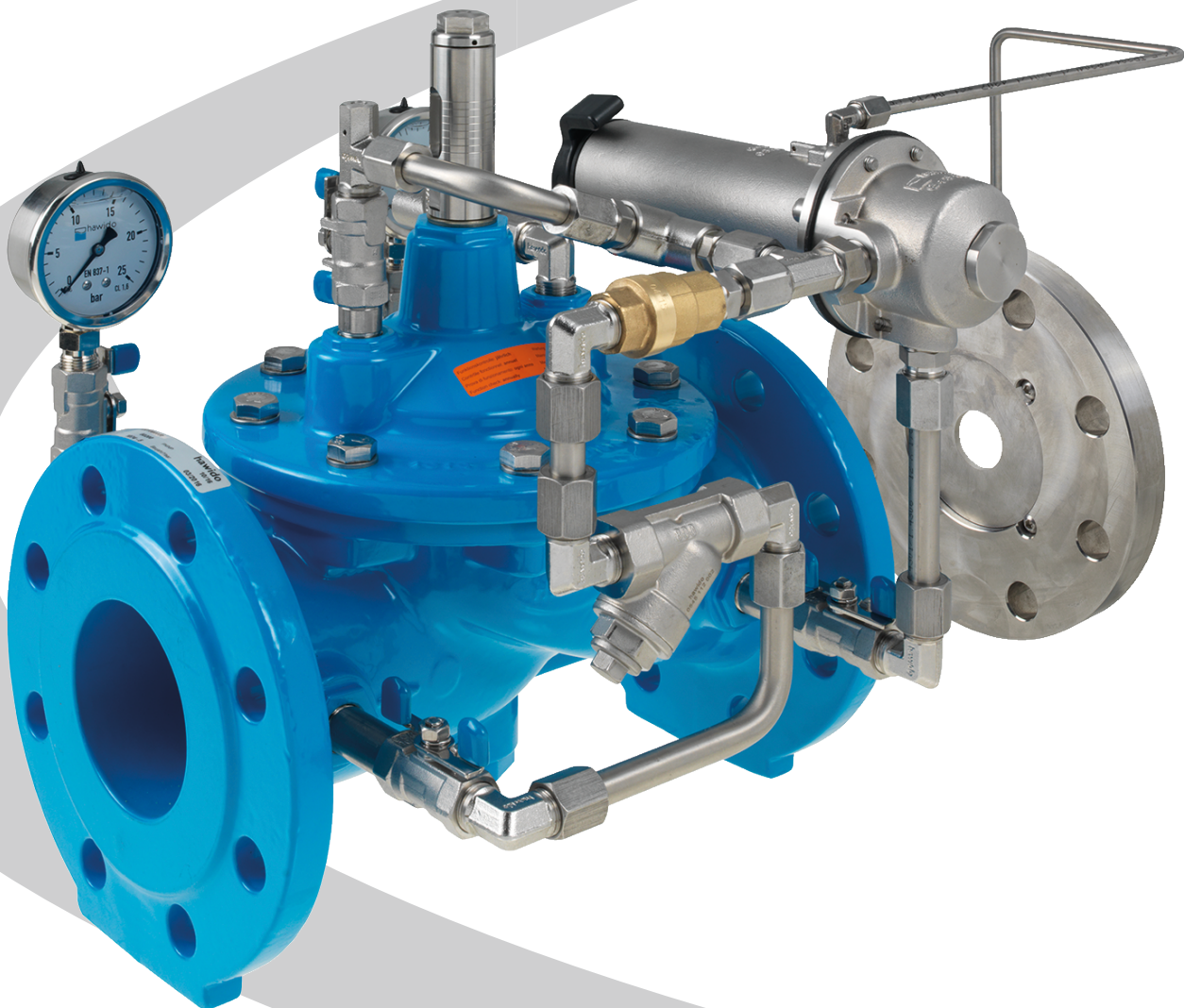




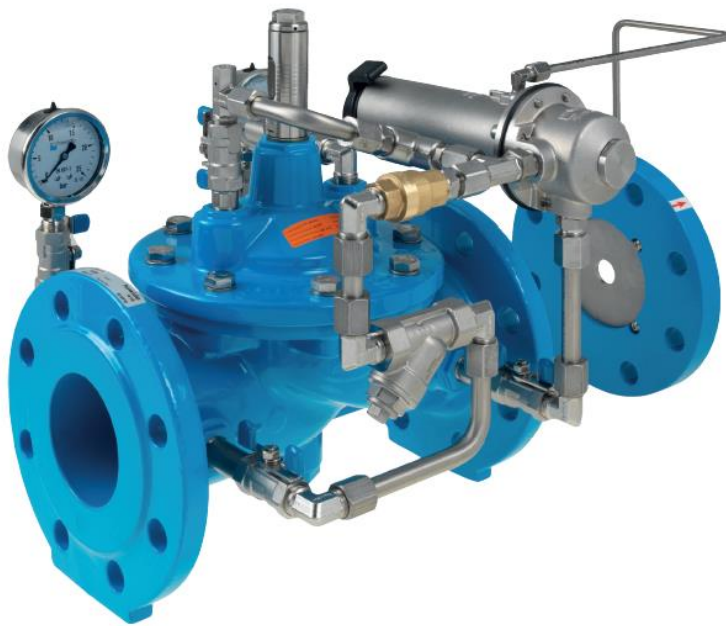


## **HAWIDO - REGULATING VALVES**

Instruction for

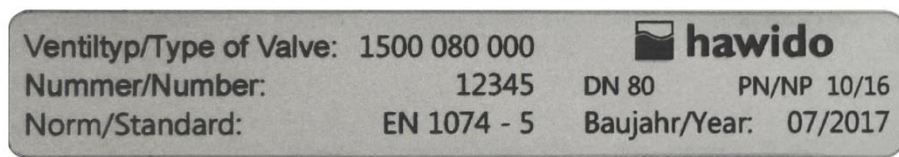
**Flow limitation valve with backflow prevention  
Type 1301**

**ND40 to DN200**



Keep this instruction manual at the location of the valve!

Example of rating plate



After the commissioning, enter the following data and make use of this additional information regarding the valve type, pressure and flow ratios when consulting the manufacturer or the supplier or asking them questions:

Serial number: ..... DN ..... PN: .....

Year of manufacture:.....

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## A. Description

### 1. Function

The flow limitation valve with backflow prevention automatically performs two work processes:

1. It purely hydraulically limits a pre-determined maximum flow. For flows that are significantly below the limiting quantity, the valve is in an intermediate position. In this case, a pressure loss is to be expected. As soon as the amount of water drawn approaches the limiting quantity, the valve begins to throttle. Depending on the amount of water drawn and the throttling, the pressure after the valve will continue to drop.  
The nominal flow rate can be progressively varied up to  $\pm 15\%$  with a hand wheel on the control valve (6).
2. It functions as backflow prevention, by preventing any backflow by means of the non-return valve (9A, 9B), if the inlet pressure (P1) becomes lower than the outlet pressure (P2). The valve closing speed for the backflow prevention function is set by the check valve (10).

#### **Technical features:**

|                      |                                                                     |
|----------------------|---------------------------------------------------------------------|
| Medium:              | Drinking water                                                      |
| Pressure stages:     | PN 10 (from DN 200 Standard)<br>PN16 (up to DN150 Standard)<br>PN25 |
| Flanges:             | Connection dimensions according to DIN 1092 -2                      |
| Manometer:           | EN 837-1; Accuracy class 1.0                                        |
| Main valve material: | EN-GJS-400-15                                                       |
| Temperature range:   | 2 – 40 °C                                                           |

### 2. General safety instructions

These instructions must be read through carefully and understood before starting the commissioning. Damage to property and injuries to persons could occur as a result of improper installation, commissioning, operation and maintenance.

The Hawle regulating valve (HAWIDO) has been designed for use in drinking and process water supplies. Other application media only after consultation with the manufacturer.

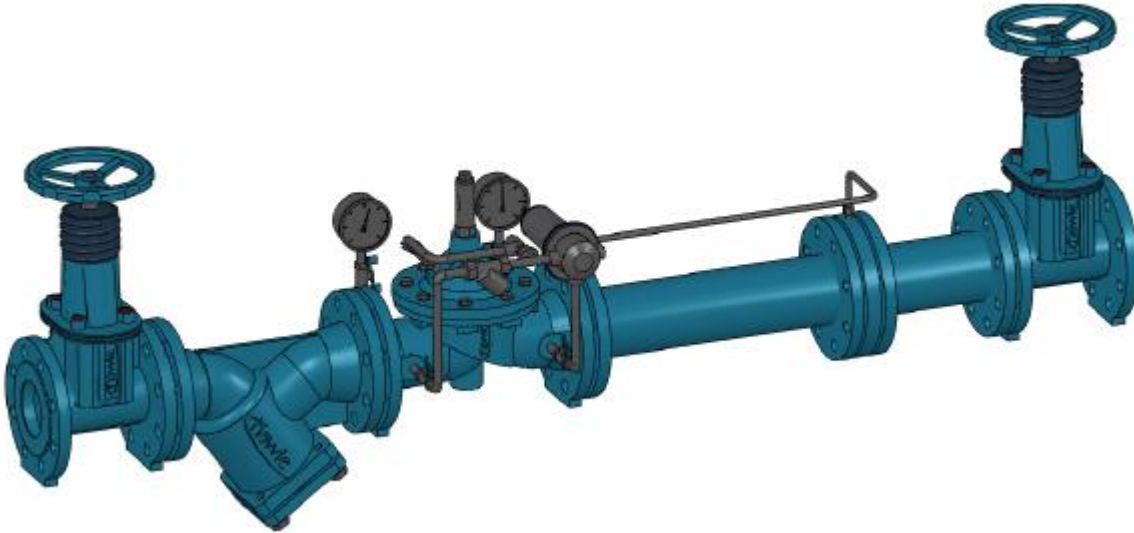
The technical regulations (e.g. SVGW, ÖVGW, DVGW...) and codes of practice (e.g. VDE, VDI ...), laws and standards are taken as a minimum standard, and must be adhered to and applied.

Work on electrical installations (e.g. installation of magnetic position switches, solenoid valves, etc.) may only be carried out by personnel authorised for this work.

In principle, the responsibility for the layout, the installation position, the installation and the commissioning of the fittings in the pipe work lies with the designer, the installation company and/or the operator. Design or installation errors can adversely affect the safe operation of the regulating valve, and can represent a significant risk. Please consult us in case of doubt.

### 3. Recommended installation

Before the installation of the fitting, the pipe lines must be carefully blown or flushed through to prevent any foreign material, such as pieces of wood, stones etc., from entering the regulating valve.



The differential pressure orifice plate (7) must be installed after the HAWIDO valve. We recommended taking the following measurements into consideration:

X = linear distance between the valve and the differential pressure orifice plate = 5 x DN line.

Y = linear distance between the differential pressure orifice plate and the next fitting = 3 x DN line.

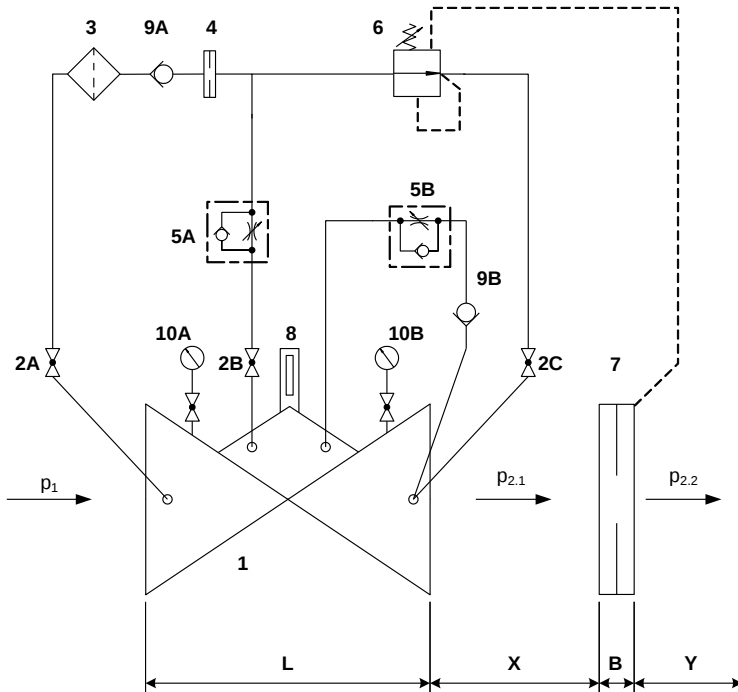
The fitting piece and the mounting/dismounting adapter are not contained in the scope of supply (supplied by the customer).

The HAWIDO must be installed horizontally (other installation models on request) with the valve cover upwards. We recommend that a gate valve and a dirt trap be fitted in front of the valve, as well as the mounting of a gate valve at the outlet. Before the installation, check that no coarse foreign objects can penetrate into the HAWIDO.

Please contact us for other types of installation.

## B. Commissioning

### 1. Functional diagram (1301)



#### Components

- 1 Main valve 1200
- 2 Ball valve (A, B, C)
- 3 Filter
- 4 Orifice plate
- 5 One-way flow restrictor (A, B)
- 6 Control valve
- 7 Orifice plate support with orifice plate
- 8 Optical position indicator Electrical position indicator (optional) Valve opening limiter (optional)
- 9 Non-return valve (9A, 9B)
- 10 Pressure gauge (A, B)

#### Recommendation:

- X: Length = 5 x DN
- Y: Length = 3 x DN

**B:** DN40 to DN150 B = 22mm  
DN200 to DN250 B = 27mm  
DN300 to DN400 B = 29mm

### 2. Preparatory work

Before commissioning the valve, check that the gate valves on the inlet and outlet sides of the valve are **closed** and that the flange connections have been correctly tightened and sealed.

On the valve:

- Open ball valves (2A and 2B) Loosen the lock nut on the one-way flow restrictor (5) and turn out the set screw completely
- Unscrew the adjusting screw on the one-way flow restrictor (5) by approximately 10 turns. (The line to the control chamber is open).
- Close the ball valve (2C)
- Loosen the threaded pin in the central plug on the position indicator by a few turns.
- Slightly loosen a union of the control line at its highest point (approximately one turn).
- Loosen the hand wheel on the flow control valve (6) until no resistance is felt from the spring.

### 3. Venting

**Procedure:**

Loosen the threaded pin of the optical position indicator 2 – 3 turns with a screwdriver (caution: Do not completely unscrew the threaded pin!)

**Slowly** open the inlet gate valve on the inlet side until water flows into the valve.

Once the valve venting procedure has caused all the air to be expelled from the control line, retighten the plug screw and the loosened union. Check that all screw connections are properly sealed, and re-tighten if necessary.

### 4. Setting-up

**Procedure:**

- Turn off the hand wheel on the flow rate control valve (6) completely.
- **Slowly** open the ball valve (2C).
- **Slowly and gradually** open the shut-off gate valve on the outlet side; the valve opens and water flows through the system.
- Slowly turn the hand wheel on the flow rate control valve (6) until the required flow rate is attained (normally the outlet pressure is measured after the differential pressure orifice plate (7)).

**Note:**

Wait for the hydraulic system to stabilise between each half turn of the hand wheel. Check the pressure on the outlet side using the pressure gauge.

### 5. Setting the reaction speed

If the HAWIDO does not operate quietly, or if pressure shocks occur in the supply network, this can be corrected by the corresponding adjustment of the one-way flow restrictor (4).

**Procedure:**

Loosen the locknut. Screw in the set screw clockwise with a screwdriver until the valve operates quietly. Then retighten the locknut.

**Caution**

The setting screw must always remain at least 3 - 5 turns open, otherwise the valve will not reopen after the closing sequence.

### 6. Check function

The valve closing speed can be set on the check valve (9) with a volume backflow ( $p_2$  greater than  $p_1$ ).

**The check valve (9) must be open by at least one turn.**

## 7. Checking for leakage

HAWIDO valves are tested at the factory for both leak tightness and function before delivery. When checking for leakage under operational conditions, particular attention must therefore be given to the seals of the flange connections, the control line and the central plug screw on the valve cover. Where necessary, ensure the seal by retightening the connections.

**Notes:**

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## C. Fault finding

| Symptoms                         | Possible cause                                | Action                                                                                                                                        |
|----------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Valve does not open              | One-way flow restrictor blocked               | Replace or unscrew the set screw several times until the valve functions properly                                                             |
|                                  | One-way flow restrictor closed too far        | Unscrew the set screw until the valve functions properly                                                                                      |
| Valve does not close             | One-way flow restrictor blocked               | Replace, or screw the set screw fully in and out several times and then re-set                                                                |
|                                  | Filter in the control line blocked            | Clean the filter                                                                                                                              |
|                                  | Air in the control line / upper valve chamber | Vent                                                                                                                                          |
|                                  | Foreign matter in the main valve              | Carry out service and remove any foreign matter                                                                                               |
|                                  | Diaphragm defective                           | Carry out a service. Replace the diaphragm                                                                                                    |
|                                  | Valve spindle jammed by encrustation          | Carry out service and remove any encrustation                                                                                                 |
| Loud noise                       | Unfavourable operating conditions             | Change pressure by approx. 0.1 to 0.2 bar. Slightly open or close the one-way flow restrictor. Contact the Hawle Customer Service department. |
|                                  | Wrong valve size                              | Have the correct valve size calculated (contact Hawle)                                                                                        |
| Erratic operation                | One-way flow restrictor incorrectly set       | Set according to Chapter 5                                                                                                                    |
| Original flow values not reached | Control valve maladjusted                     | Reset control valve                                                                                                                           |
|                                  | Changed operating conditions                  | Reset (see Setting-up paragraph)                                                                                                              |
| EWS coating damaged              | Transportation damage, installation damage    | Repair with Hawle two-component repair set for coatings                                                                                       |

## D. Putting out of service and maintenance

### 1. Putting out of service

The operating valve must first be shut off hydraulically by proceeding as follows:

- **Slowly** close the gate valves before and after the valve
- **Slowly** close the ball valves (2A, 2B, 2C)

The valve has now been taken out of operation, and a service can be carried out.

### 2. Maintenance and service

#### 2.1 General information

Through our many years of experience with diaphragm valves that are controlled by the flow medium, we know that our HAWIDO's normally function trouble-free for many years. Regular maintenance is a precondition for this, however.

Under normal operating conditions, the following should be carried out:

- The valve should be checked for correct operation once a year (functional check)
- The dirt trap upstream of the valve and the filter in the control line should be cleaned once a year
- The inner working components should be checked and worn parts be replaced every four to five years (maintenance).

Under unusual operating conditions (e.g. with water which contains quantities of suspended matter, very high pressure reduction, small flow rates etc.), maintenance should be carried out more frequently.

**Maintenance sign:**

|                                          |              |             |
|------------------------------------------|--------------|-------------|
| Funktionskontrolle: <b>jährlich</b>      | Wartung:     | <b>20xx</b> |
| Contrôle fonctionnel: <b>annuel</b>      | Maintenance: |             |
| Prova di funzionamento: <b>ogni anno</b> | Mantenzione: |             |
| Function check: <b>annually</b>          | Maintenance: |             |

xx stands for the respective year.

#### 2.2 Annual functional checks

##### Cleaning the dirt trap in the main line

- Unscrew the lid
- Clean the filter with a brush or cloth, or replace it
- Install the filter and screw the lid back on

##### Cleaning the filter in the control line

- Unscrew the lid of the filter
- Clean the filter with a brush or cloth etc., or replace it
- Re-install the filter and screw the filter lid back on.

### Checking the valve

- Remove the optical position indicator.
- Check that the valve spindle moves easily by raising and lowering it with the threaded rod.
- Install the optical position indicator.

### Putting back into service

- according to Commissioning paragraph

### Functional check of the valve

**Attention:** In order to avoid pressure surges in the functional check described below, large flow rates must be throttled by **slowly** closing the gate valve in front of the valve.

- **Slowly** close the ball valve (2C); the valve must close.
- **Slowly** open the ball valve (2C); the valve must open.

## 2.3 4 to 5-year maintenance

### Dirt trap (main line)

- Unscrew the lid
- Clean or replace the filter
- Install the filter and screw the lid back on

### Filter (control line)

- Unscrew the lid of the filter
- Clean or replace the filter mesh
- Re-install the filter and screw the filter lid back on.

### Base valve (see chapter: *Repair kits and spare parts*)

- Loosen the screw connections and remove the complete control line.
- Dismantle the optical position indicator or assembled accessories and replace the gaskets.
- Undo the screws of the valve cover and remove the cover.
- Visually inspect all inner components for wear, dirt and scaling
- Clean the inner components, the seat and the inner surfaces, including the cover
- Dismantle the spindle guide in the body, flush the body interior.  
For valves DN 40 to DN 100 (from 2012 on) and DN 125 to DN 200 (from 2014 on) the spindle guide is dismantled from the inside. Here the thread of the spindle guide and the base valve must be **extremely clean**. Grease the thread thoroughly (e.g. Foodgrease Aqua, Art. no. 5292, see chapter "Control line individual parts and accessories").
- Replace the diaphragm, the O-ring and the seat seal.
- Grease the spindle guide area with a grease suitable for contact with food (e.g. Foodgrease Aqua). Check the easy movement of the spindle by lifting and lowering with the spindle lifting tool (article number 1199, see chapter "Control line individual parts and accessories").
- Reassemble the base valve (see table in the annex for torques). During the assembly, the easy movement of the spindle must be checked with the spindle lifting tool by lifting and lowering **several times**.

### Dismantling the control valve (see Chapter 3)

- Loosen the adjusting lever and turn to the left until no resistance can be felt from the spring
- Undo the housing screw
- Undo the guide screw, item 19, and undo the seat support, item 22.
- Replace the diaphragm, the O-ring and, if necessary, the seal support
- Visually inspect the inner surfaces of the housing, and clean if necessary, including the cover
- Reassemble the control valve (see table in the annex for torques).

#### Functional check of the one-way flow restrictor

- Undo the locknut
- Screw in the throttle screw, and then unscrew it as far as it goes
- Screw in again a few turns. This process must be easy and meet little resistance

#### Putting back into service

- see Commissioning chapter

#### Functional check of the valve

**Caution:** In order to avoid pressure surges in the functional check described below, large flow rates must be throttled by **slowly** closing the gate valve in front of the valve.

- **Slowly** close the ball valve (2C); the valve must close.
- **Slowly** open the ball valve (2C); the valve must open.

### 3. Repair kits and spare parts

Several replacement parts are required for the 4 or 5 - year service. These can be obtained as a repair kit for:

- the main valve
- the control valve
- the control line
- the optical position indicator

The article numbers can be found in the part lists and the lists of spare parts.

**Caution:**

When ordering replacement parts, always specify the valve type, serial number and year of construction!

**Important:**

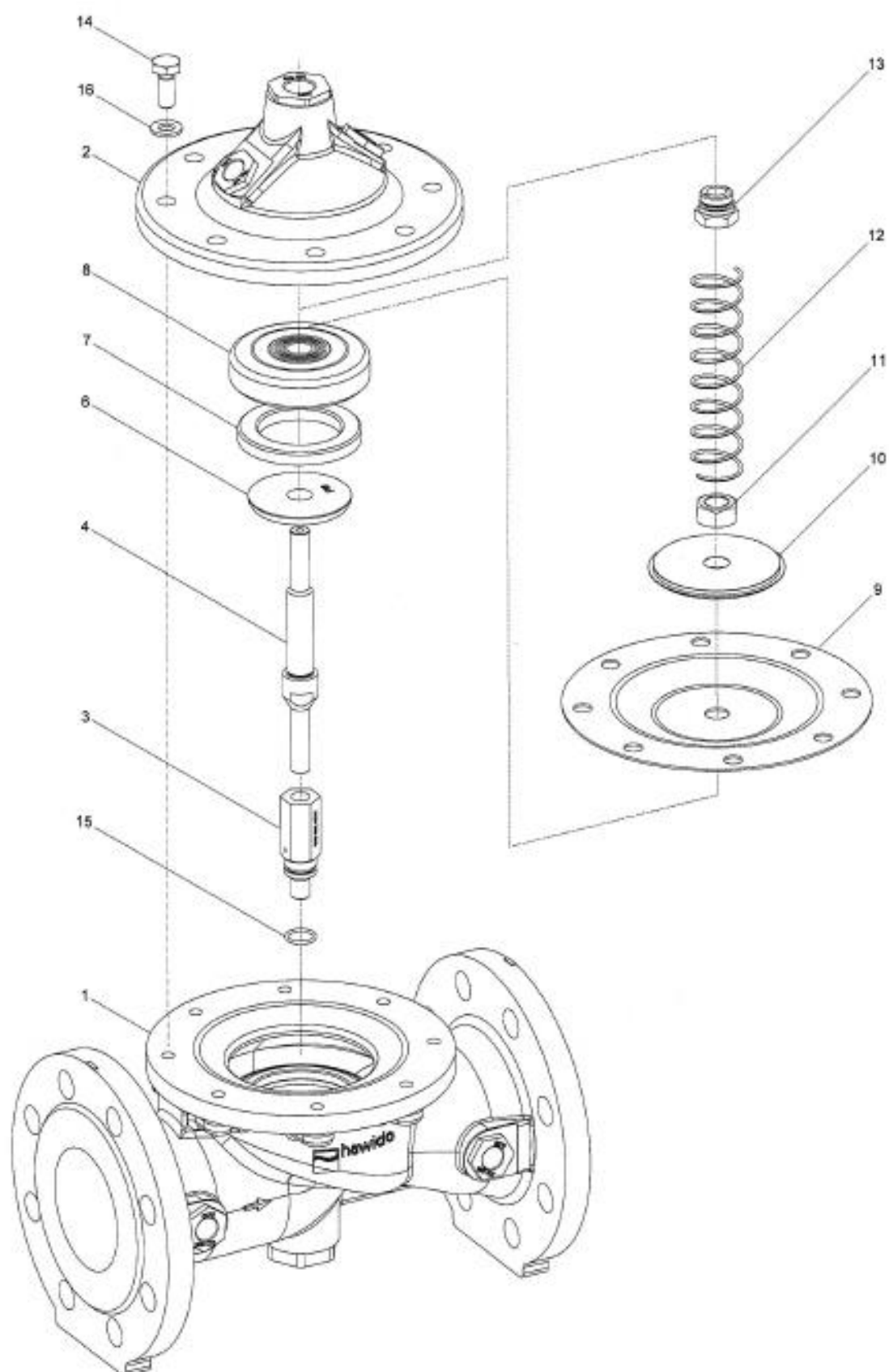
Replacement parts made of EPDM (diaphragms, seals) and NBR (O-rings) must be stored in a dark place, protected from UV radiation!

Shelf-life when stored in the dark:

EPDM 8 years from date of manufacture

NBR 5 years from date of manufacture

### 3.1 Base valve DN 40 to DN 200 (drawing)



08.12.2011/plü

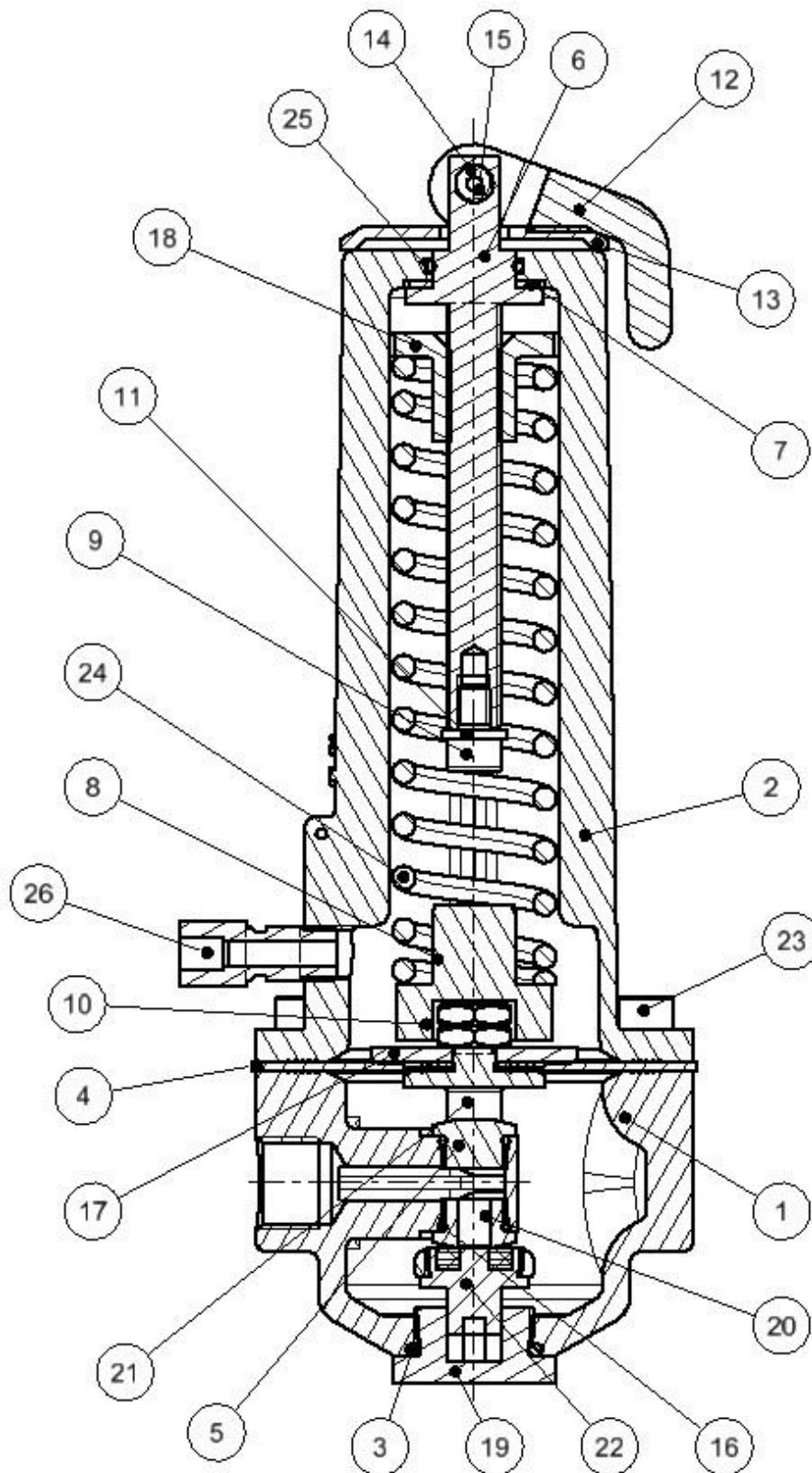
### 3.2 Main valve (Parts list)

| Item. | Description                                                                             | Material | Article number |              |              |              |              |
|-------|-----------------------------------------------------------------------------------------|----------|----------------|--------------|--------------|--------------|--------------|
|       |                                                                                         |          | DN 40          | DN 50        | DN 65        | DN 80        | DN 100       |
| 1     | Body                                                                                    | GGG 40   | 1004 040 000   | 1004 050 000 | 1004 065 000 | 1004 080 000 | 1004 100 000 |
| 2     | Valve cover                                                                             | GGG 40   | 1014 050 000   | 1014 050 000 | 1014 065 000 | 1014 080 000 | 1014 100 000 |
| 3     | Spindle guide cover                                                                     | INOX     | 1024 900 000   | 1024 900 001 | 1024 900 002 | 1024 900 003 | 1024 900 004 |
| 4     | Spindle                                                                                 | INOX     | 1026 050 000   | 1026 050 000 | 1026 065 000 | 1026 080 000 | 1026 100 000 |
| 5     | Seat                                                                                    | INOX     | *              | *            | *            | *            | *            |
| 6     | Counter seat                                                                            | INOX     | 1044 040 001   | 1044 050 001 | 1044 065 001 | 1044 080 001 | 1044 100 001 |
| 7     | Seal                                                                                    | EPDM     | 1022 040 000   | 1022 050 000 | 1022 065 000 | 1022 080 000 | 1022 100 000 |
| 8     | Seal carrier                                                                            | INOX     | 1027 040 200   | 1027 050 200 | 1027 065 200 | 1027 080 200 | 1027 100 200 |
| 9     | Diaphragm PN10/16                                                                       | EPDM     | 1020 050 000   | 1020 050 000 | 1020 065 000 | 1020 080 000 | 1020 100 000 |
|       | Diaphragm PN25                                                                          | EPDM     | 1020 050 000   | 1020 050 000 | 1021 065 000 | 1021 080 000 | 1021 100 000 |
| 10    | Pressure disc                                                                           | INOX     | 1047 050 000   | 1047 050 000 | 1047 065 000 | 1047 080 000 | 1047 100 000 |
| 11    | Nut                                                                                     | INOX     | 0007 710 080   | 0007 710 080 | 0007 712 080 | 0007 716 080 | 0007 716 080 |
| 12    | Spring                                                                                  | INOX     | 1049 050 000   | 1049 050 000 | 1049 065 000 | 1049 080 000 | 1049 100 000 |
|       | Spring for valves installed upright position                                            | INOX     | 1050 050 000   | 1050 050 000 | 1050 065 000 | 1050 080 000 | 1050 100 000 |
| 13    | Spindle guide cover                                                                     | INOX     | 1042 900 000   | 1042 900 000 | 1042 900 001 | 1042 900 002 | 1042 900 002 |
| 14    | Hexagonal screw                                                                         | INOX     | 0006 608 020   | 0006 608 020 | 0006 610 025 | 0006 610 025 | 0006 612 025 |
| 15    | O-ring                                                                                  | NBR      | 0180 012 020   | 0180 012 020 | 0180 012 020 | 0180 016 020 | 0180 016 020 |
| 16    | Washer                                                                                  | INOX     | 0008 208 000   | 0008 208 000 | 0008 210 000 | 0008 210 000 | 0008 212 000 |
| 17    | GSK-sticker                                                                             |          | 1099 900 000   | 1099 900 000 | 1099 900 000 | 1099 900 000 | 1099 900 000 |
| 18    | Maintenance sticker                                                                     |          | 9691 0xx 000   | 9691 0xx 000 | 9691 0xx 000 | 9691 0xx 000 | 9691 0xx 000 |
|       |                                                                                         |          |                |              |              |              |              |
|       | Main valve complete                                                                     | PN10/16  | 1201 040 000   | 1201 050 000 | 1201 065 000 | 1201 080 000 | 1201 100 000 |
|       | Main valve complete                                                                     | PN25     | --             | --           | 1201 065 025 | 1201 080 025 | 1201 100 025 |
|       |                                                                                         |          |                |              |              |              |              |
|       | Repair kit for main valve with stainless steel connection, comprising item 7, 9, 15, 18 | PN10/16  | 1080 040 000   | 1080 050 000 | 1080 065 000 | 1080 080 000 | 1080 100 000 |
|       |                                                                                         | PN25     | 1080 040 000   | 1080 050 000 | 1081 065 000 | 1081 080 000 | 1081 100 000 |

| Item | Description                                                                             | Material | Article number |              |              |              |
|------|-----------------------------------------------------------------------------------------|----------|----------------|--------------|--------------|--------------|
|      |                                                                                         |          | DN 125         | DN 150       | DN 200°      | DN 200^      |
| 1    | Body                                                                                    | GGG 40   | 1004 125 000   | 1004 151 000 | 1004 200 000 | 1004 200 016 |
| 2    | Valve cover                                                                             | GGG 40   | 1014 125 000   | 1014 151 000 | 1014 200 000 | 1014 200 000 |
| 3    | Spindle guide cover                                                                     | INOX     | 1024 900 005   | 1024 900 005 | 1024 900 006 | 1024 900 006 |
| 4    | Spindle                                                                                 | INOX     | 1026 125 000   | 1026 151 000 | 1026 200 000 | 1026 200 000 |
| 5    | Seat                                                                                    | INOX     | *              | *            | *            | *            |
| 6    | Counter seat                                                                            | INOX     | 1044 125 001   | 1044 150 001 | 1044 200 001 | 1044 200 001 |
| 7    | Seal                                                                                    | EPDM     | 1022 125 150   | 1022 151 000 | 1022 200 000 | 1022 200 000 |
| 8    | Seal carrier                                                                            | INOX     | 1027 125 200   | 1027 151 200 | 1027 200 200 | 1027 200 200 |
| 9    | Diaphragm PN10/16                                                                       | EPDM     | 1020 125 150   | 1020 151 000 | 1020 200 000 | 1020 200 000 |
|      | Diaphragm PN25                                                                          | CR       | 1051 125 150   | 1051 151 000 | --           | 1034 200 000 |
| 10   | Pressure disc                                                                           | INOX     | 1047 125 150   | 1047 151 000 | 1047 200 000 | 1047 200 000 |
| 11   | Nut                                                                                     | INOX     | 0007 720 080   | 0007 720 080 | 0007 724 080 | 0007 724 080 |
| 12   | Spring                                                                                  | INOX     | 1049 125 150   | 1049 151 150 | 1049 200 000 | 1049 200 000 |
|      | Spring for valves installed upright position                                            | INOX     | 1050 125 150   | 1050 151 000 | 1050 200 000 | 1050 200 000 |
| 13   | Spindle guide cover                                                                     | INOX     | 1042 900 003   | 1042 900 003 | 1042 900 004 | 1042 900 004 |
| 14   | Hexagonal screw                                                                         | INOX     | 0006 616 035   | 0006 616 035 | 0006 620 045 | 0006 620 045 |
| 15   | O-ring                                                                                  | NBR      | 0180 018 020   | 0180 018 020 | 0180 021 020 | 0180 021 020 |
| 16   | Washer                                                                                  | INOX     | 0008 216 000   | 0008 216 000 | 0008 220 000 | 0008 220 000 |
| 17   | GSK-sticker                                                                             |          | 1099 900 000   | 1099 900 000 | 1099 900 000 | 1099 900 000 |
| 18   | Maintenance sticker                                                                     |          | 9691 0xx 000   | 9691 0xx 000 | 9691 0xx 000 | 9691 0xx 000 |
| 21   | Retaining bracket                                                                       | INOX     | --             | --           | 1200 900 020 | 1200 900 020 |
|      | Main valve complete                                                                     | PN10/16  | 1201 125 000   | 1201 151 000 | 1201 200 000 | 1201 200 016 |
|      | Main valve complete                                                                     | PN25     | 1201 125 025   | 1201 151 025 |              | 1201 200 025 |
|      | Repair kit for main valve with stainless steel connection, comprising item 7, 9, 15, 18 | PN10/16  | 1080 125 150   | 1080 151 000 | 1080 200 000 | 1080 200 000 |
|      |                                                                                         | PN25     | 1081 125 150   | 1081 151 000 |              | 1081 200 000 |

° PN10  
^ PN16  
\* not interchangeable  
16.03.2018/plü

### 3.3 Stainless steel limitation control valve (drawing)



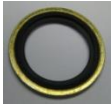
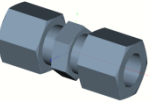
As at: 17.03.2015

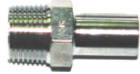
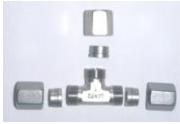
### 3.4 Stainless steel limitation control valve (parts list)

| Item | Description                                                  | Material                     | Article number |
|------|--------------------------------------------------------------|------------------------------|----------------|
|      |                                                              |                              | PN 10/16       |
| 1    | Control casing                                               | Stainless steel              | 1100 200 000   |
| 2    | Cover                                                        | Stainless steel              | 1108 200 001   |
| 3    | O-ring                                                       | NBR70                        | 0180 020 025   |
| 4    | Diaphragm DN3/8                                              | EPDM (W270)                  | 1121 000 000   |
| 5    | Seat Compact Form 1.0, blank                                 | Stainless steel              | 1117 200 000   |
| 6    | Pressure screw                                               | Stainless steel              | 1133 200 000   |
| 7    | Fibre seal 10/25 x 1                                         | Rubber                       | 0132 024 015   |
| 8    | Spring guide to compact pilot valve                          | Stainless steel              | 1133 400 000   |
| 9    | M6 x 10 Cap bolt                                             | Stainless steel              | 0004 506 010   |
| 10   | M8 x 0.5d Hexagon nut                                        | Stainless steel              | 0007 208 050   |
| 11   | U-washer                                                     | Stainless steel              | 0008 206 000   |
| 12   | Clamping and adjusting lever                                 | Kst – PA6.6                  | 1135 000 001   |
| 13   | Load washer for clamping lever                               | Kst – PA6.6                  | 1135 000 010   |
| 14   | Axle with IG to the clamping lever                           | Stainless steel              | 1135 000 011   |
| 15   | M4 x 16 Cap bolt                                             | Stainless steel              | 0004 804 016   |
| 16   | O-ring                                                       | EPDM (W270)                  | 0180 010 015   |
| 17   | Pressure disc DN 3/8" (control valve)                        | Stainless steel              | 1129 012 000   |
| 18   | Pressure nut (control valve new)                             | Bronze                       | 1134 000 010   |
| 19   | Guide pins (DRV/MBV)                                         | STAINLESS<br>STEEL           | 1137 000 000   |
| 20   | Seat Compact Form 1.0, 6 mm                                  | STAINLESS<br>STEEL           | 1117 200 001   |
| 21   | Yoke                                                         | STAINLESS<br>STEEL           | 1136 000 002   |
| 22   | Sealing plate with pin                                       | STAINLESS<br>STEEL / EPDM    | 1120 200 000   |
| 23   | M6 x 16 Cap bolt                                             | STAINLESS<br>STEEL           | 0004 506 016   |
| 24   | Pressure spring - weak                                       | STAINLESS<br>STEEL           | 1145 200 001   |
| 25   | O-ring                                                       | EPDM (W270)                  | 0180 014 020   |
| 26   | Straight screw-in fitting d6 - 1/8"                          | Stainless steel              | 0311 006 004   |
|      |                                                              | <b>REGULATING<br/>RANGE:</b> |                |
|      | Complete control valve (weak)                                | 0.2 – 5 bar                  | 1915 012 101   |
|      | Repair kit consisting of:<br>Items 3, 4, 16 (2 pcs.), 22, 25 |                              |                |

As at: 17.03.2015/jma

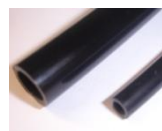
### 3.5 Control line individual parts and accessories

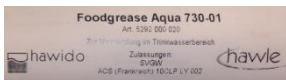
| Master number<br>Designation                                              | Picture                                                                             | Size<br>further sizes possibly available                                                                                                                                                                                                                                                     | Art. number                                                                                                                                  |
|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0130</b><br>Compound seal                                              |    | stainless steel/NBR 3/8"<br>stainless steel/NBR 1/2"<br>stainless steel/NBR 3/4"<br>Stahl/NBR 1"                                                                                                                                                                                             | 0130 012 000<br>0130 016 000<br>0130 025 000<br>0130 032 000                                                                                 |
| <b>0273</b><br>Individual parts                                           |    | Fitting connection (consisting of:<br>connector nut and clamping ring)<br>DN 12 stainless steel<br><br>connector nut only                                                                                                                                                                    | 0273 012 000<br><br>0274 xxx xxx                                                                                                             |
| <b>0275</b><br>Support<br>sleeve                                          |    | stainless steel d4 – 6<br>stainless steel d12 – 9<br>stainless steel d12 – 10                                                                                                                                                                                                                | 0275 006 004<br>0275 012 009<br>0275 012 010                                                                                                 |
| <b>0283</b><br>Clamping ring                                              |    | d6 stainless steel<br>d12 stainless steel<br>d18 stainless steel<br>d8 - 6 stainless steel                                                                                                                                                                                                   | 0283 006 000<br>0283 012 000<br>0283 018 000<br>0283 008 006                                                                                 |
| <b>0284</b><br>Orifice plate<br><br>(Old orifice plate<br>number<br>0281. |   | d12 stainless steel Ø 0.6 mm<br>d12 stainless steel Ø 0.9 mm<br>d12 stainless steel Ø 1.2 mm<br>d12 stainless steel Ø 1.5 mm<br>d12 stainless steel Ø 1.9 mm<br>d12 stainless steel Ø 2.4 mm<br>d12 stainless steel Ø 3.1 mm<br>d18 stainless steel Ø 3.5 mm<br>d18 stainless steel Ø 4.0 mm | 0284 006 000<br>0284 009 000<br>0284 012 000<br>0284 015 000<br>0284 019 000<br>0284 024 000<br>0284 031 000<br>0284 035 010<br>0284 040 010 |
| <b>0311</b><br>fitting<br>with screw-in nipple                            |  | d 12 - 3/8" stainless steel<br>d 12 - 1/2" stainless steel<br>d 6 - 1/8" stainless steel<br>d 6 - 1/4" stainless steel<br>d 6 - 3/8" stainless steel<br>d18 – 1/2" stainless steel                                                                                                           | 0311 012 012<br>0311 012 016<br>0311 006 004<br>0311 006 008<br>0311 006 012<br>0311 018 016                                                 |
| <b>0323</b><br>Straight fitting                                           |  | d 6 stainless steel<br>d 12 stainless steel                                                                                                                                                                                                                                                  | 0323 006 000<br>0323 012 000                                                                                                                 |
| <b>0324</b><br>Straight socket<br>end fitting                             |  | d12 - 3/8"                                                                                                                                                                                                                                                                                   | 0324 012 012                                                                                                                                 |
| <b>0351</b><br>Reduction<br>fitting                                       |  | d6 – d12 stainless steel                                                                                                                                                                                                                                                                     | 0351 012 006                                                                                                                                 |
| <b>0361</b><br>Transition sleeve                                          |  | d 10 - 3/8" stainless steel<br>d 12 - 3/8" stainless steel<br>d 12 - 1/2" stainless steel<br>d 18 – 1/2" stainless steel                                                                                                                                                                     | 0361 010 012<br>0361 012 012<br>0361 012 016<br>0361 018 016                                                                                 |
| <b>0371</b><br>Reduction nipple                                           |  | IG d 12 – AG 3/8" stainless steel                                                                                                                                                                                                                                                            | 0371 012 012                                                                                                                                 |

|                                            |                                                                                     |                                                                                                                                              |                                                                              |
|--------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>0401<br/>Sleeve</b>                     |    | 3/8" stainless steel<br>1/2" stainless steel<br>3/4" stainless steel<br>1" stainless steel                                                   | 0401 012 000<br>0401 016 000<br>0401 025 000<br>0401 032 000                 |
| <b>0411<br/>Adjuster nipple</b>            |    | DN 6 - 1/8" stainless steel<br>DN12 - 3/8" stainless steel                                                                                   | 0411 006 004<br>0411 012 012                                                 |
| <b>0431<br/>Screw-in elbow</b>             |    | DN 6 - 1/8" stainless steel<br>DN6 - 1/4" stainless steel<br>DN12 - 3/8" stainless steel<br>DN18 - 1/2" stainless steel                      | 0431 006 004<br>0431 006 008<br>0431 012 012<br>0431 018 016                 |
| <b>0431<br/>Screw-in elbow with vent</b>   |    | DN 12/3/8" Stainless steel                                                                                                                   | 0431 012 013                                                                 |
| <b>0451<br/>Angled fitting</b>             |    | DN6 stainless steel<br>DN12 stainless steel<br>DN18 stainless steel                                                                          | 0451 006 000<br>0451 012 000<br>0451 018 000                                 |
| <b>0452<br/>90° Adjuster elbow</b>         |    | DN12                                                                                                                                         | 0452 012 000                                                                 |
| <b>0455<br/>Connector elbow</b>            |  | IG 3/8" stainless steel<br>IG 1/2" stainless steel<br>IG 3/4" stainless steel<br>IG 1" stainless steel                                       | 0455 012 000<br>0455 016 000<br>0455 025 000<br>0455 032 000                 |
| <b>0456<br/>Connector elbow</b>            |  | IG 3/8" - AG 3/8" stainless steel<br>IG 1/2" - AG 1/2" stainless steel<br>IG 3/4" - AG 3/4" stainless steel<br>IG 1" - AG 1" stainless steel | 0456 012 000<br>0456 016 000<br>0456 025 000<br>0456 032 000                 |
| <b>0461<br/>T-piece</b>                    |  | d6 stainless steel<br>d12 stainless steel<br>d12 - 6 - 12 stainless steel<br>d18 stainless steel                                             | 0461 006 000<br>0461 012 000<br>0461 012 006<br>0461 018 000                 |
| <b>0510<br/>Plug</b>                       |  | AG 3/8" conical stainless steel<br>AG 1/2" conical stainless steel                                                                           | 0510 012 000<br>0510 016 000                                                 |
| <b>0511<br/>Vent plug,,<br/>lock screw</b> |  | AG 1/2" stainless steel<br>AG 3/4" stainless steel<br>AG 1" stainless steel with hexagon socket                                              | 0511 016 000<br>0511 025 000<br>0511 032 001                                 |
| <b>0520<br/>hexagon double nipple</b>      |  | d 1/8" stainless steel<br>d 1/4" stainless steel<br>d 3/8" stainless steel<br>d 1/2" stainless steel<br>d 3/4" stainless steel               | 0520 004 000<br>0520 008 000<br>0520 012 000<br>0520 016 000<br>0520 025 000 |
| <b>0541<br/>Ball valve</b>                 |  | DN 3/8" stainless steel<br>DN 1/2" stainless steel<br>DN 3/4" stainless steel                                                                | 0541 012 001<br>0541 016 000<br>0541 016 010                                 |

|                                                            |                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                           |
|------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0545</b><br><b>Stainless steel dirt filter</b>          |   | Stainless steel Y-filter IG 3/8"<br>Individual parts:<br>Stainless steel dirt filter<br>Plug, complete for Y-filter, stainless steel<br>Large seal for Y-filter, POM<br>Small O-ring for plug<br><br>Stainless steel Y-filter IG 1/2"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0545 112 002<br><br>0545 900 051<br>0545 112 010<br>0545 112 011<br>0545 112 012<br><br>0545 116 000                                                                                      |
| <b>0549</b><br><b>Flow control valve &amp; check valve</b> |   | DN 3/8" Check valve brass nickel-plated<br><br>Stainless steel IG 3/8" type B d 12 with long spindle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0549 000 002<br><br>0549 000 005                                                                                                                                                          |
| <b>0570</b><br><b>non-return valve</b>                     |   | 3/8" brass (max. 40 bar)<br>1/2" brass (max. 40 bar)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0570 012 045<br>0570 016 045                                                                                                                                                              |
| <b>0600</b><br><b>Manometer</b>                            |   | AG 3/8" 0 - 6 bar<br>AG 3/8" 0 - 10 bar<br>AG 3/8" 0 - 16 bar<br>AG 3/8" 0 - 25 bar<br>AG 3/8" 0 - 40 bar<br>AG 3/8" 0 - 60 bar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0600 012 006<br>0600 012 010<br>0600 012 016<br>0600 012 025<br>0600 012 040<br>0600 012 060                                                                                              |
| <b>0610</b><br><b>Solenoid valves</b>                      |  | Solenoid valve, normally open 2/2-way valve (for 1795/96)<br><b>122K84</b><br><br>Solenoid valve, normally closed 2/2 way valve (for 1795/96)<br><b>E121K04</b><br><br>Solenoid valve, normally open 3/2 way valve (for 1703 to DN 100 1603, 1706 PN 16 all nominal sizes)<br><b>132K04</b><br><br>Solenoid valve normally closed 3/2 way valve (for 1704 to DN 100, 1604)<br><b>E131K04</b><br><br>Solenoid valve normally open 2/2 way valve (for 1704 from DN 125 1304, 1404, 1504)<br>(old: E322 H73 06)<br><br>Solenoid valve normally closed 2/2 way valve, with manual override (For 1703 from DN 125, 1303, 1403, 1503, 1706 PN 25 from DN 125)<br>(old: E321 (H13)<br><br>Solenoid valve universal 3/2 way valve (for 1706 PN 25 to DN 100)<br><br>*****<br><br>Replacement part. Diaphragm, for MV type<br>0610 510 001 and 0610 510 002<br><br>Replacement part set for MV type 0610 510 001<br>Consisting of: Diaphragm, Armature guide tube, armature and seals | 0610 122 084<br><br>0610 121 004<br><br>0610 132 004<br><br>0610 131 004<br><br>0610 510 002<br><br>0610 510 001<br><br>0610 133 005<br><br>*****<br><br>0610 590 001<br><br>0610 590 002 |

|                                             |                                                                                     |                                                                                                                                                                                                                                                                                                        |                                                                                                                              |
|---------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>0620, 0621</b><br><b>Coils</b>           |    | AC coils with<br>voltage indication<br><br>DC coils with<br>voltage indication                                                                                                                                                                                                                         | 0620 xxx xxx<br><br>0621 xxx xxx                                                                                             |
| <b>0630</b><br><b>Appliance socket</b>      |    | Appliance socket<br>for electromagnet                                                                                                                                                                                                                                                                  | 0630 000 000                                                                                                                 |
| <b>0653</b><br><b>Connector modules</b>     |    | Connector modules for solenoid valves<br>Type LBV 24 DC 8S, incl. 2m cable<br><br>Connector modules for solenoid valves<br>Type LBV<br>IN: 48-230VAC/DC<br>OUT: 48VDC<br>incl. 2m cable 3-wire<br>(Only to be used for 48VDC coils)                                                                    | 0653 024 008<br><br>0653 230 000                                                                                             |
| <b>0670</b><br><b>Overcut</b>               |   | AG 3/8" IG 1/8" stainless steel<br>AG 3/8" IG 1/4" stainless steel<br>AG 1/2" IG 3/8" stainless steel<br>AG 3/4" IG 3/8" stainless steel<br>AG 1" IG 1/8" stainless steel<br>AG 1" IG 1/2" stainless steel                                                                                             | 0670 012 004<br>0670 012 008<br>0670 016 012<br>0670 025 012<br>0670 032 012<br>0670 032 016                                 |
| <b>0671</b><br><b>Sleeve nipple reduced</b> |  | IG 1/2" AG 3/8"<br>IG 1" AG 3/8"<br>IG 1" AG 1/2"<br>IG 1" AG 3/4"                                                                                                                                                                                                                                     | 0671 016 012<br>0671 032 012<br>0671 032 016<br>0671 032 025                                                                 |
| <b>0680</b><br><b>Barrel nipple</b>         |  | AG 3/8" L = 30 mm stainless steel<br>AG 3/8" L = 40 mm stainless steel<br>AG 3/8" L = 50 mm stainless steel<br>AG 3/8" L = 60 mm stainless steel<br>AG 3/8" L = 70 mm stainless steel<br>AG 3/8" L = 80 mm stainless steel<br>AG 3/8" L = 110 mm stainless steel<br>AG 1/2" L = xxx mm stainless steel | 0680 012 030<br>0680 012 040<br>0680 012 050<br>0680 012 060<br>0680 012 070<br>0680 012 080<br>0680 012 110<br>0680 016 xxx |
| <b>0690</b><br><b>Adapting nipple</b>       |  | AG 3/8" - 1/8"<br>AG 3/8" - 1/4"<br>AG 1/2" - 3/8"<br>AG 3/4" - 3/8"<br>AG 1" - 3/8"<br>AG 1" - 1/2"                                                                                                                                                                                                   | 0690 012 004<br>0690 012 008<br>0690 016 012<br>0690 025 012<br>0690 032 012<br>0690 032 016                                 |
| <b>0711</b><br><b>T-fitting</b>             |  | IG 3/8" level stainless steel<br>IG 1/2" level stainless steel<br>IG 3/4" level stainless steel<br>IG 1" level stainless steel                                                                                                                                                                         | 0711 012 000<br>0711 016 000<br>0711 025 000<br>0711 032 000                                                                 |
| <b>0730</b><br><b>Seamless tube</b>         |  | d6 x 1mm stainless steel<br>d12 x 1.5 mm stainless steel<br>d15 x 1.5 mm stainless steel<br>d18 x 1.5 mm stainless steel                                                                                                                                                                               | 0730 006 010<br>0730 012 015<br>0730 015 015<br>0730 018 015                                                                 |

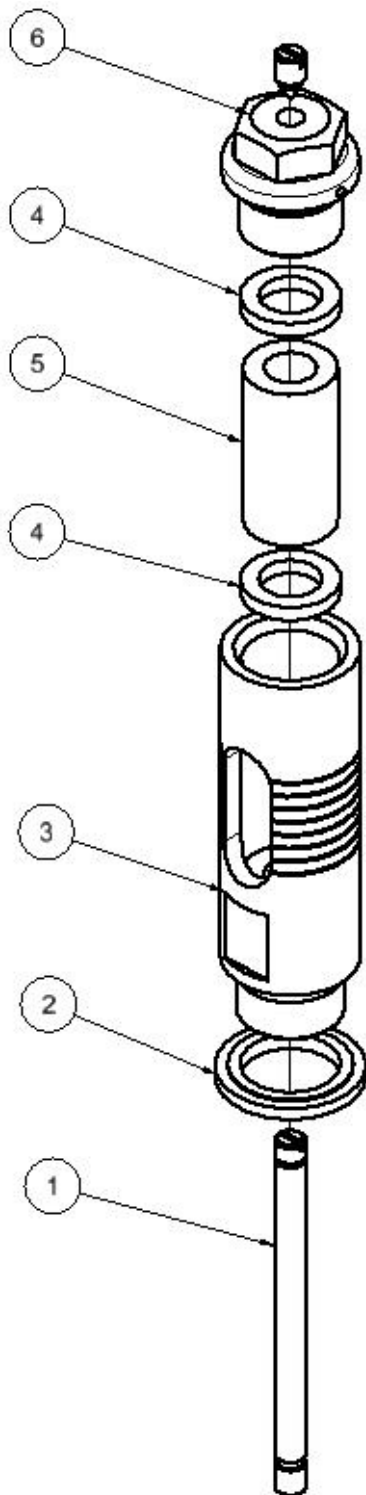
|                                                       |                                                                                   |                                                                                                                                                                                                            |                                                                             |
|-------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <b>1188</b><br><b>Rep. Set</b><br><b>Control line</b> |  | <p>From serial number 14252 (January 2003)<br/> DN40 to 100<br/> DN125 to 300</p> <p>From approx. serial number 25915 (June 2014,<br/> Filter type B (0545 112 002)<br/> DN40 to 100<br/> DN125 to 200</p> | <p>1188 065 100<br/> 1188 125 300</p> <p>1188 000 000<br/> 1188 000 001</p> |
| <b>SA.0</b><br><b>PA-tube</b>                         |  | <p>Polyamide tube OD 6 mm, ID 4 mm<br/> Polyamide tube OD 12 mm, ID 9 mm</p>                                                                                                                               | <p>SA.0 000 060<br/> SA.0 000 290</p>                                       |

| Tools and accessories                           |                                                                                     |                                                                                          |                                       |
|-------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------|
| <b>1199</b><br><b>Spindle lifting tool</b>      |    | <p>M5<br/> M6</p>                                                                        | <p>1199 000 000<br/> 1199 000 010</p> |
| <b>1199</b><br><b>Spanner for sealing plate</b> |  | <p>Spanner for assembling and dismantling the sealing plate from the DRV pilot valve</p> | <p>1199 000 020</p>                   |
| <b>1199</b><br><b>Socket spanner attachment</b> |  | <p>Socket spanner attachment for flow control valve</p>                                  | <p>1199 000 030</p>                   |
| <b>1199</b><br><b>Socket spanner</b>            |  | <p>Socket spanner for flow control valve</p>                                             | <p>1199 000 040</p>                   |
| <b>5292</b><br><b>Grease</b>                    |  | <p>Foodgrease Aqua<br/> Tube with 175g</p>                                               | <p>5292 000 020</p>                   |

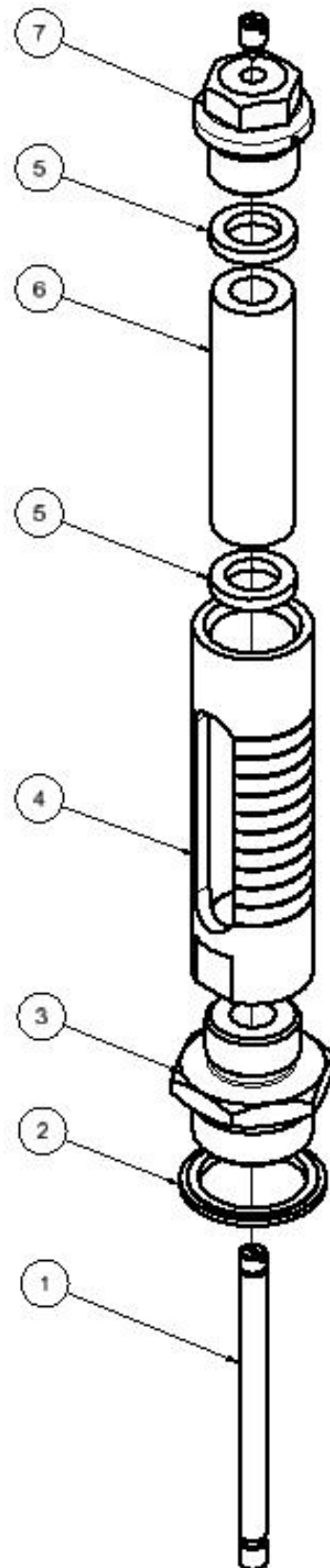
02.02.2018/plü

### 3.6 Optical position indicator (Drawing)

DN 40 – DN 100



DN 125 – DN 300



12.03.2014/plü

### 3.7 Optical position indicator (Parts list)

| Item | Description                            | Material            | Article number |              |              |              |              |
|------|----------------------------------------|---------------------|----------------|--------------|--------------|--------------|--------------|
|      |                                        |                     | DN 40          | DN 50        | DN 65        | DN 80        | DN 100       |
| 1    | Indicator pin                          | Stainless steel     | 1992 000 050   | 1992 000 050 | 1992 000 080 | 1992 000 080 | 1992 000 100 |
| 2    | Compound seal ½"                       | Stainless steel NBR | 0130 016 000   | 0130 016 000 | 0130 016 000 | 0130 016 000 | 0130 016 000 |
| 3    | Indicator body                         | Stainless steel     | 1994 000 010   | 1994 000 010 | 1994 000 010 | 1994 000 010 | 1994 000 010 |
| 4    | Seal                                   | EPDM70              | 1992 900 030   | 1992 900 030 | 1992 900 030 | 1992 900 030 | 1992 900 030 |
| 5    | Sight tube                             | Glass               | 1993 050 100   | 1993 050 100 | 1993 050 100 | 1993 050 100 | 1993 050 100 |
| 6    | Plug ½"                                | Stainless steel     | 0511 016 000   | 0511 016 000 | 0511 016 000 | 0511 016 000 | 0511 016 000 |
|      | Optical position indicator, complete   |                     | 1995 000 050   | 1995 000 050 | 1995 000 080 | 1995 000 080 | 1995 000 100 |
|      | Repair kit consisting of Items 2 and 4 |                     | 1996 000 000   | 1996 000 000 | 1996 000 000 | 1996 000 000 | 1996 000 000 |

| Item | Description                            | Material            | Article number |              |              |              |              |
|------|----------------------------------------|---------------------|----------------|--------------|--------------|--------------|--------------|
|      |                                        |                     | DN 125         | DN 150       | DN 200       | DN 250       | DN 300       |
| 1    | Indicator pin                          | Stainless steel     | 1992 000 125   | 1992 000 150 | 1992 000 200 | 1992 000 250 | 1992 000 300 |
| 2    | Compound seal ¾"                       | Stainless steel NBR | 0130 025 000   | 0130 025 000 | 0130 025 000 |              |              |
|      | Compound seal 1"                       | Steel/NBR           |                |              |              | 0130 032 000 | 0130 032 000 |
| 3    | Adapting nipple                        | Stainless steel     | 1992 900 020   | 1992 900 020 | 1992 900 020 | 1992 900 025 | 1992 900 025 |
| 4    | Indicator body                         | Stainless steel     | 1994 000 020   | 1994 000 020 | 1994 000 020 | 1994 000 020 | 1994 000 030 |
| 5    | Seal                                   | EPDM70              | 1992 900 030   | 1992 900 030 | 1992 900 030 | 1992 900 030 | 1992 900 030 |
| 6    | Sight tube                             | Glass               | 1993 125 250   | 1993 125 250 | 1993 125 250 | 1993 125 250 | 1993 300 000 |
| 7    | Plug ½"                                | Stainless steel     | 0511 016 000   | 0511 016 000 | 0511 016 000 | 0511 016 000 | 0511 016 000 |
|      | Optical position indicator, complete   |                     | 1995 000 125   | 1995 000 150 | 1995 000 200 | 1995 000 250 | 1995 000 300 |
|      | Repair kit consisting of Items 2 and 5 |                     | 1996 000 010   | 1996 000 010 | 1996 000 010 | 1996 000 020 | 1996 000 020 |

12.03.2014/plü

## E. Annex

### 1. Torques

When assembling the base valve and the control valves all **bolts** are checked with a torque spanner according to the following list. Lightly grease the bolts before assembling!

| Base valves | Nominal size<br>DN | Hex bolt<br>M | Strength<br>class <sup>1)</sup> | Tightening torque |                    |
|-------------|--------------------|---------------|---------------------------------|-------------------|--------------------|
|             |                    |               |                                 | Target            | Max. <sup>2)</sup> |
|             | 40 - 50            | M 8           | A4/80                           | 22 Nm             | 25 Nm              |
|             | 65 - 80            | M 10          |                                 | 47 Nm             | 50 Nm              |
|             | 100                | M 12          |                                 | 84 Nm             | 87 Nm              |
|             | 125 - 150          | M 16          |                                 | 172 Nm            | 216 Nm             |
|             | 200                | M 20          |                                 | 285 Nm            | 423 Nm             |
|             | 250                | M 20          |                                 | 285 Nm            | 423 Nm             |
|             | 300                | M 20          |                                 | 380 Nm            | 423 Nm             |

| Control valves | Type          | Socket<br>M   | Strength<br>class <sup>1)</sup> | Tightening torque |        |
|----------------|---------------|---------------|---------------------------------|-------------------|--------|
|                |               |               |                                 | Target            | Max.   |
|                | DRV / DAV     | M 6           | A2 / A4 / 70                    | 8 Nm              | 8.5 Nm |
|                | MBV / RBS     |               |                                 |                   |        |
|                | Control valve | Hex bolt<br>M | Strength<br>class               | Target            | Max.   |
|                | NAZ           | M 6           | A2 / A4 / 70                    | 8 Nm              | 8.5 Nm |

(Not for new applications)

| Base valves | Nominal size<br>DN | Hex bolt<br>M | Strength<br>class <sup>1)</sup> | Tightening torque |        |
|-------------|--------------------|---------------|---------------------------------|-------------------|--------|
|             |                    |               |                                 | Target            | Max.   |
|             | 40 - 50            | M 8           | A2/70                           | 17 Nm             | 19 Nm  |
|             | 65                 | M 10          |                                 | 33 Nm             | 36 Nm  |
|             | 80                 | M 10          |                                 | 40 Nm             | 40 Nm  |
|             | 100                | M 12          |                                 | 70 Nm             | 72 Nm  |
|             | 125 - 150          | M 16          |                                 | 172 Nm            | 172 Nm |
|             | 200                | M 20          |                                 | 280 Nm            | 285 Nm |
|             | 250                | M 20          |                                 | 280 Nm            | 285 Nm |
|             | 300                | M 20          |                                 | 235 Nm            | 240 Nm |

Attention: <sup>1)</sup> = Note designation on screw head A2 – 70 or A4 – 80!

<sup>2)</sup> = Maximum permitted torque according to strength analysis

Bolts according to SN EN ISO 4014 and SN EN ISO 4017

As at: FO 0065, Rev. 12 / 19.12.2017

## F. Hawle in Europe

### Addresses:

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