NEPTUNE 4

Nilfisk ALTO

Why Compromise

Supplement to Service Manual NEPTUNE 3 and NEPTUNE 5 / 7

Wap KEW TECHNOLOGIES

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Preface

There are only minor differences between the NEPTUNE 4 hot-water high-pressure cleaner and NEPTUNE 3 and NEPTUNE 5 line of products. This service manual mainly refers to the concerning sections in the service manuals NEPTUNE 3 and NEPTUNE 5 / 7.

Repair work requires a suitable testing workplace with the necessary power supply.

If operating errors are evident, refer the customer to the user manual.

A fault in the cleaner can have a number of causes. Refer to Chapter E for troubleshooting.

Also refer to the illustrated spare parts list (p/n 301002627) for your repairs. This shows you the location of the individual parts and the sequence in which they are assembled.

Read the ”Service / Technical Information” sheets. They include information on technical modifications that have been made after this service manual was printed.

”Service / Technical Information” sheets are also valid as a supplement to the spare parts list until a new edition is published.

Service manuals and “Service / Technical Information” sheets should be available at the place where repairs are carried out.

Transfer to third parties is not allowed.

Use original **Nilfisk ALTO** spare parts only!

Safety instructions

For your own safety

Repairs should only be made by someone who has received proper instructions for the job or who is a qualified electrician.

Observe national safety directives and regulations for the electrical engineering trade, in particular:

IEC 60335-2-69
EN 60335-2-69

Before starting the equipment, be sure to read the accompanying operator manual, and keep it close as ready reference.

The equipment should only be used by persons who have been instructed in its use and are authorized to do so.

ESD (electrostatic discharge)

Observe the following ESD precautions before any repair of or near electronic parts:

- Touch the protective conductor to discharge your own body.
- Possibly wear an anti-static wrist strap.
- Use a conducting floor or tabletop.
- Never touch a circuit board or electronic components always hold it by the plastic or insulation.
- Transport electronic parts in conductive packaging (e.g. special ESD packages).

1. NEPTUNE 4-25 / NEPTUNE 4-28

NEPTUNE 4			Neptune 4-25 *GB*	Neptune 4-28 *GB*
Technical machine data	Machine protection category	IP	X5	X5
	Current consumption	A	30	13
	Voltage	V	110	230
	Frequency	Hz	50	50
	Connected load	kW	3	3
	Sound pressure	dB (A)	72,4	72,4
	HP nozzle		500	640
	Pressure P1 / P1 max.	bar	90 / 200	90 / 200
	Pressure P2 / P2 max.	bar	25 / 32	25 / 32
	Max. recoil force	N	25	27
	Water throughput (max.)	l/h	720	770
	Water throughput (EN 60335-2-79)	l/h	660	720
	Water intake pressure (max.)	bar	10	10
	Water intake temperature (max.)	°C	40	40
Motor	Voltage	V	110	230
	Frequency	Hz	50	50
	Connected load	kW	2	2,2
	Motor insulation		CL. F	CL. F
	Ingress protection	IP	54	54
	RPM	U/min	1450	1450
Pump	Type		NP5 10.12	NP5 11.14
	Plunger		ceramic	ceramic
	Plunger diameter	mm	18	18
	Plunger stroke	mm	9,8	10,8
	Pump oil		SAE 15 W 40	SAE 15 W 40
	Amount of oil	ml	1000	1000
Heat exchanger	Fuel pressure	bar	15 (- 0,5)	15 (- 0,5)
	Fuel consumption dt = 45 K	kg/h	3,2	3,5
	Exhaust temperature	°C	185	185
	CO_2 content (min.)	%	10,5 (+ 0,5)	10,5 (+ 0,5)
	Soot rating		0 - 1	0 - 1
	Efficiency	%	> 92	> 92
	Water content (coil)	l	3,5	3,5
	Heating power	kW	55	55
Dimensions and weight	Length	mm	1053	1053
	Width	mm	685	685
	Height	mm	750	750
	Weight	kg	128	128
Miscellaneous	High-pressure hose		DN 8 x 10 m	DN 8 x 10 m
	Electrical lead	m	5	5
	Fuel tank	l	16	16
	Detergent tank	l	10	10

Table B.1: Neptune 4-25 / Neptune 4-28

Note: *Neptune 4-28 *GB* is also available as X-model.*

2. NEPTUNE 4-30

NEPTUNE 4			Neptune 4-30 *EU*	Neptune 4-30 *EXP*
Technical machine data	Machine protection category	IP	X5	X5
	Current consumption	A	15,6	15
	Voltage	V	230	220
	Frequency	Hz	50	60
	Connected load	kW	3,4	3,3
	Sound pressure	dB (A)	72,4	72,4
	HP nozzle		530	500
	Pressure P1 / P1 max.	bar	110 / 200	105 / 200
	Pressure P2 / P2 max.	bar	25 / 32	25 / 32
	Max. recoil force	N	30	27
	Water throughput (max.)	l/h	750	720
	Water throughput (EN 60335-2-79)	l/h	700	670
	Water intake pressure (max.)	bar	10	10
	Water intake temperature (max.)	°C	40	40
Motor	Voltage	V	230	220
	Frequency	Hz	50	60
	Connected load	kW	2,2	2,2
	Motor insulation		CL. F	CL. F
	Ingress protection	IP	54	54
	RPM	U/min	1450	1750
Pump	Type		NP5 11.14	NP5 2,8G22
	Plunger		ceramic	ceramic
	Plunger diameter	mm	18	18
	Plunger stroke	mm	10,8	8,5
	Pump oil		SAE 15 W 40	SAE 15 W 40
	Amount of oil	ml	1000	1000
Heat exchanger	Fuel pressure	bar	15 (- 0,5)	15 (- 0,5)
	Fuel consumption dt = 45 K	kg/h	3,45	3,3
	Exhaust temperature	°C	185	185
	CO_2 content (min.)	%	10,5 (+ 0,5)	10,5 (+ 0,5)
	Soot rating		0 - 1	0 - 1
	Efficiency	%	> 92	> 92
	Water content (coil)	l	3,5	3,5
	Heating power	kW	55	55
Dimensions and weight	Length	mm	1053	1053
	Width	mm	685	685
	Height	mm	750	750
	Weight	kg	128	128
Miscellaneous	High-pressure hose		DN 6 x 10 m	DN 6 x 10 m
	Electrical lead	m	5	5
	Fuel tank	l	16	16
	Detergent tank	l	10	10

Table B.2: Neptune 4-30

Note: *Neptune 4-30 *EU* and Neptune 4-30 *EXP* are also available as X-models.*

3. NEPTUNE 4-42

NEPTUNE 4			Neptune 4-42 *EU*
Technical machine data	Machine protection category	IP	X5
	Current consumption	A	10
	Voltage	V	400
	Frequency	Hz	50
	Connected load	kW	5,6
	Sound pressure	dB (A)	76,5
	HP nozzle		0475
	Pressure P1 / P1 max.	bar	170 / 250
	Pressure P2 / P2 max.	bar	25 / 32
	Max. recoil force	N	43
	Water throughput (max.)	l/h	860
	Water throughput (EN 60335-2-79)	l/h	800
	Water intake pressure (max.)	bar	10
	Water intake temperature (max.)	°C	40
Motor	Voltage	V	400
	Frequency	Hz	50
	Connected load	kW	4,5
	Motor insulation		CL. F
	Ingress protection	IP	54
	RPM	U/min	1450
Pump	Type		NP5 13.20
	Plunger		ceramic
	Plunger diameter	mm	18
	Plunger stroke	mm	12,8
	Pump oil		SAE 15 W 40
	Amount of oil	ml	1000
Heat exchanger	Fuel pressure	bar	15 (- 0,5)
	Fuel consumption dt = 45 K	kg/h	3,9
	Exhaust temperature	°C	185
	CO_2 content (min.)	%	10,5 (+ 0,5)
	Soot rating		0 - 1
	Efficiency	%	> 92
	Water content (coil)	l	3,5
	Heating power	kW	70
Dimensions and weight	Length	mm	1053
	Width	mm	685
	Height	mm	750
	Weight	kg	132,5
Miscellaneous	High-pressure hose		DN 8 x 10 m
	Electrical lead	m	5
	Fuel tank	l	16
	Detergent tank	l	10

Table B.3: Neptune 4-42

Note: *Neptune 4-42 *EU* is also available as X-model.*

4. NEPTUNE 4-49

NEPTUNE 4

			Neptune 4-49 *EU*	Neptune 4-49 *NO, BE*
Technical machine data	Machine protection category	IP	X5	X5
	Current consumption	A	12,5	21,7 / 12,5
	Voltage	V	400	230, 400
	Frequency	Hz	50	50
	Connected load	kW	6,9	6,9
	Sound pressure	dB (A)	76,6	76,6
	HP nozzle		0550	0550
	Pressure P1 / P1 max.	bar	180 / 250	180 / 250
	Pressure P2 / P2 max.	bar	25 / 32	25 / 32
	Max. recoil force	N	47	47
	Water throughput (max.)	l/h	950	950
	Water throughput (EN 60335-2-79)	l/h	900	900
	Water intake pressure (max.)	bar	10	10
	Water intake temperature (max.)	°C	40	40
Motor	Voltage	V	400	230, 400
	Frequency	Hz	50	50
	Connected load	kW	5,5	5,5
	Motor insulation		CL. F	CL. F
	Ingress protection	IP	54	54
	RPM	U/min	1450	1450
Pump	Type		NP5 15.20	NP5 15.20
	Plunger		ceramic	ceramic
	Plunger diameter	mm	18	18
	Plunger stroke	mm	14,6	14,6
	Pump oil		SAE 15 W 40	SAE 15 W 40
	Amount of oil	ml	1000	1000
Heat exchanger	Fuel pressure	bar	15 (- 0,5)	15 (- 0,5)
	Fuel consumption dt = 45 K	kg/h	4,4	4,4
	Exhaust temperature	°C	185	185
	CO_2 content (min.)	%	10,5 (+ 0,5)	10,5 (+ 0,5)
	Soot rating		0 - 1	0 - 1
	Efficiency	%	> 92	> 92
	Water content (coil)	l	3,5	3,5
	Heating power	kW	70	70
Dimensions and weight	Length	mm	1053	1053
	Width	mm	685	685
	Height	mm	750	750
	Weight	kg	137,5	137,5
Miscellaneous	High-pressure hose		DN 8 x 10 m	DN 8 x 10 m
	Electrical lead	m	5	5
	Fuel tank	l	16	16
	Detergent tank	l	10	10

Table B.4: Neptune 4-49

Note: *Neptune 4-49 *EU* and Neptune 4-49 *NO, BE* are also available as X-models.*

5. NEPTUNE 4-54

NEPTUNE 4

			Neptune 4-54 *EU*	Neptune 4-54 *NO, BE*	Neptune 4-54 *EXP*
Technical machine data	Machine protection category	IP	X5	X5	X5
	Current consumption	A	14	24 / 14	22,5 / 14
	Voltage	V	400	230, 400	220, 460
	Frequency	Hz	50	50	60
	Connected load	kW	7,9	7,9	7,9
	Sound pressure	dB (A)	76,9	76,9	76,9
	HP nozzle		0500	0500	0500
	Pressure P1 / P1 max.	bar	200 / 250	200 / 250	200 / 250
	Pressure P2 / P2 max.	bar	25 / 32	25 / 32	25 / 32
	Max. recoil force	N	56	56	52
	Water throughput (max.)	l/h	1050	1050	1050
	Water throughput (EN 60335-2-79)	l/h	1000	1000	1000
	Water intake pressure (max.)	bar	10	10	10
	Water intake temperature (max.)	°C	40	40	40
Motor	Voltage	V	400	230, 400	220, 460
	Frequency	Hz	50	50	60
	Connected load	kW	5,5	5,5	5,5
	Motor insulation		CL. F	CL. F	CL. F
	Ingress protection	IP	54	54	54
	RPM	U/min	1450	1450	1750
Pump	Type		NP5 15.20	NP5 15.20	NP5 4G30
	Plunger		ceramic	ceramic	ceramic
	Plunger diameter	mm	18	18	18
	Plunger stroke	mm	14,6	14,6	12
	Pump oil		SAE 15 W 40	SAE 15 W 40	SAE 15 W 40
	Amount of oil	ml	1000	1000	1000
Heat exchanger	Fuel pressure	bar	15 (- 0,5)	15 (- 0,5)	15 (- 0,5)
	Fuel consumption dt = 45 K	kg/h	4,9	4,9	4,9
	Exhaust temperature	°C	185	185	185
	CO_2 content (min.)	%	10,5 (+ 0,5)	10,5 (+ 0,5)	10,5 (+ 0,5)
	Soot rating		0 - 1	0 - 1	0 - 1
	Efficiency	%	> 92	> 92	> 92
	Water content (coil)	l	3,5	3,5	3,5
	Heating power	kW	70	70	70
Dimensions and weight	Length	mm	1053	1053	1053
	Width	mm	685	685	685
	Height	mm	750	750	750
	Weight	kg	137,5	137,5	137,5
Miscellaneous	High-pressure hose		DN 8 x 10 m	DN 8 x 10 m	DN 8 x 10 m
	Electrical lead	m	5	5	5
	Fuel tank	l	16	16	16
	Detergent tank	l	10	10	10

Table B.5: Neptune 4-54

Note: *All three Neptune 4-54 variants are also available as X-models.*

Construction

Fig. C.1: Neptune 4

The external design of the Neptune 4 hot-water high-pressure cleaner is identical to the Neptune 3 line of products. As far as sensors, control, functionality and electronics are concerned, there are no differences to the Neptune 3 series as well.
There are only two differences compared to Neptune 3:
The Neptune 4 series has the NP5 hp-pump (1) installed (like the Neptune 5) and the machine is equipped with an additional hydraulic accumulator (2)(see also STI MPW-040).
For further details about the construction of the machine, refer to the Neptune 3 and Neptune 5 / 7 Service Manuals (chapter C resp. chapter 3).

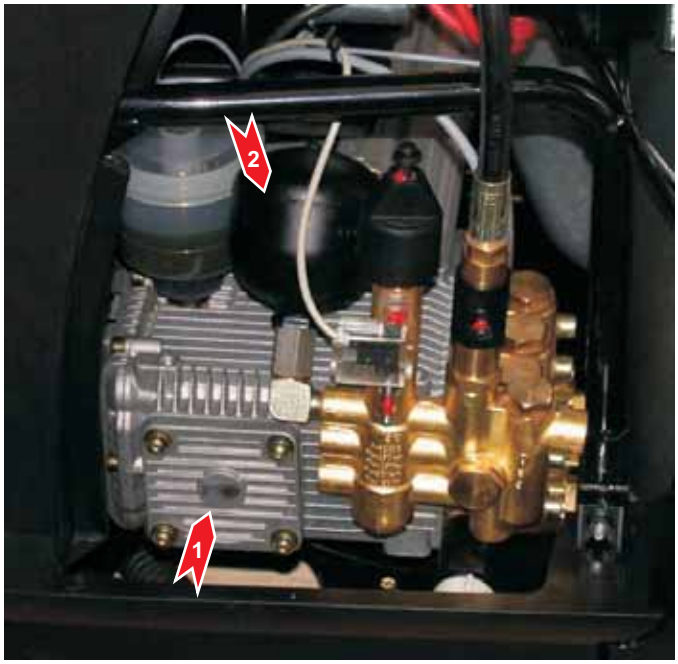

Fig. C.2: NP5 pump & Control Safety Block with hydraulic accumulator

The Neptune 4 HPC is available in following versions:

Neptune 4-25:	1~
Neptune 4-28:	1~
Neptune 4-30:	1~
Neptune 4-42:	3~
Neptune 4-49:	3~
Neptune 4-54:	3~

The machine comes as standard- (with storage tray for accessories, tools, etc.) or X-model (with hose reel instead of the storage tray). Upgrading with a hose reel is possible.

Fig. C.1 & C.2:

1.) NP5 hp-pump 2.) Hydraulic accumulator

Function

There are no functional differences between the Neptune 3 line of products and the Neptune 4 series.

For further details on the subject of function refer to the Neptune 3 Service Manual (chapter D) as well as the user manual of the respective machine.
For details about the function of the NP5 hp-pump refer to the Neptune 5 / 7 Service Manual (chapter 4).
Further valuable information can be found in the Service / Technical Information (STI) sheets for Neptune 3 / 5 / 7.

Troubleshooting

Based on the same microprocessor control as the Neptune 3 line of products, the Neptune 4 shows the same error codes for verification of the cause of a malfunction of the machine.
This also applies to other troubleshooting procedures.

For further details on the subject of troubleshooting refer to the Neptune 3 Service Manual (chapter E) as well as the user manual of the respective machine.
For details about troubleshooting the NP5 hp-pump refer to the Neptune 5 / 7 Service Manual (chapter 5).
Further valuable information can be found in the Service / Technical Information (STI) sheets for Neptune 3 / 5 / 7.

Maintenance / repair

Maintenance and repair works to be performed on the Neptune 4 are the same as for the Neptune 3 line of products, except the hp-pump.
Further details concerning maintenance / repair can be found in the Neptune 3 (chapter F) & Neptune 5 / 7 (chapter 6) Service Manuals as well as in the respective User Manual (part number 301002531).

1. Maintenance

For details refer to the Neptune 3 Service Manual chapter F.1.

2. Periphery

For details refer to the Neptune 3 Service Manual chapter F.2.

3. Control Safety Block

For details refer to the Neptune 3 Service Manual chapter F.3.

4. Motor

For details refer to the Neptune 3 (chapter F.4.) and Neptune 5 / 7 (chapter 6) Service Manual.

5. Pump

For details refer to the Neptune 5 / 7 Service Manual chapter 6.

6. SDR valve

For details refer to the Neptune 3 Service Manual chapter F.6.

7. Heating subsystem

For details refer to the Neptune 3 Service Manual chapter F.7.

8. Electrical subsystem

For details refer to the Neptune 3 Service Manual chapter F.8.

Adjustments

1. Control board

For adjustment refer to the Neptune 3 Service Manual (chapter G.1).

2. Control Safety Block

The adjustment procedure is described in the Neptune 3 Service Manual (chapter G.2) or STI MPW-030.

3. Heat exchanger system

The adjustment procedure is described in the Neptune 3 Service Manual (chapter G.3) or STI MPW-005 / STI MPW-028.

NEPTUNE		4
CO_2 content	*%*	10.5 (+ 0.5)
Fuel pressure	*bar*	15 (- 0.5)
Soot rating		0-1

Table G.1: Heat exchanger settings

4. Flow control

The adjustment procedure is described in the Neptune 3 Service Manual (chapter G.3).

5. Automatic AntiStone

The parameters for adjustment are described in the Neptune 3 Service Manual (chapter G.4).

6. Electrical connection

The adjustment of the star / delta switch is described in the Neptune 3 Service Manual (chapter G.5).

1. Wiring diagrams parts list

Note: *The components listed in Table H.1 relate to the following Neptune 4 wiring diagrams.*

Code	Component designation
A1	Control board
A3	Starting electronic
B1	Temperature sensor
B2	Reed switch
B3	Thermo fuse
B4	Microswitch
B6	Float switch, pump oil
B7	Flame sensor
B8	Float switch, AntiStone
B9	Float switch, fuel
C1	Capacitor
C2	Starting capacitor
F1	Pico fuse
F2 / F3	Fine-wire fuse
K1	Contactor
K2	Relay
K3	Klixon relay
M1	Motor, three-phase
M2	Burner fan motor
MT	Thermal protector
R1	Discharge resistor
R2	Inrush current limiter
S1	Switch on / off + temperature setting
S2	Switch star / delta
T1	Transformer
T2	Ignition transformer
X1	Flat connector
X2-X4	Terminal block
X5	Plug connector, 5-way, datalogger
X11 – X13	Omnibus terminal
Xma-b	Motor connector
Y1	Solenoid valve

Table H.1: Wiring diagrams parts list for Neptune 4

2. 3~ star (71305)

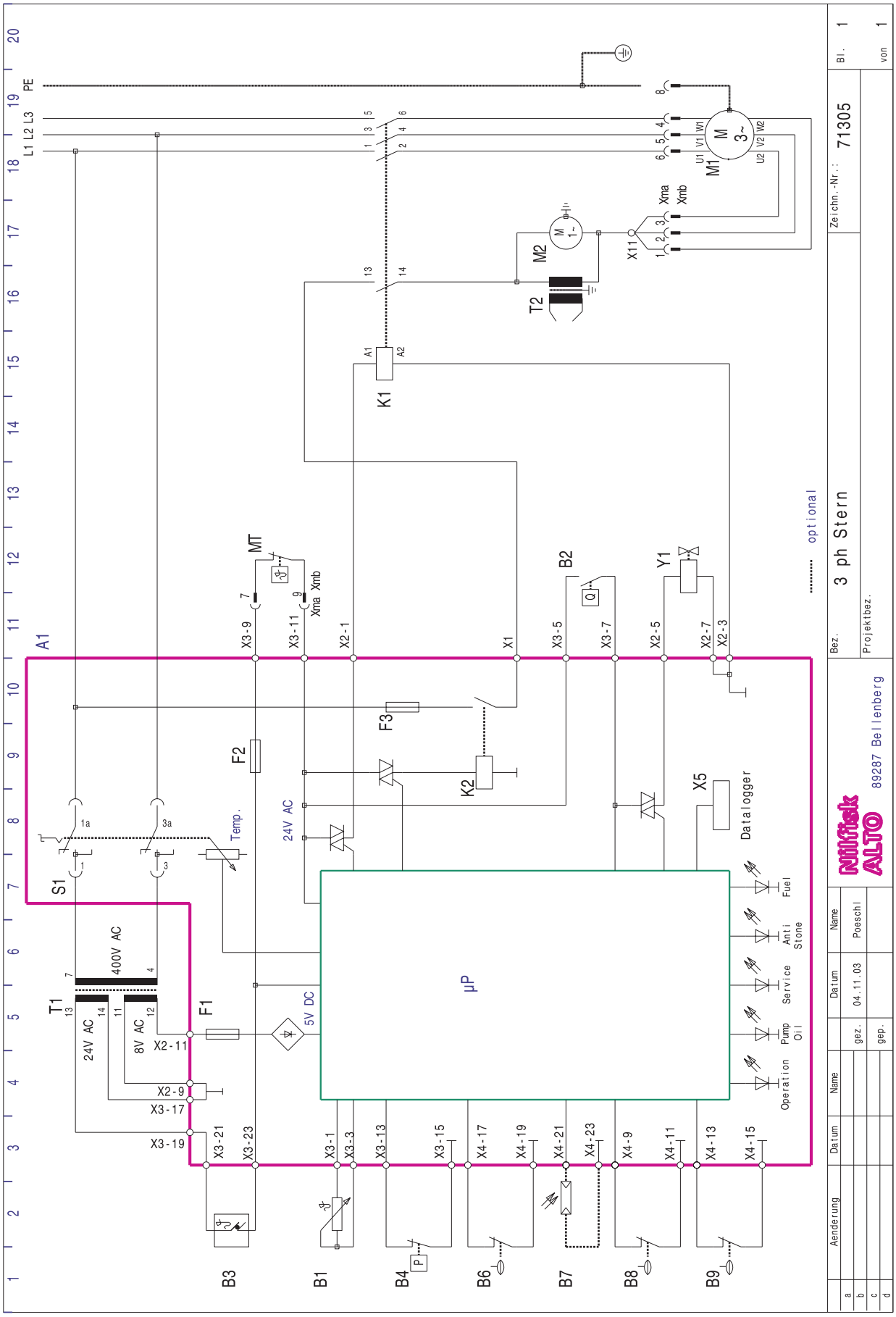

Fig. H.1: Wiring diagram 3~ star

4. 1~ with Klixon relay (71307a)

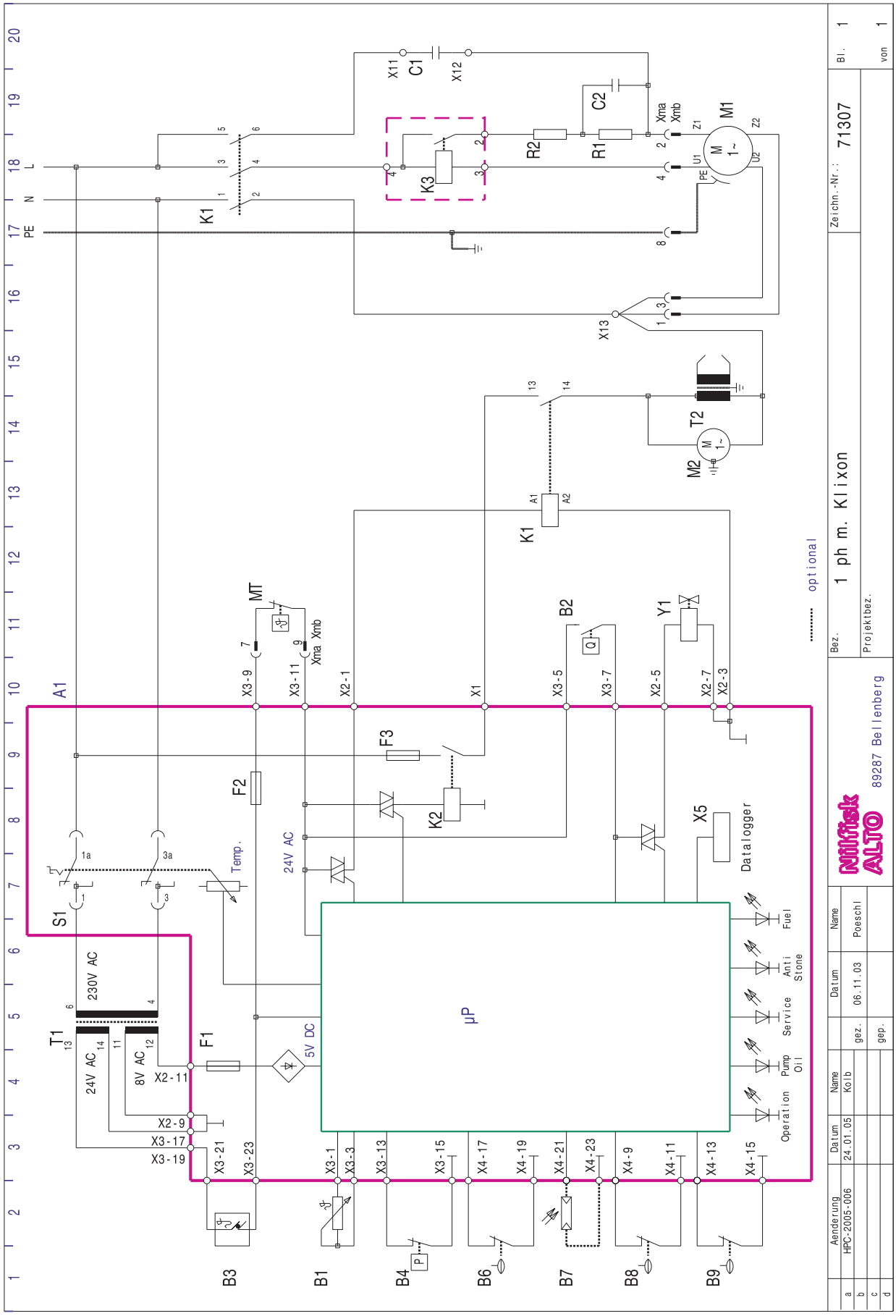

Fig. H.3: Wiring diagram 1~ with Klixon relay

3. 3~ star / delta (71306)

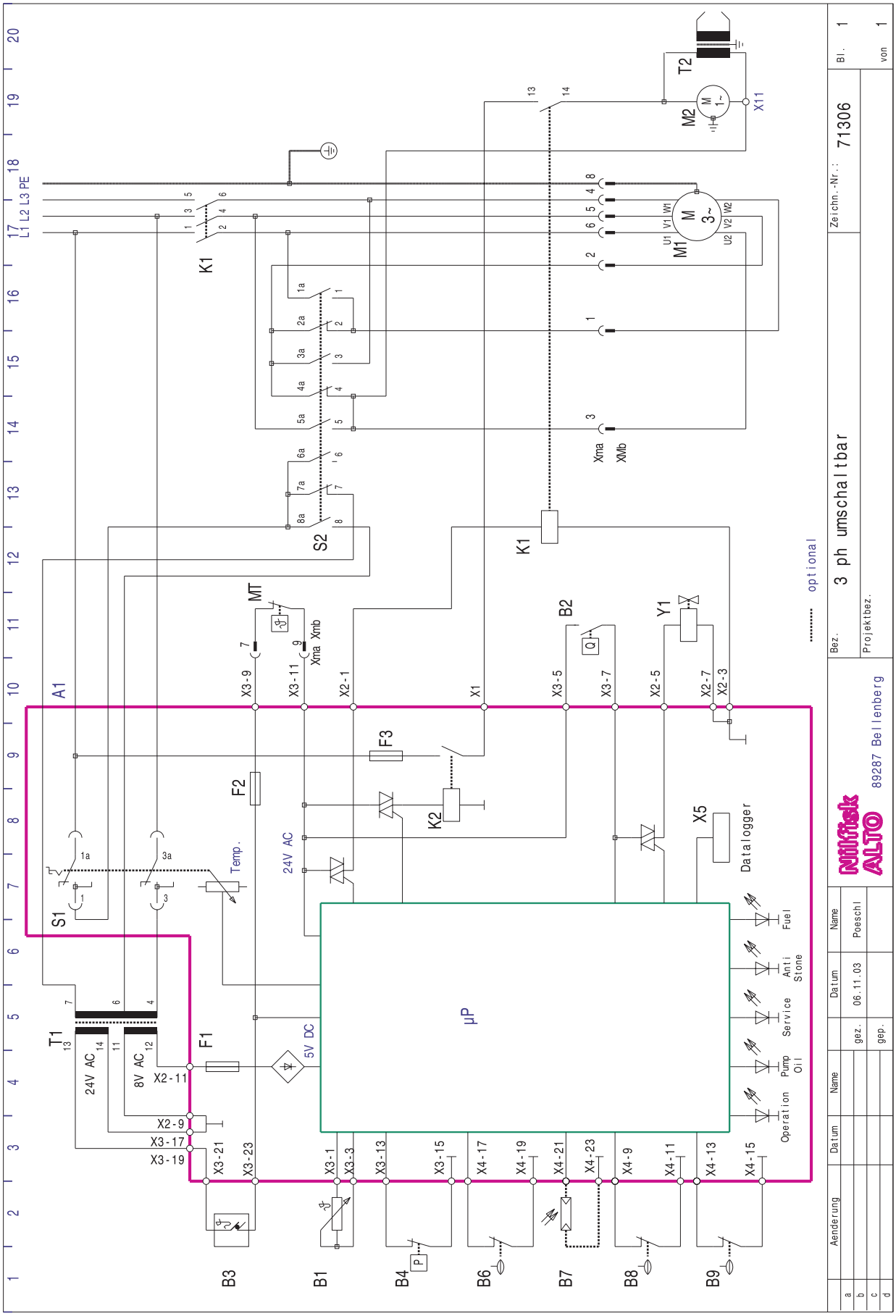

Fig. H.2: Wiring diagram 3~ star / delta

5. 1~ with starting electronic (71418)

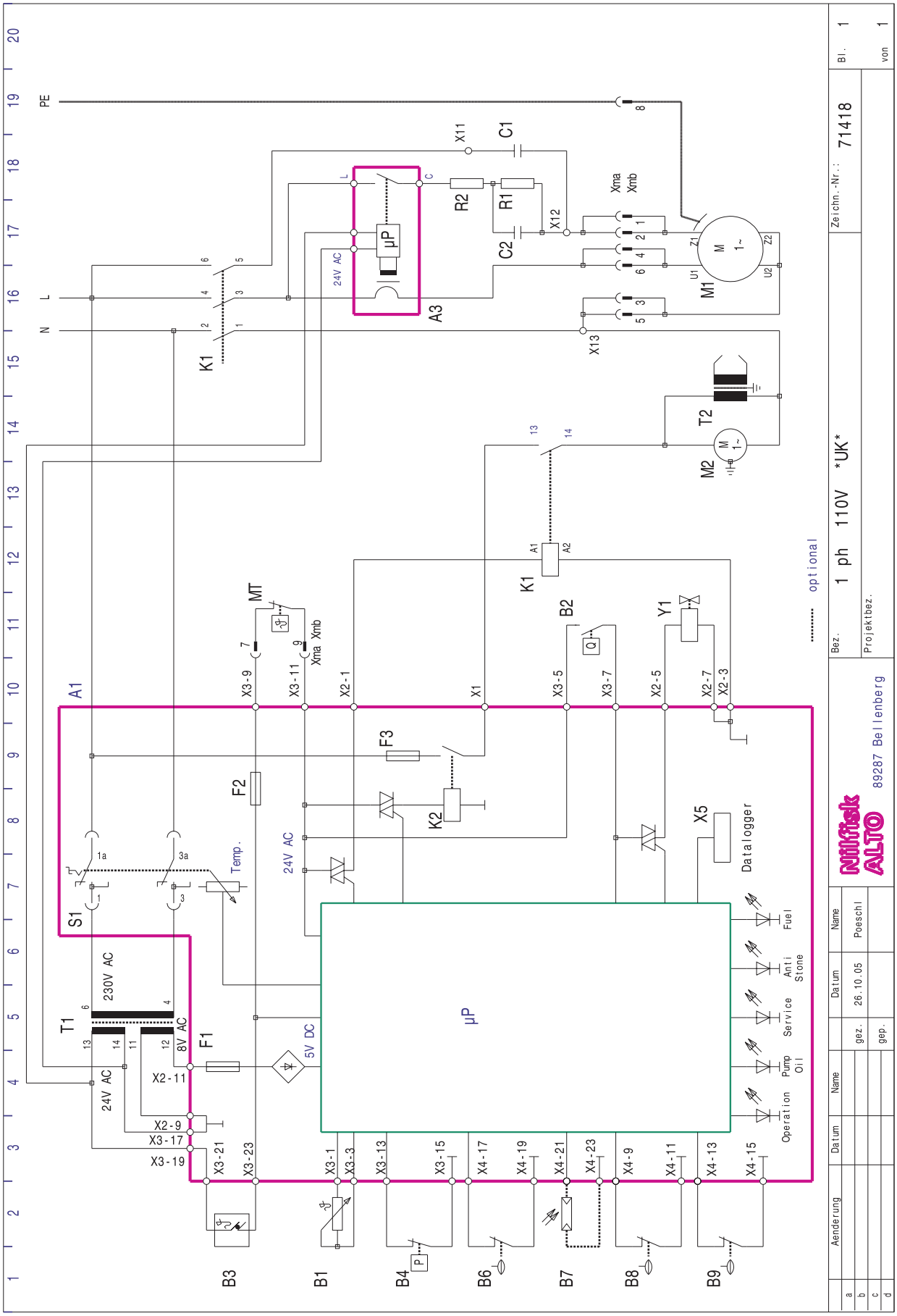

Fig. H.4: Wiring diagram 1~ with starting electronic

Special tools / spare parts / service accessories

Part No.	Description	Comment
	Special tools	
17237	Soot pump with filter paper and soot rating scale	
17238	Filter paper (replacement)	
17239	Soot rating scale	
17240	CO_2 meter with refill fluid	
17241	CO_2 measuring fluid	
17242	Gas thermometer (pointer)	
17243	Measuring case (empty)	
17246	Fuel pressure meter	
40471	Gas thermometer (LCD)	
40472	Exhaust loss calculator	
63138	Test bolt	
301001873	Jumper	also see STI MPW/SPW-008
301000383	Datalogger	
301000382	Power supply, Datalogger 230 V / 9 V AC	German version
301001804	Support	for service crane
301001078	Service crane	
301001089	Chimney adapter	
301002067	TESTO exhaust air probe	also see STI MPW/SPW-011
301001875	TESTO central unit	also see STI MPW/SPW-011
301001934	Mounting tool, oil seal	for pump shaft
301001935	Mounting tool, oil seal	for piston
301001090	Crane eye	
301001874	Metratester	el. safety check
	Spare parts / repair kits	
301000911	Safety valve	3~ machines
62730	Safety valve	1~ machines
63056	Repair kit CSB	
301001688	Attachment set: Hose reel	
301001146	Kit piston 18 mm	
301001148	Kit piston sealing 18 mm	
301001150	Kit oil sealing	
301001151	Kit support ring 18 mm	
301001153	Kit valve (x6) for pump	
3812385	Fuse 5 x 20; 6.3A/250V, 'slow'	F3
3812625	Fuse 5 x 20; 2.0A/250V, 'slow'	F2
	Service accessories	
41455	Grease (-15 °C to +130 °C), tube 50 g; foodstuff quality	
33397	Loctite 242, bottle 50 ml	
33667	Silicon grease, tube 100 g	
	Stop varnish, commercial	
	Silicon spray, commercial	
	Copper paste, commercial	

Table I.1: Special tools, spare parts and service accessories

For further details about special tools, spare parts and service accessories, also refer to the Neptune 3 (chapter I) & Neptune 5 / 7 (chapter 9) Service Manuals, the Neptune 4 spare parts list as well as the respective STI sheets.

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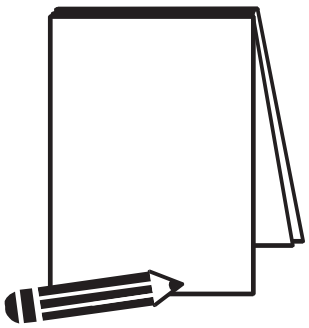

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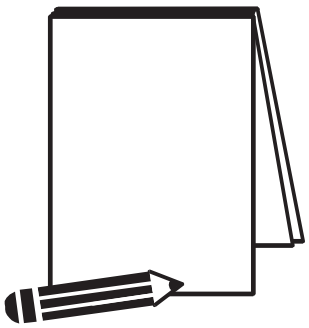

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