

# Compact hydraulic power pack type KA2 and KAW2

## Product documentation

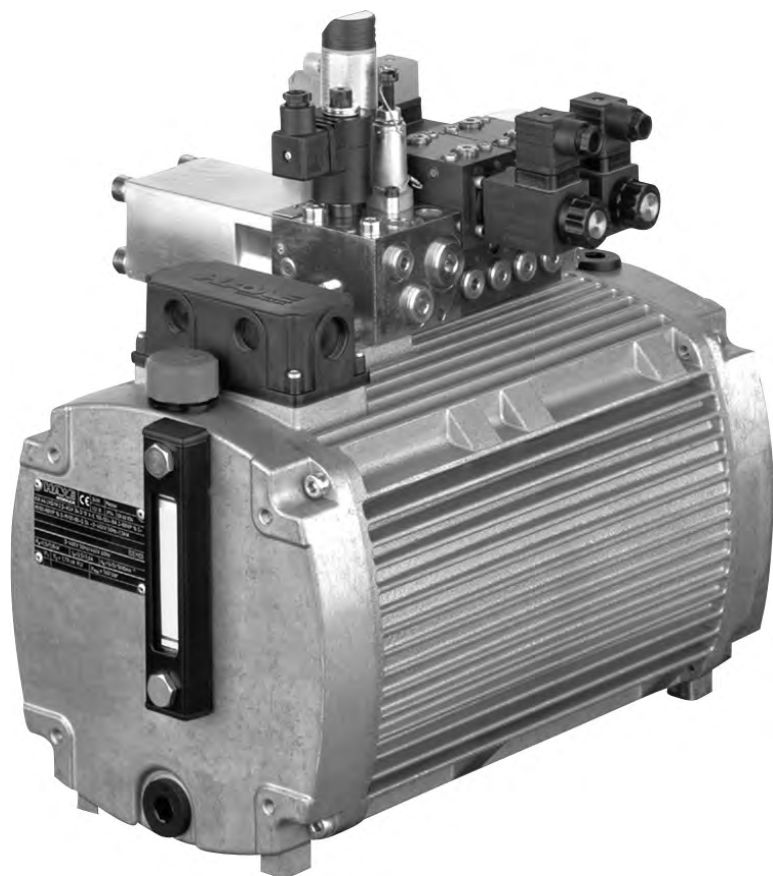


For short period operation and standby mode

Operating pressure  $p_{\max}$ : 700 bar

Geometric displacement  $V_{\max}$ : 7.9 cm<sup>3</sup>/rev

Usable volume  $V_{\text{use max}}$ : 9.05 l



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## Overview compact hydraulic power pack type KA2 and KAW2

Compact hydraulic power packs are a type of hydraulic power pack. They are characterised by a highly compact design, since the motor shaft of the electric motor also acts as the pump shaft.

### Features and benefits:

- Additional separately driven fan for maximum utilisation of power
- Fill/usable volumes can be flexibly extended by modular tank extensions
- Long lifetime and excellent reliability achieved by using radial piston pumps
- Low oil fill volumes make it environmentally sound thanks to small cost of disposal and low costs for hydraulic fluid
- Co-ordinated range of valves and accessories from modular system
- Suitable for vertical and horizontal installation
- Optimum efficiency thanks to suboil motor cooling, direct transmission of force and cleverly designed heat dissipation

### Intended applications:

- Brake and rotor adjustment modules on wind turbines
- Clamping systems on machine tools and appliances
- Hydraulic torque wrenches
- Rivets and clinching equipment
- Presses
- Handling systems



*Compact hydraulic power pack type KA2 and KAW2*

## 2 Available versions, main data

### 2.1 Motor and container

Order coding example:

|       |    |    |     |    |             |          |           |                 |          |               |
|-------|----|----|-----|----|-------------|----------|-----------|-----------------|----------|---------------|
| KA 24 | 1  | S  | KS  | E/ | H 1,81      | - A1/280 | - FSR-24V | - 3x400 V 50 Hz |          |               |
| KA 28 | 22 | L1 | KTF | P/ | HZ 0,59/8,8 | - ...    |           | - 3x400 V 50 Hz | /24 V DC | - G 1/2 x 300 |

|  |  |  |  |  |                            |   |                   |                            |                       |                                      |  |
|--|--|--|--|--|----------------------------|---|-------------------|----------------------------|-----------------------|--------------------------------------|--|
|  |  |  |  |  |                            |   |                   |                            |                       | Oil drain hose                       | Table 1g<br>Oil drain<br>hose                    |
|  |  |  |  |  |                            |   |                   |                            |                       | Motor voltage<br>for additional fans | Table 1d Motor<br>voltage for<br>additional fans |
|  |  |  |  |  |                            |   |                   | Motor voltage              | Table 5 Motor voltage |                                      |  |
|  |  |  |  |  |                            |   | External side fan | Table 1f External side fan |                       |                                      |  |
|  |  |  |  |  | Pump version               | Pump version, see <a href="#">Chapter 2.2, "Pump"</a> |                   |                            |                       |                                      |  |
|  |  |  |  |  | Electrical connection      | Table 1e Electrical connection                        |                   |                            |                       |                                      |  |
|  |  |  |  |  | Additional options         | Table 1d Additional options                           |                   |                            |                       |                                      |  |
|  |  |  |  |  | Installation position      | Table 1c Installation position                        |                   |                            |                       |                                      |  |
|  |  |  |  |  | Tank size                  | Table 1b Tank size                                    |                   |                            |                       |                                      |  |
|  |  |  |  |  | Basic type and motor power | Table 1a Basic type and motor power                   |                   |                            |                       |                                      |  |

**Table 1a Basic type and motor power**

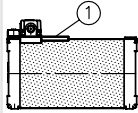
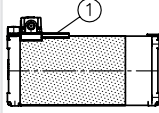
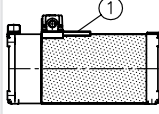
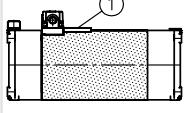
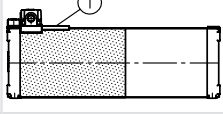
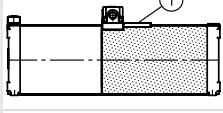
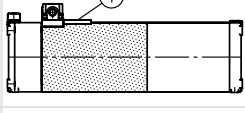
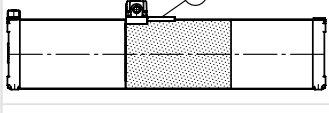
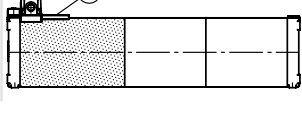
| Basic type           | Motor voltages and motor data ** |                    |                    |                   |
|----------------------|----------------------------------|--------------------|--------------------|-------------------|
|                      |                                  | Nominal voltage ** | Nominal power (kW) | Rated speed [rpm] |
| KA 21                | 3-phase motor                    | 3x400 V 50 Hz      | 0.55               | 2790 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 0.66               | 3350 (60 Hz)      |
| KA 22                | 3-phase motor                    | 3x400 V 50 Hz      | 1.1                | 2790 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 1.32               | 3400 (60 Hz)      |
| KA 23                | 3-phase motor                    | 3x400 V 50 Hz      | 0.37               | 1360 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 0.44               | 1650 (60 Hz)      |
| KA 24                | 3-phase motor                    | 3x400 V 50 Hz      | 0.75               | 1360 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 0.9                | 1650 (60 Hz)      |
| KA 26 *<br>KA 26 V * | 3-phase motor                    | 3x400 V 50 Hz      | 1.4                | 2810 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 1.68               | 3340 (60 Hz)      |
| KA 28 *              | 3-phase motor                    | 3x400 V 50 Hz      | 1.2                | 1380 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 1.45               | 1680 (60 Hz)      |
| KA 29 *<br>KA 29 V * | 3-phase motor                    | 3x400 V 50 Hz      | 1.6                | 1390 (50 Hz)      |
|                      |                                  | 3x460 V 60 Hz      | 1.92               | 1690 (60 Hz)      |
| KAW 21               | Single-phase-motor               | 1x230 V 50 Hz      | 0.37               | 2770 (50 Hz)      |
|                      |                                  | 1x110 V 60 Hz      |                    | 3340 (60 Hz)      |
| KAW 22               | Single-phase-motor               | 1x230 V 50 Hz      | 0.75               | 2810 (50 Hz)      |
|                      |                                  | 1x110 V 60 Hz      |                    | 3400 (60 Hz)      |
| KAW 23               | Single-phase-motor               | 1x230 V 50 Hz      | 0.25               | 1380 (50 Hz)      |
|                      |                                  | 1x110 V 60 Hz      |                    | 1650 (60 Hz)      |
| KAW 24               | Single-phase-motor               | 1x230 V 50 Hz      | 0.50               | 1390 (50 Hz)      |
|                      |                                  | 1x110 V 60 Hz      |                    | 1680 (60 Hz)      |
| KAW 26 *             | Single-phase-motor               | 1x230 V 50 Hz      | 1.10               | 2770 (50 Hz)      |
|                      |                                  | 1x110 V 60 Hz      |                    | 3340 (60 Hz)      |
| KAW 28 *             | Single-phase-motor               | 1x230 V 50 Hz      | 0.7                | 1370 (50 Hz)      |
|                      |                                  | 1x110 V 60 Hz      |                    | 1650 (60 Hz)      |


**Note**

The actual power consumption depends on the load and can be up to 1.8 x nominal power.

- \* Marked basic types only in connection with tank sizes 1, 11, 2, 21, 22, 3 in accordance with Table 1b
- \*\* Other available nominal voltages, see [Chapter 3.2, "Electrical"](#) Table 5 and [Chapter 6.1, "Planning information"](#)
- basic types KA ... V (encased stator) for hydraulic installations with water content (such as a coolant) of up to 0.3 %

**Table 1b Tank size**

| Tank size      | Combination   | Fill volume<br>$V_{\text{fill}}$ (l) | Usable volume vertical<br>$V_{\text{usable}}$ (l) | Usable volume horizontal<br>$V_{\text{usable}}$ (l) |
|----------------|---|--------------------------------------|---|---|
| No designation |    | 3.9                                  | 1.85  | 1.5   |
| 1              |    | 5.0                                  | 2.7   | 2.0   |
| 01             |    | 5.0                                  | 1.85  | 2.0   |
| 11             |    | 6.1                                  | 2.7   | 2.5   |
| 2              |    | 7.5                                  | 5.45  | 3.15  |
| 02             |   | 7.5                                  | --  | 3.15  |
| 21             |  | 8.6                                  | 5.45  | 3.65  |
| 22             |  | 11.1                                 | --  | 4.8   |
| 3              |  | 11.1                                 | 9.05  | 4.8   |

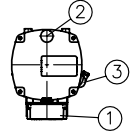
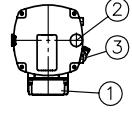
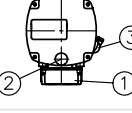
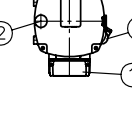
1 Pedestal, valve mounting, terminal box, additional options

**i Note**

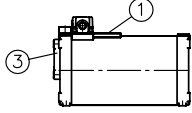
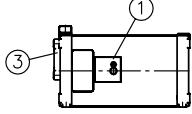
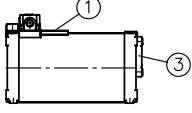
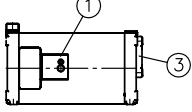
- The fill volume and usable volume may deviate slightly from the values indicated here, depending on the motor and pump.

**Table 1c Installation position**

**Vertical**

| Coding | Comment  | Installation position   |
|--------|--|---|
| S      | Series   |  |
| S1     | Lid rotated through 90° on the top             |  |
| S14    | Lid rotated through 90° on the top and bottom  |   |
| S25    | Lid rotated through 180° on the top and bottom |  |
| S36    | Lid rotated through 270° on the top and bottom |  |

**Horizontal**

| Coding | Comment                                  | Installation position   |
|--------|--|---|
| L      | Series                                   |   |
| L1     | Pedestal rotated through 90°             |  |
| L4     | Type plate and level gauge on the "back" |  |
| L14    | Combination of L1 and L4                 |  |

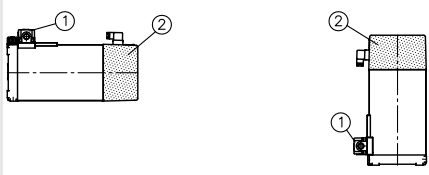
- 1 Pedestal, valve mounting, terminal box, additional options
- 2 Oil filler, breather filter
- 3 Level gauge

**i Note**

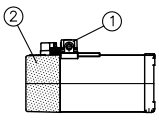
- The horizontal version can be incorporated vertically.
- The vertical version within radial piston design (coding H, HH and HZ in accordance with [Chapter 2.2, "Pump"](#)) cannot be inserted horizontally.
- Re. 1: Setup of a connection block/directional valve bank, see [Chapter 6.1, "Planning information"](#) ("Selection of connection blocks" and "Selection of directional valve banks")



**Table 1d Additional options**

| Coding         | Comment  | Vertical | Horizontal |
|----------------|--|----------|------------|
| No designation | Without additional equipment   | ●        | ●          |
| K              | Oil level gauge / level gauge right  | ●        | ●          |
| K1             | Oil level gauge / level gauge left   | ●        | -          |
| KK             | Oil level gauge / level gauge right, in any extension, only with extension coding 3  | ●        | -          |
| KK1            | Oil level gauge / level gauge left, in any extension, only with extension coding 3   | ●        | -          |
| KS, K1S        | Level gauge with a level switch (N/O contact), switching function for a falling level  | ●        | -          |
| KD, K1D        | Level gauge with a level switch (N/C contact), switching function for a falling level  | ●        | -          |
| KDD, KSS       | 2-point level switch (switch-off/prewarning), combination of two N/C contacts (DD) and two N/O contacts (SS)   | ●        | -          |
| S              | Level switch (N/O contact)   | -        | ●          |
| D              | Level switch (N/C contact)   | -        | ●          |
| DD, SS         | 2-point level switch (switch-off/prewarning), combination of two N/C contacts (DD) and two N/O contacts (SS), not with KAW-type, not in combination with a T-coding temperature switch   | -        | ●          |
| T              | Temperature switch (switching point of 80°C), series in the KAW model  | ●        | ●          |
| T60            | Temperature switch (switching point of 60°C), only in the KA model   | ●        | ●          |
| TT60, TT50     | 2-point temperature switch (switching point of 80°C / 60°C or 50°C, switch-off/prewarning); in horizontal version, not in combination with an S or D-coding level switch   | ●        | ●          |
| G              | Silica gel filter (instead of the breather filter, see <a href="#">Chapter 6.1.1, "Selection advice"</a> ("Silica gel filter")), cannot be retrofitted, not with an additional fan with coding F   | ●        | -          |
| F              | Additional fan (see <a href="#">Chapter 6.1.1, "Selection advice"</a> ("Determination of excess temperature")), available motor voltages and other motor data, see <a href="#">Chapter 3.2, "Electrical"</a> , can be retrofitted, not in combination with installation position L, L1 or L4 and oil level gauge / level gauge, coding K.<br><br> <p>1 Pedestal, valve mounting, terminal box, additional option<br/>2 Additional fan</p> | ●        | ●          |

**Re. Table 1d Additional options**

| Coding | Comment  | Vertical | Horizontal |
|--------|--|----------|------------|
| F1     | <p>Additional fan same as coding F, but assembled in the opposite position, not in combination with installation position L or L1 and oil level gauge / level gauge, coding K.</p>  <p>1 Pedestal, valve mounting, terminal box, additional option<br/>2 Additional fan</p> | -        | ●          |
| B      | <ul style="list-style-type: none"> <li>▪ Filler reduction, no need for a dipstick</li> <li>▪ Filler sieve mesh width 0.63 mm</li> <li>▪ Vertical version: not in combination with the additional fan, coding F</li> <li>▪ Cannot be retrofitted</li> </ul>   | ●        | ●          |
| B1     | <ul style="list-style-type: none"> <li>▪ Filler reduction, no need for a dipstick</li> <li>▪ Filler sieve mesh width 0.63 mm</li> <li>▪ Cannot be retrofitted</li> <li>▪ Where necessary, watch out for a collision with the mounted valve bank!</li> </ul>  | -        | ●          |

**Table 1e Electrical connection**

| Coding         | Comment  |
|----------------|--|
| No designation | Series (terminal box)  |
| P              | HARTING plug   |
| PM, PM1, PM2   | HARTING plug with an additional connection M12x1 right, left or on both sides for temperature and/or level switch (horizontal version), in a vertical version and level switch (coding KD, KS) M12 connection to the level gauge<br>Coding PM2 not in combination with suppressor coding PE                            |
| M, M1, M2      | Terminal box with an additional connection M12x1 right, left or on both sides for temperature and/or level switch (horizontal version), in a vertical version and level switch (coding KD, KS) M12 connection to the level gauge<br>Coding M2 not in combination with suppressor coding E or filler reduction coding B |
| E, PE          | Additional suppressor on terminal box or HARTING plug, see <a href="#">Chapter 3.2, "Electrical"</a> , only with the KA-type   |

**Table 1f External side fan**

| Coding | Comment  | Vertical        | Horizontal    |
|--------|--|-----------------|---------------|
| FSL    | External side fan left<br>(see <a href="#">Chapter 6.1.1, "Selection advice"</a> ("Determination of excess temperature")), available motor voltages and other motor data, see <a href="#">Chapter 3.2, "Electrical"</a> , can be retrofitted   | ●<br>(not K1)   | ●             |
| FSR    | External side fan right<br>(see <a href="#">Chapter 6.1.1, "Selection advice"</a> ("Determination of excess temperature")), available motor voltages and other motor data, see <a href="#">Chapter 3.2, "Electrical"</a> , can be retrofitted  | ●<br>(not K)    | ●<br>(not L1) |
| FSH    | External side fan rear<br>(see <a href="#">Chapter 6.1.1, "Selection advice"</a> ("Determination of excess temperature")), available motor voltages and other motor data, see <a href="#">Chapter 3.2, "Electrical"</a> , can be retrofitted   | ●               | -             |
| FSLR   | 2 external side fans right and left<br>(see <a href="#">Chapter 6.1.1, "Selection advice"</a> ("Determination of excess temperature")), available motor voltages and other motor data, see <a href="#">Chapter 3.2, "Electrical"</a> , can be retrofitted  | ●<br>(not K(1)) | ●<br>(not L1) |
|        | <p><b>Options:</b></p> <ul style="list-style-type: none"> <li>▪ No details - no safety guard</li> <li>▪ "S" - Safety guard</li> </ul> <p><b>Motor voltage details:</b></p> <ul style="list-style-type: none"> <li>▪ " -1x110 V " (1x115 V 50 Hz, 1x110 V 60 Hz ⊥)</li> <li>▪ " -1x230 V " (1x230 V 50/60 Hz ⊥)</li> <li>▪ " -24 V " (24 V DC)</li> </ul> <p><b>Details of the plug on the opposite side:</b></p> <ul style="list-style-type: none"> <li>▪ No details - no opposite plug</li> <li>▪ CA3TY1 - opposite plug with a 3m cable for a motor voltage of 1x110 V, 1x230 V</li> <li>▪ CA3TY2 - opposite plug with a 3m cable for a motor voltage of 24 VDC</li> </ul> |                 |               |

**Table 1g Oil drain hose**

| Coding         | Description   |
|----------------|---|
| No designation | Tapped plug G 1/2 (BSPP)  |
| G 1/2 x 300    | Oil drain hose approximately 300 mm with a ball valve             |
| G 1/2 x 500    | Oil drain hose approximately 500 mm with a ball valve             |
| G 1/2 W x 300  | Oil drain hose approximately 300 mm with a bracket and ball valve |
| G 1/2 W x 500  | Oil drain hose approximately 500 mm with a bracket and ball valve |

## 2.2 Pump

### 2.2.1 Single-circuit pumps

Order coding example:

KA 242 DT/1 - H 6,7 - A1/180 - 3x400 V 50 Hz

Single-circuit pump with a 3-phase motor      Table 2a Single-circuit pump with a 3-phase motor

#### Table 2a Single-circuit pump (radial piston pump) with a 3-phase motor

##### Note

- The delivery flow  $Q_{\max}$  relates to the rated speed and varies depending on the load (see diagrams [Chapter 3.2, "Electrical"](#)).
- Notes on the pressures  $p_{\max}$  (see [Chapter 3.2, "Electrical"](#), Table 5).
- In pump version **Z**, the max. hydraulic work value  $(pV_g)_{\max}$  is to be reduced by 10%.
- **The permissible pressures  $p_{\max}$  relate to a version with a 3x400/230 V 50 Hz or 3x460 V 60 Hz motor.**
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical"](#), Table 5)"

**Radial piston pump H**

| Delivery flow coding                             |                                      | H 0.33 | H 0.47 | H 0.59 | H 0.66 | H 0.91 | H 0.93 |      |
|--|--------------------------------------|--------|--------|--------|--------|--------|--------|------|
| Piston diameter (mm)                             |                                      | 4      | 5      | 4      | 6      | 7      | 5      |      |
| Number of pump elements                          |                                      | 3      | 3      | 6      | 3      | 3      | 6      |      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) |                                      | 0.23   | 0.35   | 0.45   | 0.51   | 0.69   | 0.71   |      |
| KA 21  | Permissible pressure $p_{max}$ (bar) | 700    | 465    | 360    | 320    | 235    | 230    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.63   | 0.99   | 1.26   | 1.42   | 1.93   | 1.97 |
|  |                                      | 60 Hz  | 0.76   | 1.18   | 1.52   | 1.70   | 2.32   | 2.37 |
| KA 22  | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 700    | 700    | 700    | 700    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.63   | 0.99   | 1.26   | 1.42   | 1.93   | 1.97 |
|  |                                      | 60 Hz  | 0.76   | 1.18   | 1.52   | 1.70   | 2.32   | 2.37 |
| KA 23  | Permissible pressure $p_{max}$ (bar) | 700    | 620    | 485    | 430    | 315    | 310    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.31   | 0.48   | 0.62   | 0.69   | 0.94   | 0.96 |
|  |                                      | 60 Hz  | 0.37   | 0.58   | 0.75   | 0.84   | 1.14   | 1.17 |
| KA 24  | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 700    | 700    | 700    | 700    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.31   | 0.48   | 0.62   | 0.69   | 0.94   | 0.96 |
|  |                                      | 60 Hz  | 0.37   | 0.58   | 0.75   | 0.84   | 1.14   | 1.17 |
| KA 26<br>KA 26 V                                 | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 700    | 700    | 700    | 700    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.63   | 0.99   | 1.26   | 1.42   | 1.93   | 1.97 |
|  |                                      | 60 Hz  | 0.76   | 1.18   | 1.52   | 1.70   | 2.32   | 2.37 |
| KA 28  | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 700    | 700    | 700    | 700    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.31   | 0.48   | 0.62   | 0.69   | 0.94   | 0.96 |
|  |                                      | 60 Hz  | 0.37   | 0.58   | 0.75   | 0.84   | 1.14   | 1.17 |
| KA 29<br>KA 29 V                                 | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 700    | 700    | 700    | 700    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 0.31   | 0.48   | 0.62   | 0.69   | 0.94   | 0.96 |
|  |                                      | 60 Hz  | 0.37   | 0.58   | 0.75   | 0.84   | 1.14   | 1.17 |

**Radial piston pump H**

| Delivery flow coding                             |                                      | H 1.18 | H 1.33 | H 1.51 | H 1.81 | H 2.36 | H 2.99 |      |
|--|--------------------------------------|--------|--------|--------|--------|--------|--------|------|
| Piston diameter (mm)                             |                                      | 8      | 6      | 9      | 7      | 8      | 9      |      |
| Number of pump elements                          |                                      | 3      | 6      | 3      | 6      | 6      | 6      |      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) |                                      | 0.91   | 1.02   | 1.15   | 1.39   | 1.81   | 2.29   |      |
| KA 21  | Permissible pressure $p_{max}$ (bar) | 180    | 160    | 140    | 115    | 90     | 70     |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 2.52   | 2.84   | 3.19   | 3.87   | 5.05   | 6.39 |
|  |                                      | 60 Hz  | 3.03   | 3.41   | 3.84   | 4.64   | 6.06   | 7.67 |
| KA 22  | Permissible pressure $p_{max}$ (bar) | 570    | 510    | 450    | 370    | 285    | 225    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 2.52   | 2.84   | 3.19   | 3.87   | 5.05   | 6.39 |
|  |                                      | 60 Hz  | 3.03   | 3.41   | 3.84   | 4.64   | 6.06   | 7.67 |
| KA 23  | Permissible pressure $p_{max}$ (bar) | 240    | 215    | 190    | 155    | 120    | 95     |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.23   | 1.38   | 1.56   | 1.88   | 2.46   | 3.11 |
|  |                                      | 60 Hz  | 1.49   | 1.68   | 1.89   | 2.29   | 2.99   | 3.78 |
| KA 24  | Permissible pressure $p_{max}$ (bar) | 650    | 580    | 510    | 425    | 325    | 255    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.23   | 1.38   | 1.56   | 1.88   | 2.46   | 3.11 |
|  |                                      | 60 Hz  | 1.49   | 1.68   | 1.89   | 2.29   | 2.99   | 3.78 |
| KA 26<br>KA 26 V                                 | Permissible pressure $p_{max}$ (bar) | 640    | 575    | 510    | 420    | 320    | 255    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 2.52   | 2.84   | 3.19   | 3.87   | 5.05   | 6.39 |
|  |                                      | 60 Hz  | 3.03   | 3.41   | 3.84   | 4.64   | 6.06   | 7.67 |
| KA 28  | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 550    | 625    | 480    | 375    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.23   | 1.38   | 1.56   | 1.88   | 2.46   | 3.11 |
|  |                                      | 60 Hz  | 1.49   | 1.68   | 1.89   | 2.29   | 2.99   | 3.78 |
| KA 29<br>KA 29 V                                 | Permissible pressure $p_{max}$ (bar) | 700    | 700    | 550    | 700    | 690    | 545    |      |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.23   | 1.38   | 1.56   | 1.88   | 2.46   | 3.11 |
|  |                                      | 60 Hz  | 1.49   | 1.68   | 1.89   | 2.29   | 2.99   | 3.78 |

## Radial piston pump H



### Note

- Version with PE-type pump elements in accordance with [D 5600](#)
- only available in a vertical version (Table 1c)

| Delivery flow coding                             |                                      | H 1.84 | H 2.66 | H 3.12 | H 3.61 | H 3.69 | H 4.14 |       |
|--|--------------------------------------|--------|--------|--------|--------|--------|--------|-------|
| Piston diameter (mm)                             |                                      | 10     | 12     | 13     | 14     | 10     | 15     |       |
| Number of pump elements                          |                                      | 3      | 3      | 3      | 3      | 6      | 3      |       |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) |                                      | 1.41   | 2.04   | 2.39   | 2.77   | 2.83   | 3.18   |       |
| KA 21  | Permissible pressure $p_{max}$ (bar) | 115    | 80     | 65     | 55     | 55     | 50     |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 3.90   | 5.65   | 6.62   | 7.67   | 7.84   | 8.81  |
|  |                                      | 60 Hz  | 4.69   | 6.79   | 7.96   | 9.22   | 9.42   | 10.59 |
| KA 22  | Permissible pressure $p_{max}$ (bar) | 365    | 250    | 215    | 185    | 180    | 160    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 3.90   | 5.65   | 6.62   | 7.67   | 7.84   | 8.81  |
|  |                                      | 60 Hz  | 4.69   | 6.79   | 7.96   | 9.22   | 9.42   | 10.59 |
| KA 23  | Permissible pressure $p_{max}$ (bar) | 155    | 105    | 90     | 75     | 75     | 65     |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.91   | 2.76   | 3.23   | 3.74   | 3.83   | 4.30  |
|  |                                      | 60 Hz  | 2.31   | 3.34   | 3.91   | 4.54   | 4.63   | 5.21  |
| KA 24  | Permissible pressure $p_{max}$ (bar) | 415    | 285    | 245    | 210    | 205    | 185    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.91   | 2.76   | 3.23   | 3.74   | 3.83   | 4.30  |
|  |                                      | 60 Hz  | 2.31   | 3.34   | 3.91   | 4.54   | 4.63   | 5.21  |
| KA 26<br>KA 26 V                                 | Permissible pressure $p_{max}$ (bar) | 410    | 285    | 240    | 210    | 205    | 180    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 3.90   | 5.65   | 6.62   | 7.67   | 7.84   | 8.81  |
|  |                                      | 60 Hz  | 4.69   | 6.79   | 7.96   | 9.22   | 9.42   | 10.59 |
| KA 28  | Permissible pressure $p_{max}$ (bar) | 560    | 390    | 330    | 290    | 305    | 250    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.91   | 2.76   | 3.23   | 3.74   | 3.83   | 4.30  |
|  |                                      | 60 Hz  | 2.31   | 3.34   | 3.91   | 4.54   | 4.63   | 5.21  |
| KA 29<br>KA 29 V                                 | Permissible pressure $p_{max}$ (bar) | 560    | 390    | 330    | 290    | 440    | 250    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz  | 1.91   | 2.76   | 3.23   | 3.74   | 3.83   | 4.30  |
|  |                                      | 60 Hz  | 2.31   | 3.34   | 3.91   | 4.54   | 4.63   | 5.21  |

## Radial piston pump H



### Note

- Version with PE-type pump elements in accordance with [D 5600](#)
- only available in a vertical version (Table 1c)

| Delivery flow coding                             |                                      | H 4.72 | H 5.31 | H 6.24 | H 7.23 | H 8.29 | H 9.45 |
|--|--------------------------------------|--------|--------|--------|--------|--------|--------|
| Piston diameter (mm)                             |                                      | 16     | 12     | 13     | 14     | 15     | 16     |
| Number of pump elements                          |                                      | 3      | 6      | 6      | 6      | 6      | 6      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) |                                      | 3.62   | 4.07   | 4.78   | 5.54   | 6.36   | 7.24   |
| KA 21  | Permissible pressure $p_{max}$ (bar) | 45     |        |        |        |        |        |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |
| KA 22  | Permissible pressure $p_{max}$ (bar) | 140    |        |        |        |        |        |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |
| KA 23  | Permissible pressure $p_{max}$ (bar) | 60     | 50     | 45     | 35     | 30     | 30     |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |
| KA 24  | Permissible pressure $p_{max}$ (bar) | 160    | 140    | 120    | 105    | 90     | 80     |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |
| KA 26<br>KA 26 V                                 | Permissible pressure $p_{max}$ (bar) | 160    |        |        |        |        |        |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |
| KA 28  | Permissible pressure $p_{max}$ (bar) | 220    | 210    | 180    | 155    | 135    | 120    |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |
| KA 29<br>KA 29 V                                 | Permissible pressure $p_{max}$ (bar) | 220    | 305    | 260    | 225    | 195    | 170    |
|  | Delivery flow $Q_{max}$ (lpm)        |        |        |        |        |        |        |



**Gear pump Z**

| Delivery flow coding                             |                                      | Z 1.1 | Z 1.7 | Z 2.0 | Z 2.7 | Z 3.5 | Z 4.5 |       |
|--|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Size   |                                      | 1     | 1     | 1     | 1     | 1     | 1     |       |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) |                                      | 0.86  | 1.26  | 1.69  | 2.09  | 2.51  | 3.32  |       |
| KA 21  | Permissible pressure $p_{max}$ (bar) | 155   | 110   | 80    | 65    | 55    | 40    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 2.23  | 3.07  | 3.91  | 5.30  | 6.70  | 8.65  |
|  |                                      | 60 Hz | 2.68  | 3.69  | 4.69  | 6.37  | 8.04  | 10.39 |
| KA 22  | Permissible pressure $p_{max}$ (bar) | 200   | 200   | 200   | 200   | 185   | 140   |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 2.23  | 3.07  | 3.91  | 5.30  | 6.70  | 8.65  |
|  |                                      | 60 Hz | 2.68  | 3.69  | 4.69  | 6.37  | 8.04  | 10.39 |
| KA 23  | Permissible pressure $p_{max}$ (bar) | 200   | 145   | 110   | 90    | 75    | 55    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 1.09  | 1.50  | 1.90  | 2.58  | 3.26  | 4.22  |
|  |                                      | 60 Hz | 1.32  | 1.82  | 2.31  | 3.14  | 3.96  | 5.12  |
| KA 24  | Permissible pressure $p_{max}$ (bar) | 200   | 200   | 200   | 200   | 200   | 160   |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 1.09  | 1.50  | 1.90  | 2.58  | 3.26  | 4.22  |
|  |                                      | 60 Hz | 1.32  | 1.82  | 2.31  | 3.14  | 3.96  | 5.12  |
| KA 26<br>KA 26 V                                 | Permissible pressure $p_{max}$ (bar) | 200   | 200   | 200   | 200   | 200   | 155   |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 2.23  | 3.07  | 3.91  | 5.30  | 6.70  | 8.65  |
|  |                                      | 60 Hz | 2.68  | 3.69  | 4.69  | 6.37  | 8.04  | 10.39 |
| KA 28  | Permissible pressure $p_{max}$ (bar) | 200   | 200   | 200   | 200   | 200   | 200   |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 1.09  | 1.50  | 1.90  | 2.58  | 3.26  | 4.22  |
|  |                                      | 60 Hz | 1.32  | 1.82  | 2.31  | 3.14  | 3.96  | 5.12  |
| KA 29<br>KA 29 V                                 | Permissible pressure $p_{max}$ (bar) | 200   | 200   | 200   | 200   | 200   | 200   |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 1.09  | 1.50  | 1.90  | 2.58  | 3.26  | 4.22  |
|  |                                      | 60 Hz | 1.32  | 1.82  | 2.31  | 3.14  | 3.96  | 5.12  |

**Gear pump Z**

| Delivery flow coding                             |                                      | Z 5.2 | Z 6.4 | Z 6.9 | Z 8.8 | Z 9.8 | Z 11.3 |       |
|--|--------------------------------------|-------|-------|-------|-------|-------|--------|-------|
| Size   |                                      | 1     | 1     | 1     | 1     | 1     | 1      |       |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) |                                      | 3.61  | 4.39  | 4.79  | 6.21  | 7.01  | 7.89   |       |
| KA 21  | Permissible pressure $p_{max}$ (bar) | 40    | 30    | 30    |       |       |        |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 10.04 | 12.28 | 13.39 |       |        |       |
|  |                                      | 60 Hz | 12.06 | 14.74 | 16.08 |       |        |       |
| KA 22  | Permissible pressure $p_{max}$ (bar) | 125   | 105   | 95    | 75    | 65    | 55     |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 10.04 | 12.28 | 13.39 | 17.02 | 19.53  | 22.04 |
|  |                                      | 60 Hz | 12.06 | 14.74 | 16.08 | 20.44 | 23.45  |       |
| KA 23  | Permissible pressure $p_{max}$ (bar) | 50    | 45    | 40    | 30    |       |        |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 4.90  | 5.98  | 6.53  | 8.30  |        |       |
|  |                                      | 60 Hz | 5.94  | 7.26  | 7.92  | 10.07 |        |       |
| KA 24  | Permissible pressure $p_{max}$ (bar) | 145   | 120   | 110   | 85    | 75    | 65     |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 4.90  | 5.98  | 6.53  | 8.30  | 9.52   | 10.74 |
|  |                                      | 60 Hz | 5.94  | 7.26  | 7.92  | 10.07 | 11.55  | 13.04 |
| KA 26<br>KA 26 V                                 | Permissible pressure $p_{max}$ (bar) | 145   | 115   | 105   | 80    | 75    | 65     |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 10.04 | 12.28 | 13.39 | 17.02 | 19.53  | 22.04 |
|  |                                      | 60 Hz | 12.06 | 14.74 | 16.08 | 20.44 | 23.45  |       |
| KA 28  | Permissible pressure $p_{max}$ (bar) | 200   | 175   | 160   | 125   | 110   | 95     |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 4.90  | 5.98  | 6.53  | 8.30  | 9.52   | 10.74 |
|  |                                      | 60 Hz | 5.94  | 7.26  | 7.92  | 10.07 | 11.55  | 13.04 |
| KA 29<br>KA 29 V                                 | Permissible pressure $p_{max}$ (bar) | 200   | 200   | 200   | 180   | 160   | 140    |       |
|  | Delivery flow $Q_{max}$ (lpm)        | 50 Hz | 4.90  | 5.98  | 6.53  | 8.30  | 9.52   | 10.74 |
|  |                                      | 60 Hz | 5.94  | 7.26  | 7.92  | 10.07 | 11.55  | 13.04 |

Order coding example:

KAW 26/1P1 - **Z 4,5** - AL11E/120 - 1x230 V 50 Hz

Single-circuit pump with a single-phase motor Table 2b Single-circuit pump with a single-phase motor

### Table 2b Single-circuit pump (radial piston pump H or gear pump Z) with a single-phase motor

#### Note

- The delivery flow  $Q_{\max}$  relates to the rated speed and varies depending on the load (see diagrams [Chapter 3.2, "Electrical"](#)).
- Notes on the pressures  $p_{\max}$  (see [Chapter 3.2, "Electrical"](#), Table 5).
- In pump version **Z**, the max. hydraulic work value  $(pV_g)_{\max}$  is to be reduced by 10%.
- **The permissible pressures  $p_{\max}$  relate to a version with a 1x230 V 50 Hz .**
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical"](#), Table 5)"
- The version with a single-phase motor requires an operating capacitor. For recommendations and selection advice, see [Chapter 3.2, "Electrical"](#) and [Chapter 6.1, "Planning information"](#) ("Selection of the operating capacitor for type KAW"). It is not included in the scope of delivery.
- It cannot be started up directly against the effects of pressure!

## Radial piston pump H



### Note

- At a power frequency of 60 Hz, the delivery flow is approximately 1.2 times higher than that indicated here
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical", Table 5](#))"

| Delivery flow coding                             | H 0.33 | H 0.47 | H 0.59 | H 0.66 | H 0.91 | H 0.93 |
|--|--------|--------|--------|--------|--------|--------|
| Piston diameter (mm)                             | 4      | 5      | 4      | 6      | 7      | 5      |
| Number of pump elements                          | 3      | 3      | 6      | 3      | 3      | 6      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.23   | 0.35   | 0.45   | 0.51   | 0.69   | 0.71   |

|               |                                       |  |      |      |      |      |      |      |
|---------------|---------------------------------------|--|------|------|------|------|------|------|
| <b>KAW 21</b> | Permissible pressure $p_{\max}$ (bar) |  | 435  | 285  | 220  | 195  | 145  | 140  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 0.63 | 0.99 | 1.26 | 1.42 | 1.93 | 1.97 |
| <b>KAW 22</b> | Permissible pressure $p_{\max}$ (bar) |  | 700  | 655  | 510  | 450  | 330  | 320  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 0.63 | 0.99 | 1.26 | 1.42 | 1.93 | 1.97 |
| <b>KAW 23</b> | Permissible pressure $p_{\max}$ (bar) |  | 630  | 410  | 320  | 285  | 210  | 200  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 0.31 | 0.48 | 0.62 | 0.69 | 0.94 | 0.96 |
| <b>KAW 24</b> | Permissible pressure $p_{\max}$ (bar) |  | 700  | 700  | 700  | 685  | 505  | 490  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 0.31 | 0.48 | 0.62 | 0.69 | 0.94 | 0.96 |
| <b>KAW 26</b> | Permissible pressure $p_{\max}$ (bar) |  | 700  | 700  | 610  | 540  | 395  | 385  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 0.63 | 0.99 | 1.26 | 1.42 | 1.93 | 1.97 |
| <b>KAW 28</b> | Permissible pressure $p_{\max}$ (bar) |  | 700  | 700  | 700  | 700  | 580  | 560  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 0.31 | 0.48 | 0.62 | 0.69 | 0.94 | 0.96 |

## Radial piston pump H



### Note

- At a power frequency of 60 Hz, the delivery flow is approximately 1.2 times higher than that indicated here
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical", Table 5](#))"

| Delivery flow coding                             | H 1.18 | H 1.33 | H 1.51 | H 1.81 | H 2.36 | H 2.99 |
|--|--------|--------|--------|--------|--------|--------|
| Piston diameter (mm)                             | 8      | 6      | 9      | 7      | 8      | 9      |
| Number of pump elements                          | 3      | 6      | 3      | 6      | 6      | 6      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.91   | 1.02   | 1.15   | 1.39   | 1.81   | 2.29   |

|               |                                       |  |      |      |      |      |      |      |
|---------------|---------------------------------------|--|------|------|------|------|------|------|
| <b>KAW 21</b> | Permissible pressure $p_{\max}$ (bar) |  | 110  | 95   | 85   | 70   | 55   | 40   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 2.52 | 2.84 | 3.19 | 3.87 | 5.05 | 6.39 |
| <b>KAW 22</b> | Permissible pressure $p_{\max}$ (bar) |  | 250  | 225  | 200  | 165  | 125  | 100  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 2.52 | 2.84 | 3.19 | 3.87 | 5.05 | 6.39 |
| <b>KAW 23</b> | Permissible pressure $p_{\max}$ (bar) |  | 160  | 140  | 125  | 105  | 80   | 60   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 1.23 | 1.38 | 1.56 | 1.88 | 2.46 | 3.11 |
| <b>KAW 24</b> | Permissible pressure $p_{\max}$ (bar) |  | 385  | 340  | 305  | 250  | 190  | 150  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 1.23 | 1.38 | 1.56 | 1.88 | 2.46 | 3.11 |
| <b>KAW 26</b> | Permissible pressure $p_{\max}$ (bar) |  | 300  | 270  | 240  | 195  | 150  | 120  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 2.52 | 2.84 | 3.19 | 3.87 | 5.05 | 6.39 |
| <b>KAW 28</b> | Permissible pressure $p_{\max}$ (bar) |  | 440  | 390  | 345  | 285  | 220  | 175  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 1.23 | 1.38 | 1.56 | 1.88 | 2.46 | 3.11 |

## Radial piston pump H

### **i** Note

- Version with PE-type pump elements in accordance with [D 5600](#)
- only available in a vertical version (Table 1c)
- At a power frequency of 60 Hz, the delivery flow is approximately 1.2 times higher than that indicated here
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical", Table 5](#))"

| Delivery flow coding                             | H 1.84 | H 2.66 | H 3.12 | H 3.61 | H 3.69 | H 4.14 |
|--|--------|--------|--------|--------|--------|--------|
| Piston diameter (mm)                             | 10     | 12     | 13     | 14     | 10     | 15     |
| Number of pump elements                          | 3      | 3      | 3      | 3      | 6      | 3      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 1.41   | 2.04   | 2.39   | 2.77   | 2.83   | 3.18   |

|               |                                       |  |      |      |      |      |      |      |
|---------------|---------------------------------------|--|------|------|------|------|------|------|
| <b>KAW 21</b> | Permissible pressure $p_{\max}$ (bar) |  | 70   | 45   | 40   | 35   | 35   | 30   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 3.86 | 5.59 | 6.55 | 7.59 | 7.75 | 8.71 |
| <b>KAW 22</b> | Permissible pressure $p_{\max}$ (bar) |  | 160  | 110  | 95   | 80   | 80   | 70   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 3.86 | 5.59 | 6.55 | 7.59 | 7.75 | 8.71 |
| <b>KAW 23</b> | Permissible pressure $p_{\max}$ (bar) |  | 100  | 70   | 60   | 50   | 50   | 45   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 1.90 | 2.75 | 3.22 | 3.73 | 3.81 | 4.29 |
| <b>KAW 24</b> | Permissible pressure $p_{\max}$ (bar) |  | 245  | 170  | 145  | 125  | 120  | 110  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 1.90 | 2.75 | 3.22 | 3.73 | 3.81 | 4.29 |
| <b>KAW 26</b> | Permissible pressure $p_{\max}$ (bar) |  | 195  | 130  | 115  | 95   | 95   | 85   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 3.86 | 5.59 | 6.55 | 7.59 | 7.75 | 8.71 |
| <b>KAW 28</b> | Permissible pressure $p_{\max}$ (bar) |  | 280  | 195  | 165  | 140  | 140  | 125  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |  | 1.90 | 2.75 | 3.22 | 3.73 | 3.81 | 4.29 |

## Radial piston pump H



### Note

- Version with PE-type pump elements in accordance with [D 5600](#)
- only available in a vertical version (Table 1c)
- At a power frequency of 60 Hz, the delivery flow is approximately 1.2 times higher than that indicated here
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical", Table 5](#))"

| Delivery flow coding                             | H 4.72 | H 5.31 | H 6.24 | H 7.23 | H 8.29 | H 9.45 |
|--|--------|--------|--------|--------|--------|--------|
| Piston diameter (mm)                             | 16     | 12     | 13     | 14     | 15     | 16     |
| Number of pump elements                          | 3      | 6      | 6      | 6      | 6      | 6      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 3.62   | 4.07   | 4.78   | 5.54   | 6.36   | 7.24   |

|               |                                       |      |      |      |      |      |
|---------------|---------------------------------------|------|------|------|------|------|
| <b>KAW 21</b> | Permissible pressure $p_{\max}$ (bar) | 25   |      |      |      |      |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 9.92 |      |      |      |      |
| <b>KAW 22</b> | Permissible pressure $p_{\max}$ (bar) | 60   |      |      |      |      |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 9.92 |      |      |      |      |
| <b>KAW 23</b> | Permissible pressure $p_{\max}$ (bar) | 40   | 35   | 30   | 25   | 20   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 4.88 | 5.49 | 6.44 | 7.47 | 8.57 |
| <b>KAW 24</b> | Permissible pressure $p_{\max}$ (bar) | 95   | 85   | 70   | 60   | 55   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 4.88 | 5.49 | 6.44 | 7.47 | 8.57 |
| <b>KAW 26</b> | Permissible pressure $p_{\max}$ (bar) | 75   |      |      |      |      |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 9.92 |      |      |      |      |
| <b>KAW 28</b> | Permissible pressure $p_{\max}$ (bar) | 110  | 95   | 80   | 70   | 60   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 4.88 | 5.49 | 6.44 | 7.47 | 8.57 |

## Gear pump Z



### Note

- At a power frequency of 60 Hz, the delivery flow is approximately 1.2 times higher than that indicated here
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical", Table 5](#))"

| Delivery flow coding                             | Z 1.1 | Z 1.7 | Z 2.0 | Z 2.7 | Z 3.5 | Z 4.5 |
|--|-------|-------|-------|-------|-------|-------|
| Size   | 1     | 1     | 1     | 1     | 1     | 1     |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.86  | 1.26  | 1.69  | 2.09  | 2.51  | 3.32  |

|               |                                       |      |      |      |      |      |      |
|---------------|---------------------------------------|------|------|------|------|------|------|
| <b>KAW 21</b> | Permissible pressure $p_{\max}$ (bar) | 90   | 65   | 50   | 40   | 35   |      |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 2.23 | 3.07 | 3.91 | 5.30 | 6.70 |      |
| <b>KAW 22</b> | Permissible pressure $p_{\max}$ (bar) | 200  | 155  | 115  | 90   | 80   | 60   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 2.23 | 3.07 | 3.91 | 5.30 | 6.70 | 8.65 |
| <b>KAW 23</b> | Permissible pressure $p_{\max}$ (bar) | 135  | 95   | 70   | 55   | 50   | 35   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 1.09 | 1.50 | 1.90 | 2.58 | 3.26 | 4.22 |
| <b>KAW 24</b> | Permissible pressure $p_{\max}$ (bar) | 200  | 200  | 175  | 140  | 125  | 90   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 1.09 | 1.50 | 1.90 | 2.58 | 3.26 | 4.22 |
| <b>KAW 26</b> | Permissible pressure $p_{\max}$ (bar) | 200  | 185  | 135  | 110  | 95   | 70   |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 2.23 | 3.07 | 3.91 | 5.30 | 6.70 | 8.65 |
| <b>KAW 28</b> | Permissible pressure $p_{\max}$ (bar) | 200  | 200  | 200  | 160  | 140  | 105  |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 1.09 | 1.50 | 1.90 | 2.58 | 3.26 | 4.22 |



## Gear pump Z



### Note

- At a power frequency of 60 Hz, the delivery flow is approximately 1.2 times higher than that indicated here
- Be aware of different motor power ratings and resulting permissible maximum pressures  $p_{\max} = (pV_g)_{\max}/V_g$  at other nominal voltages and power frequencies,  $(pV_g)_{\max}$  (see [Chapter 3.2, "Electrical", Table 5](#))"

| Delivery flow coding                             | Z 5.2 | Z 6.4 | Z 6.9 | Z 8.8 | Z 9.8 | Z 11.3 |
|--|-------|-------|-------|-------|-------|--------|
| Size   | 1     | 1     | 1     | 1     | 1     | 1      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 3.61  | 4.39  | 4.79  | 6.21  | 7.01  | 7.89   |

|               |                                       |       |       |       |       |       |
|---------------|---------------------------------------|-------|-------|-------|-------|-------|
| <b>KAW 21</b> | Permissible pressure $p_{\max}$ (bar) |       |       |       |       |       |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  |       |       |       |       |       |
| <b>KAW 22</b> | Permissible pressure $p_{\max}$ (bar) | 55    | 45    | 40    | 30    |       |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 10.04 | 12.28 | 13.39 | 17.02 |       |
| <b>KAW 23</b> | Permissible pressure $p_{\max}$ (bar) | 35    |       |       |       |       |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 4.90  |       |       |       |       |
| <b>KAW 24</b> | Permissible pressure $p_{\max}$ (bar) | 85    | 70    | 65    | 50    | 40    |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 4.90  | 5.98  | 6.53  | 8.30  | 9.52  |
| <b>KAW 26</b> | Permissible pressure $p_{\max}$ (bar) | 65    | 55    | 50    | 35    | 35    |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 10.04 | 12.28 | 13.39 | 17.02 | 19.53 |
| <b>KAW 28</b> | Permissible pressure $p_{\max}$ (bar) | 95    | 80    | 75    | 55    | 50    |
|               | Delivery flow $Q_{\max}$ (lpm) 50 Hz  | 4.90  | 5.98  | 6.53  | 8.30  | 9.52  |

## 2.2.2 Dual-circuit pump with shared pedestal

### a) Radial piston pump version - radial piston pump HH and radial piston pump - gear pump HZ

Order coding example:

|     |       |        |     |   |      |       |              |                 |
|-----|-------|--------|-----|---|------|-------|--------------|-----------------|
| KAW | 24 1  | S KS E | / H | H | 0,34 | / 2,0 | - NA31 - ... | - 1x230 V 50 Hz |
| KA  | 24 11 | S KS E | / H | Z | 0,34 | / 6,9 | - NA31 - ... | - 3x400 V 50 Hz |

Pressure connection P3 Table 4 Pressure connection P3

Pressure connection P1 Table 3 Pressure connection P1

Pressure connection P3 Table 4 Pressure connection P3: Radial piston pump H or gear pump Z

Pressure connection P1 Table 3 Pressure connection P1: Radial piston pump H

### Combination options

| Coding | P1              | P3               | Examples     |
|--------|-----------------|------------------|--------------|
| HH     | 3 pump elements | 3 pump elements  | HH 0.66/1.18 |
|        | 2 pump elements | 4 pump elements  | HH 0.34/0.86 |
|        | 6 pump elements | 6 pump elements  | HH 0.93/0.93 |
|        | 3 pump elements | 9 pump elements  | HH 0.47/2.01 |
| HZ     | 3 pump elements | Gear pump size 1 | HZ 0.33/9.8  |
|        | 6 pump elements | Gear pump size 1 | HZ 0.59/8.8  |

### Table 3 Pressure connection P1



#### Note

- The delivery flow  $Q_{max}$  relates to the rated speed and varies depending on the load (see diagrams [Chapter 3.2, "Electrical"](#)).
- Notes on the pressures  $p_{max}$  (see [Chapter 3.2, "Electrical"](#), Table 5).
- In pump versions HH and HZ, the max. hydraulic work value  $(pVg)_{max}$  is to be reduced by 10%.

### Radial piston pump H

| Delivery flow coding                             | H 0.33 | H 0.47 | H 0.66 | H 0.91 | H 1.18 | H 1.51 |
|--|--------|--------|--------|--------|--------|--------|
| Piston diameter (mm)                             | 4      | 5      | 6      | 7      | 8      | 9      |
| Number of pump elements                          | 3      | 3      | 3      | 3      | 3      | 3      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.23   | 0.35   | 0.51   | 0.69   | 0.91   | 1.15   |
| Delivery flow coding                             | H 0.21 | H 0.34 | H 0.48 | H 0.62 | H 0.78 | H 0.99 |
| Piston diameter (mm)                             | 4      | 5      | 6      | 7      | 8      | 9      |
| Number of pump elements                          | 2      | 2      | 2      | 2      | 2      | 2      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.15   | 0.24   | 0.34   | 0.46   | 0.60   | 0.76   |
| Delivery flow coding                             | H 0.59 | H 0.93 | H 1.33 | H 1.81 | H 2.36 | H 2.99 |
| Piston diameter (mm)                             | 4      | 5      | 6      | 7      | 8      | 9      |
| Number of pump elements                          | 6      | 6      | 6      | 6      | 6      | 6      |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.45   | 0.71   | 1.02   | 1.39   | 1.81   | 2.29   |

**Table 4 Pressure connection P3**
 **Note**

- The delivery flow  $Q_{\max}$  relates to the rated speed and varies depending on the load (see diagrams [Chapter 3.2, "Electrical"](#)).
- Notes on the pressures  $p_{\max}$  (see [Chapter 3.2, "Electrical"](#), Table 5).
- Pump version **HH** only in a vertical version
- \* only in combination with coding H 0.33 ... H 1.51 (3MPE),  $p_{\max}$  at P3 = 200 bar, only in a vertical version
- Pump version **HZ** only in combination with tank size 01, 11, 02, 21, 22.

**Radial piston pump H**

|  |               |               |               |               |               |               |
|--|---------------|---------------|---------------|---------------|---------------|---------------|
| Delivery flow coding                             | <b>H 0.33</b> | <b>H 0.47</b> | <b>H 0.66</b> | <b>H 0.91</b> | <b>H 1.18</b> | <b>H 1.51</b> |
| Piston diameter (mm)                             | 4             | 5             | 6             | 7             | 8             | 9             |
| Number of pump elements                          | 3             | 3             | 3             | 3             | 3             | 3             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.23          | 0.35          | 0.51          | 0.69          | 0.91          | 1.15          |
| Delivery flow coding                             | <b>H 0.38</b> | <b>H 0.58</b> | <b>H 0.86</b> | <b>H 1.21</b> | <b>H 1.59</b> | <b>H 2.00</b> |
| Piston diameter (mm)                             | 4             | 5             | 6             | 7             | 8             | 9             |
| Number of pump elements                          | 4             | 4             | 4             | 4             | 4             | 4             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.30          | 0.47          | 0.68          | 0.92          | 1.21          | 1.53          |
| Delivery flow coding                             | <b>H 0.59</b> | <b>H 0.93</b> | <b>H 1.33</b> | <b>H 1.81</b> | <b>H 2.36</b> | <b>H 2.99</b> |
| Piston diameter (mm)                             | 4             | 5             | 6             | 7             | 8             | 9             |
| Number of pump elements                          | 6             | 6             | 6             | 6             | 6             | 6             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.45          | 0.71          | 1.02          | 1.39          | 1.81          | 2.29          |
| Delivery flow coding                             | <b>H 0.85</b> | <b>H 1.38</b> | <b>H 2.01</b> | <b>H 2.71</b> | <b>H 3.54</b> | <b>H 4.49</b> |
| Piston diameter (mm)                             | 4             | 5             | 6             | 7             | 8             | 9             |
| Number of pump elements                          | 9             | 9             | 9             | 9             | 9             | 9             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.68          | 1.06          | 1.53          | 2.08          | 2.71          | 3.44          |
| Delivery flow coding *                           | <b>H 1.84</b> | <b>H 2.66</b> | <b>H 3.12</b> | <b>H 3.61</b> | <b>H 4.14</b> | <b>H 4.72</b> |
| Piston diameter (mm)                             | 10            | 12            | 13            | 14            | 15            | 16            |
| Number of pump elements                          | 3             | 3             | 3             | 3             | 3             | 3             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 1.41          | 2.04          | 2.39          | 2.77          | 3.18          | 3.62          |


**Gear pump Z**

|  |              |              |              |              |              |               |
|--|--------------|--------------|--------------|--------------|--------------|---------------|
| Delivery flow coding                             | <b>Z 1.1</b> | <b>Z 1.7</b> | <b>Z 2.0</b> | <b>Z 2.7</b> | <b>Z 3.5</b> | <b>Z 4.5</b>  |
| Size   | 1            | 1            | 1            | 1            | 1            | 1             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 0.86         | 1.26         | 1.69         | 2.09         | 2.51         | 3.32          |
| Delivery flow coding                             | <b>Z 5.2</b> | <b>Z 6.4</b> | <b>Z 6.9</b> | <b>Z 8.8</b> | <b>Z 9.8</b> | <b>Z 11.3</b> |
| Size   | 1            | 1            | 1            | 1            | 1            | 1             |
| Displacement volume $V_g$ (cm <sup>3</sup> /rev) | 3.61         | 4.39         | 4.79         | 6.21         | 7.01         | 7.89          |

### 3.1 General

#### General information

|                              |  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
|------------------------------|--|-----------------------|------------------|-----------|--|------------------|-----------------|------------------|------------------|------------------|------------------|
| <b>Conformity</b>            | <ul style="list-style-type: none"> <li>▪ Declaration of incorporation according to Machinery Directive 2006/42/EC, see <a href="#">Chapter 6.2, "Explanations"</a></li> <li>▪ Declaration of conformity according to Low-Voltage Directive 2006/95/EC, see <a href="#">Chapter 6.2, "Explanations"</a></li> <li>▪ UL conformity of the stators - UL reference E216350</li> <li>▪ UL conformity of the external fans F, F1 - UL reference E216350</li> </ul>  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Designation</b>           | Hydraulic power pack   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Design</b>                | Valve-controlled radial piston pump or gear pump   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Model</b>                 | Compact hydraulic power pack (closed unit with a pump, electric drive and tank)  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Material</b>              | Housing: Aluminium   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Attachment</b>            | M8 threaded holes, see dimensioned drawings  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Tightening torques</b>    | See <a href="#">Chapter 4, "Dimensions"</a>  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Installation position</b> | Vertical (KA...S) or horizontal (KA...L)<br>Take note of the installation instructions for horizontal positioning in section 4.2.  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Rotation direction</b>    | Radial piston pump – any<br>Gear pump – anticlockwise<br>(Rotation direction only ascertainable from check of delivery flow; if there is no delivery flow in the three-phase version, replace two of the three main conductors)  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Speed range</b>           | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Radial piston pump H:</td> <td style="text-align: right;">100 ... 3500 rpm</td> </tr> <tr> <td colspan="2">Gear pump</td> </tr> <tr> <td>Z 1.1 ... Z 2.7:</td> <td style="text-align: right;">800 to 4000 rpm</td> </tr> <tr> <td>Z 3.5 ... Z 8.4:</td> <td style="text-align: right;">500 ... 3800 rpm</td> </tr> <tr> <td>Z 8.8 ... Z 11.3</td> <td style="text-align: right;">500 ... 3500 rpm</td> </tr> </table> | Radial piston pump H: | 100 ... 3500 rpm | Gear pump |  | Z 1.1 ... Z 2.7: | 800 to 4000 rpm | Z 3.5 ... Z 8.4: | 500 ... 3800 rpm | Z 8.8 ... Z 11.3 | 500 ... 3500 rpm |
| Radial piston pump H:        | 100 ... 3500 rpm   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| Gear pump                    |  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| Z 1.1 ... Z 2.7:             | 800 to 4000 rpm  |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| Z 3.5 ... Z 8.4:             | 500 ... 3800 rpm   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| Z 8.8 ... Z 11.3             | 500 ... 3500 rpm   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |
| <b>Line connection</b>       | only via the screwed-on connection blocks, see selection table in <a href="#">Chapter 6.1, "Planning information"</a> ( "Selection of the connection blocks" )<br>Basic pump: Connection drilling pattern, see <a href="#">Chapter 4.3, "Electrical and hydraulic connections"</a>   |                       |                  |           |  |                  |                 |                  |                  |                  |                  |

|                           |   |             |                      |          |       |                     |        |            |      |                   |                 |
|---------------------------|---|-------------|----------------------|----------|-------|---------------------|--------|------------|------|-------------------|-----------------|
| <b>Silica gel filters</b> | <table border="0"> <tr> <td>Filter area</td> <td>26.6 cm<sup>2</sup></td> </tr> <tr> <td>Quantity</td> <td>125 g</td> </tr> <tr> <td>Absorption capacity</td> <td>150 ml</td> </tr> <tr> <td>Filtration</td> <td>3 μm</td> </tr> <tr> <td>Temperature range</td> <td>-30°C ... +90°C</td> </tr> </table> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p><b>Note</b><br/>  Take note of the maintenance information in <a href="#">Chapter 5.4, "Maintenance information"</a>!</p> </div> | Filter area | 26.6 cm <sup>2</sup> | Quantity | 125 g | Absorption capacity | 150 ml | Filtration | 3 μm | Temperature range | -30°C ... +90°C |
| Filter area               | 26.6 cm <sup>2</sup>  |             |                      |          |       |                     |        |            |      |                   |                 |
| Quantity                  | 125 g   |             |                      |          |       |                     |        |            |      |                   |                 |
| Absorption capacity       | 150 ml  |             |                      |          |       |                     |        |            |      |                   |                 |
| Filtration                | 3 μm  |             |                      |          |       |                     |        |            |      |                   |                 |
| Temperature range         | -30°C ... +90°C   |             |                      |          |       |                     |        |            |      |                   |                 |
| <b>Hydraulic fluid</b>    | <p>Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519<br/>         Viscosity range: min. approx. 4; max. approx. 800 mm<sup>2</sup>/s<br/>         Optimal operating range: approx. 10 ... 500 mm<sup>2</sup>/s<br/>         Also suitable for biologically degradable pressure fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.</p>   |             |                      |          |       |                     |        |            |      |                   |                 |
| <b>Cleanliness level</b>  | <p><b>ISO 4406</b><br/> <hr style="width: 50%; margin-left: 0;"/>         21/18/15...19/17/13</p>   |             |                      |          |       |                     |        |            |      |                   |                 |
| <b>Temperature</b>        | <p>Ambient: approx. -40 ... +80°C, Fluid: -25 ... +80°C, Note the viscosity range!<br/>         Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation.<br/>         Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70°C.</p>  |             |                      |          |       |                     |        |            |      |                   |                 |

**Weight**

(without oil filling)

| Type          | H (3 cylinders) | H (6 cylinders) | Z       | HZ      |
|---------------|-----------------|-----------------|---------|---------|
| KA 21, 23     | 10.9 kg         | 11.5 kg         | 12.7 kg | 13.2 kg |
| KA 22, 24     | 13.2 kg         | 13.6 kg         | 15.0 kg | 15.5 kg |
| KA 26, 28, 29 | 14.7 kg         | 15.1 kg         | 16.5 kg | 17.0 kg |

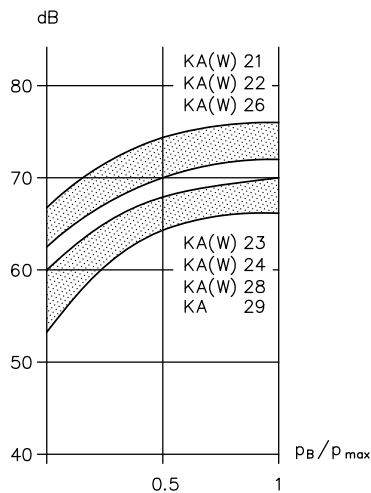
Weight of the required connection blocks and valve banks, see the relevant publications, see [Chapter 6.1, "Planning information"](#) ("Selection of connection blocks") and ("Selection of directional valve banks")

|                                  |   |
|----------------------------------|---|
| Tank size 01, 1                  | + 0.7 kg  |
| Tank size 02, 2                  | + 2.2 kg  |
| Tank size 11                     | + 1.4 kg  |
| Tank size 21                     | + 2.9 kg  |
| Tank size 22, 3                  | + 4.4 kg  |
| External fans F, F1              | + 1.8 kg  |
| External side fans FSL, FSR, FSH | + 0.54 kg (1x110 V, 1x230 V)<br>+ 0.22 kg (24 V DC) |
| External side fan FSLR           | + 1.1 kg (1x110 V, 1x230 V)<br>+ 0.45 kg (24 V DC)  |

**Characteristics**

**Running noises**

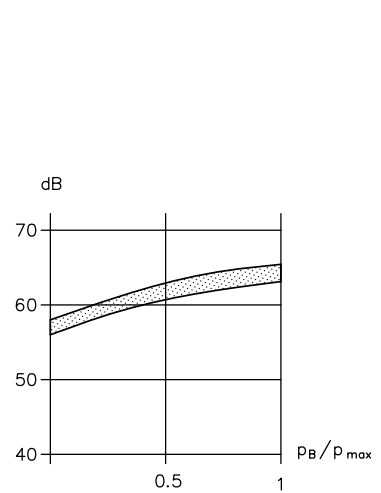
**Radial piston pump**



$p_B/p_{max}$  pressure ratio; dB noise level (A)

$$\frac{p_B}{p_{max}} \text{ Dackvehaltnis}$$

**Gear pump**



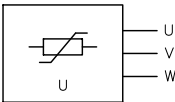
$p_B/p_{max}$  pressure ratio; dB noise level (A)

$$\frac{p_B}{p_{max}} \text{ Dackvehaltnis}$$

## 3.2 Electrical

Data applies to radial piston and gear pumps

The drive motor forms a closed, inseparable unit with the pump, see description [Chapter 1, "Overview compact hydraulic power pack type KA2 and KAW2"](#).

|                         |  |                   |             |           |              |                  |        |   |
|-------------------------|--|-------------------|-------------|-----------|--------------|------------------|--------|---|
| <b>Port</b>             | <ul style="list-style-type: none"> <li>For version with HARTING plug cable 1.5 mm<sup>2</sup></li> <li>For version with integrated terminal boxes, flat plug sleeve 6.3 AMP (cable fitting M 20x1.5 or M12x1 (PM option) must be provided by the customer)</li> </ul>  |                   |             |           |              |                  |        |   |
| <b>Protection class</b> | IP 65 in accordance with IEC 60529   |                   |             |           |              |                  |        |   |
|                         | <p><b>Note</b><br/>The breather filter must be safeguarded against moisture penetration</p>  |                   |             |           |              |                  |        |   |
| <b>Protection class</b> | VDE 0100 protection class 1  |                   |             |           |              |                  |        |   |
| <b>Insulation</b>       | <p>Designed in accordance with EN 60 664-1</p> <ul style="list-style-type: none"> <li>For 4 wire AC voltage systems L1-L2-L3-PE (3-phase systems) <b>with</b> an earthed neutral point up to 500 V AC nominal phase voltage phase-phase</li> <li>For 3-wire AC voltage systems L1-L2-L3 (3-phase systems) <b>without</b> an earthed neutral point up to a nominal phase voltage of 300 V AC phase-phase</li> <li>For a single-phase and earthed 2-wire alternating current system L-N (alternating current or mains) up to a nominal voltage of 300 V AC.</li> </ul> |                   |             |           |              |                  |        |   |
| <b>Suppressor</b>       | Type RC 3 R  |                   |             |           |              |                  |        |   |
| <b>Coding E, PE</b>     | <table border="0"> <tr> <td>Operating voltage</td> <td>3x 575 V AC</td> </tr> <tr> <td>Frequency</td> <td>10 to 400 Hz</td> </tr> <tr> <td>max. motor power</td> <td>4.0 kW</td> </tr> </table>  | Operating voltage | 3x 575 V AC | Frequency | 10 to 400 Hz | max. motor power | 4.0 kW |  |
| Operating voltage       | 3x 575 V AC  |                   |             |           |              |                  |        |   |
| Frequency               | 10 to 400 Hz   |                   |             |           |              |                  |        |   |
| max. motor power        | 4.0 kW   |                   |             |           |              |                  |        |   |

**Table 5 Motor data**
**3-phase motor**

| Type  | Nominal voltage and power frequency<br>$U_N$ (V), f (Hz) | Nominal power<br>$P_N$ (kW) | Rated speed<br>$n_N$ (rpm) | Nominal current<br>$I_N$ (A) | Starting current ratio<br>$I_A / I_N$ | Power factor<br>$\cos \varphi$ | Hydraulic work value<br>$(pV_g)_{\max}$<br>(bar cm <sup>3</sup> ) |
|-------|--|-----------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------------|---|
| KA 21 | 3x400 V 50 Hz / 3x460 V 60 Hz                            | 0.55 / 0.66                 | 2790 / 3350                | 1.25 / 1.3                   | 4.8 / 5.4                             | 0.84 / 0.88                    | 165 / 165   |
|       | 3x230 V 50 Hz  | 0.55                        | 2790                       | 2.2                          | 4.8                                   | 0.84                           | 165   |
|       | 3x690 V 50 Hz $\Upsilon$                                 | 0.55                        | 2790                       | 0.73                         | 4.8                                   | 0.84                           | 165   |
| KA 22 | 3x400 V 50 Hz / 3x460 V 60 Hz                            | 1.1 / 1.32                  | 2790 / 3400                | 2.7 / 2.6                    | 5.4 / 7.1                             | 0.83 / 0.80                    | 520 / 520   |
|       | 3x230 V 50 Hz  | 1.32                        | 2790                       | 4.7                          | 5.4                                   | 0.83                           | 520   |
|       | 3x690 V 50 Hz $\Upsilon$                                 | 1.1                         | 2790                       | 1.55                         | 6.3                                   | 0.83                           | 490   |
|       | 3x200 V 50 Hz / 3x220 V 60 Hz *                          | 1.1 / 1.1                   | 2820 / 3380                | 5.5 / 4.9                    | 5.4 / 6.2                             | 0.74 / 0.88                    | 490 / 350   |
| KA 23 | 3x400 V 50 Hz / 3x460 V 60 Hz                            | 0.37 / 0.44                 | 1360 / 1650                | 1.0 / 1.0                    | 4.3 / 4.4                             | 0.80 / 0.81                    | 220 / 220   |
|       | 3x230 V 50 Hz  | 0.37                        | 1360                       | 1.75                         | 4.3                                   | 0.80                           | 220   |
|       | 3x690 V 50 Hz $\Upsilon$ S3                              | 0.75                        | 1330                       | 1.3                          | 3.0                                   | 0.75                           | 385   |
|       | 3x575 V 60 Hz $\Upsilon$ S3                              | 0.75                        | 1670                       | 1.4                          | 3.8                                   | 0.75                           | 360   |
|       | 3x200 V 50 Hz / 3x220 V 60 Hz *                          | 0.37 / 0.37                 | 1410 / 1690                | 2.3 / 2.0                    | 4.8 / 4.8                             | 0.67 / 0.67                    | 290 / 210   |
| KA 24 | 3x400 V 50 Hz / 3x460 V 60 Hz                            | 0.75 / 0.9                  | 1360 / 1650                | 2.2 / 2.1                    | 4.3 / 5.4                             | 0.74 / 0.74                    | 590   |
|       | 3x230 V 50 Hz  | 0.75                        | 1360                       | 3.8                          | 4.3                                   | 0.74                           | 590   |
|       | 3x500 V 50 Hz / 3x575 V 60 Hz                            | 0.75 / 0.9                  | 1400 / 1700                | 1.8 / 1.6                    | 4.3 / 4.8                             | 0.71 / 0.68                    | 590 / 590   |
|       | 3x200 V 50 Hz / 3x220 V 60 Hz *                          | 0.75 / 0.75                 | 1390 / 1680                | 4.5 / 3.9                    | 4.8 / 4.8                             | 0.67 / 0.67                    | 610 / 460   |
| KA 26 | 3x400 V 50 Hz / 3x460 V 60 Hz                            | 1.4 / 1.68                  | 2810 / 3340                | 3.3 / 3.0                    | 5.1 / 5.0                             | 0.82 / 0.90                    | 585   |
|       | 3x230 V 50 Hz  | 1.4                         | 2810                       | 5.7                          | 5.1                                   | 0.82                           | 585   |
|       | 3x500 V 50 Hz / 3x575 V 60 Hz                            | 1.4 / 1.4                   | 2820 / 3450                | 2.35 / 2.0                   | 6.0 / 7.1                             | 0.85 / 0.86                    | 590 / 590   |
|       | 3x380 V 60 Hz $\Upsilon$                                 | 1.4                         | 3450                       | 3.05                         | 7.1                                   | 0.86                           | 630   |
|       | 3x200 V 50 Hz / 3x220 V 60 Hz *                          | 1.4 / 1.4                   | 2840 / 3450                | 6.4 / 5.3                    | 6.2 / 7.1                             | 0.79 / 0.86                    | 630 / 630   |
| KA 28 | 3x400 V 50 Hz / 3x460 V 60 Hz                            | 1.2 / 1.45                  | 1380 / 1680                | 3.4 / 3.2                    | 4.8 / 5.0                             | 0.76 / 0.78                    | 870 / 870   |
|       | 3x230 V 50 Hz  | 1.2                         | 1380                       | 5.9                          | 4.8                                   | 0.76                           | 870   |
|       | 3x200 V 50 Hz / 3x220 V 60 Hz *                          | 1.1 / 1.1                   | 1390 / 1690                | 6.3 / 5.5                    | 5.1 / 5.1                             | 0.67 / 0.76                    | 785 / 665   |
| KA 29 | 3x400 V 50 Hz  | 1.6 / 1.92                  | 1390 / 1690                | 6.7 / 6.2                    | 3.8 / 3.8                             | 0.54 / 0.54                    | 1250 / 1250   |
|       | 3x230 V 50 Hz  | 1.6                         | 1390                       | 11.6                         | 3.8                                   | 0.54                           | 1250  |
|       | 3x200 V 50 Hz / 3x220 V 60 Hz *                          | 1.6 / 1.92                  | 1400 / 1680                | 12.5 / 10.8                  | 3.9 / 3.9                             | 0.55 / 0.55                    | 1225 / 1060   |

\* Motors for 200 V 50 Hz or 220 V 60 Hz networks (Japan)



**Re. Table 5 Motor data**
**Single-phase-motor**

| Type          | Nominal voltage and power frequency<br>$U_N$ (V), f (Hz) | Nominal power<br>$P_N$ (kW) | Rated speed<br>$n_N$ (rpm) | Nominal current<br>$I_N$ (A) | Starting current ratio<br>$I_A / I_N$ | Power factor<br>$\cos \varphi$ | Recommended operating capacitor<br>$C_B$ ( $\mu$ F) | Hydraulic work value<br>$(pV_g)_{max}$<br>(bar $cm^3$ ) |
|---------------|--|-----------------------------|----------------------------|------------------------------|---------------------------------------|--------------------------------|---|---|
| <b>KAW 21</b> | 1x230 V 50 Hz $\perp$                                    | 0.37                        | 2770                       | 2.5                          | 3.7                                   | 0.97                           | 16  | 100   |
|               | 1x110 V 60 Hz $\perp$                                    | 0.37                        | 3340                       | 5.5                          | 3.0                                   | 0.96                           | 50  | 70  |
| <b>KAW 22</b> | 1x230 V 50 Hz $\perp$                                    | 0.75                        | 2810                       | 4.75                         | 4.4                                   | 0.94                           | 25  | 315   |
|               | 1x110 V 60 Hz $\perp$                                    | 0.75                        | 3400                       | 12.0                         | 3.5                                   | 0.90                           | 120   | 225   |
|               | 1x220 V 60 Hz $\perp$                                    | 0.75                        | 3400                       | 6.0                          | 3.5                                   | 0.90                           | 30  | 230   |
|               | 1x115 V 50 Hz $\perp$                                    | 0.75                        | 2810                       | 9.5                          | 4.4                                   | 0.94                           | 100   | 225   |
| <b>KAW 23</b> | 1x230 V 50 Hz $\perp$                                    | 0.25                        | 1380                       | 1.9                          | 3.0                                   | 0.91                           | 12  | 145   |
|               | 1x110 V 60 Hz $\perp$                                    | 0.25                        | 1650                       | 4.4                          | 3.2                                   | 0.96                           | 50  | 100   |
| <b>KAW 24</b> | 1x230 V 50 Hz $\perp$                                    | 0.5                         | 1390                       | 4.1                          | 2.9                                   | 0.95                           | 16  | 350   |
|               | 1x110 V 60 Hz $\perp$                                    | 0.5                         | 1680                       | 9.0                          | 3.3                                   | 0.98                           | 50  | 210   |
|               | 1x220 V 60 Hz $\perp$                                    | 0.5                         | 1680                       | 3.9                          | 2.9                                   | 0.98                           | 25  | 275   |
| <b>KAW 26</b> | 1x230 V 50 Hz $\perp$                                    | 1.1                         | 2770                       | 7.2                          | 4.8                                   | 0.98                           | 25  | 275   |
|               | 1x110 V 60 Hz $\perp$                                    | 1.1                         | 3340                       | 15.0                         | 4.0                                   | 0.99                           | 80  | 235   |
|               | 1x220 V 60 Hz $\perp$                                    | 1.1                         | 3340                       | 7.2                          | 4.0                                   | 0.99                           | 20  | 275   |
|               | 1x115 V 50 Hz $\perp$                                    | 1.1                         | 2750                       | 15.0                         | 4.0                                   | 0.96                           | 100   | 260   |
| <b>KAW 28</b> | 1x230 V 50 Hz $\perp$                                    | 0.7                         | 1370                       | 5.1                          | 3.0                                   | 0.94                           | 20  | 400   |
|               | 1x110 V 60 Hz $\perp$                                    | 0.7                         | 1650                       | 10.5                         | 3.0                                   | 0.98                           | 80  | 315   |

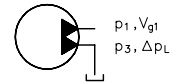
**i** Note

- The current consumption of the motor is dependent on the load. The nominal values only apply for one operating point. In modes S2 and S3 the motor may be used at up to about 1.8 times its nominal capacity. The heat development which is increased here is cooled in the no-load phases or during stoppage times.
- The current and pump delivery flow can be estimated on the basis of the medium and maximum hydraulic work values  $(pV_g)_m$  and  $(pV_g)_{max}$ .
- The relevant load case is responsible for current consumption in dual-circuit pumps. The hydraulic work of the individual circuits is to be determined and added.

All connections  
pressurised:



One connection  
pressurised, the  
other one deliver-  
ing in circulation  
mode:



Dual-circuit pumps  $(pV_g)_{calc} = p_1 V_{g1} + p_3 V_{g3}$

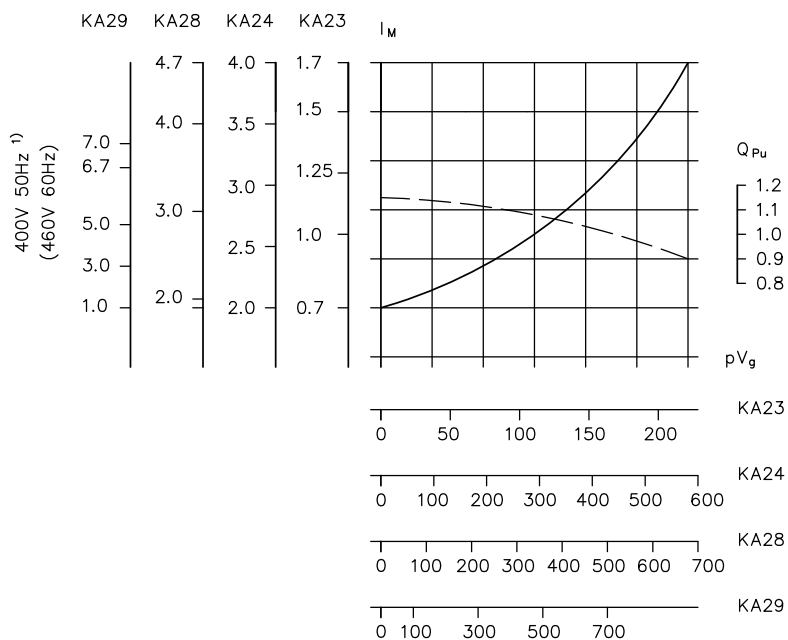
Dual-circuit pumps  $(pV_g)_{calc} = p_1 V_{g1} + \Delta p_L V_{g3}$

- Versions with single-phase motors  
Actual current consumption is also dependent on the size of the operating capacitor  
The operating capacitor is not included in the scope of supply. Re. the design, see [Chapter 6.1, "Planning information"](#) ("Selection of the operating capacitor for the KAW type")
- Re. the specification for the operating capacitor
  - 1x230 V 50 Hz - ...  $\mu F$  / 400 V DB
  - 1x220 V 60 Hz - ...  $\mu F$  / 400 V DB
  - 1x115 V 50 Hz - ...  $\mu F$  / 230 V DB
  - 1x110 V 60 Hz - ...  $\mu F$  / 230 V DB
- Voltage tolerances:  $\pm 10\%$  (IEC 38), at 3x460/265 V 60 Hz  $\pm 5\%$   
It can be operated at undervoltage; take note of information about performance restrictions in [Chapter 6.1, "Planning information"](#) ("Selection of a compact hydraulic power pack")!
- In the pump version **Z**, **HH** or **HZ**, the maximum hydraulic work value  $(pV_g)_{max}$  is to be reduced by 10%.

## Current consumption

### KA 23, KA 24, KA 28, KA 29

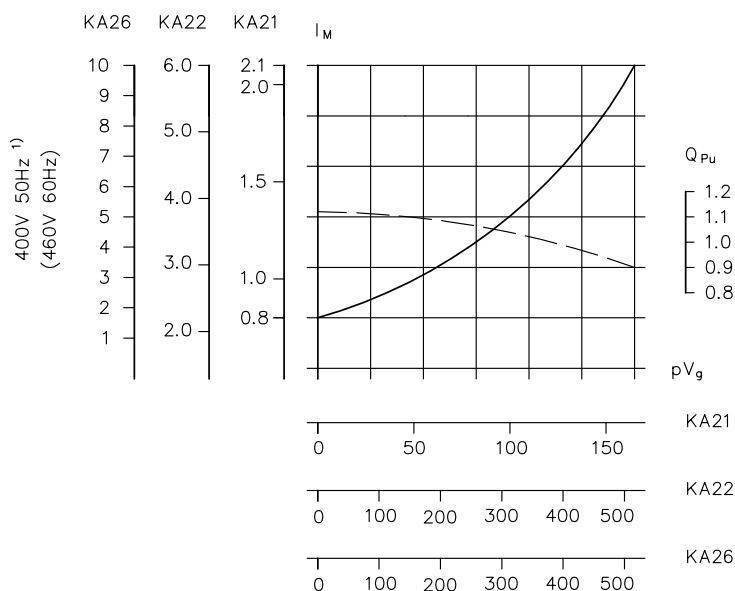
Operating voltage 3x400/230 V 50 Hz  $\Upsilon\Delta$   
3x460/265 V 60 Hz  $\Upsilon\Delta$



$pV_g$  hydraulic work value (bar  $\text{cm}^3$ );  $I_M$  motor current (A);  $Q_{PU}$  delivery flow characteristic (trend) 1.0

### KA 21, KA 22, KA 26

Operating voltage 3x400/230 V 50 Hz  $\Upsilon\Delta$   
3x460/265 V 60 Hz  $\Upsilon\Delta$

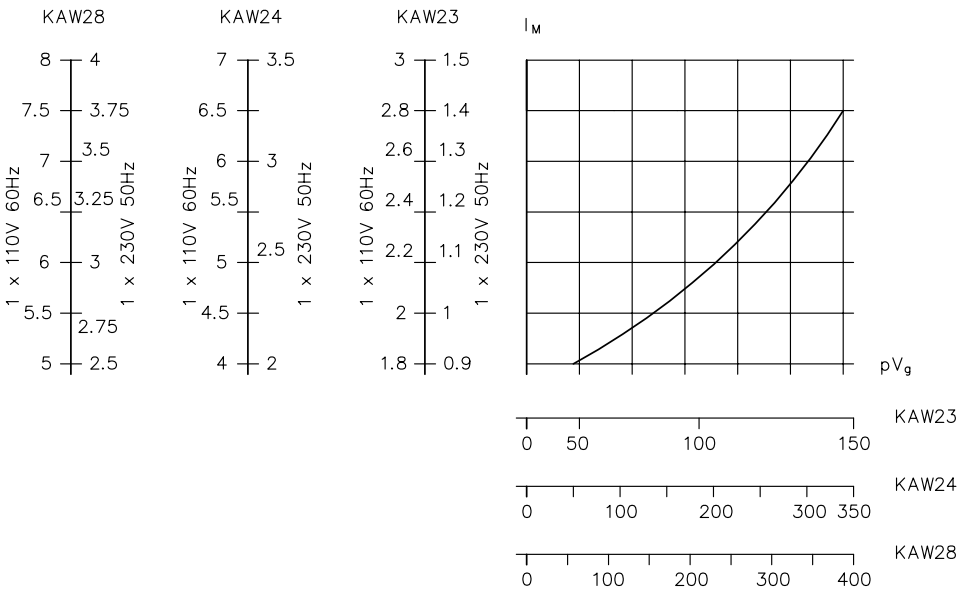


$pV_g$  hydraulic work value (bar  $\text{cm}^3$ );  $I_M$  motor current (A);  $Q_{PU}$  delivery flow characteristic (trend) 1.0

1) Values at 230 V  $\Delta$  are the values times  $\sqrt{3}$

**KAW 23, KAW 24, KAW 28**

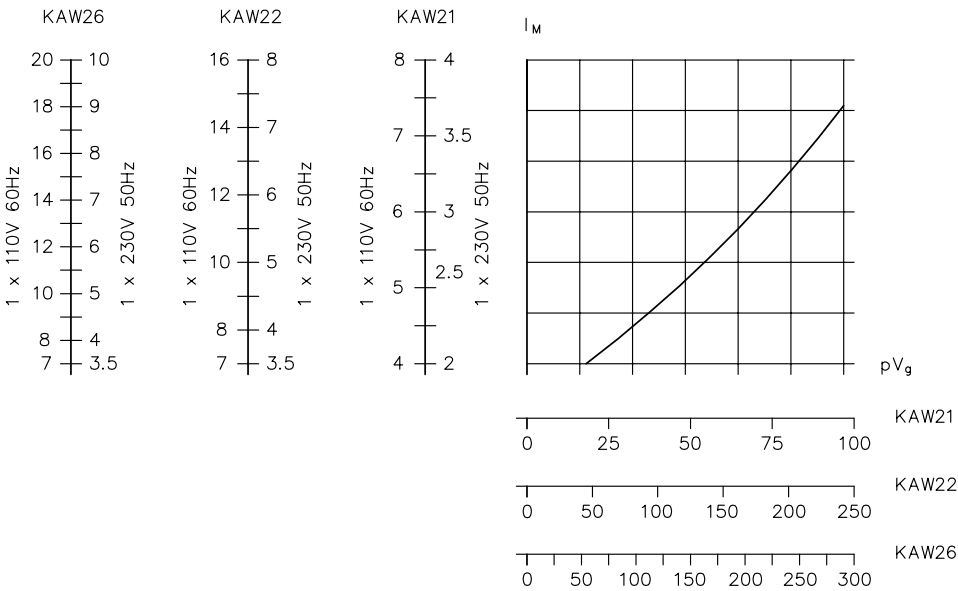
Operating voltage 1x230 V 50 Hz  
1x110 V 60 Hz



$pV_g$  hydraulic work (bar  $cm^3$ );  $I_M$  motor current (A);

**KAW 21, KAW 22, KAW 26**

Operating voltage 1x230 V 50 Hz  
1x110 V 60 Hz



$pV_g$  hydraulic work (bar  $cm^3$ );  $I_M$  motor current (A);

### Temperature switches

Coding **T, T50, T60, TT50, TT60**

#### Technical data:

Bimetallic-element switch  
 designed as a winding protection contact (type KAW)  
 designed as a separate temperature switch (type KA)



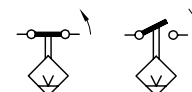
|                                      |  |
|--------------------------------------|--|
| Signal indication                    | 80°C ± 5K (coding T)<br>60°C ± 5K (coding T60)<br>50°C ± 5K (coding T50) |
| Max. voltage                         | 600 V  |
| Nominal current (cos φ ~ 0.95 / 0.6) | 2.5 A / 1.6 A  |
| Max. current at 24 V (cos φ = 1)     | 1.5 A  |
| Electrical connection                | At the terminal box / HARTING plug                                       |

### Level switch

coding **D, S** (horizontal)

#### Technical data:

|                               |                   |               |               |
|-------------------------------|-------------------|---------------|---------------|
| Max. DC/AC switching capacity | 30 VA             | <b>D</b>      | <b>S</b>      |
| Max. DC/AC current            | 0.5 A (cos φ = 1) | (N/C contact) | (N/O contact) |
| Max. voltage                  | 230 V AC/DC       |               |               |



Electrical connection At the terminal box / HARTING plug

coding **KD, KS** (vertical)

|                          |   |
|--------------------------|---|
| DC/AC switching capacity | 10 W  |
| Max. DC/AC current       | 1 A   |
| Max. voltage             | 150 V 50/60 Hz<br>200 V DC  |
| Electrical connection    | Line connector industry standard contact gap<br>9.4 mm<br>M12x1, 5-pin (coding M, M1, M2, PM, PM1, PM2) |

A protective circuit is to be implemented in the case of an inductive load!

**Fan**  
coding **F, F1**

Motor data

| U <sub>N</sub>     | P <sub>N</sub> (W) | Speed [rpm] | Protection class |
|--------------------|--------------------|-------------|------------------|
| 1x230 V 50/60 Hz ⊥ | 45                 | 2800/3250   | IP 44            |
| 1x110 V 60 Hz ⊥    | 38                 | 3250        | IP 44            |
| 24 V DC            | 12                 | 3050        | IP 20            |

Temperature range -30°C ... +50°C

Electrical connection Male connector re. DIN EN 175 301-803 A

Coding **FSL, FSR, FSH, FSLR**

Motor data

| U <sub>N</sub>     | P <sub>N</sub> (W) | Speed [rpm] | Protection class |
|--------------------|--------------------|-------------|------------------|
| 1x230 V 50/60 Hz ⊥ | 19                 | 2650/3100   | IP 68            |
| 1x110 V 50/60 Hz ⊥ | 19                 | 2650/3100   | IP 68            |
| 24 V DC            | 5                  | 2800        | IP 68            |

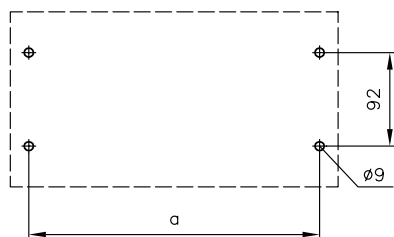
Electrical connection Tyco TE 776428-1 (24 V DC)  
Tyco TE 776428-2 (1x .. V ⊥)

## 4 Dimensions

All dimensions in mm, subject to change.

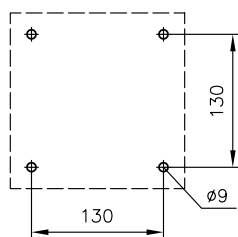
### 4.1 Mounting hole pattern

Horizontal version coding L

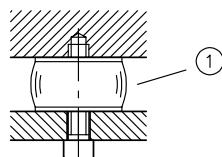


| Tank size | a   |
|-----------|-----|
| --        | 284 |
| 01, 1     | 336 |
| 11        | 388 |
| 02, 2     | 484 |
| 22, 3     | 684 |

Vertical version coding S



Recommended attachment

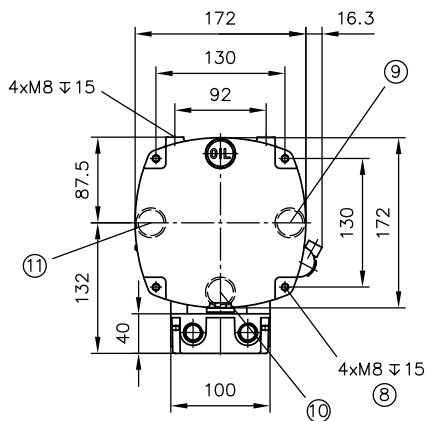
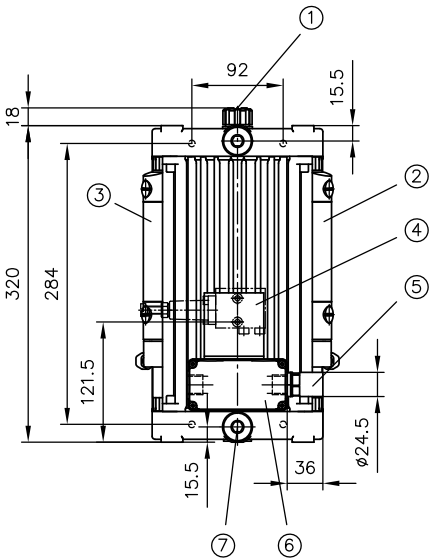


1 Damping element  $\varnothing 40 \times 30 / M8$  (65 Shore)

## 4.2 Basic pump

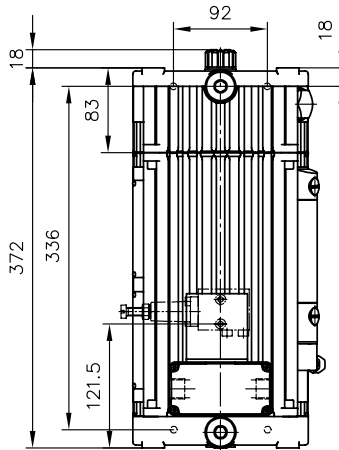
### Vertical version

Tank size (without coding)



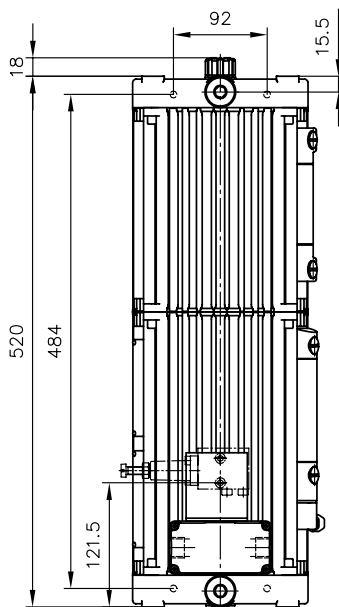
- 1 Oil filler G 1/2 (BSPP)  
Breather filter (40 µm)
- 2 Level gauge K, KS, KD
- 3 Level gauge K1, K1S, K1D
- 4 Pedestal with a connection block; example: A 1 / ...
- 5 Suppressor coding E
- 6 Terminal box coding P
- 7 Oil drain G 1/2 (BSPP)
- 8 4x at both ends Attachment holes
- 9 Installation position coding S14
- 10 Installation position coding S25
- 11 Installation position coding S36

Tank size coding 1



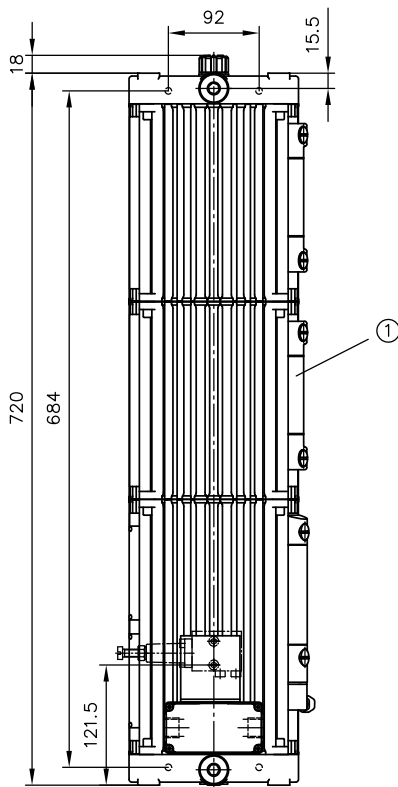
In the case of a tank size of 1, 2, 11, 21, 3 and an additional level gauge coding K, KS, KD, an additional display is to be integrated into the extension.

Tank size coding 2



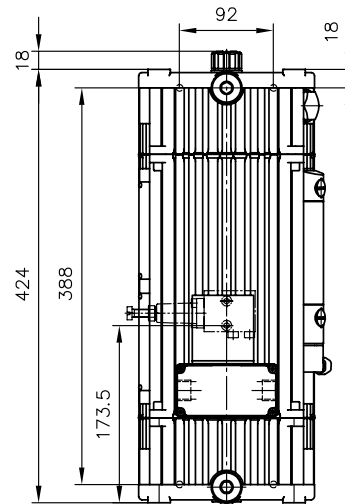


Tank size coding 3

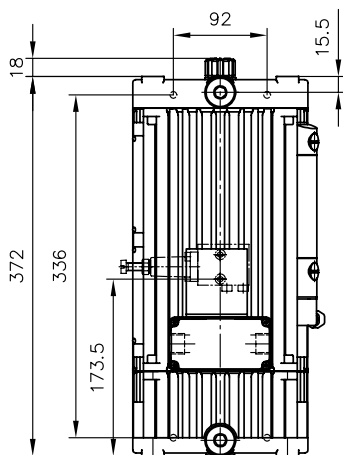


1 With coding KK

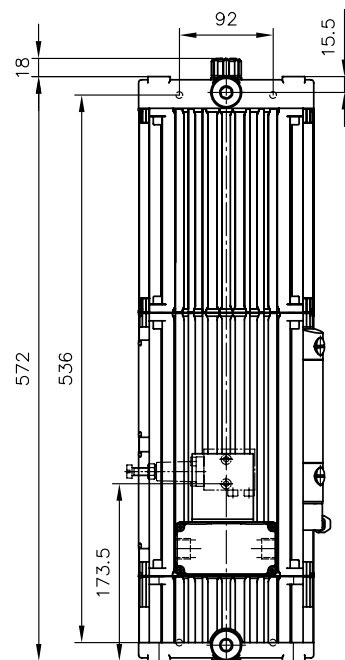
Tank size coding 11



Tank size coding 01



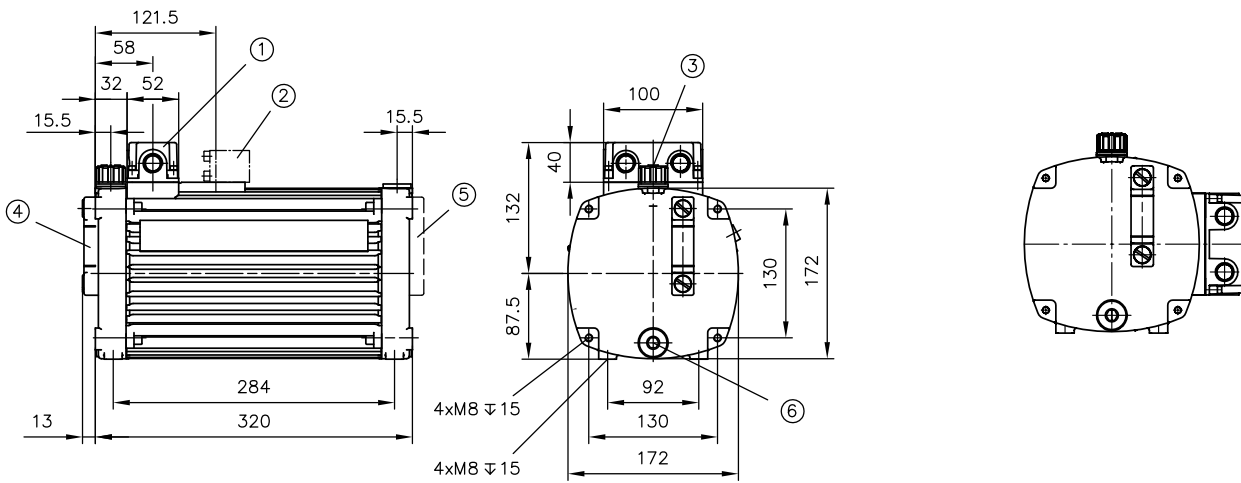
Tank size coding 21



**Horizontal version**

Tank size (without coding)

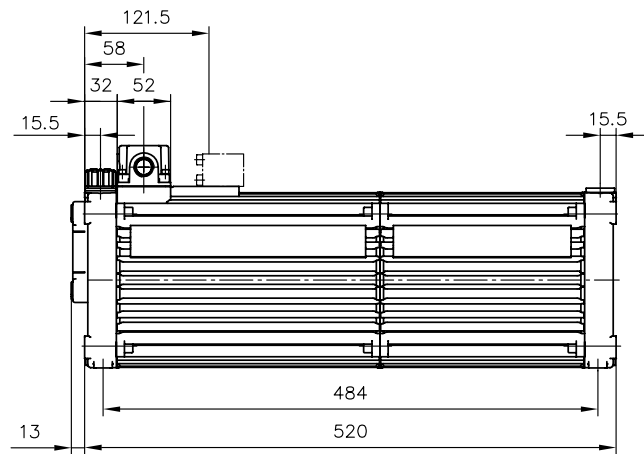
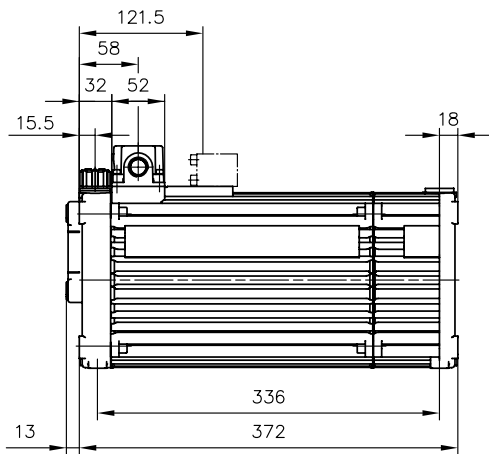
Installation position coding **L1 (L14)**



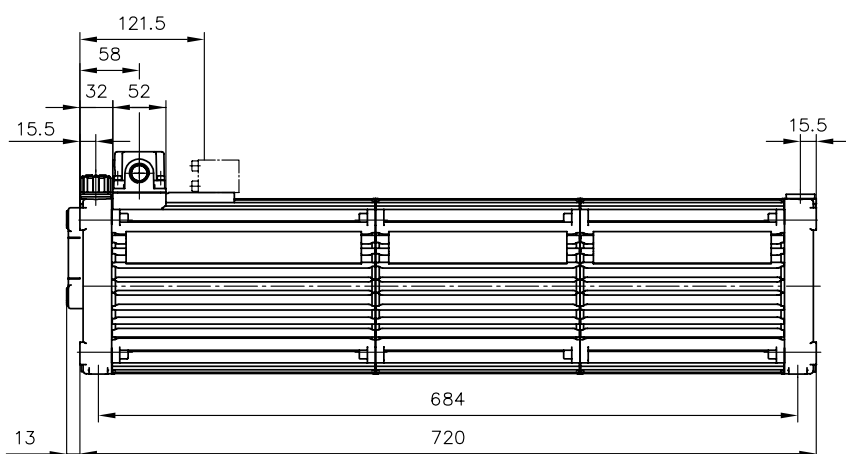
- 1 Terminal box
- 2 Example of a connection block A1/...
- 3 Oil filler G 1/2 (BSPP)  
Breather filter (40 µm)
- 4 Level gauge K (installation position coding L, L1)
- 5 Level gauge K (installation position coding L4, L14)
- 6 Oil drain G 1/2 (BSPP)

Tank size coding 1

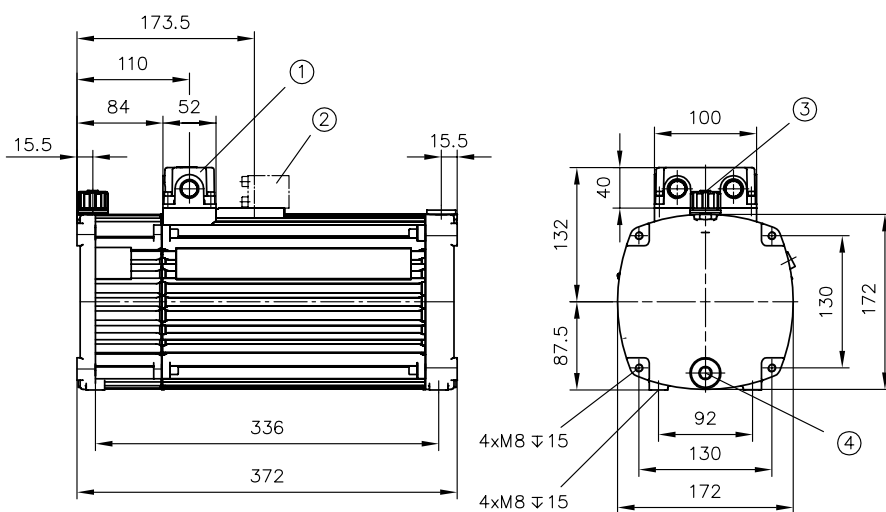
Tank size coding 2



Tank size coding **3**



Tank size coding **01**

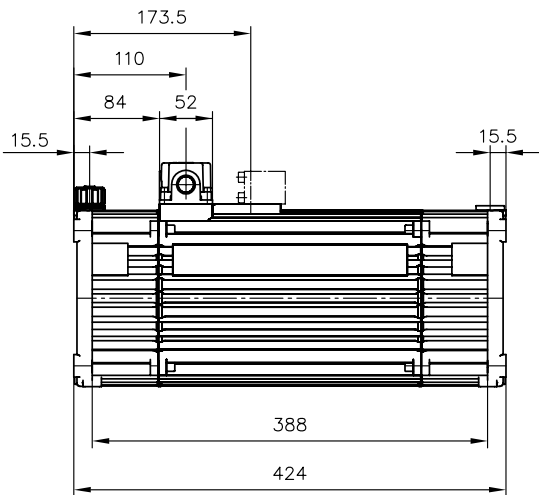


- 1 Terminal box
- 2 Example of a connection block A1/...
- 3 Oil filler G 1/2 (BSPP)  
Breather filter (40 µm)
- 4 Oil drain G 1/2 (BSPP)

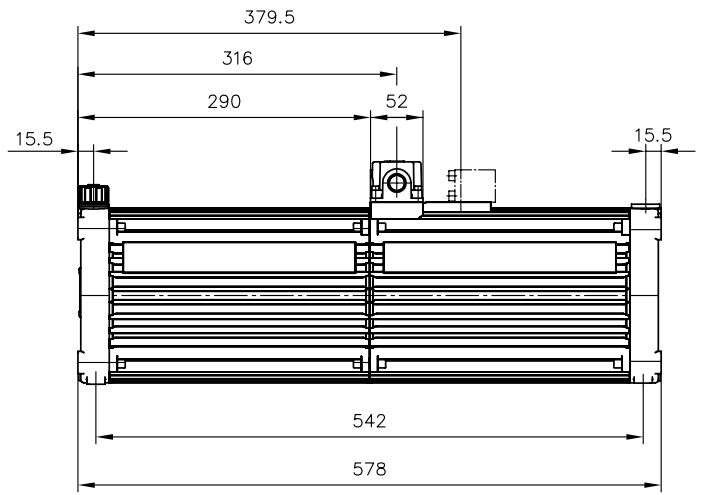
**i Note**

If a horizontal version is used in a vertical position, ensure that the vent is on top and the built-in internal pump is at the bottom.

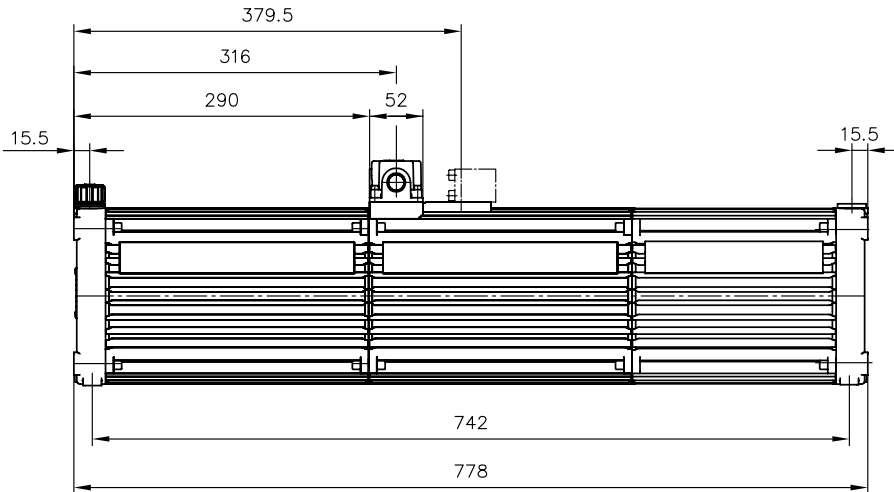
Tank size coding **11**



Tank size coding **02**



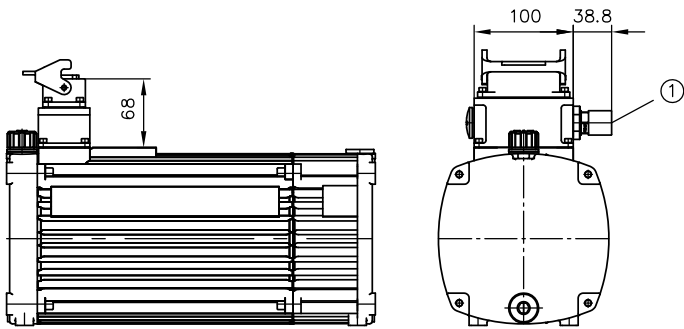
Tank size coding **22**



**Additional option**

**Terminal box**

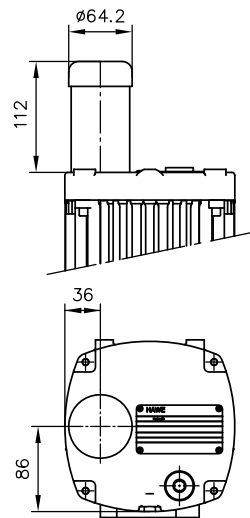
Coding P



1 Suppressor coding PE

**Silica gel filters**

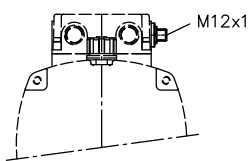
Coding G



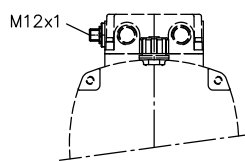
**Terminal box**

M12 connections for temperature and/or level switch

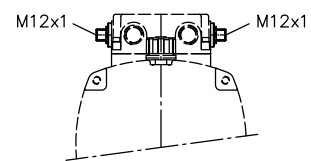
Coding M, PM



Coding M1, PM1



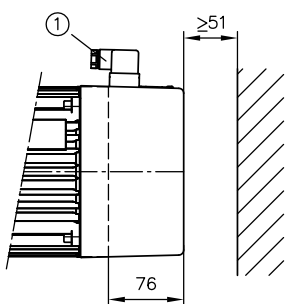
Coding M2, PM2



**Fan**

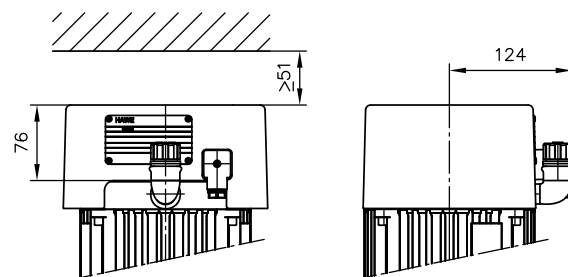
Coding F, F1

horizontal version



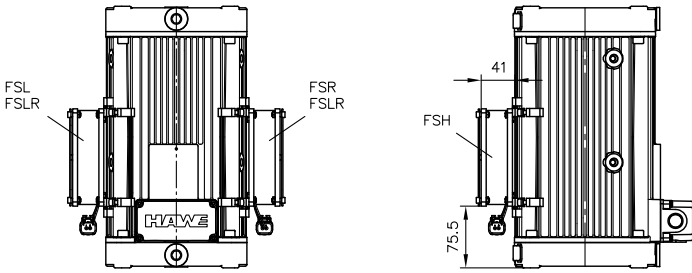
1 Electrical connection to fan

vertical version



**Fan**

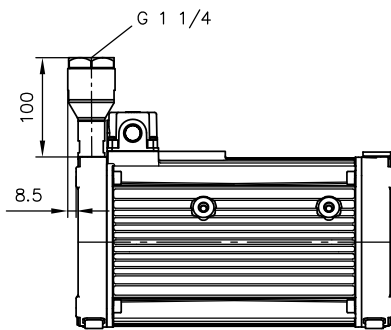
Coding **FSL, FSR, FSLR, FSH**



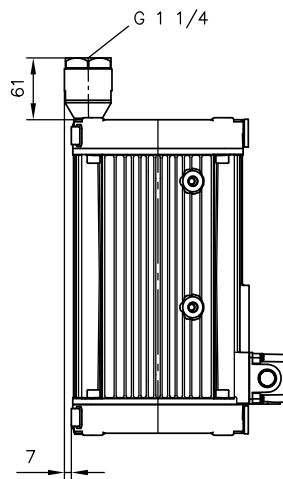
**Filler reduction**

Coding **B**

horizontal version

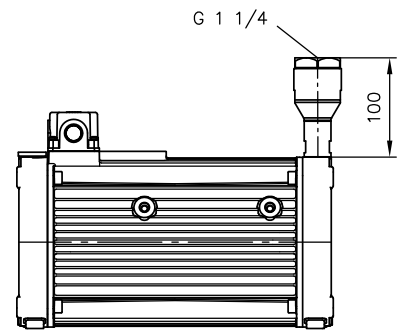


vertical version



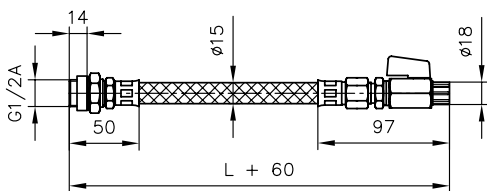
Coding **B1**

horizontal version

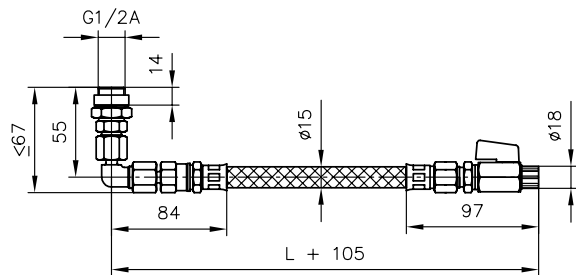


**Oil drain hose**

Coding **G 1/2 x 300**  
**G 1/2 x 500**



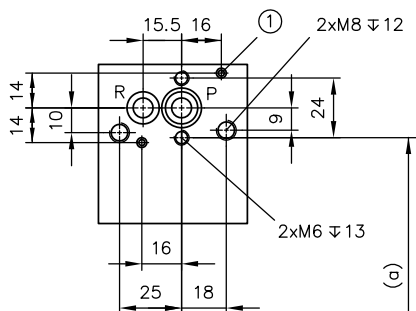
Coding **G 1/2 W x 300**  
**G 1/2 W x 500**



## 4.3 Electrical and hydraulic connections

### Hydraulic

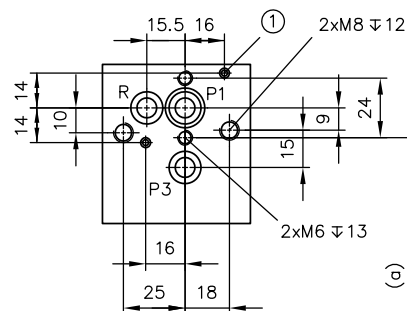
#### Single-circuit pump



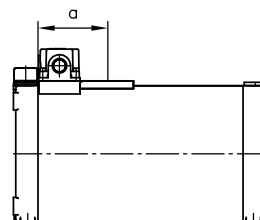
1 Centring pin  $\varnothing 4$  mm

a = 121.5

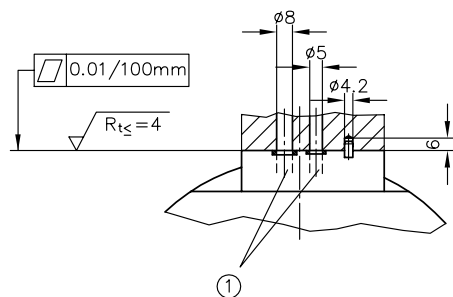
#### Dual-circuit pump with shared pedestal



1 Centring pin  $\varnothing 4$  mm



#### Hole for self-made connection block



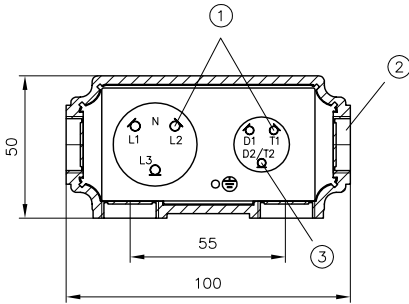
1 Sealing of connections:

P, P1, P3, R = 8x2 NBR 90 Sh

**Electrical**

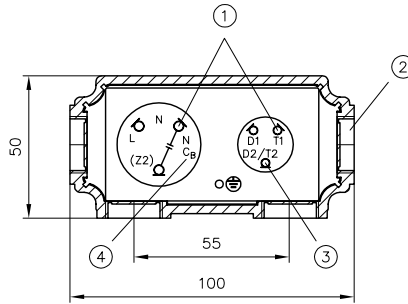
**Terminal box**

3-phase motor



- 1 Flat plug
- 2 4x cable fittings M20x1.5
- 3 For vertical version (only D2/T2-T1)

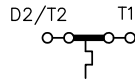
Single-phase-motor



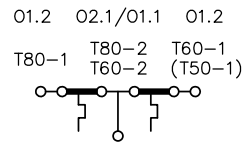
- 1 Flat plug
- 2 4x cable fittings M20x1.5
- 3 For vertical version (only D2/T2-T1)
- 4 C<sub>b</sub> – operating capacitor is not included in the scope of delivery

**Temperature switches**

Coding **T**  
(Terminal box)

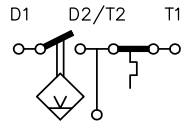


Coding **TT50, TT60**

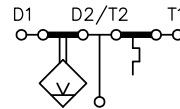


**Level switch**

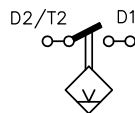
Coding **ST**  
(Terminal box)



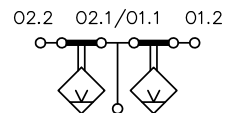
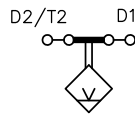
Coding **DT**  
(Terminal box)



Coding **S, D**



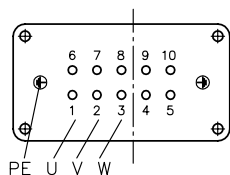
Coding **DD**



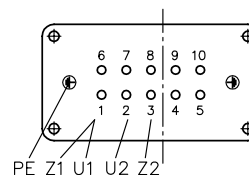


**Coding P**  
Harting plug HAN 10 E

3-phase motor

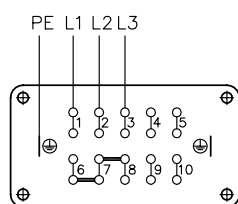


Single-phase-motor

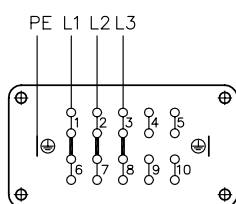


Customer-side connection (male connector)

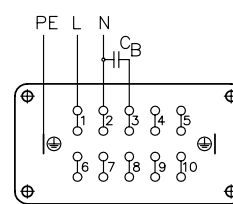
3-phase motor  $\Upsilon$



3-phase motor  $\Delta$



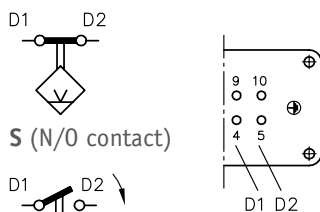
Single-phase-motor



$C_B$  – operating capacitor is not included in the scope of delivery

**Coding D, S**

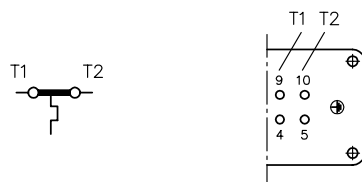
**D** (N/C contact)



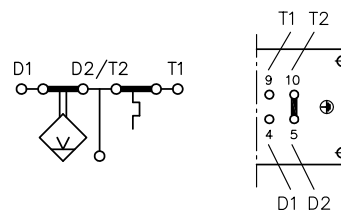
**S** (N/O contact)



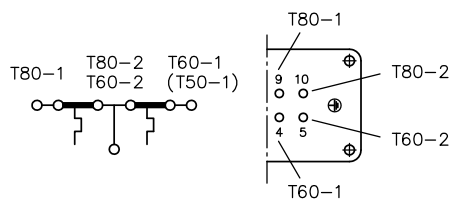
**Coding T**



**Coding DT, ST**



**Coding TT50, TT60**



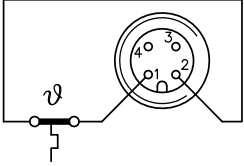
Coding **M, M1, PM, PM1**

Harting plug HAN 10 E (see page 41)

Additional connection M12x1, 4-pin

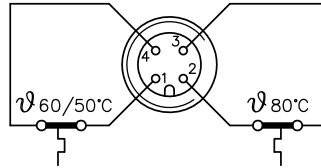
Coding **T**

One temperature switch:

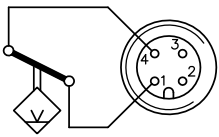


Coding **TT50, TT60**

Two temperature switches:

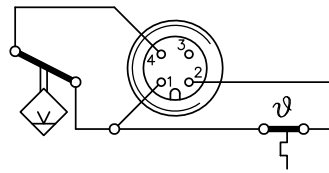


Coding **D, S**



Coding **DT, ST**

One temperature switch and one level switch (horizontal version):



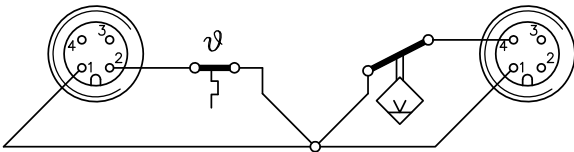
Coding **M2, PM2**

Harting plug HAN 10 E (see page 41)

2x additional connections M12x1, 4-pin

Coding **DT, ST**

One temperature switch and one level switch (horizontal version):

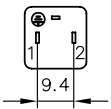


**Level switch** (vertical version)

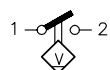
Coding **KS, KD**

Line connector

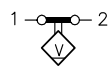
Industry standard



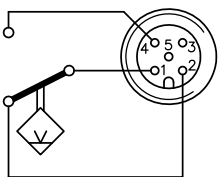
**KS** (N/O contact)



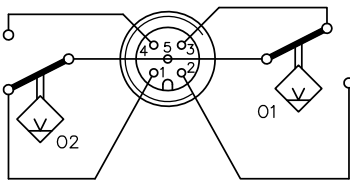
**KD** (N/C contact)



M12x1, 5-pin (coding **PM**)



Coding **KDD**



**Fan**

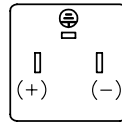
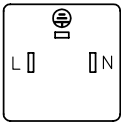
Coding **F, F1**

1x230 V 50/60 Hz ⊥  
1x110 V 60 Hz ⊥

Line connector  
DIN EN 175 301-803 A

24V DC

Line connector  
DIN EN 175 301-803 A



**Side fan**

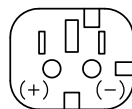
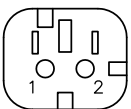
Coding **FS ...**

1x230 V 50/60 Hz ⊥  
1x115 V 50 Hz ⊥  
1x110 V 60 Hz ⊥

Tyco line connector  
TE 776427-1

24V DC

Tyco line connector  
TE 776427-2



### 5.1 Intended use

This hydraulic component is exclusively intended for hydraulic applications (fluid engineering).

These hydraulic components meet high technical safety standards and regulations for fluid engineering and electrical engineering.

The user must observe the safety measures and warnings in this documentation.

#### Essential requirements for the product to function correctly and safely:

- All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- The product must only be assembled and put into operation by qualified personnel.
- The product must only be operated within the specified technical parameters. The technical parameters are described in detail in this documentation.
- The operating and maintenance manual of the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly
- ✓ It is then not permissible to continue using or operating the product

### 5.2 Assembly information

The hydraulic power pack must only be installed in the complete system with standard and compliant connection components (screw fittings, hoses, pipes, etc.).

The hydraulic power pack must be shut down correctly prior to dismantling; this applies in particular to power packs with hydraulic accumulators.



#### Danger

**Risk to life caused by sudden movement of the hydraulic drives when dismantled incorrectly!**

Risk of serious injury or death.

- Depressurise the hydraulic system.
- Perform safety measures in preparation for maintenance.



#### Note

The pump unit may only be installed and connected by a qualified specialist who is familiar with and adheres to general engineering principles and relevant applicable regulations and standards.

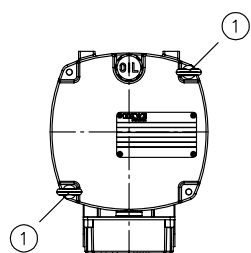
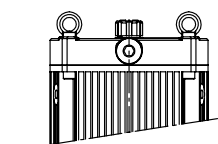
The electrical connection is to be carried out by a qualified specialist who has received appropriate training.

The following directives and standards must be observed:

- ISO 4413      Hydraulic fluid power – general rules for application
- [D 5488/1](#)      Oil recommendations
- [B 5488](#)        General operating and maintenance manual

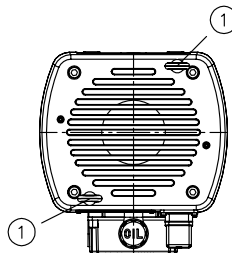
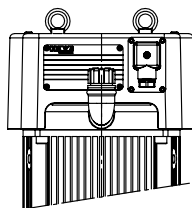
## 5.2.1 Transport information

### Vertical version



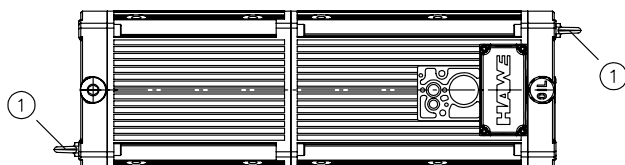
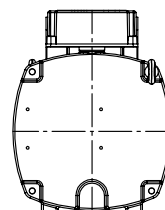
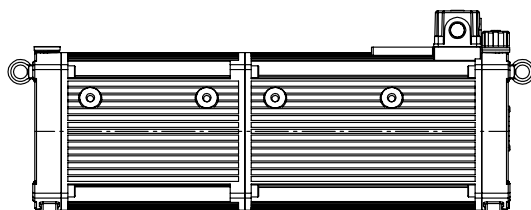
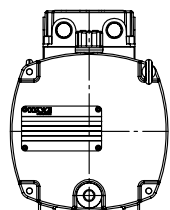
1 Eye-bolt screw-in points

### Pump with external fan



1 Eye-bolt screw-in points

### Horizontal version



1 Eye-bolt screw-in points

The eye-bolts are contained in the scope of delivery of the KA power pack.

Material number 6016 1203-00

Eye-bolt ISO 3266 M8x13

## 5.2.2 Identification

See type plate or option table

### 5.2.3 Setting up and attaching

- Setting up



**Danger**

**Risk of injury due to hot compact hydraulic power pack and hot directional valve solenoids during operation.**

Danger of burning.

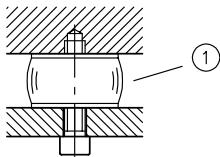
- Do not touch the compact hydraulic power pack or directional valve solenoids during operation.
- Allow the compact hydraulic power pack and directional valve solenoids to cool down before any work.
- Wear protective gloves.



**Note**

If surface temperatures >60°C occur during operation, isolating safety devices are to be provided. Ensure that fresh air can be drawn in and that warm air can escape. No changes of any kind (mechanical, welding or soldering work) may be made.

- Installation position in accordance with version, see [Chapter 2.1, "Motor and container"](#), Table 1c
- For dimensions, see [Chapter 4.2, "Basic pump "](#)
- For mounting hole pattern, see [Chapter 4.1, "Mounting hole pattern"](#)
- Recommended attachment



1 Damping element Ø40x30/M8 (65 Shore)

- Weight (for the basic power pack, without valve mounting and oil filling)  
For mass (weight) of connection blocks and valve banks, see the corresponding publications

| Type      | KA 2, KAW 2        |                    |         |         |                             |   |
|-----------|--------------------|--------------------|---------|---------|-----------------------------|---|
|           | H<br>(3 cylinders) | H<br>(6 cylinders) | Z       | HZ      |                             |   |
| KA 21, 23 | 10.9 kg            | 11.5 kg            | 12.7 kg | 13.2 kg | Tank size 01, 1             | +0.7 kg   |
| KA 22, 24 | 13.2 kg            | 13.6 kg            | 15.0 kg | 15.5 kg | Tank size 02, 2             | +2.2 kg   |
| KA 26, 28 | 14.7 kg            | 15.1 kg            | 16.5 kg | 17.0 kg | Tank size 11                | +1.4 kg   |
|           |                    |                    |         |         | Tank size 21                | +2.9 kg   |
|           |                    |                    |         |         | Tank size 22, 3             | +4.4 kg   |
|           |                    |                    |         |         | External fans F, F1         | +2.1 kg   |
|           |                    |                    |         |         | External fans FSL, FSR, FSH | +0.54 kg (1x110 V, 1x230 V)<br>+0.22 kg (24 V DC) |
|           |                    |                    |         |         | External fan FSLR           | +1.1 kg (1x110 V, 1x230 V)<br>+0.45 kg (24 V DC)  |

## 5.2.4 Electrical connection and selection of the motor protection circuit-breaker

- Connecting the electric drive (see [Chapter 3.2, "Electrical"](#))
- Connecting the float and level gauge (see [Chapter 3.2, "Electrical"](#))



### Note

Response temperature in accordance with the built-in temperature switch (see [Chapter 2.1, "Motor and container"](#), Table 1d and [Chapter 3.2, "Electrical"](#)).



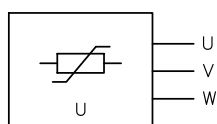
### Note

If the amount of oil removed during each operating cycle causes the oil level to fall below the monitoring level of the level switch, then suitable electrical measures are to be taken in order to ignore the signal until the oil level rises above the monitoring level once again as a result of the oil flowing back in at the end of the operating cycle.

- Setting the motor protection circuit breaker
  - The motor protection circuit breaker is set to approx.  $(0.85 \text{ to } 0.9) I_N$  (see motor current [Chapter 3.2, "Electrical"](#)). This ensures that the motor protection circuit breaker is not triggered prematurely during normal operation, but that the response of the pressure-limiting valve before switch-off is not so long that the max. permissible oil temperature is exceeded.
  - The settings of the motor protection circuit breaker must be checked during the test run. Temperature switches, level switches and pressure switches are further safety measures against malfunctions.

## 5.2.5 Information on ensuring EMC (electromagnetic compatibility)

If compact hydraulic power packs (induction machine in accordance with EN 60034-1 12.1.2.1) are connected to a system (e.g. power supply unit according to EN 60034-1 para. 6), they do not generate any non-permissible fault signals (EN 60034-1 para. 19). Stability tests for demonstrating compliance with the standard EN 60034-1 para. 12.1.2.1 or VDE 0530-1 are not required. Any brief and potentially disruptive electromagnetic fields generated when switching the motor on and off can be weakened, for example, using suppressor type 23140, 3x400 V AC 4 kW 50-60 Hz, made by Murr-Elektronik, D-71570 Oppenweiler, Germany. A suppressor can be ordered as an option. ([Chapter 2.1, "Motor and container"](#), Table 1e)



## 5.3 Operating instructions

### Product configuration and setting the pressure and flow rate

The statements and technical parameters in this documentation must be strictly observed.  
The instructions for the complete technical system must also always be followed.

#### Note

- Read the documentation carefully before usage.
- The documentation must be accessible to the operating and maintenance staff at all times.
- Keep documentation up to date after every addition or update.



#### Caution

##### **Risk of injury on overloading components due to incorrect pressure settings!**

Risk of minor injury.

- Always monitor the pressure gauge when setting and changing the pressure.

### Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the hydraulic component. Contamination can cause irreparable damage.

#### Examples of fine contamination include:

- Metal chips
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

#### Note

Fresh hydraulic fluid from the drum does not always have the highest degree of purity. Under some circumstances the fresh hydraulic fluid must be filtered before use.

Adhere to the cleanliness level of the hydraulic fluid in order to maintain faultless operation.  
(Also see cleanliness level in [Chapter 3, "Parameters"](#)).



Always fill the hydraulic fluid via the system filter or a mobile filter station.

### Check for correct connection

- Electrical: power supply, control
- Hydraulic: piping, hoses, cylinders, motors
- Mechanical: attachment to the machine, the frame and the base

### Motor protection

- The electric drive must be protected with a motor protection circuit.  
For the current setting, see [Chapter 5.2.4, "Electrical connection and selection of the motor protection circuit-breaker"](#)

### Fill volume and usable volume

| Coding | KA 2, KAW 2                          |   |   |
|--------|--------------------------------------|---|---|
|        | Fill volume<br>$V_{\text{fill}}$ (l) | Usable volume vertical<br>$V_{\text{usable}}$ (l) | Usable volume horizontal<br>$V_{\text{usable}}$ (l) |
| --     | 3.9                                  | 1.85  | 1.5   |
| 1      | 5.0                                  | 2.7   | 2.0   |
| 01     | 5.0                                  | 1.85  | 2.0   |
| 11     | 6.1                                  | 2.7   | 2.5   |
| 2      | 7.5                                  | 5.45  | 3.15  |
| 02     | 7.5                                  | --  | 3.15  |
| 21     | 8.6                                  | 5.45  | 3.65  |
| 22     | 11.1                                 | --  | 4.8   |
| 3      | 11.1                                 | 9.05  | 4.8   |



#### Note

- The fill volume and usable volume may deviate slightly from the values indicated here, depending on the motor and pump.

### Rotation direction

- Radial piston pump – any
- Gear pump – anticlockwise
- HKF-type – anticlockwise

(Rotation direction is only ascertainable from a check of delivery flow. If there is no delivery flow in the three-phase version, replace two of the three main conductors.)

### Start and bleeding

- Directional valve is in switching position in which the depressurised circulation of the pump is possible.
  1. Switch the pump on and off several times so that the pump cylinders bleed automatically.
- If the controller is not designed for this,
  2. a pipe screw connection with a short pipe bracket and a transparent plastic tube can be attached to connection P.
  3. Insert the other end into the opening for the oil filler (unscrew the air filter).
- ✓ When the oil flow is free of bubbles, the pump has been bled.
- 4. Then move the consumer(s) back and forth several times until the air is largely removed there too and the movement is smooth.
- 5. If the consumers have bleed points, loosen the locking elements and only tighten them once bubble-free oil emerges.

### Directional valves

- Any solenoid valves must be connected to the controller in accordance with the hydraulic schematic and function diagram.

### Accumulator systems

- Accumulators should be filled using designated equipment in accordance with the pressure specifications of the hydraulic schematic. The relevant operating and maintenance manuals must be followed.



#### Caution

#### Risk of injury due to incorrect transportation.

Risk of minor injury.

- Comply with the regulations on transportation and safety.
- Wear protective equipment.

### Silica gel filter

- When using a silica gel filter, remove the red caps on the underside of the compact hydraulic power pack prior to commissioning.

## 5.4 Maintenance information

This product is largely maintenance-free.

Conduct a visual inspection at regular intervals, but at least once per year, to check if the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the device surface of dust deposits and dirt at regular intervals, but at least once per year.

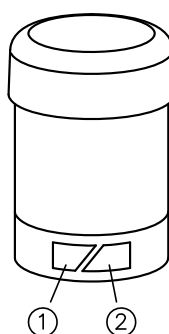
Ensure that the oil level is checked regularly.

The oil must be changed once a year; any pressure or return line filters must be changed.

For further information, see [B 5488](#)!

When using a silica gel filter,

- inspect every six months
- dispose of used filter materials in the bin for equipment stained with oil (ÖvB)



- 1 orange
- 2 red

Silica gel filter

- red = OK
- orange = needs to be changed

### **i** Note

Before starting maintenance or repair work:

- Depressurise the system on the fluid side. This applies in particular for systems with hydraulic accumulators.
- Switch off or interrupt the power supply.

Repairs and spare parts

- Repairs (replacement of wearing parts) can be carried out by trained specialists themselves. A spare parts list is available on request. The electric drive cannot be replaced.

## 5.5 Disposal information

- Valve control
  - Mixed scrap
- Pump housing with motor
  - Electronic waste
- Tank or hydraulic accumulator, as applicable (depressurised on the gas side)
  - Scrap iron
- Hydraulic fluid
  - Waste oil

## 6 Other information

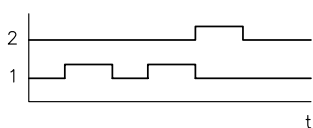
### 6.1 Planning information

#### 6.1.1 Selection advice

The procedure for the selection and design of compact hydraulic power packs with a valve attachment is described below. In order to find the ideal solution, several iterative steps generally have to be carried out.

##### a) Setting up a function diagram

The required or desired (hydraulically activated) functions form the basis for the function diagram.



##### b) Definition of pressures and flow rates

- Dimensioning and selection of actuators on the basis of the reaction forces arising
- Calculation of the individual flow rates on the basis of the required velocity profiles



#### Note

Take note of the reset times for spring-loaded clamping cylinders.

In the case of time-linked clamping devices, the release of spring-loaded clamping cylinders may often have a greater influence over the time interval than clamping. The return stroke times are determined exclusively by the forces of the reset springs. They drive the cylinder pistons ahead, against the flow resistance from directional valves and pipelines. This must be noted in the dimensions of pipelines or hose lines, as well as valves.

- Calculation of the individual operation pressures required
- Determination of the maximum (pump) delivery flow required – Q (lpm)
- Determination of the (system) operating pressure –  $p_{\max}$  (bar)

Q - flow rate

p - pressure

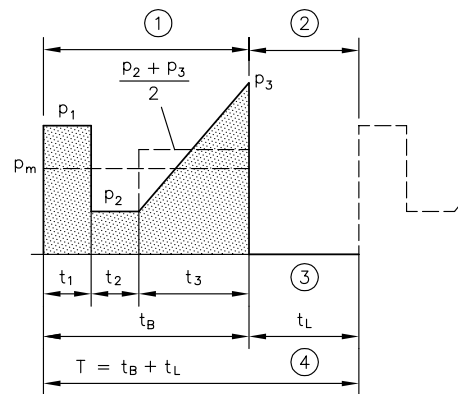
A - Area

v - Velocity

F - Force

$$Q \left( l/min \right) = 0.06 \cdot A \left( mm^2 \right) \cdot v \left( \frac{m}{s} \right)$$

$$p \left( bar \right) = \frac{10 \cdot F \left( N \right)}{A \left( mm^2 \right)}$$



- 1 Load time
- 2 No-load time
- 3 No load
- 4 One working cycle

### c) Preparation of the hydraulic schematic

- Criteria:
  - single circuit system
  - Accumulator charging mode
  - Dual-circuit systems with two separately operating hydraulics circuits
  - Dual-circuit systems with a shared hydraulics circuit (for instance, in presses or hydraulic tools as high-pressure systems / low-pressure systems, in handling systems with velocity control/rapid feed/creep)
  - Use of an accumulator for the short-term support of the pump delivery flow

### d) Setting up a time/load diagram on the basis of a function diagram

- Deriving the mode for the compact hydraulic power pack
  - Calculation of the relative ON-time %ED
  - S1 – continuous operation (not suitable for compact hydraulic power packs )
  - S2 – short period operation
  - S3 – standby mode
  - S6 – continuous run with intermittent load (only suitable in combination with fans with coding F)

### e) Selection of a compact hydraulic power pack

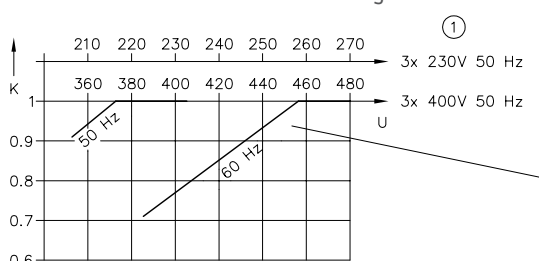
- Definition of the basic type on the basis of the power supply
  - Three-phase current – KA-type
  - Alternating current – KAW-type
- Motor selection
  - Voltage tolerances:  $\pm 10\%$  (IEC 38), at 3x460/265 V 60 Hz  $\pm 5\%$
  - A three-phase motor 400 V 50 Hz can be used without restrictions in 460 V 60 Hz supply networks. Alternating current motors can only be used in supply networks at the nominal voltage and nominal frequency.
  - It can be operated at undervoltage. Bear in mind that this will involve performance restrictions.

$$p_{\max \text{ red}} = p_{\max} \cdot k$$

$p_{\max}$  (bar) – max. operating pressure in accordance with the selection tables

$p_{\max \text{ red}}$  (bar) – reduced max. available operating pressure

\*  $k$  – correction factor from the diagram



#### Note

Pump delivery flow 1.2 x greater than at 50 Hz operation!

$U$  supply voltage (V);  $K$  correction factor

1 Motor design

- Selection of the pump type (radial piston pump, gear pump pump combination)
- Selection of the key figure for the pump delivery flow with due regard for the maximum permissible pressure and definition of the basic type with the motor size
- Estimation of the noise level from the diagrams in [Chapter 3, "Parameters"](#)

### f) Calculation of the hydraulic work value

- Calculation of the average pressure
- Calculation of the average hydraulic work value (average pressure x output volume)
- Calculation of the maximum hydraulic work value (maximum operating pressure x output volume)

$p_m$  (bar) = calculated average pressure per cycle during the load time

$$t_B = t_1 + t_2 + t_3 + \dots$$

$$p_m = \frac{1}{t_B} \left( p_1 \cdot t_1 + p_2 \cdot t_2 + \frac{p_2 + p_3}{2} \cdot t_3 + \dots \right)$$

$p_m V_g$  = average hydraulic work value

$V_g$  = geometric displacement volume in accordance with the tables [Chapter 2.2, "Pump"](#)

$$p V_{g \text{ max}} (\text{bar cm}^3) = p_{\max} \cdot V_g$$

**g) Determination of excess temperature****Caution**

Take note of the max. permissible oil temperature of 80°C!

The steady-state temperature is reached after an operating time of about half an hour.

Influencing variables:

- Pressure run during the load phase (average pressure)
- Time share of the no-load phase
- Additional throttle losses over and above normal flow resistances (approx. 30%) from valves and lines are only to be taken into account if they take effect over a longer share of time within a working cycle (load phase). For instance, this includes work against the pressure-limiting valve (loss = 100%)

In order to conduct an approximate check on the steady-state temperature of the oil fill, you generally only require the two most important items of data, i.e. average hydraulic work of the pump ( $p_m V_g$ ) and relative load duration per working cycle (%ED).

- In the case of a tank size with coding 02, 2, 22, 3, the steady-state temperature is approximately 15% lower.
- Additional fan:
  - Additional fan coding F or F1  
Reduction in the steady-state temperature by approx. 50%
  - Side fan coding FSL, FSR, FSH  
Reduction in the steady-state temperature by approx. 55%
  - 2 side fans coding FSLR  
Reduction in the steady-state temperature by approx. 60%
- The steady-state temperature which can actually be reached also depends on the switch-on mode of the fan:
  - only switched on if the pump is working
  - runs on (temperature-controlled and/or time-controlled)
  - runs continuously

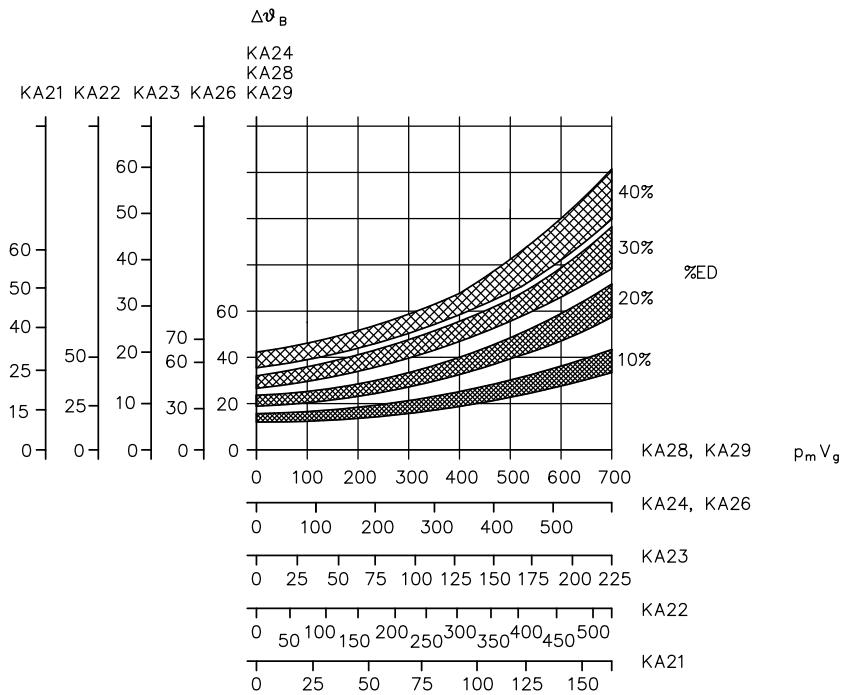
$$\vartheta_{oil\ u} = \Delta\vartheta_B + \vartheta_U$$

$\Delta\vartheta_B$  (K) - Steady-state temperature, assessment from the diagrams opposite

$\vartheta_U$  (K) - Ambient temperature at the place of installation

$\vartheta_{oil\ u}$  (°C) - Steady-state temperature of the oil fill





$p_m V_g$  average hydraulic work value (bar cm<sup>3</sup>);  $\Delta\vartheta_B$  expected steady-state temperatures (K); %ED relative ON-time

$$\text{Relative duty cycle \% ED} = \frac{t_B}{t_B + t_L} \cdot 100$$



**Note**

Lower steady-state temperatures are possible with a fan (coding F) and/or larger tank (see above).

#### h) Determination of the max. current consumption

See diagrams [Chapter 3.2, "Electrical"](#)

for the settings of the motor protection circuit breaker, see [Chapter 5.2.4, "Electrical connection and selection of the motor protection circuit-breaker"](#)

#### i) Selection of the operating capacitor for type KAW

An operating capacitor is required in order to operate a single-phase-motor. The values indicated in [Chapter 3.2, "Electrical"](#), Table 5 ensure that the pressures indicated in the selection tables are achieved.

When using <75% of the maximum capacity of the hydraulic work value ( $pV_g$ ), a capacitor which is approximately 30% smaller is to be used to reduce power losses.

**Note**

The operating capacitor is not included in the scope of delivery.

Capacitor selection

| Motor voltage                  | Rated voltage |
|--------------------------------|---------------|
| 1x230 V 50 Hz<br>1x220 V 60 Hz | 400 V DB      |
| 1x110 V 60 Hz<br>1x115 V 50 Hz | 230 V DB      |

#### j) After-run

If the compact hydraulic power pack is wired directly to the hydraulic cylinder, e.g. in the circuit for clamping devices (B-type connection blocks), and if a pressure switch causes it to cut out once the set pressure has been reached, a certain increase in pressure still takes place as a result of the after-run action of the pump motor. The level of this additional rise in pressure is dependent on the pressure setting, on the consumer volume and on the pump delivery flow. If you wish to prevent these pressure rises, the setting for the pressure-limiting valve has to be adjusted in line with the switch-off point on the pressure switch. As a result, the subsequent delivery from the pump is discharged via the pressure-limiting valve.

The adjustment is to be carried out as follows:

- 1 Open the pressure-limiting valve fully.
- 2 Set the pressure switch to the highest value (by turning the setting screw clockwise as far as it will go).
- 3 Switch on the pump (with a consumer and pressure gauge connected) and turn up the pressure-limiting valve until the pressure gauge shows the required end operating pressure.
- 4 Turn the pressure switch in the opposite direction until the pump is switched off at the pressure setting (see [Chapter 3, "Parameters"](#)).
- 5 Locking the pressure-limiting valve and the pressure switch.

The rise in pressure due to the after-run can also be avoided by using an accumulator or additional volume in the consumer line. If the compact hydraulic power pack is used to full capacity, i.e. the pressure setting is close to the maximum permissible pressure according to the selection tables in [Chapter 2.1, "Motor and container"](#) and [Chapter 2.2, "Pump"](#), practically no after-run occurs because the pump comes to a stop almost as soon as it is switched off.

### k) Silica gel filter

It makes sense to use a silica gel filter in cases where there is a possibility of water (condensation) escaping into the tank (risk of short circuit!) via the breather filter due to temperature fluctuations and/or high relative humidity.



#### Note

Take note of the maintenance information in [Chapter 5.4, "Maintenance information"](#)!

### h) Connection block and valve mounting

A connection block is necessary to make a compact hydraulic power pack ready for a hydraulic connection.

| Type                      | Description  | Publication                |
|---------------------------|--|----------------------------|
| A, AL, AM, AK, AS, AV, AP | For single-circuit pumps with a pressure-limiting valve and the possibility of direct mounting of directional valve banks<br><br><b>Optional:</b><br><ul style="list-style-type: none"> <li>– Pressure filter or return line filter</li> <li>– Idle circulation valve</li> <li>– Accumulator charging valve</li> <li>– Proportional pressure-limiting valve</li> </ul> | <a href="#">D 6905 A/1</a> |
| AN, AL, NA, C30, SS, VV   | For dual-circuit pumps with a pressure-limiting valve and the partial possibility of direct mounting of directional valve banks<br><br><b>Optional:</b><br><ul style="list-style-type: none"> <li>– Pressure filter or return line filter</li> <li>– Accumulator charging valve</li> <li>– Two-stage valve</li> <li>– Idle circulation valve</li> </ul>                | <a href="#">D 6905 A/1</a> |
| AX                        | For single-circuit pumps with a pressure-limiting valve with unit approval and the possibility of direct mounting of directional valve banks (for use in accumulator systems)<br><br><b>Optional:</b><br><ul style="list-style-type: none"> <li>– Pressure filter or return line filter</li> <li>– Idle circulation valve</li> </ul>                                   | <a href="#">D 6905 TÜV</a> |
| B                         | For single-circuit pumps for the activation of single-acting cylinders with a pressure-limiting valve and drain valve<br><br><b>Optional:</b><br><ul style="list-style-type: none"> <li>– Throttle valve</li> </ul>  | <a href="#">D 6905 B</a>   |
| C                         | For single-circuit pumps with connections P and R for direct piping  | <a href="#">D 6905 C</a>   |



#### Note

When setting the pressure-limiting valve on the connection block, take note of the maximum permissible pressure of the pump!

The direct mounting of valve banks with directional valves on A-type connection blocks enables a compact hydraulic unit to be assembled without the need for additional piping.

| Type            | Description  | p <sub>max</sub> (bar) | Publication                                     |
|-----------------|--|------------------------|---|
| <b>VB</b>       | Valve bank (directional seated valve)  | 700                    | <a href="#">D 7302</a>                          |
| <b>BWN, BWH</b> | Valve bank (directional seated valve)  | 450                    | <a href="#">D 7470 B/1</a>                      |
| <b>SWR, SWS</b> | Valve bank (directional spool valve)   | 315                    | <a href="#">D 7451</a> , <a href="#">D 7951</a> |
| <b>BA</b>       | Valve bank for the combination of different directional valves with connection pattern NG 6 in accordance with DIN 24 340-A6 | 400                    | <a href="#">D 7788</a>                          |
| <b>BVH</b>      | Valve bank (directional seated valve)  | 400                    | <a href="#">D 7788 BV</a>                       |
| <b>NBVP</b>     | Directional seated valve   | 400                    | <a href="#">D 7765 N</a>                        |
| <b>NSWP</b>     | Directional spool valve  | 315                    | <a href="#">D 7451 N</a>                        |
| <b>NSMD</b>     | Clamping module<br>(Directional spool valve with a pressure reducing valve and acknowledge function)                         | 315                    | <a href="#">D 7787</a>                          |
| <b>NZP</b>      | Intermediate plates<br>with connection pattern NG 6 in accordance with DIN 24 340-A6   | 400                    | <a href="#">D 7788 Z</a>                        |

## 6.2 Explanations

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 www.hawe.com



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 Tel. +49 89 370100-0  
 Fax +49 89 370100-1289

HAWE Hydraulik SE, Postfach 80 09 04, D-81608 München

Datum  
 2017-11-03

E-Mail

Telefon

Ihr Ansprechpartner

### Declaration of Incorporation within the meaning of the Machinery Directive 2006/42/EC, appendix II, No.1 B

Compact hydraulic power pack type KA, KAW, KA2.../ZM... and KAW2.../ZM... according to our documentation D 8010, D 8010-4, SK 8010 L1, SK 8010 S1 and SK 8010 W (latest release) is an incomplete machine (acc. to article 2g), which is exclusively intended for installation or assembly of another machinery or equipment.

The specific technical documents, necessary acc. to appendix VII B, can be prepared any time and transmitted in electronic form to the responsible national authority on request. Risk assessment and analysis are implemented according to appendix I of the Machinery Directive. The dept. MARKETING is authorized to compile the specific technical documents necessary acc. to appendix VII B.

HAWE Hydraulik SE, Dept. Marketing, Steffelsstraße 25, D-81673 München

The following basic safety and health protection requests acc. to appendix I of this guideline do apply and are complied with:  
 Chapter 1.1.2, 1.1.3, 1.1.5, 1.2 (complete chapter), 1.3.1, 1.3.2, 1.3.4, 1.3.6, 1.3.7, 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.5, 1.5.6, 1.5.8, 1.5.9, 1.5.16, 1.6.3, 1.7.1, 1.7.3, 1.7.4 and 1.7.4.3.

The incomplete machine also fulfills below shown EU-Directives:  
 2014/35/EU/2014-02-26 Directive of electrical equipment designed for use within certain voltage limits  
 2014/68/EU/2014-05-15 Pressure equipment Directive (applicable if an accumulator is used)

Following harmonised guidelines have been used:  
 EN 12004:2010-09 Safety - General principles for design  
 EN ISO 4413:2011-04 Hydraulic fluid power - General rules and safety requirements for systems and their components  
 EN 60204-1:2014-10 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

We assume that the delivered equipment is intended for the installation into a machine. Putting in operation is forbidden until it has been verified that the machine, where our products shall be installed, is complying with the Machinery Directive 2006/42/EC. This Declaration of Incorporation is void, when our product has been modified without our written approval.

I.A. Dipl.-Ing. A. Nocker (Technical Support Marketing)  
 Zertifiziert nach  
 ISO 9001  
 ISO 14001  
 ISO 50001  
 Europäische Aktiengesellschaft (SE), Sitz der Gesellschaft, München, USt-ID Nr.: DE80016198, Registergericht München HRB 174780  
 Vorstand: Karl Heesgen/Martin Heuser, Wolfgang Schor, Markus Ulmerstein  
 Vorsitzender des Aufsichtsrats: Hans-Jürgen Thaus, Ehrenvorsitzender des Aufsichtsrats: Joachim Gemlich  
 Geschäftsführer: I.A. Dipl.-Ing. A. Nocker  
 Commerzbank München: 150523700 (BLZ 700 400 411, IBAN DE88 7004 004 01 050 6237 00, BIC COBADE33XXX  
 Baden-Württembergische Bank: 2386049 (BLZ 260 501 01), IBAN DE88 6005 010 002 3800 48, BIC SLAEST  
 Bayerische Landesbank: 203893428 (BLZ 700 500 010), IBAN DE88 7005 0000 0203 6934 28, BIC BYLADE33XXX

00 6005 866

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HAWE Hydraulik SE, Postfach 80 09 04, D-81608 München, Germany

Datum  
 2015-07-01

### Declaration of conformity within the meaning of European Directive 2014/35/EC electrical equipment designed for use within certain voltage limits

We, HAWE Hydraulik SE, headquartered at D-81673 München, Steffelsstraße 25 take sole responsibility for the following declaration that the product

Compact hydraulic power pack types KA, KAW, KA2.../ZM... and KAW2.../ZM... according to our publication D 8010, D 8010-4, SK 8010 L1, SK 8010 S1 and SK 8010 W (the current issue of each respective publication)

to which this declaration refers, complies with the following standards or normative documents

DIN EN 60034 (DIN VDE 0530)  
 DIN VDE 0110

If a change is made to the product that has not been agreed in writing with the manufacturer, this declaration shall become void

HAWE Hydraulik SE

I.A. Dipl.-Ing. A. Nocker (Risk management)

Europäische Aktiengesellschaft (SE), Sitz der Gesellschaft, München, USt-ID Nr.: DE80016198, Registergericht München HRB 174780  
 Vorstand: Karl Heesgen/Martin Heuser, Wolfgang Schor, Markus Ulmerstein  
 Vorsitzender des Aufsichtsrats: Hans-Jürgen Thaus, Ehrenvorsitzender des Aufsichtsrats: Joachim Gemlich  
 Geschäftsführer: I.A. Dipl.-Ing. A. Nocker  
 Commerzbank München: 150523700 (BLZ 700 400 411, IBAN DE88 7004 004 01 050 6237 00, BIC COBADE33XXX  
 Baden-Württembergische Bank: 2386049 (BLZ 260 501 01), IBAN DE88 6005 010 002 3800 48, BIC SLAEST  
 Bayerische Landesbank: 203893428 (BLZ 700 500 010), IBAN DE88 7005 0000 0203 6934 28, BIC BYLADE33XXX

00 6005 866

## Further information

### Additional versions

- Compact hydraulic power packs type KA and KAW size 4: D 8010-4
- Compact hydraulic power pack type MPN and MPNW: D 7207
- Compact hydraulic power pack type HK 2: D 7600-2
- Compact hydraulic power pack type HK 3: D 7600-3
- Compact hydraulic power pack type HKL and HKLW: D 7600-3L
- Compact hydraulic power pack type HK 4: D 7600-4
- Compact hydraulic power pack type HC and HCW: D 7900
- Compact hydraulic power pack type NPC: D 7940
- Connection blocks type A for hydraulic power packs: D 6905 A/1
- Connection block type AX, with unit approval: D 6905 TUV
- Connection blocks type B for hydraulic power packs: D 6905 B
- Connection block type C 5 and C 6: D 6905 C
- Valve bank (directional seated valve) type VB: D 7302
- Valve bank (directional seated valve) type BWN and BWH: D 7470 B/1
- Directional spool valve type SW: D 7451
- Directional spool valve bank type SWS: D 7951
- Valve bank (nominal size 6) type BA: D 7788
- Valve bank (directional seated valve) type BVH: D 7788 BV
- Directional seated valve type NBVP 16: D 7765 N
- Directional spool valve type NSWP 2: D 7451 N
- Clamping module type NSMD: D 7787
- Intermediate plate type NZP: D 7788 Z
- Fitting type X 84: D 7077
- Diaphragm accumulator type AC: D 7969
- Miniature hydraulic accumulators, type AC: D 7571