HOPPE Bordmesstechnik GmbH

FINAL DOCUMENT

System: **AH**

Anti-Heeling System

for vessel:

Hull 2431 CO 34223

Classification: **GL**

Issue: **2008-01-22**

Yard:Jiangnan Shipyard (Group) CO.,LTD.

Shanghai 200011,P.R.China

HOPPE Bordmesstechnik GmbH

Overview

		Document	Revision
	Delivery specification, Part List	34223-00	22.01.2008
	Valve list	34223	31.07.2007
	Anti Heeling System General	A-34226-00000	07.12.2007
	Specification Anti Heeling System	9220-10-0010	10.2000
	Arrangement of Anti Heeling System	F-02903-00006	

Specification

		Document	Revision
	AH - Cabinets		
	Arrangement of Anti Heeling System Control Panel	A-34226-00302	07.12.2007
	Arrangement of Pump Panel E/R	A-34226-00303	07.12.2007
	Arrangement of Distribution Panel	F-02470-21000	
	Local starter box	F-02476-00000	
	AH - Components		
	Reversible Propeller Pump with electrical motor	Pumpspec F-2153-31812	21.03.2007 08.07.2007
	Pump curve	H300-1,8	24.07.2006
	Ex Box for PTC and Space Heater	K-02752-00000	
	Level switch HOLES2	F-02173-00000	
	Dimension drawing actuator / valve		
	Butterfly valve JIS 5K 350A with air vessel emergency close	F-02277-00000	
	Butterfly valve JIS 5K 350A double acting	F-02284-00000	
	Actuator HOPAC 3	F-02059_00000.GZ	
	Part List Square 24	F-02059-00001.ST	
	Part List Square 30	F-02059-00002.ST	
	Level switch	K-01312-00000	
	Flange A00 for level switch	F-00363-00000	
	Spare part set ETS-AH	K-00311-00000	

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Operation Manual / Test Procedures

		Document	Revision
	Operation Manual AH-System	F-03301-00105	
	Operation Manual pump	F-03301-00101	
	Operation Manual Motor	F-03301-01201	

Certificates

		Document	Revision
	Type Approval :		
	GL Anti Heeling System	17090-00 HH	12.09.2005
	GL electronic modules	17091-00 HH	12.09.2005
	GL Butterfly valves	95865-91 HH	10.05.2007
	ATEX:		
	Zener barrier	BAS01 ATEX 7145	29.04.2002
	Motor type EEx d II C T4	Nemko01 ATEX 394	20.09.2001
	Quality	Nemko01 ATEX 483Q	01.04.2005
	Test Certificate:		
	Test Certificate pump		18.01.2008

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Part List – 34223-00

Item	Amount	Part	Document	Revision
1.	1	Arrangement of Anti Heeling System Control Panel	A-34226-00302	
2.	1	Arrangement of Pump Panel E/R	A-34226-00303	
3.	1	Arrangement of Distribution Panel	F-02470-21000	
4.	1	Local starter box	F-02476-00000	
5.1	1	Reversible Propeller Pump with electrical motor	Pumpspec	
5.2	1	Ex Box for PTC and Space Heater	K-02752-00000	
5.3	1	Level switch HOLES2	F-02173-00000	
6.1	1	Butterfly valve JIS 5K 350A with air vessel emergency close	F-02277-00000	
6.2	1	Butterfly valve JIS 5K 350A double acting	F-02284-00000	
7.1	2	Level switch	K-01312-00000	
7.2	2	Flange A00 for level switch	F-00363-00000	
8.1	1	Spare part set ETS-AH	K-00311-00000	
8.2	1	1 pc. Auxiliary Contactor DILAC-22	K-02808-00000	
9.1	8	Final Documentation	34223 FINAL	
9.2	1 CD	Final Documentation	34223 FINAL	

Overview

Valve List HOPAC

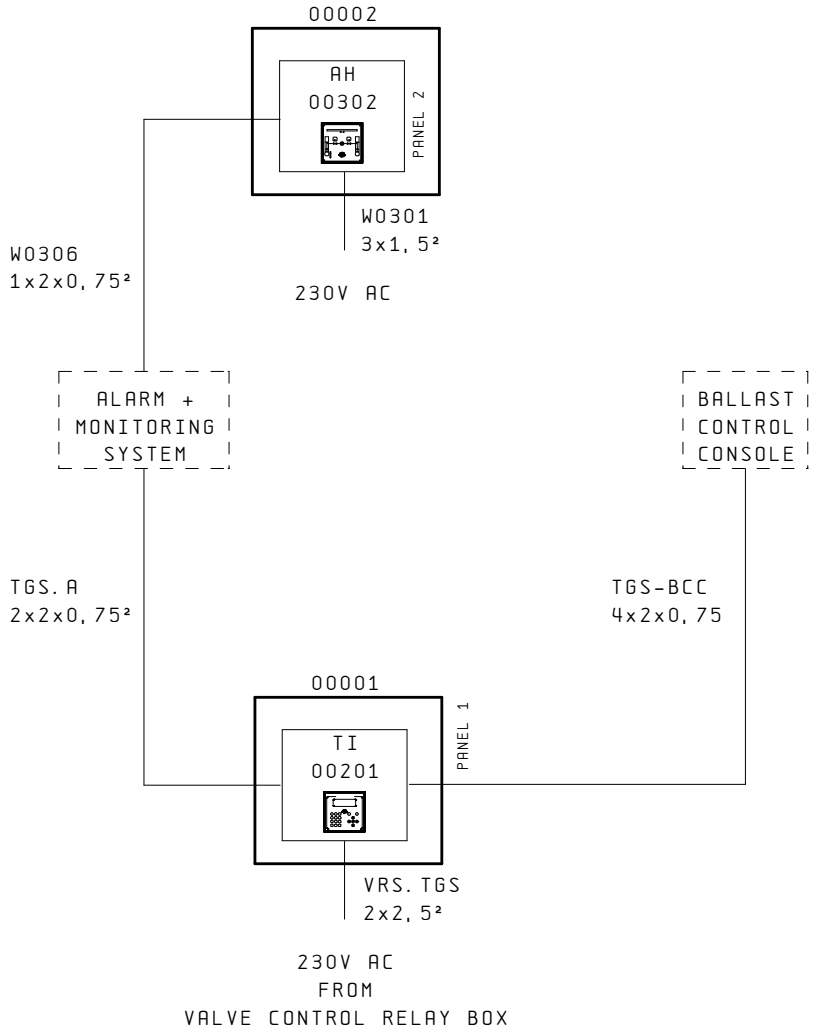
34223

Yard: JIEL Jason International Engineering Limit
Hull-No.: H2431

No	Serie-No	Pos.	Ind.	Valve	Type				Display	Yardcode I	Cabinett No.	EX	GL	Mo.	Remarks
1	0066663	3KP	2N5	op/cl	DN 350	JIS 10 K Flans	HOPAC 3	GG25	NBR			X		Ac	
2	0066664	3KO	2N5	op/cl	DN 350	JIS 10 K Flans	HOPAC 3	GG25	NBR			X		Ac	

generated: 21.03.2007
modified: 31.07.2007 06:30:01

sturmhöwel



Est. Date	21.03.07
Draw.	HaR
Engin.	T.Meyer
Rev. No. 2.0	Rev. Date 07.12.07

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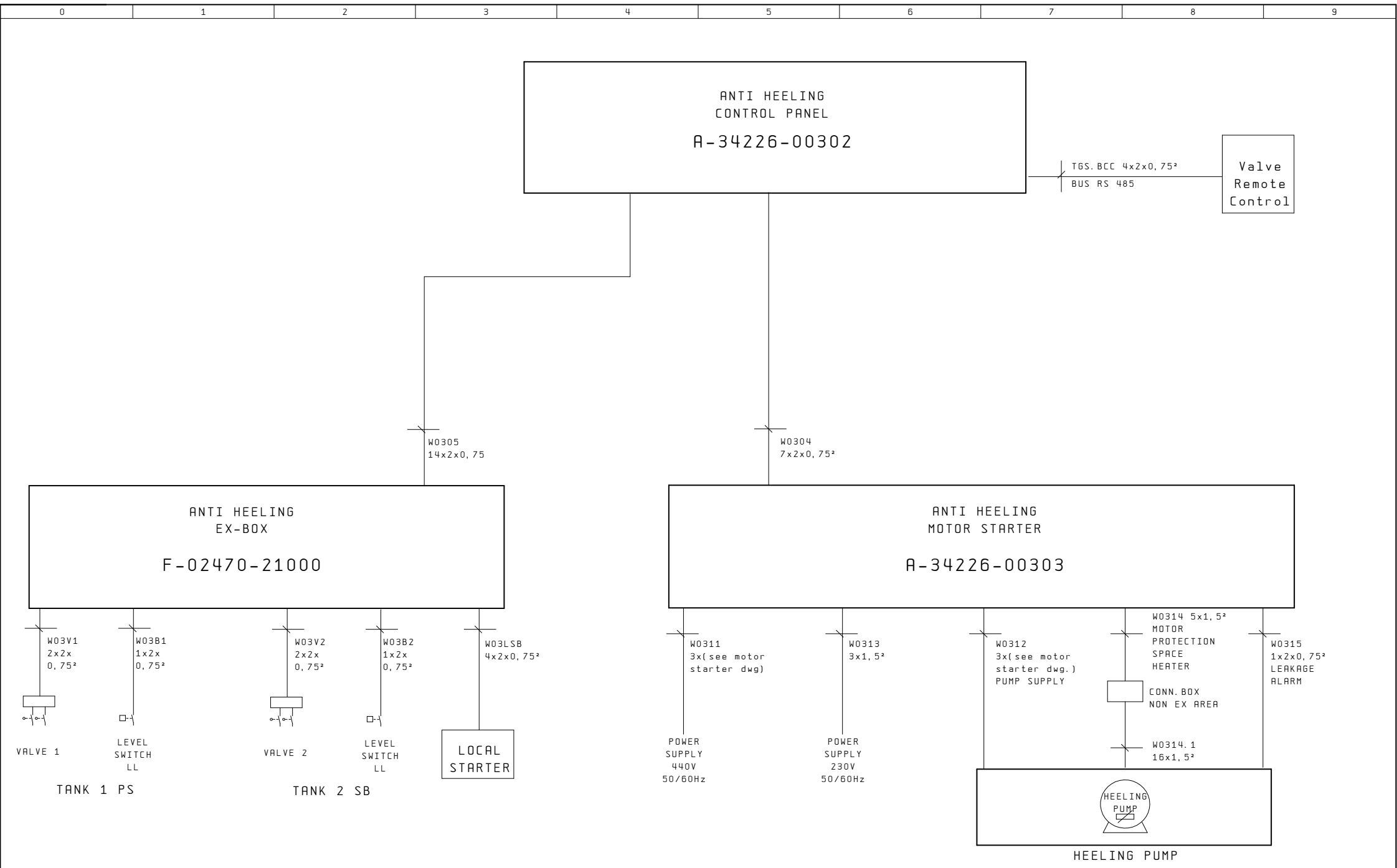
PROJECT / OVERVIEW
TT; AH

System Cable

System Cable

A-34226-00000 - SC

scale: 1:10
= 00000
+ SC
Sheet 1 / 2



Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	PROJECT / OVERVIEW TT; AH System Cable	System Cable Anti Heeling	scale: 1:10
Draw.	HaR				= 00000
Engin.	T. Meyer			A-34226- 00000 - SC	+ SC
Rev. No. 2.0	Rev. Date 07.12.07				Sheet 2 / 2

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SPECIFICATION

ANTI HEELING SYSTEM (REVERSIBLE PUMP)

Document No.: **9220-10-0010**

Issue: **10.2000**

List of content

General

This system is designed for the manual and automatic control of the ships list during loading and unloading conditions by using a reversible propeller type pump.
The ships list will be continuously measured by means of a special inclinometer and indicated with a light-diode belt on the operation panel in the range from 2° port to 2° starboard.
The electronic unit is based on a micro computer system and installed in a box for console mounting with the dimensions of 144 × 144 mm. The box is covered by a front panel with mimic diagram and integrated indication light diodes and operating push buttons.

Following operating modes can be selected easily:

OFF

INDICATION

The list and state of the pump, valves and tank low level will be indicated only

MANUAL

The required pump direction from port to starboard or vice versa can be selected by two push buttons. The pump starts and the valve opens if the corresponding push button is pressed down.
In manual operation an automatic pre heeling can be achieved for heavy lift operations. The required pre heeling angle can be selected easily. The pump will start automatically, the corresponding valve will open. The system stops after reaching the selected pre heeling angle. The system remains in the manual operation mode.

AUTOMATIC

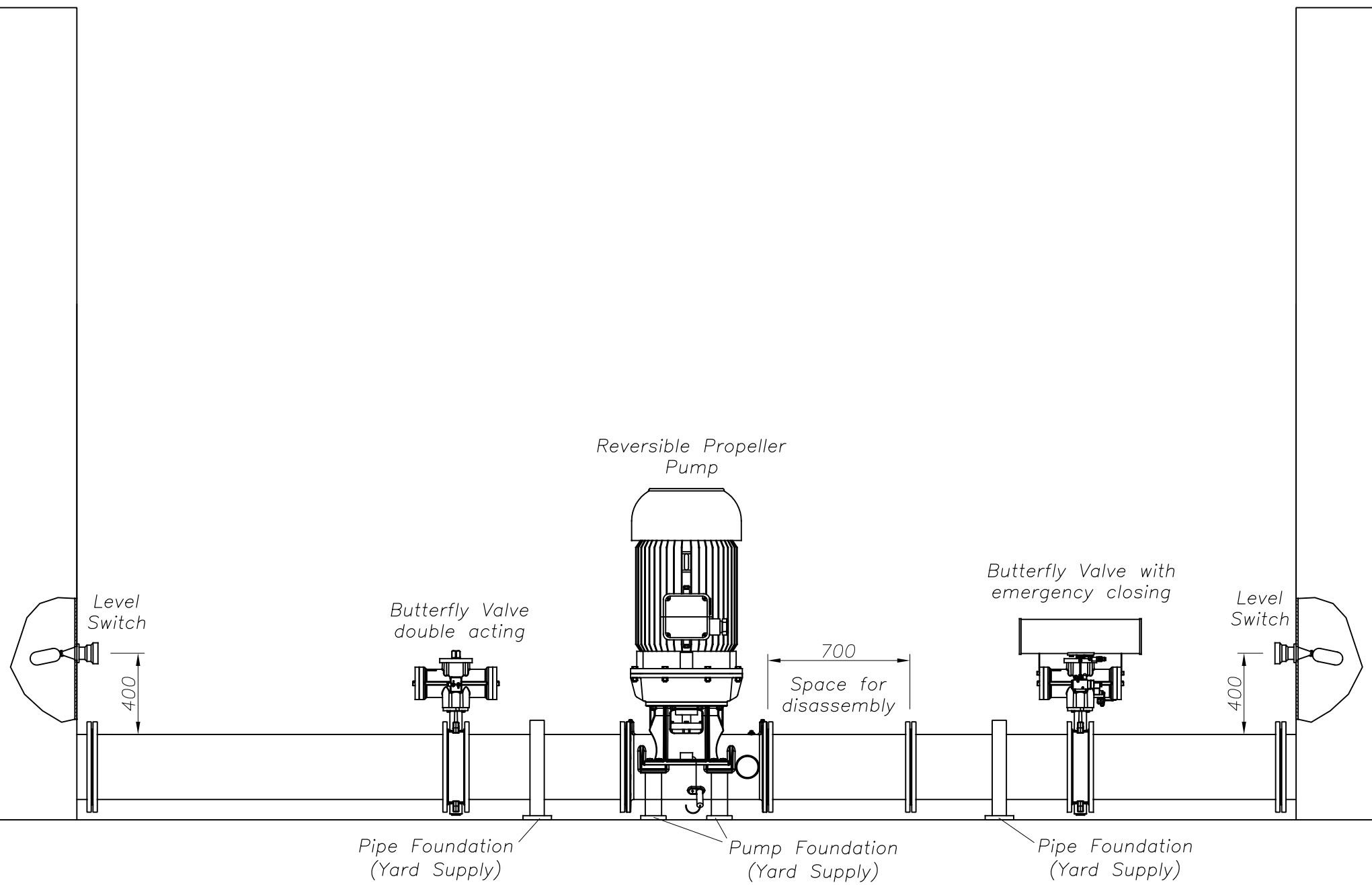
The pump will start and the valve open automatically if an adjustable limit value from 0,4° – 2° list is exceeded.
The pump stops and the valves close if the vertical ship position is reached again. The time delay pump stop is also adjustable from 10 sec – 15 min.
Separated selector switches for Heeling plant start angle and time delay pump stop are installed in the box as indicated on drawing no. AH 9020-14.
Generally the pump stops and the valve closes if the list exceeds to a value of 5°. The operating mode is changed in this case automatically to **MANUAL** and the flow direction to the side of the exceeded list is blocked.

The pump stops and the valve closes if the heeling tank on the suction side of the pump is empty.
The operating conditions of the valve, pump and tank level are indicated with light diodes on a mimic diagram.

Potential free contacts are available for following conditions:

Heeling alarm	2,5°
Emergency stop	5,0°
System failure	

The switch gear for pump and valve control is separately installed in a switch box for wall mounting.



	rev.No	date	name
draw.	est.	07.06.07	GB
eng.	est.	07.06.07	GB
rev.	1.0	07.06.07	GB

HOPPE Bordmesstechnik GmbH

F–02903–00006.IZ

Anti–Heeling System
AH–V2P1T2
Installation Drawing

Order | Source

Scale | Material | Tolerances(mm) | Surface | Page 1/1

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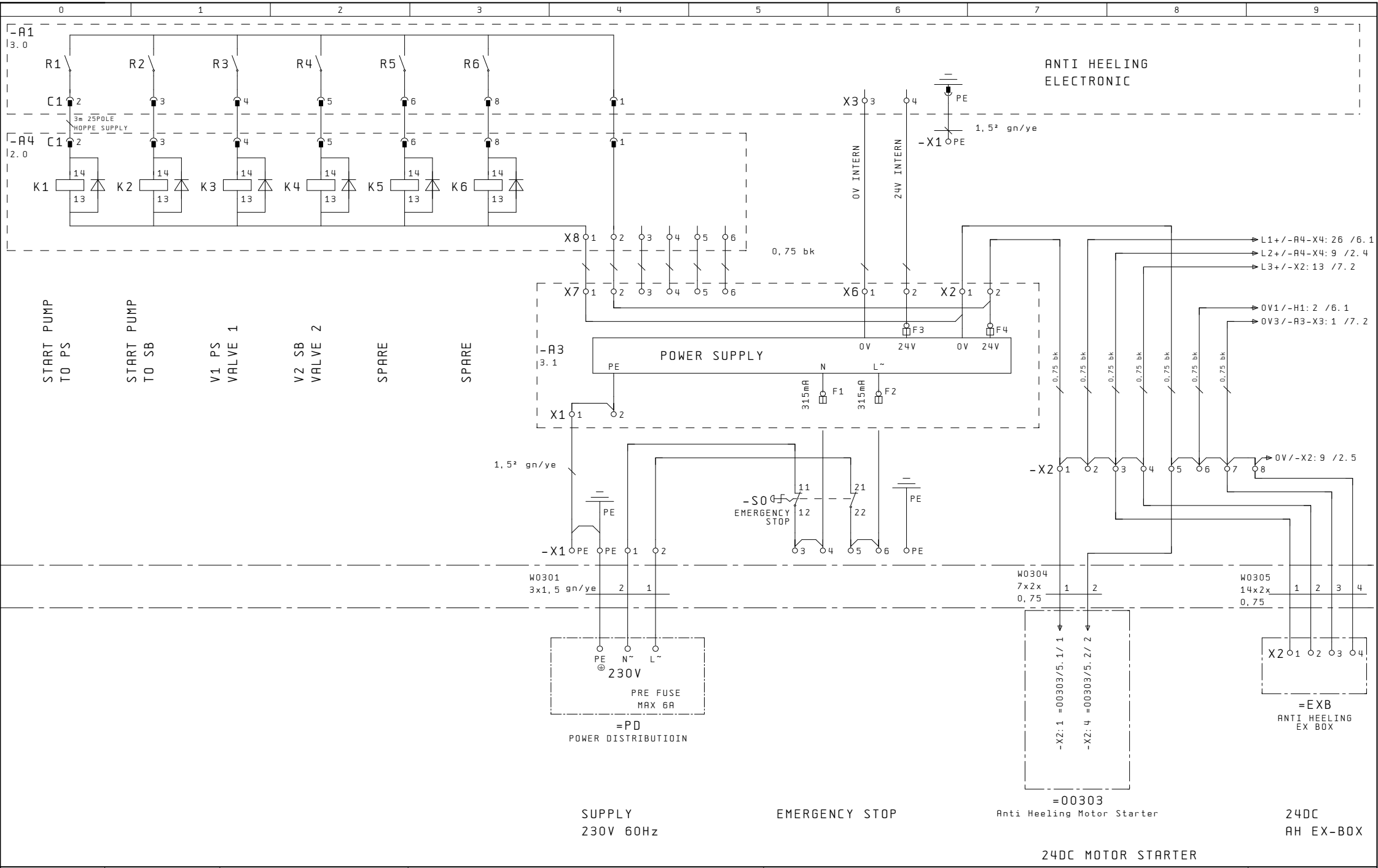
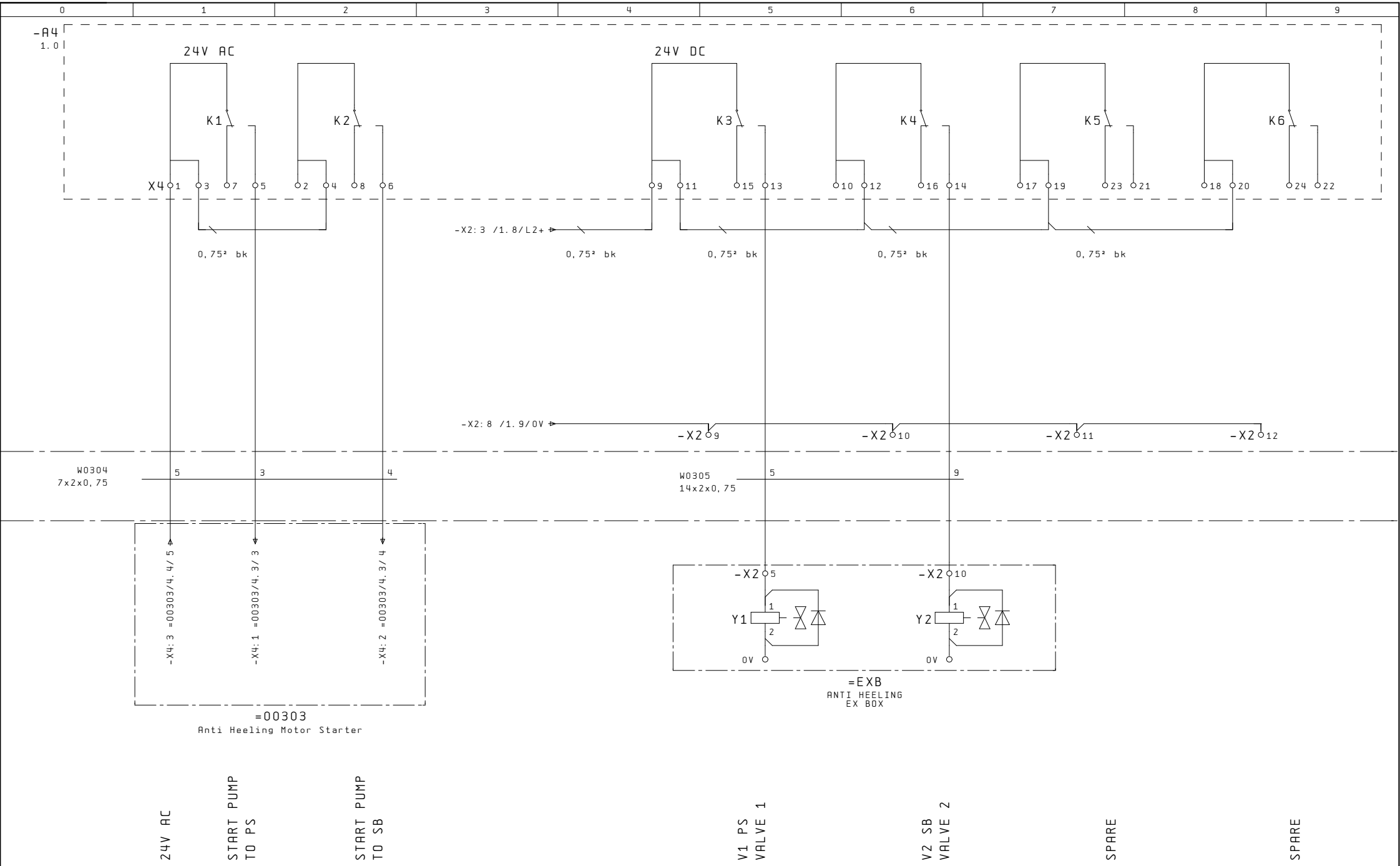
Specification



Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / CENTRAL STATION - AH Wiring Diagram	ANTI HEELING POWER SUPPLY A-34226- 00302 - SP
Draw.	HaR			scale: = 00302 + SP
Engin.	T. Meyer			Sheet 1 / 7
Rev. No. 2.0	Rev. Date 07.12.07			



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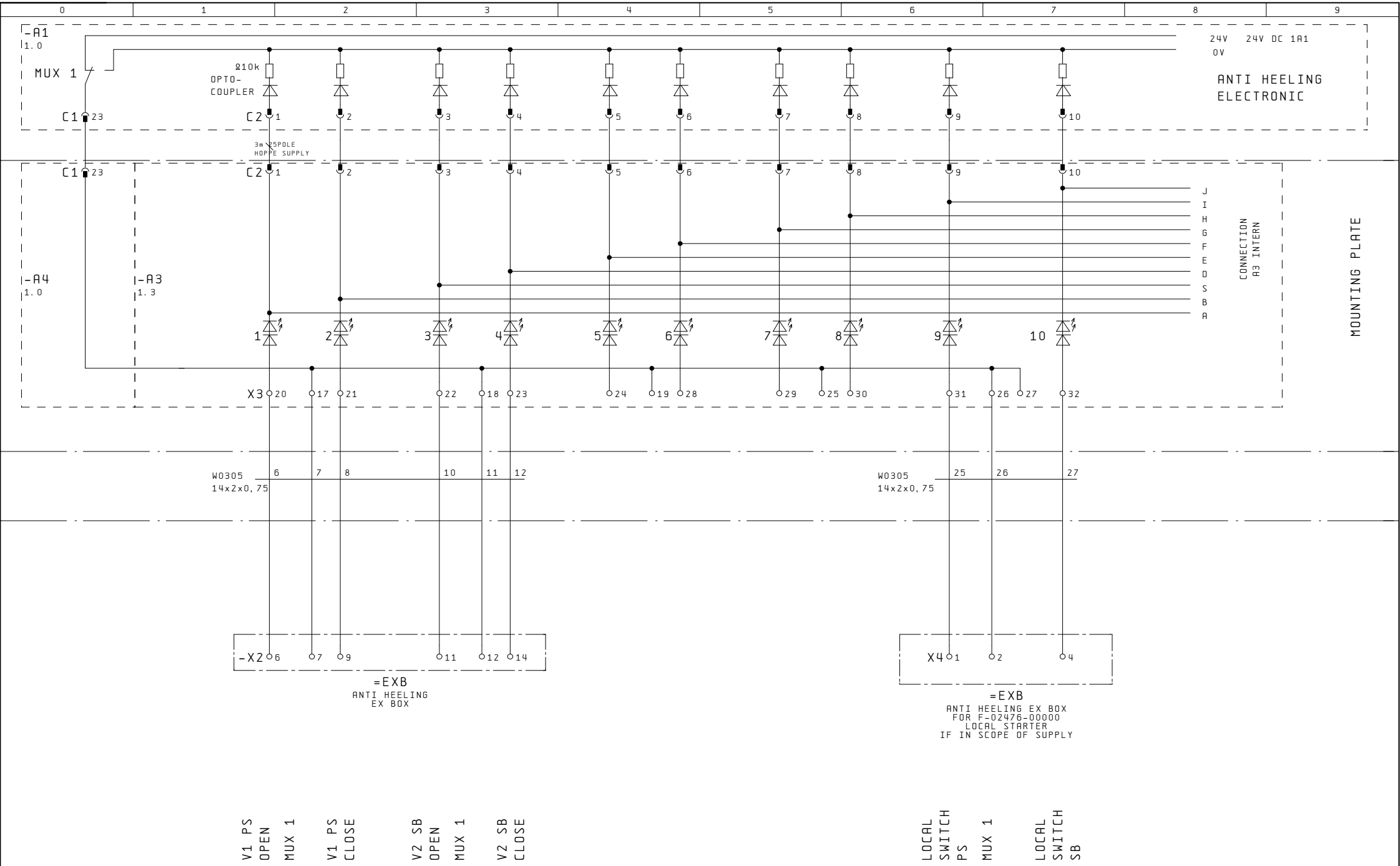
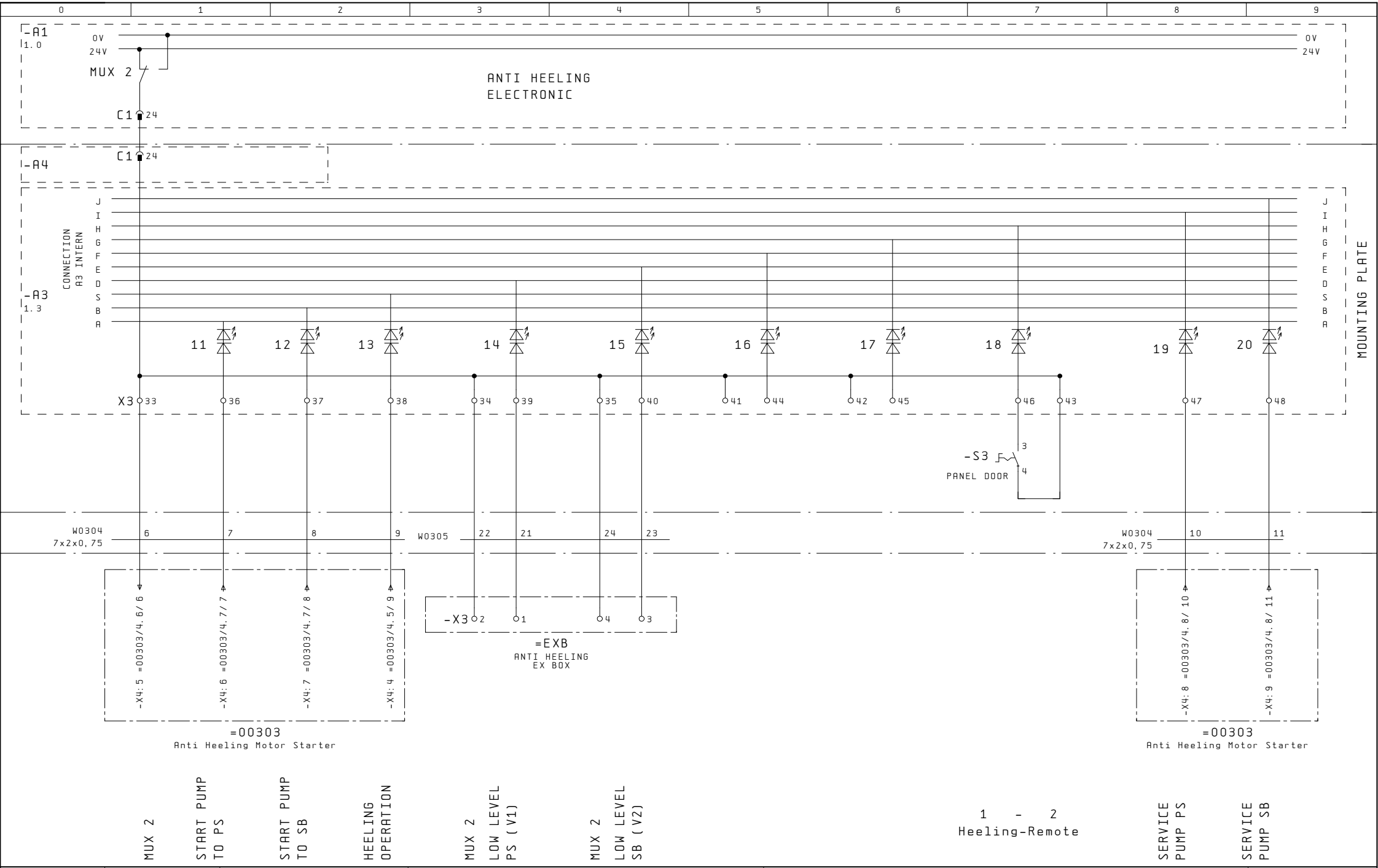
Draw.	HaR				+ SP
Engin.	T. Meyer			A-34226- 00302 - SP	Sheet 2 / 7
Rev. No. 2.0	Rev. Date 07.12.07				



Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / CENTRAL STATION - AH Wiring Diagram	AH - INPUT MUX 1	scale: = 00302
Draw.	HaR				+ SP
Engin.	T. Meyer			A-34226- 00302 - SP	Sheet 3 / 7
Rev. No. 2.0	Rev. Date 07.12.07				



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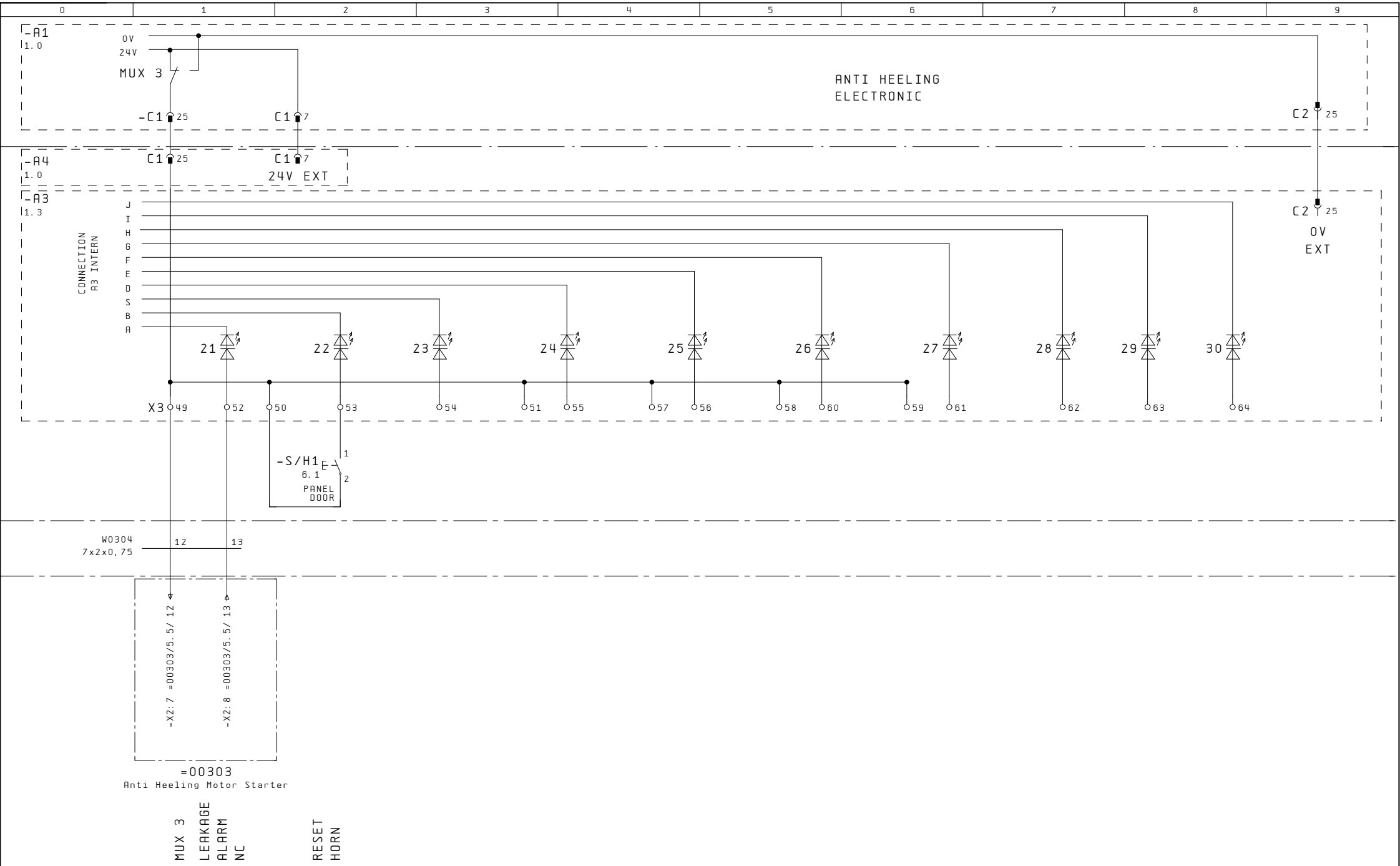
Draw.	HaR			scale: = 00302 + SP
Engin.	T.Meyer			
Rev. No. 2.0	Rev.Date 07.12.07			Sheet 4 / 7



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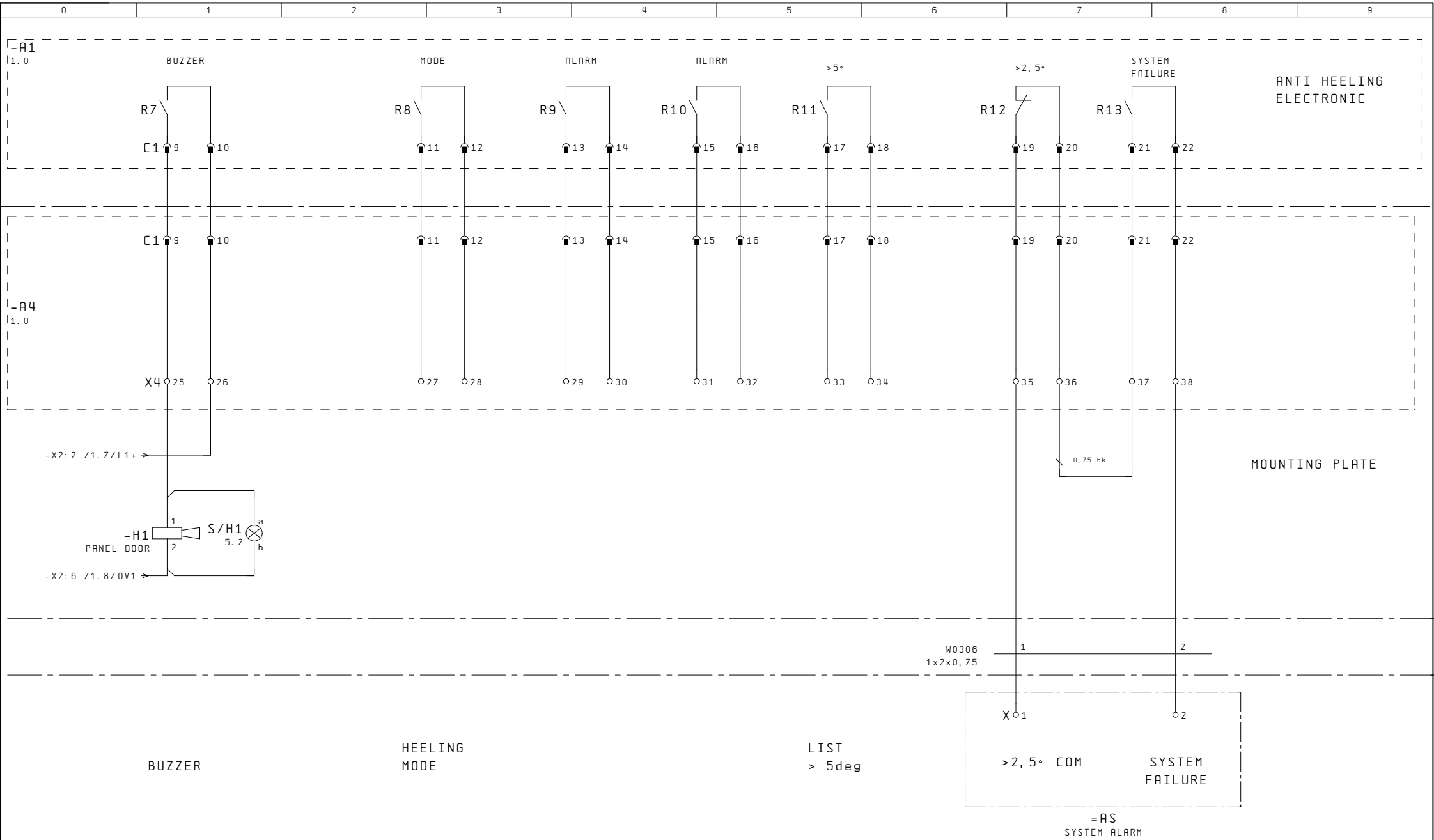
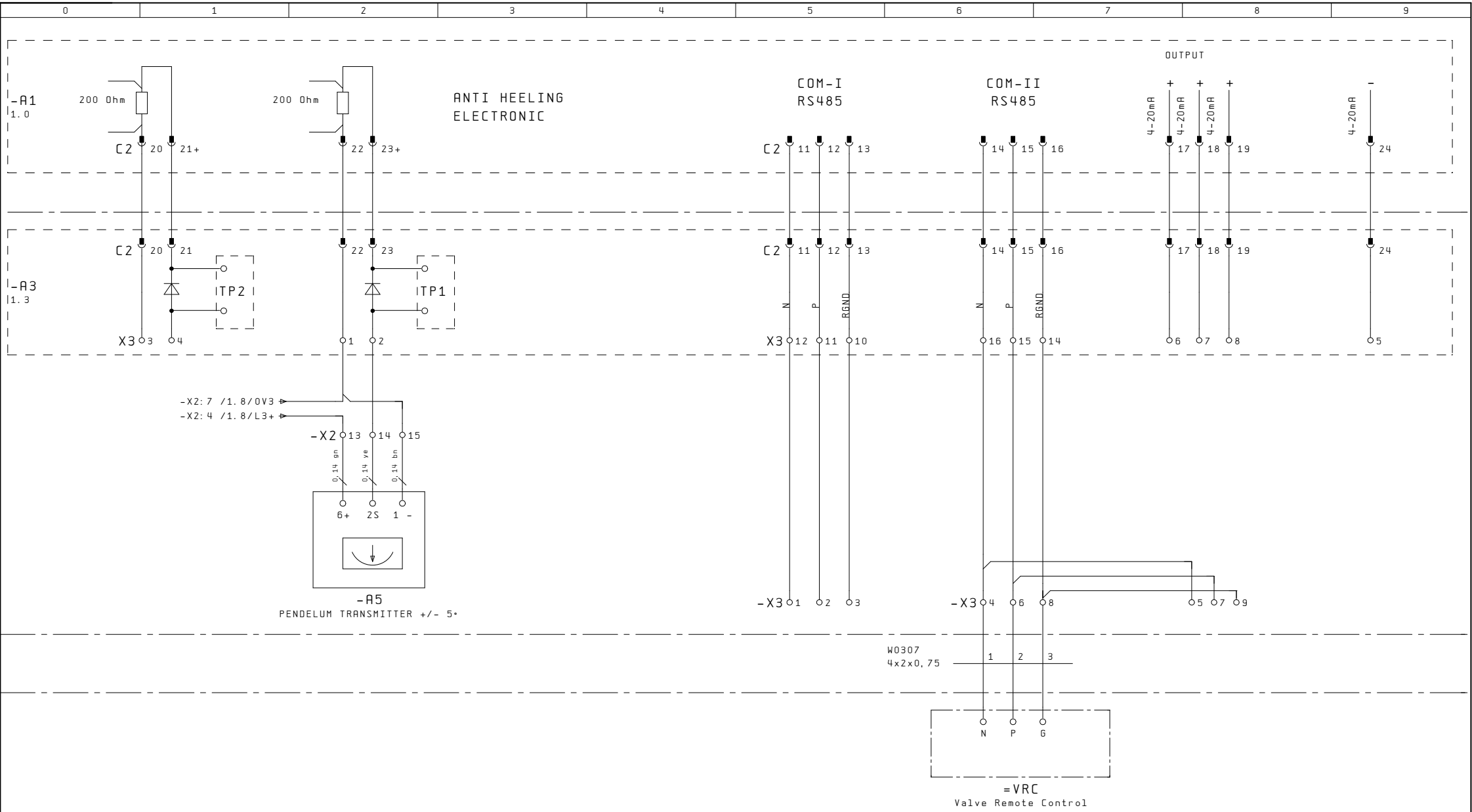
Draw.	HaR				+ SP
Engin.	T.Meyer			A-34226-00302 - SP	Sheet 5 / 7
Rev. No. 2.0	Rev. Date 07.12.07				



Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / CENTRAL STATION - AH Wiring Diagram	AH - OUTPUT - ALARM	scale: = 00302
Draw.	HaR				+ SP
Engin.	T. Meyer			A-34226- 00302 - SP	Sheet 6 / 7
Rev. No. 2.0	Rev. Date 07.12.07				



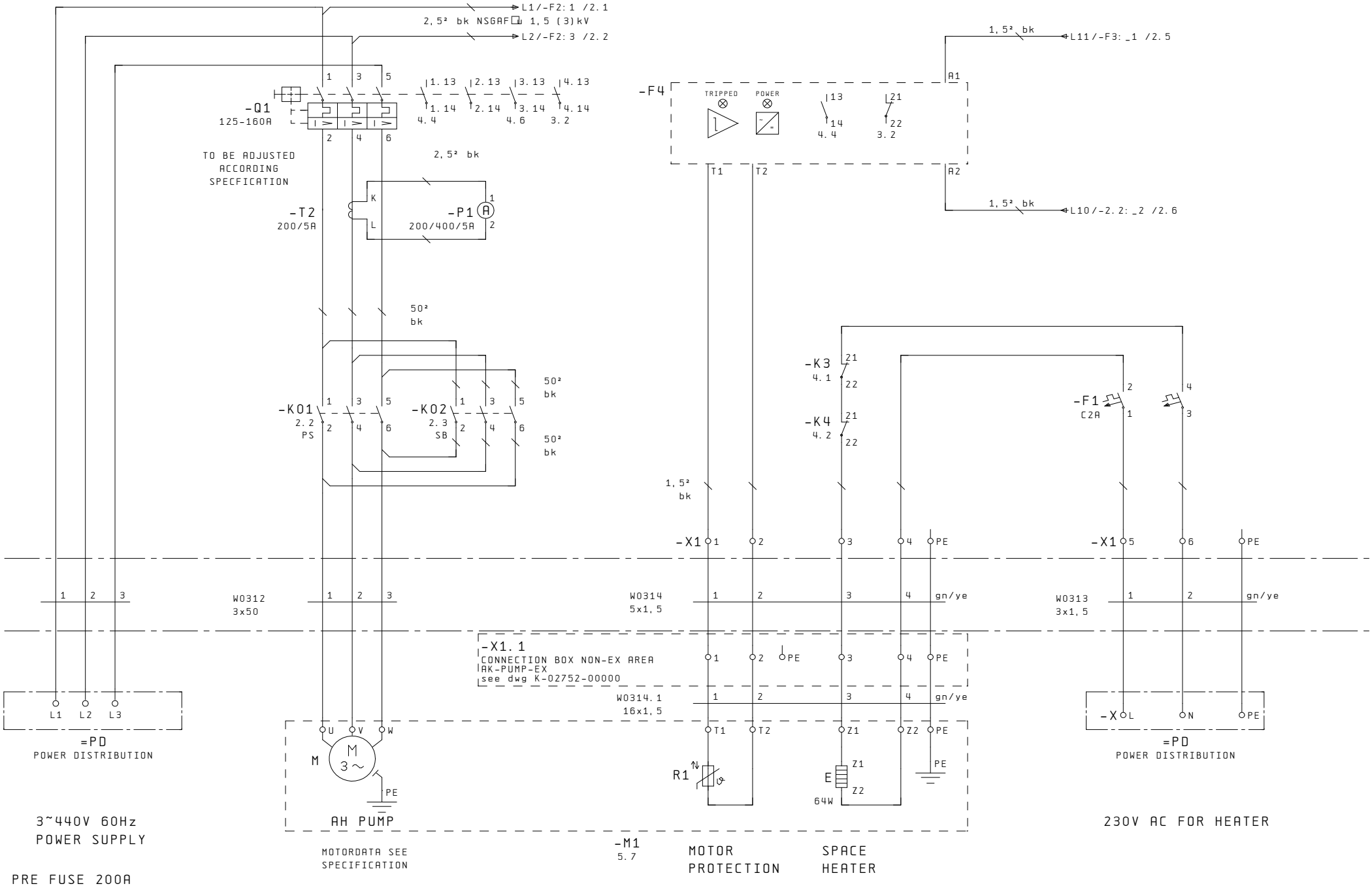
Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / CENTRAL STATION - AH Wiring Diagram	AH - OUTPUT - ALARM	scale: = 00302 + SP
Draw.	HaR				
Engin.	T.Meyer			A-34226- 00302 - SP	Sheet 7 / 7
Rev. No. 2.0	Rev. Date 07.12.07				

0	1	2	3	4	5	6	7	8	9

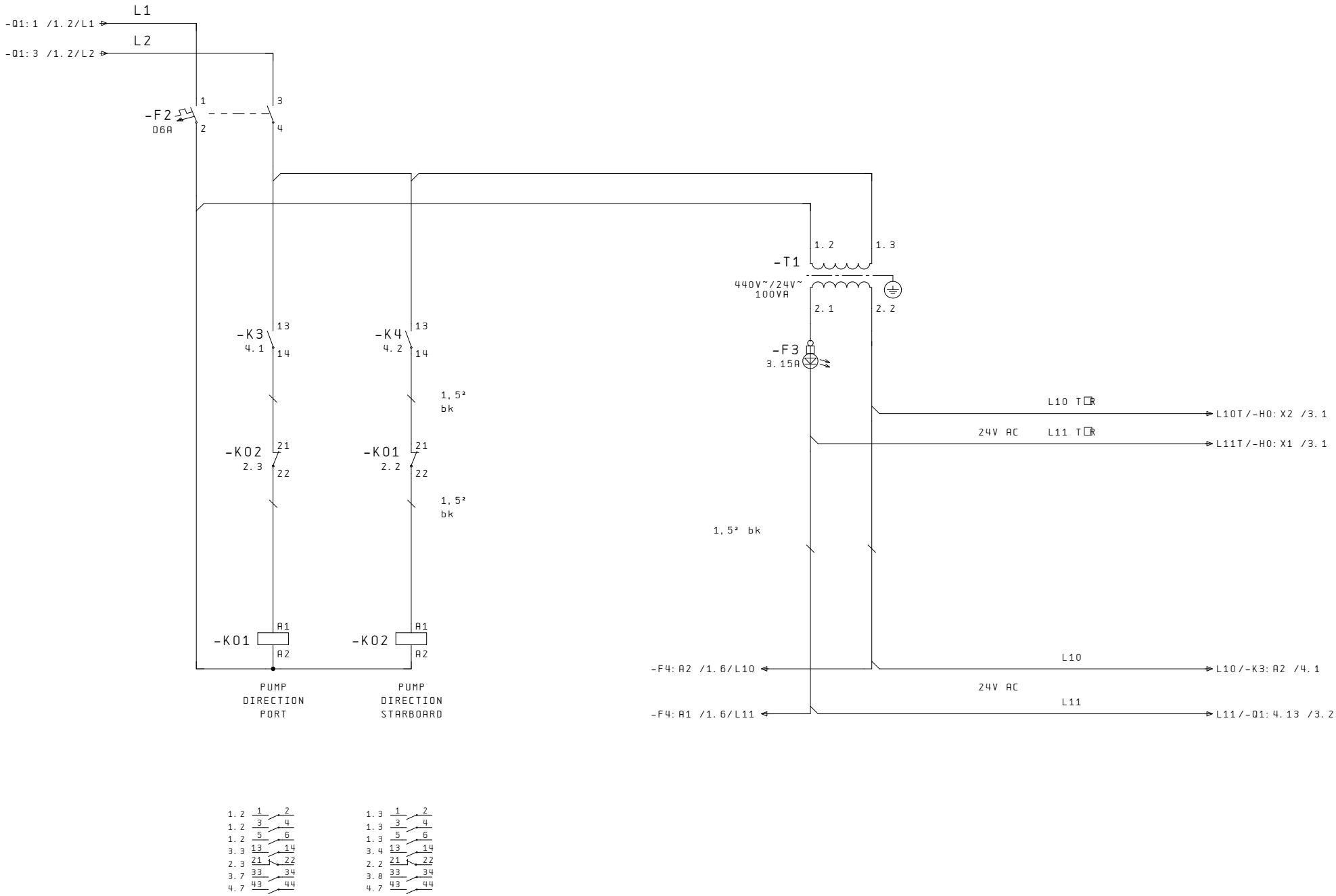
PART LIST

DESIGNATION (BMK)	QUANT	DESIGNATION		ARTICEL Nr.	WIRING DIAGR. POSITION
=00302-A1	1	CABLE SET	MIP	F-02536-10001	=00302+SP/1.0
=00302-A3	1	AH INPUT BOARD	AH-IN-30	F-02536-06001	=00302+SP/1.3
=00302-A4	1	AH OUTPUT BOARD	AH-O-6	F-02536-06002	=00302+SP/1.0
=00302-A5	1	PENDULA SENDER	PE-4000-WD/E2-01	K-01902-00000	=00302+SP/7.2
=00302-A5	1	PENDULUM SUPPORT	PE-4000-H-K	F-02142-01000	=00302+SP/7.2
=00302-H1	1	BUZZER	L/S; 18x24; 10-26V DC	K-00811-00000	=00302+SP/6.1
=00302-S0	1	EMERGENCY SHUTDOWN KEY	M22-PV	K-00901-00000	=00302+SP/1.5
=00302-S0	2	CONTACT ELEMENT	M22-K01	K-00719-00000	=00302+SP/1.5
=00302-S0	1	EMERGENCY SHUTDOWN PLATE	M22-XBK1	K-00903-00000	=00302+SP/1.5
=00302-S0	1	FIXING ADAPTER	M22-A	K-00045-00000	=00302+SP/1.5
=00302-S/H1	1	GRAVURE	SYMBOLE; ACCU.: ALARM OFF	K-00409-00000	=00302+SP/5.2
=00302-S/H1	1	ILLUMINATED PUSH BUTTON	1 BREAKER + 1 MAKE CONTACT	K-00770-00000	=00302+SP/5.2
=00302-S/H1	1	BULB	TI 3/4 MG 28V/40mA	K-00408-00000	=00302+SP/5.2
=00302-S/H1	1	PRESSURE HOOD	WHITE; FLAT; D15.8	K-00267-00000	=00302+SP/5.2
=00302-S3	1	CAM SWITCH	TM-1-8220/E	K-00896-00000	=00302+SP/4.7
=00302-S3	1	LABEL	50-18-VAR1-KS	F-02288-01001	=00302+SP/4.7
=00302-X1	3	TENSION SPRING TERMINAL	ST 4-PE	K-00667-00000	=00302+SP/1.4
=00302-X1	1	TENSION SPRING TERMINAL	ST 4	K-00666-00000	=00302+SP/1.4
=00302-X1	5	TENSION SPRING TERMINAL	ST 2,5	K-00663-00000	=00302+SP/1.4
=00302-X2	15	TENSION SPRING TERMINAL	ST 2,5	K-00663-00000	=00302+SP/1.7
=00302-X3	9	DISCONNECTING TERMINAL	ST 2,5-MT	K-01465-00000	=00302+SP/7.5

Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / CENTRAL STATION - AH	PART LIST	scale: = 00302
Draw.	DK				+ ST
Engin.	T.Meyer			A-34226- 00302 - ST	
Rev. No. 2.0	Rev.Date 07.12.07		Part Lsit		Sheet 1 / 1



Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / MOTOR STARTER - AH	PUMP CONTROL 440V~	scale: = 00303
Draw.	HaR				+ SP
Engin.	T. Meyer		Wiring Diagram	A-34226- 00303 - SP	Sheet 1 / 5
Rev. No. 2.0	Rev. Date 07.12.07				



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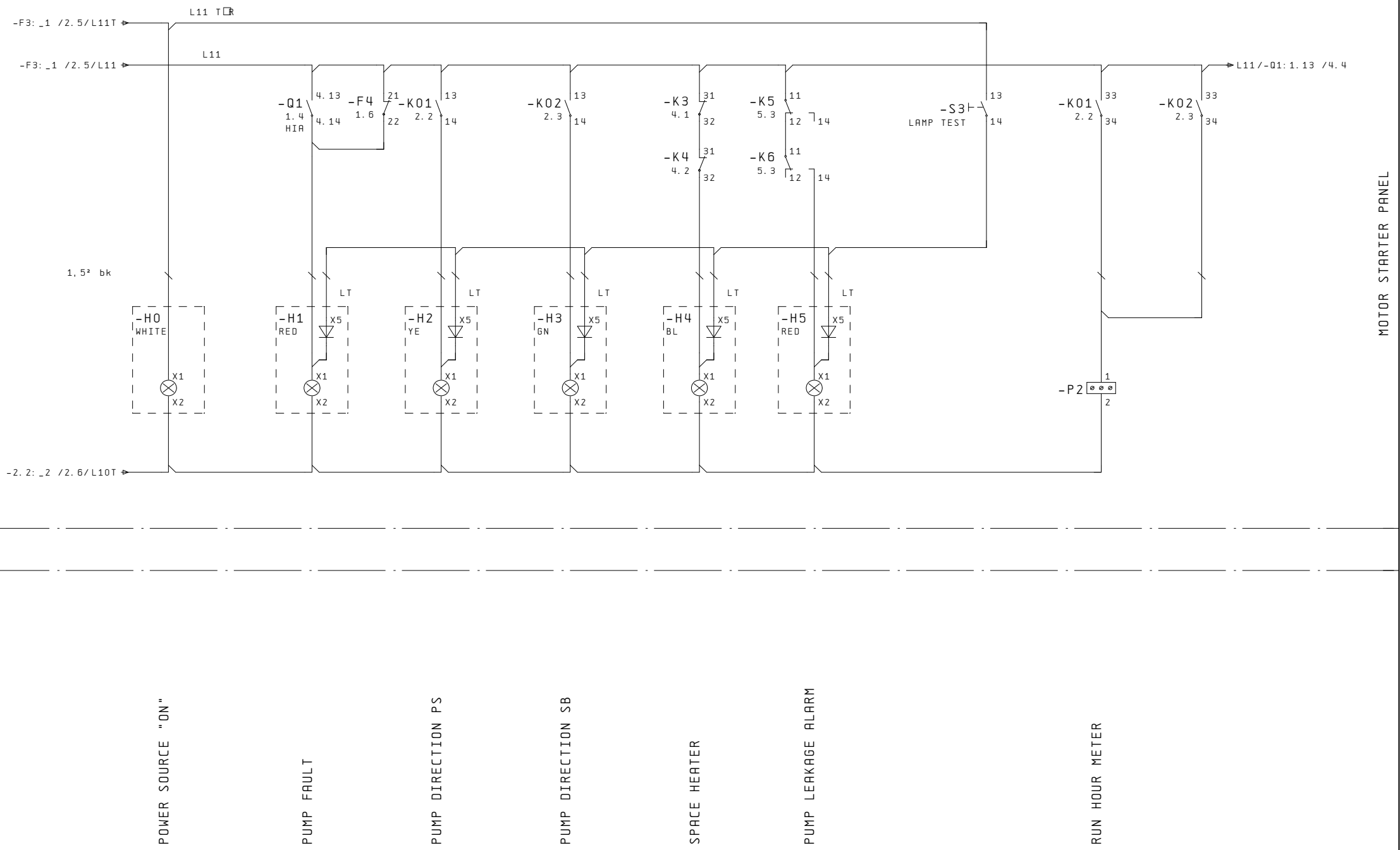
Engin.	T.Meyer			A-34226-00303 - SP	
Rev. No. 2.0	Rev. Date 07.12.07				Sheet 2 / 5



Est. Date	21.03.07
Draw.	HaR
Engin.	T.Meyer
Rev. No. 2.0	Rev. Date 07.12.07

HOPPE Bordmesstechnik GmbH

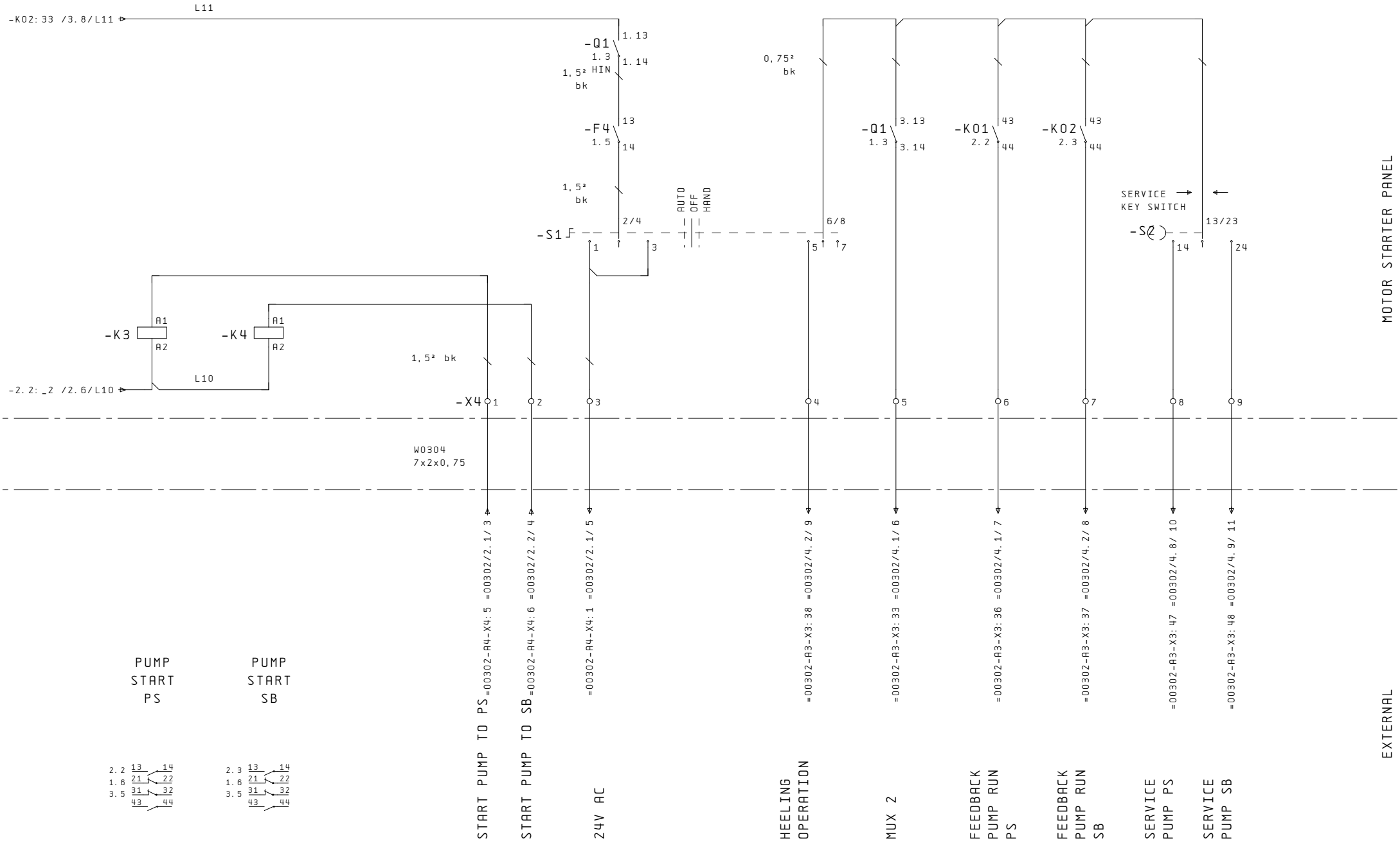
ANTI HEELING / MOTOR STARTER - AH

Wiring Diagram

PUMP CONTROL LAMPS

A-34226- 00303 - SP

scale:
= 00303
+ SP
Sheet 3 / 5



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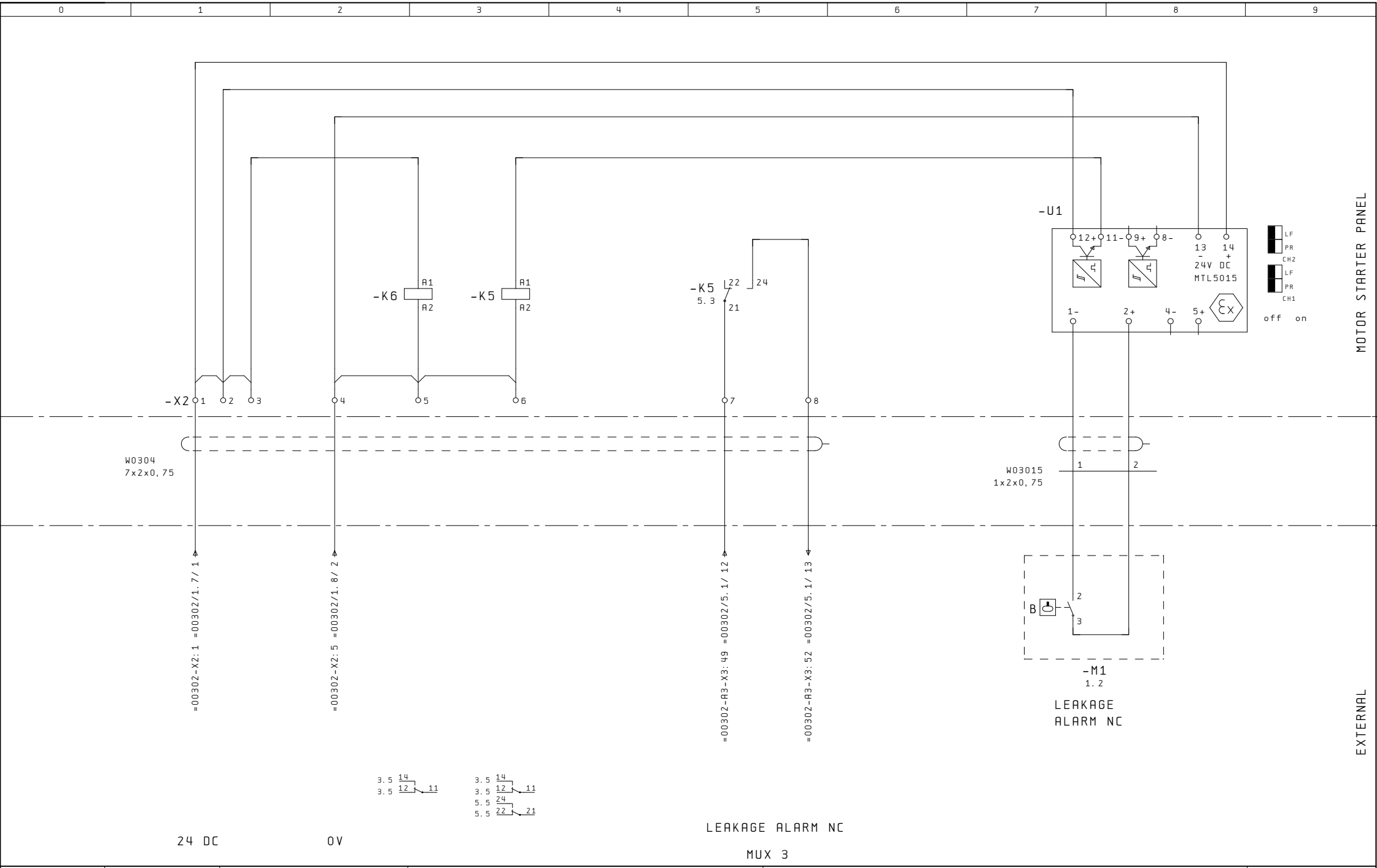
Engin.	T. Meyer			A-34226- 00303 - SP	
Rev. No. 2.0	Rev. Date 07.12.07				Sheet 4 / 5



Est. Date	21.03.07	HOPPE Bordmesstechnik GmbH	ANTI HEELING / MOTOR STARTER - AH	LEAKAGE ALARM	scale: = 00303
Draw.	HaR				+ SP
Engin.	T. Meyer		Wiring Diagram	A-34226- 00303 - SP	Sheet 5 / 5
Rev. No. 2.0	Rev. Date 07.12.07				

HOPPE Bordmesstechnik GmbH

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Drawing No. : F-02470-21000

DESIGNATION : AH-EX-V2-LS

TYP : ANTI HEELING DISTRIBUTION

Revision date : 02.08.07

Revision Index : 1.8

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS OVERVIEW	COVER SHEET	scale: 1:10
Draw.	BER				= 21000
Engin.				F-02470-21000 - SL	+ SL
Rev. No. 1.8	Rev. Date 02.08.07				Sheet 1 / 2

F-02470- LIST OF CONTENTS ANTI HEELING DISTRIBUTION AH-EX-V2-LS F-02470-21000

sheet	designation	date	Rev.
=21000+SL/1	COVER SHEET	02.08.07	1.8
=21000+SL/2	LIST OF CONTENTS	02.08.07	1.8
=21000+MP/1	PANEL	25.10.06	1.3
=21000+SP/1	EX-BOX	02.08.07	1.7
=21000+SP/2	EX-BOX	02.08.07	1.7
=21000+SP/3	EX-BOX	02.08.07	1.7
=21000+SP/4	PNEUMATIC	02.08.07	1.7
=21000+ST/1	PART LIST	28.02.07	1.5
=21000+ST/2	PART LIST	28.02.07	1.5
=21000+KL/1	=21000-L1	25.10.06	1.2
=21000+KL/2	=21000-X2	25.10.06	1.2
=21000+KL/3	=21000-X3	25.10.06	1.2
=21000+KL/4	=21000-X4	25.10.06	1.2
=21000+KL/5	=21000-XF	25.10.06	1.2
=21000+IS/1	STÜCKLISTE	28.02.07	1.4
=21000+IS/2	STÜCKLISTE	28.02.07	1.4
=21000+VP/1	VERDRAHTUNGSLISTE	30.10.06	1.3
=21000+VP/2	VERDRAHTUNGSLISTE	30.10.06	1.3

Engineer :

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS OVERVIEW	LIST OF CONTENTS	scale: = 21000
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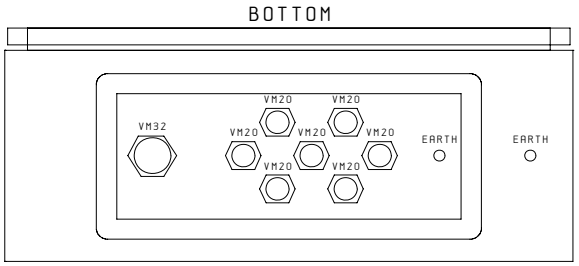
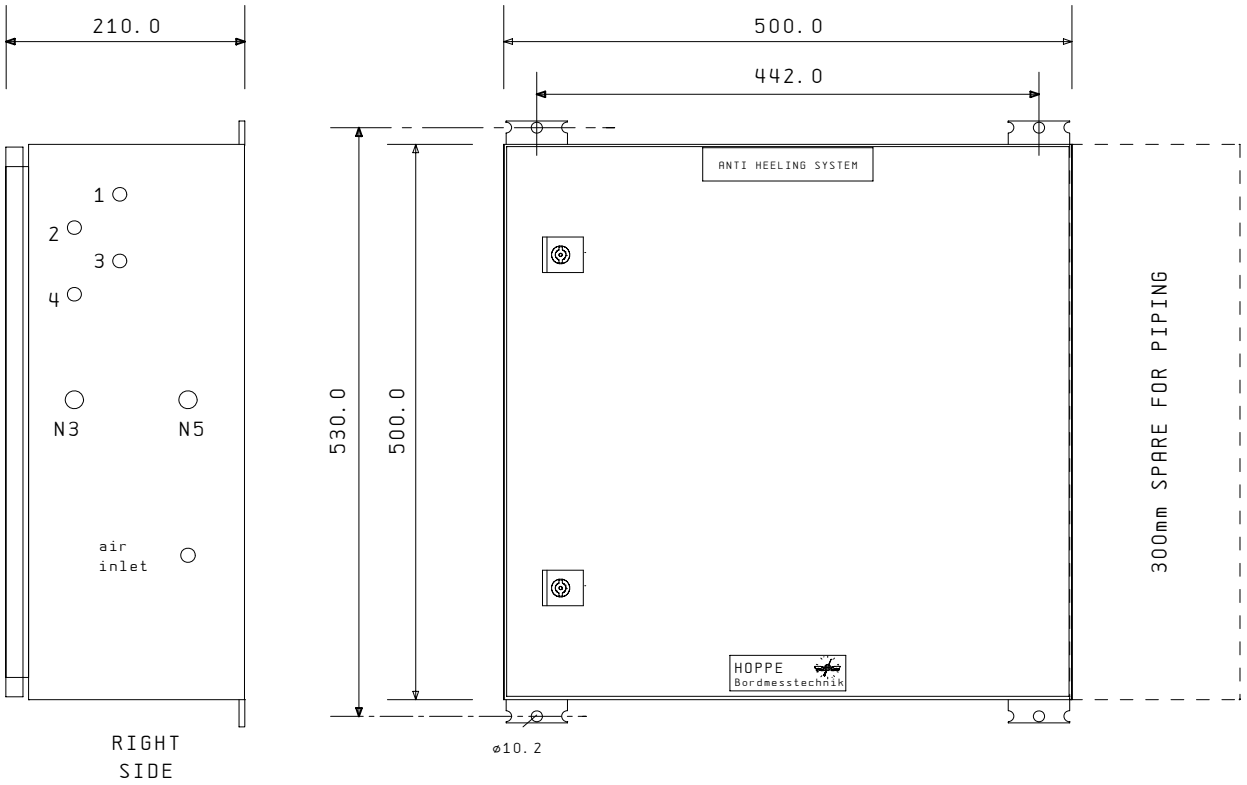
Engin.				F-02470- 21000 - SL	Sheet 2 / 2
Rev. No. 1.8	Rev. Date 02.08.07				

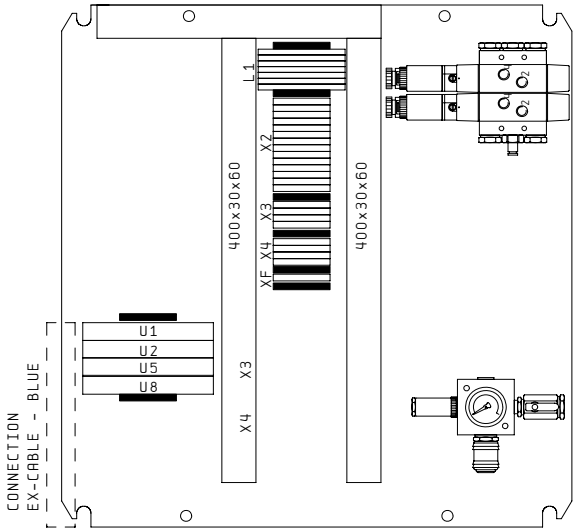


LEGEND :

CABLE GLANDS

V-M32 CABLE ø13 - ø21 19x2x0,75/14x2x0,75
V-M20 CABLE ø 6 - ø13



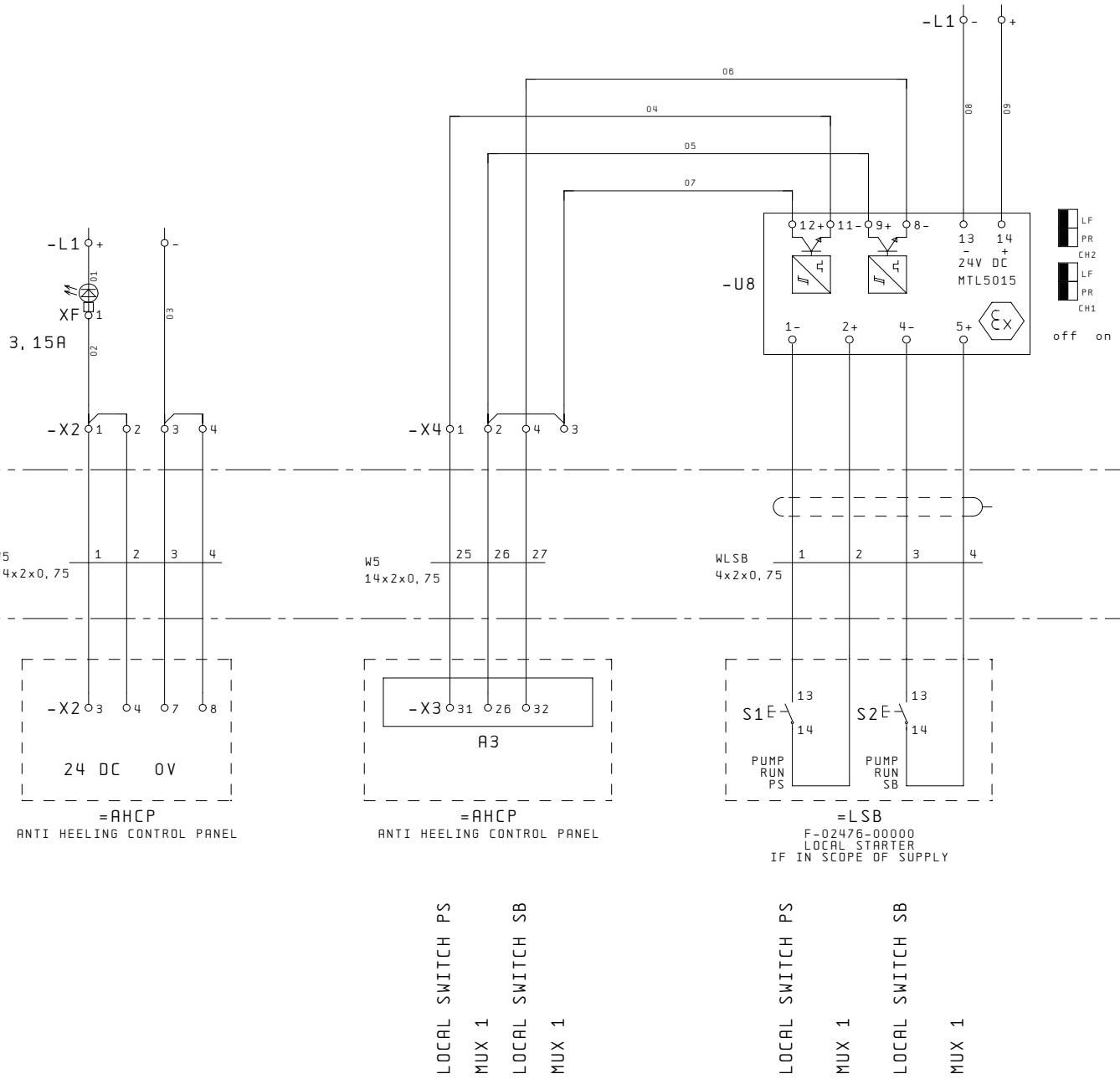


Switchboard : RITTAL AE 1050.600
500x500x210mm

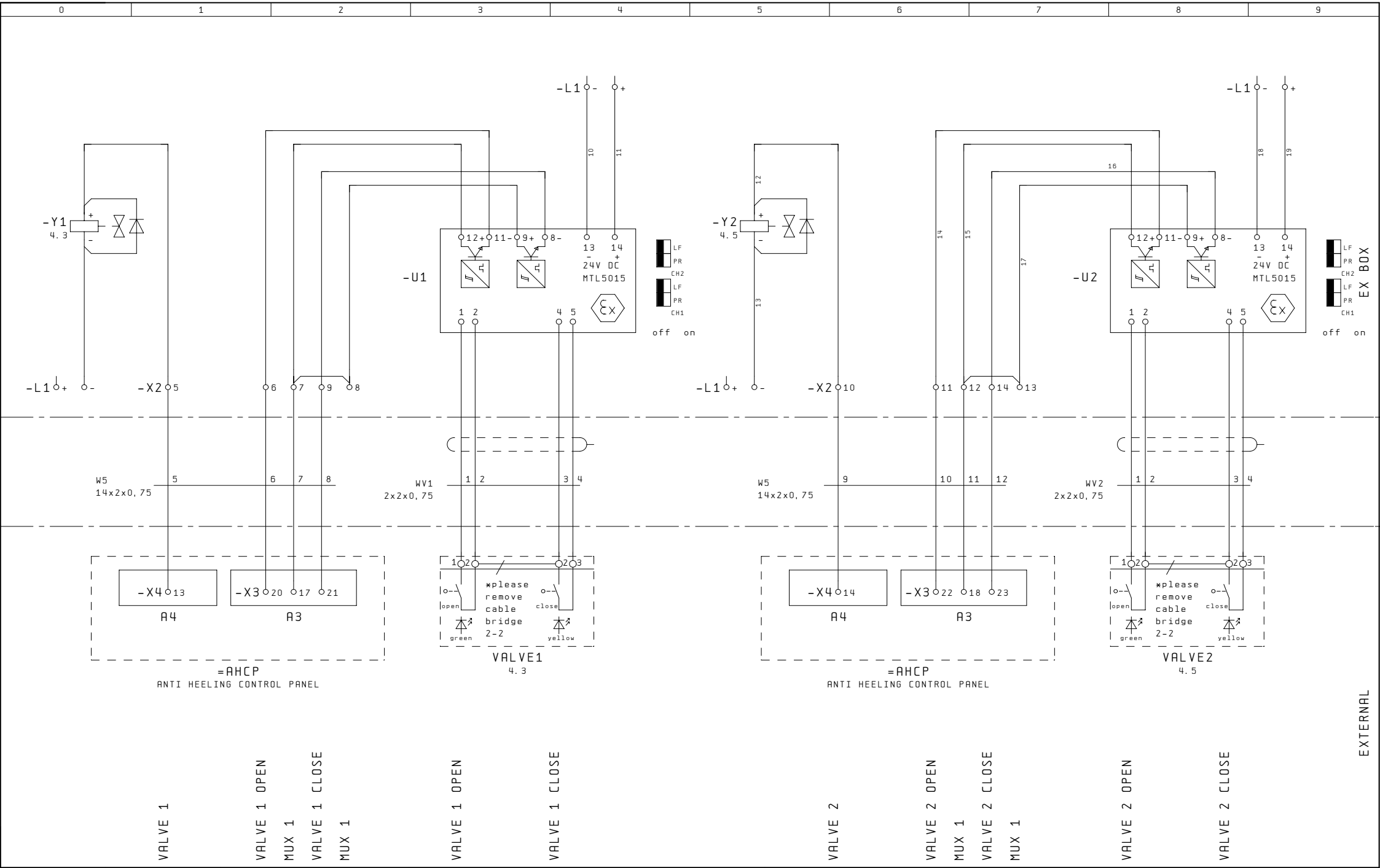
Protection : IP 56

Weight : 17 Kg

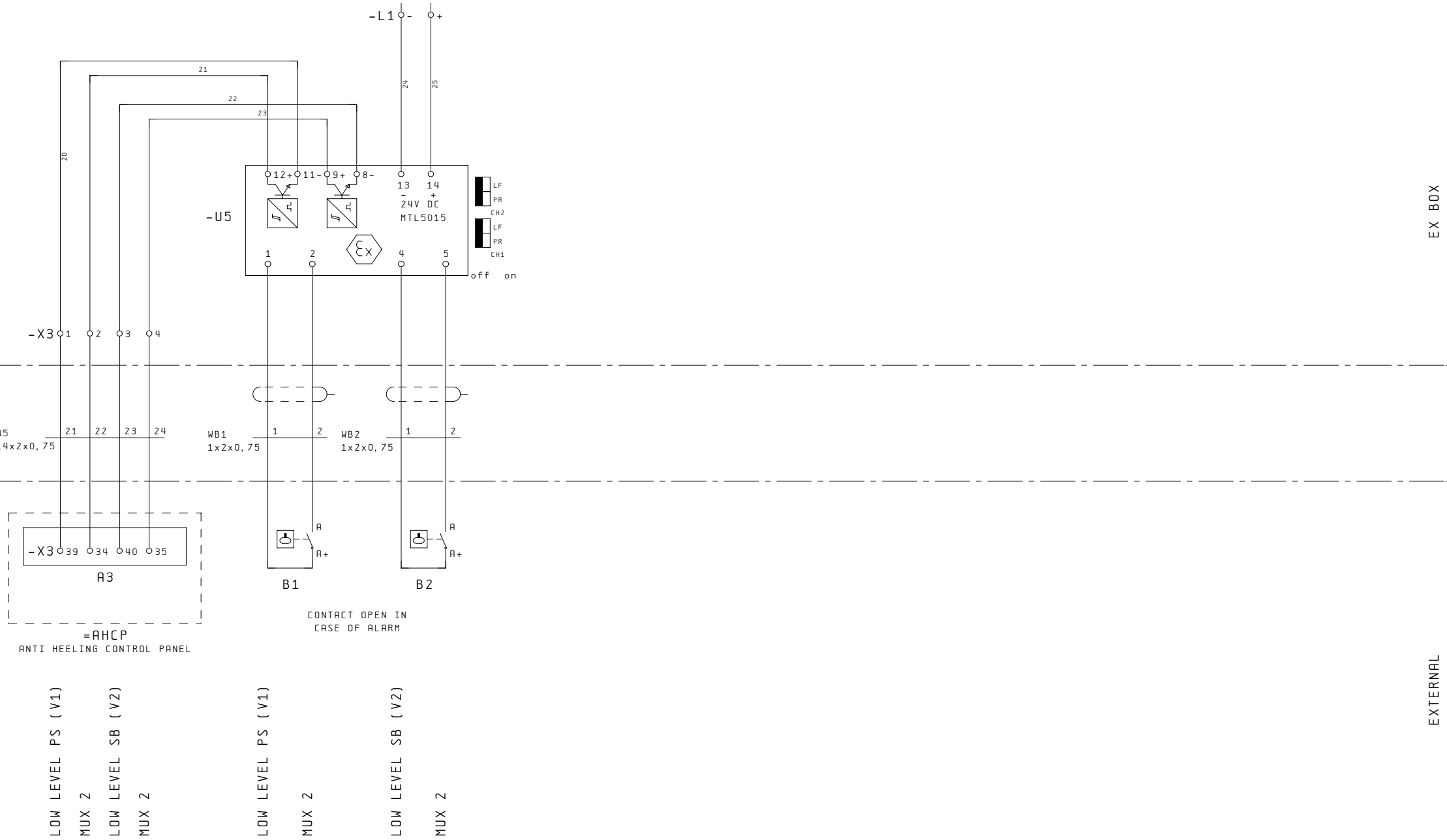
Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS LAYOUT	PANEL	scale: 1:5
Draw.	BER				= 21000
Engin.				F-02470-21000 - MP	+ MP
Rev. No. 1.3	Rev. Date 25.10.06				Sheet 1 / 1



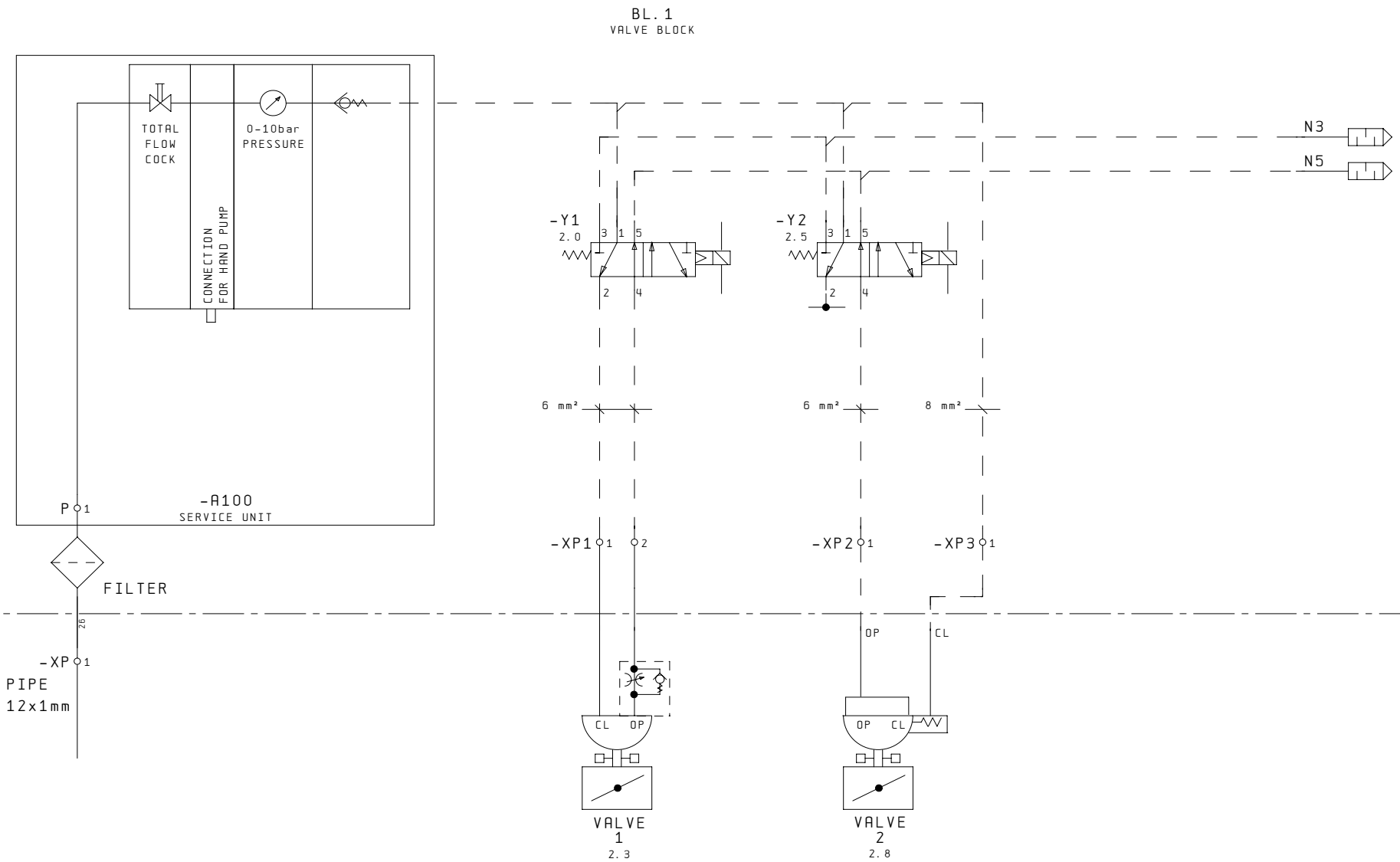
Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS WIRING DIAGRAMS	EX-BOX	scale: = 21000 + SP
Draw.	BER				
Engin.				F-02470- 21000 - SP	Sheet 1 / 4
Rev. No. 1.7	Rev. Date 02.08.07				



Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS WIRING DIAGRAMS	EX-BOX	scale: = 21000 + SP
Draw.	BER				
Engin.				F-02470- 21000 - SP	
Rev. No. 1.7	Rev. Date 02.08.07				Sheet 2 / 4



Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS WIRING DIAGRAMS	EX-BOX	scale: = 21000 + SP
Draw.	BER				
Engin.				F-02470- 21000 - SP	Sheet 3 / 4
Rev. No. 1.7	Rev. Date 02.08.07				



Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS WIRING DIAGRAMS	PNEUMATIC	scale: = 21000 + SP
Draw.	BER				
Engin.				F-02470- 21000 - SP	
Rev. No. 1.7	Rev. Date 02.08.07				Sheet 4 / 4

PART LIST

DESIGNATION (BMK)	QUANT	DESIGNATION		ARTICEL Nr.	WIRING DIAGR. POSITION
=21000-A100	1	SERVICE UNIT	WA-UNI	F-02498-02000	=21000+SP/4.0
=21000-A100-P	1	DOUBLE NIPPLE	G 1/4"	K-00249-00000	=21000+SP/4.0
=21000-BL.1	1	VALVE BLOCK	VB-P-M-2-2-24VDC	K-02924-00000	=21000+SP/4.3
=21000-L1	7	TERMINAL	QTC 1,5-TG	K-02563-00000	=21000+SP/1.0
=21000-N3	1	SOUND ABSORBER	3/8"	K-02203-00000	=21000+SP/4.7
=21000-N3	1	SCREW-ON-CONNECTION	8-G3/8,AIR TUBE	K-01139-00000	=21000+SP/4.7
=21000-N5	1	SOUND ABSORBER	3/8"	K-02203-00000	=21000+SP/4.7
=21000-N5	1	SCREW-ON-CONNECTION	8-G3/8,AIR TUBE	K-01139-00000	=21000+SP/4.7
=21000-U1	1	EX-ISOLATING-AMPLIFIER	MTL5015, SWITCH AMPLIFIER	K-01656-00000	=21000+SP/2.3
=21000-U2	1	EX-ISOLATING-AMPLIFIER	MTL5015, SWITCH AMPLIFIER	K-01656-00000	=21000+SP/2.8
=21000-U5	1	EX-ISOLATING-AMPLIFIER	MTL5015, SWITCH AMPLIFIER	K-01656-00000	=21000+SP/3.1
=21000-U8	1	EX-ISOLATING-AMPLIFIER	MTL5015, SWITCH AMPLIFIER	K-01656-00000	=21000+SP/1.4
=21000-X2	14	TENSION SPRING TERMINAL	ST 2,5	K-00663-00000	=21000+SP/1.0
=21000-X3	4	TENSION SPRING TERMINAL	ST 2,5	K-00663-00000	=21000+SP/3.0
=21000-X4	4	TENSION SPRING TERMINAL	ST 2,5	K-00663-00000	=21000+SP/1.2
=21000-XF	1	FUSE TERMINAL	ST 4-HESILED 24 (5X20)	K-01348-00000	=21000+SP/1.0
=21000-XF	1	FUSE	5x20-3,15A-T	K-02494-00000	=21000+SP/1.0
=21000-XP	1	SCREW-ON UNION PIECE	12 G1/4	K-00120-00000	=21000+SP/4.0
=21000-XP1	2	BULKHEAD UNION PIECE	SO 41521 RED.	K-01534-00000	=21000+SP/4.3
=21000-XP2	1	BULKHEAD UNION PIECE	SO 41521 RED.	K-01534-00000	=21000+SP/4.5
=21000-XP3	1	BULKHEAD UNION PIECE	SO 41521	K-02286-00000	=21000+SP/4.6
=21000-Y1	1	SCREW PLUG	Zyl.; G1/8; HEXAGON SOCKET	K-01530-00000	=21000+SP/4.3

0	1	2	3	4	5	6	7	8	9

PART LIST

DESIGNATION (BMK)	QUANT	DESIGNATION		ARTICEL Nr.	WIRING DIAGR. POSITION
=21000-Y1	1	CONNECTION INSERT, ANGLE	6-G1/8, SHORT, AIR TUBE	K-01171-00000	=21000+SP/4.3
=21000-Y1	2	CONNECTION INSERT, ANGLE	8-G1/4, SHORT, AIR TUBE	K-01173-00000	=21000+SP/4.3
=21000-Y2	1	SCREW PLUG	Zyl.; G1/8; HEXAGON SOCKET	K-01530-00000	=21000+SP/4.5
=21000-Y2	1	CONNECTION INSERT, ANGLE	6-G1/8, SHORT, AIR TUBE	K-01171-00000	=21000+SP/4.5
=21000-Y2	1	MALE HEXAGON PLUG	SO 20371	K-01527-00000	=21000+SP/4.5

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS	PART LIST	scale:
Draw.	ROH				= 21000
Engin.				F-02470- 21000 - ST	+ ST
Rev. No. 1.5	Rev. Date 28.02.07		PART LIST		Sheet 2 / 2

Terminal diagram

Function	Cable designation Cable type							0.75mm² bk	Terminal strip designation: Destination	Connection	Jumper	Terminal no. =21000-L1	Terminal name	Destination	Connection	Cable designation Cable type						Page / path
24 DC								X	-XF	1		+										+SP/1.0
MUX 1								X	-U8	14+		+										+SP/1.5
VALVE 1												+										+SP/2.0
VALVE 1 CLOSE								X	-U1	14+		+										+SP/2.4
VALVE 2												+										+SP/2.5
VALVE 2 CLOSE								X	-U2	14+		+										+SP/2.9
LOW LEVEL SB (V2)								X	-U5	14+		+										+SP/3.3
0V								X	-X2	3		-										+SP/1.1
MUX 1								X	-U8	13-		-										+SP/1.5
VALVE 1												-		-Y1	-							+SP/2.0
VALVE 1 CLOSE								X	-U1	13-		-										+SP/2.4
VALVE 2												-		-Y2	-							+SP/2.5
VALVE 2 CLOSE								X	-U2	13-		-										+SP/2.9
LOW LEVEL SB (V2)								X	-U5	13-		-										+SP/3.2

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS TERMINAL LIST	=21000-L1	scale: = 21000 + KL
Draw.	BER				
Engin.				F-02470- 21000 - KL	
Rev. No. 1.2	Rev. Date 25.10.06				Sheet 1 / 5

Terminal diagram

Function	Cable designation Cable type =21000-W5 14x2x0.75 14x2x	Terminal strip designation: Destination	Connection	Jumper	Terminal no. =21000-X2	Terminal name	Destination	Connection	Cable designation Cable type	Page / path
24 DC	1	=AHCP-X2	3		1		-XF	1		+SP/1.0
=	2	=AHCP-X2	4		2					+SP/1.0
0V	3	=AHCP-X2	7		3		-L1	-		+SP/1.1
=	4	=AHCP-X2	8		4					+SP/1.1
VALVE 1	5	-A4-X4	13		5		-Y1	+		+SP/2.1
VALVE 1 OPEN	6	-A3-X3	20		6		-U1	12+		+SP/2.1
MUX 1	7	-A3-X3	17		7		-U1	11-		+SP/2.2
=					8		-U1	8-		+SP/2.2
VALVE 1 CLOSE	8	-A3-X3	21		9		-U1	9+		+SP/2.2
VALVE 2	9	-A4-X4	14		10		-Y2	+		+SP/2.6
VALVE 2 OPEN	10	-A3-X3	22		11		-U2	12+		+SP/2.6
MUX 1	11	-A3-X3	18		12		-U2	11-		+SP/2.6
=					13		-U2	8-		+SP/2.7
VALVE 2 CLOSE	12	-A3-X3	23		14		-U2	9+		+SP/2.7

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS	=21000-X2	scale: = 21000
Draw.	BER				+ KL
Engin.			TERMINAL LIST	F-02470- 21000 - KL	Sheet 2 / 5
Rev. No. 1.2	Rev. Date 25.10.06				

Terminal diagram

Function	Cable designation Cable type =21000-W5 14x2x0,75 28x	Terminal strip designation: Destination	Connection	Jumper	Terminal no. =21000-X3	Terminal name	Destination	Connection	Cable designation Cable type	Page / path
LOW LEVEL PS (V1)	21	-A3-X3	39		1		-U5	12+		+SP/3.0
MUX 2	22	-A3-X3	34		2		-U5	11-		+SP/3.0
LOW LEVEL SB (V2)	23	-A3-X3	40		3		-U5	9+		+SP/3.0
MUX 2	24	-A3-X3	35		4		-U5	8-		+SP/3.1

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS	=21000-X3	scale: = 21000
Draw.	BER				+ KL
Engin.			TERMINAL LIST	F-02470- 21000 - KL	Sheet 3 / 5
Rev. No. 1.2	Rev. Date 25.10.06				

Terminal diagram

Function	Cable designation Cable type =21000-W5 14x2x0,75 28x	Terminal strip designation: Destination	Connection	Jumper	Terminal no. =21000-X4	Terminal name	Destination	Connection	Cable designation Cable type	Page / path
LOCAL SWITCH PS	25	-A3-X3	31		1		-U8	11-		+SP/1.2
MUX 1	26	-A3-X3	26		2		-U8	9+		+SP/1.2
=					3		-U8	12+		+SP/1.3
LOCAL SWITCH SB	27	-A3-X3	32		4		-U8	8-		+SP/1.3

Est. Date	13.12.05	HOPPE Bordmesstechnik GmbH	ANTI HEELING DISTRIBUTION AH-EX-V2-LS	=21000-X4	scale: = 21000
Draw.	BER				+ KL
Engin.			TERMINAL LIST	F-02470- 21000 - KL	Sheet 4 / 5
Rev. No. 1.2	Rev. Date 25.10.06				

Terminal diagram

Function	Cable designation Cable type 0.75mm² bk	Terminal strip designation: Destination	Connection	Jumper	Terminal no. =21000-XF	Terminal name	Destination	Connection	Cable designation Cable type	Page / path
24 DC	X	-X2	1		1		-L1	+		+SP/1.0

Est. Date	13.12.05	ANTI HEELING DISTRIBUTION	scale:
Draw.	BER	AH-EX-V2-LS	= 21000
Engin.		TERMINAL LIST	+ KL
Rev. No. 1.2	Rev. Date 25.10.06	=21000-XF	Sheet 5 / 5
HOPPE Bordmesstechnik GmbH		F-02470- 21000 - KL	

HOPPE Bordmesstechnik GmbH

Kieler Str. 318 • 22525 Hamburg • Tel: 040/ 56 19 49 -0 • Fax: 040/ 56 19 49-99
EMail: info @hoppe-bmt.de • Web: www.hoppe-bmt.de

Drawing No. : F-02476-00000

DESIGNATION : LSB-AH

TYP : LOCAL STARTER

Revision date : 15.12.05

Revision Index : 1.0

Est. Date	02.12.05	HOPPE Bordmesstechnik GmbH	LOCAL STARTER LSB-AH OVERVIEW	COVER SHEET	scale: 1:10
Draw.	ROH				= 00000
Engin.	G.Berkes				+ SL
Rev. No. 1.0	Rev.Date 15.12.05			F-02476-00000 - SL	Sheet 1 / 2

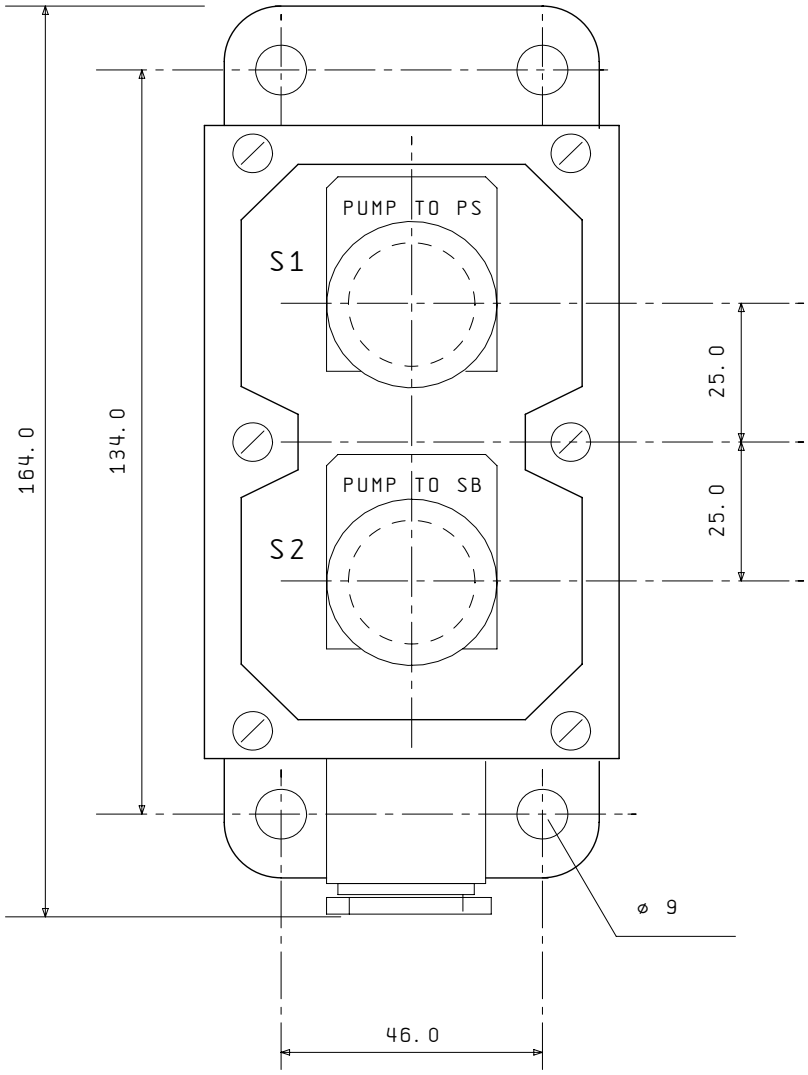
F-02476- LIST OF CONTENTS

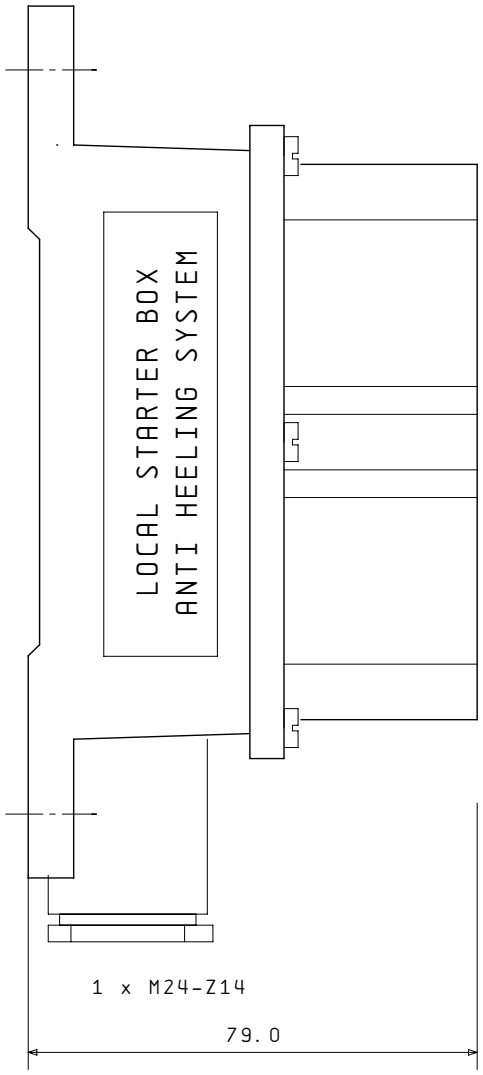
LOCAL STARTER
LSB-AH

sheet	designation	date	Rev.
=00000+SL/1	COVER SHEET	15.12.05	1.0
=00000+SL/2	LIST OF CONTENTS	15.12.05	1.0
=00000+MP/1	BOX	15.12.05	1.0
=00000+SP/1	PUMP TO PS/SB	15.12.05	1.0
=00000+ST/1	PART LIST	15.12.05	1.0
=00000+IS/1	STÜCKLISTE	15.12.05	1.0

Engineer : G.Berkes

Est. Date	02.12.05	HOPPE Bordmesstechnik GmbH	LOCAL STARTER LSB-AH OVERVIEW	LIST OF CONTENTS	scale: = 00000
Draw.	ROH				+ SL
Engin.	G.Berkes			F-02476- 00000 - SL	Sheet 2 / 2
Rev. No. 1.0	Rev.Date 15.12.05				



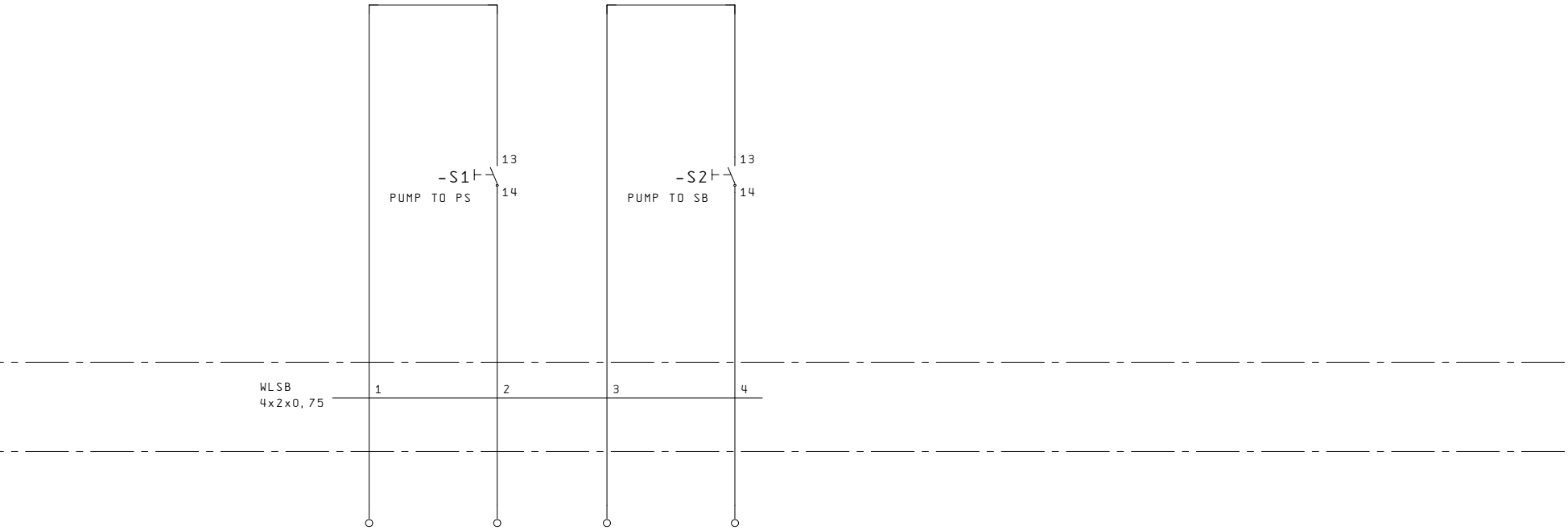


Casing : DOSE 1732

Protection : IP 56

Weight : 1,7 Kg

Est. Date	02.12.05	HOPPE Bordmesstechnik GmbH	LOCAL STARTER LSB-AH LAYOUT	BOX	scale: 1:1
Draw.	ROH				= 00000
Engin.	G.Berkes			F-02476-00000 - MP	+ MP
Rev. No. 1.0	Rev. Date 15.12.05				Sheet 1 / 1



Est. Date	02.12.05	HOPPE Bordmesstechnik GmbH	LOCAL STARTER LSB-AH WIRING DIAGRAMS	PUMP TO PS/SB	scale:
Draw.	ROH				= 00000
Engin.	G.Berkes				+ SP
Rev. No. 1.0	Rev.Date 15.12.05			F-02476-00000 - SP	Sheet 1 / 1

PART LIST

DESIGNATION (BMK)	QUANT	DESIGNATION		ARTICEL Nr.	WIRING DIAGR. POSITION
=00000-BOX	1	HOUSING	2 fach Taster; leer	K-00392-00000	=00000+MP/1.311
=00000-BOX	1	CABLE GLAND	M24x1,5; 12-14,5mm; geschirmtes Kabel	K-00624-00000	=00000+MP/1.311
=00000-BOX	1	LABEL	80-20-AHLSB-KS	F-02155-01013	=00000+MP/1.311
=00000-BOX	1			F-02503-01001	=00000+MP/1.311
=00000-BOX	1			F-02503-02001	=00000+MP/1.311
=00000-S1	1	PRESS BUTTON	M22-D-S	K-01445-00000	=00000+SP/1.4
=00000-S1	1	SELECTIVE BUTTON	M22S-ST-X	K-01124-00000	=00000+SP/1.4
=00000-S1	1	LED-ELEMENT	M22-K10	K-00720-00000	=00000+SP/1.4
=00000-S1	1	FIXING BRACKET	M22-A	K-00045-00000	=00000+SP/1.4
=00000-S1	1	LED-ELEMENT	M22-K10	K-00720-00000	=00000+SP/1.4
=00000-S2	1	PRESS BUTTON	M22-D-S	K-01445-00000	=00000+SP/1.5
=00000-S2	1	SELECTIVE BUTTON	M22S-ST-X	K-01124-00000	=00000+SP/1.5
=00000-S2	1	LED-ELEMENT	M22-K10	K-00720-00000	=00000+SP/1.5
=00000-S2	1	FIXING BRACKET	M22-A	K-00045-00000	=00000+SP/1.5
=00000-S2	1	LED-ELEMENT	M22-K10	K-00720-00000	=00000+SP/1.5

Est. Date	02.12.05	HOPPE Bordmesstechnik GmbH	LOCAL STARTER LSB-AH	PART LIST	scale: = 00000
Draw.	ROH				+ ST
Engin.	G.Berkes			F-02476-00000 - ST	
Rev. No. 1.0	Rev.Date 15.12.05		PART LIST		Sheet 1 / 1

Pump Specification

Type :	H 300 – 1,8 Reversible propeller pump
Pipe connection :	suction side JIS 5K 300A discharge side JIS 5K 300A
Working range :	1000 m³/h / 15 mWC
RpM :	1970/min
Main Parts:	Bronze 10 GNiAl
Impeller :	NiAl-bronze (DIN 1714 CuAl 10NI)
Shaft :	Stainless Steel 1.4462
Paint:	RAL 5010
Weight :	358 Kg

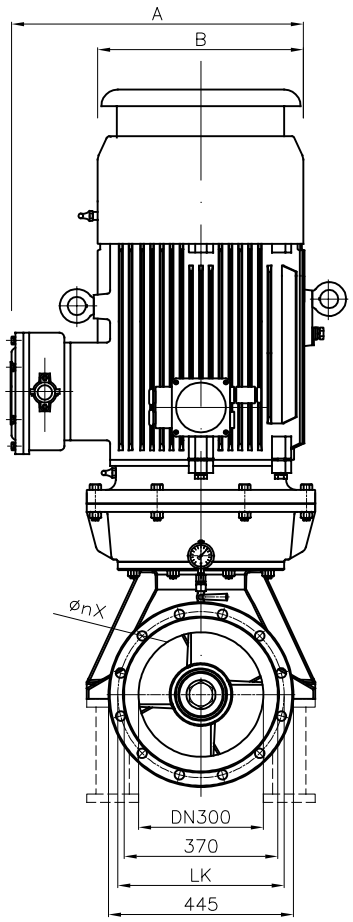
Motor Specification

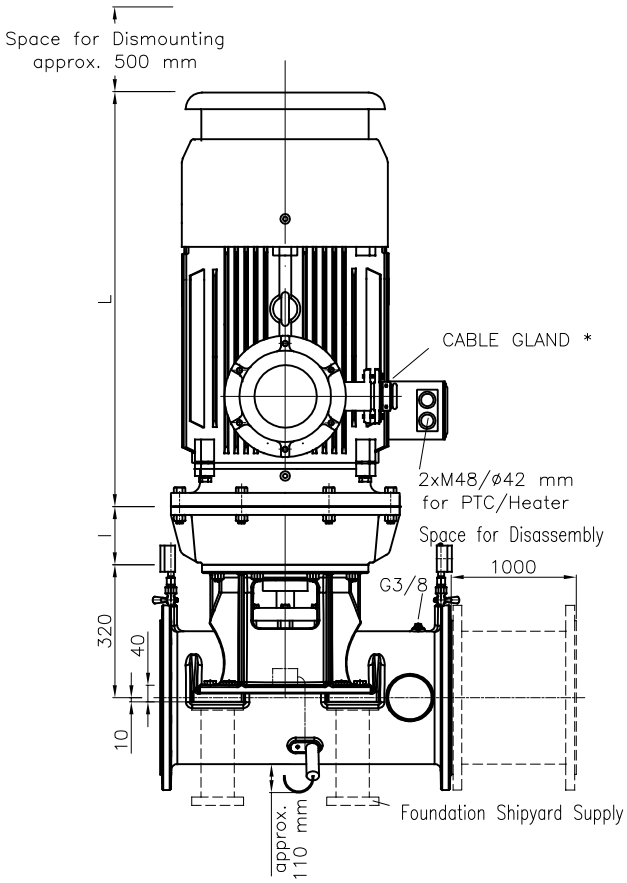
Typ :	YB2 280 S-2 EEx d II C T4
Power :	90 kW/S1 / 126 kW/S3-15%
RpM :	3550/min
Voltage :	3 x 440V, 60Hz I_N : 133,8A, I_A/I_N : 7,5
Capsuling :	IP 55
Insulation Class :	F

Thermistor (PTC) in windings (150°C)

Form :	V1
Space heating:	220V AC / 65 W
Paint:	RAL 5010
Weight :	625 kg

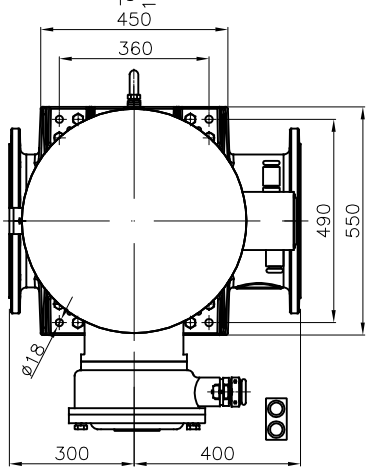
	Date	12.03.01	**HOPPE** BORDMESS-TECHNIK	**Pump Secification**		Plant:	
	Draw.	GB					**CO 34223-25**
	Rev.	03.05.05			Ship	Panel	Sh. 1
Revision Date	Ing.	tm			H2431-H2433		of 1

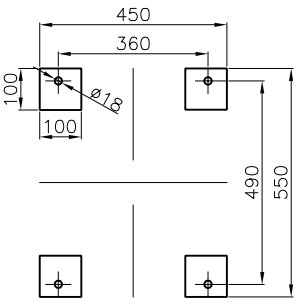




DIN Flange with slotted holes,
valid for:
DIN EN 1092-2, PN10
drilled to JIS 5K 300A

	LK	ØnX
DN300 PN10	400	23x12
JIS5K A300	390	23x12
JIS10K A300	400	25x16





Motor Typ	S1/kW	S3/kW	A/mm	B/mm	L/mm	l/mm	Cable Glands *	Weight/kG
YB2-280 S-2	90	126	660	560	960	140	M64/ø34-48 mm	983

	rev.No	date	name
draw.	est.	18.7.05	GB
eng.	est.	29.7.05	GB
rev.	1.3	06.07.07	GB

HOPPE Bordmesstechnik GmbH

F-02153-31812.GZ

Pump

AHP-300-BV-1,8-90-V-EX

Dimension Drawing

Scale: scaled

Manufacturer: BV

Order: Standard

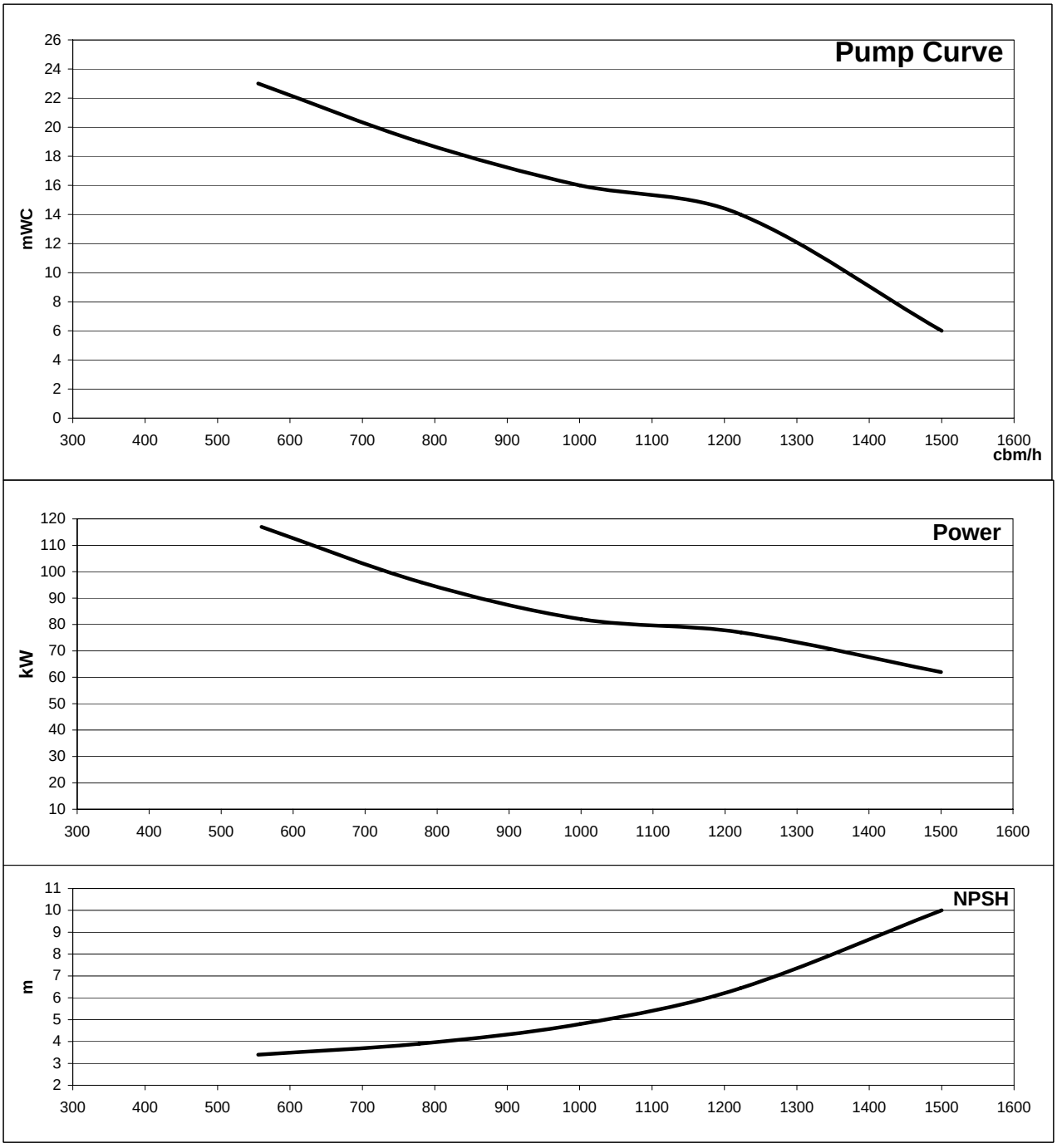
Source:

Page: 1/1

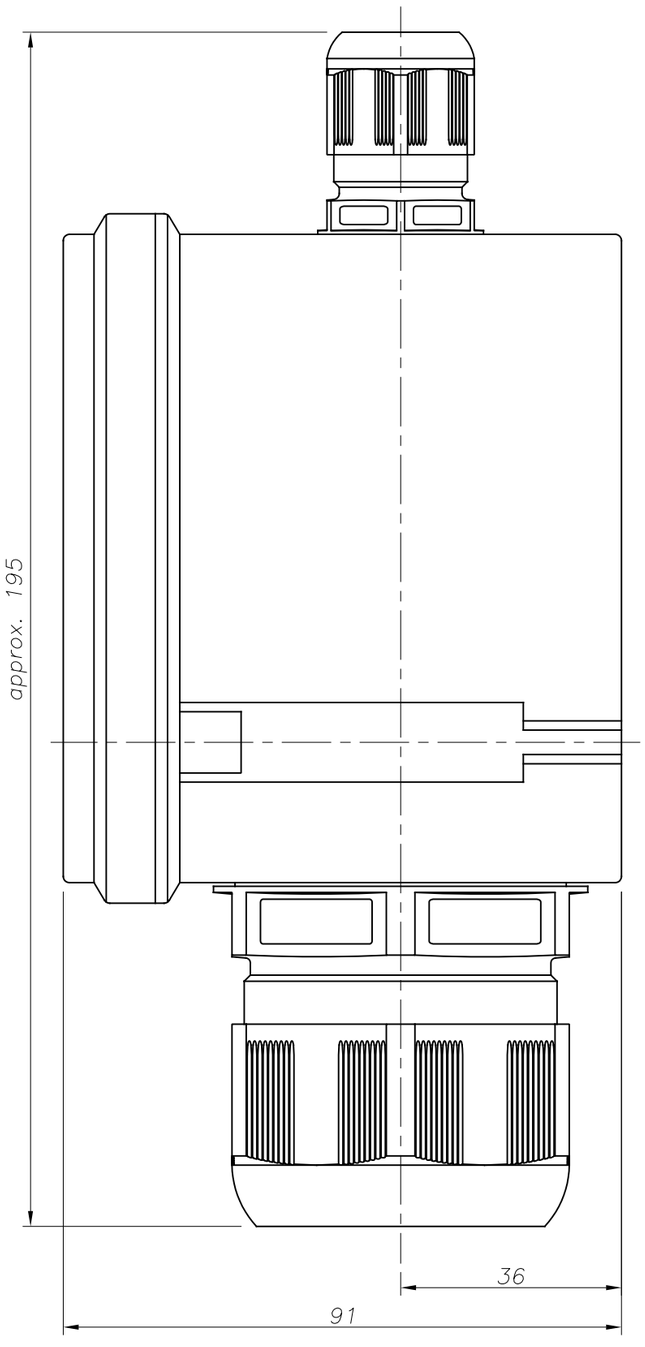
H O P P E Bordmesstechnik GmbH

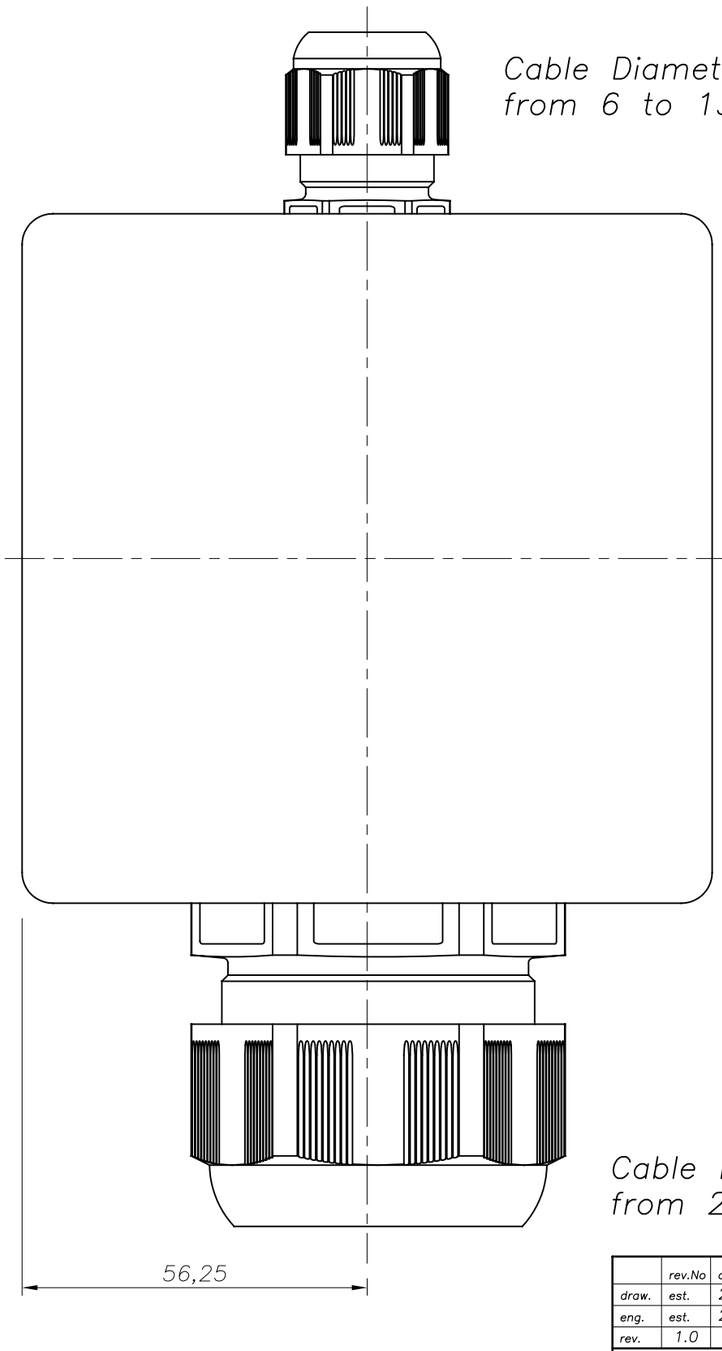
Kieler Strasse 318 • 22525 Hamburg • ☎ 040/561949-0 • Fax: 040/561949-99 • E-Mail: info@hoppe-bmt.de

Pump Type	H 300-1,8	**E-Motor**			
Casing	G-CuSn10	**Standard**	**kW-S1/S3**	80/110
Impeller	G-CuAl10Ni	**Ex**	**kW-S1/S3**	90/126
Shaft	St. St.	**rpm**		3600

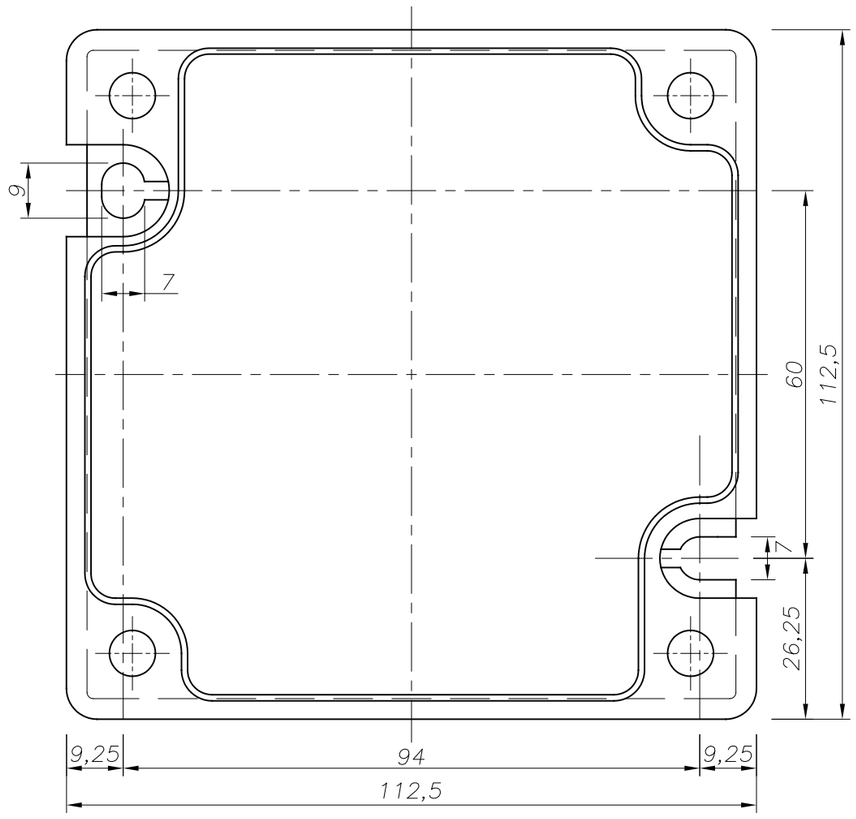


Pump curve H300-1,8 24.07.2006





Cable Diameter
from 6 to 13 mm



Front View without
Cap, Inlet and Cable Glands

Cable Diameter
from 23 to 35 mm

	rev.No	date	name
draw.	est.	22.8.06	JMe
eng.	est.	22.8.06	GB
rev.	1.0		

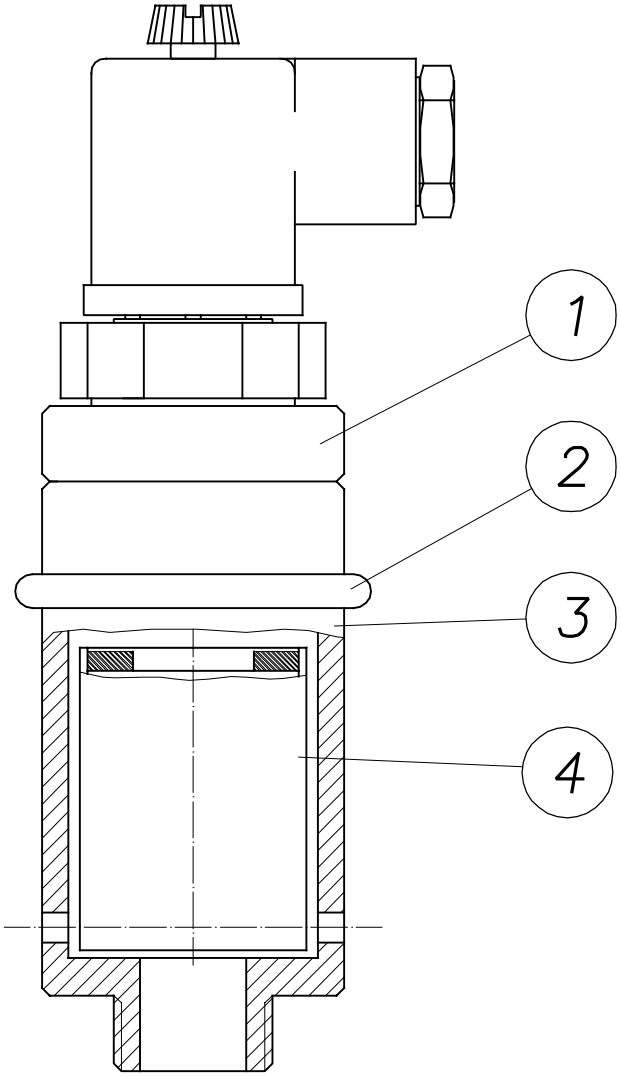
HOPPE Bordmesstechnik GmbH

K-02752-00000.KT

CONNECTION BOX
8146/1031-1xM50-1xM20
Dimension Drawing

Order	Source
Standard	

Scale	1:1 (A3)
Material	polyester
Tolerances(mm)	
Surface	
Page	1/1



	rev.No	date	name
draw.	est.	27.12.05	GB
eng.	est.	27.12.05	GB
rev.			

Standard

HOPPE Bordmesstechnik GmbH

F-02173-00000.GZ

Level Switch

HOLES2

General View

Order | Source

Scale 1:1

Material

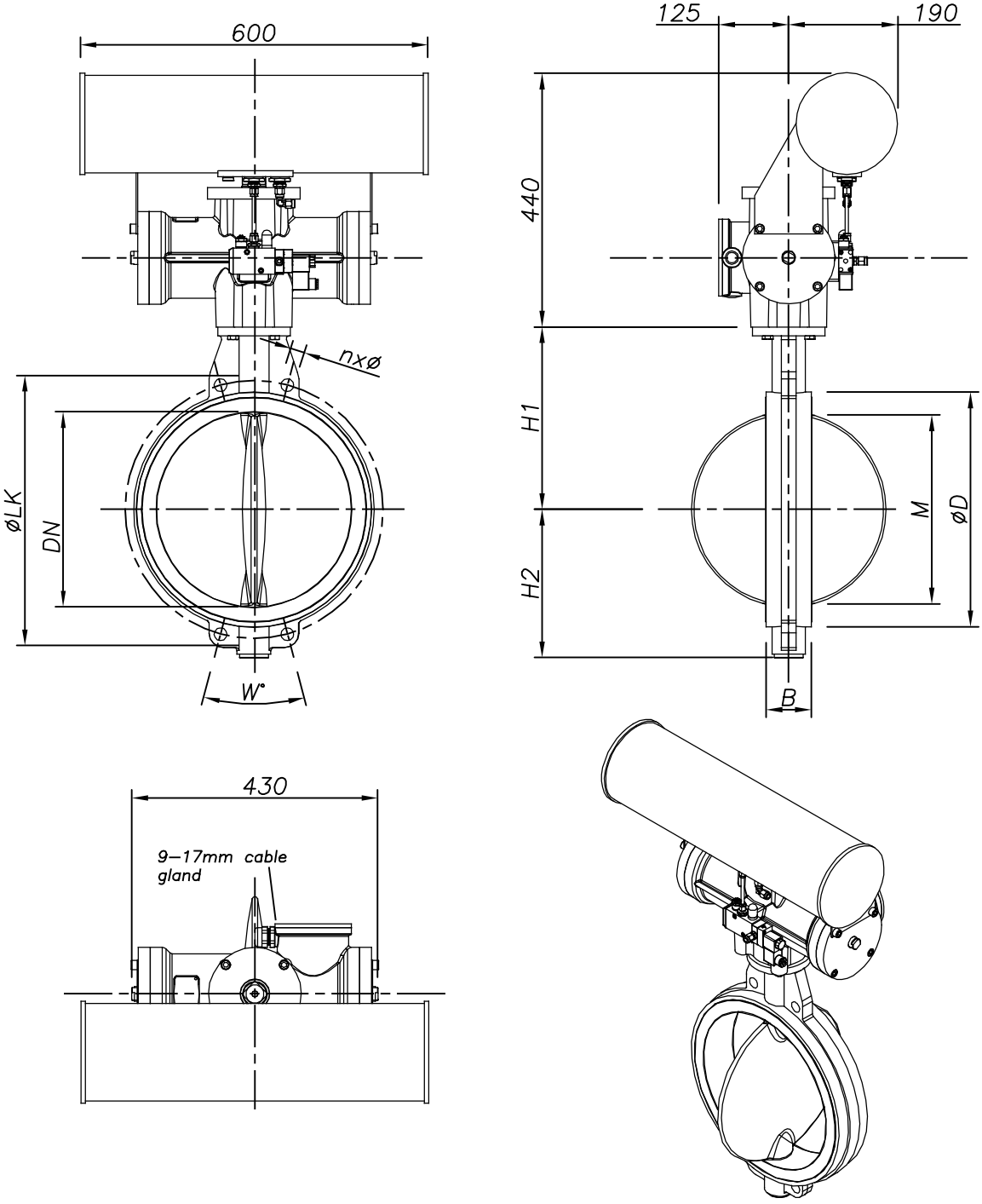
Tolerances(mm)

Surface

Page 1/1

Material Number	F-02173-00000.ST
Designation	LEVEL SWITCH
Typ	HOLES2
Revision	1.2

Item	Quantity	Designation	Typ	Material Number
1	1	SWITCH	HOLES2-KO	F-02173-02000
2	1	O-RING	35x5-NBR-70A	K-02528-00000
3	1	BODY	HOLES2	F-02173-01000
4	1	FLOATER	HOLES2-SW	F-02173-03000



Min Working Air Pressure	7.0 bar
Max Medium Pressure	4.0 bar

Actuator cross: Ac

Actuator parallel: Ap

Pipe connection type
A HOCAB
B Copper pipe
C Stainless steel pipe

DN	øD	øLK	B	H1	H2	M	nxø	W°	Kg ca.
350	405	435	78	315	256	327	12x25	30	67
400	470	495	102	363	308	373	16x25	22.5	102
450	522	555	114	388	334	421	16x25	22.5	117
500	576	605	127	413	360	470	20x25	18	147
600	672	715	154	510	426	566	20x27	18	207

	rev.No	date	name
draw.	est.	7.10.05	JMe
eng.	est.	11.10.05	GB
rev.			

HOPPE Bordmesstechnik GmbH

F-02277-00000.SZ

Valve with Actuator
Wafer Type 350A–600A
HOPAC3–700–pneumatic
Dimension Drawing

Order: Standard

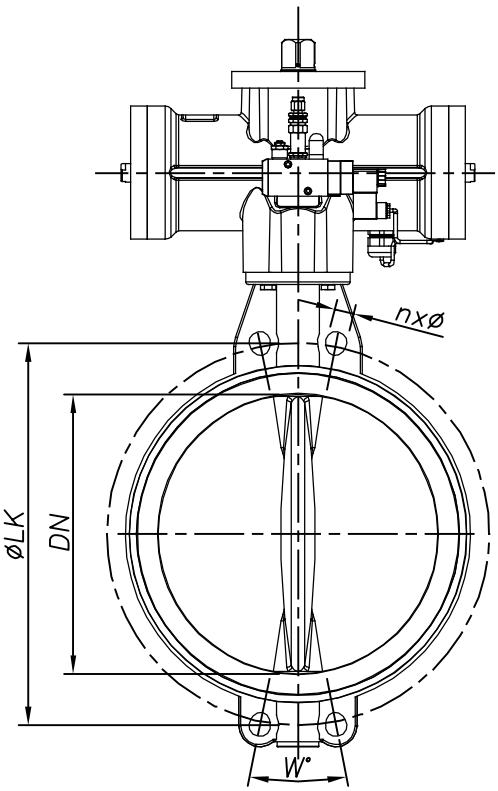
Source:

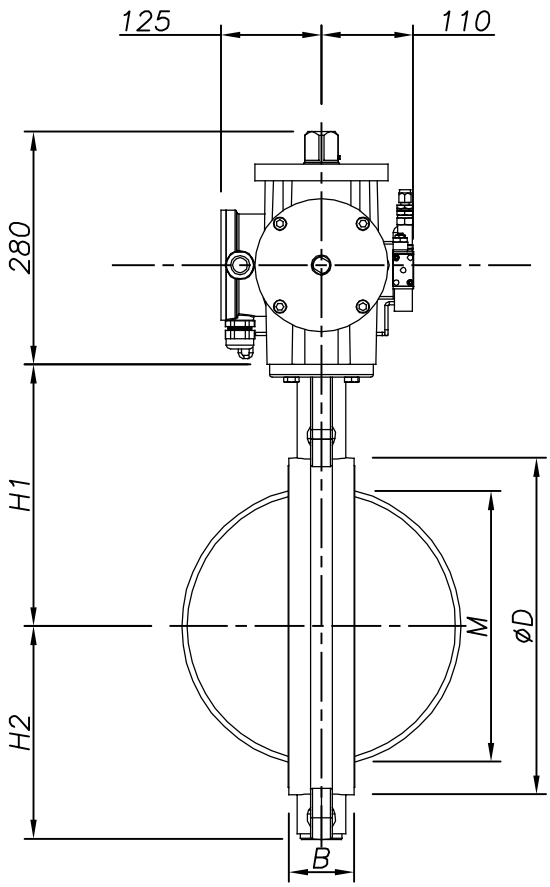
Flange connection: JIS5K

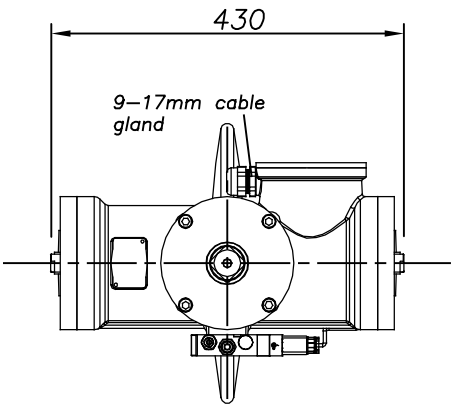
Manufacturer: EU

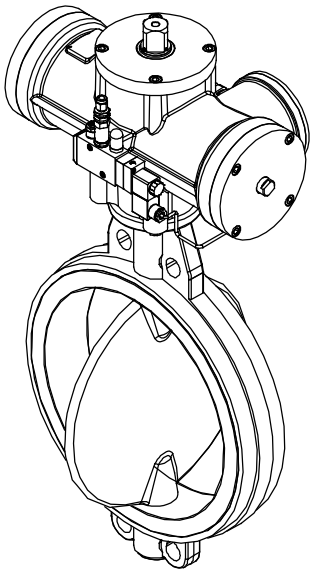
Mounting Code: KP

Page: 1/1









Min Working Air Pressure	7.0 bar
Max Medium Pressure	4.0 bar

Actuator cross: Ac

Actuator parallel: Ap

Pipe connection type
A HOCAB
B Copper pipe
C Stainless steel pipe

DN	øD	øLK	B	H1	H2	M	nxø	W°	Kg ca.
350	405	435	78	315	256	327	12x25	30	67
400	470	495	102	363	308	373	16x25	22.5	102
450	522	555	114	388	334	421	16x25	22.5	117
500	576	605	127	413	360	470	20x25	18	147
600	672	715	154	510	426	566	20x27	18	207

	rev.No	date	name
draw.	est.	16.10.05	GB
eng.	est.	16.10.05	GB
rev.			

HOPPE Bordmesstechnik GmbH

F-02284-00000.SZ

Valve with Actuator
Wafer Type 350A–600A
HOPAC3–700–pneumatic
Dimension Drawing

Order: Standard

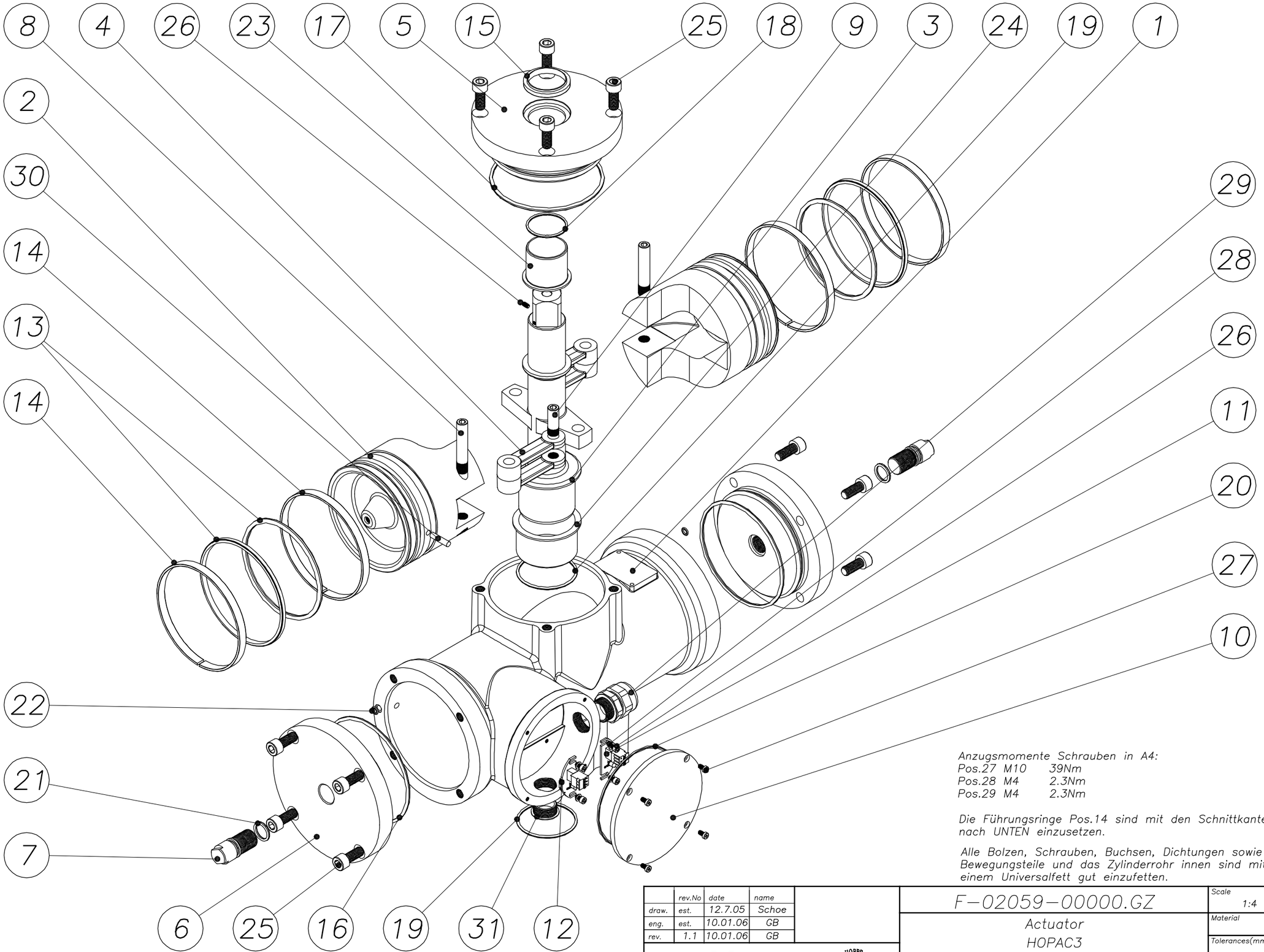
Source:

Flange connection: JIS5K

Manufacturer: EU

Mounting Code: KM

Page: 1/1



Anzugsmomente Schrauben in A4:
Pos.27 M10 39Nm
Pos.28 M4 2.3Nm
Pos.29 M4 2.3Nm

Die Führungsringe Pos.14 sind mit den Schnittkanten nach UNTEN einzusetzen.

Alle Bolzen, Schrauben, Buchsen, Dichtungen sowie Bewegungsteile und das Zylinderrohr innen sind mit einem Universalfett gut einzufetten.

	rev.No	date	name
draw.	est.	12.7.05	Schoe
eng.	est.	10.01.06	GB
rev.	1.1	10.01.06	GB

HOPPE Bordmesstechnik GmbH

F-02059-00000.GZ

Actuator
HOPAC3
Explosionszeichnung

Order | Source

Scale 1:4
Material
Tolerances(mm)
Surface
Page 1/1

Material Number	F-02059-00001.ST
Designation	ACTUATOR
Typ	HOPAC3-24
Revision	1.2

Item	Quantity	Designation	Typ	Material Number
1	1 pcs	MONOBLOCK	HOPAC3	F-02059-01000
2	2 pcs	PISTON	HOPAC3	F-02059-02000
3	1 pcs	SWIVEL BOLT	HOPAC3-24	F-02059-03000
4	2 pcs	SWIVEL LEVER	HOPAC3	F-02059-05000
5	1 pcs	COVER	HOPAC3-upper	F-02059-06000
6	2 pcs	COVER	HOPAC3-side	F-02059-07000
7	2 pcs	STOPPER	HOPAC3	F-02059-09000
8	2 pcs	BOLT	HOPAC3-12x64,5	F-02059-10000
9	2 pcs	BOLT	HOPAC3-12x34	F-02059-11000
10	1 pcs	COVER	HOPAC3-box	F-02059-08000
11	1 pcs	POSITION INDICATOR	HOPAC1-OP	F-02057-12000
12	1 pcs	POSITION INDICATOR	HOPAC1-CL	F-02057-13000
13	2 pcs	PISTON LININIG	754-125x109,5x6,3	K-00706-00000
14	4 pcs	GUIDE TAPE	HOPAC3	F-02059-17000
15	1 pcs	WIPER RING	40x50x5/8	K-01972-00000
16	2 pcs	O-RING	120x3-NBR-70A	K-00919-00000
17	1 pcs	O-RING	115x4-NBR-70A	K-01976-00000
18	1 pcs	O-RING	40x2,5-NBR-70A	K-00934-00000
19	2 pcs	O-RING	60x3-NBR-70A	K-00940-00000

Material Number	F-02059-00001.ST
Designation	ACTUATOR
Typ	HOPAC3-24
Revision	1.2

Item	Quantity	Designation	Typ	Material Number
20	1 pcs	O-RING	112x2,5-NBR-70A	K-01979-00000
21	2 pcs	O-RING	17x3-NBR-70A	K-01977-00000
22	2 pcs	O-RING	6x1,8-NBR-70A	K-01978-00000
23	1 pcs	COLLAR BUSH	GFM-4044-30	K-01973-00000
24	1 pcs	COLLAR BUSH	GFM-6065-30	K-02099-00000
25	12 pcs	HEAD CAP SCREW, HEX.SOCKET	DIN 912-M10x25-A4	K-02100-00000
26	5 pcs	HEAD CAP SCREW, HEX.SOCKET	DIN 912-M4x8-A4	K-01986-00000
27	4 pcs	HEAD CAP SCREW, HEX.SOCKET	DIN 6912-M4x10-A4	K-01987-00000
28	4 pcs	WASHER	DIN 433-4,3-A4	K-01989-00000
29	1 pcs	CABLE GLAND	ESKV 25	K-00617-00000
30	1 pcs	MAGNET	D6x25	K-01906-00000
31	1 pcs	SCREW PLUG	EVSG-ORD 25	K-02053-00000

Material Number	F-02059-00002.ST
Designation	ACTUATOR
Typ	HOPAC3-30
Revision	1.2

Item	Quantity	Designation	Typ	Material Number
1	1 pcs	MONOBLOCK	HOPAC3	F-02059-01000
2	2 pcs	PISTON	HOPAC3	F-02059-02000
3	1 pcs	SWIVEL BOLT	HOPAC3-30	F-02059-04000
4	2 pcs	SWIVEL LEVER	HOPAC3	F-02059-05000
5	1 pcs	COVER	HOPAC3-upper	F-02059-06000
6	2 pcs	COVER	HOPAC3-side	F-02059-07000
7	2 pcs	STOPPER	HOPAC3	F-02059-09000
8	2 pcs	BOLT	HOPAC3-12x64,5	F-02059-10000
9	2 pcs	BOLT	HOPAC3-12x34	F-02059-11000
10	1 pcs	COVER	HOPAC3-box	F-02059-08000
11	1 pcs	POSITION INDICATOR	HOPAC1-OP	F-02057-12000
12	1 pcs	POSITION INDICATOR	HOPAC1-CL	F-02057-13000
13	2 pcs	PISTON LININIG	754-125x109,5x6,3	K-00706-00000
14	4 pcs	GUIDE TAPE	HOPAC3	F-02059-17000
15	1 pcs	WIPER RING	40x50x5/8	K-01972-00000
16	2 pcs	O-RING	120x3-NBR-70A	K-00919-00000
17	1 pcs	O-RING	115x4-NBR-70A	K-01976-00000
18	1 pcs	O-RING	40x2,5-NBR-70A	K-00934-00000
19	2 pcs	O-RING	60x3-NBR-70A	K-00940-00000

Material Number	F-02059-00002.ST
Designation	ACTUATOR
Typ	HOPAC3-30
Revision	1.2

Item	Quantity	Designation	Typ	Material Number
20	1 pcs	O-RING	112x2,5-NBR-70A	K-01979-00000
21	2 pcs	O-RING	17x3-NBR-70A	K-01977-00000
22	2 pcs	O-RING	6x1,8-NBR-70A	K-01978-00000
23	1 pcs	COLLAR BUSH	GFM-4044-30	K-01973-00000
24	1 pcs	COLLAR BUSH	GFM-6065-30	K-02099-00000
25	12 pcs	HEAD CAP SCREW, HEX.SOCKET	DIN 912-M10x25-A4	K-02100-00000
26	5 pcs	HEAD CAP SCREW, HEX.SOCKET	DIN 912-M4x8-A4	K-01986-00000
27	4 pcs	HEAD CAP SCREW, HEX.SOCKET	DIN 6912-M4x10-A4	K-01987-00000
28	4 pcs	WASHER	DIN 433-4,3-A4	K-01989-00000
29	1 pcs	CABLE GLAND	ESKV 25	K-00617-00000
30	1 pcs	MAGNET	D6x25	K-01906-00000
31	1 pcs	SCREW PLUG	EVSG-ORD 25	K-02053-00000

Installation

Hoppe Bordmesstechnik GmbH

Technical data sheet

Document No.	Designation	Revision	Issue
K-01312-00000.TD	**Float switch S179 DB/F84**	**1.2**	**18.10.07**

1 General

1.1 Features

- General purpose
- Flameproof
- Hoseproof and submersible
- Chemical duty
- Accessories
- External chambers
- Fisher range

1.2 Operation

One permanent magnet forms part of a float assembly which rises and falls with changing liquid level. A second permanent magnet is positioned within the switch or air pilot valve so that the adjacent poles of the two magnets repel each other through a non-magnetic diaphragm. A change of liquid level which moves the float through its permissible travel will cause the float magnet to move and repel the switch magnet to give the snap action operation

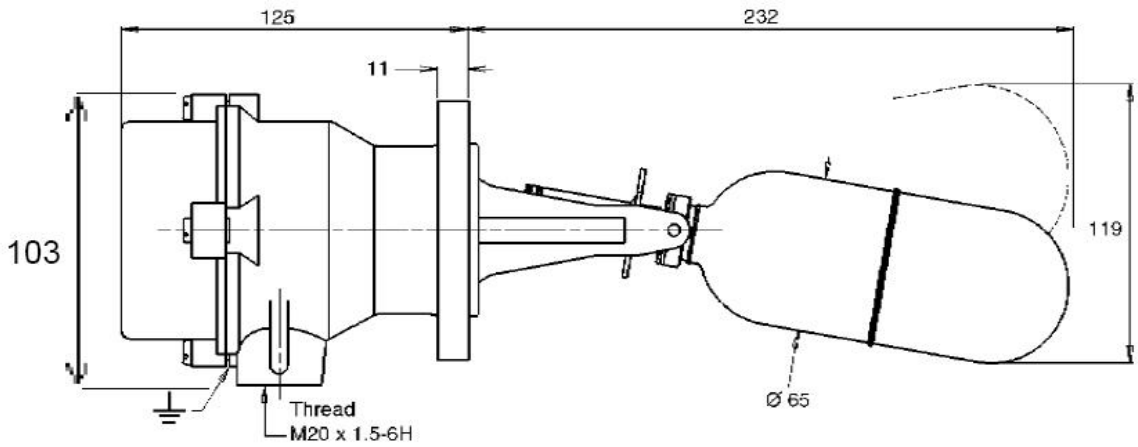
Switching is accomplished by the angular movement of the switch magnet being used to operate “push-rods”. These rods bear on contact blades and break one set of contacts whilst allowing the other set to make. The benefit of this arrangement is that contact force is independent of the magnet.

Hoppe Bordmesstechnik GmbH

Technical data sheet

Document No.	Designation	Revision	Issue
K-01312-00000.TD	**Float switch S179 DB/F84**	**1.2**	**18.10.07**

2 Technical data

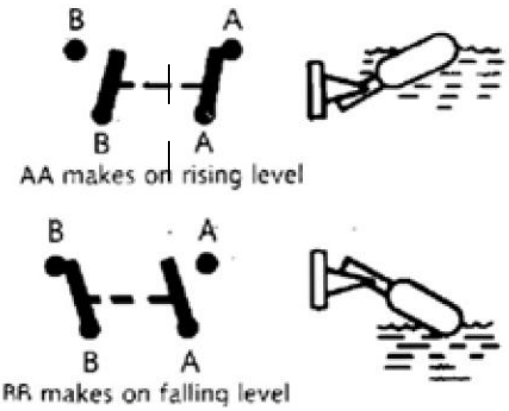


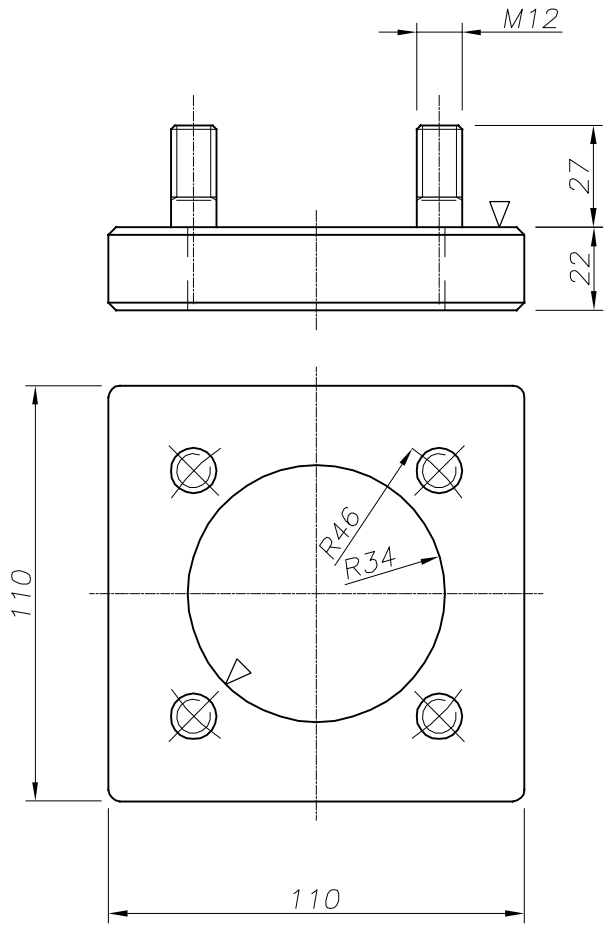
Weight:	3.5 Kg
Min S.G.:	0.65
Max. Pressure at 20°C:	34.5 bar
Max. Temperature:	400 °C

2.1 Materials

Enclosure & wetside:	Aluminium bronze to BS1400 - AB1 max. iron content 2.5%
End cap Brass	BS1400 - DCB3
Floater:	316 Stainless steel

2.2 Electrical connection





	rev.No	date	name
draw.	est.	30.12.06	GB
eng.	est.	30.12.06	GB
rev.	1.1	27.02.06	GB

HOPPE Bordmesstechnik GmbH

F-00363-00000.GZ

FLANGE

A00-S179 DB/F84

general drawing

Order | Source

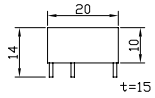
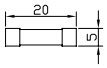
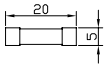
Scale 1:2

Material ST52

Tolerances(mm)

Surface

Page 1/1

No.	Quant.	Material No.	Designation/Type	Skatch	Material
1	1 pcs.	K–02961–00000	Relay DSP1		Plastic
2	2 pcs.	K–02962–00000	Fuse 5x20–315 mA–T		Glass
3	2 pcs.	K–02963–00000	Fuse 5x20–800 mA–T		Glass

	rev.No	date	name
draw.	est.	08.06.07	GB
eng.	est.	08.06.07	GB
rev.	1.0	08.06.07	GB

HOPPE Bordmesstechnik GmbH

K–00311–00000.ETZ

Spare part set

ETS–AH

Spare part drawing

Scale

Material

Tolerances(mm)

Surface

Order

Source

Page 1/1

Material Number	K-00311-00000.ST
Designation	SPARE PART SET
Typ	ETS-AH
Revision	1.0

Item	Quantity	Designation	Typ	Material Number
1	1 pcs	RELAY	DSP1	K-02961-00000
2	2 pcs	FUSE	5x20-315 mA-T	K-02962-00000
3	2 pcs	FUSE	5x20-800 mA-T	K-02963-00000

Hoppe Bordmesstechnik GmbH

Operation Manual

Document No.	Designation	Revision	Issue
F-03301-00105.HB	**Anti-Heeling-System V2P1T2**	**1.1**	**13.08.2007**

Operation Manual

Anti Heeling System

Example of a standard V2P1-T2 AH-System

Hoppe Bordmesstechnik GmbH, Kieler Str. 318, 22525 Hamburg, Germany
Tel.: + 49 40 56 19 49 0, Fax: +49 40 56 19 49 99
Email: info@hoppe-bmt.de,
website: www.hoppe-bmt.de

1 General

The anti heeling system is designed for the manual and automatic control of a ships list, mainly during loading and unloading conditions in a harbour.

The ships heeling angles are continuously measured by a special inclinometer. Heeling angles are balanced by control of water-levels in water side tanks. Water is being transferred and controlled through pumps and valves between the side tanks.

Main user interface is a micro computer based operation panel (PLC/) with push buttons for operation modes, and indicating lights for showing status of the system.

Safety warning

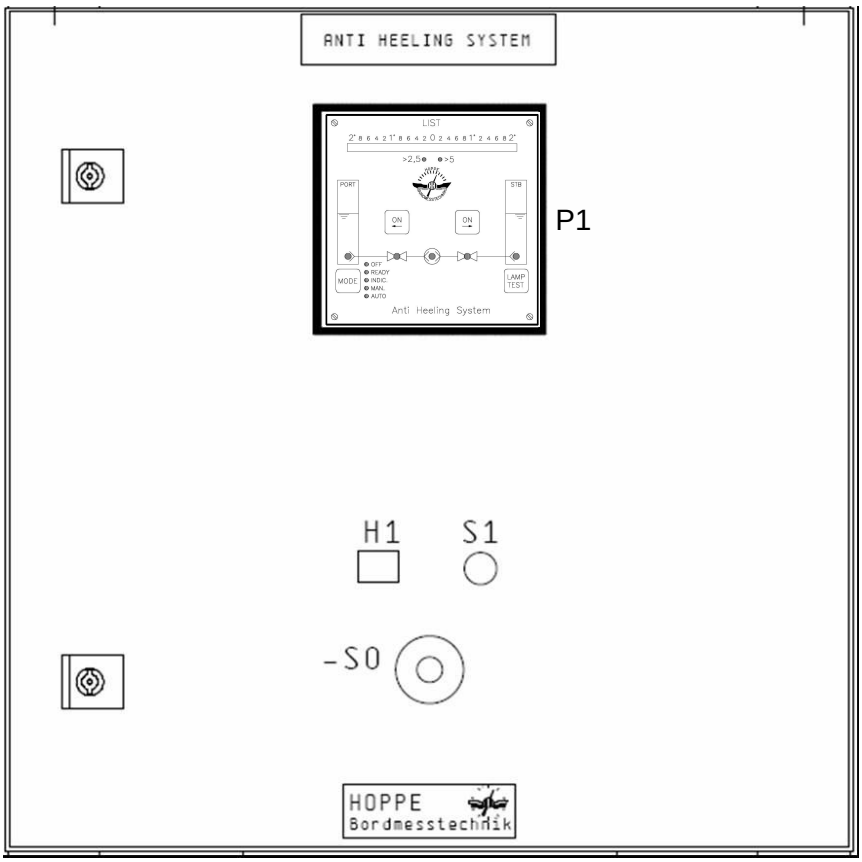
Never use automatic anti heeling system offshore. When leaving berth/harbour, the anti heeling system has to be turned off.

Offshore use of Anti Heeling System is only allowed in manual mode and needs very careful attention. Misuse may cause serious influence or damage on ships handling and performance.

2 Directory

3 Description of Instruments and Gauges

3.1 Anti-Heeling control panel

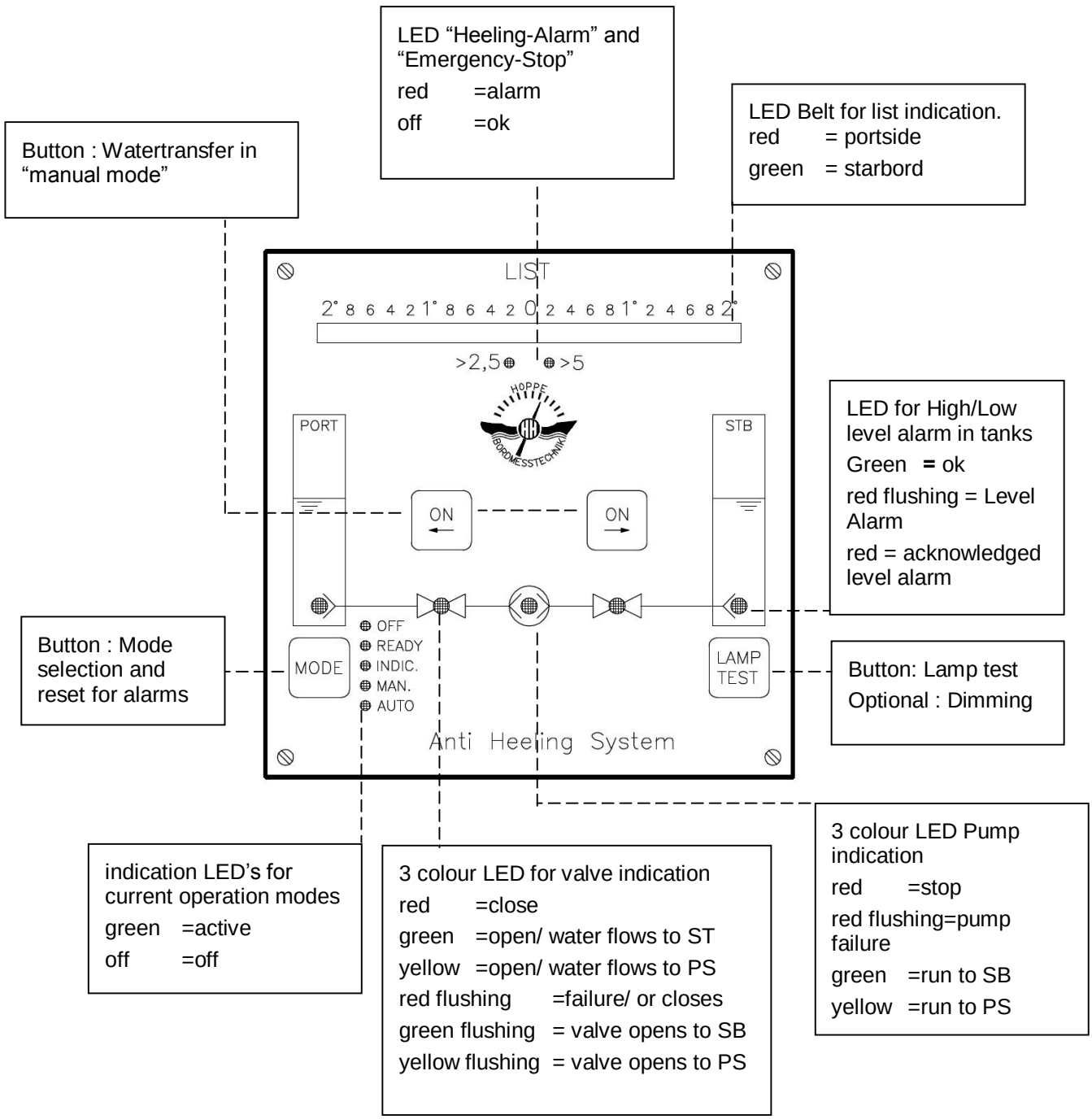


picture 1:Anti Heeling control panel

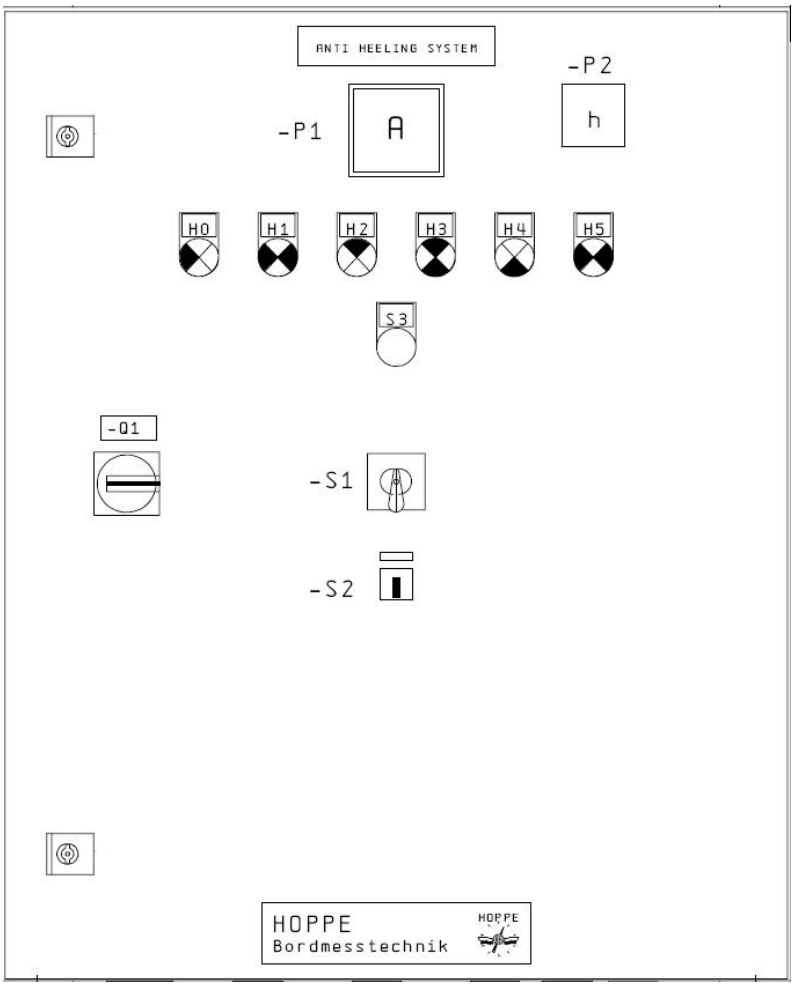
P1 = Programmable Logic Control (PLC)
H1 = Buzzer/ Horn
S1 = Reset Button
S0 = Emergency Stop

chart 1: legend switches and gauges

3.2 Programmable Logic Controller



3.3 Motor starter panel



picture 2: frontview motor starter unit

lamps
H0 = power source on
H1 = pump fault
H2 = pump to PS running
H3 = pump to ST running
H4 = space Heater running
H5 = pump leakage alarm

switches
S1 = auto/ off/ manual
S2 = service key switch
S3 = push button lamp test
Q1 = main power switch

gauges
P1 = ammeter
P2 = hour Meter

chart 2: legend switches/ gauges

4 Operation Modes

The Hoppe Anti-Heeling System can be controlled by the “PLC” (Hoppe name : “MIP”) that is mounted in the electronic panel, or it can be controlled directly from the motor starter panel.

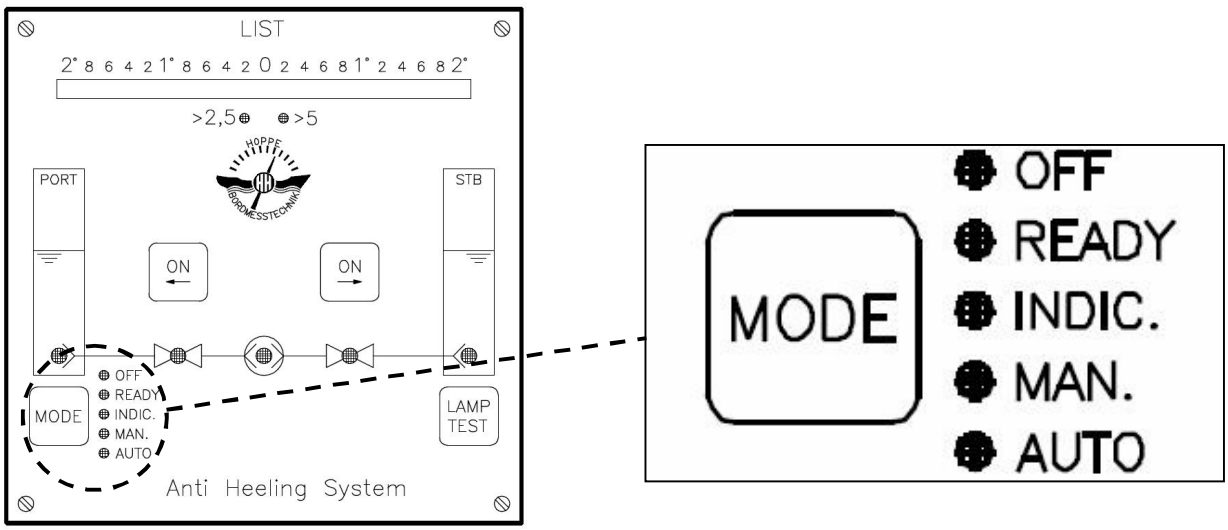
4.1 Operation from Programmable Logic Control (MIP)

The Hoppe Anti-Heeling System can be ordered and controlled from more than one PLC’s (MIP). One Master-MIP and several Slave-MIP’s for different mounting places on the vessel are possible. For control from the “PLC” following adjustments on motor starter panel have to be set.

- Main switch (Q1) has to be switched to ‘ON’- position.
- Selector switch (S1) --- ‘MANUAL / 0 / AUTOMATIC’--- has to be in position ‘AUTOMATIC’

LED “Ready” will light permanent, when selector switch S1 is in “AUTOMATIC” position.

After each push on “MODE” button, operating mode will switch one step down. After lowest mode, it will jump to top of the list. This Button is also used for reset of alarms.



4.1.1 OFF

- system indication is off , but system is under voltage/power

4.1.2 INDIC

- can be selected independent, whether LED “READY” is on or off (switch S1 can be in position automatic or manual)
- indicates list of ship, state of pump, valves and alarms
- indicates also system status and actions when system is in pure manual mode and is controlled from motor starter panel --- pls. see item “Motor Starter manual control”

4.1.3 MAN

- only possible when LED “READY” is on
- required pump direction from PS to SB or vice versa can be selected by pressing on push button

- press ON ← for pumping water to PS

  press ON → for pumping water to SB

- valve on suction side opens. After 5s pump starts and valve at pressure side opens and stay open as long the button is pressed --- loose of button lead to pump stop and closing of valves after a delay time of 10s

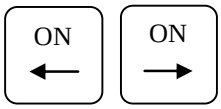
4.1.4 AUTO

- only possible when LED “READY” is on
- pump will start and valves open automatically if adjustable (pls. chapter 6.1) limit value from 0,4° - 1,9° list is exceeded
- system stops automatic when ship is in upright position

4.1.5 PRE-HEEL FUNCTION

Only possible in manual mode. Enables adjustment of ship list to PS/SB to max. of the ships list light belt on the “PLC”

- operation mode has to be switched to “manual”
- both buttons have to be pushed at the same time



- zero point (O°) starts flickering yellow at light diode belt
- requested pre-heel angle has to be selected by pressing push button for heel to PS or SB
- selected angle is indicated by light diodes
- system accepts adjusted pre-heel angle by pushing the “MODE” push button
- water transfer starts automatically
- indication on light diode belt changes alternately between actual heel angle and selected pre-heel angle
- pump stops and valves close automatically when the adjusted pre heeling angle is reached
- system remains in manual mode

4.2 Operation from Motor Starter Panel

Adjustments and indications for control by the motor starter panel

- Main switch (Q1) has to be switched to 'ON'- position
- Selector switch (S1) --- 'MANUAL / 0 / AUTOMATIC'--- has to be in position "MANUAL"
- Turn and hold "key switch" in position "PUMP TO PS" for water transfer to portside
- Turn and hold "key switch" in position "PUMP TO SB" for water transfer to starboard
- Pump status and direction of water transfer is indicated by lamps on motor starter panel
- System operation by the "PLC" is no more possible. LED "READY" on "PLC" is off.
- Only "INDIC" and "OFF" mode can be selected on "PLC"
- Automatic stop at "Over-Heeling-Angle" (angle depends on ordered version); water transfer is only possible to opposite direction

4.3 Operation in Service mode

The service mode is provided to balance the water levels in PS and SB tank after heeling. Service mode only controls the valves.

- Main switch (Q1) has to be switched on
- Selector switch (S1) has to be in position '0'
- Move key switch (S2) to position 'PUMP TO PS' or 'PUMP TO SB' and keep the switch in chosen position
- Valves in water pipe between side tanks will open and stay open as long the switch is hold in position
- Water can flow between side thanks. Pump is not running

5 Alarms and Failures

In case the Anti-Heeling-System is mounted with an acoustic alarm, all types of alarms turn on the acoustic alarm. The acoustic alarm can be acknowledged through the acoustic reset button S1 on Anti-Heeling control panel.

!** A potential free "System-Alarm" contact opens for types of listed alarms. (R13) **!

Type of Alarm	Signs of Alarm and actions	To do
Pump Failure *-Red flushing LED*	Pump stops and valves close "Automatic" mode switches over to 'MANUAL' mode. Water transfer is disabled	Alarm acknowledgement: Press "Mode-Button" => LED jumps to continious red (pump not running) and system jumps to next mode. Use Mode-Button to jump to indication mode. => Inspection of pump is requested
Valve Failure *-Red flushing LED*	Valve can not reach end positions. After 90s LED on PLC change and remains red flushing. System remains in current operation mode.	Alarm cannot be acknowledged from PLC. =>Inspection of valve and actuator for alarm reason (limit switch; cable damaged; …) Red flushing LED remains until indication for endposition and valve work correct.
Low Level Alarm *-Red flushing LED* *-Red LED (acknowledged alarm)*	LED change from green to red. After 5s red LED change to red flushing => Alarm Pump stops and valves close. System will jump to "Manual" mode. Water transfer is only possible to empty tank side.	Use manual 'Mode' and pump some water to empty tank side (min. 10-15 s) Press "Mode" button =>flushing LED will switch to constant red or LED will change to green when contact in Low Level switch closes.
High Level Alarm *-Red flushing LED* *-Red LED (acknowledged Alarm)*	System remains in operation Water transfer is possible in both directions In case of a full tank, water flows through tank ventilation pipe to open deck.	Check water levels in tanks. Be aware that "Low Level" in other tank side can come soon and limit of Heeling-System can be reached.
List Sensor Fault *-Flushing Light Diode belt*	The pump stops and the valves close Automatic switches over to 'MANUAL' operation mode. Manual Water transfer is possible, but indication of ships list is disabled.	Sensor inspection is requested. Contact Hoppe Bordmesstechnik for service or new sensor.

Pump Leakage Sensor **Alarm** *-Red flushing LED*	System stays in current operation mode. Other then “Pump Failure” operation is still possible	Inspection of leakage sensor for alarm reason. In case of water ingress the system has to be stopped and mechanical seal of pump has to be changed --- see pump operation manual. After fixing leakage of pump, press “Mode-Button” to acknowledge alarm => LED will jump to continious red

! List of Alarms without opening alarm contact R13 !

Heeling-Alarm *-Red LED*	System stays in current operation mode Alarm contact R12 opens	Check if current Heeling-Angle is acceptable. If not, turn on automatic mode or start manual pumping to requested side. LED turns off, when Heeling Angle drops under Heeling-Alarm-Value/Angle
Emergency Stop *-Red LED*	System STOP: The pump stops and the valves close Alarm contact R11 closes. Automatic switches over to ‘MANUAL’ operation mode Pump operation is blocked to exceeded side	Use manual mode to pump water to requested side until LED for Over-Heeling-Alarm turns off.

6 Adjustments

Several adjustments are fixed in the software which can only be changed by Hoppe Bordmesstechnik GmbH.

Onboard adjustments are possible for

- Heeling Angle start position in automatic mode
- Closing time of valves

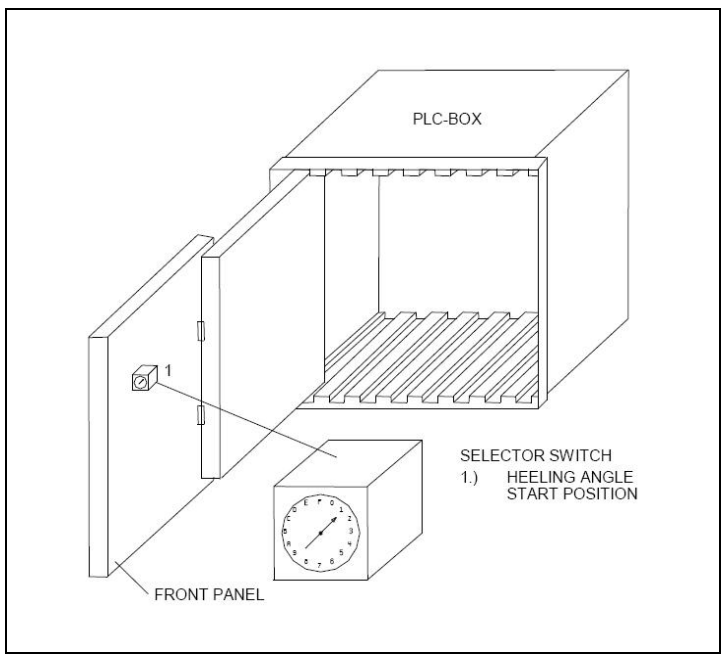
6.1 Heeling Angle start position

This value defines at which list angle of ship the pump starts and valves open.

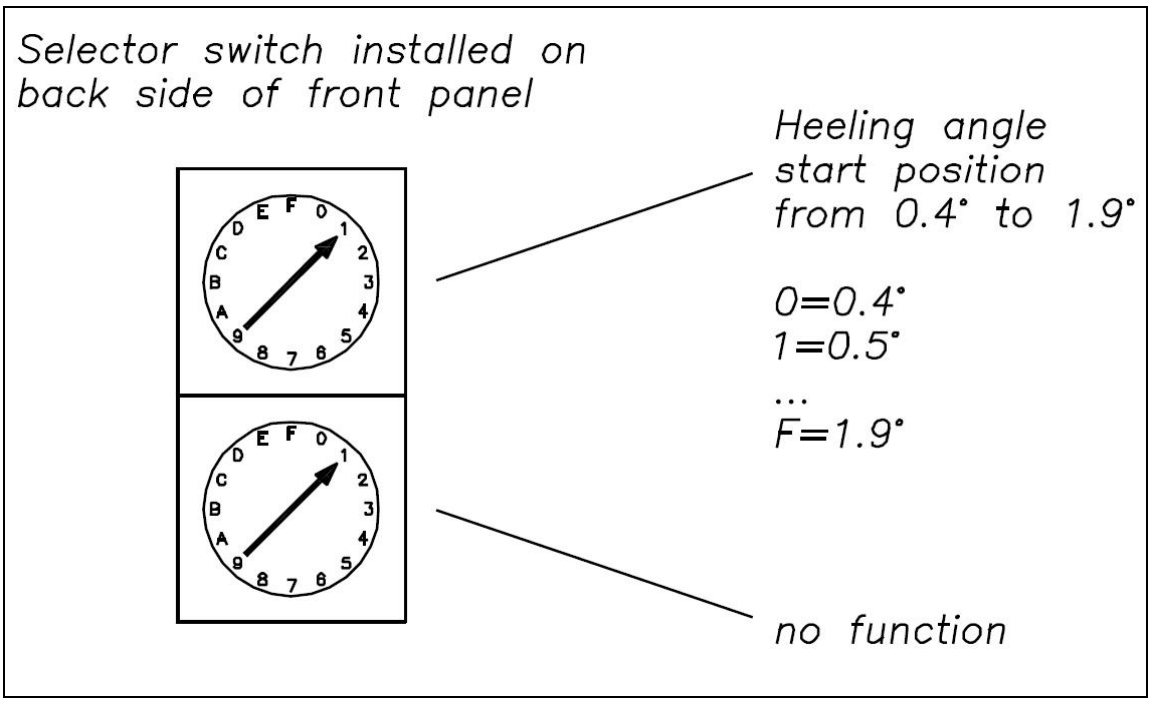
Value can be modified by change of position of corresponding selector switch.

The switch is installed inside of the PLC-Box. The Front Panel has to be dismounted for change.

- loosen the 4 screws of the panel and pull it out of the box
- selector switch is on the back side of the front panel
- turn upper switch to requested position (see picture 4)



picture 3: front panel with selector switch



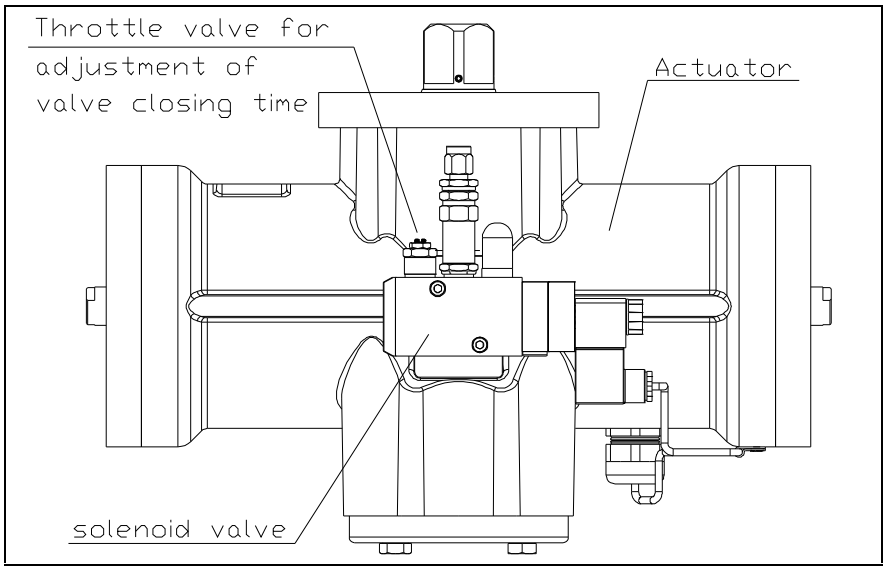
picture 4:selector switch for starting angle

6.2 Closing time of valves

To prevent water hammer, the valve closing time has to be adjusted to following chart

Valve::	**Closing Time**
DN 250	25 sec
DN 300	30 sec
DN 350	35 sec
DN 400	40 sec.

chart 3: valves with closing times



picture 5: valve actuator

The adjustment is made by turning the throttle screw on solenoid valve. The solenoid valve is mounted direct on actuator. Turning clockwise means prolongation of valve closing time, turning counter clockwise means shortening of valve closing time. The adjusted valve closing time has to be checked by valve test run.

OPERATION MANUAL
REVERSIBLE PROPELLER PUMP
TYPE H250 AND H300

Hoppe Bordmesstechnik GmbH

Operation Manual

Document No.	Designation	Revision	Issue
F-03301-00101.HB	**Reversible Propeller Pump**	**1.11**	**12.12.07**

Content

1 General

The reversible propeller pump is provided for utilisation on ships. The pump is designed for transport of sea water between opposed tanks.

The performance data pumps are checked on the bench test. The results are recorded in a test protocol

The operation instructions and safety notes of the operation manual have to be observed for a trouble free operation!

The manufacturer can not be held liable for damages when this operation manual was not considered demonstrable.

Manufacturer: **Hoppe Bordmesstechnik GmbH**
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Fax. +49 40 561949-99
e-mail: info@hoppe-bmt.de

1.1 Pump Type and Performance Range

Two types with following performance ranges are available

type	**performance range**
H 250	delivery capacity: 300m³/h to 800m³/h
H 300	delivery capacity: 700m³/h to 1400m³/h

1.2 Performance Data

The achieved performance date of aggrgate pump+motor are written down in test protocol.

Name plates are installed on pump and motor with data about:

- description of aggregate
- performance consumption of pump, max. available performance of motor
- technical data as voltage/frequency for electric connection of motor
- year of manuufacture
- identification number

1.3 Range of Application and Service Conditions

The pump is only to be used for delivery of sea water or fresh water between tanks on ships. The utilisation for other purposes or other mediums has to be approved by manufacturer.

The service conditions of complete aggregate have to be observed

- place of installation --- engine room or cargo hold
- class of explosion proof of motor
- environmental temperature +5° Celsius to + 45° Celsius
- drainage of pump at freezing danger

2 Safety at Installation, Service and Maintenance

The operation manual has to be available for personal prior installation and commissioning.

The personal must be qualified for installation, commissioning, operation, maintenance and repair works. The personal have to be trained and instructed if necessary.

Valid national and international accident prevention rules have to be observed and also the working, service and safety regulations of operator.

2.1 Marking of Safety Instructions

Safety instructions which lead to dangers for persons at non observance are marked as followed:

- symbol for general danger: À (safety sign acc. to DIN 4844-W 9)
- symbol for warning before voltage: Á (safety sign acc. to DIN 4844-W 8)

The word "**CAUTION**" is inserted in indices for safety in cases where the non observance lead to danger for function of aggregate.

The non observance of safety instructions may lead to endangerous for persons, environmental and the aggregate. Following dangers may occur:

- Failure of functions of aggregate and/or plant
- Failure of specified procedures for maintenance and repair
- Hazards of persons by electric and mechanical effects
- Hazards of ship and cargo by leakage

The non-observance of safety instructions lead to loss of any rights to claim damage compensation.

2.2 *Safety Instructions*

- Touchning protection for moving parts (e.g. coupling) may not be removed while aggregate is in service
- Endangerous by electric power are to be encluded
- Works on aggregate are only at allowed at standstill
- All safety and protection facilities have to be re-installed after completion of work
- Reconstruction or modifications are only permissible after consultation and written approval by manufacturer.
- Spare parts: only original spare parts or by manufacturer allowed parts to be used
- The manufacturer takes over none liability for consequences at use of other parts.

3 Transport and Storage

Pumps and aggregates are packed for transport acc. to manufacturer standard and order agreement.

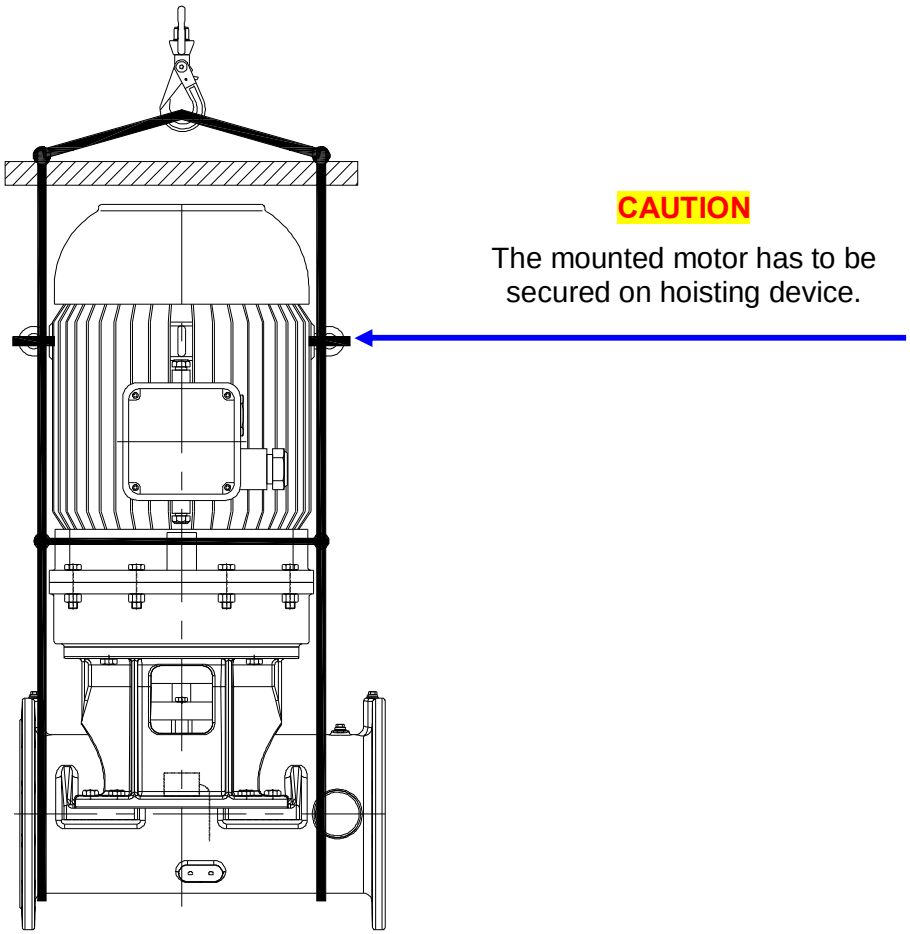
The rules and regulations in transportation business, respectively the regulations for handling of fork carriers, cranes etc. are to be observed for transport.

Improper transport and storage lead to loss of any warranty claim.

3.1 Transport of Pump

À

- Prevention of heavy vibrancies (impulsive stress)
- Observance of accident prevention rules and all additionally rules for lifting and transport of pump respectively complete aggregate
- Lifting of pump / aggregate only on stable lifting points as casing, connecting piece or frame
- saving of assembled motor on lifting column in order to avoid turning or tilting of aggregate during lifting
- Hoisting devices (e.g. stacker, crane, crane device, pulley-blocks, ropes, etc.) must be sufficiently dimensioned and may operate only by authorized persons.



3.2 Packing / Storage / Preservation

- unpacking should be made at point of installation to avoid contamination and damage
- check if delivery corresponds to order and complete
- storage in environment with high humidity and alternating temperatures is not allowed in order to avoid formation of condensation water
- Condensation water may attack metall parts (e.g. bearings) and may alter properties of lubricating greases which lead to early wear and malfunctions
- Durability of preservation is made for time period of approx. 3 month
- In the case of prolonged storage, a continued preservation is to be effected by usual commercial means which do not attack the materials employed. Mainly the parts which are in contact with each other are to be protected from corrosion in order to avoid to become stuck.
- The preservation is washed out during the trial service of the pump on board.

4 Technical data and Information to Pump

The pump is an axial-reversible propeller pump used for transport of liquids.

4.1 Construction and Function of Pump

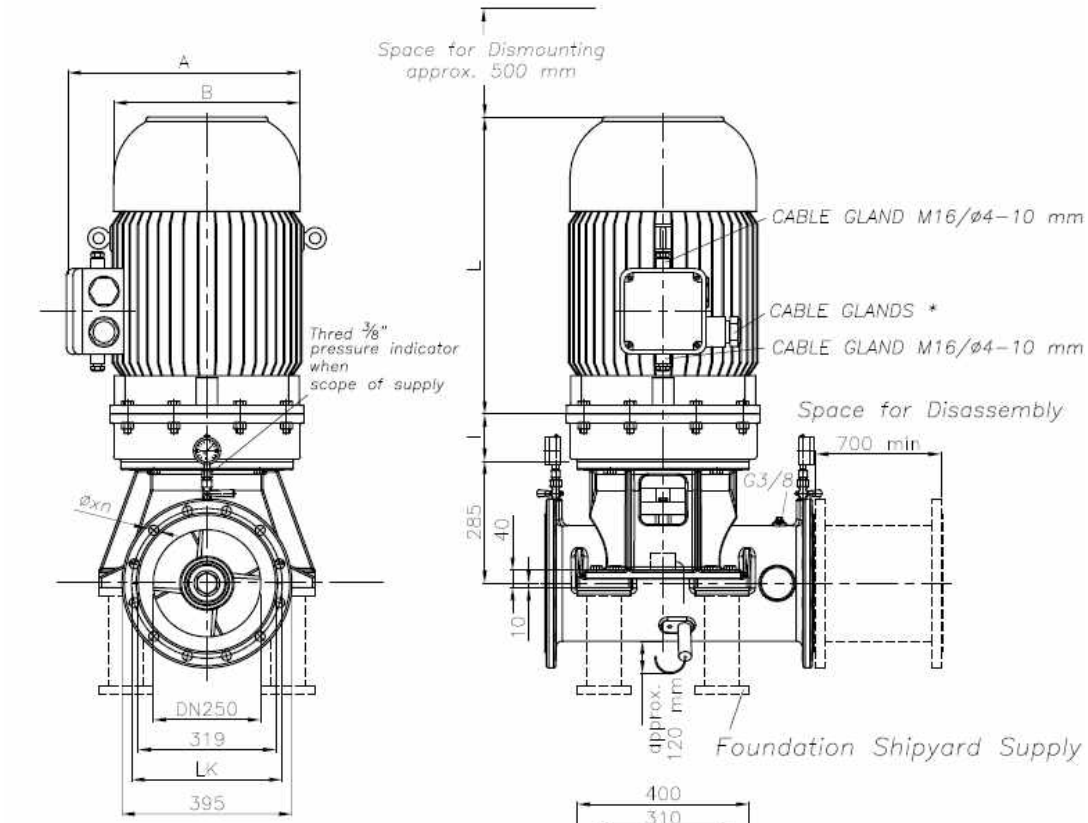
- single stage, non self-priming pump with single flow casing
- impeller: axial flow impeller
- pump shaft and drive shaft are over-mounted --- construction with angular ball bearing .
- The pump shaft and the top shaft are connected via a 90° bevel gear.
- Flexible coupling between pump shaft and drive shaft of motor
- Seal against pumped medium --- mechanical seal; single-acting, independent of direction of rotation loaded according to DIN 24 960-U-K for pumped medium
- Shaft seal against pumped medium: Radial shaft seal ring for gear oil
- Leackage space is arranged between pumped medium
- A vented leackage space is arranged between the pumped medium and gear oil which is fitted with a leackage sensor
- Grease lubrication for top ball bearing of drive shaft
- Oil lubrication for gear and all other ball bearings

4.2 Monitoring Facilities

- Monitoring of water level in tanks by float switch to prevent dry running of pump --- system stop at low water level
- motor protection relais --- protection aginst to high motor loads
- PTC-Thermistor --- protection against to high warming
- Anti-Condensation Heating --- protection against formaing of condensation water inside motor

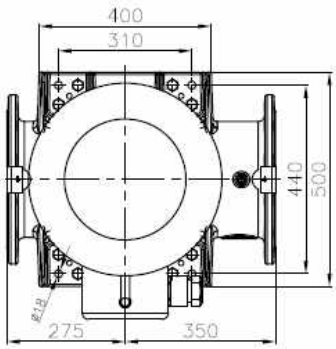
4.3 Dimensions of Pumps

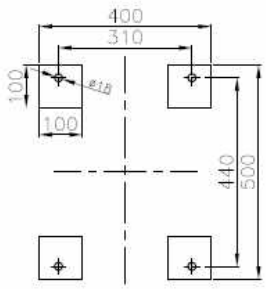
Pump: H 250: materials pls. see order confirmation



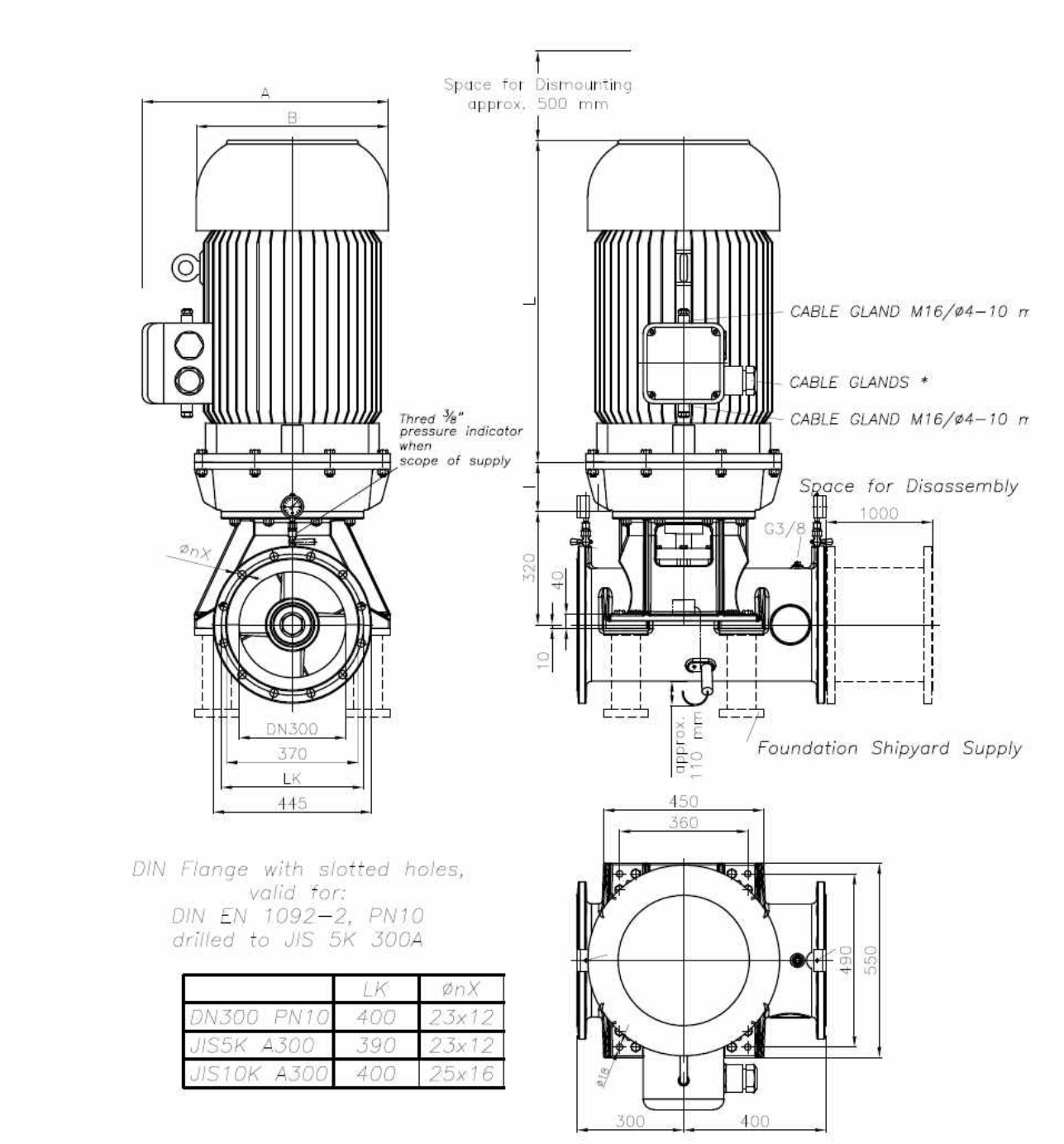
DIN Flange with slotted holes, valid for:
DIN EN 1092–2, PN10
drilled to JIS 5K 250A

	LK	øxn
DN250 PN10	350	23x12
JIS5K A250	345	23x12
JIS10K A250	355	25x12





Pump: H 300: materials pls. see order confirmation



	LK	ØnX
DN300 PN10	400	23x12
JIS5K A300	390	23x12
JIS10K A300	400	25x16

5 Installation of Pump

Before installation: visual check referring to shipping damage and completeness of delivery.
——> damage notice

CAUTION!

- Packing material in void spaces of pump and motor must be removed
- The installation work is to be executed by personnel which is qualified for the job under consideration of the existing safety instructions

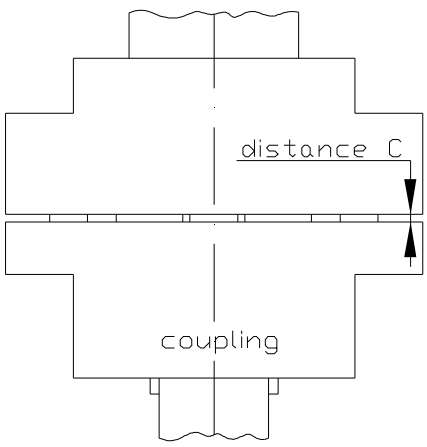
5.1 Requirements to Installation Place

- Installation has to consider sufficient space for exchange of parts or complete aggregare as well for transport
- Fixings for hoisting devices and other auxiliary means have to be provided
- Foundations have to be of sufficient strength
- Ambient temperatures below +5°C and higher +45°C have to be avoided
- Agrregat has to be installed stress relieved
- Pay attention that no vibrations are passed in pump aggregate via foundation

5.2 *Alignment of Flexible Coupling*

CAUTION

- Distance c between pump shaft and motor shaft is in range between 2 to 4 mm
- Check and adjustment of value c is not necessary at supply of complete aggregates (pump+motor assembled; checked in workshop of manufacturer)
- Check and readjustment only at maintenance or repair work



5.3 Electric Connection

À Á The connection of electric machines is to be executed by adequately qualified personnel under consideration of valid international guidelines and standards as well national rules and laws.

5.4 Connection of Pipes

CAUTION

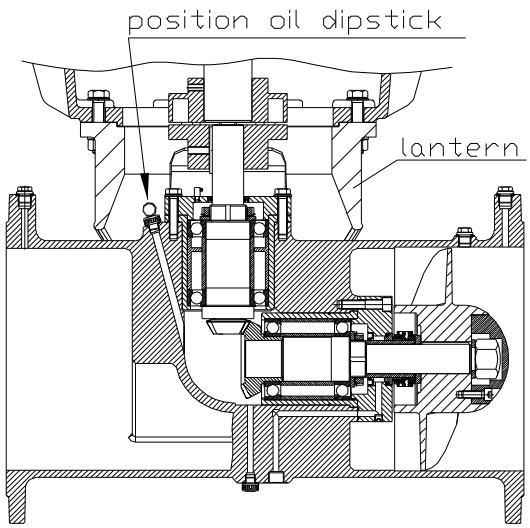
- Pipes have to be free of pollution, must be sufficient fixed and stress relieved mouted on pump, installation of compensators on deamad
- Pipe have to be installed in such matter that during filling the formation of air cushions inside pipes is excluded
- Flange gaskets may not extend into pipes since it reduces the cross section of conduit
- Installation of pipework should enable pump dismounting without discharge of tanks
- Pressure tests of pipeto be executed without the pump. Otherwise the pump may be damaged.
- The mounted pump is tested statically under the 1.5-fold nominal operating pressure.

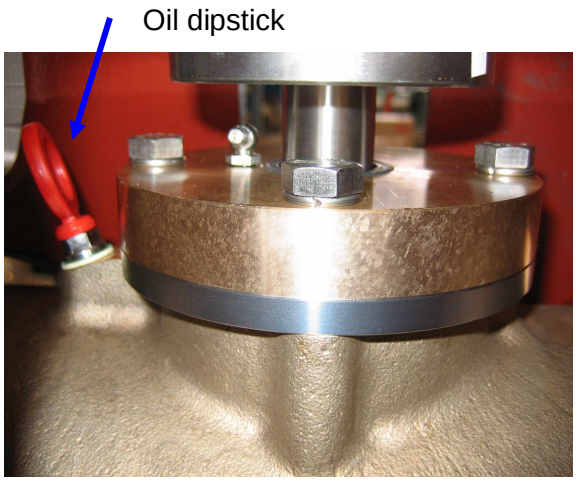
6 Commisioning

Requirements and notices have to be observed from this operation manual and from other components which are affected by pump starting-up.

6.1 Making of Operational State

- Check of grease lubrication of upper ball bearing of drive shaft --- refill on demand!
- Check oil filling in gear box by means of oil dipstick
- Oil level must be between MIN/MAX marks on oil dipstick



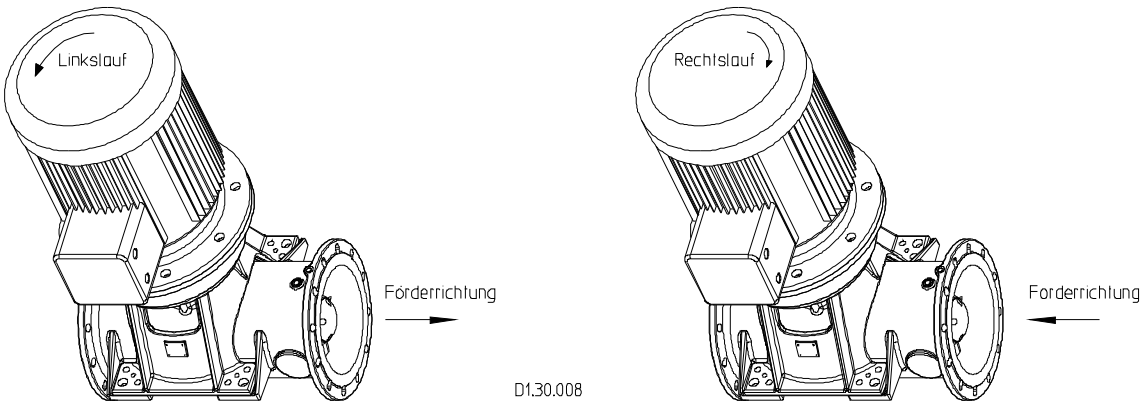


- **CAUTION mechanical seal – prevention of dry running – system must be filled!**
  At first of operation a little leakage can occur at the seal. The leakage decreases after the running-in time. The leakage fluid will drained into leakage space inside pump which is equipped with a leakage sensor.
- **CAUTION** tanks, pipes and pump must be filled with water
  The system must be deareted!
- **CAUTION** Protections for rotating parts must be installed before starting-up and may not dismounted during operation
- **CAUTION** Electric protective devices havt to correspond to valid national and international guidelines, standards and laws.
  Dismounting of protective devices during operation is not allowed!

- À Á Check electric connection --- voltage, frequency, thermistor, stand still heating
- À Á Check monitoring devices regarding adjustment of corresponding values (Motor Protection Relay, Thermistor)
- Noise protection --- Observance of valid noise protection guidelines, regulations and laws.

6.2 Control of Direction of Rotation

The control of direction of rotation is only allowed when the system is filled including tanks and pipes. A dry running of pump lead to demolition important parts of pump.



- direction of rotation: anti-clockwise – delivery (Förderrichtung) to side with impeller
- direction of rotation: clockwise – delivery (Förderrichtung) to pump side without impeller

6.3 Pump Start

Execution as follows::

- Condition: system is filled and deaerated
- Valves are open on pump suction/pressure side in piping system
- Pressure manometer are installed on pump
- System control must be ready for operation --- automatic shut-off functions
- Pump can be started (manual mode, motor starter box), monitoring of in-service behaviour
- At recognized malfunctions --- pump STOP --- determination of reason and repair
- System test program can be started/continued at normal in-service behaviour of pump

CAUTION

It's not allowed to operate the pump against close valves. The service lead to cavitation, sealing and bearing damages in best time and is connected with loss of any warranty claim!

7 Maintenance and Repair

CAUTION

Maintenance and repair works on pump may exected only by corresponding qualified personal.

7.1 Lubricants for Bearings with Grease Lubrication

- utilisation of grease --- of type KTP 2R / KP 2R / KH 2R acc. to DIN 51 502 ; e.g. FAG Arcanol Multitop
- comparable greases other manufacturers may used as well
- greases with different properties may not mixed

7.2 Lubricants for Gear and Bearings with Oil Lubrication

- Gear boxes and bearings are filled factory-installed with a high-quality full-synthetic transmission oil CLP DIN 51517, ISO VG DIN 51519.
- Oil volume H250 pump: 0,5 L
- Oil volume H300 pump: 1,3 L
- Following transmission oils are recommended for using at ambient temperatures from –10°C to +60°C:

Lubricant	***AGIP**	**ARAL**	**BP**	**DEA**
Full Synthetic Oil	*ROTRA SX 75-90	DEGOL GS 220	Enersyn SG-XP 200	Polydea PGLP 220

Lubricant	**ESSO**	**SHELL**	**MOBIL**	**KLÜBER**
Full Synthetic Oil	Umlauföl S220	Shell Tivela OelWB	**Mobilgear SHC XMP 150	Klübersynth GS 220

- Transmission oils with different properties may not mixed
- Other transmission oils needs approval by manufacturer

**factory installed oil*

***Mobilgear 600XP68, 600XP100, 600XP150, 600XP220 are similar to Mobilgear SHC XMP 150 and can also be used.*

7.3 Maintenance Rate

Following periods have to be meet for a safe and reliable function

procedure	Period	Remark
check gear oil level	all 3 month	pls. see chapter 6.1
check of fixing screws	all 12 month	manual, using keys

Grease Lubricated Bearings

- Bearings are to grease occasionally after approx. 2500 service hours
- Motors witout grease nippel are lifetime lubricated. At motors with grease nippel pls. refer to instructions in operation manual of motor manufacturer.

7.4 Change of Transmission Oil

For identification of part numbers pls. see drawings in chapter 8: spare part list

- oil change => all 100 service hours, respectively all 24 month
- switch off aggregate and avoid restart by suitable measures
- put collecting reservoir under oil drain
- drain gear lubricant oil by drain plug (912)
- remove coupling guard for better handling
- pull out dipstick
- filling: srew in drain plug (912); unscrew filling plug (911) and fill in gear lubricant oil by means of a hose; screw in filling plug (911)
- oil volume H250 pump: 0,5 L
- oil volume H300 pump: 1,3 L
- check oil level with dipstick

7.5 Monitoring during Service

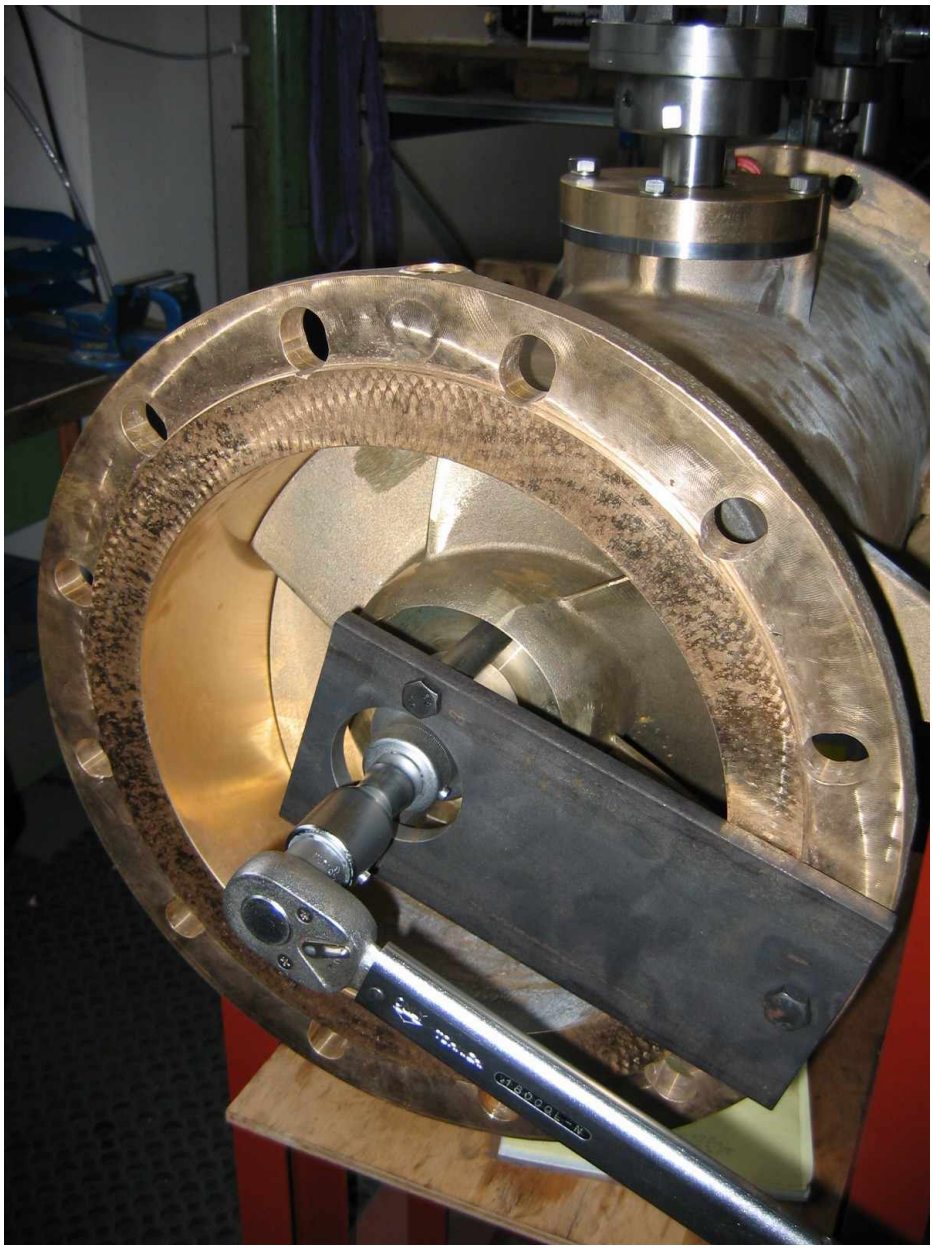
- Regularly check of shaft seals regarding leackage
- Pay attention to vibrationless pump service
- pay attention to mechanical noises

7.6 Dismounting of Mechanical Seal and Radial Shaft Seal Ring

According to the mounting conditionsit is to be decided wether the pump aggregate is to be dismounted from the basement completely or only partially.

- Switch-off the pump unit --- save against unauthorised switch-on
- Drain gear lubricant
- Loosen hexagon socket screws (914.1) of impeller cap (260) and remove the impeller cap
- Loosen impeller nut (922) and remove with disk (550.1), see picture 1
- Take off Impeller (230)
- Take out parallel key (940)
- Take off distance ring (504)
- Take off shaft protection sleeve (524) together with mechanical seal (433) from shaft
- Loosen hexagon socket screws (914)
- Remove bearing cover (360.1) with o-rings (412) and (412.3)
- **CAUTION**
- When disassembling bearing cover attend to number of inserted lock washer (558)
- dismantle retaining ring (932) from bearing cover
- remove disc (550.2)
- Pull out radial lip seal (421.1)

Picture 1: Loosen of impeller nut with help of tools D1.004 bzw. D1.004-1



CAUTION

- Clean seat of stationary seal ring and ensure that the seat is not damaged
- Check shaft wearing sleeve (524) in respect of impurities and furrows, in case brighten with buff linen cloth. In the case that the furrows are to deep, renew the part
- Clean shaft fit of the shaft wearing sleeve
- Mechanical seals are principally to be renewed completely

7.7 Reassambling of Mechanical Seal and Radial Shaft Seal Ring

CAUTION

- Clean seat of stationary seal ring and ensure that the seat is not damaged
- Check shaft wearing sleeve (524) in respect of impurities and furrows, in case brighten with buff linen cloth. In the case that the furrows are to deep, renew the part
- Clean shaft fit of the shaft wearing sleeve
- Mechanical seals are principally to be renewed completely
- Auxiliary means: soap sud, soft, not fluffing duster, home spirit
- Use soap sud when sliding on or impressing of rubber parts in order to reduce friction
- Press in radial shaft seal (421.1) Stationary seat and O-ring ring in seal cover (360.1)
- Safe Radial shaft seal with disc (550.2) and circlip (932)
- Insert adjusting washer (558)
- Slip on shaft protection sleeve (524)
- Screw complete bearing cover (360.1) with hexagon socket screws (914) to casing
- Pull on mechanical seal (433) to shaft protection sleeve. Attend to constant pressure distribution, in order not to tilt the seal.
- Slip on distance ring (504)
- mount feather key (940)
- Slip on Impeller (230)
- Screw on Impeller nut (922) with disk (550.1)
- Fasten impeller cap (260) with hexagon socket screw (914.1) at impeller
- Fill in gear lubricant oil as described under 7.4

7.8 Dismounting of Complete Drive Assembly (mediumside)

- After removing mechanical seal and radial shaft seal the complete drive assembly with o-ring (412.1) can be drawn from casing --- see picture 2

Picture 2

7.9 Dismounting of Complete Drive Assembly (driving side)

- Loosen nuts (920) and remove with spring washer (934)
- Remove screws (901) with discs (554)
- Lift motor (801)
- Dismantle coupling (840) from shaft (213) and remove key (940.1)
- Loosen hexagon screw (901.2) and remove with springwasher (934.2)
- Remove bearing cover (360) with radial shaft seal (421)
- Muttern (920) lösen und mit Federringen (934) abnehmen

CAUTION

- When dismantling bearing cover attend to amount of shim ring (558)
- Complete drive assembly can be drawn from casing (see picture 3)

Picture 3

7.10 Reassembling of Drive Assemblies

CAUTION

- As bevel wheels usually are subject to drifting away because of crossing axes and the mostly one-sided bearing, drive assemblies have to be mounted very carefully.
- Only if mounted correctly, the optimate quite-running will be reached.

Mounting of complete drive assemblies

- Slide complete drive assembly (driving side) into casing --- see picture 3
- Mount bearing cover (360) with radial shaft seal rings (421) and shim rings with hexagon nuts (901.2) and spring washers (934.2) to casing
- Mount feather key (940.1)
- Slide complete drive assembly (medium side) with o-ring (412.1) in casing --- see picture 2
- auxiliary means: soap suds, a soft duster without fuzz, spirits
- use soap suds to avoid friction when pulling or pressing in the rubber parts
- Press in radial shaft seal (421.1) stationary seat and o-ring in gland housing (360.1)
- Safe radial shaft seal ring with disc (550.2) and retaining ring (932).
- insert shim rings (558)
- slide shaft protection sleeve (524)
- Screw up complete bearing cover (360.1) with hexagon socket screws (914) with casing
- Pull mechanical seal (433) on shaft protection sleeve. Make sure that pressure forces work evenly so that mechanical seal cannot tilt.
- slide distance ring (504)
- mount feather key (940)

Adjustment of flank clearance of gearwheels

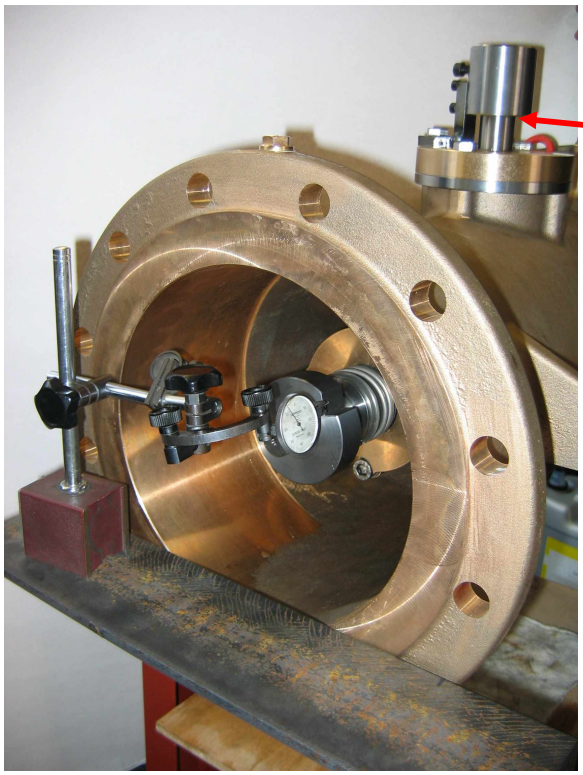
The bevel wheels are interlocked and work with a flank clearance, determined before. The range of the flank clearance is dependent from module of gearing and the operation conditions. If flank clearance is not chosen correctly, the wheels will work noisy and this will cause very early wear and tear with damages at tooth profiles or tooth fractures.

Permissible flank clearance:

Pump: H 250 --- Flank clearance 0,05 - 0,10 mm

Pump: H 300 --- Flank clearance 0,10 - 0,15 mm

Driving and pump shaft are assembled. The driving shaft is locked against twisting by means of tools D1.005 (H300) respectively D1.005-1 (H250)

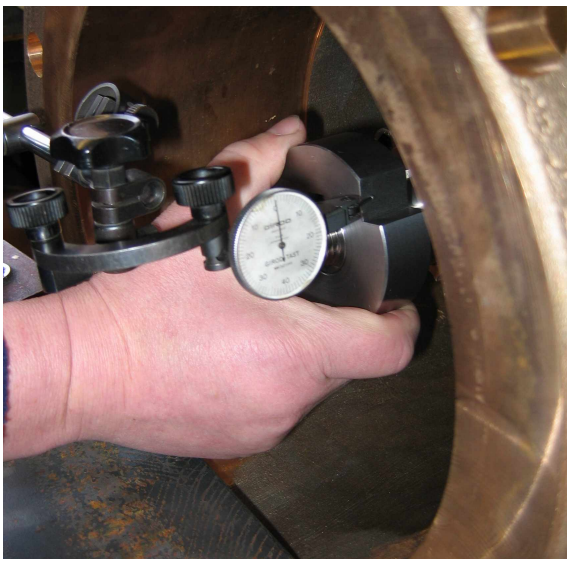


Lock driving shaft against twisting!
(tool D1.005 resp. D1.005-1)

tool D1.006 resp. D1.006-1

The screw tool D1.006 (H300) resp. D1.006-1 (H250) is mounted on pump shaft.

wird auf die Pumpenwelle geschraubt. The button of mounted metering clockwork stands at milled surface of screwed up tool with the pinion to be secured against twisting. The flank clearance is determined by moving ring gear until plant concerned and can be read directly from metering clockwork.



Further assembly of complete pump

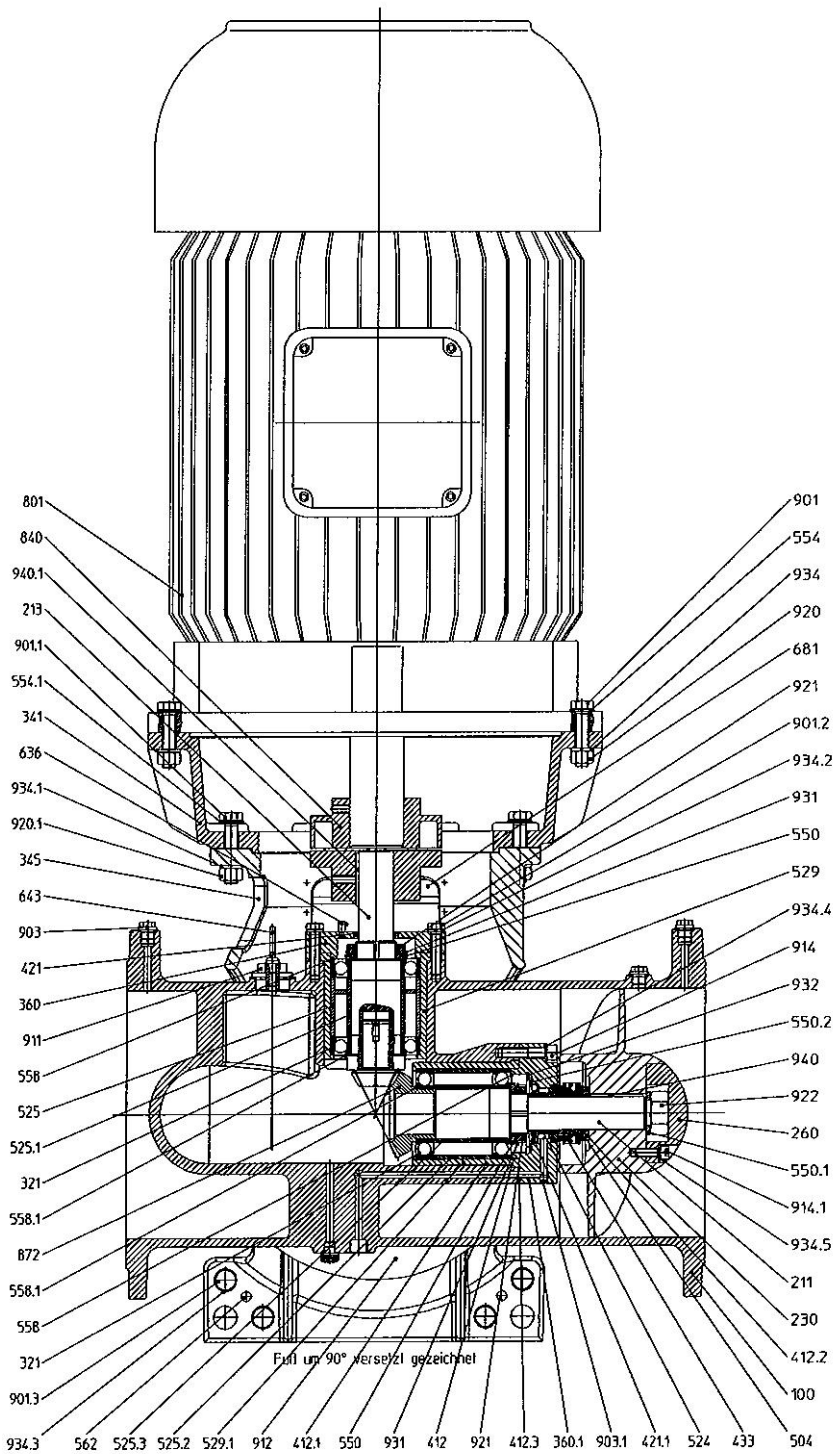
- Slide impeller (230)
- Screw impeller nut (922) with disc (550.1) (Tool D1.004 bzw. D1.004-1)
- Tighten Impeller cap (260) with hexagon socket screws (914.1) at impeller
- slide on coupling (840)
- assemble motor
- fill in gear lubricant oil as described under 7.2

8 Tool List

Tool Number	Picture
D1.004 --- Pump H 300 D1.004-1 --- Pump H 250	
D1.005 --- Pumpe H 300 D1.005-1 --- Pumpe H 250	
D1.006 --- Pumpe H 300 D1.006-1 --- Pumpe H 250	

9 Spare Part List

Pls. see following pages for identification of part numbers



Part Numbers

No.	Benennung	Designation	Pcs.	Material
100	Gehäuse	CASING	1	Gbz-10
211	Pumpenwelle	PUMP SHAFT	1	1.4462
213	Antriebswelle	TOP SHAFT	1	1.4462
230	Laufrad	IMPELLER	1	G-CuAl10Ni
260	Laufradkappe	IMPELLER HUB CAP	1	Gbz-10
321	Schrägkugellager	RADIAL BALL BEARING	4	DIN 628
341	Antriebslaterne	MOTOR STOOL	1	GG-20
345	Fusslaterne	FOOT MOUNTED LANTERN BRACKET	1	GG-20
360	Lagerdeckel	BEARING COVER	1	Gbz-10
360.1	Lagerdeckel	BEARING COVER	1	Gbz-10
412	Runddichtring	O-RING	1	FPM
412.1	Runddichtring	O-RING	1	FPM
412.2	Runddichtring	O-RING	1	FPM
412.3	Runddichtring	O-RING	1	FPM
421	Radialwellendichtring	RADIAL SHAFT SEAL RING	1	NBR
421.1	Radialwellendichtring	RADIAL SHAFT SEAL RING	1	FPM
433	Gleitringdichtung	MECHANICAL SEAL	1	C/SiC/Viton/CrNiMo
504	Abstandring	SPACER RING	1	1.4462
524	Wellenschutzhülse	SHAFT WEARING SLEEVE	1	1.4462
525	Abstandhülse	SPACER SLEEVE	1	1.4021
525.1	Abstandhülse	SPACER SLEEVE	1	1.4021
525.2	Abstandhülse	SPACER SLEEVE	1	1.4021
525.3	Abstandhülse	SPACER SLEEVE	1	1.4021
529	Lagerhülse	BEARING SLEEVE	1	1.4021
529.1	Lagerhülse	BEARING SLEEVE	1	1.4462

When ordering spare parts please indicate:

- **pump type, pump number and part number**

Part Numbers

No.	Benennung	Designation	Pcs.	Material
550	Scheibe	DISC	2	1.4021
550.1	Scheibe	DISC	1	1.4462
550.2	Scheibe	DISC	1	1.4021
554	Unterlegscheibe	WASHER	8	A4
554.1	Unterlegscheibe	WASHER	8	A4
554.2	Unterlegscheibe	WASHER	8	A4
554.3	Unterlegscheibe	WASHER	8	A4
558	Paßscheibe	SHIM RING	16	St2 K 60
558.1	Paßscheibe	SHIM RING	16	St2 K 60
562	Zylinderstift	PARALLEL PIN	4	St ; gehärtet
636	Schmiernippel	GREASE NIPPLE	1	A4
643	Ölmeßstab	OIL DIPSTICK	1	
681	Kupplungsschutz	COUPLING GUARD	2	1mm VA-Blech
801	Flanschmotor	FLANGE MOTOR	1	
840	Kupplung	COUPLING	1	
872	Kegelradpaar	GEAR WHEEL	1	
901	Sechskantschraube	HEXAGON HEAD BOLT	8	A4
901.1	Sechskantschraube	HEXAGON HEAD BOLT	9	A4
901.2	Sechskantschraube	HEXAGON HEAD BOLT	4	A4
901.3	Sechskantschraube	HEXAGON HEAD BOLT	8	A4
903	Verschlußschraube	SCREWED PLUG	3	A4
903.1	Verschlußschraube	SCREWED PLUG	3	A4

When ordering spare parts please indicate:

- **pump type, pump number and part number**

Part Numbers

No.	Benennung	Designation	Pcs.	Material
911	Füllschraube	PRIMING PLUG	1	A4
912	Entleerungsstopfen	DRAIN PLUG	1	A4
914	Zylinderschraube m. Innensechskant	HEXAGON SOCKET HEAD CUP SCREW	4	A4
914.1	Zylinderschraube m. Innensechskant	HEXAGON SOCKET HEAD CUP SCREW	4	A4
920	Sechskantmutter	HEXAGON NUT	8	A4
920.1	Sechskantmutter	HEXAGON NUT	8	A4
921	Wellenmutter	SHAFT NUT	2	Automatenstahl
922	Laufradmutter	IMPELLER NUT	1	CuAl10Ni5Fe4
931	Sicherungsblech	LOCKWASHER	2	St
932	Sicherungsring	CIRCLIP	1	Federstahl
934	Federring	SAFETY DEVICE	8	A4
934.1	Federring	SAFETY DEVICE	8	A4
934.2	Federring	SAFETY DEVICE	4	A4
934.3	Federring	SAFETY DEVICE	8	A4
934.4	Federring	SAFETY DEVICE	4	A4
934.5	Federring	SAFETY DEVICE	4	A4
940	Paßfeder	KEY	1	1.4462
940.1	Paßfeder	KEY	4	1.4462

When ordering spare parts please indicate:

- **pump type, pump number and part number**

隔爆型三相异步电动机

Flame-Proof Three-Phase Induction Motors

使 用 说 明 书

Operation Instruction

代号：**0AP.460.435**

Code: 0AP.460.435

南 阳 防 爆 集 团 有 限 公 司

Nanyang Explosion Protection Group Co., Ltd.

1 概述

1.1 YB2 系列隔爆型三相异步电动机是按照欧洲防爆标准 EN50014：1997、A1 1999 及 A2 1999《爆炸性气体环境用电气设备—通用要求》和 EN50018：2000《爆炸性气体环境用电气设备—d 型防爆外壳》的规定，制成隔爆型，适用于存在有甲烷、乙醇、煤气、乙烯等爆炸性气体及蒸气的场所，作为传动机用。防爆标志为 EExd Ⅰ或 EExd Ⅱ BT4.

1 General Descriptions

1.1 Series YB2 three-phase induction motors are designed and manufactured into flameproof type according to the specification in European Standards

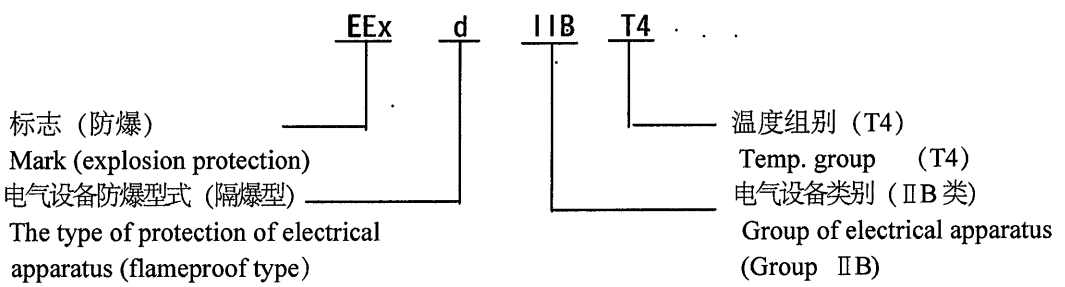
EN50014：1997, A1 1999 and A2 1999 Electrical Apparatus for Explosive Gas Atmospheres General Requirements

EN50018：2000 Electrical Apparatus for Explosive Gas Atmospheres Flameproof Enclosure "d ".

They are applicable to the locations being presence of methane, ethanol, coal gas and ethylene explosive gases and vapors and can be used as drivers. The mark of explosion protection is Eexd Ⅰ or EExd Ⅱ BT4.

1.2 在电动机外壳的明显处，设有清晰的永久性凸纹标记“EEx”或 Ex，防爆标志由标志、类型、级别、温度组别四部分组成。

1.2 The legible and durable raised sign “EEx” or “Ex” should be marked on the distinct position of the enclosure of motors. The Ex mark consists of sign, type, group and temperature class.

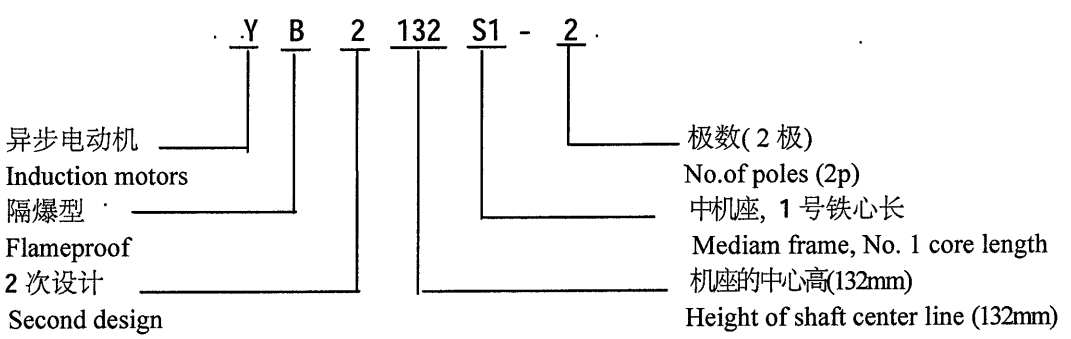


1.3 本系列电动机的容量等级、安装尺寸及其对应关系符合德国标准 DIN42673 的规定，特殊要求见外形图。

1.3 The output ratings, the mounting dimensions and correlation of this series motors conform to DIN 42673. For special requirements, see outline drawing.

1.4 电动机型号表示意义示例：

1.4 Explanation of type designation of YB2 132 S1-2 is as follows:



2 电动机的使用条件

2.1 使用环境条件：

2.1.1 环境空气温度随季节变化，一般不超过-20～+40℃。

2.1.2 海拔不超过 1000m。

2.1.3 环境空气最大相对湿度不超过 95%（当温度为+25℃时）。

2.14 煤矿井下（非采掘工作面）及工厂具有引燃温度组别分别为 T1~T4 组的可燃性气体或蒸气与空气形成的爆炸性混合物场所。

2.2 电动机使用电气条件

2.2.1 频率：50 或 60Hz。

2.2.2 电压：

机座号 63-71：750V 及以下单压；

机座号 80-280：750V 及以下单、双压；

机座号 315-355：1140V 及以下单、双压。

2.2.3 电动机工作方式为 S1（连续工作制）。

2.2.4 电动机定子绕组采用 F 级绝缘系统或 H 级绝缘系统。

注：当电动机所使用的环境条件及电气条件不符合第 2.1、2.2 的规定时，见电动机铭牌及附注标牌的规定。

2 Service Condition

2.1 Circumstance Conditions

2.1.1 Ambient temperature: subject to seasonal variations but not exceeding -20~+40℃.

2.1.2 Altitude: up to 1000m;

2.1.3 The highest relative humidity of the environmental air is not exceeding 95% (when air temperature is at +25℃).

2.14 Coal mines (non-coalface) and Zone 2 explosion hazard locations where present mixtures of flammable gas- or vapour-air with ignition temperature T1~T4.

2.2 Electrical Conditions

2.2.1 Frequency: 50Hz or 60Hz.

2.2.2 Voltage:

For frame-size 63~71 motor: single voltage ≤ 750V;
For frame-size 80~280 motor: single and double voltages ≤ 750V;
For frame-size 315~355 motor: single and double voltages ≤ 1140V.

2.2.3 The duty type is S1 (continuous running duty-type).

2.2.4 The stator windings are of Class F or Class H insulation systems.

Note: When the working conditions and electrical conditions do not conform to the specifications in 2.1～2.2, see the specifications indicated on the motor's nameplate and auxiliary marking plate.

3 结构说明

3.1 电动机的基本安装方式为 IMB3、IMB35、IMB5、IMV1，也可按用户特殊需要制造。

3.2 电动机主体外壳防护等级为 IP55，主体隔爆结构见图 1。

3.3 电动机的冷却方式：机座号 63-71 为 IC410 全封闭自冷式，机座号 80-355 为 IC411 全封闭自扇冷式。

3.4 电动机风扇为增强聚丙烯塑料、灰铸铁 HT150 或钢板焊接件，塑料风扇按 EN50014 23.4.7.8 规定的方法测得的电阻不得超过 1GΩ。

3.5 电动机定子绕组采用聚酯漆包圆铜线（F 级）或聚酰亚胺漆包圆铜线（H 级），定子铁心绕组经浸漆处理，使之成为一个整体，绕组和绝缘具有良好的电气、机械、防潮性能及热稳定性。

3.6 机座号 250-280 电机绕组上埋有热敏电阻或设有防潮加热器，其引线端接在接线盒内，根据用户需要 H160-225 电机也可增加此项要求；H315 及以上电机设有绕组及轴承温控装置，其引线端接在定子上非驱动端一侧单独的测温接线盒内；同时设有防潮加热器，其引线端接在主接线盒内。

3.7 电机转子为鼠笼转子，采用热套工艺将铸铝转子固定在轴上，转子经校正平衡，电动机运行平稳，振动小。

3.8 电动机具有一圆柱形轴伸，采用联轴器或正齿轮传动，当用正齿轮传动时，其节圆直径不得小于轴伸直径的 3 倍。按订货要求，也可生产双轴伸电机或特殊轴伸电机。

3.9 电动机接线盒位于机座顶部。主接线盒可制成三个或六个接线端子，并制成一个或二个出线口。接线盒内另设一个钢质或铜质电镀螺钉，供内接地使用，接线盒出线口适用于橡套电缆，钢管布线及防爆挠性管（铠装电缆）。接线盒防护等级为 IP55，接线盒结构见图 2-3。

3 Construction Features

3.1 The basic construction and mounting arrangement of this series motors are IMB3, IMB35, IMB5, IMV1, or manufactured according to customer's specified requests.

3.2 The degree of protection of motor main body enclosure is IP44, IP54 and IP55. And for the flameproof structure, see Figure 1.

3.3 The cooling form of the motor: IC410 totally enclosed self cooling for frame size 63~71 motor; IC411 total enclose self-fan cooling for frame size 80-355 motor.

3.4 The motor fans are made from reinforced acrylic plastering, HT150 gray cast iron or weldment of steel plate. For plastic fan, the resistance measured according to the method specified in EN50014 subclause 23.4.7.8 shall not greater than 1GΩ.

3.5 The stator windings use polyester enamel round copper wire (Class F) or polyimide enamel round copper wire (Class H). The complete wound stator cores are vacuum-pressure-impregnated (VPI) to make them be a solid integral. This process enables the windings to possess excellent electrical and mechanical properties, high moisture-resistant ability and thermal stability.

3.6 For the stator winding of frame-size 250~280, thermal resistors are embedded or anticondensation heaters are equipped. The leads of them are brought into the terminal box. The H160~225 motors can also be equipped with thermal resistors or anticondensation heaters according to user needs. H315 and above motors are equipped with winding and bearing temperature detectors, and the leads of them are terminated inside the separate terminal box for temperature detector at non-drive end of stator; H315 and above motors are also equipped with anticondensation heaters with the leads terminated inside the primary terminal box.

3.7 The motor rotor adopts squirrel cage type. The aluminum motor rotor is fixed on the shaft by means of shrink fit and balanced well to make motors operate smoothly with little noise and vibration.

3.8 The motors are provided with a cylindrical shaft extension and transmit by means of coupling or spur-gear unit. For spur gearing, the gear pitch diameter should not less than 3 times of shaft extension diameter. Two shaft extension or special shaft-extension motors can also be produced by ordering request.

3.9 The terminal box is located in the top of the motor. The terminal boxes are designed and fabricated with either three or six terminals with one or two entries. Another galvanized steel or copper screw in the box is fixed for inside earthing. The entries of the terminal box are suitable for rubber-insulated cable, conduit entry and explosion-proof flexible pipe (armoured cable). The protection degree of terminal boxes is IP55. For the construction of terminal box, see Figures 2~3.

4 防爆要点

4.1 本系列电动机在结构设计时，充分考虑到内部的爆炸性混合物产生爆炸性时，隔爆外壳应不损坏，并且内部火焰不能通过隔爆外壳接合面而引起外部爆炸性混合物爆炸。

4.1.1 组成隔爆外壳的零部件按 **EN50018** 的规定作水压试验，以保证能承受最大爆炸压力；

4.1.2 严格控制组成隔爆外壳的各零部件隔爆接合面的长度，间隙或直径差、粗糙度，接线盒内部裸露导体之间、裸露导体与金属外壳之间的电气间隙及爬电距离见图 **2**～图 **4**；

4.1.3 在 **0.9**～**1.1** 倍额定电压下，电动机外壳表面温度不超过 **135**℃。电缆引入口温度不高于电缆的允许温度，以保证电缆运行可靠。

4.2 为了保证隔爆外壳的隔爆性能，连接用的紧固螺栓装有防松垫圈，以防止螺栓自行松脱，螺栓和不透螺孔紧固后，螺钉或螺栓尾部与螺孔的底部之间留有螺纹裕量，外壳上的不透螺孔周围的金属厚度不小螺纹孔径的 **1/3**，但至少为 **3mm**。

4.3 引入电动机接线盒的电缆，在进线口处用弹性密封圈密封，密封圈的邵尔氏硬度为 **45**～**55**°，其材料符合 **EN50014 B3.3** 规定的老化试验要求。进入接线盒的电缆直径要与密封圈的孔径相符，密封圈上切有多个同心圆槽，每一圆槽对应的最小电缆外径均铸在密封圈外端面上，可根据电缆直径调整密封圈孔径，当压紧接线盒斗后，应保证密封圈与电缆间和密封圈与接线盒座间无间隙，否则将失去隔爆性能。

4.4 接线盒内端子套或接线板的绝缘部分，采用耐泄痕性分级为 **II** 级的绝缘材料制成。

4.5 接地：电动机的接地是防止漏电火花，确保安全的重要措施。外壳上的接地端子为一钢质或铜质镀锌螺栓，设在电动机外壳的明显处，并有接地标志牌“⏚”。

4.6 电动机的隔爆零件有：机座、端盖、轴(转子)、轴承内盖、接线盒座、接线盒支座、接线盒盖、接线螺栓、密封圈、端子套或接线板，见图 **1**～**3**。

4 Explosion Protection Features

4.1 These series motors are so designed in mechanical construction that should the explosive mixture inside the motors be ignited by some cause or other, the flame poof enclosures are capable of withstanding the explosion, and of preventing the sparks inside passing through the flameproof join surfaces and the ignition of explosive mixture surrounding the enclosures by sparks.

4.1.1 The parts constituting flameproof enclosure shall be tested hydrostatically according to the specification in EN50018 to ensure them to withstand the maximum explosion pressure.

4.1.2 Exercise strict control over the flameproof joint surface's length, gap or diameter clearance, the surface roughness between the surfaces of all the pats constituting the flameproof enclosure and the electric clearance and creepage distance between bare conducting parts in the terminal box, and those between the bare conducting parts and the metallic enclosure. See Figures 2~4.

4.1.3 At 0.9～1.1 times of rated voltage, the permit enclosure surface temperature shall not exceed 135℃. The temperature at the cable entry should not exceed the cable's permissible temperature to ensure the cable from harm.

4.2 In order to ensure flameproof property of the enclosures, the bolts jointing the flameproof enclosure should be provided with spring washers to prevent working loose. After fastening bolts in bolt blind hole, the thread allowance should be remained between the screw or bolt tail and the thread-hole bottom. The thickness of metal surrounding bolt blind holes on enclosures should not be less than 1/3 of the bolt diameter, but at least 3mm.

4.3 When the cable is inlet through the terminal box, the cable entry should be sealed with elastic sealing gasket. The sealing gasket is made of rubber Shore-Hardness 45～55°. The material should withstand the aging test specified in EN50014 B3.3. The diameter of the cable brought into the terminal box shall conform to that of the bore in the sealing gasket. Several different concentric round slots are made in the sealing gasket and the values of the minimum outside diameter of cable corresponding to each round slot are marked on the outer surface of the sealing gaskets. The bear diameter of sealing gasket can be adjusted according to cable diameter. The coupler should be so tightened that no gaps exist between the sealing gasket and the cable, between the sealing gasket and enter of terminal box and between the sealing gasket and chamber of gasket ring. Otherwise the flameproof property of the enclosure would be lost.

4.4 The insulating parts of terminal bushing and connecting plate in the terminal box are made of insulating material being of Degree II tracking resistance.

4.5 Earth: Earthing of the motor is the important measurement to prevent leakage electric sparks to ensure safety. A steel or copper galvanized bolt uses as an earth terminal and also an earthing sign board  fitted on distinct position of the motor enclosures.

4.6 Flameproof parts are the frame, the end shields, the shaft (rotor), the inner bearing covers, the bottom section of terminal box, the base of terminal box, the cover of terminal box, the terminal bolts, the seal gasket, the terminal sleeve, or terminal board, see Figures 1～3.

5 电动机的安装与使用要求

5.1 安装前的准备

5.1.1 电动机开箱前应检查包装是否完整无损。

5.1.2 电动机开箱后应小心清除电动机上的灰尘及轴伸凸缘止口上的防锈剂。

5.1.3 检查电动机的铭牌（及辅助标牌）是否符合订货合同及现场情况要求。

5.1.4 安装前须进行下列各项检查，若不符合要求，则不许投入使用。

a) 有防爆标志和防爆合格证编号，且应检查电动机防爆标志是否符合爆炸性气体环境的要求；

b) 所有紧固螺栓已拧紧，弹簧垫圈无丢失，防爆外壳各部件间联接妥当；

c) 所有隔爆零件无裂纹和影响隔爆性能的缺陷（未使用的新电机可不拆检）。

d) 对带注、排油的电动机润滑脂注油管畅通。

e) 对带轴承测温的电动机轴承监测装置架设好，特别注意避免风扇端的测温装置引接线与风扇相碰，造成事故。

5.2 经长途运输或长期搁置未用的电动机，在使用前必须检查定子绕组与机壳间的绝缘电阻，其值应不低于 $3\times U_N/1000$ MΩ（U_N额定电压，单位 V），否则电动机必须进行干燥处理，直到绝缘电阻达到规定值为止。

5.3 电动机安装时，应保证电动机中心线与被传动机器的中心线一致，否则会引起轴承损坏和轴断裂。并应检查联轴器或正齿轮的螺丝和销子是否紧固，机组转动是否灵活，有无卡位窜动和不正常的声音等。

5.4 检查电动机的轴承是否缺油，外壳是否可靠接地或接零等。

5.6 检查电动机保护装置是否符合要求，安装是否牢固可靠。

5.7 检查起动设备接线是否正确，起动装置是否灵活，触头接触是否良好，起动设备的金属外壳是否可靠地接地或接零等。

5.8 检查三相电源电压是否正常，电压是否过高、过低或三相电压不对称等。

5.9 电动机与电源连接

5.9.1 接线盒位于电机顶部，接线盒斗（橡套电缆为喇叭口形式，钢管布线为管螺纹形式，铠装电缆为管螺纹形式）和接线盒联接并成水平位置，若接线盒旋转 180° 时，可以从另一侧水平方向进线。且根据电动机电流大小，使用条件，正确选择供电电缆，电动机接线盒规格及铜芯电缆截面积见表 1。

表 1 Table 1

接线盒规格 Specification of terminal box	M4	M5	M6	M8	M10	M16
机 座 号 Frame size	H63～71	H80～132	H160～180	H200～225	H250～280	H315～350
功率 Output kW	0.016～1.1	0.55～4	2.2～22	15～45	30～90	45～315
电流 Current A	0.09～2.5	1.5～8	5.7～42	33～84	61.6～164	101～600
铜芯电缆截面 Cross section of copper core cable mm^2	1. 0 .1.5. 2.5	1.5. 2.5 4.0	4、6、10、16	10、16、25. 35	16、25、35、50、70	25、35、50、70、95

5 Installation and Operating

5.1 Preparations

5.1.1 Before opening the packing cases, check if the package is in good shape.

5.1.2 After opening the packing cases, clean up the dust on the motors and anti-rusting agent on the shaft extension and flange spigot carefully.

5.1.3 Check whether the data on the nameplate (and auxiliary marking plate) conform to the purchase contract and field situations.

5.1.4 The following points must be observed before installing flameproof motors. No operation is allowed if any one of these points is unsatisfactory.

a) The sign "Ex" and the certificate' s series number must have been attached to the motor. Check whether the mark of explosion protection is conform to the explosion gas location where the motor is intended to use.
b) All the bolts are tightened and spring washers are present. All parts of the flameproof enclosure are connected firmly;
c) No cracks or defects affecting the flameproof property could be found on all the flameproof parts. (For the new motor having not been used, this item can be omitted.)
d) For the motor with grease drain and replenish device, the grease replenish pipes shall be unblocked.
e) For the motor with bearing temperature detector, after the device being set up, be sure that its flexible cord shall not touch with the fan to prevent the motor from accident.

5.2 For the motor being long-distance transported and long-time stored, prior to using, the insulation resistance values between stator windings and enclosure shall not lower than $3\times$ UN/1000 MΩ (UN: rated voltage in V), otherwise the motor must be dried until the insulating resistance value achieves the specified one.

5.3 During the motor being mounted, care must be exercised in lining up, as misalignment can be detrimental to bearings and shaft in both the motor and driven equipment. Check whether the coupling or screw and pin on spur gearing is fastened, the unit runs smoothly and jam, shift and abnormal noise is present or not.

5.4 Check whether the motor's bearings are short of grease, the bearings are short of grease and the enclosure earthes or connects with zero line reliable etc.

5.6 Check whether the protective devices conform to the requirements and they are installed firmly and reliably.

5.7 Check whether the connection on the driven equipment is correct, force-supplied rotation on the driven equipment is smooth, the touching heads contact well, the metallic enclosure of the driven equipment earthes or connects with zero line reliably etc.

5.8 Check whether three-phase power supply voltage is normal. No phenomenon of over-high or over-low voltage and unsymmetry of three phase voltage is present.

5.9 Connecting with Electric Source

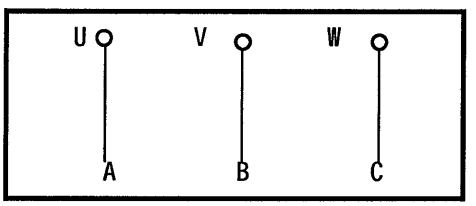
5.9.1 The bottom section of terminal box is located on the top of the motor. The gland (for the rubber-insulated cable, it is bell-shaped hole; while for conduit cable entry, it is a pipe-threaded hole and for armoured cable also pipe-threaded hole) and the bottom section of terminal box are joined together horizontally. Turn the bottom section of terminal box by an angle of 180° , and than cable can be brought in in a horizontal way on the other side. For the terminal box specification and the cross section of copper core cable, see Table 1. The power cable should be correctly chosen according to motor's current and service conditions.

5.9.2 电动机的接线方法：

5.9.2 Connecting Method:

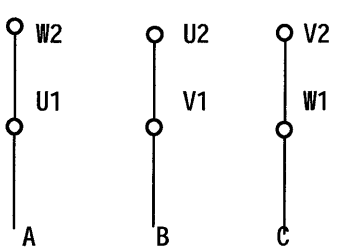
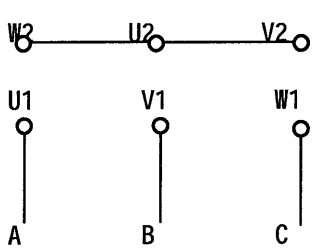
a) 电动机接线盒内三个接线端子，其线端标志为 **U、V、W**，接线方法如下图所示。

a) For the terminal box with three terminals, The marks of terminals are separately U, V and W. The connecting method is shown in the follows:



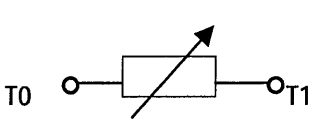
b) 电动机接线盒内六个接线端子，通过连接片改变接线，可适用两种不同电压的需要。其线端标志为 **U1、U2、V1、V2、W1、W2**，接线方法按铭牌上电压而定，接线方法如下图所示。

b) For the terminal box with six terminals, changing of connecting method through joint strips can be suitable for the requirement of two different voltages. The marks of the terminal are separately U1, U2, V1, V2, W1 and W2. They are connected according to the voltage specified on the nameplate. The connecting method is shown in the follows:

△接，低电压 △ connection，low voltage	Y 接，高电压 Y connection，high voltage
	

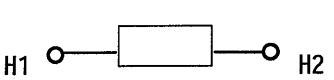
c) 对设置的绕组温控装置（热敏电阻）及加热器，其引出线在主接线盒内。引出接线示意图如下：

c) For the winding temperature detector (thermal resistor) and heater terminal box, the outlet lines are inside the primary terminal box. The connection diagram is as follows:



热敏电阻接线图

Connection diagram of thermal resistor

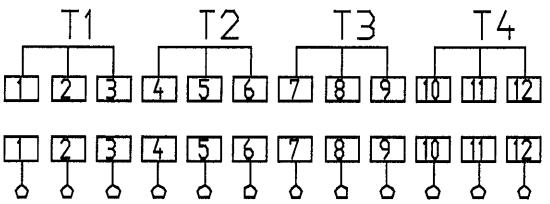


加热器接线图

Connection diagram of space heater

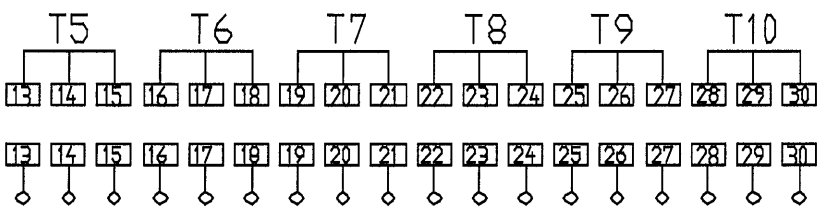
d) 对设置的轴承测温及绕组测温，其引接线端接在单独的测温接线盒内。引接线接线示意图如下：

d) For the bearing temperature detector and the winding temperature detector, the outlet lines are terminated inside the separate terminal box for temperature detectors. The connection diagram is as follows:



1-12 用于轴承测温电阻的联接

1-12 for connecting bearing temperature measurement resistor



13-30 用于定子测温电阻的联接

13-30 for connecting stator temperature measurement resistor

5.9.3 电动机的相序 U、V、W 与接入的外电源相序 A、B、C 相对应，电动机的转向从轴伸端看，为顺时针方向，否则电动机将反转，当旋转方向与要求不一致时，将外电源任何两相对调一下，即可改变电动机转向。

5.9.4 接线时，电缆芯线应置于两个弓形垫圈或压线板之间，接地芯线应置于接地螺钉的弓形垫圈之间，并应可靠连接，以保证接触完好和电气间隙的需要。

5.9.5 接线完毕后，应检查盒内有无杂物、灰尘、接法是否符合电源电压及电动机的铭牌数据的规定，确定无误方可紧固接线盒盖。

5.9.6 入接线盒的电缆，用卡板将其固定在接线盒斗上，以防止电缆拔脱。

5.9.7 外接地螺栓应可靠接地。

5.9.8 旋转方向要求的电动机，电动机转向应符合电动机辅助标牌上的规定，若不符合，应及时调整。

5.9.9 电动机接线后，经检查确认无误可接通电源进行空载试运行，并观察电动机有无异常现象，待空载运行正常后方可投入负载工作。

5.9.10 或负载运行时，均不应有断续的或异常的声响或振动。

5.9.1 老化变质，若老化变质应及时更换。

5.10 起动时的注意事 **1** 装置密封圈是否项

5.10.1 应迅速、果断地拉闸，以免烧毁电机，查清原因后，再起动电动机。

5.10.2 用同一台变压器供电时，不能同时起动，应由大到小逐台起动。

5.10.3 降低电压起动时，必须为空载或轻载，电动机只允许每小时冷态起动两次，热态起动一次。

5.9.3 Clockwise rotation will be viewed from the drive end if the motor's phase sequence U, V, W corresponds to the outer power's phase sequence A, B, C, or else vice versa. When the rotation direction is different with the required one, the exchange of any two outer power's phase sequence can change the motor's rotation direction.

5.9.4 When connecting, the cores of cables should be set between the two arc washers or two strap clamps. The cores of earthing cable should be set between the arc washers of earthing bolt and be earthed reliably in order to ensure that electric contact and clearance conform to the requirement.

5.9.5 After finishing connecting, check whether there is any substance or dust in the box and whether the connection conforms to supply voltage and data specified on the motor's nameplate. The terminal box cover can not be fastened until ensuring no doubt.

5.9.6 The cable inlet into the box must be fixed in the gland by clamping plate to prevent the cable from pulling out.

5.9.7 The external ground bolt should be earthed reliably.

5.9.8 For the motor having requirement of rotation direction, the rotation direction should conform to the specification on the auxiliary nameplate. If it dose not conform, adjust it in time.

5.9.9 After finishing connecting, energize the motor only after no error is found. The motor must be tested working at no load and at the same time observe whether any abnormal phenomena appears or not. The motor can operate at load only after the motor runs normally at no load.

5.9.10 When the motor operates at load, intermittent or abnormal noise or vibration should not taken place.

5.9.11 Check to see whether the seal rings are aged deterioration，replace them in time if so.

5.10 Points for Attention When Starting

5.10.1 After energizing, if the motor does not run, the motor should be deenergized quickly and resolutely in order to avoid the motor being damaged. Restarting the motor only after finding out the failure cause.

5.10.2 When more than identity motors are powered by identity transformer, they can not be started at the same time. The correct method is starting them one by one in the order from one to smaller one.

5.10.3 When the motor is started at reduced voltage, it must be at no-load or low load. It is only allowed to start twice at cold state of the motor and once at hot state per hour.

6 电动机的维护和修理

6.1 电动机应定期维护和修理，为月维修和年维修。

6.1.1 月维修:

6.1.1.1 清擦电动机，清除和擦去机壳外部尘垢，测量绝缘电阻。

6.1.1.2 检查电动机接线端子：检查接线盒接线螺栓（母）是否松动，拧紧螺母，必要时更换。

6.1.1.3 检查各固定部分螺栓（母）和接地线：检查接地螺栓（母），检查端盖、轴承内外盖紧固螺栓，检查接地线连接及安装情况。

6.1.1.4 检查轴承：拆下轴承盖，检查轴承润滑脂是否变脏、干涸，缺少时须适量补充，检查轴承是否有杂声，必要时更换。

6.1.1.5 检查电动机风扇有无破裂损坏，安装是否牢固，紧固螺栓（母）是否松动、损伤、磨损和变形，必要时更换。

6.1.2 年维修：

6.1.2.1 年维修内容包括月维修内容。

6.1.2.2 电动机外部检查：检查外部有无损坏，零部件是否齐全，彻底清擦，去掉尘垢，补修损坏部分。

6.1.2.3 电动机内部清理和检查：(a) 检查定子绕组污染和损伤情况，先去掉定子的灰尘，擦去污垢，若定子绕组积留油垢，先用干布擦去，再用干布沾小量汽油擦净，同时仔细检查绕组绝缘是否出现老化痕迹或有无脱落，若有，应补修、刷漆；(b) 检查铸铝转子污染和损伤情况，用目测或比色检查转子是否裂缝、污染和损伤；(c) 检查定、转子铁心有无磨损变形，如有变形，则应予修整。

6.1.2.4 绕组电气检查：(a) 检查定子绕组和转子绕组是否有相间短路，匝间短路、断路、脱焊，烧坏等现象，应针对发现的问题予以修理；(b) 用兆欧表测量所有带电部位绝缘电阻，阻值应大于 1MΩ。

6.1.2.5 清洗轴承并检查轴承磨损情况：(a) 用盛有汽油的容器来回搅动轴承多次，随后用手握住轴承内圆，转动外圆，在转动过程中，放在另一盛有汽油容器中清洗，轴承安装时，允许采用热套法，加热时，机油温度不得超过 100℃，而且轴承应得到均匀加热；(b) 检查轴承表面、滚珠及轴圈等处情况，若出现兰紫色，说明轴承已受热退火，严重者应更换轴承；(c) 有条件者对轴承内径、外径、宽度的尺寸进行测量。

6.1.2.6 修理后试运行：若电动机绕组完好，大修后要做一般性试运转，测量绝缘电阻，检查各部分是否灵活，电动机空载运转半小时，然后带负载运转。

6.2 电动机运行时，轴承温度应不高于 95℃（温度计法），轴承运行 2500h 至少检查一次，若出现润滑脂变质时，必须及时更换。清理轴承内、外盖注排油装置内的废油，达到干净、畅通，轴承需用汽油清洗干净。轴承装配时，直接添加润滑脂：2P 加油量为轴承室净容积的 1/2，4P 及以上规格电动机，加油量为轴承室净容积的 2/3。电动机运行中通过注油杯加油，2P 电动机每运行 2000h、4P 及以上电动机每运行 3000h，加油 25～45g，加油量随机座号的增加而递增。轴承润滑脂一般采用锂基润滑脂 L-XBCHA3，特殊润滑脂在附注标牌中注明。

6.3 拆装电动机时，注意保护隔爆面，加工配合面涂 204-1 防锈脂，不得有锈蚀或损伤。

6.4 在抽出或插入转子时，应防止损坏定子绕组和绝缘。

6.5 更换绕组时，电动机的绕组数据和绝缘结构不宜改变，随意改变电动机绕组，往往使电动机的某项或某几项性能恶化，以致不能使用。

6 Maintenance and Reparation

6.1 For the motors, the maintenance and reparation process should be carried out periodically, which can be divided into two parts: month maintenance and year maintenance.

6.1.1 Month maintenance:

6.1.1.1 Clean up motors: clear away the dust and dirt on outside surface of enclosure and measure insulation resistance.

6.1.1.2 Check motor's connecting terminals: check the connecting bolts (nuts) in terminal box to see whether connecting bolts (nuts) loose or not, give bolts (nuts) a good screw and replace them when necessary.

6.1.1.3 Check the bolts (nuts) on each fixed portion: check earthing bolts (nuts), fastening bolts on end shield and internal and external bearing covers, connection of ground lead and setting.

6.1.1.4 Check bearing: dismounting bearing cover, check whether the grease in bearings has been dirty and dried up or not. It is should be replenished as required, if they have run short of grease. Replace the bearings when necessary.

6.1.1.5 Check motor fan to see whether it has been ruptured or damaged and set firmly, fastening bolts (nuts) loosened, damaged, worn and deformed. Replace them when necessary.

6.1.2 Year maintenance:

6.1.2.1 Year maintenance or overhaul consists of month maintenance or routine repair.

6.1.2.2 Check the outside of motors: check the outside of motors to see whether the outside has been damaged, components are present. Clear away dust and dirt and repair damaged sections.

6.1.2.3 Clear and check the inside of motors:

(a) Check to see whether the stator windings are dirt and damaged. Clean away dust and dirt on the stators. If oil dirt can be found on stators, clean them with dry cloth first and then with dry cloth dipped a bit oil. At the same time, check winding insulation carefully to see whether there is any aging or scale off traces. If these traces are present, the stators should be repaired and painted.

(b) Check rotor winding to see whether rotor windings are dirt or damaged, observed visually the rotor end ring or color comparison to see whether there is any crack, staining and damage.

(c) Check stator and rotor cores to see whether there is any deformation, otherwise the stator and rotor cores should be repaired.

6.1.2.4 Check windings:

(a) Check the stator windings and rotor windings to see whether short circuit or open circuit between interphases or interturns, tip-off and burnt out occur. If any, solve these discovered problems.

(b) Measure insulation resistance on all live parts with a magaohm meter and the insulation resistance value should be larger than 1MΩ.

6.1.2.5 Bearing clean and check:

(a) Put the bearings into a container filled with gasoline and stir them time and again. Then hold bearing inner circle by hand and rotate top circle. During rotating, put them into another container for cleaning. It is enable to adopt shrink-on method when mounting bearings but the oil temperature should not be higher than 100℃ and bearings should be heated even.

(b) Check bearing surface roughness and ball or bearing race to see whether bearings have become purple and annealed by heating. Replace bearings if necessary.

(c) Measure bearing internal and external diameter and width, if the condition permits.

6.1.2.6 Preliminary operation after overhaul: The preliminary operation should be done after overhaul, if motor windings are in good condition. Measure insulation resistance, check the liveliness of all parts. Motors should run without load for half an hour and then with load.

6.2 During the operation, the maximum permissible temperature of the bearings should not exceed 95℃ (with a thermometer). The bearings must be inspected at least once for operation of 2500h. And it is necessary to change for lubricating-grease in time after clean them with gasoline if any degeneration is found. Clean away the waste grease from grease drain and replenish devices in order to make the devices clean and unblock. Bearings should be cleaned up with gasoline. When assembling, grease should be directly filled in. For 2-pole motors, an amount of oil should be half the net volume of the bearing house and for 4-pole and above motors two thirds. The motors in operation are oiled through oil charging cup. 25～45g oil should be added per 2000h operation for 2P motors and 3000h operation for motors 4P and above. The amount of oiling should be increased by degrees along with frame size upgrade. Generally, the lithium-based grease L-XBCHA3 is recommended. The special grease is indicated on auxiliary marking plate.

6.3 While the motor being assembled or dismantled, its flameproof joint surfaces must be kept from damage. Machining fitting surface shall be coated with Anti-rust Grease 204-1 and no rustiness or damage appears.

6.4 When the stator is taken out from the motor or insert into the motor, the stator windings and insulation should be pay attention in order to avoid them being damaged.

6.5 When renewing windings, the winding data and insulating construction should not be changed. Changing windings at will often make certain or some performance worsen and make the motor useless.

7 电动机的贮存、运输

7.1 电动机贮存中应保持环境干燥，应放在环境空气温度为-15～+40℃，水冷却电机为0～+40℃，相对湿度不大于90%的清洁、通风良好的库房内，空气中不得含有腐蚀性气体，并避免周围环境温度的急剧变化。

7.2 电动机贮存中不宜堆积太高，以免影响通风及损坏下层电动机的包装。

7.3 贮存和运输中，电动机不可倒置。

7.4 注意保护轴伸，不可用绳子套在轴伸上拖动电动机。

7.5 注意保护油杯，轴承测温装置及引接线，定子绕组测温及防潮湿加热装置及引接线。

7 Storage and Transportation

7.1 The motor in stored should keep dry and the storehouse should be clean, ventilated well and do not appears any chemical corrosion gases. The ambient temperature should be within the range of -15+40℃ and prevent changing rapidly. The relative humidity should not exceed 90%.

7.2 Motors in store should not be piled up too high in order to avoid poor ventilation and damaging of the packing in the lowest player.

7.3 Motors in store and transport shall not be placed up side down.

7.4 Care must be taken to the shaft extension. It is prohibited to draw the motor by shaft extension.

7.5 Safeguard the grease cup, the bearing temperature detector, the stator winding temperature detector, the space heater and their leads.

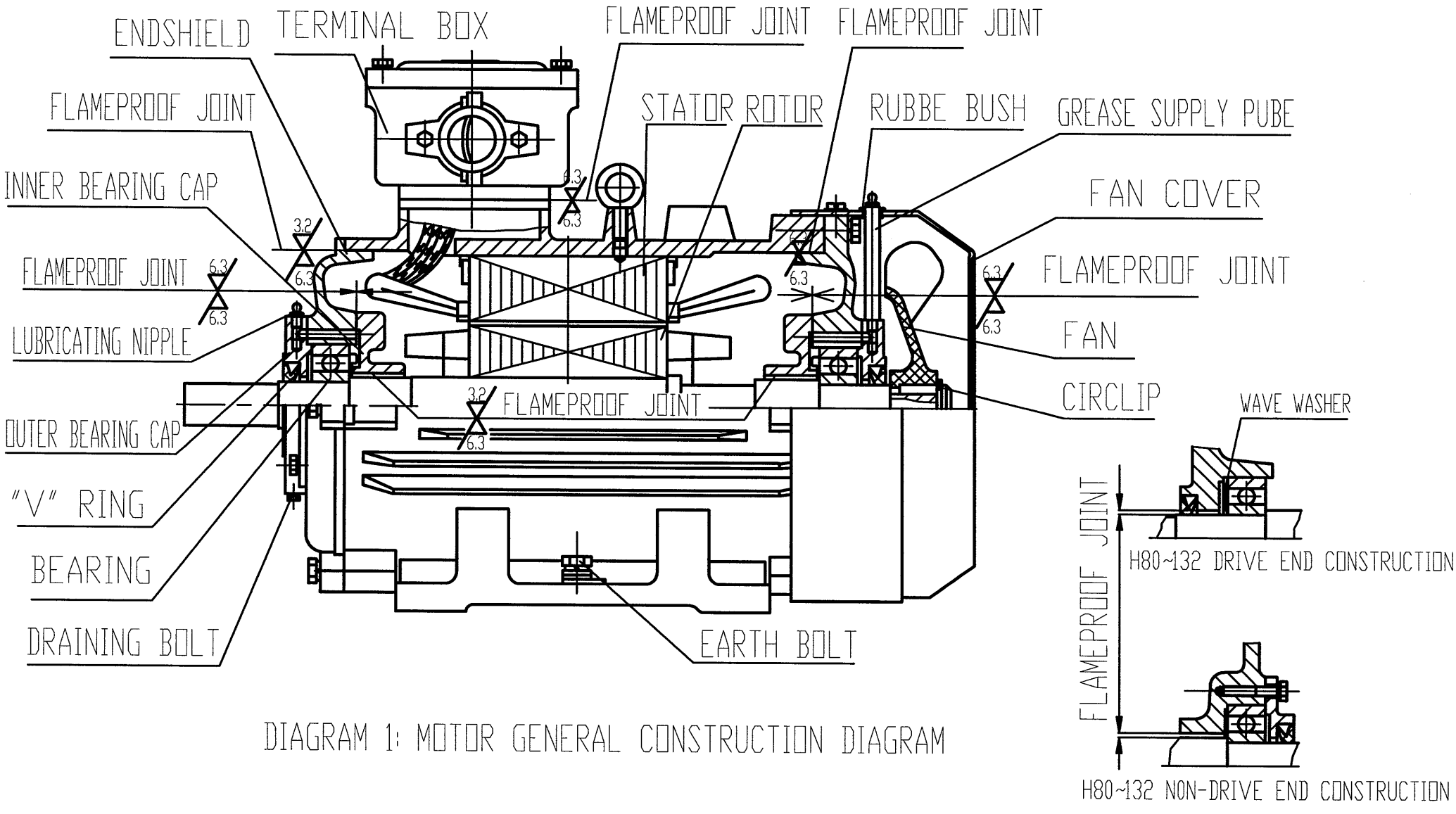


DIAGRAM 1: MOTOR GENERAL CONSTRUCTION DIAGRAM

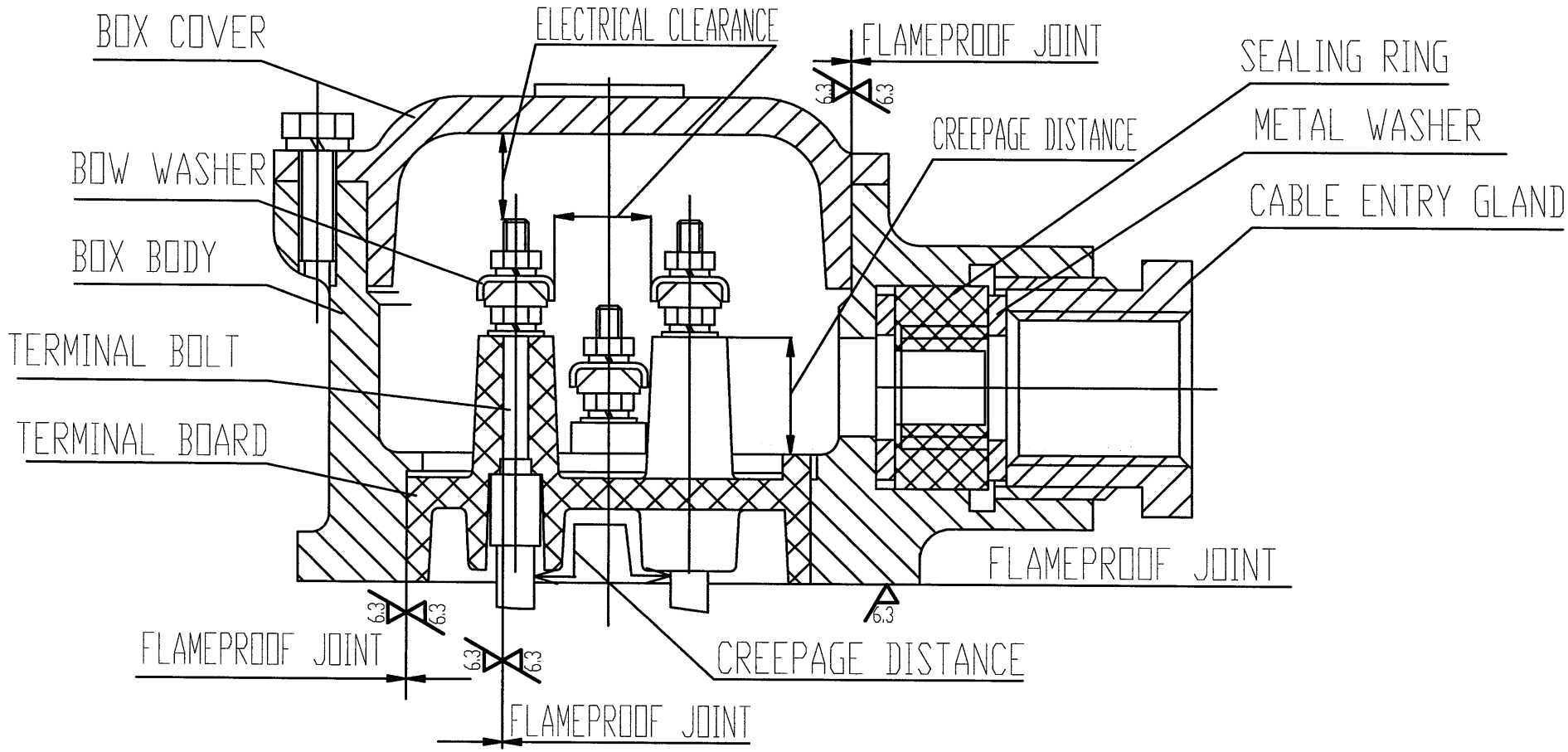


DIAGRAM 2: BOX CONSTRUCTION
FOR H63~71 SINGLE VOLTAGE BELOW 750V

RATING VOLTAGE (V)	175≤U≤275	275≤U≤420	420≤U≤550	550≤U≤750
MIN. ELECTRICAL CLEARANCE(mm)	5	6	8	10
MIN. CREEPAGE DISTANCE (mm)	6.3	10	12.5	16

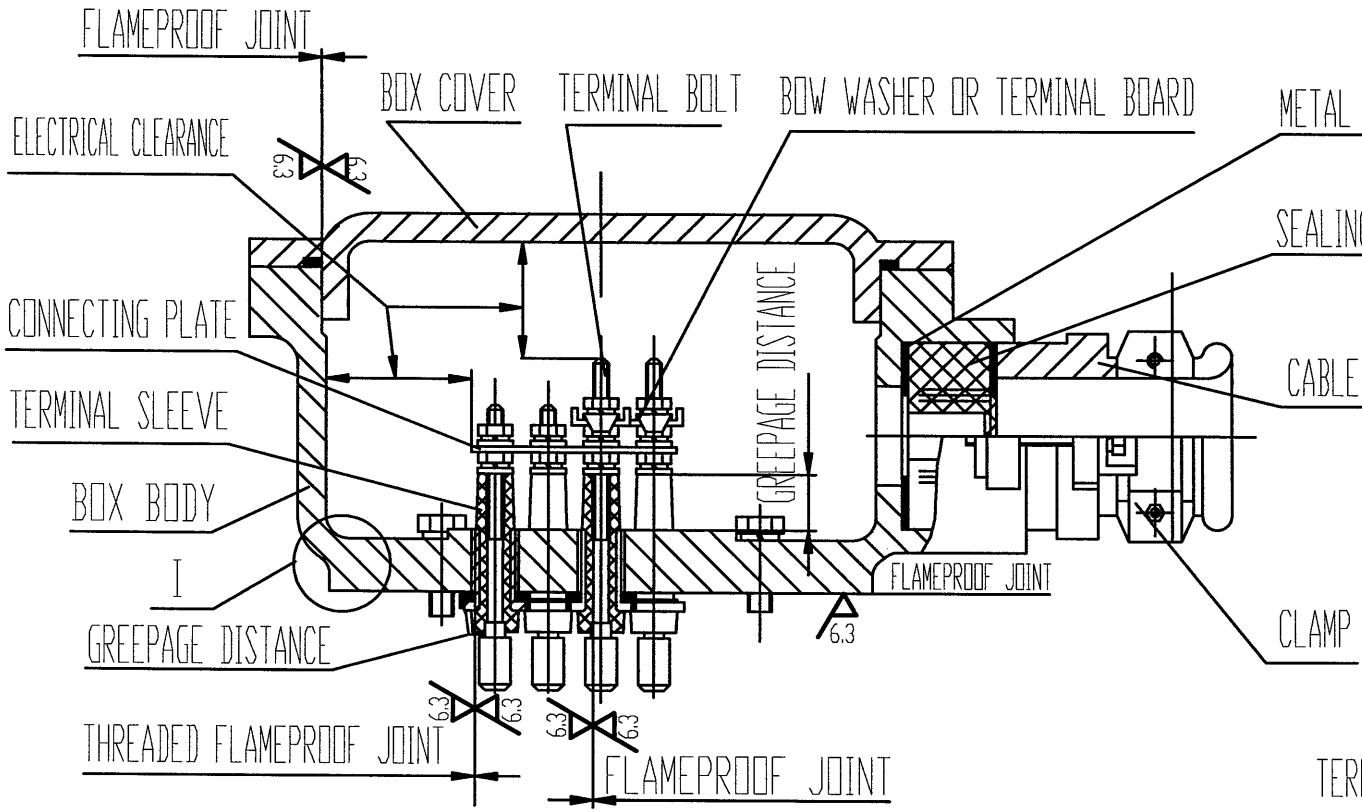
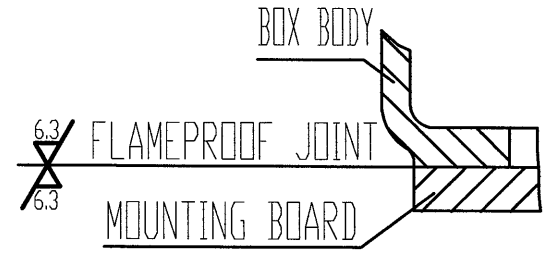


DIAGRAM 3: BOX CONSTRUCTION FOR H80~355



TERMINAL BOX FOR H250-355 MOTOR WITH MOUNTING BOARD

RATING VOLTAGE (V)	175≤U≤275	175≤U≤420	420≤U≤550	550≤U≤750	750≤U≤1100	1100≤U≤2200
MIN. ELECTRICAL CLEARANCE(mm)	5	6	8	10	14	30
MIN. CREEPAGE DISTANCE (mm)	6.3	10	12.5	16	25	36

Note:The minimal electrical clearance and creepage distance at 1140V can be calculated by means of linear interpolation method

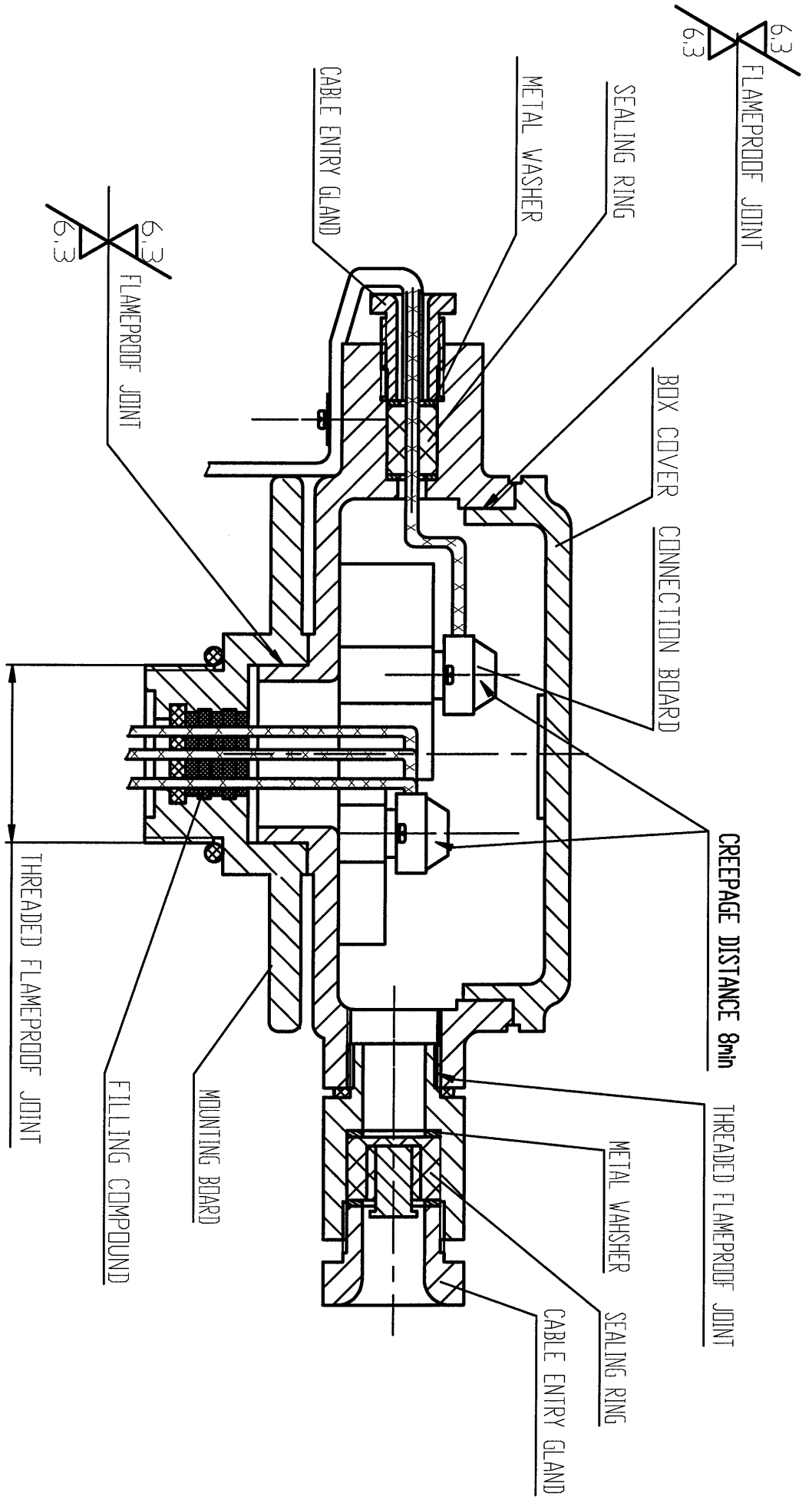


DIAGRAM 4:TERMINAL BOX CONSTRUCTION FOR
TEMPERATURE DETECTING OF H315~355 MOTOR'S BEARING AND WINDING

Certificates

HOPPE Bordmesstechnik GmbH

Type Approval Certificate

Germanischer Lloyd

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	**17 090 - 00 HH**
Company	**Hoppe Bordmesstechnik GmbH** **Kieler Straße 318** **D-22525 Hamburg**
Product Description	**Anti-Heeling System**
Type	**AH V2P1 and AH V4P1**
Environmental Category	**None**
Technical Data / Range of Application	**Range : 2° Port to 2° Starboard** **Heeling Pre Alarm: > 2,5°** **Emergency Stop: > 5,0°** **System Alarms: Voltage Failure** **Tank low Level** **Pump Failure** **Valve Failure** **Pendulum Transmitter Fault** **Anti Heeling System with Independent Emergency Stop** **Power Supply: 24 V DC** **Main Modules: AH MIP (AH-BF03B) Electronic Unit / Microcontroller 80C537** **HOP-O-01A Digital Output Modul** **HOP-I-01A Digital Input Modul** **Pendulum** **Software Version: 9120 V0.0. dated 22-09-2000** **Test and Evidence regarding Requirement Class 3**
Test Standard	**Regulations for the Use of Computers and Computer Systems**
Documents	**Test report : 9120-0005 dated 14-09-2000 and 04895.169.04 dated 20-10-2004; Software Description 9120-0002 dated 08-09-2000; Functional Description 9120-00031 dated 12-09-2000; Operation Manuals: Anti Heeling System with Reversible Pump 9220-20-0012 and with Centrifugal Pump 9220-20-0022 dated 07/2005**
Remarks	**Documents for all applications on board to be sent for approval.** **Use of type approved hardware (GL-Certificate 17 091-00 HH) only.**
Valid until	**2010-09-11**

Page 1 of 1

Type Approval Symbol GL

File No. I.B.09

Hamburg, 2005-09-12

i.V. J. Wittburg

i.A. A. Grün

Germanischer Lloyd

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

HOPPE Bordmesstechnik GmbH

Type Approval Certificate

Germanischer Lloyd

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	**17 091 - 00 HH**
Company	**Hoppe Bordmesstechnik GmbH** **Kieler Straße 318** **D-22525 Hamburg**
Product Description	**Electronic Moduls**
Type	**AH- +UNI-MIP, HOP-O-01A+I-01A, RDU BG51+7S2, RAD6+6U, RDA8, RDO8+16E +32TE, RDI16+32E, RDIO12, RAD8, RDCE, HCG4010/KS, HOBUS-D, HOPAC, HOHAC**
Environmental Category	**C; EMC2**
Technical Data / Range of Application	**AH-MIP:** Anti Heeling Electronic Unit / Microcontroller 80C537 **HOP-O-01A:** Digital Output Modul for AH-MIP **HOP-I-01A:** Digital Input and Power Supply Modul for AHMIP **UNI-MIP:** Universal Electronic Unit / Microcontroller 80C537 **RDU BG51:** Bargraph Indicator **RAD6, RAD6-U, RAD8:** Analog Input Modules **RDA8:** Analog Output Module 0(4) - 24 mA/ 0-10V **RDU 7S2:** Numeric LED Indicator **RDO8, RDO16E, RDO32TE:** Digital Output Modul (E = Extension) **RDI16, RDI32E:** Digital Input Modul (E = Extension) **RDIO12:** Digital Input Output Modul **RDCE:** Remote Digital Controler Extension Modul **HCG4010/KS:** Bus Sensor Tanktransmitter **HOBUS-D:** Junction Box **HOPAC, HOHAC:** Position Indicator **Pendulum:** Pendulum Transmitter PE 4000
Test Standard	**Guidelines for the Performance of Type Approvals, Part 2, Edition 2003**
Documents	**Test report : Pb-Nr. 3438 / 00 dated 18-08-2000 and Pb-Nr. 3439 / 00 dated 10-08-2000; EMC Protocol 000107 dated 22-07-2000 and 04895.168.04 dated 20-10-2004 System Documentation 9190-... and 9191- ... dated May 2000**
Remarks	**None**
Valid until	**2010-09-11**

Page 1 of 1

File No. **I.A.03**

Type Approval Symbol GL

Hamburg, 2005-09-12

Germanischer Lloyd i.V. J. Wittburg i. A. A. Grün

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

Type Approval Certificate

Germanischer Lloyd

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No.	95 865 - 91 HH
Company	Wouter Witzel EuroValve B.V. Industrieterrein de Pol 12 7581 CZ Losser, NETHERLANDS
Product Description	BUTTERFLY VALVES
Type	EVS / EVL / EVBS / EVML / EVFS / EVFL / EVTLS
Environmental Category	None
Technical Data / Range of Application	TECHNICAL DATA Materials Body: GG-25 , GGG-40 Valve disc: 1.4057 , AISI 316 , GGG-40 , 2.0966.97 , 2.0966.98 Shaft/pins: 1.4057 , AISI 316 , AluBr Lining: NBR , EPDM Plain bearing: PTFE RANGE OF APPLICATION The a.m. butterfly valves are approved and can be used in piping systems on ships and other structures classed by Germanischer Lloyd. LIMITATIONS - Valves made of grey cast iron are permitted only in class III piping systems and in cargo systems on oil tankers. - Wafer type butterfly valves are not to be used on the ship´s hull.
Test Standard	Regulations for the Performance of Type Tests on Mechanical Components and Equipment, Part D.2 of Germanischer Lloyd.
Documents	- Report of tests carried out dated 03.04.1991 - Technical data sheets and drawings - Quality manual
Remarks	None
Valid until	2012-04-09

Type Approval Symbol GL

File No. II.A.04

Hamburg, 2007-05-10

Germanischer Lloyd

i.V. Günter Hölzer

i.A. Hagen Markus

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

Type Approval Certificate

Germanischer Lloyd

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. **95 865 - 91 HH**

Technical data of the butterfly valves:

Type	Construction	Nominal Dia. [DN]	Nominal Pressure [PN]
EVS	Wafer type	50 - 1600	10 / 16
EVL	Wafer type	50 - 300	10 / 16
EVBS	Semi-lug type	50 - 300	16
EVML	Mono flange type	50 - 800	10 / 16
EVFS	Double flange type	50 - 1600	10 / 16
EVFL	Double flange type	50 - 1000	10 / 16
EVTLS	Tapped-lug type	50 - 600	10 / 16

Temperature range:

NBR	-30°C to + 90°C
EPDM	-50°C to +120°C

The selection of the butterfly valves for the intended use and the right installation and maintainance are to be in accordance with the regulations of the manufacturer.

Valid until **2012-04-09**

Page **2 of 2**

Type Approval Symbol GL

File No. **II.A.04**

Hamburg, 2007-05-10

Germanischer Lloyd

i. V. Günter Hölzer

i. A. Hagen Markus

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

EC-TYPE EXAMINATION CERTIFICATE

1

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC-Type Examination Certificate Number : **BAS01ATEX7145**

4 Equipment or Protective System: **MTL5015 TWO CHANNEL SWITCH/PROXIMITY DETECTOR INTERFACE WITH LINE FAULT DETECTION AND PHASE REVERSAL**

5 Manufacturer: **MEASUREMENT TECHNOLOGY LIMITED**

6 Address: **Luton, Bedfordshire, LU1 3JJ**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 The Electrical Equipment Certification Service, notified body number 600 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report N°

01(C)0220 dated 18 December 2001 (held on EECS 0703/02/299)

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 + Amds 1 & 2 **EN 50020: 1994**

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign **"X"** is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC-TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment or protective system.

12 The marking of the equipment or protective system shall include the following:-

Ex II (1) GD [EEx ia] IIC (-20°C ≤ T_a ≤ +60°C)

This certificate may only be reproduced in its entirety and without any change, schedule included.

File No: EECS 0703/02/320

This certificate is granted subject to the general conditions of the Electrical Equipment Certification Service. It does not necessarily indicate that the apparatus may be used in particular industries or circumstances.

I M CLEARE
DIRECTOR
29 April 2002

HSE Health & Safety Executive

Electrical Equipment Certification Service
Health and Safety Executive
Harpur Hill, Buxton, Derbyshire, SK17 9JN, United Kingdom
Tel: +44(0)1298 28000 Fax: +44(0)1298 28244
internet: www.baseefa.com e-mail: baseefa.info.eecs@hsl.gov.uk

Re-issued 5 July 2002 to correct drawing numbers.

CERT\ATEX\EQUIP\CAT1-2\P, Issue 1, Dated September 1998

Page 1/5

13 **Schedule**

14 **EC-TYPE EXAMINATION CERTIFICATE N° BAS01ATEX7145**

15 **Description of Equipment or Protective System**

An MTL5015 Two Channel Switch/Proximity Detector Interface with line fault detection and phase reversal enables two safe area loads to be controlled by two switches or proximity detectors located in the hazardous area. Two floating solid state on/off switches compatible with logic circuits are provided for connection in the safe area circuit. The MTL5015 is designed to restrict the transfer of energy from unspecified safe-area apparatus to two independent intrinsically safe circuits by the limitation of voltage and current.

LED indication is provided to indicate power-on, line-fault and the status of each output. Switches permit the operator to specify the line fault detection and phase reversal requirements.

The MTL5015 apparatus comprises of three isolating transformers which provide galvanic isolation between the hazardous area and the non-hazardous area circuitry and two independent detection circuits each with zener diode/diode/resistance combinations to provide voltage and current limitation. The above, together with other electronic components are mounted on a printed circuit board and housed in a moulded plastic enclosure. Polarised plugs and sockets are provided for the hazardous area and non-hazardous area connections.

CON 3, Pins 7, 8, 9; CON 4, Pins 10, 11, 12 and CON 5, Pins 13 &14

$U_m = 250V$

The circuit connected to the safe area terminals CON 3, CON 4 and CON 5 are designed to operate from a d.c. supply voltage of up to 35V.

Channel 1, CON 1, pins 2/3 wrt 1
Or
Channel 2, CON 2, pins 5/6 wrt 4

$U_o = 10.5V$
$I_o = 14mA$
$P_o = 37mW$

$C_i = 0$
$L_i = 0$

Each channel may be considered as a separate Intrinsically Safe circuit.

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the following values:

13 Schedule

14 EC-TYPE EXAMINATION CERTIFICATE N° BAS01ATEX7145

GROUP	CAPACITANCE in µF	INDUCTANCE in mH	OR	L/R RATIO in µH/ohm
IIC	2.41	175		983
IIB	16.8	680		1333
IIA	75	1000		1333

Equipment referred to in this certificate having the same type number as items in BASEEFA Certificate No Ex 97D2266 may be used as a direct substitute in a system provided that the cable parameters used are within the limits shown on this certificate.

VARIATION 0.1

To permit the removal of components associated with the second channel thus forming the MTL5012 One Channel Switch/Proximity Detector Interface with line fault detection and phase reversal.

Channel 1, CON 1, pins 2/3 wrt 1

$U_o = 10.5V$
$I_o = 14mA$
$P_o = 37mW$

$C_i = 0$
$L_i = 0$

The capacitance and either the inductance or the inductance to resistance ratio (L/R) of the hazardous area load must not exceed the values for a single channel of an MTL 5015 above.

VARIATION 0.2

To permit the connection of MTL5000 Ring Terminal assemblies in place of the safe and hazardous area screw terminals. The enclosure remains IP20 whether or not the Ring Terminal is fitted. The following MTL5000 Ring Terminals may be connected to the MTL5015 and MTL5012. Blanking covers may be removed if necessary.

Hazardous Area Terminal	MTL5015 pins	1, 2, 4, 5
	HAZ-RT-1-5	1, 2, 3, 4
Safe Area Terminal	MTL5015 pins	8, 9, 11, 12
	SAF-RT-8-12	5, 6, 7, 8

Hazardous Area Terminal	MTL5012 pins	1, 2, 3
	HAZ-RT-1-3	1, 2, 3
Safe Area Terminal	MTL5012 pins	11, 12
	SAF-RT-11-12	7, 8

13 **Schedule**

14 **EC-TYPE EXAMINATION CERTIFICATE N° BAS01ATEX7145**

16 **Report No.**

01(C)0220

17 **Special Conditions For Safe Use**

None.

18 **Essential Health and Safety Requirements**

ESSENTIAL HEALTH & SAFETY REQUIREMENTS not covered by standards listed in Section 9		
Clause	**Subject**	**Compliance**
1.1.3	Changes in characteristics of materials and combinations thereof	Report No 01(C)0220 Clause 5.1.1.3
1.2.2	Components for incorporation or replacement	Report No 01(C)0220 Clause 5.1.2.2
1.2.5	Additional means of protection	Report No 01(C)0220 Clause 5.1.2.5
1.2.7	Protection against other hazards	Report No 01(C)0220 Clause 5.1.2.7
1.4.2	Withstanding attack by aggressive substances	Report No 01(C)0220 Clause 5.1.4.2

19 **DRAWINGS**

Number	Sheet	Issue	Date	Description
CI5015	1	2	11.01	MTL5015 Parts List
CI5015	2	1	04.97	MTL5015 Circuit Diagram
CI5015	3	1	04.97	MTL5015 Component Layout
CI5015	4	2	11.01	MTL5015 General Assembly
CI5015	5	1	04.97	MTL5015 PCB Track Layout
CI5015	6	2	11.01	MTL5015 Transformer Winding Details
*CI5000-2	1	3	07.00	IS Transformer TFR300
*CI5000-2	2	3	07.00	IS Transformer TFR300
**CI5000-6	1	5	07.00	IS Transformer TFR309
**CI5000-6	2	5	07.00	IS Transformer TFR309

Drawings marked * are associated with and are held on BASEEFA Certificate BAS01ATEX7157
Drawings marked ** are associated with and are held on BASEEFA Certificate BAS01ATEX7147

Drawing associated with Variation 0.1

Number	Sheet	Issue	Date	Description
CI5012	1	2	11.01	MTL5012 Parts List
CI5012	2	1	04.97	MTL5012 Circuit Diagram

13 **Schedule**

14 **EC-TYPE EXAMINATION CERTIFICATE N° BAS01ATEX7145**

Number	Sheet	Issue	Date	Description
CI5012	3	1	04.97	MTL5012 Component Layout
CI5012	4	2	11.01	MTL5012 General Assembly
CI5012	5	1	04.97	MTL5012 PCB Track Layout
CI5012	6	2	11.01	MTL5012 Transformer Winding Details

Drawing associated with Variation 0.2

Number	Sheet	Issue	Date	Description
***CI5000-12	1 to 4	1	02.02	MTL5000 Ring Terminal

Drawing marked *** is associated with and held on BASEEFA Certificate BAS01ATEX7144

BASEEFA List Keywords
2ISOLBAR

Nemko

[1] EC-TYPE EXAMINATION CERTIFICATE

[2] Equipment or Protected System Intended for use in Potentially explosive atmospheres Directive 94/9/EC

[3] EC-Type Examination Certificate Number: Nemko 01ATEX394

[4] Equipment or Protective System: Motor

[5] Applicant/Manufacturer: Nanyang Explosion Protection Group Co., Ltd.

[6] Address: No.22 North Zhongjing Road
Nanyang, Henan
P.R. CHINA

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] Nemko AS, notified body number 0470 in accordance with Article 9 of Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 200134244

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

CENELEC EN 50014: 1997 + A1: 1999 + A2: 1999 and CENELEC EN 50018:2000

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

[12] The marking of the equipment or protective system shall include the following:

Ex II 2 G EEx d IIC T4

Oslo, 2001-09-20

Rolf Hoel
Certification Manager

Håkon S. Håkonsen
Project Engineer

Postal address: P.O.Box 73 Blindern, N-0314 OSLO, NORWAY
Office address: Gaustadalléen 30, 0373 OSLO
Telephone: +47 22 96 03 30
Fax: +47 22 96 05 50
Enterprise number: NO 974404532

[13] Schedule

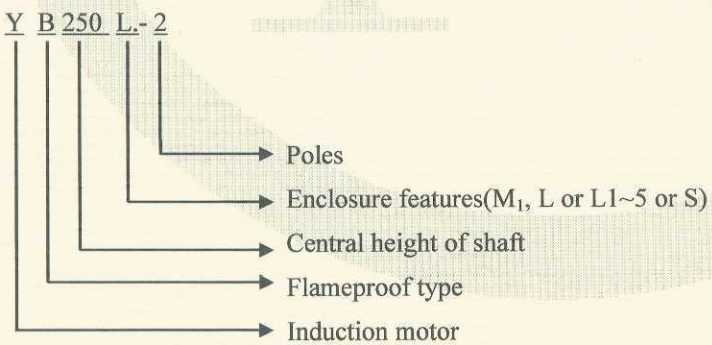
[14] EC-TYPE EXAMINATION CERTIFICATE No Nemko 01ATEX394

[15] **Description of Equipment or Protective System**
This Certificate comprises a series of flameproof three-phase induction motors.

Type Designation and Technical Data
All types: 220/380V, 230/400V, 240/415V, 380/660V, 400/690V, 415/720V 50/60Hz Poles: 2, 4, 6 or 8
Insulation F

YB71-.	0,25~0,55kW
YB80.-.	0,55~1,1kW
YB90.-.	0,75~2,2kW
YB100.-.	1,5~3kW
YB112M-.	2,2~4kW
YB132.-.	2,2~7,5kW
YB160.-.	4~18,5kW
YB180.-.	11~22kW
YB200.-.	15~37kW
YB225.-.	18,5~45kW
YB250M-.	30~55kW
YB280.-.	37~90kW
YB315.-.	45~200kW
YB355.-.	160~315kW

Type designation key example



Ingress Protection Code
IP55 according to EN 60034-5:1991

[16] **Report No. 200134244**

Composed in total 12 pages for each type and 21 pages of descriptive documents

This certificate may only be reproduced in its entirety and without any change, schedule included.

Postal address: **P.O.Box 73 Blindern N-0314 OSLO, NORWAY**
Office address: **Gaustadalléen 30 0373 OSLO**
Telephone: **+47 22 96 03 30** *Fax:* **+47 22 96 05 50**
Enterprise number: **NO 974404532**

Descriptive Documents

Name/Title	Drawing No.	Rev.	Date	Sheets
Terminal Box (M4)	5AP.354.643	-	2001-07	1
Terminal Box (M6)	5AP.354.644	-	2001-07	1
Terminal Box (M8)	5AP.354.645	-	2001-07	1
Terminal Box (M10)	5AP.354.646	-	2001-07	1
Terminal Box (M16)	5AP.354.647	-	2001-07	1
YB71 Flameproof Three Phase Induction Motors	1AP.070.775.1-5	-	2001-07	1
YB80 Flameproof Three Phase Induction Motors	1AP.070.776.1-4	-	2001-07-30	1
YB90 Flameproof Three Phase Induction Motors	1AP.070.777.1-6	-	2001-07-30	1
YB100 Flameproof Three Phase Induction Motors	1AP.070.778.1-4	-	2001-07-30	1
YB112 Flameproof Three Phase Induction Motors	1AP.070.779.1-3	-	2001-07-	1
YB132 Flameproof Three Phase Induction Motors	1AP.070.780.1-9	-	2001-07-30	1
YB160 Flameproof Three Phase Induction Motors	1AP.070.781.1-10	-	2001-07-30	1
YB180 Flameproof Three Phase Induction Motors	1AP.070.782.1-5	-	2001-07-30	1
YB200 Flameproof Three Phase Induction Motors	1AP.070.783.1-6	-	2001-07-30	1
YB225 Flameproof Three Phase Induction Motors	1AP.070.784.1-6	-	2001-07	1
YB250 Flameproof Three Phase Induction Motors	1AP.070.785.1-4	-	2001-07-30	1
YB280 Flameproof Three Phase Induction Motors	1AP.070.786.1-8	-	2001-07	1
YB315 Flameproof Three Phase Induction Motors	1AP.070.787.1-3	-	2001-07	1
YB315 Flameproof Three Phase Induction Motors	1AP.070.788.1-15	-	2001-07	1
YB355 Flameproof Three Phase Induction Motors	1AP.070.789.1-6	-	2001-07	1
YB355 Flameproof Three Phase Induction Motors	1AP.070.790.1-16	-	2001-07	1

Routine Test
A static pressure test must be performed on every motor and terminal box to ensure that the enclosures withstand the pressure and does not contain holes or cracks.
Every motor shall withstand a static pressure lasting between 10 s and 60s:
YB71: 1,5MPa, YB80 to YB132: 1,4MPa, YB160 to YB 280: 1,2MPa, YB315 to YB355: 1,5MPa

[17] Special conditions for safe use
None

[18] Essential Health and Safety Requirements
See item 9

Postal address:
P.O.Box 73 Blindern
N-0314 OSLO, NORWAY

Office address:
Gaustadalléen 30
0373 OSLO

Telephone:
+47 22 96 03 30
Fax:
+47 22 96 05 50

Enterprise number:
NO 974404532

Nemko **Worldwide Testing and Certification**

[1] PRODUCT QUALITY ASSURANCE NOTIFICATION

[2] Equipment or Protected System Intended for use in Potentially explosive atmospheres Directive 94/9/EC

[3]	**Notification Number :**	**Nemko 01ATEX483Q**
[4]	**Equipment or Protective System or Components as listed:**	**Explosion Protected Three-phase Induction Motors** **⟨Ex⟩ II 2 G EEx d**
[5] [6]	***Applicant and Manufacturer*:**	**Nanyang Explosion Protection Group Co., Ltd** **22 North Zhongjing Road, Nanyang City** **Henan Province, 473008** **P.R. CHINA**

[7] Nemko AS, notified body number 0470 for Annex VII in accordance with Article 9 of Council Directive 94/9/EC of 23 March 1994 notifies to the applicant that the actual manufacturer has a product quality system which complies to Annex VII of the Directive.

[8] This notification is based on audit report No 42124 issued the 2004-10-26 and 2005-04-01, and corrective action reviewed 2005-02-16.

The notification can be withdrawn if the manufacturer no longer satisfies the requirements of Annex VII.

Results of periodical re-assessment of the quality system are a part of this notification.

[9] This notification is valid until 2008-05-31 and can be withdrawn if the Manufacturer does not satisfy the production quality assurance re-assessment.

[10] According to Article 10[1] of the Directive 94/9/EC the CE marking shall be followed by the identification Number 0470 identifying the notified body involved in the product control stage.

This notification may only be reproduced in its entirety and without any change, schedule included.

2005-04-01-

Bernt J. Orderud
Manager, Section for Production Surveillance

Nemko AS is an independent testing and certification laboratory offering services world wide from our offices/subsidiaries in Norway, UK, Germany, Italy, USA and Taiwan.

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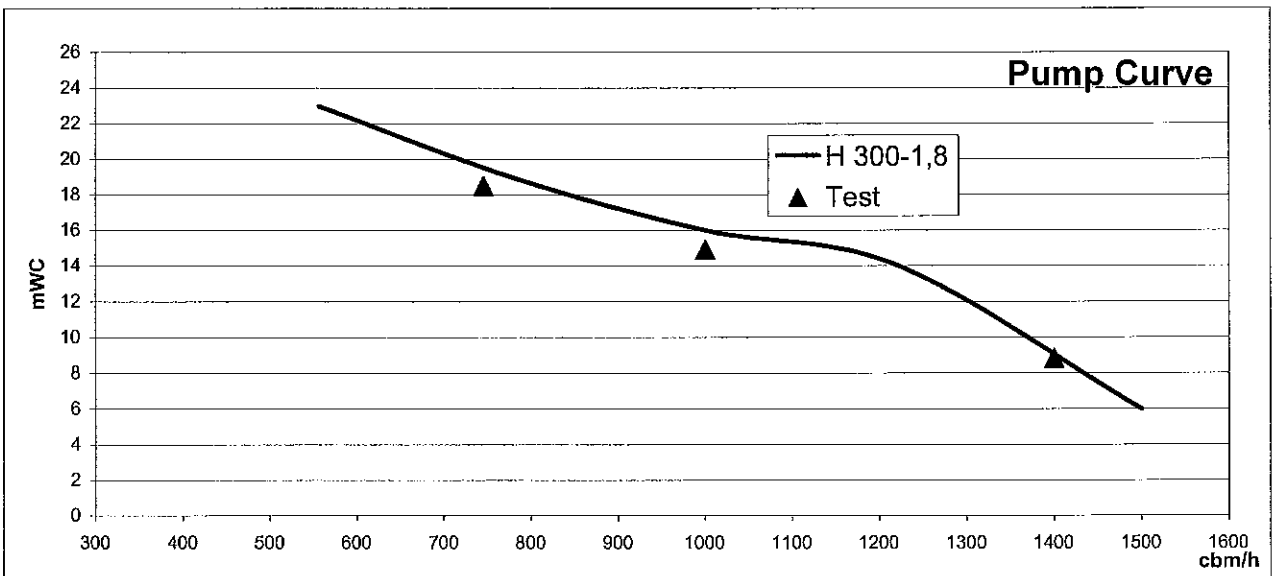
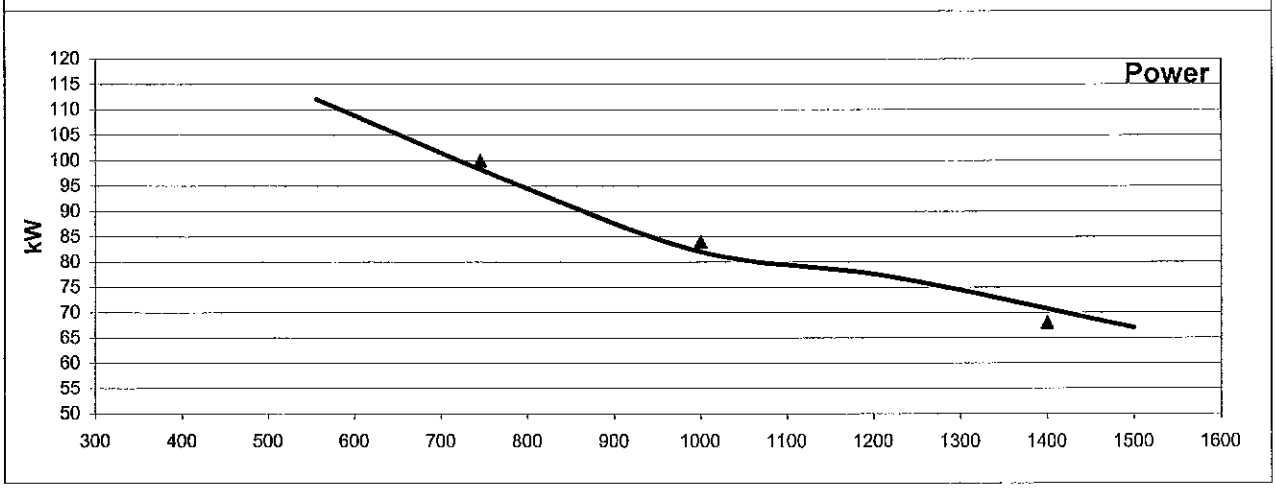
TEST REPORT - CO 34223 (S/N 307878)

Pump Type	H 300-1,8	**E-Motor**		BEVI YB280S-2
Casing	G-CuSn10	**P (S1/S3 15%**	**kW**	90/110
Impeller	G-CuAl10Ni	**V / f**	**V / Hz**	440/60
Shaft	St. St.	**n**	**rpm**	3600

Test Result

Q	**H**	**P**
cbm/h	**mWC**	**kW**
745	18,5	100
1000	14,9	84
1400	8,8	68





Hoppe Bordmesstechnik

Hamburg, 18.10.

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