



# Workholding

**Machine-center clamping**  
**Clamping fixtures**  
**Welding fixtures**  
**Fully integrated systems**

**HAW**  
HYDRAULICS

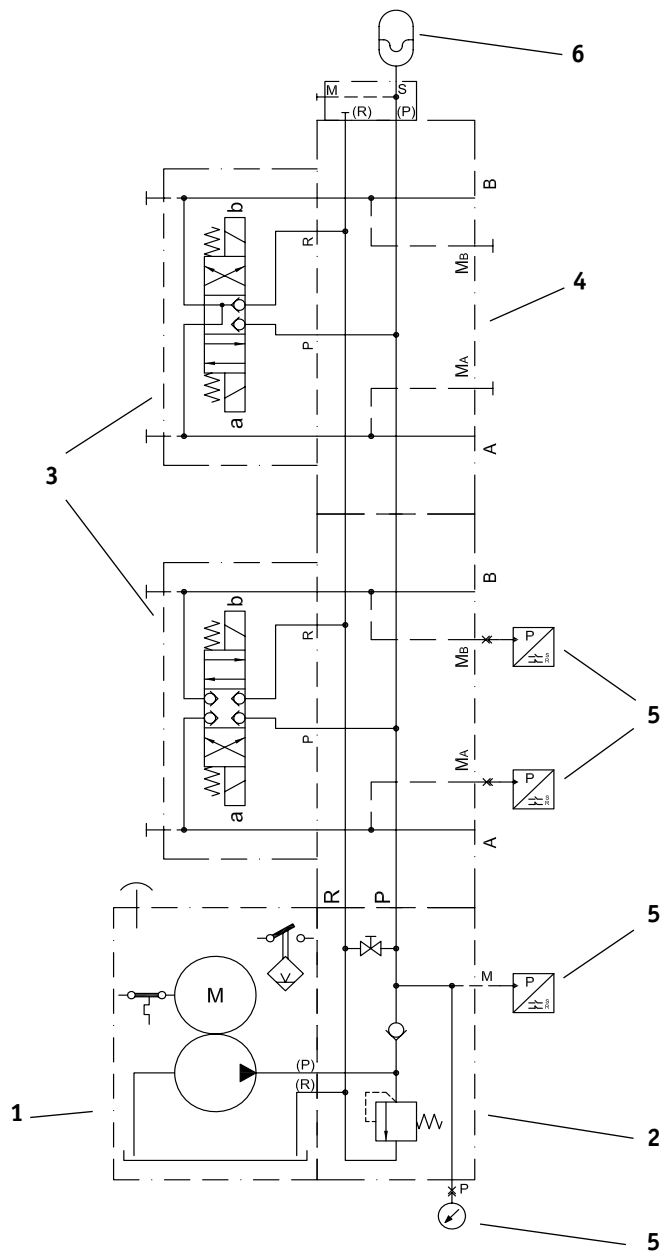
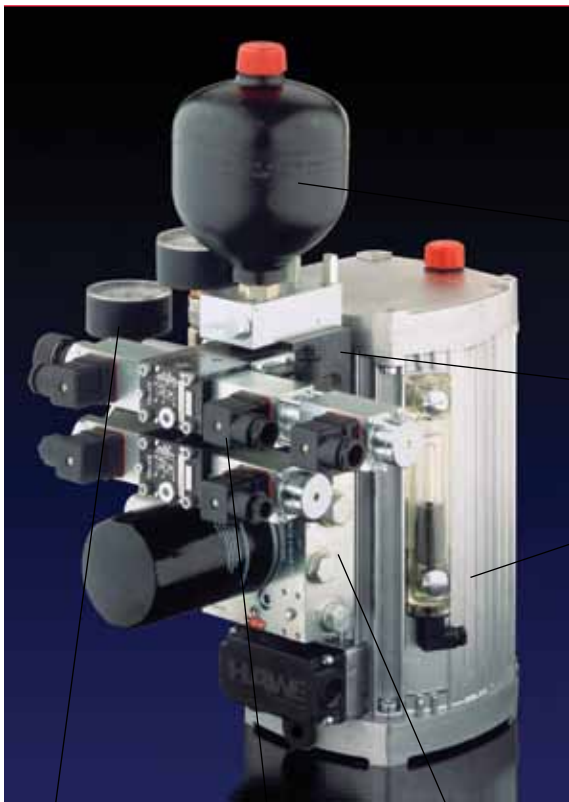
# HAWE Hydraulics: Turn-Key Modular Solutions

HAWE's unique approach to hydraulics may, at first glance, appear complicated. However, it's a simple concept based on three principles:

- 1) the manufacture of all pressurized parts from steel for smaller, more durable and reliable components in applications with extreme repeatability;
- 2) to provide varieties of standard and exclusive components for unparalleled flexibility; and
- 3) to design all components to work as a seamlessly integrated modular design for precision system solutions as individual as your application.

The modular system is the basis for the coding of HAWE's part numbers. To help you understand how to select the components of your power unit, we have provided a step-by-step example of how you would build a HAWE power pack designed for tool handling on the next page. To help demystify the part number coding, the first part code in this example is explained in detail, as is the part code for the custom power pack on page 14.

Also on pages 15 and 16, you will find a detailed description of how changing out one small part on a standard unit provides dozens of options, proving that HAWE has solutions for applications you haven't even thought of yet.



1. Compact hydraulic power pack, KA
2. Connection block, A
3. Directional valve, NBVP
4. Valve bank system, BA
5. Accessories: pressure gauges, pressure switches, etc.
6. Accumulator, AC

# A Step-by-Step Guide to Modular Design

To build a modular unit, it is first important to define what the unit is intended to do. Break that down by answering the following questions:

- 1) How many functions will it perform?
- 2) What are each of those functions?
- 3) What are the desired duty cycles?
- 4) What is the pressure requirement?
- 5) What is the flow requirement?

Once these parameters have been decided, it is time to select your components as follows:

- 1) Power pack
- 2) Connection block
- 3) Valve bank
- 4) Intermediate plate as required
- 5) Accessories, gauges and pressure switches, accumulators

Based on the schematic on page 2, the following is an example of the HAWE system. On subsequent pages, use the schematics to help you find the function you are looking for, then match the part code in the table to obtain specifications. If you have any questions, contact your HAWE authorized dealer, sales technician, application engineer, or customer service representative.

## Example

**Project name: Tool Handling**

**Functions:**

- 1) Rotary, dual acting, monitored by pressure switches
- 2) Positioning, dual acting

**Duty Cycle:**

- 1) 2-sec rotation at 1,800 psi
- 2) 1-sec positioning at 2,000 psi
- 3) 27-sec no handling

**Flow requirement:**

- 1) 0.5 gpm (rotary)
- 2) 0.5 gpm (positioning)

**Selected power pack:**

KA 24 SKST/H 1.81  
 -A 38/160-6E2 BA 2  
 -NBVP 16 G-M/3  
 -X 84 G-DG 62  
 -X 84 G-DG 62  
 -NBVP 16 D-M/3  
 -80-G 24-AC 603/90/3 A  
 -X 84 V-9/250  
 3 × 460 V 60 Hz

## What it Means

**Coding**

**Description**

KA 24 SKST/H 1.81

- Compact hydraulic power pack type KA (per datasheet D 8010 for intermittent duty)
- Vertical mount (S) with level gauge
- Level gauge with switch NO (KS)
- Temperature switch (T)
- Radial piston pump (H) with a flow rate of .60 gpm at 1,800 rpm.

-A 38/140-6E2

Connection block with relief valve, bleed valve (per datasheet D 6905 A/1) and a pressure switch installed in the M port.  
 Adjustments: system relief valve set 2,030 psi (140 bar).

Valve bank, BA (per datasheet D 7788)

**Function 1:**

BA 2-NBVP 16 G-M/3  
 -X 84 G-DG 62  
 -X 84 G-DG 62

3-position 4-way directional seated valve NBVP (per datasheet D 7765 N).  
 Electronic pressure switches (per datasheet D 5440 F) installed in both M<sub>A</sub> and M<sub>B</sub> ports.

**Function 2:**

-NBVP 16 D-G/3  
 -80-G24-AC 603/90/3 A  
 -X 84 V-9/250

3-position 4-way directional seated valve type NBVP (per datasheet D 7765 N).  
 End plate (80) with assembled accumulator AC 603 (per datasheet D 7969).  
 Pressure gauge installed in system pressure port (M) on connection block.



# Power packs

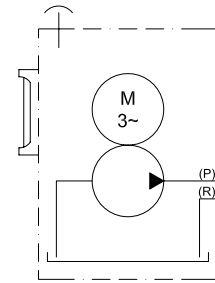


## KA(W)

### Description:

- A ready-to-use power pack for intermittent service
- Optional functions are added via a connection block

KA 24-SK/H 0.93



HAWE part number	Motor voltage	Motor capacity	Pump flow	Pump pressure	Filling volume	Usable volume
KAW 24-SKT/H 0.93	110 1 ph 60 Hz	0.7 hp	0.3 gpm	4,290 psi	1.03 gal	0.49 gal
KA 24-SK/H 0.93	230 3 ph 60 Hz	0.9 hp	0.3 gpm	5,000 psi	1.03 gal	0.49 gal
KA 24-SK/H 0.93	460 3 ph 60 Hz	1.2 hp	0.3 gpm	5,000 psi	1.03 gal	0.49 gal
KAW 281-SKT/H 1.81	110 1 ph 60 Hz	0.9 hp	0.6 gpm	3,290 psi	1.32 gal	0.71 gal
KA 281-SK/H 1.81	230 3 ph 60 Hz	1.5 hp	0.6 gpm	5,000 psi	1.32 gal	0.71 gal
KA 281-SK/H 1.81	460 3 ph 60 Hz	1.5 hp	0.6 gpm	5,000 psi	1.32 gal	0.71 gal

For more detailed information see the following datasheet:

D 8010 Compact power pack type KA

### Option:

- S = Fluid level switch (NO with fluid full)
- K = Fluid level gauge
- T = Temperature switch

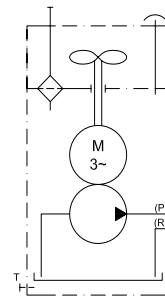


## HK | HKL(W)

### Description:

- A ready-to-use power pack for continuous and intermittent service
- Optional functions are added via a connection block

HK 24/1-H 1.08



HAWE part number	Motor voltage	Motor capacity	Pump flow	Pump pressure	Filling volume	Usable volume	Pump pressure at 230 volts
HK 24/1-H 1.08	460 3 pH 60 Hz	0.9 hp	0.3 gpm	5,000 psi	0.73 gal	0.22 gal	5,000 psi
HK 348 DT/1-H 2.5	460 3 pH 60 Hz	1.7 hp	0.8 gpm	5,000 psi	1.61 gal	0.77 gal	5,000 psi
HK 449 DT/1-H 4.2	460 3 pH 60 Hz	3.5 hp	1.3 gpm	5,000 psi	2.60 gal	1.50 gal	4,260 psi
HKLW 348 DT/1-H 2.15	110 1 pH 60 Hz	2.0 hp	0.7 gpm	5,000 psi	1.45 gal	0.69 gal	- na -
HKL 348 DT/1-H 4.8	460 3 pH 60 Hz	2.4 hp	1.5 gpm	4,860 psi	1.45 gal	0.69 gal	3,400 psi

For more detailed information see the following datasheet:

- D 7600-2 Compact hydraulic power pack type HK 2
- D 7600-3 Compact hydraulic power pack type HK 3
- D 7600-3L Compact hydraulic power pack type HKL 3
- D 7600-4 Compact hydraulic power pack type HK 4 and HKF 4

### Option:

- D = Fluid level switch (NC with fluid full)
- T = Temperature switch

HK units with a 460-V 3-pH 60-Hz motor, the unit may be wired for 265 V at pressures listed for 460 V.

If wired to a 230-V 3-pH 60-Hz power source, pressure capability of the unit may be reduced. See charted values at 230 V.

# Connection blocks

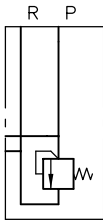


## A | AS | AL

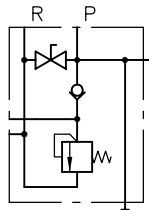
### Description:

- Allows various types of valve manifolds to be directly mounted to the power pack
- Provides a variety of optional valve functions to the power pack, such as P-port check valves, idle circulation valves, drain valves, etc.
- Features a tool-adjustable pressure setting

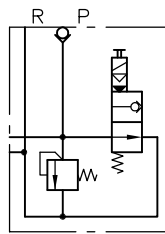
A 1/350



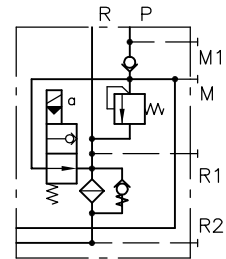
A 38/350



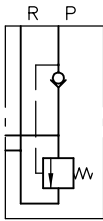
AS 3/350-G24



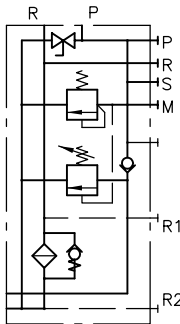
AS 3 F 2/350-G24



AL 11/C 350



AL 21 F 2/C 300/350



### HAWE Part Number

A 1/(350)  
 A 38/(350)  
 AS 3/(350)-G24  
 AS 3 F 2/(350)-G24  
 AL 11/(C 350)  
 AL 21 F 2/(C 300/350)

### Description

Standard  
 Drain valve, P-port check valve  
 Idle circulation valve N0, P-port check valve  
 Idle circulation valve N0, return flow filter, P-port check valve  
 Shut-off valve  
 Shut-off valve, return flow filter

### Replacement filter element:

6905 117 F2

### For more detailed information see the following datasheet:

D 6905 A/1 Connection blocks, A

# Add-on valve bank



## BA

### Description:

- Directly mountable to A, AS, and AL connection blocks
- Sub-plates have D03-hole pattern
- Sub-plates are combinable to a maximum of 10
- End-plates are available with several optional features, such as drain valves, pressure switches, accumulator ports

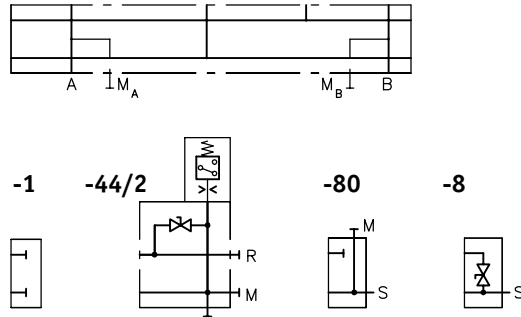
### HAWE part number

Sub-plates  
BA2-/3

### End-plates

BA2-1  
BA2-44/2  
BA2-80  
BA2-8

### Symbol



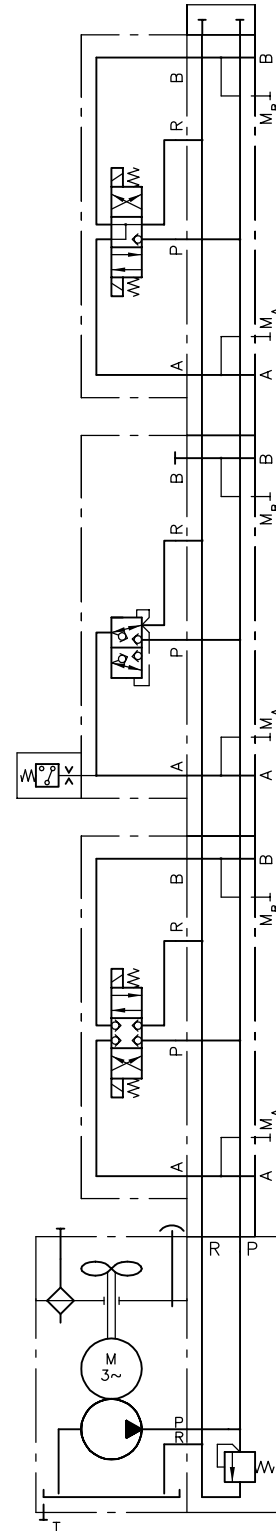
### Tie rod kits (includes tie rods, nuts)

- BA Trk 1 (M6 × 208.5 mm)
- BA Trk 2 (M6 × 258.5 mm)
- BA Trk 3 (M6 × 308.5 mm)
- BA Trk 4 (M6 × 358.5 mm)
- BA Trk 5 (M6 × 408.5 mm)
- BA Trk 6 (M6 × 58.5 mm)
- BA Trk 7 (M6 × 508.5 mm)
- BA Trk 8 (M6 × 558.5 mm)

### For more detailed information see the following datasheet:

D 7788 Valve bank type BA

### Example



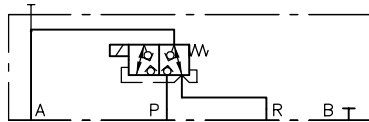
# Directional seated valves



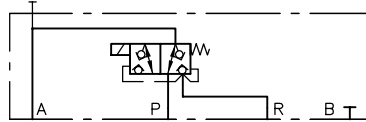
## NBVP Description:

- Zero-leak technology
- D03-hole pattern
- 2 position 3-way, 2 position 4-way, and 3 position 4-way valves
- Several other actuations available, such as hydraulic, pneumatic, manual
- Options for ports P, A, B, and T are check valves, orifices, and restrictor check valves

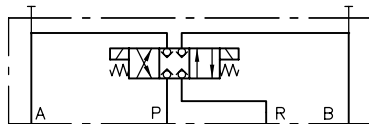
**NBVP 16 Z/2**



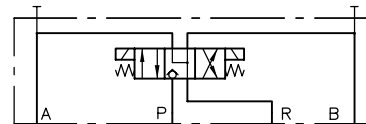
**NBVP 16 Y/2**



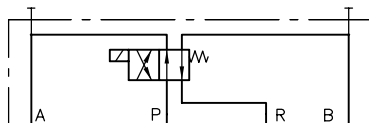
**NBVP 16 G**



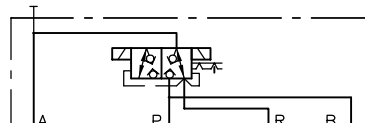
**NBVP 16 D**



**NBVP 16 W**



**NBVP 16 ZD**



HAWE part number	Maximum flow rate	Maximum pressure	Supply voltage
NBVP 16 Y/2-G24	5.3 gpm	5,800 psi	24 VDC
-WG110	5.3 gpm	5,800 psi	110 VAC
NBVP 16 Z/2-G24	5.3 gpm	5,800 psi	24 VDC
-WG110	5.3 gpm	5,800 psi	110 VAC
NBVP 16 G -G24	5.3 gpm	5,800 psi	24 VDC
-WG110	5.3 gpm	5,800 psi	110 VAC
NBVP 16 D -G24	5.3 gpm	5,800 psi	24 VDC
-WG110	5.3 gpm	5,800 psi	110 VAC
NBVP 16 W -G24	5.3 gpm	3,630 psi	24 VDC
-WG110	5.3 gpm	3,630 psi	110 VAC
NBVP 16 ZD -G24	5.3 gpm	5,800 psi	24 VDC
-WG110	5.3 gpm	5,800 psi	110 VAC

**For more detailed information see the following datasheet:**

D 7765 N Directional seated valves type NBVP

**For high-pressure applications up to 10,000 psi see the following datasheets:**

D 7300 N Directional seated valves type NG  
 D 7300 Directional seated valves type G  
 D 7302 Valve banks type VB

# Sandwich plates

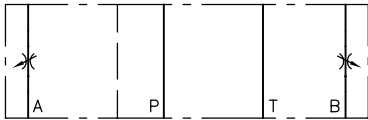


## NZP

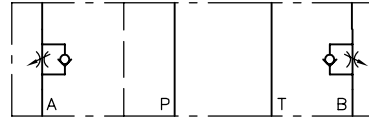
### Description:

- Widens the functionality of directional valves with D03-hole pattern
- Throttle or throttle check valves
- Pressure reducing valves in P, A, or B ports
- Options for ports P, A, B, and T are check valves, orifices, restrictor check valves

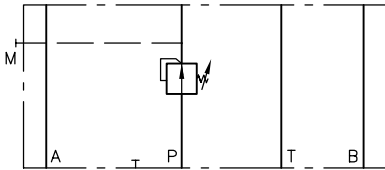
**NZP 16 Q 11**



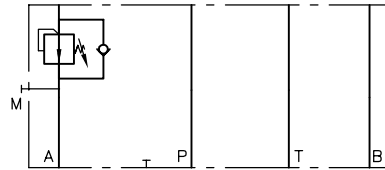
**NZP 16 Q 22**



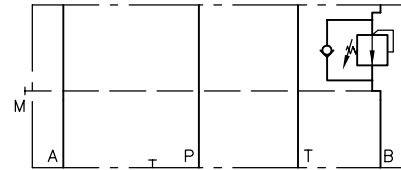
**NZP 16 CZ**



**NZP 16 ACZ**



**NZP 16 BCZ**



### HAWE part number

### Maximum flow rate

### Pressure range

Throttle or throttle check valves

NZP 16 Q 11  
NZP 16 Q 22

13.2 gpm  
13.2 gpm

7,250 psi  
7,250 psi

Pressure reducing valve

NZP 16 CZ-08  
NZP 16 CZ-1  
NZP 16 CZ-2  
NZP 16 CZ-5

3.2 gpm  
3.2 gpm  
3.2 gpm  
3.2 gpm

725–6,530 psi  
435–4,350 psi  
290–2,900 psi  
220–1,885 psi

NZP 16 ACZ-08  
NZP 16 ACZ-1  
NZP 16 ACZ-2  
NZP 16 ACZ-5

3.2 gpm  
3.2 gpm  
3.2 gpm  
3.2 gpm

725–6,530 psi  
435–4,350 psi  
290–2,900 psi  
220–1,885 psi

NZP 16 BCZ-08  
NZP 16 BCZ-1  
NZP 16 BCZ-2  
NZP 16 BCZ-5

3.2 gpm  
3.2 gpm  
3.2 gpm  
3.2 gpm

725–6,530 psi  
435–4,350 psi  
290–2,900 psi  
220–1,885 psi

**Bolt kits when sandwich valves are used are as follows:**

#### NBVP 16 D, G, DS, J, Q, K, RS, SR, W

BA 1 SW 01 bolt kit 1 sandwich Q or CZ option  
BA 1 SW 02 bolt kit 1 sandwich ACZ or BCZ options  
BA 2 SW 01 bolt kit 2 sandwich Q + CZ option  
BA 2 SW 02 bolt kit 2 sandwich Q/CZ + ACZ/BCZ options  
BA 2 SW 03 bolt kit 2 sandwich ACZ + BCZ option

#### NBVP 16 R, S, Z, Y

BA 1 SW 03 bolt kit 1 sandwich Q or CZ option  
BA 1 SW 04 bolt kit 1 sandwich ACZ or BCZ options  
BA 2 SW 04 bolt kit 2 sandwich Q + CZ option  
BA 2 SW 05 bolt kit 2 sandwich Q/CZ + ACZ/BCZ options  
BA 2 SW 06 bolt kit 2 sandwich ACZ + BCZ option

**For more detailed information see the following datasheet:**

D 7788 Z Sandwich plates type NZP



## Additional valves



### CDK

#### Description:

- A pressure reducing valve
- Zero leakage when closed
- Housing in different designs are available, such as plate mounting, sandwich plate, or pipe mounting
- Features a tool adjustable pressure setting
- Screw-in application

HAWE part number		Maximum flow rate	Pressure range	Symbol
Screw-in type	Line mounted (BSPP)			<p>CDK 3</p>
CDK 3-08	CDK 3-08 -1/4	3.2 gpm	725–6,530 psi	
CDK 3-1	CDK 3-1 -1/4	3.2 gpm	435–4,350 psi	
CDK 3-2	CDK 3-2 -1/4	3.2 gpm	290–2,900 psi	
CDK 3-5	CDK 3-5 -1/4	3.2 gpm	220–1,885 psi	

#### For more detailed information see the following datasheets:

- D 7745 Pressure reducing valves type CDK  
D 7941 Pressure reducing valves with tracked pressure switch type DK and DZ

## Sequence valves



### CMVZ

#### Description:

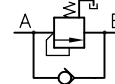
- Available as pressure limiting valves or pressure sequence valves
- Available as screw-in or for pipe mounting with housing
- Available with different pressure ranges
- Adjustable pressure setting

HAWE part number		Maximum flow rate	Pressure range	Symbol
Screw-in type	Line mounted (BSPP)			<p>CMVZ 2 C-200-3/8</p>
CMVZ 2 C-200	CMVZ 2 C-200-3/8	10.5 gpm	0–7,250 psi	
CSVZ 2 C-200	CSVZ 2 C-200-3/8	10.5 gpm	0–7,250 psi	

#### For more detailed information see the following datasheet:

- D 7710 MV Pressure valves type CMV(Z) and CSV(Z)

CSVZ 2 C-200-3/8



## Check valves



**RK | ER | RHC | BC | EBR**

**Description:**

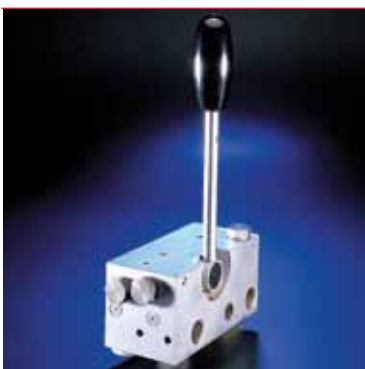
- Zero-leak check valves
- Available as screw-in, insert, or with housing for in-line pipe mounting

HAWE part number	Maximum flow rate	Pressure range	Symbol
Check valves RK 0 RK 1 RK 2 ER 13	2.6 gpm 5.3 gpm 13.2 gpm 3.2 gpm	10,000 psi 10,000 psi 10,000 psi 5,800 psi	
Pilot operated check valves RHC 1 RHC 2	4.0 gpm 9.2 gpm	10,000 psi 10,000 psi	
Restrictor check valves BC 1-0.6 BC 2-0.8 EBR 14-0.6	5.3 gpm 9.2 gpm 5.3 gpm	10,000 psi 10,000 psi 5,800 psi	

For more detailed information see the following datasheets:

- D 6969 R Check valves type RC
- D 7445 Check valves type RK
- D 7325 Check valves type ER
- D 7165 Pilot operated check valves type RHC
- D 6969 B Restrictor check valves type BC

## Remote-mounted-manual directional valve



**VH**

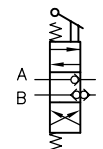
**Description:**

- 3-position 4-way directional ball seated valves
- Zero-leak technology
- Available as plate mounted or valve bank
- Different flow pattern available

HAWE part number	Maximum flow rate	Pressure range	Symbol
VH 1 G 13-pos 4-way	3.17 gpm	10,000 psi	<b>VH 1 G</b>

For more detailed information see the following datasheet:

- D 7647 Directional seated valves type VH, VHR, and VHP



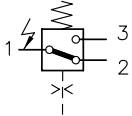
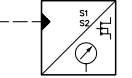
# Pressure switches



## DG

### Description:

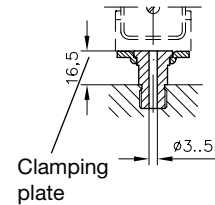
- Mechanical or electronic operated pressure switches
- Available as individual component for pipe mounting or as screw-in type
- Can be integrated into a complete power pack unit

HAWE part number	Pressure range	Symbol
Mechanical pressure switch DG 34 DG 35 DG 365	1,450–5,800 psi 290–3,630 psi 175–2,465 psi	
Electronic pressure switch with 2 settings DG 62 DG 64	0–3,630 psi 0–5,800 psi	

### For more detailed information see the following datasheets:

- D 5440 Pressure switches type DG 3  
D 5440 F Electronic pressure switches type DG 6

DG 3 Pressure switch adapter	Male thread size
Y1G	1/4
Y3G	1/8



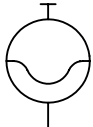
# Accumulators



## AC

### Description:

- Accumulators for dampening
- Supports pump delivery
- Available as an individual component or as an integrated part of a power pack unit

HAWE part number	Filling volume	Maximum pressure	Maximum filling pressure	Symbol
AC 13-1/4	0.79 in <sup>3</sup>	5,800 psi	3,625 psi	
AC 40-1/4	2.44 in <sup>3</sup>	5,800 psi	3,625 psi	
AC 603/3A	36.61 in <sup>3</sup>	4,800 psi	2,900 psi	

### For more detailed information see the following datasheets:

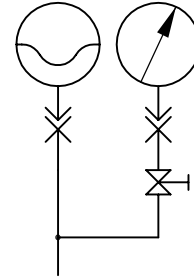
- D 7571 Miniature hydraulic accumulators type AC  
D 7969 Diaphragm accumulators type AC

# Fittings



## X 84 Description

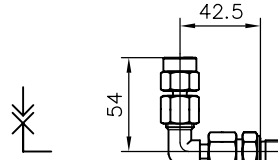
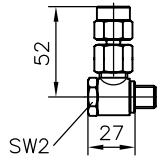
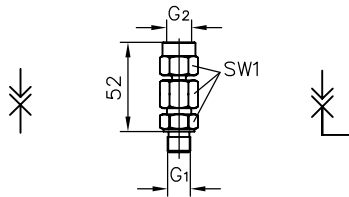
- For pressure gauges and other hydraulic equipment with tapped journal G 1/4 A (BSPP)



**X 84 G**

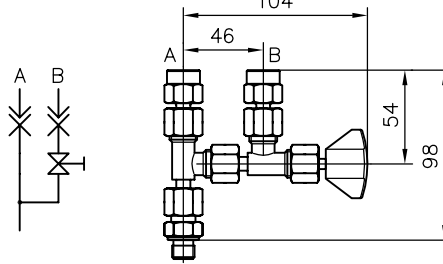
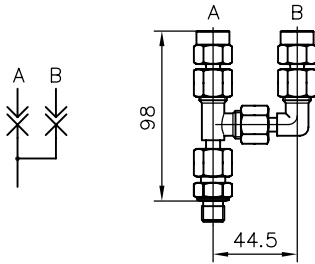
**X 84 S**

**X 84 V**



**X 84 Y**

**X 84 U**



HAWE part number		
Male jic-male BSPP	Washer and o-ring jic thread	BSPP thread
X 1019-00-0404	7/16-20	G 1/4
X 1019-00-0406	7/16-20	G 3/8
X 1019-00-0606	9/16-18	G 3/8
90°-male, jic-male BSPP	jic thread	Washer and o-ring BSPP thread
X 1019-09-0404	7/16-20	G 1/4
X 1019-09-0406	7/16-20	G 3/8
X 1019-09-0606	9/16-18	G 3/8

Bottom-mounted gauges	Pressure ranges
9/250	250 bar
9/400	400 bar
9/600	600 bar
9/1000	1000 bar

For more detailed information see the following datasheet:  
D 7077 Fittings type X 84

# My project

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Use this worksheet as described on page 2.

## **Project name:**

## **Required functions:**

1. Function:

2. Function:

3. Function:

4. Function:

5. Function:

## **Pump definition:**

Duty cycle:

HP requirement:

Flow requirement:

## **Power pack selection (type coding):**

1. Power pack:

2. Connection block:

3. Valve bank (including directional valves, sandwich plates and sub-plates for each function, plus end plate):

4. Accessories:

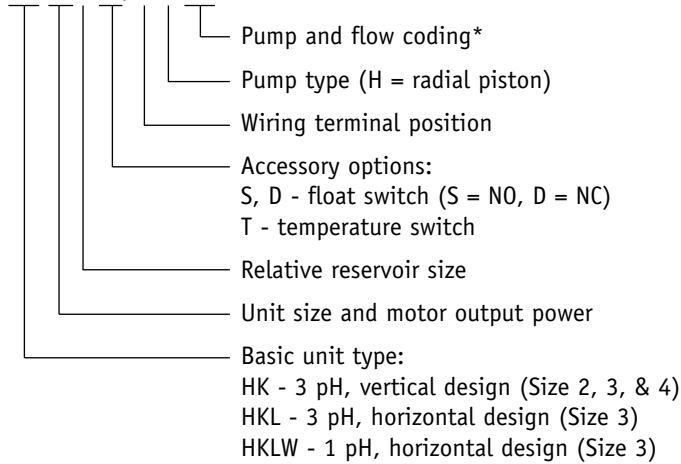


# Custom System Solutions from HAWE Hydraulics



**Compact hydraulic power units**  
types HK, HKLW, and HKL

**HAWE type coding:**  
**HK 449 DT/1-H 6.0**



\* The code correlates to the flow of the pump in liters per minute at 1,450 rpm. Note that for American units of measure, conversion from metrics must take place.

## Selecting a Base Unit

**Example:**

The application calls for a 0.85-gpm flow at 2,000 psi continuous operation.  
The "Configuration of the Base Unit, HK" table on page 15 tells us the following:

- 1) The Size 2 is too small
- 2) The power rating on Size 3 is too low
- 3) Any of the units with a 3-pH × 60 Hz × 265/460 VAC motor will meet the required flow and pressure.

Therefore, in no order of preference, the options are:

	Pump Call-Out	Flow	S1 Operation
Option 1: <b>HK 34 DT/1-H 3.6</b>	Size 2	n/a (all flow choices too low)	
Option 2: <b>HKL 348 DT/1-H 3.35</b>	Size 3 (vertical)	3.6	2,600 psi
	Size 3 (1 pH, horizontal)	3.35	1,550 psi
Option 3: <b>HK 449 DT/1-H 2.6</b>	Size 3 (3 pH, horizontal)	3.35	2,750 psi
	Size 4	2.6	5,050 psi

**Build program overview:**

**HK Size 2** D 7600-2

- 3 pH motor: 0.9 hp maximum
- Flows ranging from 0.1 to 0.7 gpm
- Maximum pressure up to 10,000 psi

**HK Size 3** D 7600-3

- 3 pH motor: 1.7 hp maximum
- Flow ranging from 0.3 to 2 gpm
- Maximum pressure up to 10,000 psi

**HKLW Size 3 (horizontal)** D 7600-3L

- 1 pH motor: 2.0 hp maximum
- Flow ranging from 0.4 to 2.8 gpm
- Maximum pressure up to 10,000 psi

**HKL Size 3 (horizontal)** D 7600-3L

- 3 pH motor: 2.4 hp maximum
- Flow ranging from 0.4 to 2.7 gpm
- Maximum pressure up to 10,000 psi

**HK Size 4** D 7600-4

- 3 pH motor: 3.5 hp maximum
- Maximum flow: 3.4 gpm
- Maximum pressure up to 10,000 psi

## Configuration of the Base Unit HK

This table represents a number of HK pump configurations by size. The bold entries are stocked parts; the non-bold entries are available with alternate pump elements. Numerous additional configurations are available. Consult your local, authorized HAWE distributor for customized system solutions.

Pump Designation	Pump and Flow Coding*	Flow (gpm)	S1 (continuous) Operating Pressure (psi)	S6 (load/no load) Maximum Pressure (psi)
<b>Size 2</b>				
HK 24 /1-H 1.08	0.46	0.14	8,700	10,000
3 pH × 60 Hz × 265/460 VAC (0.9 hp, 1,670 rpm)	0.7	0.21	5,800	8,250
Approximate filling volume: 0.73 gal	<b>1.08</b>	<b>0.30</b>	<b>4,050</b>	<b>5,500</b>
Approximate usable volume: 0.22 gal	1.39	0.41	2,900	4,200
	1.77	0.54	2,150	3,100
	2.27	0.68	1,650	2,450
<b>Size 3</b>				
HK 348 DT/1-H 3.6	0.9	0.28	10,000	10,000
3 pH × 60 Hz × 265/460 VAC (1.7 hp, 1,720 rpm)	1.25	0.38	7,650	10,000
Approximate filling volume: 1.61 gal	1.5	0.49	6,050	10,000
Approximate usable volume: 0.77 gal	2.5	0.78	3,750	6,350
	<b>3.6</b>	<b>1.12</b>	<b>2,600</b>	<b>4,450</b>
	4.3	1.29	2,150	3,750
	5.1	1.52	1,850	3,150
	5.6	1.74	1,550	2,900
	6.5	2.00	1,450	2,450
<b>Size 3 (1-pH horizontal)</b>				
HKLW 348 DT/1-H 2.15	1.15	0.37	8,100	10,000
1 pH × 60 Hz 110 VAC (2.0 hp, 1,650 rpm)	1.65	0.51	5,900	7,400
Approximate filling volume: 1.45 gal	<b>2.15</b>	<b>0.66</b>	<b>4,550</b>	<b>5,650</b>
Approximate usable volume: 0.69 gal	3.35	1.04	2,900	3,600
	4.8	1.50	2,000	2,450
	5.7	1.76	1,700	2,100
	6.7	2.04	1,450	1,800
	7.7	2.34	1,300	1,550
	8.7	2.66	1,050	1,350
<b>Size 3 (3-pH horizontal)</b>				
HKL 348 DT/1-H 4.8	1.15	0.38	9,700	10,000
3 pH × 60 Hz × 265/460 VAC (2.4 hp, 1,690 rpm)	1.65	0.52	7,100	10,000
Approximate filling volume: 1.45 gal	2.15	0.68	5,500	10,000
Approximate usable volume: 0.69 gal	3.35	1.07	3,450	7,000
	<b>4.8</b>	<b>1.54</b>	<b>2,450</b>	<b>4,850</b>
	5.7	1.80	2,000	4,100
	6.7	2.09	1,700	3,550
	7.7	2.40	1,500	3,100
	8.7	2.73	1,350	2,750
<b>Size 4</b>				
HK 449 DT/1-H 6.0	1.4	0.47	10,000	10,000
3 pH × 60 Hz × 265/460 VAC (3.5 hp, 1,700 rpm)	2.08	0.64	8,850	10,000
Approximate filling volume: 2.6 gal	2.6	0.83	6,800	9,400
Approximate usable volume: 1.5 gal	4.2	1.30	4,350	6,050
	<b>6</b>	<b>1.87</b>	<b>3,050</b>	<b>4,200</b>
	7	2.20	2,600	3,600
	8.3	2.55	2,150	3,000
HKF 489 DT/1-H 7.0	9.5	2.93	1,850	2,750
3 pH × 60 Hz × 265/460 VAC (4.8 hp, 1,730 rpm)	10.9	3.33	1,700	2,300

\*The code correlates to the flow of the pump in liters per minute at 1,450 rpm. Note that for American units of measure, conversion from metrics must take place.



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