

Hägglunds DUC Drive Unit



Valid for:

- ▶ Flow capacity: Up to 3000 lpm (790 gpm) at 50Hz
- ▶ Flow capacity: Up to 3600 lpm (950 gpm) at 60Hz
- ▶ Max operating pressure: 350 bar (5076 psi)
- ▶ Frame size: Medium and Large
- ▶ Pump size: 40-750 cc
- ▶ Single or tandem pump assembly

Features

- ▶ Compact design – small space required, vertical assembly
- ▶ Panels for sealed off hydraulic compartment
- ▶ Configurable for many applications and customer demands
- ▶ Equipped with Hägglunds advanced control system

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1 Ordering

1.1 Ordering code two compartments

In order to identify Hägglunds equipment, the following ordering code is used.

Example Hägglunds DUC-LS2

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15											
DU	C	-	L	S	2	-	315	-	500	+	000	-	0	-	W	-	Y	-	S	-	E	-	0400	/	50

01	Drive unit		DU
02	Type		
	Compact		C
03	Frame size		
	Medium frame		M
	Large frame		L
04	Pump setup		
	Single pump		S
	Tandem pumps		T
05	Number of compartments		
	Two compartments		2
06	Electric motor size		
	Electric power (kW)		011
			015
			018
			022
			030
			037
			045
			055
			075
			090
			110
			132
			160
			200
			250
			315
			355
			400
			500

07	Pump size (cc)- Top	
		040
		071
		125
		180
		250
		355
		500
	750	
08	Pump size (cc) - Bottom	
		040
		071
		125
		180
		250
	355	
09	Explosive environment	
	Not used in Ex environment	0
10	Cooler type	
	Air oil cooler	A
	Water oil cooler	W
11	Electric motor	
	Included in Drive Unit	Y
	Customer supplied	N
12	Control system	
	Häggglunds Spider control system	S
	Häggglunds Spider control system with Häggglunds CMp	C
	No control system - Only terminal box	N
	Häggglunds ICp pump control	D
13	Version	
	European	E
	American	A
14	Voltage (V)	
	Main Voltage	
15	Frequency (Hz)	
		50
		60

12	Explosive environment	
	Not used in Ex environment	0
13	Cooler type	
	Air oil cooler	A
	Water oil cooler	W
14	Electric motor	
	Included in Drive Unit	Y
	Customer supplied	N
15	Control system	
	Häggglunds Spider control system	S
	Häggglunds Spider control system with Häggglunds CMp	C
	No control system - Only terminal box	N
	Häggglunds ICp pump control	D
16	Version	
	European	E
	American	A
17	Voltage (V)	
	Main Voltage	
18	Frequency (Hz)	
		50
		60

2 Function Hägglunds DUC

2.1 General

The DUC drive unit provides the hydraulic motor(s) with required hydraulic oil flow and pressure together with system control functionality.

The drive unit is divided to 6 basic sizes depending on hydraulic flow requirements:

- Medium frame - Single pump - Two compartments (MS2)
- Medium frame - Tandem pump - Two compartments (MT2)
- Large frame - Single pump - Two compartments (LS2)
- Large frame - Tandem pump - Two compartments (LT2)
- Large frame - Single pumps - Three compartments (LS3)
- Large frame - Tandem pumps - Three compartments (LT3)

The drive unit supports functionality for one or two driven machine shafts.

Functions as cold/warm flushing and brake circuits for the hydraulic motors are available as options.

The drive unit has an embedded control system with a large variety of configurable functionality to simplify the control and monitoring of the hydraulic drive.

The control system is pre-programmed and easy to configure and contains functions as:

- Variable-speed control
- Speed feedback
- Power limitation
- Industrial fieldbus communication
- Analog and digital signal monitoring
- Pressure control (torque control) and application specific functions as:
 - Friction control
 - Shredder control
 - Synchronized control

For detailed functionality and configuration, see User manual Hägglunds Spider [RE 15330-WA](#).

The DUC drive unit can be delivered without control system if required. All electrical wiring for sensors and pump control will be wired to a junction box. Card for pump control can be assembled as an alternative, see data sheet for Hägglunds ICp, [RE 15422](#). Monitoring of the drive unit sensors must be handled externally according to *Fig. 3*

The drive unit is available for:

- Power ranges from 11 kW to 2 x 500 kW / 15 hp to 2 x 670 hp.
- Flow ranges up to 3000 lpm / 792 gpm at 1 500 rpm (3 600 lpm / 951 gpm at 1 800 rpm).
- Working pressure max 350 bar / 5076 psi.

2.1.1 Versions

Häggglunds DUC is available in two versions: European and American version

The following abbreviations are used in tables in present documentation

E = European version

A = American version

The main differences between these versions are:

European version:

- Follows the IEC/ISO standards

American version:

- Follows the NEMA/ANSI/NFPA/UL standards

The version that is needed for a specific drive unit shall be based on customer requirements.

2.1.2 Test certificate

Test certificates for each drive unit may be provided upon request. European version are issued according to European Standard EN 10204 - 3.1.

2.1.3 Standards

Declaration of Incorporation, as defined by the EC Machinery Directive 2006/42/EC, Appendix IIB

Control system

- EMC Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU

Quality assurance system, certified to standard ISO 9001.

2.1.4 Ambient temperature

Upper limit

A standard drive unit has an upper ambient temperature limit of 40 °C (104 °F).

Lower limit

A standard drive unit has a lower ambient temperature limit of -20 °C (-4 °F).

Below 0 °C (32 °F) should water oil cooler **not** be used due to freezing point of water.

2.1.5 Combination of pump and electric motor

Table 1: Pre-defined pump/electric motor combinations, for single pumps

		Pump (cc)								
		40	71	125	180	250	355	500	750	
kW	hp	Frame size Medium (MS2)				Frame size Large (LS2, LS3)				
Electric motors	11	15	X							
	15	20	X							
	18,5	25	X							
	22	30	X	X						
	30	40	X	X	X					
	37	50		X	X	X				
	45	60		X	X	X				
	55	75		X	X	X	X			
	75	100			X	X	X	X		
	90	125			X	X	X	X		
	110	150				X	X	X	X	
	132	200				X	X	X	X	
	160	250					X	X	X	
	200	300					X	X	X	
	250	350						X	X	X
	315	450							X	X
	355	500							X	X
400	550								X	
500	650								X	

X = Configurable drive unit

Table 2: Pre-defined pump/electric motor combinations, for tandem pumps two compartments

		Pump (cc)																					
		40	71	71	125	125	125	180	180	180	180	250	250	250	250	250	355	355	355	355	355	355	
		40	40	71	40	71	125	40	71	125	180	40	71	125	180	250	40	71	125	180	250	355	
kW	hp	Frame size Medium (MT2)										Frame size Large (LT2)											
Electric motors (kW)	22	30	S																				
	30	40	S	S	X																		
	37	50	S	S	X	X																	
	45	60	S	S	X	X																	
	55	75	S	S	X	X	X																
	75	100		S	X	X	X	X	X	X	X	X	X	X	X								
	90	125		S	X	X	X	X	X	X	X	X	X	X	X								
	110	150			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
	132	200				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	160	250						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	200	300						X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
	250	350												X	X	X	X	X	X	X	X	X	X
315	450														X	X	X	X	X	X	X	X	

X = Configurable drive unit
 S = Customized drive unit

Table 3: Pre-defined pump/electric motor combinations, for tandem pumps three compartments

		Pump (cc)																		
		250	250	250	250	250	355	355	355	355	355	355	500	500	500	500	500	500	500	
		40	71	125	180	250	40	71	125	180	250	355	40	71	125	180	250	355	500	
kW	hp	Frame size Large Tandem three compartments (LT3)																		
Electric motors (kW)	75	100	X	X	X															
	90	125	X	X	X	X														
	110	150	X	X	X	X	X	X	X	X			X							
	132	200	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
	160	250	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	200	300	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	250	350		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	315	450				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	355	500					X			X	X	X	X	X	X	X	X	X	X	X
	400	550									X	X	X	X	X	X	X	X	X	X
	500	650											X			X	X	X	X	X

X = Configurable drive unit.

3 Circuit diagram

3.1 Simplified hydraulic circuit single SP pump.

Features; air-oil cooler, cold flushing via check valve, cold flushing pump case

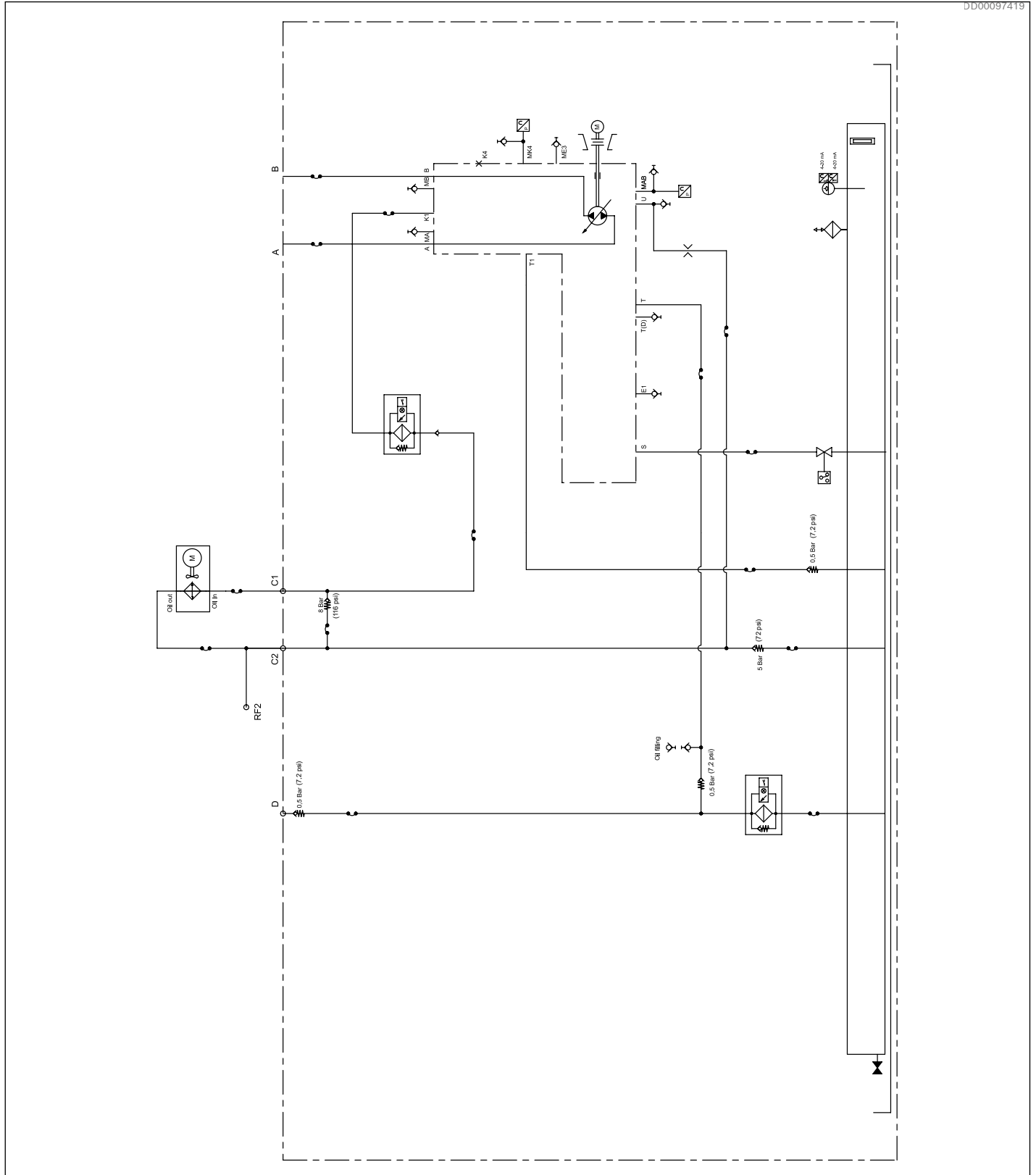


Fig. 1: Simplified hydraulic circuit single pump

3.2 Simplified hydraulic circuit SP tandem pumps.

Features; plate cooler, accumulator, heater in tank, cold flushing via external pump

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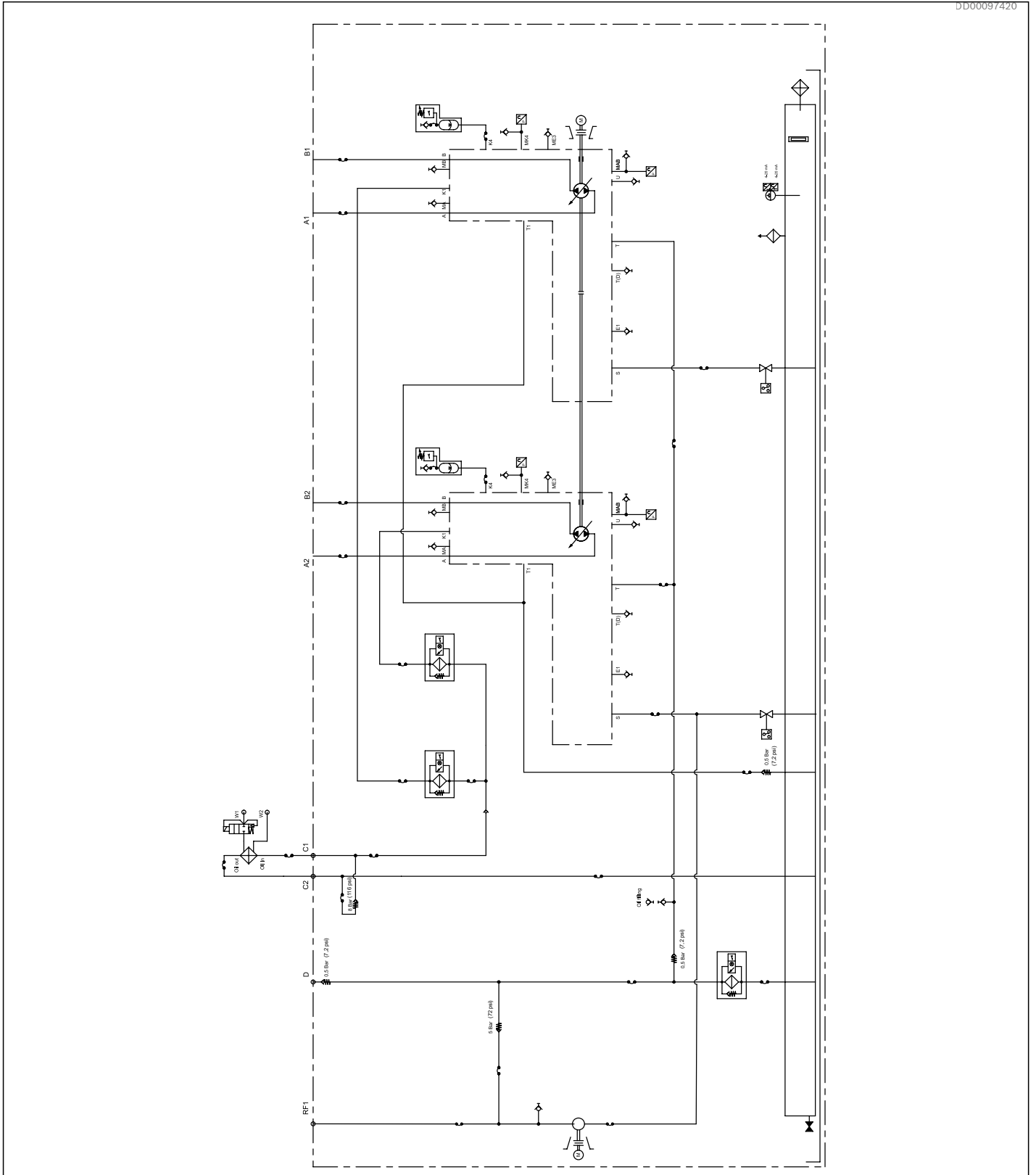


Fig. 2: Simplified hydraulic circuit double pumps

3.3 Monitoring logic diagram

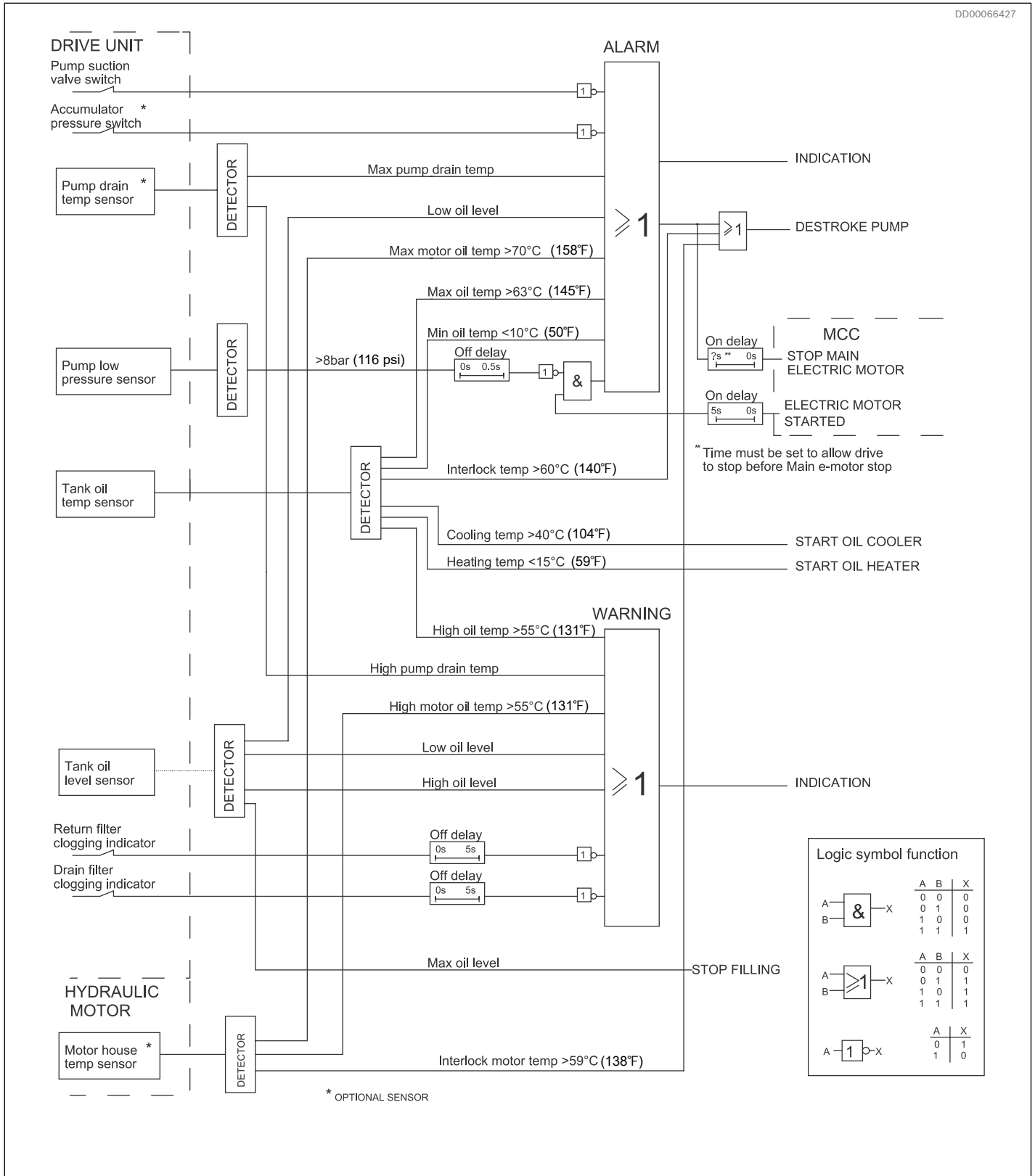


Fig. 3: Example of monitoring logic diagram with ISO VG 68 oil

4 Technical data

4.1 Drive unit (DUc)

4.1.1 Weights

Table 4: Weight drive unit

Cabinet size	Weight without oil, electric motor, tank, pump and cooler	
	kg*	lb*
DUc MS2	450	1 000
DUc LS2	700	1 550
DUc MT2	600	1 350
DUc LT2	750	1 650
DUc LS3	1300	2 800
DUc LT3	1450	3 200

* Values are rounded up to even fifties

Table 5: Weight tank

Tank size l	Weight incl. tank cover	
	kg	lb
130	70	154
220	90	198
300	110	243
350	130	287
400	140	309
600	170	375
700	170	375
900	220	485

Table 6: Weight pump

Pump	Weight		Attachment kit	Weight	
	kg	lb		kg	lb
SP40	74	163	SP40 + SP40	4	9
SP71	98	216	SP71 + SP71	5	11
SP125	150	331	SP125 + SP125	10	22
SP180	158	348	SP180 + SP180	10	22
SP250	267	589	SP250 + SP250	25	55
SP355	277	611	SP355 + SP355	29	64
SP500	394	869	SP500 + SP500	33	73
SP750	540	1 191			

Table 7: Weight electric motor

Siemens			WEG		
kW	Weight		hp	Weight	
	kg	lb		kg	lb
3	30	66	5	43	95
7,5	64	141	10	75	165
11	83	183	15	114	251
15	100	220	20	132	291
18,5	165	364	25	176	388
22	170	375	30	198	437
30	240	529	40	223	492
37	285	628	50	243	536
45	320	705	60	394	869
55	420	926	75	507	1 118
75	570	1 257	100	517	1 140
90	670	1 477	125	721	1 590
110	760	1 676	150	760	1 675
132	960	2 116	200	950	2 094
160	990	2 183	250	950	2 094
200	1 190	2 623	300	1 080	2 381
250	1 326	2 923	350	1 213	2 674
315	1 653	3 644	450	1 540	3 395
355	2 026	4 467	500	1 570	3 461
400	2 116	4 665	550	1 966	4 334
450	NA	NA	600	1 966	4 334
500	2 296	5 062	650	1 993	4 394

Table 8: Weight flushing circuit (without electric motor)

Flushing type	Electric motor		Weight	
	kW	hp	kg	lb
Cold flushing with pump	3	5	90	200
Warm and cold flushing with pump	7,5	10	95	210

Table 9: Weight brake circuit (without electric motor)

Brake type	Electric motor		Weight	
	kW	hp	kg	lb
15 bar opening pressure	-		10	20
60 bar opening pressure	3	5	80	180
200 bar opening pressure	3	5	80	180

Table 10: Weight air-oil cooler

Air-oil cooler type	Weight	
	kg	lb
HDC 050-4	38	84
HDC 060-4	60	132
HDC 080-4	101	223
HDC 085-6	131	289
HDC 090-6	173	381
HDC 100-4	222	489
HDC 100-6	196	432
HDC 200-4	429	946
HDC 200-6	357	787

Table 11: Weight water-oil plate cooler

Cooler type	Weight	
	kg	lb
B15-30	4	9
B025T-40	12	25
B025T-80	21	46
B120T-60	32	71
B120T-80	40	88
B120T-120	55	121

Table 12: Weight water-oil tube cooler

Cooler type	Weight	
	kg	lb
FC160	11	24
GK400	54	119
GK600	74	163
PK600	158	348
B-700	14	30
B-1000	29	65
B-1200	73	160
B-1600	181	400

Example

Given:

Cabinet type, DUC LT2 with 350 l tank,
B120T-120 plate cooler and cold flushing with pump.
Electric motor, Siemens 200 kW
Pumps, SP250+SP250

Solution:

Weights from tables:

Power unit without electric motor and pump 750 kg

Tank 130 kg

Cooler 55 kg

Cold flushing 90 kg

Electric motor for flushing, 30 kg (Siemens 3,0 kW)

Electric motor, 1 190 kg

Pumps, 559 kg (267+267+25)

Total weight :

$750+130+55+90+30+1\ 190+559=2\ 804$ kg

Round the value up to even hundreds : 2 900 kg

(Weight of oil in tank not included).

4.1.2 Positioning the DUC

The following space should be left free around the drive unit, to allow free ventilation and to provide sufficient working space for maintenance. Heavier maintenance such as change of motor/pump will demand more working space.

The drive units shall not be installed side by side, if nothing else is stated.

It is important that all pipes (both for water and hydraulics) are arranged to provide sufficient working space for maintenance.

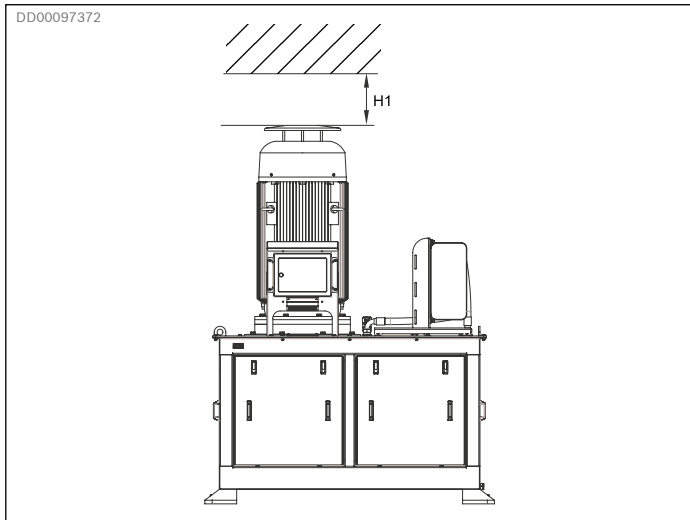


Fig. 4: Recommended minimum space over electric motor

Table 13: Recommended minimum space around DUC

Minimum space	mm	in
A1	700	28
A2*	700	28
B1	700	28
B2	1000	40
C1	600	24
D1	900	36
D2	900	36
H1	150	6

*Use A2 instead of A1 when there is external flushing or brake mounted.

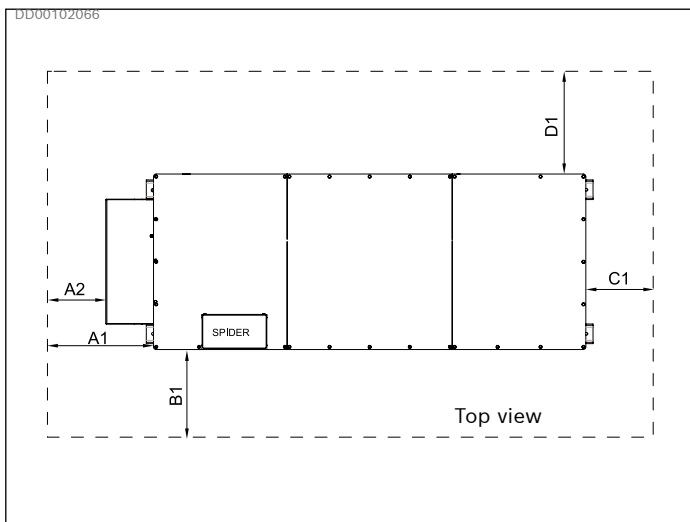


Fig. 5: Recommended minimum space around DUC MS2, LS2 and LS3

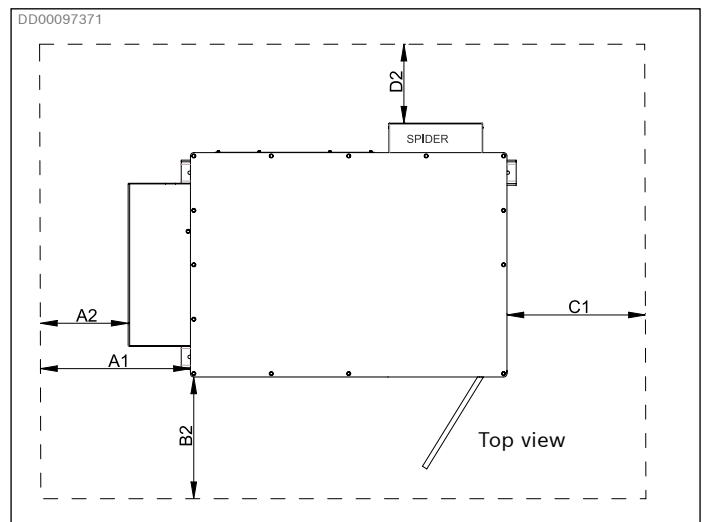


Fig. 6: Recommended minimum space around DUC MT2, LT2 and LT3

4.1.3 Dimensions DUC

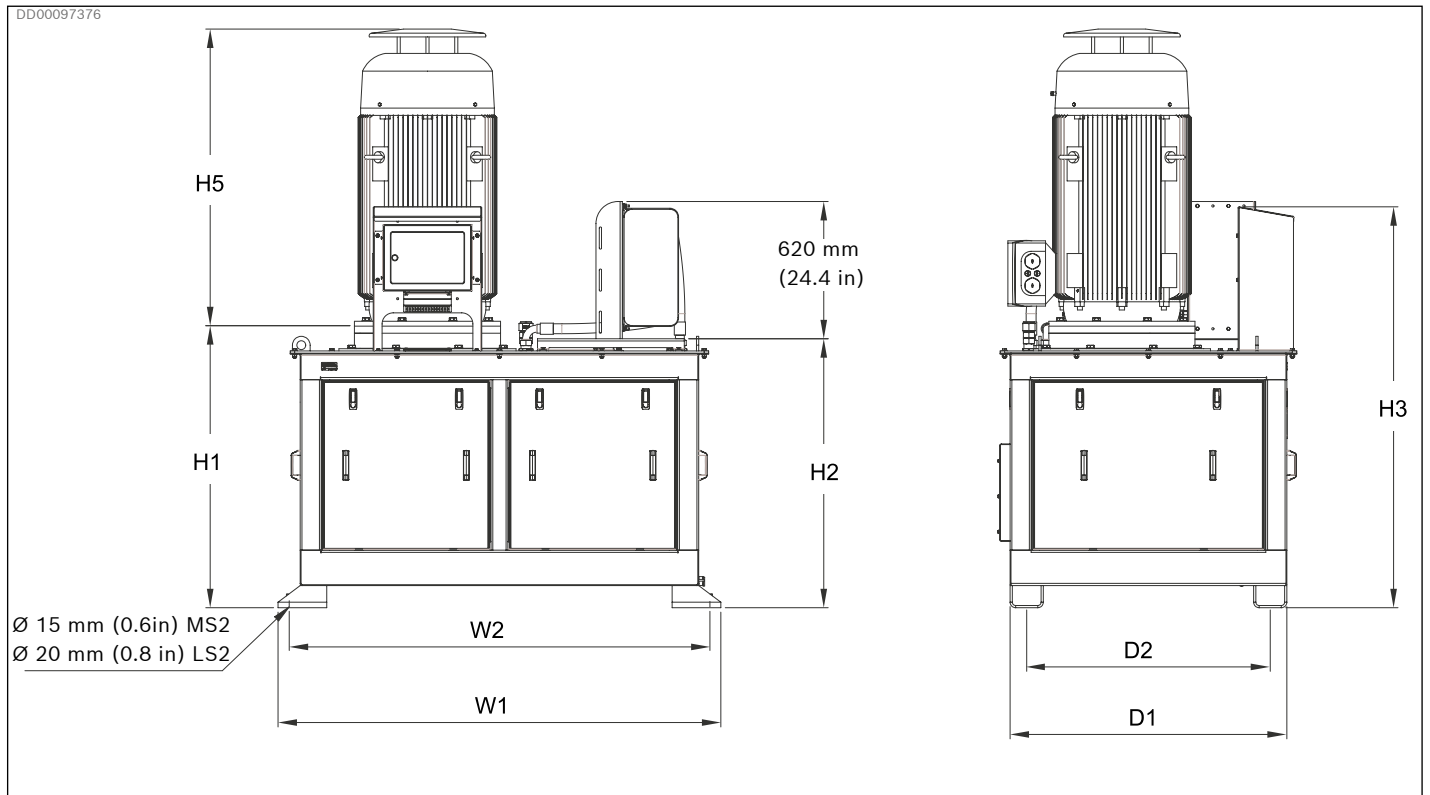


Fig. 7: DUC LS2 with water-oil plate cooler

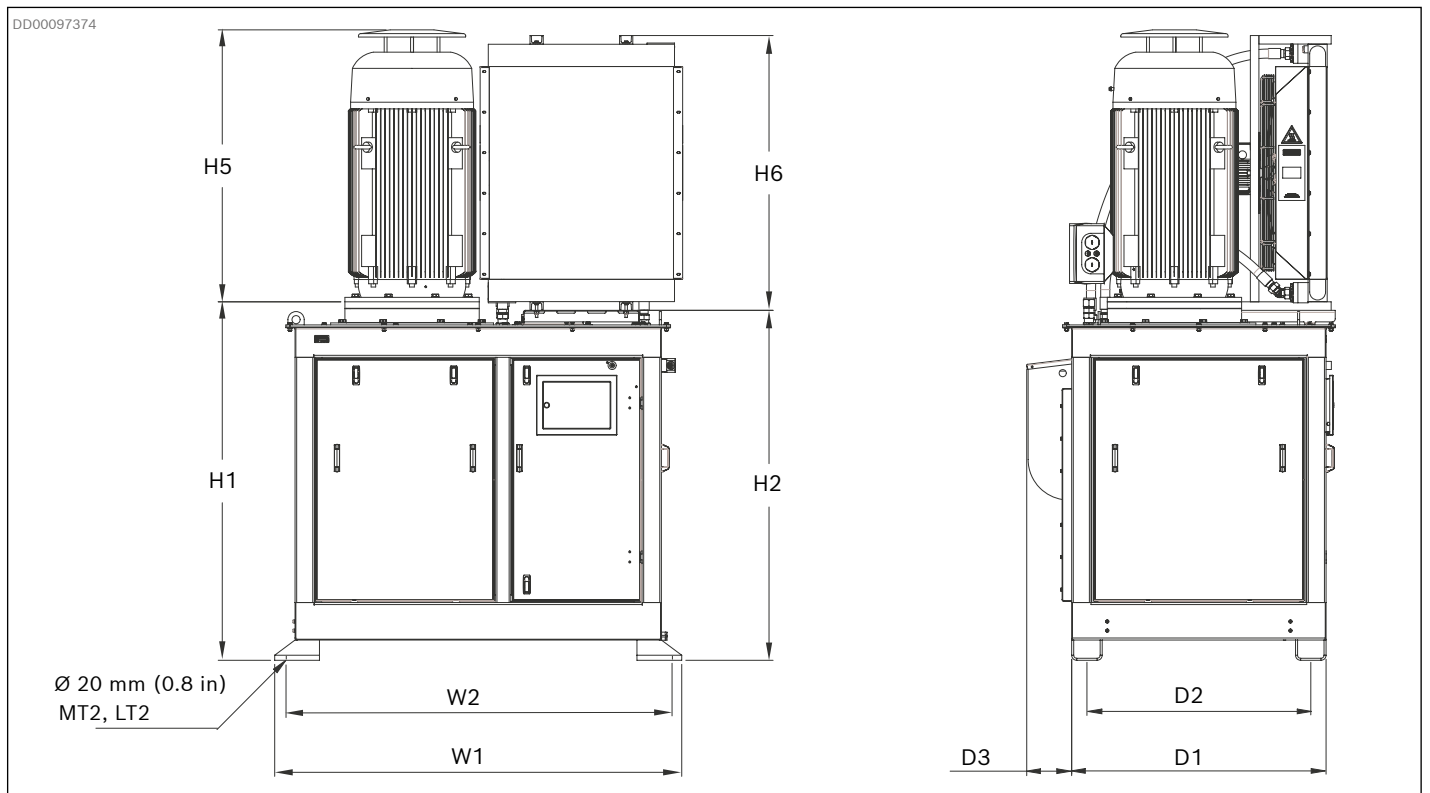


Fig. 8: DUC LT2 with air-oil cooler

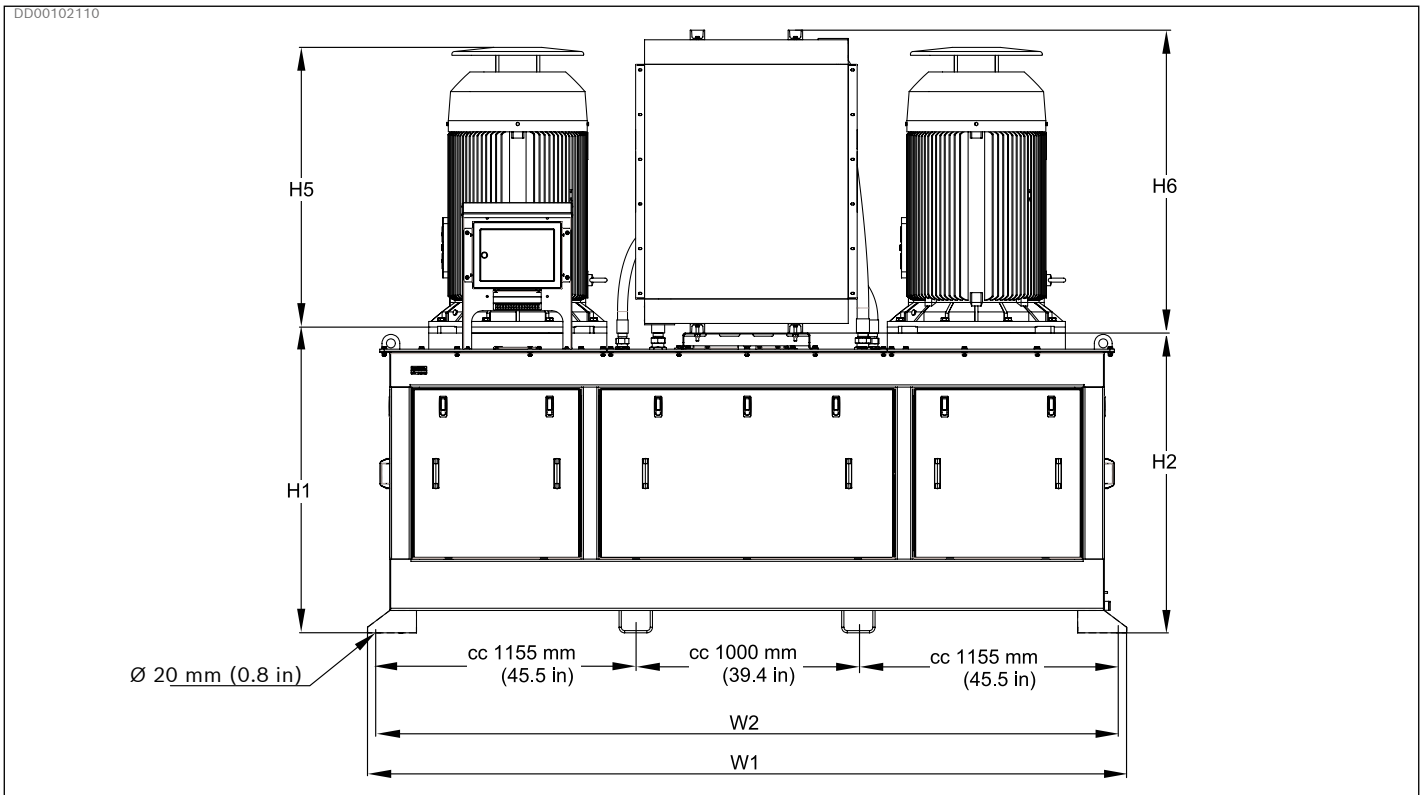


Fig. 9: DUC LS3 with air-oil cooler

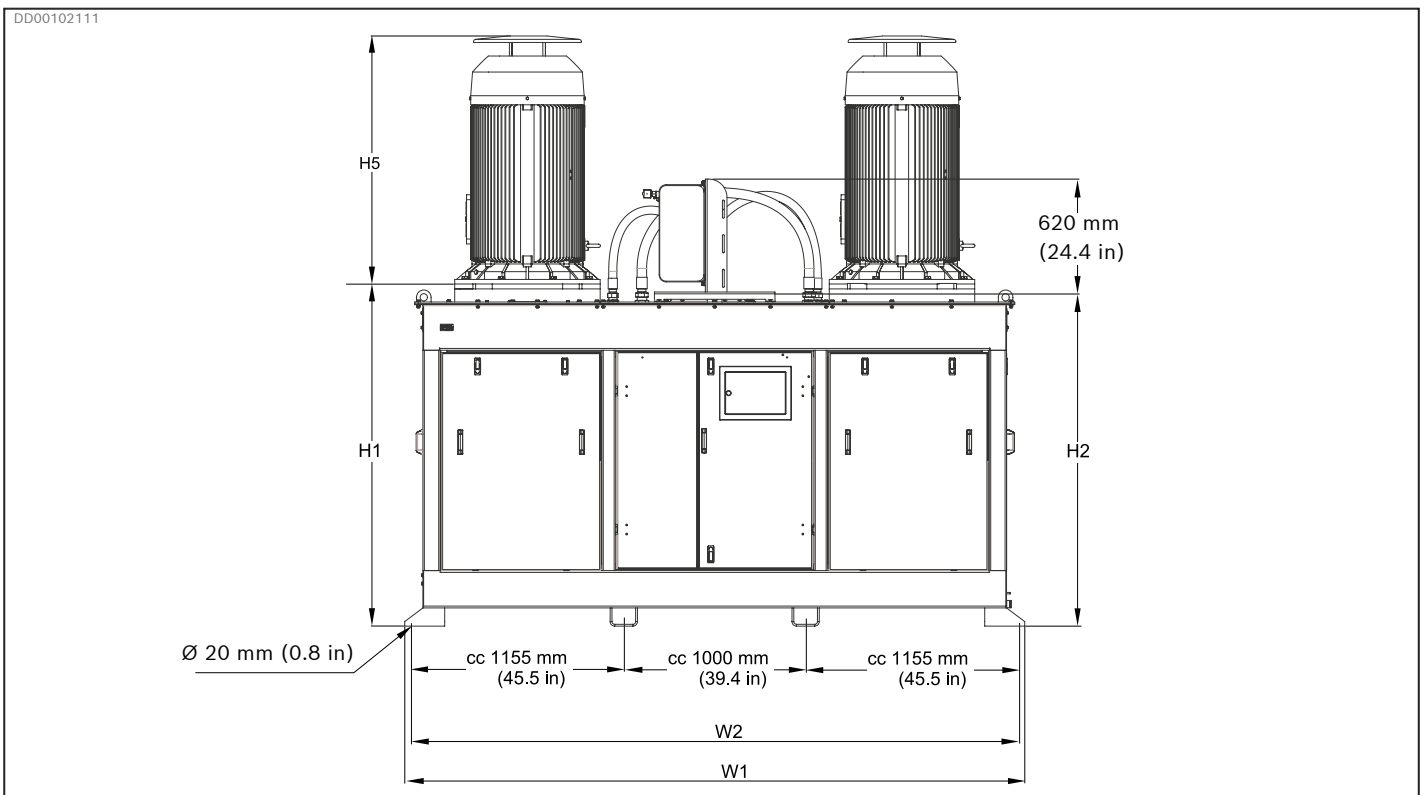


Fig. 10: DUC LT3 with water-oil plate cooler

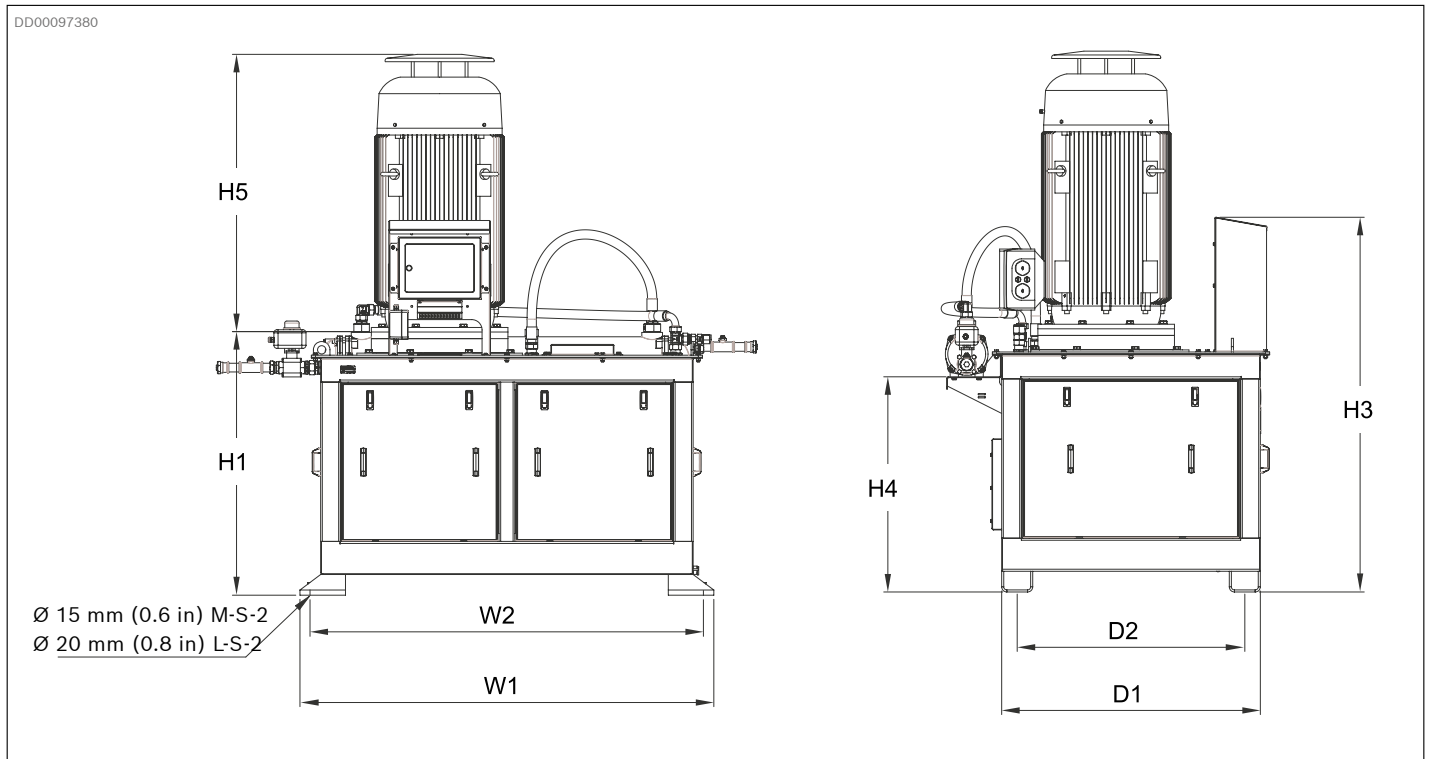


Fig. 11: DUC LS2 with water-oil tube cooler

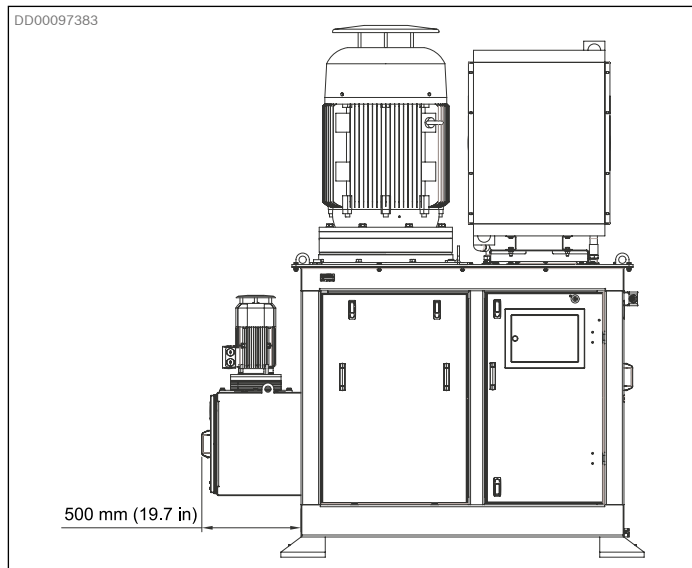


Fig. 12: DUC MT2 with extra frame box

Extra frame box when use of external warm/cold flushing, external cold flushing and brake circuit for 60 and 200 bar. The measure 500 is same for all sizes of frames.

* Usage of machine feet will increase height with 30 mm (1.2 in).

Table 14: Dimensions DUC

Type	H1*		H2		H3		H4		W1		W2		D1		D2		D3	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
DUC MS2	1030	40.6	988	38.9	1570	61.8	795	31.3	1740	68.5	1700	66.9	1000	39.4	850	33.5	-	-
DUC LS2	1275	50.2	1232	48.5	1810	71.3	1040	40.9	2000	78.7	1900	74.8	1250	49.2	1100	43.3	-	-
DUC MT2	1565	61.6	1522	59.9	-	-	1330	52.4	1800	70.9	1700	66.9	1000	39.4	850	33.5	220	8.7
DUC LT2	1770	69.7	1727	68.0	-	-	1535	60.4	2000	78.7	1900	74.8	1250	49.2	1100	43.3	220	8.7
DUC LS3	1385	54.5	1342	52.8	1925	75.8	1150	45.3	3410	134.3	3310	130.3	1250	49.2	1100	43.3	-	-
DUC LT3	1895	74.6	1852	72.9	-	-	1660	65.4	3410	134.3	3310	130.3	1250	49.2	1100	43.3	280	11.0

4.1.4 Dimensions components

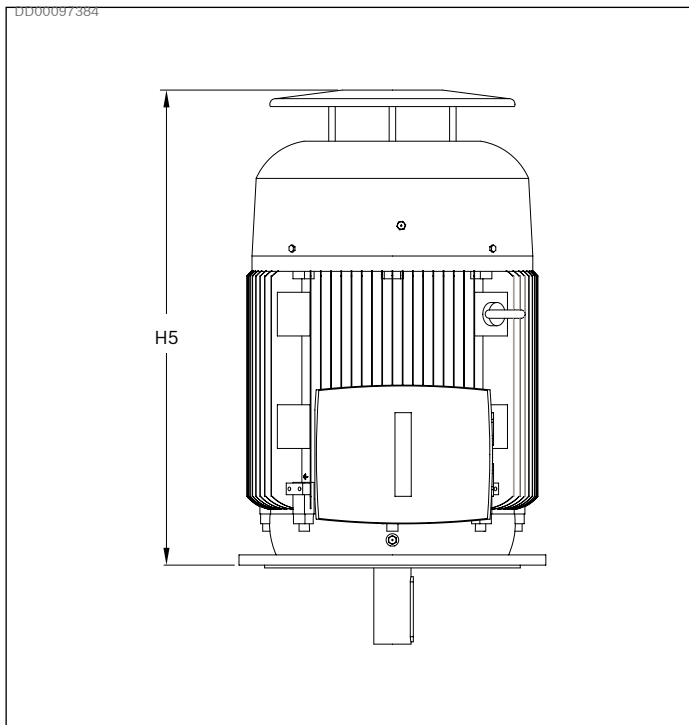


Fig. 13: Electric motor

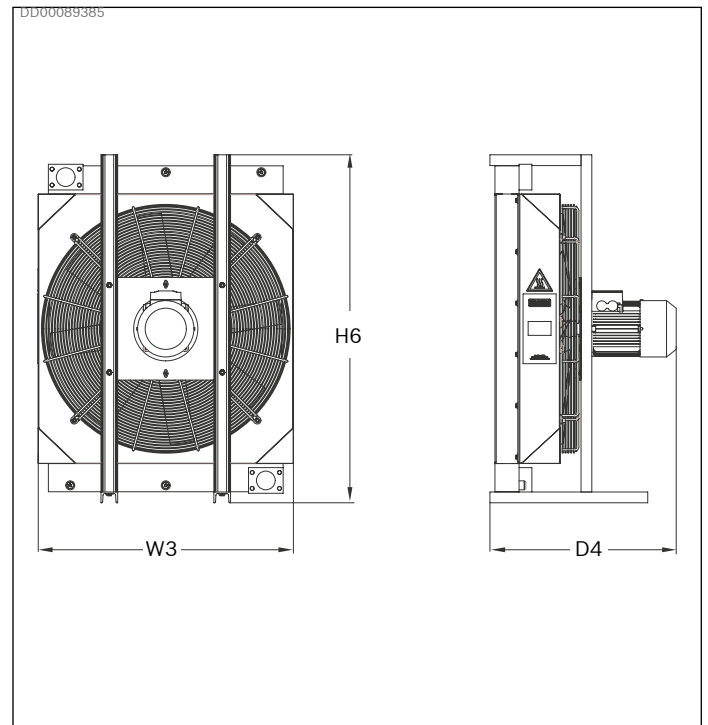


Fig. 14: Air-oil cooler

Table 15: Dimensions electric motor

Siemens (kW)	H5		WEG (hp)	H5	
	mm	in		mm	in
11	544	21.4	15	594	23.4
15	604	23.8	20	594	23.4
18.5	648	25.5	25	637	25.1
22	678	26.7	30	675	26.6
30	726	28.6	40	749	29.5
37	748	29.4	50	749	29.5
45	808	31.8	60	832	32.7
55	847	33.3	75	852	33.5
75	931	36.7	100	931	36.7
90	1042	41.0	125	1065	41.9
110	1022	40.2	150	1065	41.9
132	1187	46.7	200	1147	45.2
160	1187	46.7	250	1147	45.2
200	1342	52.8	300	1341	52.8
250	1252	49.3	350	1341	52.8
315	1362	53.6	400	1363	53.7
355	1577	62.1	450	1363	53.7
400	1577	62.1	550	1594	62.8
500	1577	62.1	650	1594	62.8

Table 16: Dimensions air-oil cooler

Cooler size	W3		H6		D4	
	mm	in	mm	in	mm	in
HDC 050	460	18.1	772	30.4	473	18.6
HDC 060	607	23.9	815	32.1	609	24.0
HDC 080	701	27.6	1035	40.7	711	28.0
HDC 085	870	34.3	1046	41.2	678	26.7
HDC 090	995	39.2	1356	53.4	707	27.8
HDC 100	995	39.2	1356	53.4	726	28.6
HDC 200	1286	50.6	1512	59.5	900	35.4

4.1.5 Dimensions DUC water connections

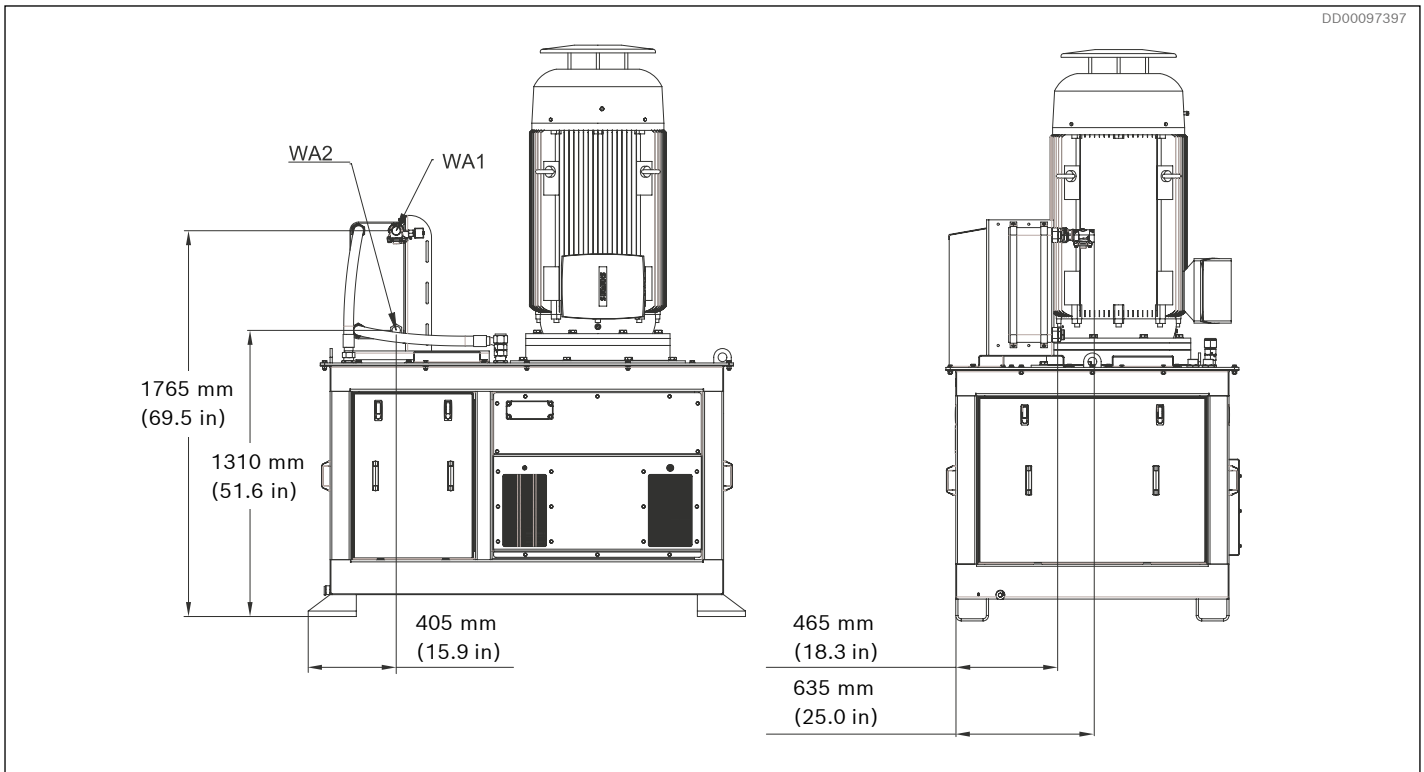


Fig. 15: Example with a DUC LS2 and B120T-080 water-oil plate cooler

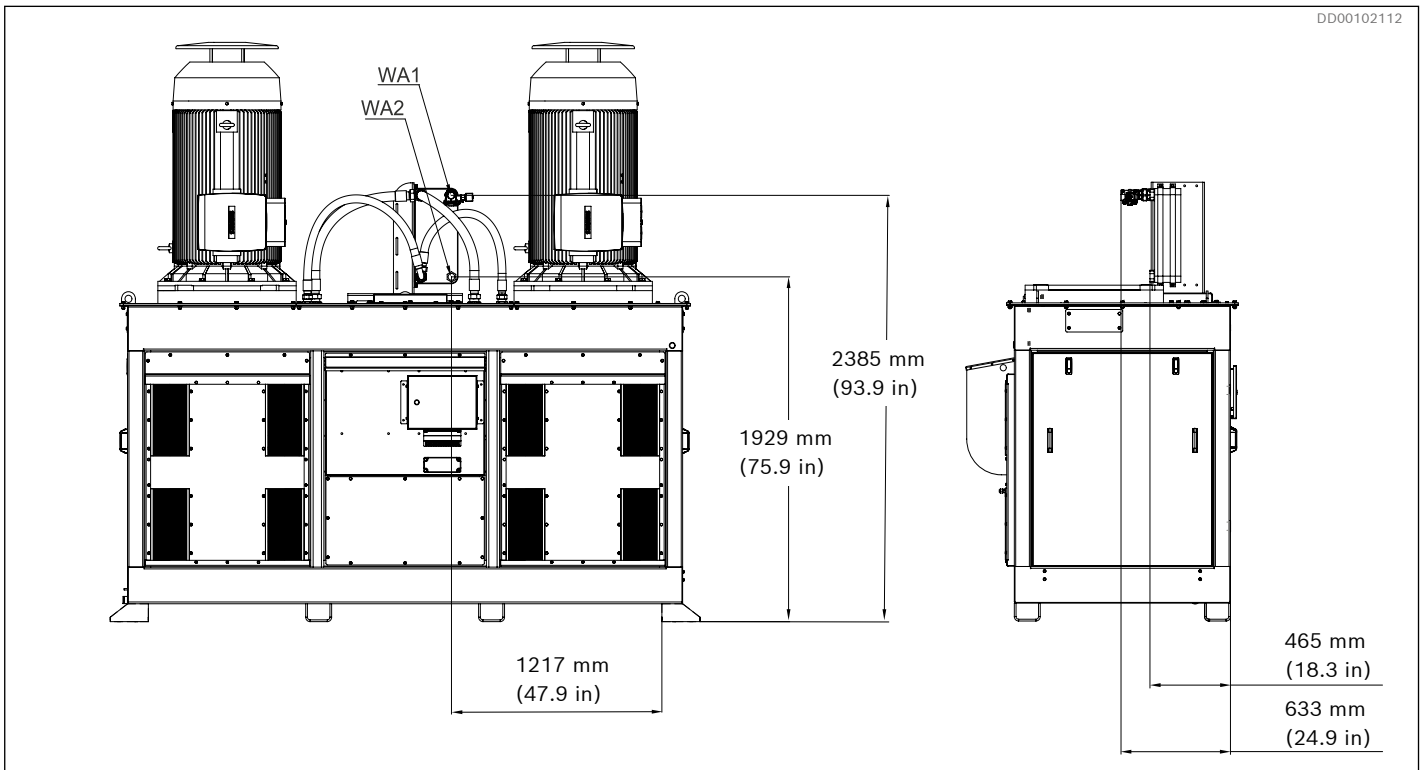


Fig. 16: Example with a DUC LT3 and B120T-120 water-oil plate cooler

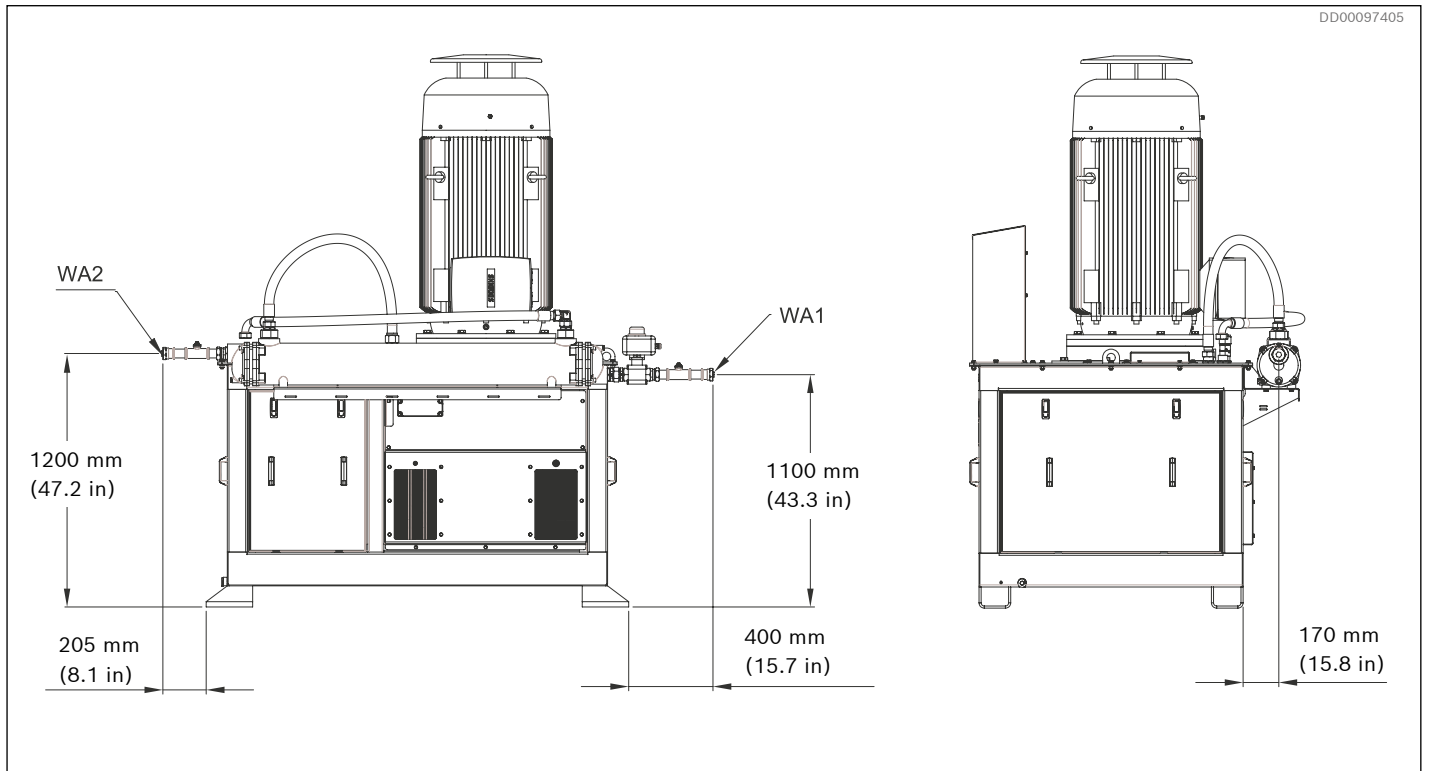


Fig. 17: Example with a DUC LS2 and GK600 water-oil tube cooler

For exakt dimensions and placement of water-oil plate and tube cooler see order specific Häggglunds DUC documentation.

4.1.6 Connections

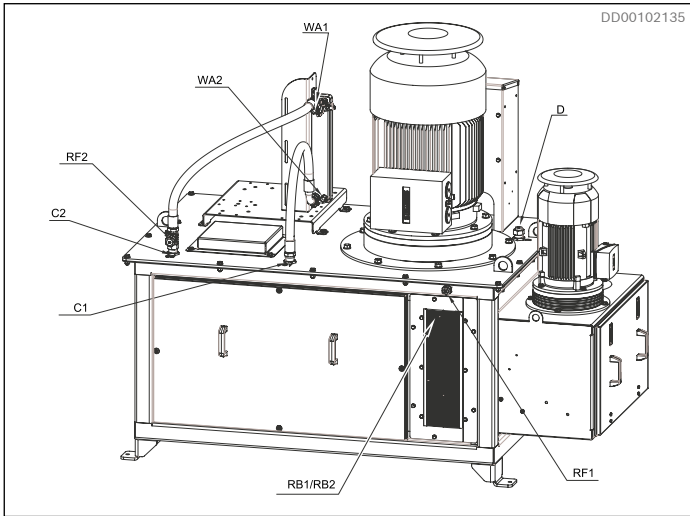


Fig. 18: Connections DUC MS2

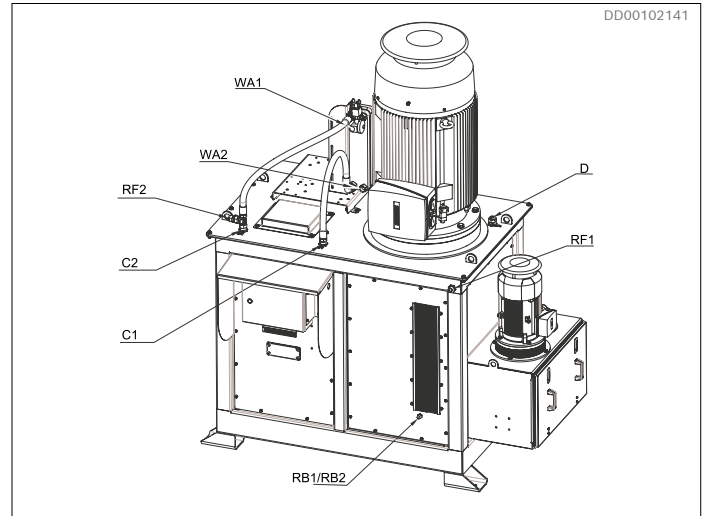


Fig. 19: Connections DUC MT2

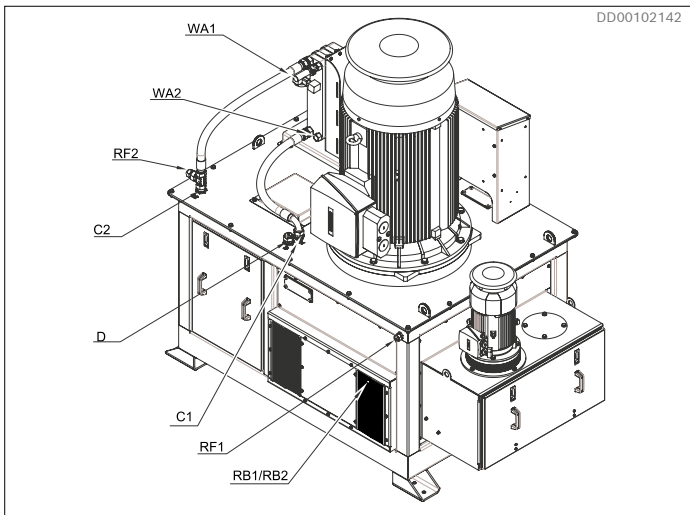


Fig. 20: Connections DUC LS2

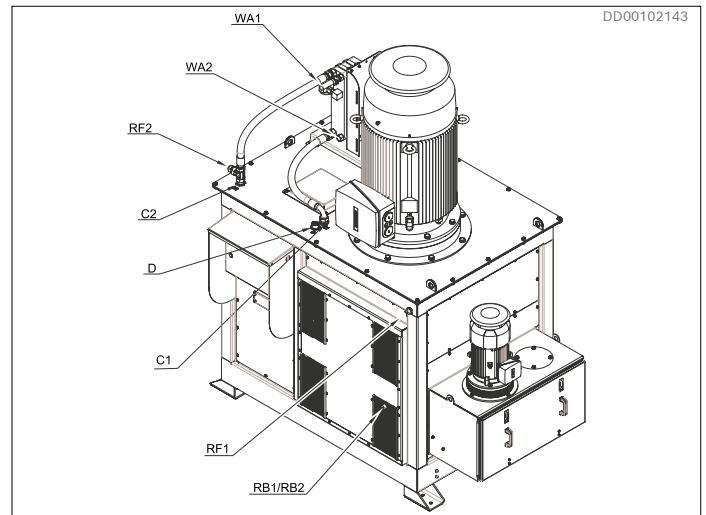


Fig. 21: Connections DUC LT2

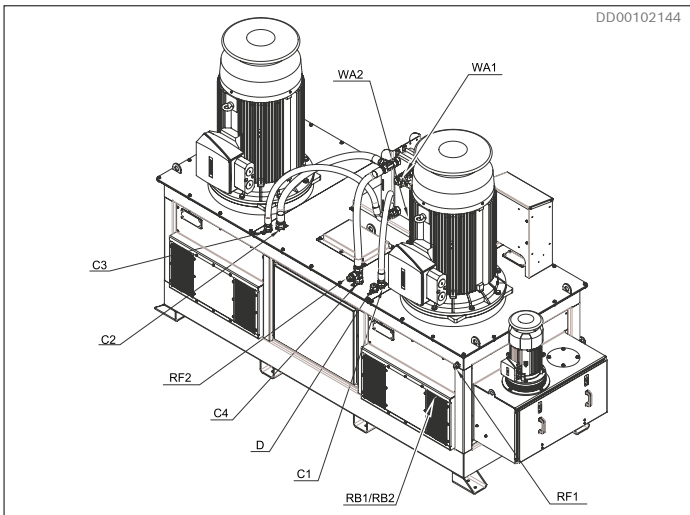


Fig. 22: Connections DUC LS3

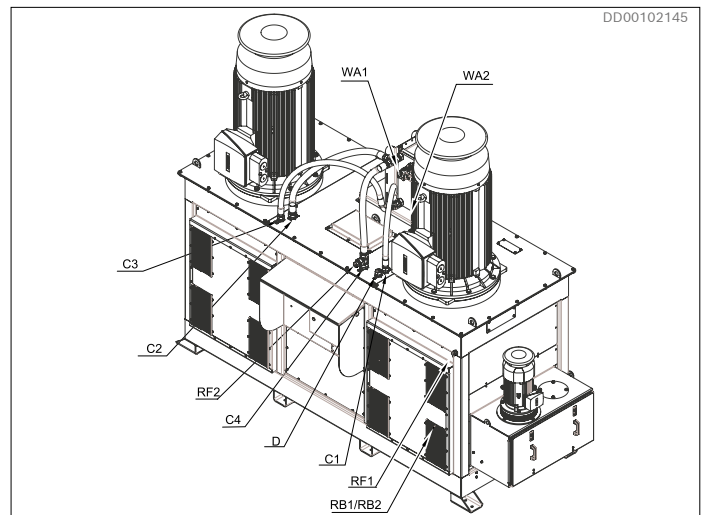


Fig. 23: Connections DUC LT3

Table 17: Hydraulic connections DUC(European version)

	Medium frame	Optional BSP	Large frame - 2 comp.	Optional BSP	Large frame - 3 comp.	Optional BSP	Function
C1	ISO 8434-1 28L Male	-	ISO 8434-1 35L Male	-	ISO 8434-1 35L Male	-	Oil OUT to cooler
C2	ISO 8434-1 28L Male	-	ISO 8434-1 35L Male	-	ISO 8434-1 42L Male	-	Oil IN from cooler
C3*					ISO 8434-1 35L Male	-	Oil OUT to cooler
C4*					ISO 8434-1 42L Male	-	Oil IN from cooler
RF1	ISO 8434-1 22L Male	¾"	ISO 8434-1 22L Male	¾"	ISO 8434-1 22L Male	¾"	Oil OUT flushing motor(s) external pump
RF2	ISO 8434-1 28L Male	1"	ISO 8434-1 28L Male	1"	ISO 8434-1 28L Male	1"	Oil OUT flushing with check valve
RB1 RB2	ISO 8434-1 12L Male	⅜"	ISO 8434-1 12L Male	⅜"	ISO 8434-1 12L Male	⅜"	Oil OUT to brake 1 Oil OUT to brake 2
D	ISO 8434-1 28L Male	1"	ISO 8434-1 35L Male	1¼"	ISO 8434-1 35L Male	1¼"	Drain from hydraulic motor(s)
WA1 WA2	½" BSP Female (B15) 1" BSP Female (B25T) 1¼" BSP Female (B120T) single cooler 1" BSP Female (FC160) 1½" BSP Female (GK400, GK600)		1" BSP Female (B25T) single cooler 1¼" BSP Female (B120T) single cooler 1½" BSP Female (serial connected cooler) 1½" BSP Female (GK400, GK600, PK600)				Water IN to cooler Water OUT from cooler

*Only used on LS3 and LT3

Table 18: Hydraulic connections (American version)

	Medium frame	Large frame - 2 comp.	Large frame - 3 comp.	Function
C1	ISO 8434-2 1" JIC Male	ISO 8434-2 1-¼" JIC Male	ISO 8434-2 1-¼" JIC Male	Oil OUT to cooler
C2	ISO 8434-2 1" JIC Male	ISO 8434-2 1-¼" JIC Male	ISO 8434-2 1-½" JIC Male	Oil IN from cooler
C3*			ISO 8434-2 1-¼" JIC Male	Oil OUT to cooler
C4*			ISO 8434-2 1-½" JIC Male	Oil IN from cooler
RF1	ISO 8434-2 ¾" JIC Male	ISO 8434-2 ¾" JIC Male	ISO 8434-2 ¾" JIC Male	Oil OUT flushing motor(s) external pump
RF2	ISO 8434-2 1" JIC Male	ISO 8434-2 1" JIC Male	ISO 8434-2 1" JIC Male	Oil OUT flushing with check valve
RB1 RB2	ISO 8434-2 ⅝" JIC Male	ISO 8434-2 ⅝" JIC Male	ISO 8434-2 ⅝" JIC Male	Oil OUT to brake 1 Oil OUT to brake 2
D	ISO 8434-2 1" JIC Male	ISO 8434-2 1-¼" JIC Male	ISO 8434-2 1-¼" JIC Male	Drain from hydraulic motor(s)
WA1 WA2	½" NPT Female 1" NPT Female 1-¼" NPT Female single cooler 1" NPT Female 1-½" NPT Female	1" NPT Female single cooler 1-¼" NPT Female single cooler 1-½" NPT Female (serial connected cooler) 1-½" NPT Female		Water IN to cooler Water OUT from cooler

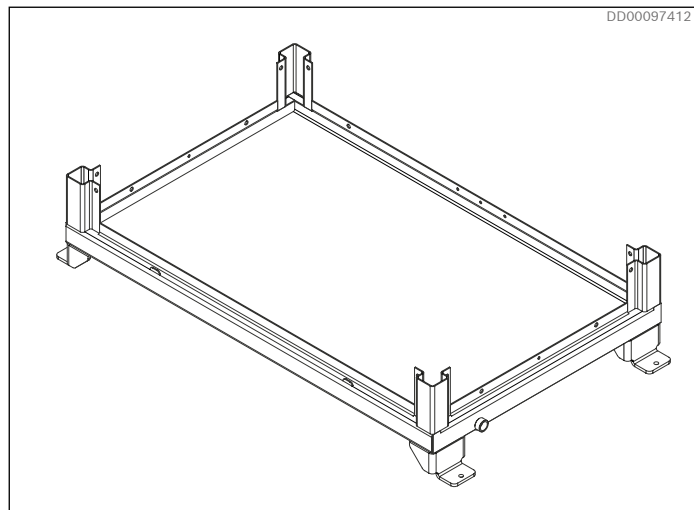
* Only used on LS3 and LT3

Table 19: Pump connections DUC

Pump type	Dimensions main connection A&B	Thread
SP40	3/4" SAE J518C FLANGE CODE 62 - 6000 PSI	3/8-16" UNC
SP71	1" SAE J518C FLANGE CODE 62 - 6000 PSI	7/16"-14 UNC
SP125	1 1/4" SAE J518C FLANGE CODE 62 - 6000 PSI	1/2"-13 UNC
SP180	FLANGE CODE 62 - 6000 PSI	
SP250	1 1/2" SAE J518C	5/8-11 UNC
SP355	FLANGE CODE 62 - 6000 PSI	
SP500	2" SAE J518C	3/4-10 UNC
SP750	FLANGE CODE 62 - 6000 PSI	

Comment: Connection directly at pump

4.1.7 DUC oil pan volume

**Fig. 24: Oil pan****Table 20: Oil pan volume**

	l	gal
DUc MS2	135	35.7
DUc LS2	330	87.1
DUc MT2	245	64.7
DUc LT2	400	105.7
DUc LS3	1040	274.7
DUc LT3	950	251.0

4.2 Main components

4.2.1 Electric motor

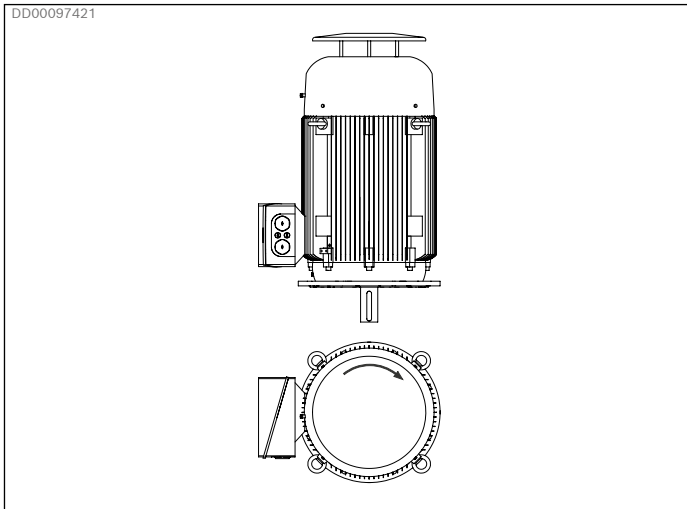


Fig. 25: Electric motor

Function

The electric motor is a totally enclosed, fan cooled TEFC squirrel-cage, 4-pole 3-phase motor

If the Häggglunds DUC will be operating in damp environment, it is advised to use an anti condensation heater to reduce the risk of short circuit in the electric motor. The electric motors used as standard in the drive unit are manufactured by Siemens (E) or WEG (A).

Output power

European version: 3-500 kW

American version: 5-650 hp

Voltage Frequency

380 VD 50 Hz	440 VD 60 Hz
400 VD / 690 VY 50 Hz	460 VD 60 Hz
415 VD 50 Hz	480 VD 60 Hz

Technical data

Table 21: Technical data electric motor

Operating Duty:	E/A	S1
Method of mounting:	E	B5/V1
	A	Vertical, F1 conduit box
Degree of protection:	E/A	IP55 (Motor and conn.box)
Cooling form:	E/A	IC411, fan cooler.
Insulation class:	E	F/B
	A	F
Motor protection:	E	3 PTC thermistors, 150 °C (302 °F), in stator winding
	A	3 PTC thermistors, (optional)
Greasing:	E/A	Grease nipples for bearing D and N side, Type H1, acc. to DIN 71412
Heater elements:	E	230 VAC
	A	120 VAC 50/60 Hz
Painting:	E	Corrosion class C3
	A	WEG Plan 203A
Sound press. level	E	≤ 85 dB(A) acc. to IEC 60034-9
Lp:	A	≤ 80 dB(A) acc. to IEC 60034-9
Service factor	E	1.15
	A	1.25

Standards

Table 22: Standards electrical motor

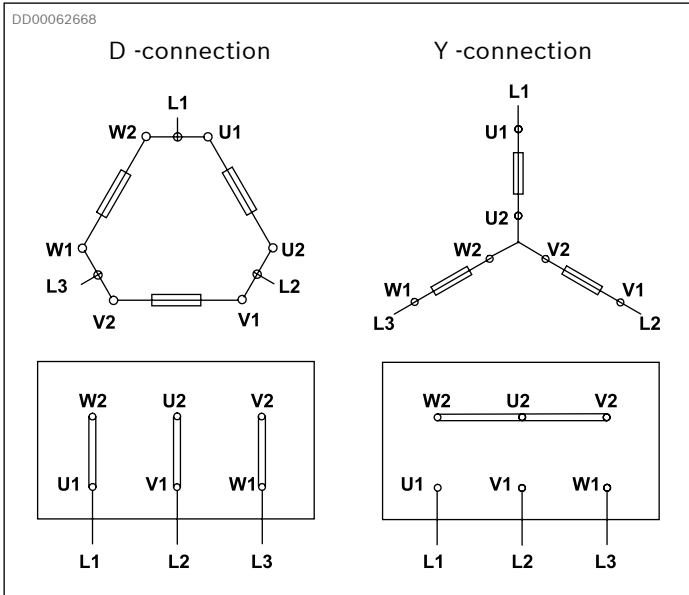
Standard	E	IEC/EN 60034
	A	NEMA MG1
EU Efficiency classes:	According to IEC 60034-30, Efficiency class IE3.	
Certificate:	Type approval test certificate type 3.1 according to EN 10-204 (on request)	

Conditions, voltage

The motors can withstand a continuous voltage deviation of 5% and a maximum deviation of up to 10% for a short time.

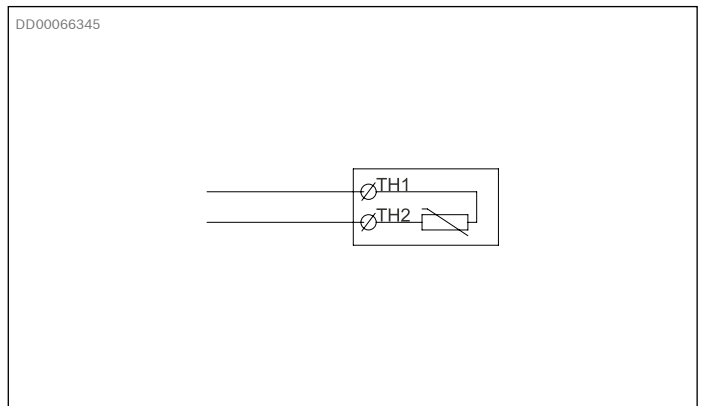
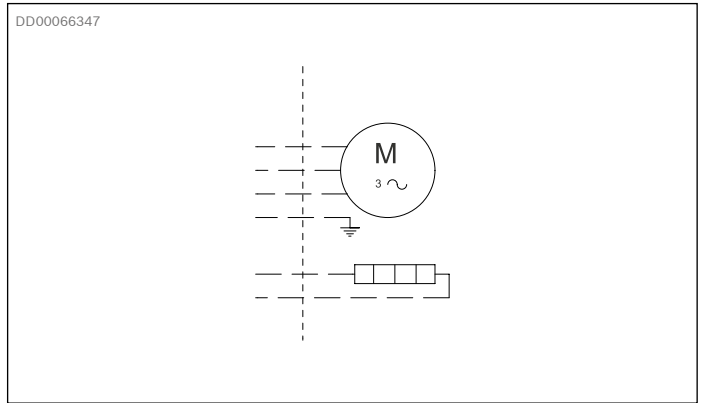
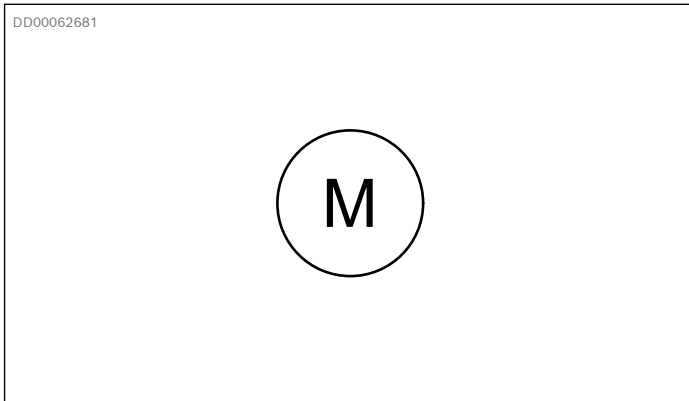
Conditions, altitude

Ambient temperature: -20 °C... +40 °C (-4 °F... 104 °F).
Altitude above sea level: 1000 m (3 280 ft).



D and Y-connections

The three windings of the motor can be connected inside the terminal box to the three phase supply net in two different ways, Y-(star-) or D-(Δ -) connection.



4.2.2 Main pump SP

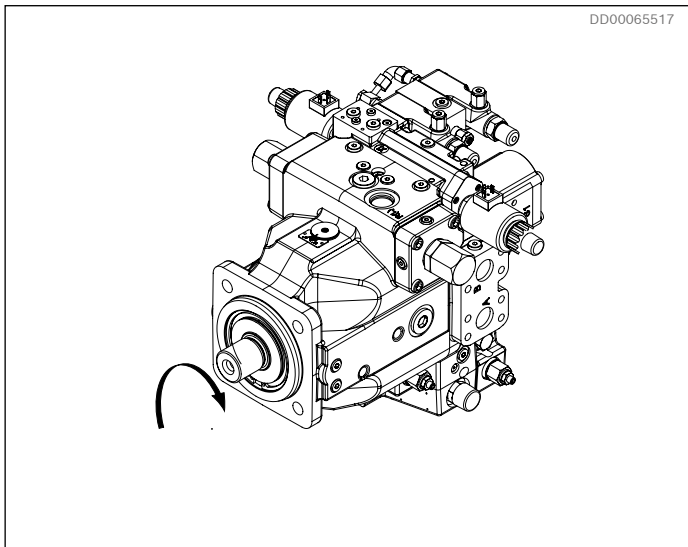


Fig. 30: Pump SP size 40 to 180

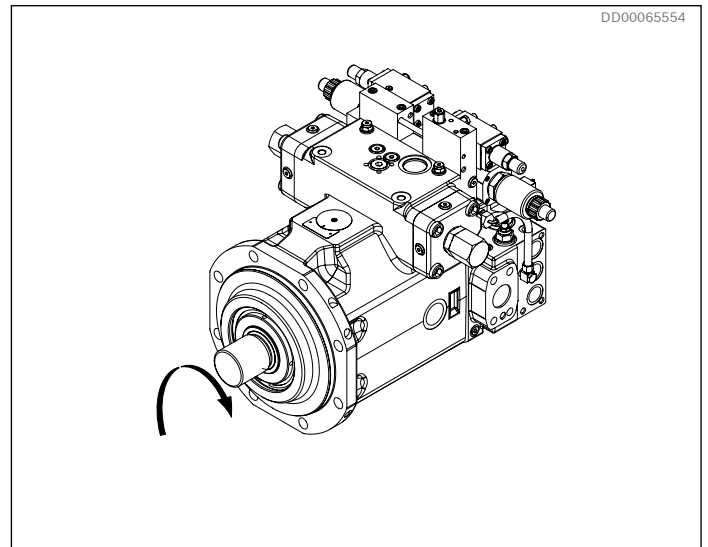


Fig. 31: Pump SP size 250 to 750

Functions

- Variable displacement axial piston pump of swash-plate design for hydrostatic closed circuit transmissions
- Flow is proportional to speed and displacement and is infinitely variable through adjustment of the swivel angle
- Output flow increases with swivel angle from 0 to its maximum value
- Swivelling the pump over centre smoothly changes the direction of flow
- A highly adaptable range of control and regulating devices are available
- The pump is equipped with two pressure relief valves on the high pressure ports to protect the hydrostatic transmission (pump and motor) from overloads
- One common pump for charge and EP displacement control
- Compact overall design
- Low noise level
- Long service life
- High efficiency
- Throughdrive for multiple pump combinations also possible with integrated charge pump up to 100%
- SP pumps can be tandem mounted to the same electric motor in combinations according to *Table 2* and *Table 3*

Charge pump and control valves

- Auxillary for SP 40 to SP 180
- Integrated for SP 250 to SP 750

Operating pressure range

Depending on the behaviour of the transmitted hydraulic energy in the system, charge pressure fluctuations can occur. In order to prevent damage to the system, charge pressure protection, which monitors the static charge pressure part is necessary. Port M_{K4} is suitable to monitor the charge pressure. It is recommended to check regularly the charge pressure for the permissible max. and min. spikes with suitable measuring equipment.

In order to prevent excessive charge pressure spikes, a low pressure accumulator can be connected to port K_4 . Accumulator sizing as well as the selection for the best connecting location depend on the system behaviour and the operating conditions under consideration of the available charge flow. Depending on the total systems leakage flow, it may be necessary to increase the charge flow by means of a larger or additional charge pump, see Inlet pressure at port S_1 (auxiliary pump).

Table 24: Operating pressure range, according to DIN 24312

Inlet operating pressure	bar	psi
Required static charge pressure (M_{K4}), $p_{c \min}$	15	217
Heavy duty pressure, $p_{c \max}$	20	290
Static charge pressure (short periods), relief valve setting, $p_{c \min. \text{ Min.}}$	8	116
Static charge pressure, $p_{c \max. \text{ Max.}}$	20	290
Dynamic charge pressure (fluctuations) Min.	4	58
Dynamic charge pressure (fluctuations) Max.	40	580
Inlet pressure at port S1 (auxiliary pump) Ps. Min.	$\geq 0,8$ bar abs	≥ 11.6 psi abs
Inlet pressure at port S1 (auxiliary pump) Ps. Max.	2	29
Outlet operating pressure, variable pump	bar	psi
Pressure at port A or B		
Nominal pressure p_N	350	5076
Peak pressure p_{\max}	400	5801
Case drain pressure	bar	psi
Max. case pressure (housing pressure):		
P_L continuous	5	72
P_L max	8	116
*T1 ,T2 and T3 must be unloaded to tank.		

*Only for SP 40 - SP 180

EP - Electro-hydraulic control with proportional solenoid

The EP control adjusts the pump displacement proportional to the solenoid current. The pump displacement is therefore step-less variable. One proportional solenoid is assigned to each direction of flow.

Operating voltage: 24 V

Nominal current: 800 mA

Current range 210...740 mA

Nominal resistance at 20 °C (68 °F): 21 Ω

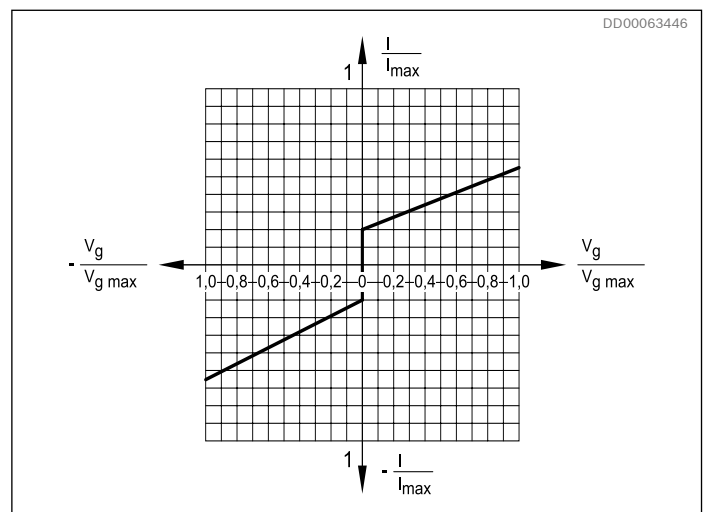
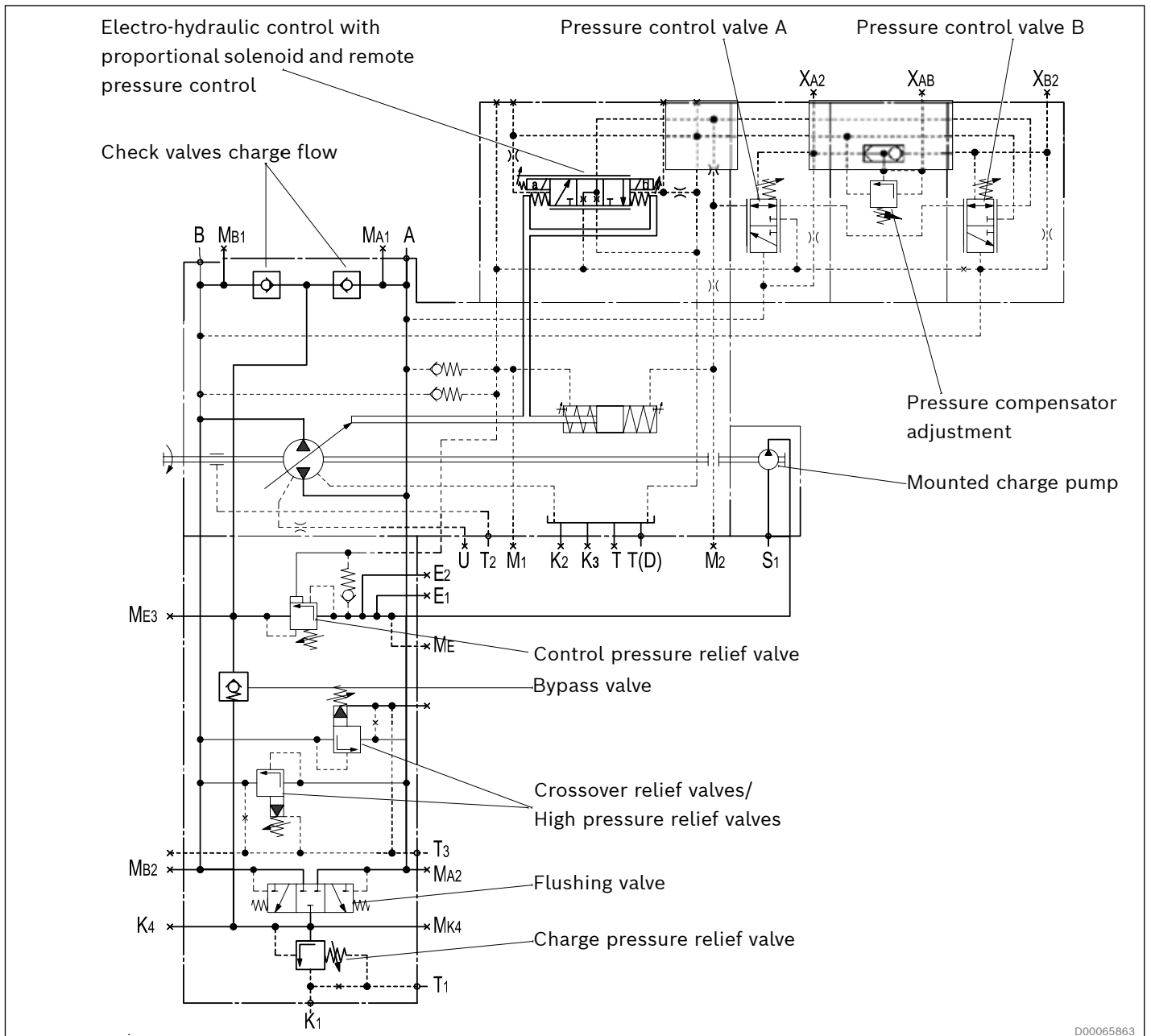


Fig. 32: EP, hydraulic control

Hydraulic circuit

Fig. 33: Principal hydraulic circuit for SP pump size 40-180
Table 25: Ports SP 40-180

Ports	Description	Ports	Description
A, B	Pressure port	ME, ME3	Test points charge pressure
S	Inlet port	K4	Accumulator port
MA1, MA2, MB1, MB2	Test points operating press.	MK4	Test point charge pressure
T, K2, K3	Oil drain port	M1, M2	Test point control pressure
E1	Brake function	XA2, XB2, XAB	Ports for remote pressure pilot valves
K1	Return flow	T1, T3	Ports for unloading of high pressure relief valves and charge pressure relief valve.
T(D)	Measure point	T2	Port for unloading of shaft seal
U	Bearing flushing port/air bleed port		

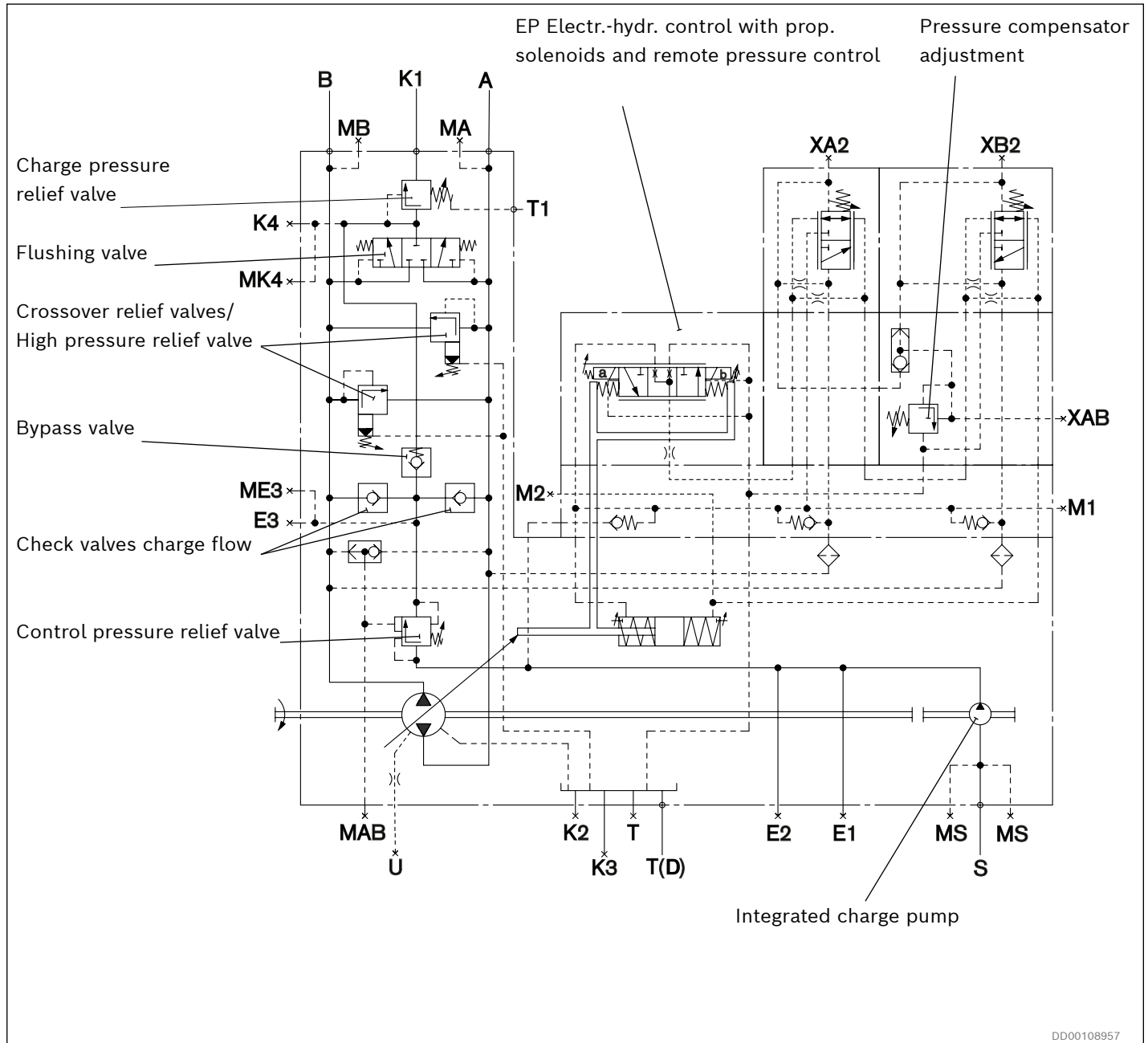


Fig. 34: Principal hydraulic circuit for SP pump size 250-750

Table 26: Ports SP 250-750

Port	Description	Port	Description
A, B	Pressure ports	ME3	Measuring port ex. charge pressure
S	Inlet port	MK4	Measuring port flushing pressure
E1	To charge filter (optional)	M1, M2	Measuring ports control pressure
E2	From charge filter (optional)	T(D)	Measure point
E3	External charge port	T, K2, K3	Oil drain port
K1	Return flow	T1	Drain port pressure relief valve
K4	Accumulator port	U	Bearing flushing port/air bleed port
MA, MB, MAB	Measuring ports operating pressure	XA2, XB2, XAB	Pilot port pressure control
MS	Measuring port inlet pressure		

Technical data

Table 27: Technical data SP 40-180

Size				40	71	125	180
Displacement	Variable pump	$V_{g \max}$	cm ³	40	71	125	180
	Auxiliary pump	$V_{g H}$	cm ³	20	25	40	45
Speed	max. speed	n_{\max}	rpm	3 000	3 000	2 600	2 400
	min. speed	n_{\min}	rpm	500	500	500	500
Flow	at n_{\max}	$o_{v \max}$	l/min	120	213	325	432
			gpm	31.7	56.3	85.9	114.1
	at $n_E=1500$ rpm		l/min	60	107	188	270
			gpm	15.8	28.3	49.7	71.3
	at $n_E=1800$ rpm		l/min	70	125	220	317
			gpm	18.5	33.0	58.1	83.7
Power, max. at (Dp=350 bar) (Dp= 5 076 psi)	at $n_{o \max}$	$P_{o \max}$	kW	86	132	190	252
			hp	115	177	255	337
	at $n_E=1500$ rpm		kW	35	62	109	158
			hp	47	83	146	212
	at $n_E=1800$ rpm		kW	41	73	128	185
			hp	55	98	172	248
Torque at $V_{g \max}$	Dp=350 bar	T_{\max}	Nm	223	395	696	1 002
	Dp= 5 076 psi		lb·ft	164	291	513	739
Variable pump (without aux.pump)	Dp=100 bar	T	Nm	64	113	199	286
	Dp= 1 450 psi		lb·ft	47	83	147	211
Moment of inertia about drive axis		J	kgm ²	0.0049	0.0121	0.03	0.055
Case volume			l	2	2,5	5	4
			g	0.53	0.66	1.32	1.06

Table 28: Technical data SP 250-750

Size				250	355	500	750
Displacement	variable pump	$V_{g \max}$	cm ³	250	355	500	750
	charge pump	$V_{g \max}$	cm ³	63	80	98	143
Speed	max. speed	n_{\max}	rpm	2 200	2 000	1 800	1 600
	min. speed	n_{\min}	rpm	800	800	800	800
Flow	at n_{\max}	$q_{V \max}$	l/min	550	710	900	1 200
				145	188	238	317
	at $n_E=1500$ rpm	$q_{VE \max}$	l/min	375	533	750	1 125
				99	141	198	297
	at $n_E=1800$ rpm	$q_{VE \max}$	l/min	440	625	880	-
				116	165	232	-
Power , max. at (Dp = 350 bar)	at n_{\max}	P_{\max}	kW	321	414	525	700
				430	555	704	939
	at $n_E=1500$ rpm	$P_{E \max}$	kW	219	311	438	656
				294	417	587	879
	at $n_E=1800$ rpm	$P_{E \max}$	kW	257	365	513	-
				345	489	688	-
Torque at $V_{g \max}$	Dp = 350 bar	T_{\max}	Nm	1 391	1 976	2 783	4 174
				1026	1457	2053	3079
Variable pump (without aux. pump)	Dp = 100 bar	T	Nm	398	564	795	1 193
				294	416	586	880
Moment of inertia about drive axis		J	kgm ²	0.0959	0.19	0.3325	0.66
Case volume			l	10	8	14	19
			g	2.64	2.11	3.70	5.02

Bearing flushing

For the following operating conditions bearing flushing is required for reliable continuous operation:

- Applications with special fluids (non mineral oils), due to limited lubricity and narrow operating temperature range
- Operation with critical conditions of temperature and viscosity with mineral oil

Flushing is carried out via U-port, which is located in the front flange area of the pump. The flushing oil flows through the front bearing and leaves the system together with the leakage oil at the case drain port.

Recommended flushing flows for the various pump sizes: These flushing flows create a pressure drop of approximately 3 bar between U-port and pump housing (including fitting).

Note. When using bearing flushing at U-port the throttle screw, which can be found at U-port, has to be turned in all the way to the stop.

Charge pressure and control valves

High pressure relief valves

Two pilot operated relief valves that prevent pump damage from excessive pressure levels. Each pressure side has its own relief valve, which is vented to the low pressure side of the loop.

Charge pressure relief valve

The charge pressure relief valve is direct operated.

T₁ needs external drain.

Setting pressure range: 12-21 bar (174-305 psi).

Standard setting 15 bar (218 psi).

Control pressure relief valve

Control pressure relief valve is direct operated with unloading function.

Setting pressure range: 30-45 bar (435-653 psi)

Normal setting range: 35-42 bar (508-610 psi) depending on pump size.

Table 29: Recommended flushing flows

Size	Flushing flow, q _R l/min	Flushing flow, q _R gpm
40	3	0.79
71	4	1.06
125	5	1.32
180	7	1.85
250	10	2.64
355	15	3.96
500	20	5.28
750	30	7.93

Table 30: Installed electric motor power when flushing is needed

Size	Installed electric motor power, kW	Installed electric motor power, hp
40	50	67
71	69	93
125	108	145
180	133	178
250	186	249
355	242	324
500	303	406
750	445	597

4.2.3 Water-oil cooler - plate type

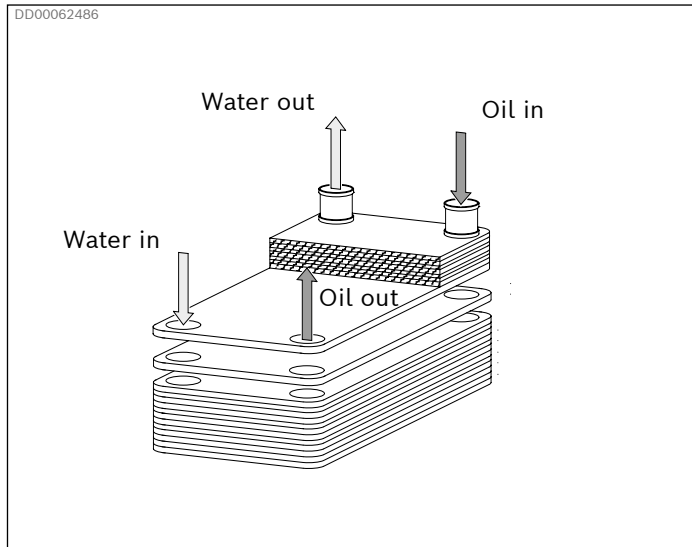


Fig. 35: Plate cooler function

Function

The plate water-oil cooler consists of pattern-embossed plates. The pattern is reversed on every other plate so that the ridges on adjacent plates intersect with each other, creating a lattice of contact points. All to achieve a turbulent flow. The oil and the water is flowing in opposite directions through the cooler.

The water flow is switched on and off by a temperature controlled valve. The water used for plate cooler needs to be of the type process water, otherwise there is a risk for the cooler being contaminated.

Table 31: Material Plate cooler

Part	Material
Plates	EN 10028/7-1.4401 (AISI 316)
Brazing	Pure copper
Connections	EN 10272-1.4401 (AISI 316)

Recommended max temperature

For oil viscosity 68 cSt the maximum recommended temperature of the inlet oil is limited to 63 °C (145 °F) and for 100 and 150 cSt limited to 66 °C (151 °F).

The temperature is limited by:

- The life of the hydraulic motor
- The recommended min. viscosity of the hydraulic fluid

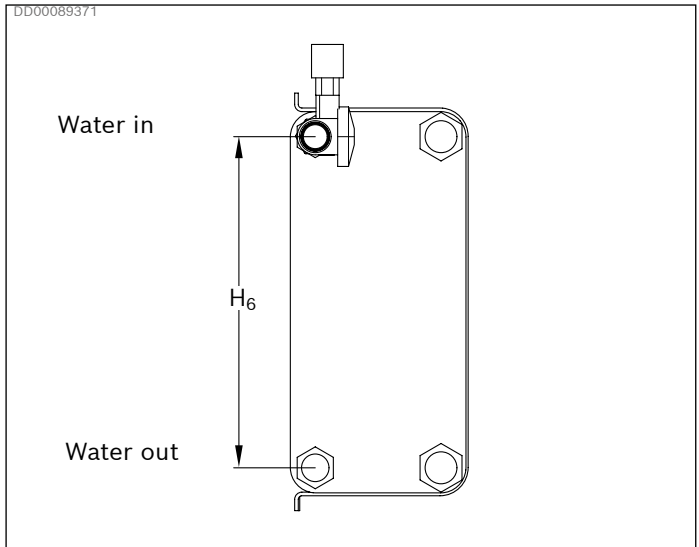


Fig. 36: Water connections plate cooler

Table 32: Dimensions water connections

Cooler size	H ₆	
	mm	in
B15-30	432	17,01
B25T-40	479	18.86
B25T-80	479	18.86
B120T-60	456	17.95
B120T-80	456	17.95
B120T-120	456	17.95

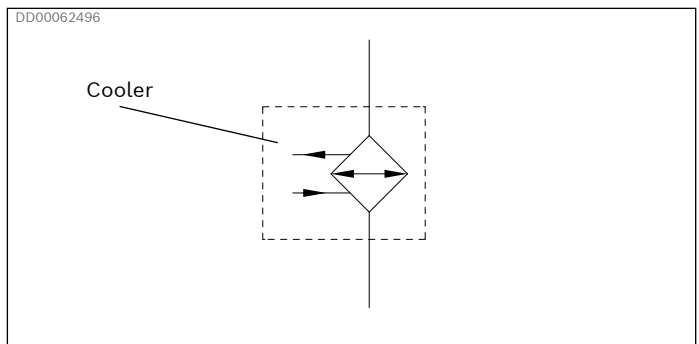


Fig. 37: Hydraulic symbol

Water connection

Recommended water pressure over cooler: 3.5 bar (50.7 psi).

Max allowed water pressure: 16 bar (232 psi)

Stainless steel water pipes are recommended to avoid corrosion. If other material is used, galvanic isolation is required between the stainless steel connections and water piping.

If the Drive Unit is equipped with rubber feet, flexible hoses are recommended between water connections and water piping

Influence of water composition on corrosion resistance

The guide below is to give a picture of the corrosion resistance of stainless steels and brazing materials in tap water at room temperature.

Explanations: + = Good resistance under normal conditions
 0 = Corrosion problems may occur especially when more factors are valued 0
 - = Use is not recommended

Table 33: Acceptable water chemical content

Water content	Concentration (mg/l or ppm)	Time limits Analyze before	AISI 316	Copper
Alkalinity (HCO ₃)	< 70	Within 24 h	+	0
	70-300		+	+
	> 300		+	=/+
Sulfate * (SO ₄ ²⁻)	< 70	No limit	+	+
	70-300		+	0/-
	> 300		+	-
HCO ₃ / SO ₄ ²⁻	< 1.0	No limit	+	+
	> 1.0		+	0/-
Electrical conductivity	< 10 µS/cm	No limit	+	0
	10-500 µS/cm		+	+
	> 500 µS/cm		+	0
pH **	< 6.0	Within 24 h	0	0
	6.0-7.5		+	0
	7.5-9.0		+	+
	> 9.0		+	0
Ammonium (NH ₄ ⁺)	< 2	Within 24 h	+	+
	2-20		+	0
	> 20		+	-
Chlorides (Cl) at 60° At 80° the Cl value is limited to 150 ppm.	< 100	No limit	+	+
	100-200		+	+
	200-300		+	+
	> 300		-	0/+
Free chlorine (Cl ₂)	< 1	Within 5 h	+	+
	1-5		-	0
	> 5		-	0/-
Hydrogen sulfide (H ₂ S)	< 0.05	No limit	+	+
	> 0.05		+	0/-
Free (aggressive) carbon dioxide (CO ₂)	< 5	No limit	+	+
	5-20		+	0
	> 20		+	-
Total hardness (°dH)	4.0-8.5	No limit	+	+
Nitrate * (NO ₃)	< 100	No limit	+	+
	> 100		+	0
Iron *** (Fe)	< 0.2	No limit	+	+
	> 0.2		+	+
Aluminium (Al)	< 0.2	No limit	+	+
	> 0.2		+	0
Manganese *** (Mn)	< 0.1	No limit	+	+
	> 0.1		+	0

* Sulfates and nitrates works as inhibitors for pitting corrosion caused by chlorides in pH neutral environments

** In general low pH (below 6) increase corrosion risk and high pH (above 7.5) decrease the corrosion risk

*** Fe³⁺ and Mn⁴⁺ are strong oxidants and may increase the risk for localised corrosion on stainless steels SiO₂ above 150 ppm increase the risk of scaling

4.2.4 Water-oil cooler - tube type

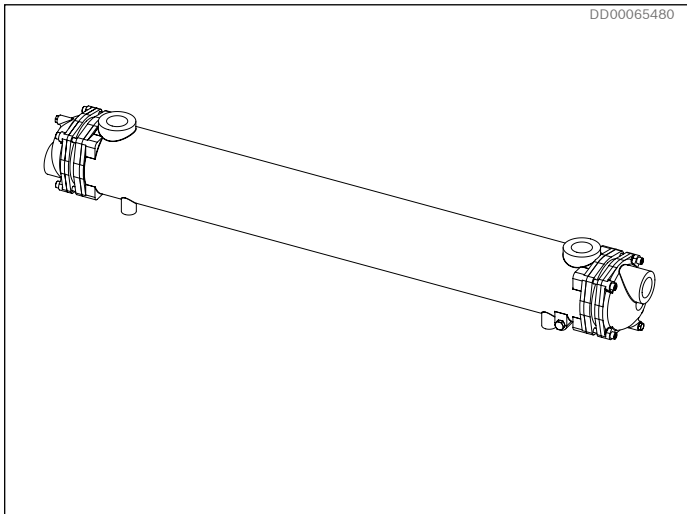


Fig. 38: Tube cooler

Function

The tube water-oil cooler consists of several tubes in a tubestack for heat exchange. The tube cooler is easy to clean and it is suitable for contaminated water. The oil and water is flowing in opposite directions. The water flow is switched on and off by a temperature controlled valve.

Table 34: Material tube cooler

Part	Material	
	European	American
Housing:	Aluminium	Steel
End cover:	Cast iron	Cast iron
Tube stack:	90/10 Cu.NI	Copper

Table 35: Acceptable water chemical content

Chemical	Level
Free Chlorine	1.0 - 3.0 ppm
Calcium Hardness	200 - 400 ppm
pH	7.2 - 7.8
Alkalinity	100 - 150 ppm
Bromine	2.0 - 4.0 ppm
Chloride	> 150 ppm

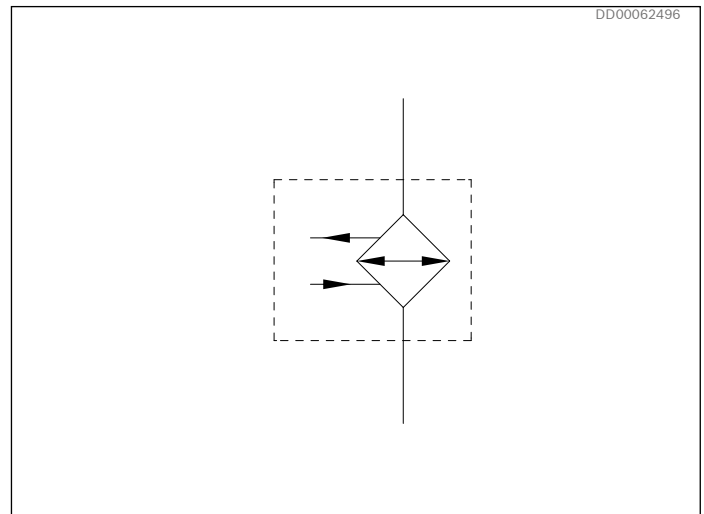


Fig. 39: Hydraulic symbol

Recommended max temperature

For oil viscosity 68 cSt the maximum recommended temperature of the inlet oil is limited to 63 °C (145 °F) and for 100 and 150 cSt limited to 66 °C (151 °F).

The temperature is limited by:

- The life of the hydraulic motor
- The recommended min. viscosity of the hydraulic fluid

Water connection

Recommended water pressure over cooler: 3.5 bar (50.7 psi).

Max allowed water pressure: 16 bar (232 psi)

Stainless steel water pipes are recommended to avoid corrosion. If other material is used, galvanic isolation is required between the stainless steel connections and water piping.

If the Drive Unit is equipped with rubber feets, flexible hoses are recommended between water connections and water piping

4.2.5 Häggglunds HDC cooler (air-oil cooler)

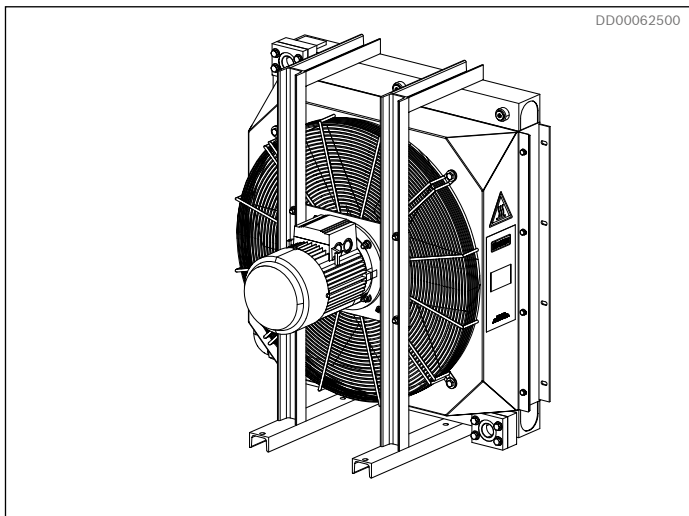


Fig. 40: Häggglunds HDC cooler

Function

- The air-oil cooler consists of a fan driven by an electric motor, blowing air through the cooler matrix.
- The cooling pipes are made by extruded aluminium sections. They are flat with narrow short sides to expose a maximum heat-emitting area and to allow low air pressure drop.
- The electric motor is a 3-phase asynchronous motor.
- An 8 bar bypass valve is always installed inside the DUC between the inlet and outlet of the cooler. An extra bypass valve is mounted directly on the cooler under following conditions
 - When the cooler is mounted separately and the ambient temperature is below 0°C.
 - When the cooler is mounted on the unit and the ambient temperature is below -20°C .

Note:

When the air-oil cooler is separated from the Power unit, the pressure drop through the piping hoses is not allowed to exceed 1 bar (14 psi). Always applicable for size HDC 200.

Recommended max temperature

For oil viscosity 68 cSt the maximum recommended temperature of the inlet oil is limited to 63 °C (145 °F) and for 100 and 150 cSt limited to 66 °C (151 °F).

The temperature is limited by:

- The life of the hydraulic motor
- The recommended min. viscosity of the hydraulic fluid

Mechanical data

Electric motor:

- Insulation: Class F
- Temperature rise: Class B
- Protection standard: IP55

Table 36: Oil volume

Cooler Type	Oil volume of the cooler	
	l	gal
HDC 050	5,7	1.51
HDC 060	8,7	2.30
HDC 080	17,7	4.68
HDC 085	15,5	4.09
HDC 090	28,6	7.56
HDC 100	32,7	8.64
HDC 200	54,8	14.48

Table 37: Material types

Part	Material
Matrix	Aluminum
Fan blades	Nylon PAG
Fan housing	Steel
Fan guard	Steel
Electric motor	Aluminum
Other parts	Steel
Coating	Painted black RAL 9005

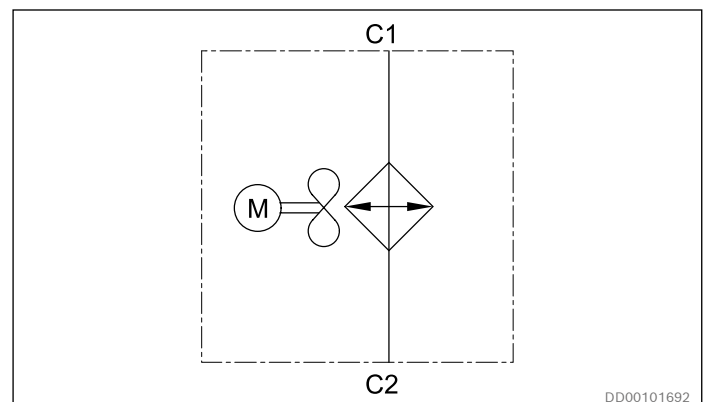


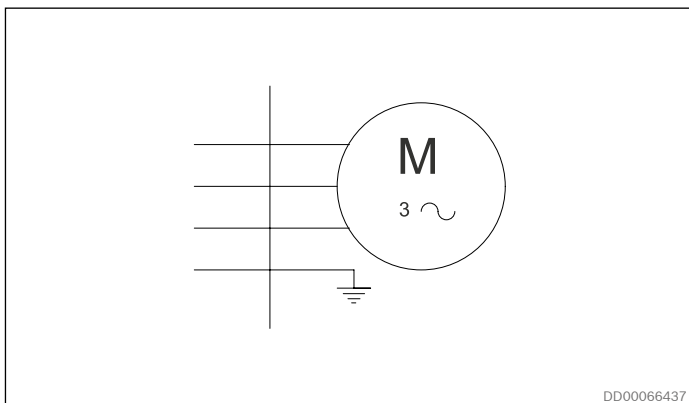
Fig. 41: Hydraulic symbol

HDC cooler, electric motor data / sound data**Table 38: HDC cooler data**

Cooler ordering code	Driving power (kW)		Noise dBA	Max perm.dynamic pressure		Max. perm.static pressure	
	50 Hz	60 Hz		bar	psi	bar	psi
HDC 050-4	0.37	0.43	78	14	203	26	377
HDC 060-4	0.75	0.90	78	14	203	26	377
HDC 080-4	1.5	1.8	78	14	203	26	377
HDC 085-6	2.2	2.6	78	14	203	21	305
HDC 090-6	2.2	2.6	85	14	203	21	305
HDC 100-6	2.2	2.6	87	14	203	21	305
HDC 100-4	7.5	9.0	97	14	203	21	305
HDC 200-6	7.5	9.0	92	14	203	21	305
HDC 200-4	18.5	22.2	100	14	203	21	305

Electrical data**Table 39: Rated data electric motors**

Voltage (V)	Frequency (Hz)
380	50
400	50
440	60
460	60

**Fig. 42: Electrical symbol**

Ordering code

In order to identify Häggglunds equipment, the following ordering code is used.

Example Häggglunds HDC200

01	02	03	04	05	06	07	08	09	10	11	12							
HDC	200	-	A	6	G	01	-	20	-	40	-	0	-	1	-	4	-	00

01	Häggglunds air-oil cooler	HDC
02	Cooler size	
	20	020
	30	030
	50	050
	60	060
	80	080
	85	085
	90	090
	100	100
	200	200
03	Cooling media	
	Air	A
04	Number of poles, electric motor	
	4-pole	4
	6-pole	6
	8-pole	8
05	Electric motor type/voltage	
	230V 50Hz	A
	380V 50Hz	B
	400V 50Hz	C
	415V 50Hz	D
	415V 50Hz (355-455V) (47-53Hz)	E
	460V 50Hz	F
	500V 50Hz	G
	525V 50Hz	H
	550V 50Hz	I
	660V 50Hz	J
	690V 50Hz	K
	440V 60Hz	L
	460V 60Hz	M
	480V 60Hz	N
	Special electric motor	Z

06	Motor output	
	0,18 kW 50Hz	00
	0,37 kW 50Hz	01
	0,75 kW 50Hz	02
	1,5 kW 50Hz	03
	2,2 kW 50Hz	04
	3 kW 50Hz	05
	4 kW 50Hz	06
	5,5 kW 50Hz	07
	7,5 kW 50Hz	08
	11 kW 50Hz	09
	18,5 kW 50Hz	10
	22 kW 50 Hz	11
	30 kW 50 Hz	12
	0,21 kW 60Hz	20
	0,43 kW 60Hz	21
	0,9 kW 60Hz	22
	1,8 kW 60Hz	23
	2,6 kW 60Hz	24
	3,6 kW 60Hz	25
4,8 kW 60Hz	26	
9,0 kW 60Hz	27	
13,2 kW 60Hz	28	
22,2 kW 60Hz	29	
07	Ambient temperature min	
	-20°C (Standard)	20
	-30°C	30
	-40°C	40
	-45°C	45
08	Ambient temperature max	
	+40°C (Standard)	40
	+45°C	45
	+50°C	50
09	Heater	
	None (Standard)	0
	Space heater	S
10	Altitude (A)	
	A < 1000 m (standard)	1
	1000 m < A < 2000 m	2
	2000 m < A < 3000 m	3
	3000 m < A < 4000 m	4
	4000 m < A < 4500 m	5
	4500 m < A < 5000 m	6
11	Cooler matrix	
	Without bypass (Standard)	0
	4 bar bypass	4
12	Special design	
	Standard	00
	Special index 01-99	01

4.2.6 Tank

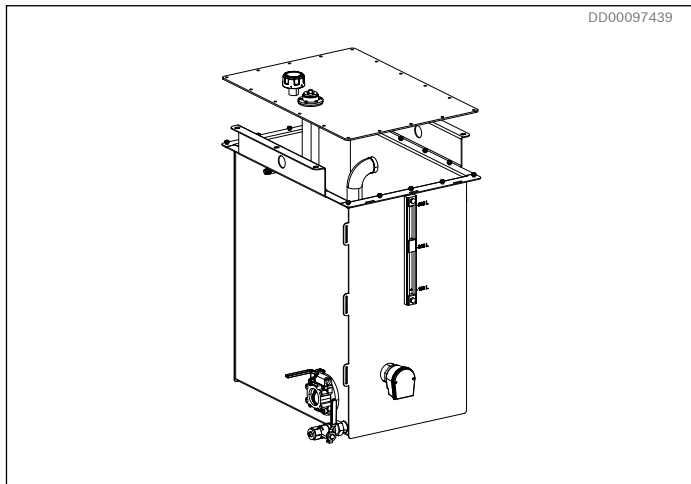


Fig. 43: Tank

Function

The tank contains cooled clean oil for the continuous oil exchange in the hydraulic system.

The tank is welded of stainless steel plates.

In the drive unit the tank supplies up to four pumps.

The tank volume has a ratio of minimum 1:1 to the exchange demand of the drive unit.

The tank is equipped with:

- Visual level gauge
- Suction valve with position switch
- Level sensor
- Temperature sensor
- Drain tap
- Filling point with quick release coupling.(oil filling via drain filter)
- Air breather filter
- Oil heater (option)
- Bladder (option)

Leakage test by supplier:

Air pressure 0,2 bar (2.9 psi), max 0,3 bar (4.3 psi) inside tank.

Soap water are sprayed at the weldings outside the tank and check for leakage.

Mechanical data

Table 40: Tank volume

Frame variant/version	Tank volume	
	l	gal
MS2	130	34.3
LS2	300	79.3
MT2	220	58.1
LT2	350	92.5
LS3	400/600	105.7/158.6
LT3	700/900	184.9/237.8

Table 41: Material

Part	Material
Tank	Stainless steel 1.4301
Fluid level gauge	Lens Lens base Shroud
	Polyamid Nylon Polystyrene

Fluid level temperature gauge

The fluid level gauge is resistant to mineral and petroleum based fluids.

Standards

Welding according to SS-ISO 5817

4.2.7 Oil filter

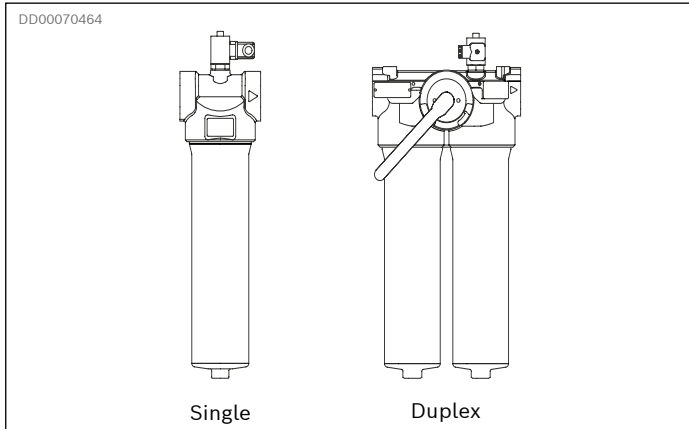


Fig. 44: Oil filter

Function

The filters are used in drain and return lines. The filter housing is equipped with bypass valve and an electrical and visual contamination indicator. The oil flow through the filter is according to the picture above. Single (standard) or duplex (option) filters can be selected. There is a contamination indicator that gives indication if the differential pressure is above 2.2 bar (31.9 psi) - 10% and the temperature of the oil is above 30 °C (86 °F).

A single filter has one filter element and a duplex filter has two filter elements but only one filter is used at any one time. On duplex filters the filter elements can easily be replaced without interrupting operation.

Separation characteristics

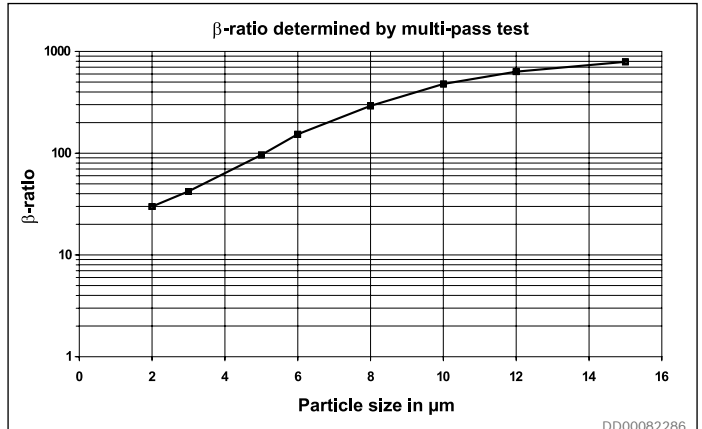


Fig. 45: Separation characteristics

The filter elements are β -stable (Fig. 45), has a multi layered structure and are compatible with HFA , HFB and HFC fluids. The opening pressure for the by-pass valve $\Delta P = 3.5$ bar (50.8 psi) + 10%.

The β -ratio for the particle size 10 (μm) fullfills ISO 4572 ($\beta_{10} \geq 75$).

Standards

Filter and filter elements according to DIN 24550

Mechanical data

Table 42: Technical data, filters

Part		Single/Duplex	
Filter complete:	Filter head	Aluminum alloy	
	Filter bowl	250-600 Aluminum	
	Seals	Nitrile rubber	
	Low pressure type bypass Δp	Max pressure	25 bar (360 psi)
		By pass pressure	3.5 bar (50 psi) + 10%
	Max flow	Size 250	250 l/min (66 gpm)
Size 400		400 l/min (106 gpm)	
Size 600		600l/min (160 gpm)	
Filter element:	Filtration grade	10 μm (standard) 6 μm (optional)	
	Filter	Synthetic glass fibre material	
	End shields	Sn plated	
	Inside tube	Sn plated	
	Antistatic layer	Optional	

4.2.8 Häggglunds Spider

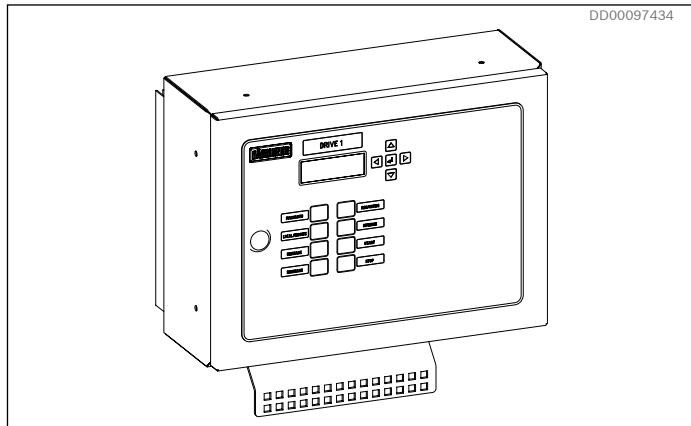


Fig. 46: Häggglunds Spider

Function

The Häggglunds Spider is the monitoring and control system for the Häggglunds DUC drive unit. It can work as a stand-alone control system or be slaved under a factory system and contains drivers for pumps, monitoring of the hydraulic system and functionality for many applications. Häggglunds Spider is delivered assembled to the drive unit at suitable location, fully parameterized, tested and ready to use. The configuration of Häggglunds Spider can be adopted for various applications needs, providing consistent start and stop sequences. It is the connection point for remote interface cabling e.g. to a customer DCS via discrete cabling or via a number of different Field bus types.

The Spider control panel is used for local control and monitoring of the drive unit. The panel is available with one set of buttons and display for a single drive or with two sets of buttons and displays for two drives.

Two display types are available

- **OLED** with yellow characters on a black background for Latin and Japanese characters.
- **VFD** with bright blue characters on a black background for Latin and Chinese characters.

Table 43: Technical data Häggglunds Spider

Häggglunds spider	
Material	Stainless steel, EN 1.4301
Dimension (WxHxD)	400x300x145 mm (15.75x11.81x 5.71 in)
Protection class	IP65
Power supply	90...264VAC, 50...60Hz
Power consumption	max 300 VA
+24 VDC outlets	Fused
Electric motor interlock	3 x Relay contacts 3 A, 30VDC / 250VAC, Closed = OK, to interlock relay in MCC
Digital inputs	47 x 24 VDC
Analog inputs	9 x 4-20mA
Digital outputs	13 x Relay contacts 3 A, 30VDC / 250VAC
Encoder inputs	2 x Quad incremental
Fieldbus slave Card	Profibus DP Modbus RTU Controlnet EtherNet IP ProfiNet DeviceNet Modbus TCP CC-Link
Space heater (optional)	PTC, <30 °C (<86 °F), moisture prevention
Terminals	One row spring clamp type, max 2.5 mm ² (14 AWG)
Cable gland plate	Multigate MC 25
Corrosion protection	VCI Emitter
Control panel	
Material	Stainless steel, EN 1.4301
Dimension (WxHxD)	395x295x35 mm (15.55x11.61x1.38 in)
Protection class	IP65
Communication	CAN
Connector	M12
Corrosion protection	VCI Emitter

For detailed information about Häggglunds Spider, see User manual [RE 15330-WA](#).

4.2.9 Hägglunds ICp Pump control

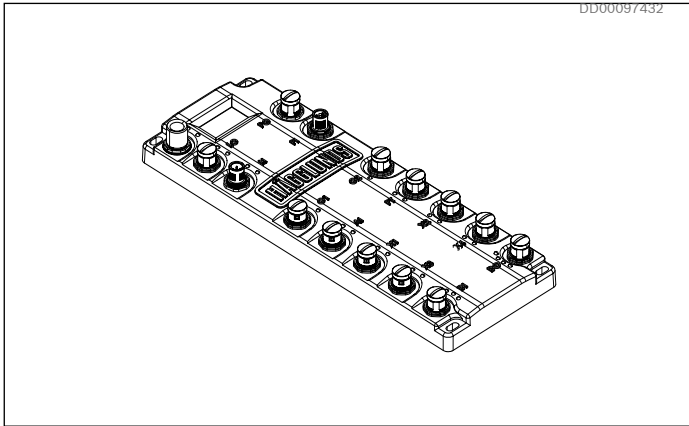


Fig. 47: Hägglunds ICp pump control

Function

The Hägglunds ICp pump control is an alternative to Spider for controlling the pump. The solenoid coils of each pump in the drive unit is connected to an ICp unit. The pumps can be controlled without feedback, using the ICp as an amplifier or locked into closed loop control using either work pressure or swash angle as input.

Configuration of ICp is done via Bluetooth and the Hägglunds ICp app is available for both android and iOS.

Table 44: Technical data Hägglunds ICp

Dimension (WxHxD)	111x310x31 mm (0.43x1.22x0.12 in)
Protection class	IP67
Power supply	+24VDC(18-30)
Power consumption	Max 60VA
+24V outlets	Fused 100mA
Digital inputs	12 x 24VDC
Analog inputs	6 x 4-20 mA, 1 x PT100
Digital outputs	8 x 24VDC, 800mA
Contacts	M12
Wireless connection	Bluetooth low energy

For detailed information about Hägglunds ICp, see data sheet [RE 15422](#).

4.3 Other components

4.3.1 Water valve

4.3.1.1 Water solenoid valve

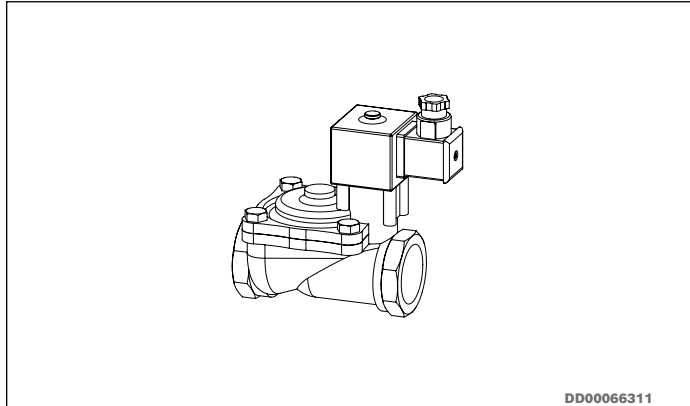


Fig. 48: Water solenoid valve

Function

The water valve is a two-way, normally closed, pilot operated solenoid valve with a floating diaphragm .

The water valve shall be connected to turn the cooling water on at the preset oil temperature in the tank.

All water valves for the european version are equipped with a manual override control.

For proper operation, for the american version, water must be filtered to 44 µm before entering the water valve.

Mechanical data

Table 45: Pressure

Water valve size		Differential pressure bar (psi)	Max. pressure bar (psi)
1/2", 1"	E	0.3-10 (4.3-145)	10 (145)
1 1/4", 1 1/2"	E	0.3-9 (5-130)	9 (130)
1 1/4", 1 1/2"	A	6.89 (100)	8.6 (125)
2"	A	3.44 (50)	8.6 (125)

Table 46: Flow

Water valve size		Max flow at ΔP 1 bar, l/min (gpm)
1/2"	E	70 (18)
1"	E	165 (44)
1 1/4"	E	213 (56)
1 1/2"	E	322 (85)
1 1/4"	A	227 (60)
1 1/2"	A	344 (91)
2"	A	857 (226)

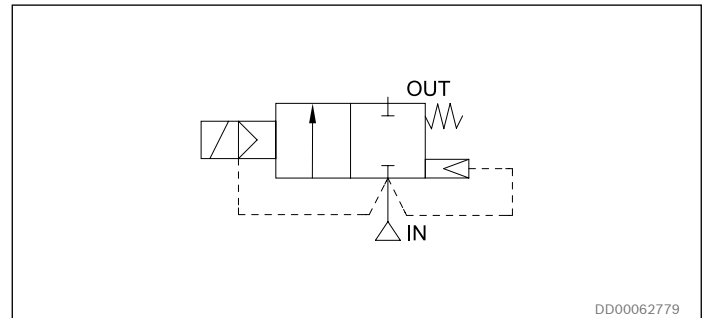


Fig. 49: Hydraulic symbol

Table 47: Material

Part	Material
Body	Brass
Core tube	Stainless steel
Core and plugnut	Stainless steel
Springs	Stainless steel
Seat	Brass
Seal, diaphragm & disc	NBR
Shading coil	Copper

Electrical data

Table 48: Electrical characteristics

Coil insulation class	F
Connector	Spade plug
Connector specification	EN 175301-803 (DIN 43650)-A
Coil safety	IEC 335
Coil enclosure protection	Moulded IP65 (EN 60529)
Control voltage	24 VDC

Table 49: Power ratings

Water valve size		Power ratings	
		holding (W)	hot/cold (W)
1/2", 1"	E	4	6.9
1 1/4", 1 1/2"	E	6	11.2
1 1/4"	A	4	11,6
1 1/2"	A	6	11,6
2"	A	6	11,6

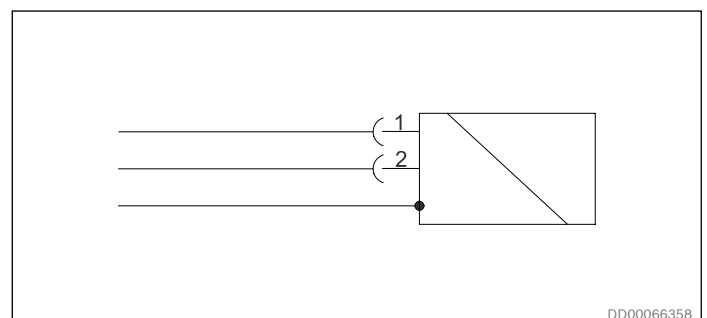


Fig. 50: Electrical symbol

4.3.1.2 Water ball valve

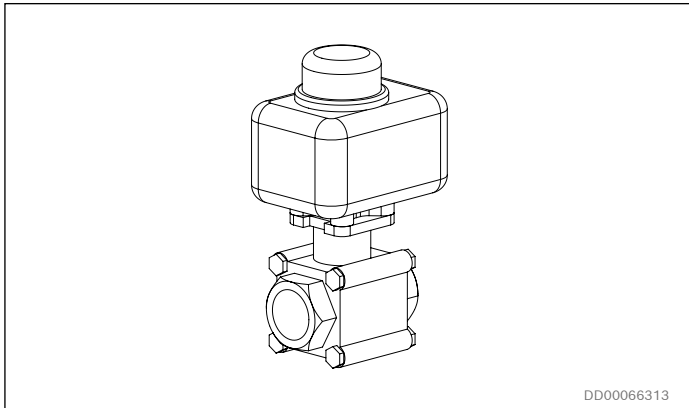


Fig. 51: Water ball valve

Function

The water valve for tube cooler is a two-way ball valve manoeuvred by an electric actuator.

The water valve will turn the cooling water at the preset oil temperature in the tank.

The water valve is equipped with a manual override control and visual position.

The valve is used for tube coolers on GK400, GK 600 and PK 600

Mechanical data

Table 50: Ball valve

Size	Max pressure
1 ½"	10 bar (145 psi)

Table 51: Electric actuator

Enclosure	IP67 Nema 4 and 6
Ambient temp	-20 °C...+70 °C (-4 °F...+158 °F)
Limit switches	Open/Close, 2+2 pcs
Travel Angle	90°±5°
Weight	2.8 kg (6.2 lb)
Opening time 90°	10 sek (24 VDC)

Table 52: Material

Part	Material	
Valve	Body	CF8M
	Ball	SS316
	Seat	CTFE
Electric actuator	Steel, Aluminum and Al Bronze	

Electrical data

Conduit Entries: M20 x 1,5

Space Heater: 5W

Anti-condensation

Table 53: Supply

Control Voltage	Max Current
24 V	1.8 A

Table 54: Connection

Terminal	Function
1	24 VDC for close, 0 VDC for open
2	0 VDC for close, 24 VDC for open
3	Jumpered to 2
4	Limit switch Closed
5	Limit switch Open
6	Feeder for limit switches
7	Heater 0 VDC
8	Heater 24 VDC

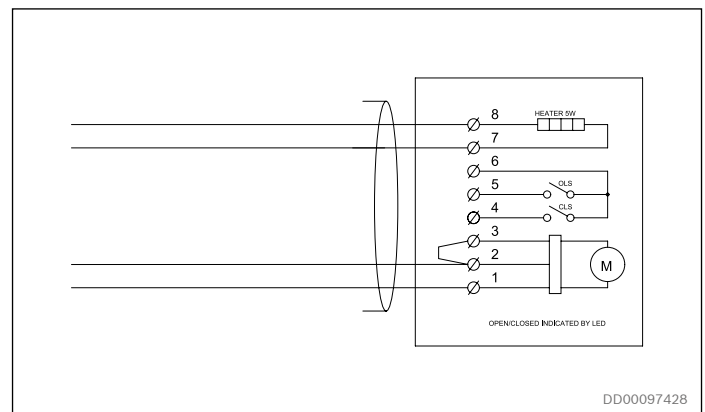


Fig. 52: Electrical symbol

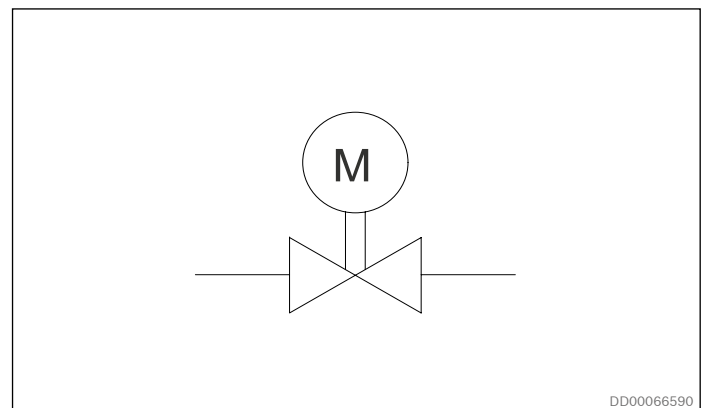


Fig. 53: Hydraulic symbol

4.3.2 Suction line valve

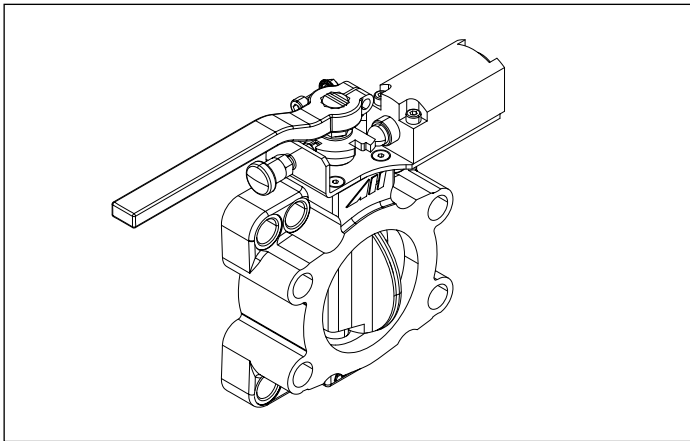


Fig. 56: Suction line valve

Function

The suction line valve will separate the pump from the tank at service.

The suction line indicator is a limit switch with forced breaking contact that opens when the suction line valve is closed.

It shall be connected to stop the power unit when the switch is open.

Mechanical data

Table 55: Standards

Item	Standard
Construction	DIN-EN 50047
Electrical safety	VDE 0113

Protection class

Protection class IP67 according to IEC Publ. 34-5 / DIN 40050

Table 56: Material

Part	Material
Cage, valve	Aluminium
Shifter	Aluminium
Seals	Nitrile rubber
Valve, other parts	Steel galvanized
Cage and lifter, limit switch	Thermoplast glass-fibre reinforced

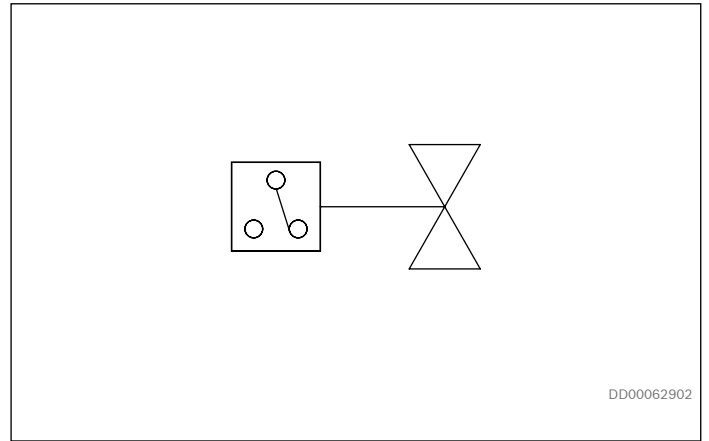


Fig. 54: Hydraulic symbol

Electrical connections

The cable is connected on screw terminals inside the housing.

Electrical data

Table 57: Electrical data

Max. voltage	Max. cont. current	Max. switch on current
400 VAC	6 A	16 A

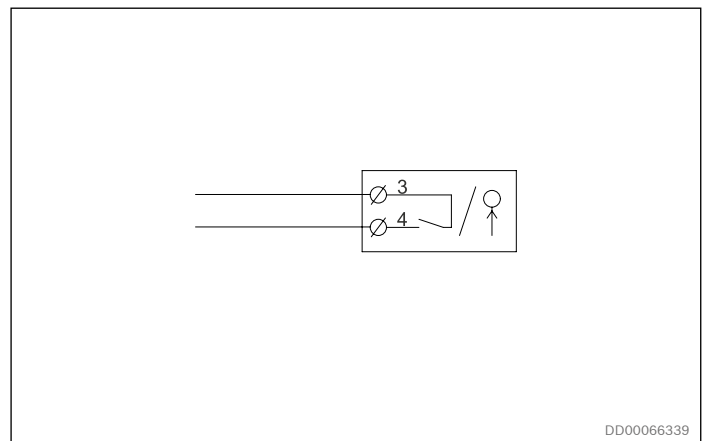


Fig. 55: Electric symbol

4.3.3 Clogging Indicator, oil filter

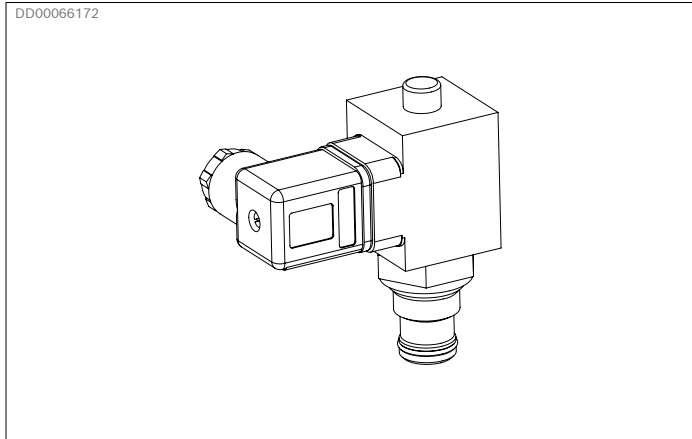


Fig. 57: Clogging indicator, oil filter

Function

A clogging indicator is mounted in the oil filter housing to indicate when the filter element must be changed. Both a visual and an electric indication are obtained. When the level of contamination in the filter element is increased, the pressure drop over the filter will increase. Indication takes place at a differential pressure across the filter of 2.2 bar (32 psi) for return and drain filter. The visual indicator is reset automatically. The electrical indication is internally interlocked by a thermo switch below 30 °C (86 °F) rising temperature to avoid indication due to high viscosity. The interlock is activated at 20 °C (68 °F) falling temp.

Protection class

IP 65 acc. to IEC 529 / DIN 40050

Mechanical data

Table 58: Clogging indicator

Material	Lower section	Aluminum alloy, Steel
	Upper section	Polyamid
	Seals	Nitrile rubber
Max. operating pressure	420 bar	
Temperature range	-10 °C ... +100 °C (50°F...212 °F)	

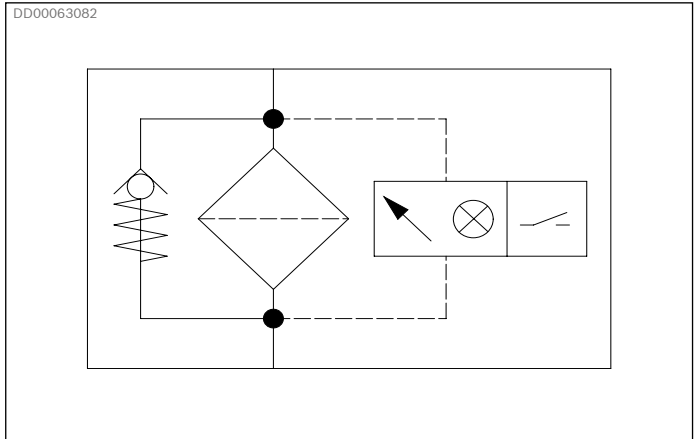


Fig. 58: Hydraulic symbol (oil filter with indicator)

Electrical data

Table 59: Clogging indicator

Switch type	normally closed
Indication	Mechanical
Switching voltage	nominal 24 VDC max 48 VDC
Max. switching power with resistive load	20 VA/20 W
Cold start supression	30 °C (86 °F), rising 20 °C (68 °F), falling

Electrical connections

Socket plug acc. to DIN 43650 / ISO 4400

Cable diameter: Ø 6-10 mm

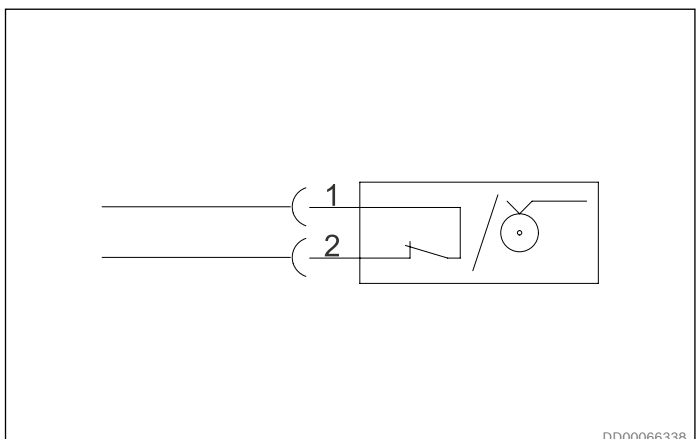


Fig. 59: Electrical symbol

4.3.4 Air breather

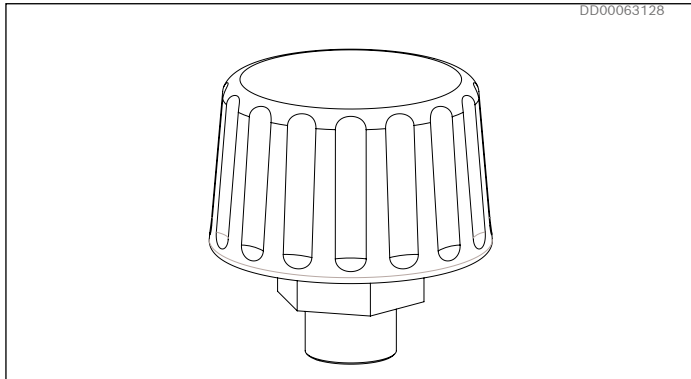


Fig. 60: Air breather

Function

The air breathing of the tank is via an air filter element to prevent contamination of the oil by particles in the air. The breather filter consists of a housing which is screwed onto the oil tank and a built-in filter element.

Mechanical data

Table 60: Material, Air breather filter

Filter	Standard	For bladder
Filtration rating	3 µm (absolute)	
Check/bypass valve:	No	Yes Δp at 0.2 bar (2.9 psi)
Clogging indicator	No	
Temperature range	-30 °C or +100 °C (-30 °F or +212 °F)	
Material	Steel, zinc-plated/plastic coated	
Hose	Paper fiber	
Filter element	NBR (Nitrile)	
Seal	G3/4"	
Tread	Anti-splash device	
Additional attributes	The standard models are suitable for use with mineral and lubrication oils according to ISO 2943	
Hydraulic fluids		

The filter elements are made from phenolic resin impregnated paper and cannot therefore be cleaned

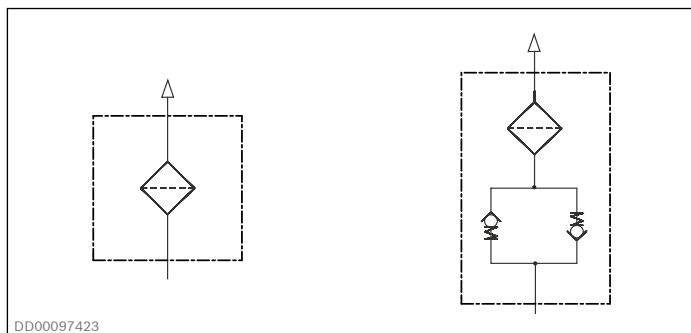


Fig. 61: Hydraulic symbol

4.3.5 Tank bladder

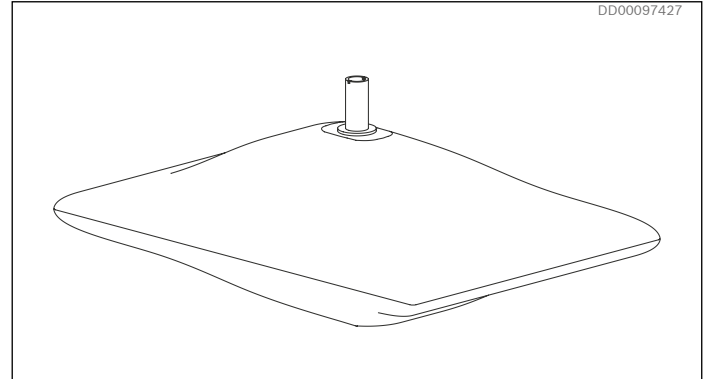


Fig. 62: Tank bladder

Function

The separators (bladder) task is to prevent contamination to enter into the tank and contaminate the hydraulic fluid. If the drive unit is operating in dusty environment it is advisable to choose an air bladder combine with an air relief valve for the tank air breathing.

Mechanical data

Volume (Expanded): 6 l, 8 l, 25 l (1.58 gal, 2.11 gal, 6.60 gal)

Shape: Rectangular Standard.

Thread: 3/4" BSP Carbon Steel.

Material: Reinforced Polyurethane with coated thermoplastic sheet.

4.3.6 Electronic level and temperature sensor

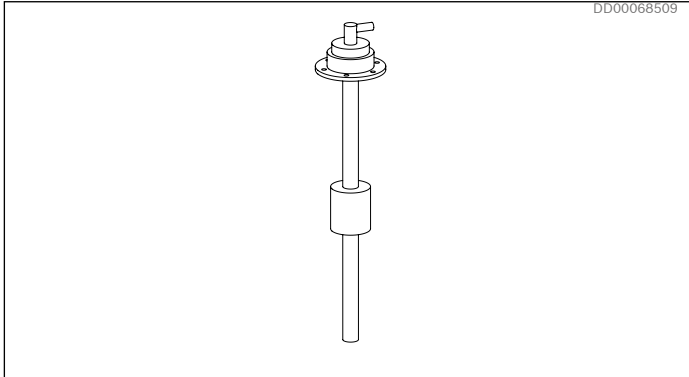


Fig. 63: Electronic level and temperature sensor

Mechanical data

Table 61: Electronic level and temperature sensor

Sensing method temperature		Pt 100
Sensing method level		Reed contacts
Material in contact with media		Stainless steel
Probe length	MS2	370 mm (14.57 in)
	MT2, LS2, LT2,LS3	500 mm (19.68 in)
	LT3	800 mm (31.50 in)
Medium temperature range		-20 .. +80 °C (-4 ...+176°F)
Protection class		IP65

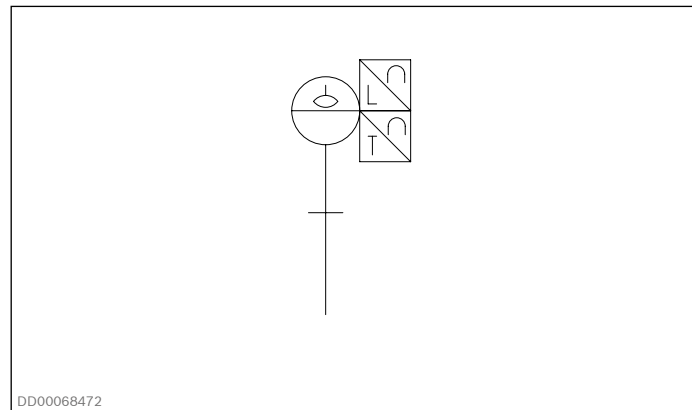


Fig. 64: Hydraulic symbol

Function

The tank oil sensor gives analog outputs for oil temperature and oil level. Sensor readings and threshold levels are set in the control system depending on the tank volume.

Electrical data

Table 62: Electronic level and temperature sensor

Supply voltage U	10...36VDC	
Output signal	4-20mA,	
Max load	(U-9.0V)/20mA	
Signal increment steps level	5 mm (0.20 in)	
Temperature range	0...100 °C (32...212 °F)	
Accuracy	± 1.5 °C (34.7 °F)	
Electrical connection	4 pin, Female M12	
Pin connection	pin 1	+U
	pin 2	Temp signal
	pin 3	Not used
	pin 4	Level signal

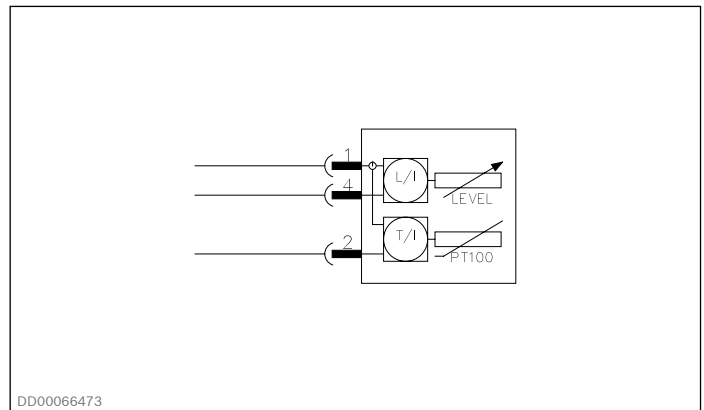


Fig. 65: Electrical symbol

Table 63: Volumes for threshold levels, electronic level and temperature sensor

Tank size	Max level				Nominal level				Warning level				Alarm (Stop) level			
	Volume		Distance from top		Volume		Distance from top		Volume		Distance from top		Volume		Distance from top	
	L	gal	mm	in	L	gal	mm	in	L	gal	mm	in	L	gal	mm	in
130 l	137	36.1	53	2.09	130	34.3	85	3.35	110	29.0	175	6.89	90	23.7	266	10.47
220 l	234	61.8	50	1.97	220	58.1	95	3.74	175	46.2	299	11.77	160	42.2	367	14.45
300 l	318	84.0	39	1.54	300	79.2	80	3.15	245	64.7	230	9.06	223	58.9	290	11.42
350 l	385	101.7	57	2.24	350	92.4	125	4.92	290	76.6	289	11.38	260	68.6	371	14.61
400 l	425	112.3	49	1.93	400	105.7	87	3.43	282	74.5	270	10.63	260	68.6	301	11.85
600 l	625	165.1	44	1.73	600	158.5	82	3.23	420	111.0	357	14.06	390	103.0	403	15.87
700 l	715	188.9	60	2.36	700	184.9	83	3.27	520	137.4	358	14.09	490	129.4	404	15.91
900 l	915	241.7	60	2.36	900	237.8	83	3.27	700	184.9	358	14.09	650	171.7	465	18.30

4.3.7 Accumulator

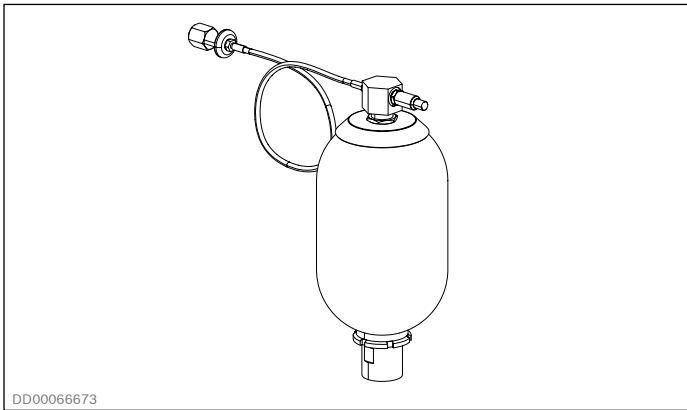


Fig. 66: Accumulator

Function

The hydropneumatic accumulator has bladder and gaskets for operating with mineral oil or non aggressive fluids. The precharge pressure is 9 bar (130.5 psi). It feeds the closed hydraulic circuit at low pressure side to:

- Damp hydraulic pressure pulses at the low pressure side.
- Supply the low pressure side with oil to prevent cavitation.

Available sizes are 2.5 and 4 litres (0.66 and 1.06 gal). The accumulator pressure is monitored via a pressure switch

Mechanical data

Table 64: Material, accumulator

Part	Material
Shell	Chrome molybdenum steel
Bladder	Nitrile (NBR 20)
Gas	Dry nitrogen
Painting	Primal RAL 3003
Coated (inside)	Plastic

Limits

Maximum allowed working pressure 330 bar (4786 psi).
 Maximum allowed oil flow 120 l/min (31.7 gpm).
 Pressure ratio 1:4 (precharge pressure: maximum pressure in the system).
 The precharge pressure may not exceed 90% of the lowest working pressure in the system and not be less than 25% of the highest working pressure in the system.

The pressure switch is monitoring the preloading pressure in the accumulator bladder. If the pressure falls below 7 bar (101psi) the switching contact is opened. The contact shall be connected in the interlock circuit for the hydraulic drive to permit restart of the system.

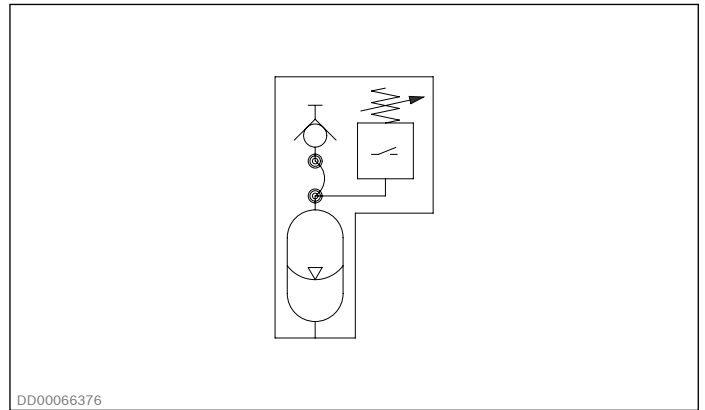


Fig. 67: Hydraulic symbol

Delivery

Accumulators in DUC delivered by air freight are delivered empty (= pre-charged to 1-2 bar, 14-29 psi) and need to be charged with N₂ (Nitrogen gas) to 9 bar (130 psi) before start of system. Empty accumulators are marked with a tag at delivery.

Electrical data

Table 65: Pressure switch

Supply voltage U _b	10...30 VDC
Switch output	PNP transistor output
Max load	400 mA
Protection class	IP67
Connector	M12 A coded 4-pin contact
Pin connection	Pin 1 - +U _b
	Pin 2 - PNP output
	Pin 3 - 0V
	Pin 4 - NC

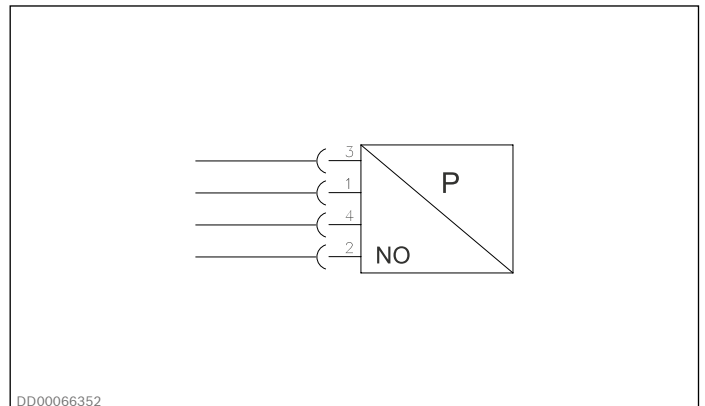


Fig. 68: Electrical symbol

4.3.8 Auxillary pumps

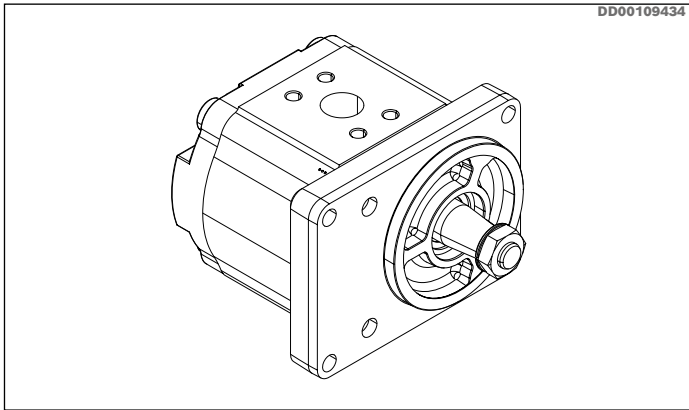


Fig. 69: Auxillary pump

Function

The auxiliary pumps are used when external circuits are needed for flushing and/or brake functionalities.

The pump type used is an external gear pump.

Table 66: Auxillary pumps

Pump size	Ordering code	Max continuous pressure		Max peak pressure	
		bar	psi	bar	psi
4	AZPF-12-004RCB20MB	250	3626	300	4351
11	AZPF-12-011RCB20MB	250	3626	300	4351
32	AZPG-22-032RCB07MB	250	3626	300	4351
56	AZPG-22-056RCB07MB	195	2828	250	3626

Reference

For more information see the specific data sheets chapter 7 *Required and additional documents*

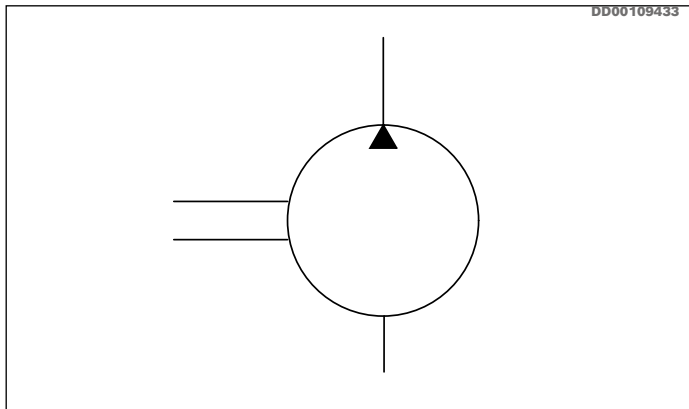


Fig. 70: Hydraulic symbol

4.3.9 Pressure sensor

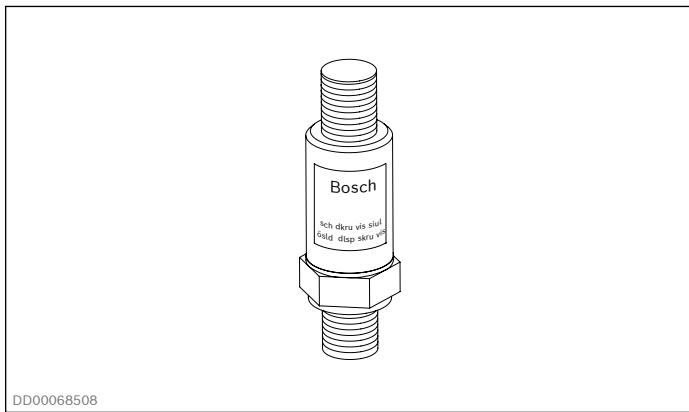


Fig. 71: Pressure sensor

Function

The pressure sensor gives information about the pressure level in different parts of the hydraulic system. The signal is used for information about system usage and/or used for control functions.

Electrical data

Table 67: Pressure sensor

Measuring range	Work pressure 0...400 bar (0...5801 psi)
	Low pressure 0...250 bar (0...3626 psi)
Supply voltage U_b	16...36 VDC
Output	4...20 mA
Max load (ohm)	$(U_b - 8.5 \text{ V}) / 20 \text{ mA}$
Protection class	IP65
Connector	4 pole M12
Pin connection	Pin 1 - $+U_b$
	Pin 2 - signal output

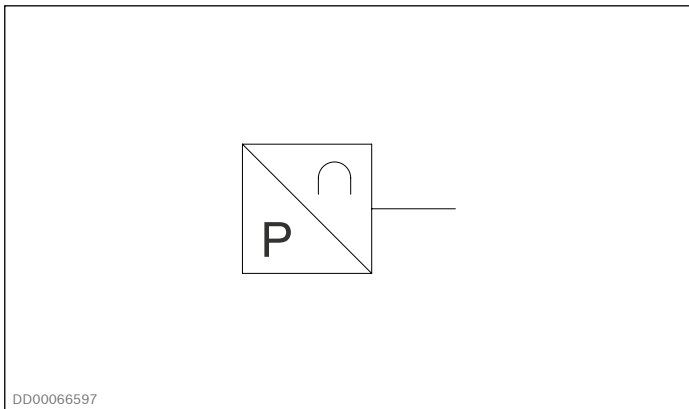


Fig. 72: Hydraulic symbol

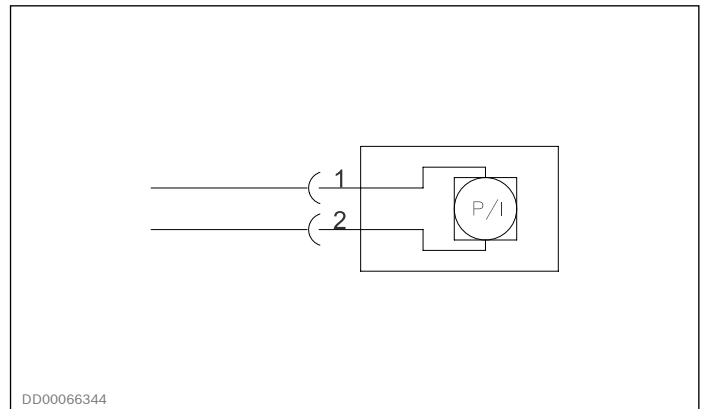


Fig. 73: Electrical symbol

4.3.10 Oil heater

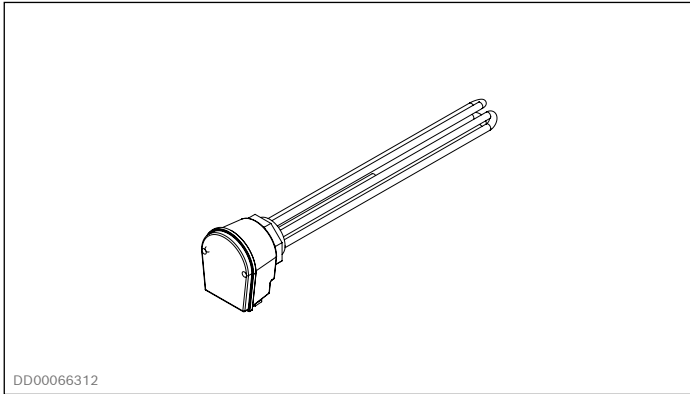


Fig. 74: Oil heater

Function

At installation in ambient temperature below 0 °C (32 °F) a heater is needed in the oil tank to keep the oil temperature above a set level. The control system measures the temperature in the tank and gives an output to control an external relay to switch on/off power to the heater. The oil heater is an electrical block heater, with the heating coils in direct contact with the oil.

Mechanical data

Table 68: Oilheater

Tubular elements	Stainless steel 1.4404	
Head	Brass 2"	
Heater length	670 W	435 mm (17.13 in)
	1000 W	555 mm (21.85 in)
Terminal box	Silumin	
Lid	Carbonate plastic	
Protection class	IP54	

Electrical data

Table 69: Oilheater

Power	670 W, 1000 W
Voltage	220-240 V
	380-415 V
	440-480 V
	660-690 V

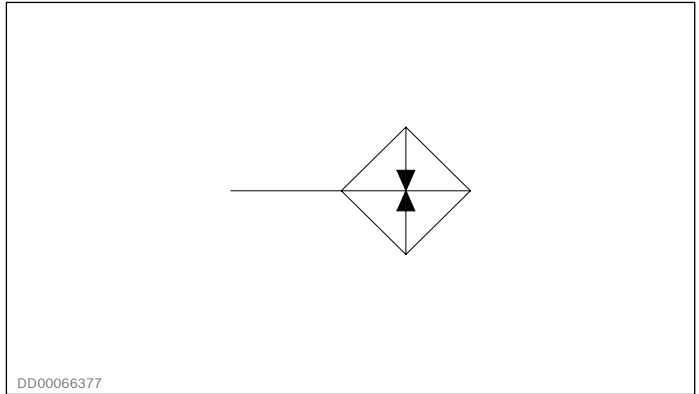


Fig. 75: Hydraulic symbol

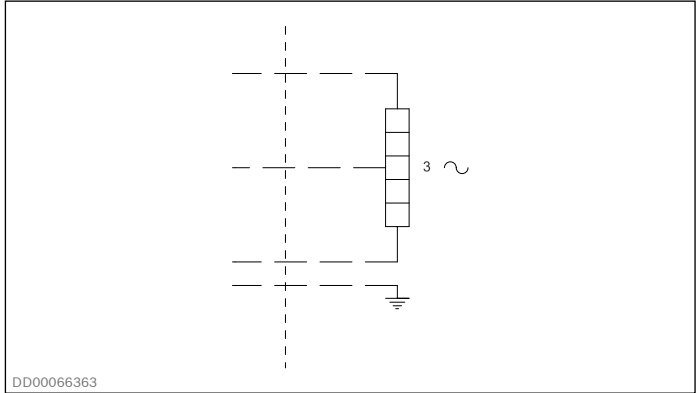


Fig. 76: Electrical symbol

Electrical connections

The cable is connected on screw terminals inside the terminal box.

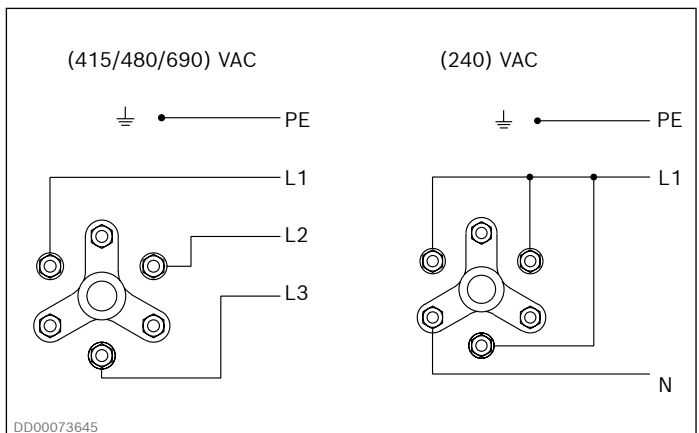


Fig. 77: Electrical connections

4.3.11 Drain temperature sensor

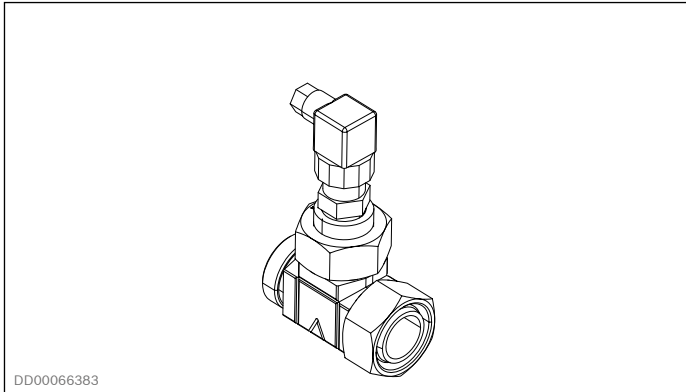


Fig. 78: Drain temperature sensor

Function

The drain temp sensor measures the temperature in the drain line from the hydraulic motor or/and from the main pump. The signal is controlling the flushing circuit for cooling/heating of the hydraulic motor and the main pump.

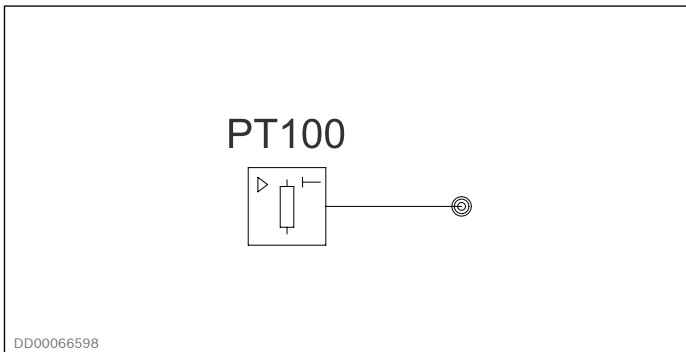


Fig. 79: Hydraulic symbol

Electrical data

Table 70: Drain temperature sensor

Temp range	0...100°C (32...212 °F)
Supply voltage U_b	10...30VDC
Output	4...20mA
Max load (ohm)	$(U_b - 7.5V) / 22mA$
Protection class	IP65
Connector	DIN 43650 (Hirschman)
Pin connection	Pin 1 - $+U_b$ Pin 2 - signal output

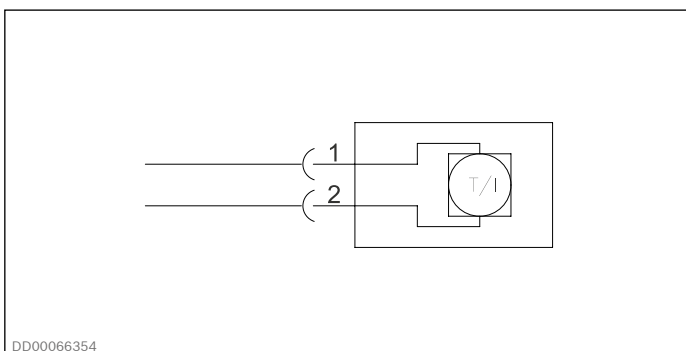


Fig. 80: Electrical symbol

4.3.12 Electrical connection box

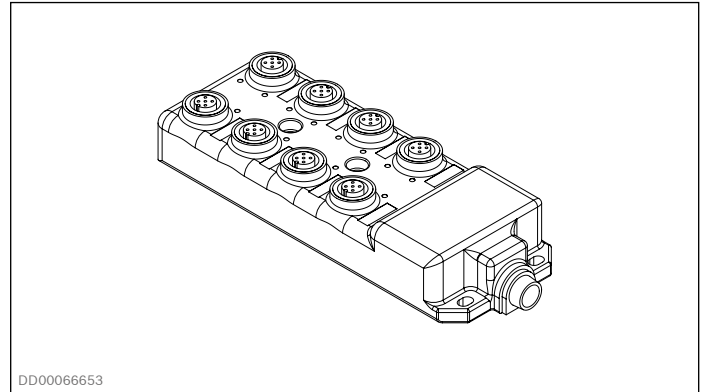


Fig. 81: Electrical connection box

Function

Electrical signals from sensors and valves in the Drive Unit are connected to the Control system or Junction box via distributed connection boxes.

Connections from the boxes to the actuators are distributed via short connection cables with M12 contacts on the connection box side.

Note! Only used in MT2, LT2, LS3 and LT3

Electrical data

Table 71: Connection box

Material	Housing PBT, Moulding PUR
Degree of protection	IP67
Contact material	CU alloy goldplated
Cable type	PUR black (LiYY11Y-HF)
Cable area	0.5 mm ² (Power 1 mm ²)/ 20 AWG (Power 16 AWG)
Ambient temperature	-25 °C ... +80 °C (-13 °F...+ 176 °F)
Electrical connections	4 pin, Female M12 A-standard (IEC 610 76-2-101)
Number of connections	4 or 8

4.3.13 LED lightning

Function

The lightning inside the drive unit is of LED list type. One LED list per pump compartment is installed. The LED list is controlled via the Hägglunds Spider.

Electrical data

Table 72: LED lightning

Material	Aluminum
Lenght	500 mm
Degree of protection	IP68
Ambient temperature	-40 °C ... 80 °C
Supply voltage	24VDC
Light output	260 Lumen
Power consumption	7,2W

4.4 Sound

Two types of Hägglunds DUC have been measured at 1500 rpm:

- DUC MS2 with SP180 and 75kW (100 hp) electric motor
- DUC LS2 with SP500 and 250 kW (335 hp) electric motor

Both drive units were equipped with panels and water cooler.

The emission sound pressure levels have been measured according to ISO 11202 and the sound power level have been calculated according to ISO 3746.

The noise test is done under following conditions:

- Three types of condition was tested:
 - a. Idling the pump
 - b. 0% flow at pump and pressure at 250 bar (3625 psi).
 - c. 100% flow and pressure at 50 bar (725 psi).
- Four measuring points 1.0 m (3.3 ft) around and one point 1.0 m (3.3 ft) above the DUC.
- The environmental correction, K2A, according to ISO 3746 is 2dB (measured on site). The result is reported with the K2A correction
- The sound pressure level from the Drive Unit was 10 dB higher than the background level at all conditions, no correction is needed.

Table 73: Measured sound levels DUC

Pump Electric motor		Condition		
		Idling	250 bar (3625 psi) 0% Flow	50 bar (725 psi) 100% Flow
L _{pa} ¹⁾	SP180 75kW	62	69	71
L _{wa} ²⁾	SP180 75kW	80	87	89
L _{pa} ¹⁾	SP500 250kW	65	81	81
L _{wa} ²⁾	SP500 250kW	80	100	99

¹⁾ Average of the measured sound pressure levels at 1m (16 ft), corrected with K2A.

²⁾ Calculated sound power level according to ISO 3746, corrected with K2A.

4.5 Environment options

4.5.1 Flushing

Flushing is used either to cool or warm up the hydraulic motor and/or pump, depending on need due to the environmental conditions that the drive unit will be working at.

Cold flushing is done by one of two different methods;

- A separate pump that takes oil from the oil tank and pumps it through one of the drain connections on the motor and/or pump and back to the tank.
- A check valve leads a part of the cooled oil from the oil cooler to the connecting ports on the motor and/or pump and back to the tank via drain line. This method can cause problems for air coolers due to pressure spikes, if the drive unit is supporting chock load applications.

When warm flushing is activated, oil from the tank is pumped by a separate flushing pump through a pressure relief valve and further to the motor and pump. When the oil passes the valve it gets warmed up.

4.5.2 Brake release system

The brake release system is an additional function where flow from either the charge pump or a separate pump is used to open the brake on the hydraulic motor depending on brake opening pressure level. The preset brake opening pressure level is 15, 60 or 200 bar (218, 870 or 2 901 psi) depending on brake type. The flow is controlled via a directional valve in the drive unit.

4.5.3 Low ambient temperature

< 0 °C (< 32 °F)

- It is recommended to equip the oil tank with a heater.
- It is recommended to equip the drive unit with an auxiliary flushing circuit for warm flushing of pump(s) and hydraulic motor(s).
- An air-oil cooler has to be used, due to the freezing point of water.

< -20 °C (< -4 °F)

- It is mandatory to equip the oil tank with a heater.
- It is mandatory to equip the drive unit with an auxiliary flushing circuit for warm flushing of pump(s) and hydraulic motor(s).
- All electric motors will be specified for temperatures < -20°C (< -4 °F)
- Spider control unit will be equipped with heater.
- The hydraulic compartment in the drive unit will be equipped with a heater.

< -30 °C (< -22 °F)

All electric motors will be specified for temperatures < -30°C (< -22 °F)

< -40 °C (< -40 °F)

The drive unit has to be placed indoors

4.5.4 High ambient temperature

Ambient temperatures > 40 °C (104 °F) limit the permitted output power for the electric motor.

For ambient temperatures > 40 °C (104 °F) it is recommended to use water-oil cooler.

4.5.5 Machine feet

If the unit needs to be isolated regarding vibrations or to compensate for uneven surfaces machine feet can be used. They have an adjustment range of 25-32 mm (0.98-1.26 inch) for DUC MS2 and 30-38 mm (1.18-1.50 inch) for DUC LS2, MT2, LT2, LS3 and LT3.

4.5.6 Oil pan

The bottom part of the DUC is designed to work as an oil pan for leakage oil. The oil can be removed from the pan via a drain tap on the side.

For oil pan size see 4.1.7.

4.5.7 Painting

Two different corrosivity categories regarding corrosion protection are available in accordance with SS-EN ISO 12944:

- Corrosivity category C3

Frame and external brackets: RAL 9005 Black

Doors, hoods and panels: RAL 2002 Orange

- Corrosivity category C5

Frame and external brackets: RAL 9005 Black

Doors, hoods and panels: Stainless steel EN 1.4301

All external bolts, washers and nuts are hot-dip galvanized.

4.6 External pipe work General

The Drive unit should be placed close to the hydraulic motor in order to minimise piping if it is possible. See "4.1.2 Positioning the DUC", page 17

4.6.1 Pipe size

The pipe work between motor and the Drive unit shall be dimensioned for at least four times the maximum pressure, the equipment may be re-adjusted to higher pressures in service.

It is important that the lines between the main connections of the motor and Drive unit are as short as possible. The total pressure drop in the main and return line must not exceed 5% of the normal working pressure.

The pipe shall be sized to give the following approximate flow rates:

Main lines < 5-7 m/s (176-247 ft/s)

Return lines < 3 m/s (106 ft/s)

Drain & suction lines < 1 m/s (35 ft/s)

It is particularly important that the pressure in drain lines does not exceed the max. case pressure for motor/pump.

4.6.2 Material in hydraulic pipes

Use a high-grade steel as per ISO 3304, DIN 2391/C or ASTM A 519 1010 for the hydraulic pipes.

4.6.3 Pipe couplings

For pipes with:

$d \leq 25$ mm (0.98 in): SAE J514 (SAE-16)

$25 \leq d \leq 60$ mm ($0.98 \leq d \leq 2.36$ in): SAE J518 (SAE-16)

4.6.4 Pipe clamps

The pipes shall be clamped with uniformly spaced clamps.

The distance between the clamps depends on the type of clamps but it may not exceed the following values:

$15 \leq d \leq 38$ mm max. 2 000 mm ($0.59 \leq d \leq 1.50$ in max. 78.73 in).

$d \geq 38$ mm max. 3 000 mm ($d \geq 1.50$ in max. 118.11 in)

In addition, the pipes must be clamped immediately before and after a bend and immediately before transition to a hose.

The pipe clamps shall be secured to a stable and non vibrating surface.

The pipe clamps must be of a type permitting a certain amount of axial and radial motion in the clamped joint and have good vibration-absorbing property.

4.6.5 Welded couplings

Welded couplings shall be avoided because of the high possibility of system contamination due to the welding process.

4.6.6 Hoses

- Hoses shall always be used between piping and hydraulic motor/pump.
- Use flexible hoses to prevent imposing stress from moving/vibrating equipment.
- Connect hoses with attention to bending radius, adequate slack for machine movement and select to hang without stressing the end fittings.
- Use hoses, if it is possible, to connect direct between unit and machine to ease fitting and reduce transmission of noise.
- The hoses must be short and have the smallest possible diameter in order to obtain a small compression volume. Maximum flow velocities listed under "Pipe size" must however be taken into consideration.

4.7 Hydraulic fluids

The Hägglunds DUC is primarily designed for operation with hydraulic fluids according to ISO 11158 HM. Before the start of project planning, see data sheet [RE 15414](#), Hydraulic fluid quick reference, for detailed information on hydraulic fluids and specific additional demands.

ISO 11158	ISO 15380	ISO 12922
Mineral oil based and mineral oil related hydraulic fluids	Environmentally acceptable hydraulic fluids	Fire resistant hydraulic fluids

Within these standards, not all fluid classes are allowed, some are recommended, and there are also additional demands (see data sheet [RE 15414](#)).

5 Accessories

5.1 Spidercom

Spidercom is a Windows program for communication with Spider control system.

It is used for:

- uploading and conversion of log data
- uploading, editing and downloading of setup parameters

The program can run on Windows 7, 8 or 10. A standard RS232 serial port is recommended for communication with Spider. If that is not available, a USB to serial converter must be used.

5.2 VpCI

The emitter VpCI (Vapor phase Corrosion Inhibitor) is mounted inside electrical and electronic enclosures to protect against oxidation. The emitter (containing a pulverous substance) emits a vapor that covers all components with a protective layer when the air inside the enclosure is saturated.

The Emitter can be stored for 2 years before installation if the protective bag is air tight. Life time after installation is 2 years.

6 Packing

6.1 Packing procedure



Fig. 82: Desiccant bags

- Desiccant bags are placed inside the DUC to avoid corrosion



Fig. 83: Plastic bag

- The cabinet is sealed with a plastic bag and covered with a crate



Fig. 84: Crate with rain protection

- The top of the crate is rain protected with plastic film
- The crate is marked with centre of gravity, fork lifting points and weight
- Packing material confirming with ISPM No. 15

6.2 Items not assembled at delivery

6.2.1 Items not assembled at delivery

Main electric motors

- DUC MS2: Motor always assembled
- DUC LS2: Motor never assembled
- DUC MT2: Motor never assembled
- DUC LT2: Motor never assembled
- DUC LS3: Motor never assembled
- DUC LT3: Motor never assembled

Cooler assembly











- DUC MS2: Air-oil cooler up to HDC 085 is assembled. HDC 090 and HDC 100 never assembled
Plate and tube water-oil cooler always assembled
- DUC LS2: Air-oil cooler never assembled
Plate water-oil cooler always assembled
Tube water-oil cooler never assembled
- DUC MT2: Air-oil cooler never assembled
Plate water-oil cooler always assembled.
Tube water-oil cooler never assembled
- DUC LT2: Air-oil cooler never assembled
Plate and tube water-oil cooler never assembled
- DUC LS3: Air-oil cooler never assembled
Plate water-oil cooler always assembled
Tube water-oil cooler never assembled
- DUC LT3: Air-oil cooler never assembled
Plate and tube water-oil cooler never assembled

All items delivered separated from the Drive Unit are protected with VCI plastic bags.

6.2.2 Small items not assembled at delivery

- Machine feet
- Filter element - spare

7 Required and additional documents

 Title	Document no	Document type
 Installation and maintenance manual, Häggglunds DUc	RE 15326-WA	Instruction manual
 User manual Häggglunds Spider	RE 15330-WA	Instruction manual
 Sound and vibration	RE 15411	Data sheet
 Pump control, Häggglunds ICp	RE 15422	Data sheet
 Hydraulic fluid quick reference	RE 15414	Data sheet
 Hydraulic fluids based on mineral oils and related hydrocarbons	RE 90220	Data sheet
 Environmentally acceptable hydraulic fluids	RE 90221	Data sheet
 External gear pump High Performance AZPF (Pump size 4/11 cc)	RE 10089	Data sheet
 External gear pump High Performance AZPG (Pump size 32/56 cc)	RE 10093	Data sheet

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The data specified above only serve to describe the product.

As our products are constantly being further developed, no statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging