

Pitch adjusting time by local manual control

- With the hydraulic system in proper working order, the proportional valve (101) can be actuated on the solenoid.
- Put the propeller blades in the maximum ahead position (pump pressure at C1) by pushing the pinion of the valve to the left or right using a pin or small screwdriver or if applied with the ahead push-button of the proportional valve (101).
- Put the propeller blades in the maximum astern position (pump pressure at C2) by pushing the pinion of the valve to the left or right using a pin or small screwdriver or if applied with the astern head push-button of the proportional valve (101).
- Record time.

Safety valve

- Put the propeller blades in one of the maximum positions (see "Pitch adjusting time by local manual control").
- The safety valve PSV1 (125) is now set at the safety pressure; see selection table "Hydraulic Components".
- The safety pressure is the maximum necessary pressure with a margin of 15 bar.

NOTE



During the first trials of the ship, the required pressure can be somewhat higher because of "running in" phenomena. In order to keep full controllability, the safety pressure must be temporarily adjusted to a higher level. Make sure to check the maximum required pressure after some time and decrease the setting of the safety valve as much as possible.

- Check the pressure on the pressure gauge and correct if necessary by adjusting PSV1 (125).

Switch-over system of the pumps (class approved DP systems only)

- Make sure that the local manual starters of the two pumps are set to 'AUTO'.
- On the Engine Control Room/Engine Room (ECR/ER) panel, select pump 1 as the main pump with the pump select knob.
- Stop the running of pump 1 by switching the local manual starter to 'OFF'.
- Check whether the low-pressure alarm is activated.
- Check whether the stand-by pump is automatically started.
- Now check the system the other way around by switching the local manual starters of the two pumps to 'AUTO' again and on the ECR/ER panel selecting pump 2 as the main pump.
- Stop the running of pump 2 by switching the local manual starter to 'OFF'.
- Check whether the low-pressure alarm is activated and the stand-by pump automatically started.
- Switch the starters of the two pumps to 'AUTO' again.


7.4

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HYDRAULIC DIAGRAM/POWER PACK			
MAIN COMPONENTS, SENSORS AND SETTINGS			
Wärtsilä installation no.	SNL/16041.M1HS11P	Date	17.10.2016
		Modification	A
		Classification	LR
TT1,5-30080-004-100LA-B1A0CS			
Technical data			
Load pressure [bar]	110	Voltage [V]	440
Safety pressure [bar]	140	Frequency [Hz]	60
Test pressure [bar]	210	Inom per E-motor[A]	5,0
Requested flow [L/min]	10,4		
Actual flow [L/min]	10,6	Drive	2x50%
Preliminary drawing	DAAK001613	Block diagram:	DAAK014183
Assembly drawing		Header tank	DAAK001608
Hydraulic diagram			
Electric diagram			
Cooler data		Functional Connections	
Fresh water		(P)C1/(P)C2	GE20S
Heat exchange [kW]	0.95	RP/ST	GE42L
Water temperature [°C]	32	VT	GE42L
water flow [L/min]	22		
Item	Code	Description	Data
101		Prop valve onboard elec.	Input -10/+10V
105.01A		E-Motor 100LA	Power S1 2,64 kW S6 3,828 kW
105.01B		E-Motor 100LA	Power S1 2,64 kW S6 3,828 kW
123.01A		Gearpump G2 4CC	Pumpflow 5,29 L/min.
123.01B		Gearpump G2 4CC	Pumpflow 5,29 L/min.
125		Direct acting relief 1DR2	Set at 140 Bar
126		LS Valve 1PS100	Set at approx. 15 Bar
129		Tank 80 Liter	Capacity 80 Liter
140	OC	Fresh water cooler PWO B8X10	
150	LSAL	Levelswitch LMM	Low level alarm power pack (60 Liter)
154.01	PSL	Pressure switch MBC	Pressure available, set at 8 bar
154.02	PSL	Pressure switch MBC	Pressure available, set at 8 bar
154.03	PSAH	Pressure switch MBC	Pressure filter by-pass, set at 3 bar
180	LI	Dip stick	Level power pack tank
184	PI	Pressure gauge	0-160 Bar
185	TI	Optical level ind. with opt. temp indicator	
130		Header tank 35L	Capacity 35 Liter
181	LI	Dip stick	Level header tank
151	LSAL	Levelswitch LMM	Low level alarm header tank (12 Liter)
167	TAH	Temperature switch	Set at 65° C
157	PSAH	Pressure switch clogged filter	Set at 1.5 Bar
159	PSAL	Low pressure alarm	Set at 6 bar

[illegible]

- C1, C2 = 1/2" BSP 20S
 PL1, PL2, = 1/2" BSP Plugged
 PL5 = 1/2" BSP
 L4 = 1/2" BSP
 P1, P2, FL = 1/2" BSP
 L, LS1, LS2 = 1/2" BSP
 M(X), MT, PE = 1" BSP
 DRAIN = 1" BSP
 VT/RP/ST = 1 1/2" BSP 42L

FLOW & PIPE LINES:

Maximum fluid velocities:
 2 m/s for suction lines
 3 m/s for hydraulic pressure lines
 3 m/s for lubrication pressure lines

Maximum pressure lines:
 Hydraulic pressure lines - 5 bar (per line)
 Lubrication pressure lines - 2 bar (per line)

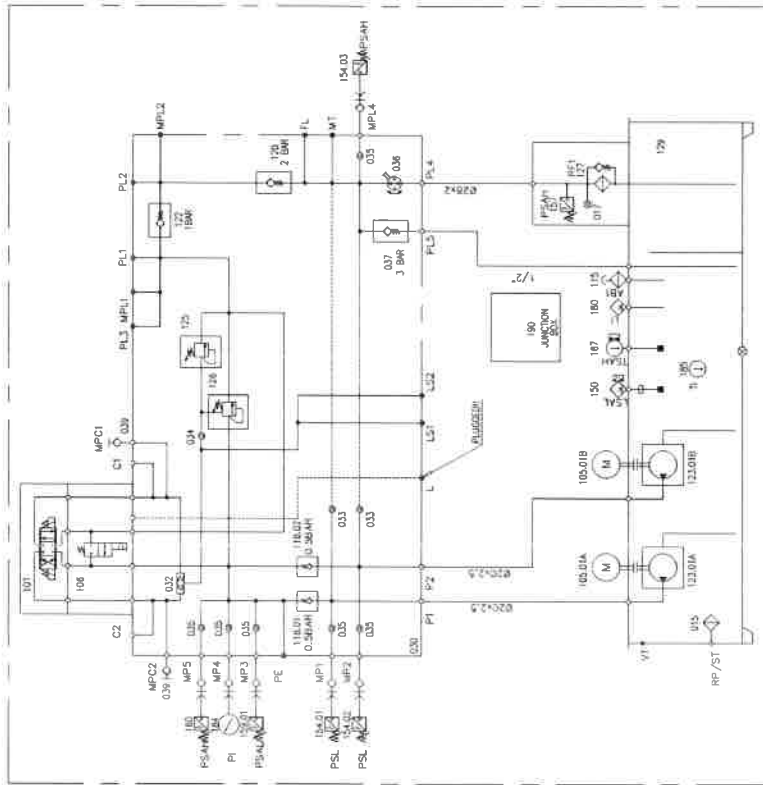
Condition:
 In general we advise to partition hydraulic and lub oil modules close to the thruster.

Maximum supply pressure / individual supply at intake:
 10 mtr / 10 bars for high pressure line and return piping (per line, so 20/20 for a total supply and return piping system)

Fluid lubrication:
 If no special requirements we advise metric precision piping for use of Parker cutting ring couplings
 12x1.5, 16x2.0, 18x2.0, 22x2.0, 25x3.0, 28x2.0, 30x4.0, 38x4.0, 42x3.0, 60.3x8.0

CAUTION: DO NOT EXCEED MAXIMUM PIPE DESIGN PRESSURE

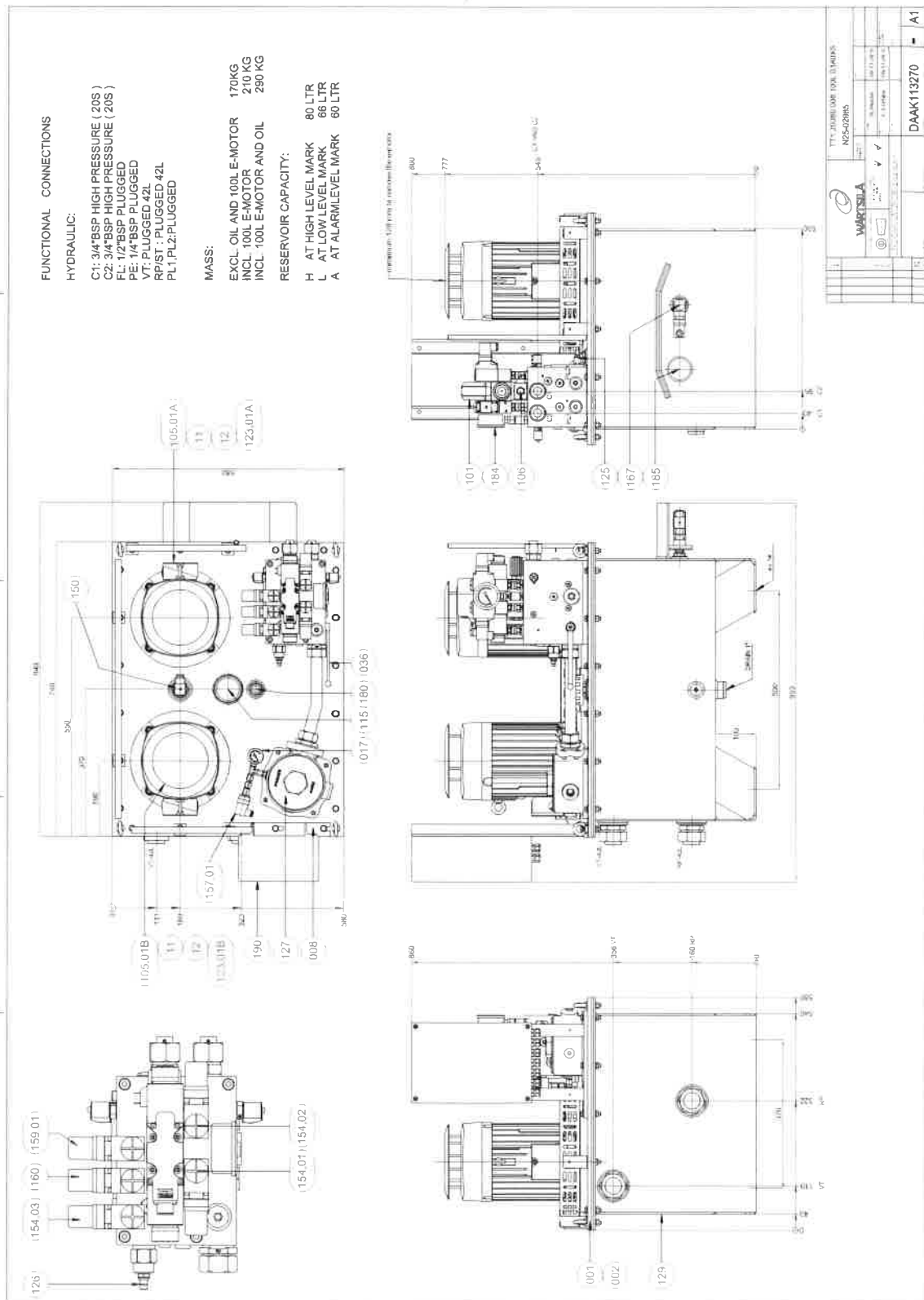
Piping material used on power pack: Fine grain E235N (Acc. EN10305-4)

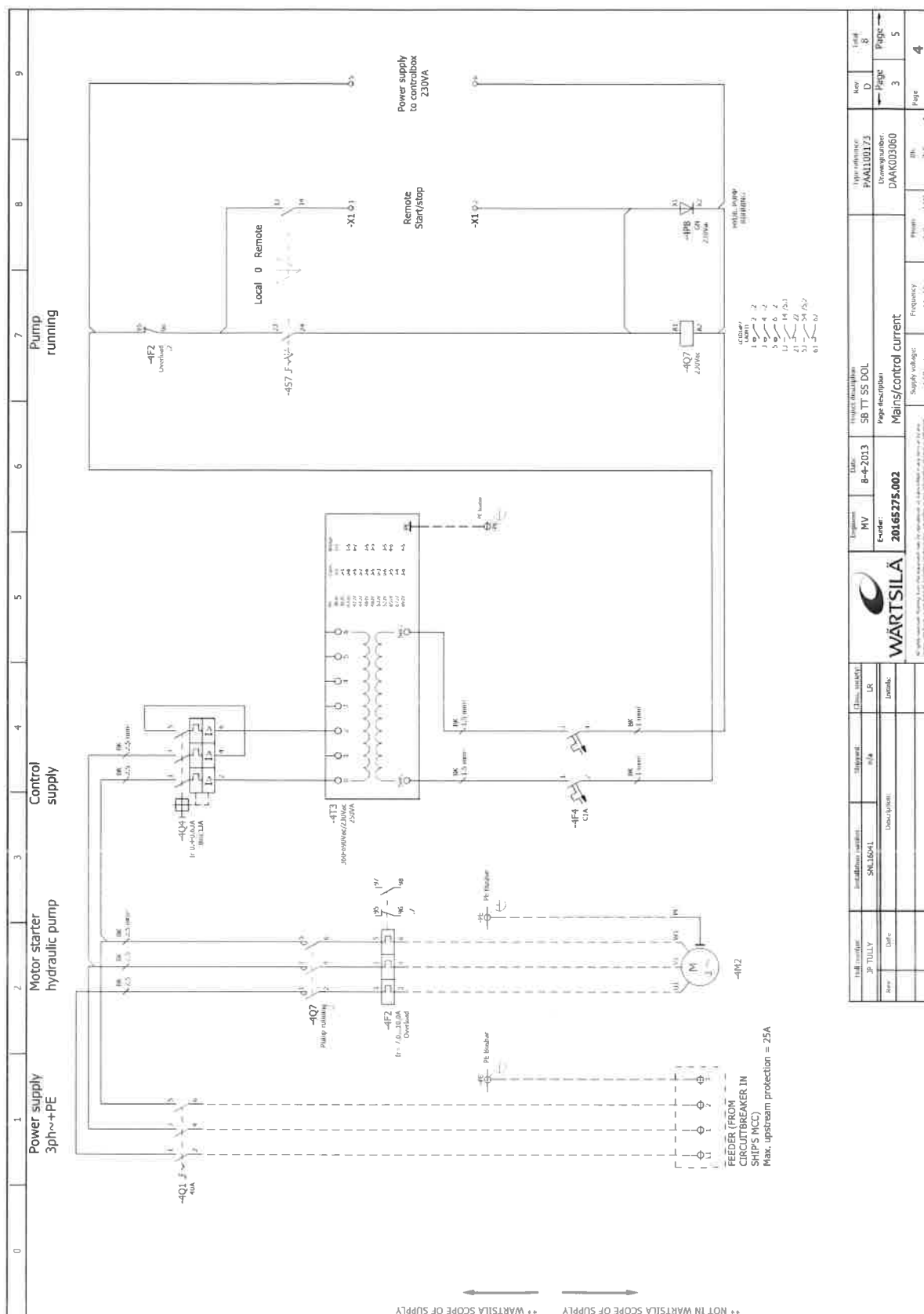


Rev	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Rev	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

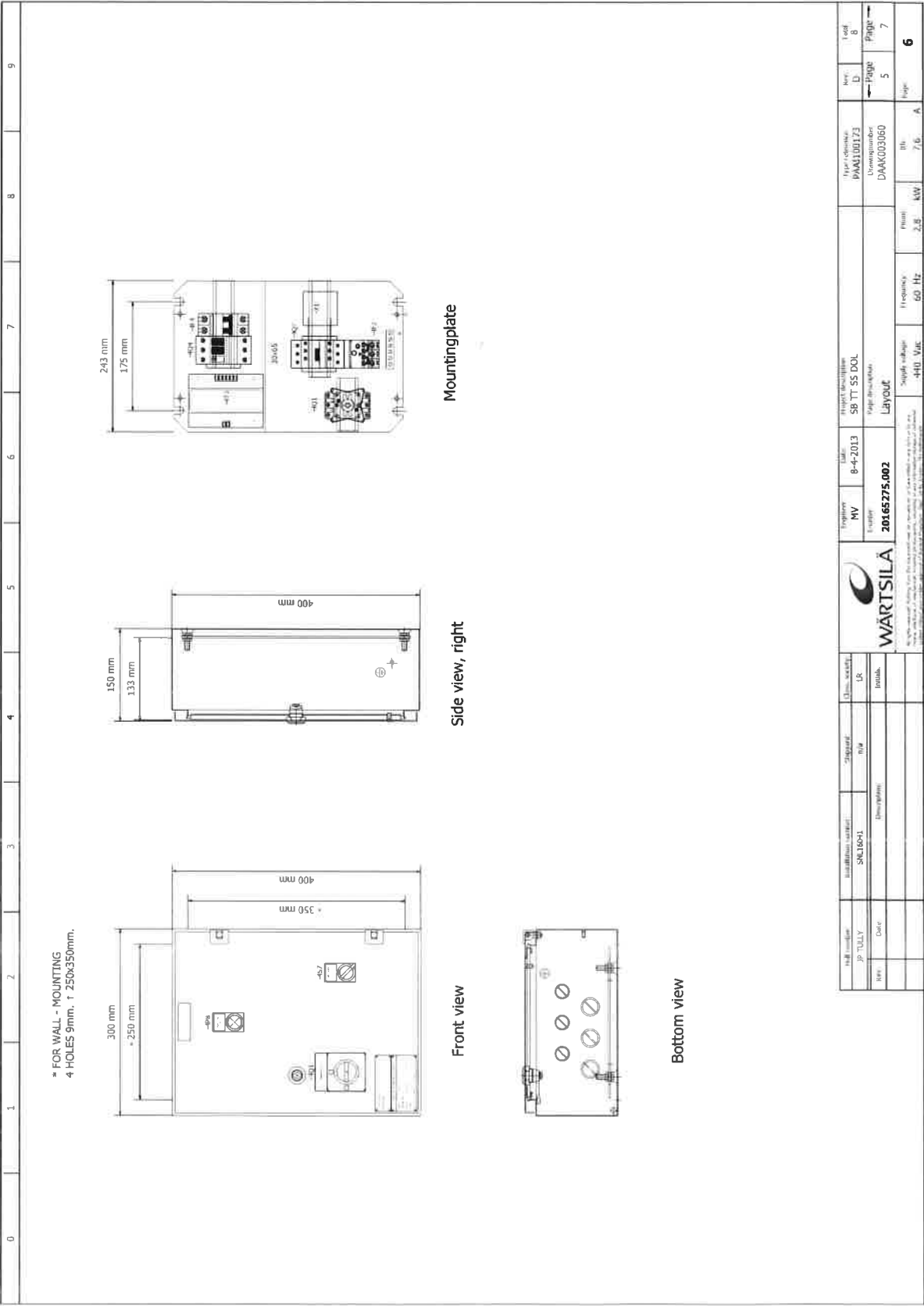


HYDRAULIC DIAGRAM
 T11 70880
 111 70880
 111 70880





0	1	2	3	4	5	6	7	8	9
Running		Running							



0	1	2	3	4	5	6	7	8	9
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60 mm

STARTER 1 TUNNEL THRUSTER
No: SNL16041.M1-H51P20

20 mm

27 mm

-4P8

HYDR. PUMP
RUNNING

18 mm

-4S7

HYDR. PUMP
0
LOC REM

50 mm

CLASS. SOC. LR
APPROVAL

25 mm

45 mm

WÄRTSILÄ PROPULSION

TYPE NR. PAA1100173

DRAWING NR. DAAK003060

VOLTAGE 440 V-50/60 Hz

CURRENT MAX 10 AMP.

ADJUSTED AT 7,6 AMP.

STARTER HYDRAULIC PUMP

Head position	parallel to motion	Class. water	Ship	Project description	Page	Total
JP-TULLY	SNL16041	LR	8-4-2013	SB TT SS DOL	8	8
Rev	Date	Includes	Order	Page description	Page	Page
			20165275.002	Textplates	6	8
				Supply voltage	Page	Page
				440 V-50	6	8
				Frequency	Page	Page
				50 Hz	6	8

Terminal line-up diagram

[illegible][illegible]
$$= 10 + -x1$$

Remote start/stop

100

Running

10

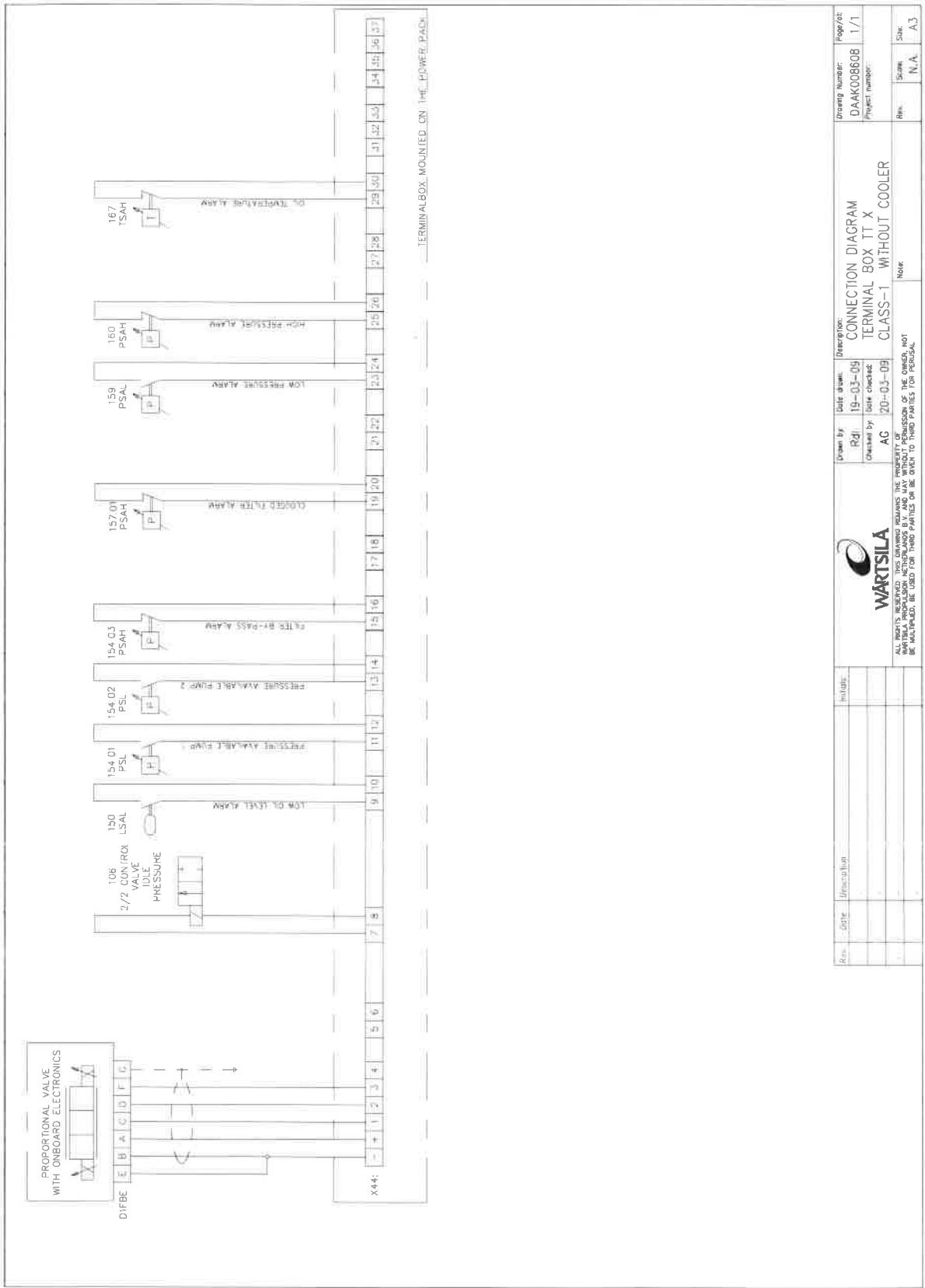
Power supply to controlbox 230VA

11

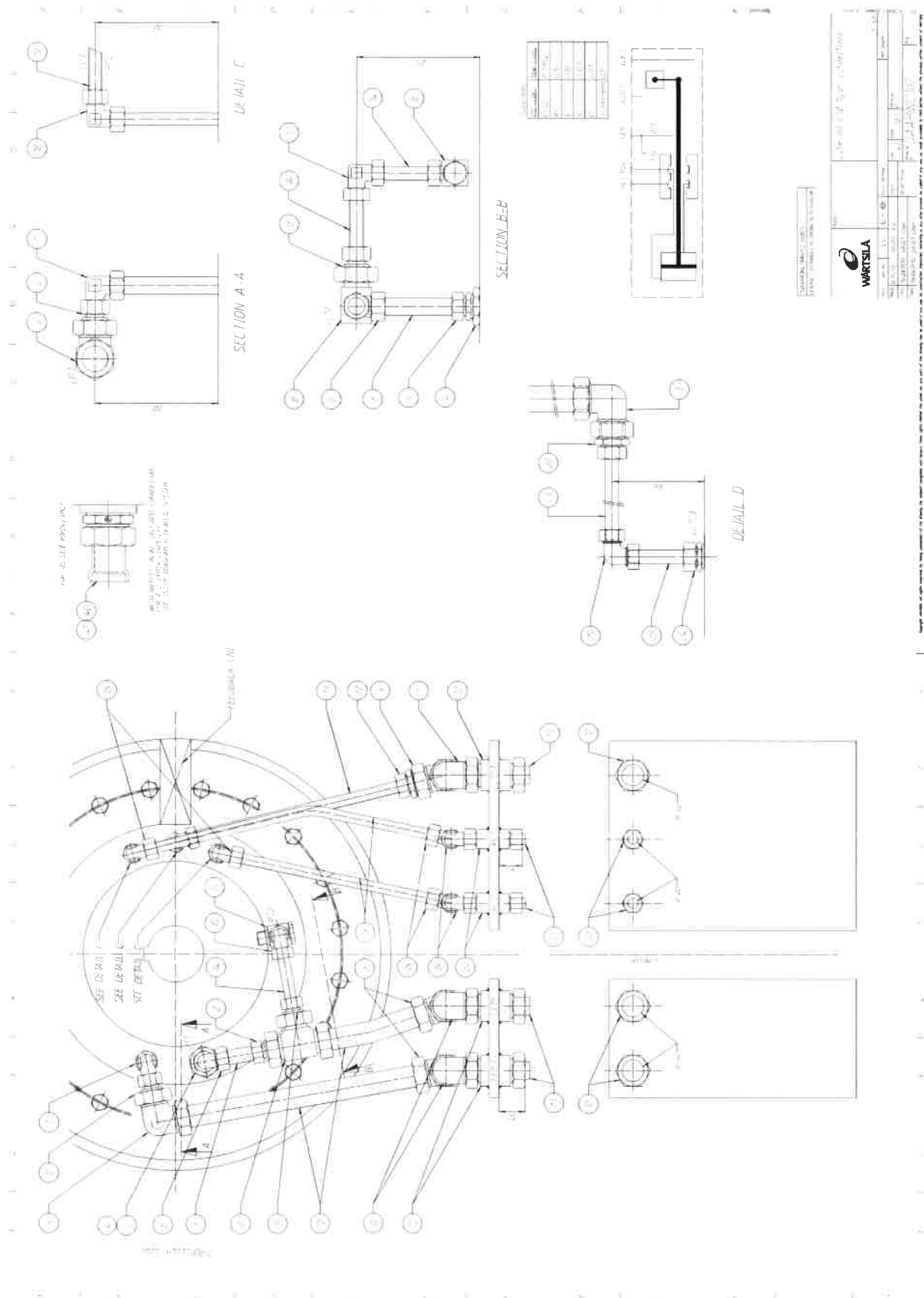
Running

11

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Rev.	Drawn	Issued	Initials	WARTSILA	Drawn by	Date drawn	Description	Drawing Number	Page/ot
					RdJ	19-03-09	CONNECTION DIAGRAM	DAAK008608	1/1
					Checked by	Date checked	TERMINAL BOX TT X	Project number:	
					AC	20-03-09	CLASS-I WITHOUT COOLER		
							Note	Rev.	Scale
							ALL RIGHTS RESERVED. NO REPRODUCTION OR TRANSMISSION OF THIS DOCUMENT IS ALLOWED WITHOUT PERMISSION OF THE OWNER, NOT BE MULTIPLIED, BE USED FOR THIRD PARTIES OR BE GIVEN TO THIRD PARTIES FOR PERSONAL	N.A.	A3



CONNECTIONS

LLB 1 = 42L
 LL9/LL12.1 = 42L
 DRAIN BT = 28L
 FILLING = 42L
 FO = 1 1/2" BSP
 FI = 1 1/2" BSP
 M1-M6 = 1/4" BSP
 M7-MB = 1/2" BSP

GENERAL

FLOW & PIPE LINES

Minimum flow velocity:
 1 m/s for suction lines
 2 m/s for return lines
 5 m/s for hydraulic pressure lines
 3 m/s for lubrication pressure lines

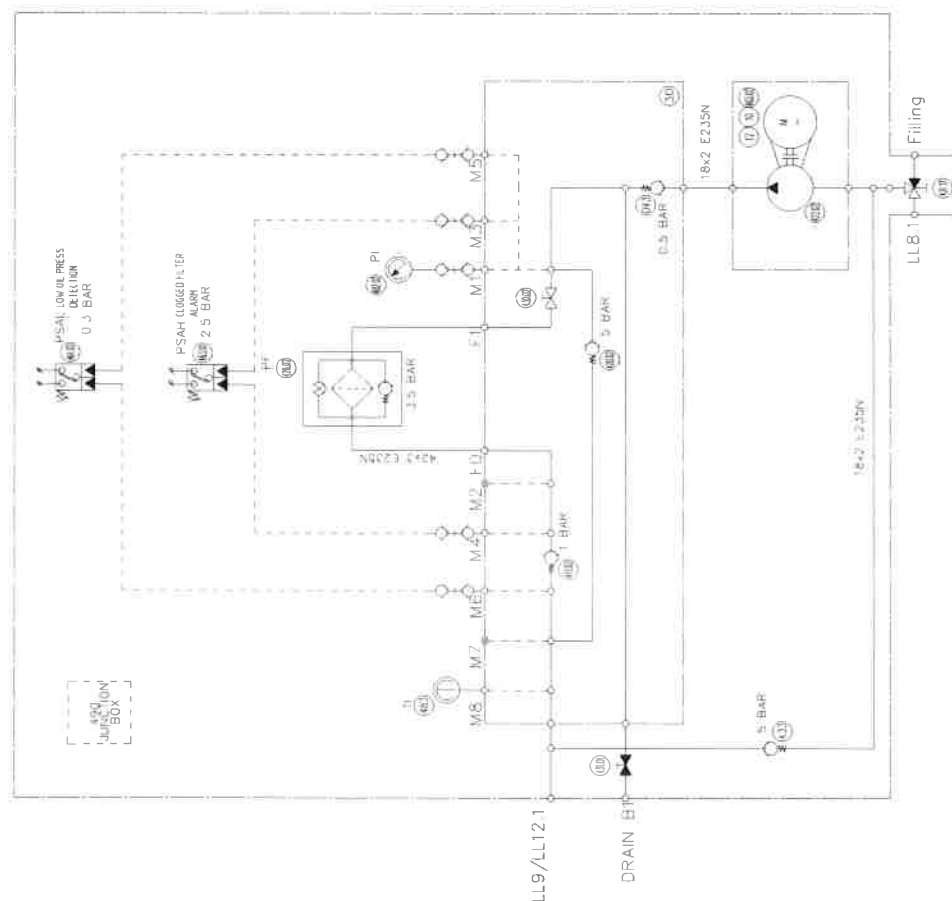
Maximum pressure drop:
 Hydraulic pressure lines - 5 bar (per line)
 Lubrication pressure lines - 2 bar (per line)

In general we advise to position hydraulic and lub oil modules close to the thruster

Maximum piping lengths / maximum number of bends:
 10 mtr / 10 bends for high pressure lines (per line, so 20/20 for a total supply and return piping system)

Piping dimensions:
 If no special requirements we advise metric precision piping for use of Parker cutting ring couplings
 Normal piping diameters:
 25x3.0, 28x3.0, 32x3.0, 38x4.0, 42x3.0, 50x4.0
CAUTION: DO NOT EXCEED MAXIMUM PIPE DESIGN PRESSURE

Piping material used on power pack: Fine grain E235N (Acc EN10305-4)



Rev	Date	Description	Author	Check	Drawn by	Date checked	Drawn by	Date checked	Project number	Project name	Page	Scale	Unit	Size
1	19-12-13	Rev. 001 added	DEV		EM	10-01-08	EM	10-01-08	905 6100	905 6100	1/1	N/A	A3	
2	12-12-13	Rev. 002 added	DEV											
3	12-12-13	Rev. 003 added	DEV											
4	12-12-13	Rev. 004 added	DEV											
5	12-12-13	Rev. 005 added	DEV											



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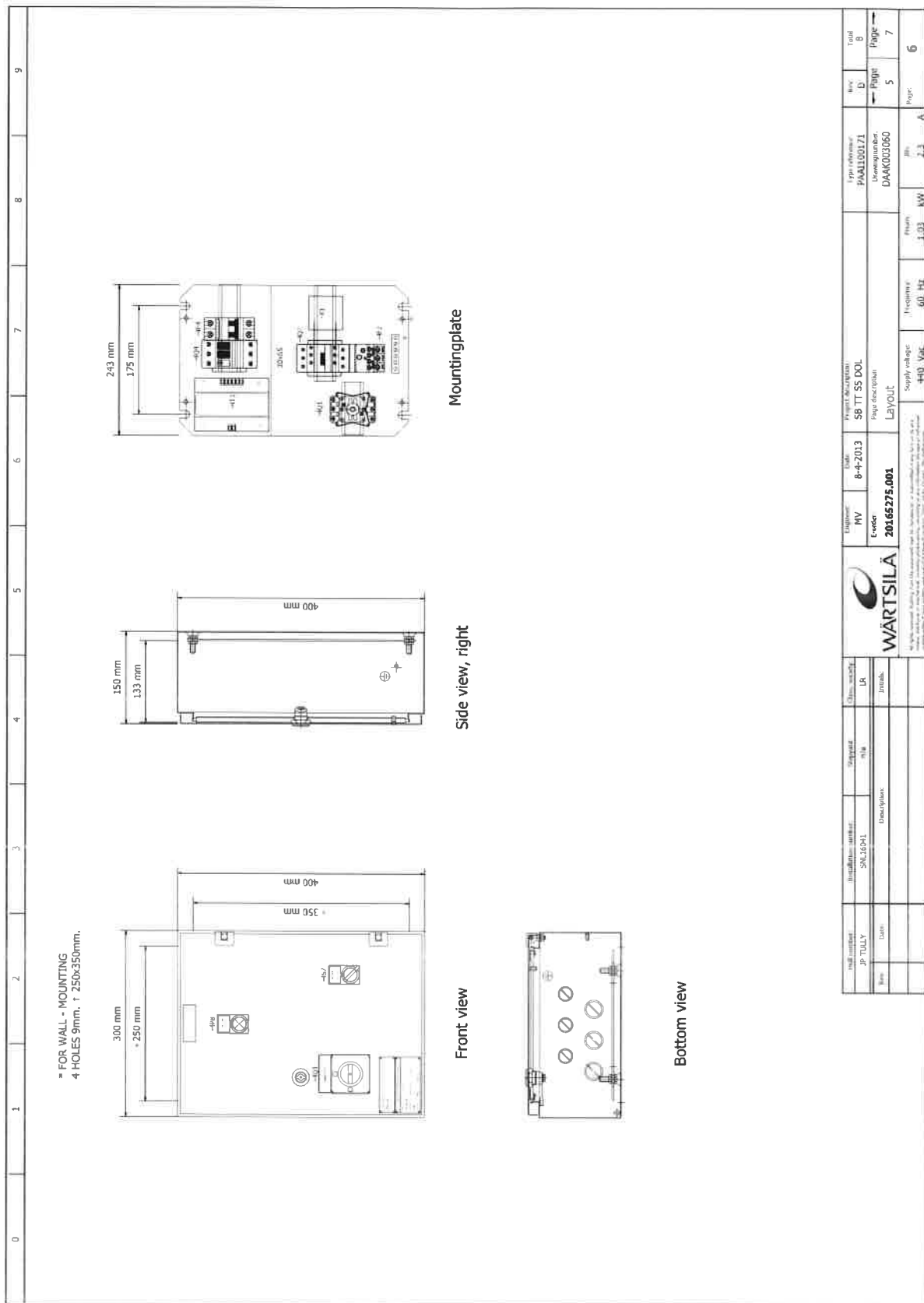
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0	1	2	3	4	5	6	7	8	9
General									
Coding in panel									
Component		Conductor							
12 K 1		Path		Function		Number		Page	
		12 00							
Wirecoding									
NOT IN SCOPE OF DELIVERY									
Partex type PA fabr. Weidmüller									
Coding connection number									
Coding on wire-Number									
Component encoding from/to									
Terminals									
Screw terminals									
Spring cage terminals									
Wiring									
<input type="checkbox"/> H05V2-K/H07V2-K (+90°C)									
<input checked="" type="checkbox"/> H05V2-K/H07V2-K (Halogen Free)									
<input type="checkbox"/>									
<input type="checkbox"/>									
Approved									
Name :									
Occupation :									
Date :									
Signature :									
WIRECOLOURS AND SIZES :									
Mains									
690/400VAC		L1,L2,L3 PE		Black Green/Yellow		≥ 1,5mm ² ≥ 1,5mm ²			
230VAC		Phase Neutral PE		Black Black Green/Yellow		≥ 1,5mm ² ≥ 1,5mm ² ≥ 1,5mm ²			
Controls									
230/115VAC		Phase / Switched Neutral		Black Black		≥ 1mm ² ≥ 1mm ²			
Pot. free		General		Black		≥ 1mm ²			
Terminal strip marking									
X5									
Voltage type									
Terminal strip marking									
Structure identifier overview									
Voltage type									
X0 = 320...690VAC									
X1 = 230VAC/24VAC									
Mains Heating/controls									
Analogue signals									
0-10VDC		Potentiometer		+10V REF 0V		White Green Brown		3x0.5 mm ² CY	
0-10VDC		Signal		REF 0V		White Brown		2x0.5 mm ² CY	
0-20/4-20mA		Signal		REF 0V		White Brown		2x0.5 mm ² CY	
Page 3									



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0	1	2	3	4	5	6	7	8	9
<div><div><div>60 mm</div><div>STARTER TUNNEL THRUSTER No: SNL16041 M1-HSL1P20</div><div>20 mm</div></div><div><div>27 mm</div><div>-4P8</div><div>HYDR. PUMP RUNNING</div><div>18 mm</div></div><div><div>-4S7</div><div>HYDR. PUMP 0 LOC REM</div></div></div> <div><div>910 mm</div><div>CLASS. SOC. <u>LR</u> APPROVAL</div><div>25 mm</div></div> <div><div>45 mm</div><div>WÄRTSILÄ PROPULSION TYPE NR. PAA1100171 DRAWING NR. DAAK003060 VOLTAGE 440 V-50/60 Hz CURRENT MAX 2,5 AMP. ADJUSTED AT 2,3 AMP. STARTER HYDRAULIC PUMP</div></div>									
<div><div><div><div><div>High voltage</div><div>JP TULLY</div></div><div><div>Revision</div><div>Date</div></div></div><div><div>Installation Location</div><div>SNL16041</div></div><div><div>Changeable</div><div>N/A</div></div><div><div>Class. society</div><div>LR</div></div></div><div><div>WÄRTSILÄ</div><div>an approved drawing and the drawings are the property of Wärtsilä and shall not be used for any other purpose without the written consent of Wärtsilä.</div></div><div><div>Equipment</div><div>MV</div><div>Unit</div><div>20165275.001</div></div><div><div>Project description</div><div>SB TT SS DOL</div><div>Page description</div><div>Textplates</div></div><div><div>Type</div><div>8-4-2013</div></div><div><div>Type reference</div><div>PAA1100171</div><div>Drawings reference</div><div>DAAK003060</div></div><div><div>Frequency</div><div>60 Hz</div><div>Power</div><div>1,03 kW</div><div>SH</div><div>2,3 A</div></div><div><div>Supply voltage</div><div>440 VAC</div></div><div><div>Page</div><div>6</div><div>Page</div><div>8</div><div>Page</div><div>7</div></div></div>									

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