GIERSCH

Brenner und Heizsysteme

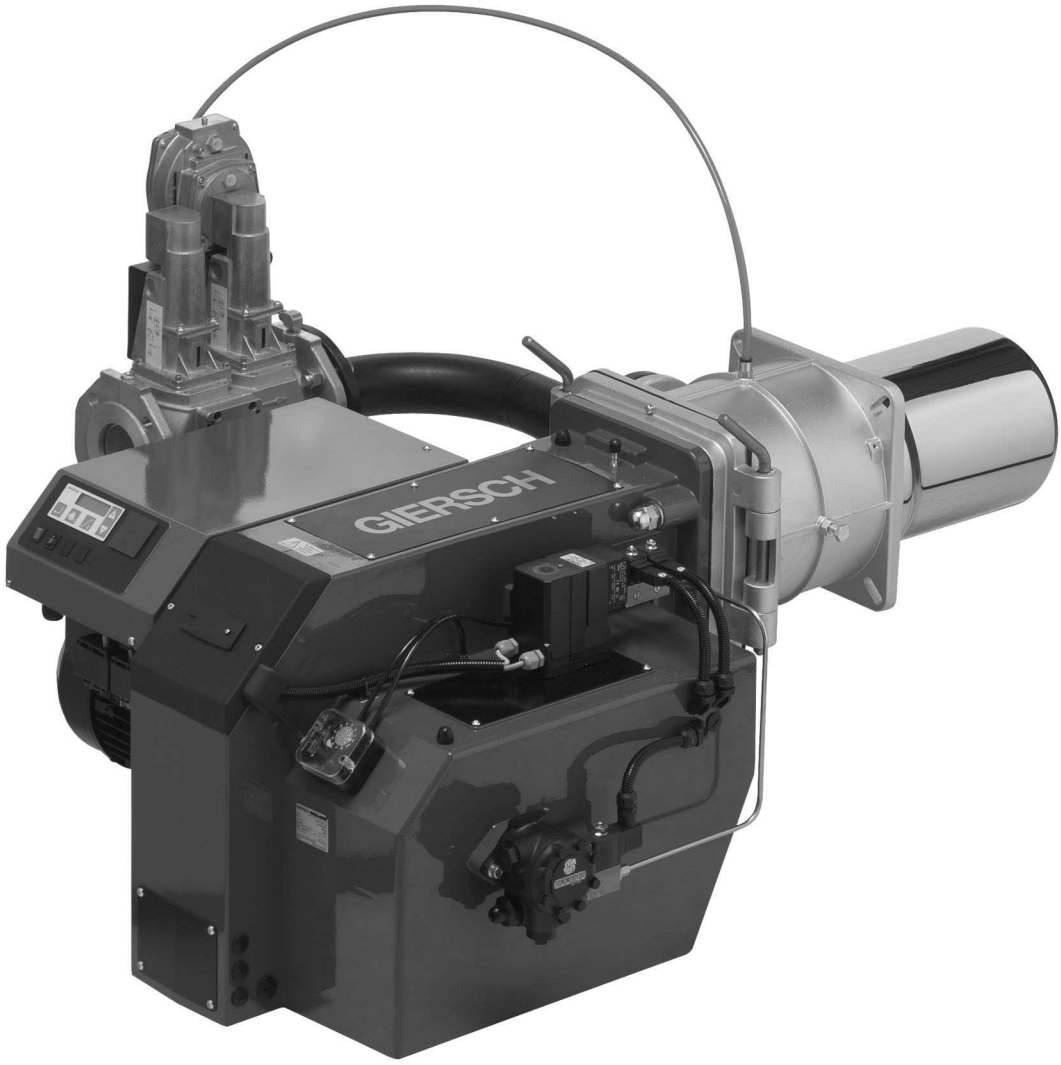
Technical Information • Installation Instructions

MK3

Issue June 2017

As our policy is one of continuous improvement we reserve the right to make technical modifications!

Oil / gas



CE

GB

Contents

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1. General information

Installation of a combined gas/oil burner must be performed in accordance with extensive regulations and guidelines. It is therefore the duty of the installer to be familiar with all applicable regulations and requirements. Installation, start-up and maintenance must be performed with utmost care.
The burner must not be operated in rooms with high levels of air humidity (laundry rooms), dust or corrosive vapours. The boiler room must be ventilated accordingly with ventilation air.

Heating oil EL in accordance with DIN 51603 must be used.
The dual fuel burners for combustion of natural gas or liquid gas according to EN 437 and heating oil EL suitable and comply with European standards EN 676 and EN 267th.

Manually operated shut-off valve

A manually operated shut-off valve shall be provided upstream of all isolate the burner. The manual fuel valve shall be readily accessible.

Filter and venting device

A filter shall be fitted upstream the burner to prevent the ingress of foreign elements. Adequate means to vent the fuel supply be provided.

2. Scope of delivery

Before installing the GIERSCH Series MK3 combined gas/oil burner, please check that all the items included in the scope of delivery are present.
Scope of delivery:
burner, mounting kit, separate operating instructions, technical information, separate circuit diagram, flange seal, one 7- pin connector and one 4- pin plug connector (Wieland connector).

Caution !
Oil nozzles are not included in the scope of delivery.

For gas:

Gas train

Gas installation and commissioning are subject to the applicable Technical Regulations of the DVGW (DVGW-TRGI).
The gas pipe must be designed to conform to the flow rate and the available gas flow pressure and routed with the lowest pressure loss over the shortest distance to the burner.
The loss of gas pressure via the gas train and the burner as well as the resistance on the fuel gas side of the heat generator must be less than the connection flow pressure.

Caution !
Observe sequence and throughflow direction of fittings

3. Maintenance and customer service

The complete system should be checked once a year for correct functioning and leaks in accordance with DIN 4755 by a representative of the manufacturer or other suitably qualified person.
According to DIN EN 267 it is not permissible to perform repairs on components with a safety function. On the other hand, the replacement of parts with genuine parts or approved equivalent parts is permitted.
We accept no liability for consequential damage in cases of incorrect installation or repair, the fitting of non-genuine parts or where the equipment has been used for purposes for which it was not intended.

4. Operating instructions

The operating instructions together with this technical information leaflet must be displayed in a clearly visible position in the boiler room. The address of the nearest customer service centre must be displayed on the back of the operating instructions.

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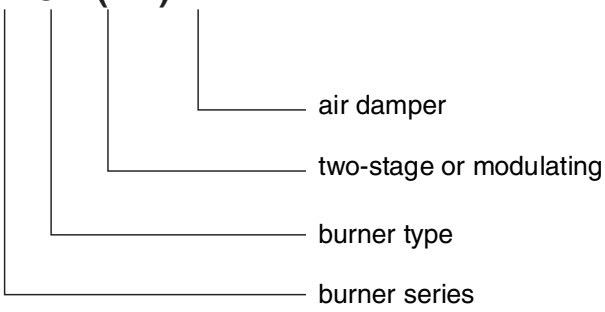
5. Instruction of operating personnel

Faults are often caused by operator error. The operating personnel must be properly instructed in how the burner works. In the event of recurring faults, Customer Service should be notified.

6. Key for code designation

MK 3-Z(-M)-L

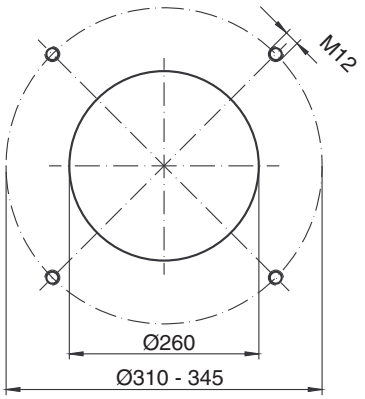


7. Technical specifications

	Burner type			
Technical specifications	**MK3.1**	**MK3.2**	**MK3.3**	**MK3.4**
Burner output in kW (in gas-fired operation)	441 - 1510	738 - 1880	620 - 2505	887 - 2705
Burner output (in oil-fired operation) in kg/h (in kW)	46.2 - 127.3 (548 - 1510)	62.2 - 158.5 (738 - 1880)	64.0 - 211.2 (759 - 2505)	74.8 - 228.0 (887 - 2705)
Fuel	Heating oil in accordance with DIN 51603, natural gas LL + E, liquid gas			
Mode of operation	Optionally oil/gas two-Stage or gas modulating, oil two-Stage			
Voltage	3 / N / PE ~ 50 Hz / 400 V			
Power consumption at start / during operation *	10.5 / 6.5	15.0 / 9.0	15.5 / 9.3	16.3 / 11.3
Electric motor power (at 2800rpm) in kW	3.0	4.0	4.4	5.5
Flame failure controller	KLC 1000			
Control box	MPA 22			

* The power consumption of the version with external oil pump is 2.7 A higher.

8. Boiler connection dimensions (All dimensions are given in mm)



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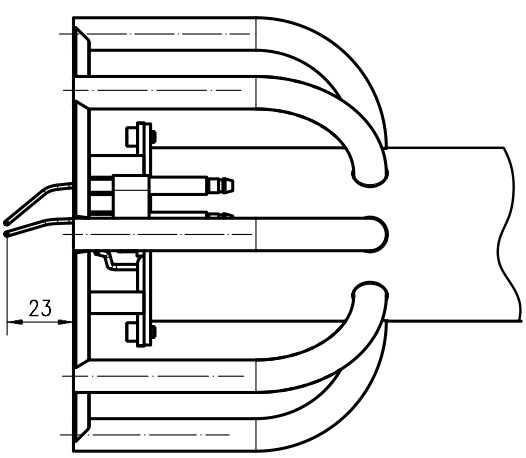
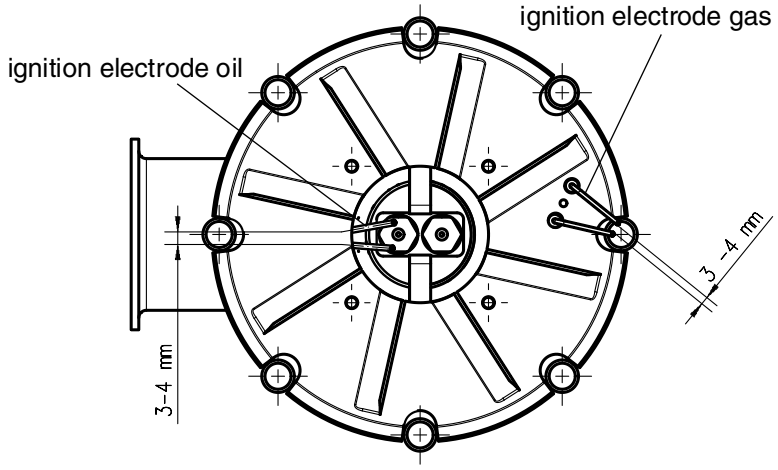
9. Ignition electrode

The following clearances between the nozzle and ignition electrode should be observed:

The given dimensions are intended for checking purposes after making necessary corrective adjustments or replacing an electrode.





10. Flame failure controller

During commissioning and after any cleaning maintenance, the flame detector should be checked.

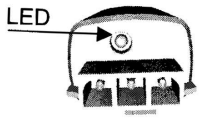
Following procedures be followed:

- Start the burner with the fuel supply closed-off or remove the flame detector from its mounting flange and cover the UV tube using a soft cloth to avoid touching the glass lens. The control box will lock-out at the end of the safety time due to absence of a flame signal.

- Remove the flame detector from its mounting flange. Start the burner while exposing the flame detector to an external UV radiation source such as a cigarette lighter flame, or a small gas flame (n.b. electric room lighting or a torch is inadequate). The burner Control Box must go to lock-out due to detecting an extraneous light source either immediately or at the end of the air pre-purge cycle, depending on the type/model of the Control Box.
- Close off the fuel supply or remove flame detector from its mounting flange and cover the UV tube using a soft cloth when the burner is in the "run" position. The control box must go immediately to lock-out resulting in the burner shutting down.

Operating Indicator LED

The flame detector KLC 1000 indicates the following operating conditions and flame signal strengths via the built-in LED..

No burner operation	LED is OFF	No heating request	
Pre-ventilation	LED is OFF	No flame present	
Burner operation	LED is flashing	Flame present	

- Clean the sight glass of the KLC 1000 with a clean, lint-free cloth. Under no circumstances may burner clean-ing sprays be used. Further tests are not necessary because internal checks are carried out on KLC 1000

11. Oil connection

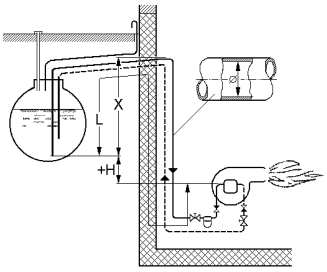
Oil lines must be routed to the burner as far as necessary to allow the oil hoses to be connected without tension. Care must be taken to ensure that the burner can easily be moved into the service position.

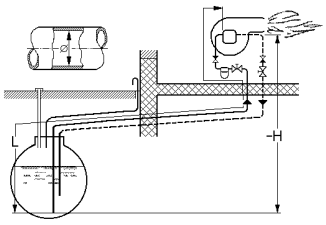
Important: an oil filter must be installed before the oil pump.

The tables for single and double line installation show the maximum possible pipe length in dependence on three factors relating to heating oil type EL 4.8 cST.

- Height differential between pump and tank,
- nozzle delivery rate or pump type,
- pipe diameter.

4 brackets, 1 valve and 1 check valve for resistance were factored into the suction line length. Due to possible degassing of the oil, dimension "X" should not exceed a length of 4 m.

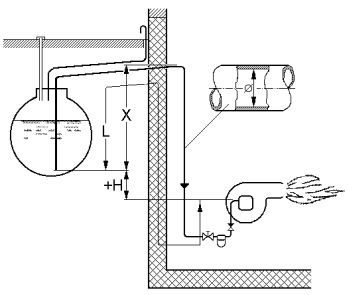


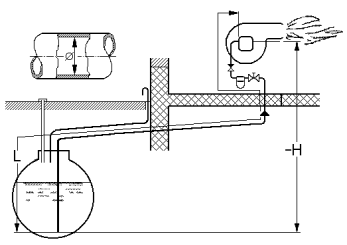


Double line system

H (m)	Suntec AJ6 L (m)				Suntec J7 L (m)				
∅ mm	10	12	14	16	10	12	14	16	20
4.0	13	28	54	93	7	17	34	60	-
3.0	11	25	47	82	6	15	29	52	-
2.0	9	21	40	70	5	12	25	45	-
1.0	8	17	34	59	3	10	21	37	-
0.5	7	16	30	53	3	9	19	34	-
0	6	14	27	48	2	8	16	30	77
-0.5	5	12	24	42	-	6	14	26	67
-1.0	4	10	20	36	-	5	12	22	58
-2.0	2	7	14	25	-	3	8	15	40
-3.0	0	3	7	13	-	-	3	7	22
-4.0	-	-	-	-	-	-	-	-	4

Single-pipe system





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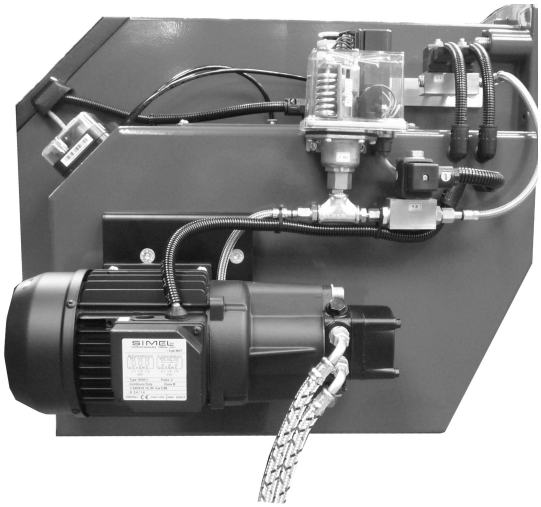
Nozzle	14 (gph)			20 (gph)				30 (gph)				45 (gph)			
.∅ mm	8	10	12	8	10	12	14	10	12	14	16	10	12	14	16
H (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)	L (m)
4.0	21	52	100	14	36	75	100	23	49	92	-	15	32	61	100
3.0	18	45	95	12	31	66	100	20	43	81	-	13	28	53	92
2.0	16	39	82	11	27	57	100	17	37	70	-	11	24	46	79
1.0	13	33	69	9	23	48	89	15	31	59	-	9	20	38	66
0.5	12	30	62	8	20	43	81	13	28	53	-	8	18	35	60
0	11	27	56	7	18	39	72	12	25	48	82	7	16	31	54
-0.5	9	23	49	6	16	34	64	10	22	42	72	-	14	27	47
-1.0	8	20	43	5	14	30	55	9	19	36	63	-	12	23	41
-2.0	5	14	30	3	10	21	39	6	13	25	44	-	8	16	28
-3.0	3	8	17	-	5	11	22	3	7	14	25	-	4	8	15
-4.0	-	-	4	-	-	-	5	-	-	-	5	-	-	-	-

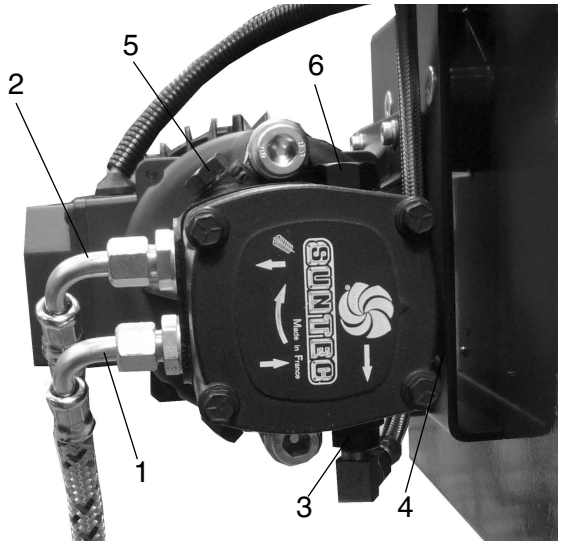
12. Pump unit

The oil lines should be as far introduced to the burner in that the oil pipes are connected to strain relief. It is important to ensure that the burner can be easily brought into the service position.

Before the installation of the oil pump of the oil filter is essential.

Pump unit for MK3.1 / MK3.2





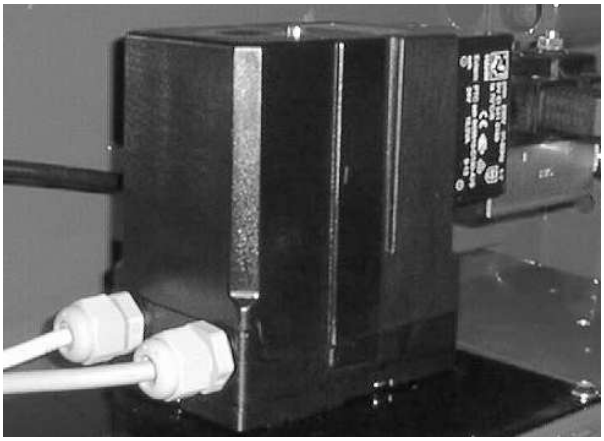
Oil pumpe AJ6-CC

1 Flow
2 Return
3 Outlett to nozzle
4 Pressure adjuster
5 Vaccuum testing connection
6 Pressure testing connection

If the pump is to the single pipe system to be changed, so please note the following:
Remove return pipe and connection nipple. The by-pass plug from the return hole and unscrew tightly with a plug. The suction rate of the pump is then the nozzle throughput.

13. Front panel

14. Air flap positioning motor



The air flap positioning motor is designed for air flap adjustment on progressive two-Stage burners or modulating burners. The motor is activated electronically via the microprocessor-controlled control box.

Caution

The housing must not be opened while the power is on, as the incident light will cause irreparable damage to the drive.

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15. Remote switching

Note
If the selector switch under the burner hood is in the **"Remote"** position, it is not possible to change over between oil and gas operation with the selector switch on the front panel. It is only possible to change over between oil and gas operation if the selector switch under the burner hood is in the **"Manual"** position.

16. Air pressure switch

The air pressure switch is a differential pressure switch and monitors pressure at the forced-air burner.

The air pressure switch is preset at the factory to 8 mbar.

Note

In the event of low air pressure, check to see if CO levels were above the stipulated value before the burner reached its shut-off point.

Possible causes:

- Incorrect setting
- Motor is not running
- Motor is rotating in the wrong direction.

17. Gas pressure monitor

The gas pressure monitor serves to monitor the gas inlet pressure. The burner is shut down if the gas inlet pressure drops below the set minimum value (preset at factory). The burner starts up automatically again when the minimum pressure is exceeded. Initially set half the inlet pressure. Check for CO formation. For this purpose, reduce the gas inlet pressure and check the CO concentration. The CO concentration must be below the stipulated value.

18. Function test

The flame monitor must undergo a safety test both at initial start-up and after modifications or if the system has been out of use for a lengthy period of time.

Start-up test with blacked-out flame sensor:
The burner must go into lockout mode on expiration of the safety interval.

Start-up with exposed flame sensor:
The burner must go into lockout mode after approx. 20 s of pre-ventilation.

to ISO standards. Start-up; if the burner is in operation, cover the flame sensor:
New start-up attempt; on expiration of the safety period, the burner must go into fault mode.

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19. Commissioning: Adjustment mode - oil-fired operation

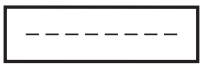
To enter this adjustment mode, the burner must be on standby.
Standby means that the burner is connected to the power supply, but no heating request has been issued and the burner is switched to oil-fired operation. If **OFF** appears on the display on MPA 22, the unit is running in standby mode and has already been configured.

If **OFFUPr** appears on the display, the MPA 22 is also running in standby mode, but the unit is still unprogrammed and all setting parameters still have to be entered by the following procedure.

Important: If the setting operation is interrupted within 30 min. or not completed correctly, **OFFUPr** will also be displayed.

To change new setting parameters or old setting parameters, follow these steps:

Step 1:
Enter the safety code. Press key 1 and key 2 simultaneously



Step 2:
7 horizontal bars are now displayed. Enter the password as follows.
Note: The intervals between the individual inputs must not be longer than 20 sec., as the MPA 22 will otherwise revert to standby mode. If this is the case, you will have to start the code entry procedure from the beginning again.

- Press the minus key twice.

- Confirm your entry by pressing key 2 once.

- Press the minus key once.

- Confirm your entry by pressing key 2 twice.

- Press the plus key 4 x.

- Confirm your entry by pressing key 2 once.

- Press the plus key twice.

- Confirm your entry by pressing key 2 once.

- Press the plus key 3 x.

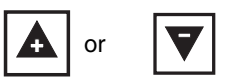
- Confirm your entry by pressing key 2 once.

- Press the minus key 4x.

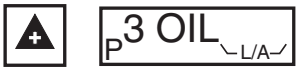
- Press the enter key once.
  Password entry is now finished.

Step 3:
after the correct password has been entered, **EOIL** appears on the display.

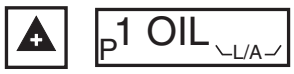
Step 4:
the operating points 9OIL (Stage 3), **3OIL (Stage 2)** and **1OIL (Stage 1)** can now be selected by pressing the **plus or minus key**.



Step 5:
After Stage 3 has been selected, **9OIL** appears on the display. The Stage 3 operating point can be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.
Note: The setting value for Stage 3 should be set to a value 0.1° greater than the value for Stage 2!



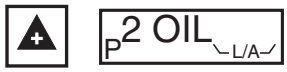
Step 6:
After you have set **Stage 3**, press the **plus key** to set **Stage 2** . **3OIL** appears on the display.
The Stage 2 operating point can be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.
For basic setting values, please refer to the adjustment table.



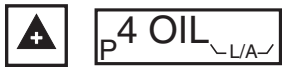
Step 7:
After you have set **Stage 2**, press the **plus key** to set **Stage 1**. **1OIL.** appears on the display.
The **Stage 1** operating point can be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.
For basic setting values, please refer to the adjustment table.

Step 8:
After you have set **Stage 1** , press the **plus key** to set the ignition point **P0**. **0OIL.** appears on the display.
The ignition point **P0** can be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.

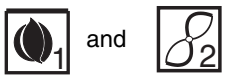
Step 9:
After you have set the ignition point **P0** , press the **plus key**
to set the Stage 1 / 2 switch-over point. **2OIL.** appears on the display.
The Stage 1 / 2 switch-over point can be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.



Step 10:
After the Stage 1 / 2 switch-over point has been set, press the **plus key**. **4OIL** of the Stage 3 / 3 switch-over point appears on the display. The setting value should be at **Stage 3**. Press the **plus key** again. **OIL.**
appears on the display.
Close the safety loop. The burner should now start up and dwell in the ignition position. If this is not the case, please repeat the procedure for adjustment of the ignition point under Step 8.



Step 11:
The setting values are now adjusted in relation to the boiler and the required burner output. The burner is in operation throughout the adjustment procedure so that all boilers and measured data relevant to the burner can be recorded.
Adjust the operating points in the order Stage 1, Stage 2, Stage 3 (0.1° greater than Stage 2), Stage 1 /2 switch-over point, Stage 3 / 4 switch-over point (0.1° greater than Stage 2) and make adjustments by simultaneously pressing **key 2** and the **plus or minus key**. To switch the burner to normal operation, press **key 1** and **key 2** simultaneously for approximately 2 sec. The burner switches to Stage 1 and then returns to normal operation. The setting procedure is now completed and the values have been stored.



Note:
If you want to change values after finishing the setting procedure, you will have to start from the beginning again, i.e. **OFF**.

Note: faults are cleared by pressing the enter key.

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Adjustment mode - gas-fired operation

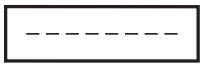
To enter this adjustment mode, the burner must be on standby.
Standby means that the burner is connected to the power supply, but no heating request has been issued and the burner is switched to gas-fired operation.
If **OFF** appears on the display on MPA 22,
the unit is running in standby mode and has already been configured.

If **OFFUPr** appears on the display, the MPA 22 is also running in standby mode, but the unit is still unprogrammed and all setting parameters still have to be entered by the following procedure.

Important: If the setting operation is interrupted within 30 min. or not completed correctly, **OFFUPr** will also be displayed.

To change new setting parameters or old setting parameters, follow these steps:

Step 1:
Enter the safety code. Press **key 1** and **key 2** simultaneously



Step 2:
7 horizontal bars are now displayed. Enter the password as follows.
Note: The intervals between the individual inputs must not be longer than 20 sec., as the MPA 22 will otherwise revert to standby mode. If this is the case, you will have to start the code entry procedure from the beginning again.

- Press the minus key twice.

- Confirm your entry by pressing key 2 once.

- Press the minus key once.

- Confirm your entry by pressing key 2 twice.

- Press the plus key 4 x.

- Confirm your entry by pressing key 2 once.

- Press the plus key twice.

- Confirm your entry by pressing key 2 once.

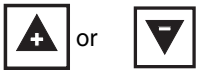
- Press the plus key 3 x.

- Confirm your entry by pressing key 2 once.

- Press the minus key 4x.

- Press the enter key once.
  Password entry is now finished.

Step 3:
after the correct password has been entered, **EGAS Pn** appears on the display.



Step 4:
the operating points P9 (max load), **P1 (min load)** and **P0 (starting point)** can now be selected by pressing the **plus or minus key**.

Step 5:
After the operating point **P9** has been selected, **9GAS** appears on the display.
The max load operating point can be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.
For basic setting values, please refer to the adjustment table.

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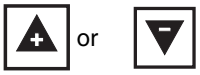
Step 6:
After you have set **P9**, press the **plus key** to set **P1**. **1 Gas** appears on the display.
The min load operating point can now be set to a value between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**.
For basic setting values, please refer to the adjustment table.

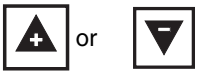
Step 7:
After you have set **P1**, press the **plus key** to set **P0** (the starting point). **0 Gas** appears on the display.
The starting point can now be adjusted to values between 0° and 90° by holding down **key 2** and optionally pressing the **plus or minus key**. The value of **P1** should preferably be set. If **P1**, (min. load) is set to a very low value, it is recommended to set **P0** to a higher value than **P1** in order to ensure stable starting.
For basic setting values, please refer to the adjustment table.

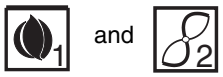
Step 8:
After you have set **P0**, press the **plus key.**
GAS Pn. appears on the display.
Now close the safety loop and issue a heating request.
The burner should now start up and dwell in the ignition position. If this is not the case, please repeat the procedure for adjustment of ignition point **P0** under **Step 7**. After the burner has started up, the gas train must be set to the nozzle pressure specified in the adjustment table.



Step 9:
The setting values are now adjusted in relation to the boiler and the required burner output. The burner is in operation throughout the adjustment procedure so that all boilers and measured data relevant to the burner can be recorded.
Adjust the operating points in the order **P0**,**P1** and **P9** and make adjustments by simultaneously pressing **key 2** and the **plus or minus key**. To switch the burner to normal operation, press **key 1** and **key 2** simultaneously for approximately 2 sec. The burner switches to min output **P1** and then returns to normal operation.
The setting procedure is now completed.

Note:
If you want to change values after finishing the setting procedure, you will have to start from the beginning again.





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20. Troubleshooting / process description

Defect determined:	Cause:	Remedy:	Fault code
Burner motor does not start up	Electric supply lead faulty	Rectify faults in electrical installation	
	Fuse faulty	Replace	
	Safety thermostat locked	Unlock	42 h
	Temperature of controller setting is exceeded	Renewed start attempt after temperature drop	
	MPA 22 faulty	Replace	04 h
	Leak	Rectify leak	44H / 43H
	No gas	Safeguard gas supply	
	Gas pressure monitor faulty	Replace compact unit or gas pressure switch	22 h
	Filter in gas train dirty	Clean or replace	
	Air pressure switch not in idle position	Check air pressure switch (see page 8)	20 h
	Burner motor faulty	Replace	
	Mains voltage < 187 V	Rectify faults in electrical installation	
Burner starts up and switches to fault mode before or after expiration of the safety period	Air pressure switch does not switch through during pre-ventilation	See Page 8	21 h
	Fault: external light	See Page 5	26 h
	Gas solenoid valve does not open	Replace gas train	
	Starting gas quantity set too low	Increase starting gas quantity	
	No ignition	Check ignition electrode and setting, ignition transformer and cable	
	Phase and zero mixed up	Connect connector unit in correct phase sequence	
	Flame control faulty	Check according to Page 5	2BH
	Air pressure switch opens during operation	See Page 8	21 h
	Gas nozzle dirty or faulty	Clean or replace gas nozzle	
Flame extinguishes during operation	No gas / oil	Safeguard gas supply	
	Filter in gas train dirty	Clean or replace	
	Flame blow-off	Incorrect burner setting	27 h
	Air pressure switch contact opens	Check/replace air pressure switch	21 h
	Flame signal too weak	Measure flame signal (see page 5)	27 h

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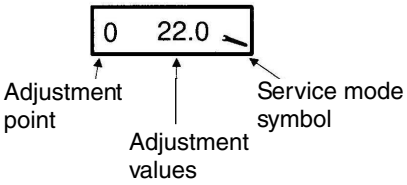
Service mode - pneumatic gas-fired operation

The service mode serves to display the set parameters and to read out the fault memory. It can be invoked in any operating state of the burner.

Important:

setting values cannot be changed in service mode. If no key is pressed for longer than 20 sec., the display returns to standby mode.

To access the service mode, press the **enter key** for approx. 2 sec. The following now appear on the display: point **P0** and the air flap positioning motor setting value at ignition in angular degrees, plus a wrench symbol denoting the service mode.



The following points can be retrieved by repeatedly pressing the enter key:

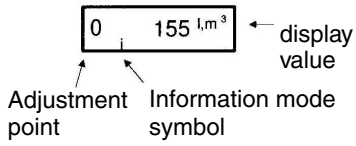
- The characteristic curves for points **P0**, **P1** and **P9**
- The last 6 fault messages **P10** to **P15** (see fault code MPA)
- The testing times of the valve proving system **P16** and **P17**
- The flame quality **P18**
- The eBus address of the MPA **P19**
- The switch setting of the valve proving system **P21**
- The eBus address of the external controller **P24**
- The modulation delay
- The set start points **P26**

To exit the service mode, please press the enter key or wait approx. 20 sec.

Information mode

The information mode is intended for display of consumption figures, operating hours and software data.

To access information mode, press the **enter key** for approx. 0.5 sec. A **zero** and a **value** appear on the display.



The following values can be queried in information mode under setting points 0 to 8. Retrieve by repeatedly pressing the enter key:

Important:

If no key is pressed for longer than 20 sec., the display returns to normal operating mode.

0 = fuel consumption
1 = total operating hours
2 = for oil only
3 = for oil
only 4 = number of successful start-ups
5 = display of software version
6 = software creation date
7 = hardware number
8 = date of production

Troubleshooting the MPA

Code	Description
04 h	Internal hardware fault
05 h	Internal hardware fault
06 h	Internal hardware fault
07 h	Internal hardware fault
09 h	Internal hardware fault
10 h	Internal hardware fault
11 h	Internal hardware fault
12 h	Internal hardware fault
13 h	Internal hardware fault
14 h	Internal hardware fault
15 h	Internal hardware fault
20 h	Air pressure switch is not in idle position
21 h	Failure of air pressure switch
22 h	Failure of gas pressure monitor
25 h	No flame after safety period
26 h	Outside light
27 h	Flame failure during operation
29 h	Internal hardware fault
2AH	Internal hardware fault
2BH	Short-circuit in photo resistor or internal fault
2CH	Internal hardware fault
30 h	Internal hardware fault
31 h	Internal hardware fault
32 h	Internal hardware fault
33 h	Internal hardware fault
34 h	Internal hardware fault
42 h	Safety chain interrupted
43 h	Y3 found to be leaking during leak check
44 h	Y3 found to be leaking during leak check
45 h	Internal hardware fault
46 h	Internal hardware fault
47 h	Internal hardware fault
48 h	Internal hardware fault
4AH	Internal hardware fault
5BH	Internal hardware fault
4CH	Internal hardware fault
4DH	Internal hardware fault
4EH	Internal hardware fault
50 h	Internal hardware fault
51 h	Internal hardware fault
52 h	Internal hardware fault
53 h	Internal hardware fault
54 h	Internal hardware fault
55 h	Internal hardware fault
56 h	Internal hardware fault
57 h	Internal hardware fault
58 h	Internal hardware fault
59 h	Internal hardware fault

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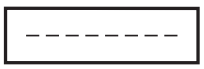
Code	Description
5AH	Internal hardware fault
5CH	Internal hardware fault
5DH	Internal hardware fault
5EH	Internal hardware fault
63 h	Internal hardware fault
64 h	Internal hardware fault
65 h	Internal hardware fault
67 h	Internal hardware fault
68 h	Incorrect feedback from air flap positioning drive (check connector and cable, actuator drive mounting and air flap mechanism)
6AH	Air-flap actuator position is out of tolerance (check connector and cable, actuator drive mounting and air flap mechanism)
6CH	Internal hardware fault
6DH	Internal hardware fault
6EH	Actuator drive interchanged or incorrectly connected
6FH	Burner detection error
70 h	Internal hardware fault
71 h	Internal hardware fault
73 h	Internal hardware fault
74 h	Internal hardware fault
75 h	Internal hardware fault
76 h	Internal hardware fault
77 h	Internal hardware fault
78 h	Internal hardware fault
79 h	Internal hardware fault

Fault message NoID:

If this fault message appears, this means that the internal parameter values of the MPA have been altered by external influences.

To change the setting parameters, carry out the following steps:

Step 1:
Press keys 1 and 2 simultaneously for approx. 2 seconds.



Step 2:
7 horizontal bars are now displayed. Enter the password.
Note: The intervals between the individual inputs must not be longer than 20 sec., as the MPA 22 will otherwise revert to standby mode. If this is the case, you will have to start the code entry procedure from the beginning again.

Step 3:
Confirm the password. Press keys 1 and 2 simultaneously for approx. 2 seconds.

Step 4:
Select control box type MPA 22.

Step 5:
Confirm your input by simultaneously pressing keys 1 and 2.

If you are unable to perform a reset, replace the unit. To determine the cause of the fault within the immediate vicinity of the burner, please contact the manufacturer.

Description of procedure for gas-fired operation:

Start-up tests	Process and program memory test / ramp actuator drives to reference point
State 01	Start-up decision (heating request issued)
State 02	Blower idle state check
State 03	Blower start-up
State 04	Pre-ventilation
State 05	Pre-ventilation / activate and test watchdog
State 06	Pre-ventilation
State 07	Air drive unit to ignition position
State 08	Pre-ignition depending on parameter
State 09	Start-up safety period
State 10	Stabilisation period
State 11	Ramp actuator drive from ignition point to operating characteristic, controller enable time
State 12	Operation
State 13	VPS - Evacuate valve cavity / (post-vent)
State 14	Test period Y2 / (residual post-ventilation time)
State 15	VPS - Fill valve cavity / (residual post-ventilation time)
State 16	Test period Y3 / (residual post-ventilation time)
State 17	Residual post-ventilation time
State 18	Restart inhibit period / wait loop for low gas program
State 20	Standby setting

Description of procedure for oil-fired operation:

Start-up tests	Processor and program memory test / ramp actuator drives to reference point
State 01	Start-up decision (heating request issued)
State 02	Blower idle state check
State 03	not used
State 04	Load watchdog
State 05	Activate and test watchdog
State 06	Pre-ventilation
State 07	Ramp air drive unit to ignition point
State 08	Delay until ignition point
State 09	Start-up safety period
State 10	Stabilisation period
State 11	Ramp actuator drive from ignition point to operating characteristic, controller enable time
State 12	Operation
State 17	Residual post-ventilation time
State 18	Restart inhibit period
State 20	Standby setting

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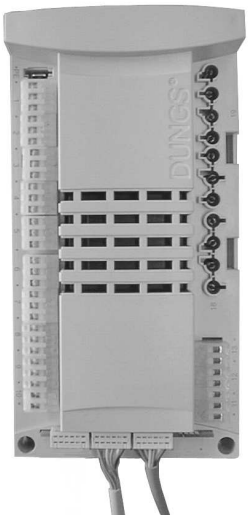
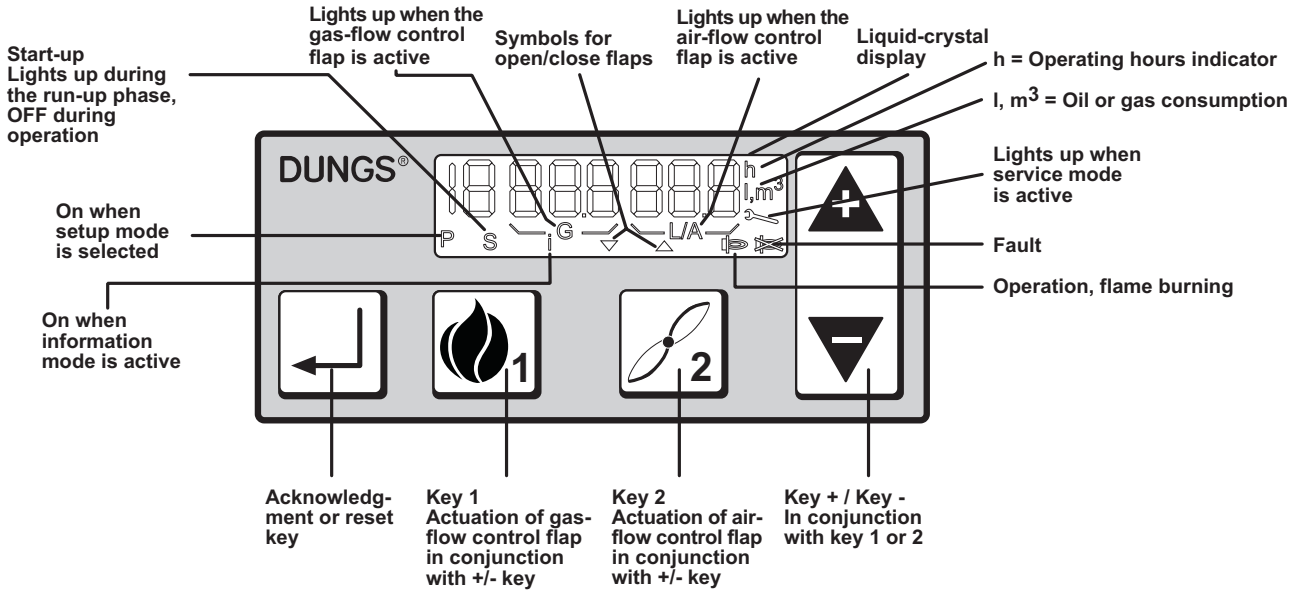
21. Control unit MPA 22



The MPA 22 is a microprocessor-controlled intermittent-duty control box for controlling and monitoring pneumatic modulating forced-air burners with an actuator drive. For operation as an automatic gas burner control with integral valve proving system.
The MPA 22 has e-BUS connectivity.

Gas certification
EU type test approval according to EU Gas Appliance Directive.
MPA 22 CE-0085AU316

22. MPA 22 control unit display



23. Calculation principles for gas burner adjustment

The values given in the tables are setting values for start-up.
The necessary system adjustment must be newly determined in each case.

General:
the calorific value ($H_{i,n}$) of fuel gases is generally specified
for the normal state (0°C, 1013 mbar).

Natural gas type E $H_{i,n}$ = 10.4 kWh/m^3
Natural gas type LL $H_{i,n}$ = 9.3 kWh/m^3
Gas counters measure the volume of gas in the operational state.

Gas flow determination:
To allow the heat generator load to be adjusted correctly, the gas flow rate must be determined in advance.

Example:

Altitude above m.s.l.	230 m
barometric air pressure B (acc. to table)	989 mbar
gas pressure P_G at meter	20 mbar
gas temperature ϑ_G	16°C
boiler output Q_n	430 kW
efficiency h_K (assumed)	90%
calorific value $H_{i,n}$	10.4 kWh/m^3

Gas flow in standard state (V_n)

$$V_n = \frac{Q_n}{\eta_k \times H_{i,n}} = \frac{430kW}{0,90 \times 10,4 \frac{kWh}{m^3}} = 46 \frac{m^3}{h}$$

Gas flow in operating state (V_B)

$$V_B = \frac{V_n}{f} = \frac{46 \frac{m^3}{h}}{0,94} = 49 \frac{m^3}{h}$$

Conversion factor (f)

$$f = \frac{B + P_G}{1013} \times \frac{273}{273 + \vartheta_G}$$

Annual average air pressure

Mean geodetic altitude of the supply region above m.s.l. [m]	from		1	51	101	151	201	251	301	351	401	451	501	551	601	651	701
	to	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750
Annual average of air pressure	(mbar)	1016	1013	1007	1001	995	989	983	977	971	965	959	953	947	942	936	930

Legend:
Q_n = boiler output [kW]
h_K = efficiency [%]
$H_{i,n}$ = lower standard calorific value [kWh/m^3]
f = conversion factor
B = barometric air pressure [mbar]
p_G = gas pressure at gas meter [mbar]
ϑ_G = gas temperature at gas meter [°C]

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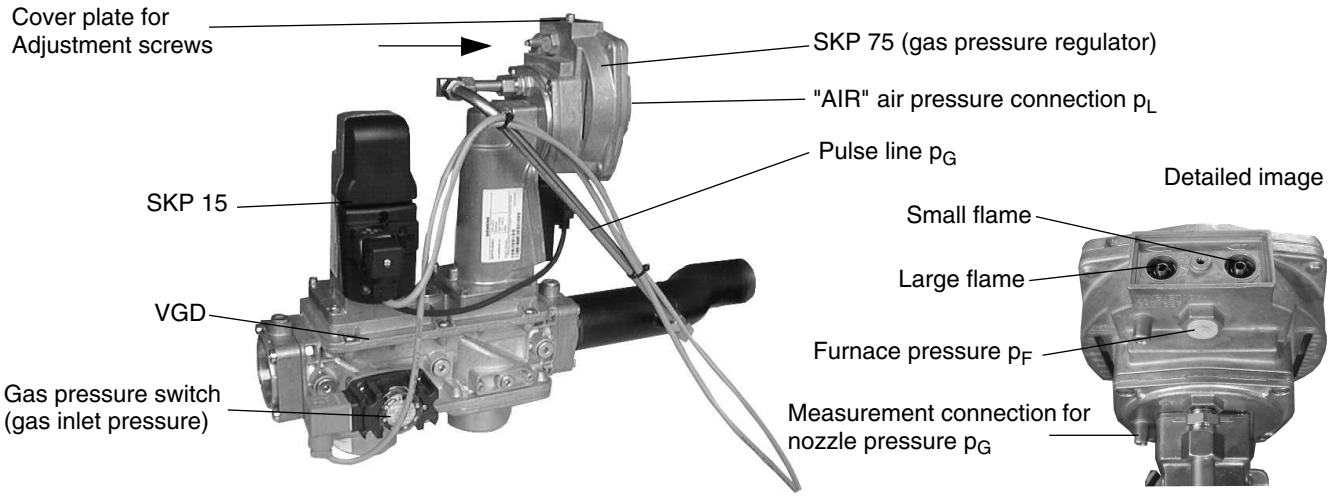
24 Gas burner with gas train KEV $_{II}$ 1 ½", KEV 2", KEV DN65, KEV DN80 and KEV DN 100

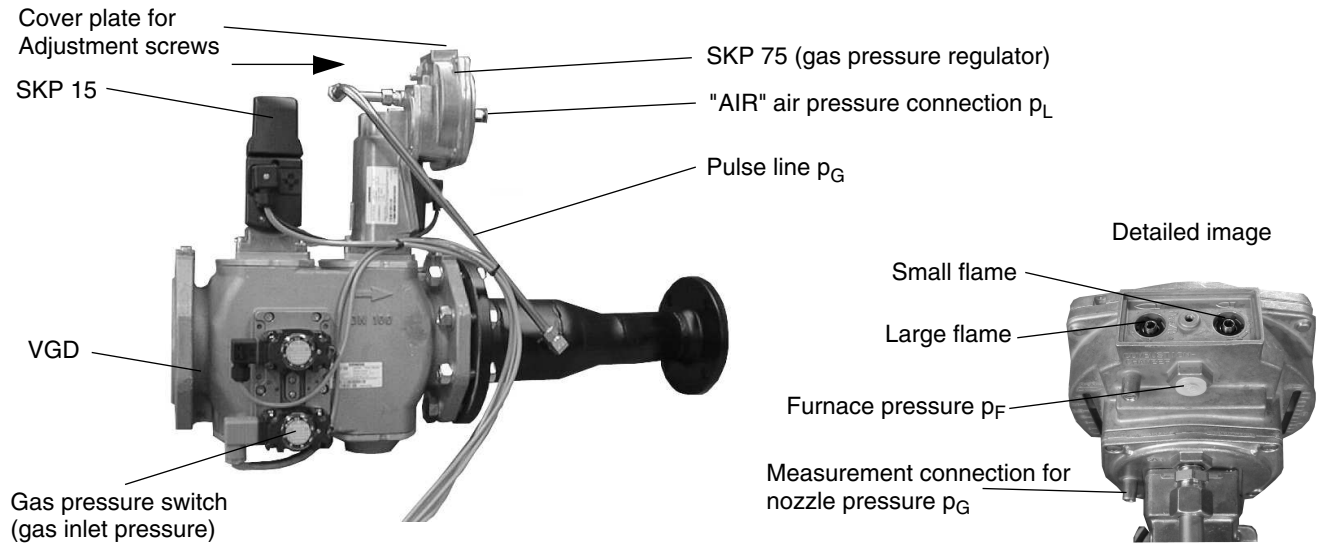
Installing the gas ramp	
Installation position	only in horizontal line, not tilted.
Minimum distance to masonry	20 mm
Screw in the measuring nipple for the furnace pressure at the top of the gas jacket Lay the guide for the connecting hose in a smooth curve between the measuring nipple for the furnace pressure and the KEV.	

The nipple for the air pressure connection must be screwed into the top of the gas jacket .

KEV $_{II}$ 1 ½", KEV 2" .



KEV DN65, KEV DN80



Connect the blue hose on the "AIR" connection of the KEV to the air pressure connection on the gas jacket. The blue hose is a control line for the KEV and must be laid in a smooth curve without any kinks.

Remove the plate for covering the adjustment screws from the gas pressure regulator.

Start the burner.

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1. Setting the excess air for Max. output and Min. output

- Set air flap positions ST2 for the Max. output and ST1 for the Min. output according to the setting tables (see page 41 ff.).
- In Max. output, adjust the excess air using the "large flame" / "V" setting screw on the gas pressure regulator. The CO_2 content in the exhaust gas should be 9 - 10% for natural gas and 11 - 12% for liquid gas.
- In Min. output, adjust the excess air using the "small flame" / "N" setting screw on the gas pressure regulator. The CO_2 content in the exhaust gas should be 9 - 10% for natural gas and 11 - 12% for liquid gas.The Min. output setting influences the Max. output setting.
- In Max. output, check the excess air and if necessary, correct using the "large flame" / "V" setting screw on the gas pressure regulator.

2. Setting the Max. output and Min. output

- Check the Max. output by referring to the gas volume on the gas meter or compare the nozzle pressure with the values in the setting tables. The output can be increased by opening the air flap (enlarge ST2) and decreased by closing the air flap (reduce ST2). The air surplus is not affected by this adjustment.
- Check the Min. output by referring to the gas volume on the gas meter or compare the nozzle pressure with the values in the setting tables. The output can be increased by opening the air flap (enlarge ST1) and decreased by closing the air flap (reduce ST1). The air surplus is not affected by this adjustment.

Burner start:

- Start the gas burner at Min. output - if the burner does not start, turn the setting screw **N** in the "**+**" direction and repeat the starting procedure.

Large flame / "V" setting	**Exhaust gas analysis values**	
Change in "+" direction if:	CO_2 too low	O_2 too high
Change in "-" direction if:	CO_2 too high	O_2 too low

Adjust nozzle pressure **Max. output**	**Max. output**
Increase ST2/ Max. output if:	Output/nozzle pressure too low
Decrease ST2/ Max. output if:	Output/nozzle pressure too high

Adjust nozzle pressure **Min. output**	**Min. output**
Increase ST1/ Min. output if:	Output/nozzle pressure too low
Decrease ST1/ Min. output if:	Output/nozzle pressure too high

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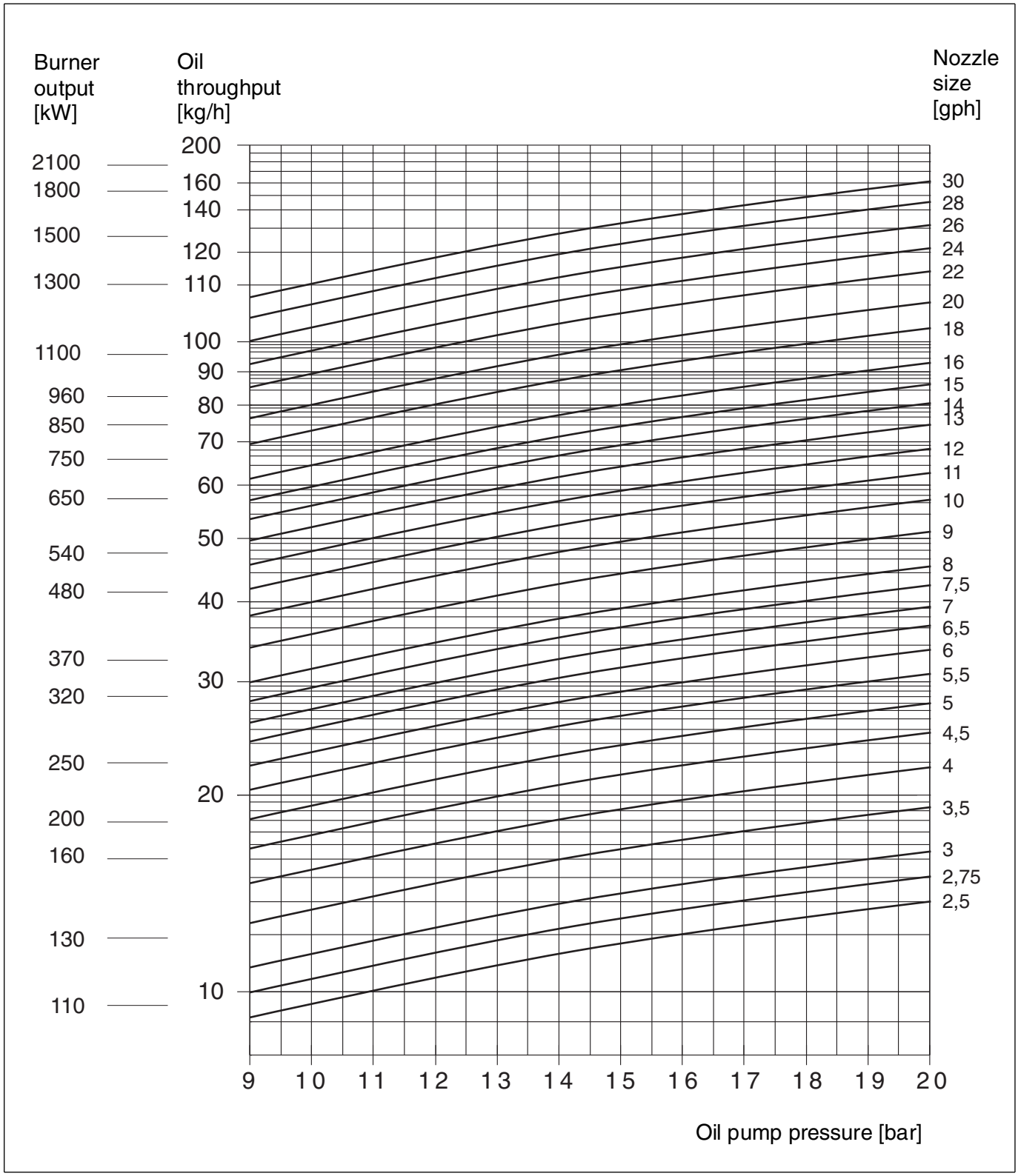
Small flame /"N" setting	Exhaust gas analysis values	
Change in "+" direction if:	CO_2 too low	O_2 too high
Change in "-" direction if:	CO_2 too high	O_2 too low

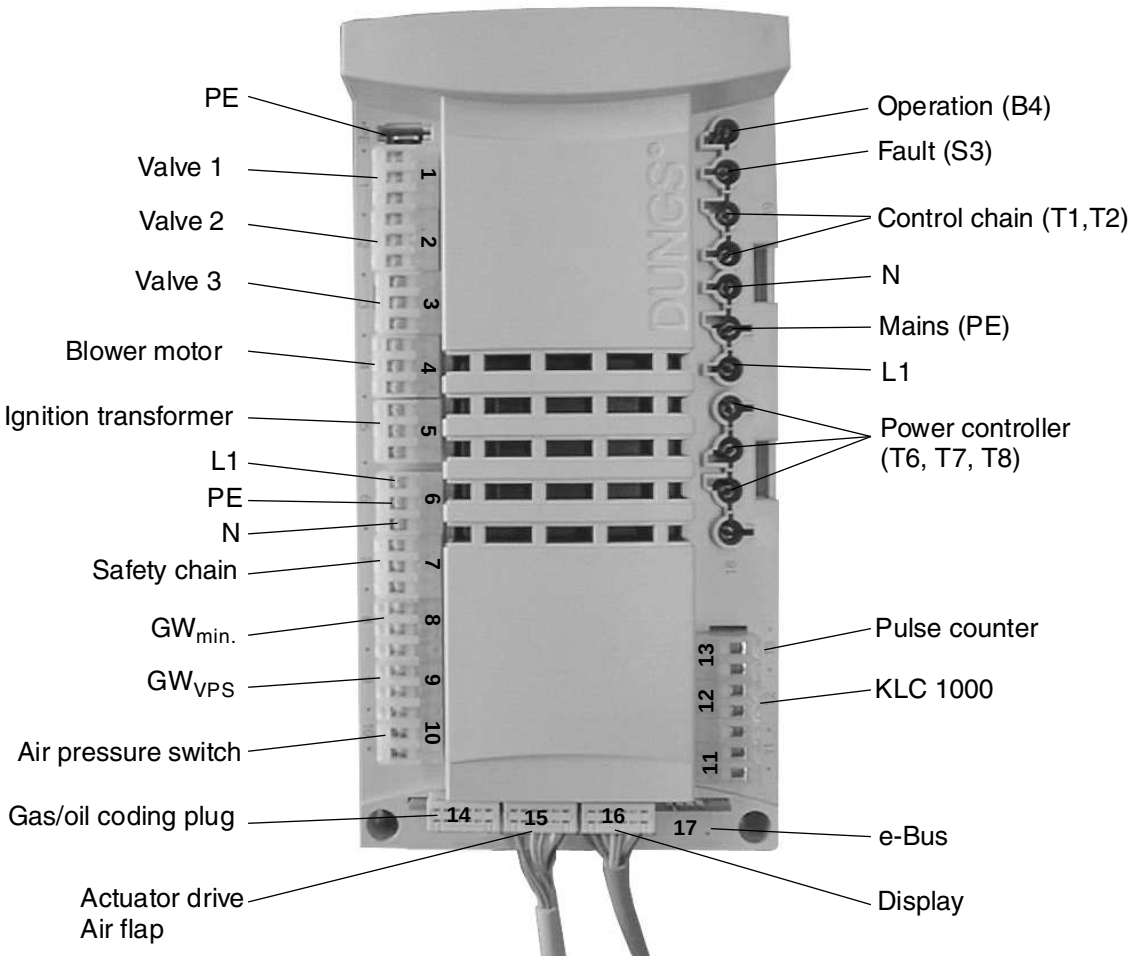
Caution !
Difference between baffle plate pressure p_L - furnace pressure p_F must be at least 0.3 mbar.

25. Nozzle selection diagram

If the desired output deviates from the values specified in the tables, the nozzle size and the pump pressure can be determined on the basis of the following diagram.



26. Circuit diagram



Key:

B7	KLC 1000
F2	Motor protection switch
F3	Safety temperature limiter
F4	Air pressure switch
F5	Motor protection switch
F11	ext. boiler controller fuse 6.3 AT / max 10 AF
F12	ext. motor supply lead fuse
F21	ext. temperature controller
F51	Gas pressure monitor
F52	Leak monitor
F60	Oil pressure switch
H11	ext. status lamp
H13	ext. fault indicator lamp
K1	Motor contactor
K2	Remote release solenoid actuator
K3, K4	Isolating relay
K9	Run-on relay
KM1	Star contactor
KM2	Mains contactor
KM3	Delta contactor
KM4	Delta contactor auxiliary contact
KM5	ext. motor contactor Oil pump
M1	Burner motor
M2	External oil pump motor
Q1	Heater power switch
S1	Control box MPA 22
S3	ON/OFF switch with indicator lamp
S9	Manual/remote switch
S10	Gas/oil switch
S16	Stored program controller
T2	Ignition transformer (gas)
T3	Ignition transformer (oil)
X11,X31	Boiler controller plug
X12,X32	Burner socket
X13	7-pin plug on MPA
X33	4-pin plug on MPA
X41	Plug for compact unit
X42	7-pin socket for burner
X61	Plug for oil solenoid valve
X62	socket for oil solenoid valve
X63	Plug for oil solenoid valve Stage 2
X64	Socket for oil solenoid valve Stage
2 X65	Plug for safety solenoid valve
X66	Socket for safety solenoid valve
X71	Plug for oil ignition transformer
X72	Socket for oil ignition transformer
X73	Plug for gas ignition transformer
X74	Socket for gas ignition transformer
X81, X91	Terminal strip
X84	Terminal strip for 3-phase AC connection
X85	Two-pin coding plug MPA Two-Stage/modulating
X86	Two-pin coding socket MPA Two-Stage/modulating
X90	Terminal strip
X112	ext. socketSV/gas pressure monitor - Leak monitor
X113	Gas pressure monitor plug - Leak monitor
X140	Coding plug MPA
X141	Actuator drive plug
X142	Operating unit plug
X150	ext. motor plug Oil pump pump side
X151	ext. motor socket Oil pump, pump side
X152	Oil pressure switch socket Oil pump, pump side
X153	Oil pressure switch plug Oil pump, pump side
Y2	Gas solenoid valve
Y3	Gas safety solenoid valve Stage 2
Y6	Oil solenoid valve
Y7	Oil solenoid valve Stage 2
Y8	Safety solenoid valve

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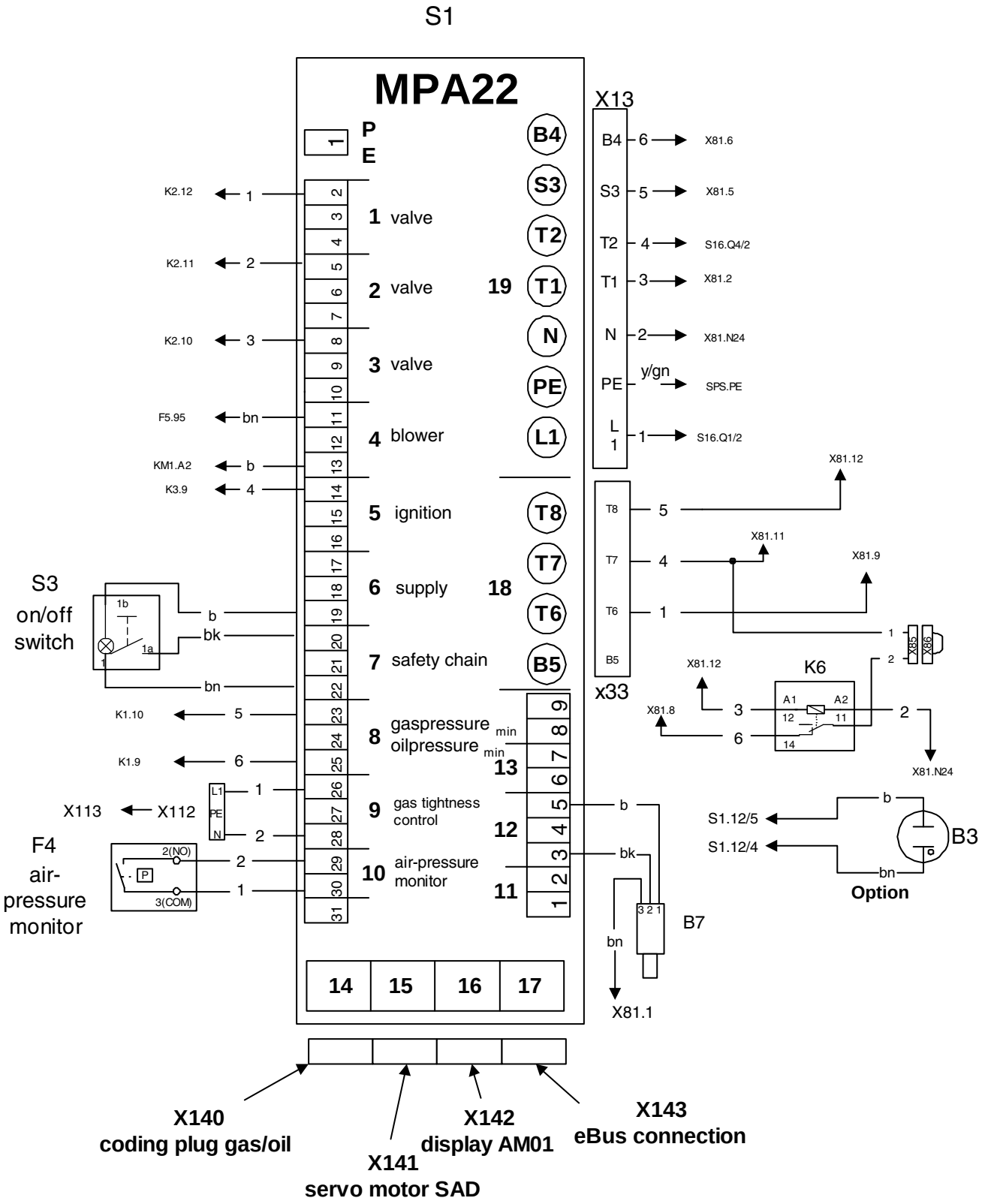

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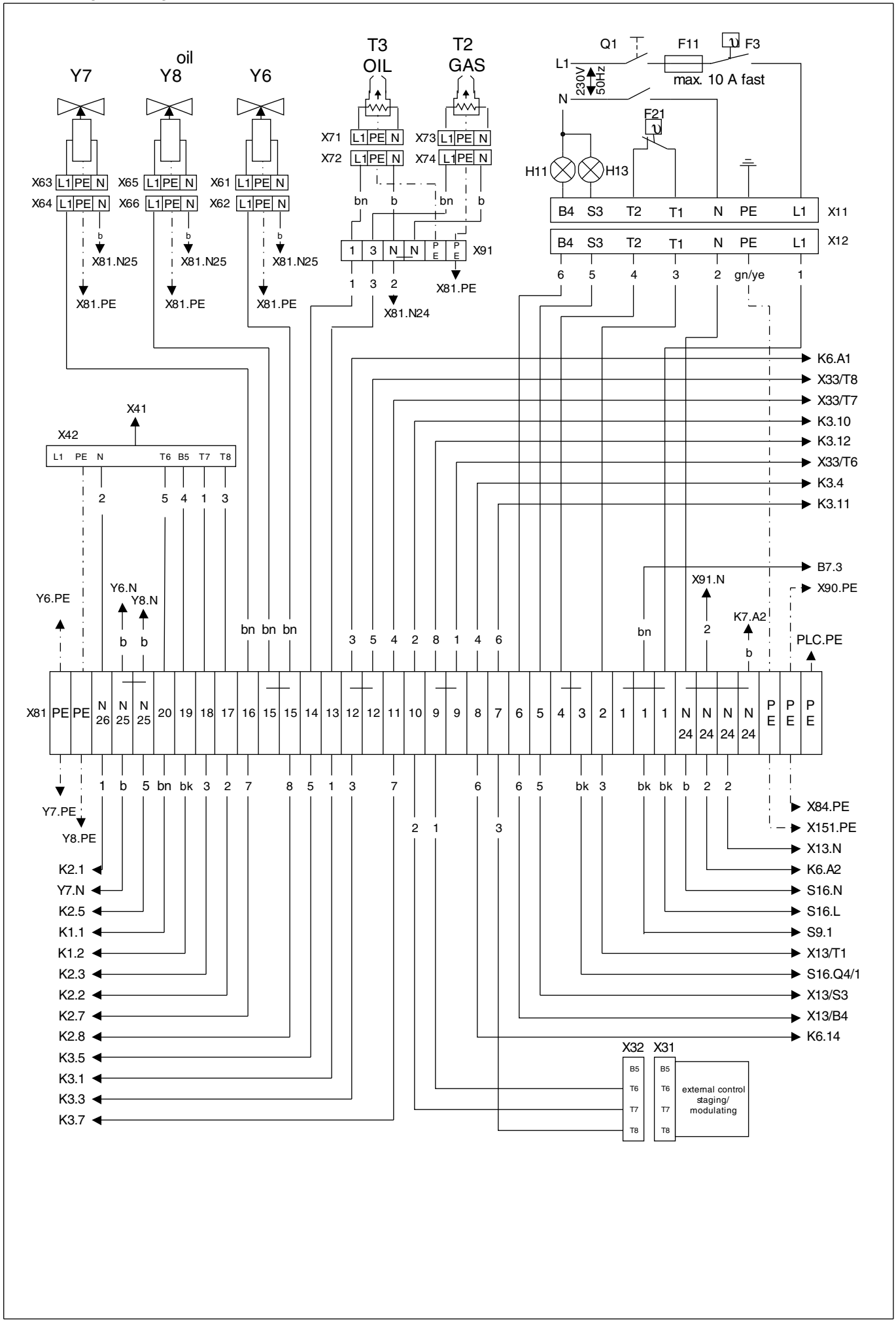
Circuit diagram page 2



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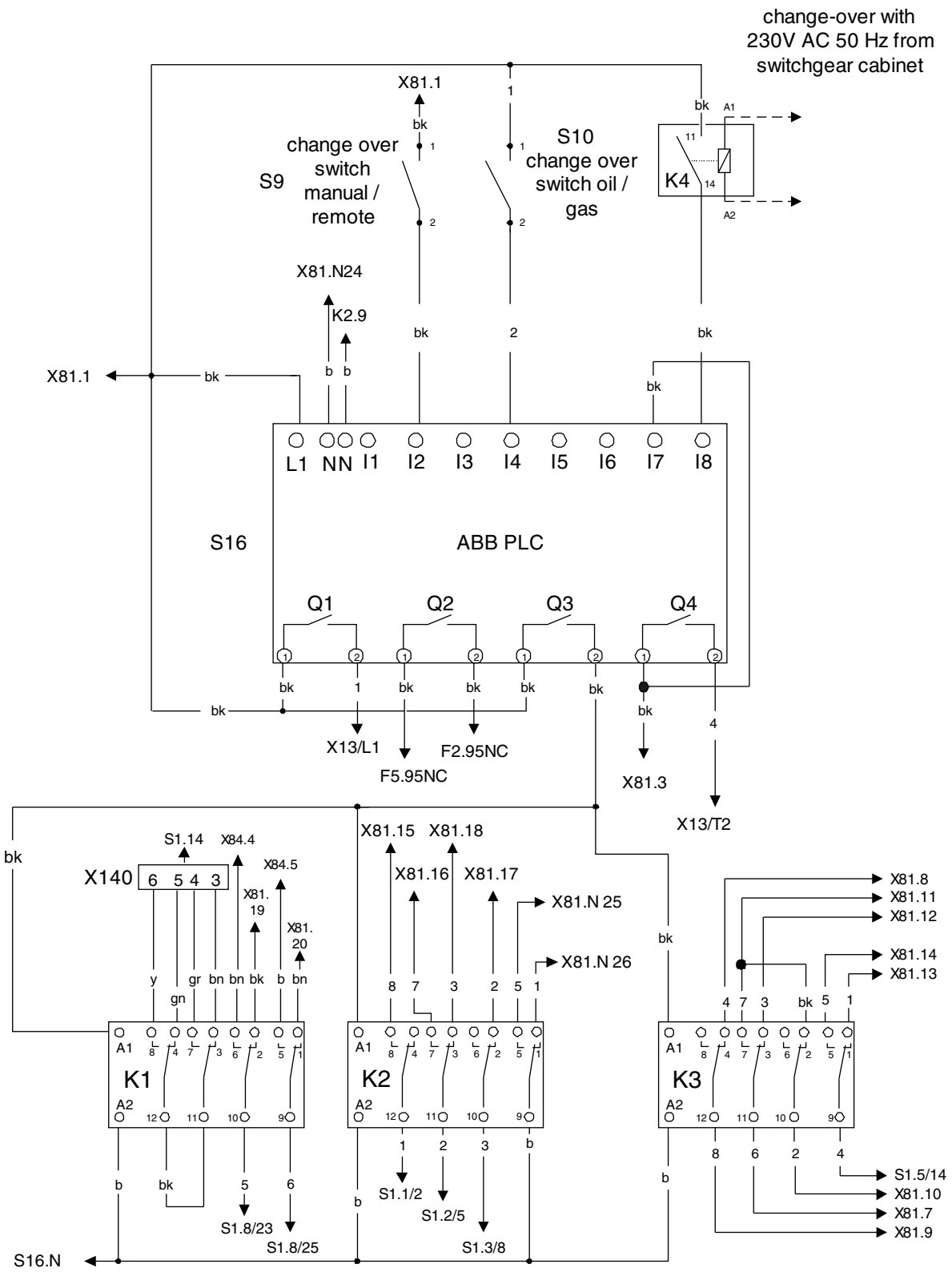
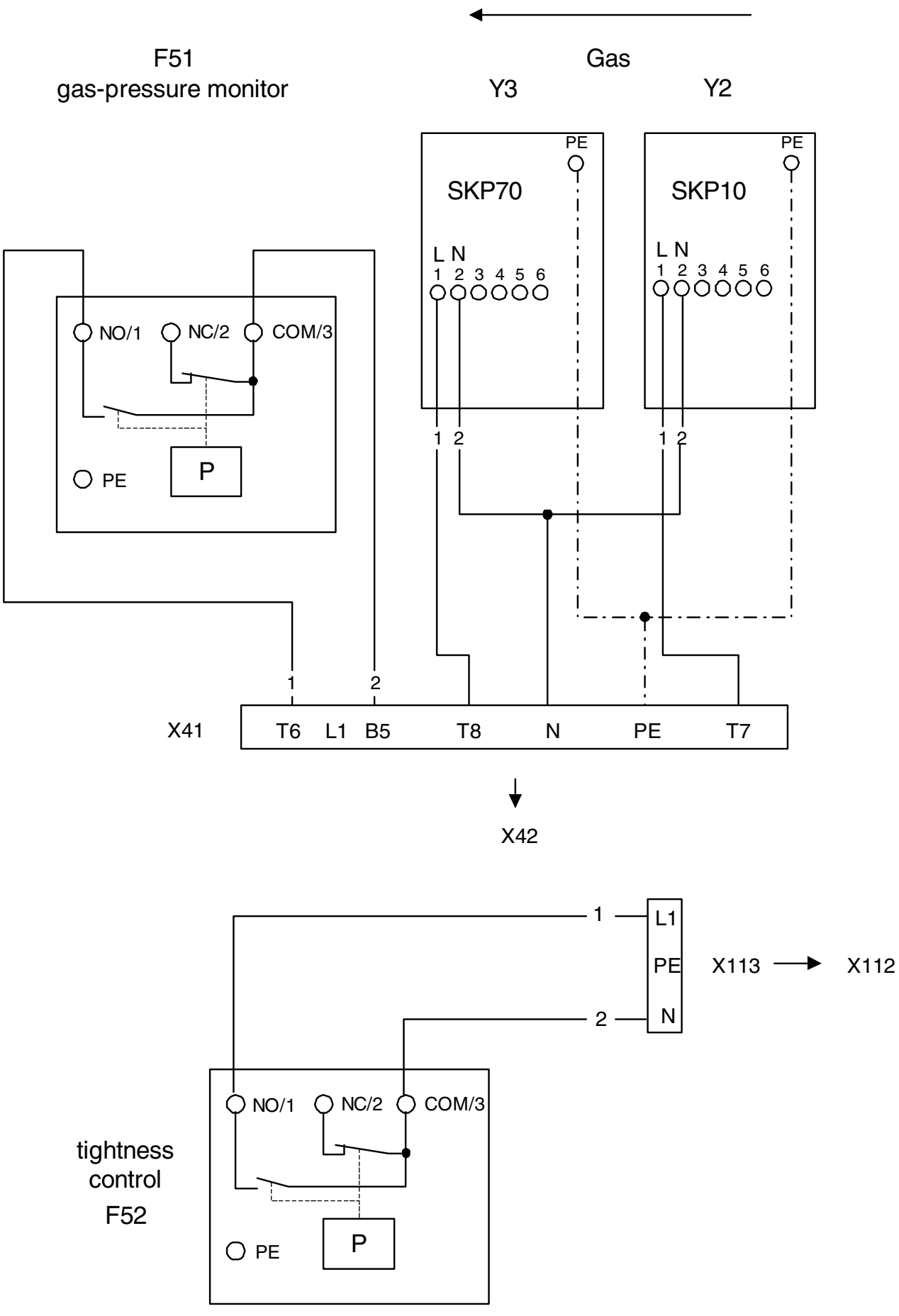
Circuit diagram page 3



Circuit diagram page 4a (gas train SKP)



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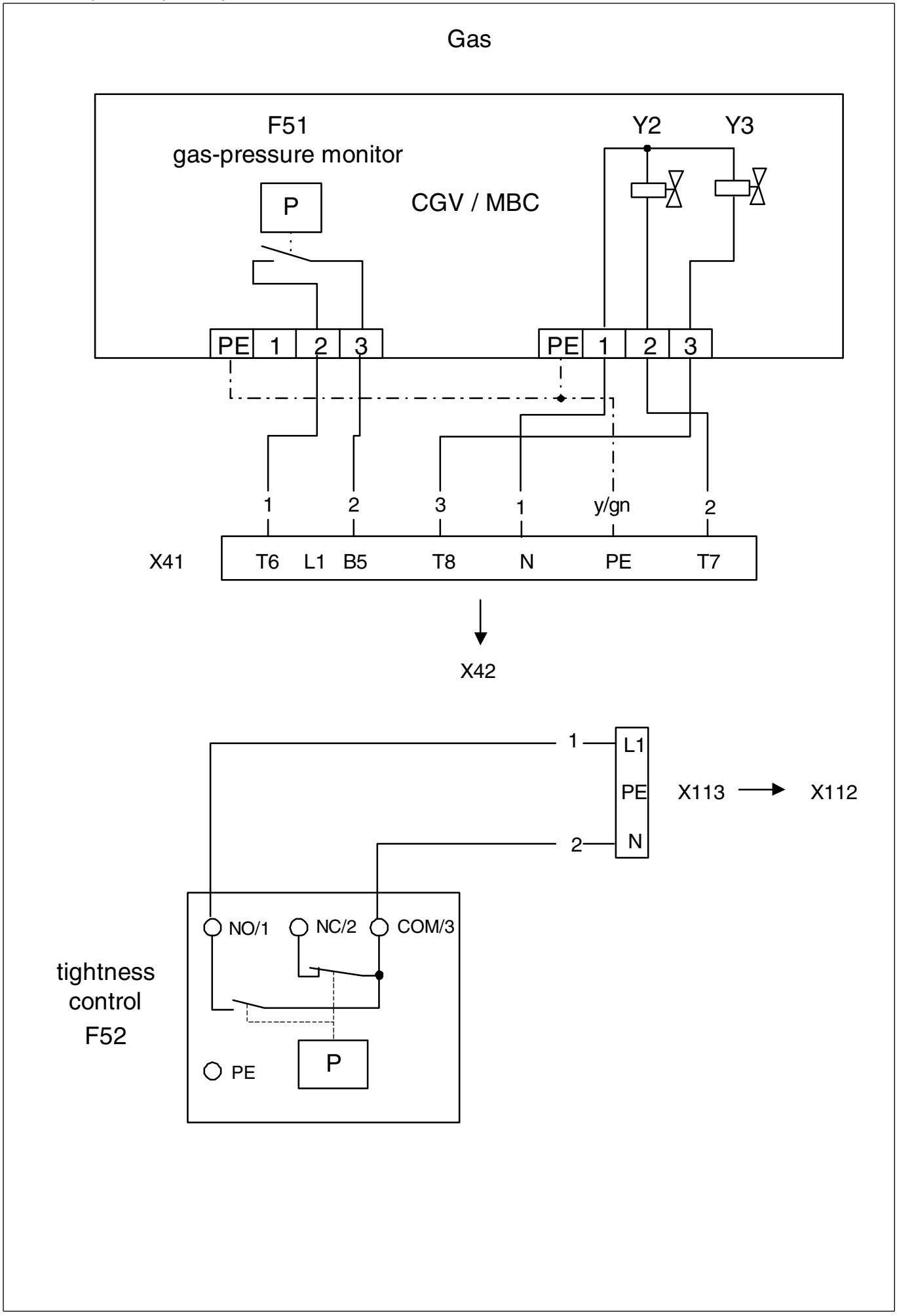
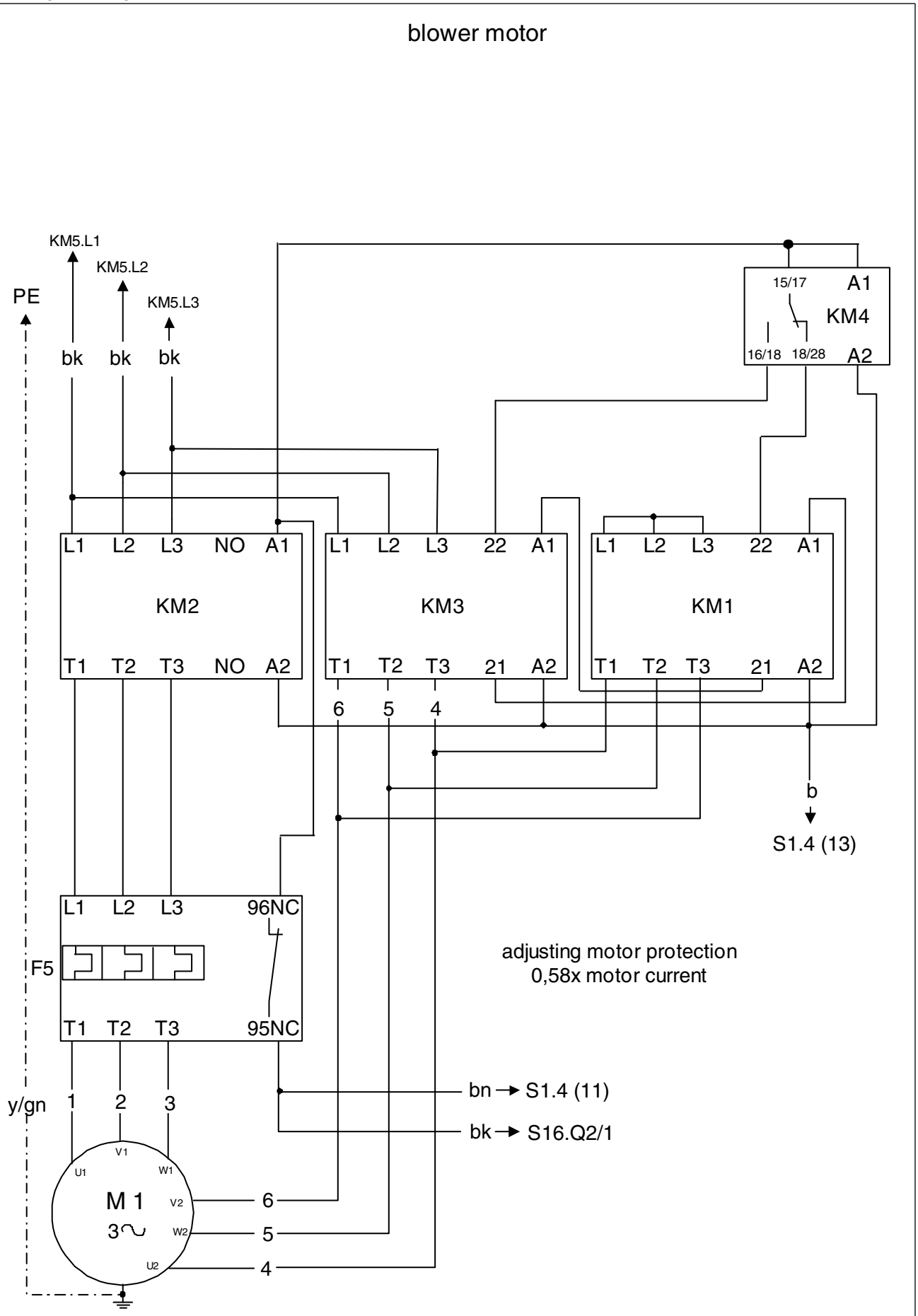

Gas
F51
gas-pressure monitor
P
CGV / MBC
Y2
Y3
PE
1
2
3
PE
1
2
3
1
2
3
1
y/gn
2
X41
T6
L1
B5
T8
N
PE
T7
X42
1
2
L1
PE
N
X113
X112
NO/1
NC/2
COM/3
tightness
control
F52
PE
P

Circuit diagram page 5



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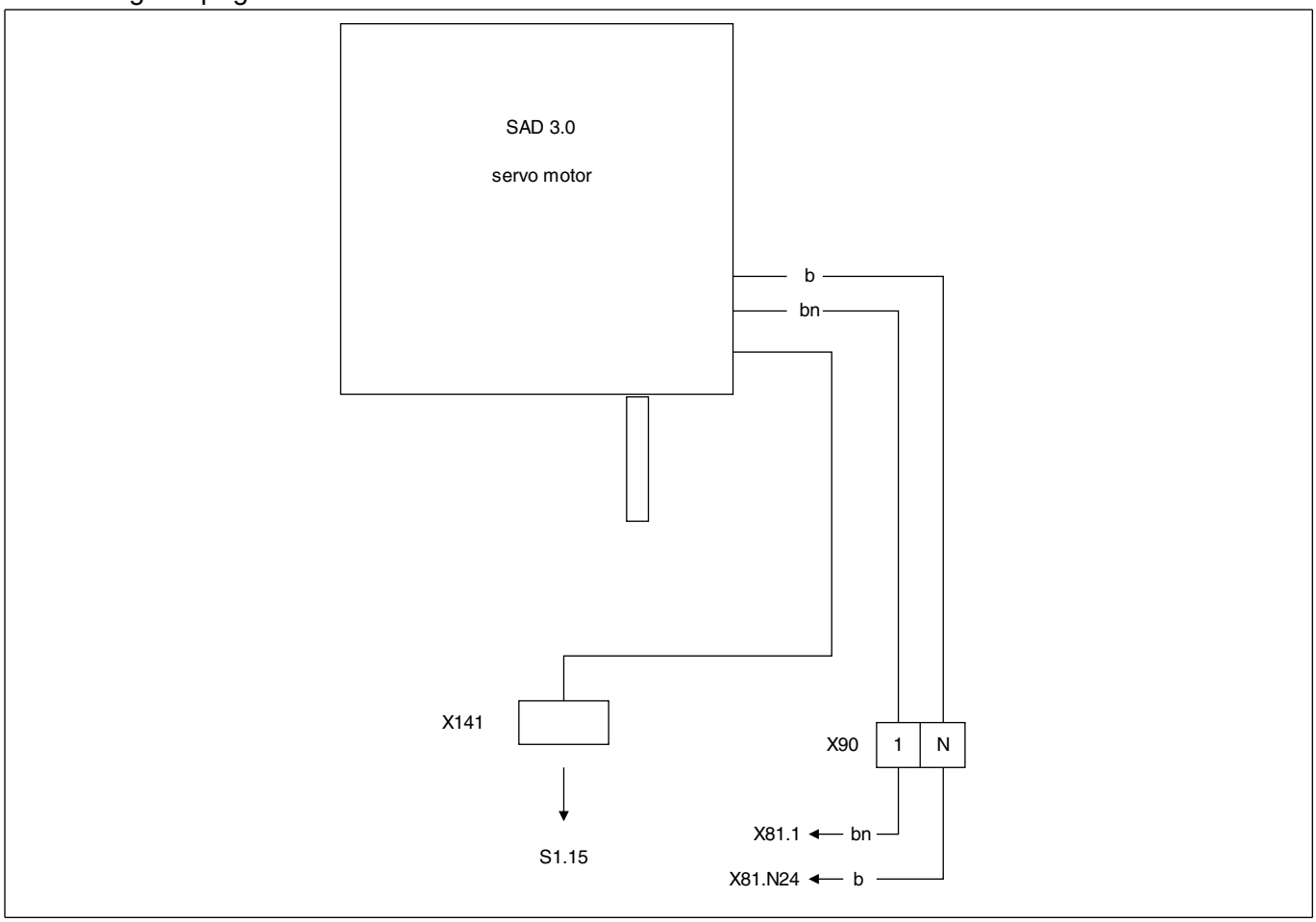
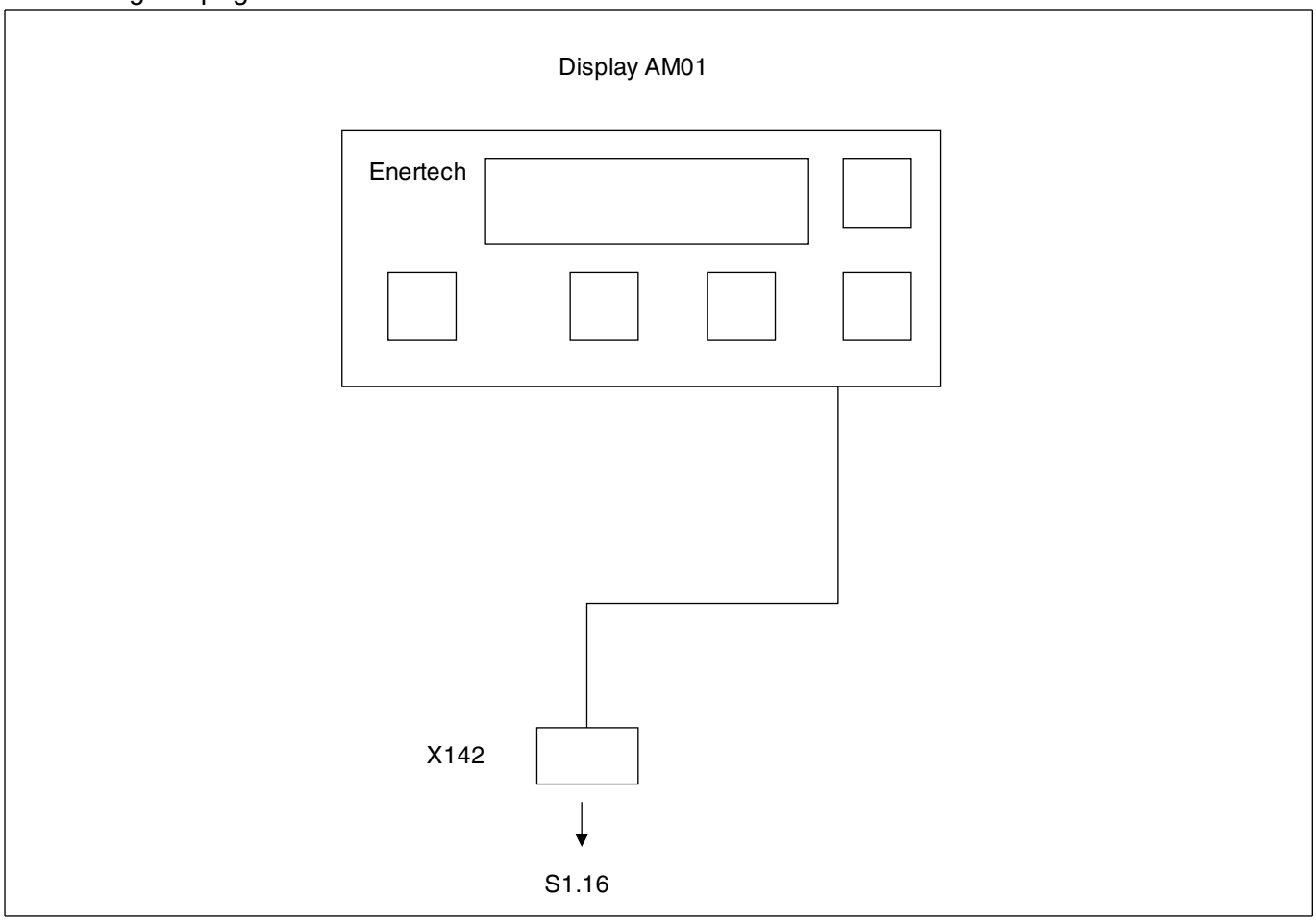
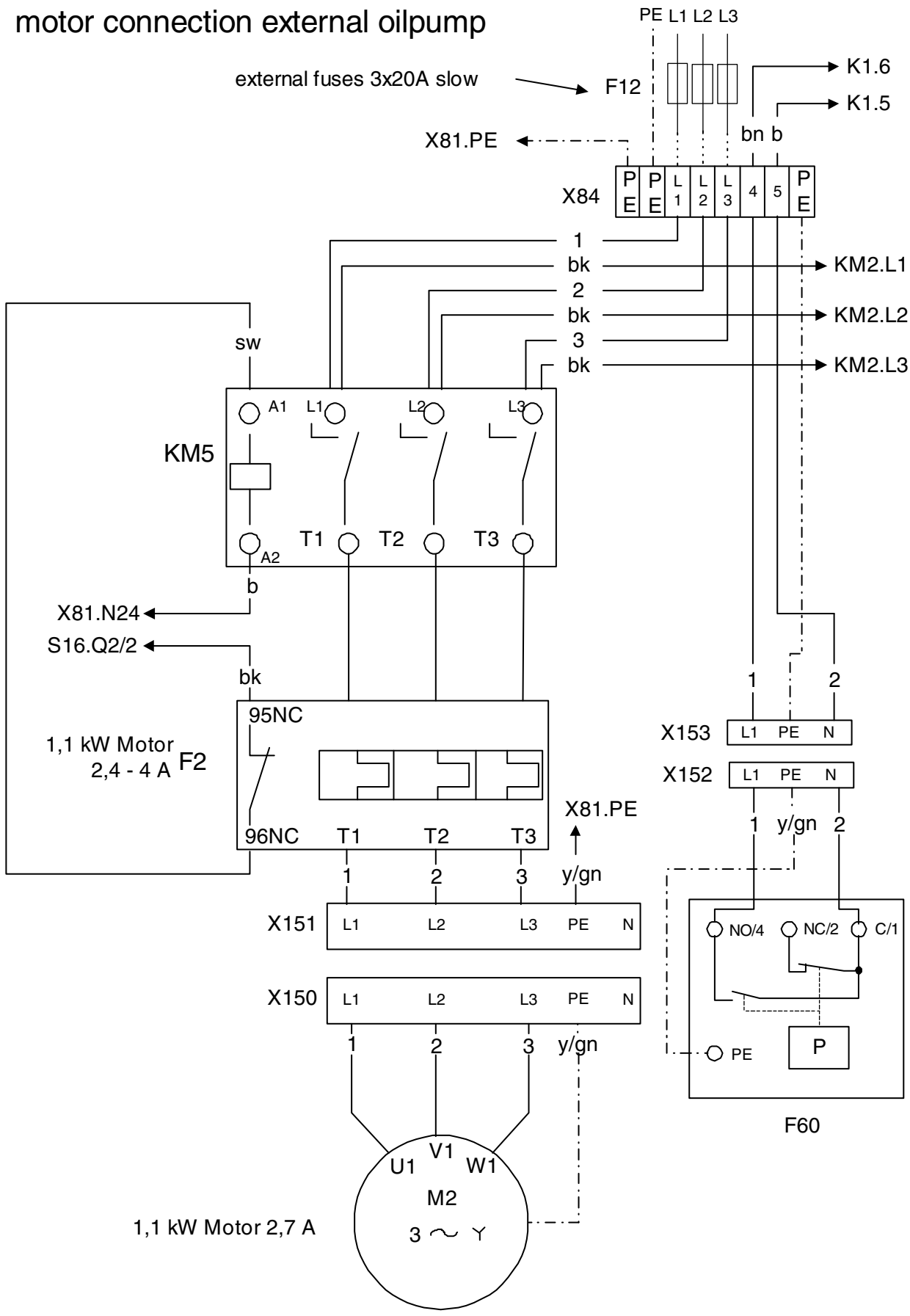
Circuit diagram page 6

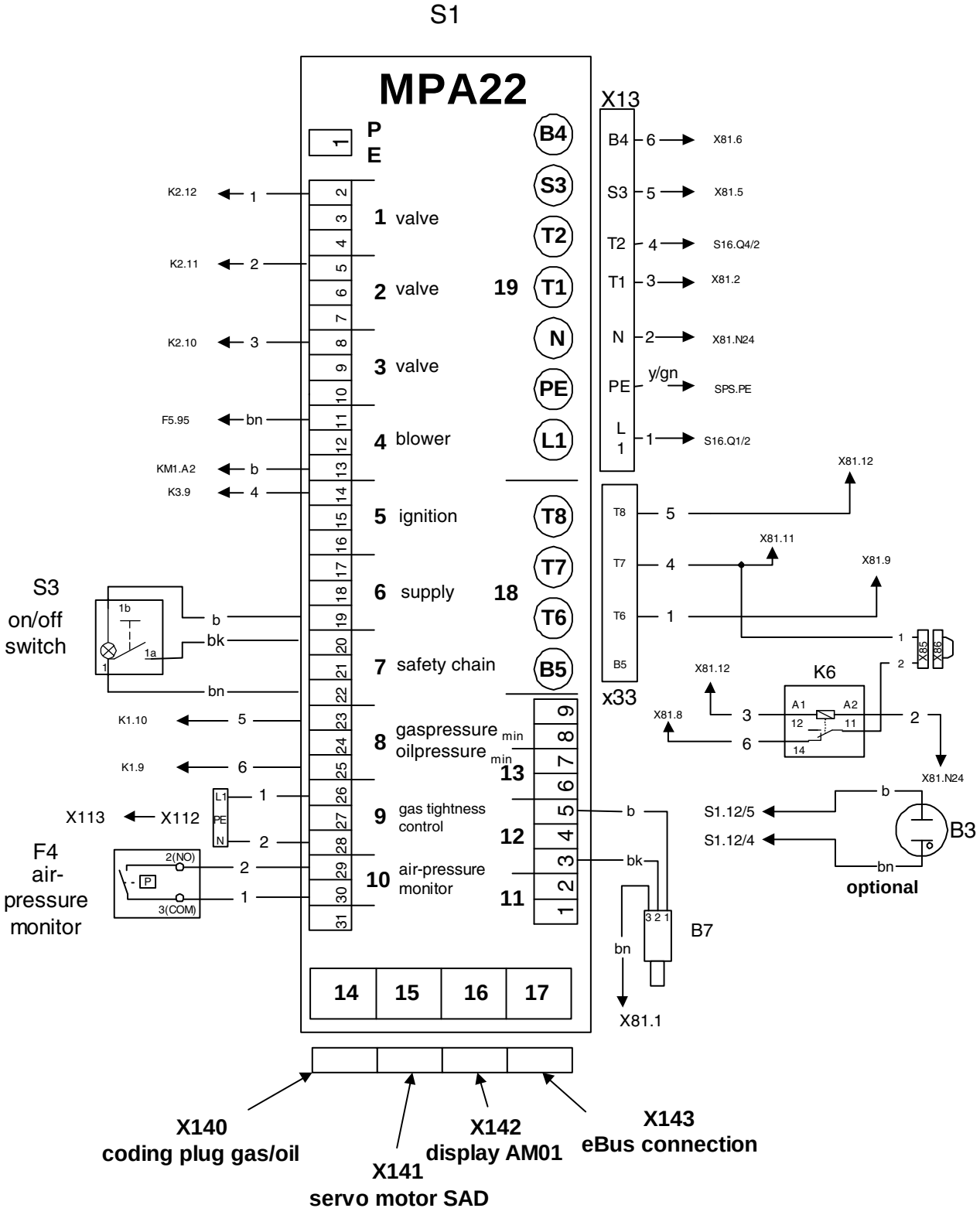


Circuit diagram page 7




motor connection external oilpump
PE L1 L2 L3
external fuses 3x20A slow
F12
K1.6
K1.5
X81.PE
bn b
X84
PE PE L1 L2 L3 4 5 PE
1
bk
KM2.L1
2
bk
KM2.L2
3
bk
KM2.L3
sw
A1 L1 L2 L3
KM5
T1 T2 T3
A2
b
X81.N24
S16.Q2/2
bk
95NC
1,1 kW Motor
2,4 - 4 A F2
96NC T1 T2 T3
X81.PE
1 2 3 y/gn
X151 L1 L2 L3 PE N
X150 L1 L2 L3 PE N
1 2 3 y/gn
U1 V1 W1
M2
1,1 kW Motor 2,7 A
3 ~ Y
1 2
X153 L1 PE N
X152 L1 PE N
1 y/gn 2
NO/4 NC/2 C/1
PE
P
F60

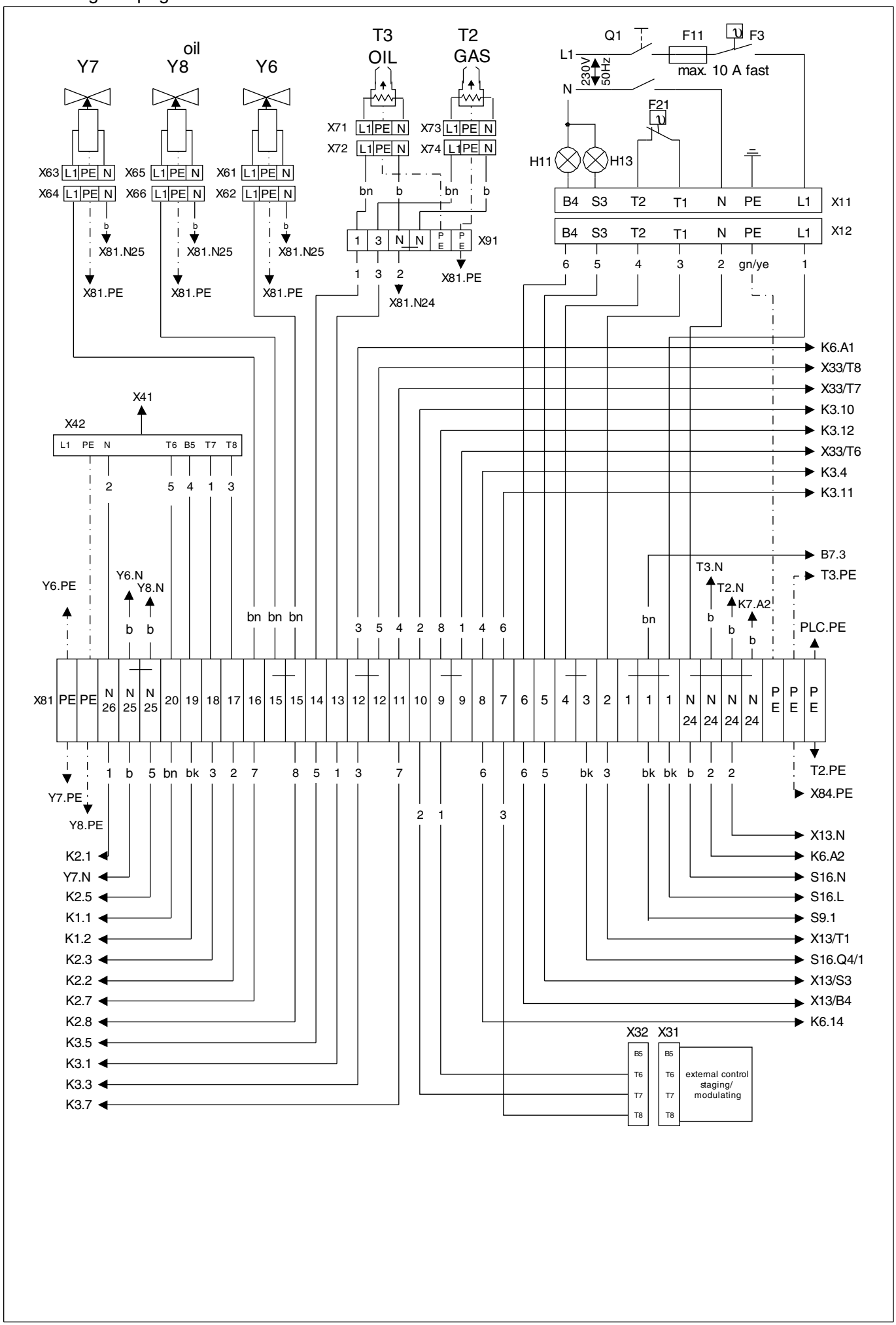
Circuit diagram without oil pump unit page 1



SP_1534-GB.3

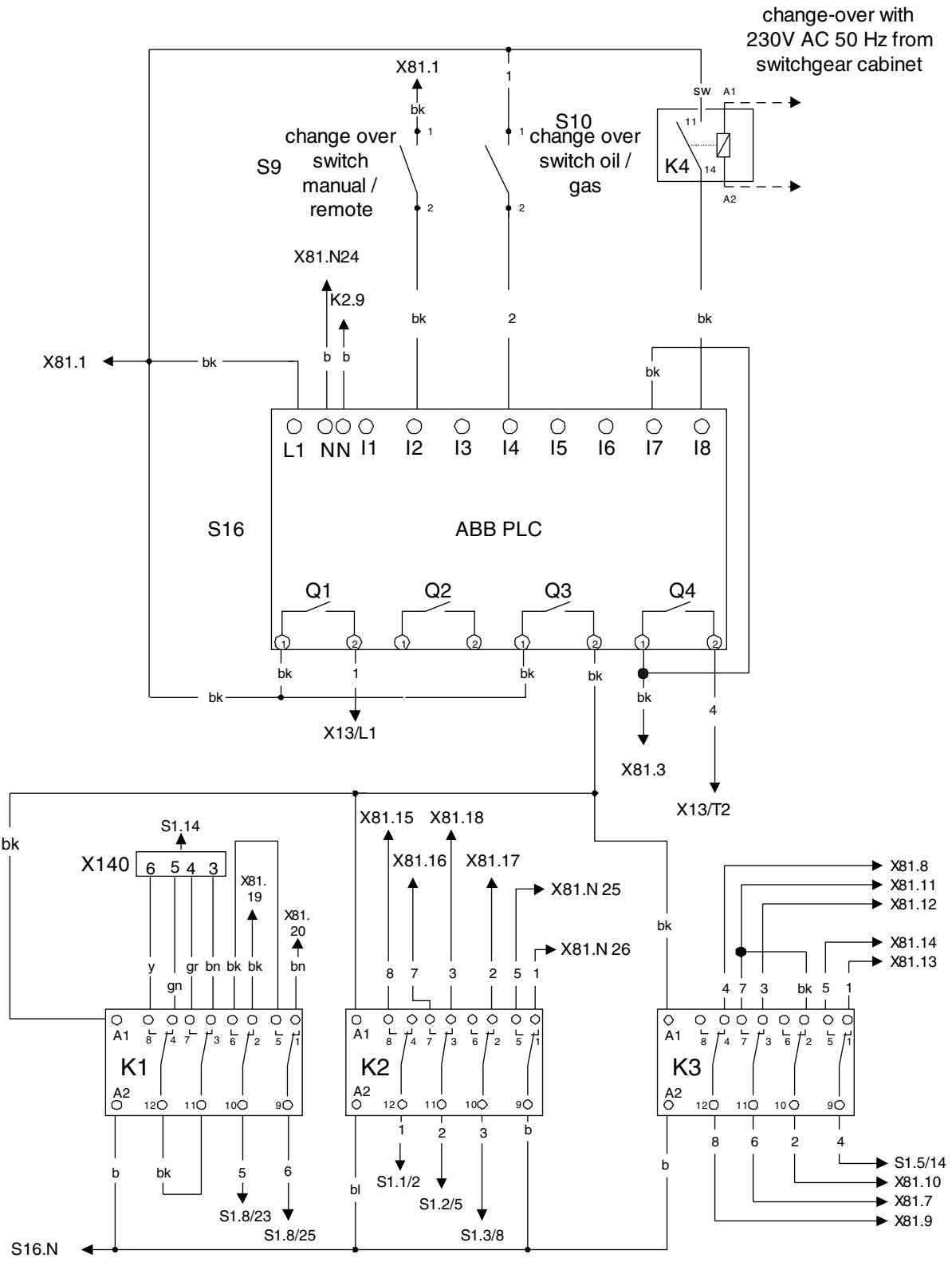
E. 28.01.09 • G. 07.06.17

Circuit diagram page 2

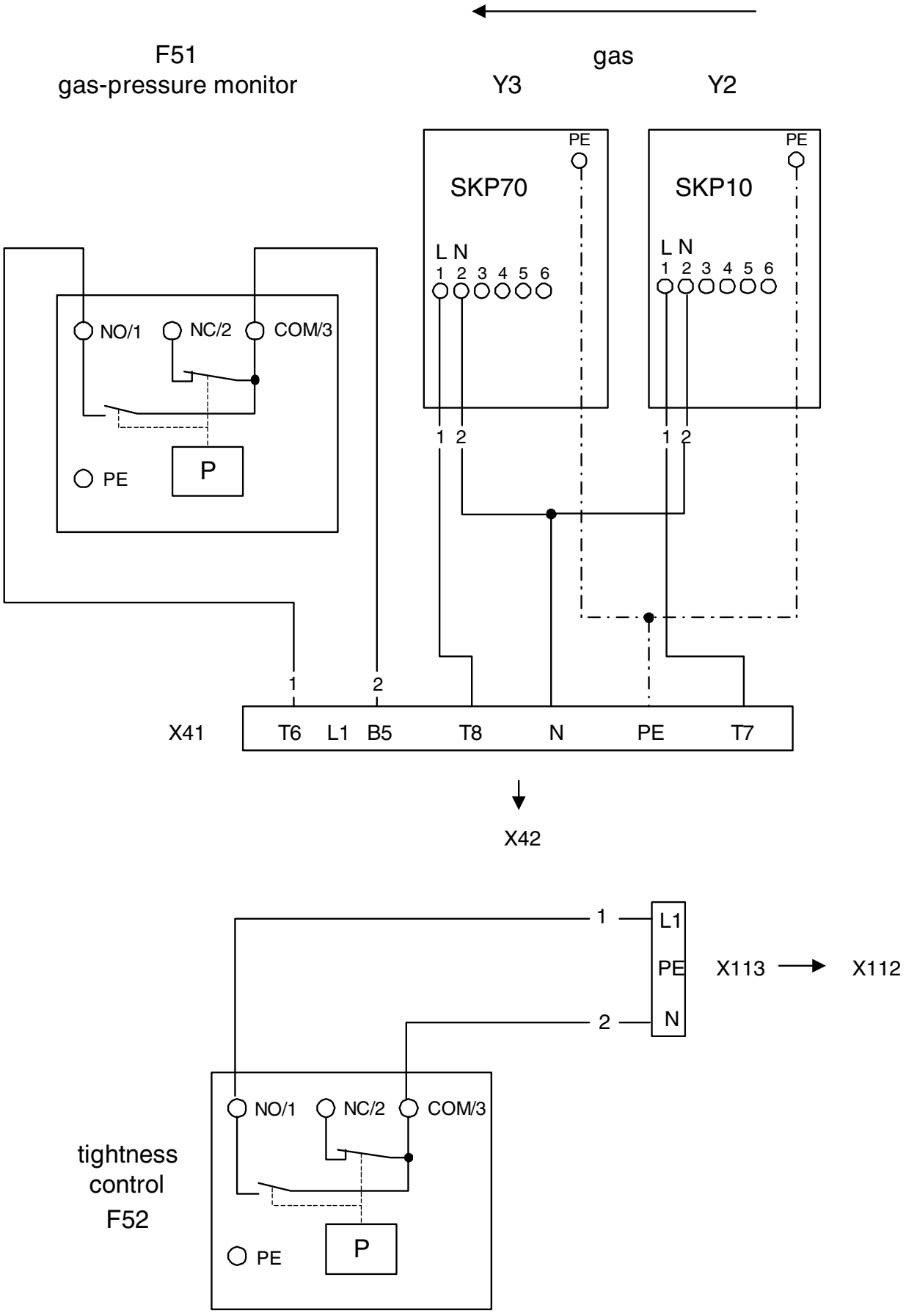


E. 28.01.09 • G. 07.06.17

Circuit diagram page 3

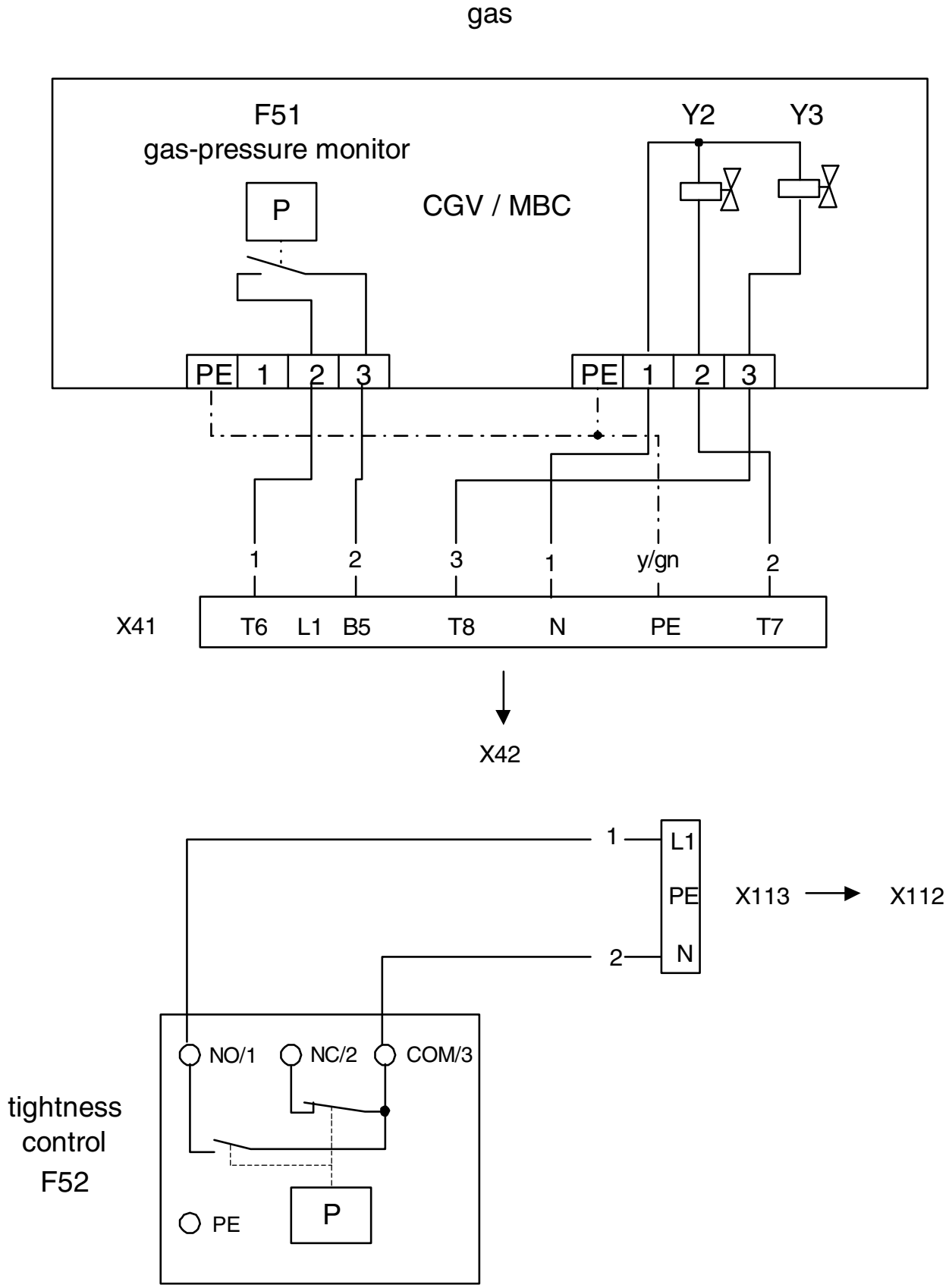


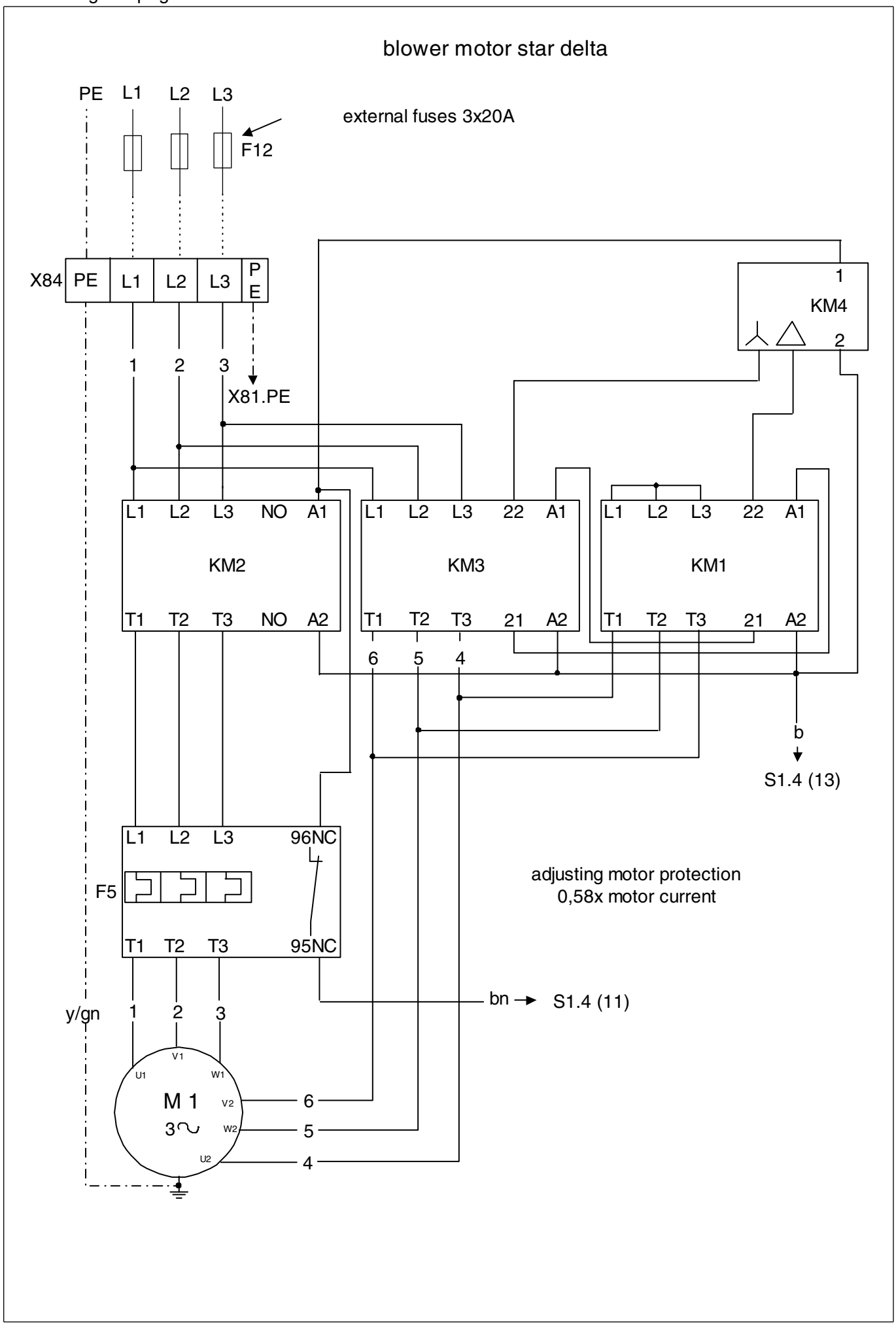
Circuit diagram page 4a (gas train SKP)



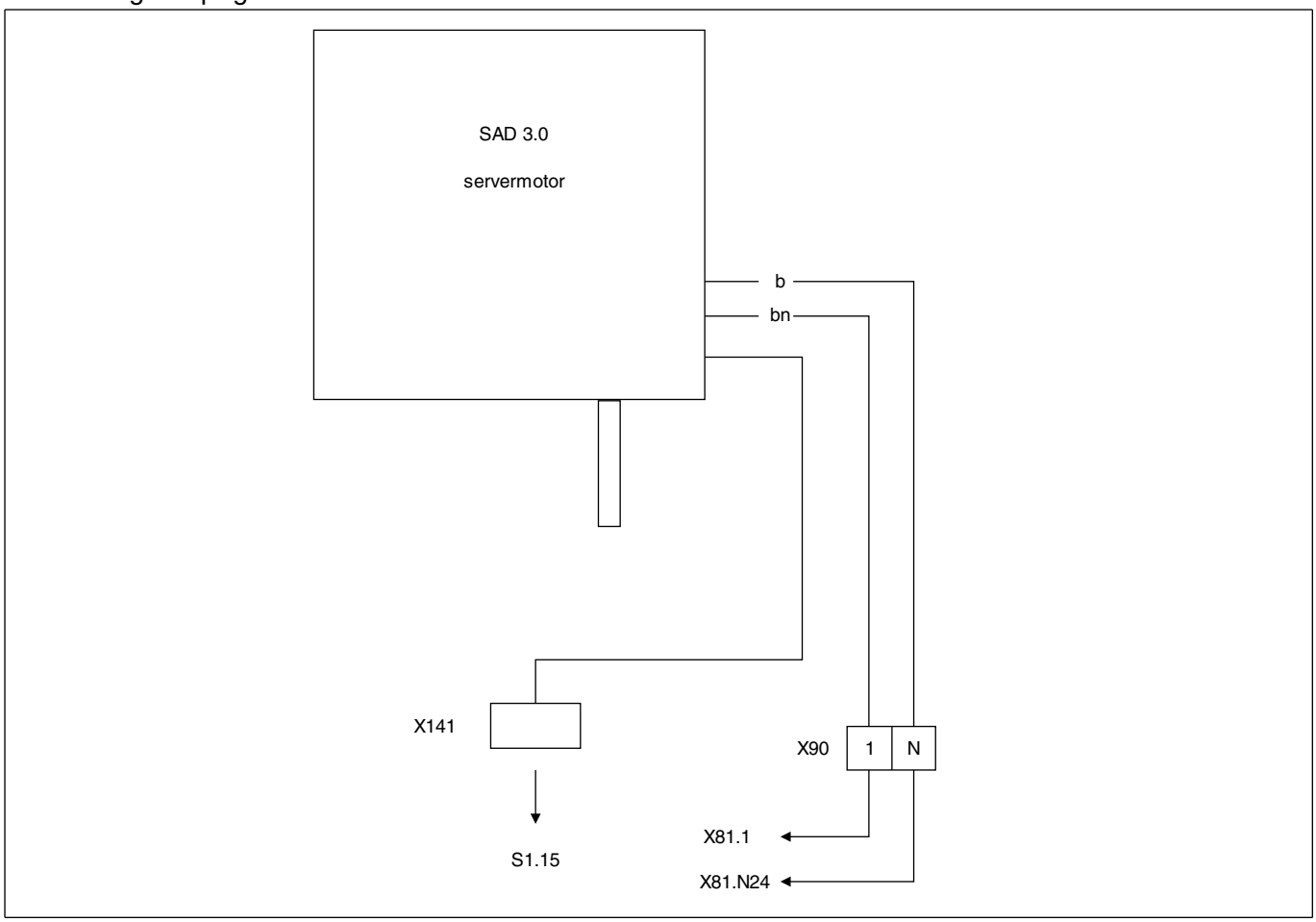
E. 28.01.09 • G. 07.06.17

Circuit diagram page 4b (gas train CG)

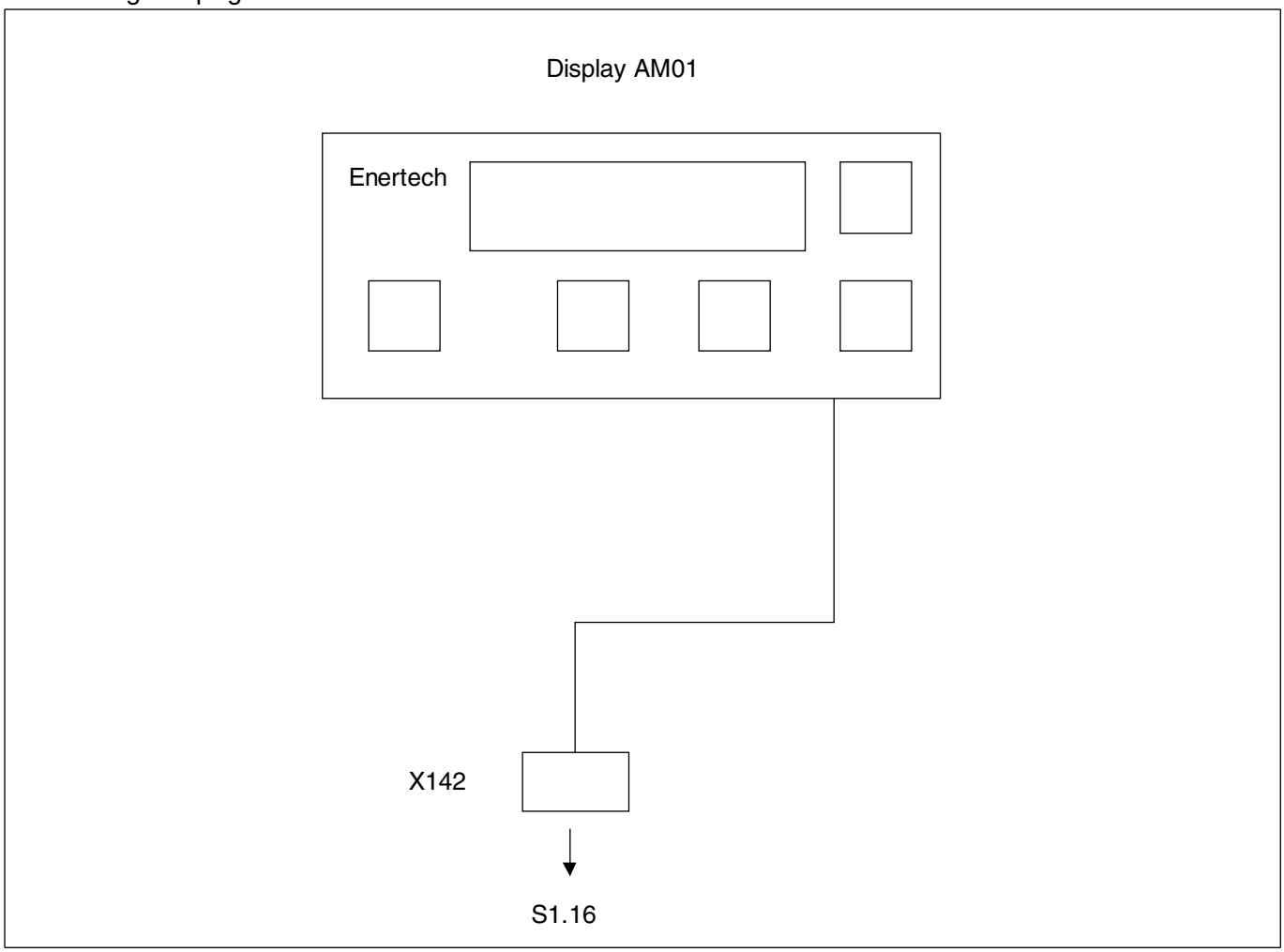



blower motor star delta
PE L1 L2 L3
external fuses 3x20A
F12
X84 PE L1 L2 L3 PE
1 2 3
X81.PE
1
KM4
2
L1 L2 L3 NO A1
KM2
T1 T2 T3 NO A2
L1 L2 L3 22 A1
KM3
T1 T2 T3 21 A2
L1 L2 L3 22 A1
KM1
T1 T2 T3 21 A2
6 5 4
b
S1.4 (13)
L1 L2 L3 96NC
F5
T1 T2 T3 95NC
adjusting motor protection
0,58x motor current
bn → S1.4 (11)
y/gn 1 2 3
V1
U1 W1
M 1
3~
V2
W2
U2
6
5
4

Circuit diagram page 6



Circuit diagram page 7



MK3.1-ZM-L					MK3.1-ZM-L-N								MK3.1-ZM-L-F			
					Natural gas L $H_{i,n}$ = 9.3 [kWh/m³]				Natural gas H $H_{i,n}$ = 10.4 [kWh/m³]				Liquid gas $H_{i,n}$ = 25.89 [kWh/m³]			
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]	
St. 2	St. 1	St. 2	St. 2 P 9	St. 1 P 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1
1000	550	930	15	10	13.6	4.0	110.9	61.0	10.1	2.4	99.1	54.5	12.1	3.6	39.8	21.9
1100	550	1023	20	11	16.0	4.0	121.9	61.0	12.0	2.4	109.0	54.4	14.6	3.6	43.8	21.9
1200	600	1116	20	11	18.6	4.9	133.0	66.5	14.0	3.2	119.0	59.5	17.4	4.3	47.8	23.9
1300	650	1209	38	12	21.2	5.9	144.1	72.1	16.1	4.0	128.9	64.4	20.4	5.1	51.8	25.9
1400	700	1302	80	13	23.9	7.0	155.2	77.6	18.2	4.8	138.8	69.4	23.6	5.9	55.7	27.9
1500	750	1395	90	14	26.8	8.0	166.3	83.1	20.4	5.6	148.7	74.3	27.1	6.8	59.7	29.9

MK3.1-ZM-L														
									Heating oil EL H_i = 11.86 [kWh/kg]					
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]						Pump pressure [bar]	Oil nozzle (Steinen)		Oil flow rate [kg/h]		
St. 2	St. 1	St. 2	9 OIL	3 OIL	1 OIL	0 OIL	2 OIL	4 OIL		St. 2 SS/60°	St. 1 SS/60°	St. 2	St. 1	
1000	550	930	15.1	15	11	10	15	15.1	21	7/60°S	8.5/60°S	84.3	46.4	
1100	550	1023	20.1	20	12	11	15	20.1	21	8.5/60°S	8.5/60°S	92.7	46.4	
1200	600	1116	20.1	20	12	11	15	20.1	21	9/60°S	9/60°S	101.2	50.6	
1300	650	1209	38.1	38	13	12	15	38.1	21	10/60°S	10/60°S	109.6	54.8	
1400	700	1302	80.1	80	14	13	18	80.1	20	11/60°S	11/60°S	118.0	59.0	
1500	750	1395	90	89.9	15	14	18	90	20	12/60°S	12/60°S	126.5	63.2	

MK3.2-ZM-L					MK3.2-ZM-L-N								MK3.2-ZM-L-F			
					Natural gas L $H_{i,n}$ = 9.3 [kWh/m³]				Natural gas H $H_{i,n}$ = 10.4 [kWh/m³]				Liquid gas $H_{i,n}$ = 25.89 [kWh/m³]			
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]	
St. 2	St. 1	St. 2	St. 2 P 9	St. 1 P 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1
1400	750	1302	35	12	26.5	6.5	155.2	83.1	22.3	6.3	138.8	74.3	20.0	5.7	55.7	29.9
1500	750	1395	37	12	29.4	8.5	166.3	83.1	24.8	6.3	148.7	74.3	22.9	5.7	59.7	29.9
1600	800	1488	42	13	32.3	9.8	177.4	88.7	27.4	7.5	158.6	79.3	26.1	6.5	63.7	31.9
1700	850	1581	50	14	35.2	11.2	188.4	94.2	29.9	8.7	168.5	84.3	29.4	7.4	67.7	33.8
1800	900	1674	68	15	38.1	12.5	199.5	99.8	32.5	9.9	178.4	89.2	33.0	8.3	71.7	35.8

MK3.2-ZM-L														
									Heating oil EL H_i = 11.86 [kWh/kg]					
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]						Pump pressure [bar]	Oil nozzle (Steinen)		Oil flow rate [kg/h]		
St. 2	St. 1	St. 2	9 OIL	3 OIL	1 OIL	0 OIL	2 OIL	4 OIL		St. 2 SS/60°	St. 1 SS/60°	St. 2	St. 1	
1400	750	1302	35.1	35	13	12	15	35.1	20	10/60°S	12/60°S	118.0	63.2	
1500	750	1395	37.1	37	12	12	15	37.1	20	12/60°S	12/60°S	126.5	63.2	
1600	800	1488	42.1	42	14	13	16	42.1	20	12/60°S	12/60°S	134.9	67.5	
1700	850	1581	50.1	50	15	14	17	50.1	21	13/60°S	13/60°S	143.3	71.7	
1800	900	1674	68.1	68	16	15	18	68.1	20	14/60°S	14/60°S	151.8	75.9	

MK3.3-ZM-L					MK3.3-ZM-L-N								MK3.3-ZM-L-F			
					Natural gas L $H_{i,n}$ = 9.3 [kWh/m³]				Natural gas H $H_{i,n}$ = 10.4 [kWh/m³]				Liquid gas $H_{i,n}$ = 25.89 [kWh/m³]			
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]	
St. 2	St. 1	St. 2	St. 2 P 9	St. 1 P 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1
1700	850	1581	32	12	18.3	4.2	188.4	94.2	14.8	3.0	168.5	84.3	14.8	3.7	67.7	33.8
1900	950	1767	39	15	22.4	5.5	210.6	105.3	18.3	4.2	188.3	94.2	18.5	4.6	75.7	37.8
2100	1050	1953	42	17	26.9	7.0	232.8	116.4	22.0	5.4	208.2	104.1	22.6	5.6	83.6	41.8
2300	1150	2139	68	19	31.6	8.5	255.0	127.5	25.9	6.7	228.0	114.0	27.1	6.8	91.6	45.8
2500	1250	2325	90	21	36.7	10.1	277.1	138.6	30.1	8.0	247.8	123.9	32.0	8.0	99.5	49.8

MK3.3-ZM-L														
									Heating oil EL H_i = 11.86 [kWh/kg]					
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]						Pump pressure [bar]	Oil nozzle (Steinen)		Oil flow rate [kg/h]		
St. 2	St. 1	St. 2	9 OIL	3 OIL	1 OIL	0 OIL	2 OIL	4 OIL		St. 2 SS/60°	St. 1 SS/60°	St. 2	St. 1	
1700	850	1581	32.1	32	14	13	16	32.1	21	13/60°S	13/60°S	143.3	71.7	
1900	950	1767	39.1	39	16	15	18	39.1	20	15/60°S	15/60°S	160.2	80.1	
2100	1050	1953	42.1	42	18	17	20	42.1	21	16/60°S	16/60°S	177.1	88.5	
2300	1150	2139	68.1	68	20	19	22	68.1	20	18/60°S	18/60°S	193.9	97.0	
2500	1250	2325	90.0	89.9	22	21	24	90.0	21	19/60°S	19/60°S	210.8	105.4	

MK3.4-ZM-L					MK3.4-ZM-L-N								MK3.4-ZM-L-F			
					Natural gas L $H_{i,n}$ = 9.3 [kWh/m³]				Natural gas H $H_{i,n}$ = 10.4 [kWh/m³]				Liquid gas $H_{i,n}$ = 25.89 [kWh/m³]			
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]		Gas nozzle pressure p_G [mbar]		Gas flow rate [m³/h]	
St. 2	St. 1	St. 2	St. 2 P 9	St. 1 P 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1	St. 2	St. 1
1800	900	1674	30	12	20.0	4.0	199.5	99.8	15.9	2.8	178.4	89.2	16.5	4.1	71.7	35.8
2000	1000	1860	33	14	24.7	5.4	221.7	110.9	19.8	3.9	198.3	99.1	20.4	5.1	79.6	39.8
2200	1100	2046	41	16	29.9	6.8	243.9	121.9	23.9	5.1	218.1	109.0	24.7	6.2	87.6	43.8
2400	1200	2232	50	18	35.4	8.4	266.0	133.0	28.4	6.4	237.9	119.0	29.4	7.4	95.6	47.8
2600	1300	2418	80	20	41.3	10.1	288.2	144.1	33.3	7.8	257.7	128.9	34.5	8.6	103.5	51.8

MK3.4-ZM-L														
									Heating oil EL H_i = 11.86 [kWh/kg]					
Burner output [kW]		Boiler output η= 92% [kW]	Air flap position [°]						Pump pressure [bar]	Oil nozzle (Steinen)		Oil flow rate [kg/h]		
St. 2	St. 1	St. 2	9 OIL	3 OIL	1 OIL	0 OIL	2 OIL	4 OIL		St. 2 SS/60°	St. 1 SS/60°	St. 2	St. 1	
1800	900	1674	30.1	30	13	12	16	30.1	21	14/60°S	14/60°S	151.8	75.9	
2000	1000	1860	33.1	33	15	14	18	33.1	22	15/60°S	15/60°S	168.6	84.3	
2200	1100	2046	41.1	41	17	16	20	41.1	21	17/60°S	17/60°S	185.5	92.7	
2400	1200	2232	50.1	50	19	18	22	50.1	20	19/60°S	19/60°S	202.4	101.2	
2600	1300	2418	80.1	80	21	20	24	80.1	21	20/60°S	20/60°S	219.2	109.6	

28. Adjustments log

Please enter the measured values into the Adjustments log.

Boiler type	Gas fitting

Measured values		min.	max.	Date
P0 (start point)				
P1 (min load)				
P9 (max load)				
Flue gas temperature	°C			
Carbon dioxide (CO_2 level)	%			
O_2 content	%			
CO level	%			
Flue	mbar			
Nozzle pressure	mbar			
Boiler pressure	mbar			
Room temperature	°C			
Gas type				
Setting value **V** at the fitting				
Setting value **N** at the fitting				

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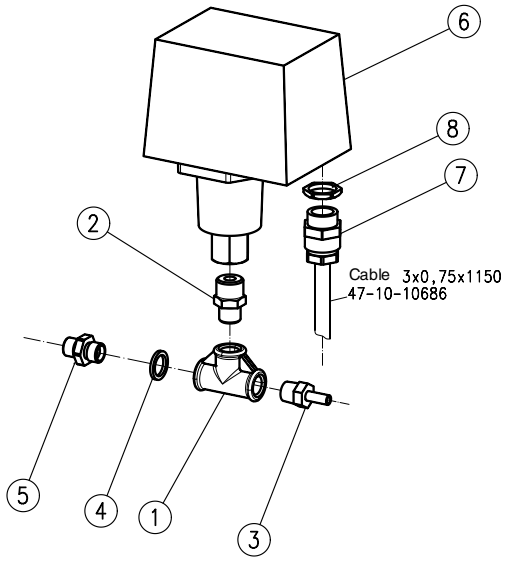
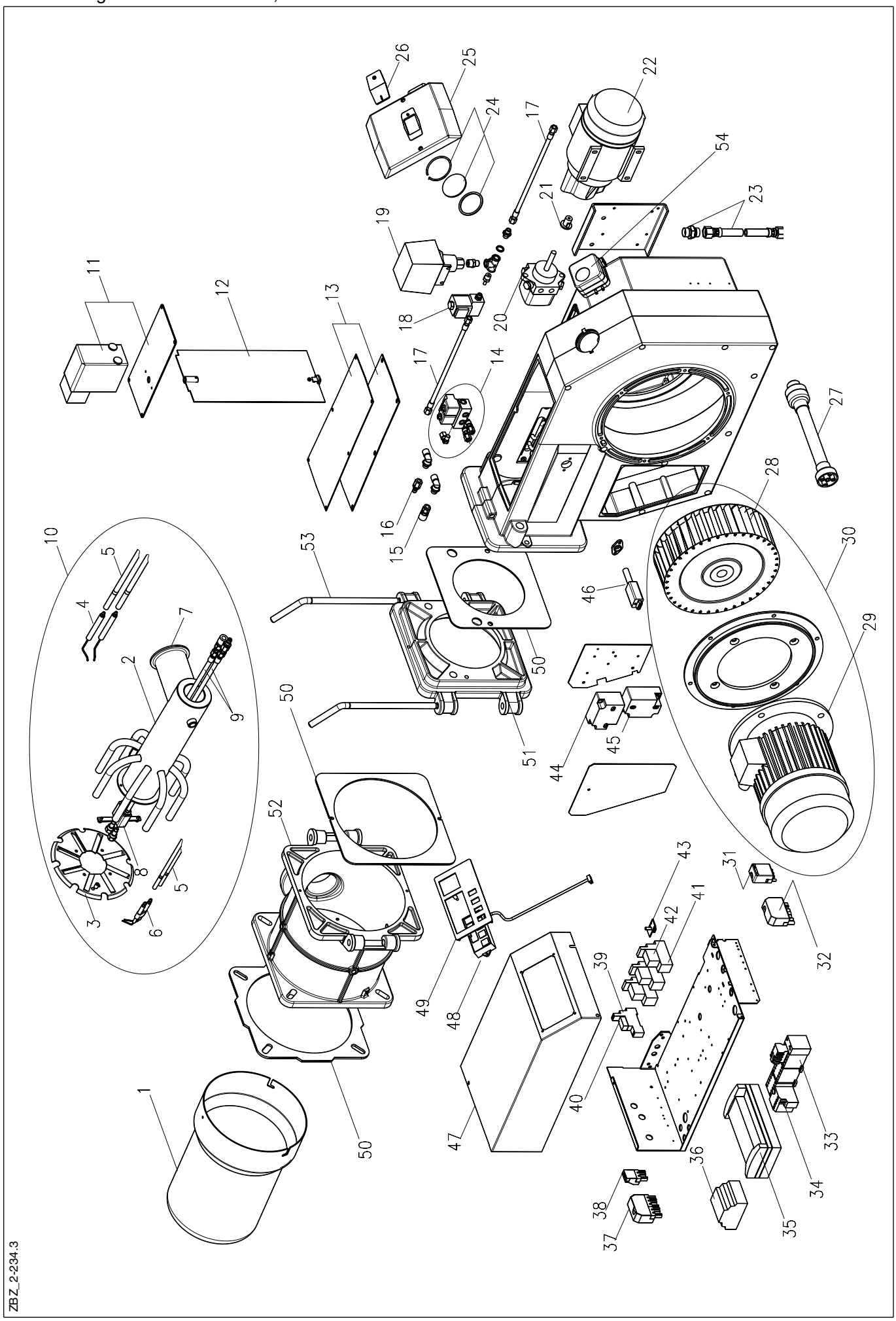
29. Exploded views / spare parts lists

Oil pressure switch 0 - 40 bar (pre-assembled)



ZBZ_2-456

Position	Designation	Pack qty	Art. no.
1	T-piece No. 130_1_4	1	47-10-20342
2	Double nipple reducted 1-4_3-8	1	47-10-25412
3	Straight screwed R-thread D6 1/4	1	47-10-12808
4	Sealing washer Al 13 x 18 x 2	1	37-10-11293
5	Hose nippel NW6 1/4“ 8LL	1	37-10-11348
6	Pressure switch compl. 0 - 40 bar	1	47-10-28330
7	Cable gland POZ 11, black	1	47-10-10299
8	Locknut PG11	1	47-10-11588


ZBZ_2-234.3

Item	Designation	PU	Art. No.
1	Burner pipe MK3.1, MK3.2	1	47-90-25392
1	Burner pipe MK3.1, MK3.2, extended 200 mm	1	47-90-25442
2	Mixing head MK3.1, MK3.2 welded	1	47-90-27091
2	Mixing head MK3.1, MK3.2 welded, extended 200 mm	1	47-90-27092
3	Baffle plate MK3.1, MK3.2	1	47-90-25088
4	Oil ignition electrodes compl.	1	47-90-26213
5	Oil / gas ignition cable set	2	47-50-25003
5	Oil / gas ignition cable set, extended 200 mm	2	47-50-25482
6	Gas ignition electrode compl.	1	47-90-24921
7	Seal for gas nozzle	5	47-50-12791
8	Nozzle holder MK3 compl. pre-assembled	1	47-90-25086
8	Nozzle holder MK3 compl. pre-assembled, extended 200 mm	1	47-90-25423
9	Hydraulic set	1	47-90-27087
10	Mixing head MK3 compl. pre-assembled, excl. ignition cable	1	47-90-25036
10	Mixing head MK3 compl. pre-assembled, extended 200 mm, excl. ignition cable	1	47-90-24993
11	Actuator drive SAD 3.0	1	47-90-24473
12	Air damper compl.	1	47-90-24464
13	Cover with seals	1	47-90-12982
14	Double solenoid valve block compl.	1	47-90-27105
15	Hydraulic coupling compl.	1	47-90-25464
16	Hydraulic sealing nipple T2320V, compl.	1	47-90-25465
17	Pressure hose NW4 compl. 320 mm long	1	47-90-24995
18	Solenoid valve R 1/4“	1	36-90-11583
19	Oil pressure switch 0-40 bar compl. with cabel	1	47-90-28330
20	Oil pump AJ6, compl.	1	47-90-26064
21	Coupling pomp-motor	1	47-90-28851
22	Motor 0.55 kW	1	47-90-28787
23	Metal hose NW10, 1500 mm long	2	47-50-12818
24	Sight glass with seal	1	36-90-11544
25	Hood MK3	1	47-90-24999
26	Cover for sight glass	5	47-50-12106
27	Coupling compl. MK3 compl.	1	47-90-27096
28	Fan wheel TLR Ø 280 x 80 for MK3.1	1	47-90-27093
28	Fan wheel TLR Ø 280 x 100 for MK3.2	1	47-90-27099
29	3 kW motor for MK3.1	1	47-90-12802
29	4 kW motor for MK3.2	1	47-90-12803
30	3 kW motor with fan wheel for MK3.1	1	47-90-27094
30	4 kW motor with fan wheel for MK3.2	1	47-90-27100
31	4-pin socket green	1	37-90-20744
32	7-pin socket black/brown	1	37-90-20731
33	Star-delta combination ZE4 for MK3.1	1	47-90-25176-01
33	Star-delta combination ZE6 for MK3.2	1	47-90-25176
34	Thermal overload relay 2.4 - 4.0 A for MK3.1	1	47-90-25172
34	Thermal overload relay 4.0 - 6.0 A	1	47-90-25173
35	Control box MPA 22	1	47-90-24166
36	Logic module CL-LSR	1	47-90-25177
37	7-pin socket green	1	37-90-10831
38	3-pin fermale connector black	1	37-90-20739

Item	Designation	PU	Art. No.
39	Base CR-PLSx	1	47-90-26713
40	Relay CR-P230AC2	1	47-90-25199
41	Base CR-M4LS	1	47-90-26731
42	Relay CR-M230AC4	1	47-90-25181
43	Remote-manual switch	1	47-90-25040
44	Ignition transformer Mod. 26/35 incl. ignition cable 200 mm lg.	1	47-90-26790
45	Ignition transformer Mod. 26/48 incl. ignition cable 200 mm lg.	1	47-90-27095
46	KLC 1000	1	47-90-27184
47	Hood for switch box MK30	1	47-90-25206
48	MPA display AM07	1	47-90-24167
49	Facing panel MK3	1	47-90-25074
50	Seal set	1	47-90-26792
51	Gas jacket MG3 part 2	1	47-90-12771
52	Gas jacket MG3 part 1	1	47-90-12770
53	Fixing bar MG3	2	46-90-12809
54	Differential pressure monitor 2.5 - 50 mbar	1	47-90-26723
-	Thermal overload relay for pump unit 2.4 - 4 A	1	47-90-25172
-	Mini motor contactor B7-30-10 for pump unit	1	47-90-25171
-	Inlet nozzle	1	47-90-12875
-	Motor connection cable	1	47-90-25410

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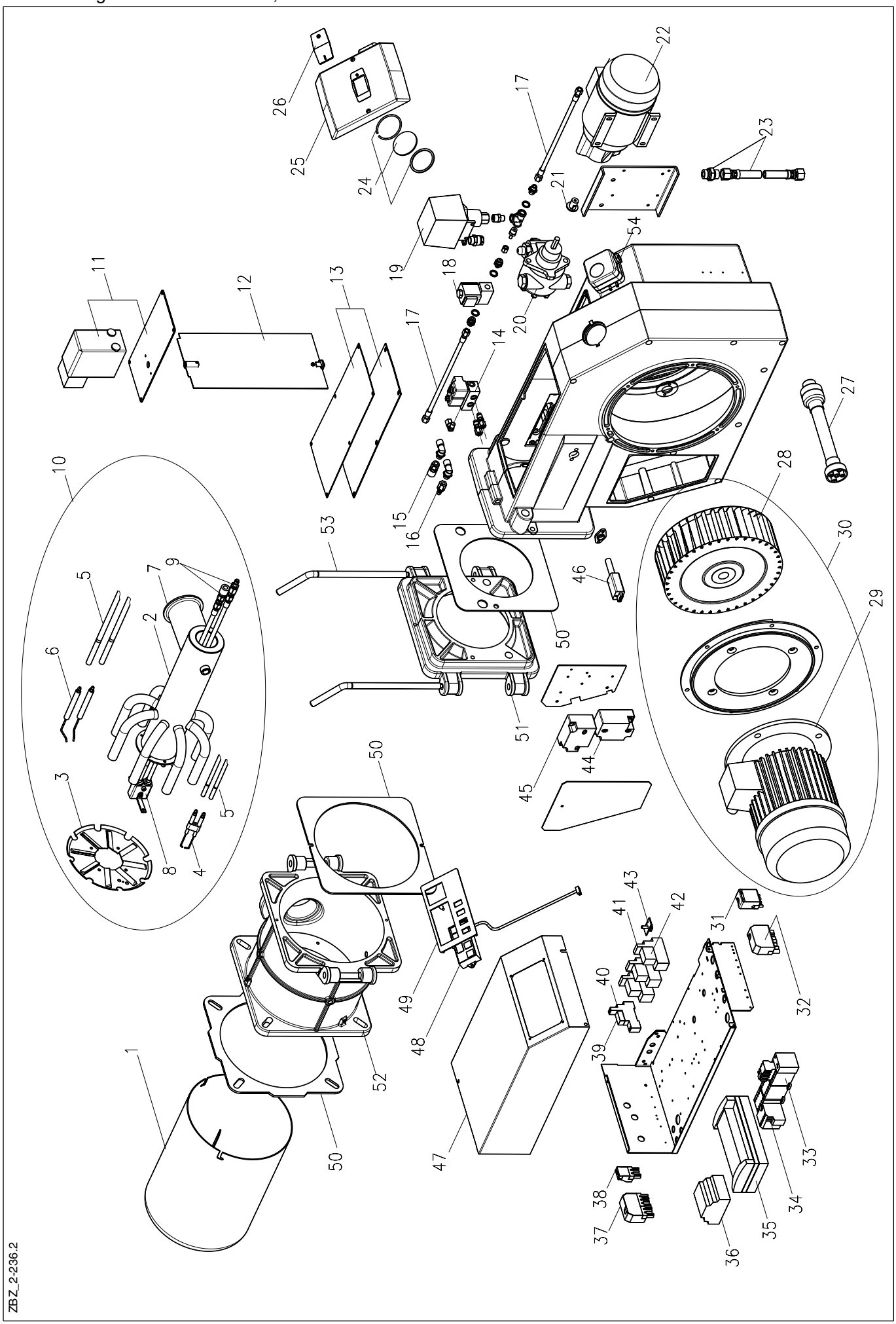

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Item	Designation	PU	Art. No.
1	Burner pipe MK3.3, MK3.4	1	47-90-25393
1	Burner pipe MK3.3, MK3.4, extended 200 mm	1	47-90-25443
2	Mixing head MK3.3, MK3.4 welded	1	47-90-27097
2	Mixing head MK3.3, MK3.4 welded, extended 200 mm	1	47-90-27098
3	Baffle plate MK3.3, MK3.4	1	47-90-25238
4	Oil ignition electrodes compl.	1	47-90-26213
5	Oil / gas ignition cable set	2	47-50-25003
5	Oil / gas ignition cable set, extended 200 mm	2	47-50-25482
6	Gas ignition electrode compl.	1	47-90-24921
7	Seal for gas nozzle	5	47-50-12791
8	Nozzle holder MK3 compl. pre-assembled	1	47-90-25086
8	Nozzle holder MK3 compl. pre-assembled, extended 200 mm	1	47-90-25423
9	Hydraulic set	1	47-90-27087
10	Mixing head MK3 compl. pre-assembled, excl. ignition cable	1	47-90-25272
10	Mixing head MK3 compl. pre-assembled, extended 200 mm, excl. ignition cable	1	47-90-25425
11	Actuator drive SAD 3.0	1	47-90-24473
12	Air damper compl.	1	47-90-24464
13	Cover with seals	1	47-90-12982
14	Double solenoid valve block compl.	1	47-90-27105
15	Hydraulic coupling compl.	1	47-90-25464
16	Hydraulic sealing nipple T2320V, compl.	1	47-90-25465
17	Pressure hose NW4 compl. 320 mm long	1	47-90-24995
18	Solenoid valve R 1/4“ compl. for MK3.3, MK3.4	1	47-90-27107
19	Oil pressure switch 0-40 bar compl. with cabel	1	47-90-28330
20	Oil pump J7CCC, compl.	1	47-90-27110
21	Coupling pump-motor	1	47-90-28851
22	Motor 0.55 kW	1	47-90-28787
23	Metal hose NW10 1500 mm lg.	1	47-90-12818
24	Sight glass with seal	1	36-90-11544
25	Hood MK3	1	47-90-24999
26	Cover for sight glass	5	47-50-12106
27	Coupling compl. MK3.3 compl.	1	47-90-27101
27	Coupling compl. MK3.4 compl.	1	47-90-27102
28	Fan wheel TLR Ø 280 x 100 for MK3.3	1	47-90-27099
28	Fan wheel TS Ø 290 x 114 for MK3.4	1	47-90-25426
29	4 kW motor for MK3.3	1	47-90-12803
29	5.5 kW motor for MK3.4	1	47-90-22876
30	4 kW motor with fan wheel for MK3.3	1	47-90-27100
30	5.5 kW motor with fan wheel for MK3.4	1	47-90-26801
31	4-pin socket green	1	37-90-20744
32	7-pin socket black/brown	1	37-90-20731
33	Star-delta combination ZE6 for MK3.3	1	47-90-25176
33	Star-delta combination ZE9 for MK3.4	1	47-90-25176-02
34	Thermal overload relay 4.0 - 6.0 A for MK3.3	1	47-90-25173
34	Thermal overload relay 6.0 - 9.0 A for MK3.4	1	47-90-25174
35	Control box MPA 22	1	47-90-24166
36	Logic module CL-LSR	1	47-90-25177
37	7-pin socket green	1	37-90-10831

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Item	Designation	PU	Art. No.
38	3-pin fermale connector black	1	37-90-20739
39	Relay CR-P230AC2	1	47-90-25199
40	Base CR-PLSx	1	47-90-26713
41	Base CR-M4LS	1	47-90-26731
42	Relay CR-M230AC4	1	47-90-25181
43	Remote-manual switch	1	47-90-25040
44	Ignition transformer Fida Mod. 26/35 incl. ignition cable 200 mm lg. for MK3.3, MK3.4	1	47-90-26790
45	Ignition transformer Fida Mod. 26/48 incl. ignition cable 200 mm lg. for MK3.3	1	47-90-27095
45	Ignition transformer Fida Mod. 26/48 incl. ignition cable 460 mm lg. for MK3.4	1	47-90-26930
46	KLC 1000	1	47-90-27184
47	Hood for switch box MK30	1	47-90-25206
48	MPA display AM07	1	47-90-24167
49	Facing panel MK3	1	47-90-25074
50	Seal set	1	47-90-26792
51	Gas jacket MG3 part 2	1	47-90-12771
52	Gas jacket MG3 part 1	1	47-90-12770
53	Fixing bar MG3	2	46-90-12809
54	Differential pressure monitor 2.5 - 50 mbar	1	47-90-26723
-	Thermal overload relay for pump unit 2.4 - 4 A	1	47-90-25172
-	Mini motor contactor B7-30-10 for pump unit	1	47-90-25171
-	Inlet nozzle	1	47-90-12875
-	Motor connection cable	1	47-90-25410

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30. Declaration of conformity for dual-fuel burner for heating oil EL and natural gas or liquid gas

We, Enertech GmbH, D-58675 Hemer, hereby declare on its own responsibility that the products

MK2. ... and MK3. ...

are in conformity with the following standards and regulations:

EN 267

EN 676

EN 61000-6-2

EN 61000-6-3

EN 60335-1

EN 60335-2-102

These products are CE labelled in compliance with the provisions of the following directives:

2006 / 42 / EC Machinery Directive

2004 / 108 / EC EMC Directive

2006 / 95 / EC Low Voltage Directive

92 / 42 / EEC Energy Efficiency Directive

CE - approved

CE - 0085BR0306 according to Test Report 143192E1/15563 (GWI) and
CE - 0085BR0307 according to Test Report 139082E1/15564 (GWI).

Hemer, 1 September 2008

Dipl.-Ing. R. Rebbe, Head of Development

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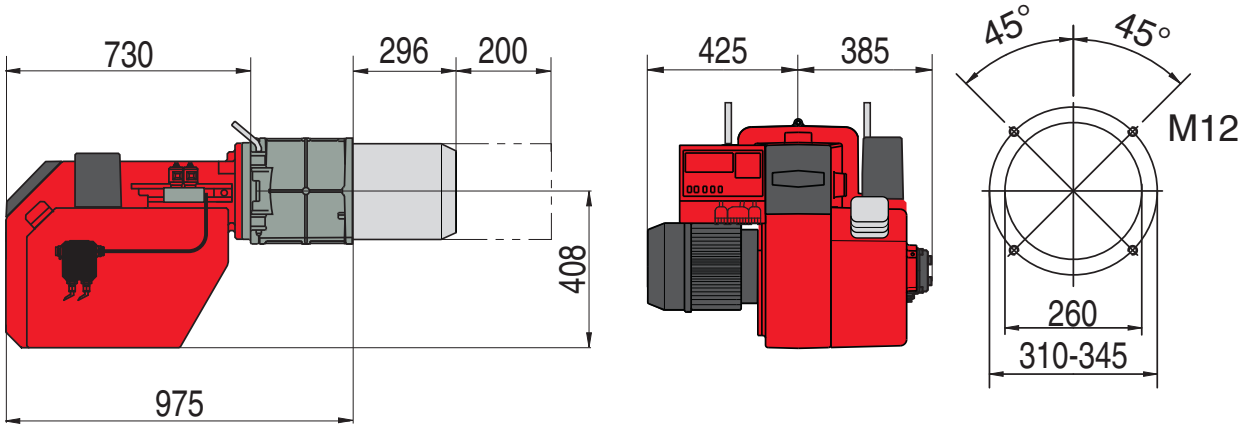
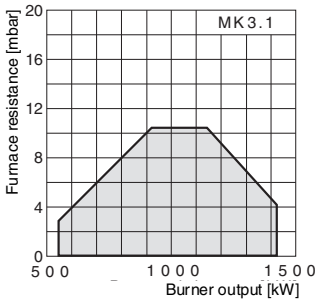
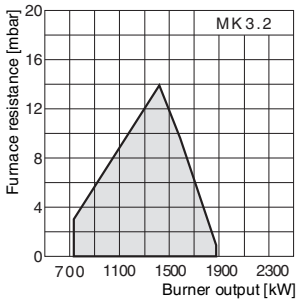
31. Dimensions (All dimensions are given in mm)

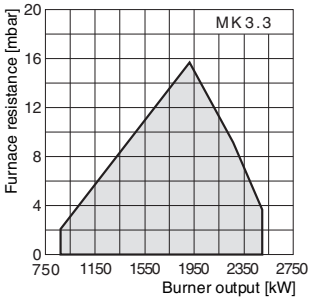


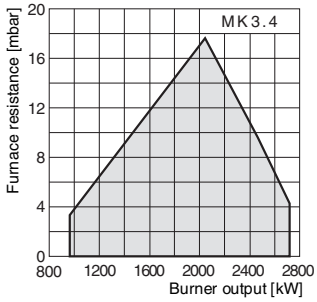
32. Working ranges

Gas / oil









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