

DATA SHEET

Drive unit

Hägglunds DUc

VALID FOR

- Flow capacity: Up to 3000 l/min (790 gpm)at 50Hz
- Flow capacity: Up to 3600 l/min (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 control system
- Optional cover for the electric motor
- Option for explosive environment available

RE 15326 09-2026 Replaces: 10-2023
Bosch Rexroth AB

HÄGGLUNDS

Contents

1 Ordering code 4
1.1 Ordering code two compartments 4
1.2 Ordering code three compartments 6
2 Function Hägglunds DUc 8
2.1 General 8
2.1.1 Versions 9
2.1.2 Test certificate 9
2.1.3 Standards 9
2.1.4 Ambient temperature 9
2.1.5 Combination of pump and electric motor 10
3 Circuit diagram 12
3.1 Simplified hydraulic circuit single SP pump. 12
3.2 Simplified hydraulic circuit SP tandem pumps. 13
3.3 Monitoring logic diagram 14
4 Technical data 15
4.1 Drive unit (DUc) 15
4.1.1 Weights 15
4.1.2 Positioning the DUc 17
4.1.3 Dimensions DUc 18
4.1.4 Dimensions components 22
4.1.5 Dimensions DUc water connections 23
4.1.6 Connections 25
4.1.7 DUc oil pan volume 28
4.2 Main components 29
4.2.1 Electric motor 29
4.2.2 Main pump SP 31
4.2.3 Water-oil cooler - plate type 34
4.2.4 Water-oil cooler - tube type 36
4.2.5 Hägglunds HDC cooler (air-oil cooler) 37
4.2.6 Tank 38
4.2.7 Oil filter 39
4.2.8 Hägglunds Spider 41
4.2.9 Hägglunds ICp pump control 42
4.2.10 Hägglunds Control System (HCS) 43
4.3 Other components 44
4.3.1 Water valve 44
4.3.2 Suction line valve 46
4.3.3 Clogging Indicator, oil filter 47
4.3.4 Air breather 48
4.3.5 Tank bladder 48
4.3.6 Accumulator 49
4.3.7 Electronic level and temperature sensor 50
4.3.8 Auxiliary pumps 52
4.3.9 Pressure sensor 52
4.3.10 Oil heater 53
4.3.11 Drain temperature sensor 54
4.3.12 LED lighting 54
4.3.13 Hägglunds QECC 55
4.3.14 Machine feet 55
4.3.15 Cabinet heater 56
4.4 Sound 57
4.5 Environment options 57
4.5.1 Flushing 57
4.5.2 Brake release system 57
4.5.3 Low ambient temperature 58
4.5.4 High ambient temperature 58
4.5.5 Oil pan 58
4.5.6 Leveling pipe 58
4.5.7 One compartment unit 58
4.5.8 Explosive environment 58
4.5.9 Sound protection 59
4.5.10 Anchoring possibility 59
4.5.11 Roll -Back Function 59
4.5.12 Painting 59
4.6 External pipe work - General 60
4.6.1 Pipe size 60
4.6.2 Material in hydraulic pipes 60
4.6.3 Pipe couplings 60
4.6.4 Pipe clamps 60
4.6.5 Welded couplings 60
4.6.6 Hoses 60
4.7 Hydraulic fluids 60
5 Accessories 61
5.1 Spidercom 61
5.2 HDcom 61
5.3 VpCI 61
6 Packing 62
6.1 Packing procedure (Mellansel) 62
6.2 Packing procedure (Grove City) 62
6.3 Items not assembled at delivery 62
6.3.1 Items not assembled at delivery 62
6.3.2 Small items not assembled at delivery 62
7 Required and additional documents 63

1 Ordering code

1.1 Ordering code two compartments

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

Example Hägglunds DUc-LS2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
HD	-	DU	C	-	L	S	2	-	315	-	500	+	000	-	S	C	-	0	U	W	Y	S	E	-	0400	/	50

1	**Brand**	
	Hägglunds	**HD**
2	**Drive Unit**	
	Drive Unit	**DU**
3	**Type**	
	Compact	**C**
4	**Frame size**	
	Medium frame	**M**
	Large frame	**L**
5	**Pump setup**	
	Single pump	**S**
	Tandem pump	**T**
6	**Number of compartments**	
	One compartment	**1**
	Two compartments	**2**
7	**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

8	**Pump size (cc) - SP pumps – Top**	
		040
		071
		125
		180
		250
		355
		500
		750
9	**Pump size (cc) - SP pumps – Bottom**	
		040
		071
		125
		180
		250
		355
10	**Type of filter**	
	Single	**S**
	Duplex	**D**
11	**Filtration**	
	With charge line filter	**C**
	With charge line filter and drain line filter	**D**
12	**Explosive environment**	
	Not used in Ex environment	**0**
	ATEX	**1**
13	**Type of cover**	
	Without panels and top cover	**0**
	With panels, without top cover	**U**
	With panels and top cover	**C**
	With sound option	**S**
14	**Cooler type**	
	Air oil cooler	**A**
	Water oil cooler	**W**
15	**Electric motor**	
	Included in Drive Unit	**Y**
	Customer supplied	**N**
16	**Control system**	
	Hägglunds Spider	**S**
	Hägglunds Control System	**C**
	No control system - Only terminal box	**N**
	Hägglunds ICp pump control	**D**
17	**Version**	
	European	**E**
	American	**A**
18	**Voltage (V)**	
	Main Voltage	
19	**Frequency (Hz)**	
		50
		60

1.2 Ordering code three compartments

Example Hägglunds DUc-LT3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
HD	**-**	**DU**	**C**	**-**	**L**	**T**	**3**	**-**	**160**	**/**	**160**	**-**	**250**	**+**	**250**	**/**	**250**	**+**	**250**	**-**	**S**	**C**	**-**	**0**	**U**	**W**	**Y**	**S**	**E**	**-**	**0400**	**/**	**50**

1	**Brand**	
	Hägglunds	**HD**
2	**Drive Unit**	
	Drive Unit	**DU**
3	**Type**	
	Compact	**C**
04	**Frame size**	
	Medium Frame	**M**
	Large Frame	**L**
05	**Pump setup**	
	Single pump	**S**
	Tandem pumps	**T**
06	**Number of compartments**	
	Three compartments	**3**
07 08	**Electric motor size**	
	Electric power (kW) – Left compartment Electric power (kW) – Right compartment	**022** **030** **037** **045** **055** **075** **090** **110** **132** **160** **200** **250** **315** **355** **400** **500**
09 11	**Pump size (cc) SP pumps – Top**	
	Pump size (cc) SP pumps –upper left compartment Pump size (cc) SP pumps –upper right compartment	**040** **071** **125** **180** **250** **355** **500** **750**

10 12	**Pump size (cc) SP pumps – Bottom**	
	Pump size (cc) SP pumps –lower left compartment	**040**
	Pump size (cc) SP pumps –lower right compartment	**071**
		125
		180
		250
		355
		500
13	**Type of filter**	
	Single	**S**
	Duplex	**D**
14	**Filtration**	
	With charge line filter	**C**
	With charge line filter and drain line filter	**D**
15	**Explosive environment**	
	Not used in Ex environment	**0**
	ATEX	**1**
16	**Type of cover**	
	Without panels and top cover	**0**
	With panels, without top cover	**U**
	With panels and top cover	**C**
	With sound option	**S**
17	**Cooler type**	
	Air oil cooler	**A**
	Water oil cooler	**W**
18	**Electric motor**	
	Included in Drive Unit	**Y**
	Customer supplied	**N**
19	**Control system**	
	Hägglunds Spider	**S**
	Hägglunds Control System	**C**
	No control system - only terminal box	**N**
	Hägglunds ICp pump control	**D**
20	**Version**	
	European	**E**
	American	**A**
21	**Voltage (V)**	
	Main Voltage	
22	**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 into 8 basic sizes depending on hydraulic flow requirements:

- Medium frame - Single pump - Two compartments (MS2)
- Medium frame - Tandem pump - Two compartments (MT2)
- Medium frame - Single pump - Three compartments (MS3)
- Medium frame - Tandem pump - Three compartments (MT3)
- 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 for 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 such as:

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

The DUc drive unit can be delivered without a control system if required. All electrical wiring for sensors and pump control will be wired to a junction box. A driver card for pump control can be assembled as an alternative. 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 l/min / 792 gpm at 1 500 rpm (3 600 l/min / 951 gpm at 1 800 rpm).
- Working pressure max 350 bar / 5076 psi.

2.1.1 Versions

Hägglunds DUc is available in two versions: European and American
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

This product is a Partly Completed Machinery (PCM) as defined by the EC Machinery Directive 2006/42/EC, Appendix IIB. A Declaration of Incorporation (DoI) is issued for the product, confirming its compliance with the relevant essential health and safety requirements of the Machinery Directive.

Our quality assurance system is 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) a water- oil cooler should **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, MS3)				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 frame size medium, tandem pumps

			Pump (cc)									
			40	71	71	125	125	125	180	180	180	180
			40	40	71	40	71	125	40	71	125	180
	kW	hp	Frame size Medium (MT2, MT3)									
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
	90	125		S	X	X	X	X	X	X	X	X
	110	150			X	X	X	X	X	X	X	X
	132	200				X	X	X	X	X	X	X
	160	250						X	X	X	X	X
	200	300						X		X	X	X
	250	350										
	315	450										

X = Configurable drive unit

S = Customized drive unit

Table 3: Pre-defined pump/electric motor combinations, for frame size large, tandem pumps

			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 (LT2, 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			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

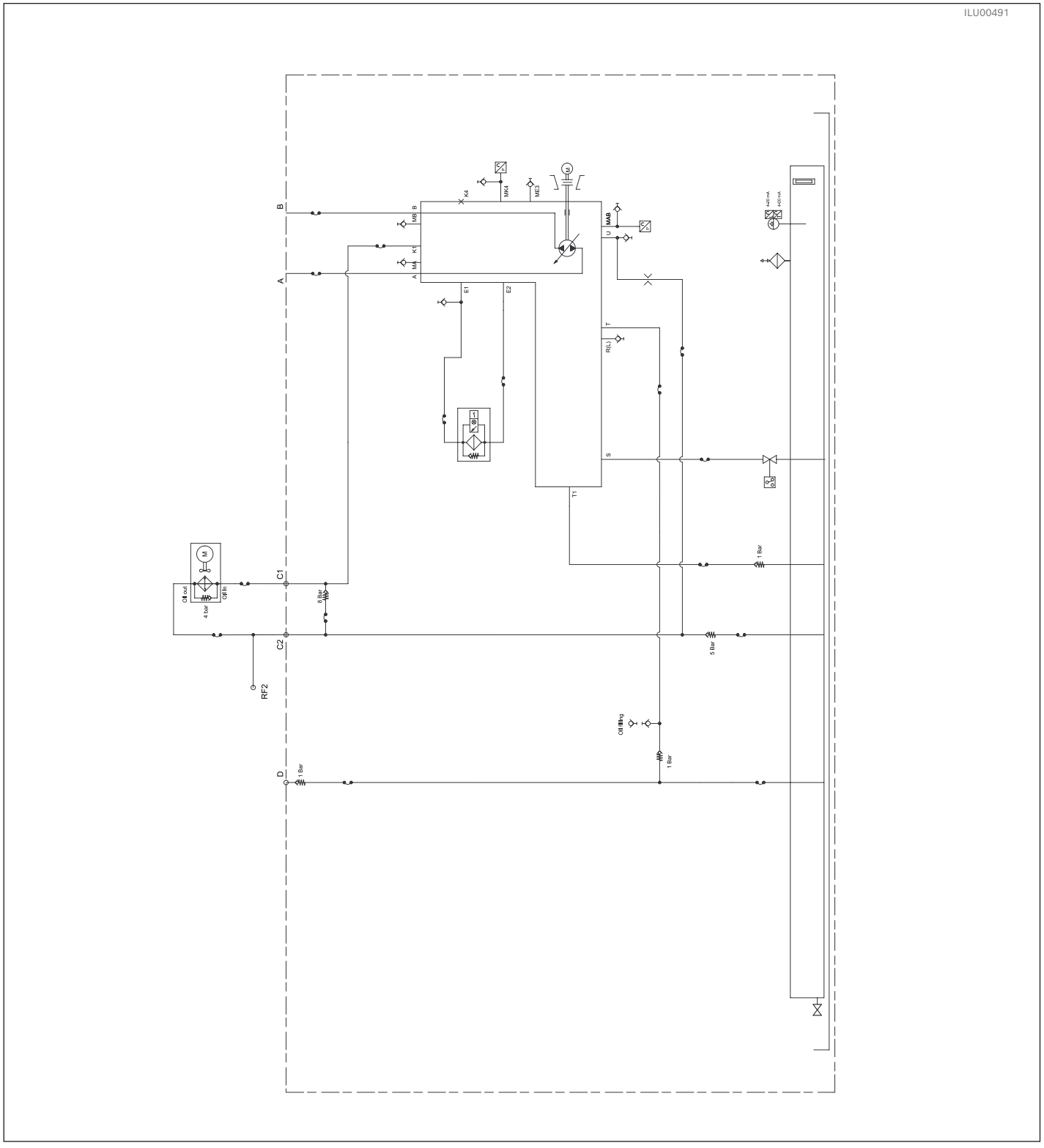


Fig. 1: Simplified hydraulic circuit single pump

3.2 Simplified hydraulic circuit SP tandem pumps.

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

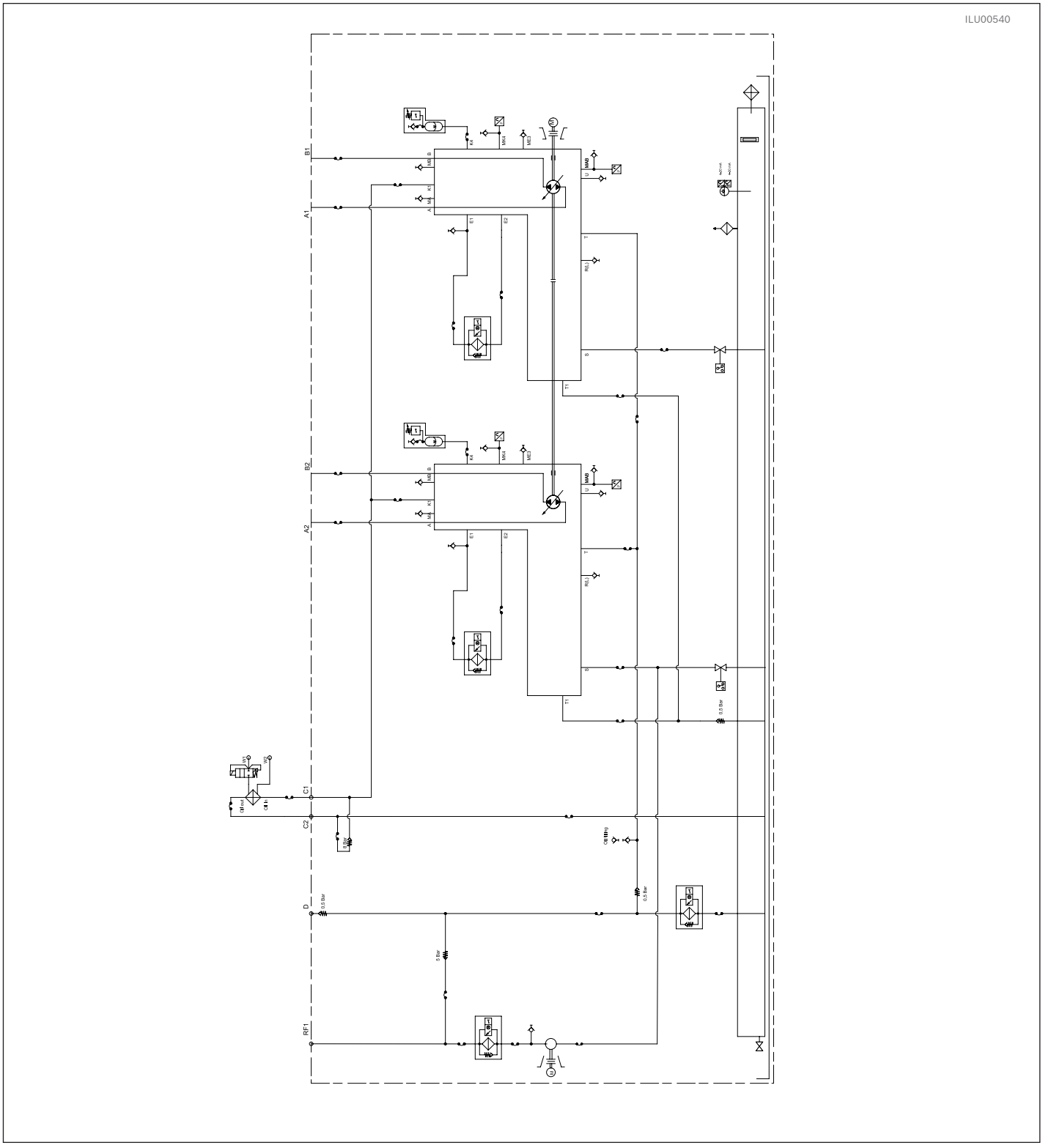


Fig. 2: Simplified hydraulic circuit double pumps

3.3 Monitoring logic diagram

The monitoring logic diagram describes the necessary monitoring of the unit. Depending of selection of control system, some of these functions will be controlled by the control system and status is send on the customer interface, and some have to be covered by the factory system. Most levels are adjustable, the diagram below show an example for a specific oil.

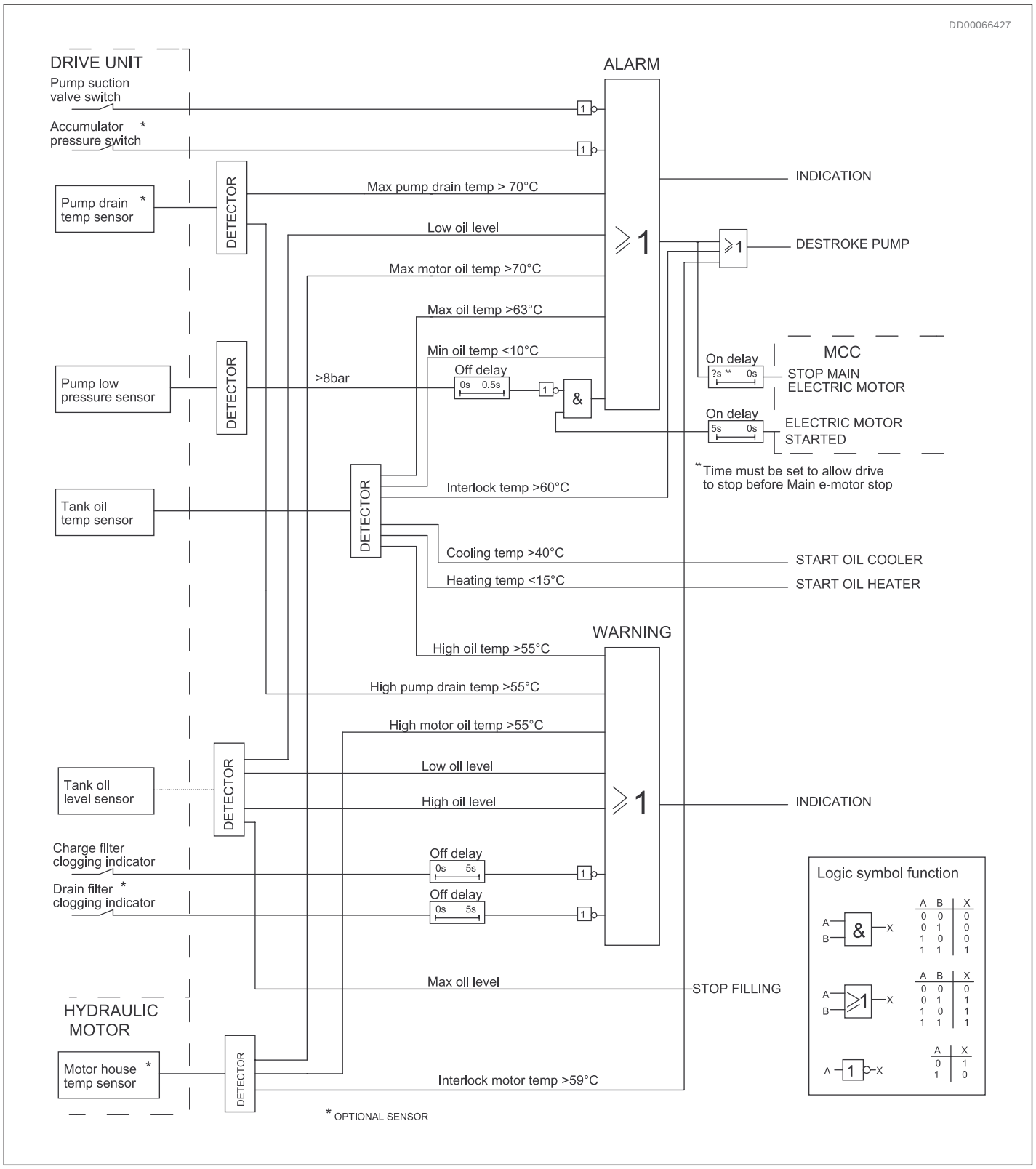


Fig. 3: Example of monitoring logic diagram with ISO VG 68 oil

4 Technical data

4.1 Drive unit (DUc)

4.1.1 Weights

Table 4: Weight drive unit

Frame size	Weight without oil, electric motor, tank, pump and cooler	
	kg*	lb*
MS2	450	1 000
MT2	600	1 350
MS3	750	1 650
MT3	800	1 800
LS2	700	1 550
LT2	750	1 650
LS3	1 300	2 900
LT3	1 450	3 200

* Values are rounded up to even fifties

Table 5: Weight tank

Frame size	Volume	Weight incl. tank cover	
		kg*	lb*
MS2	100	70	155
MT2	150	85	185
MS3	150	90	200
MS3	170	95	210
MT3	260	120	265
MT3	310	130	285
LS2	180	90	200
LT2	280	120	265
LS3	350	135	300
LS3	500	160	355
LT3	560	180	395
LT3	670	200	440

* Values are rounded up to even fives

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

Innomotics			WEG		
	Weight			Weight	
kW	kg	lb	hp	kg	lb
0,75	14	31	1	12	26
3	38	84	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	670	1477	100	517	1 140
90	730	1609	125	721	1 590
110	971	2141	150	760	1 675
132	991	2185	200	950	2 094
160	1250	2756	250	950	2 094
200	1340	2954	300	1 080	2 381
250	1593	3612	350	1 213	2 674
315	1 653	3644	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 top cover

Frame size	Top cover size	Weight 2 compartments		Weight 3 compartments	
		kg*	lb*	kg*	lb*
M	800	110	235	170	375
M	1000	125	270	195	425
M	1200	140	305	215	475
M	1500	170	370	260	575
L	1000	155	335	245	540
L	1200	170	375	275	600
L	1500	210	455	325	715
L	1700	225	495	355	775

* Values are rounded up to even fives

Table 9: Weight flushing circuit (without electric motor)

Flushing type	Electric motor		Weight	
	kW	hp	kg	lb
Cold flushing with pump	0,75	1	85	190
Cold flushing with pump	3	5	90	200
Warm and cold flushing with pump	7,5	10	95	210

Table 10: 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

Table 11: Weight air- oil cooler

Air-oil cooler type	Weight	
	kg	lb
HDC 050-4	38	84
HDC 060-4	62	137
HDC 080-4	102	224
HDC 085-6	144	317
HDC 090-6	175	385
HDC 100-4	220	485
HDC 100-6	196	432
HDC 200-4	429	946
HDC 200-6	433	955

Table 12: 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 13: 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 280 l tank,
B120T-120 plate cooler and cold flushing with pump.
Electric motor, Innomotics 200 kW
Pumps, SP250+SP250
Top cover, L2 1500

Solution:
Weights from tables:
Drive unit without electric motor and pump 750 kg
Tank 120 kg
Cooler 55 kg
Cold flushing 90 kg
Electric motor for flushing, 30 kg (Innomotics 3,0 kW)
Electric motor, 1 340 kg
Pumps, 559 kg (267+267+25)
Top cover, 210 kg

Total weight :
750+120+55+90+30+1340+559+210=3 154 kg
Round the value up to even hundreds: 3 200 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.

Table 14: 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.

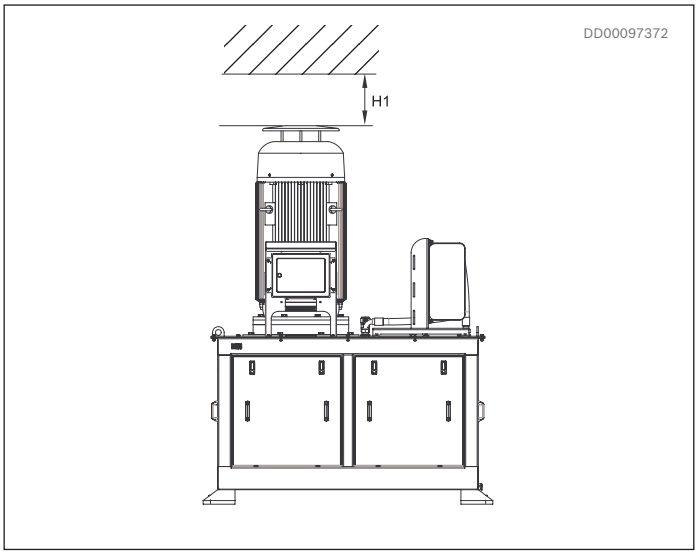


Fig. 4: Recommended minimum space over electric motor

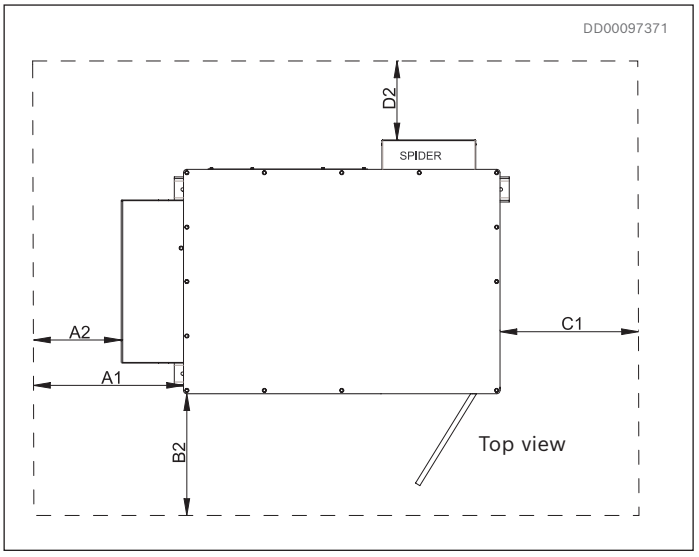


Fig. 6: Recommended minimum space around DUc MT2, MT3, LT2 and LT3

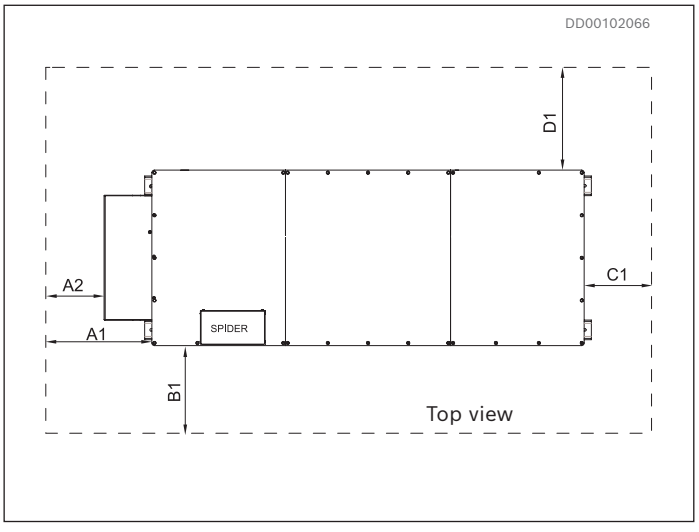


Fig. 5: Recommended minimum space around DUc MS2, MS3, LS2 and LS3

4.1.3 Dimensions DUc

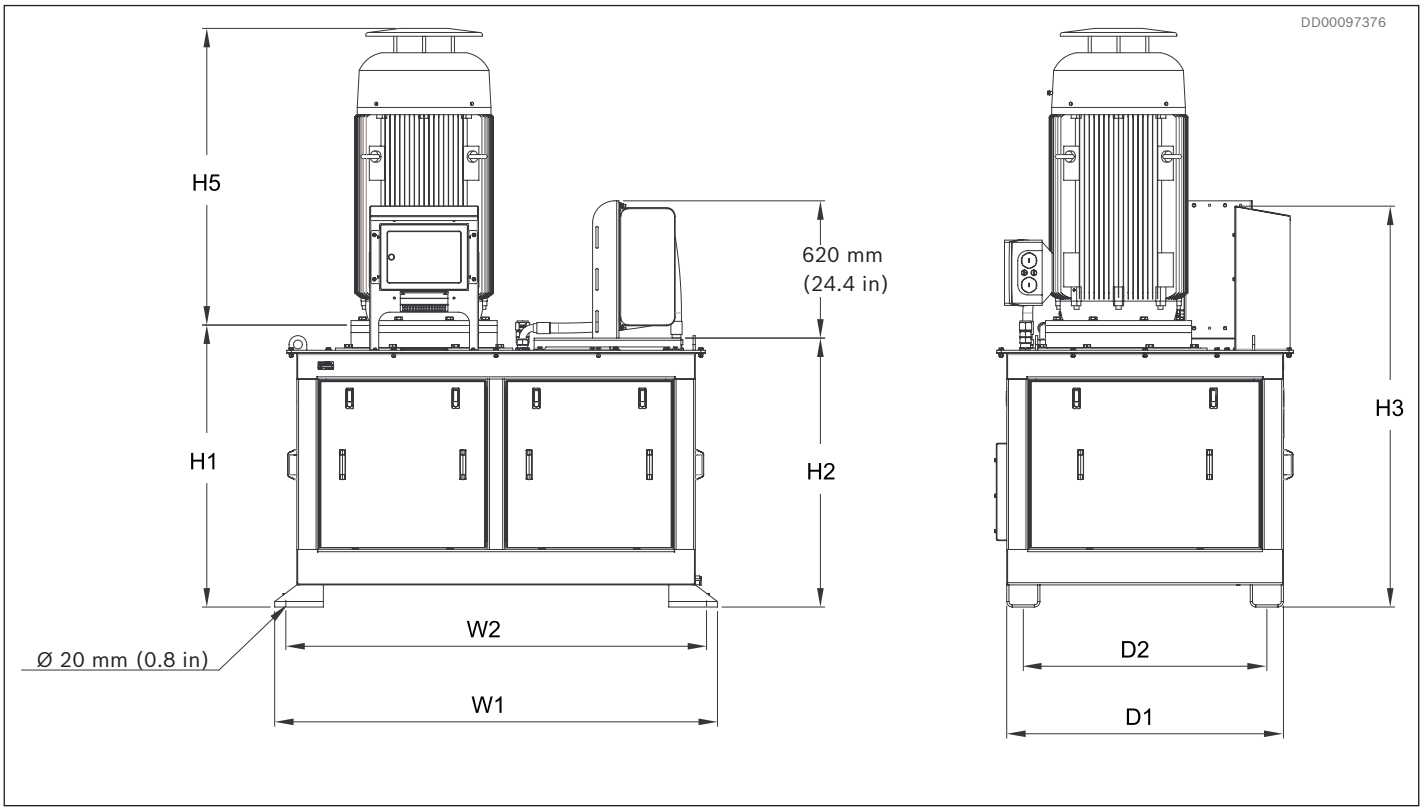


Fig. 7: DUc LS2 with water-oil plate cooler

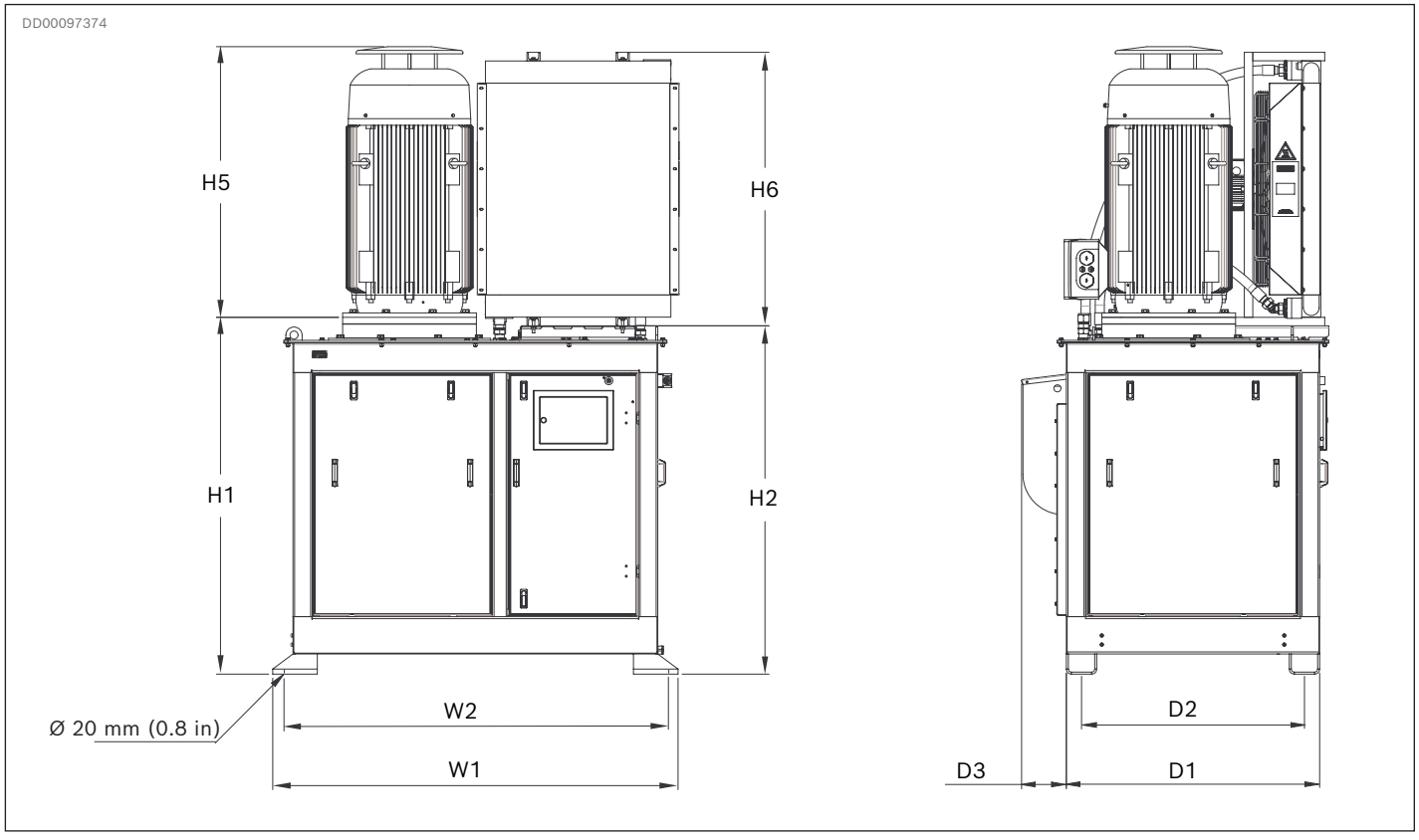


Fig. 8: DUc LT2 with air-oil cooler

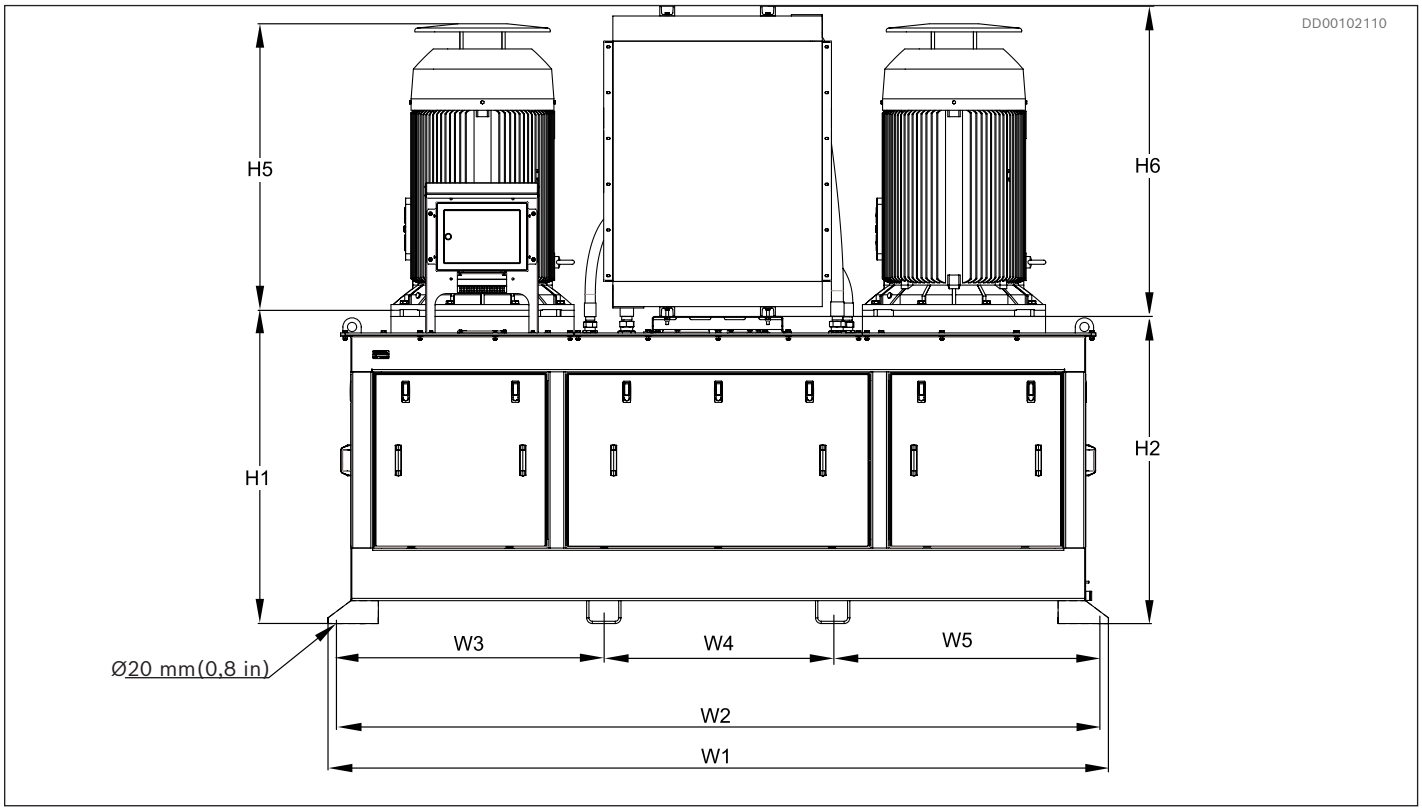


Fig. 9: DUc LS3 with air-oil cooler

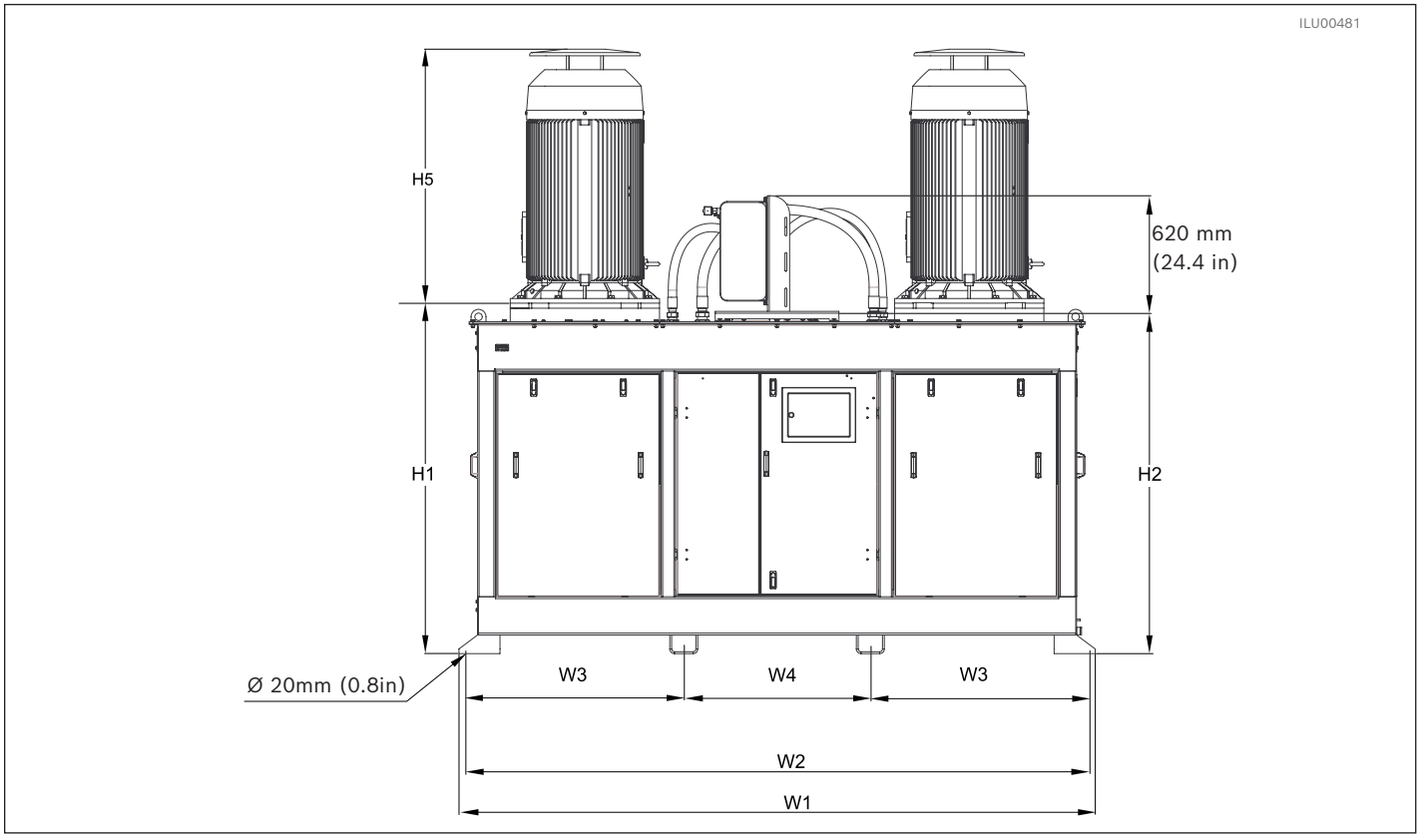


Fig. 10: DUc LT3 with water-oil plate cooler

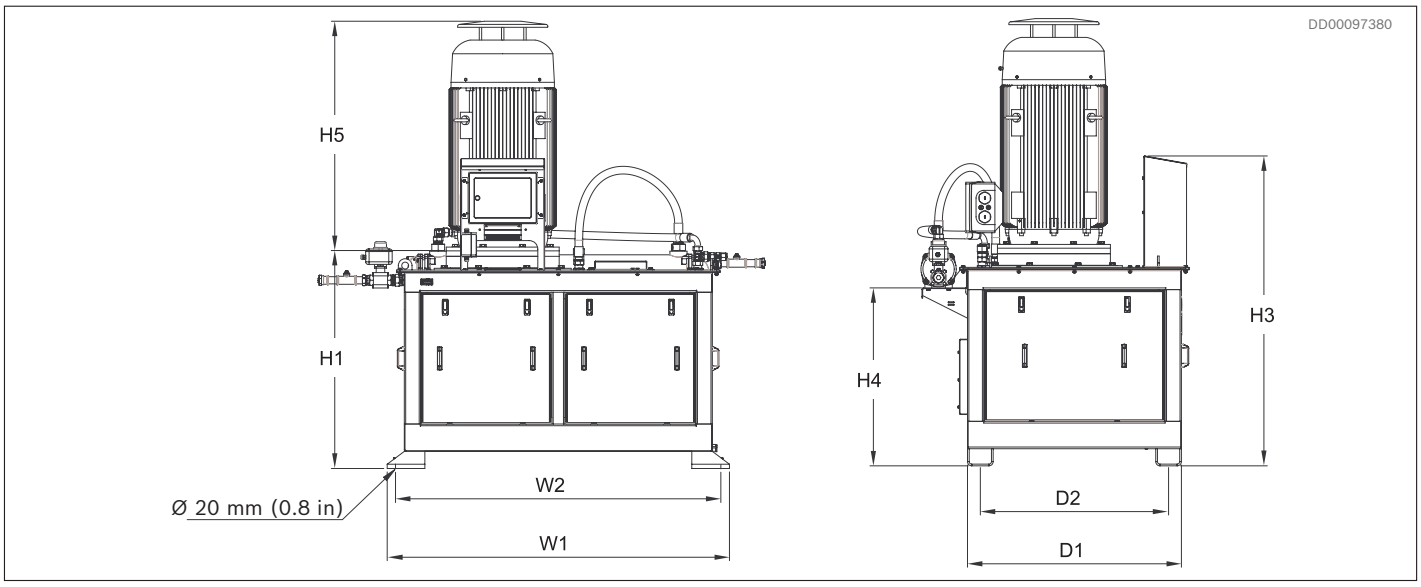


Fig. 11: DUc LS2 with water-oil tube cooler

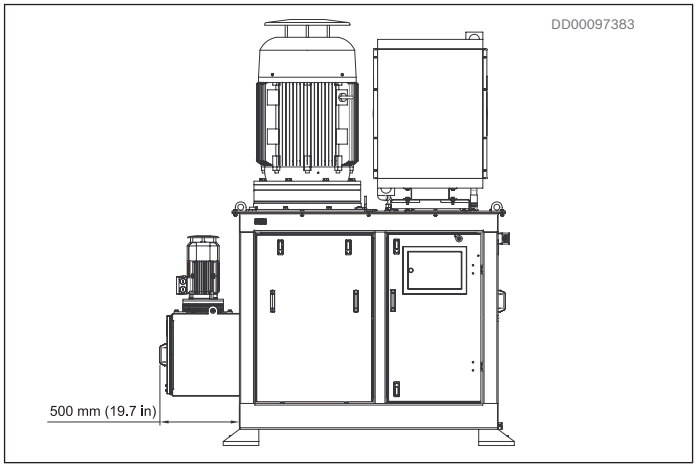


Fig. 12: DUc MT2 with extra frame box

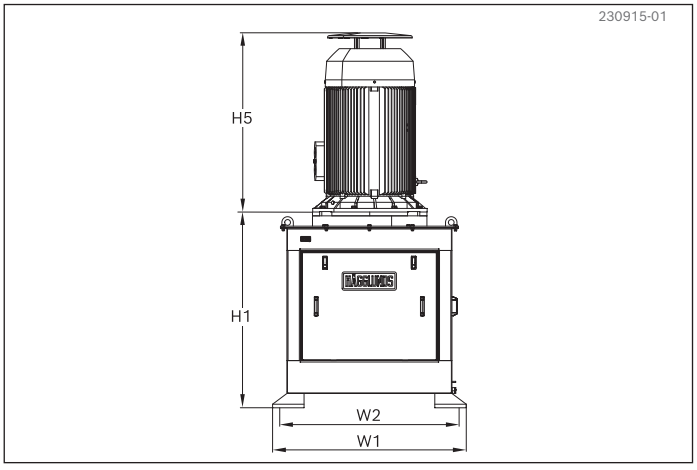


Fig. 13: DUc LS1

An extra frame box is used for the external warm/cold flushing, external cold flushing, and brake circuit for 60 bar. The 500mm measurement is the same for all sizes of frames.

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

Table 15: Dimensions DUc

Type	H1*		H2		H3		H4		W1		W2		W3		W4		D1		D2		D3	
DUc	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**	**mm**	**in**
MS1	1131	44.5	–	–	–	–	–	–	1057	41.6	957	37.7	–	–	–	–	1000	39.4	850	33.5	–	–
MT1	1615	63.6	–	–	–	–	–	–	1057	41.6	957	37.7	–	–	–	–	1000	39.4	850	33.5	–	–
MS2	1131	44.5	1088	42.8	1771	69.7	847	33.3	1800	70.9	1700	66.9	–	–	–	–	1000	39.4	850	33.5	–	–
MT2	1615	63.6	1572	61.9	–	–	1414	55.7	1800	70.9	1700	66.9	–	–	–	–	1000	39.4	850	33.5	220	8.7
MS3	1131	44.5	1088	42.8	1771	69.7	958	37.7	2970	116.9	2870	113.0	925	36.4	1020	40.2	1000	39.4	850	33.5	–	–
MT3	1615	63.6	1572	61.9	–	–	1414	55.7	2970	116.9	2870	113.0	990	39.0	890	35.0	1000	39.4	850	33.5	220	8.7
LS1	1461	57.5	–	–	–	–	–	–	1354	53.3	1254	49.4	–	–	–	–	1250	49.2	1100	43.3	–	–
LT1	1995	78.5	–	–	–	–	–	–	1354	53.3	1254	49.4	–	–	–	–	1250	49.2	1100	43.3	–	–
LS2	1461	57.5	1418	55.8	2021	83.5	1278	50.3	2000	78.7	1900	74.8	–	–	–	–	1250	49.2	1100	43.3	–	–
LT2	1995	78.6	1952	76.9	–	–	1782	70.2	2000	78.7	1900	74.8	–	–	–	–	1250	49.2	1100	43.3	220	8.7
LS3	1461	57.5	1418	55.8	2021	83.5	1248	49.1	3410	134.3	3310	130.3	1155	45.5	1000	39.4	1250	49.2	1100	43.3	–	–
LT3	1995	78.6	1952	76.9	–	–	1667	65.6	3410	134.3	3310	130.3	1155	45.5	1000	39.4	1250	49.2	1100	43.3	280	11.0

The general tolerance for the dimensions are according to ISO 13920:2023 class B for welded parts

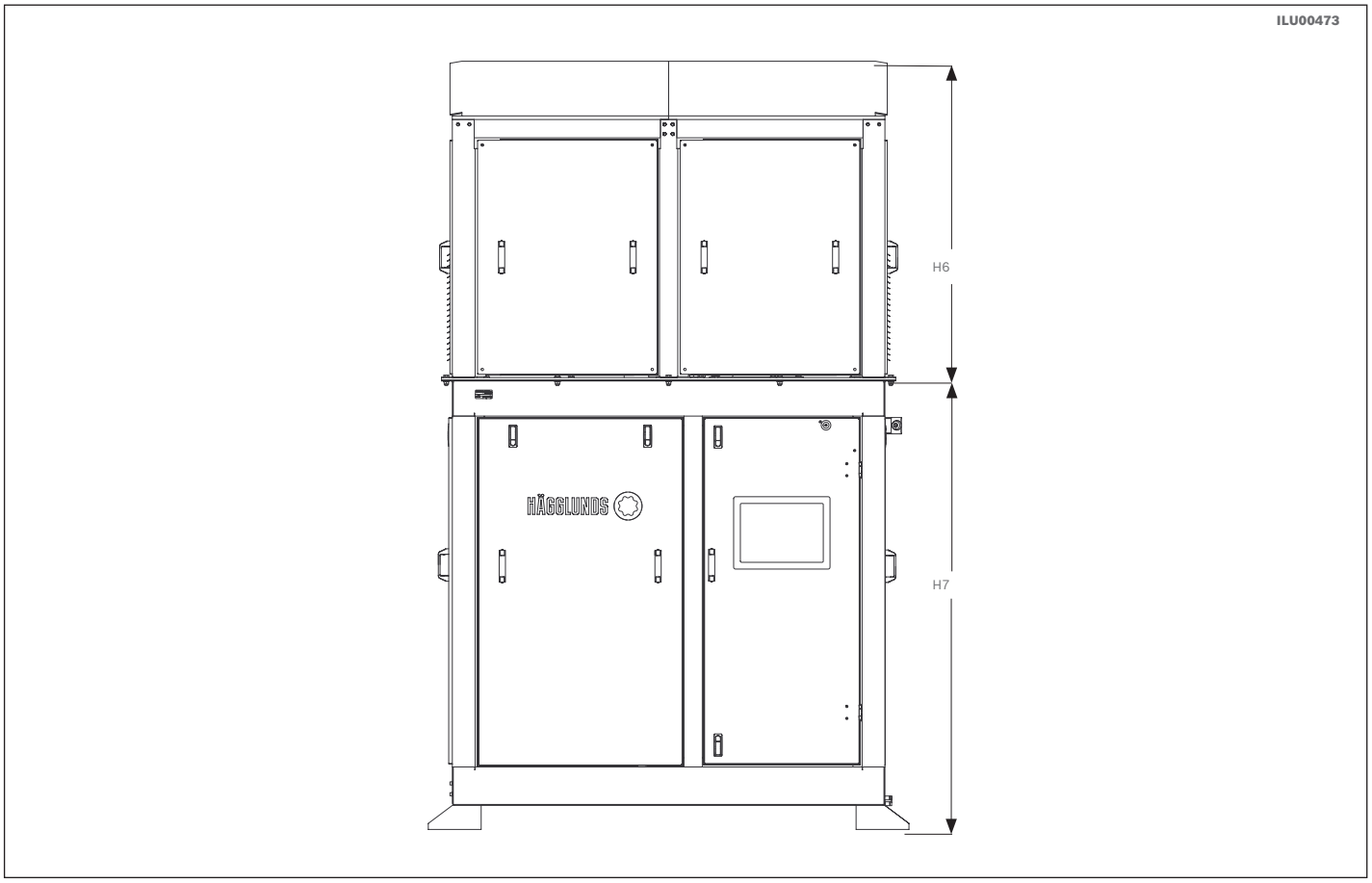


Fig. 14: DUc LT2 with top cover

Table 16: Top cover height

Frame size	Electric Motor Power(Kw)	Top cover height H6		Heightframe H7	
		mm	in	mm	in
MS	11-30	895	35.2	1016	40.0
MS	37-55	1095	43.1	1016	40.0
MS	75-132	1295	51.0	1016	40.0
MT	22-30	895	35.2	1500	59.1
MT	37-55	1095	43.1	1500	59.1
MT	75-132	1295	51.0	1500	59.1
MT	160-200	1595	62.8	1500	59.1
LS	55	1117	44.0	1270	50.0
LS	75-132	1317	51.9	1270	50.0
LS	160-315	1617	63.7	1270	50.0
LS	355-500	1817	71.5	1270	50.0
LT	75-132	1317	51.9	1880	74.0
LT	160-315	1617	63.17	1880	74.0
LT	355-500	1817	71.5	1880	74.0

4.1.4 Dimensions components

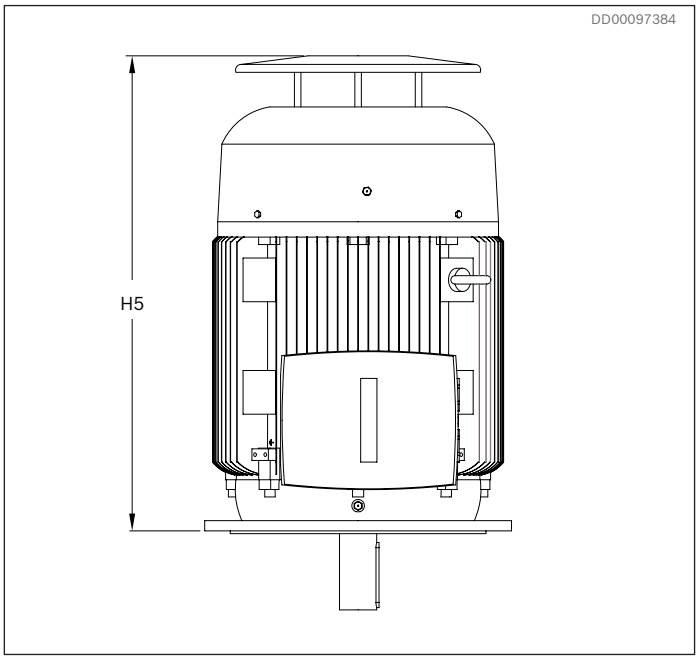


Fig. 15: Electric motor

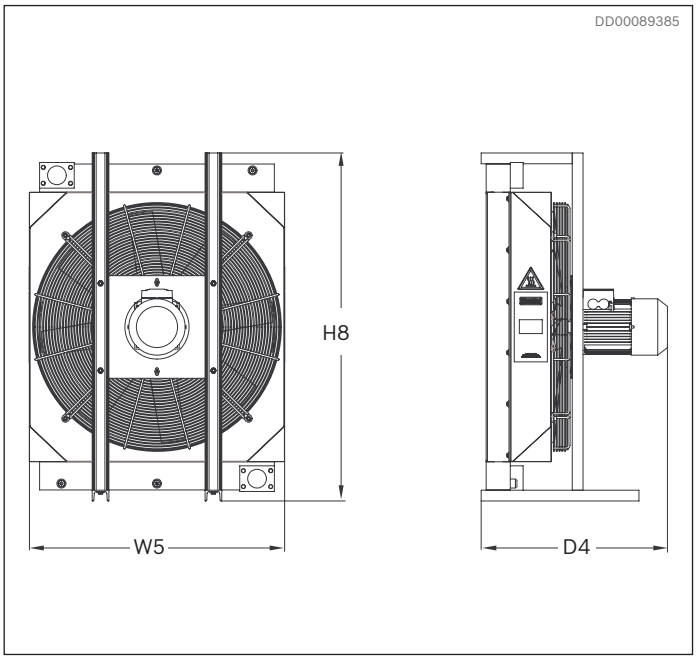


Fig. 16: Air-oil cooler

Table 17: Dimensions electric motor

Innomotics	H5		WEG	H5	
(kW)	mm	in	(hp)	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	1040	40.9	100	931	36.7
90	1040	40.9	125	1065	41.9
110	1067	42.0	150	1065	41.9
132	1067	42.0	200	1147	45.2
160	1297	51.0	250	1147	45.2
200	1297	51.0	300	1341	52.8
250	1362	53.6	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 18: Dimensions air -oil cooler

Cooler size	W5		H8		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

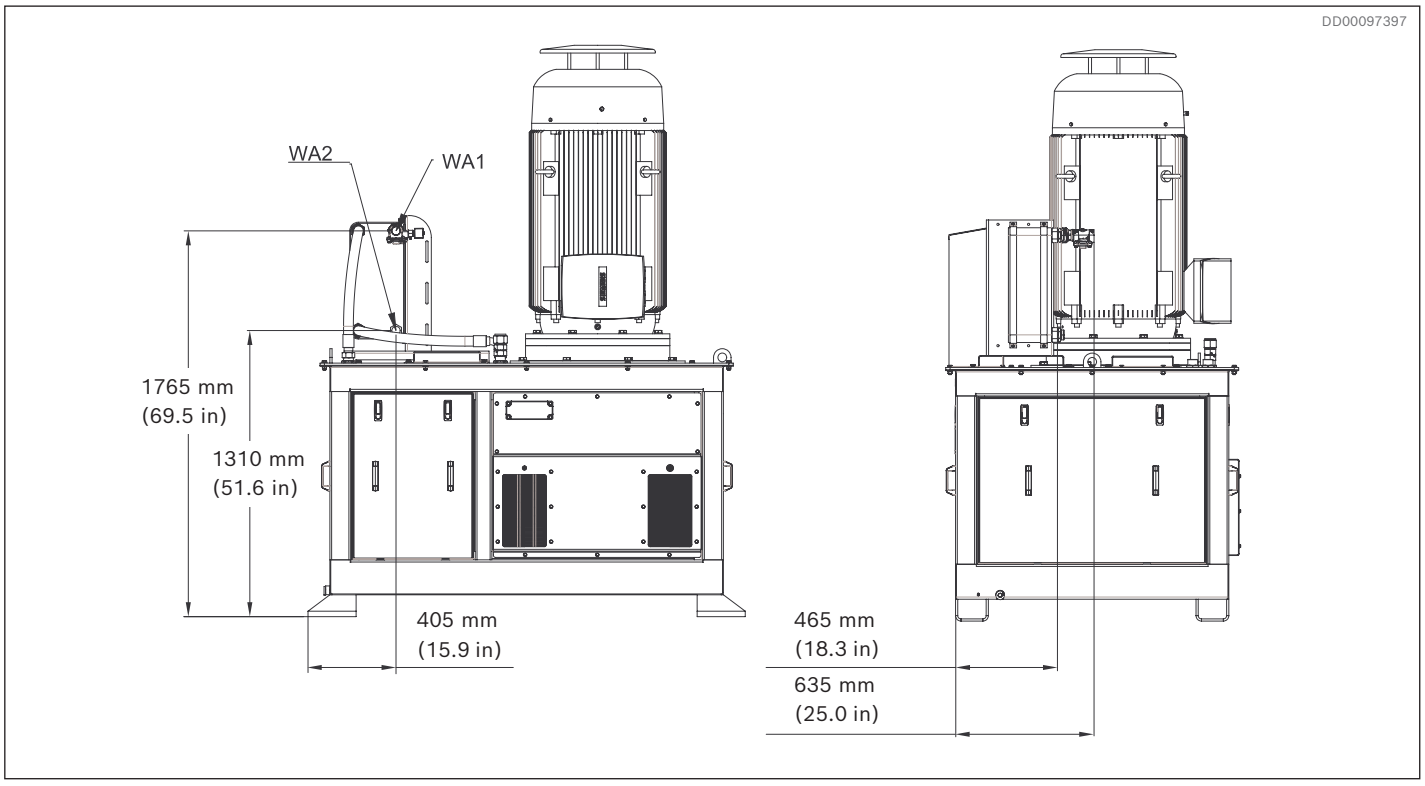


Fig. 17: Example with a DUc LS2 and B120T-080 water-oil plate cooler

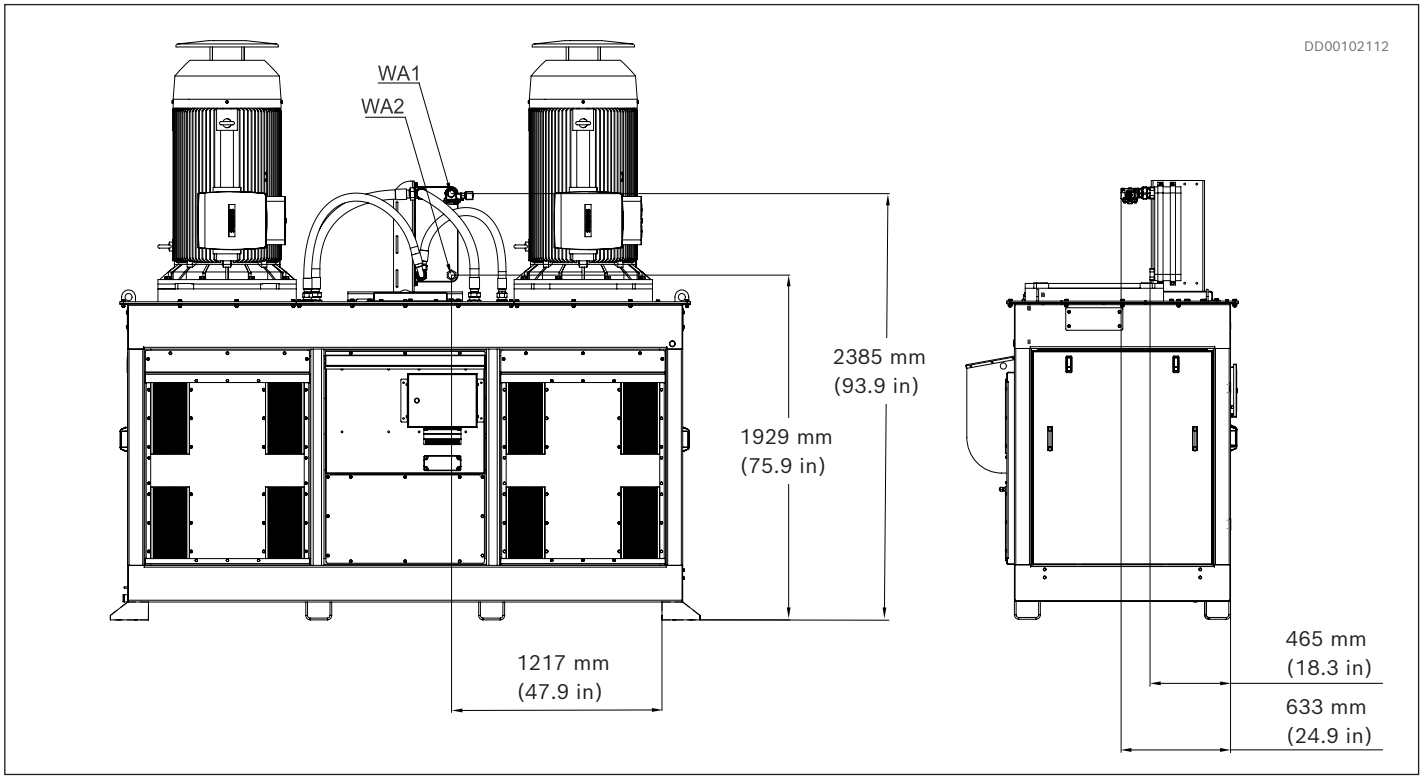


Fig. 18: Example with a DUc LT3 and B120T-120 water-oil plate cooler

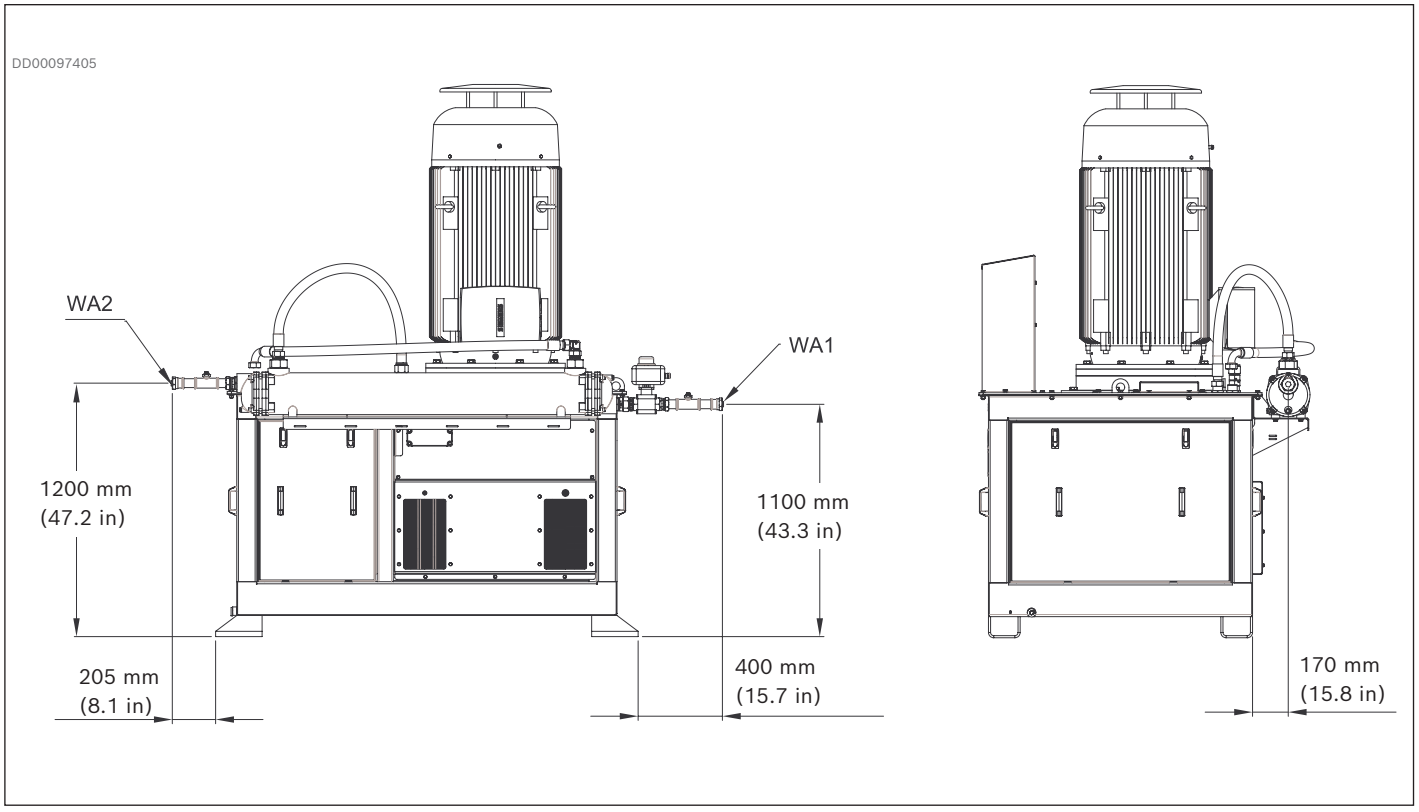


Fig. 19: Example with a DUc LS2 and GK600 water-oil tube cooler

For exact dimensions and placement of water-oil plate and tube cooler see order specific Hägglunds DUc documentation.

4.1.6 Connections

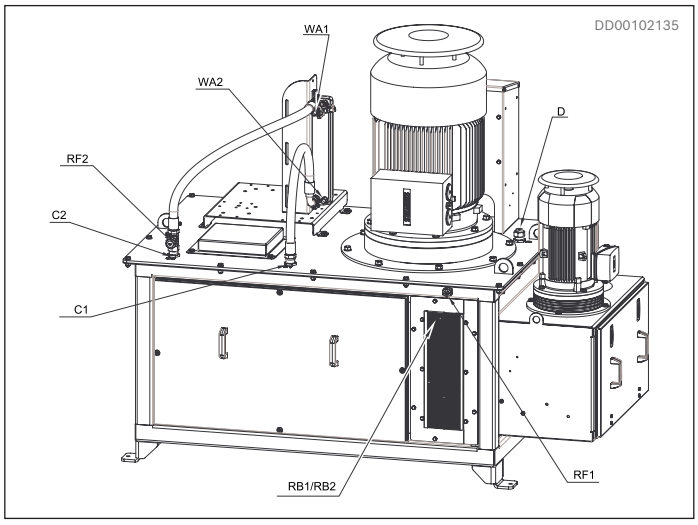


Fig. 20: Connections DUc MS2

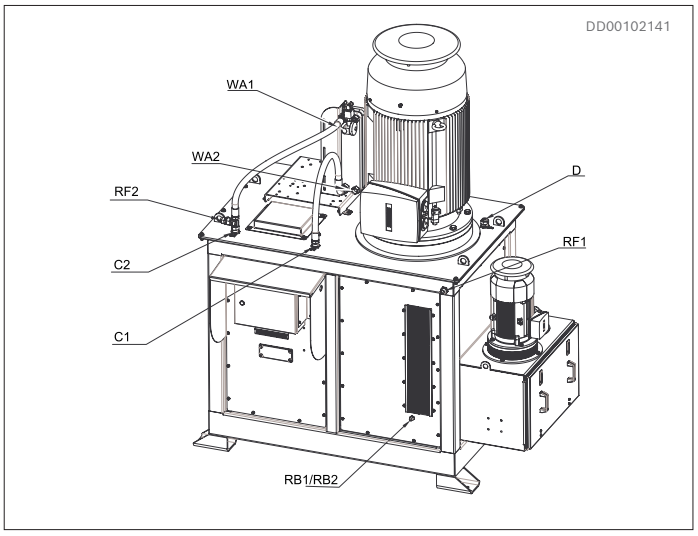


Fig. 21: Connections DUc MT2

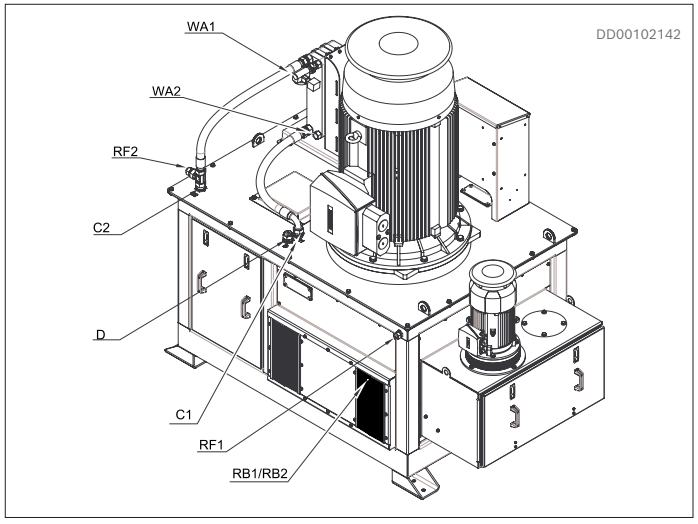


Fig. 22: Connections DUc LS2

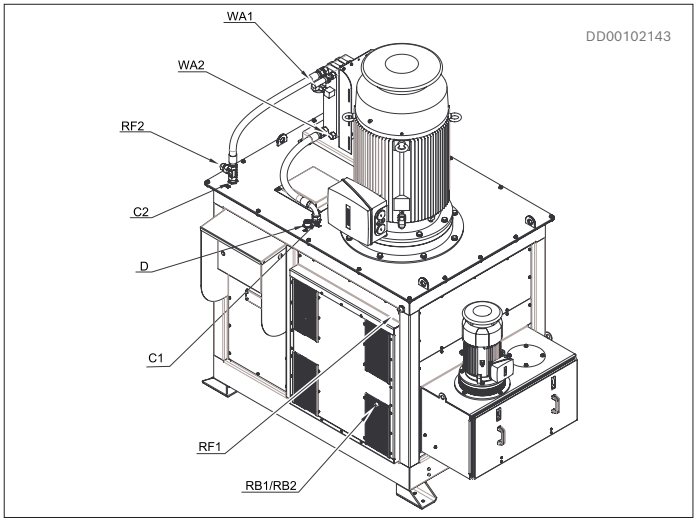


Fig. 23: Connections DUc LT2

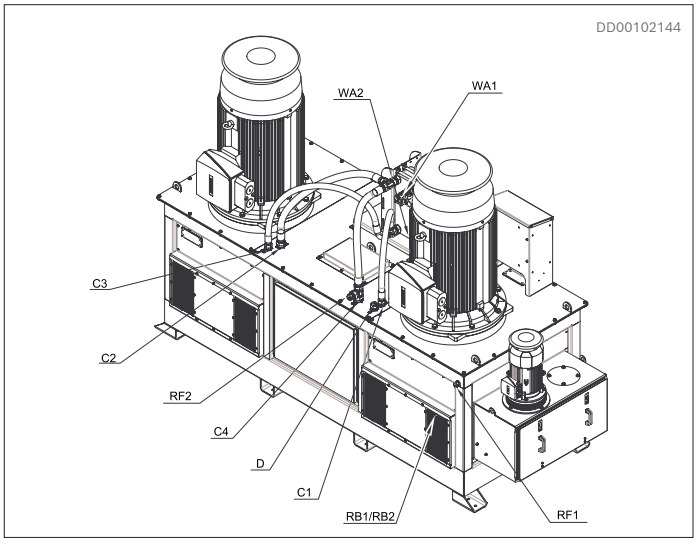


Fig. 24: Connections DUc LS3

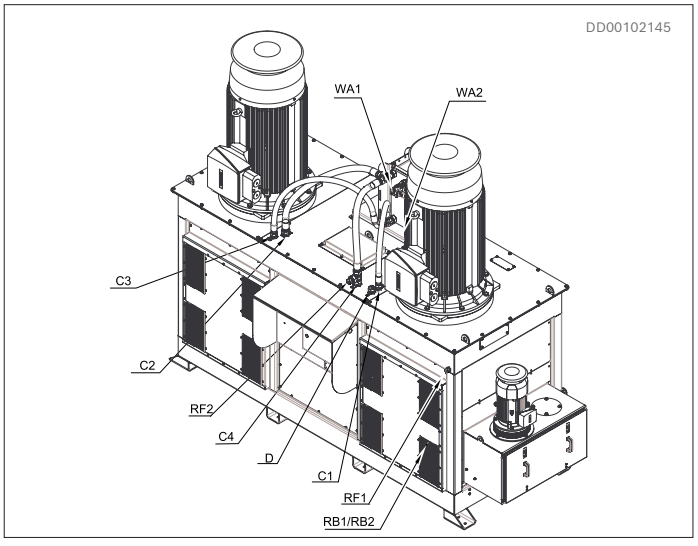


Fig. 25: Connections DUc LT3

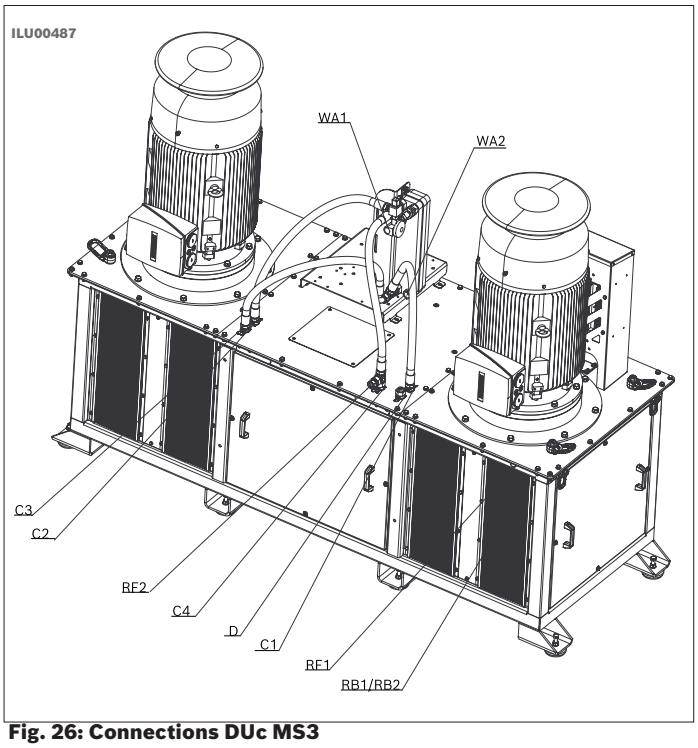


Fig. 26: Connections DUc MS3

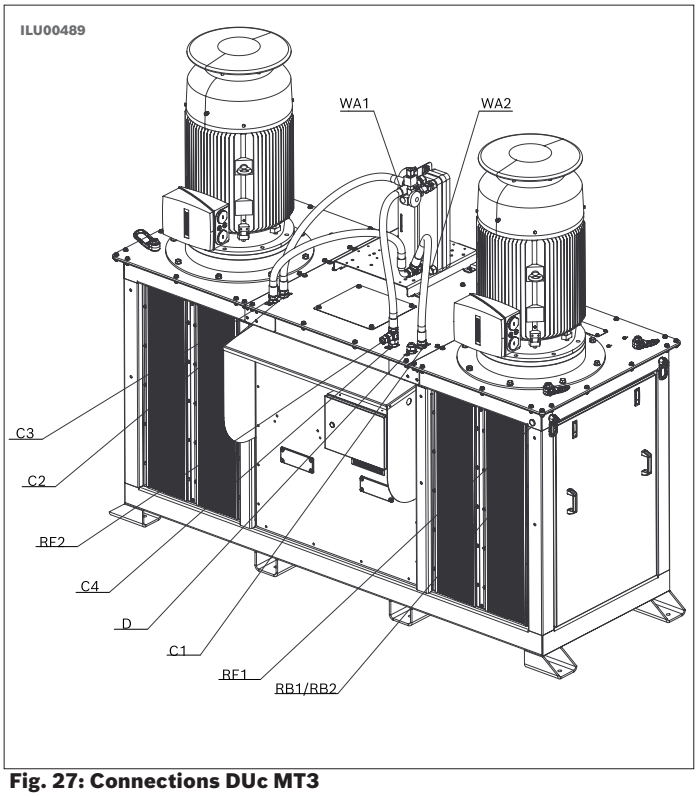


Fig. 27: Connections DUc MT3

Table 19: Hydraulic connections (European version)

	Medium frame – 2 compartments	Optional BSP	Medium frame – 3 compartments	Optional BSP	Large frame - 2 compartments	Optional BSP	Large frame - 3 compartments	Optional BSP	Function
C1	ISO 8434-1 28L Male	–	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 28L Male	–	ISO 8434-1 35L Male	–	ISO 8434-1 42L Male	–	Oil IN from cooler
C3*			ISO 8434-1 28L Male	–			ISO 8434-1 35L Male	–	Oil OUT to cooler
C4*			ISO 8434-1 28L Male	–			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″	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″	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″	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 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) single cooler 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 MS3, MT3, LS3 and LT3

Table 20: Hydraulic connections (American version)

	Medium frame – 2 compartments	Medium frame – 3 compartments	Large frame - 2 compartments	Large frame - 3 compartments	Function
C1	ISO 8434-2 1“ JIC Male	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" 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" JIC Male		ISO 8434-2 1-¼“ JIC Male	Oil OUT to cooler
C4*		ISO 8434-2 1" JIC Male		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	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	ISO 8434-2 1" JIC Male	Oil OUT flushing with check valve
RB1 **RB2**	ISO 8434-2 ⅜" JIC Male	ISO 8434-2 ⅜" JIC Male	ISO 8434-2 ⅜" JIC Male	ISO 8434-2 ⅜" JIC Male	Oil OUT to brake 1 Oil OUT to brake 2
D	ISO 8434-2 1“ JIC Male	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 single cooler 1¼” NPT Female single cooler 1” NPT Female 1½” NPT Female		1” NPT Female single cooler 1¼” NPT Female single cooler 1½” NPT Female serial connected cooler 1½” NPT Female		Water IN to cooler Water OUT from cooler

*Only used on MS3, MT3, LS3 and LT3

Table 21: 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 SP180	1 1/4" SAE J518C FLANGE CODE 62 - 6000 PSI	1/2"-13 UNC
SP250 SP355	1 1/2" SAE J518C FLANGE CODE 62 - 6000 PSI	5/8-11 UNC
SP500 SP750	2" SAE J518C FLANGE CODE 62 - 6000 PSI	3/4-10 UNC

Comment: Connection directly at pump

4.1.7 DUc oil pan volume

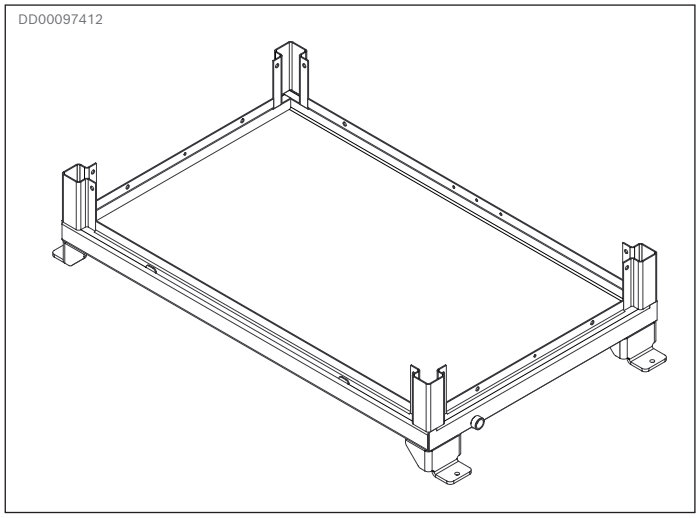


Fig. 28: Oil pan

Table 22: Oil pan volume

Frame size	l	gal
DUc MS2	135	35.7
DUc MT2	205	54,2
DUc MS3	240	63,4
DUc MT3	360	95.1
DUc LS2	290	76.6
DUc LT2	380	100,4
DUc LS3	515	136.0
DUc LT3	670	177.0

4.2 Main components

4.2.1 Electric motor

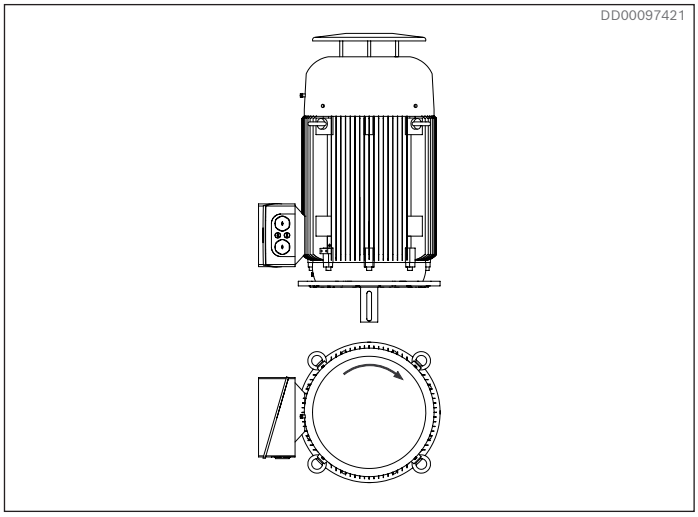


Fig. 29: Electric motor

Function

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

If the Hägglunds DUc will be operating in damp enviroment, 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 Innomotics (E) or WEG (A).

Technical data

Table 23: Technical data electric motor

Operating Duty:	E/A	S1
Method of mounting:	E	V1
	A	Vertical, F1 conduit box
Degree of protection:	E/A	IP55 (Motor and conn.box)
Output power	E/A	3-500 kW (5-650 hp)
Cooling form:	E/A	IC411, fan cooler.
Insulation class:	E	F/B
	A	F
Motor protection:	E	3 PTC thermistors, 150 ºC (302 ℉), 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 Lp:	E	≤ 85 dB(A) acc. to IEC 60034-9
	A	≤ 80 dB(A) acc. to IEC 60034-9
Service factor	E	1.15
	A	1.25

Standards

Table 24: Standards electrical motor

Standard	E	IEC/EN 60034
	A	NEMA MG1
EU Efficiency classes:		According to IEC 60034-30, Efficiency class IE3 (3-55 kW, 355-500 kW) Efficiency class IE3/IE4 (75-315 kW) IE4 when 400V/50Hz or 460V/60Hz
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).

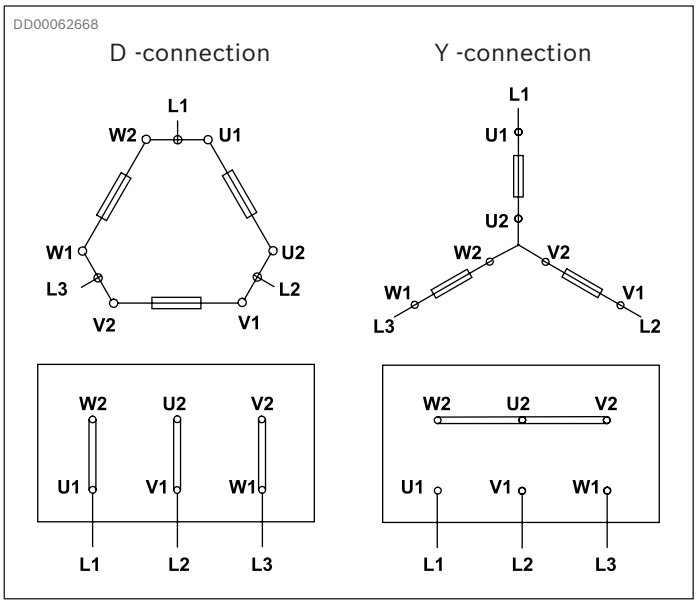


Fig. 30: D and Y connections

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.

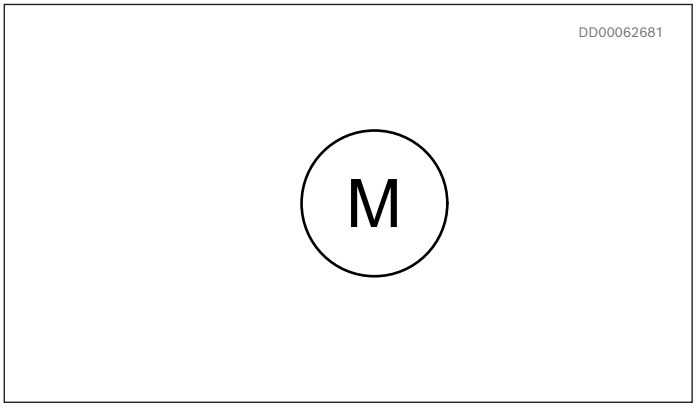


Fig. 31: Hydraulic symbol

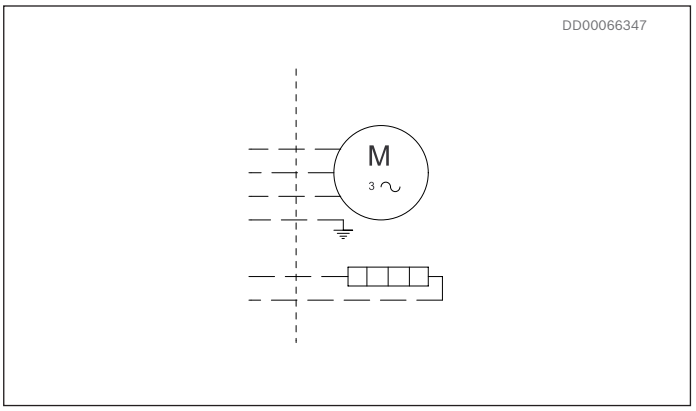


Fig. 32: Electrical symbol

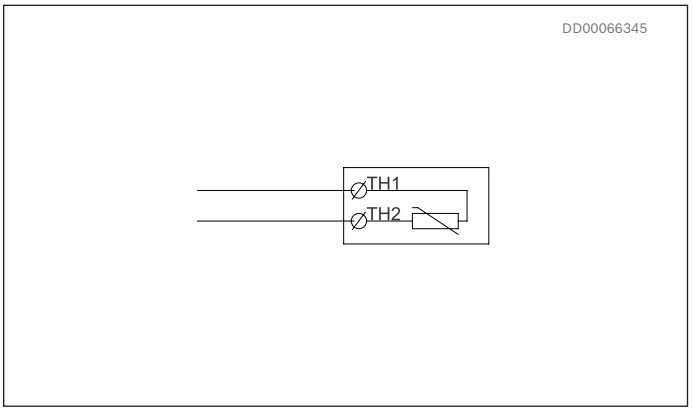


Fig. 33: Electrical symbol (thermistor)

4.2.2 Main pump SP

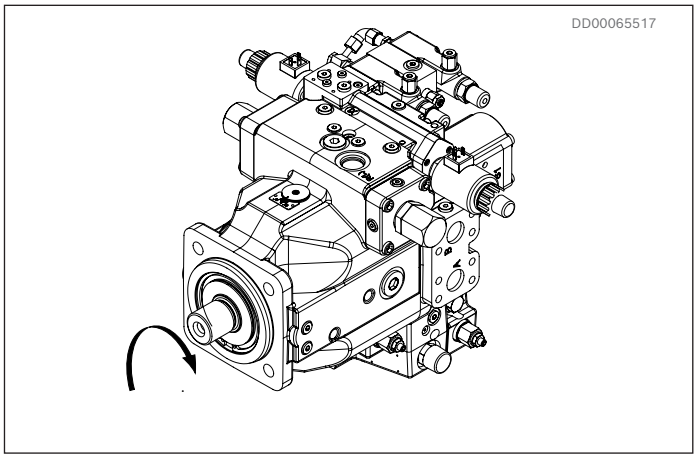


Fig. 34: Pump SP size 40 to 180

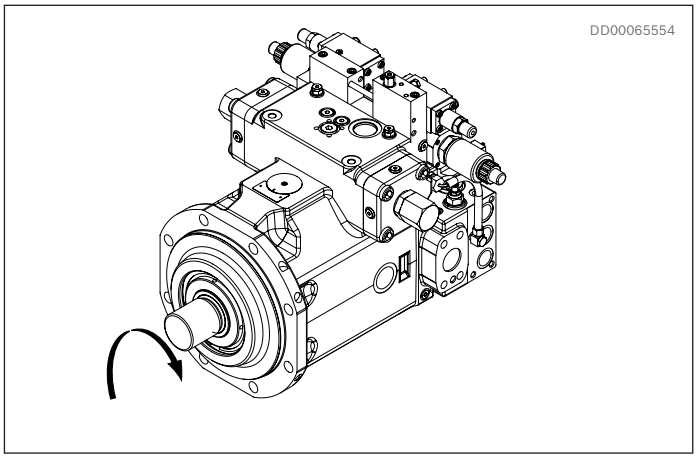


Fig. 35: Pump SP size 250 to 750

Functions

- Variable displacement axial piston pump of swashplate 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

Table 25: Pump displacement

Size				**40**	**71**	**125**	**180**	**250**	**355**	**500**	**750**
Displacement	Variable pump	$V_{g\,max}$	cm^3	40	71	125	180	250	355	500	750
	Charge pump	$V_{g\,H}$	cm^3	20	25	40	45	63	80	98	143

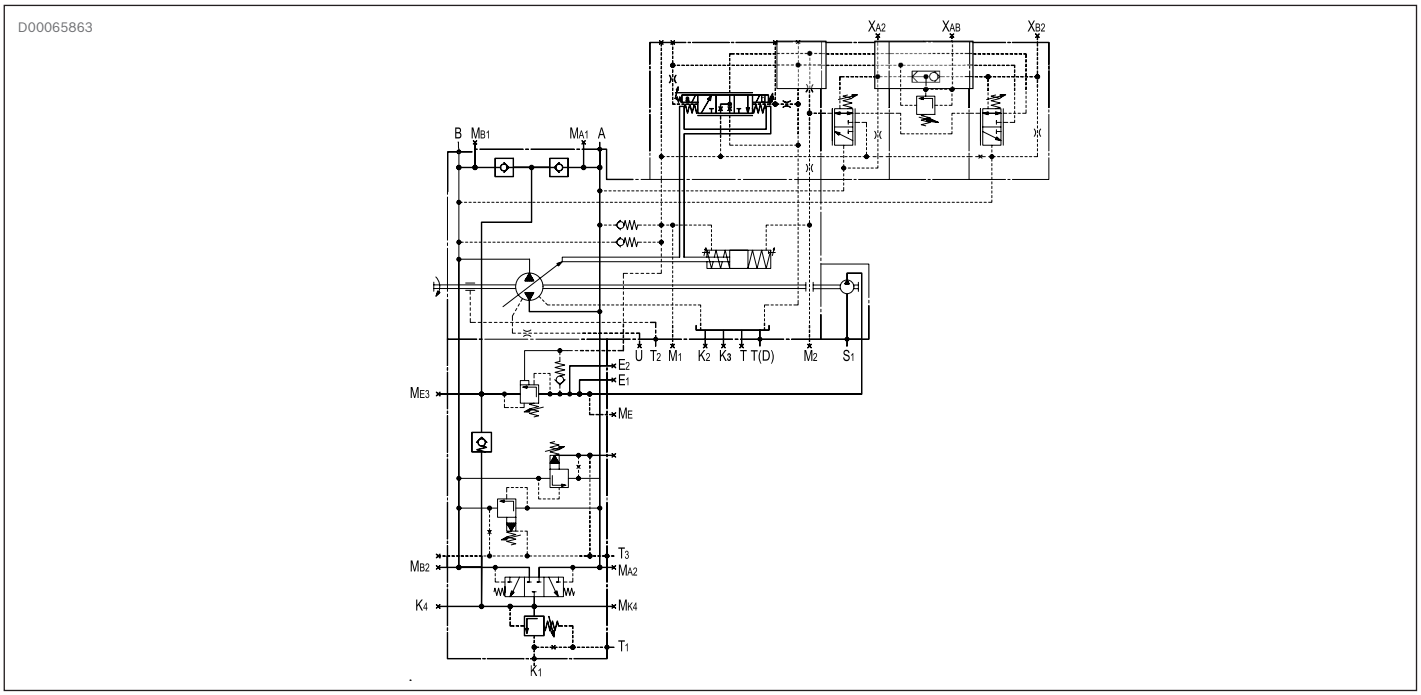


Fig. 36: Principal hydraulic circuit for SP pump size 40-180

Table 26: Working pressure range SP 40 to SP 180

Pressure at working ports A or B			**Definition**
Nominal pressure p_{nom}		350 bar	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}		400 bar	The maximum pressure corresponds to the maximum working pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.
Single operating period		1 s	
Total operating period		300 h	
Minimum pressure (high-pressure side)		15 bar	Minimum pressure at the high-pressure side (**A** or **B**) which is required to prevent damage to the axial piston unit.
Minimum pressure (low-pressure side)		Speed related	Minimum pressure at the low-pressure side (**A** or **B**) which is required in order to prevent damage to the axial piston unit. The low pressure is present at port $\mathbf{M_{K4}}$ with the flushing slide deflected.
Rate of pressure change $R_{A\ max}$		16000 bar/s	Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range.
Boost pressure			
Minimum boost pressure p_{Sp} (at n_{nom})		16 bar	Measuring port $\mathbf{M_{K4}}$ (Please contact Bosch Rexroth representative for coupled multiple pumps)
Maximum static boost pressure $p_{Sp\ max}$		25 bar	
Permissible pressure peaks in boost pressure	minimum	4 bar	
	maximum	40 bar	
Pressure at suction port S (version with integrated boost pump)			
Minimum pressure $p_{S\ min}$		≥ 0.8 bar absolute	Minimum pressure at suction port **S** (inlet) that is required in order to avoid damage to the axial piston unit.
Maximum pressure $p_{S\ max}$		30 bar absolute	
Control pressure for EP and HD control.			
Minimum required control pressure $p_{St\ min}$		30 bar + (Pn-Ps)	Measuring port $\mathbf{ME_3}$ for Pn= pump in neutral,Ps= pump on stroke **ME** measuring port for control pressure (should be about 37 bar depending on viscosity and pump size)

Reference

For more information see the specific data sheet RE 15328

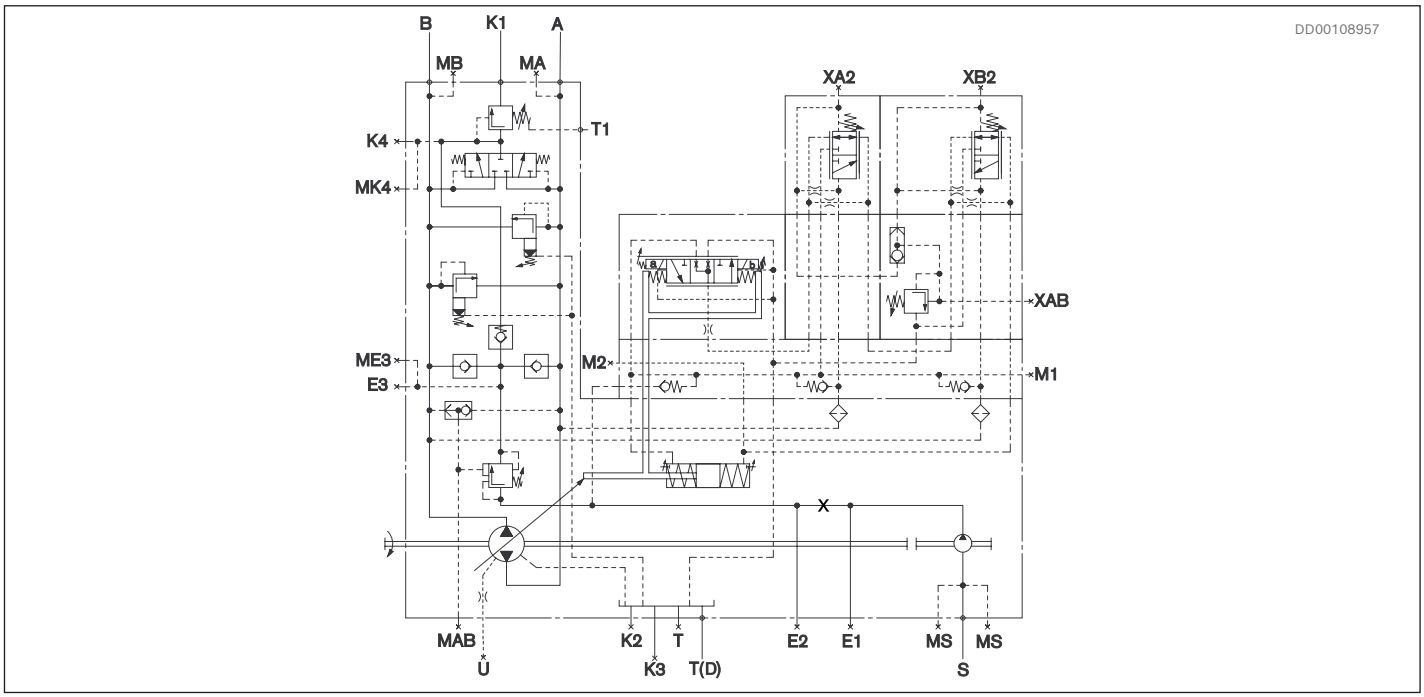


Fig. 37: Principal hydraulic circuit for SP 250 to SP 750

Table 27: Working pressure range SP 250 to SP 750

Pressure at working ports A or B			**Definition**
Nominal pressure p_{nom}		350 bar	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}		400 bar	The maximum pressure corresponds to the maximum working pressure within the single operating period. The sum of the single operating periods must not exceed the total operating period.
Single operating period		1 s	
Total operating period		300 h	
Minimum pressure (high-pressure side))		15 bar	Minimum pressure at the high-pressure side (**A** or **B**) which is required to prevent damage to the axial piston unit.
Minimum pressure (low-pressure side)		Speed related	Minimum pressure at the low-pressure side (**A** or **B**) which is required in order to prevent damage to the axial piston unit. The low pressure is present at port $\mathbf{M_{K4}}$ with the flushing slide deflected.
Rate of pressure change $R_{A\ max}$		16000 bar/s	Maximum permissible speed of pressure build-up and reduction during a pressure change across the entire pressure range.
Boost pressure			
Minimum boost pressure p_{Sp} (at n_{nom})		16 bar	NG250 to 500 series 30
		20 bar	NG750 series 30
		10 bar	NG250 to 500 series 33
Maximum static boost pressure $p_{Sp\ max}$		30 bar	
Permissible pressure peaks in boost pressure	minimum	4 bar	
	maximum	40 bar	
Pressure at suction port S (version with integrated boost pump)			
Minimum pressure $p_{S\ min}$		≥ 0.8 bar absolute	Minimum pressure at suction port **S** (inlet) that is required in order to avoid damage to the axial piston unit.
Maximum pressure $p_{S\ max}$		30 bar absolute	
Control pressure for EP and HD control.			
Minimum required control pressure $p_{St\ min}$		30 bar + (Pn-Ps) SP355 35 bar + (Pn-Ps)	Measuring port $\mathbf{E_1}$ or $\mathbf{E_2}$ Pn= pump in neutral, Ps= pump on stroke

Measuring port $\mathbf{M_{K4}}$ (Please contact Bosch Rexroth representative for coupled multiple pumps)

Reference

For more information see the specific data sheet RE 15333

4.2.3 Water-oil cooler - plate type

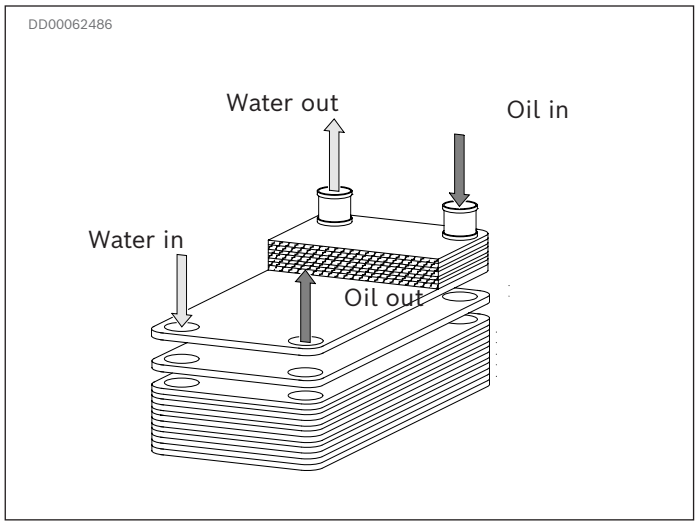


Fig. 38: Plate cooler function

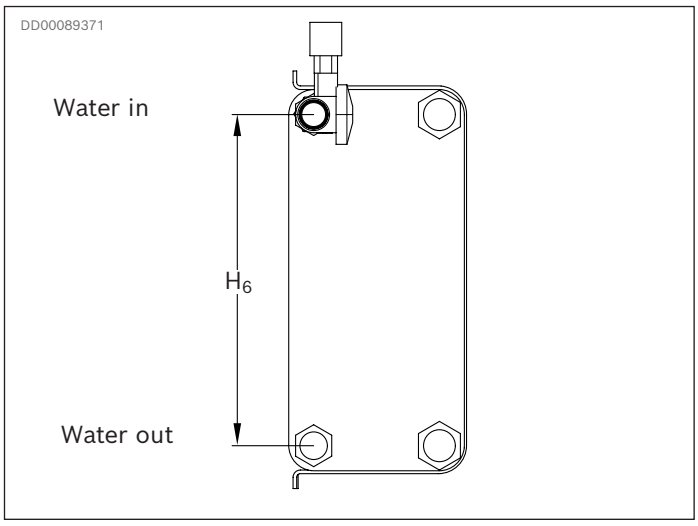


Fig. 39: Water connections plate cooler

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 28: Material Plate cooler

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

Table 29: 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

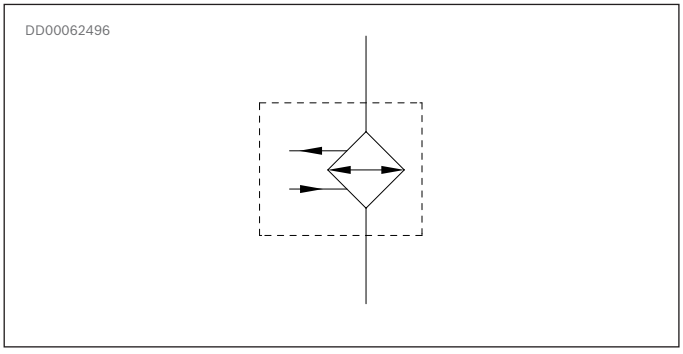


Fig. 40: Hydraulic symbol

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 machine 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 water at room temperature. In the table, a number of important chemical components are listed, however the actual corrosion is a very complex process influenced by many different components in combination. This document is therefore a considerable simplification and should not be overvalued!

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

Table 30: 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		+	0/+
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
In general low pH (below 6) increase corrosion risk and high pH (above 7.5) decrease the corrosion risk	6.0-7.5		+	0
	7.5-9.0		+	+
	9.0 -10		+	0
	>10.0		+	0/+(****)
			+	0
Ammonium (NH_4^+)	< 2	Within 24 h	+	+
	2-20		+	0
	> 20		+	-
Chlorides (Cl^-) at 60°	< 100	No limit	+	+
At 80° the Cl^- value is limited to 150 ppm.	100-200		+	+
	200-300		+	+
	300-700		0/+	0/+
	>700		-	0
Free chlorine (Cl_2)	< 1	Within 5 h	+	+
	1-5		-	0
	> 5		-	0/-
Hydrogen sulfide (H_2S)	< 0.05	No limit	+	+
	> 0.05		+	0/-
Free (aggressive) carbon dioxide (CO_2)	< 5	No limit	+	+
	5-20		+	0
	> 20		+	-
Total hardness (°dH)***	4.0-11	No limit	+	+
	70 - 200 mg/l CaCO3			
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 act as inhibitors for pitting corrosion caused by chlorides in pH neutral environments

** In Distrect Energy systems, due to good control over quality, pH values up to 10 are consiered safe:+

*** If the hardness values are outside the recommended range, other parameters such as oxygen content, conductivity and pH values should be considered to evaluate the corrosion risk.

**** Fe^{3+} and Mn^{4+} are strong oxidants and may increase the risk for localized corrosion on stainless steels in combination with brazing material cooper.

4.2.4 Water-oil cooler - tube type

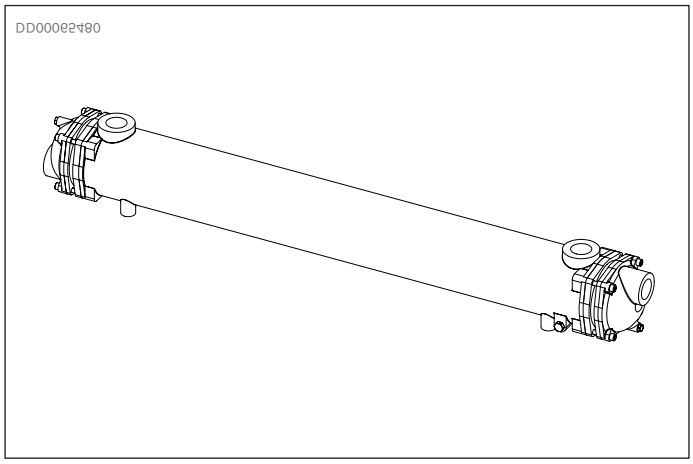


Fig. 41: Tube cooler

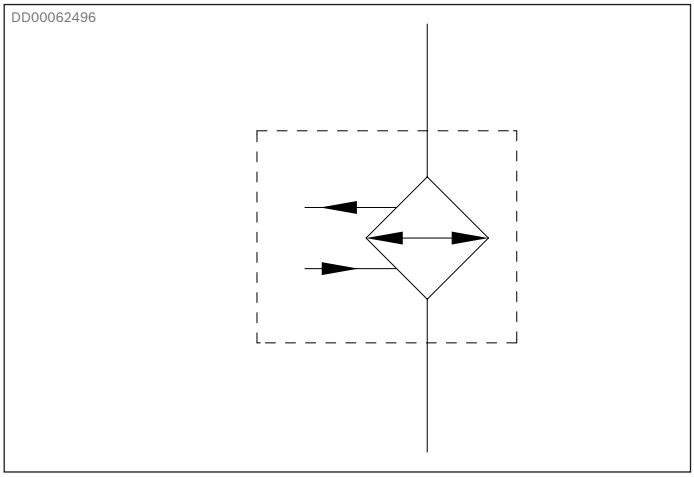


Fig. 42: Hydraulic symbol

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.

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

Table 31: Material tube cooler

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

Table 32: 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

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 machine feet, flexible hoses are recommended between water connections and water piping.

4.2.5 Hägglunds HDC cooler (air-oil cooler)

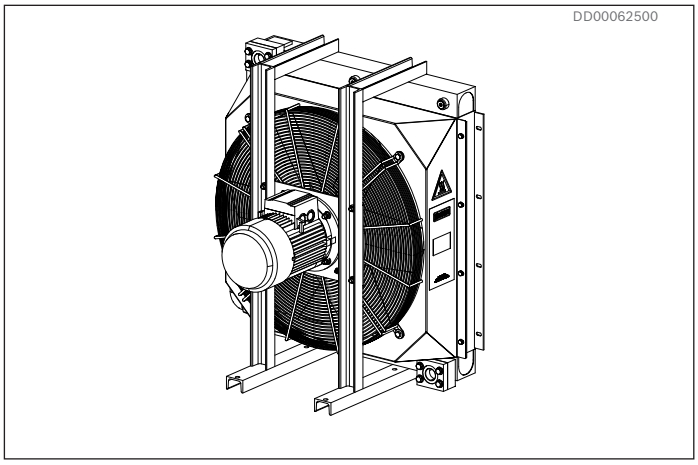


Fig. 43: Hägglunds HDC cooler

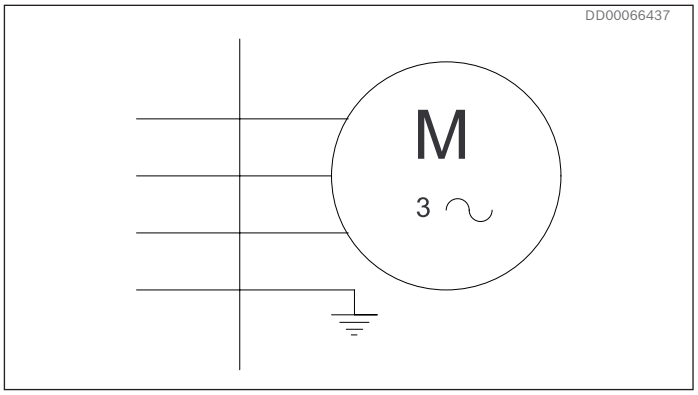


Fig. 44: Electrical symbol

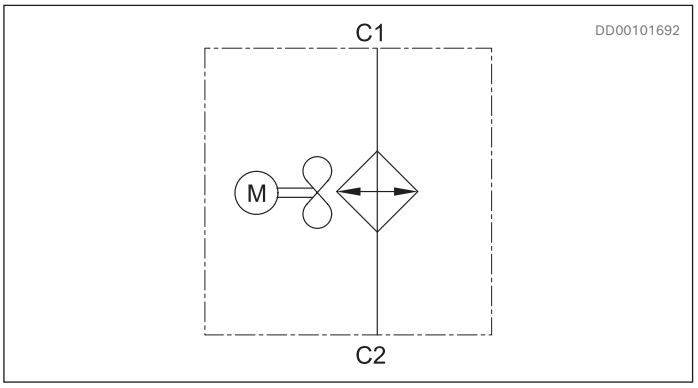


Fig. 45: Hydralic figure

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.

Reference

For more information see the specific data sheet RE 15334

Table 33: HDC cooler data

Cooler Type	Oil volume of the cooler		Driving power (kW)		Noise	Max perm.dynamic pressure		Max. perm.static pressure		Max. volume flow	
	l	gal	50 Hz	60 Hz	dBA	bar	psi	bar	psi	l/min	gpm
HDC 050-4	5.7	1.51	0.37	0.43	78	14	203	26	377	200	52.8
HDC 060-4	8.7	2.30	0.75	0.90	78	14	203	26	377	250	66.0
HDC 080-4	17.7	4.68	1.5	1.8	78	14	203	26	377	350	92.5
HDC 085-6	15.5	4.09	2.2	2.6	78	14	203	21	305	350	92.5
HDC 090-6	28.6	7.56	2.2	2.6	85	14	203	21	305	450	118.9
HDC 100-6	32.7	8.64	2.2	2.6	87	14	203	21	305	530	140.0
HDC 100-4	32.7	8.64	7.5	9.0	97	14	203	21	305	530	140.0
HDC 200-6	54.8	14.48	7.5	9.0	92	14	203	21	305	700	184.9
HDC 200-4	54.8	14.48	18.5	22.2	100	14	203	21	305	700	184.9

4.2.6 Tank

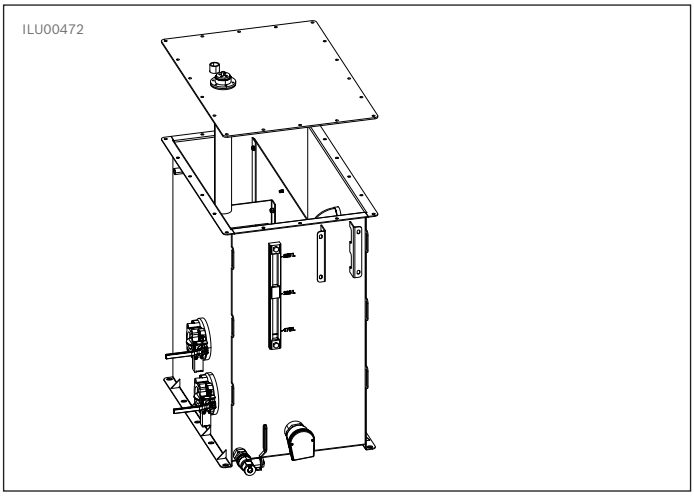


Fig. 46: Tank

Function

The tanks are myCro optimized and contains cooled 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 six pumps.
The tank volume has a ratio of minimum 0.7:1 to the exchange demand of the drive unit.

The tank is equipped with:
- Two removable baffle plates
- Diffusers for passive degassing of hydraulic fluids
- Visual level gauge
- Suction valve(s) with position switch(es)
- Level and temperature sensor
- Drain tap
- Magnetic plug (mounted on outlet drain tap)
- Filling point with quick release coupling.
- 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.

Mechnical data

Table 34: Tank Volume

Frame variant	Tank volume					
	Nominal		Min *)		Max *)	
	l	gal	l	gal	l	gal
MS2	100	26,4	59	15,6	112	29,6
MT2	150	39,6	95	25,1	171	45,1
MS3	150	39,6	88	23,2	170	44,9
MS3	180	47,5	71	18,7	198	52,3
MT3	260	68,6	177	46,7	292	77,1
MT3	330	87,1	123	32,5	343	90,6
LS2	180	47,5	63	16,6	201	53,1
LT2	280	73,9	191	50,4	314	82,9
LS3	350	92,4	159	42,0	384	101,4
LS3	500	132,0	119	31,4	527	139,1
LT3	560	147,8	219	57,8	614	162,1
LT3	800	211,2	449	118,5	818	216,0

*) Alarm levels

Magnetic plug

Plug with built-in magnet for collecting metal flakes, which might be present in the hyraulic oil in the tank

Table 35: Material

Part		Material
Tank		Stainless steel 1.4301
Fluid level gauge	Lens	Polyamid
	Lens base	Nylon
	Shroud	Polystyrene
Magnetic plug	Plug	Aluminium
	Magnet	Steel

Standards

Welding according to SS-ISO 5817

4.2.7 Oil filter

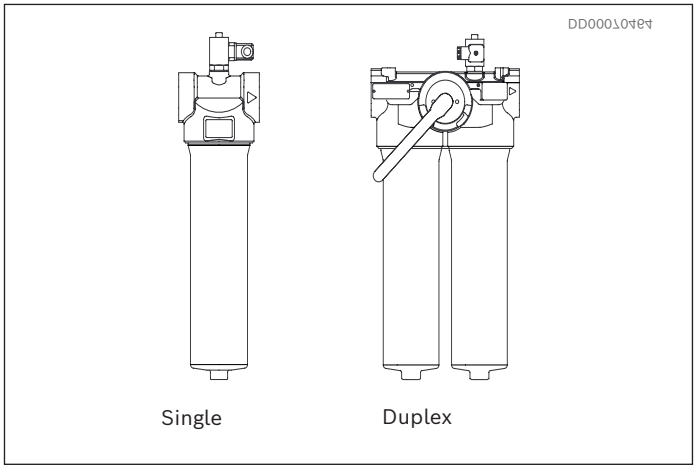


Fig. 47: Oil filter

Separation characteristics

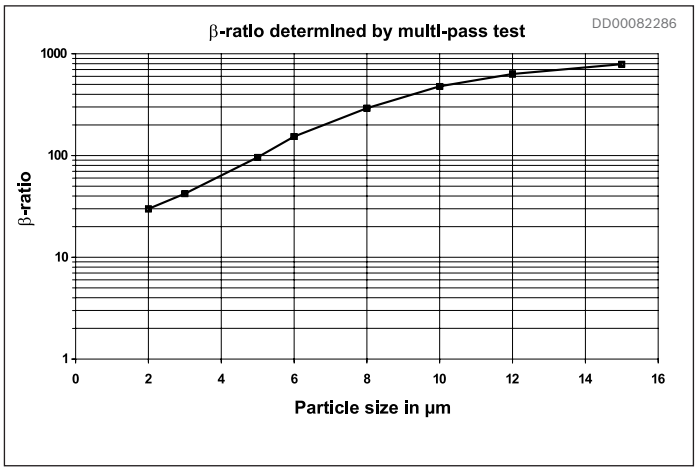


Fig. 48: Separation characteristics

Function

The filters are used in charge line(s) as standard. Alternatively, filters can also be used in drain lines. The filter housing is equipped with a 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 an indication if the differential pressure is above;

- For charge line filters: 5 bar (73 psi) -10% and the temperature of the oil is above 30°C (86°F).
- For drain line filters: 2.2 bar (32 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.

The filter elements are β-stable (*Fig. 45*), has a multi layered structure and are compatible with hydraulic fluids according to table 36.

The opening pressure for the by-pass valve;

- For charge line filters: ΔP = 7 bar (102 psi) +10%.
- For drain line filters: ΔP = 3.5 bar (51 psi) +10%.

The β-ratio for the particle size 10 µm fulfills ISO 4572 (β10 ≥ 75).

Table 36: Compability with permitted hydraulic fluids

Hydraulic fluid		Classification	Suitable sealing materials
Mineral oil		HLP	NBR
Bio-degradable	Insoluble in water	HETG	NBR
		HEES	FKM
Flame-resistant	Water-free	HFDU	FKM
	Containing water	HFDR	FKM
		HFC	NBR

Standards

Filter and filter elements according to DIN 24550

Mechnical data

Table 37: Technical data, filters

Part		Filter type	Single/Duplex
Filter complete:	Filter head		Aluminum
	Filter bowl		Aluminum
	Seals		NBR
			FKM (option)
	Max pressure	Single	110 bar (1595 psi)
		Duplex 160–400	50 bar (725 psi)
		Duplex 600	110 bar (1595 psi)
	Bypass pressure Δp	Drain	3.5 bar (51 psi) + 10%
		Charge	7 bar (102 psi) + 10%
	Flow specifications for 68 cSt at Δp ~ 1.1 bar	Single 160	130 l/min (34 gpm)
		Duplex 160	105 l/min (28 gpm)
		Single 250	175 l/min (53 gpm)
		Duplex 250	130 l/min (34 gpm)
		Single 400	240 l/min (63 gpm)
		Duplex 400	150 l/min (40 gpm)
		Single 600	265 l/min (70 gpm)
		Duplex 600	160 l/min (42 gpm)
Filter element:	Filtration grade		10 µm
	Filter		Glass fibre material
	End shields		Plastic
	Inside tube		Tin-coated
	Antistatic layer		Standard

4.2.8 Hägglunds Spider

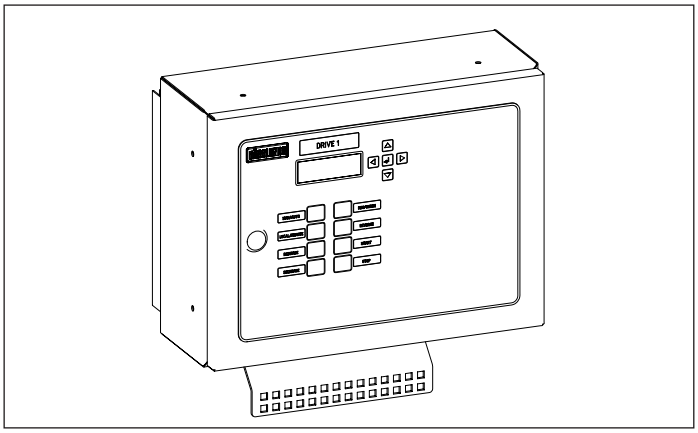


Fig. 49: Hägglunds Spider

Function

The Hägglunds Spider is the monitoring and control system for the Hägglunds 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. The Hägglunds Spider is delivered assembled to the drive unit at a suitable location, fully parameterized, tested and ready to use. The configuration of the Hägglunds 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 38: Technical data Hägglunds Spider

Hägglunds Spider	
Material	Stainless steel, EN 1.4301
Dimension (WxHxD)	400x300X145 mm (15.75x11.81x 5.71 in)
Protection class	IP65
Power supply	115±10% or 230±10% VAC, 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 Hägglunds Spider, see User manual RE 15330-WA.

4.2.8.1 Electrical connection box

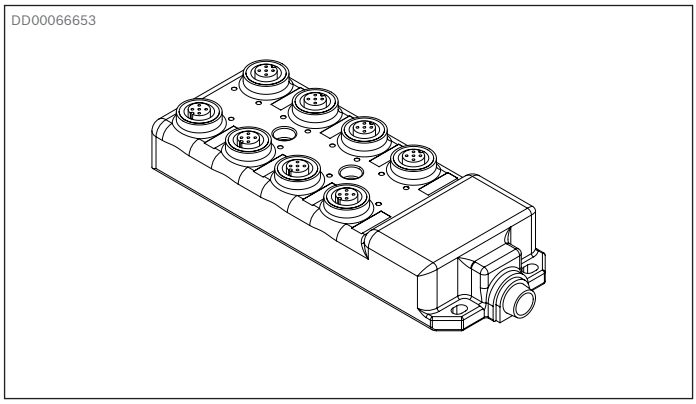


Fig. 50: Electrical connection box

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.

Electrical data

Table 40: 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 mm² (Power 1 mm²)/ 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

4.2.9 Hägglunds ICp pump control

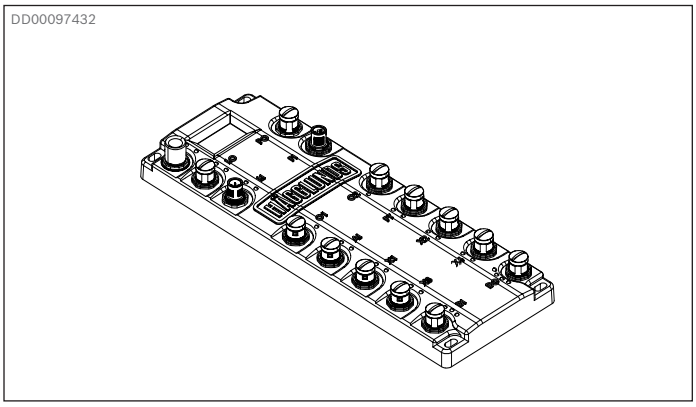


Fig. 51: Hägglunds ICp pump control

Function

The Hägglunds ICp pump control is an alternative to the 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 the ICp is done via Bluetooth and the Hägglunds ICp app is available for both android and iOS.

Hägglunds ICp has functionality for monitoring analog and digital signals.

Table 39: 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.

4.2.10 Hägglunds Control System (HCS)

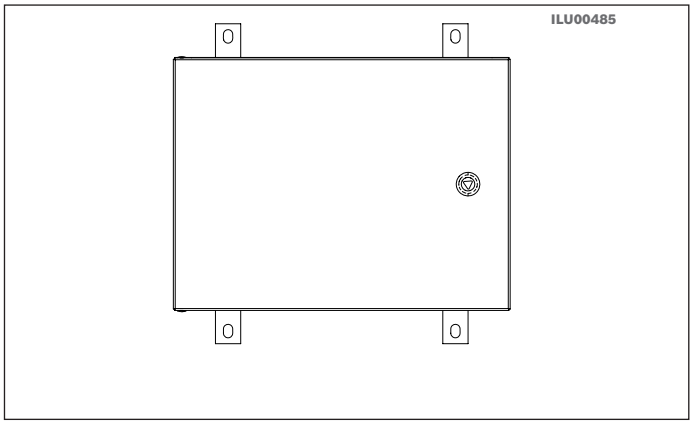


Fig. 52: The HCS

Function

The Hägglunds Control System (HCS) is a state-of-the-art control system for up to five shafts and 12 pumps. HCS can work as a standalone system or be controlled by a factory control system (DCS) via bus. Analog options are available on request. HCS represent a shift in technology to improve reliability, performance and security.

Sensors and actuators are normally connected via remote IO-link masters.

Table 41: Hägglunds Control system

Material	Stainless steel, EN 1.4301
Dimension (WxHxD)	400x300X250 mm
Protection	Class IP65
Power supply	100-230±10% VAC, 50 – 60Hz
Power consumption	Max 240 VA
+24 VDC outlets	Electronically fused, resettable and monitored
Digital inputs	8 x 24 VDC
Analog inputs	4 x 4-20mA
Digital outputs	8 x 0.5 A, 24VDC
Encoder inputs	1 x Quad incremental
Fieldbus (slave)	ProfiNet
IO-link master type	EtherCat
Space heater (optional)	PTC, <30 °C (<86 ℉), moisture prevention
Terminals	Screw type, max 2.5 mm2 (14 AWG)
Cable gland plate	Multigate MC 25
Corrosion protection	VCI Emitter

For detailed information about Hägglunds Control System, see User manual RE 15331-WA

4.2.10.1 IO- link master

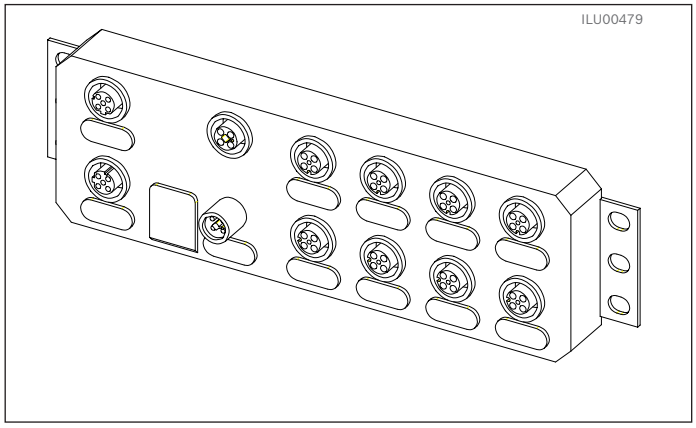


Fig. 53: The IO-link master

Function

The sensors to Hägglunds Control System use IO-link for communication instead of analog 4-20mA. IO-link is a modern industrial standard that add robustness and ease of maintenance to the system. Each sensor is connected to a hub, the IO-link master, who in turn communicate with the control system. This provides a segmented and robust system design that is Industry 4.0 compliant.
Analog sensors can be connected to the IO-link master using an adapter.

Electrical data

Table 42: IO-link master

Material	Plastic
Degree of protection	IP65/IP67
Ambient temperature	-25°C – +60°C (-13℉ – +140℉)
Electrical connections	M12 connector
Number of connections	8, class A or A + B
Power supply	24VDC, M12 connector
Bus type	EtherCAT, M12 connector

4.3 Other components

4.3.1 Water valve

4.3.1.1 Water solenoid valve

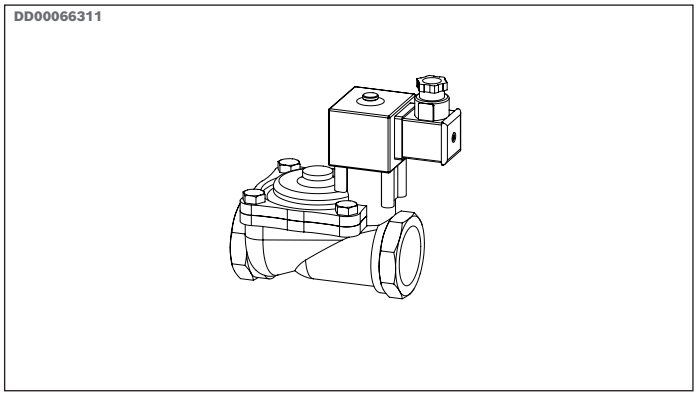


Fig. 54: Water solenoid valve

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.

Mechnical data

Table 43: 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 44: 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)

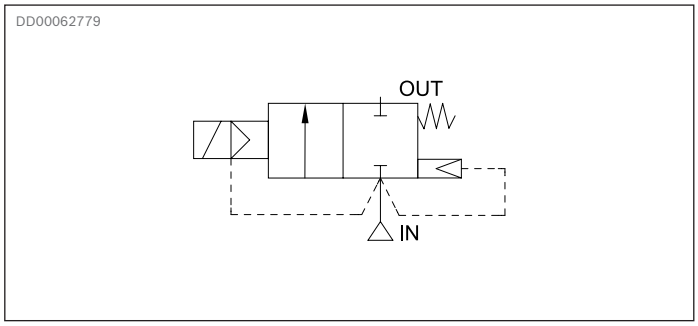


Fig. 55: Hydraulic symbol

Table 45: 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 46: 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 47: Power ratings

Water valve size		Power ratings	
		holding	hot/cold
		(W)	(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

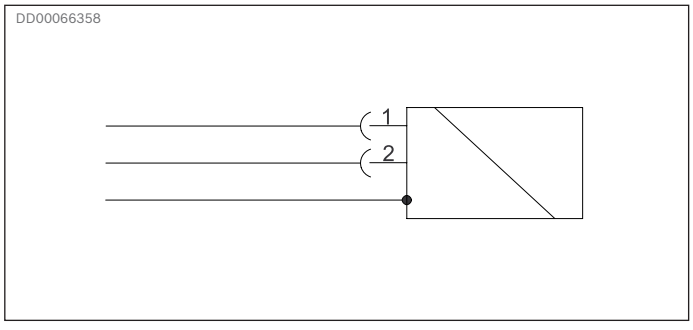


Fig. 56: Electrical symbol

4.3.1.2 Water ball valve

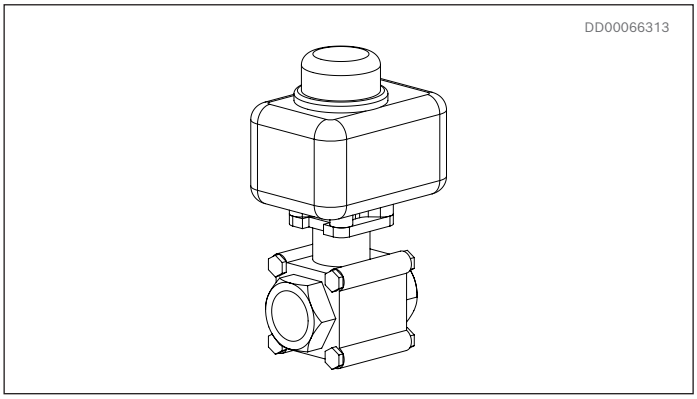


Fig. 57: Water ball valve

Function

The water valve for tube cooler is a two-way ball valve maneuvered by an electric actuator.
The water valve shall be connected to turn the cooling water on 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 48: Ball valve

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

Table 49: Electric actuator

Enclosure	IP67 Nema 4 and 6
Ambient temp	-20 ℃...+70 ℃ (-4 ℉...+158 ℉)
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 50: 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 51: Supply

Control Voltage	Max Current
24 V	1.8 A

Table 52: Connections

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

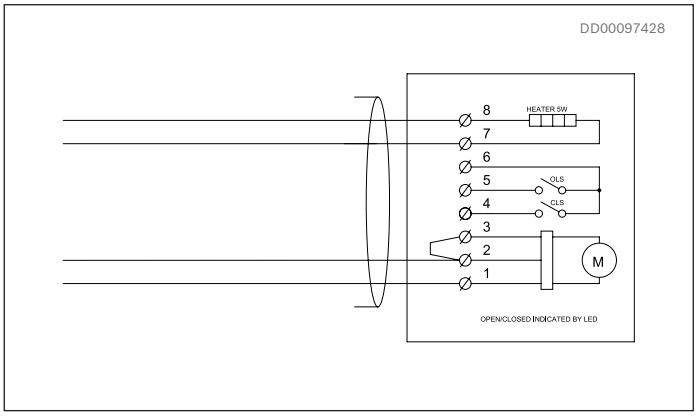


Fig. 58: Electrical symbol

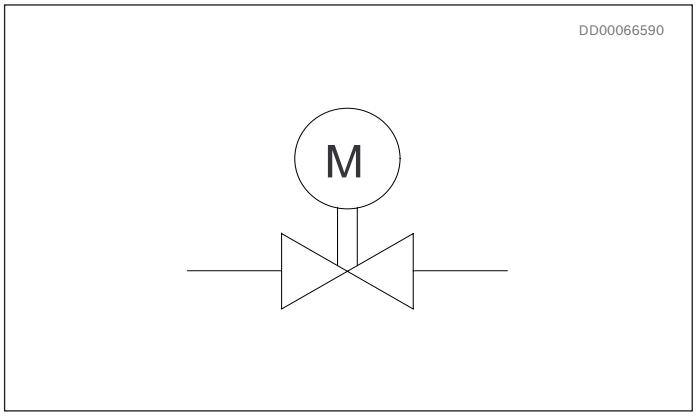


Fig. 59: Hydraulic symbol

4.3.2 Suction line valve

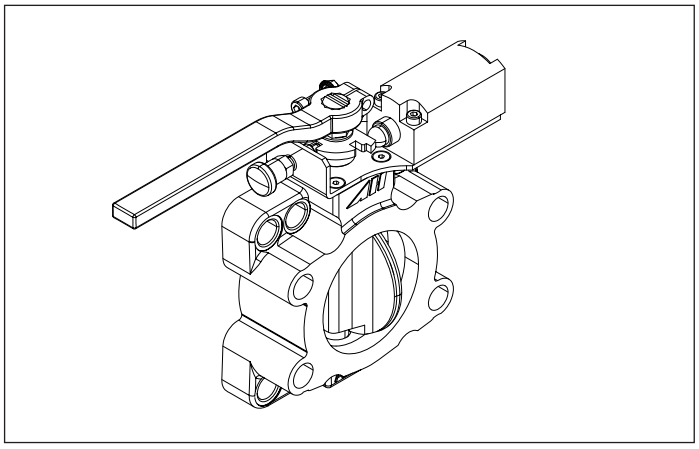


Fig. 60: Suction line valve

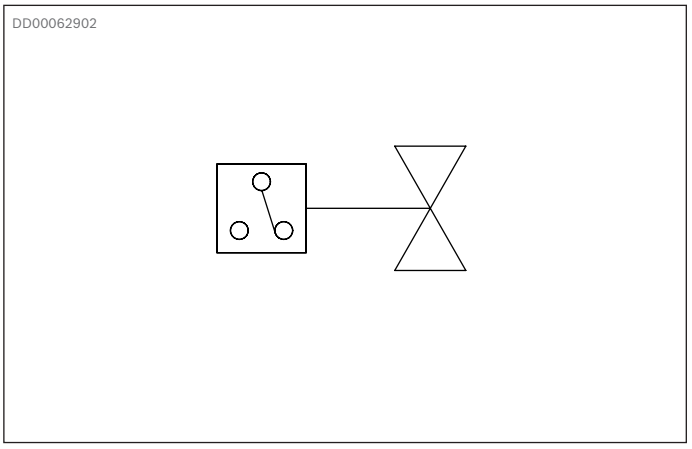


Fig. 61: Hydraulic symbol

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 53: 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 54: 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

Electrical connections

The cable is connected on screw terminals inside the housing.

Electrical data

Table 55: Electrical data

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

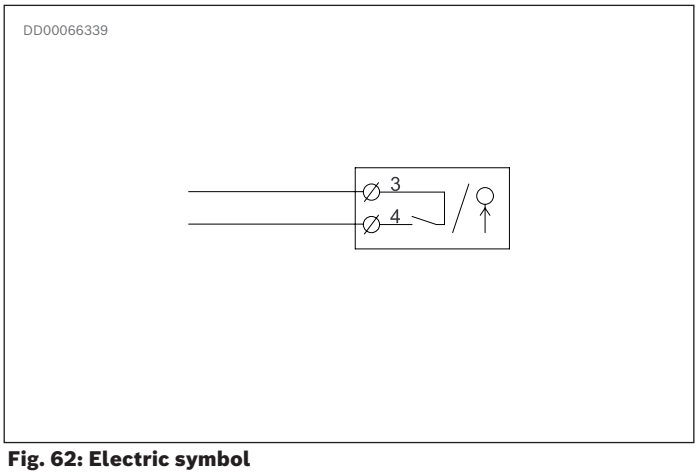


Fig. 62: Electric symbol

4.3.3 Clogging Indicator, oil filter

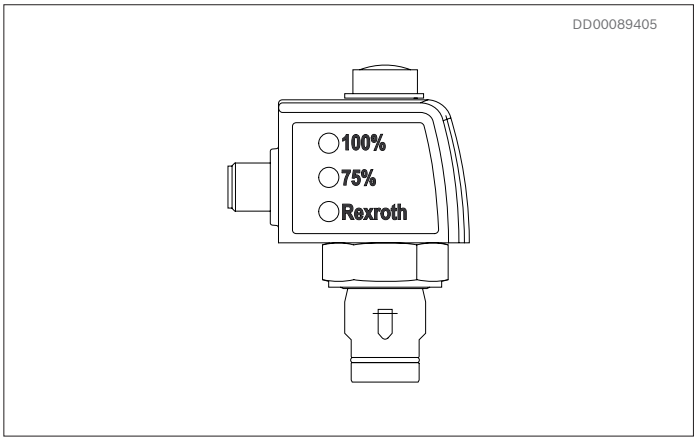


Fig. 63: Clogging indicator, oil filter

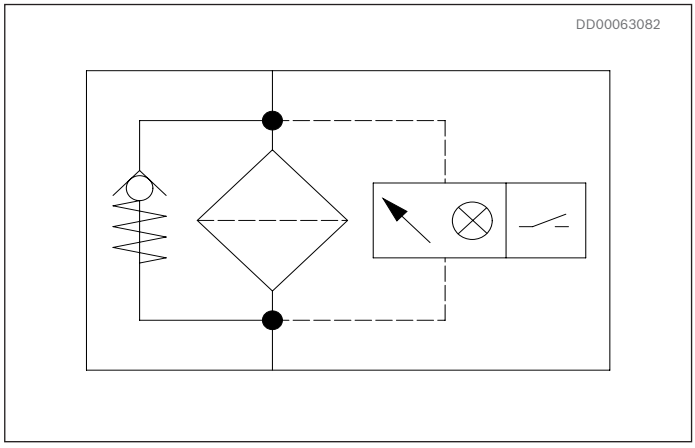


Fig. 64: Hydraulic symbol (oil filter with indicator)

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 5 bar (73 psi) for charge filter and 2.2 bar (32 psi) for 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 67 acc to EN 60529

Mechanical data

Table 56: Clogging indicator

Part		2.2 bar	5.0 bar
Material	Lower section	Aluminum	Brass
	Upper section	Polyamid	
	Seals	Nitrile rubber	
Max. operating pressure		160 bar	450 bar
Temperature range	Lower section	-30°C ... +100°C	
	Upper section	-25°C ... +85°C	

Electrical data

Table 57: Clogging indicator

Switch type	100% normally closed
Indication	Mechanical Stand-by Green LED 75% Yellow LED 100% Red LED
Switching voltage	10..30 VDC
Max. switching power with resistive load	20 W
Cold start suppression	30 °C (86 °F), rising
	20 °C (68 °F), falling

Electrical connections

M12 Socket plug

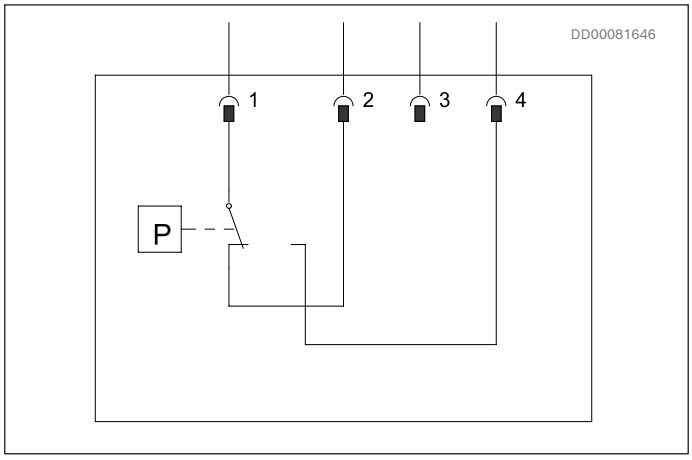


Fig. 65: Electrical symbol

4.3.4 Air breather

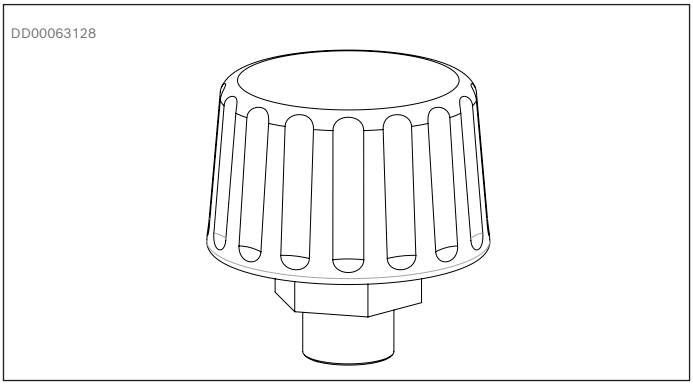


Fig. 66: Air breather

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 58: 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 ℉ or +212 ℉)	
Material	Hose	Steel, zinc-plated/plastic coated	
	Filter element	Paper fiber	
	Seal	NBR (Nitrile)	
	Tread	G3/4″	
Additional attributes		Anti-splash device	
Hydraulic fluids		The standard models are suitable for use with mineral and lubrication oils according to ISO 2943	

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

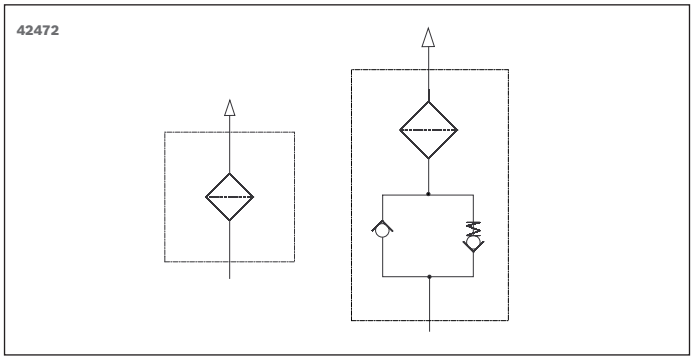


Fig. 67: Hydraulic symbol

4.3.5 Tank bladder

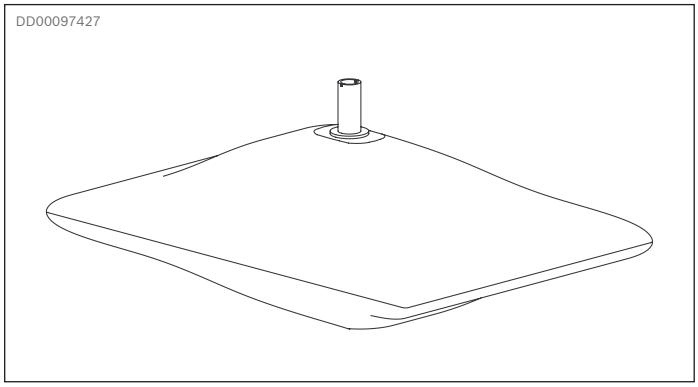


Fig. 68: Tank bladder

Function

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

Mechanical data

Table 59: Tank bladder

Thread	3/4" BSP Carbon Steel
Material	Reinforced Polyurethane with coated thermoplastic sheet

Table 60: Tank bladder sizes

Frame size	Volume (L)	Bladder volume (L)	Bladder volume(gal)
MS2	100	2	0,53
MT2	150	2	0,53
MS3	150	6	1,58
MS3	170	6	1,58
MT3	260	6	1,58
MT3	310	6	1,58
LS2	180	6	1,58
LT2	280	6	1,58
LS3	350	8	2,11
LS3	500	8	2,11
LT3	560	8	2,11
LT3	670	8	2,11

4.3.6 Accumulator

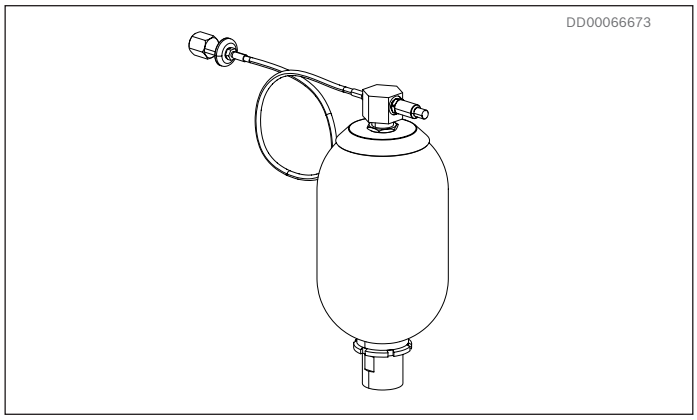


Fig. 69: Accumulator

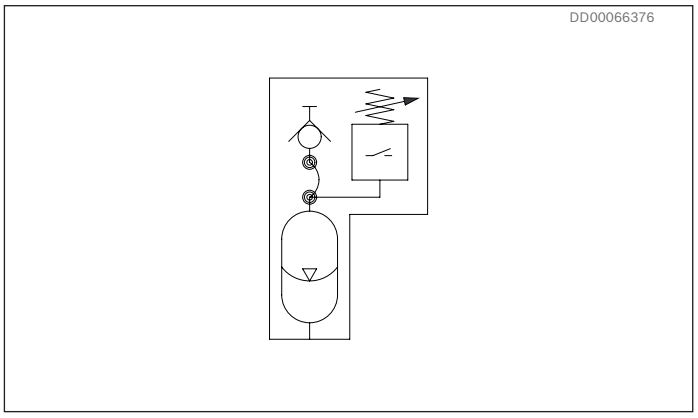


Fig. 70: Hydraulic symbol

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 the 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 61: 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.

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 N_2 (Nitrogen gas) to 9 bar (130 psi) before starting the system. Empty accumulators are marked with a tag at delivery.

Electrical data

Table 62: Pressure switch

Supply voltage Ub	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 - +Ub
	Pin 2 - PNP output
	Pin 3 - 0V
	Pin 4 - NC

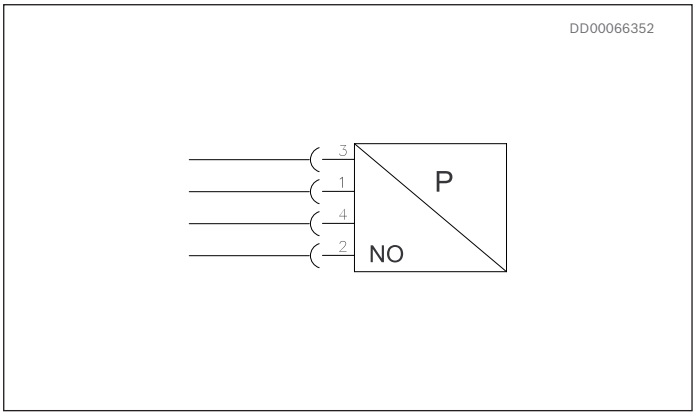


Fig. 71: Electrical symbol

4.3.7 Electronic level and temperature sensor

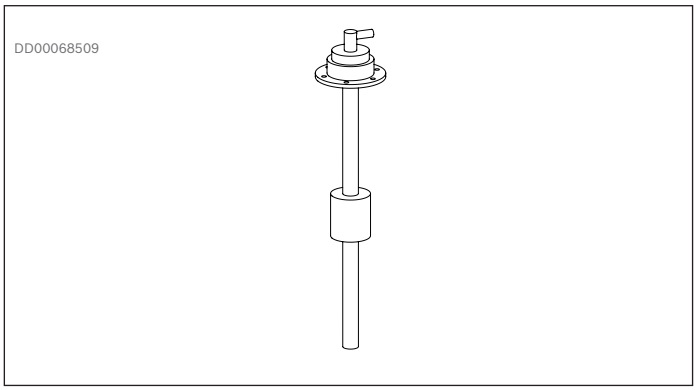


Fig. 72: Electronic level and temperature sensor

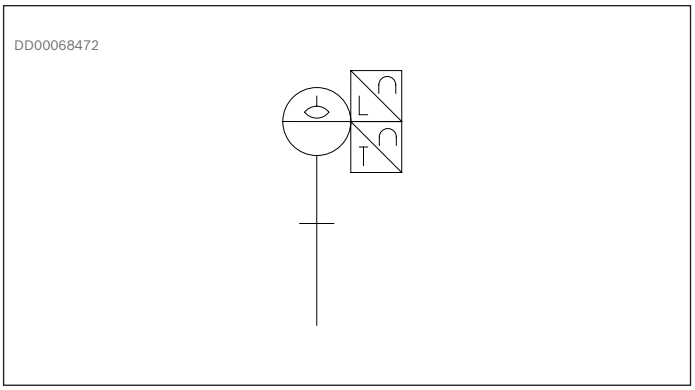


Fig. 73: Hydraulic symbol

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.

Mechanical data

Table 63: 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, MS3	370 mm (14.57 in)
	MT2, MT3, LS2, LT2, LS3	500 mm (19.68 in)
	LT3	800 mm (31.50 in)
Medium temperature range		-20 .. +80 °C (-4 ...+176℉)
Protection class		IP65

Electrical data

Table 64: 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 ℉)	
Accuracy	± 1.5 °C (34.7 ℉)	
Electrical connection	4 pin, Female M12	
Pin connection	pin 1	+U
	pin 2	Temp signal
	pin 3	Not used
	pin 4	Level signal

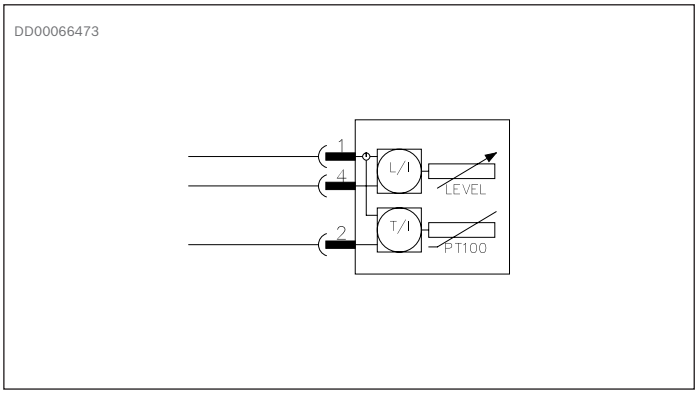


Fig. 74: Electrical symbol

Table 65: Volumes for threshold levels, electronic level and temperature sensor

		Max level				Nominal level				Warning level				Alarm (Stop) level			
Frame size	**Tank size**	**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**
MS2	100 L	112	29,6	46	1,81	100	26,4	100	3,94	80	21,1	191	7,53	59	15,6	286	11,27
MS3	150 L	170	44,9	46	1,81	150	39,6	105	4,14	119	31,4	196	7,72	88	23,2	287	11,31
MS3	180 L	198	52,3	47	1,85	180	47,5	100	3,94	126	33,3	259	10,2	71	18,7	420	16,55
MT2	150 L	171	45,1	55	2,17	150	39,6	150	5,91	123	32,5	272	10,72	95	25,1	399	15,72
MT3	260 L	292	77,1	56	2,21	260	68,6	150	5,91	219	57,8	270	10,64	177	46,7	394	15,52
MT3	330 L	343	90,6	62	2,44	330	87,1	100	3,94	227	59,9	402	15,84	123	32,5	708	27,9
LS2	180 L	201	53,1	48	1,89	180	47,5	105	4,14	122	32,2	263	10,36	63	16,6	424	16,71
LS3	350 L	384	101,4	49	1,93	350	92,4	105	4,14	255	67,3	260	10,24	159	42	417	16,43
LS3	500 L	527	139,1	56	2,21	500	132	100	3,94	310	81,8	410	16,15	119	31,4	723	28,49
LT2	280 L	314	82,9	57	2,25	280	73,9	150	5,91	236	62,3	270	10,64	191	50,4	393	15,48
LT3	560 L	614	162,1	62	2,44	560	147,8	100	3,94	390	103	428	16,86	219	57,8	707	27,86
LT3	800 L	818	216	71	2,8	800	211,2	150	5,91	625	165	386	15,21	449	118,5	674	26,56

4.3.8 Auxiliary pumps

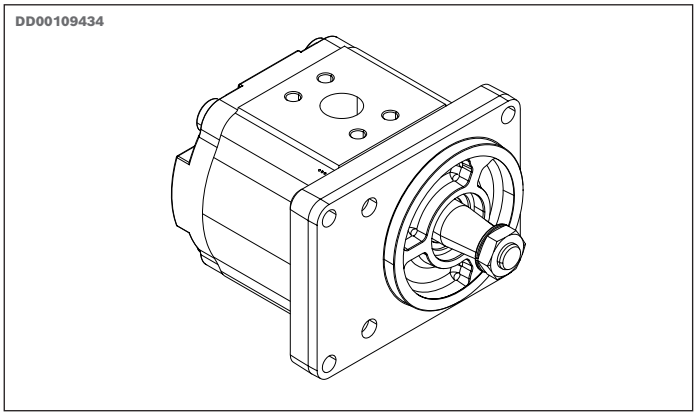


Fig. 75: Auxiliary pump

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.

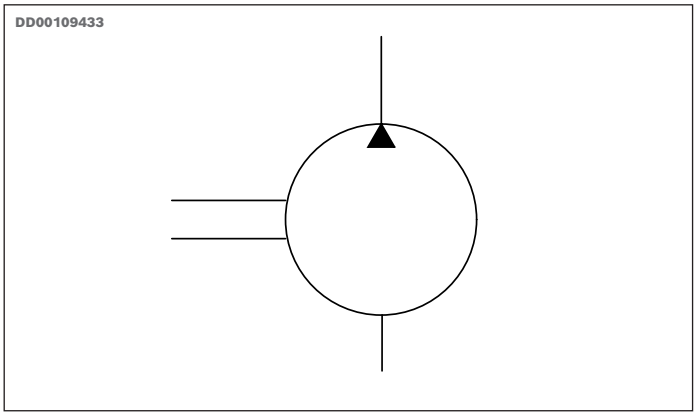


Fig. 76: Hydraulic symbol

Table 66: Auxiliary pumps

Pump size	Ordering code	Max continuous pressure		Max peak pressure	
cc		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 in *7 Required and additional documents*

4.3.9 Pressure sensor

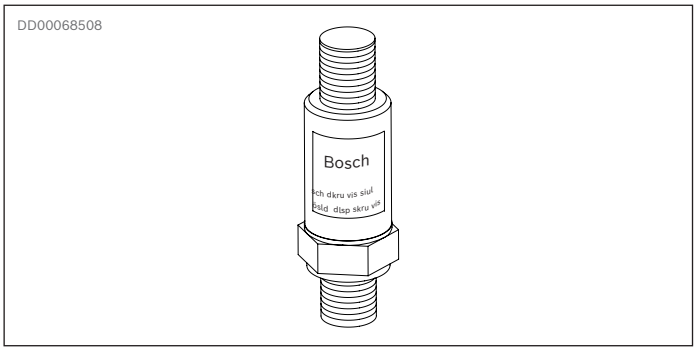


Fig. 77: Pressure sensor

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.

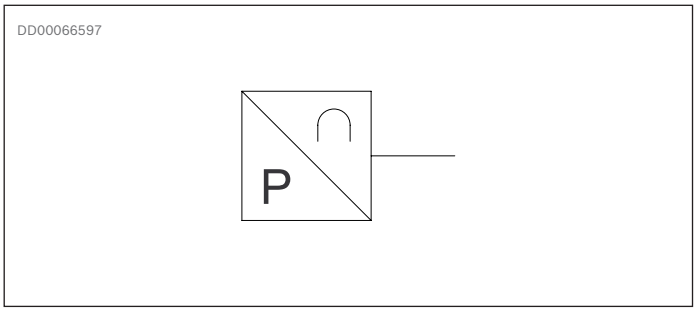


Fig. 78: Hydraulic symbol

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 Ub	16...36 VDC
Output	4...20 mA
Max load (ohm)	(Ub-8.5 V)/20 mA
Protection class	IP65
Connector	4 pole M12
Pin connection	Pin 1 - +Ub
	Pin 2 - signal output

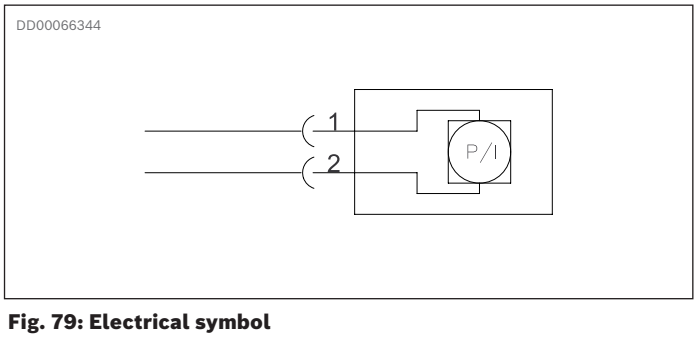


Fig. 79: Electrical symbol

4.3.10 Oil heater

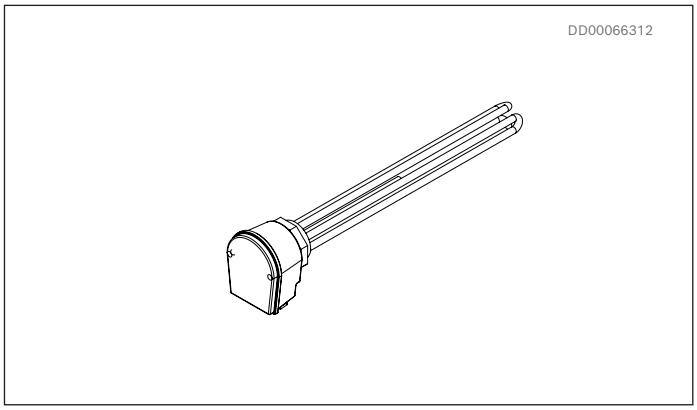


Fig. 80: Oil heater

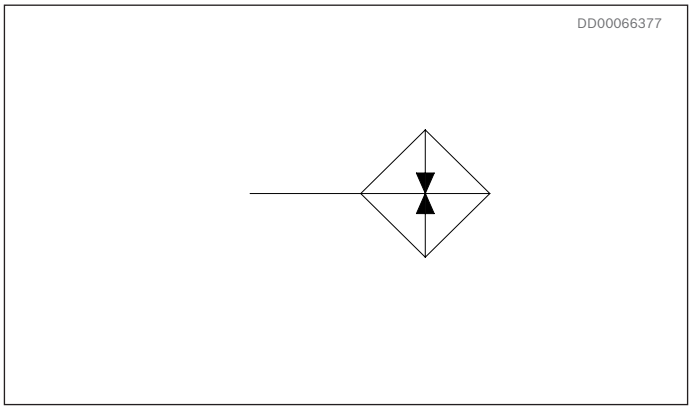


Fig. 81: Hydraulic symbol

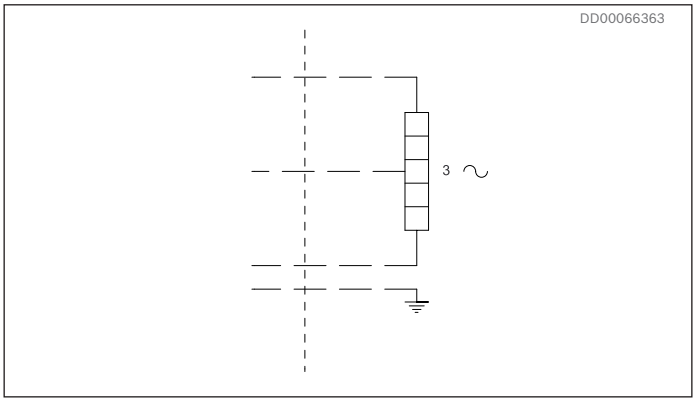


Fig. 82: Electrical symbol

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: Oil heater

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: Oil heater

Power	Medium frame	670 W
	Large frame	1000 W
Voltage	1 phase	220-240 V
	3 phase	380-415 V
		440-480 V
		660-690 V

Electrical connections

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

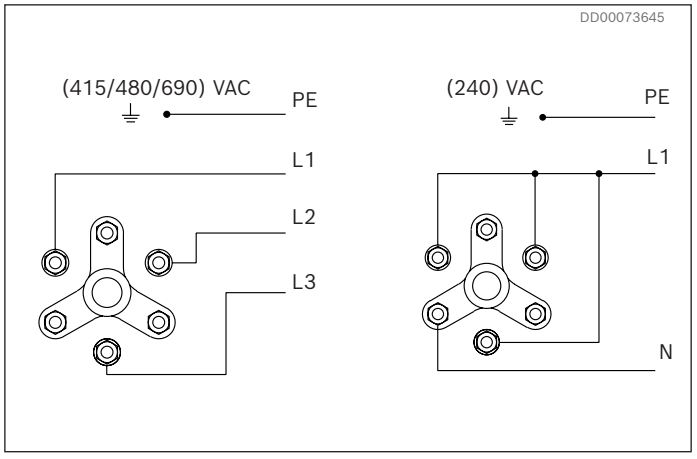


Fig. 83: Electrical connections

4.3.11 Drain temperature sensor

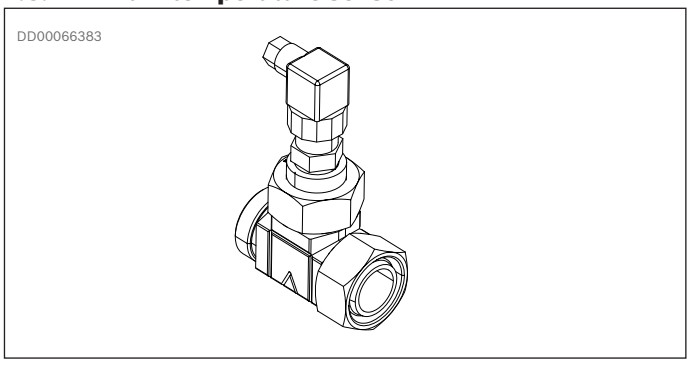


Fig. 84: Drain temperature sensor

Function

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

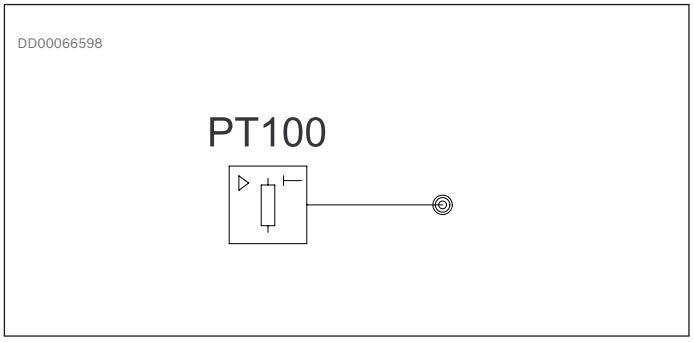


Fig. 85: Hydraulic symbol

Electrical data

Table 70: Drain temperature sensor

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

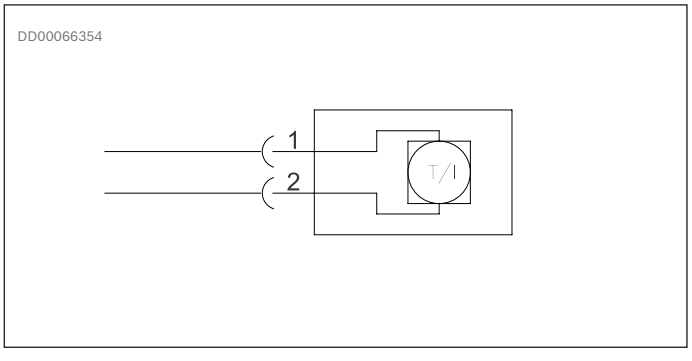


Fig. 86: Electrical symbol

4.3.12 LED lighting

Function

The standard lighting 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.
The premium lighting is a LED machine light. One machine light per pump compartment is installed. The LED machine light is controlled via a separate switch.

Electrical data

Table 71: Standard lighting

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

Table 72: Premium lighting

Material	Anodized aluminium(Light housing) Singel- pane safety glass(ESG, thermally toughened float glass) Pane
Length	365 mm
Degree of protection	IP67
Ambient temperature	0 °C..50 °C
Supply voltage	24 VDC
Light output	1080 lumen
Power consumption	10,5W

Table 73: Switch for premium lighting

Material	**Plastic**
Degree of protection	IP54
Rated voltage	250V
Rated currant	16A

4.3.13 Hägglunds QECC

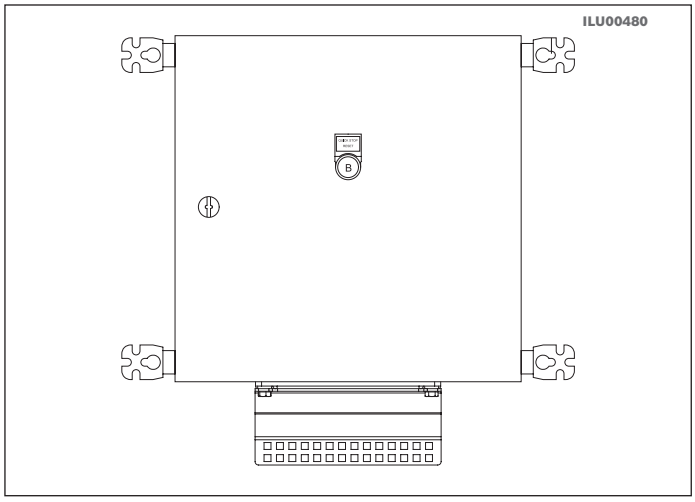


Fig. 87: Hägglunds QECC

Function

The Hägglunds QECC is an additional control unit that is used to stop all motion of the hydraulic motor in a fast, safe and controlled manner.
The Hägglunds QECC work together with a Hägglunds VQCC 800 mounted on the hydraulic motor. Together these units are referred to as the Hägglunds Quick Stop Unit.

Reference

For more information see the specific data sheet RE 15370

4.3.14 Machine feet

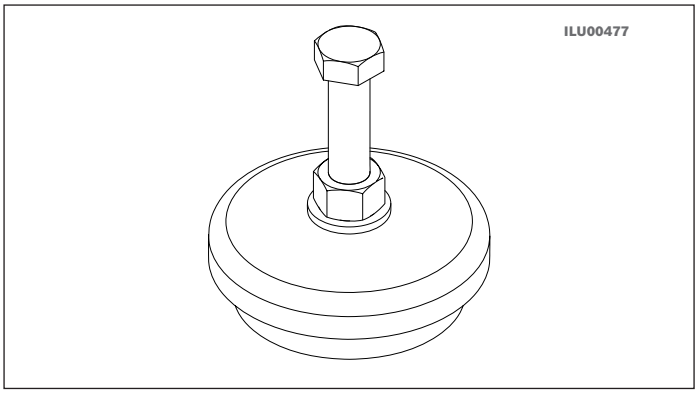


Fig. 88: Machine foot

Function

To isolate vibrations or compensate for uneven surfaces, machine feet can be used in place of a fixed installation.

Table 74: Machine feet quantity

Frame size	TF 600	TF 1200
MS2	4	
MT2		4
MS3	8	
MT3		8
LS2		4
LT2		4
LS3		8
LT3		8

Table 75: Machine foot technical data

Type	Foot diameter (mm)	Bolt Thread	Bolt Length (mm)	Max Load (kg)	Adjustment range
TF 600	81	M12	70	600	25-32mm (0,98-1,26 inch)
TF 1200	108	M16	70	1 200	30-38 mm (1,18-1,50 inch)

4.3.15 Cabinet heater

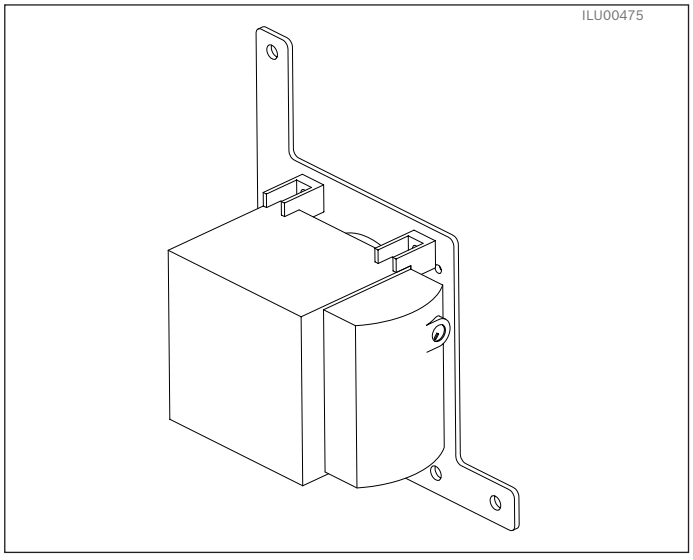


Fig. 89: Cabinet heater

Function

The cabinet heater is a part of the solution to handle low ambient temperatures. The fan heater provides an evenly distributed air temperature inside the unit. This heater has an integrated thermostat for temperature control.

Table 76: Cabinet heater technical data

Heating capacity[1]	1200 W
Operation voltage	AC 230 V. 50/60 Hz
Max current	13.0 A
Setting range[2]	0 to 60**°**C (32 to 140**°**F)
Heating element	PTC resistor - temperature limiting
Overheat protection	Built-in temperature limiter
Connection	2-pole terminal AWG 16 max(1,5mm^2) with strain relief, clamping torque 0,8Nm max.
Housing	Plastic, UL 94V-0, black
Operating / Storage temperature	-45 to +70 °C(-49 to +158 °F)
Operating / Storage humidity	Max 90 %RH(non- condensing)
Protection class/ Protection type	II (double insulated) /IP20

1) At 20 **°**C(68**°**F) ambient temperature
2) Switching difference 7**°**C ± 4°(12.6°F± 7°F)
Standard settings from Hägglunds 10**°**C (50°F)

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 the following conditions:

- Three types of condition were 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 77: 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 shock 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 or 60 bar (218 or 870 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 drive unit with panels.
- 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 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*.

4.5.6 Leveling pipe

Leveling pipe function is normally used in large drive systems where multiple drive units are required to feed the hydraulic motor(s). It is of high importance that the tank levels are equal in these type of drive systems. Technically this function is solved with a 4“ hose that connect two, or more, drive unit tanks to each other.

4.5.7 One compartment unit

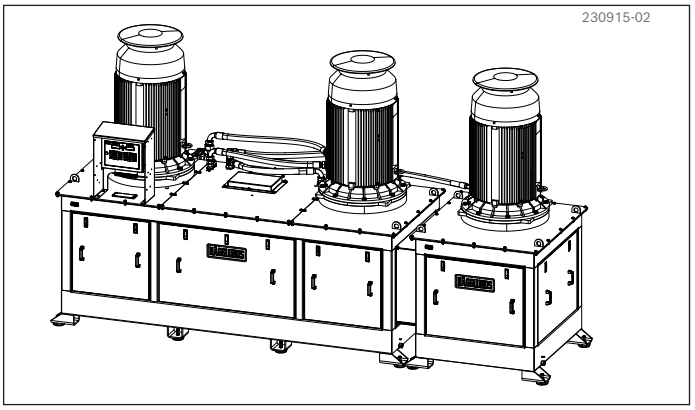


Fig. 90: Example LS3+LS1

An additional one compartment unit (MS1/MT1/LS1/LT1) can be connected to the DUc MS3, MT3, LS3 or LT3 when a third pump stack is required. A third pump stack can be used for either stand by functionality or when additional flow is required to run the system.
There are limitations when additional flow is required to run the system when MS3 or MT3 is used. Following combinations are **not** allowed:

MS1:

- SP 180 in 60Hz with 32cc auxiliary pump

MT1:

- SP 125+125 in 60Hz with 32cc auxiliary pump
- SP 180+180 in 60Hz with any auxiliary pump

Contact your Bosch Rexroth representative if you require other auxiliary circuits or increased charge pump in combination with a one compartment unit.

4.5.8 Explosive environment

The drive unit can be adapted to work in hazardous areas, ATEX Zone 1 or Zone 2.
In order to comply with the requirements for certification particular components are needed and there may also be some limitations of functions from what a non-certified drive unit can handle.

4.5.9 Sound protection

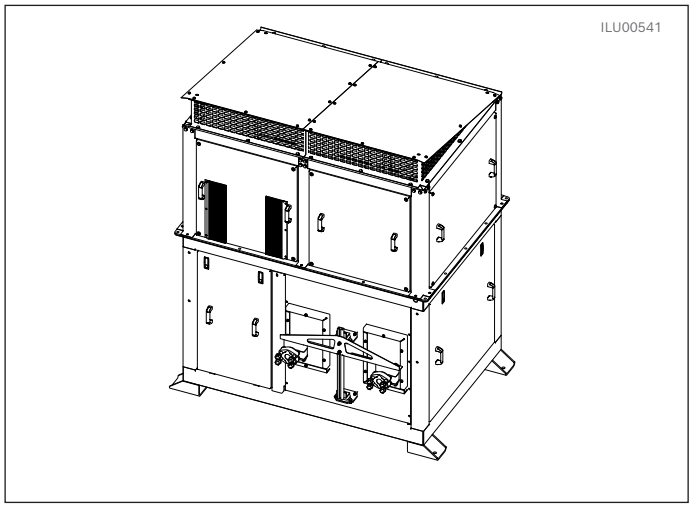


Fig. 91: Sound protection

The drive unit can be equipped with extra sound protection, which means that the weighted sound power level is in average 2 dB(A) lower than a drive unit without sound protection.
A drive unit with sound protection is fitted with a top cover and the outlet area for the pump high pressure hoses is covered with a thick insulation.

4.5.10 Anchoring possibility

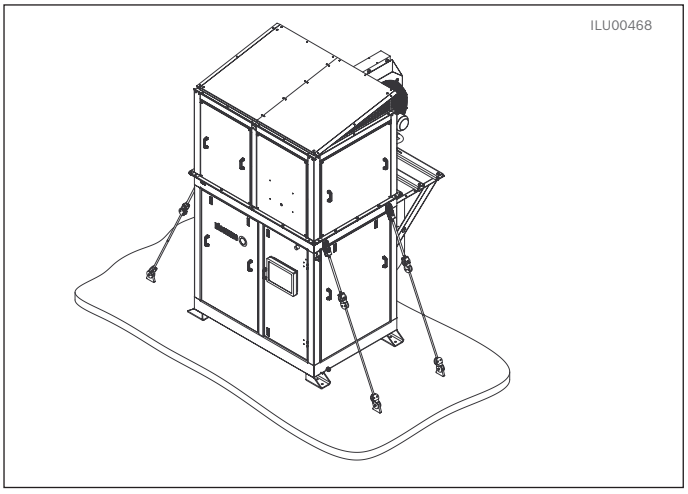


Fig. 92: Anchoring possibility

If the unit is mounted on an inclined plane or if it is exposed to external influences such as wind or vibration, the unit can be anchored according to Fig. 92 .
Anchoring support is not included in scope of supply.

4.5.11 Roll -Back Function

An optional roll-back function for rollers can be added to a hydraulic drive system in combination with the Quick Stop Unit, Hägglunds VQCC 800 and QECC (see RE 15365)

The roll-back system consists of separately driven open-loop pump(s), pressure control valve(s), and pressure line(s) connected to the motor via the hydraulic quick stop valve, Hägglunds VQCC 800 (see RE 15374)

The principle of the rollback function is that when the solenoid valves on the quick stop valve are de-energized, the rotation of the main hydraulic motor stops because the main line C flow from the motor is blocked by the main cartridge in the quick stop valve. At the same time, the main pump is de-stroked to the zero position.
As soon as the hydraulic motor stops, the roll-back pump's electric motor must start. The roll-back pump supplies oil to the C1 line and onward to the C line of the hydraulic motor, causing the roller(s) to move in the reverse direction for as long as the roll-back pump motor is running.
The roll-back pump must run for a defined period to rotate the hydraulic motor in reverse to the required angular position.

4.5.12 Painting

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

Corrosivity category C3 - which is recommended for normal industrial atmosphere

Frame and external brackets:	RAL 9005 Black
Doors, hoods and panels	RAL 2002 Orange

Corrosivity category C5 - which is recommended for marine environment with high salt load or aggressive industrial atmosphere.

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.

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 (16-23 ft/s)
Return lines	<	3 m/s (10 ft/s)
Drain & suction lines	<	1 m/s (3 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 ASTMA 519 1010 for the hydraulic pipes.

4.6.3 Pipe couplings

For pipes with:
d ≤ 25 mm (0.98 in): SAE J514 (SAE-16)
25 ≤ d ≤ 60 mm (0.98 ≤ d ≤ 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 ≤ d ≤ 38 mm max. 2 000 mm (0.59 ≤ d ≤ 1.50 in max. 78.73 in).
d ≥ 38 mm max. 3 000 mm (d ≥ 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 and above. Communication is via RS232

5.2 HDcom

The HDcom is a windows based application used to configure HCS.

HDcom is used for:
- downloading log data
- uploading, editing and downloading setup parameters

HDcom can run on Windows 10 or above. Communication is via Ethernet.

5.3 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 (Mellansel)



Fig. 93: Desiccant bags

- Desiccant bags are placed inside the DUc to avoid corrosion



Fig. 94: Plastic bag

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



Fig. 95: 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 Packing procedure (Grove City)

Packing procedure according to 6.1 with the exception of:

- Domestic deliveries are not crated, just packed with desiccants and shrink-wrapped.
- Export gets desiccants, shrink wrapped, and crated, but does not get the plastic rain protection as shown.

6.3 Items not assembled at delivery

6.3.1 Items not assembled at delivery

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

Main electric motors

Motors are not assembled to the frames, except for frame sizes: MS2 and MS3.

Cooler assembly

- DUc MS2, MS3: Air-oil cooler up to HDC 085 is assembled. HDC 090 and HDC 100 never assembled
  Plate and tube water-oil cooler FC 160 always assembled. Other tube water-oil cooler sizes never assembled
- DUc LS2, LS3: Air-oil cooler never assembled
  Plate water-oil cooler always assembled
  Tube water-oil cooler never assembled
- DUc MT2, MT3: Air-oil cooler never assembled
  Plate water-oil cooler always assembled.
  Tube water-oil cooler never assembled
- DUc LT2, LT3: Air-oil cooler never assembled
  Plate and tube water-oil cooler never assembled

Note! Air-oil coolers never assembled if top cover

Top cover assembly

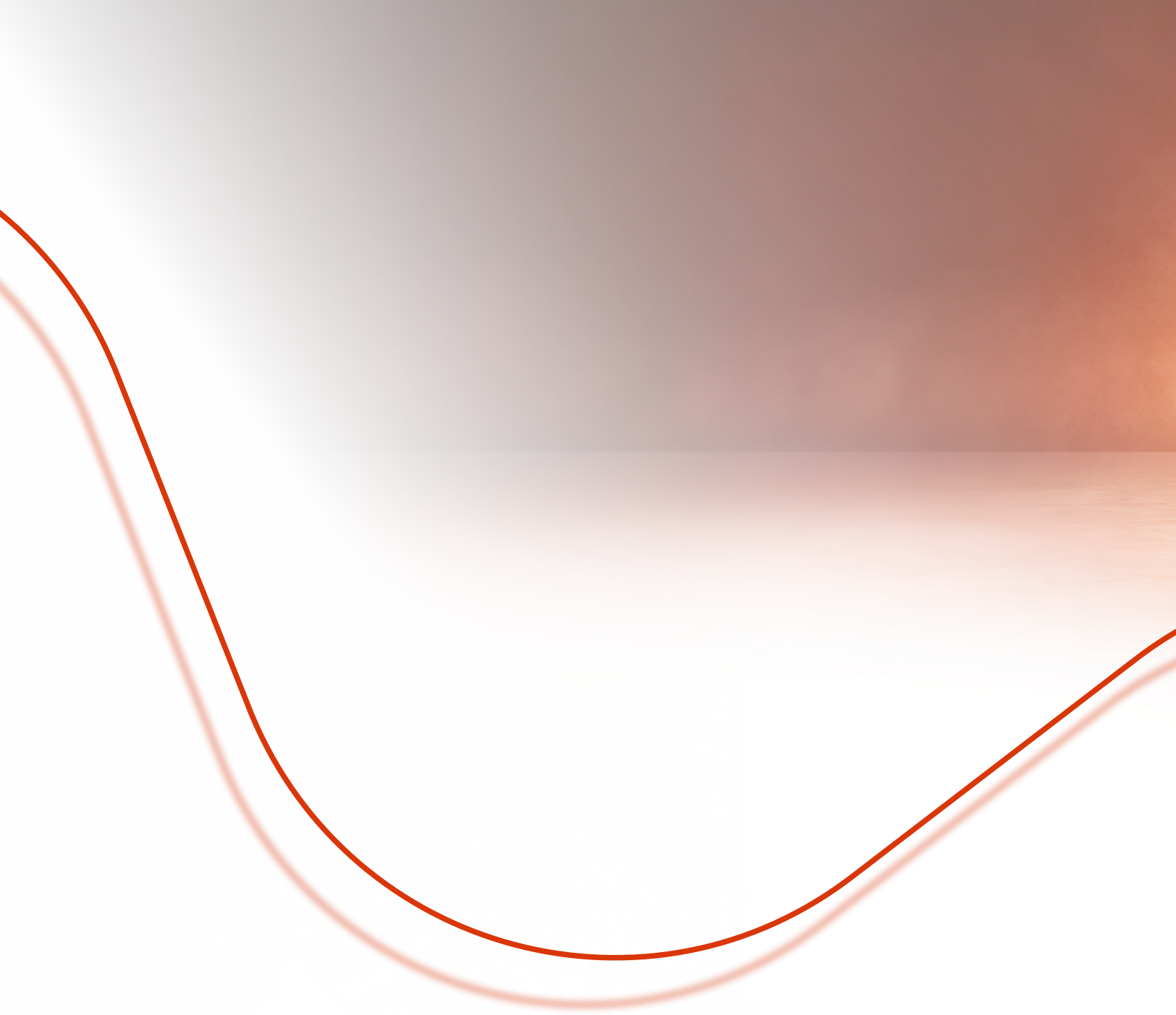
The top cover is sent in parts alongside the drive unit and is to be assembled on-site.

6.3.2 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, Hägglunds DUc	RE 15326-WA	Instruction manual
🕮	User manual Hägglunds Spider	RE 15330-WA	Instruction manual
🕮	Sound and vibration	RE 15411	Data sheet
🕮	Pump control, Hägglunds ICp	RE 15422	Data sheet
🕮	Axial-piston pump Hägglunds SP 40 to SP 180	RE 15328	Data sheet
🕮	Axial-piston pump Hägglunds SP 250 to SP 750	RE 15333	Data sheet
🕮	Hägglunds HDC Air oil cooler	RE 15334	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
🕮	User manual Hägglunds Control System	RE 15331-WA	Instruction manual
🕮	Hägglunds QECC	RE 15370	Data sheet
🕮	Quick stop unit - Hägglunds VQCC 800 & QECC	RE 15365	Data sheet
🕮	Hägglunds VQCC 800	RE 15374	Data sheet



HÄGGLUNDS
Bosch Rexroth AB
SE-895 80 Mellansel
tel: +46 (0)660 870 00
www.hagglunds.com
Hägglunds is a brand of Rexroth, a leading global supplier of drive and control technologies. Hägglunds solutions enrich a comprehensive Rexroth portfolio.

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.