MMM Group

Service instructions

Laboratory drying ovens and incubators
line Standard

ECOCELL	**22, 55, 111, 222, 404, 707**
DUROCELL	**22, 55, 111, 222**
VENTICELL	**22, 55, 111, 222, 222/2, 404, 404/2, 707, 707/2**
INCUCELL	**22, 55, 111, 222, 404, 707**
INCUCELL V	**22, 55, 111, 222, 404, 707**

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CONTENTS:

15. 7. 2013

1 INTRODUCTION

These Service instructions contain a complex information about the product, that are necessary for repairing, maintaining and checking of the unit.
A knowledge of The Operation Instructions of the Laboratory cabinets and incubators, written in a separate manual is expected.

2 TECHNICAL DATA

Technical data are given in the Operation instructions.

3 DESCRIPTION OF THE UNIT

3.1 FUNCTIONAL PARTS

3.1.1 CHAMBER

The chambers of individual types are made of stainless steel DIN 1.4301, examples are given in appendixes in chapter 8.

Resistance **heating elements in stainless steel tubular** containers are placed in front of the internal surface of the rear wall in VCs and ICVs, and in front of the left and right side wall and chamber bottom in ECs, DCs, and ICs. In two-door models, the heating elements are placed in front of the left and right side chamber.

In one-door models, the sensor of the **temperature regulator PT100** is fixed at the top of the rear chamber wall. In two-door models, it is fixed at the top of the side chamber wall (at the power supply side.

The digital safety thermostat sensor (PT100) is attached in the same place as the temperature regulator sensor.

The ventilator ensures the forced air circulation inside the chamber. If you open the air outlet valve (in types with ventilator you open the suction valve at the same time, in types without ventilator the suction opening has no valve – it is always open), the ambient air is let in the chamber (in types with ventilator it is drawn in actively).

Sheets of the **inner chamber** are inserted one after another into this outer chamber, the projections and the holes of the sheets fit together.

Steel (with Ni/Cr- couting) or stainless-steel **wire trays** are slid into the profiles on sides of the inner chamber.

The sheets of outer chamber are covered with a **thermoinsulating wool of mineral fibers** from the outside. The front edge of the chamber is provided with a **sealing made of silicone rubber**.

The chamber door - the front entrance into the chamber is closed – in case of IC and ICV – both by the inner glass door and the outer metal sheet door, in case of VC, EC, DC only by the outer metal sheet door.
The outer metal door is isolated by **thermoinsulating wool of mineral fibers**.

3.1.2 THE COVERS OF THE UNIT

The covers are made of a galvanized steel sheet (zinc layer 3 µm) and they are these main parts:

- chamber cover,
- door cover.

The galvanized steel sheet is coated layer of water-soluble varnish that is then heat-cured.

3.2 FUNCTIONAL SYSTEMS

3.2.1 ELECTROINSTALLATION

The plastic body of the regulator with **regulator board with control elements** and **the safety thermostat** is fixed on the door.
In one-door models, the regulator board is connected to the motherboard in the right leg by means of a cable going through a sleeve in the lower door hinge. In one-phase models, the main cable is connected to the mentioned motherboard. In three-phase models, it is connected to the additional board placed in the left leg where the filters and switchers of the heating elements are placed as well.
In two-door models, the indication panel is hung on the second door. The motherboard is connected with the connecting board by means of two cables. The connecting board is placed under the side device panel. The connecting board contains the RS232 interface connector allowing a printer or PC connection. Other cables are connected to this board as well (the regulator cable, the indication panel cable, and the door blocking circuit); they go through the access ports in the lower hinge of the appropriate door. Other cables are connected to this board as well (the regulator and indication panel cable). The cables go through the sleeves in the lower hinge of the appropriate door. The heating switchers are placed in the accessory legs and the power supply cable goes through a sleeve in the side wall of the device.
Other data – concerning **heating bodies, safety thermostat sensor, thermoregulator sensor** – are given in chapter 3.1.1.
Appropriate documentation and pictures are given in chapter 8.

3.2.2 CONNECTION

Basic data for connection:		
Mains connection:	230V/50(60)Hz 400V/50(60)Hz, 3NPE; 115V/50(60)Hz; 115V/50(60)Hz, 3PE	
(standard types are marked with bold face)		
Mains voltage fluctuation	±10 %	
Protection against dangerous contact - class:		I
External circuits insulation		
double insulation		
Protection according to EN 60529	IP 20	
Overvoltage category according to (IEC 664 – EN 61010)		
II in case of pollution degree 2		
Used fuses:	according to corresponding diagrams in the Service instructions	
The mains supply for the three-phase units must be ensured by a switch or circuit breaker which serves for disconnection. Such a switch or circuit breaker must be: – A component part of the building installation; – Placed in an immediate vicinity of the unit and accessible easily by the operator; – Labelled as the device disconnecting element; – Rated correctly and must comply with the requirements of the standards IEC 60947-1 and IEC 60947-3.		
Ambient conditions:		
– ambient temperature: +5 °C to +40 °C – max.relative humidity: 80 % at the temperature up to 31 °C – maximal altitude: 3000 m		

4 THE FUNCTIONS OF THE UNIT

4.1 FUNCTION AND CONTROL

described in Operation instructions of the Laboratory drying ovens and incubators.

4.2 OPERATING SOFTWARE

The user's services mode is used for:

- setting the operating parameters (for example setting the printing interval)

The service technician mode serves to:

- Set the control circuit basic parameters that usually remain unchanged. In an ideal case, they should be set only once at the time of the device activation. In practice, this mode is used under situations when (e.g. due to a repair or upgrade) something has been changed in the device (most often the electronics board or EPROM);
- For safety system parameters setting. The setting must be equal or analogical to the control circuit parameters setting.

4.2.1 USER'S SERVICE

User's services are service operations usually accessible to the user and they are described in the Instructions for use.

4.2.2 OPERATING ENGINEER'S SERVICES

4.2.2.1 ENTRY AND QUIT THE OPERATING ENGINEER'S SERVICES

Enter this group of operations (if you are in the normal or error mode) by pressing the buttons **ON/OFF** and **X/W** simultaneously for ca. 2 sec. More, a password is required for access and "0000" is shown on the display. Enter the password (1993) from the left to the right in individual numbers by pressing ▲ and ▼, confirm by using ON/OFF. The currently changed number blinks. After confirming the fourth number the title „FAIL" will display in 1 in case of entering a wrong password and you will get to standard mode. In case of a correct password, you will get to service mode. The display shows Sr and the Service-No., by means of ▼ and ▲ select the required number and enter the service by pressing **X/W**. After setting the data quit the service by pressing **X/W** and by pressing **ON/OFF** quit the group of operations and get to the normal mode.

When quitting the service mode, printout of all service and user's parameters is activated if the printer is selected and connected.

4.2.2.2 SERVICE 1 – CALIBRATION OF THE TEMPERATURE CONVERTER AT THE RESISTANCE 110 Ω

It is supposed in this service, that there is a resistor 110 Ω connected instead of PT 100. After connecting the resistor wait for ca. 15 sec till the temperature is stabilized. Then carry the calibration out. To perform the calibration, press and hold **ON/OFF**. The display will count down the time remaining to the calibration start. If you release the button, the procedure will be interrupted and the calibration will not be performed. After the time is counted down to zero, the calibration is performed, which is indicated by "CAL" and "donE" displaying. After that, the display will show either the calibrated temperature or dashes. In case of calibration with this resistance (this or the previous one) to be successfully finished with correct measured value, dots are blinking at the display while showing the calibrated temperature.If the dots are not displayed, the calibration probably has not been performed correctly and must be repeated. After the service is performed, the dasheds should not be displayed and the device is calibrated.

Note 1:
After finishing the calibration it is suitable to check, which (calibrated) temperature is shown in case of resistor 110 Ω

(corresponds to 25,7 °C), and which one is shown in case of resistor 150 Ω (corresponds to 130,4 °C). If these values are different, another calibration should be carried out.

Note 2:
After the calibration you can switch over between the calibrated and not calibrated temperatures by means of following buttons:
The calibrated value is displayed without the offset.

▲ The calibrated temperature is displayed (in addition to it, dots may be flashing on the display). Before the value is displayed, “CAl” Help is displayed for 1 s.

▼ The non-calibrated temperature is displayed. Before the value is displayed, “UnCl” Help is displayed for 1 s.

Note 3:
The calibration may be incorrect even if the display does not report Error 1 – no calibration.

4.2.2.3 SERVICE 2 – RE CONVERTER AT THE RESISTANCE 150 Ω

See Service 1 – only resistor 150 Ω is connected instead of the PT 100 sensor.

4.2.2.4 SERVICE 3 – 5 – SETTING THE OFFSET

Legends:

- Temperature of the first offset. 40 °C (the required temperature, the first offset corresponds to – service 3).
- Temperature of the second offset According to the type of the cabinet: 70 °C for IC and ICV; and 100 °C for other cabinets (the required temperature, the second offset corresponds to – service 4).
- Temperature of the third offset according to the type of the cabinet: for IC and ICV it is not measured; for other cabinets 190 °C (the required temperature, the third offset corresponds to – service 5).

The method of setting is equal in all three services:
To activate the service, press and hold **X/W.**
The display will show the offset in °C (with one decimal place). You can change the data by means of ▼ and ▲.
After any change, the value on the display will start flashing and the change must be recorded in the control and safety system by **ON/OFF** pressing. If the recording is successful, dots will start flashing. If the recording has not been performed correctly, the original values remain on both positions. The value may be both positive and negative, ± 99.9 °C at the most.

Set all three offsets to 0.0 at first. Then exit the service technician mode and enter the normal mode. Put the sensor of the independent thermometer in the centre of the chamber. Set the temperature of the first offset in the normal mode. Let it temper and stabilize at the temperature reached (T_1) for approx. 30 minutes. Then measure the temperature inside (in the centre of) the chamber (T_2) by means of an independent thermometer. Calculate the difference $T_2 – T_1$ and write it down. Perform the tempering and $T_2 – T_1$ difference calculation for both the second and third offset temperature. Then re-enter the service technician mode and set the acquired offsets.

4.2.2.5 SERVICE 6 – IDENTIFICATION OF THE EPROM VERSION

When entering the service, the display shows the SW version of the control circuit. By means of ▲ button, month and year („month.year“ format) of SW creation, control sum of EPROM control circuit, SW control system version, and SW safety system can be displayed in succession.By means of ▼ button, a reverse order of display is switched.
If the month and year are displayed, the day may be displayed on the display by holding the **ON/OFF** button pressed. You can then switch between the day and time display by means of ▲ or ▼ button (format “hour.min”).
If SW safety system version is displayed, control sum of EPROM safety system can be displayed by holding the **ON/OFF** button pressed.

4.2.2.6 SERVICE 7 – INITIALIZATION OF EEPROM

After entering the service the report “IEEPr” is shown on the display, press **ON/OFF** and then ▲.

Caution, by initializing you cancel all data stored in EEPROM. (Note: the non-backed EXTRAM is a part of the processor, important settings are included in EEPROM.)

4.2.2.7 SERVICE 8 – SETTING THE TYPE OF CABINET

Enter the service. The display shows the abbreviation of the device type. Use ▼ or ▲ to select the corresponding type.

Note:

- =VC and =EC are up to 250 °C; ≡VC and ≡EC are up to 300 °C
- IC and ICV are up to 70 °C; ≡IC, ≡ICV are up to 100 °C
- ııICV is up to 70 °C ≡IC and ≡ICV up to 100 °C, both with a switched-off ventilator (prevents the cultivating media and tissue cultures from drying)
- VCP has an overpressure control function for the device equipped with an overpressure ventilator (for 707 only)
- DC is up to 125 °C
- Do not use VAC and SC.

4.2.2.8 SERVICE 9 – SETTING THE VOLUME OF CABINET

After entering the service the volume of the cabinet (22, 55, 111, 222, 404, 707) is shown on the display. By means of ▼ and ▲ select set the appropriate volume.

Before you exit the service mode, the value changed must be overwritten in the safety system in Service 25.

Note:
In services 8 and 9, there could be set only the valid combination of the cabinet type and size.

4.2.2.9 SERVICE 10 – SETTING THE TWO-DOOR VERSION

One-door version (“d 1” is displayed), two-door version (“d 2” is displayed), or two-door with blocking version (”d 2b” is displayed) can be set by means of ▼ or ▲.
If you choose “d 2b”, you can test the functionality of the blocking mechanism. The test is performed by a long press of the.**ON/OFF** button.

Thus you enter the first submenu in which the required status can be switched by means of ▲ and ▼:
O Both doors are unblocked
I The infectious door is unblocked
C Both doors are blocked
S The sterile door is unblocked
A Transfer X–C–I
B Transfer X–C–S,
where X is an arbitrary initial state.

The display shows:
1st character – the required status
2nd character – “.“ (the activity is running) or “–“ (the activity has been terminated)
3rd character – reached status
4th character – error message code.

By subsequent pressing of the **ON/OFF** button, we can gradually switch to the submenu of the servo-drives of the infectious and sterile side.
By means of the buttons ▲ and ▼, you can change the position of the given blocking servo-drive in these submenus.

The display will show:
1st character– “d“
2nd character – “I“ or “S“ (according to the submenu for servo-drives testing of the infectious or sterile side
3rd character – the required status “B“ or “U“
4th character – achieved state “B“ (blocked) or “U“ (unblocked).

4.2.2.10 SERVICE 11 – DIFFERENT TYPES OF THE HEATING

Set the heating type by means of ▼ or ▲,
SEC 1 – corresponds to the single-acting heating,
SEC 2 – corresponds to the double-acting heating.

4.2.2.11 SERVICE 12 – DIFFERENTIATION BETWEEN DOOR WITHOUT AND WITH WINDOW

The door with window causes higher thermal losses and therefore the regulation is adapted. After entering the service, use ▼ or ▲ buttons to set the door without a window (LOSn) or with a window (LOSY).

4.2.2.12 SERVICE 15 – FLEXIBLE SENSOR ACTIVATION

After entering the service, the flexible sensor can be either activated (the display shows „FLEY“) or deactivated (the display shows „FLEn“) by means of ▼ or ▲ buttons.

4.2.2.13 SERVICE 16 – FLEXIBLE SENSOR CALIBRATION AT 110 Ω

The calibration is performed in the same way as the regulating sensor calibration (Service 1). The calibration resistance is, however, connected to the flexible sensor terminals.

4.2.2.14 SERVICE 17 – FLEXIBLE SENSOR CALIBRATION AT 150 Ω

The calibration is performed in the same way as the regulating sensor calibration (Service 2).The calibration resistance is, however, connected to the flexible sensor terminals.

4.2.2.15 SERVICE 18 TO 20 – FLEXIBLE SENSOR OFFSET SETTING

It is performed in the same way as Service 3 to 5 but without recording the values in the safety system.The flexible sensor must have close contact with the reference thermometer.

4.2.2.16 SERVICE 21 – START OF A PROGRAMME DERIVED FROM THE FLEXIBLE SENSOR

After entering the service, this function can be either activated (the display shows „FLSY“) or deactivated (the display shows „FLSn“) by means of ▼ or ▲ button.

4.2.2.17 SERVICE 25 – SAFETY SYSTEM INITIALIZATION

This function sets the check circuit to the configuration that corresponds to the safety circuit configuration. It must be set no sooner than after setting all the important control circuit parameters – regulation sensor calibration, regulation sensor offset, type and size of the apparatus, inhomogeneity correction, and regulation offset.
During the initialization, the check conditions range (see the tolerance diagram), way of reaction (thermostat class), and the safety user and safety limit temperatures are set. As the safety user temperature limit and maximum time set by the user are overwritten to the initial values, the values should be written down from U6 and U8 before the overwriting and set again by the user after the overwriting.
Press and hold the button **X/W** – the display shows “SF.CO”. By short **ON/OFF** pressing under continuous **X/W** holding, the rewriting procedure will start, during which the middle horizontal segments are displayed only. A process will start during which the display shows only the medium horizontal segments. After the initialization is terminated successfully, the display shows “donE” with two flickering dots.
If any error occurred during the overwriting, the display will show “FAIL”. The correct initialization and calibration of the safety system can be checked at the time of the service mode termination, or at the time of the device connection to the power supply. The safety system and calibration setting are checked at that time and if they are not correct, an appropriate error will be announced.

4.2.2.18 SERVICE 26 – CALIBRATION OF THE SAFETY SYSTEM TEMPERATURE CONVERTER AT 110 Ω

It shall be carried out in the same way as the calibration of the regulatory sensor converter (Service 1) except for connection of the calibrating resistor to the check sensor terminals. The **X/W** button must be held pressed from the service entry till the termination of the calibration.

4.2.2.19 SERVICE 27 – CALIBRATION OF THE TEMPERATURE CONVERTER OF THE CHECK SYSTEM AT 150 Ω

It shall be carried out in the same way as the calibration of the regulatory sensor converter (Service 2); the control is the same as in the Service 26.

NOTE
Calibration (Service 26 and 27) and initialization (Service 25) can be performed in an arbitrary order.

4.2.2.20 SERVICE 28 – SELECTION OF THE VENTILATOR RUNNING AFTER EXPOSURE TERMINATION

After entering the service, the display shows „FAnY“ or „FAnn“ depending on whether or not the ventilator should keep running. You can switch between the settings by means of ▼ ▲ button.

4.2.2.21 SERVICE 29 – REAL VALUES DISPLAYING

The service allows viewing of the real procedural temperatures measured by the control system (“Ctr”), flexible sensor (“FLE”) and the safety system (“SFt”), and of the non-calibrated values (“Un.Ct”, “Un.FL”, “Un.SF”). The individual values can be displayed by means of ◄ and ►. When the safety system temperature is displayed, you can use **ON/OFF** to switch on (dots start flashing) or off the mode in which the said value can also be printed or recorded to the WarmComm SW. This mode serves for recording with the aim to analyse problems with sensors. In addition to switching-off by means of the given button, the mode can also be cancelled by disconnection from the power mains.

4.2.2.22 SERVICE 30 – DIFFERENTIATION OF THE SAFETY RELAY TEST TYPE, AND TESTING

In the older HW version, the safety relay test was performed by the relay disconnection during the temperature rise and by measuring and testing whether the temperature is dropping down or not. It was a temperature-type test (“TEMP”). The actual kind of test measures the supply voltage on the disconnected safety relay contact only. It is a voltage-type test (“Volt”). You can switch between the two test types by means of ▼ and ▲.

Note:
The use of the older temperature-type test is expected for atypical purposes only and there is a problem of the

absence of compatible Instructions for Use and Service Instructions covering all the functions.
If the device is equipped with older components than those specified in these Service Instructions, the voltage-type test cannot be performed.

Performing the voltage-type test
If the voltage-type test has been selected, the test itself can be switched on by means of **ON/OFF**. If the test was successful, the display shows “donE” and flashing dots. If there is any mistake, “E” and the number of the error sub-code is displayed. The test will start even after the service mode termination.
If the sub-code is 32 after the test is switched on in the service mode, the safety system activation prevents the testing (the red LED is lighting). Change the setting in U6 so as the safety system is not activated and perform the test again.

5 ADJUSTMENT OF THE UNIT

After the device is manufactured, the output control shall carry out the following operations according to the testing and setting regulations. Such operations can also be carried out by a service technician with corresponding qualification. Steps 5.2 and 5.3 don’t have to be carried out in they were performed by the manufacturer of the printed-circuit boards.

5.1 ELECTRICITY SAFETY CHECK-UP

After eliminating a defect (event. after starting the work) prove the unit safety in the electricity part before starting the operation in case the electricity safety of the unit might have changed when mounting and replacing the defected part.

When checking the unit according to EN 61010-1 do the following:
- inspection of the unit,
- measuring of the protective conductor resistance – R_{PE}
- current measurement from contact-accessible parts – I_{Δ}

Then measure the current consumption in the mode of heating. Record the measured values.

Inspection of the unit
Do the following:
- check the integrity and the mechanic connections of the protective conductors,
- check the connection of the other conductors and cables (connector connections),
- check the mechanical fitting of the electrical as well as the mechanical parts.

Measuring of the protective conductor – RPE
There shall not be a resistance higher than 0,1 Ω between the main protective clamp (plug cavity) and conductive parts that are accessible through a touch (EN 61010-1). The resistance of the lead-in wire is not included.

Current measurement from contact-accessible parts – I_{Δ}
The current measured must not exceed 3.5 mA (EN 61010-1).

Measuring of the current supplying the unit when heating
It can be done when replacing the heating bodies, or when the heating-up time considerably longer than at the previous tests or longer than the value in the technical parameter table. Do the measuring with a clamps ammeter or with a standard ammeter with a range of 20 A ac. The measuring is the easiest when used special instruments (for example PU 184) which are connected between the mains socket and the plug of the unit while the panels do not have to be demounted in order to have an access to the electrical circuits.
Manufacturers of certain clamps ammeters include a special interconnecting cable which enables to connect the ammeter directly to the supply.
If the value of the current is lower than the table parameters, it can be caused by a defected heating body, wrong connection of the bodies or a defect on the supply board.

The recording of the measured values
Record the measured values properly (a test protocol) for the customer as well as for the service organization.

5.2 INITIALIZATION OF EEPROM

By initializing the EEPROM is set to the initial state.
By initializing, if it is carried out on an already set board, some important information (setting the converter, offset etc.) can be lost and you must do all settings again!
Further procedure see chapter 4.2.2 of the the Service instructions.

5.3 TEMPERATURE CONVERTERS CALIBRATION

Perform the calibrations for the regulatory, flexible, and safety system sensors according to the description in chapter 4.2.2 of these instructions.

5.4 SETTING THE TYPE AND VOLUME OF THE CABINET

Carry out according to the chapter 4.2.2 of these instructions.

5.5 TEMPERATURE OFFSET SETTING

Temperature setting for the regulatory and flexible (if applicable) sensor shall be performed according to the description in chapter 4.2.2 of these instructions.

5.6 SETTING THE PRINTER AND CHECK OF THE PRINTER CONTROL

Carry out according to the chapter 4.3 and 4.5 of the Operation instructions.

5.7 ADJUSTING THE DOOR

The door can be adjusted in four places (see Fig. 12).
The pins of the lock 3 + 4: These pins can be loosen with a lock nut and the position can be adjusted forwards/ backwards by means of a thread.
Door hinge 1: By loosening the bolt M8 at the right side of the foot the door can be adjusted in horizontal level forwards/backwards.
Door hinge upper 2: Take the plastic cover off to enable access to the bolt M8. By loosening this bolt position of the door can be adjusted.

Adjust the door so that when closed the rubber sealing of the chamber would fit to the sheet of the floating door along the whole perimeter. To check it up place a sheet of paper between the sealing and the metal sheet of the floating door before it is closed, it is possible to take the paper out against a small resistance.

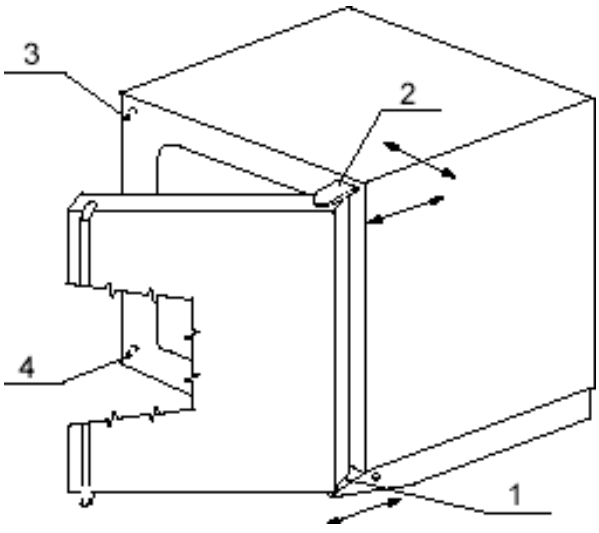


fig. 12

5.8 CHECK OF THE TECHNICAL PARAMETERS

a) Record of the temperature control course at the temperatures
   - for IC and ICV – 37 °C and 70 °C
   - for EC, VC - 150 °C
   - for DC - 125 °C
   so that the resolution of the temperature variation with accuracy 0.1°C is possible and the
   rise time can be read.
   Record at the temperature for at least 5 hours.
b) According to the results decide about further procedure.

5.9 PT100 CHECKING BY MEANS OF A DRY BLOCK CALIBRATOR

The checking shall be carried out only if there are doubts about the correct function of the temperature sensor.

1. Set the temperature $T_{dryblock}$ = 180°C at the dry block calibrator.
2. Enter the Service 1 and press ▲ button to display the calibrated temperature.
3. Read the temperature T_{disp} indicated on the display of the unit.
4. Make provision for the leads resistance (see the table). Determine: $T_{sensor} = T_{disp} - \Delta T_{input}$

Cabinet volume	ΔT_{input} [°C]	
	Silicone (red) cover	Stainless steel cover
22	2,0	2,2
55	2,0	2,2
111	2,0	2,2
222	2,0	2,2
404	3,0	3,3
707	3,0	3,3

The measured temperature tolerance for the used Class A PT sensor (EN 60751–A) is:
ΔT_{tol} = 0.15 + 0.002 T [°C], where T is the measured temperature.
For 180 °C, there is thus ΔT_{tol} = 0.51 °C.

6 ERROR MESSAGES

In case the display shows an error or the device is in an error state, perform the appropriate activities according to Iinstructions fir use and then follow the below given description.

6.1 ERRORS OF THE CONTROL SYSTEM

Er1 Non-calibrated regulating sensor
Other data are available by means of ▲ button
- Calibration constant at 110 (C110) and at 150 (C150).
Check in Service 1 and 2 whether dots are flashing when the calibrated temperature is displayed, and whether the temperature displayed (both calibrated and non-calibrated) corresponds to the actual one (temperature measured by the regulatory sensor). You can also connect the calibrating resistances and check again whether the calibrated value corresponds to the declared 25.7/130.4 °C. If the dots are not flashing or the temperature does not correspond to the given values, perform the appropriate calibration or both of them according to the chapters Service 1 and Service 2.
If the calibration still cannot be performed, look at the values of the calibration constants, i.e. the non-calibrated temperatures for the given resistance. If they differ much from the values 25.7 °C and 130.4 °C (by more than 10 °C), they indicate great deviations (out of the expected tolerance) of the transmission of the control board input circuits, i.e. some defect of the control board.

Er4 Error IIC – wrong initial status
1. Put down the content of all service settings (Services 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, and 28), or print them on a printer and perform the EPROM initialization (Service 7). Re-record the service setting and initialize the safety system (Service 25).
2. Replace the control panel.

Er5 Error IIC – wrong subsequent status
See Er4.

Er6 Not enough memory in EEPROM
See Er4.

Er7 IIC buses
See Er4.

Er8 RAM error
Replace the control panel.

Er9 Error of communication with the safety system
1. Check whether the control board is equipped wit a processor circuit (PIC16F88). If not, correct it and calibrate (Service 26, 27) and initialize (Service 25).
2. Check whether the safety system is supplied by power. After the device is switched on, red safety system LED should light for about 5 s. If it does not, look for the cause in the safety system power supply – cables, power board.
3. Replace the control panel.

6.2 SAFETY SYSTEM ERRORS

For Er11, Er12, Er13, Er14, Er15 and Er23 errors, other data are available by means of the button ▲ – recorded temperature of the control system (“Ctr”), flexible sensor (“FLE”), safety system (“SFt”), or their variants without th calibration and offset (“Un.Ct”, “Un.FL”, “Un.SF”).

Er11 The value is out of the real range; the sensor was disconnected or short-circuited
1. Switch off the device and measure the resistance of the check PT100 sensor, best if disconnected from the control panel. The resistance should range within approximately 100 to 200 Ohm. If there is a marked difference, check the sensor and replace it if necessary (no need to carry out the calibration). Compare the temperature measured by the safety system displayed in Service 29 after switching the button ▼or▲ with the reference thermometer. Check whether the temperature is measured under correctly set offsets and whether the temperatures coincide.
2. Replace the control panel.

Er13 The temperature exceeds the upper user limit controlled by the safety system
1. Initialize the safety system again (Service 25).
2. Check the coincidence of the measured temperature of the control and safety system, i.e. take the same steps as in case of error Er23; proceed from the point 1.
3. Replace the control panel.

Er15 The hazardous upper temperature limit was exceeded
1. Initialize the safety system again (Service 25).
2. Check the coincidence of the measured temperature of the control and safety system, i.e. take the same steps as in case of error Er23; proceed from the point 1.
3. Replace the control panel.

Er16 The minimum phase time was not reached
1. Check the correctness of the safety system initialization (either by power reconnection or exit from Service 25).
2. Replace the control panel.

Er17 The maximum phase time was exceeded
1. Check the correctness of the safety system initialization (either by power reconnection or exit from Service 25).
2. Replace the control panel.

Er18 The version and CRC SW of the safety system do not correspond to the control SW assumptions
1. Put down the SW version of both the control panel and the safety system (see Service 6), or print them on a printer (see Service Instructions, chapter Entry to and Exit from the Service Technician Services) and evaluate the causes of the said error occurrence.
2. Replace the control panel.

Er19 The offsets of the safety system temperature do not correspond to the status of offsets of the control SW

1. Check the correctness of the safety system initialization including the offsets (either by power reconnection or exit from Service 25).
2. Compare the offsets setting (Service 3 to 5) with the data in the output record of the device. If the setting coincides, reinitialize the check system (Service 25).
3. Replace the control panel.

Er20 The calibration values from the safety system reached unauthorized magnitude

Same procedure as in Er1 but Services 26 and 27 are used for the checks and settings.

Er21 The configuration setting of the safety system reached unauthorized magnitude

1. Check the correctness of the safety system initialization (either by power reconnection or exit from Service 25).
2. Replace the control panel.

Er22 The hazardous maximum temperature in the safety system reached an unauthorized value

Follow the same procedure like in Er21.

Er23 The measured temperature of the control system differs from the temperature of the safety system by more than 15 °C (by more than 5 °C in the 4-minute exposure phase).

1. Was the potential error announced without a reason
   Press the ▲ button in the error state. Write down the recorded temperatures of the control (“Ctr”) and safety (“SFt”) system (and all other for the subsequent steps) in the moment of the error occurrence. These values will be printed together with the error message. If the error state is no more available, write down the actual temperatures of the control (“Ctr”) and safety system (“Sft”) in Service 29 (the values are printed at the service mode termination). You may not see the erroneous temperature in the actual values because the reason of the temperature change has already passed away. If the values do not differ by more than 1 °C, cancel the error. Replace the control board in case of repeated reporting only.
2. **Was the error caused by erroneous (differing) offsets**
   Check the correctness of the safety system initialization including the offsets (Service 25). If it is not correct, perform the safety system initialization again – Service 25. Then continue by Point 1 repeating and check whether or not the error has passed away.
3. **Was the error caused by a wrong calibration**
   Press the ▲ button in the error state. Write down the recorded non-calibrated temperatures of the control (“Un.Ct”) and safety (“Un.SF”) system in the moment of the error occurrence. These values will be printed together with the error message. If the error state is no more available, write down the actual non-calibrated temperatures of the control (“Un.Ct”) and safety system (“Un.Sf”) in Service 29 (the values are printed at the service mode termination).
   If both non-calibrated temperatures differ by more than 2 °C (within the same meaning as during the comparison - see point 1), omit the following steps 4 and 5 and check the sensors for a defect. If the temperatures do not differ, the calibration of one of them can be erroneous, and therefore, perform the following steps:
4. **Perform the activities like in Er20**. Continue by Point 1 repeating and check whether the error has passed away.
5. **Perform the activities like in Er1**. Continue by Point 1 repeating and check whether the error has passed away.
6. **Was the error caused by defective sensors and/or their connection**
   Compare the control, check and reference temperatures by means of a service reference thermometer or service reference PT sensor (replacement or connection as a flexible one) and displace the sensor which measures different values. The reference temperatures must be positioned in the centre of the chamber, or all thermometers and sensors must be in one place and all their offsets must be zeroed (or have equal values). After you replace the defective sensor, repeat Point 1 and check whether the error has subsided. If you are not able to identify which of the differently measuring sensors is defective, replace both of them.
   To compare the temperatures, you can switch on the check sensor temperature printing or its recording to WarmComm in Service 29. The defective sensor can be identified by the time characteristics of the temperature with jump fluctuations of temperature during the cycle.
   If the control sensor is replaced successfully, a small deviation of the actual temperature measurement can occur. Any potential error should be compensated by a new offsetting procedure according to chapter 4.2.2.4.
7. Replace the control panel.

Er24 – The safety relay test has not been successful

1. Write down the error sub-code (SubC – available by the ▲ button) and proceed according to step 2. If the error state is no more available, switch on the safety relay test again in Service 30. Check also whether the correct test type has been chosen – the voltage-type one (unless an atypical purpose is required).
2. Intervene according to the sub-code:
   If the sub-code is 0, it means an error of the chosen test type (the temperature-type one). This type has not been dealt with in these Service Instructions. Consider the correctness of the atypical setting and if it is intentional, follow the appropriate documents for the atypical setting or an older device type.
   If the sub-code is 16, replace the control board.
   If the sub-code is 32, the test was started from an error state related to the safety system activation. Remove the cause of the error and restart the test.

3. If there is another sub-code than one of those mentioned above, use the following procedure:
   In the three-phase variant, replace the three-phase power board and perform the test again.
   Then replace the power board and perform the test again.
   If the error still persists after the replacement, replace the control board instead of the power board and perform the test again.
   The last possibility: Check where the connecting cable between the boards is not defective.

D4 (relay energizing) and D8 (voltage detection) signalling is as follows: At standstill (the relay is connected), both are lighting; during the test or safety system activation (the relay is disconnected), both are turned off.

If the sub-code is 1, the safety relay or the related circuits are still erroneously disconnected while they are to be connected. If the sub-code is 2, the safety relay or the related circuits are still erroneously connected while they are to be disconnected.

6.3 ERRORS OR THE SENSORS

For Er50, Er51, Er52 and Er53 errors, other data are available after ▲ pressing – the temperature of the control system (“Ctr”), flexible sensor (“FLE”) and safety system (“SFt”).

Er25 Non-calibrated flexible sensor
Equal procedure as in Er1 but Services 16 and 17 will be used for the checks and settings.

Er50 The regulatory sensor value is too small. The sensor was short-circuited.
1. Switch off the device and measure the PT 100 regulating sensor resistance, best if disconnected from the control panel. The resistance should range approximately from 100 to 200 Ohm. If there is a marked deviation, check the sensor and/or replace it (it is not necessary to perform the calibration). Compare the measured temperature with the reference thermometer. Check whether the measurement is performed under correctly set offsets and whether the temperatures coincide.
2. Replace the control panel.

Er51 The regulatory sensor value is too great. The sensor was disconnected.
Follow the same procedure like in Er50.

Er52 The flexible sensor value is too small. The sensor was short-circuited
Equal procedure as in Er50 but measurement at terminals for the flexible sensor is performed only.

Er53 The flexible sensor value is too great. The sensor was disconnected.
Equal procedure as in Er50 but measurement at terminals for the flexible sensor is performed only.

Er60 – The offset curve of the control sensor is not sloping upward in the whole range.
Consider the offsets purpose and reality and change their values eventually.

Er61 – The offset curve of the flexible sensor is not sloping upward in the whole range.
Same procedure as in Er60 but the flexible sensors are to be set.

Er62 – The offset curve of the safety sensor is not sloping upward in the whole range.
Same procedure as in Er60.

6.4 ERRORS OF THE DOOR BLOCKING

Er30 to Er37 No success in blocking or unblocking (odd numbers are used for sterile doors, even numbers for infectious doors)
1. Enter Service 10 and check whether the two-door cabinet version with blocking has been set.
2. Enter the submenu of the blocking status test (both doors are blocked; the sterile door is unblocked; the infectious door is unblocked; both doors are unblocked) and its setting. Check the course of the blocking setting and if it is correct, repeat the step according to Operation instructions.
3. In Service 10, enter another submenu – test of the moves positions of the infectious and sterile part servomechanisms. Check there the correctness of the servomechanisms move (unblocked, blocked) and if it is correct, repeat the step according to Operation instructions.
4. Look for an electric or mechanical cause of defect. Check the output signals on the second control panel used for servomotor excitation. Check on the appropriate panel the input signals from the servomotor end-limit switches.
5. Replace the appropriate control panel.

Er39 The infectious door is open at the end of exposure
1. Check the door end-limit switches and the door switch system. If the defect was removed, repeat the step according to Operation instructions.
2. Replace the control panel.

Er40 to Er47 Incorrect position of the blocking mechanism (odd numbers are used for sterile doors, even numbers for infectious doors)
See Er30 to Er37.

6.5 NOT DISPLAYED ERRORS

Red LED with the safety thermostat symbol is lighting and the sound alarm is activated (intermittent tone). The safety system found the set temperature exceeding. The error is not displayed; information on the display is normal (IC and ICV devices only).

Procedure A: Check whether the timing of signals for the heating switching XP2/3 (section 1) and XP2/5 (section 2) corresponds to the heating signalling. If not, replace the control panel. If yes, check the fuses on the source board and the heaters current whether it corresponds to the heating switching by the control unit. If not, replace the source board.

Red LED with the safety thermostat symbol is lighting and the control unit does not react. The safety system disconnected the safety relay; there is no current entering the heating elements.

1. Check k the supply voltage of the control panel at XP2/13+14 (+8 V) towards XP2/15+17 (GND). If the voltage is not correct, check the fuses on the source board and/or replace the board.
2. Replace the control panel.

The device does not display any information on LED (dark display).
Disconnect the control panel and check whether the supply voltage passes from the source board to XP2/13+14 (+8 V) towards XP2/15+17 (GND). If it is correct, replace the control panel. Otherwise, check the fuses and/or replace the source board.

The device does not react to any button.
Replace the control panel.

The printer either does not print anything, or prints some nonsense.

1. Check the conductor wires RS232 (XP2/10 – XP3/6, XP2/12 – XP3/2, XP2/16 – XP3/3)
2. Check the printer cable.
3. Replace the control panel.

The temperature overshoots the required temperature markedly during the exposure cycle and reaches it only after some time.

Procedure B: Check whether the device type and size and the number of heating sections have been set correctly. Check the heaters flow and the ventilator run (in VC and SC devices).

The temperature exceeds markedly the required value during the exposure cycle and the device continues to be overheated.
Follow the procedure A.

The temperature reaches the required temperature during the exposure cycle only after a too long time.
Follow the procedure B.

The temperature never reaches the required value during the exposure cycle.

1. Follow the procedure B.
2. Follow the procedure A.

7 MOUNTING AND DISMOUNTING OF PARTS

7.1 ELECTRICAL PARTS

Caution!
All operations must be carried out on a device, which has been disconnected from power supply – disconnect the power supply cord plug from the socket!

7.1.1 REGULATOR BOARD

1. Put down the content of all service settings (Services 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 18, 19, 20, 21, and 28), or print them on a printer – see the chapter Entry to and Exit from the Service Technician Mode.
2. Check whether both the replacement panel and SW of the control part (EEPROM memory) are intended for the given type of product and whether their versions are equal to or higher (compatible) than the original panel. You can find the SW version on the memory label or by means of Service 6. Check the equivalence.
3. The regulator board is situated on the back side of the metal plate panel of the regulator. The upper part of the panel is fastened by prominences snapping in the offsets of the moulded plastic part – regulator cover. The lower part of the panel is fastened to the moulded plastic part by two screws from the back side. The moulded plastic cover of the regulator is fastened to the door by snapping the fixing hooks and flexible snapping levers in the appropriate holes.
4. When demounting the panel, snap at first the two flexible levers out of the holes by means of a thin rod (ø 3) or a screwdriver. Then hook the fixing hooks off the holes. Disconnect the conductors of PT100 temperature sensors, connecting cable (to the source board) and the protective connection connector from the regulator board. Then unscrew two screws that hold the panel inside the moulded plastic part and tilt it in the direction from the moulded plastic cover and pull the panel out.
5. Replace the control panel. Mount it in the reverse direction.

6. If the panel supplier has not guaranteed so, check in Services 1, 2, 16, 17, 23, 24, 26, and 27 whether the panel has been calibrated during its manufacture. Correct temperatures (both calibrated and non-calibrated) for the given input resistance (110/150 Ohm – 25.7/130.4 °C) should be displayed in the given Services. If they are not displayed, or if dashes are displayed at the calibrated position, carry out the calibration. Re-record the service setting (Service 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 18, 19, 20, 21, and 28) and initialize the safety system (Service 25).
7. If it was not possible to find the setting from the original control panel, carry out all the settings according to chapters 5.4 and 5.5.
8. Check whether the initial setting of the ventilator mode and speed is “FAnn” (Service instructions, Service 28) and 100 % (Operation instructions,U 4), respectively.
9. Check the correct functioning of the safety system. The checking shall be carried out after the rise to the required temperature ($T_{reqired}$) and sufficient stabilization (10 minutes at least).

Check the temperature exceeding:

- Activate the User Service U6.
- Set the upper checked limit to the temperature $T_{user\ high}$ = $T_{required}$ + 1 °C. The safety system must not react.
- Set the upper checked limit to the temperature $T_{user\ high}$ = $T_{required}$ – 1 °C. The safety system must react. The protective thermostat LED lights up and Er13 is displayed. In INCUCELL devices, red LED with a protective thermostat symbol lights on.

After the checking is finished, set the temperature $T_{user\ high}$ to the value of the maximum operation temperature (according to Operation instructions, chapter 4.6.3), increased by 20 °C.

10. Disconnect the device form the electric power mains and reconnect it (or reset the control unit by concurrent pressing of all four buttons). At the same time, correctness test of data recorded in the safety system is carried out.

7.1.2 POWER SUPPLY BOARD

The power board is attached by means of two screws. After unscrewing them, disconnect the connected connectors and slip-on flat sleeves. You can then take the power board out of the leg and perform the given work. Assembly is carried out in the reversed way. Before sliding the board into the leg again, check the faultless and firm connection of the protective connectors. When sliding the board in, the board must be slid in the moulded conduct in the leg side.

7.1.3 THERMOSENSOR PT100

When replacing a defective sensor, the possibility of the contact resistance occurrence on bad-quality contacts must be prevented and the conditions for a later testing and claiming of a defective probe must be observed (the sensor cable must be 1 m long at least).

Possible ways of replacement:

1. PT100 sensor demounting (including the cable) and subsequent mounting of a new complete PT100.

It is the best way from the above mentioned reasons. Pull out the metal plates of the inner chamber. Loosen the screw on the sensor holder and pull out the sensor. Tilt the panel with the regulator board fastened in the plastic cover on the cabinet door and disconnect the sensor conductors from the WAGO clamps (detailed connection – see the diagram in the Annex hereto). Pull the sensor and the wire out of the cabinet. To avoid damaging of the neighbouring conductors insulation, the sensor cable must not be pulled in and out using either force or pulling tools with sharp edges. Follow a reverse procedure to mount the sensor. After the replacement is ready, offsets shall be set – see 4.2.2.4.

The following methods can be used if the above mentioned disassembly and assembly cannot be done.

2. Pull PT100 sensor out of the chamber and cut it off so that the cable length from the end of the sensor well till the end of the remaining part of the cable connected to the sensor was 1 m at least. The new sensor cable shall be cut to the same length. After the insulation of the conductor ends is removed, connect the new sensor to the automatics cable by means of cage clamps WAGO 222-412.
3. There are other possible methods (crimping, soldering) but they require special tools and material. They bear quite a great risk of imperfect connection due to use of an unsuitable tool or part and, therefore, we cannot recommend them. The remaining cable from the sensor must again be at least 1 m long.

7.1.4 VENTILATOR

Remove the metal sheets of the inner chamber, loosen the bolts of the sensor holders, unscrew the front screws holding the ventilator cover, slide the cover out. Demount the three nuts fixing the ventilator. Shift the ventilator out and after disconnecting the wires take it out.
Caution, the runner is fixed to the shaft with a left-hand nut. Follow a reverse procedure to do mounting.

7.1.5 HEATING BODY

Demount the rear cover of the unit and disconnect the wires of the heating bodies. Remove the metal sheets of

the inner chamber. After unscrewing the nuts holding the heating bodies remove the heating bodies. Follow a reverse procedure to do mounting of the new heating bodies.

7.1.6 DOOR BLOCKING SYSTEM

For access, remove the inner cover of the appropriate door. The controlling motor and its controlling circuit are placed on a common holder which is attached to the bottom wall of the door jacket by means of four screws.

7.2 MECHANICAL PART

7.2.1 DOOR - ADJUSTING

Description in chapter 5.

7.2.2 SEALING - EXCHANGE

Take off the sealing, begin in the middle bottom part.
Fix the new sealing on the edge of the chamber, begin in the middle bottom part. Slam the sealing between the chamber and the outer cover.

7.3 RECOMMENDED MEASURING APPARATUSES AND INSTRUMENTS

7.3.1 MEASURING APPARATUSES

Voltage ranges:
750 VAC (± 0,8 % range up to 40 V)
1000 VDC (± 0,3 % range up to 40 V)

Current ranges:
up to 20 A (± 2,0 % of readout)

Frequence:
up to 1000 kHz, ± 0,1 %

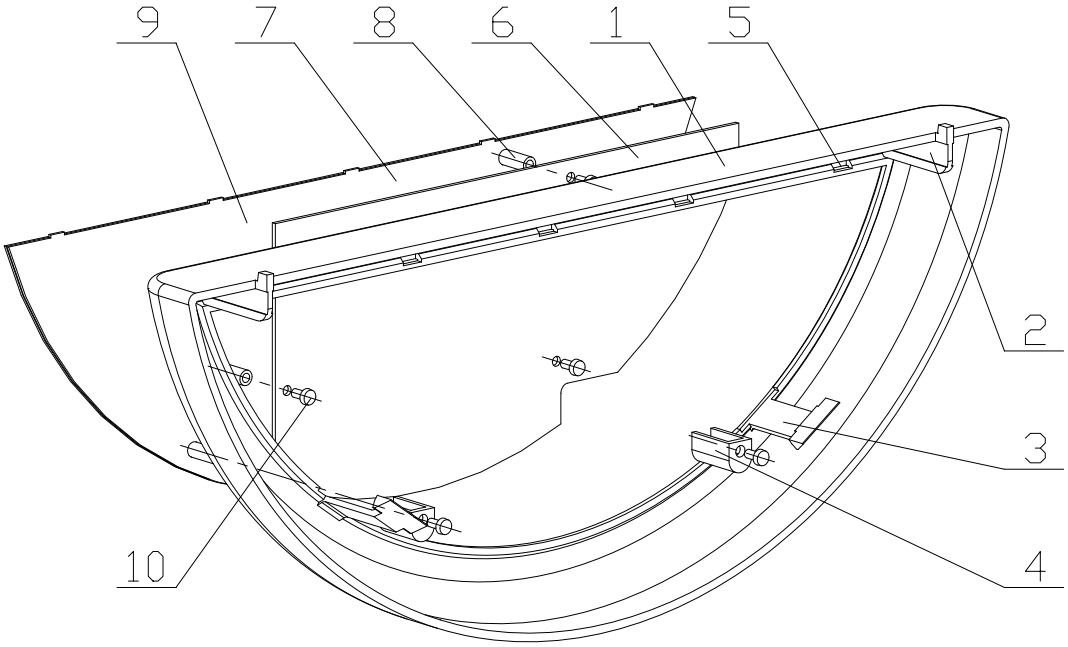
Temperature:
from 0 °C to 350 °C
± 0.2 °C for range from 0 to 199,9 °C
± 0,2 % of the measured value from 200 to 350 °C

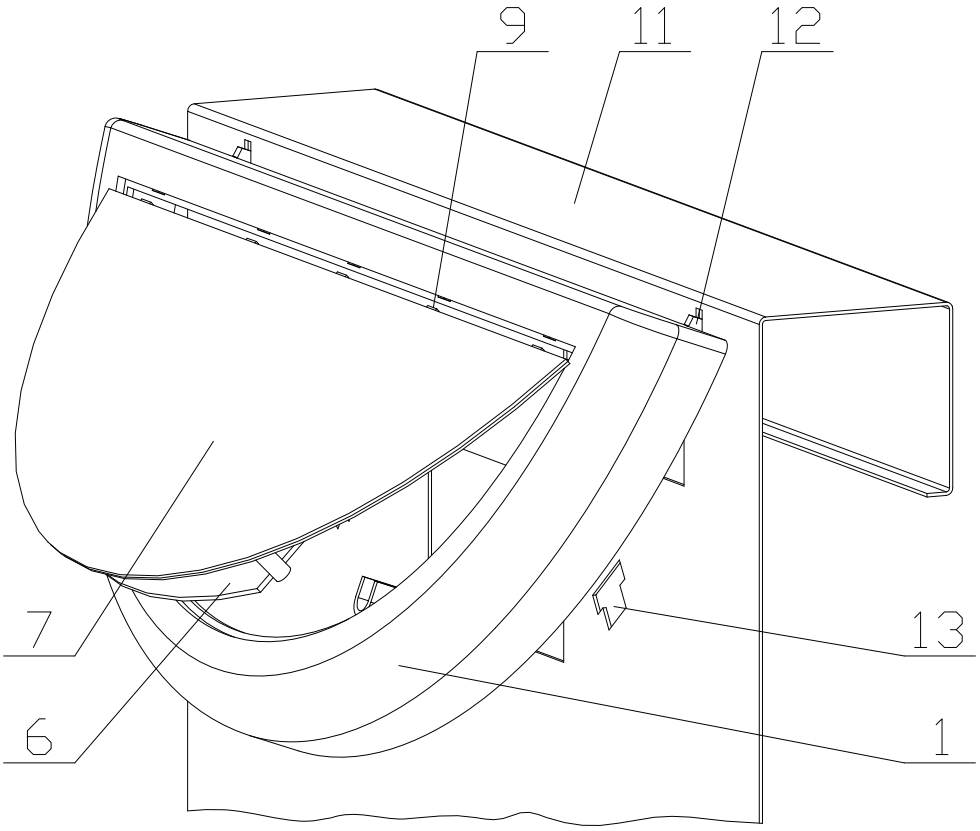
Caution! Calibrate the system measuring sensor–measuring apparatus at the temperatures used for setting the offsets with accuracy of 0.1 °C.

8 SUPPLEMENT

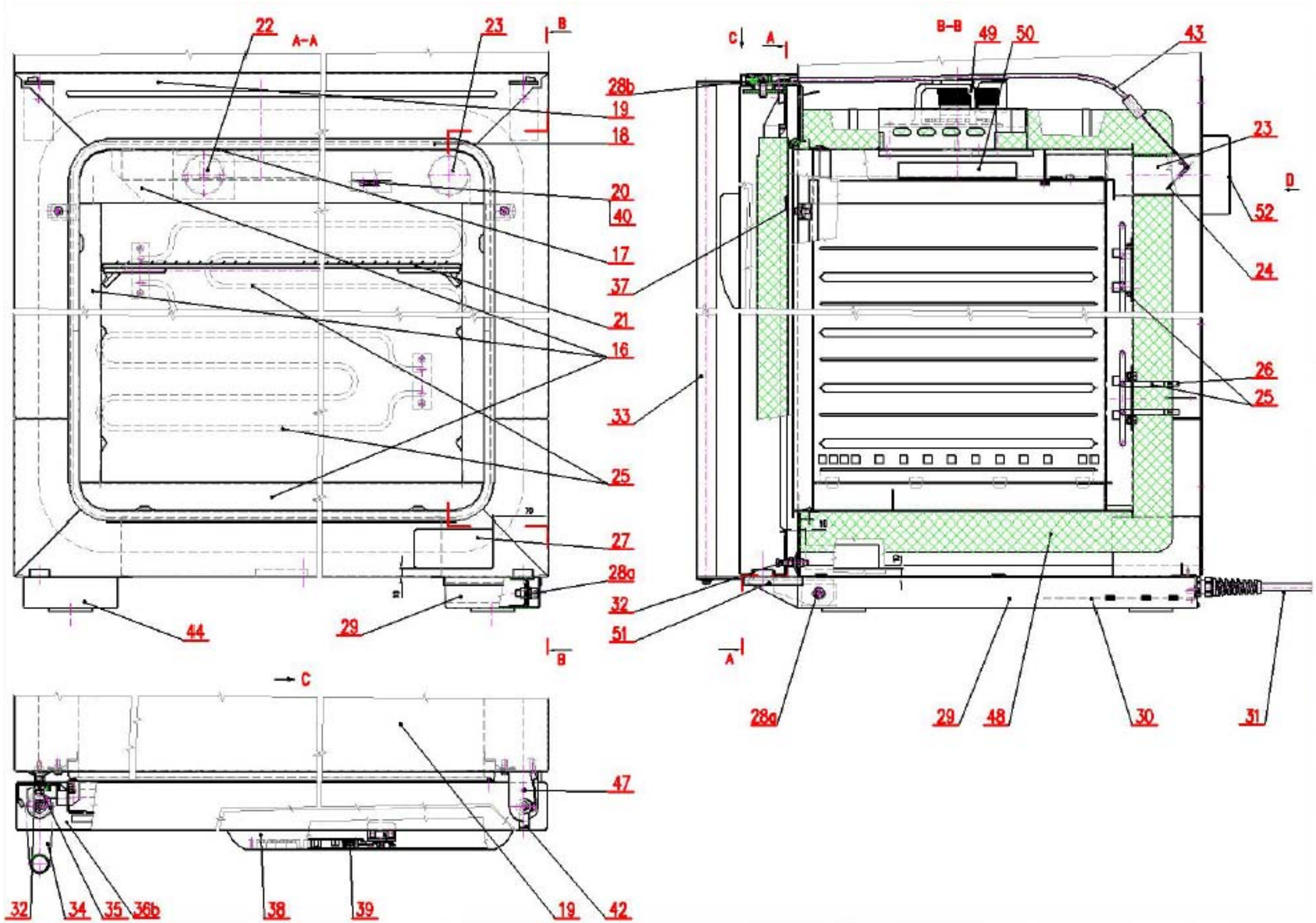
8.1 MECHANICAL PART

8.1.1 DETAILS OF THE REGULATOR CONTROL PANEL

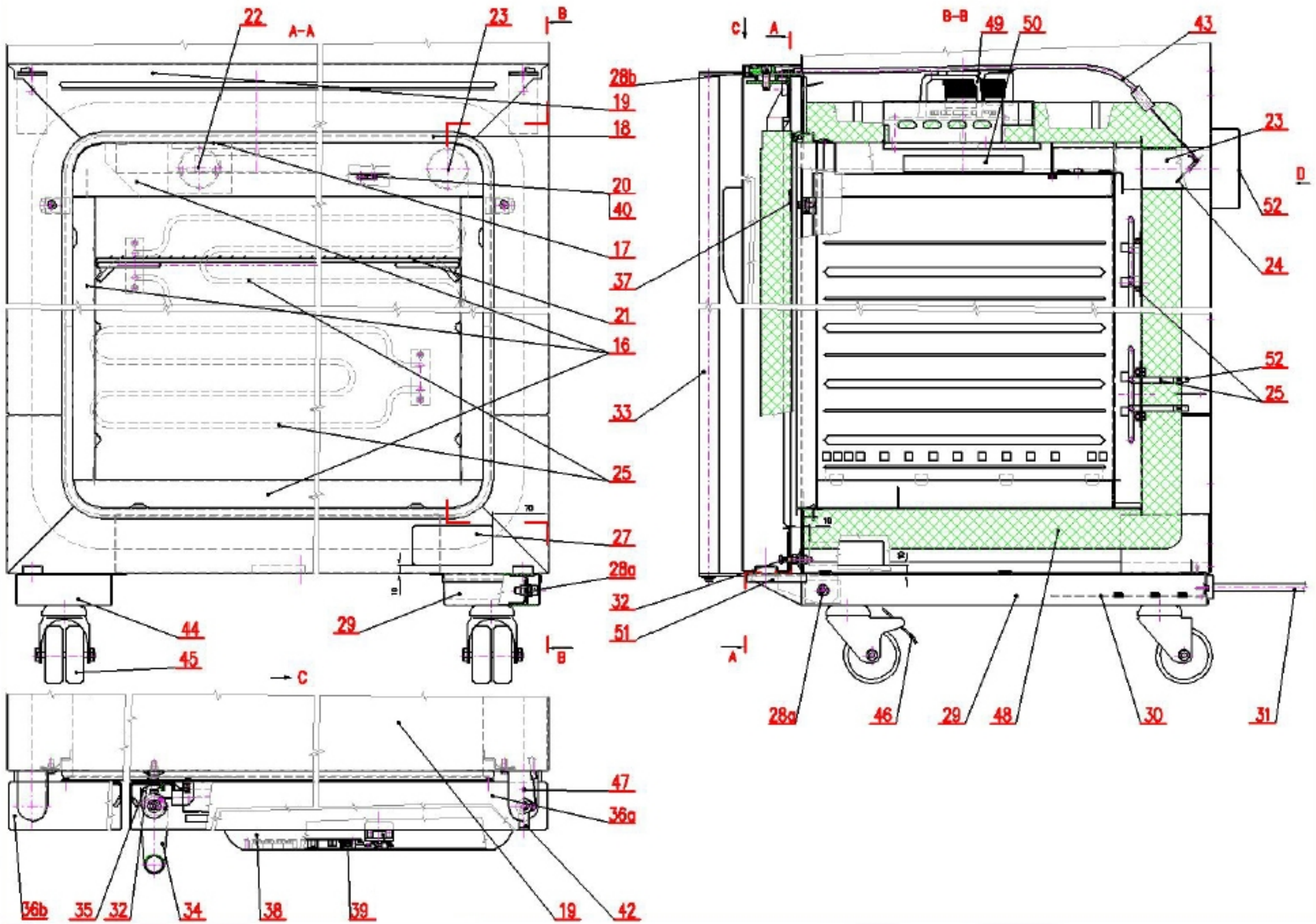




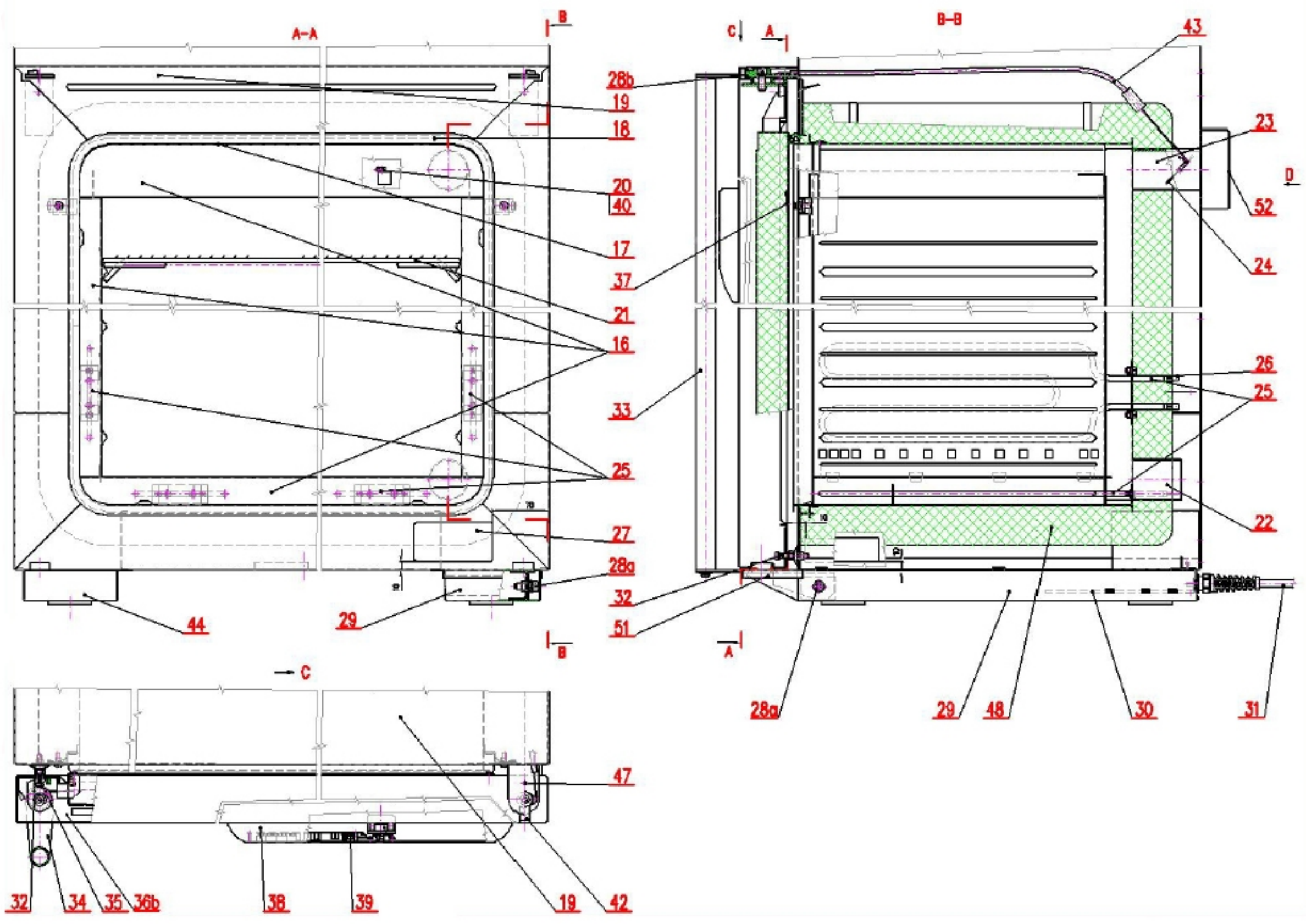
8.1.2 VENTICELL AND INCUCELL WITH VENTILATOR – SIZE 55 - 222



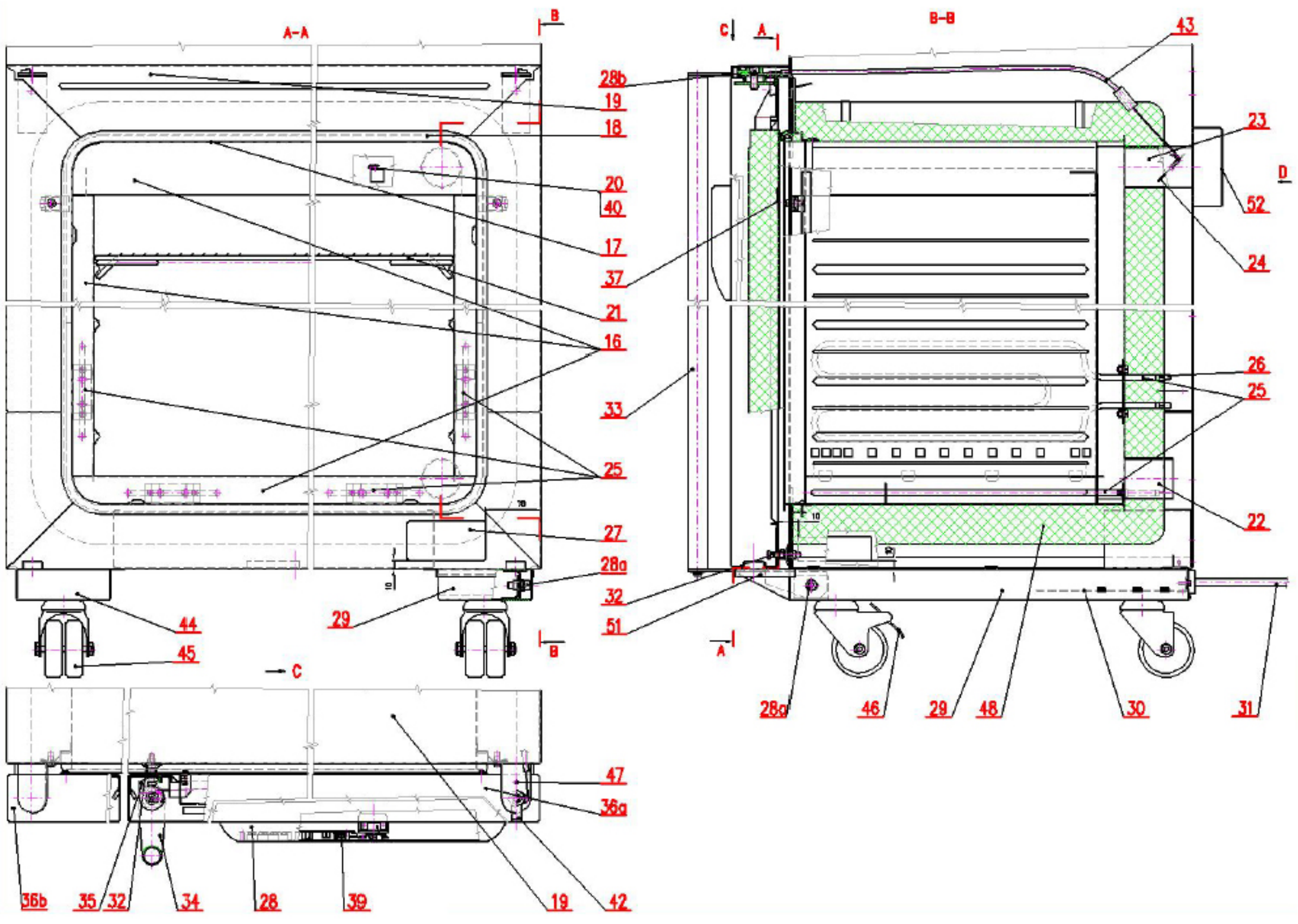
8.1.3 VENTICELL AND INCUCELL WITH VENTILATOR – SIZE 404 AND 707



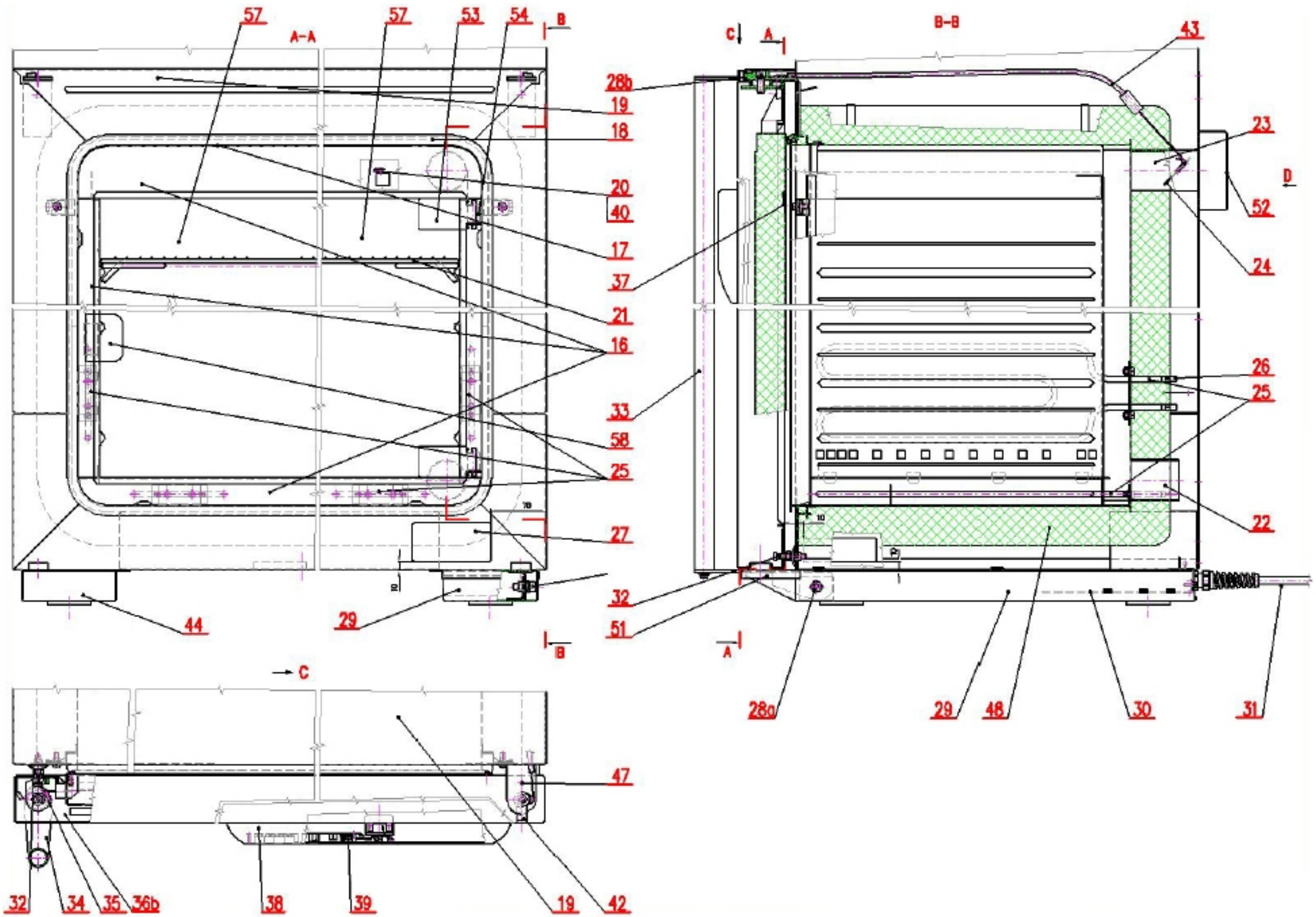
8.1.4 ECOCELL AND DUROCELL – SIZE 55 - 222



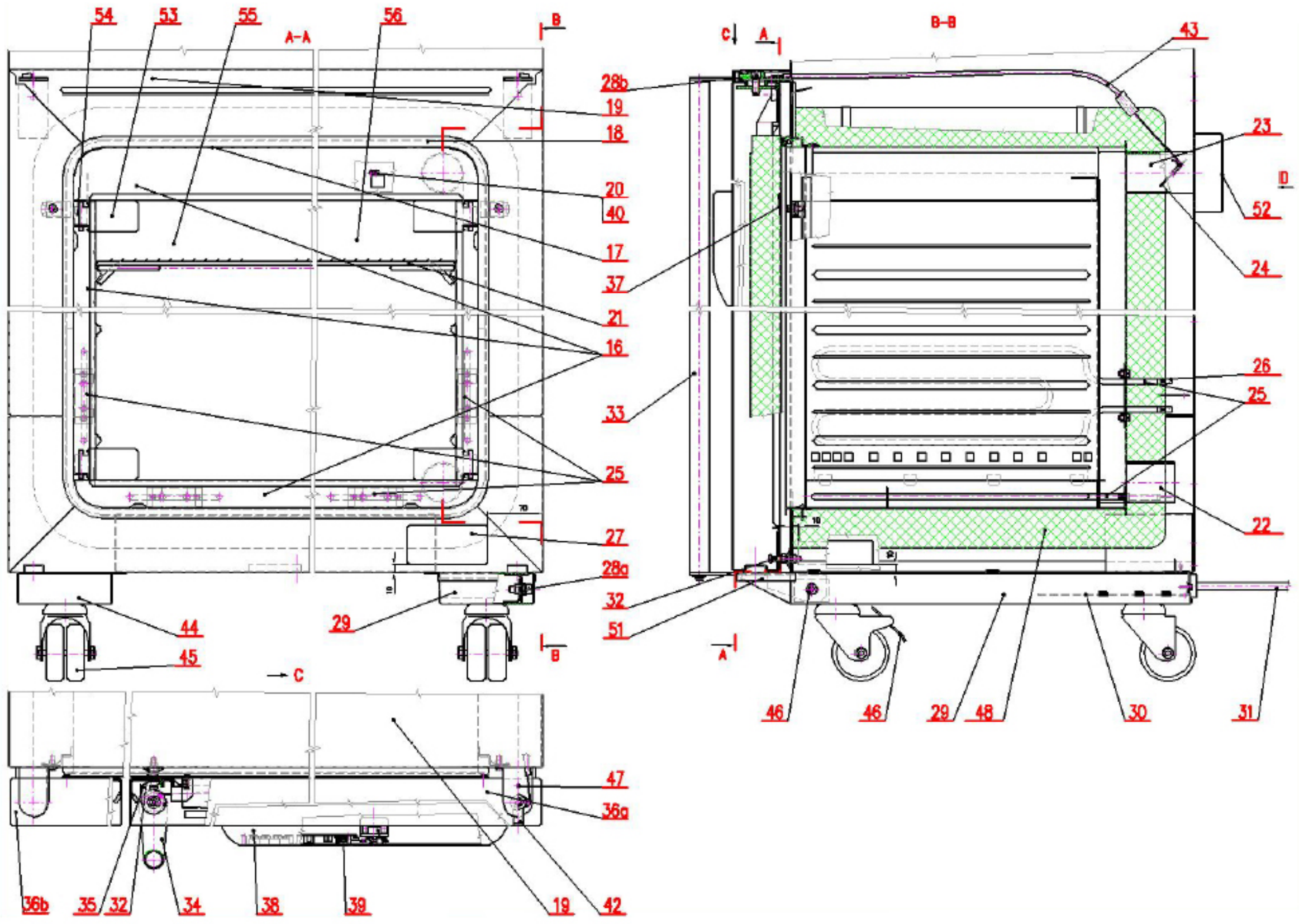
8.1.5 ECOCELL – SIZE 404 AND 707



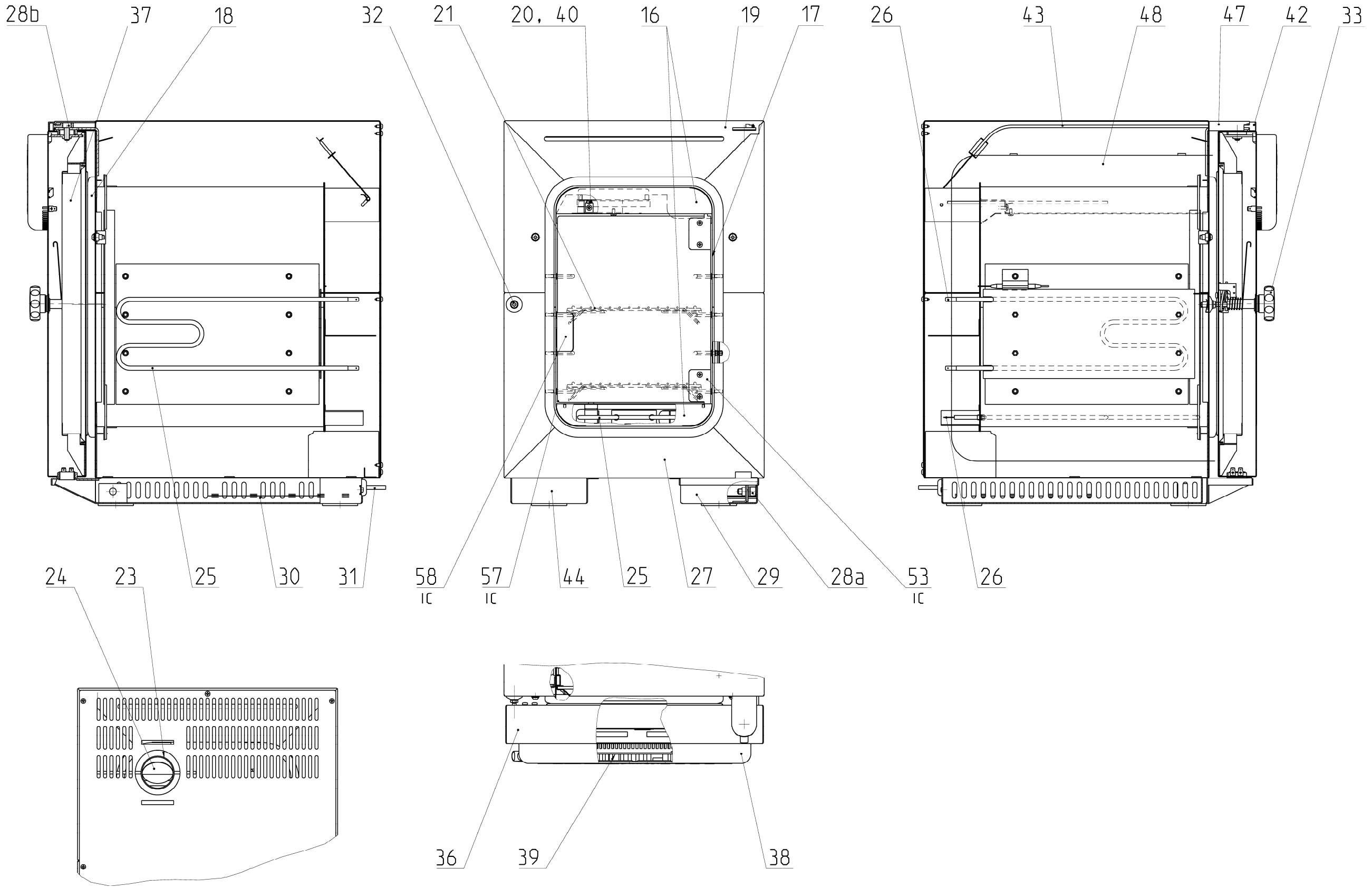
8.1.6 INCUCELL – SIZE 55 - 222



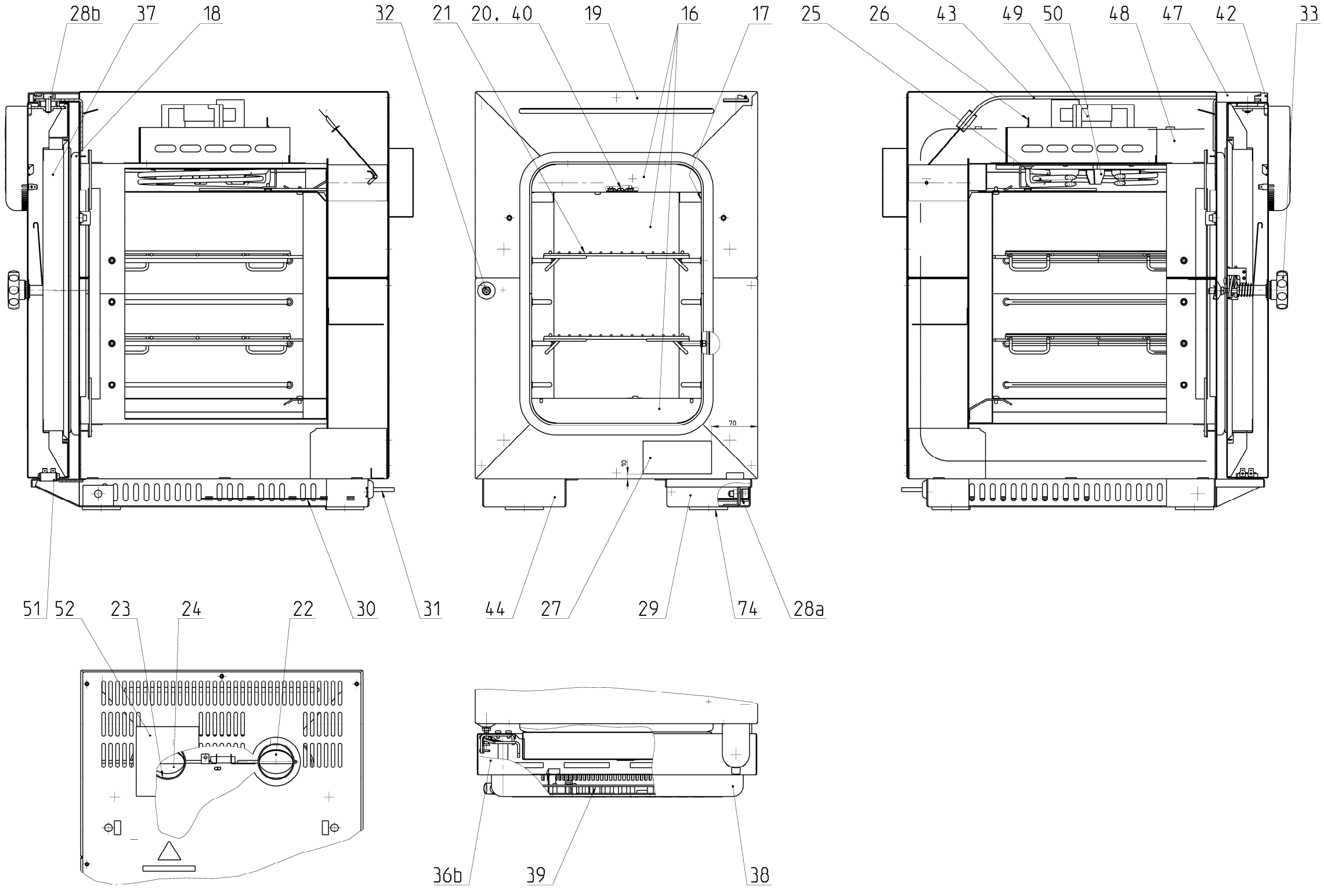
8.1.7 INCUCELL – SIZE 404 AND 707



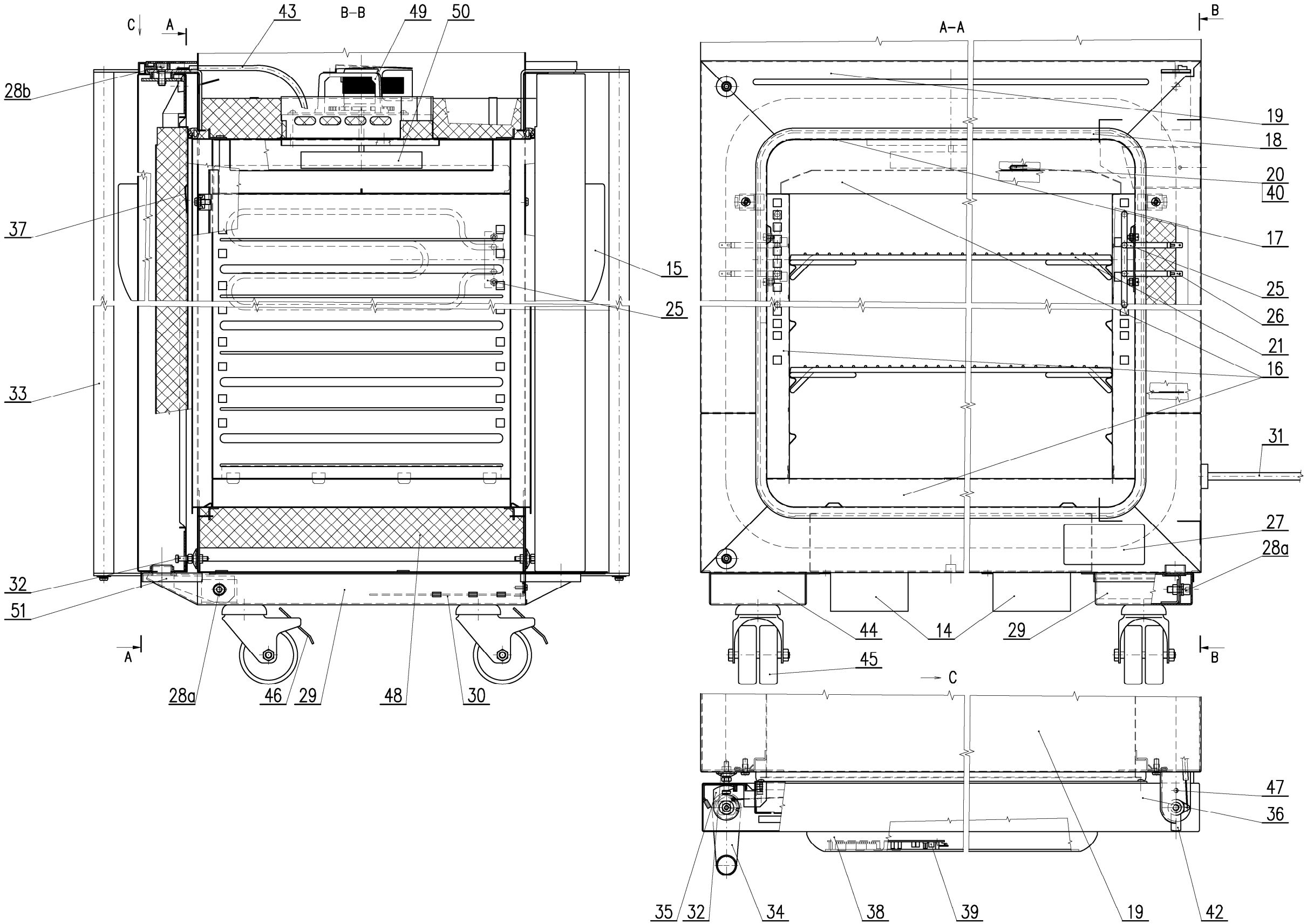
8.1.8 ECOCELL, INCUCELL AND DUROCELL – SIZE 22



8.1.9 VENTICELL AND INCUCELL WITH VENTILATOR – SIZE 22



8.1.10 VENTICELL TWO-DOOR CABINETS

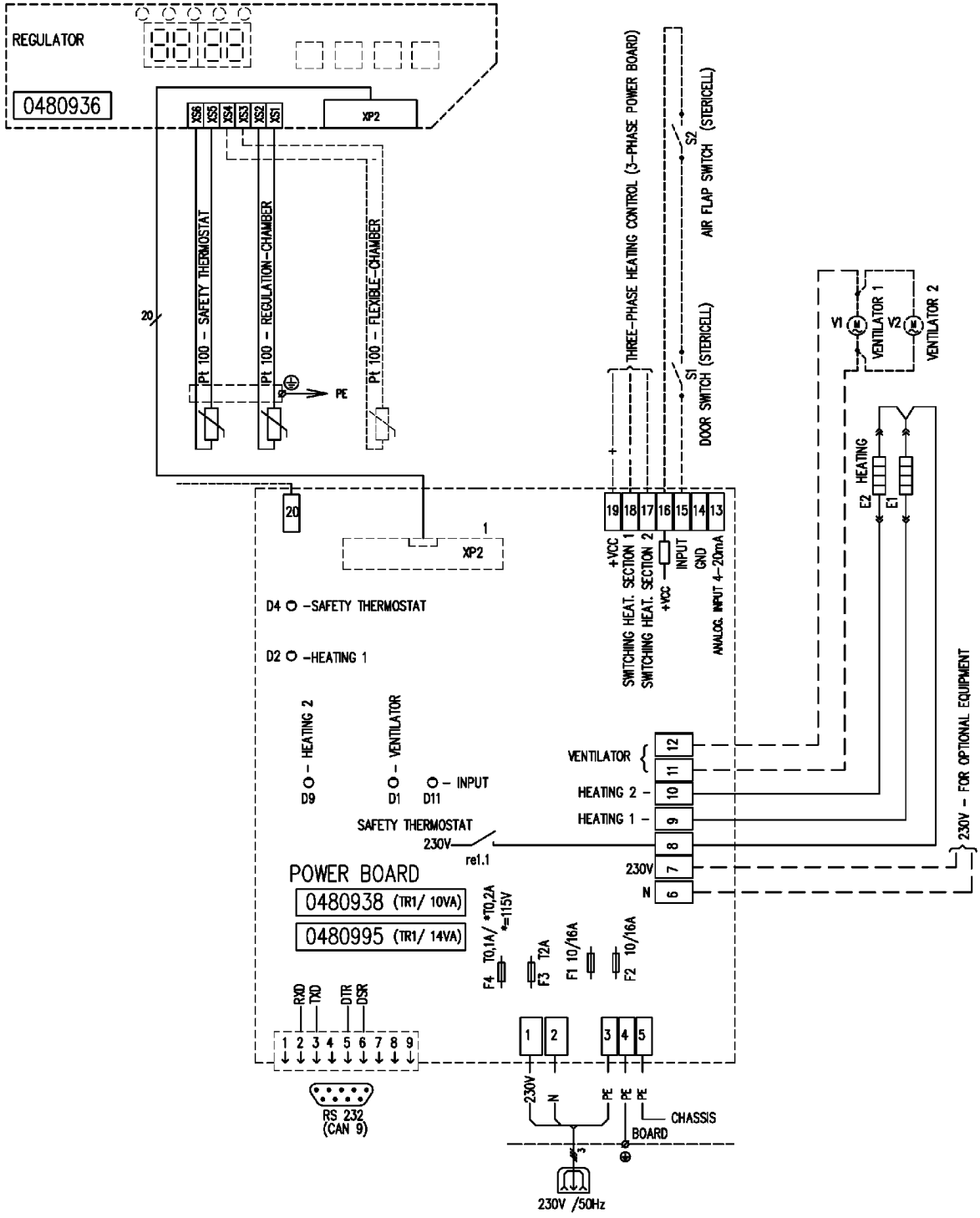


8.1.11 LEGEND TO THE FIGURES

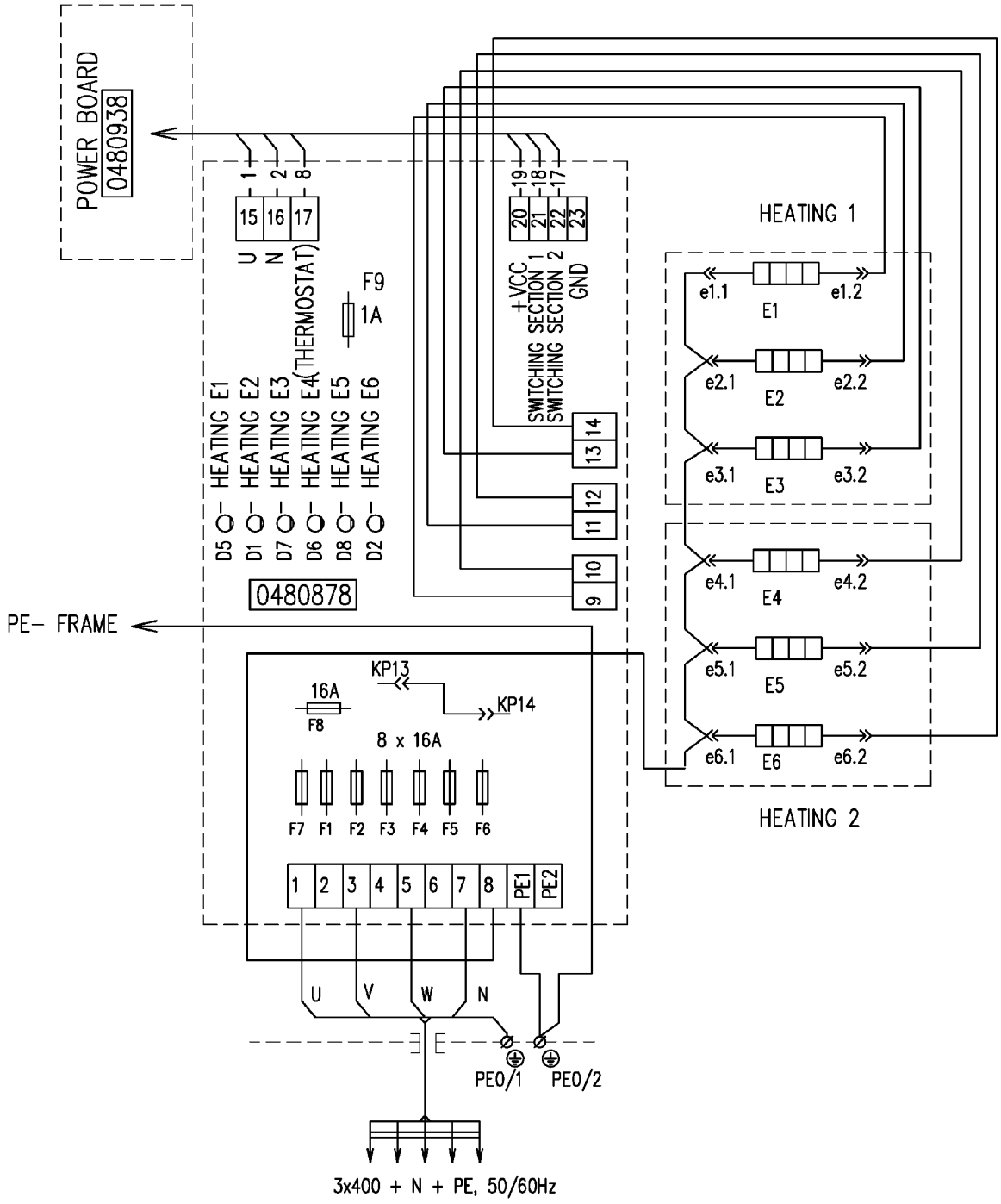
1	Plastic body of the regulator	31	Power supply cord (inside the right foot in volumes 22, 55, 111, 222)
2	Fixing hooks of the plastic body	32	Pin of the door lock
3	Fixing slamming levers of the plastic body	33	Hand rail
4	Pins for fixing the regulator board	34	Attachment of the hand rail
5	Openings for projections of the panel	35	Hooks of the door lock
6	Printed wiring board of the regulator	36	Door jacket (a)/b) – right/left in the volume 707)
7	Panel (with foil keyboard)	37	Outer door
8	Pins for fixing the board to the panel	38	Plastic body of the regulator fitted
9	Projections of the panel	39	Regulator board
10	Screws for fixing the board to the panel	40	Switching box of the safety thermostat
11	Metal sheet of the door	41	
12	Opening in the door sheet for slamming the hooks 2)	42	Control lever of the outlet valve (and the suction valve in VC, ICV)
13	Opening in the door sheet for slamming the hooks 3)	43	Bowden of the control of the valve position
14		44	Left foot (in 3-phase units with the supply board II and the power supply cord)
15		45	Roll (volumes 404, 707)
16	Sheets of the inner chamber	46	Roll brakes
17	Wall of the outer chamber	47	Door hinge with the plastic cover
18	Sealing between the door and the chamber	48	Insulation
19	Outer jacket of the cabinet	49	Ventilator motor (in volumes 404, 707 2 pc)
20	Regulator sensor PT 100	50	Ventilator runner
21	Wire shelf (sieve)	51	Bushing for the el. installation – connection of the regulator and supply board
22	Suction opening with the valve	52	Cover of the outlet opening
23	Outlet opening with the valve	53	Hinge of the glass door (IC, ICV) – part I
24	Outlet valve	54	Hinge of the glass door (IC, ICV) – part II
25	Heating bodies	55	Left glass door (IC, ICV 707)
26	Contacts of heating bodies	56	Right glass door (IC, ICV 707)
27	Product plate	57	Glass door (IC, ICV 55 – 404)
28	a), b) adjusting screw of the door hinge	58	Catch of the magnetic lock of the glass door
29	Right foot (with power supply board I)		
30	Power supply board		

8.2 ELECTROINSTALLATION

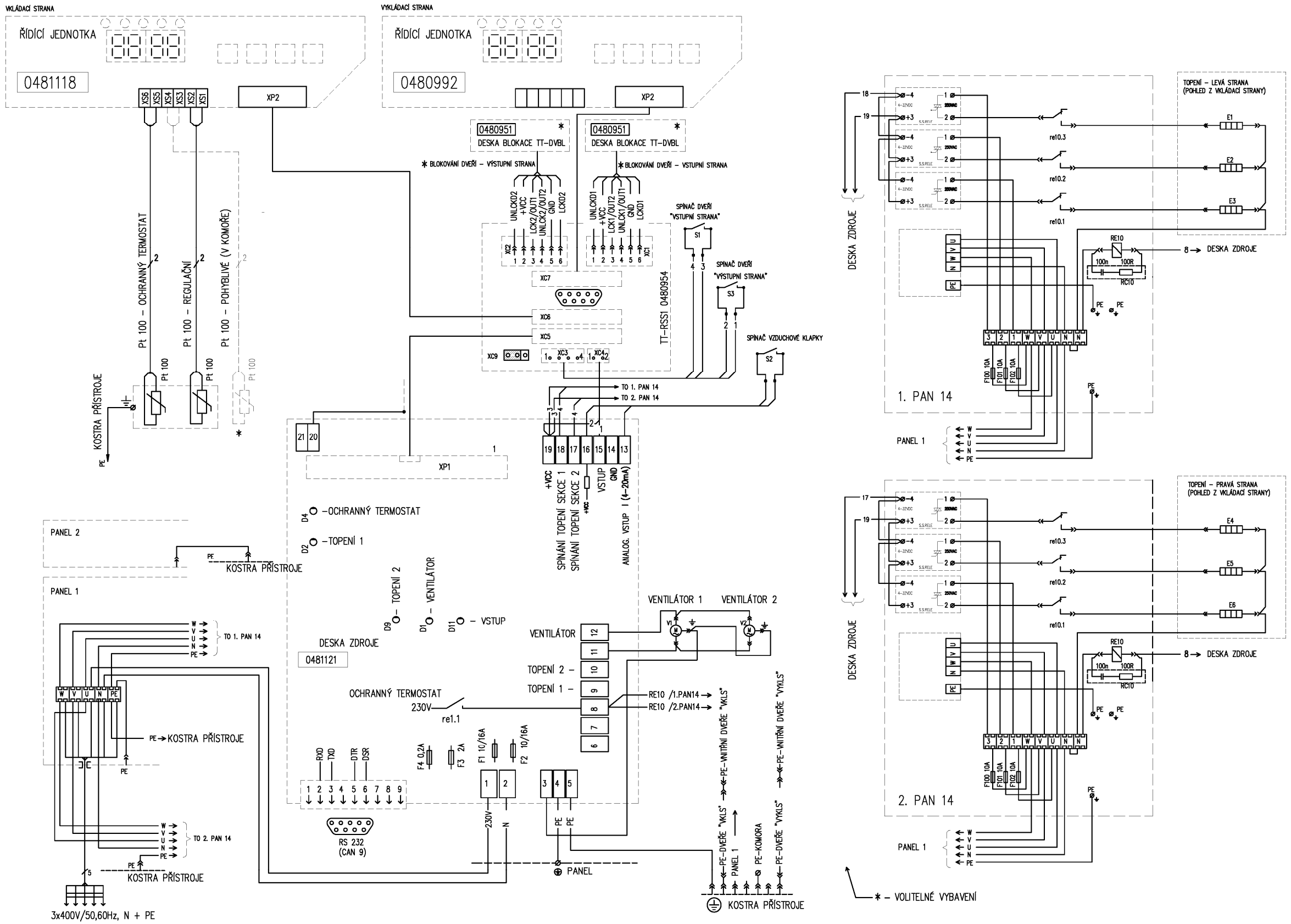
8.2.1 WIRING DIAGRAM OF SINGLE-PHASE TYPES EC, DC, VC, IC, ICV



8.2.2 WIRING DIAGRAM OF THREE-PHASE TYPES VC, EC, IC, ICV



8.2.3 WIRING DIAGRAM TWO-DOOR CABINETS VC



8.2.4 HEATING BODIES – ACCORDING TO THE TYPE AND VOLUME OF THE UNIT

Unit type	Volume	Type of heating body			Supply voltage	Power	Sections-division
		900 W/230 V 0387243	**900 W/230 V 0387244**	**600 W/230 V 0387241**			
VC	55			2	230 V	1200 W	600+600
	111	2			230 V	1800 W	900+900
	222	2			230 V	1800 W	900+900
	222/2			6		3600 W	600+600 600+600 600+600
	404			6	400 V/3NPE	3600 W	600+600 600+600 600+600
	404/2		6		400 V/3NPE	5400 W	900+900 900+900 900+900
	707	4		2	400 V/3NPE	4800 W	900+900 900+900 600+600
	707/2		8		400 V/3NPE	7200 W	900+900 900+900 1800+1800
		300 W/230 V 0387238		**600 W/230 V 0387241**			
ICV	55	2			230 V	600 W	300+300
	111	2			230 V	600 W	300+300
	222	2			230 V	600 W	300+300
	404			2	230 V	1200 W	600+600
	707	4			230 V	1200 W	600+600
		900 W/230 V 0387245	**230 W/230 V 0387246**	**450 W/230 V 0387247**			
EC, DC	22		2	1	230 V	910 W	
VC, ICV	22	1			230 V	900 W	
IC	22		2	1	230 V	230 W	
.		**300 W/230 V 0387237**	**450 W/230 V 0387239**	**450 W/230 V 0387253**			
IC	55	4			230 V	300 W	150+150
	111	4			230 V	300 W	150+150
	222		4		230 V	450 W	225+225
	404		8		230 V	900 W	450+450
	707		8		230 V	900 W	450+450
EC, DC	55	4			230 V	1200 W	600+600
	111			4	230 V	1800 W	900+900
	222		4		230 V	1800 W	900+900
	404		8		400 V/3NPE	3600 W	900+900 450+450 450+450
	707		10		400 V/3NPE	4500 W	900+900 900+900 450+450

8.2.5 SIGNALS OF THE CONNECTOR – XP2

Pin	Signal description	Type	Active level
1	Air flap switch [2])	AI	4 – 20 mA
2	Door switch (output) [2])	DI	L
3	Chamber heating 1	DO	H
4	Door switch (input)	DI	L
5	Chamber heating 2	DO	H
6	Alarm	DO	H
7	State of safety relay	DI	L
8	Door blocking (output [2])	DI	L
9	Chamber ventilator	DO	H
10	RXD	RS232	
11	HEPA ventilator / Socket [1])	DO	H
12	DSR	RS232	
13	Regulator power supply		+8 V
14	Regulator power supply		+8 V
15	GND		0 V
16	TXD	RS232	
17	GND		0 V
18	Protective thermostat – Temperature overrun	DO	L
19	Protective circuit power supply –		0 V
20	Protective circuit power supply +		+12 V

8.2.6 OUTLET SIDE PANEL SIGNALS – XP2 [2])

Pin	Signal description	Type	Active level
3	Door unblocking (output)	DO	H
5	Door blocking (output)	DO	H
6	Door switch (output)	DO	H
7	Door unblocking (input)	DO	H
10	RXD	RS232	
11	Door blocking (input)	DI	L
13	Regulator power supply		+8 V
14	Regulator power supply		+8 V
15	GND		0 V
16	TXD	RS232	
17	GND		0 V

[1]) ..... For optional accessories only

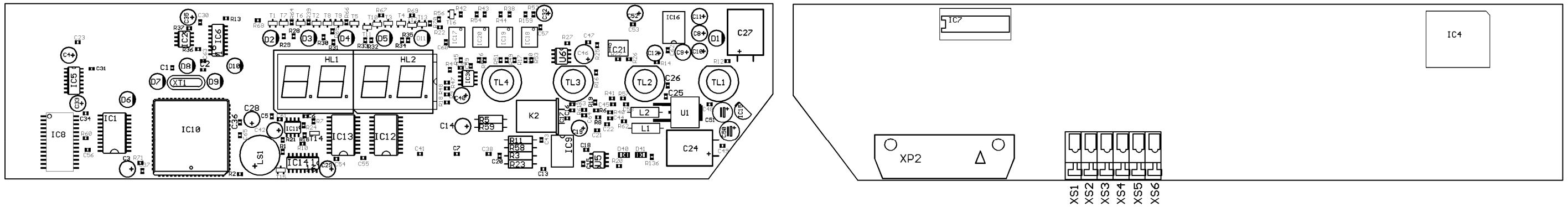
[2]) ..... two-door models

DI, DO .. digital input, output

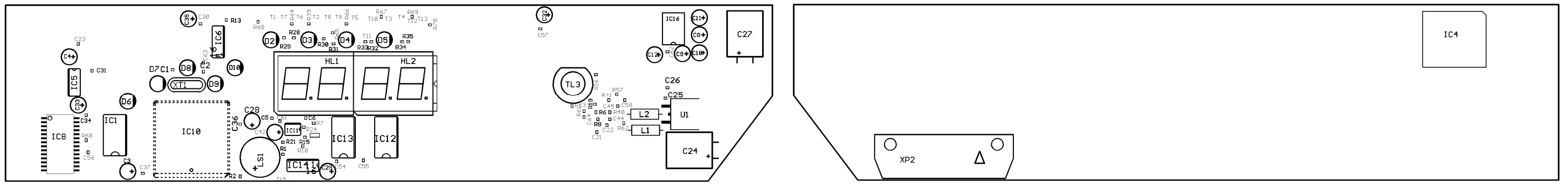
AI, AO .. analog input, output

An active thermostat level means the protective circuit disconnection. An active DI signal level means the connected switch connection.

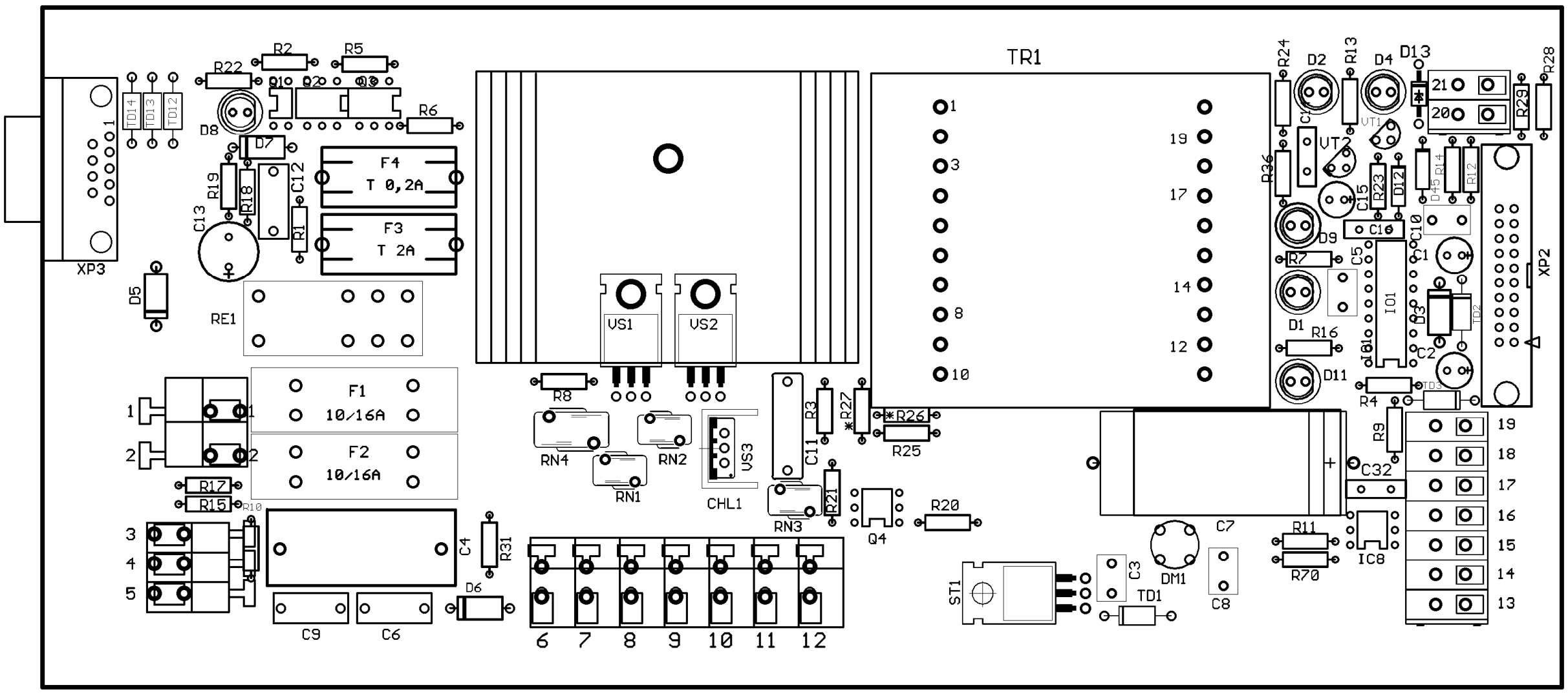
8.2.7 OPERATING PROCES UNIT 0481118



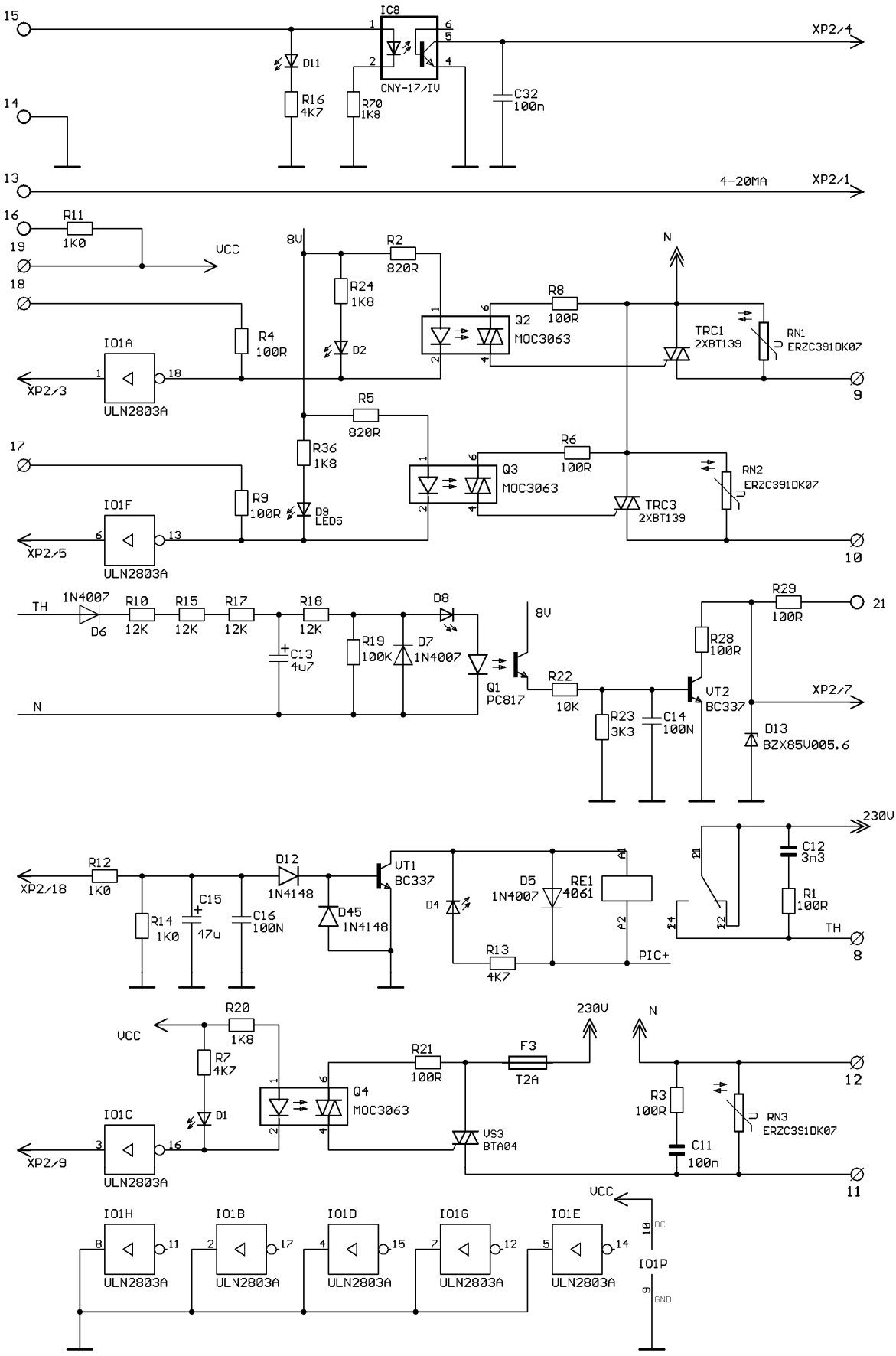
8.2.8 OPERATING PROCES UNIT 0480992 (INDICATION PANEL)



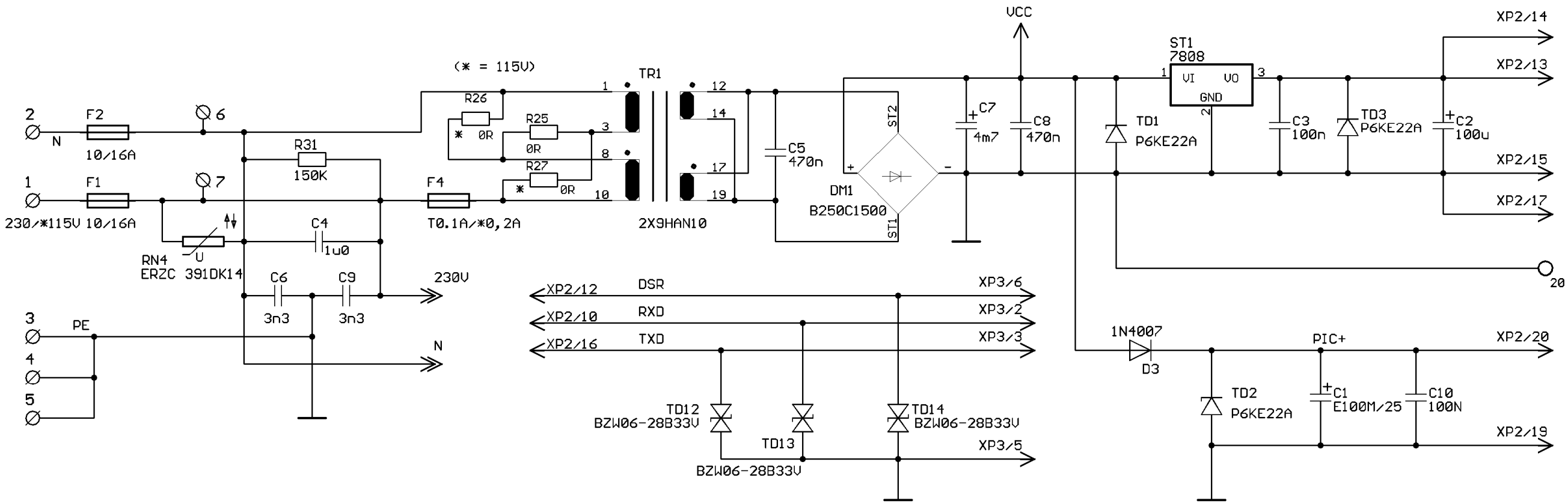
8.2.9 LAYOUT OF ELEMENTS ON THE SUPPLY BOARD 0481119 (0481121)



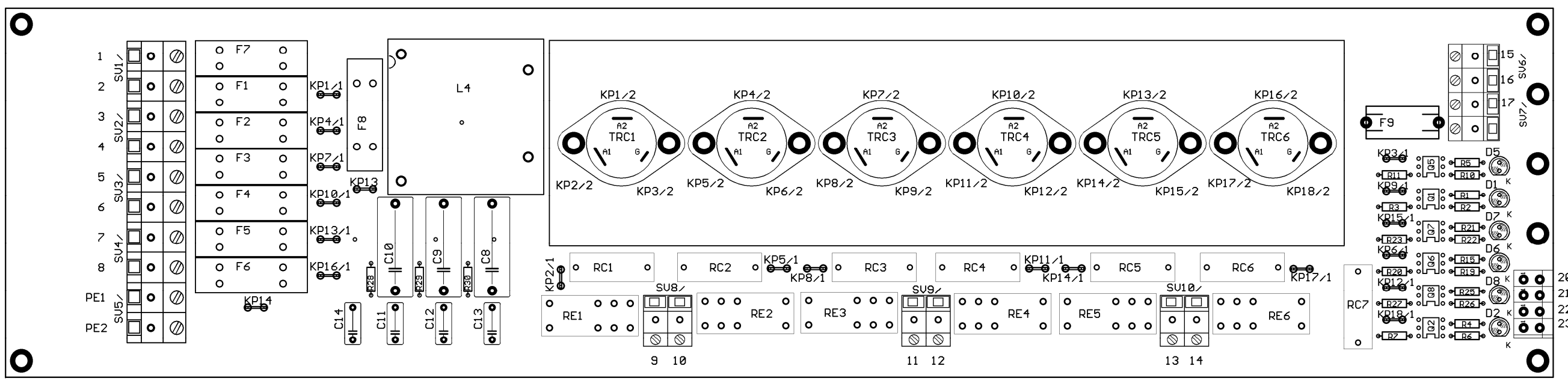
8.2.10 SUPPLY BOARD 0481119 (0481121) – WIRING 1/2



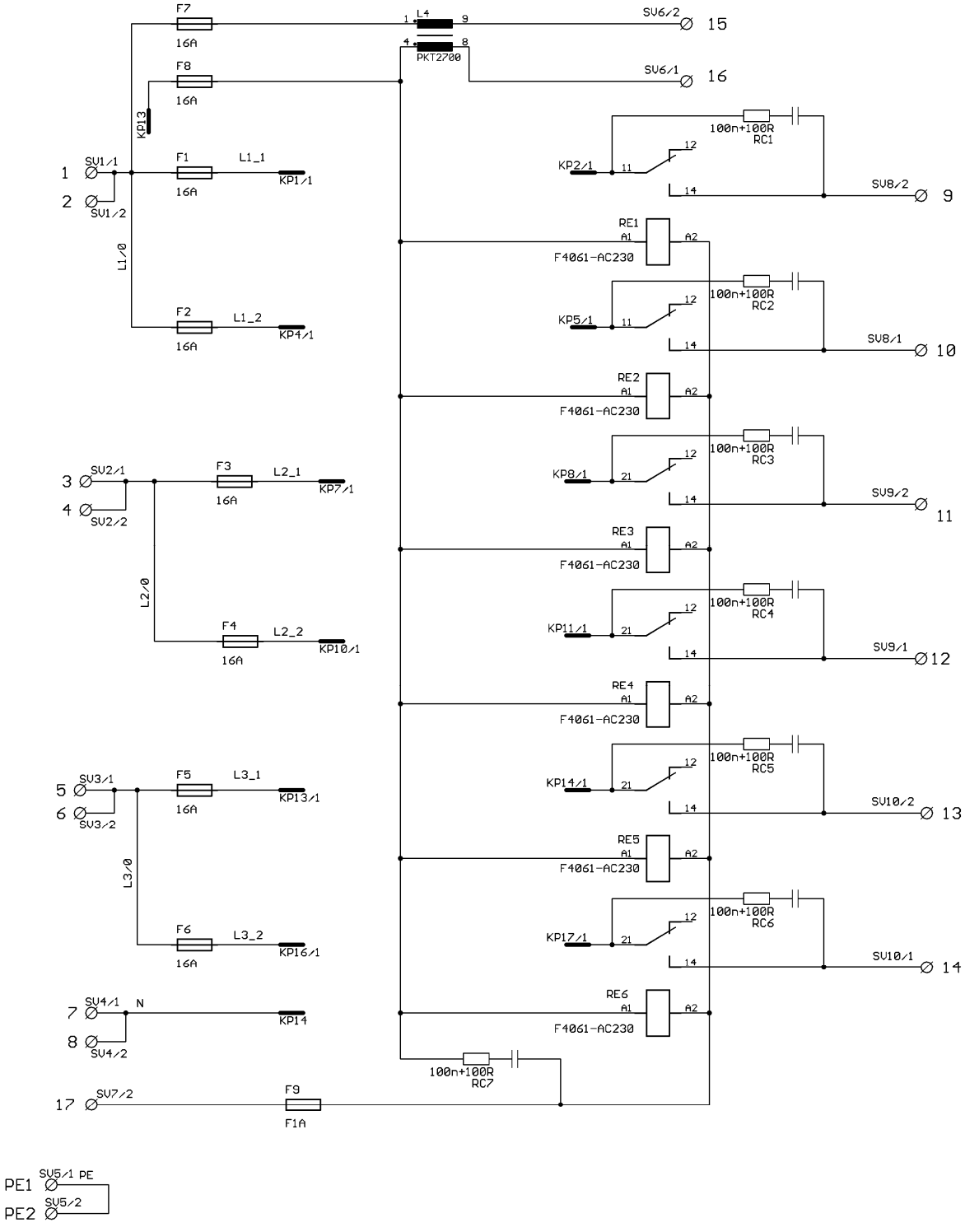
8.2.11 SUPPLY BOARD 0481119 (0481121) – WIRING 2/2



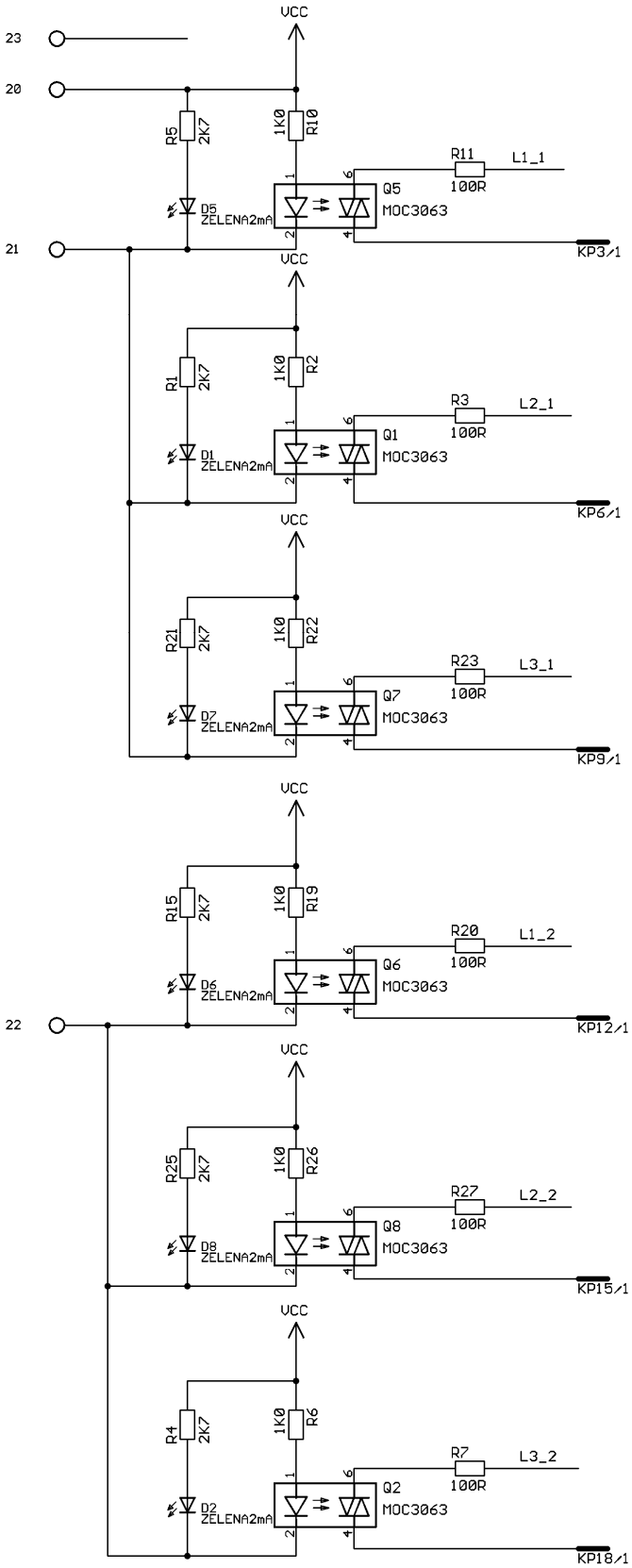
8.2.12 LAYOUT OF ELEMENTS ON THE SUPPLY BOARD 0480878 (FOR THREE-PHASE SUPPLY)



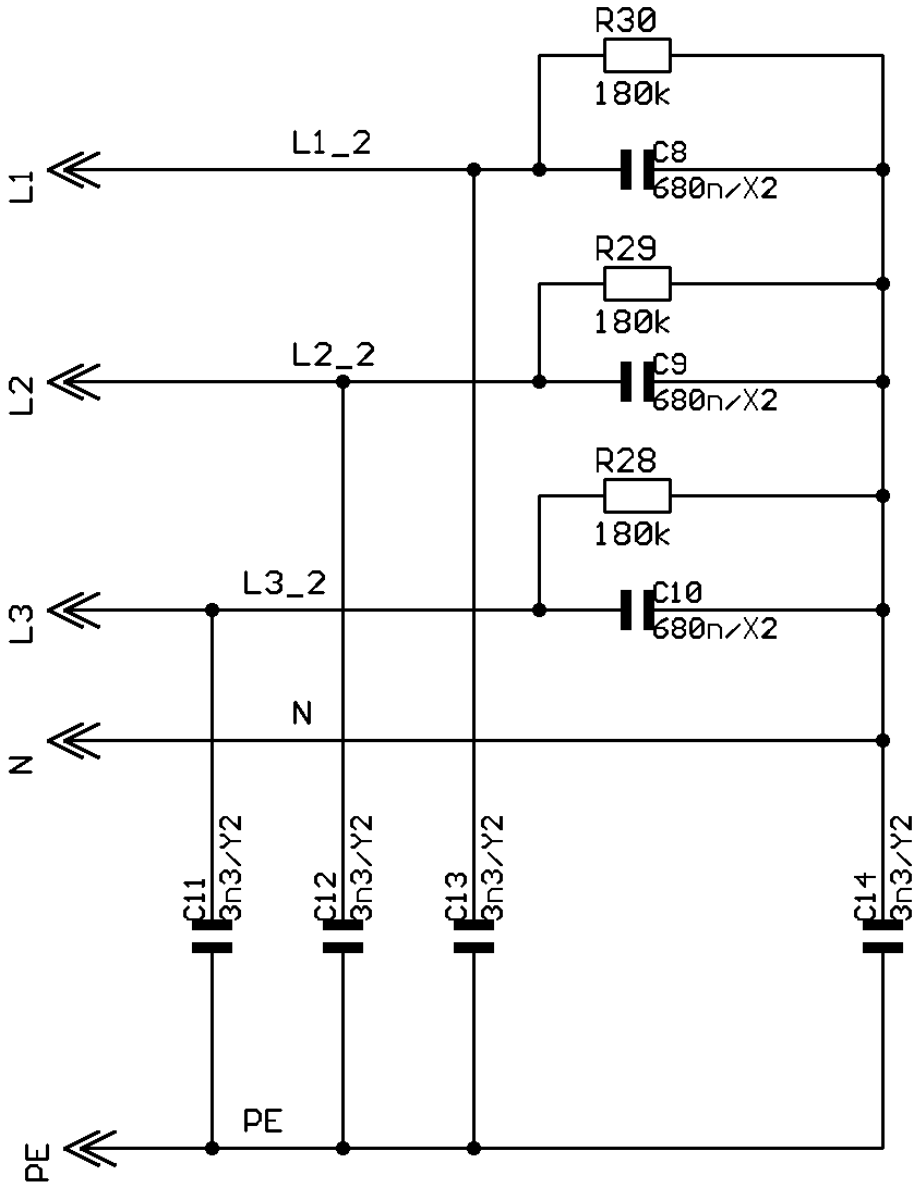
8.2.13 THREE-PHASE SUPPLY BOARD 0480878 – WIRING 1/3



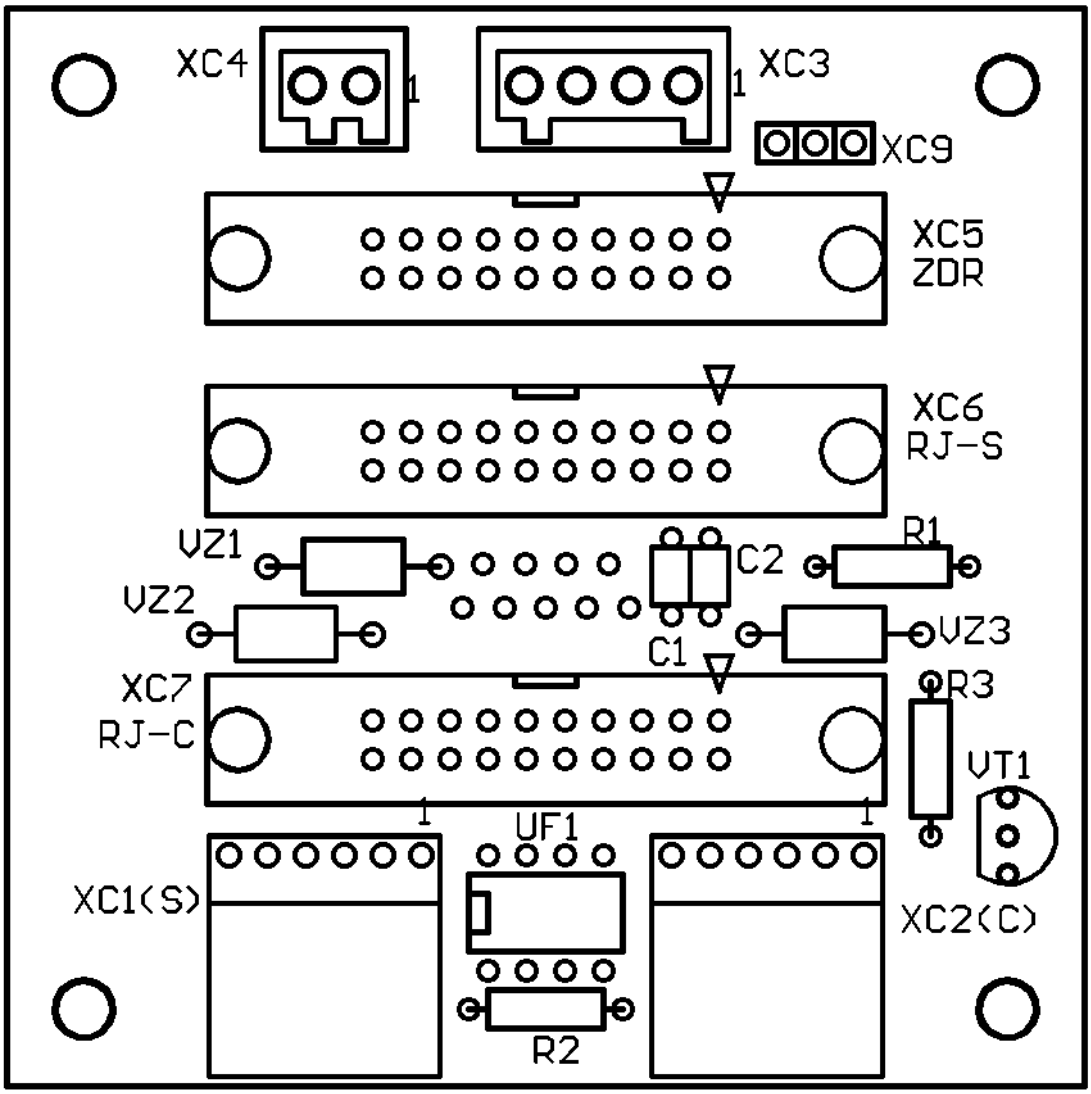
8.2.14 THREE-PHASE SUPPLY BOARD 0480878 – WIRING 2/3



8.2.15 THREE-PHASE SUPPLY BOARD 0480878 – WIRING 3/3



8.2.16 THREE-PHASE SUPPLY BOARD TT-RSS1 (0480954) – COMPONENTS LAYOUT



Connection without the door blocking

Connection with the door blocking

8.2.17 CONNECTING BOARD TT-RSS1 (0480954) – WIRING

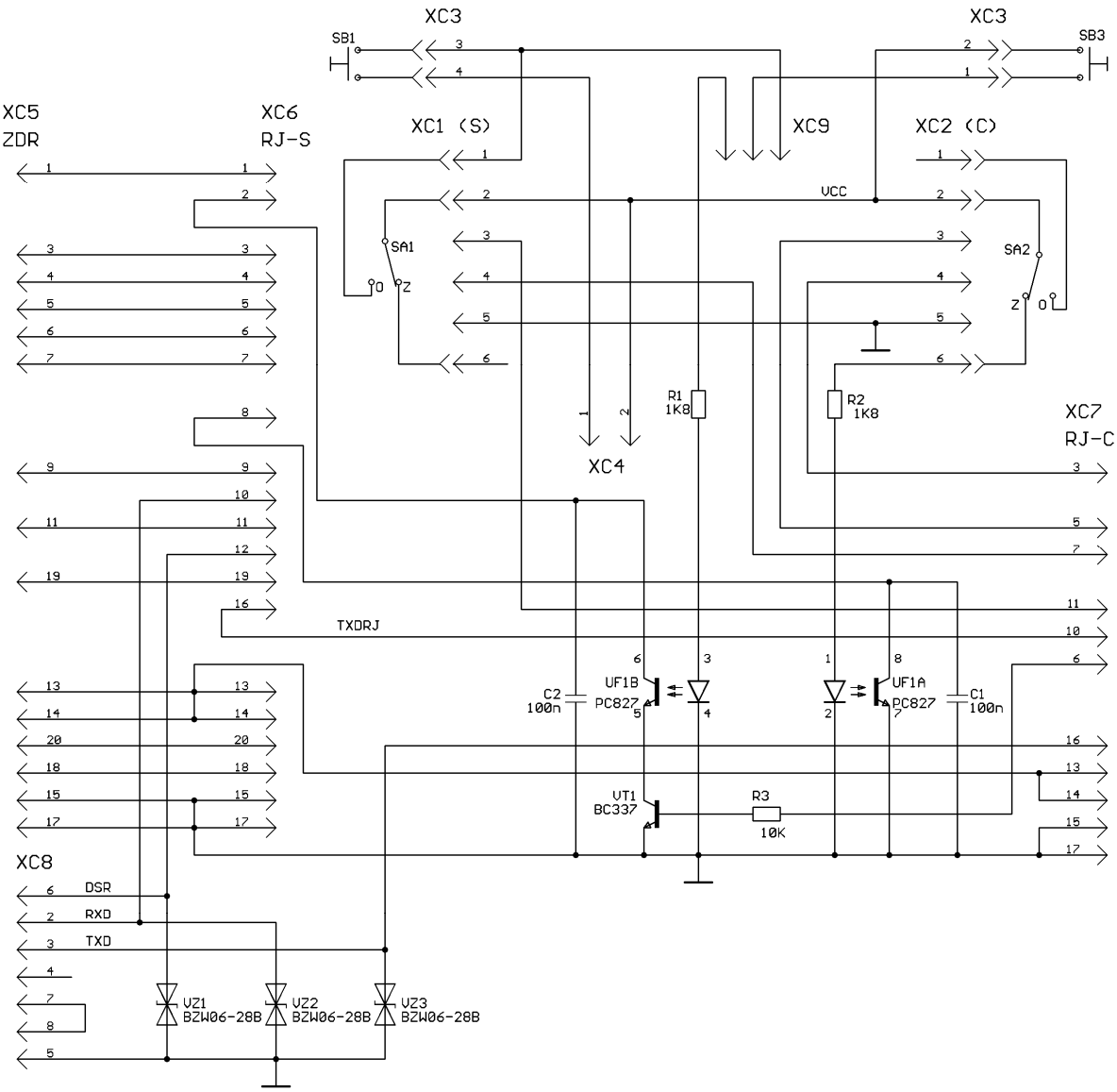


Diagram components not positioned on the board:

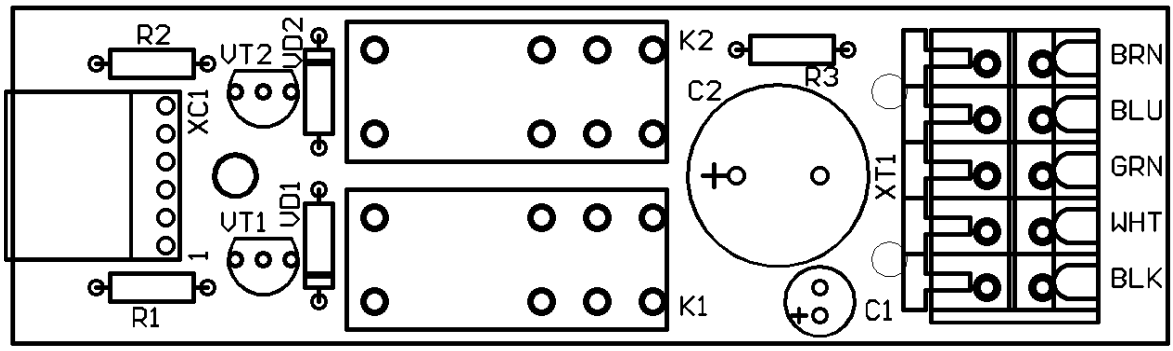
SB1 ..... door switch at the loading side

SB2 ..... door switch at the unloading side

SA1 ..... switch of the blocking mechanism position at the loading side

SA2 ..... switch of the blocking mechanism position at the unloading side

8.2.18 BLOCKING BOARD TT-DVBL (0480951) – COMPONENTS LAYOUT



8.2.19 BLOCKING BOARD TT-DVBL (0480951) – WIRING

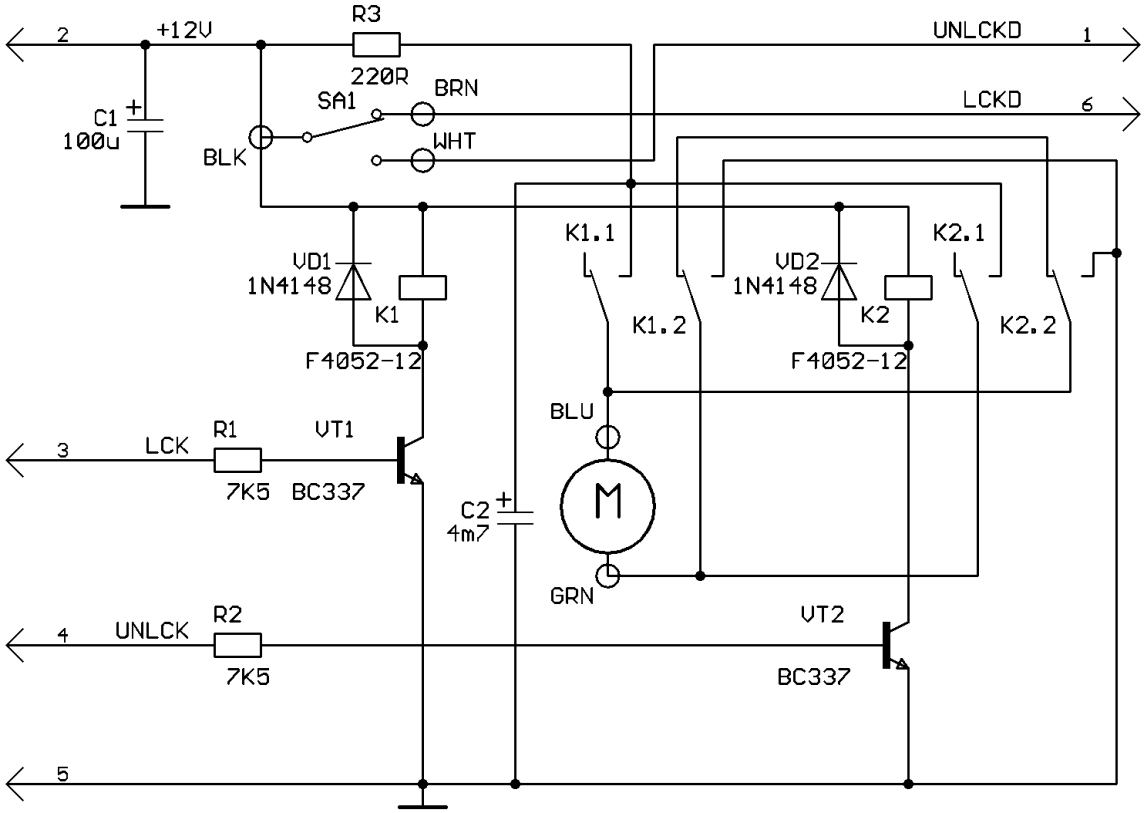


Diagram legend:

The terminal is connected to the BLK terminal in the proper position:

BRN ..... the connecting rod is pushed out

WHT..... the connecting rod is pushed in

When the connecting rod is moved in the appropriate direction, positive voltage polarity is on the terminal:

BLU..... pushing-out

GRN..... pushing-in

Components not positioned on the board:

M..... servomotor

SA1 ..... position switch

... excellence in medical and laboratory engineering

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