intended use

The following conditions must be met for the intended use:

- The coupling must only be operated in normal industrial atmospheres. Aggressive media may attack the coupling components, screws and elastic buffer rings. So the aggressive media represent a risk for the operational safety of the coupling.
- The coupling shall only be used and operated within the frame of the conditions as defined in the performance or delivery contract.
- Any change in the operation conditions or service parameters requires the verification of the coupling design.

### 1.4 Storage

On receipt of the goods, immediately check that all parts are on hand and are as ordered. Eventual shipping damages and/or missing parts have to be reported in writing.

The coupling parts can be stored in a dry place under roof at normal ambient temperatures for a time period of 6 months. Storage for a longer period requires the application of a long-term preservation.

The disk packs are made of stainless spring steel. They must not be exposed to any aggressive products, extreme temperatures or humidity. Do not store the disk packs along with acids, alkaline solutions or other caustic chemicals. The place of storage should be dry and free from dust. The air humidity should not exceed 65% and condensation is not permissible.

## MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

#### 1.5 Construction

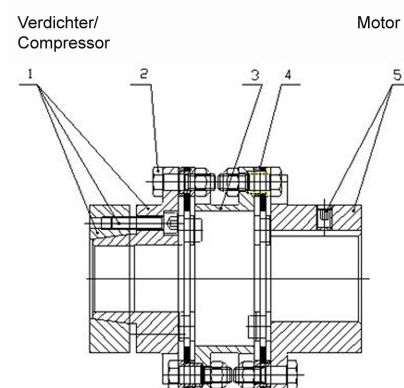
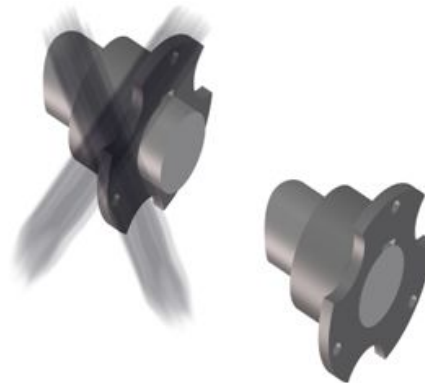


fig. 2: Design of the coupling

|   |  |
|---|--|
| 1 | Integrated hub with clamping ring and tightening screws (on compressor side) |
| 2 | Fitting screws with nuts   |
| 3 | Spacer   |
| 4 | Disk packs   |
| 5 | Hub with adjusting screw (on motor side)                                     |

tapered surfaces and the clamping set screws have to be re-greased with a lubricant.

- The holes of the hubs and the shaft ends of the compressor and drive motor must be free of grease. Use the bolting of the disk packs as they were delivered, i.e. slightly oiled. It must not be lubricated or cleaned separately!
- Uptake the coupling hub into the proposed position on the shaft. The shaft ends should not overlap, otherwise the spacer can not be radial installed or dismantled (see figure). The hub flanges must be parallel to each other, the shaft must be aligned.



#### Hint!

The spacer (pos. 3) will be delivered together with the disk packs (pos. 4) as prefabricated assembly.

Balanced assemblies are match marked. For balanced couplings, the fitted bolts and nuts are weight balanced. These sets must not be mixed with bolt sets of other couplings!

- First, the motor side hub with loose adjusting screw has to be mounted on the shaft end. The face of the hub should be flush with the motor shaft.
- For pre-assembly of the coupling, it is necessary to align the motor and compressor with the shaft so that the **distance dimension E + 1mm** is achieved at least.

When using frame structures of the GEA Refrigeration Germany GmbH is the dimension "E" is defined as follows:

Units with screw compressors of Medium series: + 10mm

Units with screw compressors of Large series: + 5mm

#### 1.6 Mounting



#### Caution!

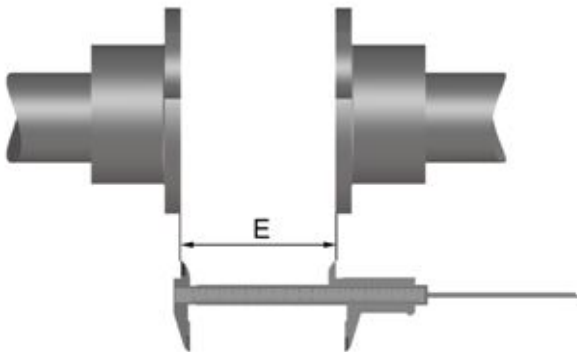
Disconnect the drive before carrying out any work on the coupling. Secure the drive against unintentional re-start and rotation!

##### 1.6.1 Mounting the coupling

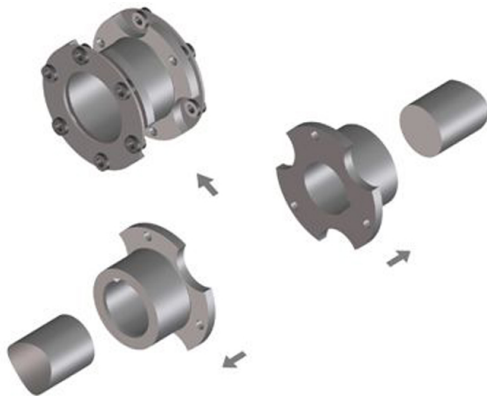
- Check the direction of rotation of the electric motor. Secure the electric motor against accidentally being switched on.
- The compressor side clamping set and the tapered surfaces of the hub are factory assembled with mounting grease. For repeat assembly, the

### MAIN PART

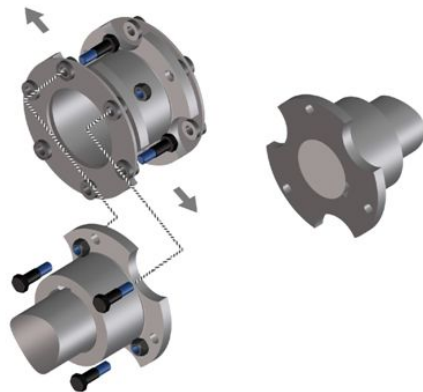
#### Torsionally Rigid Coupling POSIMIN - NZNmin



7. The compressor side hub is fitted with a clamping ring and clamping screws. Tighten all clamping screws evenly and in revolving order. Several rounds are necessary until the clamping ring is mounted with the specified tightening torque.



8. Insert the spacer and pre-assemble the fitted bolts with nuts. The NZN-min type allows to mount the fitted bolts from the hub side only!



9. Align the motor side hub to the spacer (see chapter "Coupling Alignment").
10. Tighten the nuts on the disk pack fitting screws evenly until the tightening torque is reached. Secure the fitting screws against turning. The bolts and nuts may not be greased or additionally purified, and the specified torque of the following table must not be exceeded!
11. Tighten the adjusting screw in the hub on motor side according to the tightening torque.



#### Hint!

**When tightening adjusting screws, secure them with an adhesive, such as e.g. Loctite 222, to prevent the screws from working loose and dropping out!**

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**Torsionally Rigid Coupling POSIMIN - NZNmin**

**1.6.2 Tightening torques**

**Clamping screws for hub compressor side**

| Coupling size | compressor side |               |                        |
|---------------|-----------------|---------------|------------------------|
|               | shaft diameter  | Screw DIN 912 | Tightening torque [Nm] |
| 66 E70        | 50              | M6            | 14                     |
| 105 E70       | 50              | M10           | 59                     |
| 105 E70       | 60              | M8            | 30                     |
| 168 E70/80    | 60              | M10           | 59                     |
| 260 E80       | 80              | M8            | 30                     |
| 260 E105      | 90              | M8            | 30                     |
| 330 E105      | 60              | M12           | 100                    |
| 330 E105      | 80              | M10           | 59                     |
| 330 E120      | 90              | M8            | 30                     |
| 520 E105      | 90              | M12           | 120                    |
| 520 E120      | 80              | M12           | 100                    |
| 660 E120      | 90              |               |                        |
| 660 E200      | 110             | M10           | 69                     |
| 840 E220      | ?               |               |                        |
| 1200 E210     | 110             | M16           | 250                    |

**Disk pack fitting screws (torque-tightening)**

| Coupling size | Fitting screw (pos. 5) | Tightening torque [Nm] |
|---------------|------------------------|------------------------|
| 66E70         | M 10x35                | 66                     |
| 105E70        | M 12x40                | 115                    |
| 168E70        | M 16x43                | 250                    |
| 168E80        | M 16x46                | 250                    |
| 260E80        | M 16x46                | 250                    |
| 260E105       | M 16x46                | 250                    |
| 330E105       | M 20x65                | 490                    |
| 330E120       | M 20x65                | 490                    |
| 520E105       | M 20x65                | 490                    |
| 520E120       | M 20x65                | 490                    |

## MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

| Coupling size | Fitting screw (pos. 5) | Tightening torque [Nm] |
|---------------|------------------------|------------------------|
| 660E200       | M 24x72                | 840                    |
| 840E210       | M 24x72                | 840                    |
| 1200E210      | M 30x92                | 1700                   |

## 1.7 Alignment



### Hint!

Accurate alignment of the coupling prolongs the lifetime of the disk packs and reduces the risks when operating the coupling. It is of utmost importance to observe the recommended alignment values. Exceeding the permissible misalignment values results in coupling damages and failures!

### 1.7.1 Angular displacement

Angular displacement  $\Delta K_w$

1. Measure one complete rotation (360°) on the face of the outer diameter. Determine the largest deviation  $K_{w1}$  and the smallest deviation  $K_{w2}$  (see figure).
2. Calculate the angular displacement.  
$$\Delta K_w = K_{w1} - K_{w2}$$
3. When aligning, observe the max. permissible angular misalignment  $\Delta K_{w \max}$  acc. to table!

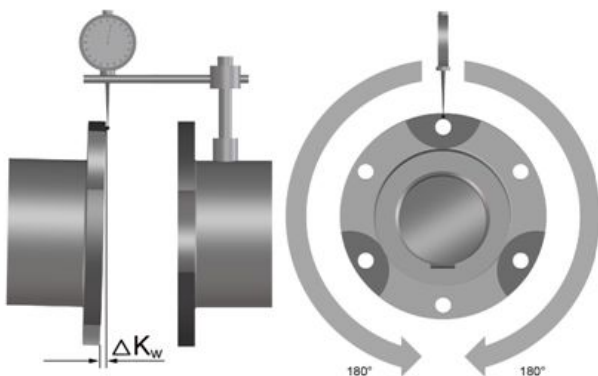


fig. 3: Determine the angular displacement

### max. permissible angular displacement

| Coupling size | $\Delta K_{w \max}$ [mm] |
|---------------|--------------------------|
| 66            | 0.25                     |
| 105           | 0.30                     |
| 168           | 0.30                     |
| 260           | 0.30                     |
| 330           | 0.35                     |
| 520           | 0.40                     |
| 660           | 0.40                     |
| 840           | 0.45                     |
| 1200          | 0.60                     |

### 1.7.2 Axial Misalignment

Axial Misalignment  $\Delta K_a$

1. Before installing the spacer measure the actual length dimension "E" of the spacer over the bushes of the disk packs (see figure).
2. Set the distance between the flange hubs to a dimension between E and (E +  $\Delta e$ ) acc. to table. Do not exceed the tolerances stated in table.

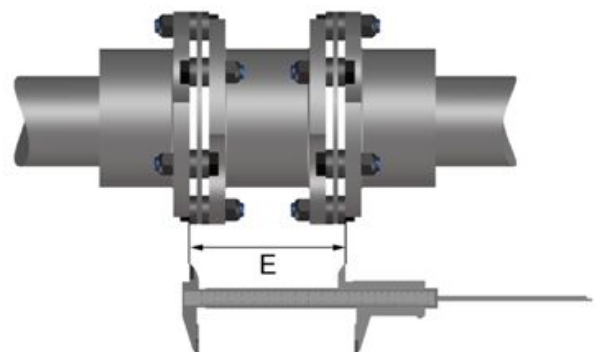


fig. 4: Determine the axial misalignment

### MAIN PART

#### Torsionally Rigid Coupling POSIMIN - NZNmin

Recommended tolerance value for mounting dimension "E"

| Coupling size | $\Delta e$ [mm] |
|---------------|-----------------|
| 66            | 0.2             |
| 105           | 0.2             |
| 168           | 0.2             |
| 260           | 0.25            |
| 330           | 0.25            |
| 520           | 0.25            |
| 660           | 0.3             |
| 840           | 0.35            |
| 1200          | 0.4             |

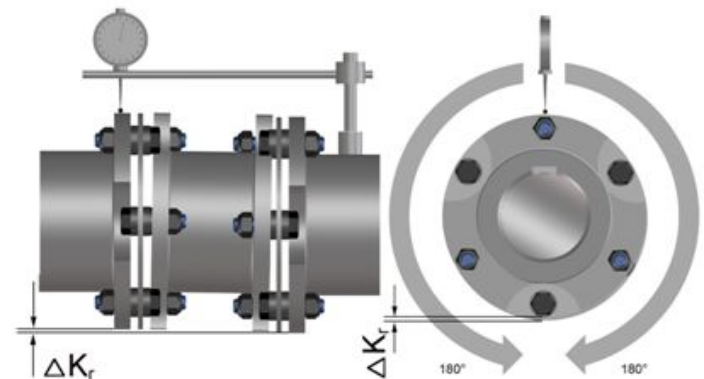


fig. 5: Determine the radial displacement



#### Hint!

Make sure not to fall below the dimension "E", as otherwise it is not possible to mount the spacer radially!

#### 1.7.3 Radial displacement

Radial displacement  $\Delta K_r$

1. Measure one complete rotation (360°). Determine the largest deviation  $K_{r1}$  and the smallest deviation  $K_{r2}$  (see figure).

Calculate the radial displacement  $\Delta K_r = 0.5 \times (K_{r1} - K_{r2})$ . Observe the preceding sign of the measured values.

2. When aligning, observe the maximum permissible radial displacement in dependence of the mounting dimension „E“  $\Delta K_{r \max} = E/1000$  [mm].
3. For verification purposes, this measurement should also be performed on the second coupling half.
4. The alignment must be corrected in case of any deviations.

### MAIN PART

#### Torsionally Rigid Coupling POSIMIN - NZNmin

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### 1.8 Running

When operating the coupling, its specific technical data have to be carefully observed. These values must never be exceeded without the prior written approval. Any change in operating conditions or operating parameters makes a review of the coupling design required!



#### Caution!

- Disconnect the drive before carrying out any work on the coupling!
- Secure the drive against unintentional re-start and rotation!
- Improperly tightened screws may cause parts to fly off what leads to most serious personal injuries and property damages!
- Before putting the coupling into operation, check the alignment and all screwed connections for correct tightening torque and firm fit!
- Before starting up the equipment, install all protective guards in order to avoid unintentional contact with freely moving or rotating parts.
- The covers have to comply with protection type IP2X as a minimum.
- The cover shall be designed to prevent dust from depositing on the coupling parts.
- The cover must not touch the coupling and must not impair the proper function of the coupling.
- While operating the coupling, pay attention to:
  - changes in operating noises
  - vibrations
- Disconnect the drive immediately, if any irregularities are observed while operating the coupling.
- Identify the cause for the problem using table “Operation faults and possible causes” and correct the fault. The listed problems are some examples to assist you in troubleshooting.
- All the machinery components and operation modes have to be considered for the determination and correction of faults!

## MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

#### 1.9 Troubleshooting

##### Operation faults and their possible causes

| Trouble                       | Cause                   | Risk warning  | Correction   |
|-------------------------------|-------------------------|---|--|
| Running noises/<br>vibrations | Alignment fault         | Increased restoring forces on shafts and bearings of the connected units. | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Remove cause for alignment fault</li> <li>3. Re-align coupling</li> <li>4. Check disk packs for damages such as cracks, dents or similar damages, and replace them, if necessary</li> </ol>   |
|                               | Damaged disk packs      | Disk breakage, spacer can fly out   | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Check coupling components for damages and replace parts, if necessary</li> <li>3. Check alignment</li> <li>4. Verify coupling design</li> <li>5. Replacement of disk packs</li> <li>6. Verify balance state of plant components and correct it, if necessary</li> </ol> |
|                               | Unbalance               | Vibrations, disk breakage   | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Check disk packs for damages such as cracks, dents or similar damages, and replace them, if necessary</li> <li>3. Verify balance state of plant components and correct it, if necessary</li> </ol>  |
|                               | Loose screw connections | Spacer can fly out  | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Check coupling components for damages and replace parts, if necessary</li> <li>3. Verify alignment of coupling</li> <li>4. Tighten nuts with the specified tightening torque</li> </ol>   |
| Disk pack damages             | Alignment fault         | Increased restoring forces on shafts and bearings of the connected units. | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Remove cause for alignment fault</li> <li>3. Re-align coupling</li> <li>4. Replacement of disk packs</li> <li>5. Verify balance state of plant components and correct it, if necessary</li> </ol>   |

### MAIN PART

#### Torsionally Rigid Coupling POSIMIN - NZNmin

| Trouble | Cause                                  | Risk warning                      | Correction  |
|---------|--|-----------------------------------|---|
|         | Overloading due to very high torque    | Disk breakage, spacer can fly out | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Verify coupling design</li> <li>3. Replace coupling</li> <li>4. Install larger coupling, if necessary</li> </ol>   |
|         | Contact with aggressive products       | Disk breakage, spacer can fly out | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Check coupling components for damages and replace parts, if necessary</li> <li>3. Replacement of disk packs</li> <li>4. Verify balance state of plant components and correct it, if necessary</li> <li>5. Verify alignment of coupling</li> <li>6. Prevent contact with aggressive products</li> </ol> |
|         | Torsional vibrations in the drive line | Disk breakage, spacer can fly out | <ol style="list-style-type: none"> <li>1. Disconnect drive</li> <li>2. Analyse and eliminate cause for torsional vibrations</li> <li>3. Check coupling components for damages and replace parts, if necessary</li> <li>4. Verify alignment of coupling</li> </ol>   |

### MAIN PART

#### Torsionally Rigid Coupling POSIMIN - NZNmin

### 1.10 Maintenance

The torsionally rigid disk coupling POSIMIN® only requires little maintenance during operation.

On the occasion of routine inspections or maintenance of the equipment, check:

- alignment of coupling,
- state of disk packs,
- firm fit of all fixing elements at the disk packs.
- Remove dust deposits from coupling parts and disk packs.

#### 1.10.1 Disk Pack Inspection



##### **Danger!**

**Disconnect the drive before carrying out any work on the coupling! Secure the drive against unintentional re-start and rotation!**

Visually inspect the disk packs after 2000 hours, however after 3 months at latest, after the first start-up. If this first inspection does not reveal any damages such as cracks or dents on the disks, further inspections may be conducted at regular intervals (see maintenance checklist of GEA Refrigeration Germany GmbH).

#### 1.10.2 Replacement of disk packs

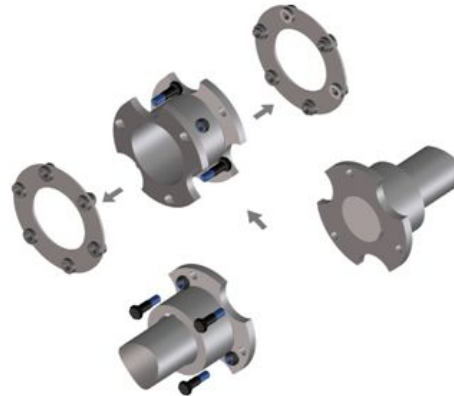


fig. 6: Replacement of disk packs

- Secure the spacer against falling down.
- Remove the fixing elements from the disk packs.
- Radially lift out the spacer along with the disk packs of the hub flanges. For larger couplings use appropriate tools and lifting devices.
- Carefully remove the damaged disk packs making sure not to damage the fitted bores in the flanges.
- Check the coupling parts for damages.
- Install the new disk packs of NZN-design with the protruding bushes to the spacer. Take care that the bushes do not get canted, and press the bushes into the flange of the spacer in a simultaneous and uniform manner.
- For further way of proceeding, see chapter "Mounting the coupling".
- For further way of proceeding, see chapter "Coupling Alignment".

## MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

#### 1.11 Basic coupling types

according to the combination compressor - max. possible driving power



**Hint!**

**Coupling types outside of these ranges on request construction of the GEA Refrigeration Germany GmbH!**

| Compressor type   | Shaft di-<br>ameter<br>(mm) | Operating data of motor/compressor |                             |                                     |                                     | Coupling data                       |                                     | Series                                       |
|---|-----------------------------|------------------------------------|-----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|
|   |                             | max. driving power                 |                             | Rated<br>torque<br>$T_{rated}$ (Nm) | Shock<br>torque<br>$T_{shock}$ (Nm) | Rated<br>torque<br>$T_{rated}$ (Nm) | Shock<br>torque<br>$T_{shock}$ (Nm) |  |
|   |                             | at 50 Hz<br>(kW)                   | at 60 Hz<br>(kW)            |                                     |                                     |                                     |                                     |  |
| H, L, M, N<br>Motor shaft $\geq 80$ mm                    | 50                          | 200                                | 240                         | 637                                 | 1592                                | 900                                 | 1600                                | 66-E70<br>105-E70                            |
| M, N  | 50                          | 300                                | 360                         | 955                                 | 2388                                | 1400                                | 2500                                | 105-E70                                      |
| P<br>Motor shaft = 85 mm                                  | 60                          | 300                                | 360                         | 955                                 | 2388                                | 1400                                | 2500                                | 105-E70<br>168 -E80                          |
| R, S, T<br>Motor shaft $> 80$ mm<br>Motor shaft $> 90$ mm | 60<br>60                    | 530<br>900                         | 640<br>1080                 | 1687<br>2865                        | 4218<br>7163                        | 2400<br>4400                        | 4300<br>8000                        | 168-E70<br>168-E80<br>330-E105               |
| V, W, Y, Z, XA<br>V, W, Y, Z, XA<br>Z, XA<br>Z, XA        | 80<br>80<br>80<br>80        | 650<br>900<br>1100<br>1250         | 780<br>1080<br>1320<br>1500 | 2069<br>2865<br>3500<br>3979        | 5173<br>7163<br>8750<br>9948        | 2900<br>4400<br>5200<br>7700        | 5200<br>8000<br>9400<br>13900       | 260-E80<br>330-E105<br>520-E120<br>660-E120  |
| XB, XC, XD<br>XB, XC, XD<br>XB, XC, XD<br>XB, XC, XD      | 90<br>90<br>90<br>90        | 650<br>987<br>1167<br>1728         | 780<br>1184<br>1400<br>2073 | 2069<br>3142<br>3714<br>5500        | 5173<br>7855<br>9286<br>13750       | 2900<br>4400<br>5200<br>7700        | 5200<br>8000<br>9400<br>13900       | 260-E105<br>330-E120<br>520-E105<br>660-E120 |
| XE, XF<br>XE, XF<br>XE, XF                                | 110<br>110<br>110           | 1728<br>1863<br>3366               | 2073<br>2235<br>4039        | 5500<br>5929<br>10714               | 13750<br>14821<br>26786             | 7700<br>8300<br>15000               | 13900<br>15000<br>27000             | 660-E200<br>840-E220<br>1200-E210            |

## MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

#### 1.12 Standard coupling types



Hint!

Coupling types outside of these ranges on request construction of the GEA Refrigeration Germany GmbH!

##### 1.12.1 Coupling for units with screw compressors types H, L, M, N / 50 - 60 Hz

| Compressor H, L, M, N<br>shaft diameter = 50 mm         |              |          |             | Compressor M, N<br>shaft diameter = 50 mm               |              |          |             |
|---|--------------|----------|-------------|---|--------------|----------|-------------|
| max. motor capacity<br>200 kW - 50 Hz<br>240 kW - 60 Hz |              |          |             | max. motor capacity<br>315 kW - 50 Hz<br>378 kW - 60 Hz |              |          |             |
| motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) | motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) |
| Ø 55 - HK   | 496298300H   | 66-E70   | 9           |   |              |          |             |
| Ø 60 - HK   | 496298301H   | 66-E70   | 9           |   |              |          |             |
| Ø 65 - HK   | 496298302H   | 66-E70   | 9           | Ø 65 - HK   | 496298306H   | 105-E70  | 14          |
| Ø 70 - HK   | 496298303H   | 66-E70   | 9           | Ø 70 - HK   | 496298307H   | 105-E70  | 14          |
| Ø 70 - VK   | 496298303V   | 66-E70   | 9           |   |              |          |             |
| Ø 75 - HK   | 496298304H   | 66-E70   | 9           | Ø 75 - HK   | 496298308H   | 105-E70  | 14          |
| Ø 80 - HK   | 496298309H   | 105-E70  | 14          | Ø 80 - HK   | 496298309H   | 105-E70  | 14          |

##### 1.12.2 Coupling for units with screw compressors types P, R, S, T / 50 - 60 Hz

| Compressor P<br>shaft diameter = 60 mm                  |              |          |             | Compressor R, S, T<br>shaft diameter = 60 mm            |              |          |             |
|---|--------------|----------|-------------|---|--------------|----------|-------------|
| max. motor capacity<br>315 kW - 50 Hz<br>378 kW - 60 Hz |              |          |             | max. motor capacity<br>530 kW - 50 Hz<br>640 kW - 60 Hz |              |          |             |
| motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) | motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) |
| Ø 55 - HK   | 496298310H   | 105-E70  | 14          | Ø 55 - HK   | 496298318H   | 168-E70  | 17          |
| Ø 60 - HK   | 496298311H   | 105-E70  | 14          | Ø 60 - HK   | 496298319H   | 168-E70  | 17          |
| Ø 65 - HK   | 496298312H   | 105-E70  | 14          | Ø 65 - HK   | 496298320H   | 168-E70  | 17          |
| Ø 65 - VK   | 496298312V   | 105-E70  | 14          |   |              |          |             |
| Ø 70 - HK   | 496298313H   | 105-E70  | 14          | Ø 70 - HK   | 496298321H   | 168-E70  | 17          |
| Ø 70 - VK   | 496298313V   | 105-E70  | 14          | Ø 70 - VK   | 496298321V   | 168-E70  | 17          |
| Ø 75 - HK   |              |          |             | Ø 75 - HK   | 496298322H   | 168-E70  | 17          |
| Ø 80 - HK   | 496298315H   | 105-E70  | 14          | Ø 80 - HK   | 496298323H   | 168-E80  | 18          |
| Ø 85 - HK   | 496298316H   | 168-E80  | 18          | Ø 85 - HK   | 496298316H   | 168-E80  | 18          |

## PRODUCT DESCRIPTION



### MAIN PART

#### Torsionally Rigid Coupling POSIMIN - NZNmin

|   |              |          |             |   |                                   |          |             |
|---|--------------|----------|-------------|---|-----------------------------------|----------|-------------|
| Compressor P<br>shaft diameter = 60 mm                  |              |          |             | Compressor R, S, T<br>shaft diameter = 60 mm            |                                   |          |             |
| max. motor capacity<br>315 kW - 50 Hz<br>378 kW - 60 Hz |              |          |             | max. motor capacity<br>530 kW - 50 Hz<br>640 kW - 60 Hz |                                   |          |             |
| motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) | motor shaft diameter                                    | Grasso Ident                      | Coupling | Weight (kg) |
| Ø 90 - HK   |              |          |             | Ø 90 - HK   | 496298325H                        | 168-E80  | 18          |
|   |              |          |             |   |                                   |          |             |
|   |              |          |             | max. motor capacity                                     | 900 kW - 50 Hz<br>1080 kW - 60 Hz |          |             |
|   |              |          |             | Ø 70 - HK   | 496298360H                        | 330-E105 | 29          |
|   |              |          |             | Ø 90 - HK   | 496298355H                        | 330-E105 | 29          |
|   |              |          |             | Ø 100 - HK  | 496298357H                        | 330-E105 | 29          |

MAIN PART

Torsionally Rigid Coupling POSIMIN - NZNmin

1.12.3 Couplings for units with screw compressors types V, W, Y, Z, XA / 50 - 60 Hz

| Compressor V, W, Y, Z, XA<br>shaft diameter = 80 mm     |              |          |             | Compressor V, W, Y, Z, XA<br>shaft diameter = 80 mm      |                                    |          |             |
|---|--------------|----------|-------------|--|------------------------------------|----------|-------------|
| max. motor capacity<br>650 kW - 50 Hz<br>780 kW - 60 Hz |              |          |             | max. motor capacity<br>900 kW - 50 Hz<br>1080 kW - 60 Hz |                                    |          |             |
| motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) | motor shaft diameter                                     | Grasso Ident                       | Coupling | Weight (kg) |
| Ø 60 - HK   | 496298326H   | 260-E80  | 20          |  |                                    |          |             |
| Ø 65 - HK   | 496298327H   | 260-E80  | 20          |  |                                    |          |             |
| Ø 65 - VK   | 496298327V   | 260-E80  | 20          |  |                                    |          |             |
| Ø 70 - HK   | 496298328H   | 260-E80  | 20          |  |                                    |          |             |
| Ø 70 - VK   | 496298328V   | 260-E80  | 20<br>20    |  |                                    |          |             |
| Ø 75 - HK   | 496298329H   | 260-E80  | 20          |  |                                    |          |             |
| Ø 80 - HK   | 496298330H   | 260-E80  | 20          | Ø 80 - HK  | 496298336H                         | 330-E105 | 29          |
| Ø 85 - HK   | 496298331H   | 260-E80  | 20          | Ø 85 - HK  | 496298337H                         | 330-E105 | 29          |
| Ø 90 - HK   | 496298332H   | 260-E80  | 20          | Ø 90 - HK  | 496298338H                         | 330-E105 | 29          |
| Ø 95 - HK   |              |          |             | Ø 95 - HK  | 496298339H                         | 330-E105 | 29          |
| Ø 100 - HK  |              |          |             | Ø 100 - HK   | 496298340H                         | 330-E105 | 29          |
|   |              |          |             |  |                                    |          |             |
|   |              |          |             | max. motor capacity                                      | 1100 kW - 50 Hz<br>1320 kW - 60 Hz |          |             |
|   |              |          |             | Ø 110 - HK   | 496298341H                         | 520-E120 | 43          |

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### Torsionally Rigid Coupling POSIMIN - NZNmin

#### 1.12.4 Couplings for units with screw compressors types XB, XC, XD / 50 Hz - 60 Hz

| Compressor XB, XC, XD<br>shaft diameter = 90 mm         |              |          |             | Compressor XB, XC, XD<br>shaft diameter = 90 mm          |                                    |          |             |
|---|--------------|----------|-------------|--|------------------------------------|----------|-------------|
| max. motor capacity<br>650 kW - 50 Hz<br>780 kW - 60 Hz |              |          |             | max. motor capacity<br>987 kW - 50 Hz<br>1184 kW - 60 Hz |                                    |          |             |
| motor shaft diameter                                    | Grasso Ident | Coupling | Weight (kg) | motor shaft diameter                                     | Grasso Ident                       | Coupling | Weight (kg) |
| Ø 65 - HK   | 496298342H   | 260-E105 | 22          | Ø 65 - HK  |                                    |          |             |
| Ø 70 - HK   | 496298343H   | 260-E105 | 22          | Ø 70 - HK  | 496298346H                         | 330-E120 | 30          |
| Ø 75 - HK   | 496298344H   | 260-E105 | 22          | Ø 75 - HK  |                                    |          |             |
| Ø 80 - HK   | 496298345H   | 260-E105 | 22          | Ø 80 - HK  |                                    |          |             |
| Ø 85 - HK   |              |          |             | Ø 85 - HK  | 496298348H                         | 330-E120 | 30          |
| Ø 90 - HK   |              |          |             | Ø 90 - HK  | 496298349H                         | 330-E120 | 30          |
| Ø 95 - HK   |              |          |             | Ø 95 - HK  | 496298350H                         | 330-E120 | 30          |
|   |              |          |             |  |                                    |          |             |
|   |              |          |             | max. motor capacity                                      | 1167 kW - 50 Hz<br>1400 kW - 60 Hz |          |             |
|   |              |          |             | Ø 80 - HK  | 496298347H                         | 520-E105 | 40          |
|   |              |          |             | Ø 85 - HK  | 496298351H                         | 520-E105 | 40          |
|   |              |          |             | Ø 90 - HK  | 496298352H                         | 520-E105 | 40          |
|   |              |          |             | Ø 95 - HK  | 496298356H                         | 520-E105 | 40          |

#### 1.12.5 Couplings for units with screw compressors types XE, XF/ 50 - 60 Hz

| Compressor XE, XF<br>shaft diameter = 110 mm              |              |          |             | Compressor XE, XF<br>shaft diameter = 110 mm              |              |           |             |
|---|--------------|----------|-------------|---|--------------|-----------|-------------|
| max. motor capacity<br>1728 kW - 50 Hz<br>2073 kW - 60 Hz |              |          |             | max. motor capacity<br>3366 kW - 50 Hz<br>4039 kW - 60 Hz |              |           |             |
| motor shaft diameter                                      | Grasso Ident | Coupling | Weight (kg) | motor shaft diameter                                      | Grasso Ident | Coupling  | Weight (kg) |
| Ø 75 - HK   | 496298361H   | 660-E200 | 57          | Ø 75 - HK   |              |           |             |
| Ø 80 - HK   | 496298353H   | 660-E200 | 57          | Ø 80 - HK   |              |           |             |
| Ø 120 - HK  |              |          |             | Ø 120 - HK  | 496298354H   | 1200-E210 | 102         |

## MAIN PART

### Torsionally Rigid Coupling POSIMIN - NZNmin

#### 1.13 Spare parts for standard couplings

##### 1.13.1 Spare parts - Torsionally rigid coupling for units with screw compressors types H, L, M, N / 50 - 60 Hz

| Grasso Ident<br>Coupling   | Integrated clamping<br>hub compressor<br>side <sup>1</sup> | Fixing elements for<br>disk pack                                       | Spacer    | Disk pack              | Clamping hub<br>motor side <sup>4</sup> |
|--|--|--|-----------|------------------------|---|
| 496298300H   | 497898150  | 497898133 <sup>2</sup>   | 497898144 | 497898138 <sup>3</sup> | 497898253H                              |
| 496298301H   |  |  |           |                        | 497898254H                              |
| 496298302H   |  |  |           |                        | 497898255H                              |
| 496298303H   |  |  |           |                        | 497898256H                              |
| 496298304H   |  |  |           |                        | 497898257H                              |
| 496298303V   |  |  |           |                        | 497898400V                              |
| 496298306H   | 497898066  | 497898134 <sup>2</sup>   | 497898145 | 497898139 <sup>3</sup> | 497898259H                              |
| 496298307H   |  |  |           |                        | 497898260H                              |
| 496298308H   |  |  |           |                        | 497898261H                              |
| 496298309H   |  |  |           |                        | 497898262H                              |
| <sup>1</sup> Hub + clamping ring + tightening screws<br><sup>2</sup> 1 set = 12 pcs. of fitting screws |  | <sup>3</sup> 2 for each coupling<br><sup>4</sup> Hub + adjusting screw |           |                        |   |

##### 1.13.2 Spare parts - Torsionally rigid coupling for units with screw compressors types P, R, S, T / 50 - 60 Hz

| Grasso Ident Coupling | Integrated clamping hub compressor side <sup>1</sup> | Fixing elements for steel disk pack <sup>2</sup> | Spacer    | Steel disk pack <sup>3</sup> | Clamping hub motor side <sup>4</sup> |
|-----------------------|--|--|-----------|------------------------------|--------------------------------------|
| 496298310H            | 497898156  | 497898134  | 497898145 | 497898139                    | 497898263H                           |
| 496298311H            |  |  |           |                              | 497898264H                           |
| 496298312H            |  |  |           |                              | 497898265H                           |
| 496298313H            |  |  |           |                              | 497898266H                           |
| 496298313V            |  |  |           |                              | 497898185V                           |
| 496298315H            |  |  |           |                              | 497898267H                           |
| 496298312V            |  |  |           |                              | 497898402V                           |
| 496298316H            | 497898071  | 497898303  | 497898146 | 497898140                    | 497898268H                           |
| 496298318H            | 497898071  | 497898304  | 497898146 | 497898140                    | 497898269H                           |
| 496298319H            |  |  |           |                              | 497898270H                           |
| 496298320H            |  |  |           |                              | 497898271H                           |
| 496298321H            |  |  |           |                              | 497898272H                           |
| 496298321V            |  |  |           |                              | 497898186V                           |
| 496298322H            |  |  |           |                              | 497898273H                           |
| 496298323H            | 497898071  | 497898303  | 497898146 | 497898140                    | 497898274H                           |

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### Torsionally Rigid Coupling POSIMIN - NZNmin

| Grasso Ident<br>Coupling   | Integrated clamping<br>hub compressor<br>side <sup>1</sup> | Fixing elements for<br>steel disk pack <sup>2</sup>                    | Spacer    | Steel disk pack <sup>3</sup> | Clamping hub<br>motor side <sup>4</sup> |
|--|--|--|-----------|------------------------------|---|
| 496298325H   |  |  |           |                              | 497898275H                              |
| 496298355H   | 497898302  | 497898078  | 497898087 | 497898093                    | 497898303H                              |
| 496298360H   |  |  |           |                              | 497898293H                              |
| 496298357H   |  |  |           |                              | 497898401H                              |
| <sup>1</sup> Hub + clamping ring + tightening screws<br><sup>2</sup> 1 set = 12 pcs. of fitting screws |  | <sup>3</sup> 2 for each coupling<br><sup>4</sup> Hub + adjusting screw |           |                              |   |

#### 1.13.3 Spare parts - Torsionally rigid coupling for units with screw compressors types V, W, Y, Z, XA / 50 - 60 Hz

| Grasso Ident Coupling  | Integrated clamping hub compressor side <sup>1</sup> | Fixing elements for steel disk pack <sup>2</sup>                       | Spacer    | Steel disk pack <sup>3</sup> | Integrated clamping hub motor side <sup>4</sup> |
|--|--|--|-----------|------------------------------|---|
| 496298326H   | 497898168  | 497898305  | 497898147 | 497898141                    | 497898276H                                      |
| 496298327H   |  |  |           |                              | 497898277H                                      |
| 496298328H   |  |  |           |                              | 497898278H                                      |
| 496298329H   |  |  |           |                              | 497898279H                                      |
| 496298330H   |  |  |           |                              | 497898280H                                      |
| 496298331H   |  |  |           |                              | 497898281H                                      |
| 496298332H   |  |  |           |                              | 497898282H                                      |
| 496298327V   |  |  |           |                              | 497898403V                                      |
| 496298328V   |  |  |           |                              | 497898404V                                      |
| 496298336H   | 497898306  | 497898078  | 497898087 | 497898093                    | 497898283H                                      |
| 496298337H   |  |  |           |                              | 497898284H                                      |
| 496298338H   |  |  |           |                              | 497898285H                                      |
| 496298339H   |  |  |           |                              | 497898286H                                      |
| 496298340H   |  |  |           |                              | 497898287H                                      |
| 496298341H   | 497898069  | 497898078  | 497898086 | 497898092                    | 497898288H                                      |
| <sup>1</sup> Hub + clamping ring + tightening screws<br><sup>2</sup> 1 set = 12 pcs. of fitting screws |  | <sup>3</sup> 2 for each coupling<br><sup>4</sup> Hub + adjusting screw |           |                              |   |

#### 1.13.4 Spare parts - Torsionally rigid coupling for units with screw compressors types XB, XC, XD / 50 - 60 Hz

| Grasso Ident Coupling | Integrated clamping hub compressor side <sup>1</sup> | Fixing elements for steel disk pack <sup>2</sup> | Spacer    | Steel disk pack <sup>3</sup> | Integrated clamping hub motor side <sup>4</sup> |
|-----------------------|--|--|-----------|------------------------------|---|
| 496298342H            | 497898067  | 497898305  | 497898084 | 497898141                    | 497898289H                                      |
| 496298343H            |  |  |           |                              | 497898290H                                      |
| 496298344H            |  |  |           |                              | 497898291H                                      |

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### MAIN PART

#### Torsionally Rigid Coupling POSIMIN - NZNmin

| Grasso Ident<br>Coupling   | Integrated clamping<br>hub compressor<br>side <sup>1</sup> | Fixing elements for<br>steel disk pack <sup>2</sup>                    | Spacer    | Steel disk pack <sup>3</sup> | Integrated clamp-<br>ing hub motor<br>side <sup>4</sup> |
|--|--|--|-----------|------------------------------|---|
| 496298345H   |  |  |           |                              | 497898292H  |
| 496298346H   | 497898068  | 497898078  | 497898085 | 497898093                    | 497898293H  |
| 496298348H   |  |  |           |                              | 497898294H  |
| 496298349H   |  |  |           |                              | 497898295H  |
| 496298350H   |  |  |           |                              | 497898296H  |
| 496298347H   | 497898307  | 497898078  | 497898308 | 497898092                    | 497898297H  |
| 496298351H   |  |  |           |                              | 497898298H  |
| 496298352H   |  |  |           |                              | 497898299H  |
| 496298356H   |  |  |           |                              | 497898405H  |
| <sup>1</sup> Hub + clamping ring + tightening screws<br><sup>2</sup> 1 set = 12 pcs. of fitting screws |  | <sup>3</sup> 2 for each coupling<br><sup>4</sup> Hub + adjusting screw |           |                              |   |

#### 1.13.5 Spare parts - Torsionally rigid coupling for units with screw compressors types XE, XF/ 50 - 60 Hz

| Grasso Ident Coupling  | Integrated clamping hub compressor side <sup>1</sup> | Fixing elements for steel disk pack <sup>2</sup>                       | Spacer    | Steel disk pack <sup>3</sup> | Integrated clamping hub motor side <sup>4</sup> |
|--|--|--|-----------|------------------------------|---|
| 496298353H   | 497898309  | 497898311  | 497898313 | 497898315                    | 497898300H                                      |
| 496298361H   |  |  |           |                              | 497898406H                                      |
| 496298354H   | 497898310  | 497898312  | 497898314 | 497898316                    | 497898301H                                      |
| <sup>1</sup> Hub + clamping ring + tightening screws<br><sup>2</sup> 1 set = 12 pcs. of fitting screws |  | <sup>3</sup> 2 for each coupling<br><sup>4</sup> Hub + adjusting screw |           |                              |   |

# 1 PRESSURE TRANSDUCER AKS 3000

for cooling and air conditioning systems and heat pumps

## 1.1 View

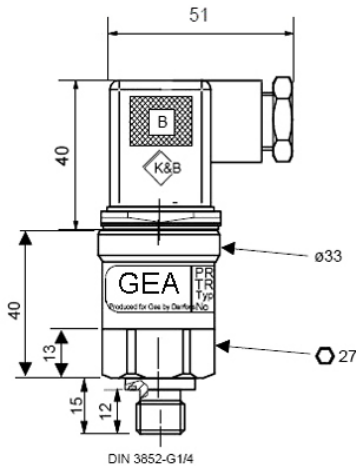


Fig.1: Pressure transducer AKS 3000... GEA Grasso, Dimensions



Fig.2: Pressure transducer AKS 3000... GEA Grasso, view

## 1.2 Pressure transducer AKS 3000

**AKS 3000** is a pressure transducer with 4 - 20 mA standard signal, developed to meet demands in A/C and refrigerating plants.

AKS 3000 is a pressure transducer with **absolute pressure reference**, which constructed according to the proven piezoresistive measuring principle.

The pressure difference is a sealed gauge. This means that atmospheric pressure variations have no influence on regulating accuracy. A must in accurate low pressure regulation.

All materials in contact with the refrigerant and materials for the housing are AISI 316L stainless steel.

No gaskets, all connectors are made through laser weldings only.

AKS 3000 has a 4 to 20 mA output signal and is available with DIN elbow plug.

### Advantages

AKS 3000 designed to meet A/C and refrigerating plants for the following requirements developed:

1. Tough operation conditions
  - Vibrations
  - Shock during operation and transport
  - Humidity and ice formation
  - Temperature variations
  - Corrosive media like ammonia gases and salt mist

2. High performance
  - 4 - 20 mA output signal
  - 1 % accuracy
  - 0.5 % linearity
3. Perfect system integrity
  - Compact design
  - Max. operating pressure see table
  - Temperature compensation for suction line
  - G 1/4 ", screw-in connection
  - Protection type: IP 65 with plug
4. Application
  - High pressure control
  - Compressor capacity control
  - Evaporator pressure detection
  - Oil pressure control

### 1.3 Technical data

| Electrical specifications |   |
|---------------------------|---|
| Nominal output signal     | 4... 20 mA  |
| Supply voltage            | 10... 30 V Direct current, polarity protected                               |
| Supply voltage dependency | < 0.2 % FS/ 10 V  |
| Current limitation        | 28 mA (typ.)  |
| Max. load [ $R_L$ ]       | $[R_L] = (\text{Supply voltage} - 10 \text{ V}) / 0,02 \text{ A } [\Omega]$ |

| Operating conditions          |                  |
|-------------------------------|------------------|
| Temperature limits medium     | - 40 °C to 85 °C |
| Compensated temperature range | 0 °C to 80 °C    |
| Ambient temperature range     | - 40 °C to 85 °C |
| Protection type plug design   | IP 65, EN 60529  |

| Operating conditions |  |
|----------------------|--|
| Insulation           | > 100 MΩ, at 100 V DC direct current   |
| CE-mark              | Interference emission / interference immunity acc. to DIN 61000-6, Declaration of conformity |

| Mechanical specifications |  |
|---------------------------|--|
| Electrical connection     | Elbow plug Pg9 DIN EN 175301-803 (DIN 43650) Type of style A, grey   |
| Wetted parts, material    | EN 10088-1, 1.4404 (AISI316L)  |
| Casing                    | EN 10088-1, 1.4404 (AISI316L)  |
| Weight                    | 0.2 kg   |
| Media                     | HFC, CFC, HCFC, ammonia  |
| Mechanical connection     | G 1/4A with max. 25 Nm<br>Moulded profiled ring DIN 3869-14-CR: Grasso Ident number 762998214<br>Moulded profiled ring DIN 3869-14-HNBR: Grasso Ident number 762998314 |

### Thermal sensitivity

The AKS 3000 is calibrated to limit ambient temperature influence on the regulating accuracy.

Pressure transducer to be used at low temperature, e.g. in suction lines, are calibrated at -10 °C and +20 °C. In this way control accuracy is optimized in a temperature range of 0 °C to +80 °C.

### Electrical connection

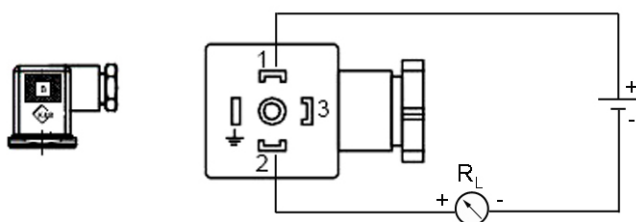


Fig.3: Pressure transducer, electrical connection  
Two wire-transducer, 4... 20 mA

|   |                                  |
|---|----------------------------------|
| 1 | Supply "+"                       |
| 2 | Supply "-"                       |
| 3 | not used                         |
| ↓ | connected to pressure transducer |

| Measuring range/ maximum operating pressure |                                     |
|---|-------------------------------------|
| Measuring range 0 ... +25 bar (a)           | Maximum operating pressure: 150 bar |
| Measuring range 0 ... 35 bar (a)            | Maximum operating pressure: 300 bar |
| Measuring range 0 ... 41 bar (a)            | Maximum operating pressure: 300 bar |
| Measuring range 0 ... 61 bar (a)            | Maximum operating pressure: 360 bar |

| Pressure ranges, Ident numbers             |                      |                     |
|--|----------------------|---------------------|
| Name                                       | Pressure range       | Grasso Ident number |
| Pressure transducer AKS 3000 GEA Grasso 25 | 0... 25 bar absolute | 632198125D          |
| Pressure transducer AKS 3000 GEA Grasso 35 | 0... 35 bar absolute | 632198035D          |
| Pressure transducer AKS 3000 GEA Grasso 41 | 0... 41 bar absolute | 632198042D          |
| Pressure transducer AKS 3000 GEA Grasso 61 | 0... 61 bar absolute | 632198160D          |

# 1 SCREW-IN RESISTANCE THERMOMETER FOR COOLING AND AIR CONDITIONING SYSTEMS AND HEAT PUMPS

## 1.1 General Information

Compact screw-in resistance thermometers GEA Grasso-406 Pt100A - 4 20 mA with replaceable measuring unit are used for measuring the temperature of the media in compressors, pressure vessels and pipelines for all refrigerants acc. EN 378-1, lubricating oils, water and brine.

By means of an electronic evaluation unit the temperature sensors convert the temperature of the media at the measuring points into 4 ... 20 mA output signals.

The thermometers are screwed into the measuring points without an additional immersion tube.



### **Danger!**

**Do not remove the complete screw-in resistance thermometer (casing with well inclusive of the measuring unit) when the compressor or the vessel or the pipeline are pressurised.**

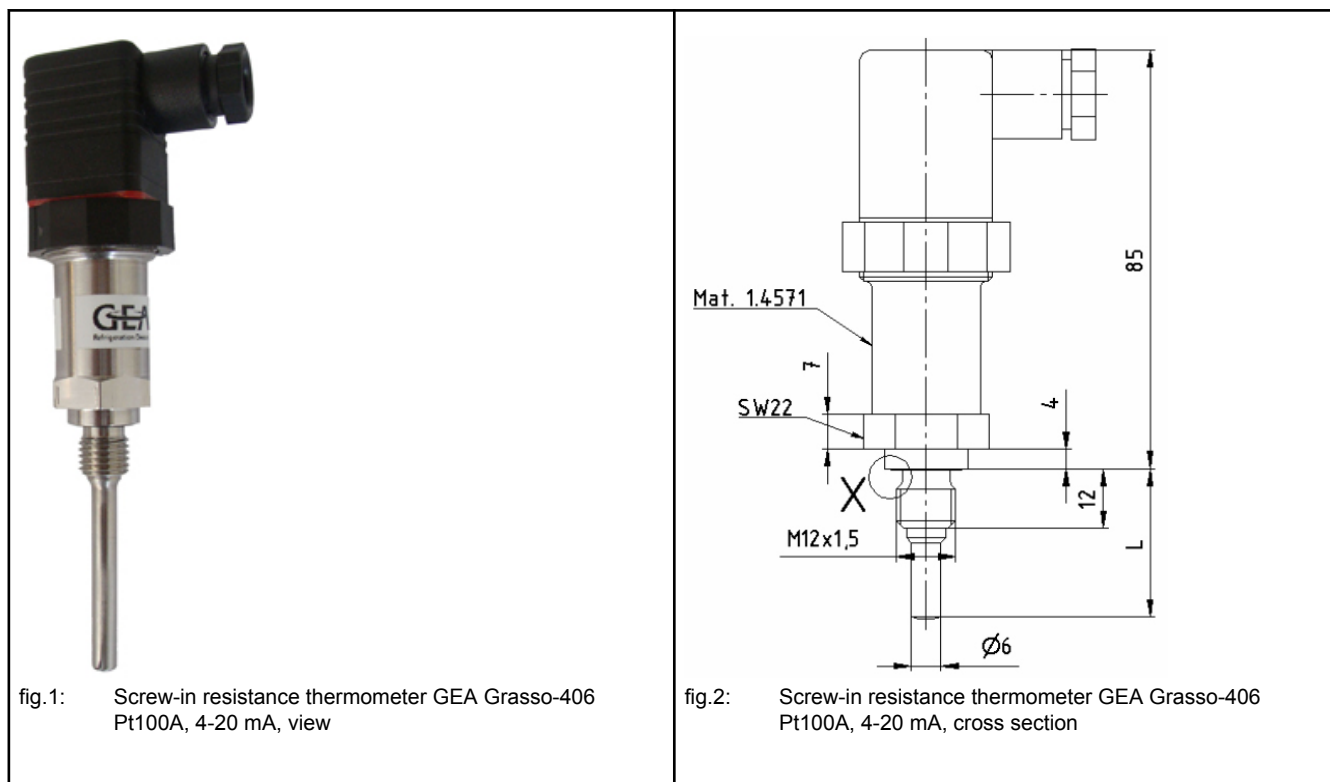
**In case it is not possible to shut off the respective part of the system and to release pressure you may remove the measuring unit by unscrewing the plug head and the union nut with the plug base plate and the associated O-ring seal and replace them. (spare part see table of Ident numbers)**

**Measuring units with the associated well may be replaced separately without pressure release and dismantling of the casing.**

The GEA Grasso-406 screw-in resistance thermometers do not require any adjustments.

The high-quality sensor technology guaranties that the accuracy of the factory setting is maintained irrespective of the operating conditions.

## 1.2 View



## 1.3 Specifications - compact resistance thermometer Pt100

| Performance                                   |   |
|---|---|
| Error of measurement                          | 0.5 °C especially calibrated for item (2040) only: 0.15 °C                            |
| Electrical                                    |   |
| Supply voltage                                | 10 ... 35 V DC polarity reversal protection, overvoltage and short circuit protection |
| Standard signal                               | 4 ... 20 mA, two-wire connection  |
| Interference emission / interference immunity | EN 50082 - (IEC 801)  |
| Physical                                      |   |
| Connection head / connector                   | DIN- bent connector GSP/GDM (black)   |
| temperature sensor / circuit                  | Pt100 class A DIN EN 60751 / 2-wire circuit   |

| Physical                                   |  |
|--|--|
| Integrated transducer / output signal      | 406-transducer at plug base plate with coupler socket / 4 ... 20 mA                            |
| Casing type / well type                    | (Diameter, material)<br>22 mm / 1.4571<br>6 mm / 1.4571  |
| Screw-in gudgeon, thread                   | M12 x 1,5 DIN 3852-E   |
| Fitting length L in mm                     | 30, 60, 90, 120 mm   |
| Gasket                                     | enclosed refrigerant and refrigerating machine oil resistant gasket - ring section DIN 3869-12 |
| Medium resistance                          | all refrigerants acc. EN 378-1, refrigerating machine oil, water and brine                     |
| Operating pressure range                   | 0...63 bar a   |
| Application temperature range              | -60 °C...+140 °C   |
| Installation position / fixation torque    | any / max. 25 Nm   |
| Weight [g], length 30 / 60 / 90 / 120 [mm] | 112 g / 116 g / 120 g / 124 g  |
| Protection class                           | IP 65 acc. to DIN 40 050   |
| CE mark                                    |  |

#### 1.4 Specifications - analogue transducer type 406 for Pt100A

The type 406 is an analogue transducer for Pt100 class A measuring resistors according to DIN En 60751. It converts the temperature related resistance of the sensor very precisely in linear relation with the temperature into a standard electrical signal of 4 ... 20 mA.

The transducer is fixed on a GSP-DIN plug baseplate.

| Analogue transducer type 406 for Pt100A |   |
|---|---|
| Input / sensor connection               | 1x Pt100A 2-wire circuit                      |
| Outlet                                  | 4 – 20 mA current loop                        |
| Current limitation                      | 23 mA   |
| Measured current                        | 0.8 ... 1 mA (depends upon sensor resistance) |

**Analogue transducer type 406 for Pt100A**

|                           |  |
|---------------------------|--|
| Loop voltage              | 10 ... 35 V DC, polarity reversal protection |
| Allowable residual ripple | < 10%  |
| Sensor breakage           | > 20 mA                                      |
| Sensor short circuit      | < 4 mA                                       |
| Temperature range balance | - 60 °C ... + 140 °C measuring range         |
| Humidity                  | < 95 % relative humidity                     |
| Electrical connections    | Poles 1 (+) and 2 (-) loop                   |
| EMV emission              | EN 61000-6-3:2001                            |
| EMV interference immunity | EN 61000-6-3:2001                            |

**Pin assignment, sensor setting**

The controllers are set at the factory for the temperature range of 200 K /from ... to/ -60 °C ... +140 °C and protected against unintentional readjustment.

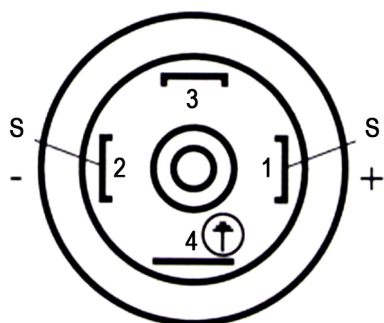


fig.3: Pin assignment with plug base plate without encasement

|   |      |
|---|------|
| S | Loop |
|---|------|

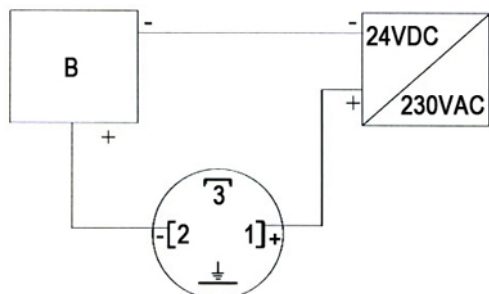


fig.4: Electronic unit - external pin assignment

|   |      |
|---|------|
| B | Load |
|---|------|

### Input circuit of the sensor

The transducer is operated with a 2-wire circuit.

The resistance of the conductors has very little (virtually no) influence on the measuring result since these conductors are extremely short and have equal lengths, they consist both of the same material and have the same cross-section.

### Output circuit of the sensor

The current loop establishes a series circuit of the transducer and the display/evaluation elements.

In this circuit the transducer limits the current in correspondence with the input signal. Max. The transducer itself consumes max. 4 mA.

### Protection

The analogue transducer is completely enclosed in a casting compound for improving its protection against moisture and oil and its vibration resistance. It is screwed into the casing with an O-ring seal.

## 1.5 Use lengths, Ident numbers

| Compact screw-in resistance thermometer GEA Grasso - 406, Pt100A |              |  |  |
|--|--------------|--|--|
| Installation length L (mm)                                       | Weight m (g) | Resistance thermometer Pt100A - 4 ... 20 mA, M12x1,5 | measuring unit (spare part) Pt100A - 4 ... 20 mA |
| 30   | 112          | 630498243E   | 630498117E                                       |
| 60   | 116          | 630498246E   | 630498118E                                       |
| 90   | 120          | 630498249E   | 630498119E                                       |
| 120  | 124          | 630498252E   | 630498120E                                       |
| 150  | 128          | 630498245E   | 630498128E                                       |
| 180  | 132          | 630498258E   | 630498132E                                       |

| Ring sealing section               |              |
|------------------------------------|--------------|
| Mechanical connection ring section | Ident number |
| DIN 3869 - 12 - CR                 | 762998212    |
| DIN 3869 - 12 - HNBR               | 762998312    |

**Installation position of ring section**

M12x1,5 with max 25 Nm

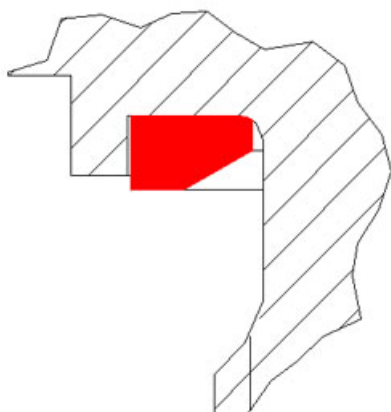


fig.5: correct Installation position of ring section (detail X)

## MAIN PART

### Safety group - block (A)

**System A - design: 1x overflow valve (22 bar g.p.) NB 15 - 65 +  
2x safety valve (23 bar g.p.) NB 15 - 40 with 1x change-over valve NB 15 - 40**

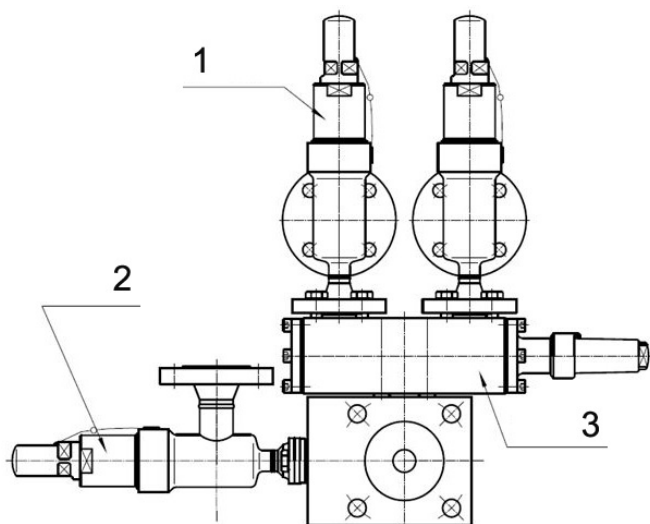


fig. 1: Safety group - block, design type with 1x overflow valve, 2x safety valve and 1x change-over valve

|   |                   |
|---|-------------------|
| 1 | Safety valve      |
| 2 | Overflow valve    |
| 3 | Change-over valve |

| nominal width<br>Safety valve | nominal width<br>Overflow valve | nominal width<br>Change-over valve | Gaskets material | Grasso Ident |
|-------------------------------|---------------------------------|------------------------------------|------------------|--------------|
| 15                            | 15                              | 15                                 | CR               | 501398650    |
| 15                            | 15                              | 15                                 | HNBR             | 501398650N   |
| 15                            | 20                              | 15                                 | CR               | 501398651    |
| 15                            | 20                              | 15                                 | HNBR             | 501398651N   |
| 15                            | 25                              | 15                                 | CR               | 501398652    |
| 15                            | 25                              | 15                                 | HNBR             | 501398652N   |
| 15                            | 32                              | 15                                 | CR               | 501398653    |
| 15                            | 32                              | 15                                 | HNBR             | 501398653N   |
| 15                            | 40                              | 15                                 | CR               | 501398654    |
| 15                            | 40                              | 15                                 | HNBR             | 501398654N   |
| 15                            | 50                              | 15                                 | CR               | 501398655    |
| 15                            | 50                              | 15                                 | HNBR             | 501398655N   |
| 15                            | 65                              | 15                                 | CR               | 501398656    |
| 15                            | 65                              | 15                                 | HNBR             | 501398656N   |
| 20                            | 15                              | 20                                 | CR               | 501398657    |

## PRODUCT DESCRIPTION



### MAIN PART

#### Safety group - block (A)

| nominal width<br>Safety valve | nominal width<br>Overflow valve | nominal width<br>Change-over valve | Gaskets material | Grasso Ident |
|-------------------------------|---------------------------------|------------------------------------|------------------|--------------|
| 20                            | 15                              | 20                                 | HNBR             | 501398657N   |
| 20                            | 20                              | 20                                 | CR               | 501398658    |
| 20                            | 20                              | 20                                 | HNBR             | 501398658N   |
| 20                            | 25                              | 20                                 | CR               | 501398659    |
| 20                            | 25                              | 20                                 | HNBR             | 501398659N   |
| 20                            | 32                              | 20                                 | CR               | 501398660    |
| 20                            | 32                              | 20                                 | HNBR             | 501398660N   |
| 20                            | 40                              | 20                                 | CR               | 501398661    |
| 20                            | 40                              | 20                                 | HNBR             | 501398661N   |
| 20                            | 50                              | 20                                 | CR               | 501398662    |
| 20                            | 50                              | 20                                 | HNBR             | 501398662N   |
| 20                            | 65                              | 20                                 | CR               | 501398663    |
| 20                            | 65                              | 20                                 | HNBR             | 501398663N   |
| 25                            | 15                              | 25                                 | CR               | 501398664    |
| 25                            | 15                              | 25                                 | HNBR             | 501398664N   |
| 25                            | 20                              | 25                                 | CR               | 501398665    |
| 25                            | 20                              | 25                                 | HNBR             | 501398665N   |
| 25                            | 25                              | 25                                 | CR               | 501398666    |
| 25                            | 25                              | 25                                 | HNBR             | 501398666N   |
| 25                            | 32                              | 25                                 | CR               | 501398667    |
| 25                            | 32                              | 25                                 | HNBR             | 501398667N   |
| 25                            | 40                              | 25                                 | CR               | 501398668    |
| 25                            | 40                              | 25                                 | HNBR             | 501398668N   |
| 25                            | 50                              | 25                                 | CR               | 501398669    |
| 25                            | 50                              | 25                                 | HNBR             | 501398669N   |
| 25                            | 65                              | 25                                 | CR               | 501398670    |
| 25                            | 65                              | 25                                 | HNBR             | 501398670N   |
| 32                            | 15                              | 32                                 | CR               | 501398760    |
| 32                            | 15                              | 32                                 | HNBR             | 501398760N   |
| 32                            | 20                              | 32                                 | CR               | 501398761    |
| 32                            | 20                              | 32                                 | HNBR             | 501398761N   |
| 32                            | 25                              | 32                                 | CR               | 501398762    |

## PRODUCT DESCRIPTION



### MAIN PART

#### Safety group - block (A)

| nominal width<br>Safety valve | nominal width<br>Overflow valve | nominal width<br>Change-over valve | Gaskets material | Grasso Ident |
|-------------------------------|---------------------------------|------------------------------------|------------------|--------------|
| 32                            | 25                              | 32                                 | HNBR             | 501398762N   |
| 32                            | 32                              | 32                                 | CR               | 501398763    |
| 32                            | 32                              | 32                                 | HNBR             | 501398763N   |
| 32                            | 40                              | 32                                 | CR               | 501398764    |
| 32                            | 40                              | 32                                 | HNBR             | 501398764N   |
| 32                            | 50                              | 32                                 | CR               | 501398765    |
| 32                            | 50                              | 32                                 | HNBR             | 501398765N   |
| 32                            | 65                              | 32                                 | CR               | 501398766    |
| 32                            | 65                              | 32                                 | HNBR             | 501398766N   |
| 40                            | 15                              | 40                                 | CR               | 501398767    |
| 40                            | 15                              | 40                                 | HNBR             | 501398767N   |
| 40                            | 20                              | 40                                 | CR               | 501398768    |
| 40                            | 20                              | 40                                 | HNBR             | 501398768N   |
| 40                            | 25                              | 40                                 | CR               | 501398769    |
| 40                            | 25                              | 40                                 | HNBR             | 501398769N   |
| 40                            | 32                              | 40                                 | CR               | 501398770    |
| 40                            | 32                              | 40                                 | HNBR             | 501398770N   |
| 40                            | 40                              | 40                                 | CR               | 501398771    |
| 40                            | 40                              | 40                                 | HNBR             | 501398771N   |
| 40                            | 50                              | 40                                 | CR               | 501398772    |
| 40                            | 50                              | 40                                 | HNBR             | 501398772N   |
| 40                            | 65                              | 40                                 | CR               | 501398773    |
| 40                            | 65                              | 40                                 | HNBR             | 501398773N   |

- NB 15 - 65
- PN 25 (PN 40 on request)
- compact assembly, prepared for the installation on the standard GEA Refrigeration Germany GmbH oil separator
- standard safety valves with change-over valve for oil separators protection  
**set value of safety valves** = see P+I diagram and parameter list
- Overflow valve, backpressure-independent, bypass from discharge- to suction side  
**set value of overflow valve** = see P+I diagram and parameter list
- additional safety valve protection due to bursting discs (optional)
- easy mounting
- flanges according to DIN/ ANSI or on request



# 1 SAFETY PRESSURE LIMITER DB-1000/2 - 100 BAR

## 1.1 General Information

The electronic safety pressure limiter DB-1000/2-100 bar is the combination of a pressure limiter (PZH) and an safety pressure limiter (PZHH) together in a common case and work independently of each other. The application is to prevent a transgression of the maximum operating pressure in refrigeration plants, air-conditioning systems, heat pumps, pressure boilers and steam generators in accordance with BGR 500, chapter 2.35 (operator) and EN 378 (manufacturer).

Pressure limiter (PZH) and safety pressure limiter (PZHH) supervise the respectively oriented pressure threshold. At transgression the respective output relay is switched inactively and a signal LED flashes.

The reset of the PZH is carried out by means of a button at the case on the left side. The PZHH can be resetted only by means of a button after removal of the lid with a screwdriver.

## 1.2 Features

- Safety pressure limiter DB-1000/2 - 100 bar in accordance with EN 378 with self-test functions
- Internal errors cause the immediate switching off of the outputs and being shown by a LED-flash code
- USB socket for the connection with PC or notebook computer
- Parameter setting, reading of the appeared pressure maximum and other functions are possible with the help of an enclosed PC program
- Independent analogous pressure output of 4...20 mA (4 mA at 0 bar, 20 mA at 100 bar)

### Pressure range

The pressure cells of the PZH and the PZHH will be choosed depending on use purpose. The nominal pressure (up to 100 bar) is indicated in the model number.

Example: Safety pressure limiter DB-1000/2 - 100 bar Nominal pressure 100 bar

### Pressure measuring cells

according to EN 378-1 (appendix E), permitted overload up to double nominal pressure, the bursting pressure is the 2.5 times nominal pressure

## 1.3 View



fig.1: Safety pressure limiter DB-1000/2 - 100 bar

## 1.4 Media and operating conditions

- Operating temperature: - 40.... +80 °C (for the device)
- Temperature in media: -40...+125 °C (under using of heat insulation between sensor and media)
- Shock proofed: Vibration speed max. 4.5 (10) mm/s (category B Class III in according ISO 2372 ) at 50 Hz
- Enclosure: IP 65 (when the lid is closed)

Resistance against all refrigerants to EN 378-1 (appendix E)

The safety pressure limiter is suitable for using with all refrigerants of the media group 1 und 2 in accordance with the Pressure Equipment Directive (PED) 97/23/EC, for example

Mg1: ammonia (R717)

Mg2: R22, R134a, R507, R23, R744 (CO<sub>2</sub>), R404a, R407a, R407c

### PZH and PZHH range

The default pressure threshold of PZH: preadjusted to 35 bar

The default pressure threshold of PZHH: preadjusted to 36 bar

The pressure thresholds can be adjusted by user between 5 bar and 95 bar.

The preadjusted values are the test values of the pressure switch. These settings can be adjusted to the system specification and / or installation situation. The adjustment must be realised by trained personnel using the software "DB1000soft" with protocol functions. The new settings must be documented and kept with no time limit available.

## 1.5 Electronic

|  |   |
|--|---|
| Supply voltage   | 24V DC +/- 20%                                    |
| Current consumption  | max. 90 mA  |
| Pressure measuring grid  | 5 ms  |
| Pressure limit PZH and PZHH  | adjustable between 5% and 90% of nominal pressure |
| Precision of switch point:   | 0,5% of nominal pressure                          |
| Switch delay   | pre-adjusted to 0.3 s                             |
| Load capacity of the safety relays<br><u>At DC 24V</u><br>DC1: non or low inductive loads (L/R < 1ms) max. 9.0 A<br>DC13: DC-electromagnet (contactor) max. 1.8 A<br><br><u>At AC 230V</u><br>AC1: non or low inductive loads (cos phi > 0.95) max. 6.3 A<br>AC3: Squirrel cage motors max. 2.5 A<br>AC15: electromagnetic load (contactor >72VA) max. 1.4 A |   |

## 1.6 Dimensions, assembly

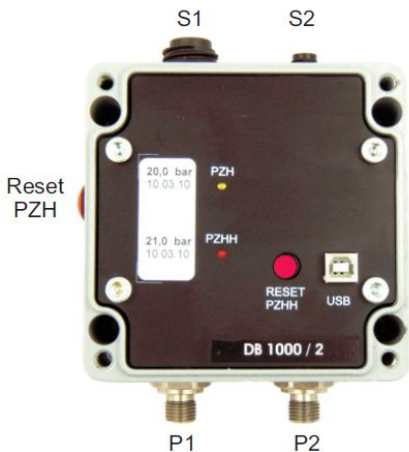


fig.2: Electrical connection  
Distance P1 - P2 (centre to centre) = 45.7 mm

|   |                                     |
|---|-------------------------------------|
| Case:   | encapsulated aluminium case         |
| dimension (L x W x H):  | 122 x 120 x 81 mm                   |
| Mounting position:  | vertical, pressure connection below |
| The safety pressure limiter DB-1000/2 is delivered with a checked connection adapter for tube 8 mm, output below. |                                     |

| Pin assignment S1  |   |
|--|---|
| cable box  | 4-pin (not included in scope of delivery) |
| Pin 1 and 2  | Relay contact PZH                         |
| Pin 3 and 4  | Relay contact PZHH                        |
| The relay contacts are connected in series by the manufacturer |   |

| Pin assignment S2 |  |
|-------------------|--|
| cable box         | 4-pin (not included in scope of delivery)  |
| Pin 1             | Ground   |
| Pin 2             | +24V DC  |
| Pin 4             | analogue pressure output 4-20 mA with load resistor against GND (Pin 1)<br>200...800 Ohm |

## 1.7 Software



fig.3: Software DB-1000soft

- Reading of the previous pressure maxima with time stamp
- Function test (triggering PZH and PZHH without raise of the pressure)
- Password protected input of the switch level
- Password protected input of the switching delay time
- Extensive protocol functions

## 1.8 Certificates

The safety pressure limiter DB-1000/2 have been checked and certified by the "TÜV Rheinland" according to the following norms:

- DIN EN12263:1999
- DIN EN60730-1:2005
- DIN EN 607-30-2-6:2004 (outline)
- DIN EN12952-11:2007
- DIN EN12953-9:2007
- Guideline 97/23/EC (pressure equipment guideline), certificate no.: 01 202 931-B-09-0011

Declaration of conformity: The safety pressure limiter DB-10002 is concurrently in accordance with above-mentioned examinations to the machine guideline 2006/42/EC.

EC type examination: according to guideline 97/23/EC

## 1.9 Spare parts

For the safety pressure DB-1000/2, no spare parts are provided.

If the unit is to be changed or replaced, use the **Grasso Ident: 638298210PN100** for ordering the spare part at GEA Gasso GmbH.

## Betriebsvorschrift

Armaturen für die Kältetechnik

## Operating Instructions

Valves for refrigeration

| <b><i>Druckhalteventil</i></b>      | <b><i>Constant pressure valve</i></b> |
|-------------------------------------|---------------------------------------|
| <b><i>RVR</i></b> – Typenvertreter: | <b><i>RVR</i></b> – types example:    |
| <b>436</b>                          | <b>436</b>                            |

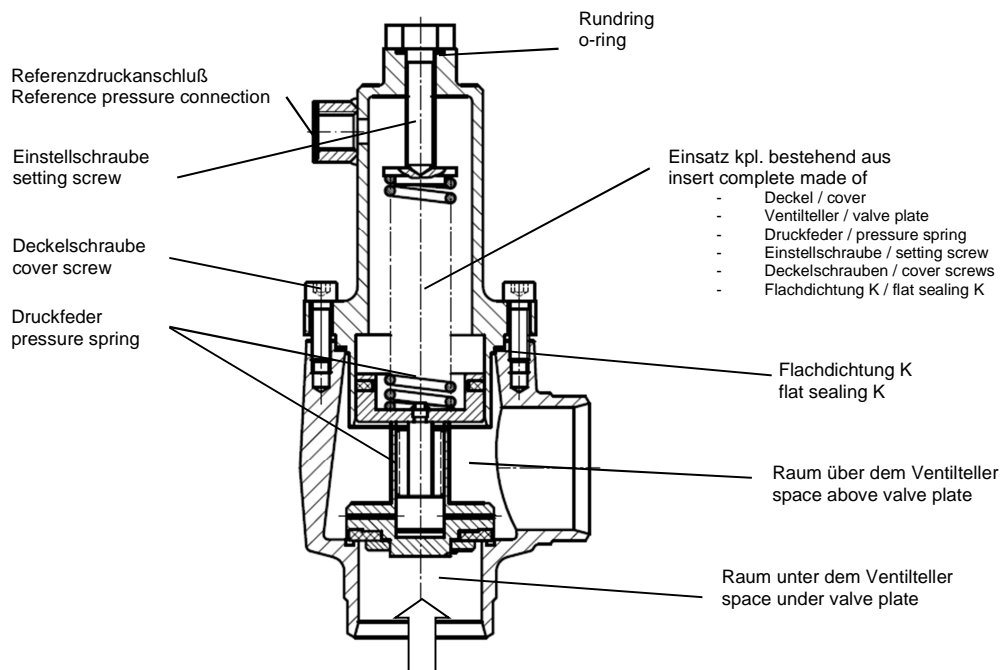
| <b>Inhaltsverzeichnis</b>    | <b>Seite</b> | <b>Contents</b>              | <b>Page</b> |
|------------------------------|--------------|------------------------------|-------------|
| 1. Übersicht der Bauarten    | 2            | 1. Survey of Types           | 2           |
| 2. Technische Kennwerte      | 2            | 2. Technical Characteristics | 2           |
| 3. Sicherheitshinweise       | 3            | 3. Safety Instructions       | 3           |
| 4. Anwendung                 | 3            | 4. Application               | 3           |
| 5. Funktionsschema           | 4            | 5. Principal scheme          | 4           |
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## 1. Übersicht der Bauarten

## 1. Survey of types

**Typ / type**      **DN40 -150**

**436**



## 2. Technische Kennwerte

## 2. Technical characteristics

Gehäusewerkstoff  
Auswahl nach DIN EN12284, AD-2000 Reihe W  
St: P235GH, S235JR, S355J2  
TT: P215NL, P255QL, P355NL1  
NIRO: X5CrNi18-10  
oder gleichwertige

body material selection of material according to  
German DIN EN12284, AD-2000 Reihe W,  
St: P235GH, S235JR, S355J2  
TT: P215NL, P255QL, P355NL1  
NIRO: X5CrNi18-10  
or any equivalent

bei Verwendung von Schrauben der  
Festigkeitsklasse 8.8

by using screws 8.8

| PN | TB (MWT) [C°]  | -60* | -40* | -25* | -10 | +50 | +150 |
|----|----------------|------|------|------|-----|-----|------|
| 25 | PS (MWP) [bar] | 7,3  | 18,3 | 18,7 | 25  | 25  | 25   |
| 40 |                | 11,8 | 29,4 | 30   | 40  | 40  | 40   |
| 63 |                | 18,5 | 46,3 | 47,2 | 63  | 63  | 63   |

bei Verwendung von Schrauben der  
Festigkeitsklasse A2-70

by using screws A2-70

| PN | TB (MWT) [C°]  | -60* | -60** | -10 | +50 | +150 |
|----|----------------|------|-------|-----|-----|------|
| 25 | PS (MWP) [bar] | 18,7 | 25    | 25  | 25  | 25   |
| 40 |                | 30   | 40    | 40  | 40  | 40   |
| 63 |                | 47,2 | 63    | 63  | 63  | 63   |

\*\* Beanspruchungsfall I (TT, Niro)

\*\* stress case I (TT, Niro)

\* Beanspruchungsfall II ( nach AD2000-W10,  
EN 12284) (ST)

\* stress case II ( acc. to AD2000-W10,  
EN 12284) (ST)

|   |  |
|---|--|
| Zulässiger Umgebungstemperaturbereich (C°)<br>-50 bis +50 | permissible ambient temperature range (C°)<br>-50 to +50 |
|---|--|

|  |  |
|--|--|
| <b>Betriebsmedien</b>  | <b>working media</b>   |
| Kältemittel der Fluidgruppen 1+2 nach 97/23/EG<br>Druckgeräterichtlinie, | Refrigerant according to fluid group 1+2 of pressure<br>equipment directive(PED) 97/23/EG. |
| <b>Durchflusswert KVS</b>  | <b>flow factor (m³/h)</b>  |

| Typ / type | DN  | 40   | 50   | 65   | 80    | 100   | 125   | 150   |
|------------|-----|------|------|------|-------|-------|-------|-------|
|            | 436 | 39,0 | 57,0 | 86,0 | 164,0 | 242,0 | 373,0 | 541,0 |

|   |  |
|---|--|
| Einbauanlage stehend  | mounting position in vertical position   |
| Leckage nach außen,<br>Sitz <5g Kältemittel im Jahr $\Delta p=10$ bar über Ventilteller | leakage outward,<br>seat <5g refrigerant per year $\Delta p=10$ bar above the valve<br>plate |

### 3. Sicherheitshinweise

! Ventile mit Transport- oder Lagerschäden dürfen nicht eingebaut werden.

! Ventile:

- müssen frei von Achskräften, Biege- und Torsionsmomenten sein
- dürfen nicht als Fixpunkte von Rohrleitungen dienen.

! Bei Autogenschweißung oder Hartlötung darf die Flamme das Ventil nicht berühren.

! Verunreinigungen jeglicher Art müssen vom Innenraum der Ventile ferngehalten werden.

! Schließen oder Öffnen der Ventile mit einer Handradgabel oder sonstiger hebelarmverlängernder Gegenstände ist unzulässig, da dies zur Beschädigung der Sitzdichtung führen kann.

! Demontage bzw. Ausbau der Ventile nur bei druckloser, abgesaugter und ausreichendbelüfteter Rohrleitung.

### 4. Anwendung

**AWP-Druckhalteventile** sind selbsttätig wirkende Reguliereinrichtungen, die innerhalb des Kältemittelkreislaufes von Kältemittelverdichteraggregaten in der Startphase umgehend für einen definierten Druck im Ölabscheider sorgen und damit den notwendigen Öldruck aufbauen. Das Druckhalteventil ist mit einem gegendruckkompensierenden Dichtelement ausgestattet. Das Ventil arbeitet mit drei Schaltstellungen, die in Punkt 5. näher erläutert werden.

**Achtung:** Ventile arbeiten abhängig vom Druckverhältnis über und unter dem Ventilteller.

### 3. Safety instructions

! Valves that have been damaged during transport or storage must not be installed.

! Valves:

- no axial forces, bending or torsional moments should act upon the valves.
- must not be used as fixing points for pipes

! In the case of gase welding or brazing, the flame may not reach the valve.

! Any kind of soiling has to be kept away from the inside of the valve.

! It is not allowed to open or close the valves by means of a hand wheel wrench or any other devices for extending the lever arm, as this may damage the seat sealing.

! The valves may not be disassembled or detached before the pipe has been depressurized, sucked off and adequately ventilated.

### 4. Application

**AWP-constant pressure valves** automatically operated regulating device (constant pressure function), within the refrigerant circle system of refrigerant compressor packages, ensuring sufficient minimum differential pressure respectively oil injection pressure during the start-up phase and running of the refrigerant compressor. The constant pressure valve is equipped with a back-pressure compensation sealing element. The valve works with 3 switch positions, which are described in point 5.

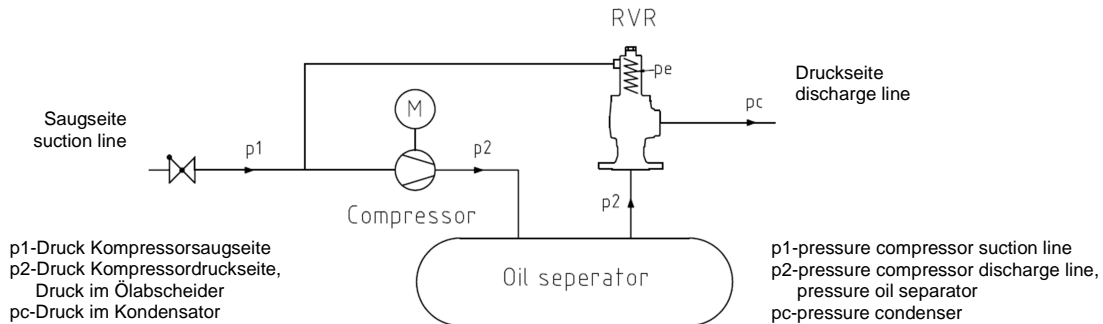
**Attention:** The Valve works dependent on pressure above / below the valve seat.

Sie werden durch den Druck des Betriebsmediums unter dem Ventilteller in Abhängigkeit vom eingestellten Öffnungsdruck( $p_e$ ) geöffnet. Dieser wird durch den Kunden vorgegeben und durch den Hersteller fest eingestellt. Soll der Einstelldruck verändert werden, ist der Hersteller zu konsultieren.

The valve will be open by pressure of operating media, but depended on set pressure( $p_e$ ) of the valve. The set pressure is determine by customer and is fix adjusted by AWP. If it necessary to change set pressure please contact AWP.

## 5. Funktionsschema

## 5. Principal scheme



Schaltstellung 1:  
(Bild 1) Das Ventil befindet sich in dieser Stellung solange bis der Druckunterschied zwischen  $p_1$  und  $p_2$  oder  $p_1$  und  $p_c$  nicht größer wird als der über die Druckfeder vordefinierte Öffnungsdruck. Das tritt auf, wenn der Kompressor ausgeschaltet ist und die Druckseite des Kompressors das gleiche Druckniveau wie die Saugseite hat.

$$\begin{aligned} p_c - p_1 &< p_e \\ p_c &> p_2 \end{aligned}$$

Schaltstellung 2:  
(Bild 2) Schaltstellung 2 tritt ein, wenn der Kondensationsdruck größer ist als der Druck im Ölabscheider und der Druckunterschied zwischen der Saugseite des Kompressors und des Kondensationsdruckes größer ist als die Federkraft.

$$\begin{aligned} p_c - p_1 &> p_e \\ p_c &> p_2 \end{aligned}$$

Wenn der Kompressor gestartet wird, befindet sich das Ventil in einer der beiden oben genannten Schaltstellungen, abhängig von der Differenz zwischen Ölabscheider- und Kondensationsdruck. Dabei können 3 verschiedene Startsituationen vorliegen.

Startsituation A: Der Kondensationsdruck ist kleiner als der Druck im Ölabscheider. Das Anfahren beginnt in Schaltstellung 1 und geht über auf Schaltstellung 3 sobald die Druckdifferenz zwischen Ölabscheider und Kompressorsaugseite die Federkraft überwindet.

Switch position 1:  
(picture 1) The valve is in this position as long as the differential pressure of  $p_1$  and  $p_2$  or  $p_1$  and  $p_c$  becomes not bigger than the defined set pressure, which is regulated by the spring. This proceeds, if the compressor is switched off and the discharge side of the compressor has the same pressure level as the suction side.

$$\begin{aligned} p_c - p_1 &< p_e \\ p_c &> p_2 \end{aligned}$$

2: This position proceeds, if the condensing pressure becomes bigger as the pressure in the oil separator and when the pressure difference between the suction side and the condenser is bigger than the spring force of the big spring.

$$\begin{aligned} p_c - p_1 &> p_e \\ p_c &> p_2 \end{aligned}$$

The valve will be in one of these positions, if the compressor will be switched on. Which position, depends on the differential pressure between the oil separator and the condenser. Thereby, 3 different start scenarios could occur.

Start scenario A: The condensing pressure is lower than the pressure in the oil separator. The startup begins in switch position 1 and passes into position 3 as soon as the pressure difference between the oil separator and the suction side of the compressor overcomes the spring force.

**Startsituation B:** Der Kondensationsdruck ist größer als der Druck im Ölabscheider, aber die Differenz zwischen den Beiden ist kleiner als die Federkraft. Das Anfahren beginnt in Schaltstellung 1 und geht über auf Schaltstellung 2 sobald der Differenzdruck zwischen Kompressorausgseite und Kondensator größer ist als die Federkraft. Wenn der Ölabscheiderdruck sich dem Kondensationsdruck annähert, öffnet das Ventil und die Schaltstellung 3 ist erreicht.

**Startsituation C:** Der Kondensationsdruck ist größer als der Ölabscheiderdruck mit der Federkraft. Das Anfahren beginnt in der Schaltstellung 2.

(Bild 3)

$$p_c > p_2 + p_e$$

Wenn der Ölabscheiderdruck sich dem Kondensationsdruck annähert, öffnet das Ventil und die Schaltstellung 3 ist erreicht.

**Start scenario B:** The condensing pressure is bigger than the pressure of the oil separator, but the difference between these pressures is smaller than the spring force. The startup begins in switch position 1 and passes into position 2 as soon as the differential pressure between the suction side and the condenser becomes bigger than the spring force. The valve begins to open and reach switch position 3, if the pressure of the oil separator comes close to the pressure of the condenser.

**Start scenario C:** The condensing pressure is bigger than the pressure of the oil separator with the spring force. The startup begins in switch position 2.

(picture 3)

$$p_c > p_2 + p_e$$

The valve begins to open and reach switch position 3, if the pressure of the oil separator comes close to the pressure of the condenser.

**Schaltstellung 3:** Das Ventil ist vollständig geöffnet.

**Switch position 3:** The valve is completely opened.

Wenn der Kompressor ausgeschaltet wird, befindet sich das Ventil in Schaltstellung 3 bis der Kondensationsdruck sich dem Druck auf der Kompressorausgseite annähert und die Feder das Ventil schließt. Das Ventil befindet sich dann wieder in Schaltstellung 1.

If the compressor will be switched off, the valve will be in switch position 3 until the condensing pressure comes close to the pressure of the suction side, then the spring will close the valve. Now, the valve is in switch position 1 again.

Schaltstellungen:

Switch positions:

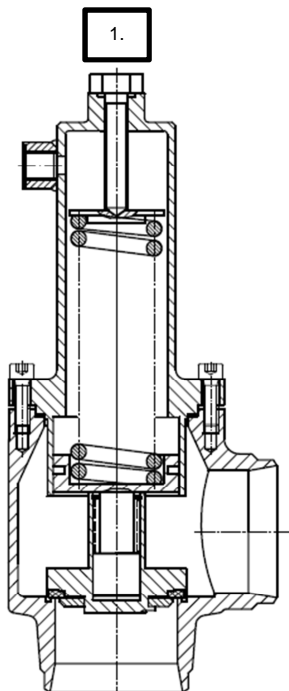


Bild / picture: 1

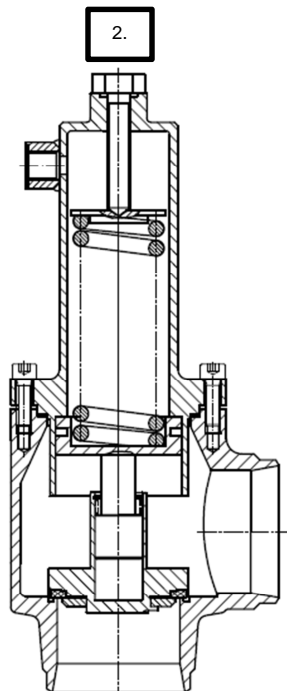


Bild / picture: 2

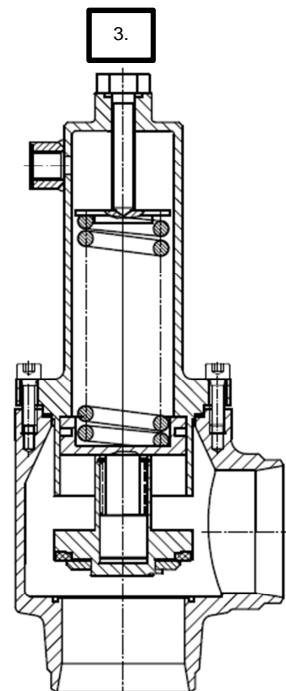


Bild / picture: 3

## 6. Einbau

Vor Einbau der Ventile sind Rohrleitungen und Anlagenteile zu säubern.

### **-bitte beachten-**

Die Abweichung von der Parallelität bzw. Rechtwinkligkeit der Anschweißenden bzw. Flanschdichtflächen darf 1° nicht überschreiten. Anschlußflansche müssen achsengleich sein. Ventile mit Transport- und Lagerschäden dürfen nicht eingebaut werden. Nach dem Entfernen der Rohrstopfen können die Ventile in beliebiger Lage eingeschweißt bzw. montiert werden. Die Durchflußrichtung (siehe Pfeil auf Kennzeichenschild) sollte eingehalten werden. Eine entgegengesetzte Durchflußrichtung ist zulässig, die Leistungsangaben gelten dann nicht. Bei Anwendung moderner Schweißverfahren (z.B. WIG, CO2) werden die Ventile zum Einschweißen nicht demontiert. Das Handrad ist in Mittelstellung zu bringen. Die Befestigungsschrauben und Muttern sind über Kreuz und gleichmäßig anzuziehen.

### Ausbaumaß

| DN | 40 | 50 | 65 | 80 | 100 | 125 | 150 |
|----|----|----|----|----|-----|-----|-----|
| mm | 55 | 55 | 65 | 95 | 105 | 180 | 200 |

## 7. Wartung

**AWP-Druckhalteventile** arbeiten wartungsfrei. Treten Mängel im Funktionsverhalten auf, ist eine Reparatur möglich. Während der Garantiezeit dürfen Reparaturen nur durch AWP bzw. mit dessen Einverständnis durch geschultes Instandhaltungspersonal des Betreibers der Anlage vorgenommen werden.

### **! Sicherheitshinweise beachten**

### **Auswechseln Einsatz kpl.**

1. Deckelschrauben ISO 4762 oder EN 24014 lösen.



Auf eventuell austretendes restliches Kältemittel achten. Bis zum völligen Druckausgleich Deckelschrauben lose im Gehäuse belassen. Erst danach völlig herauserschrauben.

### Schrauben screws

| DN              | 40 | 50 | 65 | 80              | 100 | 125 | 150 |
|-----------------|----|----|----|-----------------|-----|-----|-----|
| M               | 8  | 8  | 8  | 10              | 12  | 16  | 16  |
| <b>ISO 4762</b> |    |    |    | <b>EN 24014</b> |     |     |     |
| SW              | 6  | 6  | 6  | 16              | 18  | 24  | 24  |

2. Deckelschrauben herauserschrauben und Deckel einschließlich Innenteile herausziehen und durch neuen Einsatz kpl. ersetzen.  
Vor der Montage sind alle Einzelteile der Ventile zu reinigen, der Ventilteller und der Deckel einzufetten.  
Anschließend wird noch ein Flachdichtring K eingelegt, der Deckel aufgesetzt und mit den Schrauben gleichmäßig und über Kreuz angezogen.

## 6. Installation

Before installing the valves, the pipelines and the components have to be cleaned.

### **-please notice-**

The deviation from the parallelism or squareness of the welding ends or, as the case may be, the sealing surfaces of the flanges must not exceed 1°. The connecting flanges have to be coaxial. Valves that have been damaged during transport or storage must not be installed. After the protective caps have been removed, the valves can be welded on, or installed in any position. The flow direction (see arrow on specification label) should be observed. With modern welding processes (such as TIG, CO2-shielded metal-arc), the valves are not disassembled for welding. The fastening bolts and nuts have to be tightened crosswise and evenly. After the installation has been performed, check whether the hand wheel runs smoothly within its entire lift range.

## 7. Maintenance

**AWP-constant pressure valves** are maintenance-free. In case any defects in the functional performance of the valves occur, they can be repaired. During the term of warranty, repairs may only be carried out by the AWP or - with his consent - by specially-trained maintenance personnel working for the plant operator.

### **! Safety instructions please notice**

### **Replace the cover cpl.**

1. Loosen the cover screws ISO 4762 oder EN 24014.



The cover screws should be kept loosely in the body until the pressure has equalized totally. Only then should it be unscrewed completely.

2. Unscrew cover screws and draw out the cover including internal parts and replace by a complete new insert.  
Before mounting, clean all component parts of the valves; valve plate and the cover are lubricated.  
Afterwards another flat sealing ring is inserted, the cover is put back in its place and is tightened by means of the screws evenly and crosswise.

|                     |    | DN  | 40       | 50 | 65 | 80       | 100   | 125   | 150 |
|---------------------|----|---|----------|----|----|----------|-------|-------|-----|
| Schrauben<br>screws | M  |   | 8x25     |    |    | 10x30    | 12x35 | 16x45 |     |
|                     |    |   | ISO 4762 |    |    | EN 24014 |       |       |     |
|                     | SW |   | 6        | 6  | 6  | 16       | 18    | 24    | 24  |
|                     |    | Anziehdrehmoment / tightening moment [Nm] (8.8) |          |    |    |          |       |       |     |
|                     |    |   | 25       | 25 | 25 | 49       | 85    | 210   | 210 |

Schrauben  
screws

## 8. Transport und Lagerung

**AWP-Druckhalteventile** werden stoßgeschützt, mit Folie abgedeckt transportiert.

Die Lagerung hat in trockenen Räumen zu erfolgen. Es ist auf den unversehrten Verschluss der Anschlussstutzen zu achten.

Verschmutzungen jeglicher Art müssen vom Innenraum ferngehalten werden. Die außenliegenden Flächen der Armaturen sind mit einem Korrosionsschutzanstrich für trockene Lagerung bei Raumtemperatur versehen, der mindestens 1 Jahr wirksam ist.

Der Korrosionsschutzanstrich **BISPHENOL-A-Epoxidharz** ist ein guter Haftvermittler für Deckanstrichstoffe auf 1- und 2-Komponenten-Basis.

## 9. Garantie

Die Garantieleistung für Erzeugnisse ist entsprechend den vertraglichen Bestimmungen im Liefervertrag festgelegt.

## 10. Ersatzteile

Ersatzteile entsprechend Bild Seite 2:  
Ersatzteilbestellung: (muss enthalten)

- Anzahl
- Bezeichnung entspr. Bild Seite 2 Typ 427/428
- Bestellnummer
- Nennweite der Armatur
- Baujahr der Armatur
- Öffnungsdruck
- Kältemittel

### Bestellbeispiel:

**3 Stück, Einsatz kpl., RVR, 436  
DN50, 06/2003, NH<sub>3</sub>**

Einsatz kpl. / cover cpl.  
Bestellnummer / stock number

## 8. Transport, Storage

During transport, **AWP constant pressure valves** are protected against shocks and covered with plastic sheeting. They should be stored in dry rooms.

Care has to be taken that the plugs of the connecting pieces are not damaged. Any kind of soiling has to be kept away from the inside of the fitting.

The external surfaces of the valves are provided with a layer of anticorrosive paint for dry storing at room temperature, which remains effective for at least 1 year.

The anticorrosive paint which **BISPHENOL-A-Epoxidharz** is a good bonding agent for one or two-pot finishing coating paints.

## 9. Warranty

The warranty services for our products have been defined in compliance with the regulations stipulated the contract of delivery.

## 10. Spare parts

Spare parts according to the illustration sheet page 2:  
Ordering Spare parts: (an order must contain):

- quantity
- designation according to illustration sheet page 2
- stock number
- nominal diameter of the fitting
- year of construction of the fitting
- opening pressure
- refrigerant

### Example for ordering

**3 pieces, cover cpl., RVR, 436  
DN50, 06/2003, NH<sub>3</sub>**

Flachdichtring K  
flat sealing ring K

| PS 25              | PS40               | PS63               | DN  | Bestellnummer<br>stock number | Abmessung<br>dimension |
|--------------------|--------------------|--------------------|-----|-------------------------------|------------------------|
| 436 xx E15.5110001 | 436 xx E15.5110001 | 436 xx K15.5110001 | 40  | 163 01.15.4 146 00 3          | 62 x 68,8 x 1,5        |
| 436 xx E15.5110001 | 436 xx E15.5110001 | 436 xx K15.5110001 | 50  | 163 01.15.4 146 00 3          | 62 x 68,8 x 1,5        |
| 436 xx B17.5110001 | 436 xx E17.5110001 | 436 xx K17.5110001 | 65  | 163 01.17.4 146 00 3          | 76 x 84,8 x 1,5        |
| 436 xx E18.5110001 | 436 xx E18.5110001 | 436 xx K18.5110001 | 80  | 163 01.18.4 146 00 3          | 94 x 105 x 1,5         |
| 436 xx E19.5110001 | 436 xx E19.5110001 | 436 xx K19.5110001 | 100 | 163 01.19.4 146 00 3          | 115 x 129 x 1,5        |
| 436 xx E20.5110001 | 436 xx E20.5110001 | 436 xx K20.5110001 | 125 | 163 01.20.4 146 00 3          | 140 x 159 x 1,5        |
| 436 xx E21.5110001 | 436 xx E21.5110001 | 436 xx K21.5110001 | 150 | 163 01.21.4 146 00 3          | 170 x 188,5 x 2,0      |

## 11. Kennzeichnung

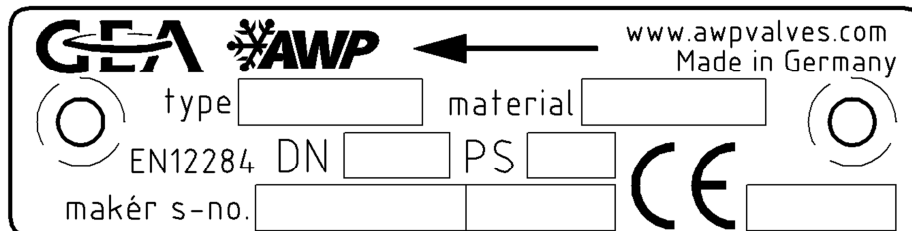
Die Kennzeichnung der AWP-Absperrventile erfolgt entsprechend EN12284.

- Kennzeichenschild auf Gehäuse

## 11. Specification

The specification of the AWP-shut off valves complies with German Standard EN12284

- Specification label of the casing



|          |       |   |
|----------|-------|---|
| PS       | [bar] | - maximal zulässiger Betriebsüberdruck<br>permissible working pressure  |
| DN       | [mm]  | - Nennweite<br>nominal diameter   |
| EN 12284 |       | - Kältemittelarmaturen, Sicherheitstechnische Festlegungen,<br>Prüfung, Kennzeichnung<br>European Standard: refrigerant valves; requirements, testing,<br>marking |

## 12. Hinweis auf Restgefahren entsprechend der Druckgeräte richtlinie (97/23/EG)

Vom Hersteller nicht zu vermeidende Restgefahren bestehen durch:

- Unbefugtes Lösen des Deckels während des Betriebes bzw. Lösen der Schraubbuchse ohne Aktivierung der Rückdichtung
- Unsachgemäße Montage von Flanschverbindungen (Eingangs- und Ausgangsflansch, Deckel)
- Verschmutzungen im Betriebsmedium bzw. Unsachgemäßer Umgang mit Einbauteilen können zu Beschädigungen an der Sitzdichtung führen
- Nichtbeachtung der Einsatzgrenzen und Herstellervorschriften entsprechend dieser Betriebsvorschrift

## 12. Information on risks in conformance to pressure appliance directive

Remaining risks which cannot be avoided by the manufacturer arise because of:

- Unauthorized loosening of the cover during operation or removing of the screw bushing without activation of the back sealing
- Incorrect assembly of the flange connections (inlet and outlet flange, lid)
- Dirt in the service medium or inappropriate handling of the internal fittings may cause damage to the seat seal
- Ignore of the operating range and manufacturer rules acc. to this operating instruction

## Betriebsvorschrift

Armaturen für die Kältetechnik

## Operating Instructions

Valves for refrigeration

### **Absperrventile** mit steigender Spindel

**AVR** – Typenvertreter:  
mit elastischer PTFE-Ring Abdichtung an der Spindel

**263, 264, 26G** – Deckel geflanscht

**263 1, 264 1, 26G A** – Deckel geflanscht und  
verlängert

### **Shut off Valves** with rising stem

**AVR** – types example:  
with PTFE-ring seal on the stem

**263, 264, 26G** – cover flanged

**263 1, 264 1, 26G A** – cover flanged and  
extension

| Inhaltsverzeichnis           | Seite | Contents                     | Page |
|------------------------------|-------|------------------------------|------|
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| 2. Technische Kennwerte      | 2     | 2. Technical Characteristics | 2    |
| 3. Sicherheitshinweise       | 3     | 3. Safety Instructions       | 3    |
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| 11. Kennzeichnung            | 10    | 11. Specification            | 10   |
| 12. Hinweis auf Restgefahren | 10    | 12. Information on risks     | 10   |

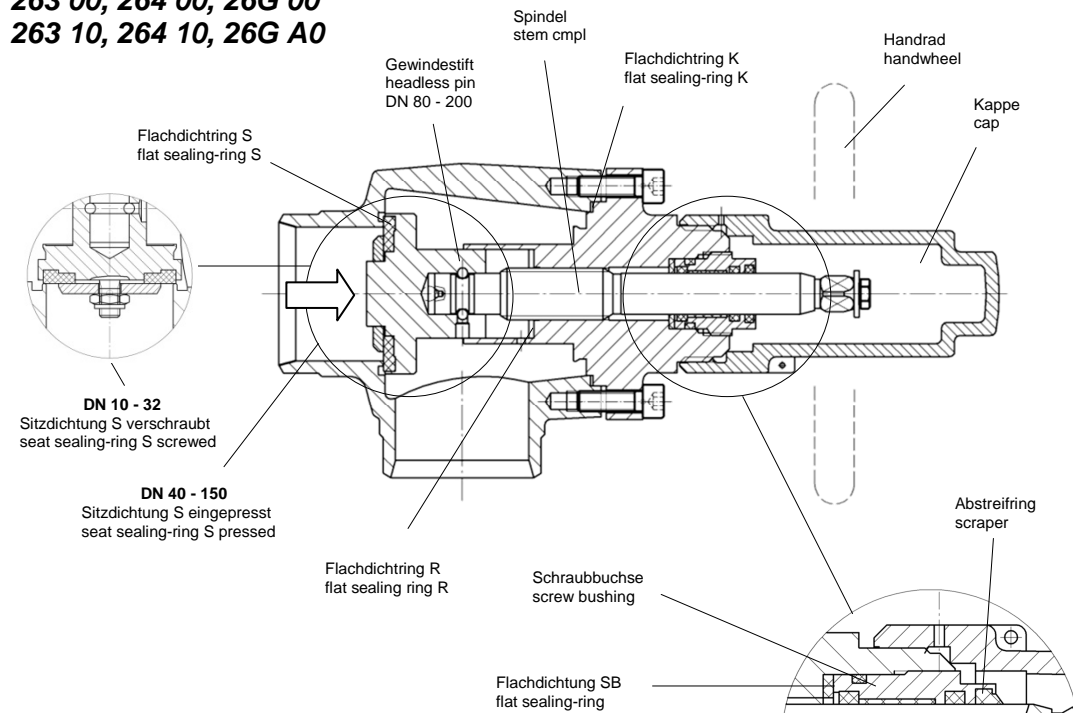
## 1. Übersicht der Bauarten

## 1. Survey of types

### Typ / type DN25 - 250

263 00, 264 00, 26G 00

263 10, 264 10, 26G A0

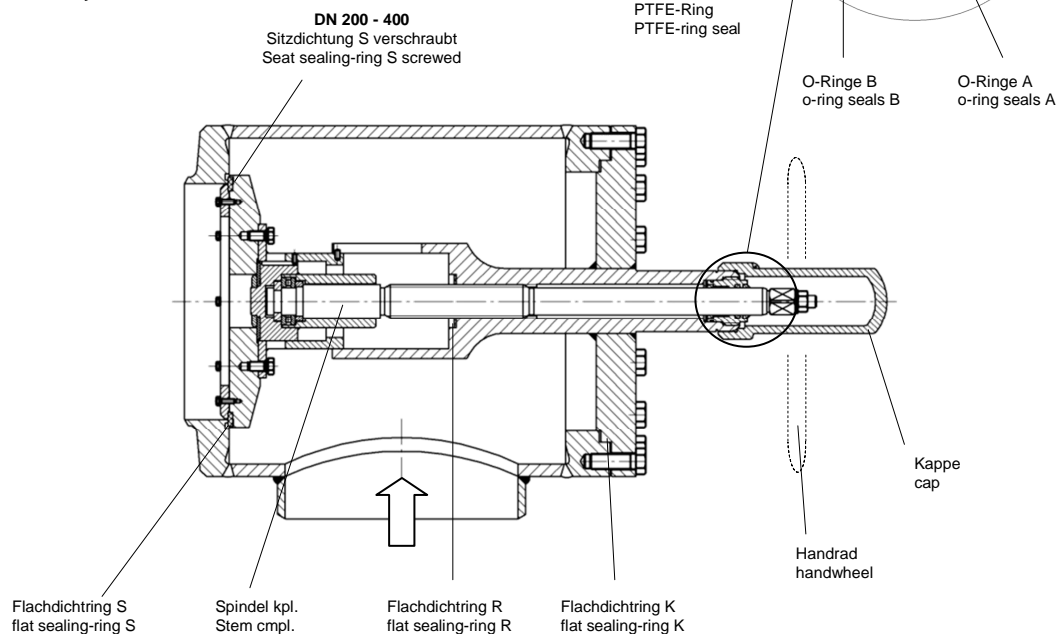


### Typ / type

### DN300 – 400

mit Ventiltellerentlastung / with balancing valve disc

263 00, 264 00



## 2. Technische Kennwerte

## 2. Technical characteristics

|  |                |  |       |      |     |       |       |
|--|----------------|--|-------|------|-----|-------|-------|
| Gehäusewerkstoff<br>Auswahl nach DIN EN12284, AD-2000 Reihe W<br>St: P235GH, S235JR, S355J2<br>TT: P215NL, P255QL, P355NL1, G20Mn5QT<br>NIRO: X5CrNi18-10, GXCrNiMoNb19-11-2<br>oder gleichwertige |                | body material selection of material according to<br>German DIN EN12284, AD-2000 Reihe W,<br>St: P235GH, S235JR, S355J2<br>TT: P215NL, P255QL, P355NL1, G20Mn5QT<br>NIRO: X5CrNi18-10, GXCrNiMoNb19-11-2<br>or any equivalent |       |      |     |       |       |
| bei Verwendung von Schrauben der<br>Festigkeitsklasse 8.8  |                | by using screws 8.8  |       |      |     |       |       |
| PN   | TB (MWT) [C]   | -60*   | -40*  | -25* | -10 | +50   | +150  |
| 25   | PS (MWP) [bar] | 5  | 12,5  | 18,7 | 25  | 25    | 25    |
| 40   |                | 8  | 20    | 30   | 40  | 40    | 40    |
| 63   |                | 12,6   | 31,5  | 47,2 | 63  | 63    | 63*** |
| bei Verwendung von Schrauben der<br>Festigkeitsklasse A2-70  |                | by using screws A2-70  |       |      |     |       |       |
| PN   | TB (MWT) [C]   | -60*   | -60** | -10  | +50 | +150  |       |
| 25   | PS (MWP) [bar] | 18,7   | 25    | 25   | 25  | 25    |       |
| 40   |                | 30   | 40    | 40   | 40  | 40    |       |
| 63   |                | 47,2   | 63    | 63   | 63  | 63*** |       |
| *** G20Mn5QT =43bar/ GXCrNiMoNb19-11-2 =50bar  |                | *** G20Mn5QT =43bar/ GXCrNiMoNb19-11-2 =50bar  |       |      |     |       |       |
| ** Beanspruchungsfall I (TT, Niro)   |                | ** kind of straining I (TT, Niro)  |       |      |     |       |       |
| * Beanspruchungsfall II ( nach AD2000-W10,<br>EN 12284) (ST)   |                | * kind of straining II ( after AD2000-W10,<br>EN 12284) (ST)   |       |      |     |       |       |

Zulässiger Umgebungtemperaturbereich (C°)  
-50 bis +50

permissible ambient temperature range (C°)  
-50 to +50

### Betriebsmedien

Kältemittel EN 378 Teil 1, z.B.NH<sub>3</sub>, R22, R134a, Blends  
und Gemische mit Kältemaschinenöl, neutrale, gasförmige  
und flüssige Medien Kühlsole auf Glycol-Basis,

### working media

cold brine basing on glycol refrigerant EN 378 p. 1 and  
mixtures with refrigerator oil, neutral, gaseous and liquid  
media, cold brine basing on glycol

| Typ / DN | Durchflusswert KVS |      |      |      |      |       |       |       |       | flow factor (m <sup>3</sup> /h) |        |        |        |        |
|----------|--------------------|------|------|------|------|-------|-------|-------|-------|---------------------------------|--------|--------|--------|--------|
|          | 25                 | 32   | 40   | 50   | 65   | 80    | 100   | 125   | 150   | 200                             | 250    | 300    | 350    | 400    |
| 263/26G  | 12,7               | 18,6 | 30,0 | 42,0 | 66,5 | 109,0 | 151,0 | 245,0 | 352,0 | 526,0                           | 800,0  | 960,0  | 1340,0 | 1930,0 |
| 264      | 13,8               | 22,2 | 37,0 | 53,5 | 80,0 | 159,0 | 231,0 | 373,0 | 464,0 | 1049,0                          | 1180,0 | 1416,0 | 2120,0 | 3140,0 |

Einbauanlage beliebig, Durchflußrichtung sollte eingehalten  
werden

mounting position in any desired position, the flow direction  
should be observed

Leckage nach außen,  
Sitz (g/a) <5 Kältemittel im Jahr

leakage outward,  
seat (g/a) <5 refrigerant per year

### 3. Sicherheitshinweise

! Ventile mit Transport- oder Lagerschäden dürfen nicht eingebaut werden.

! Ventile:

- müssen frei von Achskräften, Biege- und Torsionsmomenten sein
- dürfen nicht als Fixpunkte von Rohrleitungen dienen.

! Bei Autogenschweißung oder Hartlötung darf die Flamme das Ventil nicht berühren.

! Verunreinigungen jeglicher Art müssen vom Innenraum der Ventile ferngehalten werden.

! Schließen oder Öffnen der Ventile mit einer Handradgabel oder sonstiger hebelarmverlängernder Gegenstände ist unzulässig, da dies zur Beschädigung der Sitzdichtung führen kann.

! Demontage bzw. Ausbau der Ventile nur bei druckloser, abgesaugter und ausreichendbelüfteter Rohrleitung.

### 4. Anwendung

**AWP-Absperrventile** sind geeignet für den Einsatz in Kältemittelkreisläufen für Industrie-Kälteanlagen.

### 5. Funktionsbeschreibung

**AWP-Absperrventile** sind durch ein Handrad zu betätigen. Die Ventile werden mit Blickrichtung auf das Handrad rechtsdrehend geschlossen und linksdrehend geöffnet. Die Ventile sind Absperrarmaturen und dürfen nur in "Auf"-oder "Zu"-Stellung gefahren werden. Beim Öffnen des Ventils ist die Spindel bis zum Anschlag in die oberste Stellung zu fahren (voll geöffnet). Die Ventile sind mit einer Rückdichtung ausgerüstet (Flachdichtring R).

**Bei voll geöffnetem Ventil ist der gefahrlose Austausch der Dichtelemente (O-Ringe A, B, PTFE-Ringe) an der Spindel, durch Heraus-schrauben der Schraubbuchse möglich.**

Bei extremen Temperaturen ist das Ventil mit Schutzhandschuhen zu bedienen.

Die Betätigung des Absperrventils gegen eine eingeschlossene Flüssigkeit ist zu vermeiden, da es durch die Bewegung der Spindel zur Volumenänderung kommt. Dies bedingt eine unzulässige Druckzunahme im abgeschlossenen Rohrschnitt. Das Schließen der Absperrventile in Flüssigkeitsleitungen hat in Reihenfolge zu einem Behälter mit Gasvolumen zu erfolgen.

! DN 300 bis 400 mit Ventiltellerentlastung!

### 6. Einbau

Vor Einbau der Ventile sind Rohrleitungen und Anlagenteile zu säubern.

**-bitte beachten-**

Die Abweichung von der Parallelität bzw. Rechtwinkligkeit der Anschweißenden bzw. Flanschdichtflächen darf 1° nicht überschreiten. Anschlußflansche müssen achsengleich sein. Ventile mit Transport- und Lagerschäden dürfen nicht eingebaut werden. Nach dem Entfernen der Rohrstopfen können die Ventile in beliebiger Lage eingeschweißt bzw. montiert werden. Die Durchflußrichtung (siehe Pfeil auf Kennzeichenschild) sollte eingehalten werden. Eine entgegengesetzte Durchflußrichtung ist bis DN250 zulässig, die Leistungsangaben gelten dann nicht.

### 3. Safety instructions

! Valves that have been damaged during transport or storage must not be installed.

! Valves:

- no axial forces, bending or torsional moments should act upon the valves.
- must not be used as fixing points for pipes

! In the case of gas welding or brazing, the flame may not reach the valve.

! Any kind of soiling has to be kept away from the inside of the valve.

! It is not allowed to open or close the valves by means of a hand wheel wrench or any other devices for extending the lever arm, as this may damage the seat sealing.

! The valves may not be disassembled or detached before the pipe has been depressurized, sucked off and adequately ventilated.

### 4. Application

**AWP-Shut off valves** are suitable for being employed in the refrigerant cycles for industrial refrigerating plants.

### 5. Functional description

**AWP-Shut off valves** are actuated by a hand wheel. They are shut off clockwise in viewing direction towards the operating element and are opened counterclockwise. The valves are shut-off devices and may only be operated in "shut-off" or "open" position. When opening the valve, the stem has to be moved to the limit stop into the uppermost position (completely open). The valves are equipped with a back sealing (flat sealing ring R).

**When the valve is completely open, it is possible to replace the sealing elements (O-rings, A, B, PTFE-ring) at the stem safely by unscrewing bushing.**

In case the flow medium reaches extreme temperatures, the valve must be handled with protective gloves, -danger of burning-.

Actuating the valve against a liquid in a closed section should be avoid, as the motion of the stem causes a change in volume within the valve body. This, in turn, causes an inadmissible increase of pressure in the closed pipe section. Valves in pipes for liquids have to be shut off in direction towards a vessel containing gas.

! DN 300 to 400 with balancing valve disk!

### 6. Installation

Before installing the valves, the pipelines and the components have to be cleaned.

**-please notice-**

The deviation from the parallelism or squareness of the welding ends or, as the case may be, the sealing surfaces of the flanges must not exceed 1°. The connecting flanges have to be coaxial. Valves that have been damaged during transport or storage must not be installed. After the protective caps have been removed, the valves can be welded on, or installed in any position.

An opposite flow direction is permitted up to DN 250, the performance figures do not apply then.

Ab DN300 sollte die Durchflußrichtung über folgende Differenzdrücke eingehalten werden.

| DN                     | 300 | 350 | 400 |
|------------------------|-----|-----|-----|
| $\Delta p(\text{bar})$ | 6   | 4,5 | 3,5 |

Bei Anwendung moderner Schweißverfahren (z.B. WIG, CO<sub>2</sub>) werden die Ventile zum Einschweißen nicht demontiert. Das Handrad ist in Mittelstellung zu bringen. Die Befestigungsschrauben und Muttern sind über Kreuz und gleichmäßig anzuziehen.

Nach dem Einbau ist die Leichtgängigkeit des Handrades im kompletten Hubbereich zu überprüfen. Das Deckelgewinde zum Aufschrauben der Kappe hat farbfrei zu bleiben und ist zu fetten (z.B. mit RENAX UNITEMP 2).

**-bitte beachten-**

Zur Demontage des Einsatzes ist genügend Platz auf der Deckelseite vorzusehen.

DN300 should flow from the following differential pressures are maintained.

With modern welding processes (such as TIG, CO<sub>2</sub>-shielded metal-arc), the valves are not disassembled for welding.

The fastening bolts and nuts have to be tightened crosswise and evenly. After the installation has been performed, check whether the hand wheel runs smoothly within its entire lift range.

The thread of the cover for unscrewing the cap must not be painted and has to be greased (e.g. with RENAX UNITEMP 2).

**-please notice-**

For disassembling the valve sufficient space has to be provided on the side of the cover.

| DN | 25  | 32  | 40  | 50  | 65  | 80  | 100 | 125 | 150 | 200 | 250 | 300 | 350  | 400  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| mm | 115 | 115 | 130 | 130 | 145 | 170 | 170 | 240 | 270 | 425 | 600 | 800 | 1200 | 1200 |

## 7. Wartung

**AWP-Absperrventile** arbeiten wartungsfrei. Treten Mängel im Funktionsverhalten auf, ist eine Reparatur möglich. Während der Garantiezeit dürfen Reparaturen nur durch AWP bzw. mit dessen Einverständnis durchgeschultes Instandhaltungspersonal des Betreibers der Anlage vorgenommen werden.

**! Sicherheitshinweise beachten**

**• Auswechseln der Spindelabdichtung**  
(bei Betrieb der Anlage)

1. Kappe abschrauben

| DN | 25 - 32 | 40 - 65 | 80 - 100 | 125 - 150 | 200 - 400 |
|----|---------|---------|----------|-----------|-----------|
| SW | 24      | 32      | 41       | 50        | 60        |

2. Spindel mittels Handrad bis zum Anschlag in die oberste Stellung fahren.

3. Schraubbuchse links herum herauserschrauben.

**!** Auf eventuell austretendes restliches Kältemittel achten. Bis zum völligen Druckausgleich Schraubbuchse lose im Deckel belassen. Erst danach völlig herauserschrauben

| DN | 25 - 32 | 40 - 65 | 80 - 100 | 125 - 150 | 200 - 400 |
|----|---------|---------|----------|-----------|-----------|
| SW | 22      | 27      | 32       | 46        | 55        |

4. O-Ringe A, B, PTFE-Ring und Abstreifring entfernen und durch neue ersetzen. Flachdichtring SB aus dem Einbauraum im Deckel entfernen.

5. Spindel säubern.

6. Neuen Flachdichtring SB in Deckel einlegen. Schraubbuchse mit Kältefett (RENAXUNITEMP2) bzw. gleichwertiges einfetten und handfest anziehen.

7. Zur Dichtheitskontrolle ist die Spindel in Mittelstellung zubringen und der Deckelbereich mit Schaummitteln einzupinseln.

## 7. Maintenance

**AWP-Shut off valves** are maintenance-free. In case any defects in the functional performance of the valves occur, they can be repaired. During the term of warranty, repairs may only be carried out by the AWP or -with his consent by specially-trained maintenance personal working for the plant operator.

**! Safety instructions please notice**

**• Replacing the stem sealing**  
(During operation of the system)

1. Screw off the cap

2. Move the stem by means of the uppermost position.

3. Screw off the screw bushing counter-clockwise.

**!** The screw bushing should be kept loosely in the cover until the pressure has equalized totally. Only then should it be unscrewed completely.

4. Remove the o-ring seals A, B, PTFE-ring and the scraper and replace them by new ones. Remove flat sealing ring SB from the seal housing in the cover.

5. Clean the stem.

6. Insert a new flat sealing-ring SB into the cover. Lubricate the screw bushing with low-temperature grease (RENAXUNITEMP 2) or any other appropriate lubricant and fasten it finger tight.

7. For leakage test move the stem into central position and coat the cover area with a foaming agent.

• **Auswechseln Flachdichtring S und R bzw. Spindel kpl.**

1. Ventil bis Anschlag öffnen. Deckelschrauben ISO 4762 und EN 24014 lösen.

! Auf eventuell austretendes restliches Kältemittel achten. Bis zum völligen Druckausgleich Deckelschrauben lose im Gehäuse belassen. Erst danach völlig herausschrauben.

|                     | DN | 25       | 32 | 40 | 50 | 65 | 80       | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 |
|---------------------|----|----------|----|----|----|----|----------|-----|-----|-----|-----|-----|-----|-----|-----|
| Schrauben<br>screws | M  | 8        | 8  | 8  | 8  | 8  | 10       | 12  | 16  | 16  | 16  | 20  | 20  | 24  | 30  |
|                     |    | ISO 4762 |    |    |    |    | EN 24014 |     |     |     |     |     |     |     |     |
|                     | SW | 6        | 6  | 6  | 6  | 6  | 16       | 18  | 24  | 24  | 24  | 30  | 30  | 36  | 46  |

2. Deckelschrauben herausschrauben und Deckel einschließlich Innenteile am Handrad herausziehen.
3. Handrad von der Spindel abschrauben und die Spindel nach Entfernen des Gewindestiftes (DN80 bis 200) aus dem Deckel herausdrehen.
4. Flachdichtring R herausnehmen und ersetzen.
5. **DN 25 bis 32:**  
Ventiltellerschrauben abschrauben und Flachdichtring S herausnehmen.  
**DN 40 bis 150:**  
Durch geeignete Verfahren (Feilen, Sägen) Entfernen der Sicken am Ventilteller, so dass die Scheibe und der Flachdichtring S abgenommen werden können.  
**DN 200 bis 400:**  
Ventiltellerschrauben abschrauben und Flachdichtring S herausnehmen.

Schrauben  
screws  
EN 24014

| DN | 200-400 |
|----|---------|
| M  | 6x20    |
| SW | 10      |

6. Einlegen des neuen Flachdichtringes S, Sicherung durch Scheibe und Eindringen der Sicken durch geeignete Verfahren (z.B. Handhebelpresse), bzw. Ventil

Vor der Montage sind alle Einzelteile der Ventile zu reinigen, die Spindel und der Deckel einzufetten. Anschließend wird noch ein Flachdichtring K eingelegt, der Deckel aufgesetzt und mit den Schrauben gleichmäßig und über Kreuz angezogen.

• **Replacing the flat sealing ring S and R, or stem cpl.**

1. Open the valve up to the limit stop. Loosen the cover screws ISO 4762 and EN 24014.

! The cover screws should be kept loosely in the body until the pressure has equalized totally. Only then should it be unscrewed completely.

2. Unscrew cover screws and draw out the cover including internal parts by means of the handwheel.
3. Screw the handwheel from the stem and turn the stem out of the cover after having removed the headless pin (only DN 80 to 200).
4. Remove the flat sealing ring R and replace it.
5. **DN 25 to 32:**  
Unscrew valve-disc plate and draw out the flat sealing-ring S.  
**DN 40 to 150:**  
Remove crimps from the valve plate by means of suitable methods (such as filling, sawing) so that the washer and the flat sealing ring S can be taken off.  
**DN 200 to 400:**  
Unscrew valve-disc plate and draw out the flat sealing-ring S.

6. Insert a new flat sealing ring S, secure it by means of the washer and reproduce the crimps by means of appropriate methods, e.g. hand lever press, or valve-plate screws tightening.

Before mounting, clean all component parts of the valves; grease stem and the cover. Afterwards another flat sealing ring is inserted, the cover is put back in its place and is tightened by means of the screws evenly and crosswise.

| DN  | 25       | 32   | 40   | 50   | 65   | 80       | 100   | 125   | 150   | 200   | 250   | 300   | 350   | 400   |
|---|----------|------|------|------|------|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| M   | 8x25     | 8x25 | 8x25 | 8x25 | 8x25 | 10x30    | 12x35 | 16x45 | 16x45 | 16x45 | 20x60 | 20x60 | 24x65 | 30x80 |
|   | ISO 4762 |      |      |      |      | EN 24014 |       |       |       |       |       |       |       |       |
| SW  | 6        | 6    | 6    | 6    | 6    | 16       | 18    | 24    | 24    | 24    | 30    | 30    | 36    | 46    |
| Anziehdrehmoment / tightening moment [Nm] (8.8) |          |      |      |      |      |          |       |       |       |       |       |       |       |       |
|   | 25       | 25   | 25   | 25   | 25   | 49       | 85    | 210   | 210   | 210   | 425   | 425   | 730   | 1450  |

## 8. Transport und Lagerung

**AWP-Absperrventile** werden stoßgeschützt, mit Folie abgedeckt transportiert. Die Lagerung hat in trockenen Räumen zu erfolgen. Es ist auf den unversehrten Verschluss der Anschlussstutzen zu achten. Verschmutzungen jeglicher Art müssen vom Innenraum ferngehalten werden. Die außenliegenden Flächen der Armaturen sind mit einem Korrosionsschutzanstrich für trockene Lagerung bei Raumtemperatur versehen, der mindestens 1 Jahr wirksam ist. Der Korrosionsschutzanstrich **BISPHENOL-A-Epoxidharz** ist ein guter Haftvermittler für Deckanstrichstoffe auf 1- und 2-Komponenten-Basis.

## 9. Garantie

Die Garantieleistung für Erzeugnisse ist entsprechend den vertraglichen Bestimmungen im Liefervertrag festgelegt.

## 10. Ersatzteile

Ersatzteile entsprechend Bild Seite 2:  
Ersatzteilbestellung: (muss enthalten)

- Anzahl
- Bezeichnung entsprechen Bilder für Typ
- Bestell-Nummer
- Nennweite der Armatur
- Baujahr der Armatur

**Bestellbeispiel:**  
**3 Stück, Spindel kpl. AVR, 263 00**  
**263 00E13.5060001,**  
**DN32, 05/2010**

## 8. Transport, Storage

During transport, **AWP-Shut off valves** are protected against shocks and covered with plastic sheeting. They should be stored in dry rooms. Care has to be taken that the plugs of the connecting pieces are not damaged. Any kind of soiling has to be kept away from the inside of the fitting. The external surfaces of the valves are provided with a layer of anticorrosive paint for dry storing at room temperature, which remains effective for at least 1 year. The anticorrosive paint which **BISPHENOL-A-Epoxidharz** is a good bonding agent for one or two-pot finishing coating paints.

## 9. Warranty

The warranty services for our products have been defined in compliance with the regulations stipulated the contract of delivery.

## 10. Spare parts

Spare parts according to the illustration sheet page 2:  
Ordering Spare parts: (an order must contain):

- quantity
- designation according to illustration sheet page 2
- stock number
- nominal diameter of the fitting
- year of construction of the fitting

**Example for ordering**  
**3 pieces, stem cmpl. AVR, 263 00**  
**263 00E13.5060001,**  
**DN32, 05/2010**

| Handrad / handwheel |                               |                        | Kappe / cap |                               |                        |
|---------------------|-------------------------------|------------------------|-------------|-------------------------------|------------------------|
| DN                  | Bestellnummer<br>stock number | Abmessung<br>dimension | DN          | Bestellnummer<br>stock number | Abmessung<br>dimension |
| 25                  | 163 00E13.5 280 00 3          | ⌀ 120 x 11/14          | 25          | 164 02.13.3 180 00 3          | M36 x 2,0              |
| 32                  | 163 00E13.5 280 00 3          | ⌀ 120 x 11/14          | 32          | 164 02.13.3 180 00 3          | M36 x 2,0              |
| 40                  | 163 00E15.5 280 00 3          | ⌀ 140 x 12/16          | 40          | 164 02.15.3 180 00 3          | M52 x 3,0              |
| 50                  | 163 00E15.5 280 00 3          | ⌀ 140 x 12/16          | 50          | 164 02.15.3 180 00 3          | M52 x 3,0              |
| 65                  | 163 00E15.5 280 00 3          | ⌀ 140 x 12/16          | 65          | 164 02.15.3 180 00 3          | M52 x 3,0              |
| 80                  | 163 00E18.5 280 00 3          | ⌀ 180 x 14/22          | 80          | 164 02.19.3 180 00 3          | M60 x 3,0              |
| 100                 | 163 00E18.5 280 00 3          | ⌀ 180 x 14/22          | 100         | 164 02.19.3 180 00 3          | M60 x 3,0              |
| 125                 | 163 01.20.5 280 00 3          | ⌀ 300 x 22/26          | 125         | 164 02.21.3 180 00 3          | M76 x 3,0              |
| 150                 | 163 01.21.5 280 00 3          | ⌀ 400 x 22/26          | 150         | 164 02.21.3 180 00 3          | M76 x 3,0              |
| 200                 | 163 01.23.5 280 00 3          | ⌀ 600 x 28/46          | 200         | 164 02.23.3 180 00 3          | M80 x 3,0              |
| 250                 | 163 01.23.5 280 00 3          | ⌀ 600 x 28/46          | 250         | 164 02.23.3 180 00 3          | M80 x 3,0              |
| 300                 | 163 01.23.5 280 00 3          | ⌀ 600 x 28/46          | 300         | 164 02.23.3 180 00 3          | M80 x 3,0              |
| 350                 | 163 01.23.5 280 00 3          | ⌀ 600 x 28/46          | 350         | 164 02.23.3 180 00 3          | M80 x 3,0              |
| 400                 | 163 01.23.5 280 00 3          | ⌀ 600 x 28/46          | 400         | 164 02.23.3 180 00 3          | M80 x 3,0              |

| Flachdichtring K / flat sealing ring K AFM30 |                               |                        | Flachdichtring S / flat sealing ring S PTFE |                               |                        |
|--|-------------------------------|------------------------|---|-------------------------------|------------------------|
| DN   | Bestellnummer<br>stock number | Abmessung<br>dimension | DN  | Bestellnummer<br>stock number | Abmessung<br>dimension |
| 25   | 163 01.13.4 146 00 3          | ⌀ 43 x 49,0 x 1,5      | 25  | 163 01.13.2 144 00 3          | ⌀ 20,2 x 33,8 x 3,0    |
| 32   | 163 01.13.4 146 00 3          | ⌀ 43 x 49,0 x 1,5      | 32  | 163 01.13.2 144 00 3          | ⌀ 20,2 x 33,8 x 3,0    |
| 40   | 163 01.15.4 146 00 3          | ⌀ 62 x 68,8 x 1,5      | 40  | 163 01.15.2 144 00 3          | ⌀ 32,2 x 47,8 x 4,0    |
| 50   | 163 01.15.4 146 00 3          | ⌀ 62 x 68,8 x 1,5      | 50  | 163 01.15.2 144 00 3          | ⌀ 32,2 x 57,8 x 4,0    |
| 65   | 163 01.17.4 146 00 3          | ⌀ 76 x 84,8 x 1,5      | 65  | 163 01.17.2 144 00 3          | ⌀ 55,2 x 71,0 x 4,0    |
| 80   | 163 01.18.4 146 00 3          | ⌀ 94 x 105 x 1,5       | 80  | 163 01.18.2 144 00 3          | ⌀ 68,0 x 89,0 x 5,0    |
| 100  | 163 01.19.4 146 00 3          | ⌀ 115 x 129 x 1,5      | 100   | 163 01.19.2 144 00 3          | ⌀ 86 x 109 x 5,0       |
| 125  | 163 01.20.4 146 00 3          | ⌀ 140 x 159 x 1,5      | 125   | 163 01.20.2 144 00 3          | ⌀ 112 x 134 x 6,0      |
| 150  | 163 01.21.4 146 00 3          | ⌀ 170 x 188,5 x 2,0    | 150   | 163 01.21.2 144 00 3          | ⌀ 130 x 163 x 6,0      |
| 200  | 163 01.23.4 146 00 3          | ⌀ 240 x 259 x 2,0      | 200   | 163 01.23.2 144 00 3          | ⌀ 185 x 218 x 6,0      |
| 250  | 163 01.24.4 146 00 3          | ⌀ 296 x 320 x 2,0      | 250   | 164 02.24.2 144 00 3          | ⌀ 230 x 275 x 6,0      |
| 300  | 263 01.25.4 146 00 3          | ⌀ 338 x 366 x 2,0      | 300   | 263 02.25.2 144 00 3          | ⌀ 289 x 322 x 6,0      |
| 350  | 263 01.26.4 146 00 3          | ⌀ 370 x 400 x 2,0      | 350   | 263 02.26.2 144 00 3          | ⌀ 322 x 355 x 6,0      |
| 400  | 263 00B27.4 146 00 3          | ⌀ 440 x 478 x 2,0      | 400   | 263 00B27.2 144 00 3          | ⌀ 361 x 398 x 8,0      |

| Flachdichtring SB / flat sealing ring SB AFM30 |                               |                        | Flachdichtring R / flat sealing ring R PTFE |                               |                        |
|--|-------------------------------|------------------------|---|-------------------------------|------------------------|
| DN   | Bestellnummer<br>stock number | Abmessung<br>dimension | DN  | Bestellnummer<br>stock number | Abmessung<br>dimension |
| 25   | 363 02.13.4 143 00 3          | ⌀ 14 x 25,5 x 2,0      | 25  | 164 02.10.2 145 00 3          | ⌀ 16 x 21,6 x 2,0      |
| 32   | 363 02.13.4 143 00 3          | ⌀ 14 x 25,5 x 2,0      | 32  | 164 02.10.2 145 00 3          | ⌀ 16 x 21,6 x 2,0      |
| 40   | 164 02.15.4 143 00 3          | ⌀ 16 x 26,9 x 2,0      | 40  | 264 00.17.2 145 00 3          | ⌀ 20 x 33,9 x 2,0      |
| 50   | 164 02.15.4 143 00 3          | ⌀ 16 x 26,9 x 2,0      | 50  | 264 00.17.2 145 00 3          | ⌀ 20 x 33,9 x 2,0      |
| 65   | 164 02.15.4 143 00 3          | ⌀ 16 x 26,9 x 2,0      | 65  | 264 00.17.2 145 00 3          | ⌀ 20 x 33,9 x 2,0      |
| 80   | 164 02.18.4 143 00 3          | ⌀ 20 x 32,9 x 2,0      | 80  | 164 02.18.2 145 00 3          | ⌀ 26 x 40,0 x 3,0      |
| 100  | 164 02.18.4 143 00 3          | ⌀ 20 x 32,9 x 2,0      | 100   | 164 02.18.2 145 00 3          | ⌀ 26 x 40,0 x 3,0      |
| 125  | 164 02.21.4 143 00 3          | ⌀ 28 x 45,9 x 2,0      | 125   | 164 02.21.2 145 00 3          | ⌀ 36 x 52,0 x 3,0      |
| 150  | 164 02.21.4 143 00 3          | ⌀ 28 x 45,9 x 2,0      | 150   | 164 02.21.2 145 00 3          | ⌀ 36 x 52,0 x 3,0      |
| 200  | 164 02.23.4 143 00 3          | ⌀ 35 x 54,9 x 2,0      | 200   | 164 02.23.2 145 00 3          | ⌀ 45 x 70,0 x 3,0      |
| 250  | 164 02.23.4 143 00 3          | ⌀ 35 x 54,9 x 2,0      | 250   | 164 02.23.2 145 00 3          | ⌀ 45 x 70,0 x 3,0      |
| 300  | 164 02.23.4 143 00 3          | ⌀ 35 x 54,9 x 2,0      | 300   | 164 02.23.2 145 00 3          | ⌀ 45 x 70,0 x 3,0      |
| 350  | 164 02.23.4 143 00 3          | ⌀ 35 x 54,9 x 2,0      | 350   | 164 02.23.2 145 00 3          | ⌀ 45 x 70,0 x 3,0      |
| 400  | 164 02.23.4 143 00 3          | ⌀ 35 x 54,9 x 2,0      | 400   | 164 02.23.2 145 00 3          | ⌀ 45 x 70,0 x 3,0      |

| Schraubbuchse kpl. / screw bushing cmpl. |                               | Spindel kpl. / stem cmpl.  |                               | Spindel kpl. / stem cmpl.     |                        |
|--|-------------------------------|----------------------------|-------------------------------|-------------------------------|------------------------|
| DN                                       | Bestellnummer / stock number  | Typ / type: 263 00, 264 00 |                               | Typ / type: 263 10, 264 10    |                        |
| 25                                       | 163 00E13.8 142 001           | 263 00E13.5 060 00 1       |                               | 263 10E13.5 060 00 1          |                        |
| 32                                       | 163 00E13.8 142 001           | 263 00E13.5 060 00 1       |                               | 263 10E13.5 060 00 1          |                        |
| 40                                       | 163 00E15.8 142 001           | 263 00E15.5 060 00 1       |                               | 263 10E15.5 060 00 1          |                        |
| 50                                       | 163 00E15.8 142 001           | 263 00E15.5 060 00 1       |                               | 263 10E15.5 060 00 1          |                        |
| 65                                       | 163 00E15.8 142 001           | 263 00E17.5 060 00 1       |                               | 263 10E17.5 060 00 1          |                        |
| 80                                       | 163 00E18.8 142 001           | 263 00E18.5 060 00 1       |                               | 263 10E18.5 060 00 1          |                        |
| 100                                      | 163 00E18.8 142 001           | 263 00E19.5 060 00 1       |                               | 263 10E19.5 060 00 1          |                        |
| 125                                      | 163 00E21.8 142 001           | 263 00E20.5 060 00 1       |                               | 263 10E20.5 060 00 1          |                        |
| 150                                      | 163 00E21.8 142 001           | 263 00E21.5 060 00 1       |                               | 263 10E21.5 060 00 1          |                        |
| 200                                      | 163 00E23.8 142 001           | 263 00E23.5 060 00 1       |                               | 263 10E23.5 060 00 1          |                        |
| 250                                      | 163 00E23.8 142 001           | 263 00B24.5 060 00 1       |                               | -                             |                        |
| 300                                      | 163 00E23.8 142 001           | 263 02.25.5 060 00 1       |                               | -                             |                        |
| 350                                      | 163 00E23.8 142 001           | 263 02.26.5 060 00 1       |                               | -                             |                        |
| 400                                      | 163 00E23.8 142 001           | 263 00B27.5 060 00 1       |                               | -                             |                        |
|  |                               |                            |                               |                               |                        |
| O-Ring A / o-ring seal A CR75            |                               |                            | O-Ring B / o-ring seal B CR75 |                               |                        |
| DN                                       | Bestellnummer<br>stock number | Abmessung<br>dimension     | DN                            | Bestellnummer<br>stock number | Abmessung<br>dimension |
| 25                                       | 73 75 91                      | ⌀ 14 x 3                   | 25                            | 73 75 22                      | ⌀ 22 x 2               |
| 32                                       | 73 75 91                      | ⌀ 14 x 3                   | 32                            | 73 75 22                      | ⌀ 22 x 2               |
| 40                                       | 73 75 59                      | ⌀ 16 x 3                   | 40                            | 73 75 01                      | ⌀ 22 x 3               |
| 50                                       | 73 75 59                      | ⌀ 16 x 3                   | 50                            | 73 75 01                      | ⌀ 22 x 3               |
| 65                                       | 73 75 59                      | ⌀ 16 x 3                   | 65                            | 73 75 01                      | ⌀ 22 x 3               |
| 80                                       | 73 75 25                      | ⌀ 20 x 3                   | 80                            | 73 75 03                      | ⌀ 28 x 3               |
| 100                                      | 73 75 25                      | ⌀ 20 x 3                   | 100                           | 73 75 03                      | ⌀ 28 x 3               |
| 125                                      | 73 75 96                      | ⌀ 28 x 5                   | 125                           | 73 75 16                      | ⌀ 40 x 3               |
| 150                                      | 73 75 96                      | ⌀ 28 x 5                   | 150                           | 73 75 16                      | ⌀ 40 x 3               |
| 200                                      | 73 75 97                      | ⌀ 35 x 5                   | 200                           | 73 75 27                      | ⌀ 50 x 3               |
| 250                                      | 73 75 97                      | ⌀ 35 x 5                   | 250                           | 73 75 27                      | ⌀ 50 x 3               |
| 300                                      | 73 75 97                      | ⌀ 35 x 5                   | 300                           | 73 75 27                      | ⌀ 50 x 3               |
| 350                                      | 73 75 97                      | ⌀ 35 x 5                   | 350                           | 73 75 27                      | ⌀ 50 x 3               |
| 400                                      | 73 75 97                      | ⌀ 35 x 5                   | 400                           | 73 75 27                      | ⌀ 50 x 3               |
|  |                               |                            |                               |                               |                        |
| PTFE-Ring / PTFE-ring seal               |                               |                            | Abstreifring / scraper NBR85  |                               |                        |
| DN                                       | Bestellnummer<br>stock number | Abmessung<br>dimension     | DN                            | Bestellnummer<br>stock number | Abmessung<br>dimension |
| 25                                       | 72 84 00                      | ⌀ 14 x 19 /3,9             | 25                            | 73 98 55                      | 14 x 20 x 5            |
| 32                                       | 72 84 00                      | ⌀ 14 x 19 /3,9             | 32                            | 73 98 55                      | 14 x 20 x 5            |
| 40                                       | 72 84 01                      | ⌀ 16 x 21 /3,9             | 40                            | 73 98 38                      | 16 x 22 x 5            |
| 50                                       | 72 84 01                      | ⌀ 16 x 21 /3,9             | 50                            | 73 98 38                      | 16 x 22 x 5            |
| 65                                       | 72 84 01                      | ⌀ 16 x 21 /3,9             | 65                            | 73 98 38                      | 16 x 22 x 5            |
| 80                                       | 72 84 02                      | ⌀ 20 x 25 /3,9             | 80                            | 73 98 41                      | 20 x 28 x 7            |
| 100                                      | 72 84 02                      | ⌀ 20 x 25 /3,9             | 100                           | 73 98 41                      | 20 x 28 x 7            |
| 125                                      | 72 84 03                      | ⌀ 28 x 28 /5,9             | 125                           | 73 98 54                      | 28 x 36 x 7            |
| 150                                      | 72 84 03                      | ⌀ 28 x 28 /5,9             | 150                           | 73 98 54                      | 28 x 36 x 7            |
| 200                                      | 72 84 04                      | ⌀ 35 x 36,8 /6,0           | 200                           | 73 75 37                      | 35 x 43 x 7            |
| 250                                      | 72 84 04                      | ⌀ 35 x 36,8 /6,0           | 250                           | 73 75 37                      | 35 x 43 x 7            |
| 300                                      | 72 84 04                      | ⌀ 35 x 36,8 /6,0           | 300                           | 73 75 37                      | 35 x 43 x 7            |
| 350                                      | 72 84 04                      | ⌀ 35 x 36,8 /6,0           | 350                           | 73 75 37                      | 35 x 43 x 7            |
| 400                                      | 72 84 04                      | ⌀ 35 x 36,8 /6,0           | 400                           | 73 75 37                      | 35 x 43 x 7            |

## 11. Kennzeichnung

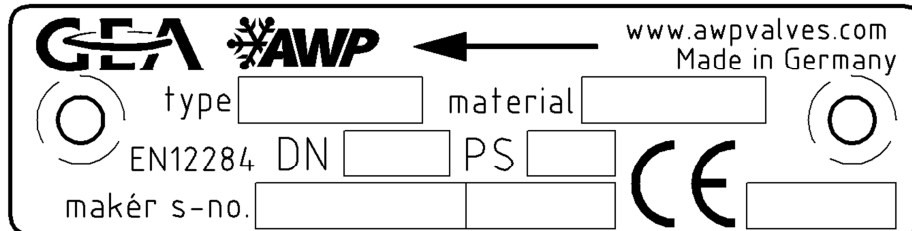
Die Kennzeichnung der AWP-Absperrventile erfolgt entsprechend EN12284.

- Kennzeichenschild auf Gehäuse

## 11. Specification

The specification of the AWP-shut off valves complies with German Standard EN12284

- Specification label of the casing



|          |       |   |
|----------|-------|---|
| PS       | [bar] | - maximal zulässiger Betriebsüberdruck<br>permissible working pressure  |
| DN       | [mm]  | - Nennweite<br>nominal diameter   |
| EN 12284 |       | - Kältemittelarmaturen, Sicherheitstechnische Festlegungen,<br>Prüfung, Kennzeichnung<br>European Standard: refrigerant valves; requirements, testing,<br>marking |

## 12. Hinweis auf Restgefahren entsprechend der Druckgeräterichtlinie (97/23/EG)

Vom Hersteller nicht zu vermeidende Restgefahren bestehen durch:

- Unbefugtes Lösen des Deckels während des Betriebes bzw. Lösen der Schraubbuchse ohne Aktivierung der Rückdichtung
- Unsachgemäße Montage von Flanschverbindungen (Eingangs- und Ausgangsflansch, Deckel)
- Verschmutzungen im Betriebsmedium bzw. Unsachgemäßer Umgang mit Einbauteilen können zu Beschädigungen an der Sitzdichtung führen
- Nichtbeachtung der Einsatzgrenzen und Herstellervorschriften entsprechend dieser Betriebsvorschrift

## 12. Information on risks in conformance to pressure appliance directive

Remaining risks which cannot be avoided by the manufacturer arise because of:

- Unauthorized loosening of the cover during operation or removing of the screw bushing without activation of the back sealing
- Incorrect assembly of the flange connections (inlet and outlet flange, lid)
- Dirt in the service medium or inappropriate handling of the internal fittings may cause damage to the seat seal
- Ignore of the operating range and manufacturer rules acc. to this operating instruction

# 1 SERVICE VALVES WITH RISING STEM

## HRS types, metallic-back seal

### 1.1 Safety Instructions



#### Hint!

- Valves that have been damaged during transport or storage must not be installed.
- No axial forces, bending or torsional moments should act upon the valves.
- Valves must not be used as fixing points for pipes.
- In the case of gas welding or brazing, the flame may not reach the valve.
- Any kind of soiling has to be kept away from the inside of the valve.
- The valves may not be detached before the pipe has been depressurized, sucked off.

#### Information on further risks in conformance to pressure appliance directive (97/23/EG)

Remaining risks which can not be avoided by the manufacturer arise because of:

- Unauthorised loosening of the screw bushing without examination whether spindle until it stops in the highest position was driven
- Incorrect assembly of threaded joints
- Dirt in the service medium may cause damage the stem
- Ignore of operating range and manufacturer rules acc. to this operating instruction

Remaining risks of "double valves" which can not be avoided by the manufacturer arise because of:

- Connecting system components at open valve

### 1.2 Application

Service valves are suitable for being employed in the refrigerant cycles for refrigerating plants.

### 1.3 Specification

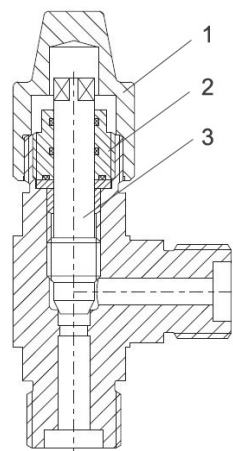


fig.1: Service valve, straight form

|   |               |
|---|---------------|
| 1 | Cap           |
| 2 | Screw bushing |
| 3 | Stem          |

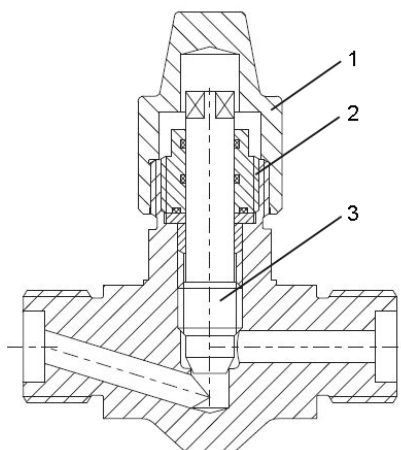


fig.2: Service valve, angle type (on request only)

|   |               |
|---|---------------|
| 1 | Cap           |
| 2 | Screw bushing |
| 3 | Stem          |

The specification of the valves complies with EN 12284 of the casing:

- Valve type HRS E (D)  
E = angle type // D = straight form
- Connection inlet/outlet
- Manufacturer
- Flow direction

## 1.4 Double valves

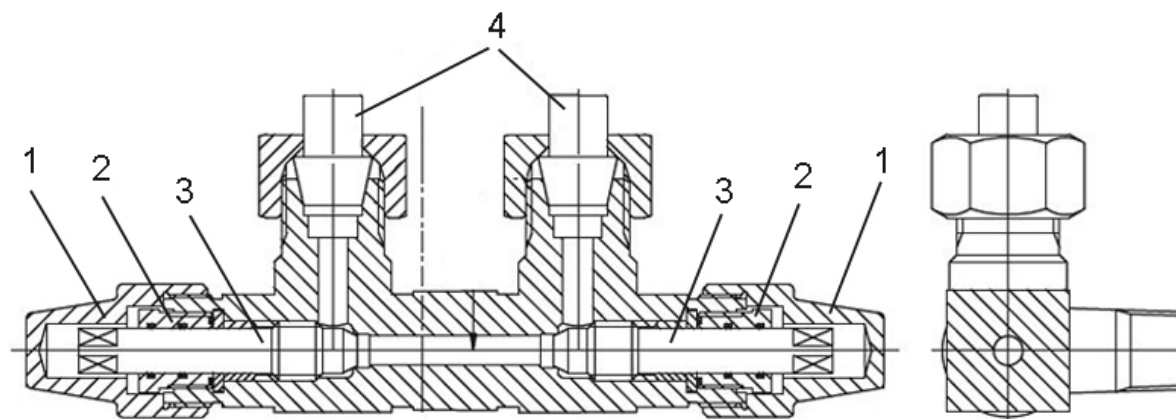


fig.3: Double valve M16x1,5

|   |               |
|---|---------------|
| 1 | Cap           |
| 2 | Screw bushing |
| 3 | Stem          |
| 4 | Blind plug    |

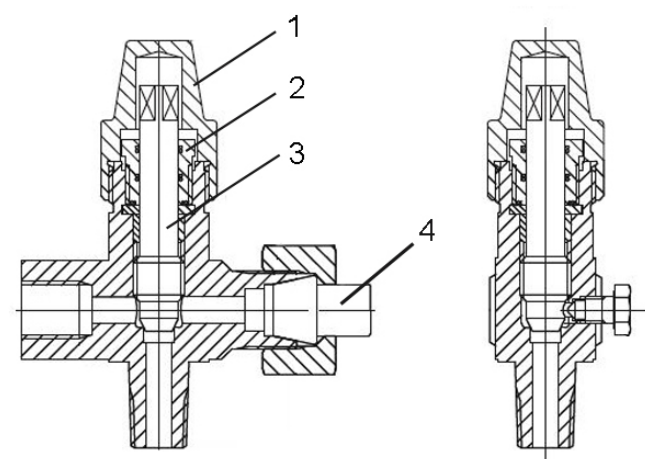


fig.4: Double valve R 1/4"

|   |               |
|---|---------------|
| 1 | Cap           |
| 2 | Screw bushing |
| 3 | Stem          |
| 4 | Blind plug    |

**Caution!**

The system components may only be connected or replaced after venting and closing the valve, especially for double valves (see fig. 4, valves with double-system connections) and with control through one spindle. For venting the screw SW10 (see figure) is used.

The specification of the double valves complies with EN 12284 of the casing:

- Valve type
- Connection inlet/outlet
- Manufacturer
- Flow direction

## 1.5 Technical characteristics

| Technical characteristics        |   |
|----------------------------------|---|
| Media of operation:              | Refrigerants acc. to EN 378 part 1, e.g. ammonia, R22, R134a, propane, butane, CO <sub>2</sub> and mixtures with refrigerating oil, neutral, gaseous and liquid media cold brine basing on glycol |
| Temperature limits:              | -60°C to +150°C   |
| Permissible ambient temperature: | - 50°C to +50°C   |
| Pressure stage:                  | 63 bar  |
| Housing material:                | Selection of material acc. to EN 12284, AD-W 10<br>C22.8 // 1.0460 (steel)<br>X6CrNiMoTi17.12 2 // 1.4571 (stainless steel) or any equivalent   |
| Mounting position:               | individual  |
| Leakage to the outside:          | <5 g/a (refrigerant per year)   |

| Table acc. to AD 2000 |      |                |       |       |     |     |      |
|-----------------------|------|----------------|-------|-------|-----|-----|------|
| PS                    | DN   | TS (MWT) [°C]  | -60*  | -60** | -10 | +50 | +150 |
| 63                    | 8-15 | PS (MWP) [bar] | 47,25 | 63    | 63  | 63  | 63   |

\*\* kind of straining I // \* kind of straining II (acc. to AD 2000 W10, EN 12284)

## 1.6 Functional description

Service valves are operated by a handwheel or by ratchet. They are shut off clockwise in viewing direction towards the operating element and are opened counter-clockwise. The valves are shut-off devices and may only be operated in "shut-off" or "open" position. When opening the valve, the stem has to be moved to the limit stop into the top position (completely open). The valves are equipped with a back sealing. **When the valve is completely open, is it possible to replace the screw bushing with the sealing.**



### Hint!

**The screw bush is taped with left-hand thread.**

**In case of extrem high temperatures the valve has to be handled with protective gloves (danger of burning!).**

## 1.7 Installation

Before installing the valves, the pipelines and the components have to be cleaned.

The deviation from the squareness and parallelism of the pipe connection may be not higher than 1°.

Valves that have been damaged during transport or storage are not allowed to installed. After the protective caps (at the connection ends) have been removed the valves can be welded on or installed in any desired directions. For recommended flow direction see the stamp arrow at the valve housing. During the weld on procedure the valve stem has to be in the central position. After the installation has been performed, check whether the handwheel runs smoothly within its entire lift range. The thread of the cap must not be painted and has to be greased.

For disassembling the valve sufficient space has to be provided on the side of the cover.

## 1.8 Maintenance

Service valves are maintenance-free. Replacement of stem sealing is possible.

**Replacing the stem sealing (during operation of the system):**

1. Screw off the cap. **across flat dimension = 22**
2. Move the stem by means of the uppermost position.
3. Unscrew the screw bushing the right. **across flat dimension = 14**



### Hint!

**Pay attention to any leaking refrigerant remaining. The screw bushing should be kept loosely in the cover until the pressure has equalized totally. Only then should it be unscrewed completely.**

4. Clean the stem.
5. Lubricate the screw bushing with low-temperature grease (e.g. RENAX UNITEMP 2) or any other appropriate lubricant and tighten clockwise.
6. For leakage test move the stem into central position and coat the area screw bushing/stem with afoam.

**Stem turning moment = 15 Nm**

## 1.9 Transport and storage

### Transport

The valves have to be transported shockproofed.

### Storage

The storage must be carried out in dry rooms. It is important that the plugs of the connecting pieces are not damaged. Pollution of any kind must be kept away from the inside of the fitting. The steel version of the valves is galvanized to protect against corrosion.

## 1.10 Spare parts

A spare parts order includes the Screw bush with the corresponding seals.

The replacement order must contain:

- Quantity
- Designation according to illustration (valve type, see valve housing)
- Stock number: **Grasso Ident 501306658**
- Year of construction of the fitting

Example for ordering: 3 pieces, screw bushing HRS 025, Grasso Ident 501306658, year of construction: 06/2009

## 1.11 Connection combinations - Grasso Ident

HRS 26 - technical progress, 2010, used in the products of the GEA Grasso GmbH

HRS 25 - use on request

HRS 25 / HRS 25 - stainless steel version on request

| Stop valves                          |                          |                                      |                          |                           |                |
|--------------------------------------|--------------------------|--------------------------------------|--------------------------|---------------------------|----------------|
| Inlet                                | Accessories <sup>1</sup> | Outlet                               | Accessories <sup>1</sup> | Designation               | Grasso Ident   |
| M16x1,5 conical                      |                          | M18x1,5 RA12                         | 1 + 2                    | HRS E AC/A84<br>DN8 PS63  | 501299036awp63 |
| G1/4 inside with<br>receded shoulder |                          | G1/4 inside with<br>receded shoulder |                          | 02660F07B8B3GG00          | 501306608awp63 |
| M16x1,5 conical                      |                          | G1/4 inside with<br>receded shoulder |                          | 02260F07A8B3CG00          | 501306609awp63 |
| M18x1,5 RA12                         |                          | M18x1,5 RA12                         | 1 + 2                    | HRS E A84/A84<br>DN8 PS63 | 501306611awp63 |
| M26x1,5 RA18                         | 1 + 2                    | M26x1,5 RA18                         | 1 + 2                    | HRS E AS4/AS4<br>DN8 PS63 | 501306613awp63 |
| M30x2 RA22                           | 1 + 2                    | M30x1,5 RA22                         | 1 + 2                    | HRS E AT4/AT4<br>DN8 PS63 | 501306614awp63 |
| AE 18x3                              | 1 + 2                    | G 1/2" RA12                          | 1 + 2                    | HRS E E4/AN4<br>DN8 PS63  | 501306620awp63 |
| AE 18x3                              |                          | G 1/2" RA12                          | 3                        | HRS E E4/AN2<br>DN8 PS63  | 501306621awp63 |
| M16x1,5 conical                      |                          | G 1/2" RA12                          | 1 + 2                    | HRS E AC/AN4<br>DN8 PS63  | 501306622awp63 |
| M16x1,5 conical                      |                          | G 1/2" RA12                          | 3                        | HRS E AC/AN2<br>DN8 PS63  | 501306623awp63 |
| M22x1,5 conical                      |                          | G 1/2" RA12                          | 1 + 2                    | HRS E AD/AN4<br>DN8 PS63  | 501306624awp63 |
| M22x1,5 conical                      |                          | G 1/2" RA12                          | 3                        | HRS E AD/AN2<br>DN8 PS63  | 501306625awp63 |
| AE 18x3                              |                          | G 3/4" RA18                          | 1 + 2                    | HRS E E4/AP4<br>DN10 PS63 | 501306626awp63 |
| AE 18x3                              |                          | G 3/4" RA18                          | 3                        | HRS E E4/AP2<br>DN10 PS63 | 501306627awp63 |
| M22x1,5 conical                      |                          | G 3/4" RA18                          | 1 + 2                    | HRS E AD/AP4<br>DN8 PS63  | 501306628awp63 |

| Stop valves     |                          |                 |                          |                           |                |
|-----------------|--------------------------|-----------------|--------------------------|---------------------------|----------------|
| Inlet           | Accessories <sup>1</sup> | Outlet          | Accessories <sup>1</sup> | Designation               | Grasso Ident   |
| M22x1,5 conical |                          | G 3/4" RA18     | 3                        | HRS E AD/AP2<br>DN8 PS63  | 501306629awp63 |
| R 1/4" conical  |                          | G 1/4" inside   |                          | HRS E AG/AH<br>DN8 PS63   | 501306630awp63 |
| R 1/4" conical  |                          | G 3/8" inside   |                          | HRS E AG/AM<br>DN8 PS63   | 501306631awp63 |
| R 1/4" conical  |                          | G 1/2" RA12     | 1 + 2                    | HRS E AG/AN4<br>DN8 PS63  | 501306632awp63 |
| R 1/2" conical  |                          | G 1/2" RA12     | 1 + 2                    | HRS E AX/AN4<br>DN8 PS63  | 501306633awp63 |
| R 1/2" conical  |                          | G 1/2" RA12     | 3                        | HRS E AX/AN2<br>DN8 PS63  | 501306634awp63 |
| M18x1,5 RA12    | 1 + 2                    | G 1/2" RA12     | 3                        | HRS E A84/AN2<br>DN8 PS63 | 501306637awp63 |
| G 1/2" RA12     | 1 + 2                    | M16x1,5 conical |                          | HRS E AN4/AC<br>DN8 PS63  | 501306638awp63 |
| G 1/2" RA12     | 3                        | M16x1,5 conical |                          | HRS E AN2/AC<br>DN8 PS63  | 501306639awp63 |
| M16x1,5 conical |                          | G 1/4" inside   |                          | HRS E AC/AH<br>DN8 PS63   | 501306640awp63 |
| M16x1,5 conical |                          | G 3/8" inside   |                          | HRS E AC/AM<br>DN8 PS63   | 501306641awp63 |
| AE18x3          | 3                        | G1/2" RA12      |                          | 96462F08B8A35S02          | 501306658awp63 |
| AE12x1,5        | 3                        | AE12x1,5        |                          | 02600F07A8A33300          | 501306670awp63 |

<sup>1</sup> Explanation: 1 = pipe nut // 2 = welding taper bush // 3 = blind nut

| Double valves   |             |                                     |             |                  |                |
|-----------------|-------------|-------------------------------------|-------------|------------------|----------------|
| Inlet           | Accessories | Outlet                              | Accessories | Designation      | Grasso Ident   |
| M16x1,5 conical |             | 2x G 1/2" RA12                      |             | E2460F07C5ANN022 | 501306660awp63 |
| R 1/4" conical  |             | 1x G 1/4" inside<br>1x M18x1,5 RA12 |             | 02B60F07G5AH8022 | 501306661awp63 |
| R 1/4" conical  |             | 1x R 3/8" inside<br>M18x1,5 RA12    |             | 02B60F07G5AM8022 | 501306662awp63 |

## Betriebsvorschrift

Armaturen für die Kältetechnik

## Operating Instructions

Valves for refrigeration

| <b><i>Schnellschlußventil</i></b>                            | <b><i>Quick - closing valve</i></b>                        |
|--|--|
| <b>SSO</b> – Typenvertreter:                                 | <b>SSO</b> – types example:                                |
| <b>460 62</b> Anschweißende am Eingang<br>Gewinde am Ausgang | <b>460 62</b> Inlet: welding ends<br>Outlet: threaded ends |
| <b>460 64</b> Flansch am Eingang<br>Gewinde am Ausgang       | <b>460 64</b> Inlet: flanges<br>Outlet: threaded ends      |

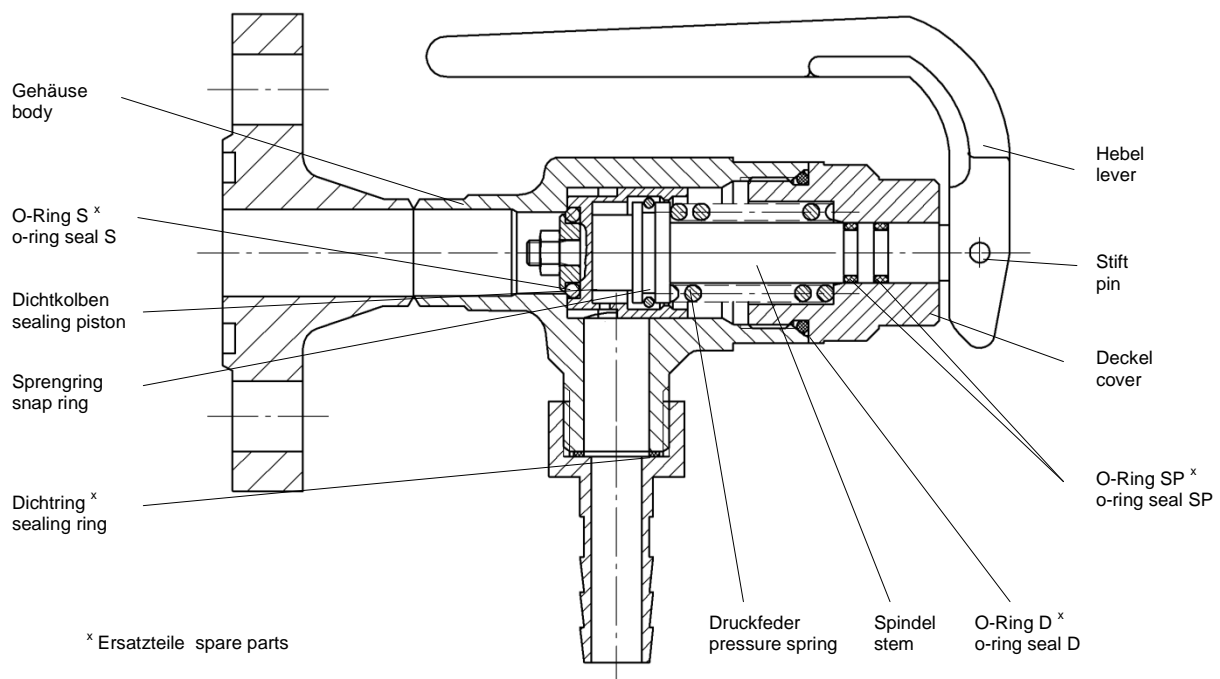
| <b>Inhaltsverzeichnis</b>    | <b>Seite</b> | <b>Contents</b>              | <b>Page</b> |
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| 3. Anwendung                 | 3            | 3. Application               | 3           |
| 4. Funktionsbeschreibung     | 3            | 4. Functional Description    | 3           |
| 5. Einbau                    | 3            | 5. Installation              | 3           |
| 6. Wartung                   | 4            | 6. Maintenance               | 4           |
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## 1. Übersicht der Bauarten

### Typ / type DN10 - 250

|                       |  |            |  |
|-----------------------|--|------------|--|
| <b>460 62</b> Eckform | Anschweißende am Eingang<br>Gewinde am Ausgang | angle type | Inlet: welding ends<br>Outlet: threaded ends |
| <b>460 64</b> Eckform | Flansch am Eingang<br>Gewinde am Ausgang       |            | Inlet: flanges<br>Outlet: threaded ends      |

## 1. Survey of types



## 2. Technische Kennwerte

## 2. Technical characteristics

Gehäusewerkstoff  
Auswahl nach DIN EN12284, AD-2000 Reihe W  
St: P235GH, S355J2  
TT: P215NL, P255QL, P355NL1  
NIRO: X5CrNi18-10  
oder gleichwertige

body material selection of material according to  
German DIN EN12284, AD-2000 Reihe W,  
St: P235GH, S355J2  
TT: P215NL, P255QL, P355NL1  
NIRO: X5CrNi18-10  
or any equivalent

| PN | DN | TB (MWT) [C]   | -35* | -35** | -10 | +50 | +130 |
|----|----|----------------|------|-------|-----|-----|------|
| 25 | 15 | PS (MWP) [bar] | 18,7 | 25    | 25  | 25  | 25   |
| 40 | 15 | PS (MWP) [bar] | 30   | 40    | 40  | 40  | 40   |

\*\* Beanspruchungsfall I (TT, Niro)

\* Beanspruchungsfall II ( nach AD2000-W10, EN 12284) (ST)

\*\* kind of straining I (TT, Niro)

\* kind of straining II ( after AD2000-W10, EN 12284) (ST)

Zulässiger Umgebungstemperaturbereich (C°)    permissible ambient temperature range (C°)  
 -50 bis +50    -50 to +50

| Betriebsmedien  | working media  |
|---|--|
| Kältemittel EN 378 Teil 1, z.B. NH <sub>3</sub> , R22, R134a, Blends und Gemische mit Kältemaschinenöl, neutrale, gasförmige und flüssige Medien Kühlsole auf Glycol-Basis, | cold brine basing on glycol refrigerant EN 378 p. 1 and mixtures with refrigerator oil, neutral, gaseous and liquid media, cold brine basing on glycol |
| Öffnungsdruck > 25 bar  | opening pressure > 25 bar  |
| Einbauanlage beliebig, Durchflußrichtung sollte eingehalten werden  | mounting position in any desired position, the flow direction should be observed   |
| Leckage nach außen,<br>Sitz (g/a) <5 Kältemittel im Jahr  | leakage outward,<br>seat (g/a) <5 refrigerant per year   |

### 3. Anwendung

**AWP-Schnellschlußventile** sind geeignet für den Einbau in Ölablaßleitungen und besonders gefährdeten Anlagenteilen z.B.: Füllstandsanzeiger, Schaugläser, flexible Leitungen u.a.

**! Hinweis ! DIN 8975 Teil 6 Pkt. 5.5**

In der Ölablaßleitung ist vor dem Schnellschlußventil ein Absperrventil (AVR oder AVB) mit waagrecht angeordneter Spindel einzubauen.

### 4. Funktionsbeschreibung

**AWP-Schnellschlußventile** werden durch Ziehen am Hebel Pos.2 zum Öffnen gebracht. Der unter dem Dichtkolben Pos.10 anstehende Anlagendruck unterstützt den Öffnungsvorgang.

Die Druckfeder ist so dimensioniert, dass der Dichtkolben bei einem anstehenden Anlagendruck > 20 bar selbsttätig öffnet.

Durch Loslassen des Hebels Pos.2 schließt der Dichtkolben Pos.10 selbstständig.

Die Abdichtung am Ventilsitz erfolgt mit einem O-Ring S Pos.11 aus Chloropren.

### 5. Einbau

Vor Einbau der Ventile sind Rohrleitungen und Anlagenteile zu säubern.

**-bitte beachten-**

Die Abweichung von der Parallelität bzw. Rechtwinkligkeit der Anschweißenden bzw. Flanschdichtflächen darf 1° nicht überschreiten. Anschlußflansche müssen achsengleich sein. Ventile mit Transport- und Lagerschäden dürfen nicht eingebaut werden. Nach dem Entfernen der Rohrstopfen können die Ventile in beliebiger Lage eingeschweißt bzw. montiert werden. Nach dem Entfernen der Rohrstopfen können die Ventile in beliebiger Lage eingeschweißt bzw. montiert werden. Die Durchflußrichtung (siehe Pfeil auf Kennzeichenschild) ist einzuhalten.

### 3. Application

**AWP quick-closing valves** are suitable for being employed in oil drain pipeline (oil drain valve) and in system parts which are especially exposed to danger, such as: level indicators, viewing glasses, flexible pipes and the like

**! please notice ! DIN 8975 part 6, section 5.5**

A shut off valve (AVR or AVB) with a horizontally disposed stem has to be mounted in front of the quick-closing valve.

### 4. Functional description

**AWP quick-closing valves** are opened by pulling the lever pos.2. The system pressure acting upon the sealing piston pos.10 supports the opening.

The pressure spring is dimensioned in a way that the sealing piston opens automatically if the system pressure raises > 20 bar.

If the lever pos.2 is released, the sealing piston pos.10 closes automatically.

The sealing at the valve seat is affected by a chloroprene O-ring S pos.11.

### 5. Installation

Before installing the valves, the pipelines and the components have to be cleaned.

**-please notice-**

The deviation from the parallelism or squareness of the welding ends or, as the case may be, the sealing surfaces of the flanges must not exceed 1°. The connecting flanges have to be coaxial. Valves that have been damaged during transport or storage must not be installed. After the protective caps have been removed, the valves can be welded on, or installed in horizontal or vertical position, in the latter case with the cover pointing downwards. The flow direction ( see arrow on specification label ) should be observed.

**-bitte beachten-****AWP-Schnellschlußventile**

- müssen frei von Achskräften, Biege- und Torsionsmomenten sein
- dürfen nicht als Fixpunkte von Rohrleitungen dienen
- bei Autogenschweißung oder Hartlötung darf die Flamme das Ventil nicht berühren

Bei Anwendung moderner Schweißverfahren (z.B. WIG, CO<sub>2</sub>) werden die Schnellschlußventile zum Einschweißen nicht demontiert.

**-bitte beachten-**

Zur Demontage der Innenteile ist genügend Platz auf der Deckelseite vorzusehen: > 40 mm.

**6. Wartung**

**AWP-Schnellschlußventile** arbeiten wartungsfrei. Treten Mängel im Funktionsverhalten auf, ist eine Reparatur möglich.

**Demontage bzw. Ausbau der Ventile nur bei druckloser, abgesaugter und ausreichend belüfteter Rohrleitung.**

**! Demontage !**

- Stift Pos.1 Ø 4 mm heraus schlagen und Hebel Pos.2 abnehmen.
- Deckel Pos.3 vorsichtig entgegen dem Uhrzeigersinn mit einem Maulschlüssel [SW 30 mm] heraus schrauben

**! Deckel Pos.3 steht geringfügig durch die Druckfeder unter Spannung !**

- Spindel Pos.6 zusammen mit Druckfeder Pos.7 und Dichtkolben Pos.10 aus dem Gehäuse heraus nehmen.
- alle O-Ringe entfernen

**! Montage !**

- Teile vorsichtig säubern, keine scharfen Gegenstände verwenden.
- O-Ring Bereiche mit etwas Kältefett z.B.: RENAX UNITEMP 2 bestreichen und neue O-Ringe entsprechend Bild 1 montieren.

| O-Ring / o-ring | Abmessung / Dimension | Stück / piece |
|-----------------|-----------------------|---------------|
| SP Pos.4        | 8 x 2                 | 2             |
| D Pos.5         | 26 x 3                | 1             |
| S Pos.11        | 12 x 3                | 1             |

- Gehäuseinnenraum, Dichtkolben Pos.10 und Spindel Pos.5 im Bereich der O-Ringe SP Pos.4 leicht einfetten mit z.B.: RENAX UNITEMP 2
- Spindel Pos.6 zusammen mit Druckfeder Pos.7 und Dichtkolben Pos.10 in das Gehäuse einführen
- Deckel Pos.3 vorsichtig über die Spindel Pos.6 schieben und unter leichtem Druck mit einer Drehung im Uhrzeigersinn in das Gehäuse Pos.12 eindrehen.  
Deckel SW 30 mit ca. 100 Nm anziehen
- Hebel Pos.2 so auf der Spindel Pos.6 platzieren, dass der Stift Pos.1 eingeschlagen werden kann.
- abschließend Funktionskontrolle

**-please notice-****AWP quick-closing valves:**

- no axial forces, bending or torsional moments should act upon the valves
- must not be used as fixing points for pipes
- in the case of gas welding or brazing, the flame may not reach the valve.

With modern welding processes (such as TIG, CO<sub>2</sub> - shielded metal-arc), the quick-closing valves are not disassembled for welding.

**-please notice-**

For disassembling the inner parts has to be provided on the side of the cover: > 40 mm.

**6. Maintenance**

**AWP quick-closing valves** are maintenance-free. In case any defects occur in the functional performance of the valves, they can be repaired.

**The valves may not be disassembled or detached before the pipe has been depressurized, sucked off and adequately ventilated.**

**! Disassembly !**

- Knock out the pin pos.1 Ø 4 mm and remove lever pos.2
- Screw out the cover pos.3 counterclockwise by means of a spanner [with across 30mm] carefully.

**! The cover pos.3 is under slight pressure due to the pressure spring !**

- Remove stem pos.6 together with pressure spring pos.7 and sealing piston pos.10 from the body.
- Remove all O-rings.

**! Assembly !**

- Clean the parts carefully, do not use any sharp objects.
- Grease the surfaces around the O-rings with a little low-temperature grease, e.g. RENAX UNITEMP 2 and mount new O-rings according to figure 1.

- Grease the interior of the body, the sealing piston pos.10 and the stem pos.5 around the O-rings SP pos.4 slightly with e.g. RENAX UNITEMP 2.
- Insert stem pos.6 together with pressure spring pos.7 and sealing piston pos.10 into the body.
- Install the cover pos.3 by pushing it over the stem pos.6 and screw it into the body pos.12 by exerting slight pressure and performing one turn in clockwise direction.  
Tighten the cover with across 30 with approx. 100 Nm
- Place the lever pos.2 on the stem pos.6 in a way that the pin pos.1 can be driven into the lever
- final step: operational check

## 7. Transport und Lagerung

**AWP-Schnellschlußventile** werden stoß- und feuchtigkeitsgeschützt transportiert. Die Lagerung hat in trockenen Räumen zu erfolgen. Es ist auf den unversehrten Verschluss der Anschlussstutzen zu achten. Verschmutzungen jeglicher Art müssen vom Innenraum ferngehalten werden. Die außenliegenden Flächen der Armaturen sind mit einem Korrosionsschutzanstrich für trockene Lagerung bei Raumtemperatur versehen, der mindestens 1 Jahr wirksam ist.

Der Korrosionsschutzanstrich auf **Basis Epoxidharzester in Verbindung mit Zinkphosphat** ist ein guter Haftvermittler für Deckanstrichstoffe auf 1- und 2-Komponenten-Basis.

## 8. Garantie

Die Garantieleistung für Erzeugnisse ist entsprechend den vertraglichen Bestimmungen im Liefervertrag festgelegt.

## 9. Ersatzteile

Ersatzteile entsprechend Bild Seite 2:  
Ersatzteilbestellung: (muss enthalten)

- Anzahl
- Bezeichnung entsprechen Bilder für Typ
- Bestell-Nummer
- Nennweite der Armatur
- Baujahr der Armatur

**Bestellbeispiel:**  
**3 Stück, O-Ring D, SSO**  
**73 75 71,**  
**DN15, 06/2005**

## 7. Transport, Storage

During transport, **AWP quick-closing valves** are protected against shocks and moisture. The fittings should be stored in dry rooms. Care has to be taken that the plugs of the connecting pieces are not damaged. Any kind of soiling has to be kept away from the inside of the fitting. The external surfaces of the valves are provided with a layer of anticorrosive paint for dry storing at room temperature, which remains effective for at least 1 year.

The anticorrosive paint which is **based on esterified epoxy resin in combination with zinc phosphate** is a good bonding agent for one or two-pot Finishing coating paints.

## 8. Warranty

The warranty services for our products have been defined in compliance with the regulations stipulated the contract of delivery.

## 9. Spare parts

Spare parts according to the illustration sheet page 2:  
Ordering Spare parts: (an order must contain):

- quantity
- designation according to illustration sheet page 2
- stock number
- nominal diameter of the fitting
- year of construction of the fitting

**Example for ordering**  
**3 pieces, O-rings D, SSO**  
**73 75 71**  
**DN15, 06/2005**

### Ersatzteile:

### spare parts:

| Pos. | Bezeichnung<br>marking    | Bestellnummer<br>stock number | Abmessung<br>dimension | Werkstoff<br>material | Stück je Ventil<br>piece per valve |
|------|---------------------------|-------------------------------|------------------------|-----------------------|------------------------------------|
| 4    | o-ring SP                 | 73 75 23                      | 8 x 2                  | CR 75                 | 2                                  |
| 5    | o-ring D                  | 73 75 71                      | 26 x 3                 | CR 75                 | 1                                  |
| 11   | o-ring S                  | 73 75 75                      | 12 x 3                 | CR 85                 | 1                                  |
| 8    | Dichtring<br>sealing ring | 73 74 88                      | 13 x 18                | Alu                   | 1                                  |

## 10. Kennzeichnung

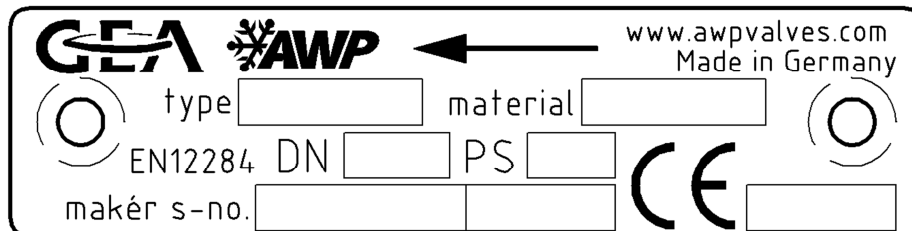
Die Kennzeichnung der AWP-Schnellschlussventile erfolgt entsprechend EN12284.

- Kennzeichenschild auf Gehäuse

## 10. Specification

The specification of the AWP quick-closing valves complies with German Standard EN12284

- Specification label of the casing



|          |       |   |
|----------|-------|---|
| PS       | [bar] | - maximal zulässiger Betriebsüberdruck<br>permissible working pressure  |
| DN       | [mm]  | - Nennweite<br>nominal diameter   |
| EN 12284 |       | - Kältemittelarmaturen, Sicherheitstechnische Festlegungen,<br>Prüfung, Kennzeichnung<br>European Standard: refrigerant valves; requirements, testing,<br>marking |

## 11. Hinweis auf Restgefahren entsprechend der Druckgeräte-richtlinie (97/23/EG)

Vom Hersteller nicht zu vermeidende Restgefahren bestehen durch:

- Unbefugtes Lösen des Deckels während des Betriebes bzw. Lösen der Schraubbuchse ohne Aktivierung der Rückdichtung
- Unsachgemäße Montage von Flanschverbindungen (Eingangs- und Ausgangsflansch, Deckel)
- Verschmutzungen im Betriebsmedium bzw. Unsachgemäßer Umgang mit Einbauteilen können zu Beschädigungen an der Sitzdichtung führen
- Nichtbeachtung der Einsatzgrenzen und Herstellervorschriften entsprechend dieser Betriebsvorschrift

## 11. Information on risks in conformance to pressure appliance directive

Remaining risks which cannot be avoided by the manufacturer arise because of:

- Unauthorized loosening of the cover during operation or removing of the screw bushing without activation of the back sealing
- Incorrect assembly of the flange connections (inlet and outlet flange, lid)
- Dirt in the service medium or inappropriate handling of the internal fittings may cause damage to the seat seal
- Ignore of the operating range and manufacturer rules acc. to this operating instruction

# 1 LEVEL MONITOR

**INT279 LN - Level monitor MIN**

**INT279 LX - Level monitor MAX**



Fig.1: View

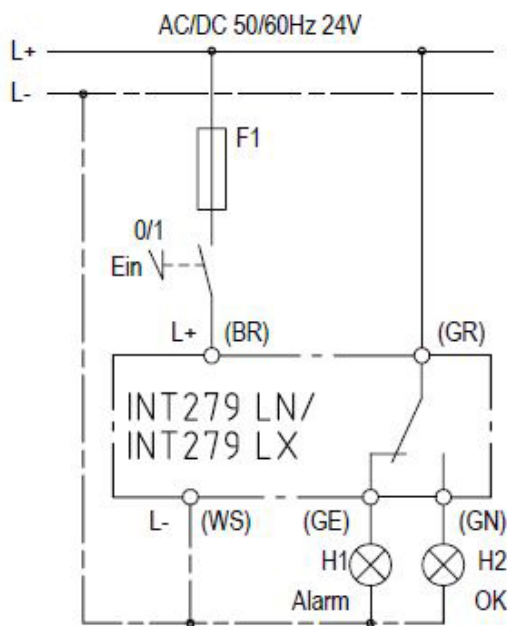


Fig.2: Wiring diagram

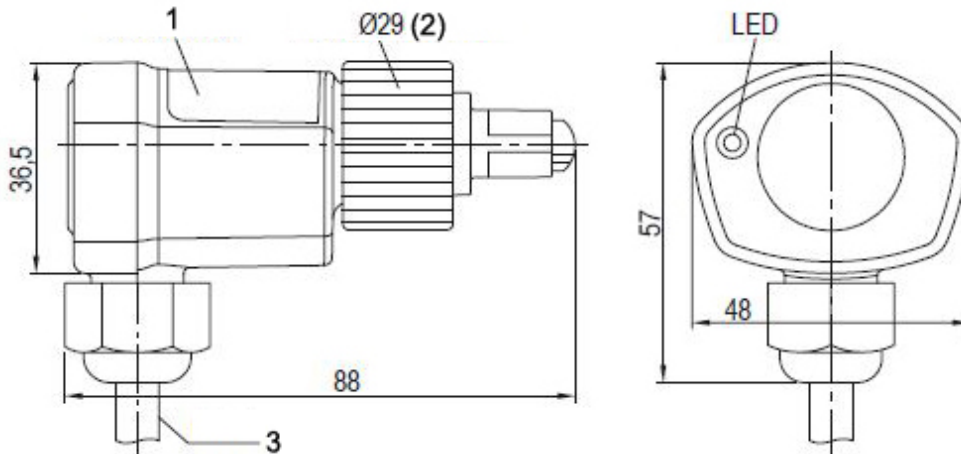


Fig.3: Dimensions (in mm)

|   |                 |
|---|-----------------|
| 1 | Evaluation unit |
| 2 | Screw cap       |
| 3 | Cable           |

## 1.1 Application

The optical monitoring unit is used for contactless monitoring of the liquid level. This is accomplished by a screw-in unit installed at the measuring point for optical level scanning as well as an electronic, removable evaluation unit.

### INT279 LN - Level monitor MIN

The relay trips 3 seconds after connecting the supply voltage. If a level too low is detected the relay switches off after a delay, the red LED lights. If the level reaches the good range, the relay picks up again after a delay, the red LED goes out. The own monitoring system of the optics integrated into the INT279 LN ensures increased operational reliability. An installation check monitors the proper assembly. If there is a fault, the relay switches off after a delay, the red LED flashes.

### INT279 LX - Level monitor MAX

The relay trips 3 seconds after connecting the supply voltage. If a level too high is detected the relay switches off after a delay, the red LED lights. If the level falls under the limit, the relay picks up again after a delay, the red LED goes out. The own monitoring system of the optics integrated into the INT279 LX ensures increased operational reliability. An installation check monitors the proper assembly. If there is a fault, the relay switches off after a delay, the red LED flashes.

## 1.2 Installation instructions

The proper leak tightness at the transition point depends on the application and is to be ensured by the user.



### Hint!

**The electrical connection must be performed by a qualified electrician. The valid European and national standards for connecting electrical equipment must be observed.**

## Assembly

1. The electronics receptacle (especially the glass) must be checked for cleanliness.
2. Insert the evaluation unit in the screw-in piece and tighten by hand using the union nut. It is important to make sure that the cable outlet is facing downwards.  
Tightening torque approx. 10 Nm
3. Electrical connection according to the wiring diagram.
4. Check the leak tightness after refilling the tank.

## 1.3 Technical data



### Hint!

**The sensor for level monitoring must be protected with a 315 mA fuse against maximum current consumption during operation. A securing kit (1 kit per sensor), consisting of 315 mA fuse, fuse terminal and connecting cable can be ordered from GEA Refrigeration Germany GmbH.**

|                                       |  |  |
|---------------------------------------|--|--|
| Mains voltage:                        |  | AC/DC, 50 Hz/ 60 Hz, 24 V ± 10 %, 3 VA                 |
| Permissible ambient temperature:      |  | -30 °C ... +60 °C                                      |
| Max. Medium temperature:              |  | +120 °C  |
| Delays:                               | Level monitoring from connecting the supply voltage according to | 3 s ± 1 s  |
|                                       | Relay On (level good)  | 5 s ± 2 s, LED Off                                     |
|                                       | Relay off (level too low)  | 5 s ± 2 s, LED On                                      |
|                                       | Relay off (level too high)                                       | 5 s ± 2 s, LED On                                      |
|                                       | Relay off (fault)  | 5 s ± 2 s, LED flashes                                 |
| Relay: 240 V AC AgNi90/10             |  | Max. 240 V AC 2.5 A C300<br>Min. > 24 V AC/DC > 20 mA  |
| Mechanical service life:              |  | approx. 10 <sup>5</sup> switching cycles               |
| Protection category acc. to EN 60529: |  | IP54 when installed                                    |
| Connection cable: <sup>1</sup>        |  | 5 x 0.75 m <sup>2</sup> LiY-CY, colour coded, L = 10 m |
| Housing material:                     |  | PA66 / PA6, s fibre glass reinforced                   |
| Attachment:                           |  | Pipe nut   |

<sup>1</sup> Option: halogen-free cable

|             |  |
|-------------|--|
| Weight:     | approx. 1100 g                             |
| Test bases: | EN 61000-6-2<br>EN 61000-6-3<br>EN 61010-1 |

Only the screw-in pieces described below may be used.

#### 1.4 Screw-in pieces



Fig.4: Screw-in piece level monitoring

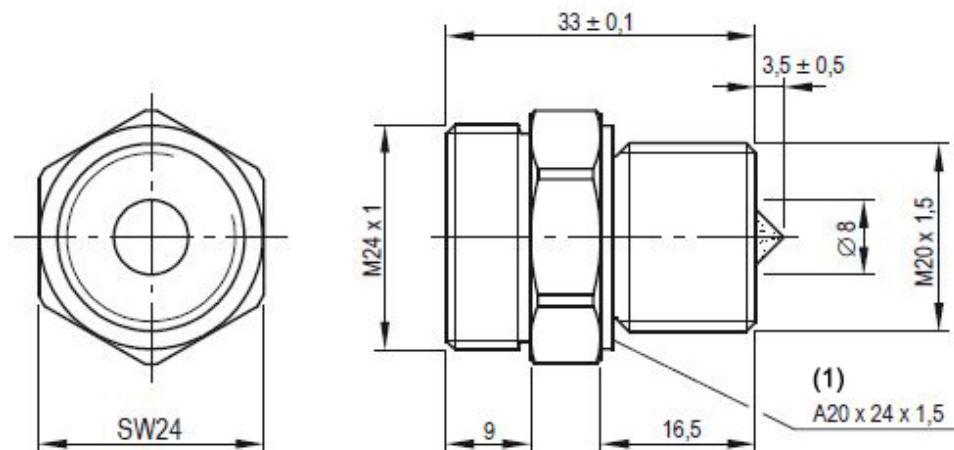


Fig.5: Dimensions (in mm), M20 x 1.5 mm, short

|   |        |
|---|--------|
| 1 | Gasket |
|---|--------|

#### Application

In conjunction with the corresponding level monitoring evaluation unit, the screw-in piece is used for the non-contact detection of fill limits and is designed for installation in tanks and/or compressors. **The screw-in pieces are particularly suitable for installation in NH<sub>3</sub> systems.**

#### Installation

The proper leak tightness at the transition point depends on the application and is to be ensured by the user.

The max. tightening torque of the screw-in piece is 75 Nm and must be secured by a ring spanner or a socket wrench.

The glass cone must not be damaged. The electronics receptacle (especially the glass) must be checked for cleanliness. After re-filling the tank or the compressor, the leak tightness of the screw-in piece is to be checked.

### Specifications

|   |   |   |
|---|---|---|
| Permissible ambient temperature:  |   | -30 °C ... +60 °C                                 |
| Max. Ambient temperature on the glass cone:                                     |   | +120 °C   |
| Housing material:   |   | Nickel-plated steel, suitable for NH <sub>3</sub> |
| Connection thread:  |   | M20 x 1.5 mm                                      |
| Spanner size:   |   | 24  |
| Weight:   |   | approx. 45 g                                      |
| Version 63 bar in accordance with the Pressure Equipment Directive (2014/68/EU) |   |   |
| max. Operating pressure<br>PS   | -10 °C ... +120 °C<br>-60 °C ... -10 °C | 63 bar<br>48 bar                                  |
| Min. Burst pressure   |   | 315 bar   |

## 1.5 GEA Refrigeration Germany GmbH Ident Numbers

|  |  |
|--|--|
| INT279LN level monitor MIN   | 634198173 <sup>2</sup><br>634198173 HAL <sup>3</sup> |
| INT279LX level monitor MAX   | 634198174 <sup>2</sup><br>634198174 HAL <sup>3</sup> |
| Screw-in piece   | 634198175  |
| Flat gasket A20 x 24 x 1.5, DIN 7603<br>(for the installation of the screw-in piece) | 438698032  |
| Securing kit<br>(315 mA fuse, fuse terminal block, connection cable)                 | 591098897  |

<sup>2</sup> silicone-free cable

<sup>3</sup> halogen-free and silicone-free cable



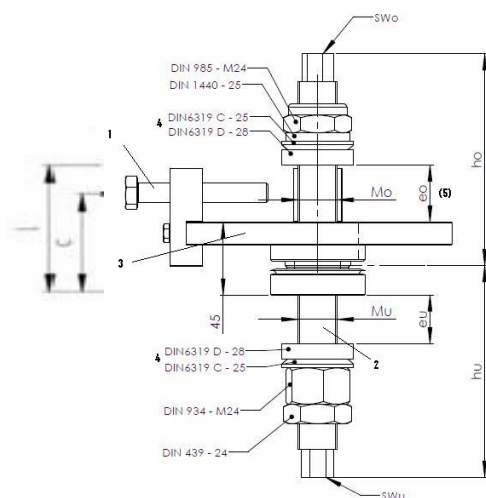
## MAIN COMPONENT 3D-Adjuster

### 1. 3D Adjuster (3D VSE)

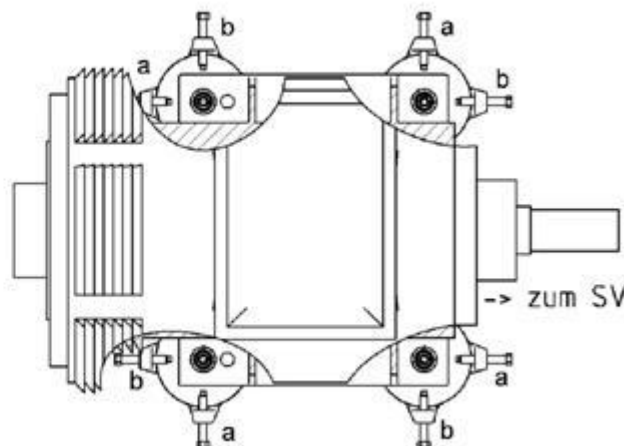
#### 1.1 Setup, function, technical informations

The 3D-Adjusting element has been constructed both for vertical and horizontal adjustment and fixation of an electric motor to a screw compressor.

The Adjuster consists of a main body including a directly connected screw-element for vertical adjustment, an integrated function for adjusting a non-parallel surface, a resting-plate with two in an 90° angle connected screws for horizontal adjustment.



pic. 1: 3-D Adjuster: main components



pic. 2: setup of components in connection to motor – view from above

|   |                                    |
|---|------------------------------------|
| 1 | adjusting screw                    |
| 2 | Adjustment bolts / fastening bolts |
| 3 | Ball supporting disc               |
| 4 | Compensation disc "p"              |
| 5 | Engine base                        |

#### Dimensions

for symmetric and asymmetric versions

| 3D VSE | Ø D | M      |    |    | l  | c  | s  |
|--------|-----|--------|----|----|----|----|----|
| 40     | 90  | 12     | 16 | 20 | 68 | 56 | 20 |
| 40     | 130 | 12/16  | 20 | 24 | 75 | 58 | 20 |
| 40     | 170 | 16     | 20 | 24 | 75 | 58 | 20 |
| 50     | 230 | 20/24  | 30 | 36 | 80 | 60 | 20 |
| 50     | 270 | 24/ 30 | 36 | 42 | 95 | 80 | 20 |

## MAIN COMPONENT

### 3D-Adjuster

#### Technical information

| Typ 3D Adjuster | adjustment bolt<br>vertical | max. permissible<br>adjustment torque<br>[Nm] | max. permissible<br>load<br>[KN] | max. permissible<br>tightening<br>torque [Nm] |
|-----------------|-----------------------------|---|----------------------------------|---|
| 40              | M 12                        | 40  | 8                                | 49  |
| 40/50           | M 16                        | 100   | 20                               | 180   |
| 40/50           | M 20                        | 150   | 30                               | 370   |
| 50              | M 24                        | 200   | 40                               | 640   |
| 60              | M 24                        | 300   | 40                               | 640   |
| 50/60           | M 30                        | 400   | 50                               | 900   |
| 50/60           | M 36                        | 450   | 60                               | 2.600   |
| 60              | M 42                        | 450   | 60                               | 4.400   |

| type 3D VSE | pressure screw horizontal | max. permitted torque [Nm] |
|-------------|---------------------------|----------------------------|
| 40          | M 12                      | 35                         |
| 50          | M 12                      | 35                         |
| 60          | M 12                      | 35                         |

#### Adjustment

1. Unscrew pressure screws until there is enough room for positioning the motor.
2. Place motor on 3D VSE.
3. Adjust motor vertically (hexnuts not fixed).
4. Fix lower hexnut by coutering against motor base frame.
5. Adjust motor horizontally by using pressure screws.
6. Fix motor by tightening upper hexnut.
7. Double check result of adjustment.

**MAIN COMPONENT**  
**3D-Adjuster**

**1.2 3D-Adjuster, symmetrical type**

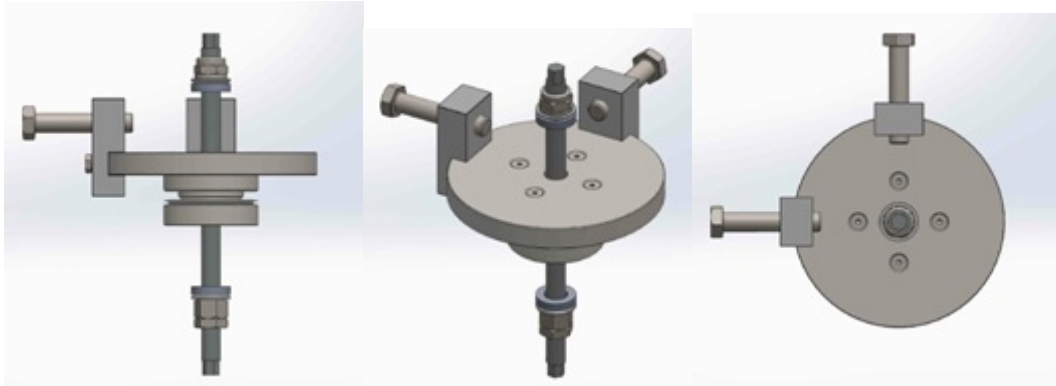


Abb. 3: 3D-Adjuster, symmetrical type

| Grasso Ident | size      | M  | a   | H        | eo | eu |
|--------------|-----------|----|-----|----------|----|----|
| 573599121    | 3D VSE 40 | 12 | 40  | 44 +/- 4 | 20 | 30 |
| 573599122    | 3D VSE 40 | 12 | 40  | 44 +/- 4 | 30 | 30 |
| 573599123    | 3D VSE 40 | 12 | 40  | 44 +/- 4 | 35 | 30 |
| 573599124    | 3D VSE 40 | 16 | 40  | 44 +/- 4 | 30 | 30 |
| 573599125    | 3D VSE 40 | 16 | 40  | 44 +/- 4 | 35 | 30 |
| 573599126    | 3D VSE 40 | 20 | 40  | 44 +/- 4 | 30 | 30 |
| 573599127    | 3D VSE 40 | 20 | 40  | 44 +/- 4 | 35 | 30 |
| 573599153    | 3D VSE 40 | 12 | 60  | 44 +/- 4 | 30 | 30 |
| 573599131    | 3D VSE 40 | 16 | 60  | 44 +/- 4 | 35 | 30 |
| 573599132    | 3D VSE 40 | 16 | 60  | 44 +/- 4 | 40 | 30 |
| 573599133    | 3D VSE 40 | 16 | 60  | 44 +/- 4 | 45 | 30 |
| 573599139    | 3D VSE 40 | 16 | 80  | 44 +/- 4 | 40 | 30 |
| 573599140    | 3D VSE 40 | 16 | 80  | 44 +/- 4 | 45 | 30 |
| 573599141    | 3D VSE 40 | 16 | 80  | 44 +/- 4 | 50 | 30 |
| 573599247    | 3D VSE 40 | 20 | 60  | 44 +/- 4 | 35 | 30 |
| 573599134    | 3D VSE 40 | 20 | 60  | 44 +/- 4 | 40 | 30 |
| 573599151    | 3D VSE 40 | 20 | 60  | 44 +/- 4 | 40 | 30 |
| 573599135    | 3D VSE 40 | 20 | 60  | 44 +/- 4 | 45 | 30 |
| 573599106    | 3D VSE 40 | 20 | 60  | 44 +/- 4 | 45 | 65 |
| 573599142    | 3D VSE 40 | 20 | 80  | 44 +/- 4 | 40 | 30 |
| 573599143    | 3D VSE 40 | 20 | 80  | 44 +/- 4 | 45 | 30 |
| 573599144    | 3D VSE 40 | 20 | 80  | 44 +/- 4 | 50 | 30 |
| 573599248    | 3D VSE 40 | 24 | 60  | 44 +/- 4 | 35 | 30 |
| 573599136    | 3D VSE 40 | 24 | 60  | 44 +/- 4 | 40 | 30 |
| 573599137    | 3D VSE 40 | 24 | 60  | 44 +/- 4 | 45 | 30 |
| 573599138    | 3D VSE 40 | 24 | 60  | 44 +/- 4 | 50 | 30 |
| 573599154    | 3D VSE 40 | 24 | 80  | 44 +/- 4 | 30 | 30 |
| 573599145    | 3D VSE 40 | 24 | 80  | 44 +/- 4 | 45 | 30 |
| 573599146    | 3D VSE 40 | 24 | 80  | 44 +/- 4 | 50 | 30 |
| 573599147    | 3D VSE 40 | 24 | 80  | 44 +/- 4 | 55 | 30 |
| 573599150    | 3D VSE 40 | 24 | 80  | 44 +/- 4 | 60 | 30 |
| 573599156    | 3D VSE 40 | 24 | 80  | 44 +/- 4 | 70 | 30 |
| 573599172    | 3D VSE 50 | 20 | 110 | 54 +/- 4 | 55 | 30 |
| 573599256    | 3D VSE 50 | 24 | 110 | 54 +/- 4 | 30 | 30 |
| 573599161    | 3D VSE 50 | 24 | 110 | 54 +/- 4 | 50 | 30 |
| 573599162    | 3D VSE 50 | 24 | 110 | 54 +/- 4 | 55 | 30 |
| 573599169    | 3D VSE 50 | 24 | 110 | 54 +/- 4 | 70 | 30 |
| 573599251    | 3D VSE 50 | 24 | 130 | 54 +/- 4 | 50 | 30 |

**MAIN COMPONENT****3D-Adjuster**

|           |           |    |     |          |    |    |
|-----------|-----------|----|-----|----------|----|----|
| 573599173 | 3D VSE 50 | 30 | 110 | 54 +/- 4 | 20 | 30 |
| 573599200 | 3D VSE 50 | 30 | 110 | 54 +/- 4 | 40 | 30 |
| 573599163 | 3D VSE 50 | 30 | 110 | 54 +/- 4 | 50 | 30 |
| 573599164 | 3D VSE 50 | 30 | 110 | 54 +/- 4 | 55 | 30 |
| 573599165 | 3D VSE 50 | 30 | 110 | 54 +/- 4 | 60 | 30 |
| 573599240 | 3D VSE 50 | 36 | 110 | 54 +/- 4 | 40 | 30 |
| 573599239 | 3D VSE 50 | 36 | 110 | 54 +/- 4 | 50 | 40 |
| 573599166 | 3D VSE 50 | 36 | 110 | 54 +/- 4 | 55 | 30 |
| 573599167 | 3D VSE 50 | 36 | 110 | 54 +/- 4 | 60 | 30 |

MAIN COMPONENT  
3D-Adjuster

1.3 3D-VSE, asymmetric type

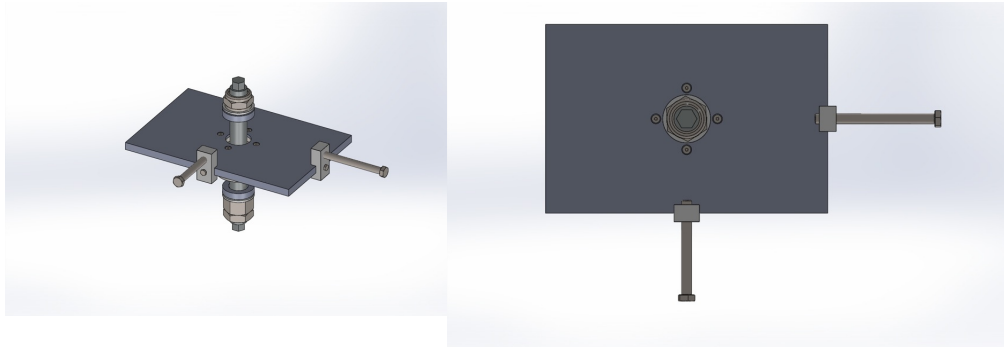


Abb. 4: 3D-VSE: asymmetric type

| Grasso Ident | Größe     | M  | a   | b   | H        | eo | eu |
|--------------|-----------|----|-----|-----|----------|----|----|
| 573599170    | 3D VSE 50 | 20 | 150 | 110 | 54 +/- 4 | 55 | 30 |
| 573599171    | 3D VSE 50 | 20 | 110 | 150 | 54 +/- 4 | 55 | 30 |
| 573599178    | 3D VSE 50 | 24 | 110 | 180 | 54 +/- 4 | 40 | 30 |
| 573599179    | 3D VSE 50 | 24 | 180 | 110 | 54 +/- 4 | 40 | 30 |
| 573599180    | 3D VSE 50 | 24 | 110 | 150 | 54 +/- 4 | 55 | 30 |
| 573599181    | 3D VSE 50 | 24 | 150 | 110 | 54 +/- 4 | 55 | 30 |
| 573599182    | 3D VSE 50 | 24 | 110 | 150 | 54 +/- 4 | 60 | 30 |
| 573599183    | 3D VSE 50 | 24 | 150 | 110 | 54 +/- 4 | 60 | 30 |
| 573599184    | 3D VSE 50 | 30 | 110 | 150 | 54 +/- 4 | 55 | 30 |
| 573599185    | 3D VSE 50 | 30 | 150 | 110 | 54 +/- 4 | 55 | 30 |
| 573599186    | 3D VSE 50 | 30 | 110 | 150 | 54 +/- 4 | 60 | 30 |
| 573599187    | 3D VSE 50 | 30 | 150 | 110 | 54 +/- 4 | 60 | 30 |
| 573599188    | 3D VSE 50 | 36 | 110 | 150 | 54 +/- 4 | 55 | 30 |
| 573599189    | 3D VSE 50 | 36 | 150 | 110 | 54 +/- 4 | 55 | 30 |
| 573599190    | 3D VSE 50 | 36 | 110 | 150 | 54 +/- 4 | 60 | 30 |
| 573599191    | 3D VSE 50 | 36 | 150 | 110 | 54 +/- 4 | 60 | 30 |
| 573599225    | 3D VSE 50 | 30 | 110 | 150 | 54 +/- 4 | 40 | 30 |
| 573599226    | 3D VSE 50 | 30 | 150 | 110 | 54 +/- 4 | 40 | 30 |
| 573599227    | 3D VSE 50 | 24 | 110 | 150 | 54 +/- 4 | 50 | 30 |
| 573599228    | 3D VSE 50 | 24 | 150 | 110 | 54 +/- 4 | 50 | 30 |
| 573599235    | 3D VSE 50 | 36 | 110 | 150 | 54 +/- 4 | 40 | 30 |
| 573599236    | 3D VSE 50 | 36 | 150 | 110 | 54 +/- 4 | 40 | 30 |
| 573599241    | 3D VSE 50 | 36 | 110 | 150 | 54 +/- 4 | 45 | 30 |
| 573599242    | 3D VSE 50 | 36 | 150 | 110 | 54 +/- 4 | 45 | 30 |
| 573599243    | 3D VSE 50 | 24 | 110 | 150 | 54 +/- 4 | 30 | 30 |
| 573599244    | 3D VSE 50 | 24 | 150 | 110 | 54 +/- 4 | 30 | 30 |

**MAIN COMPONENT**  
**3D-Adjuster**

| Grasso Ident | Größe     | M  | a   | b   | H       | eo | eu |
|--------------|-----------|----|-----|-----|---------|----|----|
| 573599192    | 3D VSE 60 | 42 | 180 | 130 | 62 +/-6 | 85 | 30 |
| 573599193    | 3D VSE 60 | 42 | 130 | 180 | 62 +/-6 | 85 | 30 |
| 573599194    | 3D VSE 60 | 30 | 180 | 130 | 62 +/-6 | 60 | 90 |
| 573599195    | 3D VSE 60 | 30 | 130 | 180 | 62 +/-6 | 60 | 90 |
| 573599196    | 3D VSE 60 | 42 | 200 | 150 | 62 +/-6 | 70 | 30 |
| 573599197    | 3D VSE 60 | 42 | 150 | 200 | 62 +/-6 | 70 | 30 |
| 573599199    | 3D VSE 60 | 30 | 180 | 130 | 62 +/-6 | 50 | 30 |
| 573599199    | 3D VSE 60 | 30 | 130 | 180 | 62 +/-6 | 50 | 30 |
| 573599201    | 3D VSE 60 | 36 | 180 | 130 | 62 +/-6 | 70 | 30 |
| 573599202    | 3D VSE 60 | 36 | 130 | 180 | 62 +/-6 | 70 | 30 |
| 573599203    | 3D VSE 60 | 36 | 180 | 130 | 62 +/-6 | 50 | 30 |
| 573599204    | 3D VSE 60 | 36 | 130 | 180 | 62 +/-6 | 50 | 30 |
| 573599205    | 3D VSE 60 | 36 | 230 | 130 | 62 +/-6 | 50 | 30 |
| 573599206    | 3D VSE 60 | 36 | 130 | 230 | 62 +/-6 | 50 | 30 |
| 573599207    | 3D VSE 60 | 30 | 180 | 130 | 62 +/-6 | 60 | 30 |
| 573599208    | 3D VSE 60 | 30 | 130 | 180 | 62 +/-6 | 60 | 30 |
| 573599209    | 3D VSE 60 | 30 | 200 | 150 | 62 +/-6 | 50 | 30 |
| 573599210    | 3D VSE 60 | 30 | 150 | 200 | 62 +/-6 | 50 | 30 |
| 573599211    | 3D VSE 60 | 30 | 300 | 150 | 62 +/-6 | 50 | 30 |
| 573599212    | 3D VSE 60 | 30 | 150 | 300 | 62 +/-6 | 50 | 30 |
| 573599213    | 3D VSE 60 | 24 | 200 | 120 | 62 +/-6 | 30 | 30 |
| 573599214    | 3D VSE 60 | 24 | 120 | 200 | 62 +/-6 | 30 | 30 |
| 573599215    | 3D VSE 60 | 24 | 200 | 150 | 62 +/-6 | 30 | 30 |
| 573599216    | 3D VSE 60 | 24 | 150 | 200 | 62 +/-6 | 30 | 30 |
| 573599217    | 3D VSE 60 | 36 | 300 | 150 | 62 +/-6 | 50 | 30 |
| 573599218    | 3D VSE 60 | 36 | 150 | 300 | 62 +/-6 | 50 | 30 |
| 573599219    | 3D VSE 60 | 36 | 360 | 150 | 62 +/-6 | 50 | 30 |
| 573599220    | 3D VSE 60 | 36 | 150 | 360 | 62 +/-6 | 50 | 30 |
| 573599221    | 3D VSE 60 | 24 | 300 | 150 | 62 +/-6 | 50 | 30 |
| 573599222    | 3D VSE 60 | 24 | 150 | 300 | 62 +/-6 | 50 | 30 |
| 573599223    | 3D VSE 60 | 24 | 230 | 130 | 62 +/-6 | 50 | 30 |
| 573599224    | 3D VSE 60 | 24 | 130 | 230 | 62 +/-6 | 50 | 30 |
| 573599229    | 3D VSE 60 | 30 | 200 | 120 | 62 +/-6 | 35 | 30 |
| 573599230    | 3D VSE 60 | 30 | 120 | 200 | 62 +/-6 | 35 | 30 |
| 573599231    | 3D VSE 60 | 30 | 230 | 130 | 62 +/-6 | 50 | 30 |
| 573599232    | 3D VSE 60 | 30 | 130 | 230 | 62 +/-6 | 50 | 30 |
| 573599233    | 3D VSE 60 | 36 | 360 | 150 | 62 +/-6 | 70 | 30 |
| 573599234    | 3D VSE 60 | 36 | 150 | 360 | 62 +/-6 | 70 | 30 |
| 573599237    | 3D VSE 60 | 42 | 180 | 130 | 62 +/-6 | 50 | 30 |
| 573599238    | 3D VSE 60 | 42 | 130 | 180 | 62 +/-6 | 50 | 30 |
| 573599245    | 3D VSE 60 | 30 | 360 | 150 | 62 +/-6 | 50 | 30 |
| 573599246    | 3D VSE 60 | 30 | 150 | 360 | 62 +/-6 | 50 | 30 |
| 573599249    | 3D VSE 60 | 42 | 300 | 150 | 62 +/-6 | 50 | 30 |
| 573599250    | 3D VSE 60 | 42 | 150 | 300 | 62 +/-6 | 50 | 30 |
| 573599252    | 3D VSE 60 | 24 | 200 | 150 | 62 +/-6 | 50 | 30 |
| 573599253    | 3D VSE 60 | 24 | 150 | 200 | 62 +/-6 | 50 | 30 |
| 573599254    | 3D VSE 60 | 42 | 230 | 130 | 62 +/-6 | 50 | 30 |
| 573599255    | 3D VSE 60 | 42 | 130 | 230 | 62 +/-6 | 50 | 30 |

## MAIN COMPONENT

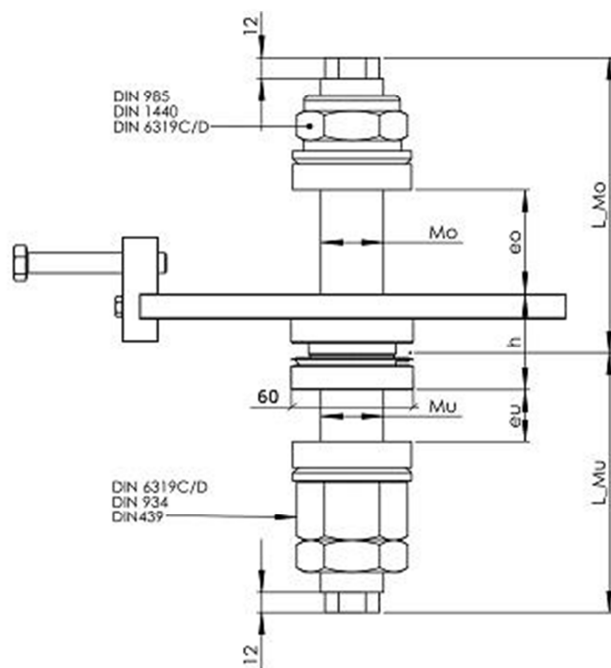
## 3D-Adjuster

### Mounting hardware GEA 3D-adjuster

### Mounting position according to technical drawing

| Qty<br>each 3D-<br>VSE | description                                  | DIN          | material                      |
|------------------------|--|--------------|-------------------------------|
| 2                      | adjustment screw horizontal                  | DIN 933      | 8.8 zinc plated               |
| 2                      | adjustment clamps                            | DIN 933      | 8.8 zinc plated               |
| 4                      | fixing screw disc                            | DIN 7991     | 8.8 zinc plated               |
| 2                      | compensation disc "p"                        | DIN 6319     | *unalloyed hardening<br>steel |
| 1                      | Prevailing torque type hexagon nuts (upside) | DIN 985      | steel 8 zinc plated           |
| 1                      | Hex nut (lower side)                         | DIN 934      | steel 8 zinc plated           |
| 1                      | counternut (unten)                           | DIN 439      | steel 04 zinc plated          |
| 1                      | spring-type straight pins (fixation of bolt) | DIN 1481     | spring steel                  |
| 1                      | threaded pin                                 | special part | 8.8 zinc plated               |

\*at manufacturer's option





# 1 LEVEL MOUNT ELEMENTS, LM TYPE

## for anti-vibration Installation

### 1.1 Standard design

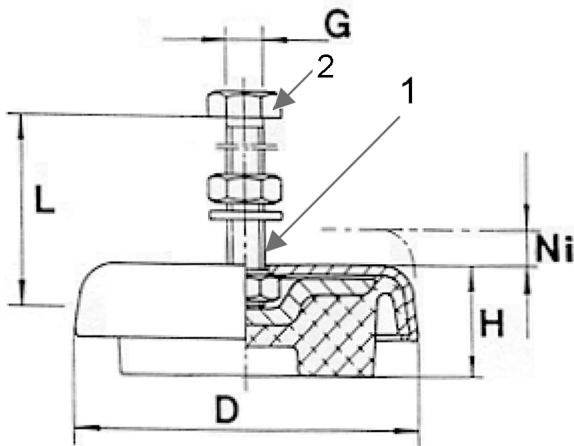


fig.1: Level Mount Elements, LM Type, Standard design

|   |             |
|---|-------------|
| 1 | Spacer bush |
| 2 | Bolt head   |

## Characteristics

| Type LM                              |                  | 1-11      | 3-11      | 3-25      | 3-33      |
|--------------------------------------|------------------|-----------|-----------|-----------|-----------|
| Diameter                             | D <sup>1)</sup>  | 80        | 120       |           |           |
| Height                               | H <sup>1)</sup>  | 25        | 37        |           | 32        |
| Thread size                          | G <sup>1)</sup>  | M10       | M12       |           |           |
| Screw length                         | L <sup>1)</sup>  | 80        | 90        |           |           |
| Max. mounting foot thickness         | 1)               | 43        | 44        |           |           |
| Levelling height                     | Ni <sup>1)</sup> | 15        | 20        |           |           |
| Weight                               | (kg)             | 0,4       | 1,1       |           |           |
| Load per element                     | (kg)             | 480       | 650       | 900       | 1200      |
| Grasso Ident<br>Hexagonal bolt head  |                  | 763398043 | 763398044 | 763398045 | 763398046 |
| Grasso Ident<br>Square-cut bolt head |                  | 763398047 | 763398050 | 763398035 | 763398051 |

<sup>1)</sup> all dimension values listed in mm

## 1.2 Special design bottom plate BA Type

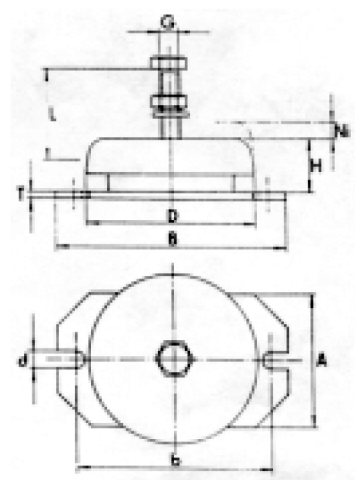


fig.2: Level Mount Elements, LM Type, Special design bottom plate (BA)

### Characteristics

| Type LM                       |                 | 3-11 BA   | 3-25 BA   |
|-------------------------------|-----------------|-----------|-----------|
| Length                        | B <sup>1)</sup> | 158       | 158       |
| Width                         | A <sup>1)</sup> | 90        | 90        |
| Thickness                     | T <sup>1)</sup> | 10        | 10        |
| Distance between hole centres | b <sup>1)</sup> | 140       | 140       |
| Bore hole                     | d <sup>1)</sup> | 13        | 13        |
| Weight                        | (kg)            | 2         | 2         |
| Load per element              | (kg)            | 650       | 900       |
| Grasso Ident                  |                 | 763398049 | 763398048 |

<sup>1)</sup> all dimension values listed in mm

## 1.3 Features

### Design

- Elastomer-metal-connection
- Compact design
- Integrated levelling system

### Characteristics

- Active and passive arrangements
- Anti-vibration mounting, impulse absorption
- Structure-borne noise insulation
- Installation without holding point on foundation
- Broadband loading range
- Natural frequency (stat.) 12 Hz – 20 Hz
- Fine thread

#### Options

- Parts out of galvanized metal
- Parts out of stainless steel
- Elastomer as special quality

#### Levelling

- Levelling range max. 5 - 30 mm

#### Materials

- Elastomer piece in CR-quality with high angular flexibility, resistant to ageing and oil
- Outer cap out of St W 23 or GG
- Yellow enamelled metal surface
- Forged clamping plate
- Screw M10/ M12 acc. DIN 933, quality 8.8 zinc-coated



#### Caution!

The combination of level mount elements and U-type profile is equipped 1 wedge-disc for each element!



#### Hint!

For Package frames with bore holes diameter 20 mm:  
Install the delivered spacer bushes between frame section and screw bolt!

| Type LM                             | 1-11      | 3-11      | 3-25 | 3-33 |
|-------------------------------------|-----------|-----------|------|------|
| Thread size                         | M10       | M12       |      |      |
| 4-disc (wedge disc)<br>acc. DIN 434 | Ø 11      | Ø 13      |      |      |
| Grasso Ident                        | 542711002 | 542711003 |      |      |
| Spacer bush                         | B0742270  | B0742240  |      |      |

## 1.4 Installation instruction

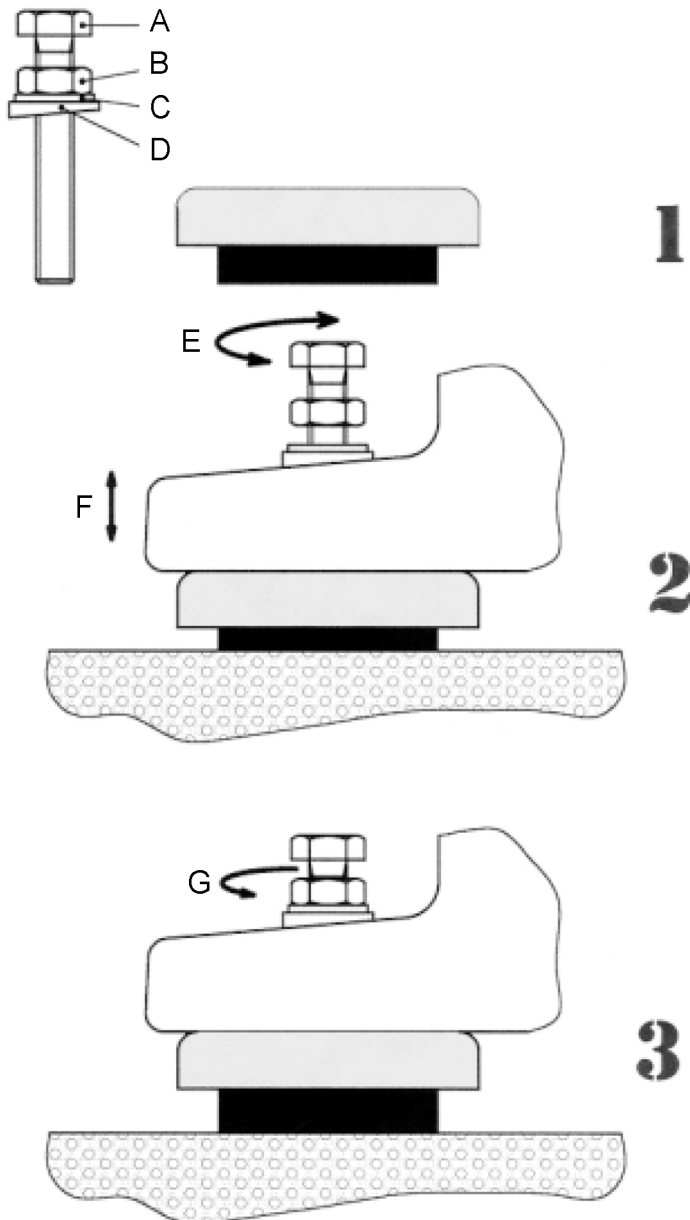
**Caution!****Pay attention to assembly!**

fig.3: Level Mount Element, LM Type, Installation instruction

|   |            |
|---|------------|
| A | Screw      |
| B | Nut        |
| C | Washer     |
| D | Key washer |
| E | Turn!      |
| F | Level      |
| G | Counter!   |





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