

Drive system

Hägglungs Fusion



VALID FOR:

- Torque range: Up to 280 kNm (up to 206 517 lb·ft)
- Speed range: Up to 67 rpm at 50 Hz
Up to 81 rpm at 60 Hz
- Maximum operating pressure: 350 bar (5076 psi)
- Power range: Up to 75 kW (100 hp)

FEATURES

- All in one drive solution
- Extremely compact design – small footprint
- Panels for sealed off hydraulic compartment
- Can be equipped with Hägglungs advanced control system
- No need for foundation or alignment

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1 Ordering code

In order to identify Hägglunds equipment exactly, the following ordering code is used. Example Hägglunds Fusion:

HD	-	FN	X	-	0050	0050	S	N	0	3	-	M	037	071	-	A	S	D	3	0	E	400	/	50	-	00
01		02	03		04	05	06	07	08	09		10	11	12		13	14	15	16	17	18	19		20		21

01	Brand																						
	Hägglunds																						HD

02	Drive system																						
	Fusion																						FN

03	Feature																						
	Standard																						X

04	Hydraulic motor frame size																						
	CA 50																						0050
	CA 70																						0070
	CA 100																						0100
	CA 140																						0140
	CA 210																						0210
	Quantum (QMX) 280																						0280
	Quantum (QMX) 400																						0400
	Quantum (QMX) 560																						0560
	Quantum (QMX) 840																						0840

05	Hydraulic motor nominal size, specific torque, Nm/bar																						
	Frame size 50						0020	0025	0032	0040	0050												
	Frame size 70							0040	0050	0060	0070												
	Frame size 100						0040	0050	0064	0080	0100												
	Frame size 140							0080	0100	0120	0140												
	Frame size 210								0160	0180	0210												
	Frame size 280									0240	0280												
	Frame size 400		0240	0280	0320	0360	0400	0440	0480	0520	0560												
	Frame size 560								0440	0480	0520	0560											
	Frame size 840						0600	0640	0680	0720	0760	0800	0840										

06	Mounting alternative shaft																						
	Splines																						S
	Shrink disc coupling																						C
	Hydraulic shrink disc																						H

07	Type of seal																						
	NBR (Nitrile)																						N
	FPM (Viton)																						V

08	Type of brake	Splines	Mechanical shrink disc	Hydraulic shrink disc	
	Without brake	●	●	●	0
	BICA 13	●	●	●	A
	BICA 24	●	●	●	B
	BICA 37	●	●	●	C
	BICA 48	●	-	-	D
	BICA 64	●	-	-	E
	BICA 90	●	-	-	F
	BICA 134	●	-	-	G
	BICA 160	●	-	-	H

● = Available – Not available

09	Torque arm mounting position	
	3 o'clock	3
	9 o'clock	9
10	Frame size	
	Medium	M
	Large	L
11	Electric motor size	
	11 kW	011
	15 kW	015
	18.5 kW	018
	22 kW	022
	30 kW	030
	37 kW	037
	45 kW	045
	55 kW	055
75 kW	075	
12	Pump size	
	28 cc	028
	40 cc	040
	56 cc	056
	71 cc	071
	90 cc	090
125 cc	125	
13	Type of cooler	
	Air oil cooler	A
14	Type of filter	
	Single	S
	Duplex	D
15	Type of control	
	Pump control	D
	Control system	S
16	Painting system	
	C3 (normal industrial atmosphere)	3
	C5 (marine or aggressive industrial atmosphere)	5
17	Hazardous area	
	Not used in hazardous area	0
18	Version	
	European	E
	American	A
19	Voltage	
	Main Voltage	
20	Frequency	
	50 Hz	50
	60 Hz	60
21	Design	
	Standard	00
	Special index	01-99

2 Function Hägglands Fusion

2.1 General

The Hägglands Fusion drive system is a compact all in one drive solution with high reliability and long service life. Fusion delivers high torque throughout the whole speed range with infinite start, stop, and reverse, which will not damage the system. Fusion is rugged and reliable, designed for outdoor use in all weather conditions.

The Fusion drive system is an infinitely variable ratio drive, a gear box is not required to adjust ratio affecting speed. This allows for flexibility in speed range to adjust process capacity without varying electric motor frequency or adjusting gear ratios. The system is capable of producing any speed within its specified range. Installation is easy and comes with either internal splines or hollow shaft with a shrink disc coupling that mounts directly to the machine's drive shaft.

Fusion drive system features an asynchronous electric motor driving a variable displacement axial piston pump. Hydraulic motor speed is controlled by varying the current to the proportional solenoid stroker on the hydraulic pump, which sets the swash plate angle and therefore piston stroke and resultant flow to the hydraulic motor. A speed encoder is supplied to provide full closed loop speed feedback and control.

Standard features supported in Fusion:

- Torque arm with pivot attachment which can handle load in tension or compression
- Stainless steel reservoir to ensure no corrosion in the reservoir that could lead to oil contamination
- Filtration of the charge flow to keep a clean loop

Fusion includes the following sensors:

- High pressure sensor which allows for monitoring maximum system pressure to ensure no damage to the equipment
- Charge pressure sensor ensures hydraulic motor and pump internal parts are fully engaged and ready to produce torque upon demand
- Level sensor for monitoring of oil level
- Oil tank temperature sensor monitors reservoir temperature to ensure minimum temperature for startup and maximum temperature for interlock to protect equipment
- Speed encoder for reading hydraulic motor speed

For variants with pump control, included sensors are connected to an IO-link master, except the speed encoder which has a pulse interface. Also pump valve actuators are connected to the IO-link master. The IO-link master can be adopted to match the customer preferred communication protocol.

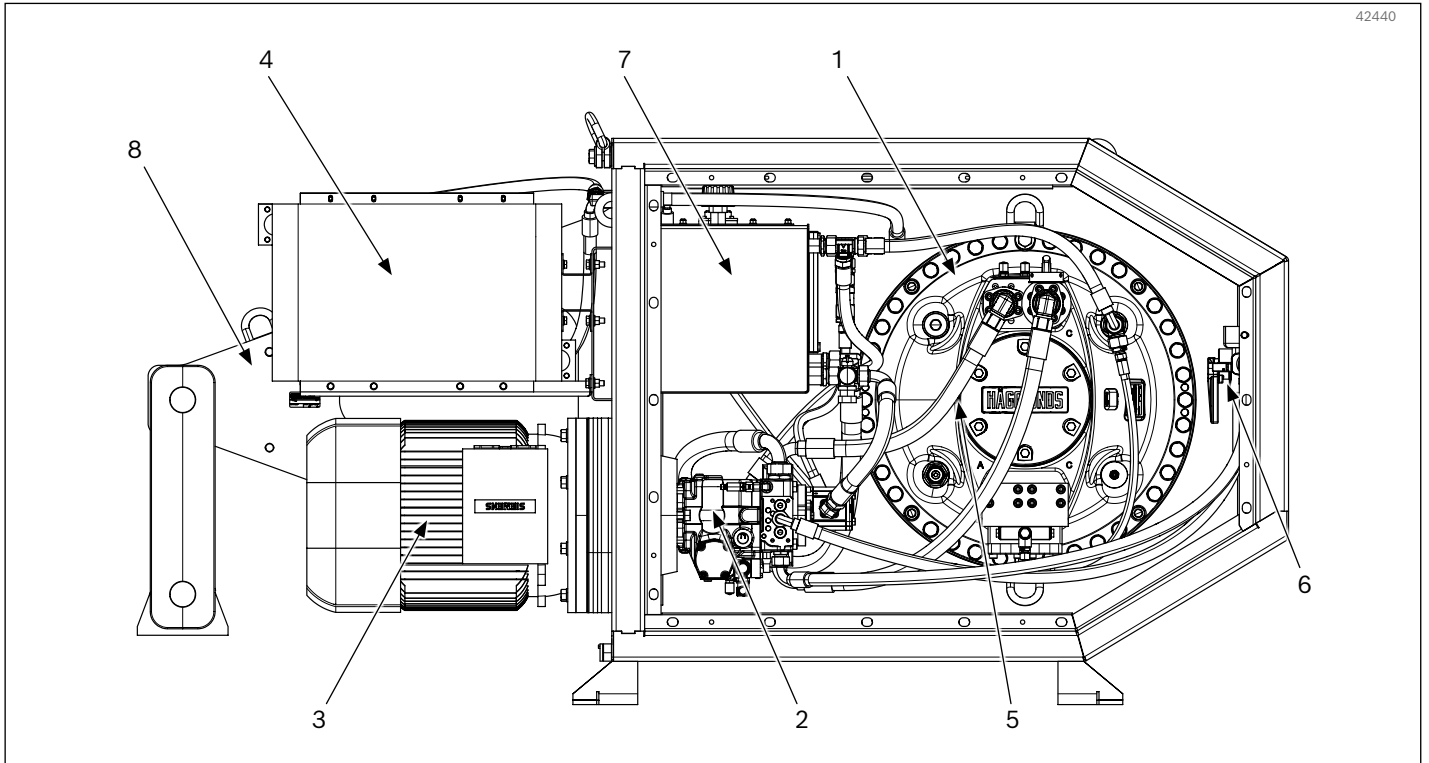


Fig. 1: Main components Hägglunds Fusion

1. Hydraulic motor
2. Hydraulic pump
3. Electric motor
4. Air oil cooler
5. Speed encoder
6. Charge filtration
7. Oil tank
8. Torque arm

2.1.1 Versions

Hägglunds Fusion is available in two versions: European and 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 system shall be based on customer requirements.

2.1.2 Test certificate

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

2.1.3 Compliance

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

Control system

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

Quality assurance system, certified to standard ISO 9001.

2.1.4 Ambient temperature

Upper limit

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

Lower limit

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

2.1.5 Possible combinations

Table 1 shows the possible combinations of pump and electric motor combinations for Hägglunds Fusion. See 1 Ordering code for all possible combinations in combination with hydraulic motors.

Please contact your Bosch Rexroth representative for suitable dimensioning of the drive system.

Table 1: Possible pump and electric motor combinations

Electric motor kW (hp)	Pump					
	28 cc	40 cc	56 cc	71 cc	90 cc	125 cc
11 (15)	•	•				
15 (20)	•	•				
18.5 (25)	•	•	•			
22 (30)	•	•	•	•		
30 (40)		•	•	•	•	
37 (50)			•	•	•	•
45 (60)				•	•	•
55 (75)					•	•
75 (100)						•

3 Circuit diagram

3.1 Simplified hydraulic circuit

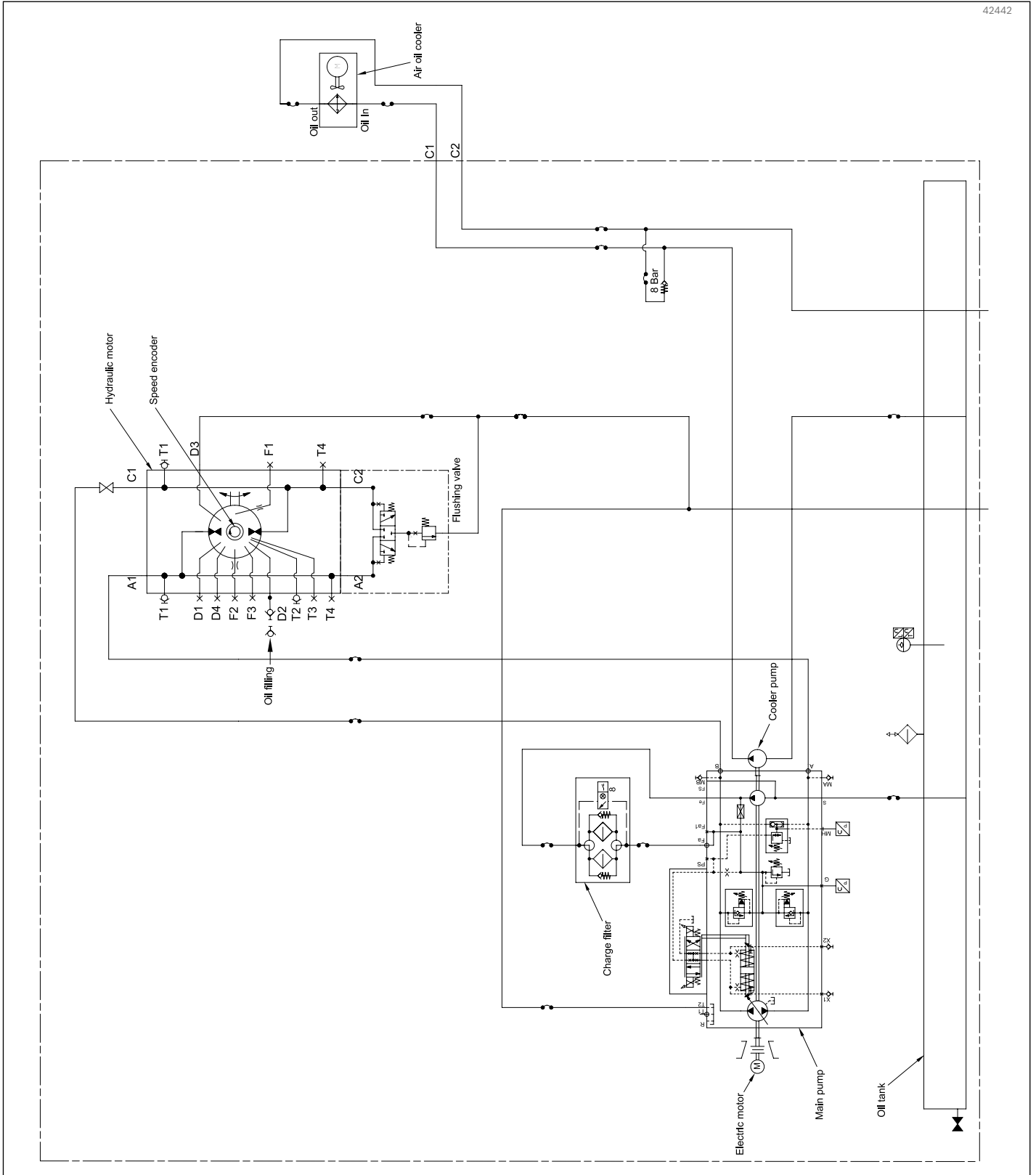


Fig. 2: Simplified hydraulic circuit

3.2 Monitoring logic diagram

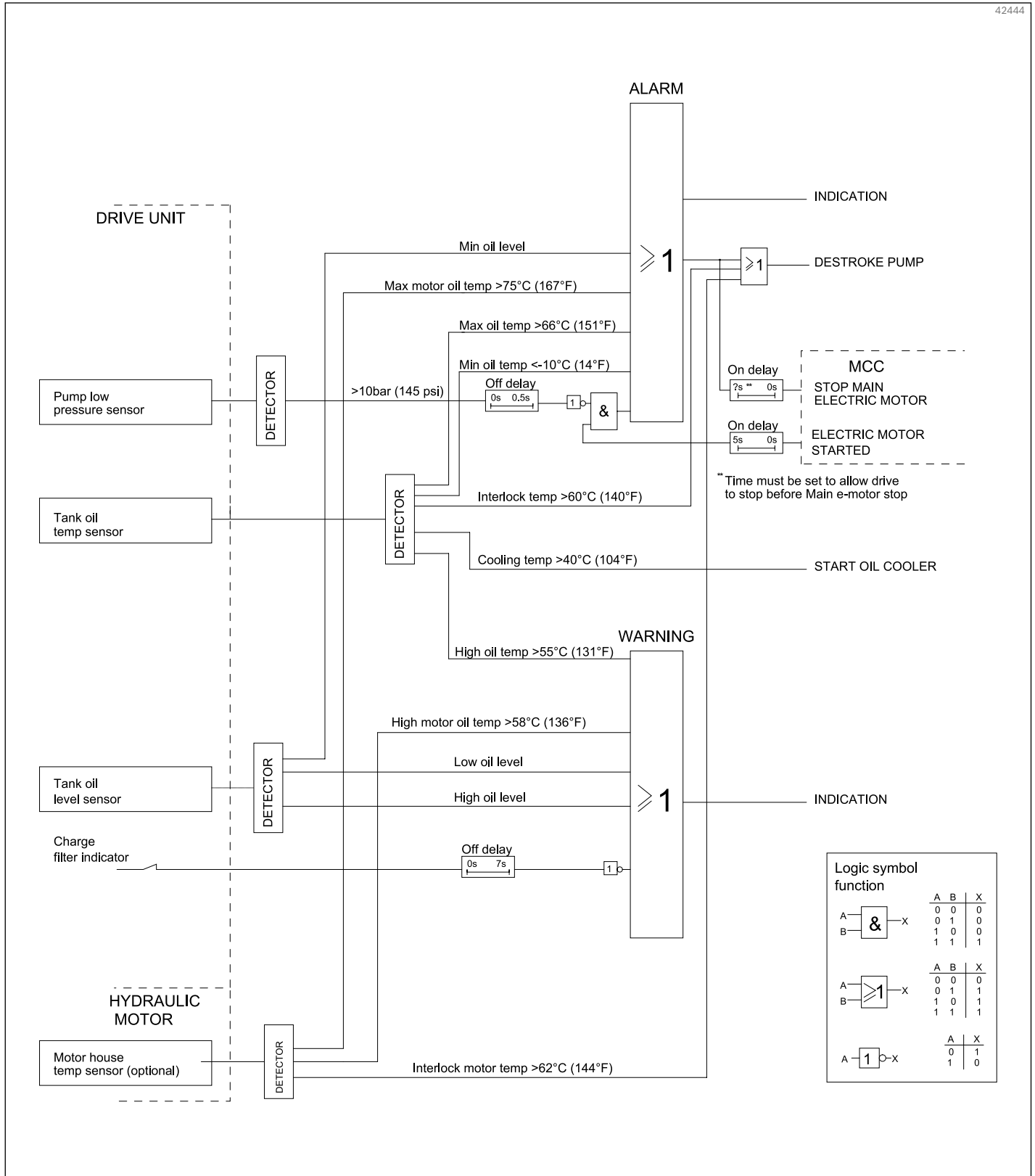


Fig. 3: Example of monitoring logic diagram with synthetic ISO VG 68 oil

4 Technical data

4.1 Pressure levels

Maximum operating pressure¹⁾: 350 bar (5076 psi).

Maximum pressure during start-up²⁾: 370 bar (5366 psi).

Maximum peak pressure³⁾: 420 bar (6092 psi).

¹⁾ Pressure limitations for Quantum motors in some nominal motor sizes, see specific data in [RE 15428-A](#)

²⁾ Limited to max 1 min, max 20 times/year, unidirectional rotation, during the life time of drive.

³⁾ Peak pressure 420 bar maximum, allowed to occur at a single operating period of max. 1 second. Total amount of single operation periods = 10 000 times.

4.2 Weights

Table 2: Weight basic unit

Frame size	Weight*	
	kg	lb
Medium	388	855
Large	450	992

*Weight without hydraulic motor, torque arm, pump, electric motor and air-oil cooler

Table 3: Weight hydraulic motor

Hydraulic motor frame size	Weight			
	Splines		Shrink disc coupling	
	kg	lb	kg	lb
CA 50	175	437	203	447
CA 70	205	450	232	512
CA 100	265	584	310	683
CA 140	305	672	347	765
CA 210	395	870	456	1005
QMX 280	705	1555	800	1760
QMX 400	1060	2335	1160	2555
QMX 560	1115	2450	1290	2840
QMX 840	1445	3185	1620	3570

Table 4: Weight torque arm

Hydraulic motor frame size	Weight	
	kg	lb
CA 50	360	794
CA 70	355	783
CA 100	350	772
CA 140/CA 210	360	794
QMX 280/QMX 400	370	816
QMX 560/QMX 840	330	728

Table 5: Weight pump

Pump cc	Weight	
	kg	lb
28	39	86
40	41	90
56	48	106
71	60	132
90	65	143
125	85	187

Table 6: Weight electric motor

Electric motor kW	Weight	
	kg	lb
11	80	176
15	110	243
18.5	170	375
22	190	419
30	240	529
37	285	628
45	340	750
55	420	926
75	620	1367

Table 7: Weight air-oil cooler

Air-oil cooler type	Weight	
	kg	lb
HDC 030-4	24	53
HDC 050-4	38	84
HDC 060-4	62	137
HDC 080-4	102	225

Example

Given: Hägglunds Fusion with

- Hydraulic motor: QMX 280 splines
- Electric motor: 37 kW
- Pump: 71 cc
- Cooler: HDC 50-4

Solution: Weights from tables

Basic drive unit	388 kg
Hydraulic motor	705 kg
Torque arm	360 kg
Pump	60 kg
Electric motor	285 kg
Cooler	38 kg

Total weight:

$388+705+360+38+285+60=1\ 836$ kg

Round the value up to even fifties : 1 850 kg
(Weight of oil in system not included).

4.3 Load calculations

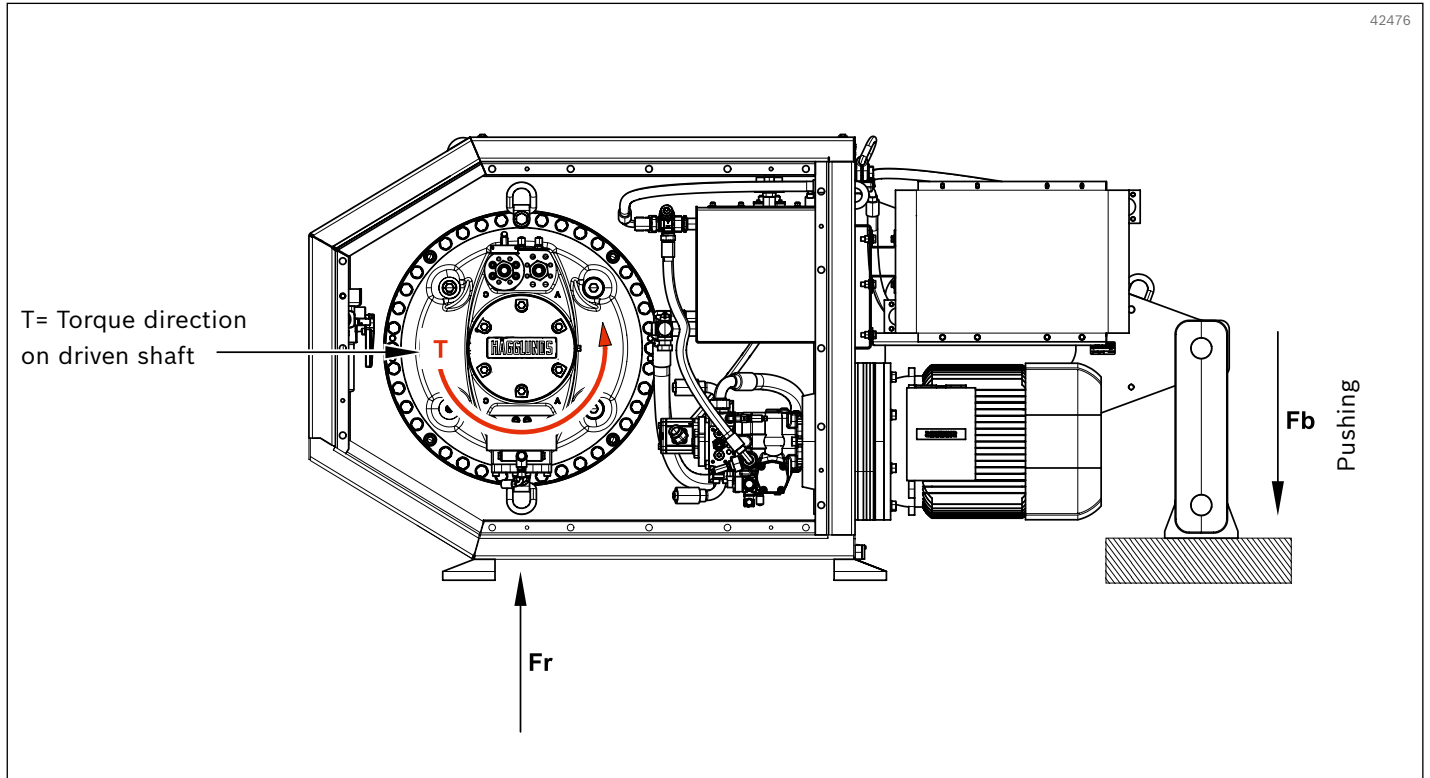


Fig. 4: External forces F_r , F_b for torque arm (3 o'clock position)

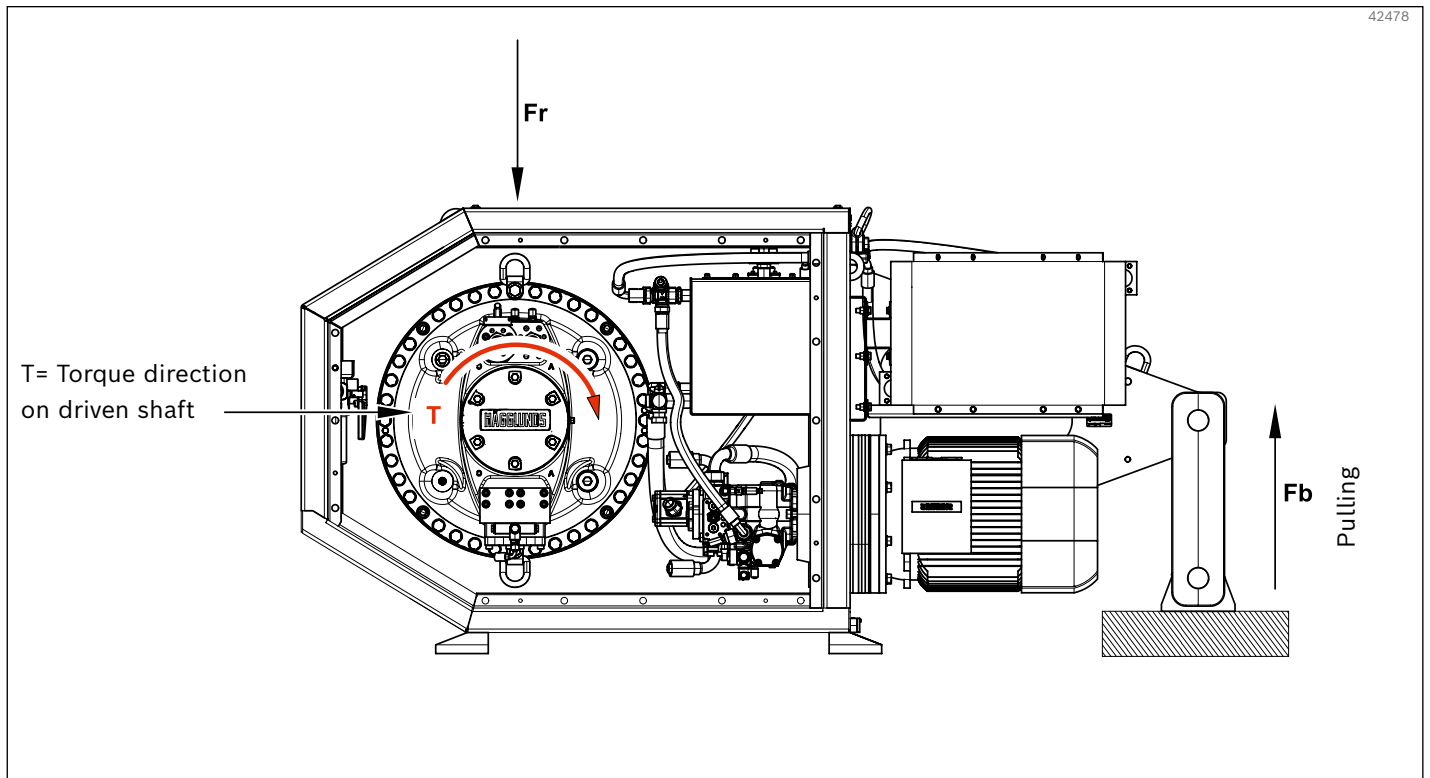


Fig. 5: External forces F_r , F_b for torque arm (3 o'clock position)

Table 8: External forces torque arm valid for delta pressure 400 bar (5800 psi) static

Hydraulic motor ¹⁾	Electric motor	Force Fb		Force Fr ²⁾	
		kN	lbf	kN	lbf
CA 50-50 S	15 kW	10	2250	21	4725
	75 kW	10	2250	28	6300
CA 70-70 S	15 kW	14	3150	25	5625
	75 kW	14	3150	32	7200
CA 100-100 S	15 kW	20	4500	32	7200
	75 kW	20	4500	39	8775
CA 140-140 S	15 kW	28	6300	40	9000
	75 kW	28	6300	48	10800
CA 210-210 S	15 kW	42	9450	55	12375
	75 kW	42	9450	63	14175
QMX 280-280 S	15 kW	56	12600	72	16200
	75 kW	56	12600	80	18000
QMX 400-400 S	22 kW	80	18000	101	22725
	75 kW	80	18000	107	24075
QMX 560-560 S	30 kW	113	25425	134	30150
	75 kW	113	25425	140	31500
QMX 840-840 S	37 kW	169	38025	193	43425
	75 kW	169	38025	199	44775
CA 50-50 C	15 kW	10	2250	21	4725
	75 kW	10	2250	28	6300
CA 70-70 C	15 kW	14	3150	25	5625
	75 kW	14	3150	33	7425
CA 100-100 C	15 kW	20	4500	32	7200
	75kW	20	4500	39	8775
CA 140-140 C	15 kW	28	6300	41	9225
	75 kW	28	6300	48	10800
CA 210-210 C	15 kW	42	9450	56	12600
	75 kW	42	9450	63	14175
QMX 280-280 C	15 kW	56	12600	73	16425
	75 kW	56	12600	81	18225
QMX 400-400 C	22 kW	80	18000	102	22950
	75 kW	80	18000	108	24300
QMX 560-560 C	30 kW	113	25425	135	30375
	75 kW	113	25425	141	31725
QMX 840-840 C	37 kW	169	38025	195	43875
	75 kW	169	38025	201	45225

¹⁾ S = splines, C = shrink disc coupling

²⁾ The Force Fr is calculated including the total weight of the Fusion unit.

The option BICA brake is not considered in the calculation of external forces.

4.4 Positioning Fusion

The following space must be left free around the drive system, to allow free ventilation (distance A_A and B_A) and to provide sufficient working space for maintenance (distance B and C). Heavier maintenance such as change of motor/pump will demand more working space.

Table 9: Minimum space around drive system

Minimum space	mm	in
A_A	150	5.9
B	1000	39.4
B_A	HDC 030-4	500
	HDC 050-4	772
	HDC 060-4	815
C	700	27.6

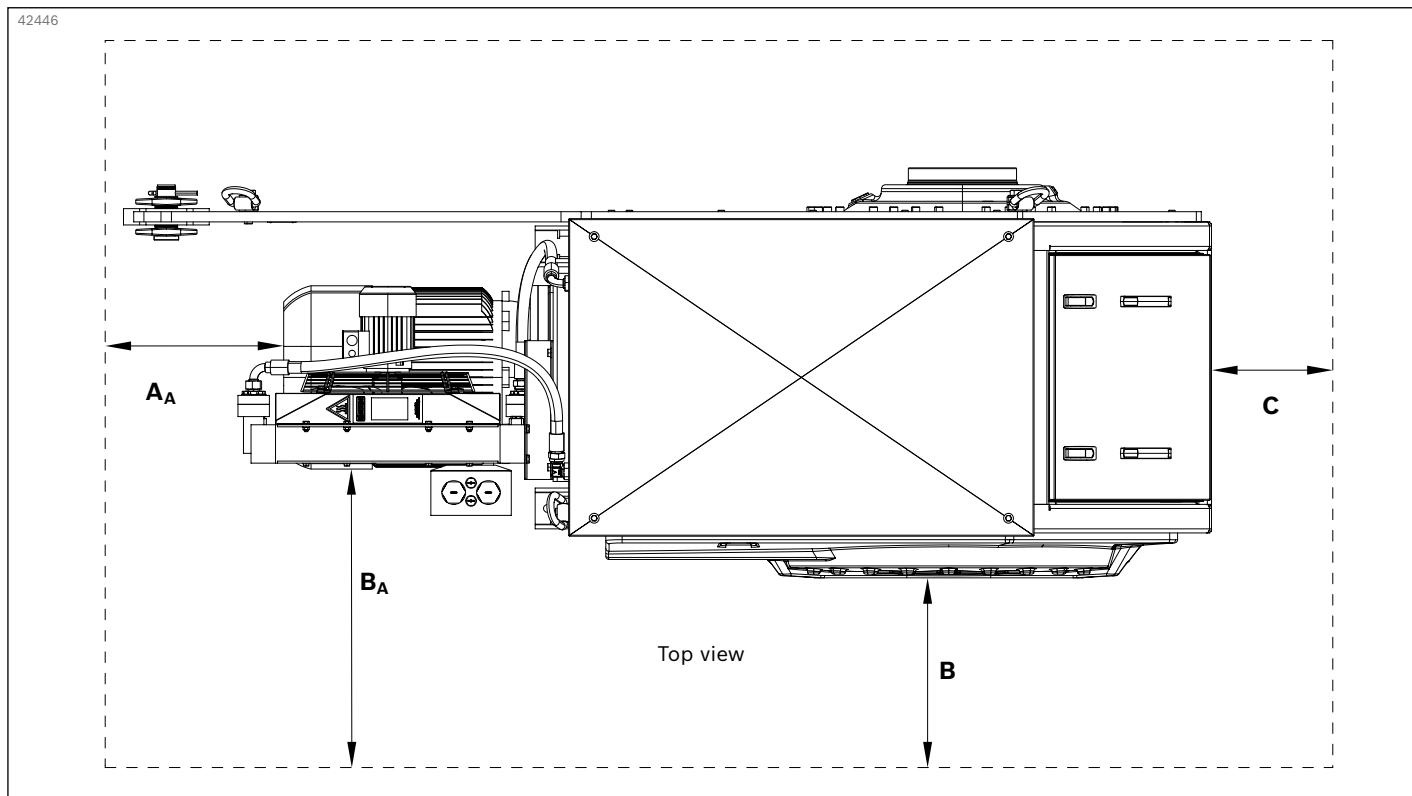


Fig. 6: Minimum space around drive system

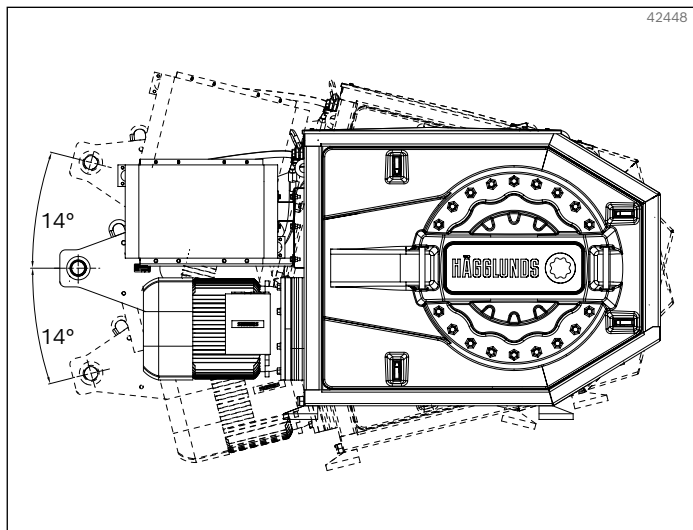


Fig. 7: Alternative positions 9 o'clock

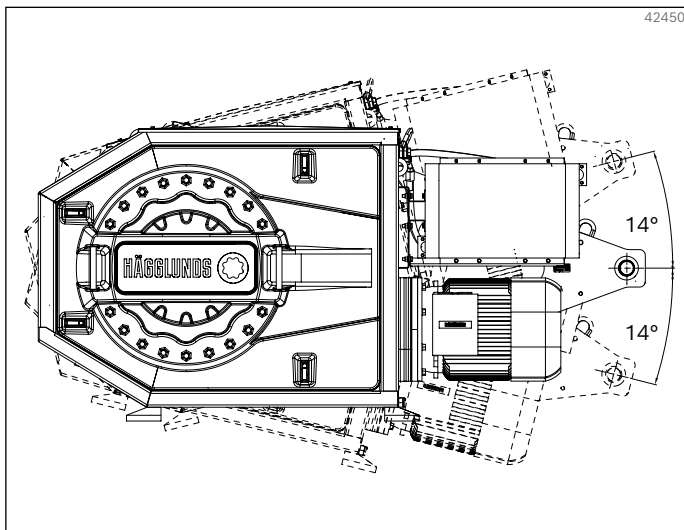


Fig. 8: Alternative positions 3 o'clock

4.5 Mounting on driven shaft

For shaft recommendations see chapter Mounting alternatives and sections for torque arm mounting in [RE 15305](#) respectively [RE 15428-A](#). For drawings see *6 Required and additional documents*.

4.6 Direction of rotation

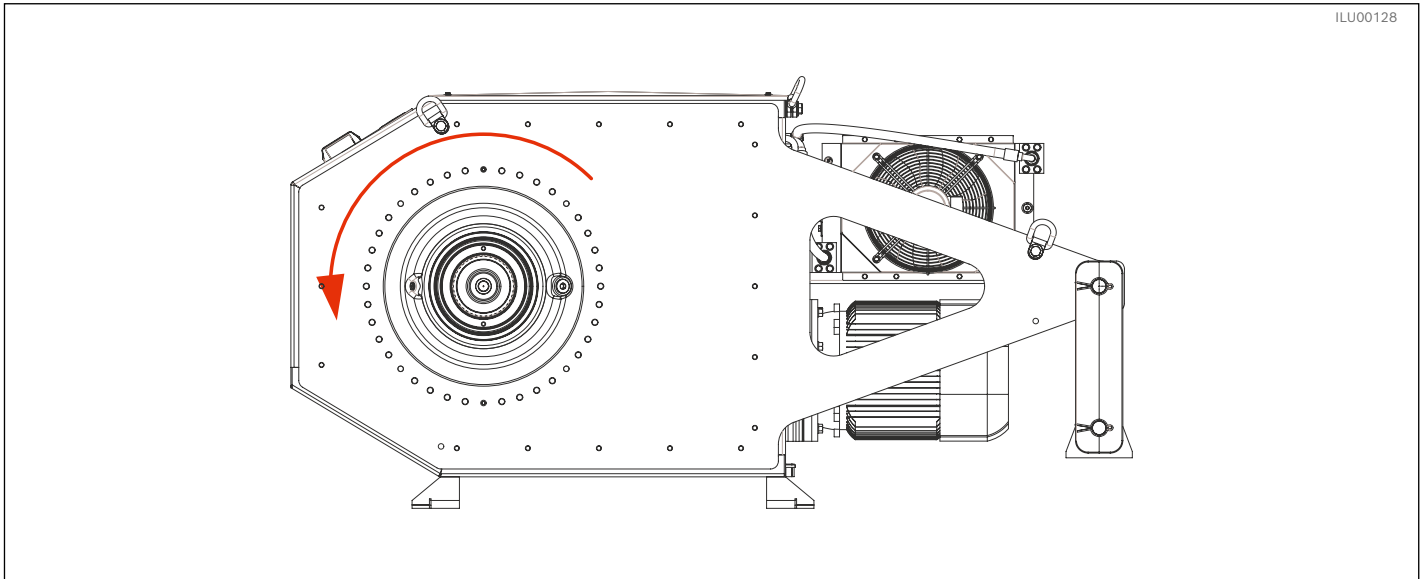


Fig. 9: Counter clockwise rotation with torque arm position 9 o'clock

Counter clockwise rotation (seen from shaft end), is achieved with flow inlet in A port on hydraulic motor and forward command in Hägglunds Spider.

Clockwise rotation is achieved with flow inlet in C port on hydraulic motor and forward command in Hägglunds Spider.

Default solution for Hägglunds Fusion is:

- Counter clockwise rotation with torque arm position 9 o'clock
- Clockwise rotation with torque arm position 3 o'clock

4.7 Dimensions Fusion

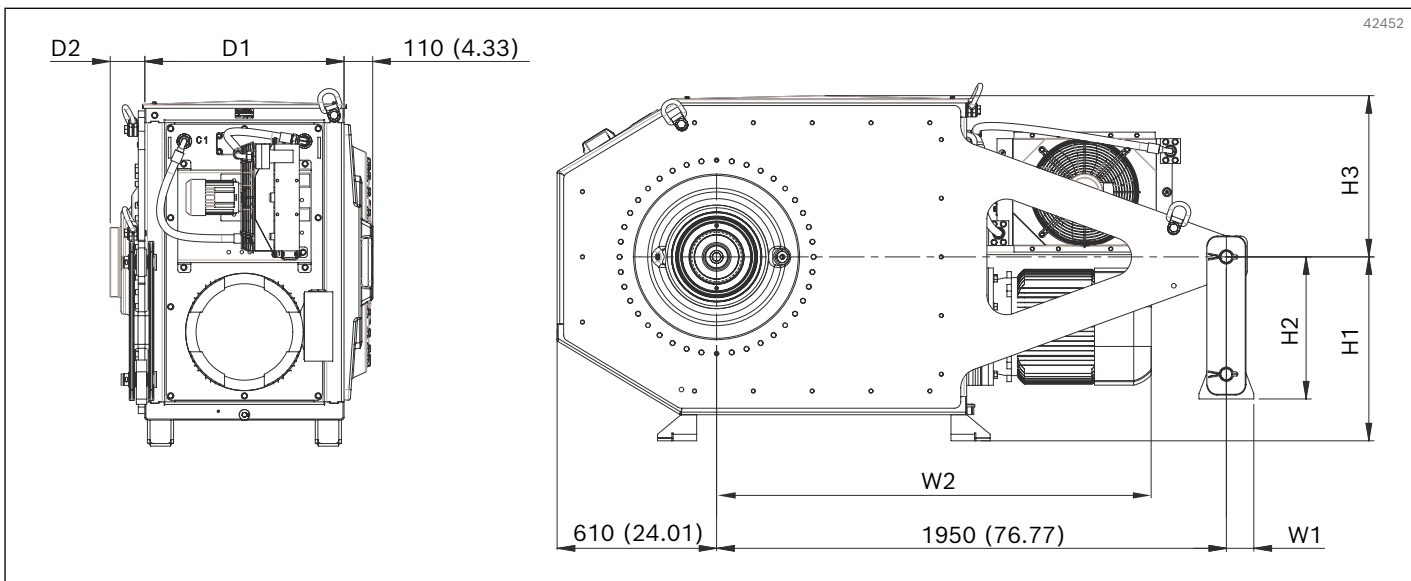


Fig. 10: Dimensions Fusion

Table 10: Dimensions Fusion

Hydraulic motor size	D2 (with splines)		D2 (with shrink disc coupling)		W1		H2	
	mm	in	mm	in	mm	in	mm	in
CA 50	50	1.97	128	5.04				
CA 70	50	1.97	128	5.04	50	1.97	340	13.39
CA 100	139	5.47	231	9.09				
CA 140	138	5.43	231	9.09				
CA 210	160	6.30	290	11.42	85	3.35	430	16.93
QMX 280	133	5.24	229	9.02				
QMX 400	133	5.24	239	9.41				
QMX 560	301	11.85	383	15.08	105	4.13	545	21.46
QMX 840	301	11.85	383	15.08				

Table 11: Dimensions Fusion

Electric motor kW	W2			
	Medium frame		Large frame	
	mm	in	mm	in
11	1501	59.09	1601	63.03
15	1561	61.46	1661	65.39
18.5	1575	62.01	1675	65.94
22	1605	63.19	1705	67.13
30	1663	65.47	1763	69.41
37	1684	66.30	1784	70.24
45	1744	68.66	1844	72.60
55	—	—	1872	73.70
75	—	—	2055	80.91

Table 12: Dimensions Fusion

	D1		H1		H3	
	mm	in	mm	in	mm	in
Medium	762	29.99	706	27.80	618	24.33
Large	862	33.94	806	31.73	618	24.33

4.8 Main components

4.8.1 Hydraulic motor

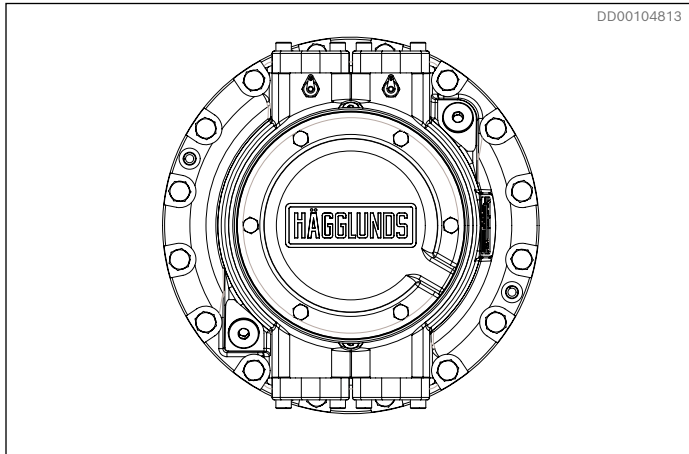


Fig. 11: Hägglunds CA

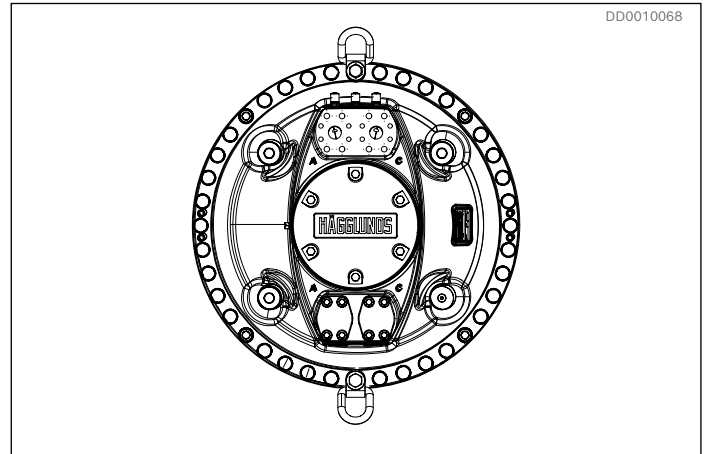


Fig. 12: Hägglunds Quantum

Function

The hydraulic motor supplies the needed torque to the machine and the load sets the pressure level in the system. The motor rotates at the required speed, determined by the oil flow from the pump.

Reference

For more information see the specific data sheets Hägglunds CA [RE 15305](#) and Hägglunds Quantum [RE 15428-A](#).

Table 13: Technical data hydraulic motor

Mounting alternatives	Splines
	Shrink disc
	Hydraulic shrink disc
Seal alternatives	NBR (Nitrile)
	FPM (Viton)
Increased robustness	DLC coated piston assemblies

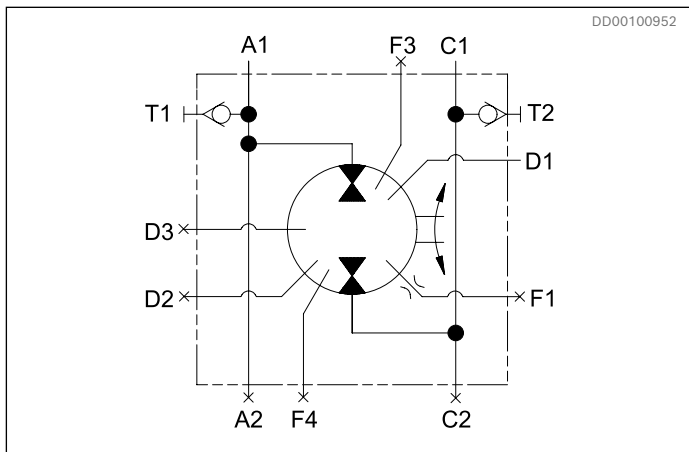


Fig. 13: Hydraulic symbol Hägglunds CA

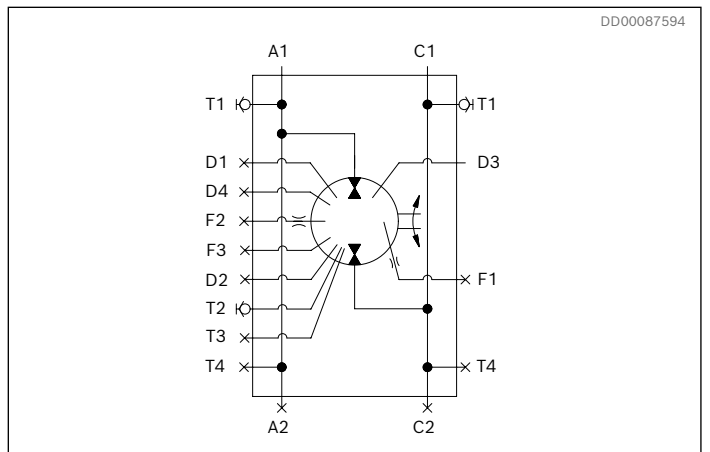


Fig. 14: Hydraulic symbol Hägglunds Quantum

4.8.2 Electric motor

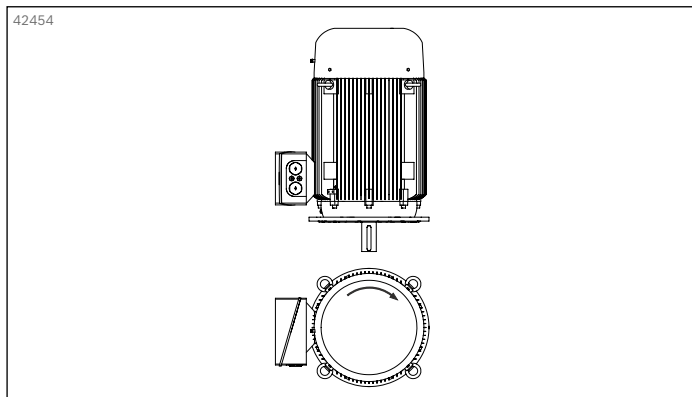


Fig. 15: Electric motor

Function

The electric motor is a totally enclosed, fan cooled (TEFC) squirrel-cage, 4-pole 3-phase motor for low-voltage. The electric motors used as standard in the drive unit are manufactured by Innomotics.

Technical data

Table 14: Technical data electric motor

Operating Duty:	S1
Method of mounting:	B5
Output power:	11-75 kW
Degree of protection:	IP55 (Motor and connection box)
Cooling form:	IC411, fan cooler.
Insulation class:	F/B
Motor protection:	3 PTC thermistors, 150 °C (302 °F), in stator winding
Greasing:	Grease nipples for bearing D and N side, Type H1, acc. to DIN 71412
Painting:	Corrosion class C3
Sound press. level Lp:	≤ 85 dB(A) acc. to IEC 60034-9
Service factor	1.15

Standards

Table 15: Standards electrical motor

Standard	IEC 60034
EU Efficiency classes:	According to IEC 60034-30, Efficiency class IE3 (11-55 kW) Efficiency class IE4 (75 kW)
Certificate:	Type approval test certificate type 3.1 according to EN 10204 (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).

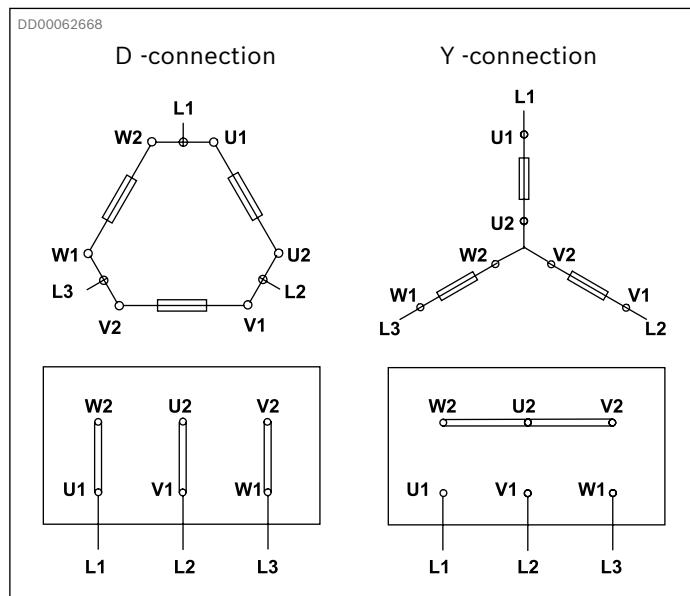


Fig. 16: D and Y connections

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.

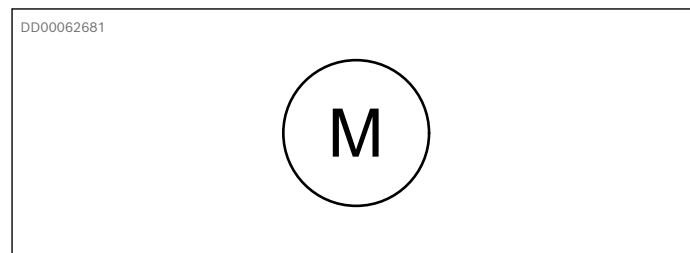


Fig. 17: Hydraulic symbol

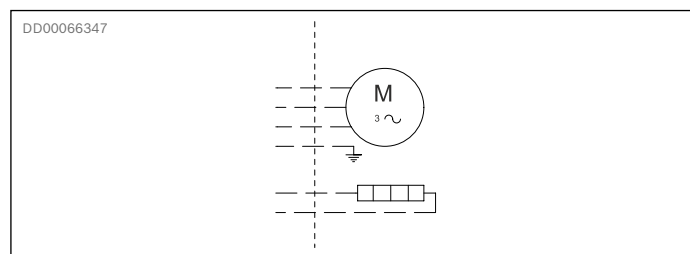


Fig. 18: Electrical symbol

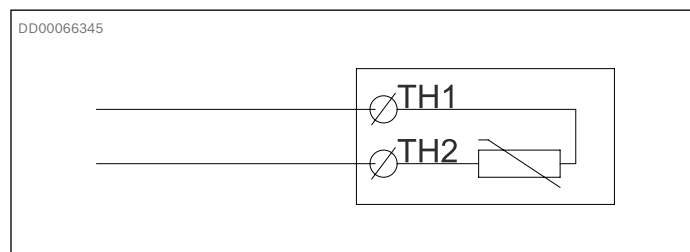


Fig. 19: Electrical symbol (thermistor)

4.8.3 Main pump

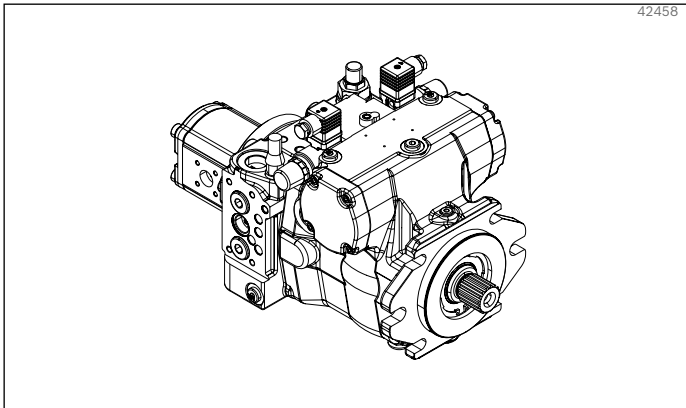


Fig. 20: Pump

Function

Variable displacement axial piston pump of swash plate design for hydrostatic closed circuit transmissions. Flow is proportional to speed and displacement and is infinitely variable through adjustment of the swivel angle.

- Output flow increases with swivel angle from 0 to its maximum value
- Swivelling the pump over center smoothly changes the direction of flow
- 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 oil supply and main pump control pressure
- With adjustable pressure cut-off as standard

Table 16: Working pressure range

Pressure at working ports A or B		Definition
Nominal pressure p_{nom}	400 bar	The nominal pressure corresponds to the maximum design pressure.
Maximum pressure p_{max}	450 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.
Maximum single operating period	10 s	
Total operating period	300 h	
Minimum pressure (low-pressure side)	10 bar above case pressure	Minimum pressure at the low-pressure side (A or B) required to prevent damage to the axial piston unit. Boost pressure setting must be higher depending on system.
Boost pump		
Nominal pressure $p_{Sp\ nom}$	25 bar	
Maximum pressure $p_{Sp\ max}$	40 bar	
Control pressure (control EP)		
Minimum control pressure $p_{St\ min}$ at $n = 2000$ rpm	20 bar above case pressure	Required control pressure p_{St} , to ensure the function of the control. The required control pressure is dependent on rotational speed, working pressure and the spring assembly of the stroking piston.

Table 17: Charge pump size

Pump size cc	Charge pump cc
28	8,6
40	11,6
56	15,1
71	19,6
90	19,6
125	28.3

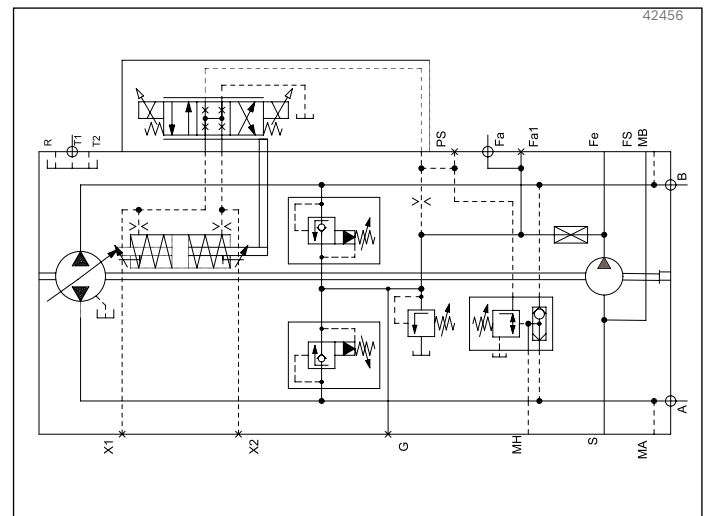


Fig. 21: Hydraulic circuit main pump

Reference

For more information see the specific data sheet [RE-E92003](#)

4.8.3.1 Flushing valve

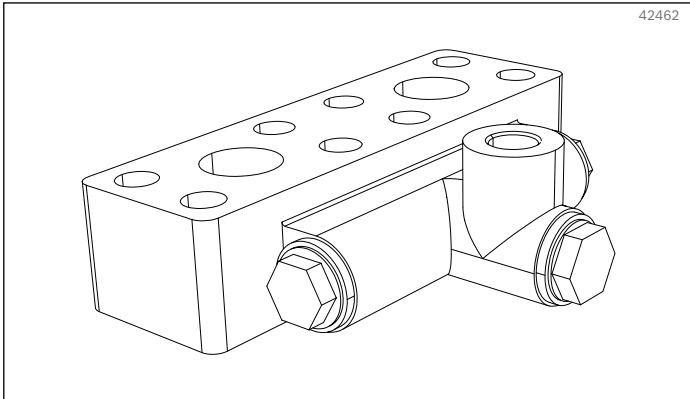


Fig. 22: Flushing valve

Function

The flushing valve is used to exchange heated hydraulic fluid from the closed circuit, when new oil is supplied from the pump, and remove dirt particles as well. The integrated pressure holding valve is used to set the charge pressure and prevent pressure drops in the system.

Technical data

Table 18: Technical data

Ordering code	Holding pressure		Switching pressure*)	
	bar	psi	bar	psi
SVF90S/10MV00C3D4H20-C	20	290.1	3 to 5	43.5 to 72.5

* Δp of the flushing piston

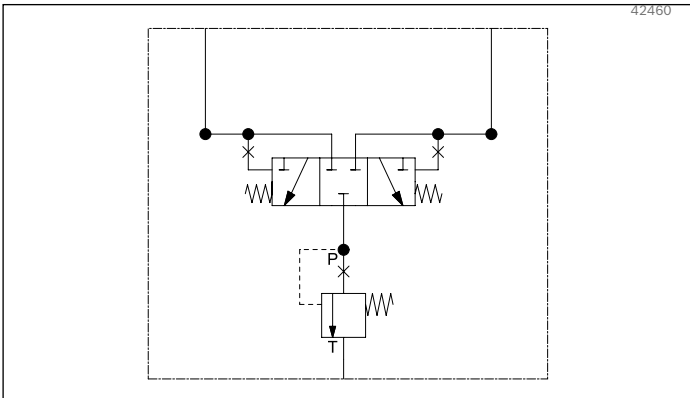


Fig. 23: Hydraulic circuit flushing valve

Reference

For more information see the specific data sheet [RE 95512](#)

4.8.3.2 Auxiliary pump

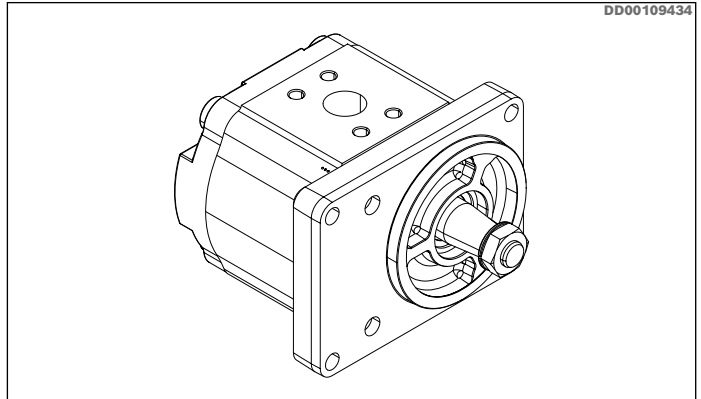


Fig. 24: Auxillary pump

Function

The auxiliary pump is used for the cooling circuit. The pump type used is an external gear pump.

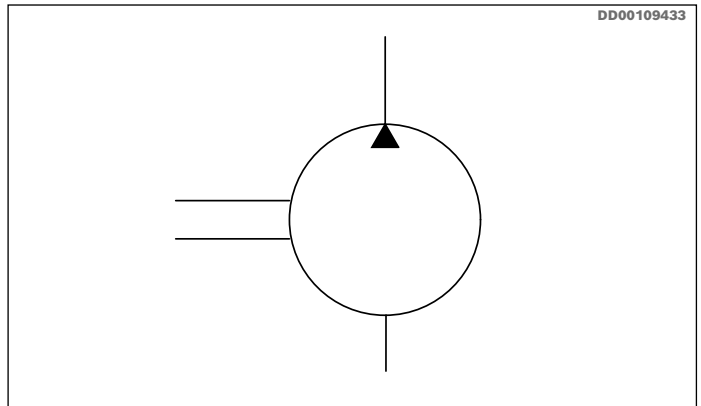


Fig. 25: Hydraulic symbol

Table 19: Auxillary pumps

Pump size	Ordering code	Max continuous pressure		Max peak pressure	
		bar	psi	bar	psi
22.5	AZPF-11-022RRR20KB-S0081	180	2611	230	3336
28	AZPF-11-028RRR20KB-S0081	120	1740	170	2466

Reference

For more information see the specific data sheet [RE 10089](#)

4.8.4 HDC cooler

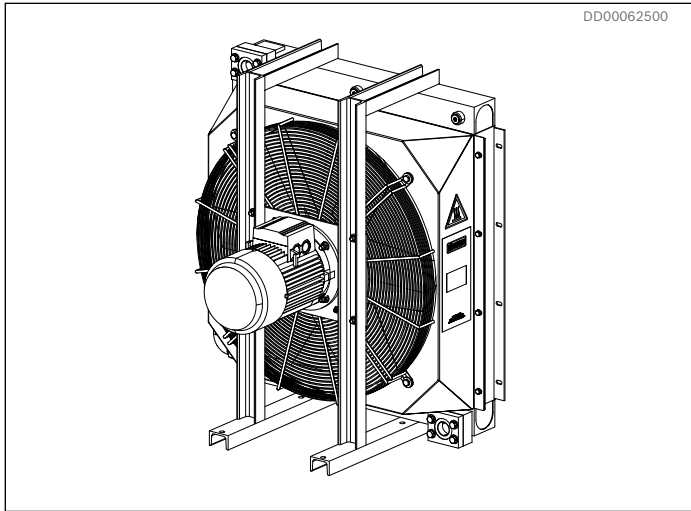


Fig. 26: Hägglunds HDC cooler

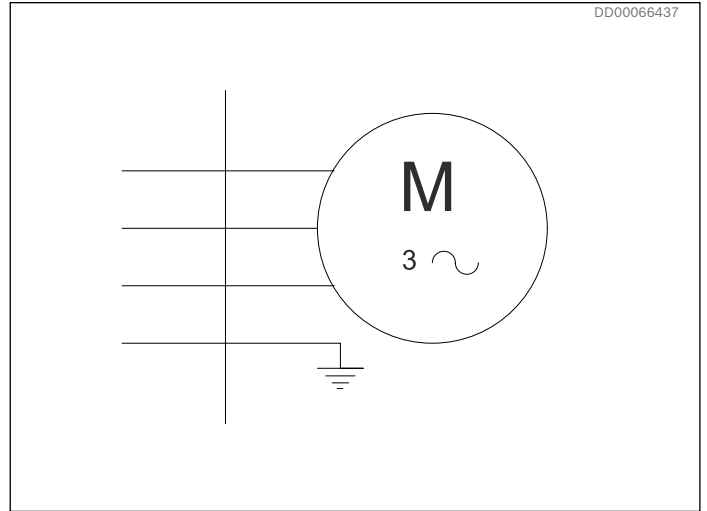


Fig. 27: Electrical symbol

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 from 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 main cabinet between the inlet and outlet of the cooler.
- An extra bypass valve is mounted directly on the cooler under the 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

Reference

For more information see the specific data sheet [RE 15334](#)

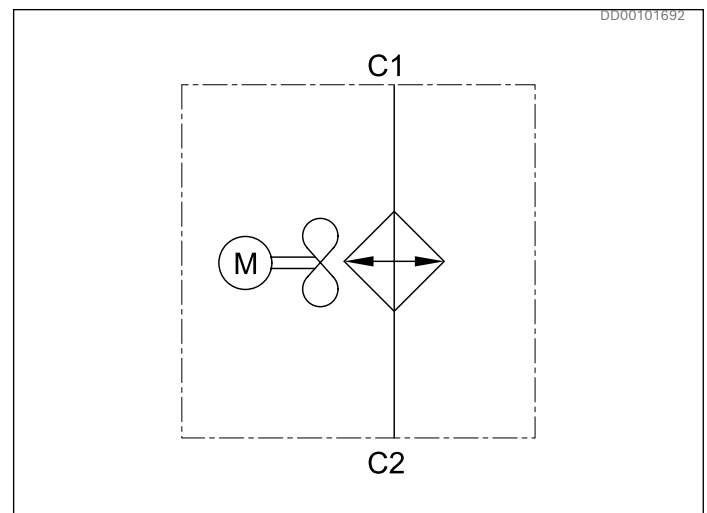


Fig. 28: Hydraulic symbol

Note!

When the air-oil cooler is separated from the drive system, the pressure drop through the piping hoses is not allowed to exceed 1 bar (14 psi).

Table 20: HDC cooler data

Cooler Type	Oil volume of the cooler		Driving power (kW)		Noise dBA	Max perm.dynamic pressure		Max. perm.static pressure		Max. volume flow	
	l	gal	50 Hz	60 Hz		bar	psi	bar	psi	l/min	gpm
HDC 030-4	3.0	0.79	0.37	0.43	76	14	203	26	377	160	42.3
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

4.8.5 Torque arm

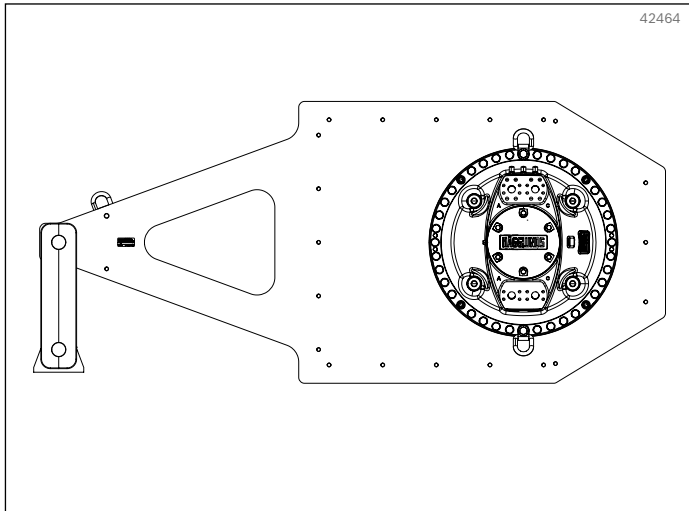


Fig. 29: Torque arm

Function

The Hägglunds single ended torque arm is the mounting solution for Hägglunds Fusion. The torque arm transmits the force generated by the hydraulic motor in to a fixed point. The length of the torque arm determines the force F_r (see Fig. 4 and Fig. 5) on motor and driven shaft

Reference

For more information see the specific data sheet [RE 15355](#)

4.8.6 Tank

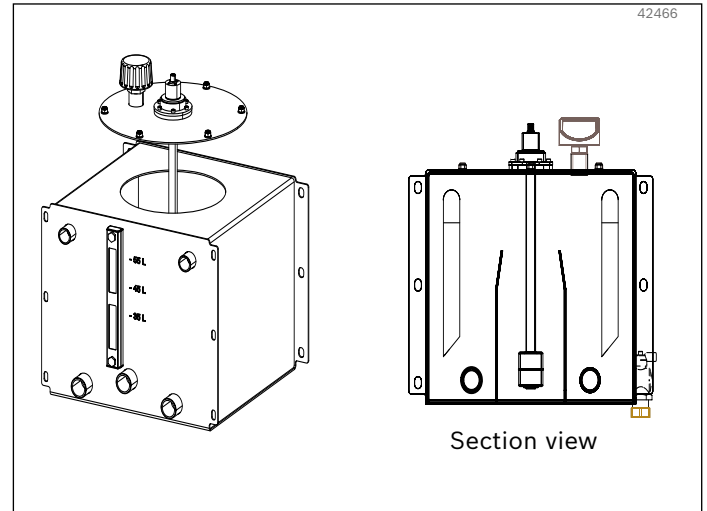


Fig. 30: Tank

Function

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

The tank has two baffle plates, separating the tank into three sections:

- Returning drain oil from motor and pump and oil out to cooler pump
- Oil out to charge pump
- Returning oil from cooler

The tank is equipped with:

- Level and temperature sensor
- Drain tap
- Air breather filter

Mechanical data

Table 21: Mechanical data

Tank volume	55 l	14.5 gal
Material	Stainless steel 1.4301	

Standards

Welding according to SS-ISO 5817

4.8.7 Oil filter

Separation characteristics

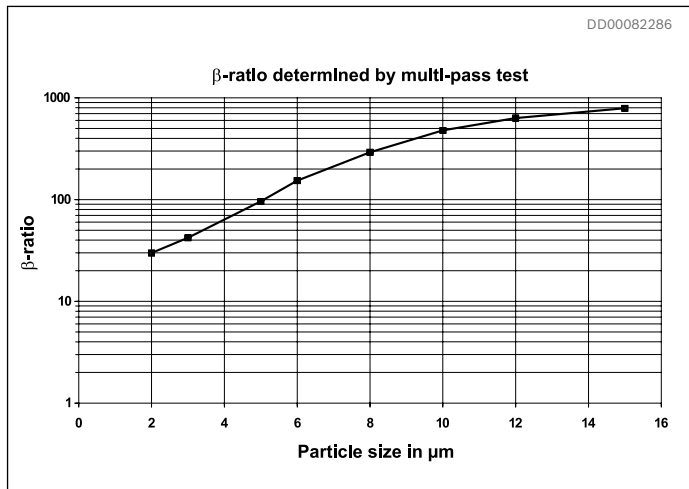
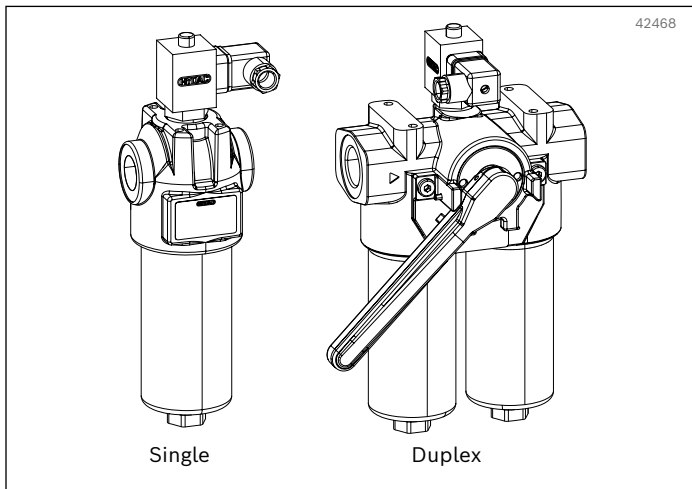


Fig. 31: Oil filter

Fig. 32: Separation characteristics

Function

The filter is used in the charge line of the pump. The filter housing is equipped with a bypass valve and an electrical and visual contamination indicator. Single (standard) or duplex (option) filters can be selected. There is a contamination indicator that gives indication if the differential pressure is above 5.0 bar (72.5 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 a time. On duplex filters the filter elements can easily be replaced without interrupting operation.

The filter elements are β-stable (Fig. 30), has a multi layered structure and are compatible with HFA, HFB and HFC fluids. The opening pressure for the bypass valve is ΔP = 6.0 bar (87.0 psi) + 10% for single filter, ΔP = 7.0 bar (101.5 psi) + 10% for duplex filter. The β-ratio for the particle size 10 μm fullfills ISO 4572 (β10 ≥ 75).

Mechanical data

Table 22: Technical data, filters

Part		Single/Duplex	
Filter complete:	Filter head	Aluminum	
	Filter bowl	Aluminum	
	Seals	Nitrile rubber	
	Max pressure	Single	100 bar (1450.4 psi)
		Duplex	63 bar (913.7 psi)
	Bypass pressure	Single	6 bar (87.0 psi) + 10%
		Duplex	7 bar (101.5 psi) + 10%
Max flow	110 l/min (29 gpm)		
Filter element:	Filtration grade	10 μm	
	Filter	Synthetic glass fibre material	
	End shields	Sn plated	
	Inside tube	Sn plated	

4.8.8 Pump control

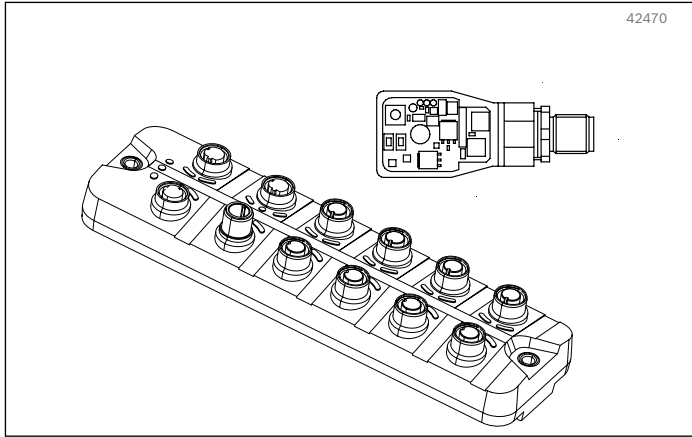


Fig. 33: IO-Link master

Function

The pump control with system control interface is the basic solution for controlling the pump and gathering sensor signals to a common customer interface. It is IO-link based and requires integration into the customer control system.

Sensors connected to the IO-link master:

- Work pressure sensor
- Charge pressure sensor
- Tank oil level
- Tank oil temperature
- Clogging indicator, oil filter

Actuators connected to the IO-link master:

- Pump valve connectors

IO-Link master

The IO-link master provides sensor data and control of actuators on an industrial bus. There are several IO-link masters variants available, with different industrial field bus. 10 m cables included for customer connections.

Table 23: Technical data IO-Link master

Protection class	IP67
Power supply	+24 VDC (20 - 30)
Max current consumption (including power amplifier)	1 A
Contacts	M12
Customer connection (Fieldbus)	PROFINET, EtherNet/IP, EtherCAT, PROFIBUS

Pump actuators

The pump valve actuator is used to control the proportional valve for one solenoid. The actuators are mounted on the main pump in Hägglunds Fusion, one for forward direction and one for reverse direction.

Parameterization is done via IO-Link. The actuator requires a class B port and a separate power supply to the IO-link master.

The actuator provides closed loop control of the coil-current and the output is therefore independent from variations in the power supply voltage and a varying solenoid resistance.

Table 24: Technical data pump actuators

Supply voltage power stage	12... 30 VDC
Current requirement	< 50 mA + solenoid current
External protection	3 A medium time lag
PWM output	Wire break and short circuit monitored
Max. output current	2.5 A
Protection class	IP65 (with gasket)
Connections	M12, 5-pole
Pin connection	IO-Link
	Pin 1 +24 VDC
	Pin 3 GND
	Pin 4 Communication
	Supply of the power stage
	Pin 2 +12...30 VDC
	Pin 5 GND

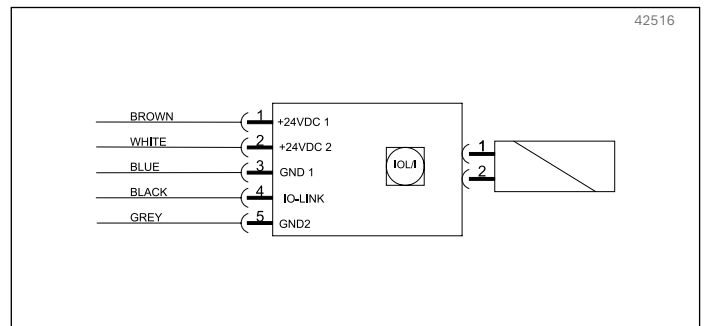


Fig. 34: Electrical symbol pump actuators

4.8.9 Speed sensor Hägglunds SPDC



Fig. 35: Hägglunds SPDC

Function

Speed sensor Hägglunds SPDC is a digital incremental encoder using magnetic sensing technology.

The sensor generates two square wave signals with 90° phase shift for detection of speed and direction of rotation.

Features

- ▶ Slim design fully integrated in motors
- ▶ Non-contact, wear free sensing system
- ▶ Possibility to read directions of rotation from sensor
- ▶ 1856 pulses per revolution for good speed control
- ▶ Protection class IP67

Reference

For more information see document: [RE 15350](#)

4.9 Other components

4.9.1 Clogging Indicator, oil filter

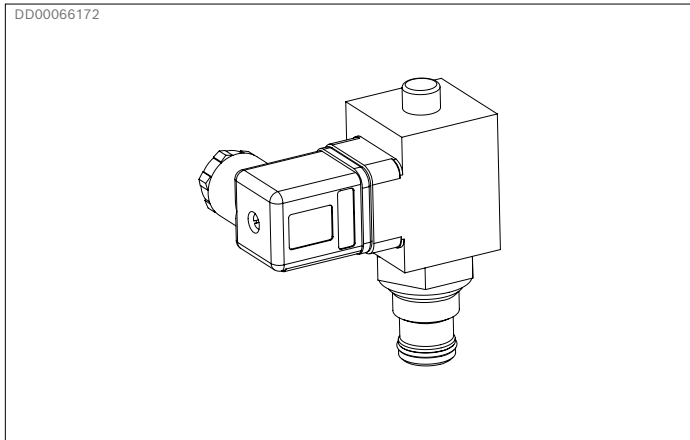


Fig. 36: Clogging indicator, oil filter

Function

A clogging indicator is mounted in the oil filter housing to indicate when the filter element must be changed. Both a visual and an electric indication are obtained. When the level of contamination in the filter element is increased, the pressure drop over the filter will increase. Indication takes place at a differential pressure across the filter of 5 bar (73 psi) for the filter. The visual indicator is reset automatically. The electrical indication is internally interlocked by a thermo switch below 30 °C (86 °F) rising temperature to avoid indication due to high viscosity. The interlock is activated at 20 °C (68 °F) falling temp.

Protection class

IP 65 acc. to IEC 529 / DIN 40050

Mechanical data

Table 25: Clogging indicator

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

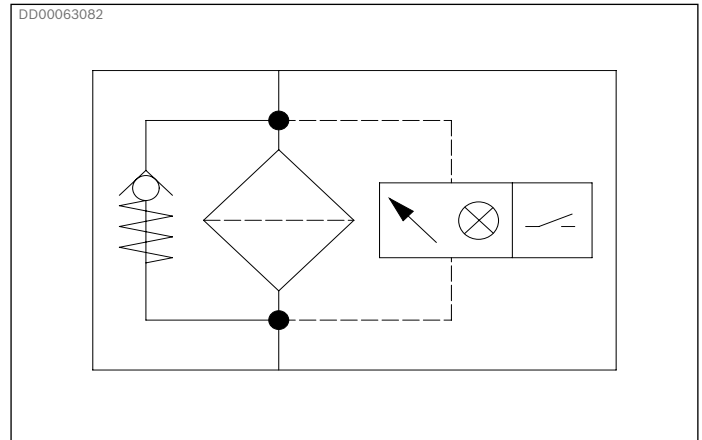


Fig. 37: Hydraulic symbol (oil filter with indicator)

Electrical data

Table 26: Clogging indicator

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

Electrical connections

Socket plug acc. to DIN 43650 / ISO 4400

Cable diameter: Ø 6-10 mm

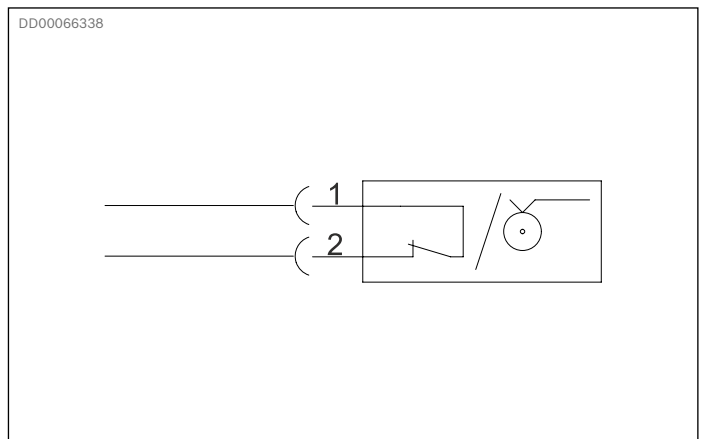


Fig. 38: Electrical symbol

4.9.2 Level and temperature sensor

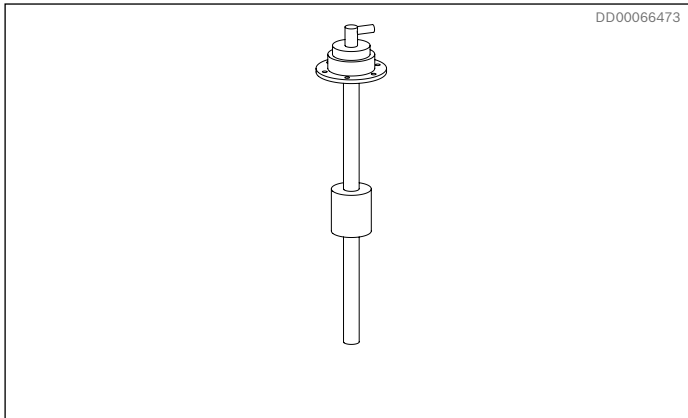


Fig. 39: Electronic level and temperature sensor

Function

The tank oil sensor provides sensor values for oil temperature and oil level. Sensor readings and threshold levels are set in the control system.

Mechanical data

Table 27: Electronic level and temperature sensor

Sensing method temperature	Pt 100
Sensing method level	Reed contacts
Material in contact with media	Stainless steel
Probe length	370 mm (14.57 in)
Medium temperature range	-20 .. +80 °C (-4 ...+176 °F)
Protection class	IP65

Table 28: Volumes for threshold levels, electronic level and temperature sensor

	Volume		Distance from top	
	l	gal	mm	in
Max level	60	15.85	43	11.36
Nominal level	55	14.53	73	19.28
Warning level	50	13.21	105	27.74
Alarm (Stop) level	44	11.62	136	35.93

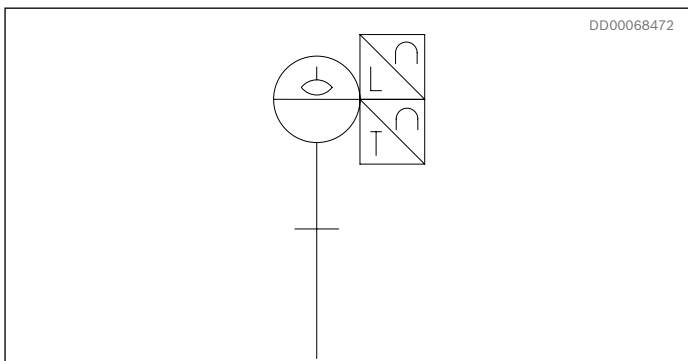


Fig. 40: Hydraulic symbol

Electrical data

Table 29: Electronic level and temperature sensor IO-Link

Supply voltage U	10...30 VDC	
Output signal	IO-Link	
Signal increment steps level	5 mm (0.20 in)	
Accuracy	± 0.8 °C (± 1.44 °F)	
Electrical connection	4 pin, Female M12	
Pin connection	Pin 1	+U
	Pin 2	Not used
	Pin 3	GND
	Pin 4	Communication

Table 30: Electronic level and temperature sensor analogue

Supply voltage U	10...36 VDC	
Output signal	4-20 mA,	
Max load	(U-9.0 V)/20 mA	
Signal increment steps level	5 mm (0.20 in)	
Temperature range	0...100 °C (32...212 °F)	
Accuracy	± 1.5 °C (± 2.7 °F)	
Electrical connection	4 pin, Female M12	
Pin connection	pin 1	+U
	pin 2	Temp signal
	pin 3	Not used
	pin 4	Level signal

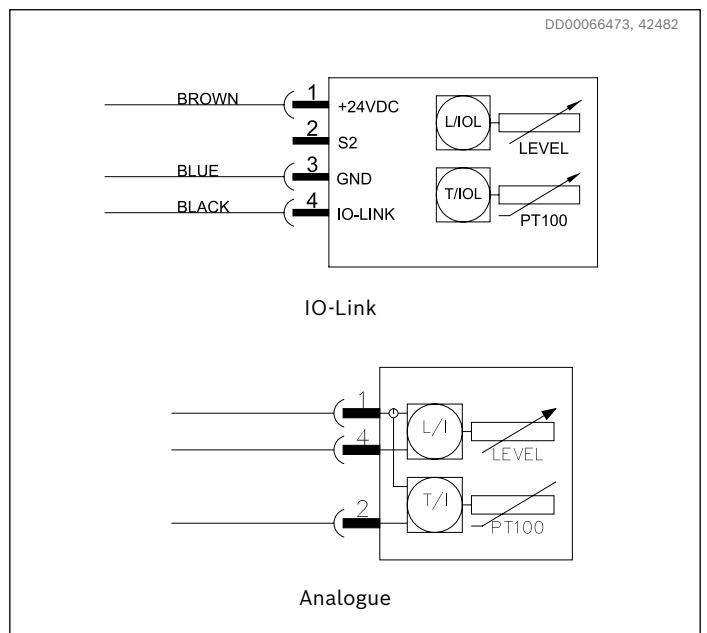


Fig. 41: Electrical symbol

4.9.3 Pressure sensor

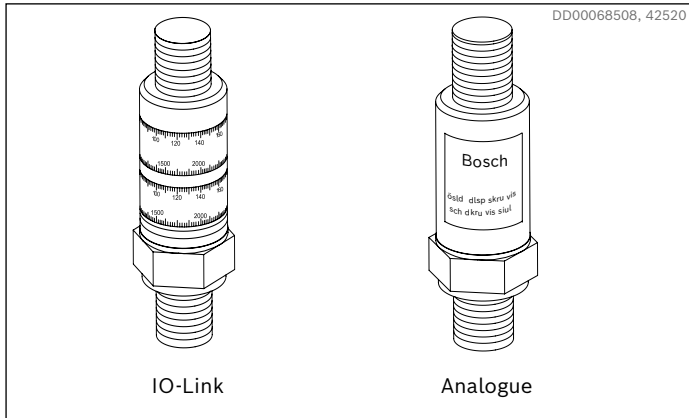


Fig. 42: Pressure sensor

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.

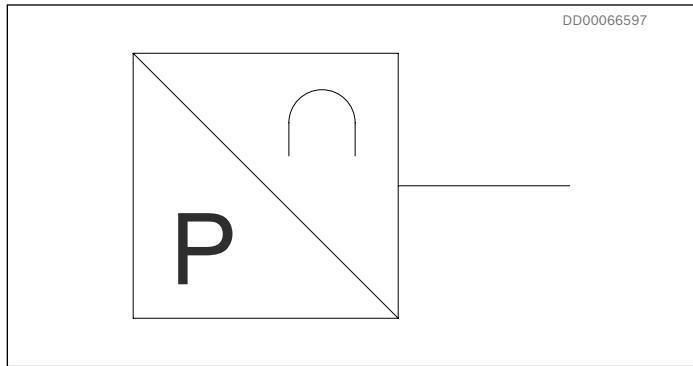


Fig. 43: Hydraulic symbol

Electrical data

Table 31: Pressure sensor IO-Link

Measuring range	Work pressure 0...400 bar (0...5801 psi)
	Charge pressure 0...250 bar (0...3626 psi)
Supply voltage U	18...30 VDC
Output	IO-Link
Protection class	IP65
Electrical connection	4 pin, Female M12
Pin connection	Pin 1 +U
	Pin 2 Not used
	Pin 3 GND
	Pin 4 Communication

Table 32: Pressure sensor analogue

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

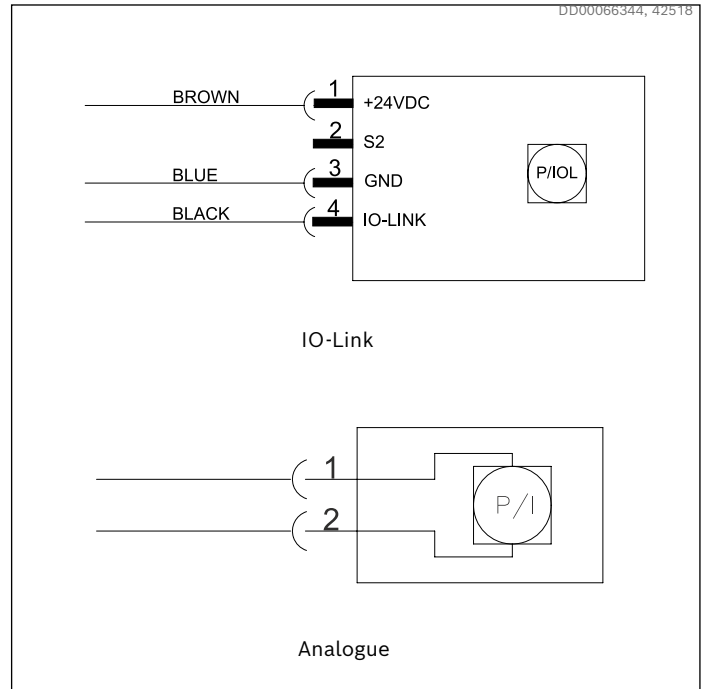


Fig. 44: Electrical symbol

4.9.4 Air breather

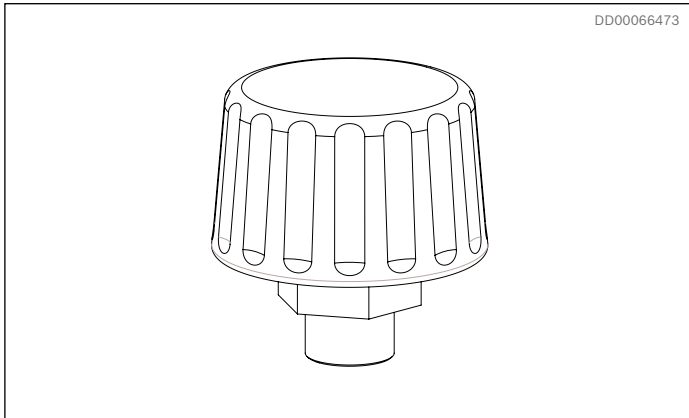


Fig. 45: Air breather

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.

It has a pre-charge of 0.2 bar to minimize the risk of getting particles from the surroundings into the tank. The pre-charge minimize the air exchange with the surroundings

Table 33: Material, air breather filter

Filter		
Filtration rating		3 µm (absolute)
Check/bypass valve:		Δp at 0.2 bar (2.9 psi)
Clogging indicator		No
Material	Hose	Steel, zinc-plated/plastic coated
	Filter element	Paper fiber
	Seal	NBR (Nitrile)
	Thread	G3/4"

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

4.9.5 Axial locking set

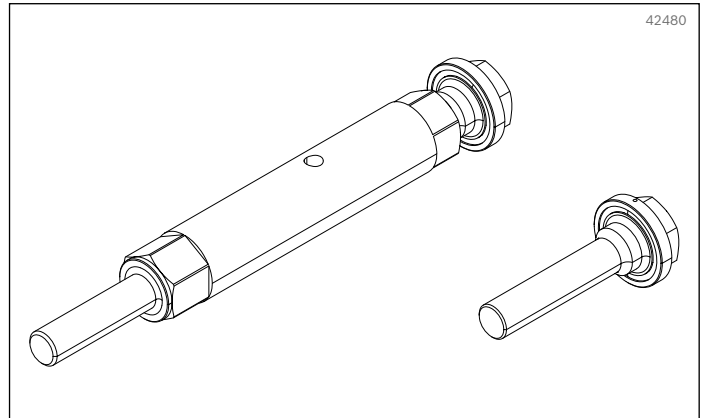


Fig. 47: Axial locking set

The axial locking set is used to secure the hydraulic motor to the driven shaft. The axial locking set is only required with mounting alternative splines and is included in the delivery.

Table 34: Material number axial locking set

Motor type	Material number
CA 50 - CA 210	R939002582
QMX 280	R939002612
QMX 400	R939002613
QMX 560	R939002614
QMX 840	R939002615

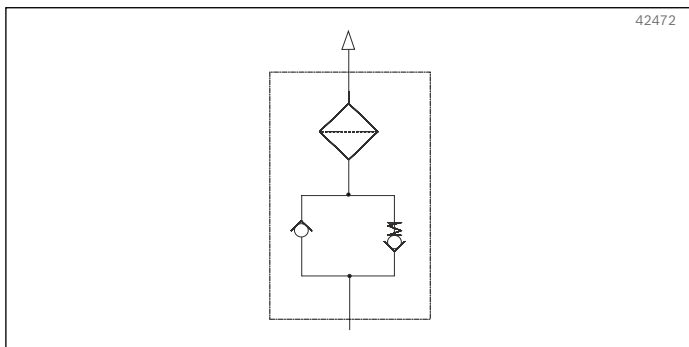


Fig. 46: Hydraulic symbol

4.9.6 Hägglunds Spider

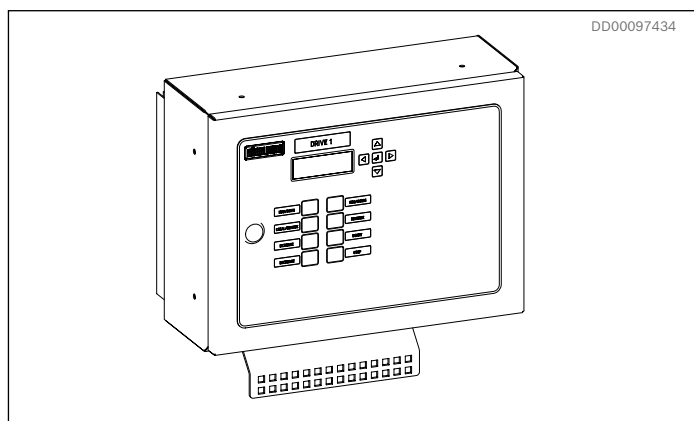


Fig. 48: Hägglunds Spider

Function

The Hägglunds Spider is the advanced monitoring and control system for the Hägglunds Fusion drive system. It can work as a stand-alone control system or be slaved under a factory system and contains driver for pump, monitoring of the system and functionality for many applications. Hägglunds Spider is delivered as loose item for mounting at suitable location, fully parameterized, tested and ready to use. The configuration of 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 system.

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.

10 m cables included for customer connections.

Table 35: 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	90...264 VAC, 50...60 Hz
Power consumption	max 300 VA
+24 VDC outlets	Fused
Electric motor interlock	3 x Relay contacts 3 A, 30 VDC / 250 VAC, Closed = OK, to interlock relay in MCC
Digital inputs	47 x 24 VDC
Analog inputs	9 x 4-20 mA
Digital outputs	13 x Relay contacts 3 A, 30 VDC / 250 VAC
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](#).

4.9.7 Hägglunds BICA brake

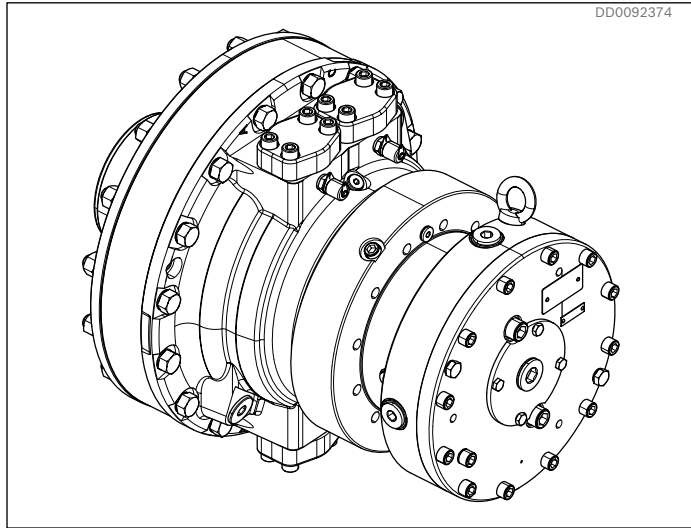


Fig. 49: CA motor with BICA brake

Description

The brakes are designed for industrial applications. The brake is made for dry operation of the discs and is not allowed for hanging load applications. The brake is designed to be used as parking brake only.

Reference

For more information see document: [RE 15366](#)

Table 36: Weight BICA brake

Brake size	Weight	
	kg	lb
BICA 13	87	192
BICA 24	160	353
BICA 37	183	403
BICA 48	210	462
BICA 64	310	682
BICA 90	310	682
BICA 134	570	1254
BICA 160	593	1307

Note!

BICA brakes on Quantum motor series can only be used in combination with spline version of motors. When there is requirement of BICA brake with shrink disc motor, it is needed to use a spline motor with shaft adapter

4.9.8 Temperature regulator

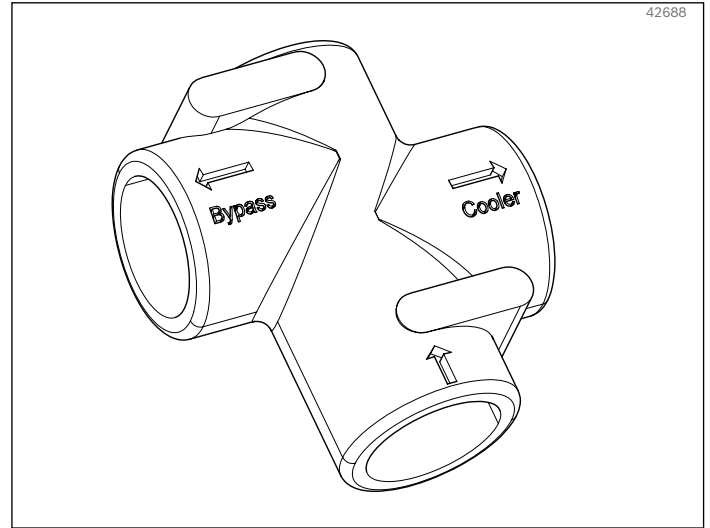


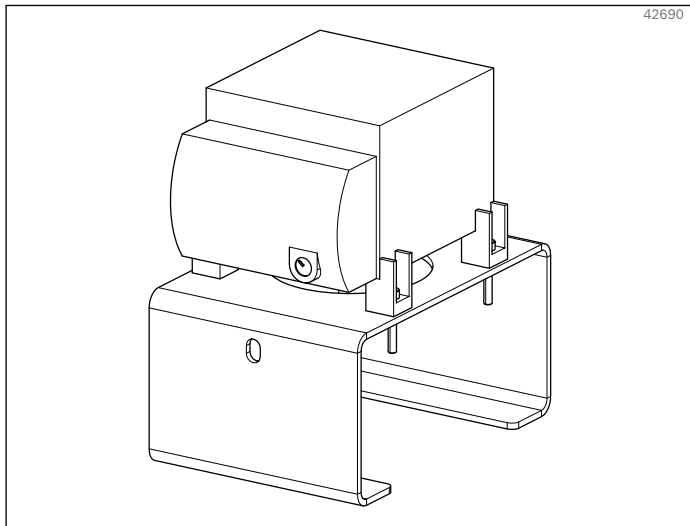
Fig. 50: Temperature regulator

Description

The temperature regulator is a part of the solution to handle low ambient temperatures. The function is to bypass the cooler until the working temperature in the hydraulic circuit is reached. It will start opening at 40 °C (104 °F).

Table 37: Technical data temperature regulator

Maximum flow	167 l/min (44.12 g/min)
Maximum working pressure	16 bar (232 PSI)
Opening temperature	40 °C (104 °F)
Hysteresis	4-5 °C (7-9 °F)

4.9.9 Cabinet heater**Fig. 51: Cabinet heater****Description**

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 38: Technical data cabinet heater

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. (1.5 mm ²) with strain relief, clamping torque 0.8 Nm 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 °C (12.6 °F ± 7 °F).

Standard settings from Häggulds 10 °C (50 °F)

4.10 Environment options

4.10.1 Brake release system

The brake release system is an additional function where flow from the pump is used to open the brake on the hydraulic motor depending on brake. The preset brake opening pressure level is specified in [RE 15366](#). The flow is controlled via a directional valve in the drive unit.

4.10.2 Low ambient temperature

< 0 °C (< 32 °F)

- It is recommended to add temperature regulator valve in the cooling circuit.
- It is recommended to equip the hydraulic compartment with a heater

< -20 °C (< -4 °F)

- It is mandatory to add temperature regulator valve in the cooling circuit.
- It is mandatory to equip the hydraulic compartment with a heater
- All electric motors will be specified for the specific temperature.
- Spider control unit will be equipped with heater.
- Extra bypass valve is mounted directly on the cooler.

≤ -40 °C (≤ -40 °F)

Not allowed.

4.10.3 High ambient temperature

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

4.10.4 Oil pan

The bottom part of the frame 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.

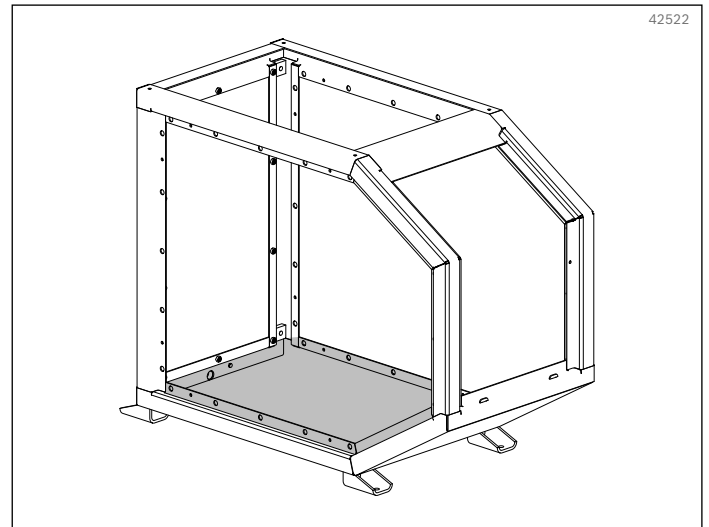


Fig. 52: Oil pan

Table 39: Total volume oil pan when frame in horizontally level

Frame size	Total volume	
	l	gal
Medium	60	15.80
Large	80	21.10

4.10.5 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 steel panels: RAL 9005 Black
Torque arm, hydraulic motor and front panel: RAL 2002 Orange.
- Corrosivity category C5 - which is recommended for marine environment with high salt load or aggressive industrial atmosphere.
Frame: RAL 9005 Black
Torque arm and hydraulic motor and front panel: RAL 2002 Orange
Steel panels: Stainless steel EN 1.4301.

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

4.11 Hydraulic fluids

4.11.1 Hydraulic fluid standards

Hägglands Fusion 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](#)).

For more information of oil filled drive system, please contact your Bosch Rexroth representative.

4.11.2 Oil viscosity recommendations

- For ambient temperature ≤ 35 °C should ISO VG 68 be used
- For ambient temperature > 35 °C should ISO VG 100 be used

Reason for the recommendation is to give the best combination for solution, functionality, and reliability.

5 Packing

























5.1 Packing procedure

- Desiccant bags are placed inside Fusion to avoid corrosion
- The drive system is sealed with a plastic bag and covered with a crate
- 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 in compliance with ISPM No. 15

5.2 Items not assembled at delivery

- Spare filter element
- Oil filling quick coupling
- Articulated connection
- Air filter - when drive system delivered oil filled
- Hägglands Spider (optional)

6 Required and additional documents

Title	Document no	Document type
 Installation and maintenance manual, Hägglunds Fusion	RE 15345-WA	Instruction manual
 Hägglunds CA	RE 15305	Data sheet
 Hägglunds Quantum	RE 15428-A	Data sheet
 Hägglunds Torque arms	RE 15355	Data sheet
 Hägglunds HDC air cooler	RE 15334	Data sheet
 Hägglunds SPDC	RE 15350	Data sheet
 Hägglunds BICA brakes	RE 15366	Data sheet
 Hägglunds Spider	RE 15330-WA	User manual
 Axial piston variable pump A4VG series 32 Europe	RE-E92003	Data sheet
 External gear pump High Performance AZPF	RE 10089	Data sheet
 Flushing valve with pressure holding valve SV	RE 95512	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
 Shaft CA 50 / CA 70 splines, external load and torque arm	278 2231	Dimension drawing
 Shaft CA 50 / CA 70 splines, motor with brake and torque arm	278 2332	Dimension drawing
 Shaft CA 100 / CA 140 splines, external load and torque arm	278 2335	Dimension drawing
 Shaft CA 100 / CA 140 splines, with brake and torque arm	278 2336	Dimension drawing
 Shaft CA 210 splines, external load and torque arm	278 2338	Dimension drawing
 Shaft CA 210 splines, motors with brake and torque arm	278 2339	Dimension drawing
 Spline shaft QMX 280 / QMX 400 for external load and torque arm	RA30005925	Dimension drawing
 Spline shaft QMX 560 to QMX 1120 for external load and torque arm	RA30005927	Dimension drawing
 Spline shaft QMX 280 for external load and torque arm mounted with brake	RB05110331	Dimension drawing
 Spline shaft QMX 560 to QMX 1120 for external load and torque arm mounted with brake	RA96775955	Dimension drawing

For dimension drawings please contact your Bosch Rexroth representative

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