

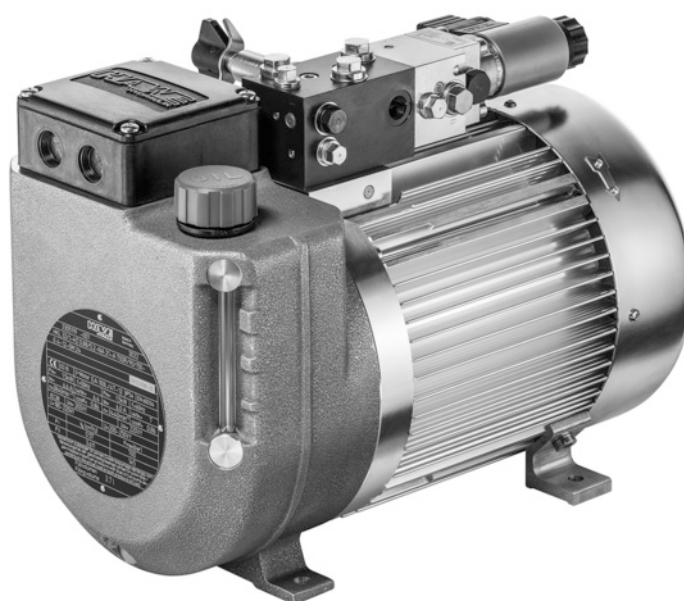
Compact hydraulic power pack type HKL, HKLW

Product documentation



For Continuous operation with constant load (S1), Short period operation (S2), Periodic intermittent operation (S3), Continuous periodic operation (S6)

Operating pressure $p_{\max}$:	700 bar
Displacement volume $V_{g \max}$:	14.5 cm ³ /rev
Usable volume $V_{\text{use max}}$:	9.1 l



© by HAWE Hydraulik SE.

The reproduction and distribution of this document, as well as the use and communication of its contents to others without explicit authorization, is prohibited.

Offenders will be held liable for the payment of damages.

All rights reserved in the event of patent or utility model applications.

Brand names, product names and trademarks are not specifically indicated. In particular with regard to registered and protected names and trademarks, usage is subject to legal provisions.

HAWE Hydraulik respects these legal provisions in all cases.

HAWE Hydraulik cannot provide individual guarantees that the stated circuits or procedures (including in part) are not subject to the intellectual property rights of third parties.

Printing date / document generated on: 2025-03-06

Table of Contents

1	Overview of compact hydraulic power pack type HKL, HKLW.....	5
2	Available versions.....	6
2.1	Motor and container.....	6
2.1.1	Basic type and motor power.....	6
2.1.2	Tank size.....	7
2.1.3	Additional options.....	7
2.1.4	Position of connection base.....	8
2.1.5	Electrical connection.....	8
2.1.6	Oil drain hose.....	9
2.2	Pump.....	10
2.2.1	Single-circuit pumps.....	10
2.2.2	Dual-circuit pump with shared connection base.....	17
2.2.3	Dual-circuit pumps with separate connection bases.....	31
3	Parameters.....	37
3.1	General data.....	37
3.2	Pressure and volumetric flow.....	38
3.3	Weight.....	38
3.4	Characteristic lines.....	39
3.4.1	Build-up of heat.....	39
3.4.2	Running noise.....	39
3.5	Electrical data.....	40
3.6	Motor data.....	41
3.7	Current consumption characteristic lines.....	42
3.8	Additional options.....	44
3.8.1	Level switch.....	44
3.8.2	Temperature switch.....	44
4	Dimensions.....	45
4.1	Mounting hole pattern.....	45
4.2	Basic pump.....	46
4.3	Connections.....	48
4.3.1	Hydraulic connections.....	48
4.3.2	Electrical connections.....	49
4.3.2.1	Position of HARTING connector.....	52
4.4	Oil drain hose.....	53
5	Installation, operation and maintenance information.....	54

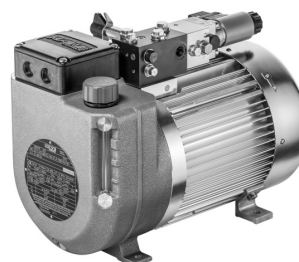
6	Other information.....	55
6.1	Planning information.....	55
6.1.1	Drawing up function diagram.....	55
6.1.2	Determining pressures and flow rates.....	55
6.1.3	Creating a hydraulic circuit diagram.....	56
6.1.4	Drawing up a time/load diagram on the basis of a function diagram.....	56
6.1.5	Selecting the compact hydraulic power pack.....	56
6.1.6	Calculating the hydraulic work value.....	57
6.1.7	Determining the steady-state temperature.....	57
6.1.8	Determining the maximum current consumption.....	57
6.1.9	Selecting the operating capacitor.....	58
6.1.10	Additional leakage oil return port.....	58
6.1.11	Setting the pump after-run.....	59
6.1.12	Connection blocks.....	60
6.1.13	Directional valve banks.....	61

1**Overview of compact hydraulic power pack type HKL, HKLW**

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. Compact hydraulic power packs are used to supply hydraulic oil in hydraulic systems.

The ready-for-connection compact hydraulic power pack type HKL includes an electric drive that runs in oil. A fan, which effectively dissipates the heat from the hydraulic system, is mounted on the housing. The type HKL is installed lying down, requiring only minimal installation height.

Single-circuit, dual-circuit or triple-circuit systems can be assembled. A radial piston pump, an external gear pump or an internal gear pump can be used as a hydraulic pump. The compact hydraulic power pack type HKL is suitable for use as a highly compact control system, since connection blocks and valve banks can be directly mounted.



Compact hydraulic power pack type HKL 3 and HKLW 3

Features and advantages

- Environmentally friendly thanks to low oil filling volume; low cost of disposal and low hydraulic fluid costs
- Long service life and high reliability

Intended applications

- Machine tools and material testing
- Test bench construction
- Hydraulic tools
- Handling systems
- Wind turbines

2

Available versions

2.1 Motor and container

Ordering examples

HKL 32 HKL 34 HKLW 32 HKLW 34	8	DT T DT	/2 /1 /1 /1	P1	H 6,7 H 1,15 HZ 0,88/5,2 Z 6,0	-B31/80-EM11V-G24 -AB 1 K B 500 -NA31-... -AL11C/80	-3x230 V 50 Hz / 3x265 V 60 Hz -3x400 V 50 Hz / 3x460 V 60 Hz -1x110 V 60 Hz -1x230 V 50 Hz	-G 1/4 x 300
					Pump version	2.2 "Pump"	Motor voltage	3.6 "Motor data"
					2.1.5 "Electrical connection"			
					2.1.4 "Position of connection base"			
					2.1.3 "Additional options"			
					2.1.2 "Tank size"			
					2.1.1 "Basic type and motor power"			
					2.1.6 "Oil drain hose"			

2.1.1 Basic type and motor power

Type	For motor voltages and motor data, see Chapter 3.6, "Motor data"		
	Nominal voltage	Nominal power (kW) at 50 Hz / 60 Hz	Rated speed (min ⁻¹) at 50 Hz/60 Hz
3-phase motor			
HKL 32	3x400 V 50 Hz / 460 V 60 Hz	1.5 / 1.8	2840 / 3410
	3x230 V 50 Hz / 265 V 60 Hz	1.5 / 1.8	2840 / 3410
HKL 34 HKL 34 V *	3x400 V 50 Hz / 460 V 60 Hz	1.5 / 1.8	1410 / 1690
	3x230 V 50 Hz / 265 V 60 Hz	1.5 / 1.8	1410 / 1690
HKL 38 * HKL 38 V *	3x400 V 50 Hz / 460 V 60 Hz	2.2 / 2.65	1375 / 1650
	3x230 V 50 Hz / 265 V 60 Hz	2.2 / 2.65	1375 / 1650
Single-phase motor			
HKLW 32	1x230 V 50 Hz / 110 V 60 Hz	1.5 / 1.5	2800 / 3420
HKLW 34 *	1x230 V 50 Hz / 110 V 60 Hz	1.5 / 1.5	1375 / 1650

* only in combination with tank size 8, 89

Resp.: Version with encased stator



NOTICE

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

2.1.2 Tank size

Coding	Description	Fill volume V _{fill} (l)	Usable volume V _{usable} (l)	
			Single-circuit pumps	Dual-circuit pumps
without coding	--	3.7	1.7	1.7
8	long housing	5.5	2.6	1.7
89	long housing and large tank	13	9.1	8.2
9	large tank	11.2	8.2	8.2

The specified values apply to

- Radial piston pump (4-cylinder pump)
- Motor 1.5 kW

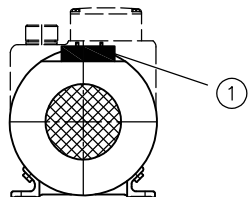
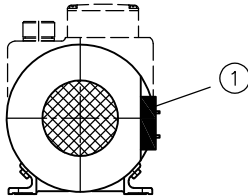
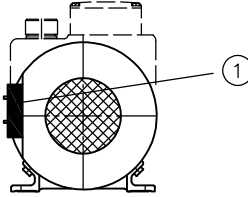
INFORMATION

The fill volume and usable volume may be slightly less than the values indicated here, depending on the motor and pump.

2.1.3 Additional options

Coding	Comment
without coding	without additional equipment, only type HKL
S	Level switch (N/O contact)
	 INFORMATION Level switch coding S in combination with HARTING plug not available.
D	Level switch (N/C contact)
T	Temperature switch (switching point of 80°C), standard/series for type HKLW
T60	Temperature switch (switching point of 60°C), only for type HKL

2.1.4 Position of connection base

Coding	Description	View
/1	Series	
/2	90° left only for single-circuit pumps	
/3	90° right only for single-circuit pumps	

1 Connection base

2.1.5 Electrical connection

Coding	Comment
without coding	Series (terminal box)
P1 P2	HARTING connector HAN 10 E HARTING connector HAN 10 E, rotated see Chapter 4.3.2.1, "Position of HARTING connector" NOTICE HARTING connector is permitted up to max. 16 A.
F FP1 FP2	Oil-tight version - F: Terminal box with flat plug contacts - FP1, FP2: HARTING plug NOTICE Coding F: - The voltage for star or delta is connected internally at the factory. - The cable gland is specially sealed. Advantage: The compact hydraulic power pack can be kept in an inclined position for a longer period of time.

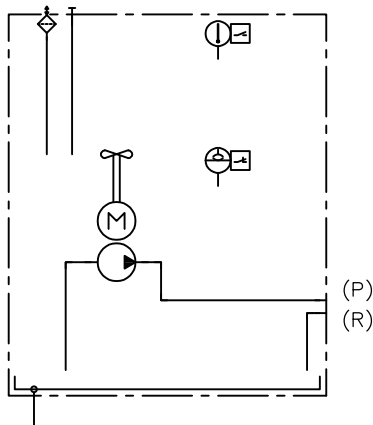
2.1.6 Oil drain hose

Coding	Description
without coding	Tapped plug G 1/4
G 1/4 x 300	Oil drain hose approximately 300 mm with ball valve
G 1/4 x 500	Oil drain hose approximately 500 mm with ball valve
G 1/4 W x 300	Oil drain hose approximately 300 mm with bracket and ball valve
G 1/4 W x 500	Oil drain hose approximately 500 mm with bracket and ball valve

2.2 Pump

2.2.1 Single-circuit pumps

Circuit symbol



Single-circuit pump (radial piston pump or gear pump) with 3-phase motor

Ordering examples

HKL 348 DT/1	-H 6,7	-AB 1 K C 180	-3x400 V 50 Hz / 3x460 V 60 Hz
HKL 32/1P1	-Z 4,5	-AL11E/120	-3x230 V 50 Hz / 3x265 V 60 Hz

Single-circuit pump with 3-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 3x400/230 V 50 Hz or 3x460/265V 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 $(pV_g)_{\max}$.

Radial piston pump H - single-circuit pump with 3-phase motor

Type	Delivery flow coding	H 1.15	H 1.65	H 2.15	H 3.35	H 4.8	H 5.7	H 6.7
	Piston diameter (mm)	6	7	8	10	12	13	14
	Displacement volume V_g (cm ³ /rev)	0.86	1.17	1.53	2.39	3.44	4.04	4.68
HKL 32	Permissible pressure p_{max} (bar)	700	520	395	255	175	150	130
	Continuous operation S1 p_1 (bar)	330	245	185	120	80	70	60
	Flow rate Q_{max} (l/min)	50 Hz	2.44	3.32	4.34	6.78	9.76	13.29
		60 Hz	2.93	3.99	5.21	8.14	11.72	15.96
HKL 34 HKL 34 V	Permissible pressure p_{max} (bar)	700	700	700	485	335	285	245
	Continuous operation S1 p_1 (bar)	670	490	380	240	170	140	120
	Flow rate Q_{max} (l/min)	50 Hz	1.21	1.65	2.15	3.37	4.85	6.60
		60 Hz	1.45	1.98	2.58	4.04	5.81	7.91
HKL 38 HKL 38 V	Permissible pressure p_{max} (bar)	700	700	700	560	390	330	290
	Continuous operation S1 p_1 (bar)	700	700	570	360	250	210	180
	Flow rate Q_{max} (l/min)	50 Hz	1.18	1.61	2.10	3.28	4.73	6.43
		60 Hz	1.42	1.93	2.52	3.94	5.67	7.72

Type	Delivery flow coding	H 7.7	H 8.7
	Piston diameter (mm)	15	16
	Displacement volume V_g (cm ³ /rev)	5.37	6.11
HKL 32	Permissible pressure p_{max} (bar)	110	95
	Continuous operation S1 p_1 (bar)	50	4
	Flow rate Q_{max} (l/min)	50 Hz	15.26
		60 Hz	18.32
HKL 34 HKL 34 V	Permissible pressure p_{max} (bar)	215	190
	Continuous operation S1 p_1 (bar)	105	95
	Flow rate Q_{max} (l/min)	50 Hz	7.57
		60 Hz	9.08
HKL 38 HKL 38 V	Permissible pressure p_{max} (bar)	250	220
	Continuous operation S1 p_1 (bar)	160	140
	Flow rate Q_{max} (l/min)	50 Hz	7.39
		60 Hz	8.86

Gear pump Z - single-circuit pump with 3-phase motor

i INFORMATION

For the pump version **Z**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Type	Delivery flow coding		Z 1.1	Z 1.7	Z 2	Z 2.7	Z 3.5	Z 4.5	Z 5.2
	Displacement volume V _g (cm ³ /rev)		0.8	1.2	1.6	2.1	2.5	3.3	3.6
	Size		1	1	1	1	1	1	1
HKL 32	Permissible pressure p _{max} (bar)		210	210	210	210	210	160	145
	Continuous operation S1 p ₁ (bar)		210	210	160	120	105	80	70
	Flow rate Q _{max} (l/min)	50 Hz	2.27	3.41	4.54	5.96	7.10	9.37	10.22
		60 Hz	2.73	4.09	5.46	7.16	8.53	11.25	12.28
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		210	210	210	210	210	210	200
	Continuous operation S1 p ₁ (bar)		210	210	210	210	210	160	145
	Flow rate Q _{max} (l/min)	50 Hz	1.13	1.69	2.26	2.96	3.53	4.65	5.08
		60 Hz	1.35	2.03	2.70	3.55	4.23	5.58	6.08
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		210	210	210	210	210	210	200
	Continuous operation S1 p ₁ (bar)		210	210	210	210	210	210	195
	Flow rate Q _{max} (l/min)	50 Hz	1.10	1.65	2.20	2.89	3.44	4.54	4.95
		60 Hz	1.32	1.98	2.64	3.47	4.13	5.45	5.94
Type	Delivery flow coding		Z 6.4	Z 6.9	Z 8.4	Z 8.8	Z 9.8		
	Displacement volume V _g (cm ³ /rev)		4.3	4.8	5.8	6.2	7.0		
	Size		1	1	1	1	1		
HKL 32	Permissible pressure p _{max} (bar)		120	110	95	90	75		
	Continuous operation S1 p ₁ (bar)		60	55	45	40	35		
	Flow rate Q _{max} (l/min)	50 Hz	12.21	13.63	16.47	17.61	19.88		
		60 Hz	14.66	16.37	19.78	21.14	23.87		
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		200	200	175	165	145		
	Continuous operation S1 p ₁ (bar)		120	110	90	85	75		
	Flow rate Q _{max} (l/min)	50 Hz	6.06	6.77	8.18	8.74	9.87		
		60 Hz	7.27	8.11	9.80	10.48	11.83		
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		200	200	200	180	170		
	Continuous operation S1 p ₁ (bar)		180	165	135	125	110		
	Flow rate Q _{max} (l/min)	50 Hz	5.91	6.60	7.98	8.53	9.63		
		60 Hz	7.10	7.92	9.57	10.23	11.55		

Gear pump Z - single-circuit pump with 3-phase motor

i INFORMATION

Gear pump size 2 only possible in combination with tank coding **9** or **89** (see Chapter 2.1.2, "Tank size").

Type	Delivery flow coding	Z 9	Z 11	Z 12.3	Z 16	Z 21
	Displacement volume V_g (cm ³ /rev)	6.0	7.6	8.5	11.0	14.5
	Size	2	2	2	2	2
HKL 32	Permissible pressure p_{max} (bar)	95	75	65	50	40
	Continuous operation $S1 p_1$ (bar)	40	30	30	20	15
	Flow rate Q_{max} (l/min)	50 Hz	17.04	21.58	24.14	41.18
		60 Hz	20.46	25.92	28.99	49.45
HKL 34 HKL 34 V	Permissible pressure p_{max} (bar)	180	140	125	100	75
	Continuous operation $S1 p_1$ (bar)	85	65	60	45	35
	Flow rate Q_{max} (l/min)	50 Hz	8.46	10.72	11.99	20.45
		60 Hz	10.14	12.84	14.37	24.51
HKL 38 HKL 38 V	Permissible pressure p_{max} (bar)	195	180	160	125	95
	Continuous operation $S1 p_1$ (bar)	130	100	90	70	50
	Flow rate Q_{max} (l/min)	50 Hz	8.25	10.45	11.69	19.94
		60 Hz	9.90	12.54	14.03	23.93

Single-circuit pump (radial piston pump or gear pump) with single-phase motor

Ordering examples

HKLW 348 DT/1	-H 6,7	-AB 1 K C 180	-1x230 V 50 Hz
HKLW 32/1P1	-Z 4,5	-AL11E/120	-1x230 V 50 Hz

Single-circuit pump with AC motor

i INFORMATION

- The flow rate Q_{max} relates to the rated speed and varies depending on the load.
- Notes on pressures p_{max} and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures p_{max} relate to a version with a 1x230 V 50 Hz or 1x110 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 $(pV_g)_{max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.

Radial piston pump H - single-circuit pump with single-phase motor

Type	Delivery flow coding		H 1.15	H 1.65	H 2.15	H 3.35	H 4.8	H 5.7	H 6.7
	Displacement volume V_g (cm ³ /rev)		0.86	1.17	1.53	2.39	3.44	4.04	4.68
	Piston diameter (mm)		6	7	8	10	12	13	14
HKLW 32	Permissible pressure p_{max} (bar)	50 Hz	345	255	195	125	85	70	60
		60 Hz	285	210	160	100	70	60	50
	Continuous operation S1 p_1 (bar)	50 Hz	340	250	190	120	85	70	60
		60 Hz	250	185	140	90	60	50	45
	Flow rate Q_{max} (l/min)	50 Hz	2.41	3.28	4.28	6.69	9.63	11.30	13.10
		60 Hz	2.94	4.00	5.23	8.17	11.76	13.80	16.00
HKLW 34	Permissible pressure p_{max} (bar)	50 Hz	700	700	540	340	240	205	175
		60 Hz	690	510	390	250	170	145	125
	Continuous operation S1 p_1 (bar)	50 Hz	690	510	390	250	170	145	125
		60 Hz	560	410	315	200	140	120	100
	Flow rate Q_{max} (l/min)	50 Hz	1.18	1.61	2.10	3.28	4.73	5.55	6.43
		60 Hz	1.42	1.93	2.52	3.94	5.67	6.66	7.72

Type	Delivery flow coding		H 7.7	H 8.7
	Displacement volume V_g (cm ³ /rev)		5.37	6.11
	Piston diameter (mm)		15	16
HKLW 32	Permissible pressure p_{max} (bar)	50 Hz	65	55
		60 Hz	45	35
	Continuous operation S1 p_1 (bar)	50 Hz	50	45
		60 Hz	40	35
	Flow rate Q_{max} (l/min)	50 Hz	15.04	17.11
		60 Hz	18.37	20.90
HKLW 34	Permissible pressure p_{max} (bar)	50 Hz	150	135
		60 Hz	110	95
	Continuous operation S1 p_1 (bar)	50 Hz	110	95
		60 Hz	90	75
	Flow rate Q_{max} (l/min)	50 Hz	7.39	8.40
		60 Hz	8.86	10.09

Gear pump Z - single-circuit pump with single-phase motor

i INFORMATION

For the pump version **Z**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Type	Delivery flow coding		Z 1.1	Z 1.7	Z 2	Z 2.7	Z 3.5	Z 4.5	Z 5.2
	Displacement volume V _g (cm ³ /rev)		0.8	1.2	1.6	2.1	2.5	3.3	3.6
	Size		1	1	1	1	1	1	1
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	210	210	150	120	105	80	70
		60 Hz	210	160	120	95	85	65	55
	Continuous operation S1 p ₁ (bar)	50 Hz	210	210	160	125	105	80	70
		60 Hz	210	160	120	90	75	60	55
	Flow rate Q _{max} (l/min)	50 Hz	2.24	3.36	4.48	5.88	7.00	9.24	10.08
		60 Hz	2.74	4.10	5.47	7.18	8.55	11.29	12.31
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	210	210	210	210	210	210	200
		60 Hz	210	210	210	210	210	160	145
	Continuous operation S1 p ₁ (bar)	50 Hz	210	210	210	210	210	160	150
		60 Hz	210	210	210	205	175	130	120
	Flow rate Q _{max} (l/min)	50 Hz	1.10	1.65	2.20	2.89	3.44	4.54	4.95
		60 Hz	1.32	1.98	2.64	3.47	4.13	5.45	5.94
Type	Delivery flow coding		Z 6.4	Z 6.9	Z 8.4	Z 8.8	Z 9.8		
	Displacement volume V _g (cm ³ /rev)		4.3	4.8	5.8	6.2	7.0		
	Size		1	1	1	1	1		
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	60	55	45	40	35		
		60 Hz	45	45	35	30	30		
	Continuous operation S1 p ₁ (bar)	50 Hz	60	55	45	40	35		
		60 Hz	45	40	30	30	30		
	Flow rate Q _{max} (l/min)	50 Hz	12.04	13.44	16.24	17.36	19.6		
		60 Hz	14.71	16.42	19.84	21.20	23.94		
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	165	150	125	115	105		
		60 Hz	120	110	90	85	75		
	Continuous operation S1 p ₁ (bar)	50 Hz	125	115	90	85	75		
		60 Hz	100	90	75	70	60		
	Flow rate Q _{max} (l/min)	50 Hz	5.91	6.60	7.98	8.53	9.63		
		60 Hz	7.10	7.92	9.57	10.23	11.55		

Gear pump Z - single-circuit pump with single-phase motor

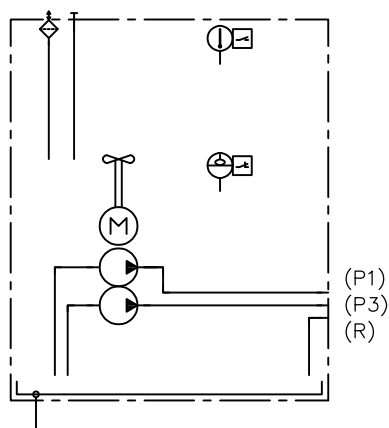
i INFORMATION

Gear pump size 2 only possible in combination with tank coding **9** or **89** (see Chapter 2.1.2, "Tank size").

Type	Delivery flow coding		Z 9	Z 11	Z 12.3	Z 16	Z 21
	Displacement volume V_g (cm ³ /rev)		6.0	7.6	8.5	11.0	14.5
	Size		2	2	2	2	2
HKLW 32	Permissible pressure p_{max} (bar)	50 Hz	55	45	40	30	25
		60 Hz	40	30	30	20	15
	Continuous operation S1 p_1 (bar)	50 Hz	40	35	30	25	15
		60 Hz	30	25	20	15	15
	Flow rate Q_{max} (l/min)	50 Hz	16.80	21.28	23.80	30.80	40.60
		60 Hz	20.52	25.99	29.07	37.62	49.59
HKLW 34	Permissible pressure p_{max} (bar)	50 Hz	130	100	90	70	50
		60 Hz	95	75	65	50	35
	Continuous operation S1 p_1 (bar)	50 Hz	90	70	60	45	35
		60 Hz	70	55	50	40	30
	Flow rate Q_{max} (l/min)	50 Hz	8.25	10.45	11.69	15.13	19.24
		60 Hz	9.90	12.54	14.03	18.15	23.93

2.2.2 Dual-circuit pump with shared connection base

Circuit symbol



Dual-circuit pump (radial piston pump - radial piston pump HH and radial piston pump - gear pump HZ) with 3-phase motor

Ordering example

HKL 348/1	H	Z	0,57	/4,5	-C30 -AB 1 K C 180	-3x400 V 50 Hz / 3x460 V 60 Hz
					Pressure connection P3	
					Pressure connection P1	
					Pressure connection P3: Radial piston pump H or gear pump Z	"Pressure connection P3: Dual-circuit pump (radial piston pump and gear pump) with 3-phase motor"
					Pressure connection P1	"Pressure connection P1: Dual-circuit pump (radial piston pump) with 3-phase motor"

Pressure connection P1: Dual-circuit pump (radial piston pump) with 3-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 3x400/230 V 50 Hz or 3x460/265V 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 $(pV_g)_{\max}$.
- For the pump version **HH, HZ, ZZ, DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump with shared connection base and 3-phase motor

Type	Delivery flow coding		H 0.37	H 0.47	H 0.57	H 0.88	H 1.12	H 1.42	H 1.82
	Displacement volume V _g (cm ³ /rev)		0.25	0.32	0.39	0.57	0.77	1.01	1.27
	Piston diameter (mm)		4	4/5	5	6	7	8	9
HKL 32	Permissible pressure p _{max} (bar)		700	700	700	700	700	570	450
	Flow rate Q _{max} (l/min)	50 Hz	0.71	0.90	1.12	1.61	2.19	2.86	3.61
		60 Hz	0.86	1.08	1.34	1.93	2.62	3.43	4.34
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		700	700	700	700	700	700	550
	Flow rate Q _{max} (l/min)	50 Hz	0.35	0.45	0.55	0.80	1.09	1.42	1.79
		60 Hz	0.42	0.54	0.66	0.96	1.30	1.70	2.15
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		700	700	700	700	700	700	700
	Flow rate Q _{max} (l/min)	50 Hz	0.35	0.44	0.54	0.78	1.06	1.38	1.75
		60 Hz	0.41	0.52	0.65	0.93	1.27	1.66	2.10

Pressure connection P3: Dual-circuit pump (radial piston pump and gear pump) with 3-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 3x400/230 V 50 Hz or 3x460/265V 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 $(pV_g)_{\max}$.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump with shared connection base and 3-phase motor

Type	Delivery flow coding	H 1.15	H 1.65	H 2.15	H 3.35	H 4.8	H 5.7	H 6.7
	Displacement volume V_g (cm ³ /rev)	0.86	1.17	1.53	2.39	3.44	4.04	4.68
	Piston diameter (mm)	6	7	8	10	12	13	14
HKL 32	Permissible pressure $p_{\max}$ (bar)	670	490	375	240	165	140	120
	Flow rate $Q_{\max}$ (l/min)	50 Hz	2.44	3.32	4.34	6.78	9.76	13.29
		60 Hz	2.93	3.99	5.21	8.14	11.72	15.96
HKL 34 HKL 34 V	Permissible pressure $p_{\max}$ (bar)	700	700	700	460	315	270	235
	Flow rate $Q_{\max}$ (l/min)	50 Hz	1.21	1.65	2.15	3.37	4.85	6.60
		60 Hz	1.45	1.98	2.58	4.04	5.81	7.91
HKL 38 HKL 38 V	Permissible pressure $p_{\max}$ (bar)	700	700	700	560	390	330	290
	Flow rate $Q_{\max}$ (l/min)	50 Hz	1.18	1.61	2.10	3.28	4.73	6.43
		60 Hz	1.42	1.93	2.52	3.94	5.67	7.72

Type	Delivery flow coding	H 7.7	H 8.7
	Displacement volume V_g (cm ³ /rev)	5.37	6.11
	Piston diameter (mm)	15	16
HKL 32	Permissible pressure $p_{\max}$ (bar)	105	90
	Flow rate $Q_{\max}$ (l/min)	50 Hz	15.26
		60 Hz	18.32
HKL 34 HKL 34 V	Permissible pressure $p_{\max}$ (bar)	200	180
	Flow rate $Q_{\max}$ (l/min)	50 Hz	7.57
		60 Hz	9.08
HKL 38 HKL 38 V	Permissible pressure $p_{\max}$ (bar)	250	220
	Flow rate $Q_{\max}$ (l/min)	50 Hz	7.39
		60 Hz	8.86

Gear pump Z - dual-circuit pump with shared connection base and 3-phase motor

Type	Delivery flow coding		Z 1.1	Z 1.7	Z 2	Z 2.7	Z 3.5	Z 4.5	Z 5.2
	Displacement volume V _g (cm ³ /rev)		0.8	1.2	1.6	2.1	2.5	3.3	3.6
	Size		1	1	1	1	1	1	1
HKL 32	Permissible pressure p _{max} (bar)		210	210	210	210	210	160	145
	Flow rate Q _{max} (l/min)	50 Hz	2.27	3.41	4.54	5.96	7.10	9.37	10.22
		60 Hz	2.73	4.09	5.46	7.16	8.53	11.25	12.28
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		210	210	210	210	210	210	200
	Flow rate Q _{max} (l/min)	50 Hz	1.13	1.69	2.26	2.96	3.53	4.65	5.08
		60 Hz	1.35	2.03	2.70	3.55	4.23	5.58	6.08
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		210	210	210	210	210	210	200
	Flow rate Q _{max} (l/min)	50 Hz	1.10	1.65	2.20	2.89	3.44	4.54	4.95
		60 Hz	1.32	1.98	2.64	3.47	4.13	5.45	5.94
Type	Delivery flow coding		Z 6.4	Z 6.9	Z 8.4	Z 8.8	Z 9.8		
	Displacement volume V _g (cm ³ /rev)		4.3	4.8	5.8	6.2	7.0		
	Size		1	1	1	1	1		
HKL 32	Permissible pressure p _{max} (bar)		120	110	95	90	75		
	Flow rate Q _{max} (l/min)	50 Hz	12.21	13.63	16.47	17.61	19.88		
		60 Hz	14.66	16.37	19.78	21.14	23.87		
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		200	200	175	165	145		
	Flow rate Q _{max} (l/min)	50 Hz	6.06	6.77	8.18	8.74	9.87		
		60 Hz	7.27	8.11	9.80	10.48	11.83		
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		200	200	200	180	170		
	Flow rate Q _{max} (l/min)	50 Hz	5.91	6.60	7.98	8.53	9.63		
		60 Hz	7.10	7.92	9.57	10.23	11.55		

Dual-circuit pump (radial piston pump - radial piston pump HH and radial piston pump - gear pump HZ) with single-phase motor

Ordering example

HKLW 32 DT/1	H	H	0,88	/5,7	-NA31 - ...	-1x110 V 60 Hz
--------------	---	---	------	------	-------------	----------------

Pressure connection P3

Pressure connection P1

Pressure connection P3, radial piston pump H or gear pump Z

"Pressure connection P3: Dual-circuit pump (radial piston pump and gear pump) with single-phase motor"

Pressure connection P1, dual-circuit pump with single-phase motor

"Pressure connection P1: Dual-circuit pump (radial piston pump) with single-phase motor"

Pressure connection P1: Dual-circuit pump (radial piston pump) with single-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 1x230 V 50 Hz or 1x110 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 $(pV_g)_{\max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump with shared connection base and single-phase motor

Type	Delivery flow coding		H 0.37	H 0.47	H 0.57	H 0.88	H 1.12	H 1.42	H 1.82
	Displacement volume V_g (cm ³ /rev)		0.25	0.32	0.39	0.57	0.77	1.01	1.27
	Piston diameter (mm)		4	4/5	5	6	7	8	9
HKLW 32	Permissible pressure $p_{\max}$ (bar)	50 Hz	700	700	700	600	440	335	265
		60 Hz	700	700	590	410	300	230	180
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.70	0.89	1.10	1.58	2.16	2.81	3.56
		60 Hz	0.86	1.09	0.41	1.93	2.63	3.44	4.35
HKLW 34	Permissible pressure $p_{\max}$ (bar)	50 Hz	700	700	700	700	700	700	610
		60 Hz	700	700	700	700	700	560	440
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.35	0.44	0.54	0.78	1.06	1.38	1.75
		60 Hz	0.41	0.52	0.65	0.93	1.27	1.66	2.10

Pressure connection P3: Dual-circuit pump (radial piston pump and gear pump) with single-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 1x230 V 50 Hz or 1x110 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 $(pV_g)_{\max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump with shared connection base and single-phase motor

Type	Delivery flow coding		H 1.15	H 1.65	H 2.15	H 3.35	H 4.8	H 5.7	H 6.7
	Displacement volume V _g (cm ³ /rev)		0.86	1.17	1.53	2.39	3.44	4.04	4.68
	Piston diameter (mm)		6	7	8	10	12	13	14
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	390	290	220	140	95	80	70
		60 Hz	272	200	150	95	65	55	50
	Flow rate Q _{max} (l/min)	50 Hz	2.41	3.28	4.28	6.69	9.63	11.30	13.10
		60 Hz	2.94	4.00	5.23	8.17	11.76	13.80	16.00
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	700	665	510	325	225	195	165
		60 Hz	660	480	370	235	165	140	120
	Flow rate Q _{max} (l/min)	50 Hz	1.18	1.61	2.10	3.28	4.73	5.55	6.43
		60 Hz	1.42	1.93	2.52	3.94	5.67	6.66	7.72
Type	Delivery flow coding		H 7.7	H 8.7					
	Displacement volume V _g (cm ³ /rev)		5.37	6.11					
	Piston diameter (mm)		15	16					
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	60	50					
		60 Hz	40	35					
	Flow rate Q _{max} (l/min)	50 Hz	15.04	17.11					
		60 Hz	18.37	20.90					
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	145	125					
		60 Hz	100	90					
	Flow rate Q _{max} (l/min)	50 Hz	7.39	8.40					
		60 Hz	8.86	10.09					

Gear pump Z - dual-circuit pump with shared connection base and single-phase motor

Type	Delivery flow coding		Z 1.1	Z 1.7	Z 2	Z 2.7	Z 3.5	Z 4.5	Z 5.2
	Displacement volume V _g (cm ³ /rev)		0.8	1.2	1.6	2.1	2.5	3.3	3.6
	Size		1	1	1	1	1	1	1
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	210	210	150	120	105	80	70
		60 Hz	210	160	120	95	85	65	55
	Flow rate Q _{max} (l/min)	50 Hz	2.24	3.36	4.48	5.88	7.00	9.24	10.08
		60 Hz	2.74	4.10	5.24	7.18	8.55	11.29	12.31
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	210	210	210	210	210	210	200
		60 Hz	210	210	210	210	210	160	145
	Flow rate Q _{max} (l/min)	50 Hz	1.10	1.65	2.20	2.89	3.44	4.54	4.95
		60 Hz	1.32	1.98	2.64	3.47	4.13	5.45	5.94
Type	Delivery flow coding		Z 6.4	Z 6.9	Z 8.4	Z 8.8	Z 9.8		
	Displacement volume V _g (cm ³ /rev)		4.3	4.8	5.8	6.2	7.0		
	Size		1	1	1	1	1		
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	60	55	45	40	35		
		60 Hz	45	45	35	30	30		
	Flow rate Q _{max} (l/min)	50 Hz	12.04	13.44	16.24	17.36	19.6		
		60 Hz	14.71	16.42	19.84	21.20	23.94		
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	165	150	125	115	105		
		60 Hz	120	110	90	85	75		
	Flow rate Q _{max} (l/min)	50 Hz	5.91	6.60	7.98	8.53	9.63		
		60 Hz	7.10	7.92	9.57	10.23	11.55		

Radial piston pump H - dual-circuit pump (type DHH) with shared connection base and 3-phase motor

Type	Delivery flow coding		H 0.6	H 0.83	H 1	H 1.6	H 2.4	H 2.8	H 3.3
	Displacement volume V _g (cm ³ /rev)		0.43	0.58	0.76	1.1	1.72	2.02	2.34
	Piston diameter (mm)		6	7	8	10	12	13	14
HKL 32	Permissible pressure p _{max} (bar)		700	700	700	475	330	280	240
	Flow rate Q _{max} (l/min)	50 Hz	1.22	1.66	2.17	3.39	4.88	5.73	6.65
		60 Hz	1.47	1.99	2.61	4.07	5.86	6.88	7.98
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		700	700	700	560	390	330	290
	Flow rate Q _{max} (l/min)	50 Hz	0.61	0.82	1.08	1.68	2.42	2.84	3.30
		60 Hz	0.73	0.99	1.29	2.02	2.91	3.41	3.95
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		700	700	700	560	390	330	290
	Flow rate Q _{max} (l/min)	50 Hz	0.59	0.80	1.05	1.64	2.36	2.77	3.22
		60 Hz	0.71	0.97	1.26	1.97	2.84	3.33	3.86

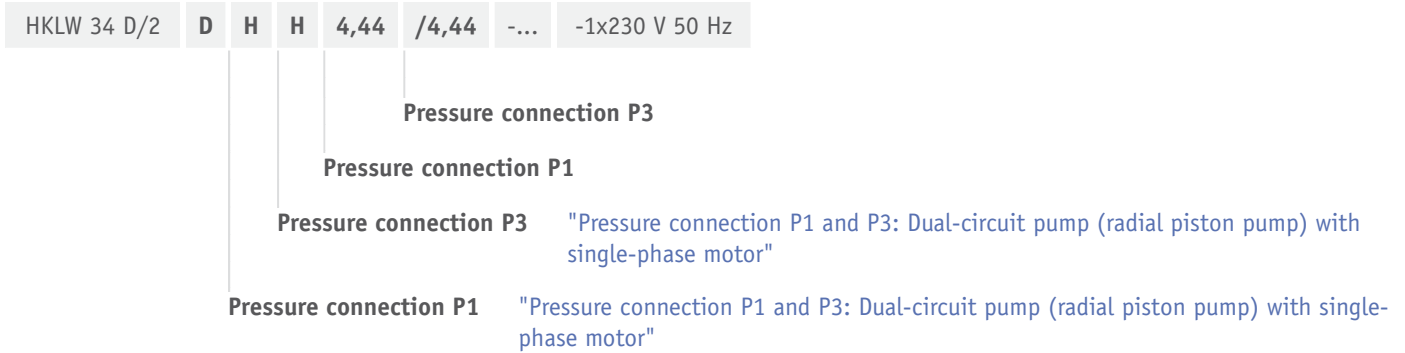
Type	Delivery flow coding		H 3.8	H 4.4
	Displacement volume V _g (cm ³ /rev)		2.6	3.06
	Piston diameter (mm)		15	16
HKL 32	Permissible pressure p _{max} (bar)		210	180
	Flow rate Q _{max} (l/min)	50 Hz	7.63	8.68
		60 Hz	9.16	10.42
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		250	220
	Flow rate Q _{max} (l/min)	50 Hz	3.79	4.31
		60 Hz	4.54	5.16
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		250	220
	Flow rate Q _{max} (l/min)	50 Hz	3.69	4.20
		60 Hz	4.43	5.04

Dual-circuit pump (radial piston pump - radial piston pump DHH) with single-phase motor

Potential use: Synchronous operation of two cylinders

In each case, two pump elements of type PE as per [D 5600](#).

Ordering example



Pressure connection P1 and P3: Dual-circuit pump (radial piston pump) with single-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see [Chapter 3.6](#), "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 1x230 V 50 Hz or 1x110 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 $(pV_g)_{\max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump (type DHH) with shared connection base and single-phase motor

Type	Delivery flow coding	H 0.6	H 0.83	H 1	H 1.6	H 2.4	H 2.8	H 3.3
	Displacement volume V_g (cm ³ /rev)	0.43	0.58	0.76	1.19	1.72	2.02	2.34
	Piston diameter (mm)	6	7	8	10	12	13	14
HKLW 32	Permissible pressure p_{max} (bar)	50 Hz	700	570	440	280	190	140
		60 Hz	540	400	300	190	130	115
	Flow rate Q_{max} (l/min)	50 Hz	1.20	1.64	2.14	3.34	4.81	5.65
		60 Hz	1.47	2.00	2.61	4.08	5.88	6.90
HKLW 34	Permissible pressure p_{max} (bar)	50 Hz	700	700	700	560	390	330
		60 Hz	700	700	700	470	320	280
	Flow rate Q_{max} (l/min)	50 Hz	0.59	0.80	1.05	1.64	2.36	2.77
		60 Hz	0.71	0.97	1.26	1.97	2.84	3.33

Type	Delivery flow coding	H 3.8	H 4.4
	Displacement volume V_g (cm ³ /rev)	2.69	3.06
	Piston diameter (mm)	15	16
HKLW 32	Permissible pressure p_{max} (bar)	50 Hz	120
		60 Hz	85
	Flow rate Q_{max} (l/min)	50 Hz	7.52
		60 Hz	9.19
HKLW 34	Permissible pressure p_{max} (bar)	50 Hz	250
		60 Hz	210
	Flow rate Q_{max} (l/min)	50 Hz	3.69
		60 Hz	4.43

Dual-circuit pump (gear pump - gear pump ZZ) with 3-phase motor

i INFORMATION

Only possible in combination with tank coding 9 or 89 (see Chapter 2.1.2, "Tank size").

Ordering example

HKL 38 89 DT/1	Z	Z	6,9	/12,3	-SS -UF 3 AB 1 E 160 - ...	-3x400 V 50 Hz / 3x460 V 60 Hz
					Pressure connection P3	
					Pressure connection P1	
					Pressure connection P3	▪ "Pressure connection P1 and P3: Dual-circuit pump (gear pump - gear pump) with 3-phase motor"
					Pressure connection P1	▪ "Pressure connection P1 and P3: Dual-circuit pump (gear pump - gear pump) with 3-phase motor"

Available combinations:

- ZZ 5.2/16
- ZZ 5.2/21
- ZZ 6.5/16
- ZZ 6.9/12.3

Pressure connection P1 and P3: Dual-circuit pump (gear pump - gear pump) with 3-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 3x400/230 V 50 Hz or 3x460/265V 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 $(pV_g)_{\max}$.
- For the pump version HH, HZ, ZZ, DHH or Z-H, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Gear pump - dual-circuit pump (type ZZ) with shared connection base and 3-phase motor

Type	Delivery flow coding	ZZ 5.2	ZZ 6.5	ZZ 6.9	ZZ 12.3	ZZ 16	ZZ 21
	Displacement volume V_g (cm ³ /rev)	3.73	4.5	4.97	8.5	11.0	14.5
	Size	1	2	1	2	2	2
HKL 32	Permissible pressure p_{max} (bar)	155	125	115	65	50	40
	Flow rate Q_{max} (l/min)	50 Hz	10.59	12.78	14.11	24.14	31.24
		60 Hz	12.72	15.35	16.95	28.99	37.51
HKL 34 HKL 34 V	Permissible pressure p_{max} (bar)	195	195	170	125	100	75
	Flow rate Q_{max} (l/min)	50 Hz	5.26	6.35	7.01	11.99	15.51
		60 Hz	6.30	7.61	8.40	14.37	18.59
HKL 38 HKL 38 V	Permissible pressure p_{max} (bar)	210	195	170	160	120	90
	Flow rate Q_{max} (l/min)	50 Hz	5.13	6.19	6.83	11.69	15.13
		60 Hz	6.15	7.43	8.20	14.03	18.15

Dual-circuit pump (gear pump - gear pump ZZ) with single-phase motor

HKLW 38 89 DT/1	Z	Z	6,9	/12,3	-SS - A1F3/160 - ...	-1x110 V 60 Hz
					Pressure connection P3	
					Pressure connection P1	
					Pressure connection P3	"Pressure connection P1 and P3: Dual-circuit pump (gear pump - gear pump) with single-phase motor"
					Pressure connection P1	"Pressure connection P1 and P3: Dual-circuit pump (gear pump - gear pump) with single-phase motor"

Pressure connection P1 and P3: Dual-circuit pump (gear pump - gear pump) with single-phase motor

i INFORMATION

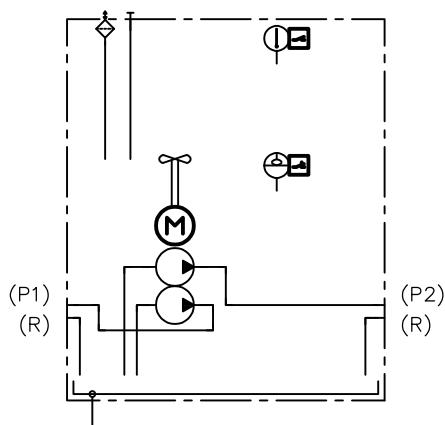
- The flow rate Q_{max} relates to the rated speed and varies depending on the load.
- Notes on pressures p_{max} and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures p_{max} relate to a version with a 1x230 V 50 Hz or 1x110 V 60 Hz motor.
- Be aware of different motor power ratings and resulting permissible maximum pressures $p_{max} = (pV_g)_{max} / V_g$, at other nominal voltages and power frequencies $(pV_g)_{max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{max}$ is 10% lower.

Gear pump - dual-circuit pump (type ZZ) with shared connection base and single-phase motor

Type	Delivery flow coding		ZZ 5.2	ZZ 6.5	ZZ 6.9	ZZ 12.3	ZZ 16	ZZ 21
	Displacement volume V_g (cm ³ /rev)		3.73	4.5	4.97	8.5	11.0	14.5
	Size		1	2	1	2	2	2
HKLW 32	Permissible pressure p_{max} (bar)	50 Hz	90	75	70	40	30	25
		60 Hz	60	50	45	25	20	15
	Flow rate Q_{max} (l/min)	50 Hz	10.44	12.60	13.92	23.80	30.80	40.60
		60 Hz	12.76	15.39	17.00	29.07	37.62	49.59
HKLW 34	Permissible pressure p_{max} (bar)	50 Hz	195	170	155	90	70	50
		60 Hz	150	125	110	65	50	35
	Flow rate Q_{max} (l/min)	50 Hz	5.13	6.19	6.83	11.69	15.13	19.94
		60 Hz	6.15	7.43	8.20	14.03	18.15	23.93

2.2.3 Dual-circuit pumps with separate connection bases

Circuit symbol



Dual-circuit pump (gear pump and radial piston pump) with 3-phase motor

i INFORMATION

Only possible in combination with tank coding 9 or 89 (see Chapter 2.1.2, "Tank size").

Ordering example

HKL 38 89 DT/1

-Z 8,8

-H 0,57

-B1/100 - 1 - 31D - G24 - AB 1 K C 180

-3x400 V 50 Hz / 3x460 V 60 Hz

Pressure connection P2 Pressure connection P2: Radial piston pump **H** as per "Pressure connection P2: Dual-circuit pump (radial piston pump) with 3-phase motor"

Pressure connection P1 "Pressure connection P1: Dual-circuit pump (gear pump) with 3-phase motor"

Pressure connection P1: Dual-circuit pump (gear pump) with 3-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 3x400/230 V 50 Hz or 3x460/265V 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 $(pV_g)_{\max}$.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Gear pump Z - dual-circuit pump with separate connection bases and 3-phase motor

Type	Delivery flow coding		Z 1.1	Z 1.7	Z 2	Z 2.7	Z 3.5	Z 4.5	Z 5.2
	Displacement volume V _g (cm ³ /rev)		0.8	1.2	1.6	2.1	2.5	3.3	3.6
	Size		1	1	1	1	1	1	1
HKL 32	Permissible pressure p _{max} (bar)		210	210	210	210	210	160	145
	Flow rate Q _{max} (l/min)	50 Hz	2.27	3.41	4.54	5.96	7.10	9.37	10.22
		60 Hz	2.73	4.09	5.46	7.16	8.53	11.25	12.28
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		210	210	210	210	210	210	210
	Flow rate Q _{max} (l/min)	50 Hz	1.13	1.69	2.26	2.96	3.53	4.65	5.08
		60 Hz	1.35	2.03	2.70	3.55	4.23	5.58	6.08
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		210	210	210	210	210	210	180
	Flow rate Q _{max} (l/min)	50 Hz	1.10	1.65	2.20	2.89	3.44	4.54	4.95
		60 Hz	1.32	1.98	2.64	3.47	4.13	5.45	5.94
Type	Delivery flow coding		Z 6.4	Z 6.9	Z 8.4	Z 8.8	Z 9.8		
	Displacement volume V _g (cm ³ /rev)		4.3	4.8	5.8	6.2	7.0		
	Size		1	1	1	1	1		
HKL 32	Permissible pressure p _{max} (bar)		120	110	95	90	75		
	Flow rate Q _{max} (l/min)	50 Hz	12.21	13.63	16.47	17.61	19.88		
		60 Hz	14.66	16.37	19.78	21.14	23.87		
HKL 34 HKL 34 V	Permissible pressure p _{max} (bar)		200	200	175	165	145		
	Flow rate Q _{max} (l/min)	50 Hz	6.06	6.77	8.18	8.74	9.87		
		60 Hz	7.27	8.11	9.80	10.48	11.83		
HKL 38 HKL 38 V	Permissible pressure p _{max} (bar)		200	200	200	180	170		
	Flow rate Q _{max} (l/min)	50 Hz	5.91	6.60	7.98	8.53	9.63		
		60 Hz	7.10	7.92	9.57	10.23	11.55		

Pressure connection P2: Dual-circuit pump (radial piston pump) with 3-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 3x400/230 V 50 Hz or 3x460/265V 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 $(pV_g)_{\max}$.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump with separate connection bases and 3-phase motor

Type	Delivery flow coding	H 0.37	H 0.47	H 0.57	H 0.88	H 1.12	H 1.42	H 1.82
	Displacement volume V_g (cm ³ /rev)	0.25	0.32	0.39	0.57	0.77	1.01	1.27
	Piston diameter (mm)	4	4/5	5	6	7	8	9
HKL 32	Permissible pressure $p_{\max}$ (bar)	700	700	700	700	700	570	450
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.71	0.90	1.12	1.61	2.19	3.61
		60 Hz	0.86	1.08	1.34	1.93	2.62	4.34
HKL 34 HKL 34 V	Permissible pressure $p_{\max}$ (bar)	700	700	700	700	700	700	550
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.35	0.45	0.55	0.80	1.09	1.79
		60 Hz	0.42	0.54	0.66	0.96	1.30	2.15
HKL 38 HKL 38 V	Permissible pressure $p_{\max}$ (bar)	700	700	700	700	700	700	700
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.35	0.44	0.54	0.78	1.06	1.75
		60 Hz	0.41	0.52	0.65	0.93	1.27	2.10

Dual-circuit pump (gear pump and radial piston pump) with single-phase motor

Ordering example

HKLW 32 8 T/1	-Z 5,2	-H 0,88	-AB 1 K F 80 - AB 1 K B 350	-1x110 V 60 Hz
		Pressure connection P2 Pressure connection P2: Radial piston pump H as per "Pressure connection P2: Dual-circuit pump (radial piston pump) with single-phase motor"		
		Pressure connection P1 "Pressure connection P1: Dual-circuit pump (gear pump) with single-phase motor"		

Pressure connection P1: Dual-circuit pump (gear pump) with single-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 1x230 V 50 Hz or 1x110 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 $(pV_g)_{\max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- For the pump version **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Gear pump Z - dual-circuit pump with separate connection bases and single-phase motor

Type	Delivery flow coding		Z 1.1	Z 1.7	Z 2	Z 2.7	Z 3.5	Z 4.5	Z 5.2
	Displacement volume V _g (cm ³ /rev)		0.8	1.2	1.6	2.1	2.5	3.3	3.6
	Size		1	1	1	1	1	1	1
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	210	210	150	120	105	80	70
		60 Hz	210	160	120	95	85	65	55
	Flow rate Q _{max} (l/min)	50 Hz	2.24	3.36	4.48	5.88	7.00	9.24	10.08
		60 Hz	2.74	4.10	5.47	7.18	8.55	11.29	12.31
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	210	210	210	210	210	210	200
		60 Hz	210	210	210	210	210	160	145
	Flow rate Q _{max} (l/min)	50 Hz	1.10	1.65	2.20	2.89	3.44	4.54	4.95
		60 Hz	1.32	1.98	2.64	3.47	4.13	5.45	5.94
Type	Delivery flow coding		Z 6.4	Z 6.9	Z 8.4	Z 8.8	Z 9.8		
	Displacement volume V _g (cm ³ /rev)		4.3	4.8	5.8	6.2	7.0		
	Size		1	1	1	1	1		
HKLW 32	Permissible pressure p _{max} (bar)	50 Hz	60	55	45	40	35		
		60 Hz	45	45	35	30	30		
	Flow rate Q _{max} (l/min)	50 Hz	12.04	13.44	16.24	17.36	19.6		
		60 Hz	14.71	16.42	19.84	21.20	23.94		
HKLW 34	Permissible pressure p _{max} (bar)	50 Hz	165	150	125	115	105		
		60 Hz	120	110	90	85	75		
	Flow rate Q _{max} (l/min)	50 Hz	5.91	6.60	7.98	8.53	9.63		
		60 Hz	7.10	7.92	9.57	10.23	11.55		

Pressure connection P2: Dual-circuit pump (radial piston pump) with single-phase motor

i INFORMATION

- The flow rate $Q_{\max}$ relates to the rated speed and varies depending on the load.
- Notes on pressures $p_{\max}$ and p_1 (see Chapter 3.6, "Motor data").
- The permissible pressures $p_{\max}$ relate to a version with a 1x230 V 50 Hz or 1x110 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 $(pV_g)_{\max}$.
- It cannot be started up directly against the effects of pressure.
- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- For the pump version **HH, HZ, ZZ, DHH** or **Z-H**, the maximum hydraulic work value $(pV_g)_{\max}$ is 10% lower.

Radial piston pump H - dual-circuit pump with separate connection bases and single-phase motor

Type	Delivery flow coding		H 0.37	H 0.47	H 0.57	H 0.88	H 1.12	H 1.42	H 1.82
	Displacement volume V_g (cm ³ /rev)		0.25	0.32	0.39	0.57	0.77	1.01	1.27
	Piston diameter (mm)		4	4/5	5	6	7	8	9
HKLW 32	Permissible pressure $p_{\max}$ (bar)	50 Hz	700	700	700	600	440	335	265
		60 Hz	700	700	590	410	300	230	180
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.70	0.89	1.10	1.58	2.16	2.81	3.56
		60 Hz	0.86	1.09	1.34	1.93	2.63	3.44	4.35
HKLW 34	Permissible pressure $p_{\max}$ (bar)	50 Hz	700	700	700	700	700	700	610
		60 Hz	700	700	700	700	700	560	440
	Flow rate $Q_{\max}$ (l/min)	50 Hz	0.35	0.44	0.54	0.78	1.06	1.38	1.75
		60 Hz	0.41	0.52	0.65	0.93	1.27	1.66	2.10

3 Parameters

3.1 General data

Conformity	- Declaration of incorporation according to Machinery Directive 2006/42/EC - Declaration of conformity according to Low-Voltage Directive 2014/35/EU - UKCA declaration of conformity according to Electrical Equipment (Safety) Regulations 2016 No. 1101 - UL conformity of the stators - UL reference E 116360
Version / Model	Hydraulic power pack with integrated electric motor (3-phase or AC version) and single-circuit pump or dual-circuit pump (high pressure and low pressure)
Pump version	Valve-controlled radial piston pump or gear pump
Operating mode	- Continuous operation with constant load (S1) - Short period operation (S2) - Periodic intermittent operation (S3) - Continuous periodic operation (S6)
Installation position	Horizontal, lying
Material	- Housing: Aluminium - Terminal box: plastic - Fan cover: sheet steel
Attachment	Four M8 or $\varnothing$ 9 bores on the bottom side, see Chapter 4.1, "Mounting hole pattern"
Hydraulic connection	Via bolted-on connection blocks, see Chapter 6.1.12, "Connection blocks" Basic pump: Connection hole pattern see Chapter 4.3.1, "Hydraulic connections"
Hydraulic fluid	Hydraulic fluid, according to DIN 51524 Parts 2 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Also suitable for biologically degradable hydraulic fluids type HEES (synthetic ester) at operating temperatures up to approx. +70°C. Not suitable for water-based fluids (risk of short circuit!). Fluids of type HEPG and HETG cannot be used. Radial piston pump H: Viscosity range: 4 - 800 mm²/s Optimal operating range: approx. 10 - 100 mm²/s Gear pump Z: Viscosity range: 12 - 800 mm²/s Optimal operating range: approx. 20 - 80 mm²/s
Cleanliness level	ISO 4406 21/18/15...19/17/13
Temperatures	Environment: approx. -25 to +60 °C, hydraulic fluid: -25 ... +80°C, ensure the correct viscosity range. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.
Rotation direction	- Radial piston pump - As desired - gear pump - anti-clockwise rotation, pay attention to the marking (arrow) on the pump. When looking through the perforation of the fan cover, the fan wheel must rotate anti-clockwise when the motor is briefly tapped.

Speed range (min ... max)	Radial piston pump H:	200 ... 3500 min ⁻¹
	Gear pump Z:	
	Size 1	
	Z 1.1 ... Z 1.7	800 ... 5000 min ⁻¹
	Z 2.0 ... Z 2.7	600 ... 4500 min ⁻¹
	Z 3.5 ... Z 6.4	500 ... 4000 min ⁻¹
	Z 6.9 ... Z 8.4	500 ... 3800 min ⁻¹
	Z 8.8	500 ... 3500 min ⁻¹
	Z 9.8	500 ... 3000 min ⁻¹
	Size 2	
	Z 6.5 ... Z 21	700 ... 3500 min ⁻¹
Tightening torque	Chapter 4, "Dimensions"	

3.2 Pressure and volumetric flow

Pressure	- Pressure side (port P): depends on version and flow rate, - Suction side (container interior): ambient air pressure. Not suitable for charging.
Start against pressure	- The version with 3-phase motor can start against the pressure p_{max}. - The version with single-phase motor can only act counter to a minor pressure.
Fill volume and usable volume	see Chapter 2.1.2, "Tank size"

3.3 Weight

(without oil filling)

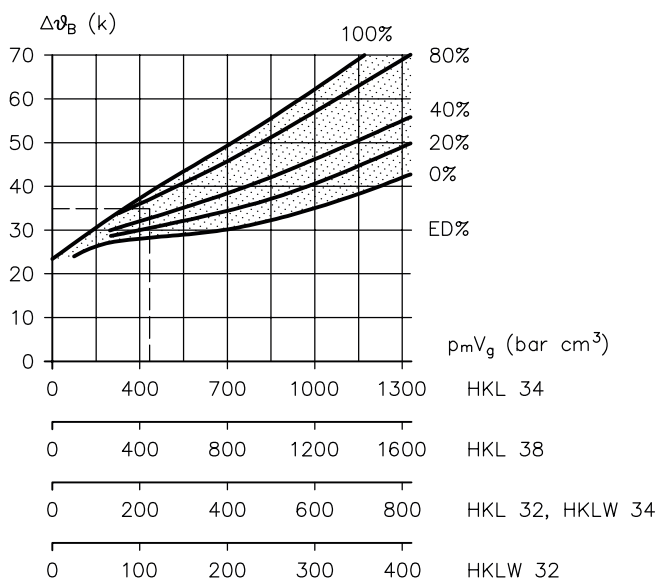
Type	H	Z	HZ, HH DHH, Z-H
HKL 3.. HKLW 3..	19.7 kg	19.7 kg	20.5 kg
HKL 3..8 HKLW 3..8	27 kg	27 kg	27.5 kg
HKL 3..89 HKLW 3..89	28.8 kg	28.8 kg	29.3 kg
HKL 3..9 HKLW 3..9	21.5 kg	21.5 kg	22.3 kg

For weights of the required connection blocks and valve banks, see corresponding publications, see Chapter 6.1.12, "Connection blocks" and Chapter 6.1.13, "Directional valve banks"

3.4 Characteristic lines

3.4.1 Build-up of heat

HKL 3

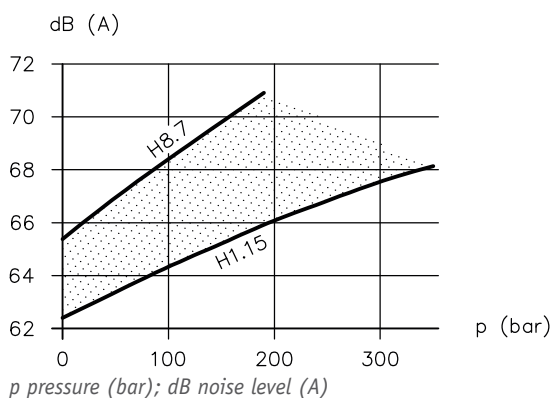


$p_m V_g$ average hydraulic work value (bar cm³); $\Delta\theta_B$ expected steady-state temperatures (K); %ED relative duty cycle

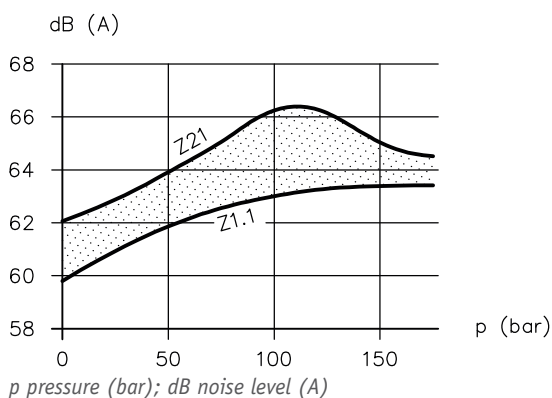
3.4.2 Running noise

Viscosity of the hydraulic fluid approx. 60 mm²/s

Radial piston pump



Gear pump



Measuring conditions:

Workroom, noise level approx. 50 dB(A); measuring point 1 m above ground; 1 m object distance, pump attached with 4 damping elements Ø40x30 (65 Shore, damping element brand no. 20291/V).

Measurement devices:

Precision noise level measurement device IEC 651 class I

NOTICE

Pumps with smaller flow rates usually tend toward the lower limit, whereas pumps with larger flow rates tend toward the upper limit. The noise level of dual-circuit pumps, based on the total flow rate, is approximately in the same range as that of a radial piston single-circuit pump of the same size.

3.5 Electrical data

The drive motor forms an enclosed, non-separable unit with the tank and pump.

Data applies to radial piston pumps and gear pumps.

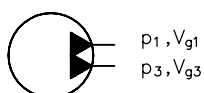
Connection	- for version with terminal box (without coding, standard/series): WAGO CAGE CLAMP®S, push-in terminal for stranded wire cross-section 1.5 ... 4 mm². Not supplied: Cable fitting M20x1.5 and eyelet 4.3 AMP ⊕. - for version with HARTING connector (coding .P1, .P2): Housing with pin insert HARTING HAN 10 E or similar. Not supplied: Mating connector with female insert for stranded wire cross-section 1.5 ... 4 mm². - for oil-tight version with terminal box and flat plug-in contacts (coding F): Flat plug-in contacts 6.3 AMP. Not supplied: Cable fitting M20x1.5 and eyelet 4.3 AMP ⊕ and blade receptacles 6.3 AMP.
Protection class	IP 54 according to IEC 60529, applies to the complete compact hydraulic power pack as a comparison protection class for purely electrical equipment
Protection class	VDE 0100 Protection class 1
Insulation	Designed in accordance with EN 60 664-1 - for 4- or 3-wire AC voltage systems L1-L2-L3-PE (3-phase systems) with an earthed neutral point to 500 V AC nominal phase voltage phase-phase - for 4- or 3-wire AC voltage systems L1-L2-L3 (3-phase systems) without an earthed neutral point (e.g. overseas) up to a nominal phase voltage of 300 V AC phase-phase - 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.

3.6 Motor data

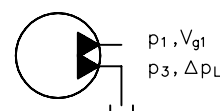
i INFORMATION

- 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 power. The heat development which is increased here is cooled in the no-load phases or during downtimes.
- The current consumption and pump flow rate can be estimated on the basis of the average and maximum hydraulic work values $(pV_g)_m$ and $(pV_g)_{max}$.
- For pump version **Z**, **HH**, **HZ**, **ZZ**, **DHH** or **Z-H**, the max. hydraulic work value $(pV_g)_{max}$ must be reduced by 10%.
- 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 $(pV_g)_{calc.} = p_1 V_{g1} + \Delta p_L V_{g3}$

- Re versions with AC motors: Actual current consumption is also dependent on the size of the operating capacitor. The operating capacitor is not included in the scope of delivery.
- Voltage tolerances: $\pm 10\%$ (IEC 60038), at 3x460/265 V 60 Hz $\pm 5\%$. It can be operated at undervoltage.

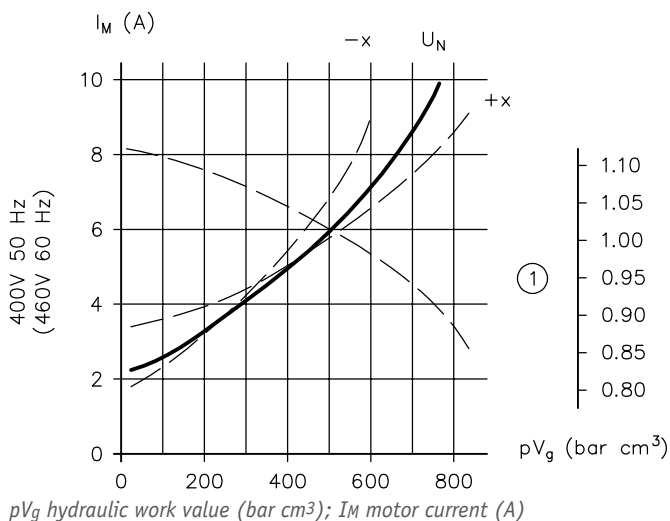
Type	Nominal voltage and power frequency U_N (V), f (Hz)	Nominal power P_N (kW)	Rated speed n_N (min ⁻¹)	Nominal current I_N (A)	Starting current ratio I_A / I_N	Power factor $\cos \varphi$	Recommend- ed operating capacitor C_B (μF)	max. hydraulic work value $(pV_g)_{max}$ (bar cm ³ /rev)
HKL 32	3x400/230 V 50 Hz $\nabla\Delta$	1.5	2840	3.3/5.8	6.3	0.86	--	600
	3x460/265 V 60 Hz $\nabla\Delta$	1.8	3410	3.4/5.9	6.1	0.86	--	600
	3x200 V 50 Hz ∇	1.5	2840	6.6	6.4	0.86	--	580
	3x220 V 60 Hz ∇	1.5	3440	6.0	7.0	0.86	--	400
HKL 34 HKL 34 V	3x400/230 V 50 Hz $\nabla\Delta$	1.5	1410	3.5/6.1	5.3	0.83	--	1150
	3x460/265 V 60 Hz $\nabla\Delta$	1.8	1690	3.6/6.2	5.0	0.83	--	1150
	3x200 V 50 Hz ∇	1.5	1410	7.2	5.1	0.81	--	1050
	3x220 V 60 Hz ∇	1.5	1700	7.2	5.2	0.87	--	840
HKL 38 HKL 38 V	3x400/230 V 50 Hz $\nabla\Delta$	2.2	1405	4.8/8.3	5.4	0.85	--	1470
	3x460/265 V 60 Hz $\nabla\Delta$	2.6	1700	4.8/8.3	5.0	0.85	--	1470
HKLW 32	1x230 V 50 Hz $\perp$	1.5	3420	10.5	3.3	0.94	25	300
	1x110 V 60 Hz $\perp$	1.5	3420	20.5	4.5	0.95	110	240
HKLW 34	1x230 V 50 Hz $\perp$	1.5	1375	10.1	3.3	0.94	40	820
	1x110 V 60 Hz $\perp$	1.5	1650	20	4.5	0.94	120	590
	1x115 V 50 Hz $\perp$	1.5	1375	21	3.3	0.94	120	680
	1x220 V 60 Hz $\perp$	1.5	1650	10	4.5	0.94	30	790

3.7 Current consumption characteristic lines

Current consumption

HKL 32

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

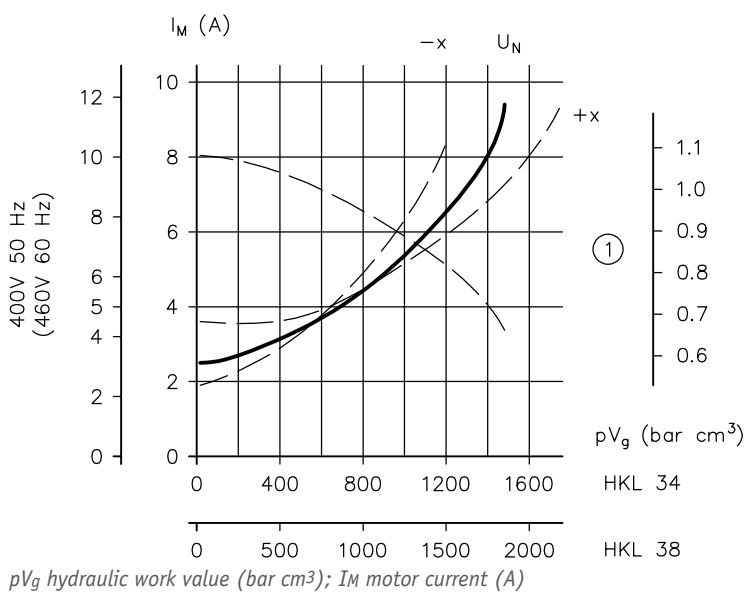


1 Flow rate progression (trend) 1.0 = Q_{max} as per tables [Chapter 2](#)

HKL 34

HKL 38

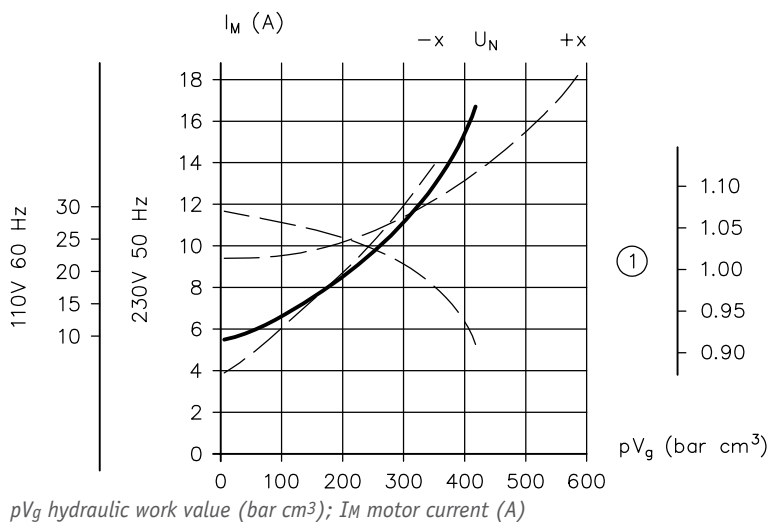
Operating voltage 3x400/230 V 50 Hz $\nabla\Delta$
3x460/265 V 60 Hz $\nabla\Delta$



1 Flow rate progression (trend) 1.0 = Q_{max} as per tables [Chapter 2](#)

HKLW 32

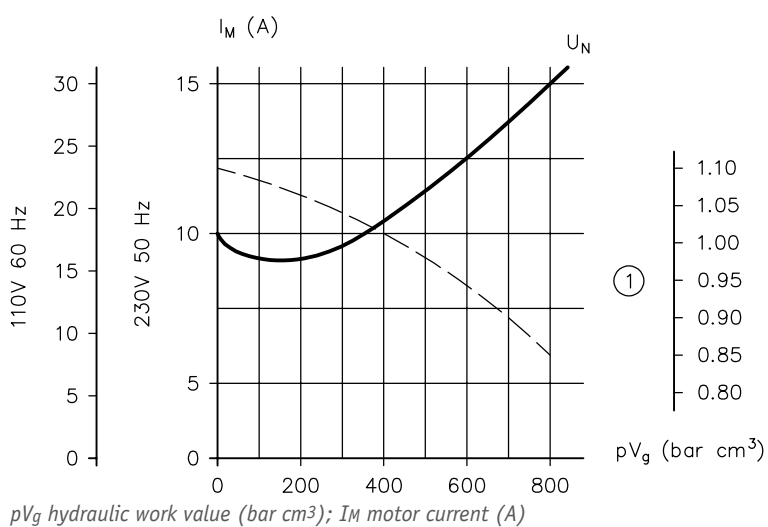
Operating voltage 1x230 V 50 Hz
 1x110 V 60 Hz



1 Flow rate progression (trend) 1.0 = $Q_{\max}$ as per tables Chapter 2

HKLW 34

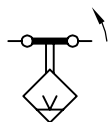
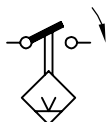
Operating voltage 1x230 V 50 Hz
 1x110 V 60 Hz



1 Flow rate progression (trend) 1.0 = $Q_{\max}$ as per tables Chapter 2

3.8 Additional options

3.8.1 Level switch

Coding	D, S	
Max. switching capacity	AC/DC: 10 VA	
Max. current	AC/DC: 0.5 A	
Max. voltage	AC/DC: 36 V	
Connection	on terminal box/HARTING plug	
Circuit symbol	Coding D (N/C contact) 	Coding S (N/O contact) 

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

3.8.2 Temperature switch

Technical data:

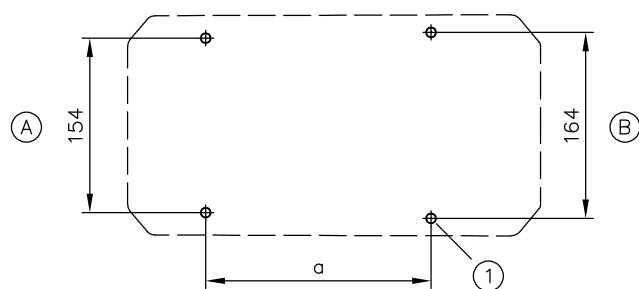
- Bimetallic-element switch
- designed as a separate temperature switch (type HKL)
- designed as a winding protection contact (type HKLW)

Coding	T
Signal indication	▪ 80°C ± 5K (coding T) ▪ 60°C ± 5K (coding T60)
Max. switching capacity	AC/DC: 10 VA
Max. current	0.5 A
Max. voltage	AC/DC: 36 V
Connection	on terminal box/HARTING connector
Circuit symbol	

4 Dimensions

All dimensions in mm, subject to change.

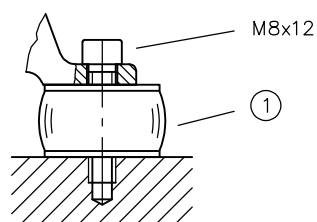
4.1 Mounting hole pattern



1 M8 or Ø9

Type	a
HKL 3.. HKLW 3..	198.5
HKL 3..8 HKLW 3..8	316.5
HKL 3..89 HKLW 3..89	377
HKL 3..9 HKLW 3..9	259

Recommended attachment with damping element



1 Damping element Ø40x30/M8



NOTICE

Hydraulic power pack attachment

Subject vibration isolators to compressive stresses only.

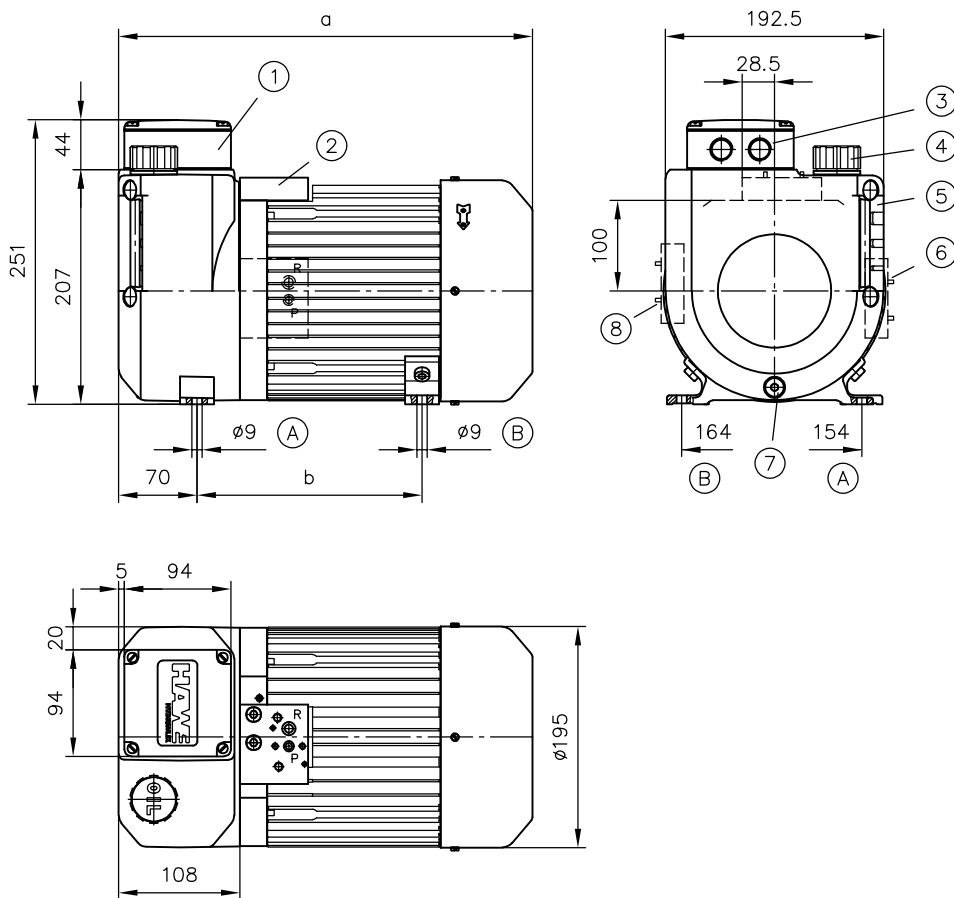


INFORMATION

The version of the hydraulic power pack and associated valve mounting determine which is the correct damping element to select.

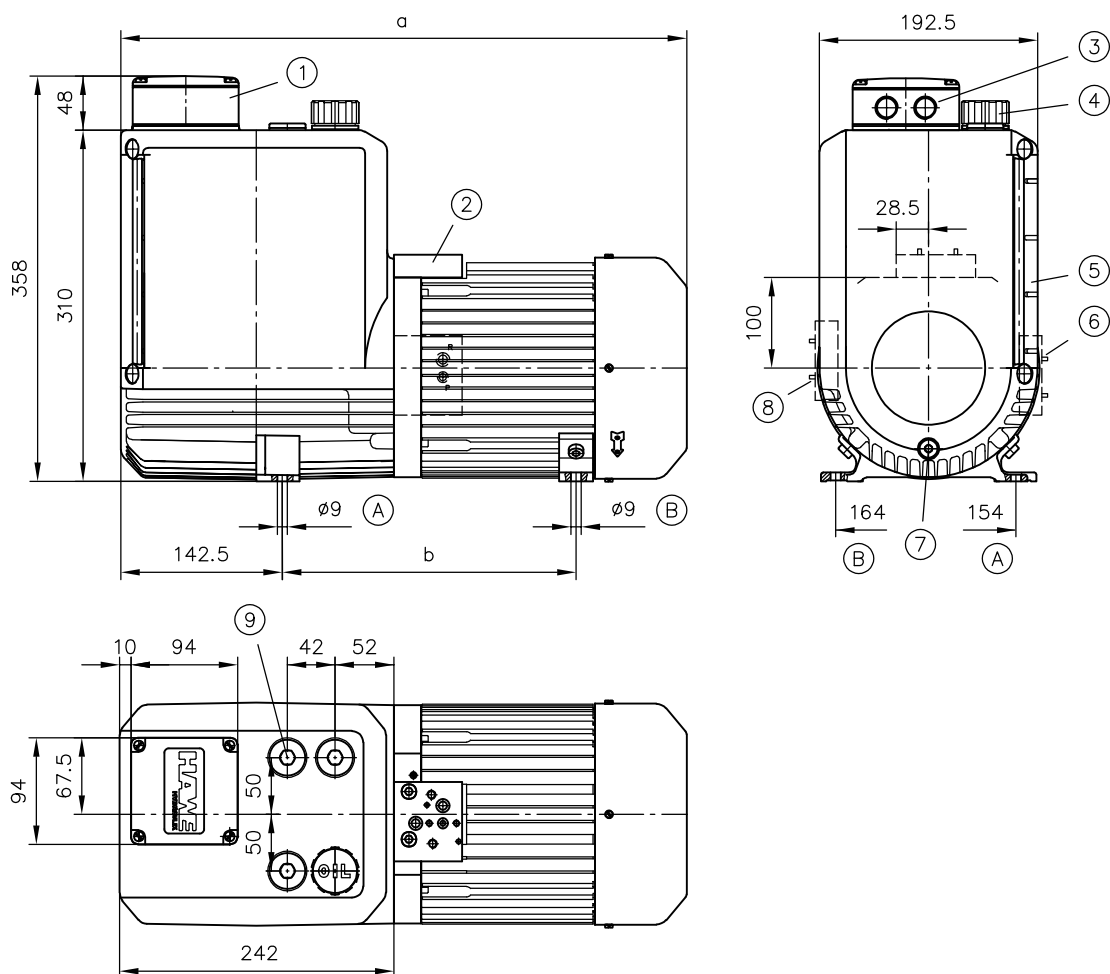
4.2 Basic pump

HKL 3.., HKL 3..8
HKLW 3.., HKLW 3..8



- 1 Terminal box 3x 90° rotatable
- 2 Connection base for HKL.../1
- 3 Thread for cable fitting M20x1.5
- 4 Filler
- 5 Oil level gauge
- 6 Connection base for HKL.../3 and for HKL.../1-Z-H
- 7 Oil drain G 1/4
- 8 Connection base for HKL.../2

Type	a	b
HKL 3.. HKLW 3..	366	198.5
HKL 3..8 HKLW 3..8	484	316.5

HKL 3..89, HKL 3..9
HKLW 3..89, HKLW 3..9


- 1 Terminal box 3x 90° rotatable
- 2 Connection base for HKL.../1
- 3 Thread for cable fitting M20x1.5
- 4 Filler
- 5 Oil level gauge
- 6 Connection base for HKL.../3 and for HKL.../1-Z-H
- 7 Oil drain G 1/4
- 8 Connection base for HKL.../2
- 9 3x return connection G 3/4

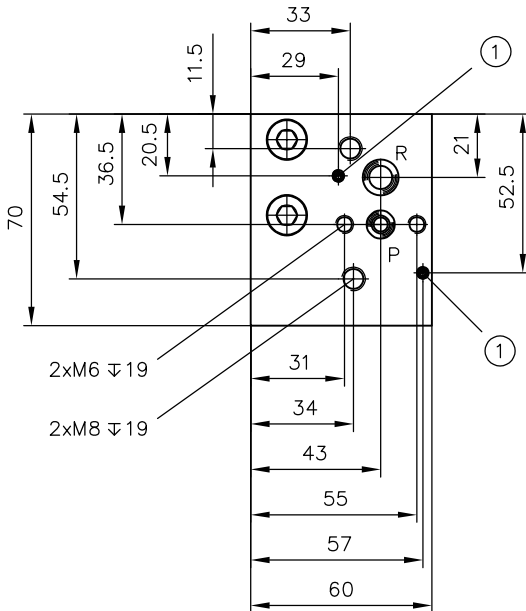
Type	a	b
HKL 3..89 HKLW 3..89	617	377
HKL 3..9 HKLW 3..9	499	259

4.3 Connections

4.3.1 Hydraulic connections

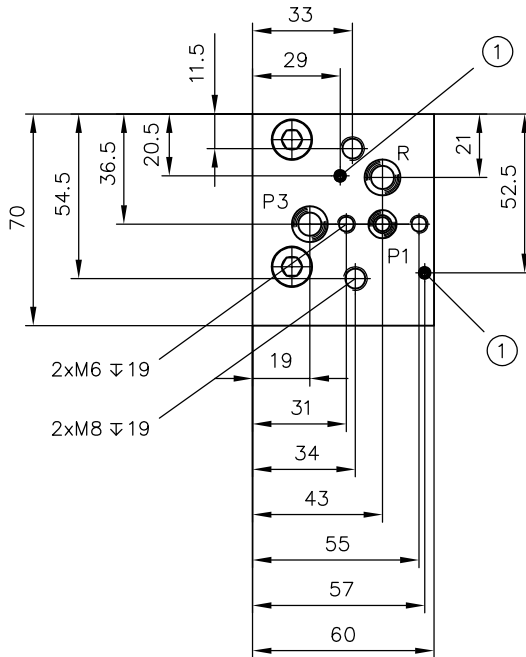
Single-circuit pump (Chapter 2.2.1)

Dual circuit pump with separate connection bases (Chapter 2.2.3)



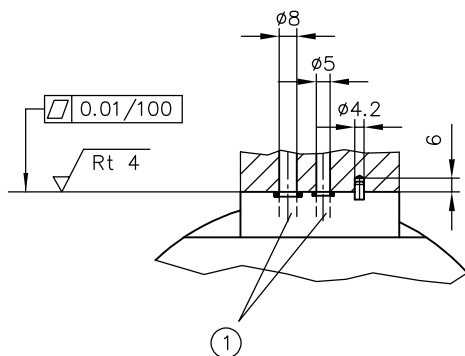
1 Centring pin

Dual-circuit pump with shared connection base (Chapter 2.2.2)



1 Centring pin

Hole for self-made connection block



1 Sealing of connections:

P and P1 = edge seal 6.07x1.68 NBR 90 Sh

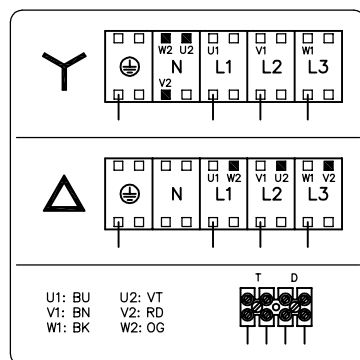
P3 and R = O-ring 8x2 NBR 90 Sh

4.3.2 Electrical connections

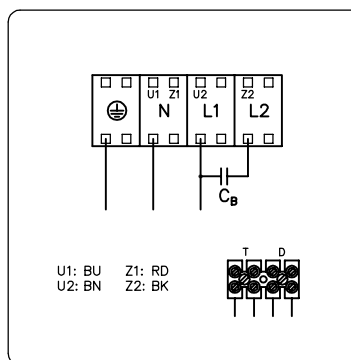
Terminal box (without coding)

WAGO CAGE CLAMP®S, cable 1.5 ... 4 mm²

3-phase motor

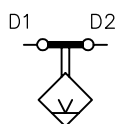


Single-phase motor

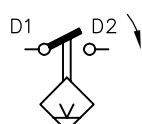


C_B - Operating capacitor
not included in scope of delivery

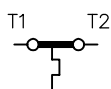
Coding D (N/C contact)



Coding S (N/O contact)



Coding T

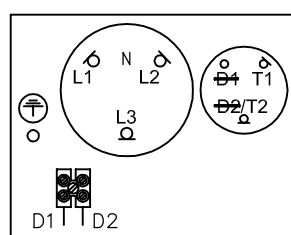


Terminal box, oil-tight version

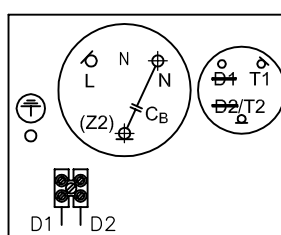
Coding F

For connection, see see Chapter 3.5, "Electrical data"

3-phase motor

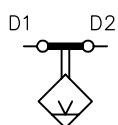


Single-phase motor

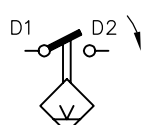


C_B - Operating capacitor
not included in scope of delivery

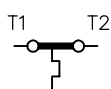
Coding D (N/C contact)



Coding S (N/O contact)



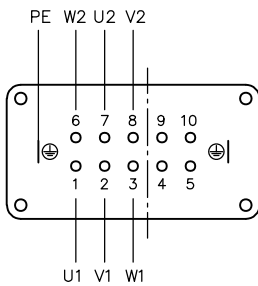
Coding T



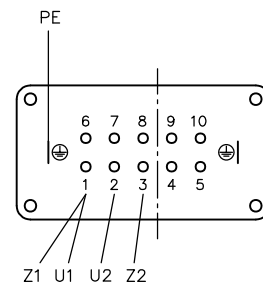
HARTING connector HAN 10 E

Coding **P1** and **P2**

3-phase motor

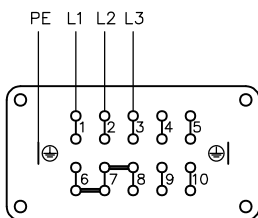


Single-phase motor

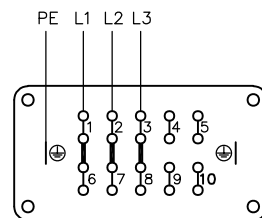


Customer-side connection (male connector)

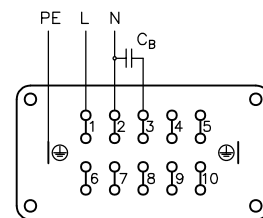
3-phase motor Υ



3-phase motor Δ

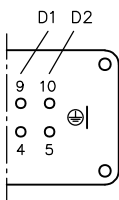


Single-phase motor

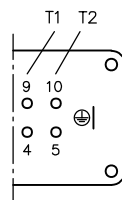


C_B - Operating capacitor
not included in scope of delivery

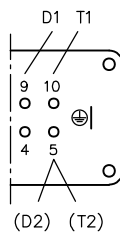
Coding **D**



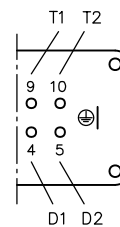
Coding **T**



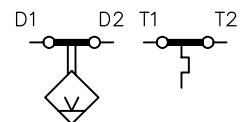
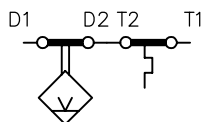
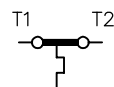
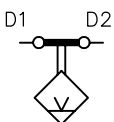
Coding **DT**



Coding **D - T**



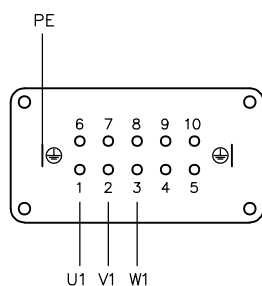
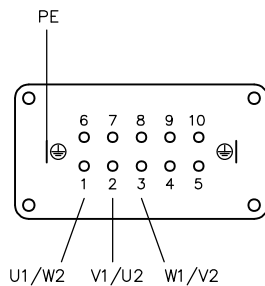
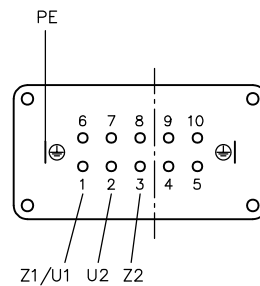
Coding **D** (N/C contact)



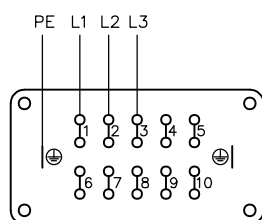
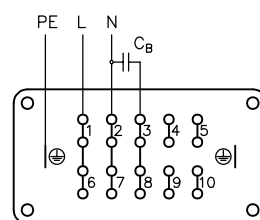
i INFORMATION

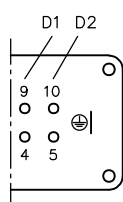
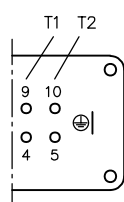
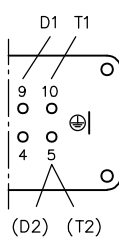
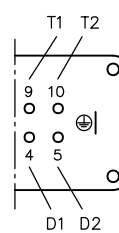
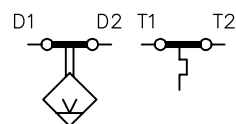
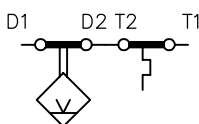
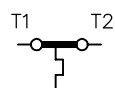
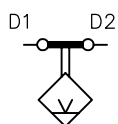
Level switch coding **S** in combination with HARTING plug not available.

HARTING connector HAN 10 E - oil-tight version

 Coding **FP1** and **FP2**
3-phase motor Υ

3-phase motor Δ

Single-phase motor

i INFORMATION

 No reconnecting from Υ to Δ possible (connected internally).

Customer-side connection (male connector)
3-phase motor Υ or Δ

Single-phase motor

 C_B - Operating capacitor
 not included in scope of delivery

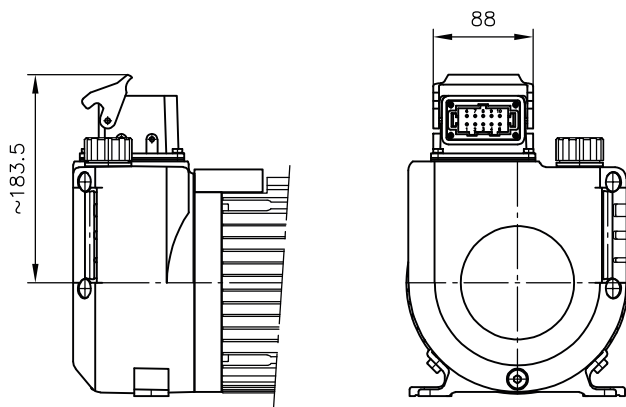
Coding D

Coding T

Coding DT

Coding D - T

Coding D
 (N/C contact)

i INFORMATION

 Level switch coding **S** in combination with HARTING plug not available.

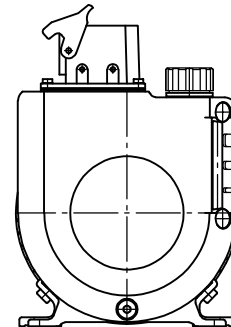
4.3.2.1 Position of HARTING connector

HKL 3, HKL 3.8

Coding **P1** and **FP1**

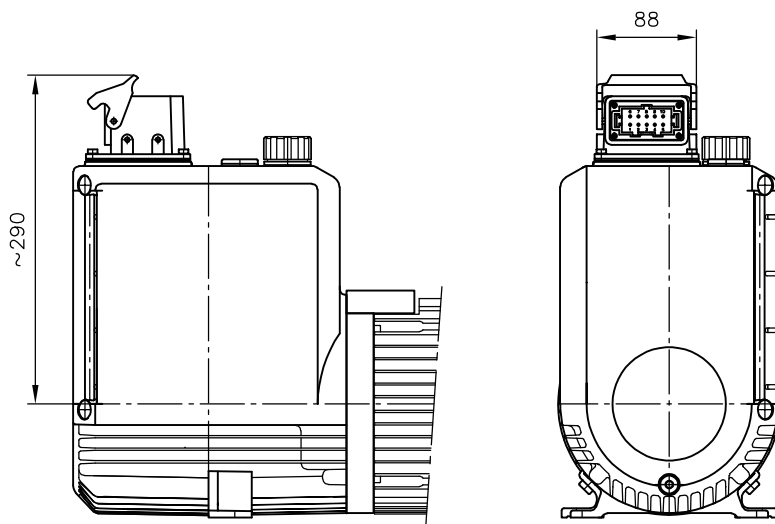


Coding **P2** and **FP2**

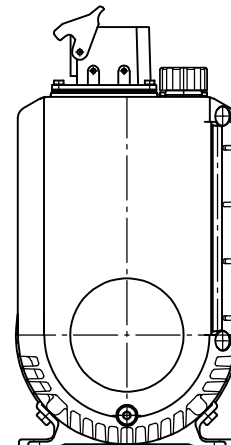


HKL 3.9, HKL 3.89

Coding **P1** and **FP1**



Coding **P2** and **FP2**



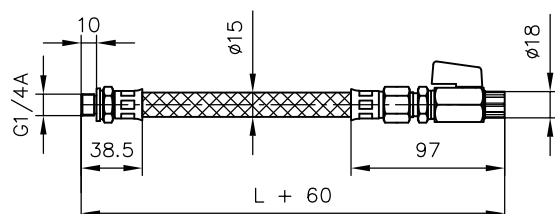
4.4 Oil drain hose

Coding

G 1/4 x 300

G 1/4 x 500

L = 300 mm / 500 mm with ball valve

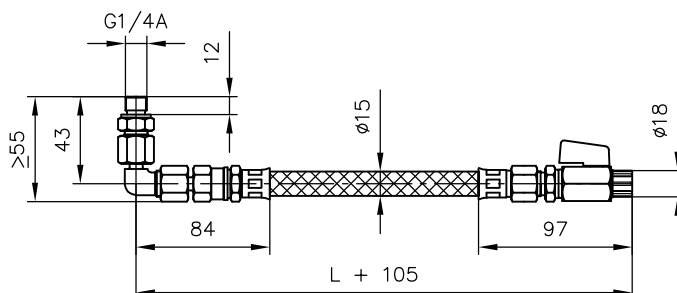


Coding

G 1/4 W x 300

G 1/4 W x 500

L = 300 mm / 500 mm with ball valve and bracket





NOTICE

Reference to other document

[Assembly instructions for compact hydraulic power pack type HKL and HKLW: B 7600-3L](#)

Available for this product: assembly instructions with notes on

- intended use,
- operating and maintenance,
- Assembly information

6 Other information

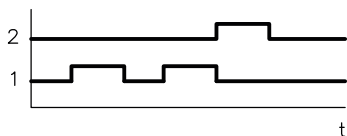
6.1 Planning information

i INFORMATION

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.

6.1.1 Drawing up function diagram

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



6.1.2 Determining pressures and flow rates

1. Dimension and select actuators based on the reaction forces that occur
2. Calculate flow rates based on the desired velocity profiles

! NOTICE

Observe the reset times of spring-loaded clamping cylinders when dimensioning pipelines or hose lines as well as the valves

In the case of time-linked clamping devices, the release of spring-loaded clamping cylinders may 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.

3. Calculate necessary operating pressures
4. Determine maximum necessary pump flow rate Q (l/min)
5. Determine system operating pressure $p_{\max}$ (bar)

Q - flow rate

p - pressure

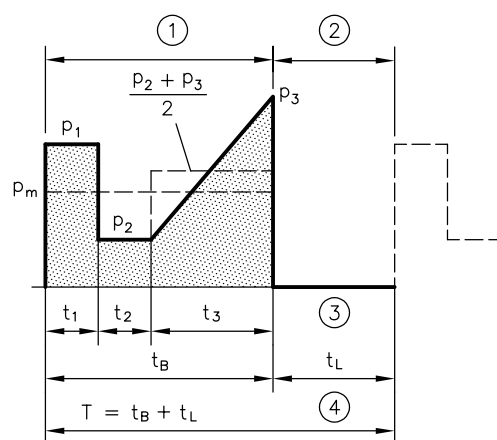
A - Area

v - Velocity

F - Force

$$Q \left(\frac{l}{\min} \right) = 0,06 \cdot A \left(mm^2 \right) \cdot v \left(\frac{m}{s} \right)$$

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



- 1 Loaded period t_B
- 2 No-load period t_L
- 3 No load
- 4 One working cycle

6.1.3 Creating a hydraulic circuit diagram

Selection 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 for rapid feed/creep)
- Use of an accumulator to provide short-term support for the pump flow rate

6.1.4 Drawing 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 duty cycle %ED
- S1 – Continuous operation (only suitable to a limited extent for compact hydraulic power packs)
- S2 – Short period operation
- S3 – Periodic intermittent operation
- S6 – Continuous operation with intermittent load

6.1.5 Selecting the compact hydraulic power pack

1. Select basic type based on power supply

- 3-phase current
- Alternating current

2. Select motor

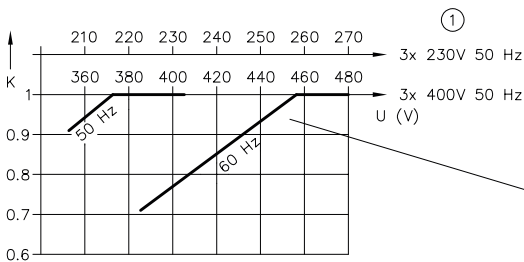
- Voltage tolerances: $\pm 10\%$ (IEC 60038), at 3x460/265 V 60 Hz $\pm 5\%$
- 400 V 50 Hz 3-phase motors can be used without restrictions in 460 V 60 Hz supply networks.
- Single-phase motors can only be used in supply networks with the nominal voltage and rated frequency.
- It can be operated at undervoltage. Bear in mind that this will involve performance restrictions.

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

$p_{\max}$ (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



U supply voltage (V); K correction factor

1 Motor design



INFORMATION

Pump flow rate 1.2 x greater than with 50 Hz operation.

3. Version with an encased stator: To be used in hydraulic installations in which a water content in the oil of up to 0.3% is expected.
4. Select pump type (radial piston pump, gear pump, pump combination)
5. Select the key figure for the pump flow rate, taking into account the maximum permissible pressure
6. Determine basic type based on motor size
7. Estimate noise level on the basis of parameters

6.1.6 Calculating the hydraulic work value

1. Calculate mean pressure
2. Calculate mean hydraulic work value (average pressure x flow rate)
3. Calculate maximum hydraulic work value (max. operating pressure x flow rate)

Calculation

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

$$(pV_g)_{\max} (\text{bar cm}^3) = p_{\max} \cdot V_g$$

6.1.7 Determining the steady-state temperature

INFORMATION

Observe the maximum permissible temperature of the hydraulic fluid of 80°C!

Calculation

$$\vartheta_{\text{Oil B}} = \Delta \vartheta_B + \vartheta_U$$

$\vartheta_{\text{Oil B}}$ (°C) Steady-state temperature of the hydraulic fluid

$\Delta \vartheta_B$ (K) Steady-state temperature (estimation from the characteristic lines to determine the excess temperature)

ϑ_U (K) Ambient temperature at the place of installation

For an approximate check of the steady-state temperature of the hydraulic fluid, the two most important data are generally sufficient:

- average hydraulic work of the pump $(pV_g)_m$ and
- relative load duration per working cycle (% duty cycle).

Other influencing factors are

- 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%)

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

t_B Load time

t_L No-load time

INFORMATION

Lower steady-state excess temperatures with larger tank.

6.1.8 Determining the maximum current consumption

Determine current consumption from the electrical data

► see Chapter 3.5, "Electrical data"

Set motor protection circuit

1. Set motor protection circuit to approximately 0.85 to 0.9 times the motor current (I_M).
 - ✓ When operating normally, the motor protection circuit will not trip prematurely.
 - ✓ When the pressure-limiting valve triggers, the period until shutdown does not become long enough for the hydraulic fluid's temperature to exceed its permissible maximum.
2. Run a test run to check the motor protection circuit's settings.


INFORMATION

Additional safety precautions against malfunctions are the temperature switches, level switches and pressure switches. These are optionally available for the hydraulic power pack.

6.1.9 Selecting the operating capacitor


NOTICE

- An operating capacitor is required in order to operate an AC motor.
- The operating capacitor is not included in the scope of delivery.

- The values listed in the table, [see Chapter 3.6, "Motor data"](#), ensure that the specified pressures are achieved.
- Where the utilisation is < 75% of the maximum possible hydraulic work value (pV_g): use an approx. 30% smaller capacitor to reduce the power losses.
- Select capacitor according to motor voltage:

Motor voltage	Rated voltage
1x 230 V 50 Hz 1x 220 V 60 Hz	400 V DB
1x 110 V 60 Hz 1x 115 V 50 Hz	230 V DB

6.1.10 Additional leakage oil return port

For larger, hot operating leakage oil return flows, for example chucks on lathes. The leakage oil return flow is guided so that its entrained heat loss is dissipated by the fan cooling.

6.1.11 Setting the pump 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 flow rate.

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 of the after-run should be carried out as follows:

1. Open the pressure-limiting valve fully.
2. Set the pressure switch to the highest value (by turning the adjusting 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 value set.
[see Chapter 3, "Parameters"](#)
5. Lock the pressure-limiting valve and the pressure switches.

The rise in pressure due to the after-run can also be avoided by using an accumulator or additional volume in the load line.

If the hydraulic power pack is used to full capacity, i.e. the pressure setting is close to the maximum permissible pressure, then practically no after-run occurs because the pump comes to a standstill almost immediately after being switched off.

[see Chapter 2, "Available versions"](#)

6.1.12 Connection blocks

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

i INFORMATION

When selecting one, take note of the specifications for the connection blocks and mounted directional valves.

When setting the pressure-limiting valve on the connection block, take note of the pump's and valve mounting's maximum permitted pressure.

Type	Description	Publication
AB	For single-circuit pumps with a pressure-limiting valve and the possibility of direct mounting of directional valve banks Optional: - Pressure filter or return line filter - Idle circulation valve - Accumulator charging valve - Proportional pressure-limiting valve	D 6905 AB
B	For single-circuit pumps for the activation of single-acting cylinders with a pressure-limiting valve and drain valve Optional: Throttle valve	D 6905 B
C	For single-circuit pumps with connections P and R for direct piping	D 6905 C
AI, AN, NA C30, SS, VV	For dual-circuit pumps with a pressure-limiting valve and the partial possibility of direct mounting of directional valve banks Optional: - Pressure filter or return line filter - Accumulator charging valve - Two-stage valve - Idle circulation valve	D 6905 A/2

6.1.13 Directional valve banks

i INFORMATION

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

This applies to all types except type **C**.

Type	Description	p _{max} (bar)	Publication
VB	Valve bank (directional seated valve)	700	D 7302
BWN, BWH	Valve bank (directional seated valve)	450	D 7470 B/1
SWR, SWS	Valve bank (directional spool valve)	315	D 7951
BA	Valve bank for the combination of different directional valves with connection pattern NG 6 in accordance with DIN 24 340-A6	400	D 7788
BVH	Valve bank (directional seated valve)	400	D 7788 BV
NBVP	Directional seated valve	400	D 7765 N
ROLV	Directional seated valve	400	D 8144
NSWP	Directional spool valve	315	D 7451 N
NSMD	Clamping module (Directional spool valve with a pressure reducing valve and acknowledge function)	120	D 7787
NZP	Intermediate plates with connection pattern NG 6 in accordance with DIN 24 340-A6	400	D 7788 Z
POL, PRL, PIL	Proportional directional spool valve	350	D 6394
PIH	Proportional directional spool valve	350	D 6418
SWPM	Directional valve	320	D 6420/1

References

Compact hydraulic power packs

- Compact hydraulic power pack type KA and KAW size 2: D 8010
- Compact hydraulic power packs type KA size 4: D 8010-4
- Compact hydraulic power pack type INKA 1: D 8132-1
- Compact hydraulic power pack type MPN and MPNW: D 7207
- 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 NPC: D 7940
- Mini hydraulic power pack type H 300, 350: D 6344
- Mini hydraulic power pack type H 400, 410, 440: D 6345
- Mini hydraulic power pack type HR 050: D 6014
- Mini hydraulic power pack type HR 080: D 6342
- Mini hydraulic power pack type HR 120: D 6343
- Servo hydraulic power pack type HS 120: D 6347
- Mini hydraulic power pack type A: D 6025

Connection blocks

- Connection blocks for single-circuit pumps types AB, AL: D 6905 AB
- Connection blocks type B for hydraulic power packs: D 6905 B
- Connection blocks type C: D 6905 C
- Connection blocks for dual-circuit pumps types AN, AL, NA: D 6905 A/2

Valves and valve banks

- 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 CWPN: D 7451 CWPN
- 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 seated valve type ROLV: D 8144
- Directional spool valve type NSWP 2: D 7451 N
- Clamping module type NSMD: D 7787
- Intermediate plate type NZP: D 7788 Z

Attached components

- Fitting type X 84: D 7077
- Diaphragm accumulator type AC: D 7969
- Miniature accumulator type AC: D 7571

