Workholding




Solutions for a World under Pressure

HAWE HYDRAULIK

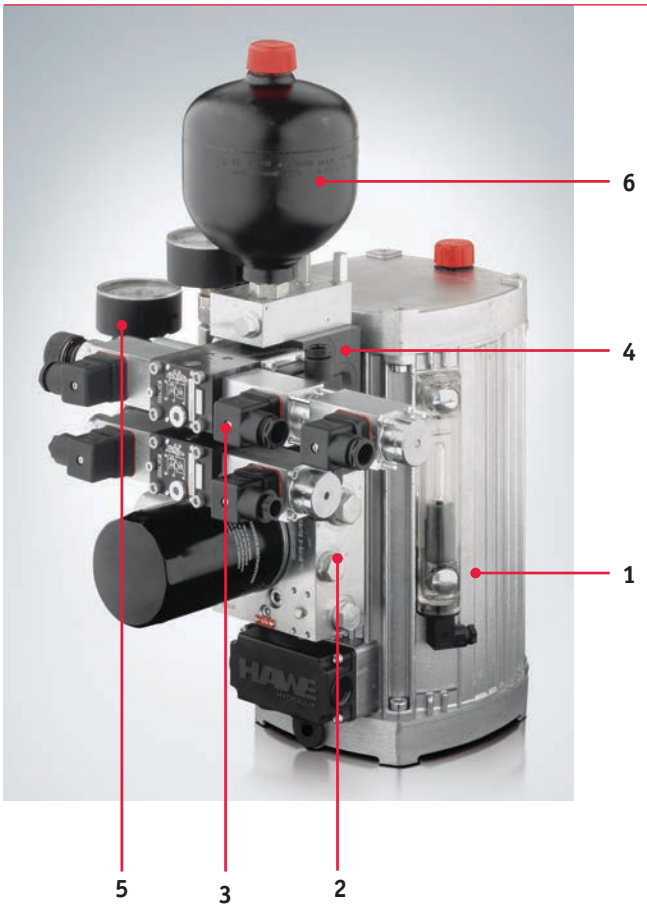
HAWE Hydraulik: Turn-Key Modular Solutions

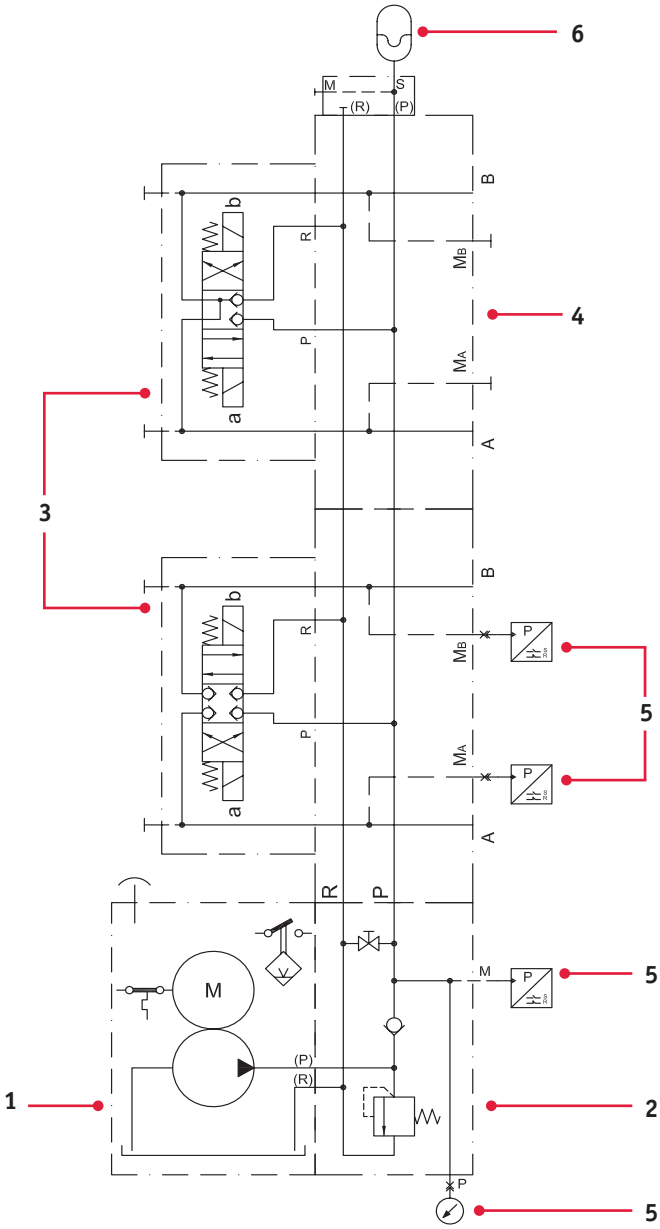
HAWE's unique approach to hydraulics may, at first glance, appear complicated. However, it's a simple concept based on three principles:

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 postioning 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 data sheet 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 data sheet 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 data sheet D 7788)
	Function 1:
BA 2-NBVP 16 G-M/3	3-position 4-way directional seated valve NBVP (per data sheet D 7765 N).
-X 84 G-DG 62 -X 84 G-DG 62	Electronic pressure switches (per data sheet D 5440 F) installed in both M_A and M_B ports.
	Function 2:
-NBVP 16 D-G/3	3-position 4-way directional seated valve type NBVP (per data sheet D 7765 N).
-80-G24-AC 603/90/3 A	End plate (80) with assembled accumulator AC 603 (per data sheet D 7969).
-X 84 V-9/250	Pressure gauge installed in system pressure port (M) on connection block.

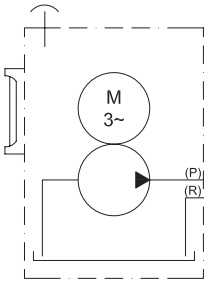
Power packs

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 data sheet:

D 8010 Compact power pack type KA

Option:

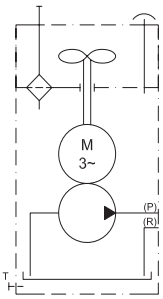
S = Fluid level switch (NO with fluid full)
K = Fluid level gauge
T = Temperature switch

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 data sheet:

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.

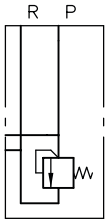
Connection blocks

A | AS | AL

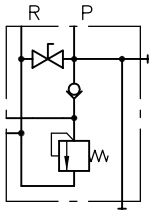
Description:

- 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

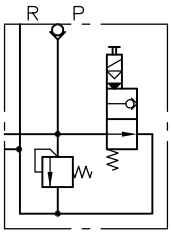
A 1/350



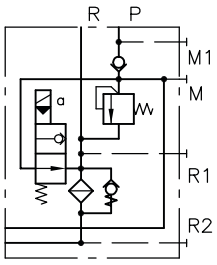
A 38/350



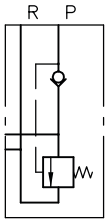
AS 3/350-G24



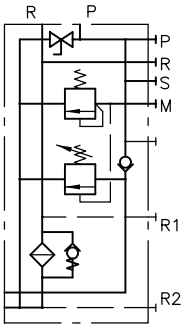
AS 3 F 2/350-G24



AL 11/C 350



AL 21 F 2/C 300/350



HAWE Part Number	Description
A 1/(350)	Standard
A 38/(350)	Drain valve, P-port check valve
AS 3/(350)-G24	Idle circulation valve NO, P-port check valve
AS 3 F 2/(350)-G24	Idle circulation valve NO, return flow filter, P-port check valve
AL 11/(C 350)	Shut-off valve
AL 21 F 2/(C 300/350)	Shut-off valve, return flow filter

Replacement filter element:
6905 117 F2

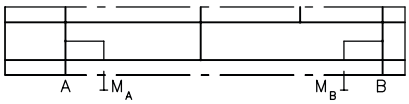
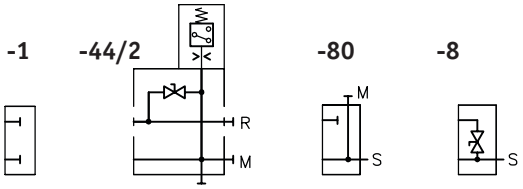
For more detailed information see the following data sheet:
D 6905 A/1 Connection blocks, A

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	Symbol
Sub-plates BA2-/3	
End-plates BA2-1 BA2-44/2 BA2-80 BA2-8	

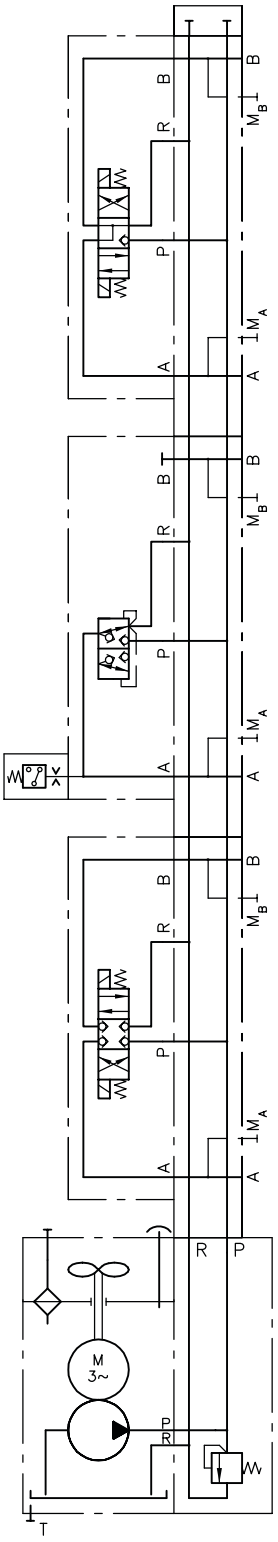
Tie rod kits (includes tie rods, nuts)

- 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 data sheet:

D 7788 Valve bank type BA

Example



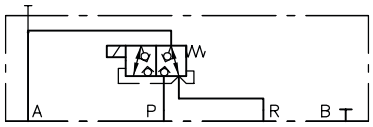
Directional seated valves

NBVP

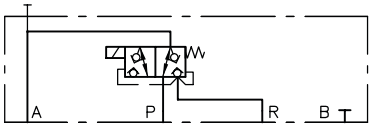
Description:

- Zero-leak technology
- DO3-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

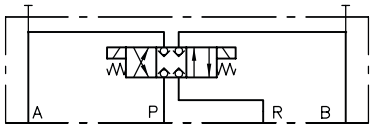
NBVP 16 Z/2



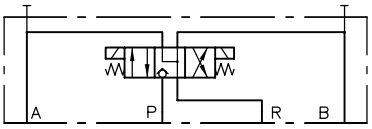
NBVP 16 Y/2



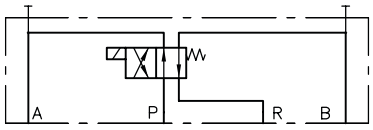
NBVP 16 G



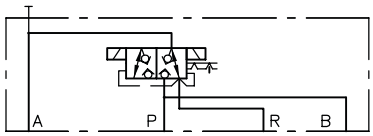
NBVP 16 D



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 data sheet:

D 7765 N Directional seated valves type NBVP

For high-pressure applications up to 10,000 psi see the following data sheets:

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

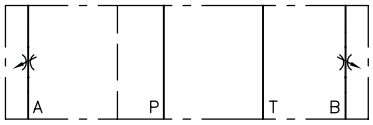
Sandwich plates

NZP

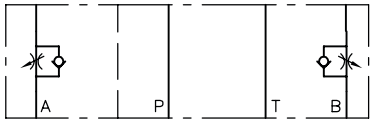
Description:

- Widens the functionality of directional valves with DO3-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

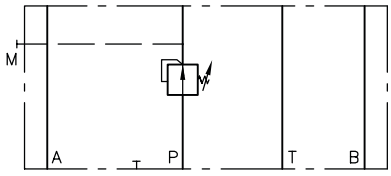
NZP 16 Q 11



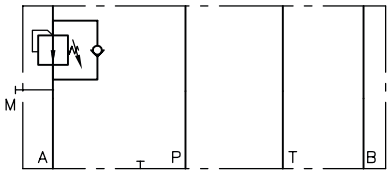
NZP 16 Q 22



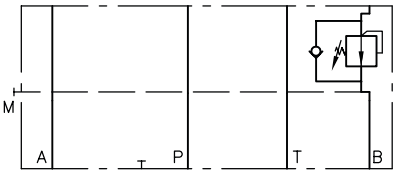
NZP 16 CZ



NZP 16 ACZ



NZP 16 BCZ



HAWE part number	Maximum flow rate	Pressure range
Throttle or throttle check valves		
NZP 16 Q 11	13.2 gpm	7,250 psi
NZP 16 Q 22	13.2 gpm	7,250 psi
Pressure reducing valve		
NZP 16 CZ-08	3.2 gpm	725–6,530 psi
NZP 16 CZ-1	3.2 gpm	435–4,350 psi
NZP 16 CZ-2	3.2 gpm	290–2,900 psi
NZP 16 CZ-5	3.2 gpm	220–1,885 psi
NZP 16 ACZ-08	3.2 gpm	725–6,530 psi
NZP 16 ACZ-1	3.2 gpm	435–4,350 psi
NZP 16 ACZ-2	3.2 gpm	290–2,900 psi
NZP 16 ACZ-5	3.2 gpm	220–1,885 psi
NZP 16 BCZ-08	3.2 gpm	725–6,530 psi
NZP 16 BCZ-1	3.2 gpm	435–4,350 psi
NZP 16 BCZ-2	3.2 gpm	290–2,900 psi
NZP 16 BCZ-5	3.2 gpm	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		NBVP 16 R, S, Z, Y	
BA 1 SW 01	bolt kit 1 sandwich Q or CZ option	BA 1 SW 03	bolt kit 1 sandwich Q or CZ option
BA 1 SW 02	bolt kit 1 sandwich ACZ or BCZ options	BA 1 SW 04	bolt kit 1 sandwich ACZ or BCZ options
BA 2 SW 01	bolt kit 2 sandwich Q + CZ option	BA 2 SW 04	bolt kit 2 sandwich Q + CZ option
BA 2 SW 02	bolt kit 2 sandwich Q/CZ + ACZ/BCZ options	BA 2 SW 05	bolt kit 2 sandwich Q/CZ + ACZ/BCZ options
BA 2 SW 03	bolt kit 2 sandwich ACZ + BCZ option	BA 2 SW 06	bolt kit 2 sandwich ACZ + BCZ option

For more detailed information see the following data sheet:

D 7788 Z Sandwich plates type NZP

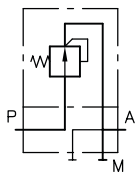
Additional valves

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)			CDK 3
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 data sheets:

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

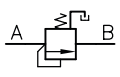
Sequence valves

CMVZ

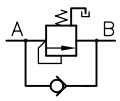
Description:

- 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)			CMVZ 2 C-200-3/8
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	



CSVZ 2 C-200-3/8



For more detailed information see the following data sheet:

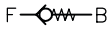
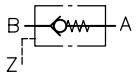
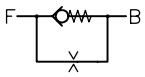
D 7710 MV Pressure valves type CMV(Z) and CSV(Z)

Check valves

RK | ER | RHC | BC | EBR

Description:

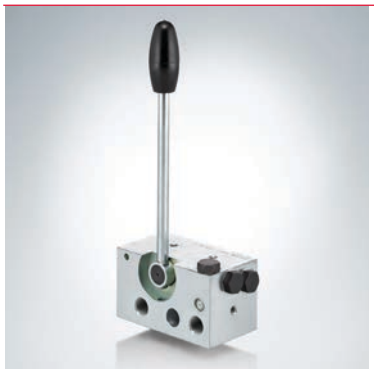
- Zero-leak check valves
- Available as screw-in, insert, or with housing for in-line pipe mounting

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

For more detailed information see the following data sheets:

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

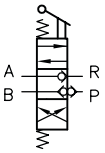
Remote-mounted-manual directional valve



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 1 3-pos 4-way	3.17 gpm	10,000 psi	VH 1 G 

For more detailed information see the following data sheet:

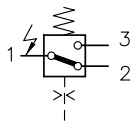
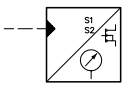
D 7647	Directional seated valves type VH, VHR, and VHP

Pressure switches

DG

Description:

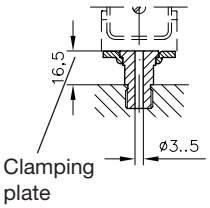
- Mechanical or electronic operated pressure switches
- Available as individual component for pipe mounting or as screw-in type
- Can be integrated into a complete power pack unit

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

For more detailed information see the following data sheets:

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

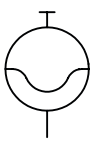


Accumulators

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^3	5,800 psi	3,625 psi	
AC 40-1/4	2.44 in^3	5,800 psi	3,625 psi	
AC 603/3A	36.61 in^3	4,800 psi	2,900 psi	

For more detailed information see the following data sheets:

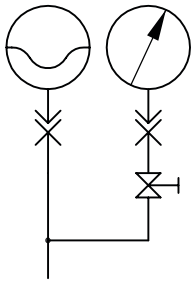
D 7571 Miniature hydraulic accumulators type AC
D 7969 Diaphragm accumulators type AC

Fittings

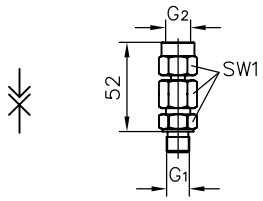
X 84

Description:

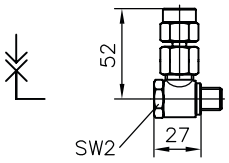
- For pressure gauges and other hydraulic equipment with tapped journal G 1/4 A (BSPP)



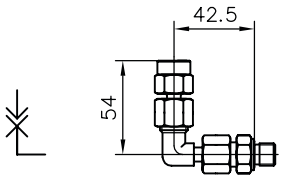
X 84 G



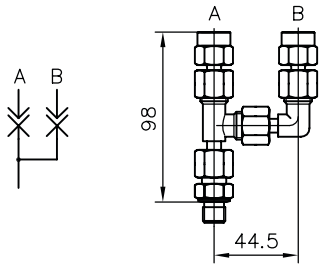
X 84 S



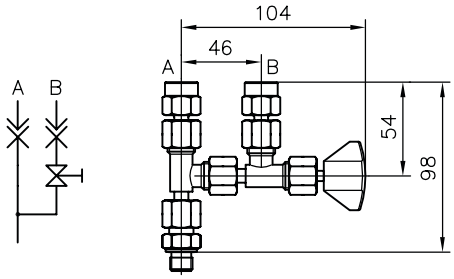
X 84 V



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 data sheet:

D 7077 Fittings type X 84

My project

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 Hydraulik

Compact hydraulic power units
types HK, HKLW, and HKL

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

- Pump and flow coding*
- Pump type (H = radial piston)
- Wiring terminal position
- Accessory options:
  S, D - float switch (S = NO, D = NC)
  T - temperature switch
- Relative reservoir size
- Unit size and motor output power
- Basic unit type:
  HK - 3 pH, vertical design (Size 2, 3, & 4)
  HKL - 3 pH, horizontal design (Size 3)
  HKLW - 1 pH, horizontal design (Size 3)

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

HK 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

* 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 metric 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:

Option 1: **HK 34 DT/1-H 3.6**

Option 2: **HKL 348 DT/1-H 3.35**

Option 3: **HK 449 DT/1-H 2.6**

	Pump Call-Out	Flow	S1 Operation
Size 2	n/a (all flow choices too low)		
Size 3 (vertical)	3.6	1.12 gpm	2,600 psi
Size 3 (1 pH, horizontal)	3.35	1.02 gpm	1,550 psi
Size 3 (3 pH, horizontal)	3.35	1.07 gpm	2,750 psi
Size 4	2.6	0.86 gpm	5,050 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)
Size 2	0.46	0.14	8,700	10,000
HK 24 /1-H 1.08	0.7	0.21	5,800	8,250
3 pH × 60 Hz × 265/460 VAC	**1.08**	**0.30**	**4,050**	**5,500**
(0.9 hp, 1,670 rpm)	1.39	0.41	2,900	4,200
Approximate filling volume: 0.73 gal	1.77	0.54	2,150	3,100
Approximate usable volume: 0.22 gal	2.27	0.68	1,650	2,450
Size 3	0.9	0.28	10,000	10,000
HK 348 DT/1-H 3.6	1.25	0.38	7,650	10,000
3 pH × 60 Hz × 265/460 VAC	1.5	0.49	6,050	10,000
(1.7 hp, 1,720 rpm)	2.5	0.78	3,750	6,350
Approximate filling volume: 1.61 gal	**3.6**	**1.12**	**2,600**	**4,450**
Approximate usable volume: 0.77 gal	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
Size 3 (1-pH horizontal)	1.15	0.37	8,100	10,000
HKLW 348 DT/1-H 2.15	1.65	0.51	5,900	7,400
1 pH × 60 Hz 110 VAC	**2.15**	**0.66**	**4,550**	**5,650**
(2.0 hp, 1,650 rpm)	3.35	1.04	2,900	3,600
Approximate filling volume: 1.45 gal	4.8	1.50	2,000	2,450
Approximate usable volume: 0.69 gal	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
Size 3 (3-pH horizontal)	1.15	0.38	9,700	10,000
HKL 348 DT/1-H 4.8	1.65	0.52	7,100	10,000
3 pH × 60 Hz × 265/460 VAC	2.15	0.68	5,500	10,000
(2.4 hp, 1,690 rpm)	3.35	1.07	3,450	7,000
Approximate filling volume: 1.45 gal	**4.8**	**1.54**	**2,450**	**4,850**
Approximate usable volume: 0.69 gal	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
Size 4	1.4	0.47	10,000	10,000
HK 449 DT/1-H 6.0	2.08	0.64	8,850	10,000
3 pH × 60 Hz × 265/460 VAC	2.6	0.83	6,800	9,400
(3.5 hp, 1,700 rpm)	4.2	1.30	4,350	6,050
Approximate filling volume: 2.6 gal	**6**	**1.87**	**3,050**	**4,200**
Approximate usable volume: 1.5 gal	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	10.9	3.33	1,700	2,300
(4.8 hp, 1,730 rpm)				

*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 metric must take place.

Workholding

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Solutions for a World under Pressure

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