FLEXIHEAT UK LTD
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Technical manual

ME665 to ME980 BOILERS

Update 11/2022

Manual code: 560959

CE

SUMMARY

1) DESCRIPTION AND CHARACTERISTICS

1.1)Description

The ME Range of electric boilers have been designed for heating needs (Closed circuits, operating pressure: 7 bar maximum).

These are class 1 boilers which require connection to an earth connection.
Protection index IP 21 / IK 08.

BOILER

- Power from 665 to 980 kW
- S235JR welded steel body without inner coating
- Operating pressure 7 bar
- Test pressure 10 bar
- Operating temperature from 20 to 95°C
- Glass wool insulation 50 mm thick Sheet metal finish (fire rating M0)
- Safety thermostat with manual reset 110°C
- Settling volume included
- Cold insulation resistance at 1 MΩ

INCOLOY HEATERS

- Armored elements to screw in diameter 77/200
- Unit power 35 kW
- Voltage 400 Volts Tri + Earth
- Dismantling immersion heaters: minimum ceiling height 2 m 50.

CONTROL AND POWER CABINET

- 1 sealed box fixed to the boiler comprising:
- 1 switch / disconnector with padlockable external control.
- 3 cartridge fuses per floor
- 1 contactor adapted to the power per floor
- 1 transformer 400/230 - 115 V protected upstream and downstream for the control circuit
- 1 on/off key switch
- 1 “On” indicator light
- 1 "Safety" light (water circulation, safety thermostat, etc.)
- 1 digital regulator
- 1 connection terminal block for external servo-controls

It is possible to place **ON REQUEST on one of the 3 sides:**

- Cabinet position
- Power supply and regulation

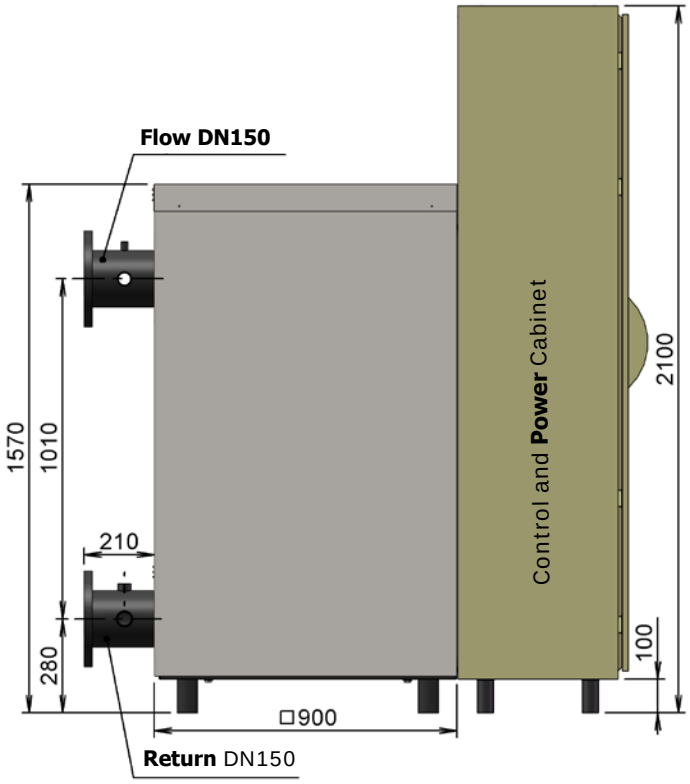
ON DEMAND :

- Horizontal series for sanitary water, swimming pool water
- Stainless steel body
- Operating pressure 10 bar

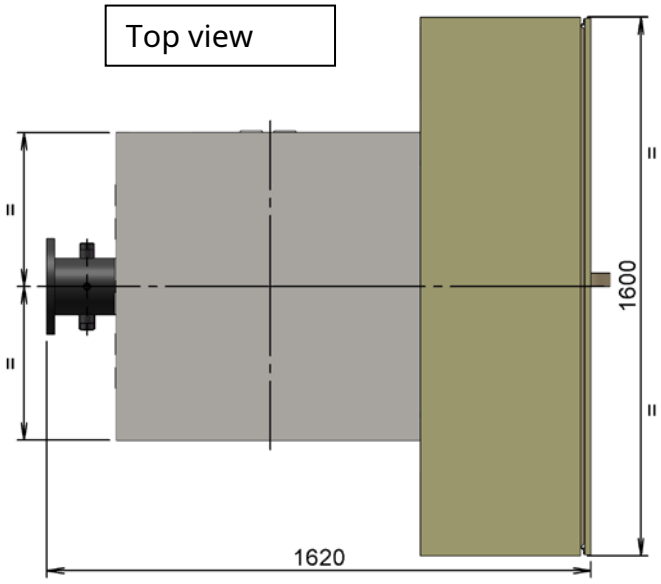
1.2)Features

Minimum flow calculated for: ΔT max = 40°C (50/90°C) Maximum flow calculated
for: 1.5m/s or ΔT min = 5°C (90/95°C)

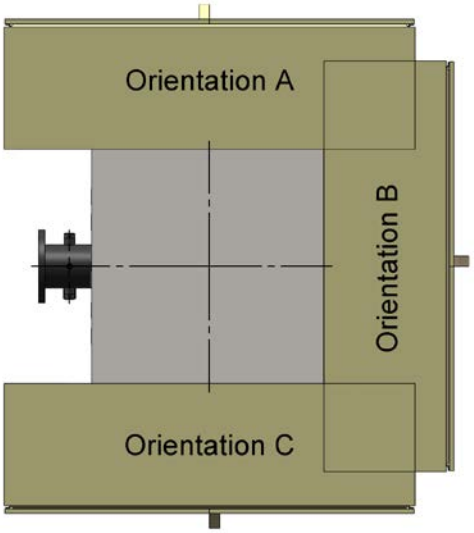
Maximum output (kW)	Number of immersion heaters	Thermo Unit	Volume (litres)	Flow rate m3/h		Maximum pressure drops kPA	Total Weight (kg)
665	19	35	610	15	95	160	910
700	20						
735	21			16			940
770	22			17			
805	23			18			970
840	24			19			
875	25						1010
910	26			20			
945	27			21			1060
980	28			22			



Top view



A choice :
- Orientation of the cabinet A, B, or C.



2) APPROVALS - REGULATIONS

Pressure equipment: Our boilers comply with Article 4.3 of the European Pressure Equipment Directive (PED 2014/68/EU), which has been transposed into French law.

Electrical equipment: The electrical equipment offered complies with :- Decree 2015-1083 on the safety of persons, animals and property when using electrical equipment designed for use within certain voltage limits.- Transposition into French law of the European Low Voltage Directive 2014/35/EU.- Certain articles of the standards Safety of household and similar electrical appliances:* NF EN 60 335 - 1.* NF EN 60 204 - 1.

Transposition into French law of the European ErP Directive 2009/125/EC.

3) INSTALLATION - EQUIPMENT

3.1) Boiler Installation Instructions

- **Place** the boiler in the desired location (see precautions in section 3.2**)**
- **Fit** the kit accessories (optional) to the boiler (see section 3.3)
- **Check** the tightness of the connections throughout the power circuit to avoid contact resistance and abnormal heating of the connections, including the immersion heater heads.
- **Remove** the power fuses
- **Make** sure the boiler is filled with water
- **Check** the insulation of the immersion heaters. If the insulation is less than 2 M , the cause must be investigated and remedied.
- **Switch** on the power using the power switch and key switch.
- **Check** that the system circulation pump is working. In particular, check the direction of rotation.
- **Check** that if the pump stops, the circulation controller switches on the safety light and stops the control and contactors.
- **Adjust** the control system as required
- **Switch** off the boiler using the power switch
- **Replace** the power fuses
- **Retighten** the connections after a week's operation.

3.2) Installation precautions

Our hot water production equipment must be installed in accordance with :-

- Current standards-
- The provisions of the D.T.U.
- The instructions below

Location

The standard ME boiler must be installed in a ventilated room in order to maintain an ambient temperature below 30°C. Relative humidity 30 to 80% (non-condensing).

It is not designed to be installed:

- in a corrosive atmosphere
- in an explosive atmosphere
- outdoors

It is advisable to install the boiler in an easily accessible place and to maintain an unobstructed passage. Provide sufficient clearance to satisfy maintenance operations.

Local accessible by truck allowing their possible removal without any handling or dismantling.

It is mandatory to install:

- A safety valve (set to a maximum of 7 bar).
- An air vent on the hot water supply (to remove dissolved gases).
- A Ø33/42 quick-drain valve (to remove deposits).

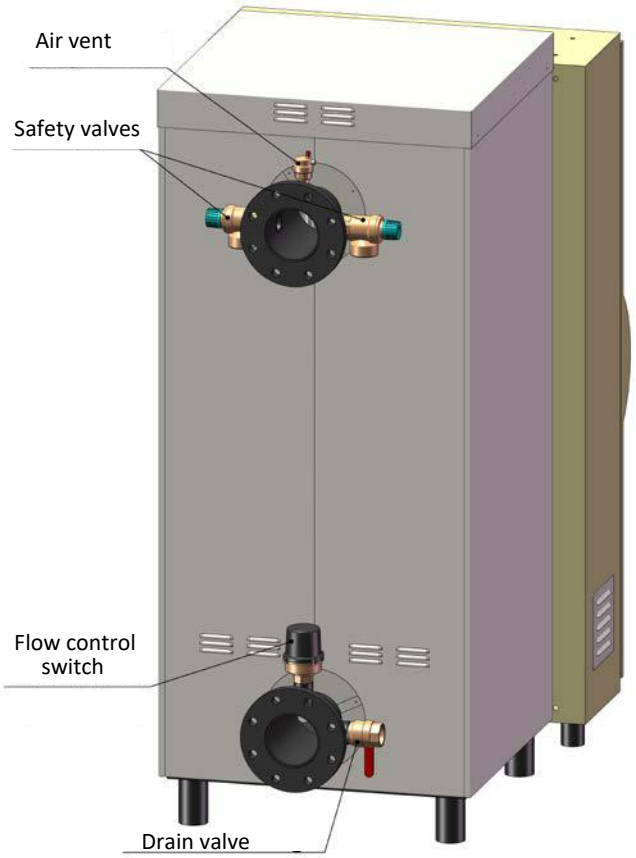
Never mix different metals favoring electro-chemical couples.

Take care:

- not to cover the ventilation holes
- not to stop the circulation in the boiler if it is in service (3-way valve, thermostatic valve)
- the minimum flow rate (see table in paragraph 1.2)

3.3)Accessory kits (optional)

- Kits for ME boiler (5020) 4 bar and (5021) 7 bar:-
  - 1 x Air vent,
  - 1 x Flow control switch,
  - 1 x Drain valve 32mm,
  - 2 x Saftey valves 32mm, 4 or 7 bar.



Characteristics of the Flow control switch (Caleffi model ref. 626)

Pipe diameter		DN150
Minimum flow detected (m^3/h)	with flow increase	16.5
	with decrease in flow	14.5
Maximum flow (m^3/h)	with flow increase	43
	with decrease in flow	36

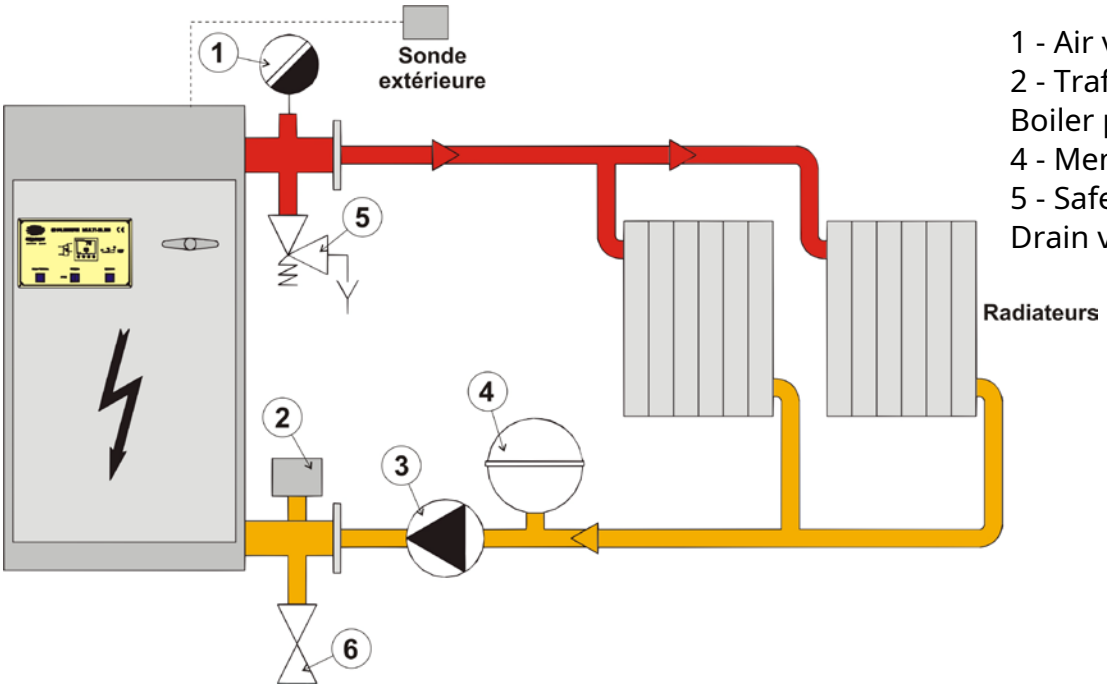
3.4)Single or double circulation pump supply (optional).

- 400 V Three-phase magnetothermal controller starter (thermal adjustable from 3 to 12 A)
- On and Fault LEDs.
- Three +1 earth terminals for connecting the pump (400 V Tri.)

A diagram with simple pump control will be supplied with the boiler.

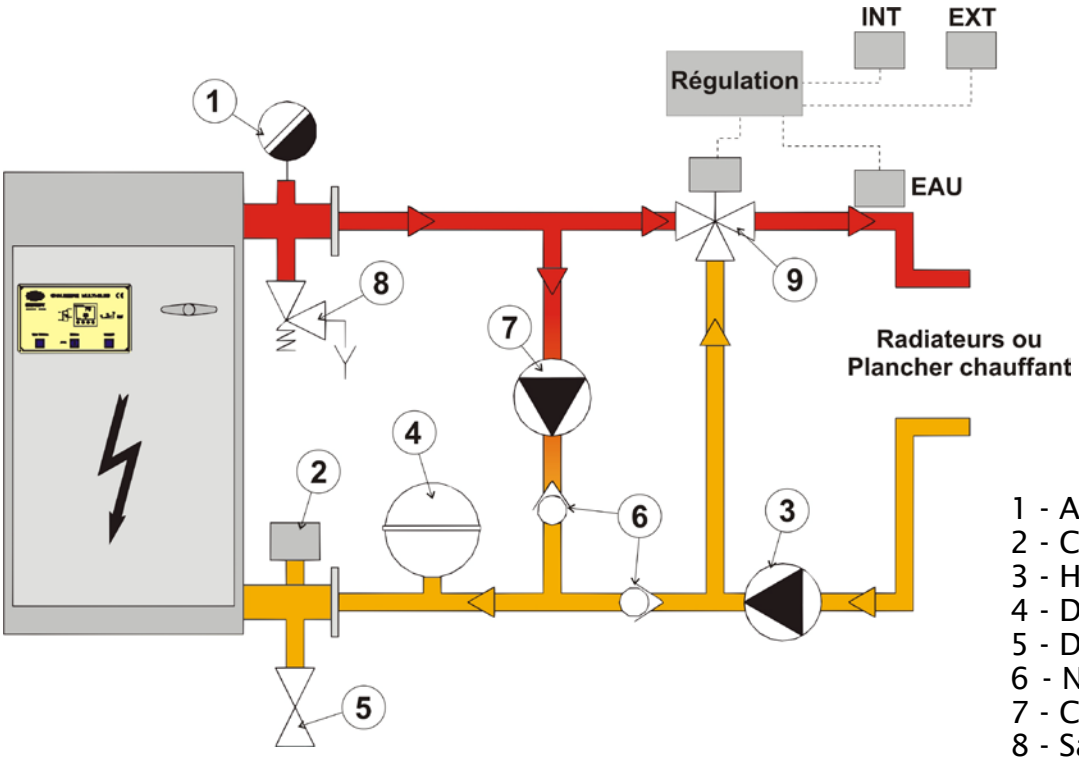
3.5)Hydraulic connection

Traditional heating with electric boiler and outdoor sensor



1 - Air vent.
2 - Traffic controller. 3 - Boiler pump.
4 - Membrane vessel.
5 - Safety valve. 6 - Drain valve.

Weather-dependent control with 3-way valve

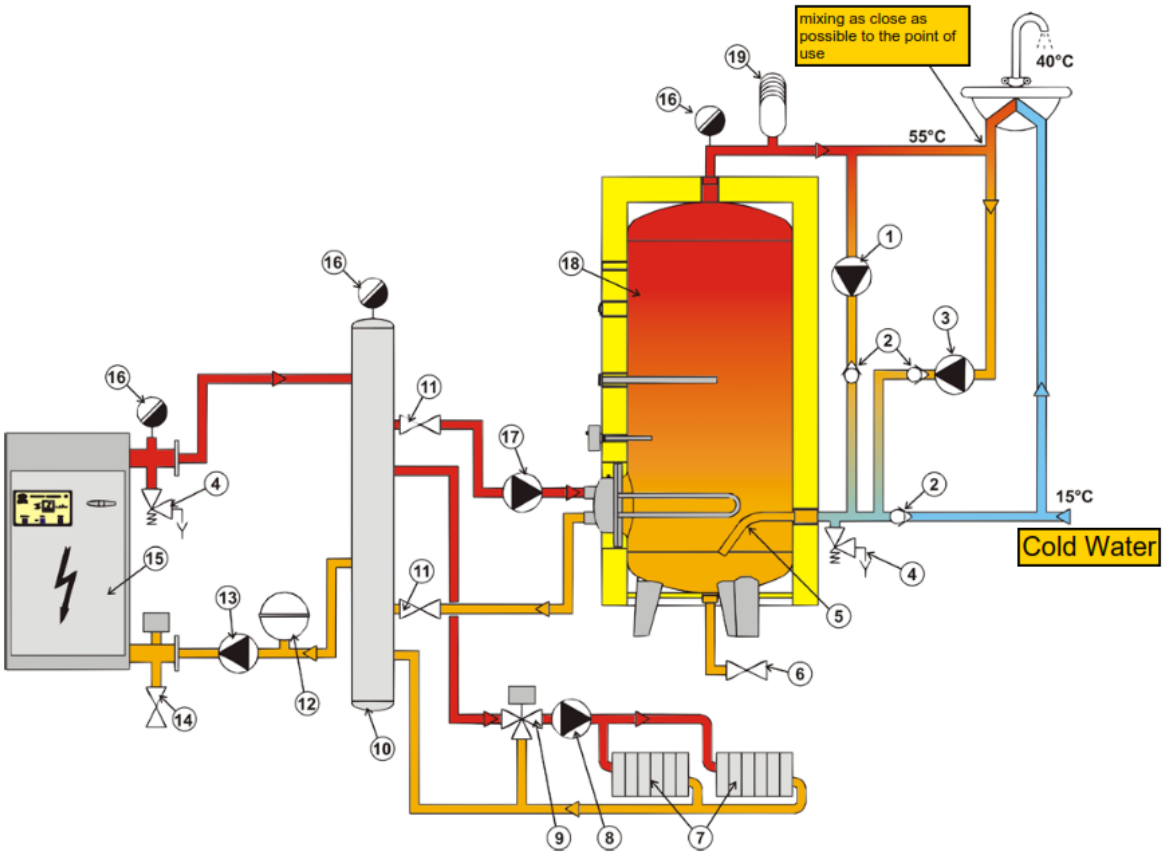


1 - Air vent.
2 - Circulation controller.
3 - Heating pump.
4 - Diaphragm vessel.
5 - Drain valve
6 - Non-return valve.
7 - Circulation pump.
8 - Safety valve.
9 - 3-way valve.

Underfloor heating: Safety thermostat 50°C maximum

Heating + DHW storage

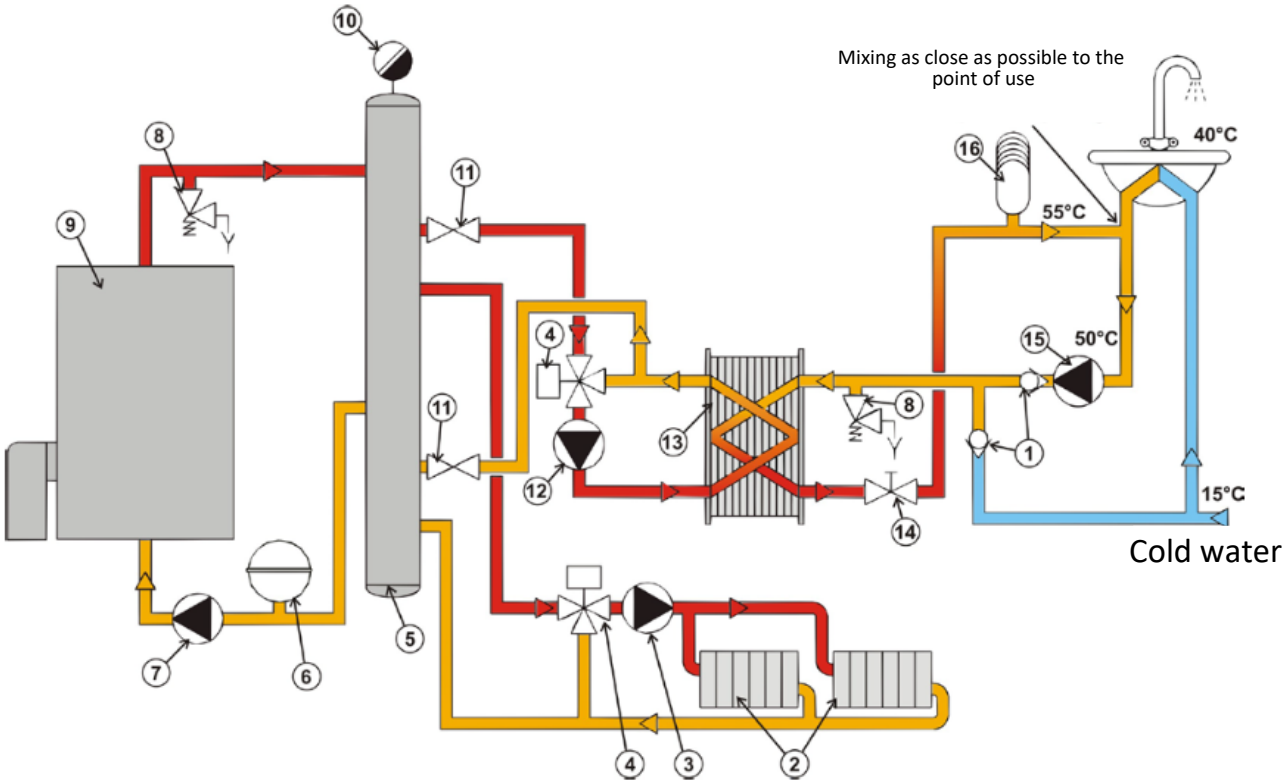
Heating + DHW storage



1 - Homogenisation pump.
2 - Non-return valve.
3 - Circulation pump.
4 - Safety valve.
5 - Anti-deposit inlet.
6 - Total drain.
7 - Radiator circuit.
8 - Heating pump.
9 - 3-way valve.
10 - Manifold.
11 - Isolation valve.
12 - Diaphragm vessel.
13 - Boiler pump.
14 - Drain valve.
15 - Boiler.
16 - Drain valve.
17 - Primary pump.
18 - Tank.
19 - Water hammer arrester.

Note: The flow rate of the boiler pump (13) must be at least 5% higher than the sum of the flow rates of the heating pump (8) + primary pump (17).

Heating + instant DHW

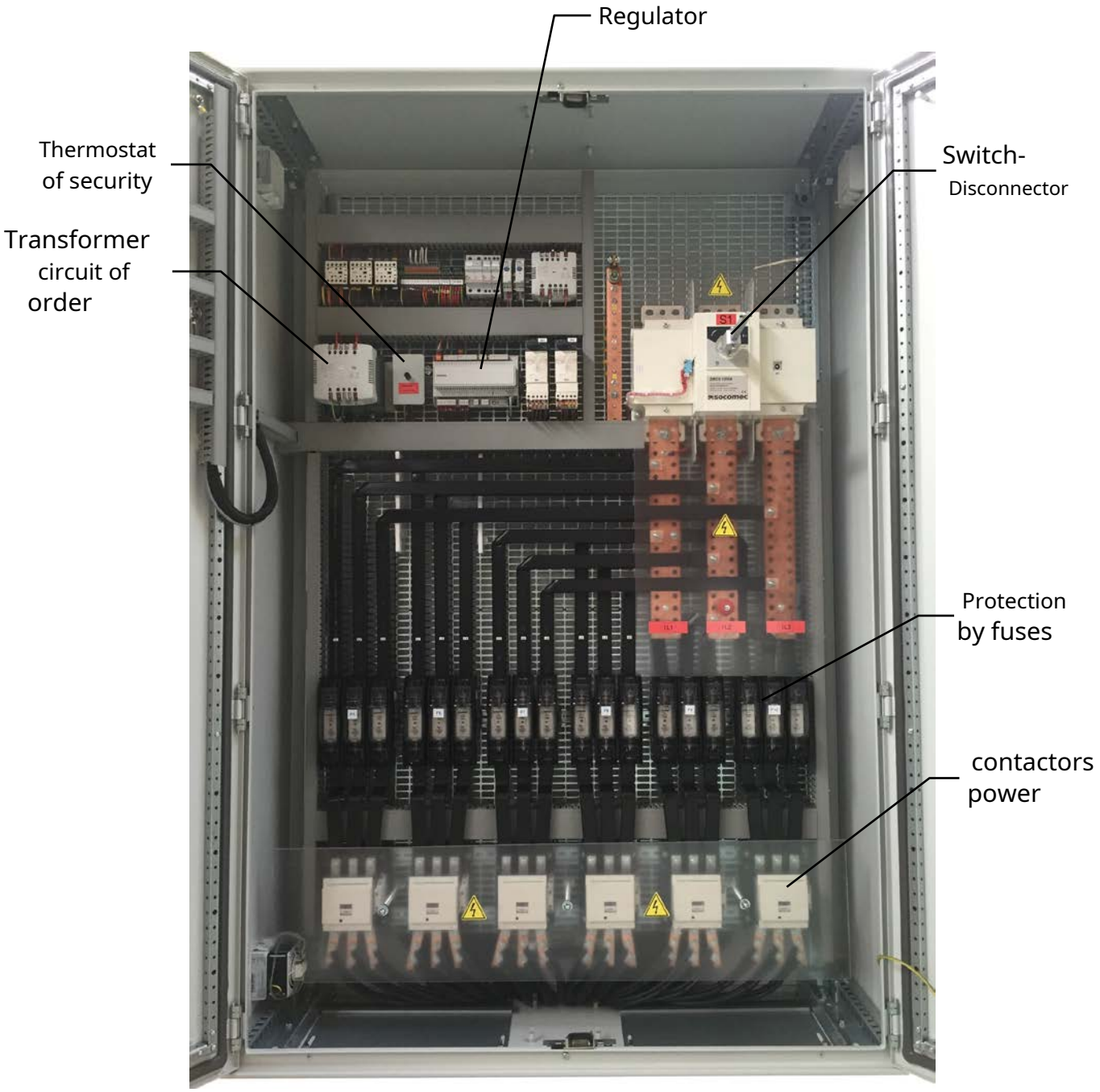


1 - Non-return valve.
2 - Radiator circuit.
3 - Heating pump.
4 - 3-way valve.
5 - Pressure-breaking bottle.
6 - Diaphragm vessel.
7 - Boiler pump.
8 - Safety valve.
9 - Boiler or sub-station supply.
10 - Drain.
11 - Isolation valve.
12 - Primary pump.
13 - Plate heat exchanger.
14 - Control valve.
15 - Circulation pump.
16 - Water hammer arrester.

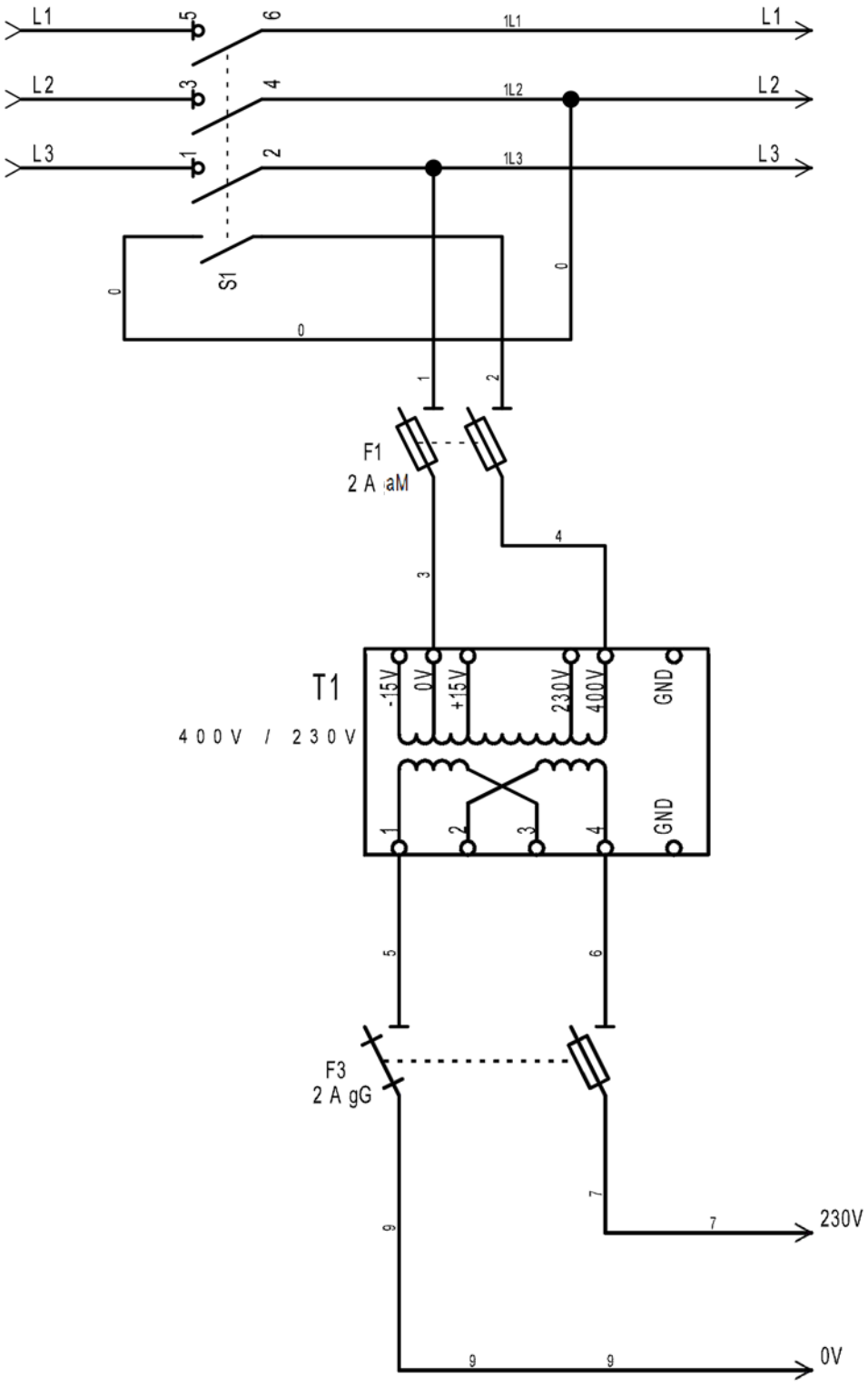
4) ELECTRICAL CONNECTION

The elements presented in this chapter represent the standard layouts and diagrams. They may vary from the materials delivered depending on the options chosen by the customer. Refer to the diagrams inserted in the boiler cabinet.

4.1)Typical layout of the cabinet

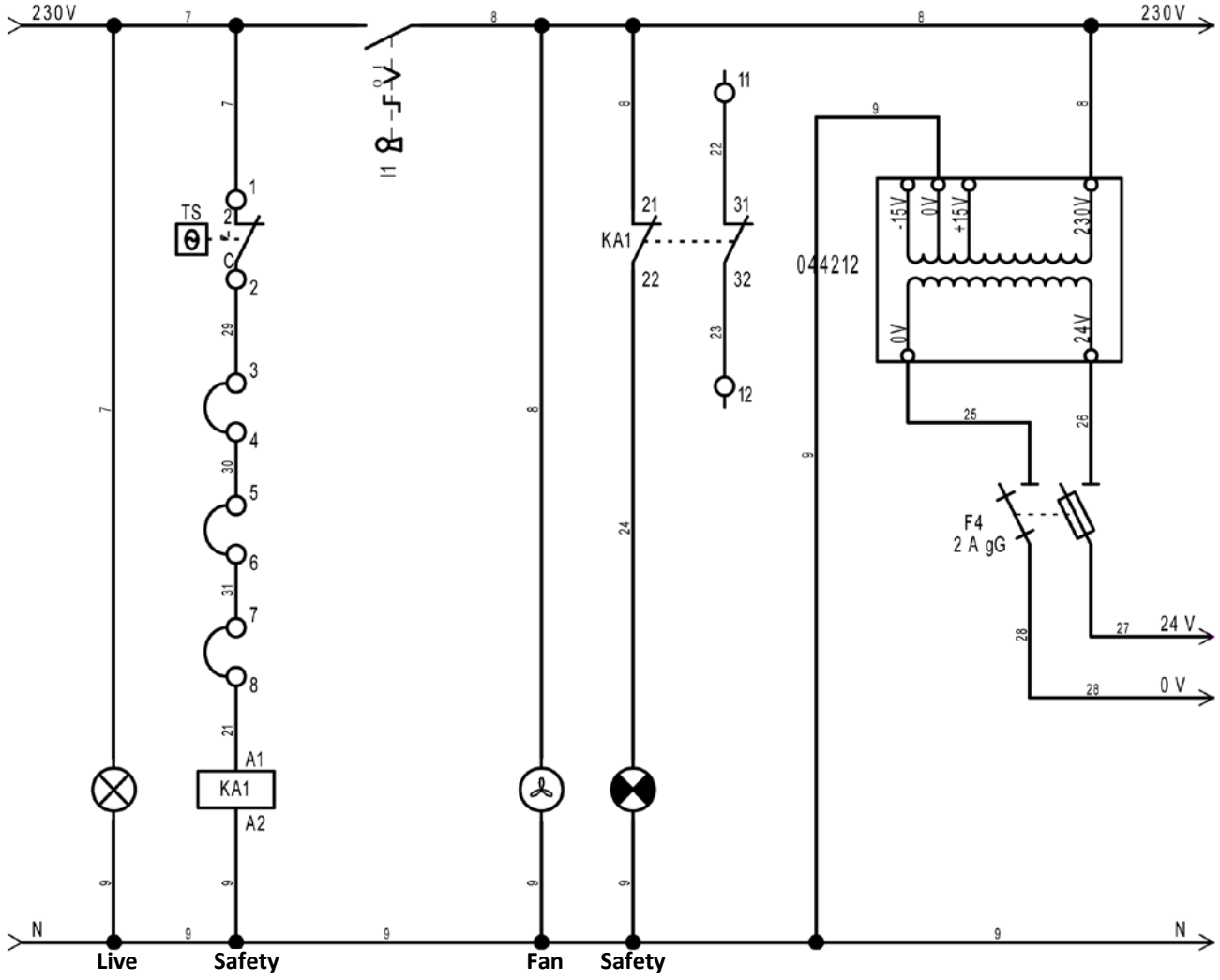


4.2)Electrical power supply diagram



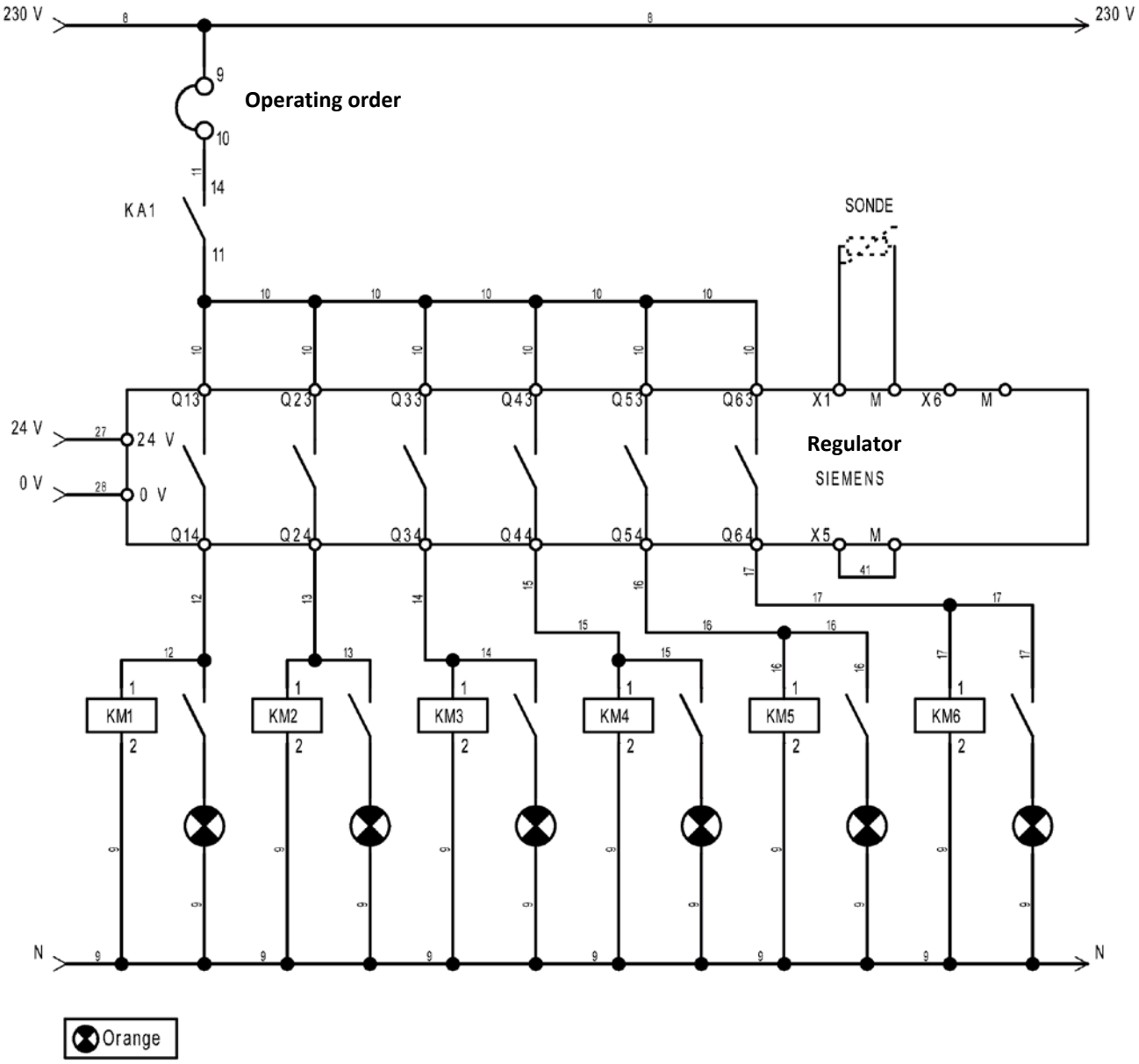
4.3)Electrical control diagram

Part 1



White
Red

Part 2



Terminal Block			
1	O	Fil 7	Entrée I1
2	O	Fil 29	
3	O	Fil 29	
4	O	Fil 30	
5	O	Fil 30	
6	O	Fil 31	
7	O	Fil 31	
8	O	Fil 21	KA1 : A1
9	O	Fil 8	Sortie I1
10	O	Fil 11	KA1 : 14
11	O	Fil 22	KA1 : 31
12	O	Fil 23	KA1 : 32
⏚	O		

Safety Thermostat

Flow controller

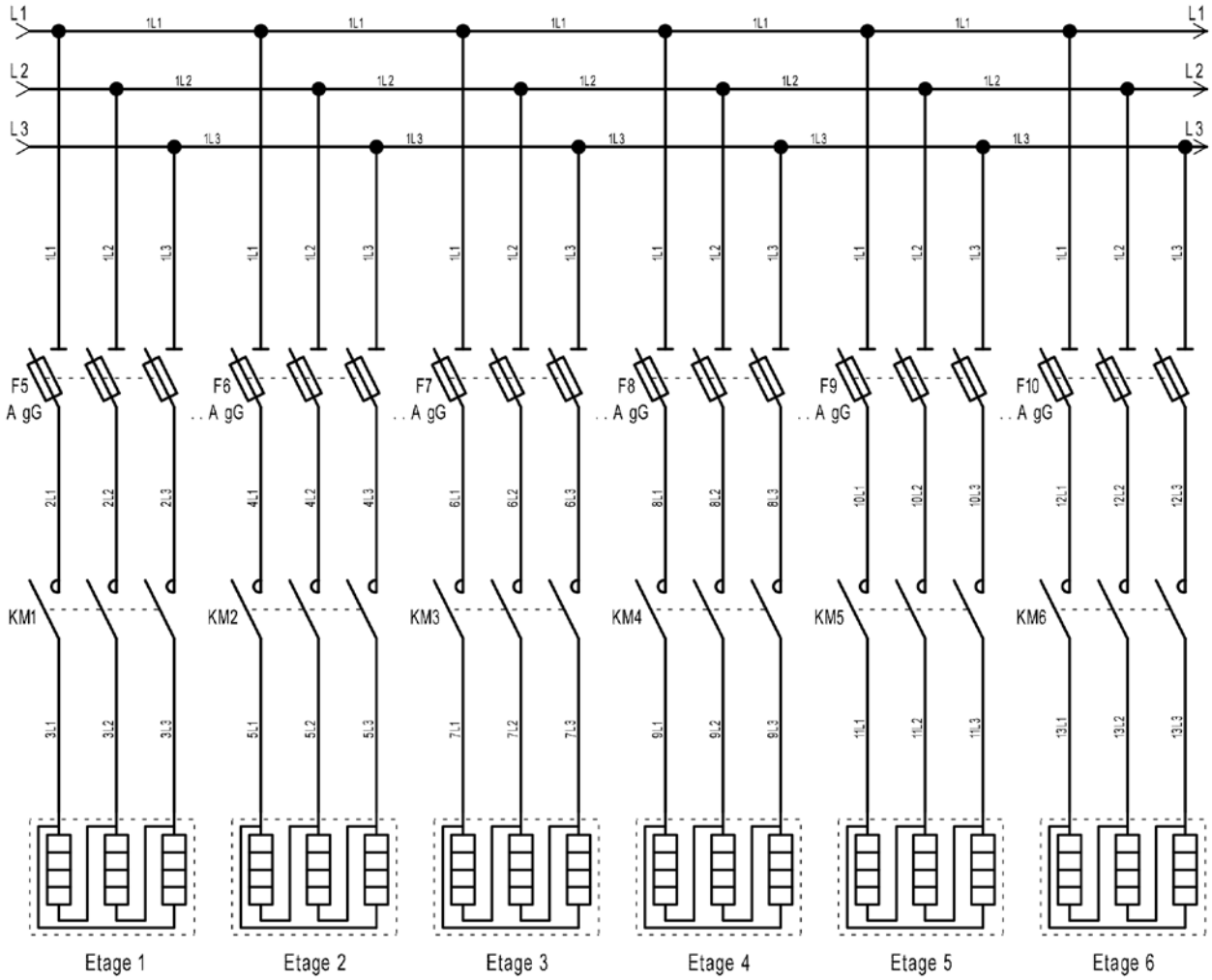
Safety pump

Other safety

Operating order

Safety report

4.4)Electrical power diagram



Power per stage 665 to 980 kW

Power	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
665kW	140	105	105	105	105	105
700kW		140				
735kW			140			
770kW				140		
805kW					140	
840kW						140
875kW	175					
910kW		175				
945kW			175			
980kW				175		

4.5)Protection

Calibre and size of fuses :
Fuses F1 to F4: industrial cylindrical cartridges size 8 x 32
F1 and F2: 1 A type aM
F3: 1 A type gG F4: 0.5 A type gG
Fuses F5 to F10: industrial blade cartridges size 1: 160 A type gGsize 2 industrial blade cartridges: 250, 315 and 400 A gG type

Calibers:

<table>
<tr><th>Power boiler</th><th>F5</th><th>F6</th><th>F7</th><th>F8</th><th>F9</th><th>F10</th></tr>
<tr><td>665kW</td><td rowspan="6">250A</td><td>160A</td><td rowspan="2">160A</td><td rowspan="3">160A</td><td rowspan="3">160A</td><td rowspan="4">160A</td></tr>
<tr><td>700kW</td><td rowspan="5">250A</td></tr>
<tr><td>735kW</td><td rowspan="6">250A</td></tr>
<tr><td>770kW</td><td rowspan="5">250A</td></tr>
<tr><td>805kW</td><td rowspan="5">250A</td></tr>
<tr><td>840kW</td><td rowspan="5">250A</td></tr>
<tr><td>875kW</td><td rowspan="4">315A</td><td rowspan="4">315A</td><td rowspan="3">315A</td><td rowspan="4">250A</td></tr>
<tr><td>910kW</td></tr>
<tr><td>945kW</td></tr>
<tr><td>980kW</td><td>315A</td></tr>
</table>

Fuses F5 to F10 can be replaced by circuit breakers of the same rating.

Electrical connection- The ME boiler must be supplied with **400 V three-phase without neutral, 50 Hz**

The cross-section of the supply cables and the upstream protection must be calculated and selected by a qualified electrician, in accordance with standard NF C 15100 (take into account the installation method, the length of the cable and the short-circuit current)

It is necessary to provide a protection device with automatic cut-off in the event of an insulation fault, differential circuit breaker or other depending on the neutral system.

Class 1 equipment protection index **IP21 / IK08**

Powering up out of the water leads to the irremediable destruction of the immersion heaters (no guarantee).

EARTH CONNECTION IS MANDATORY

5) COMMISSIONING

Boilers can be filled through any opening. Provide an air purge valve to ensure complete filling of the boiler.

Under no circumstances should the heating elements be put into operation if the boiler is not completely filled with water. Ensure complete filling before the first heating.

The boiler can be emptied via the valve in the lower part provided for this purpose (see diagrams). It can only be done if the heating elements have been switched off.
Provide an air inlet valve to prevent depression when emptying the boiler.

When the network heats up for the first time, water may flow from the safety valve, which is normal. This is due to the expansion of the water which generates an increase in the network pressure. Under no circumstances should the valve outlet be blocked. It must be kept open to the atmosphere and connected to the sewer

5.1)Information about the electrical cabinet

1. Identification plate on the cabinet
2. The rated short-time withstand current is Icw = 23 kA.
3. The regime of Neutral is indifferent
4. Conditions of use for work in the enclosure
   Busbar protection
   Fuse protection Switch with door
   interlock

Any intervention in the cabinet must be carried out by an authorized person.

5. Grounding is mandatory. (Class 1)
6. After commissioning the assembly (8 days):
   A/ Check the tightness of the immersion heater connections B/
   Check the tightness of the power circuit connections

Do an annual check thereafter.

8. Factory tests
   Remote control regulation.
   Power and remote control circuit insulation measurement.
9. The cabinet and the boiler are not designed to be installed in an environment with a corrosive or explosive atmosphere, nor outdoors.
10. Ventilation (gills or fan)
    Leave enough space for perfect air circulation. Do not
    obstruct or block the vents or the fan.

6) REGULATOR

SIEMENS regulator type POL 635 with display POL 871.72/std.

Note : the display is mounted on the door of the cabinet, the regulator is mounted at the back of the cabinet.

6.1)Presentation - Operation

Button**NEWS** :

Returns to an info page where the dates and version number of the program loaded in the controller are indicated.

Button**ALARM** :

Returns to an alarm management page. Current alarms are displayed. The last 50 messages are stored, possibility of acknowledging alarms.
This button has a red LED: Flashing LED: appearance of an alarm.
Steady LED: alarm taken into account but not repaired.

Button**ESC** :

Allows you to go back one page and go back to the first page.

Button**OK** :

Validates the modification of data in the program.
Allows you to go to the next page (sub-program).

Button**-**And**+** :

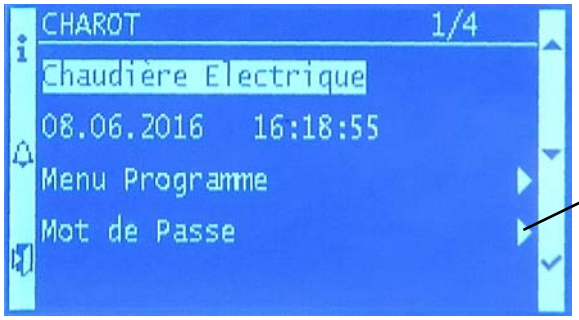
Used to select a line in the program pages or to modify the setpoints.

6.2)Programming

cover page

When the display unit is powered up, the following information is obtained:

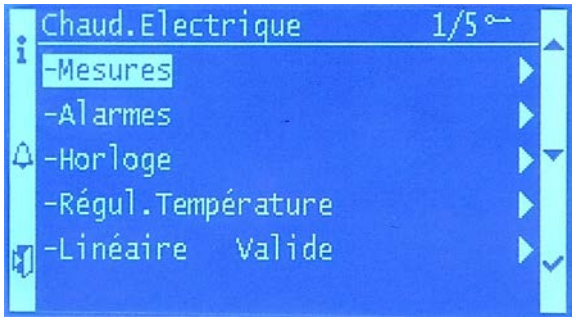
By validating on this line, move to the next page.

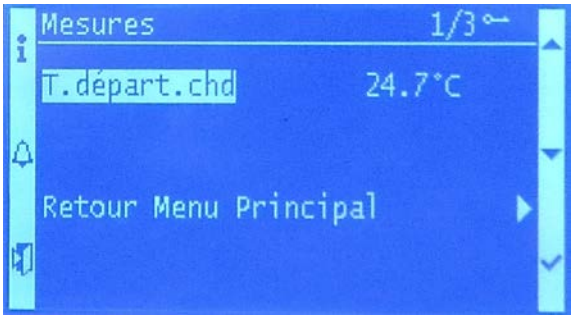


By validating on this line, you can enter a password number.
Password "1000": user level: 1 No password: user level.

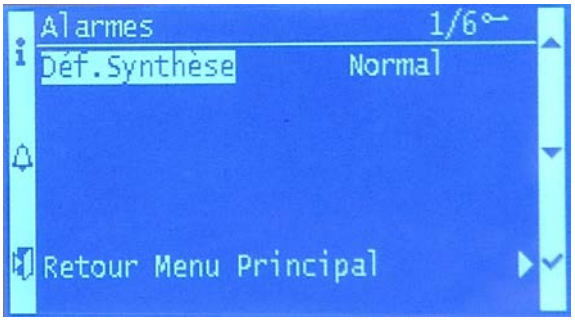
USER LEVEL

Program menu



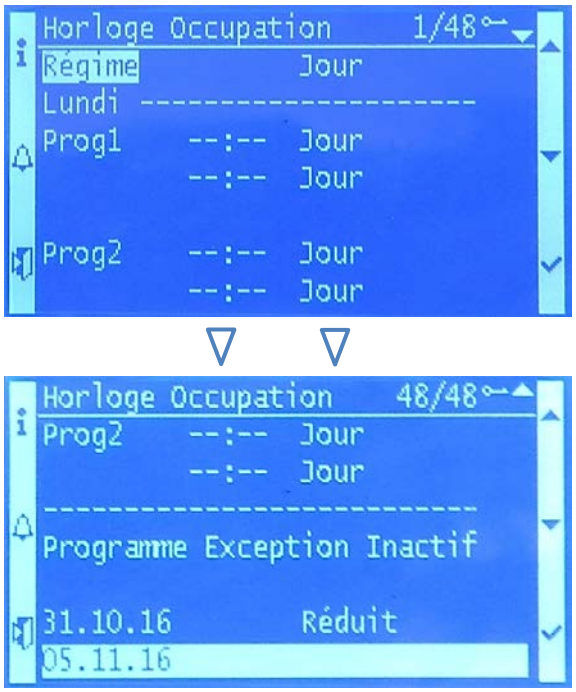


Boiler outlet water temperature.



Indicates that there are no faults. Concerns faults external to the controller. Connection to terminals X5 and M.

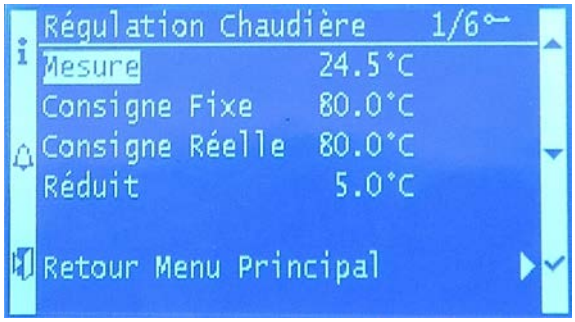
Clock



Adjustment of the time program for switching to reduced mode.
Mode: shows the current state of the clock (Day or Reduced).
Possibility of 2 reduced ranges for each day.
Adjustment of hours and minutes.
Program to run for every day of the week.

Exception program: allows you to program a reduction period of several days.

Temperature control



Measurement: boiler outlet water temperature (probe).
Fixed Setpoint: programmed setpoint adjustable between 20 and 95°C.
Actual Setpoint: fixed setpoint minus the reduced if it is active.
Reduced: temperature difference which will be removed from the fixed setpoint.

Valid Linear

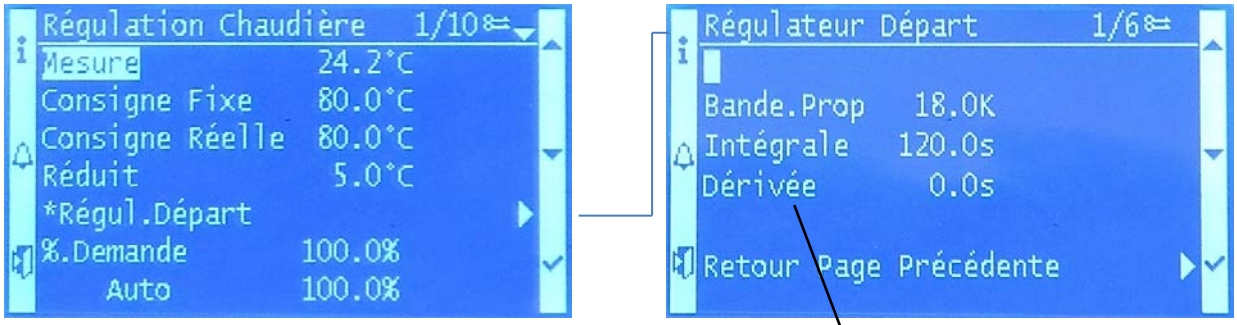
Linear mode: this is the regulator which divides the proportional band by the number of stages, thus determining the gap between engagement/ tripping for each stage.

T.Flow: boiler outlet water temperature
Stage 1 On: stage 1 on Stage 4
Off: stage 4 off

SERVICE LEVEL

Password "2000": maintenance level: 2

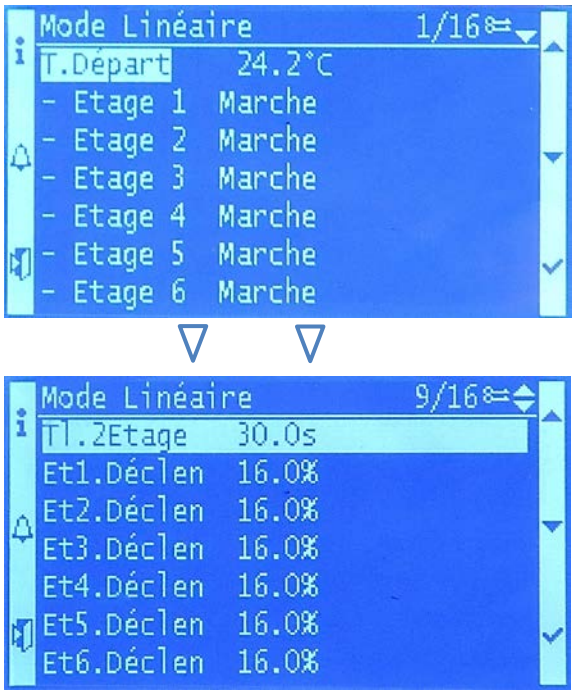
Temperature control



Measurement: boiler outlet water temperature (probe). Fixed Setpoint: programmed setpoint adjustable between 20 and 95°C. Actual Setpoint: fixed setpoint minus the reduced if it is active. Reduced: temperature difference which will be removed from the fixed setpoint.

In this page, it is possible to modify the proportional band, the integration time, the derivative time.

Valid Linear



Timeout

TI Stage: time delay on re-engagement of a stage after it has tripped.

TI.2Floor: time delay on engagement of a floor after engagement of the previous floor.

Hysteresis

Et1.Declen 16%: the hysteresis is equal to 16% of the proportional band.
Ex: BP=18K hysteresis=18x0.16= 2.9°C therefore
Stage 1 engages 3°C below the setpoint.
triggers 0.1°C below the setpoint.
Stage 2 engages 6°C below the setpoint.
triggers 0.1°C below the setpoint.

6.3)Modbus link

The controller can be connected to a GTC in Modbus RTU protocol.

Adjustable Parameters:
Slave addresses: 1 Speed:
9600 bauds 8 bits, no parity,
1 stop bit Read/Write 16-bit
words

Table of addresses:

Reading

Decimal	Request code 3 or 4	
W.00- bit 00	**Summary of faults**	
W.00- bit 01	**Flow temperature alarm**	
W.00- bit 02	**Outside temperature alarm**	
W.00- bit 03	**Item available**	
W.00- bit 04	**Item available**	
W.00- bit 05	**Item available**	
W.00- bit 06	**Item available**	
W.00- bit 07	**Item available**	
W.00- bit 08	**Item available**	
W.00- bit 09	**Item available**	
W.00- bit 10	**Item available**	
W.00- bit 11	**Item available**	
W.00- bit 12	**Item available**	
W.00- bit 13	**Item available**	
W.00- bit 14	**Item available**	
W.00- bit 15	**Item available**	
W.01- bit 00	**Item available**	
W.01- bit 01	**Stage 1 command status**	
W.01-bit 02	**Stage 2 command status**	
W.01- bit 03	**Stage 3 command status**	
W.01- bit 04	**Stage 4 command status**	
W.01- bit 05	**Floor 5 command status**	
W.01- bit 06	**Stage 6 command status**	
W.01- bit 07	**Day mode clock**	
W.01- bit 08	**Stop/Start BMS**	(GTC Order Validation)
W.01- bit 09	**Stage 1 stop lock by BMS**	
W.01- bit 10	**Lock Stage 2 shutdown by BMS**	
W.01- bit 11	**Locking Stage 3 stop by BMS**	
W.01- bit 12	**Locking Stage 4 shutdown by BMS**	
W.01- bit 13	**Block Stop floor 5 by BMS**	
W.01- bit 14	**Block Stop floor 6 by BMS**	
W.01- bit 15	**Boiler operation authorization by GTC**	

Reading (continued)

Decimal	Request code 3 or 4	
W.02- bit 00	**External temperature validated**	Configuration
W.02- bit 01	**Linear regulation mode**	
W.02- bit 02	**Adjustable regulation mode**	
W.02- bit 03	**Binary regulation mode**	
W.02- bit 04	**Item available**	
W.02- bit 05	**Item available**	
W.02- bit 06	**Item available**	
W.02- bit 07	**Item available**	
W.02- bit 08	**Item available**	
W.02- bit 09	**Item available**	
W.02- bit 10	**Item available**	
W.02- bit 11	**Item available**	
W.02- bit 12	**Item available**	
W.02- bit 13	**Item available**	
W.02- bit 14	**Item available**	
W.02- bit 15	**Item available**	
W.03	**General flow temperature**	value x10
W.04	**Outside temperature**	value x10 (Offset+50)
W.05	**Read 'Boiler setpoint**	value x10
W.06	**%.Boiler triac**	value x10
W.07	**Reading Offset Setpoint**	value x10
W.08	**Reading Flow set point (/18°C Outside temperature)**	value x10
W.09	**Reading Reduced Setpoint**	value x10
W.10	**Read Fixed Setpoint**	value x10 (If no outside temp.)

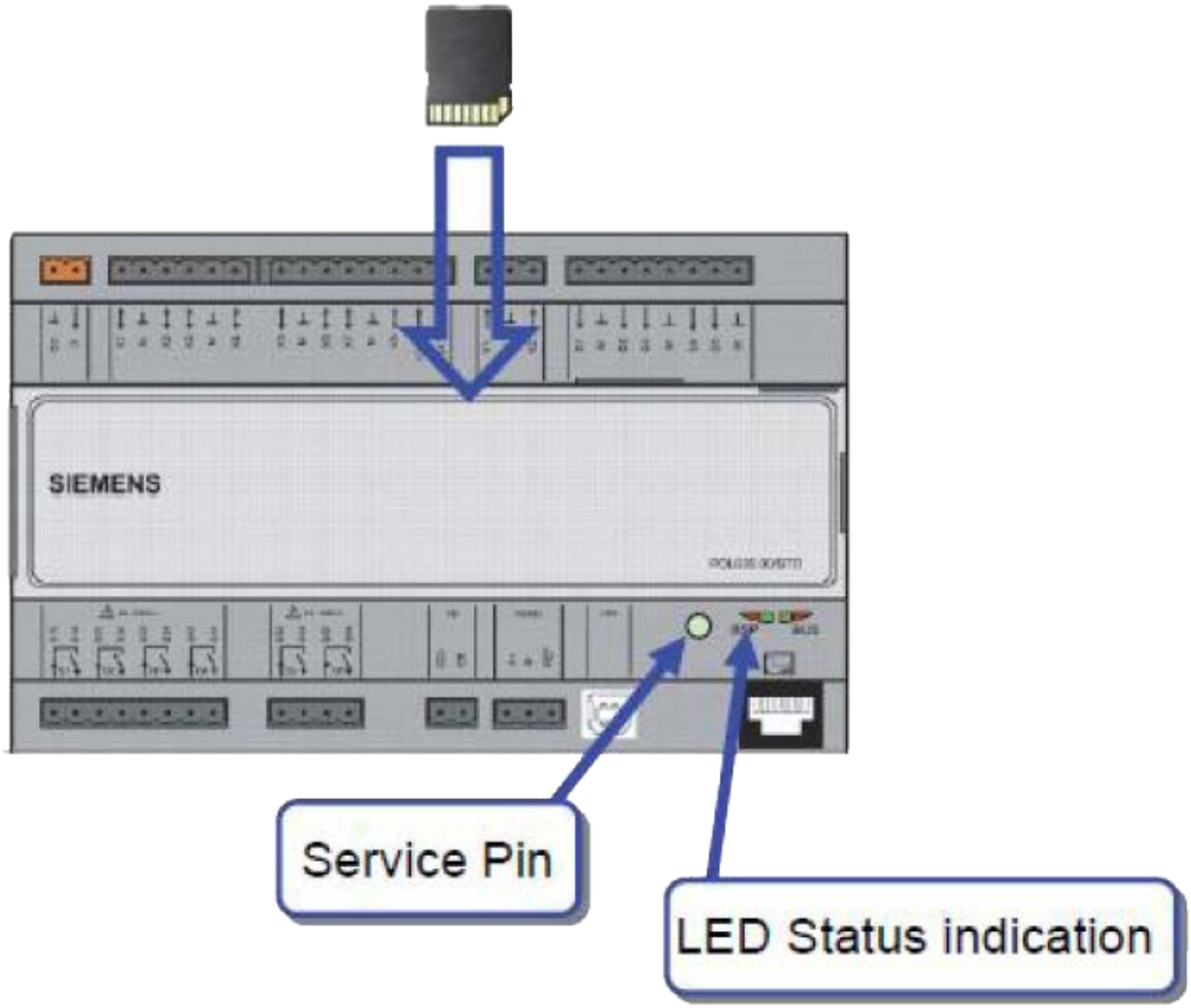
Writing

Decimal	Request code 16	
W.50-bit 00	**Day mode**	
W.50-bit 01	**Clearing Faults**	
W.50-bit 02	**Lock Stop stage 1**	
W.50-bit 03	**Lock Stop floor 2**	
W.50-bit 04	**Lock Stop stage 3**	
W.50-bit 05	**Lock Stop stage 4**	
W.50-bit 06	**Lock Stop floor 5**	
W.50-bit 07	**Block Stop floor 6**	
W.50-bit 08	**Boiler operation authorization**	
W.50-bit 09	**Item available**	
W.50- bit 10	**Item available**	
W.50-bit 11	**Item available**	
W.50-bit 12	**Item available**	
W.50- bit 13	**Item available**	
W.50-bit 14	**Item available**	
W.50-bit 15	**Item available**	

W.51	**Offset Setpoint**	Value /10
W.52	**Flow set point (/18°C outside temperature)**	Value /10
W.53	**Reduced deposit**	Value /10
W.54	**Fixed setpoint (if no outdoor temperature)**	Value /10

6.4)Loading the program into the SIEMENS controller

- **Load**the HMI.ucf, MBRTCode.ucf and OBH.ucf files on an SD card
- **Put**the regulator off
- **Insert**the SD card in the controller



- Using a long, thin object, press and hold the internal "Service Pin" button.
- Switch the regulator back on by holding down the "Service Pin" button
- Press and hold the "Service Pin" button to display the "BSP" LED
- The LED flashes red then green. When the first flash of green occurs, release the Service Pin.
- The LED continues to flash red-green 2 or 3 times (approx. 30 sec.)
- When charging is complete, the flashing stops and the LED turns orange
- Wait another 10 seconds, switch off and then back on again, the programme is now loaded; the LED lights up green.
- The pocket programme and the communication table are loaded via the SD card.- Remove the SD card

7) TRANSPORT, STORAGE, HANDLING

TRANSPORT - STORAGE

The device must be transported and stored in its original packaging to its place of installation.

Ambient temperature below 80°C.

Relative humidity 30 to 80% (non-condensing).

HANDLING

- The equipment will be handled by suitable lifting means and by qualified staff:

- use a pallet truck or forklift

- The equipment must be handled empty and without any additional accessories not supplied by the manufacturer.

- Handling will be done by the customer.

8) MAINTENANCE

The decrease in circulation speed and the rise in temperature of the water in the body of the boiler:

- Promote the settling and precipitation of mineral or other matter contained in the water, which leads to deposits of mud, scale, etc. ....
- Prevent the normal irrigation of the immersion heaters, and lead irreparably to their destruction by overheating.

He is essestial that periodic cleaning is carried out, both of theboiler body onlyimmersion heaters, and that the water is clean, without the addition of antifreeze or other descaling product.

Sludge disposal reduces the risk of corrosion under deposit of the boiler body.

It is up to you to define the maintenance intervals according to each use, not exceeding the maximum times indicated below:

*C*ommissioning

- Check electrical operation-
- Check the tightness of the connection terminals to avoid contact resistance and abnormal heating of the connections: on the power contactors and immersion heater heads.
- Operate the safety valve(s)

Monthly maintenance

- Check for correct operation of :
  - the air vent
  - the valve

Annual maintenance

- Check the tightness of the connection terminals to avoid contact resistances and abnormal heating of the connections: on the power contactors and on the immersion heater heads.

9) WARRANTIES

Our **Electric Boilers** are guaranteed against perforation in the heating circuit.

- Boiler body 3 years
- Electrical materials 1 year
- Immersion heaters 2 years

This warranty is limited at our option, the repair or replacement in our SENS factories of the parts recognized as defective.

It excludes any other damage, travel, labor costs that may result.

RETURN TO OUR FACTORIES IS MANDATORY

The replacement of parts does not extend the duration of the warranty and cannot give rise to any compensation for miscellaneous costs or any damage.

Our warranty does not cover:

- The risks of scaling, freezing, corrosion
- Damage attributable to handling or transport
- The lack of water
- The wrong maneuvers
- Pressure surges and water hammer
- Installation or usage errors
- Failure to follow installation instructions
- The lack of maintenance

The installation diagrams are for guidance only and do not preclude from complying with the rules of the trade and the regulationsor D.T.U. regulations in force.

10) SPARE PARTS

TITLES	Code No.
200 A power contactor	**582,070**
275 A power contactor	**582 201**
350 A power contactor	**582 203**
Fuse T1 160A	**587,263**
Fuse T2 250A	**587 271**
Fuse T2 315A	**587 272**
SIEMENS POL 635 regulator	**583,057**
SIEMENS display	**583,056**
Timer MAR1	**587 172**
Safety Relay 4CO - 4CF	**585 179**

TITLES	Code No.
Immersion heater 35 kW	**2536**
Safety thermostat 90/110°C	**581 104**
traffic controller	**480 230**

11) IN CASE OF BREAKDOWN

For any intervention, switch off the ME boiler.

Breakdowns	To do
The power indicator is off	• Check that the supply voltage arrives at the power switch • Check fuses F1, F2 and F3
The control screen is off	• Check fuse F4
The red light is on	• Check safety chain Ka1, safety thermostat, circulation controller and pump safety
If a stage power fuse is damaged	**Bring in a professional**
If the main power circuit breaker trips	
If the fault persists	**Bring in a professional**