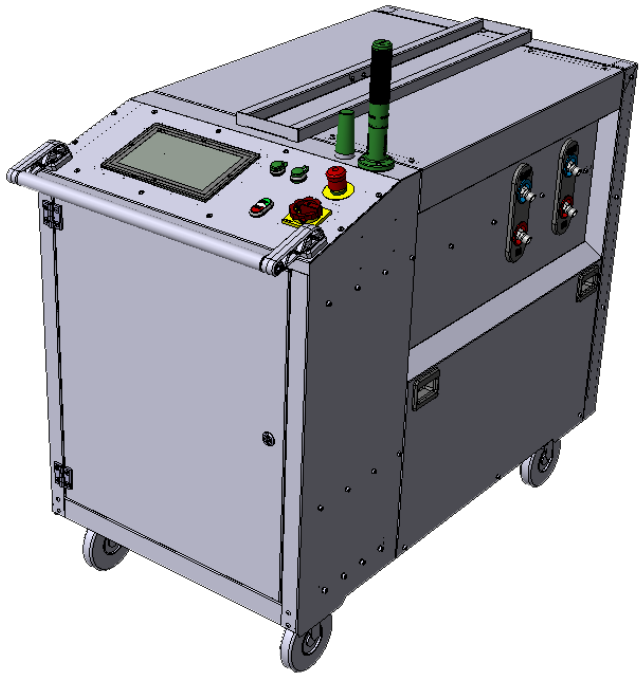
USER MANUAL

COOLINGCARE

MAINTENANCE & CLEANING MACHINE FOR MAINTENANCE OF COOLING CHANNELS

MODEL: CA-2



Production year: …….. **Serial number: ……..**

Phone: 800-521-0546 E-mail: sales@pcs-company.com Fax: 800-505-3299
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OPERATING INSTRUCTIONS

Any other form of use and use of the machine not in accordance with the form described in these operating instructions is prohibited.

CAUTION: For optimal and safe operation of the machine, please read this manual carefully and follow the recommendations of these operating instructions at all times.

CAUTION: The machine was made in the version for operators who are not disabled. If the machine is to be operated by people with disabilities, the machine should be adjusted accordingly.

STORAGE OF THE MANUAL

Keep the operating instructions at the machine. The manual should always be available!

Changes or supplements to this manual may only be made by the manufacturer, otherwise all warranty claims shall cease.
We will be grateful for any suggestions to improve this guide.

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INTRODUCTION

Every person allowed to operate within the device, including the technical staff and the supervising executive, should become familiar with this manual dealing with the transportation, installation, design, functioning, operating, maintenance and repair of the CoolingCare device prior to its installation and launching. This manual should be stored in a safe place for the current and future reference.

PLEASE READ THE FOLLOWING MANUAL BEFORE PROCEEDING WITH THE INSTALLATION PROCESS.

VEUILLEZ LIRE LE MANUEL SUIVANT AVANT DE PROCÉDER AU PROCESSUS D'INSTALLATION.

The device should be kept properly clean accordingly to the technical requirements, undergo required periodical maintaining doings and have the faults immediately removed to ensure the full utilization and prolong its run.

The warranty conditions and the warranty proceedings taken within the duration of guarantee period are given in the attached warranty card.

1.1. Important information

The protocol of delivery and acceptance (or other form accepted by the producer) determines the conditions of the CoolingCare device acceptance.

Delivery scope includes: the complete device for cleaning the injection mold cooling channels and proper documentation.

At the delivery the receiving party is obliged to:

- check the product's conformity with the order, evaluate its technical condition – every damage occurring in transportation that has not been reported immediately shall not be respected by the producer,
- check that the technical equipment of the device is complete – each case of nonconformity has to be reported to the producer and noted down in the acceptance protocol,
- check that the received documentation is complete and includes: maintenance manual, warranty card and the declaration of conformity,
- check that the signatures and stamps in the documentation are complete,
- check the serial numbers on the transport documents with the serial number on a indicative label,
- lift the device with a forklift,
- use only dedicated cleaning agents,
- test launch the device.

Moreover:

- The CoolingCare device should be located and installed accordingly to the manual (the manual should be kept next to the device),
- The device with empty containers can be moved on a flat surface with gradient up to 5% with the help of the workplace's transportation device,
- it is advisable to place the skidproof mat in front of the device.

Within the regular usage of the device, it is necessary to observe the principles included in this manual, which will ensure the infallibility and safety guaranteed by the CE/UL mark.

The cleaning agent is to be delivered to the client on additional purchase order and does not constitute part of the regular device delivery.

1.2. Machine application

Maintaining cooling of injection molds on a level allowing for their long run and appropriate use requires not only high-quality cooling medium but also regular cleaning of cooling channels.

This rule applies both for conventional, drilled cooling lines as well as conformal cooling designs, which are becoming more and more popular due to the development of the additive manufacturing technologies.

In the case of using water as the main ingredient of the cooling agent in injection molds, the channels are prone to gradual efficiency decrease connected with the gradual agglomeration of scale and corrosion residues. Such process is typical for every system powered by water and is particularly dangerous when dealing with small channel diameters, where the scale or other impurities can significantly affect the cooling efficiency, which in turn can lead to total jamming of the channels. Low thermal conductivity of the residue deteriorates the heat transfer from the mold cavities, which often affects the quality of the injected part and can lead to cycle time increase. The CoolingCare system has been created to eliminate this type of danger.

The CoolingCare device is dedicated for cleaning, diagnostics and conservation of cooling channels in injection molds.

The machine design and its functions result from the producer's years of experience in design, manufacture and use of molds with conventional as well as conformal cooling systems. The device has been equipped with two independent sections, enabling simultaneous cleaning of 2 cooling channels. Dedicated pulsation module for each section allows for independent and efficient channel cleaning in wide range of diameters irrespectively of the channel length.

The CoolingCare device enables (by choosing the right function on the console panel):

- container filling and emptying,
- blowing cooling channels with the compressed air,
- identifying leakage with pressure tests,
- identifying clogging issues with a blockage test,
- diagnosing the flow rate value for individual cooling lines,
- channels cleaning,
- rinsing the channels with mains water,
- conserving the cooling channels after the cleaning process with corrosion inhibitors.

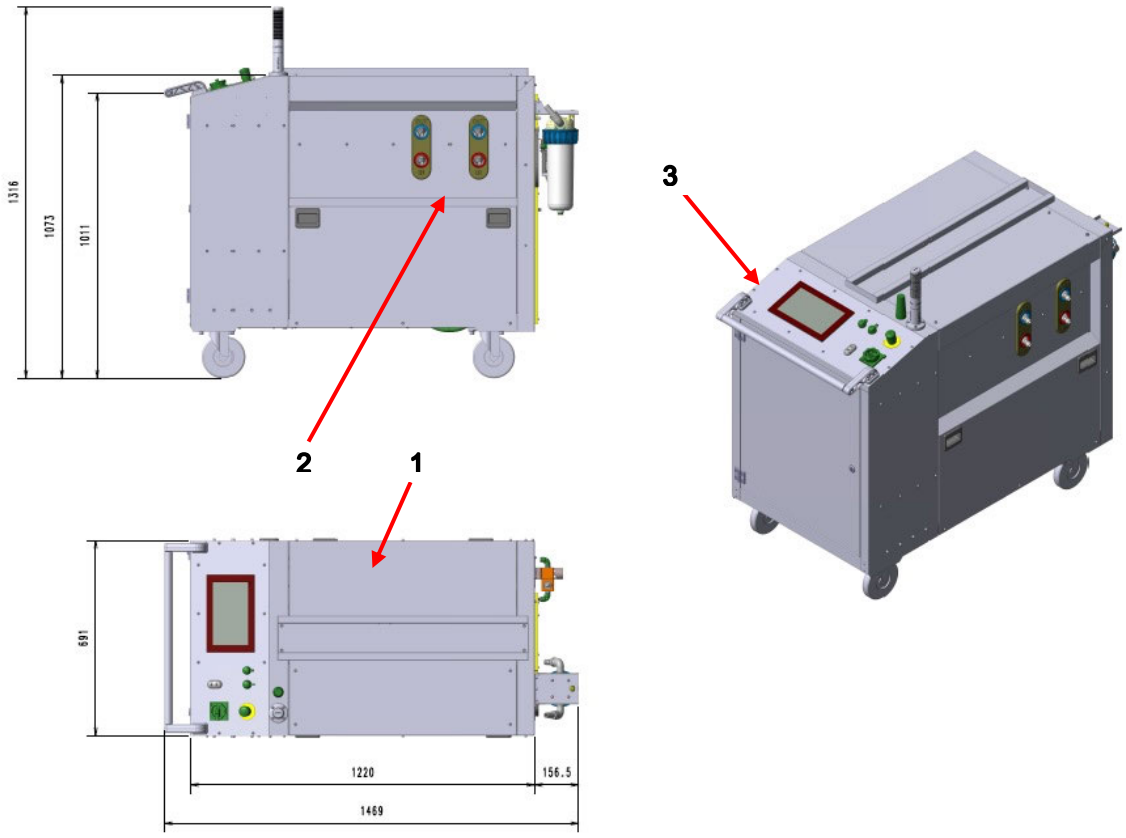
Thanks to the mobility of the device diagnostics, cleaning and post–cleaning channel rinsing can be done also on molds mounted on the injection molding machines.

The producer's patent pending cleaning process is characterized by high-pressured feed of cleaning agent into the to-be-cleaned channel followed by dynamic, bi-directional pulsation movement of cleaning medium. The diaphragm movement speed in pulsators and feed pumps adjusts automatically in relation to the resistance in flow for optimal cleaning process and optimal device's run relative to the compressor efficiency.

High dynamics of the cleaning process increase cleaning efficiency and enable the user to clean the channels with less aggressive cleaning agents. Diagnostics function of the device allows for the current flow rate measurement in a channel. The CA–2 device saves the results of the flow rate diagnostics in the device's memory. A PLC controller with a touch screen allows you to create the database for up to 3000 molds. All these built-in functions make the CoolingCare a perfect device for cooling channels maintenance as well as for support of technical supervision of

injection molds.

1.3. Technical characteristics



1 – containers section, 2 – connection section, 3 – control section

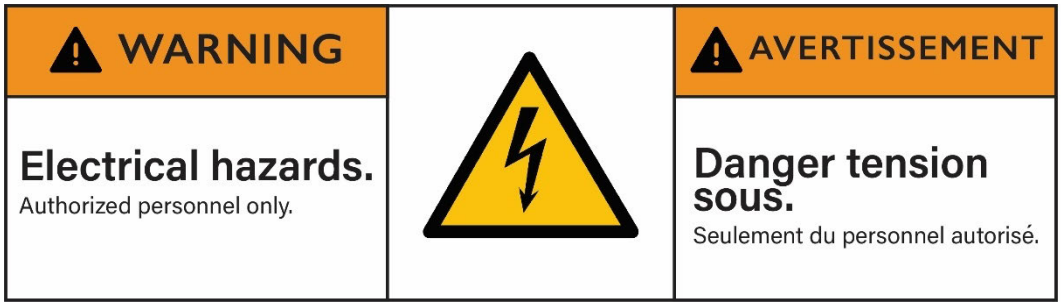
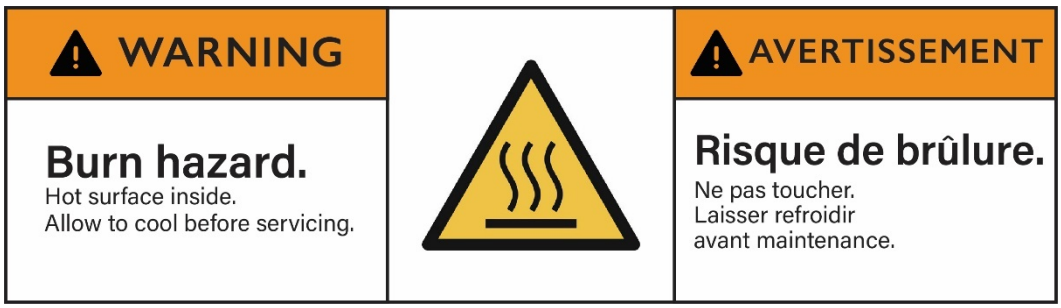
Fig. 1. Machine dimensions and main components

1. dimensions,
2. cleaning sections number = 2,
3. base agent = water,
4. cleaning agent = depending on the scale type (DS1, DS2),
5. diagnostics agent = water,
6. liquid pressure = up to 5 bar,
7. diagnostic pump type = rotary,
8. feed pump type = diaphragm,
9. pulsator pumps type = diaphragm,
10. maximum efficiency of the diagnostic pump = 86 l/min,
11. feed pumps efficiency= 12 l/min,
12. recommended air pressure = 6÷8 bar,
13. air consumption = 450 L/min,
14. cleaning agent container volume = 100 l,
15. diagnostic agent container volume = 45 l,
16. max cleaning agent temperature = 50˚C,
17. coupling thread type = 4xNPT 1/2”,
18. coupling thread type (external water supply connection) = 1xNPT 1/2", 1xNPT 3/4",
19. compressed air connection type = standard profile EURO 26 RQS series,
20. console panel = PLC with the 10,1” touch screen,
21. tare weight = 215 kg,
22. max noise level = 83 dB,
23. installed power = 5,5 kW,
24. control voltage = 240 VAC, 60Hz, 3–phase.
25. power consumption = 23,5A.

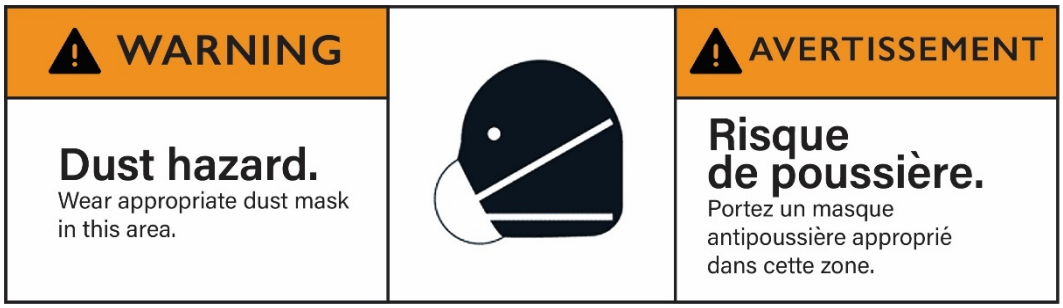
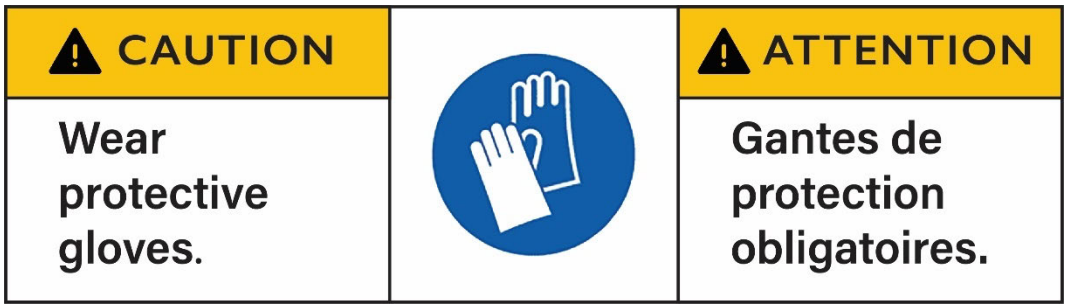
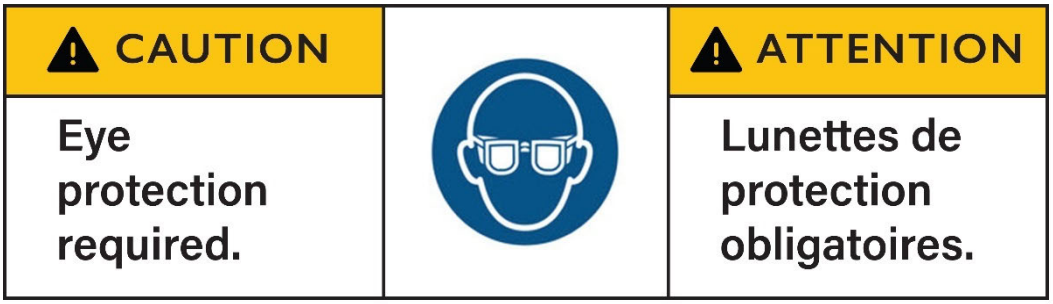
1.4. Standard and special equipment

a. User's manual – 1 unit,
b. pH-meter – 1 unit,
c. Conductivity meter – 1 unit,
d. Capacitive probe [1] – 1 unit.

1.5. Labeling

Item	Label	Meaning
1		This symbol means important remarks concerning the safety which, if not followed, may constitute danger to the people or the fixed assets. Not following the instructions may result in harm for people.
2		
3		
4		

[1] Optional equipment

5	 Use the respiratory tract protection (protective mask with the P2 filter). Utilisez la protection des voies respiratoires (masque de protection avec filtre P2).
6	 Wear protective gloves made from nitrile rubber. Porter des gants de protection en caoutchouc nitrile.
7	 Wear the hermetic protective glasses.
8	

9	 CAUTION Disconnect from supply circuit before opening. ATTENTION Débrancher du circuit d'alimentation avant d'ouvrir.
10	 CAUTION If connection is made to a potable water system, the system shall be protected against backflow. ATTENTION Si l'appareil est raccordé a un réseau d'eau potable, il doit être protégé contre les refoulements.

2. DESIGN AND FUNCTIONS

2.1. Design

The CoolingCare device has the form of a cuboid. The body of the device has been made from closed profiles welded together to create the supporting structure. The device has been enclosed in metal shields fixed to the supporting structure. To enable movement, the device is equipped with an ergonomically located handle and four wheels (two of which are equipped with pedal breaks).

The machine can be divided into 3 main sections (Fig. 1): container section, connection section and control section.

The container section constitutes two containers located one next to the other, covered by a portable plastic cover (Fig. 2). After lifting the main cover (Fig. 3) you can access the container covers, covering the 100l volume container for the cleaning agent and the 45l volume container for the diagnostic agent. Interior of the cleaning container is presented in Fig. 4, the maintenance – diagnostic one in Fig. 5. The connection section (Fig. 6) consists of 2 diaphragm pumps (pulsators) /**4**/ connected by pairs with main diaphragm feed pump /**5**/.

Fig. 2. Movable tank cover

Each pulsator has two quick connectors with the upper two /**2 – OUT**/ being used to connect the pneumatic–hydraulic hoses to the inlet of the channels and the lower ones /**3 – IN**/ to the outlet of the cooling channels (return).

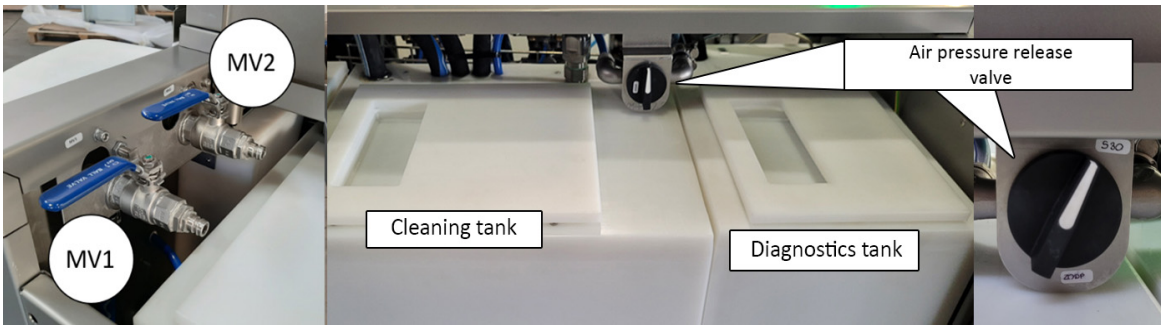


Fig. 3. Tanks with movable cover open

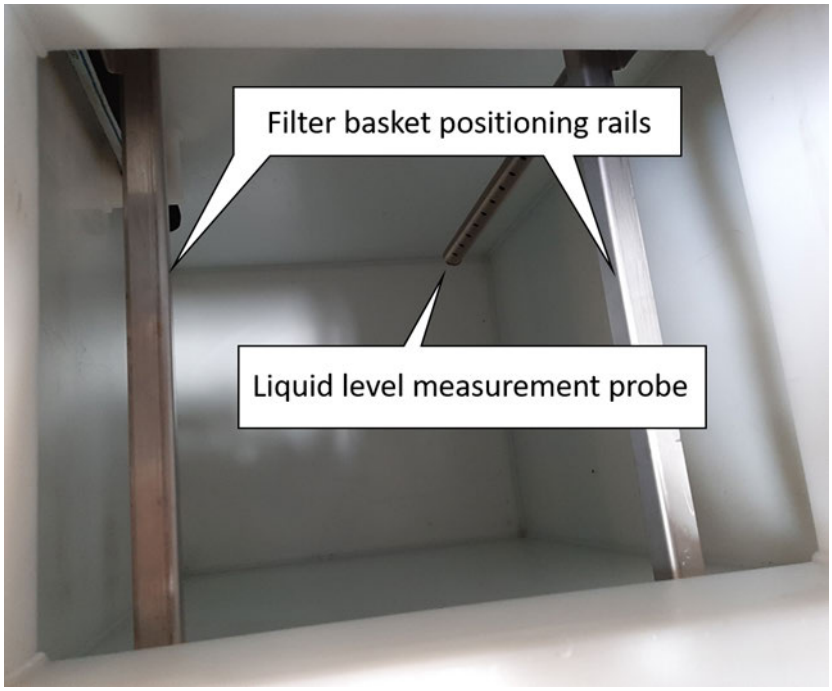
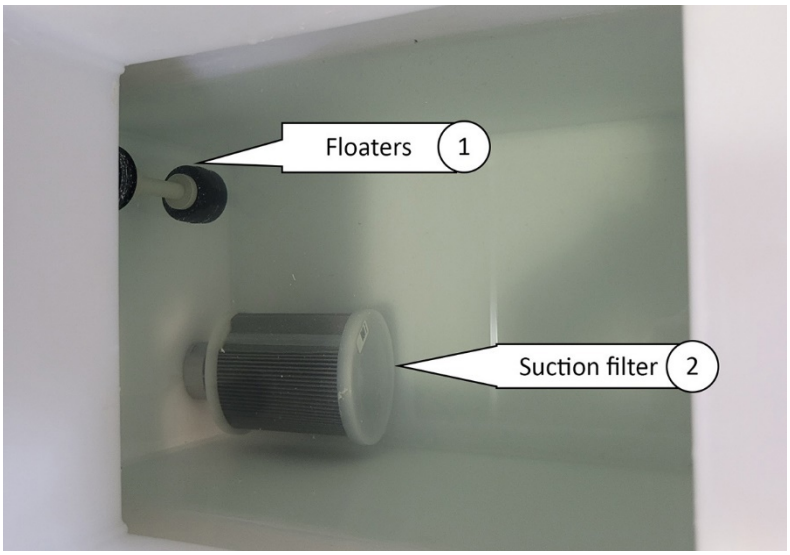
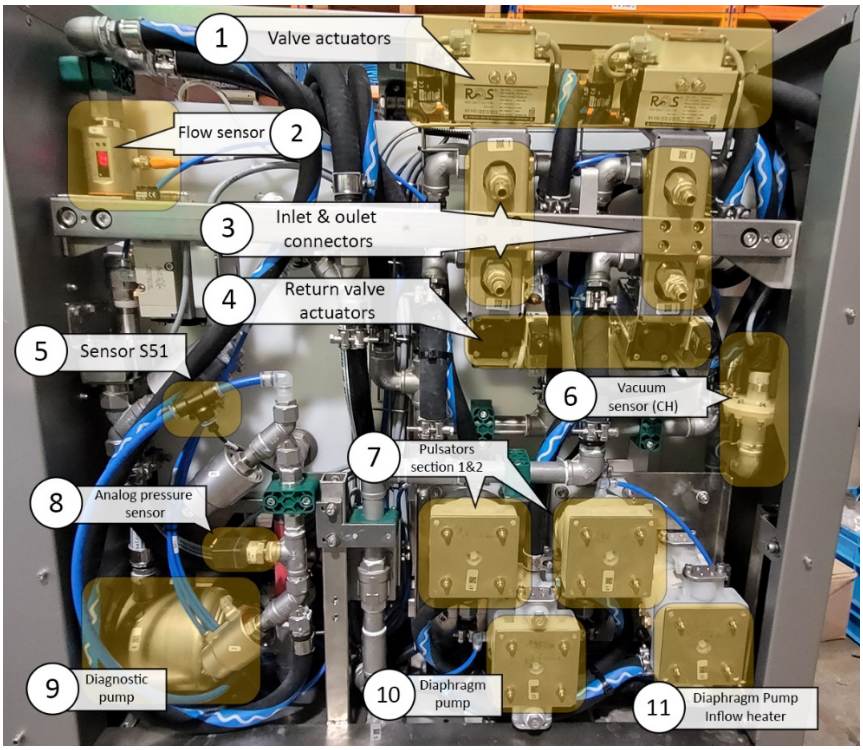


Fig. 4. Cleaning tank inside view



1 – Suction filter (on thread),
2 – 3-position floaters.

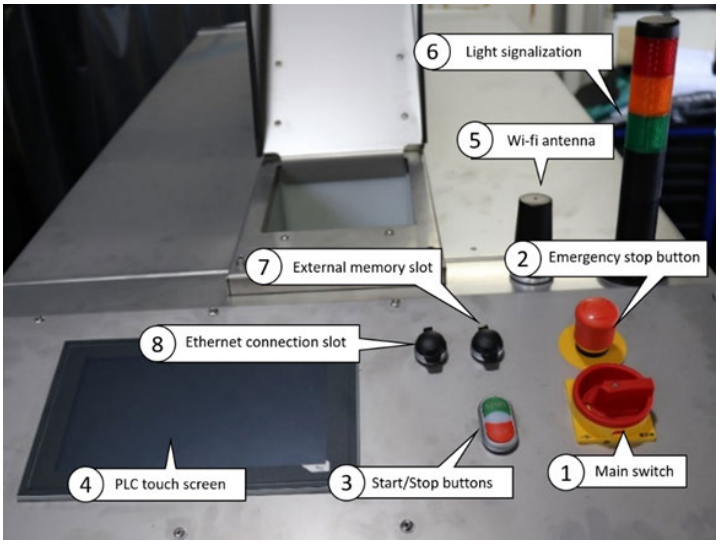
Fig. 5. Diagnostics/conservation tank



1 – Upper valve actuators, **2** – Diagnostic tank flow sensor, **3** – Quick connectors to connect the inlet and outlet of the mold cooling channels, **4** – Lower (return) valve actuators, **5** – Humidity sensor (S51), **6** – Vacuum sensor for chemical filter, **7** – Pulsators, **8** – Analog pressure sensor, **9** – Diagnostic electrical pump, **10** – Diaphragm main pump for section 1&2, **11** – Diaphragm pump inflow heater

Fig. 6. Connection/pump section (after removing the side cover)

The control section of the CoolingCare device consists of the electrical box and the console panel (Fig. 7) with LCD touch screen /**5**/, main switch /**1**/, „START" button /**3**/, „STOP" button /**4**/, emergency switch /**2**/, Wi–Fi antenna /**6**/**,** light signal /**7**/, external memory slot /**8**/, ethernet connection slot /**9**/.



1 – Main switch,
2 – Emergency stop button,
3 – „START/STOP" buttons,
4 – Touch screen,
5 – Wi–Fi antenna,
6 – Light signalization,
7 – External memory slot,
8 – Ethernet connection slot

Fig. 7. Control panel[2]

[2] CA-6 and CA-2 models share the same control panel layout

2.2. Functions

The control functions allow machine operators to:

- fill and empty the containers,
- rinse channels with mains water supply,
- blow channels with compressed air,
- run the pressure and blockage tests to identify leakage or clogging issues,
- diagnose flow rate values,
- clean,
- conserve (required corrosion inhibitor in the diagnostic container).

Detailed description of every function of the device together with the instructions for the operator have been enclosed in 5.2 section of this manual.

Type of the liquid cleaning agent is to be selected accordingly to the producer's instructions (dedicated cleaning agents have been mentioned in 0 section of this manual) depending on the type of sediment. Cleaning properties of such agents correspond to their components' material safety data sheet.

When cleaning the cooling channels, a mold is to be placed nearby the CoolingCare device and connected to the device with hydraulic hoses accordingly to the detailed instructions found in 0 section of this manual.

The cleaning process begins with diaphragm feed pumps pumping the cleaning agent from the container through the suction filter into the cooling channels. After filling the channels with the cleaning agent, the device switches to pulsation mode, where dedicated pulsators cause the agent in the circuits to dynamically pulsate in two directions. Then the process of filling the channels with fresh portion of cleaning agent is repeated. The liquid going through the circuits dissolves and washes out the residue clinging to the walls of the cooling channels and the pulsation enhances the cleaning process dynamics.

The unsolved impurities flow with the liquid to the cleaning agent container, where they are filtered. The cleaning liquid mixes with the liquid from the container and is taken back to the circuit. Working pressure as well as cleaning time depends on the operator's decision. The sediment remaining at the bottom of the container is to be periodically removed by the staff. The used liquid waste and the impurities are to be recycled by suitable waste management companies in accordance with local regulations.

3. TRANSPORTATION AND STORAGE

a. After the trial launch of the device and having declared by the producer the device works in a proper way, the device is totally emptied.

WARNING!

EVERY DOOR AND COVERS OF THE DEVICE THAT IS READY TO TRANSPORT SHOULD BE CLOSED. THE PRODUCER HOLDS NO RESPOSIBILITY WHATSOEVER FOR THE DAMAGE CAUSED BY IMPROPER TRANSPORTATION AND STORAGE OF THE DEVICE DONE BY THE USER.

b. Minimal outdoor temperature during transportation and storage is 4°C. Should lower temperature occur, suitable protective steps against freezing and corrosion ought to be taken.

c. In the case of storing and/or transporting the machine (e.g., air transport) in temperature conditions close to 0˚C (32 ˚F), all machine systems must be drained of fluids, i.e., flow heating system, diagnostic and chemical tanks, chemical filter body, all other hydraulic systems including pumps and pulsators as well as a centrifugal pump. Failure to perform the above operation may result in damage to the machine, defects in this respect are not covered by the warranty.

d. Avoid the damage caused by improper loading and unloading or impact.

e. CoolingCare device should be lifted with a forklift of the maximum load adjusted to the weight of the device with the pitchfork protruding at least 10 cm at the opposite side of the device.

f. It is forbidden to move the device without having it disconnected from the electric power supply and compressed air and mains water supply in advance.

g. During transportation it is necessary to block the wheels with a pedal break.

h. In the case of long-distance transportation, the device is to be properly fixed on the means of transport. It is recommended to fasten it with 4 belts (of resistance adequate to the weight of the device); one belt per one wheel.

i. The CoolingCare device is to be stored only in vertical position.

j. Protect from direct sunlight, cold and humidity. The maximum temperature while storing the device shall not exceed 35˚C.

4. INSTALLATION

4.1. Conditions of the work environment

a. Environment temperature = 10÷35˚C.
b. Humidity – less than 80%.
c. Light – minimum 300 lx.
d. Ventilation – general from the hall.

WARNING: The machine cannot be operated of stored in temperatures below 4˚C (immediate warranty loss).

4.2. Positioning

CoolingCare does not require any kind of base or foundation apart from levelled, hardened surface.

The device is to be located in such a way that it will not be damaged in transport or regular traffic taking place in the plant.

Space of min 0,5m around the device (from the most protruding part of the device) is to be left for service and repair steps.

After positioning the device, it should be secured by blocking the pedal breaks on the wheels.

4.3. Connecting the electric power, mains water and compressed air supply

4.3.1 Important safety instructions

WARNING!

When using electric appliances, basic precautions should always be followed, including the following:

- **Read all the instructions before using the appliance.**
- **Only use attachments recommended or sold by the manufacturer.**
- **Do not use outdoors.**
- **To disconnect, turn all controls to the off (“O”) position, then remove plug from outlet.**
- **Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.**
- **Unplug from outlet when not in use and before servicing or cleaning.**
- **Do not operate any appliance with a damaged cord or plug, or after the appliance malfunctions or damaged in any manner.**
- **Connect to a properly grounded outlet only. See Grounding Instructions.**

SAVE THESE INSTRUCTIONS

4.3.2 Grounding instructions

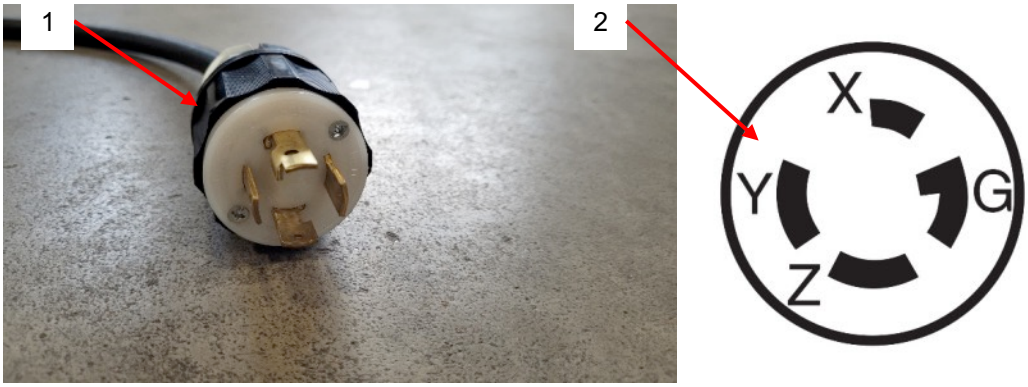
This appliance must be grounded. In the event of malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This appliance is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

DANGER – Improper connection of the equipment-grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal. Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if in doubt as to whether the appliance is properly grounded. Do not modify the plug provided with the appliance – if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

This appliance is for use on a circuit having a nominal rating more than 120 V, and is factory equipped with a specific electric cord and plug. No adapter should be used with this appliance. If the appliance must be reconnected for use on a different type of electric circuit, the reconnection should be made by qualified service personnel; and after the reconnection, the appliance should comply with all local codes and ordinances.

4.3.3 Electric power connection

CoolingCare CA-2 requires 240 (three phase) VAC 30A power socket with ground (L1/L2/L3/PE).
The installation has to correspond to the local regulations and be properly marked.
The machine is equipped with a four-wire power cord (4x12awg) ended with a 240 VAC plug.
It is forbidden to plug in the machine to a power socket devoid of grounding feature.



1 – socket connection, 2 – 30A Locking Receptacle

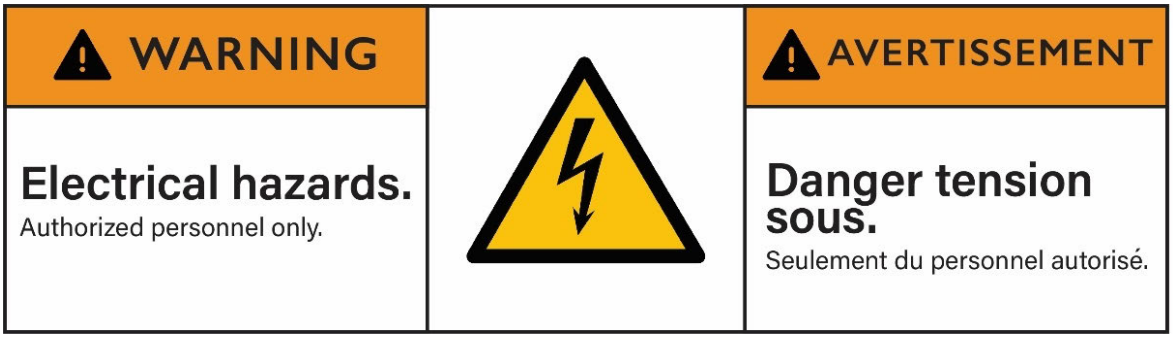
Fig. 8. Power cord plugs

The electric circuit schematics is presented at the end of the document.

Socket connection check-up

In order to check the socket connection, measure:

1. Between X and G – 120V;
2. Between Y and G – 120V;
3. Between Z and G – 120V;
4. Between X and Y – 240V;
5. Between X and Z – 240V;
6. Between Y and Z – 240V.



Only an entitled employee with proper electrical qualifications can manage connecting the device to the electric power supply, repairs and maintaining the device.

4.3.4 Compressed air and mains water supplies

Compressed air supply is to be connected to the machine by means of a suitable pneumatic tube with minimum inner diameter of 9mm, connected to the compressed air source with min. 6 bar and 800L/min efficiency. The compressed air supply hose is to be straight; one should avoid any bending that could affect the hose's air flow capacity.

Mains water connection is to be done with hydraulic hose, pressure up to 6 bar.

The pneumatic–hydraulic system schematics of the CoolingCare CA–2 is presented at the end of this document (0).

Compressed air supply (**air quality has to meet the requirements described below**) is to be piped by an elastic hose ended with a port. The port is to be firmly buckled (you should hear the characteristic sound of buckling) on the intake port /**1**/ of the device, which can be found on the side wall of the device (Fig. 9).

The port disconnection should be done on two-fold basis. First, one shuts down the supply pressure and lets the remaining pressure go into the atmosphere with the intake port remaining locked in the socket. Second, one releases the lock of the port, which enables one to disconnect the connection.

Water from the mains water supply is to be delivered by means of an elastic hose ending with a quick coupling. **Water should meet the requirements described below.**

The water hose quick coupling should be firmly fixed (Fig. 9) on intake nipple of the device /**2 – IN**/, which will be found on of the device. Connecting the system water is not necessary for the device to run, still it constitutes additional possibilities to use the device (automatic container water filling, rinsing the system after cleaning, etc.).

Attach the drainage hose to the port /**3 – OUT**/ (Fig. 9)

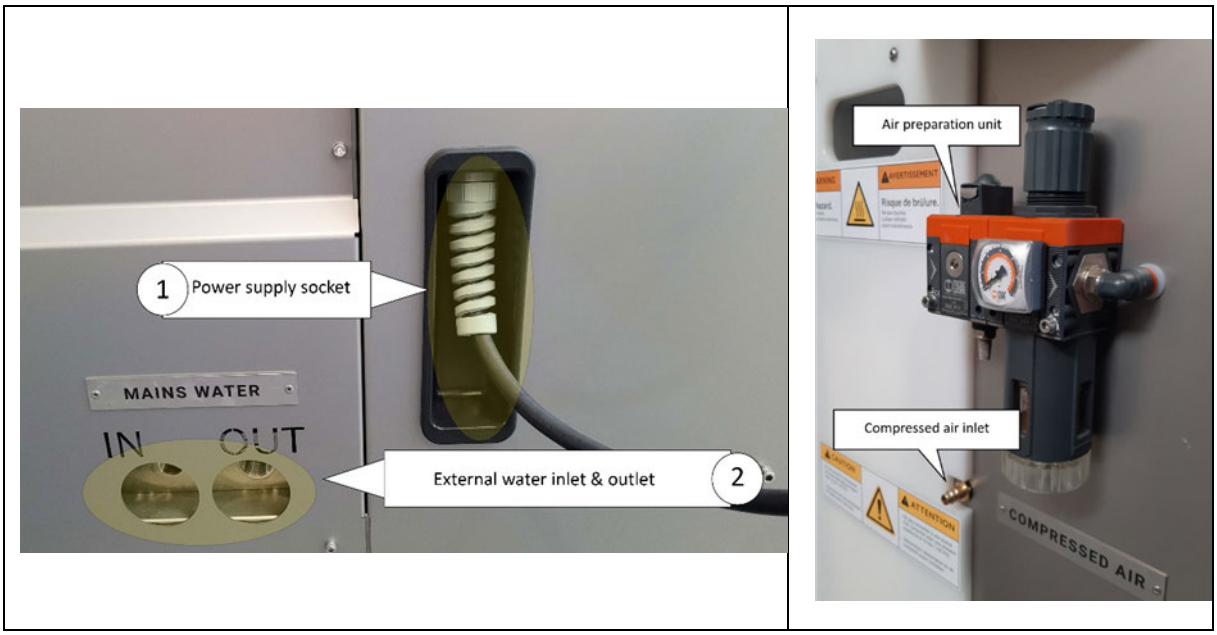


Fig. 9. Compressed air and mains water supply connections

Required air quality

Air used for the device has to at least meet the regulations for the compressed air according to ISO 8573-1 Class 3, especially in terms of pollution with the solids, condensed water or oiling. The solids shall not exceed 5 µm, and their concentration shall not exceed 5 mg/m^3, dewpoint of the compressed air can level up to maximum -20˚C degrees and shall be free of oil (using filters, drying device and oil separators necessary).

Required water quality

Water is to be clean, free from oil pollutants or suspended solids. It is recommended to use distilled water. If using tap water, make sure the water has low iron oxide content. High condensation of iron oxides may result in decreased lifespan of cleaning media.

WARNING!

Failure to meet the requirements concerning electric power supply, compressed air and water supplies shall constitute the reason to lose the warranty.

5. DETAILED OPERATIONS MANUAL

5.1. Control panel

CoolingCare console panel (Fig. 7) enables the user to choose and start certain processes and functions of the device. Certain actions will be displayed on the controller with a touchscreen.

5.2. Launch and operation

WARNING!

Before launching the device connect it to the electric power supply as well as the water and compressed air supplies in accordance with the requirements mentioned in section 4.3.

The CoolingCare device is equipped with intuitive software. Its functions and detailed procedures for the operator are presented below.

GENERAL REMARKS FOR THE DISPLAYED INFORMATION

Device's functions are selected by means of the LCD touch screen. Touching the displayed icons on the screen enables the user to program all the settings of the machine. Meaning of the most commonly used icons displayed on the screen has been explained below, while the printscreen of the screen including additional icons together with their meaning is included further in the following section of this Manual.

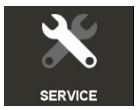
Frequently displayed icons meaning:

Icon informing of the currently logged-in user; pressing it allows the user to return to the log-in screen.

Pressing this icon takes the user to the main menu screen.

Alarm – flashing icon signals abnormal state/machine error, press it to see the alarms list.

Pressing the icon allows the user to turn on (ON) or off (OFF) the process of heating up the cleaning liquid.



Service contact details.

Return to the previous screen.

Pressing this icon allows the user to hold the current work of the device – pressing it again allows to resume the process.

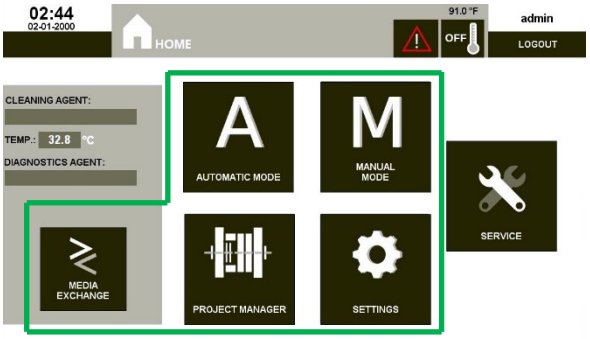
Icons allowing the user to go up or down the lines displayed on the screen.

The print screens of the console screen together with descriptions of their functions have been attached below, together with the possible steps to be taken by the user, should they appear on the screen.

5.2.1 Login screen, main menu

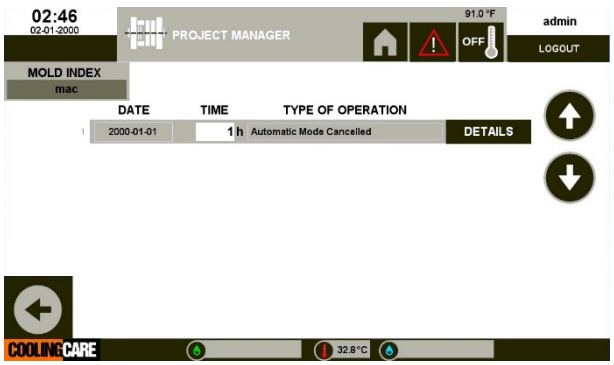
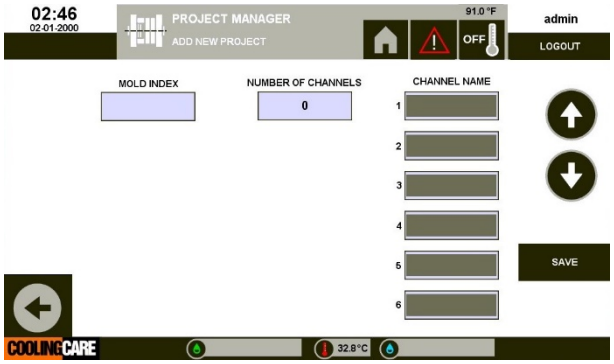
After starting the device, the log-in screen appears on the screen. The staring password is „**1234**".

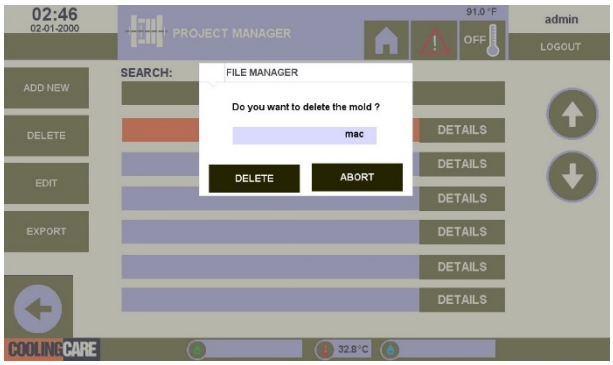
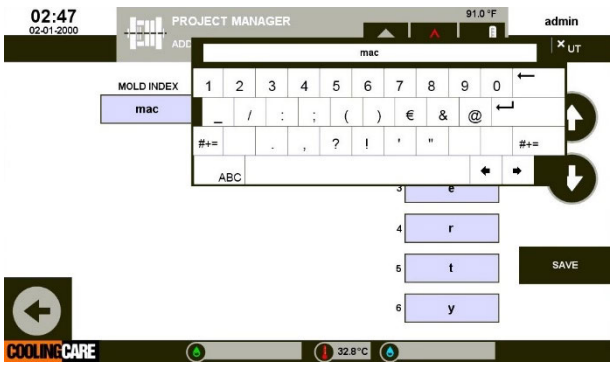
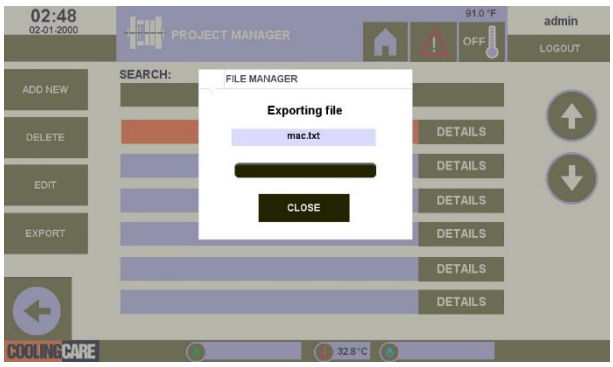
Screen number	*Screen*	*Screen description*
A. Login screen		
1		Enter login of the entitled and trained accordingly to the manual user at following log-ins. **IMPORTANT: It is possible to launch the device with the producer's login.** Pressing the arrow opens the main menu.

B. Main menu		
2		By pressing any icon marked within the green loop the user obtains the access to the following functions: A AUTOMATIC MODE – starts the cleaning algorithm in automatic mode – detailed description will be found in 0 section of this manual, M MANUAL MODE – allows the user to access to individual functions of the device – description of this function will be found in 0 section of this manual, PROJECT MANAGER – allows the user to manage the projects and view the cleaning operations history – description available in 0 section of this manual, SETTINGS – enables the user to configure the device – description of this function will be found in 0 section of this manual, MEDIA EXCHANGE – allows the user to access the liquid agents exchange screens – description of this function will be found in 0 section of this manual. Currently chosen types of cleaning or diagnostic agents and the cleaning agent's temperature will be displayed above the latter icon.

5.2.2 Project manager

The project manager allows the user to manage the mold data base. Within this function the user adds or removes the projects to or from the base, as well as has a view into the history of operations for given projects. Access to the above-mentioned functions is gained by pressing the „**PROJECT MANAGER**” icon on screen no /**2**/.

Screen number	*Screen*	*Screen description*
A. View into the project history		
3		In the middle of the main screen of the Project Manager one will find the projects saved the base. The user chooses the project by "UP – DOWN"' arrows. In the case of many projects the user can get to the desired project by "**FIND THE MOLD INDEX"** found on top of the screen. Having pressed the proper one the numeric keyboard will be displayed and the user taps in the desired projects name.
B. View into the project history		
4		Having pressed the "**DETAILS***"* icon the user will be taken to the mold's operations history screen for the given mold.
C. Adding new projects		
5		Having pressed the "**ADD NEW**" icon on the screen no /**3**/, the user will be taken to the screen where they define the name of the mold, number of the cooling channels and their names. Should the user want to clean bridged channels, they should create new channels of defined names reflecting the bridging method (e.g., cavity 123). It is significant due to the repeatability of the connecting and data recording into the base. Having defined every mold parameter and pressing „**SAVE**" icon, the project will be automatically saved and the device will automatically return to the screen no /**3**/.

D. Removing the projects		
6		Having pressed the „**REMOVE THE PROJECT**" icon the following screen will be displayed on screen no /**3**/. The operator will be asked to confirm project removal.
E. Changing the name of an existing project		
7		„**CHANGE THE NAME**" icon visible on the screen no. /**3**/ redirects the user to the **„ADD A NEW PROJECT"**, where the user can change the name of the projects and/or the names of channels. After the change is complete, the user has to save them and the device will automatically return to the screen no /**3**/.
F. Data export		
3a		Pressing the „**EXPORT**" icon on screen no /**3**/ will result in exporting the history of operations of a specific project to the external storage in the socket 8 (Fig. 7).

EXPORT FILES INSTRUCTION

The exported file is saved on an external memory stick in a form of a ***.txt*** file. The next step is to copy a selected ***.txt*** file onto a computer with installed Microsoft Office software. Once the file is on a computer's hard drive, the user creates a new ***Microsoft Excel*** file.
Once the newly created Excel file is open, we go to ***File -> Open.*** and select the exported file in ***.txt*** format.

Once the newly created Excel file is open, go to ***Data*** folder and select ***Get external data*** -> ***From text.***

*Attention: Make sure to select **All files** option in the right bottom corner.*

After selecting and opening the ***.txt*** file, ***Text Import Wizard*** will appear.

Select ***Delimited*** under ***Original data type***. Then click ***Next.***
The next step is selecting the type of column breaks. Choose ***Semicolon*** and click ***Next***.

The final step is selecting the ***Column data format***. We leave the default option, '***General'*** and click ***Finish***.

The final result is the data positioned in columns as in the picture below:

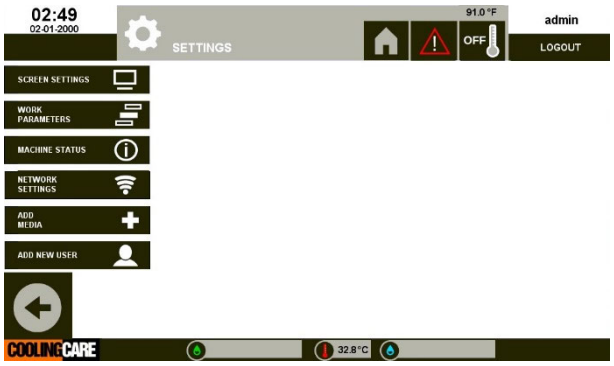
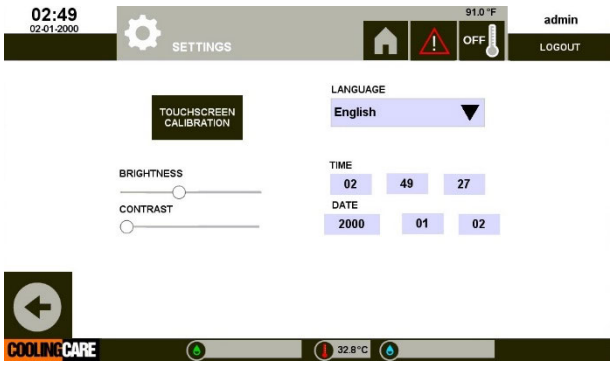
Columns (from left to right):

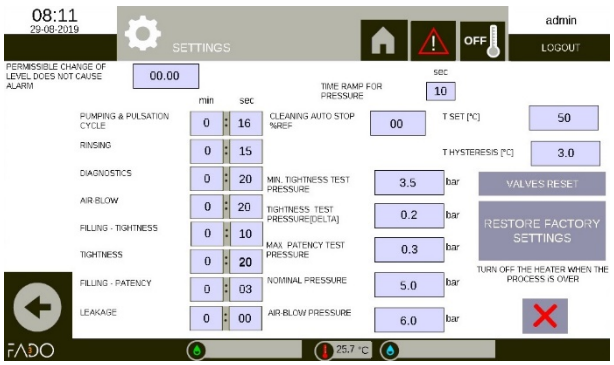
1. **Mold Name**
2. **Channel Name**
3. **Idx Channel** – channel index (0.99)
4. **Circuit** – cleaned section
5. **Type of operation**
    1. 1 – automatic mode
    2. 51 – process in automatic mode cancelled
    3. 101 – automatic mode ended; error occurred
    4. 3 – cleaning
    5. 53 – cleaning has been cancelled
    6. 2 – diagnostics
    7. 102 – diagnostics ended; error occurred
6. **Start Date Time** – date and time when the process was started
7. **End Date Time** – date and time when the process is over
8. **Cleaning Time** – defined cleaning time in seconds
9. **Reference flow** – reference flow rate, if not set than 0
10. **Flow1–Flow25** – flow rate results in the subsequent diagnostics tests during the process
11. **Number of flows** – number of recorded flow rates = number of diagnostics
12. **Medium type** – cleaning medium type
13. **Conservation** – 1–yes, 0–no
14. **Operator** – operator's name
15. **Medium working time** – cleaning medium work time
16. **Tightness before** – leakage test before the process
17. **Patency before** – blockage test before the process
18. **Tightness after** – leakage test at the end of the process

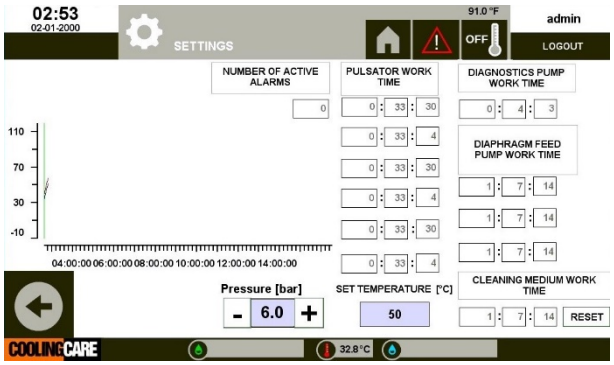
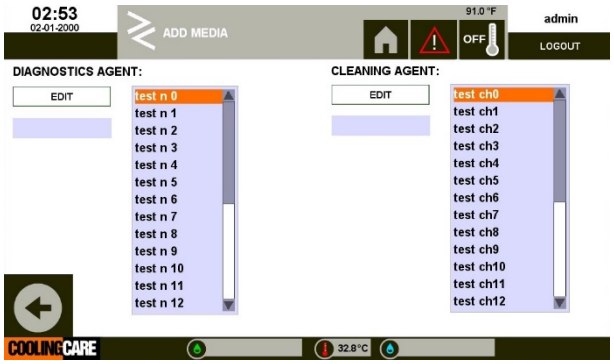
Column names will change depending on the selected language type in the machine.

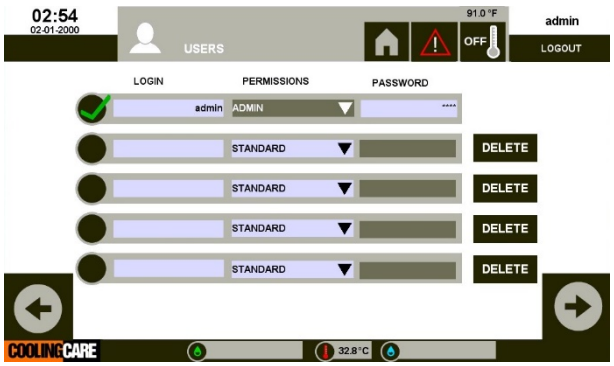
5.2.3 Settings

Having pressed the „**SETTINGS**" icon on screen no /**2**/ the user gets the access to every setting of the device.

Screen number	*Screen*	*Screen description*
A. Settings		
8		Display of the settings screen of the CoolingCare device.
B. Screen settings		
9		Choosing the language of the software settings, date and clock settings, screen calibration.

C. Work parameters		
10		The following tab allows the user to configure the work parameters: **ACCEPTABLE MEDIUM LEVEL DROP –** Medium level monitoring by means of an ultrasonic probe**.** A user predefines the maximum drop of cleaning medium (in mm) that will not cause the machine to stop (only in machines equipped with ultrasonic probe). **PUMPING & PULSATION CYCLE** – the duration of filling the channel with cleaning medium, this parameter defines also the pulsation duration. **RINSING** – channel rinsing time with mains water. **DIAGNOSTICS** – duration of diagnostics and conservation. **AIR–BLOW** – duration of drying channels with compressed air. **FILLING – PRESSURE TEST** – compressed air filling duration prior to pressure test. **PRESSURE TEST –** pressure test duration. **FILLING – BLOCKAGE TEST** – compressed air filling duration prior to blockage test. **LEAKAGE** – default time setting for leakage test based on water (diagnostics container) for individual section. This parameter can also be changed in the manual mode. **TIME RAMP FOR PRESSURE** – during air-blow the pressure gradually increases. This parameter defines the time required for the pressure to rise from 0 bars to pressure defined by the user. **CLEANING AUTO STOP REFERENCE %** – % of the reference flow rate the machine attempts to reach. After reaching the defined % the machines stops cleaning the defined channel. **MIN. TIGHTNESS TEST PRESSURE** – minimum acceptable pressure drop allowing the channel to pass the pressure test. **TIGHTNESS TEST PRESSURE [DELTA]** – pressure drop range allowing the channel to pass the pressure test.

		MAX. PATENCY TEST PRESSURE – acceptable pressure which makes the channel recognized as not clogged. **NOMINAL PRESSURE** – the pressure defined also in the run of the process. **AIR–BLOW PRESSURE –** air pressure setup for air-blow function. **T SET** – the target temperature of the cleaning agent. **T HYSTERESIS** – the temperature threshold triggering the heater restart.
D. Status of the device		
11		Time counter for the given cleaning device components.
E. Add new agent		
12		Adding new types of cleaning and diagnostic agents that will be displayed on the lower information bar on the screen.

F. Adding new uses		
13		The CoolingCare device can be operated on only by the entitled user trained in correspondence to the conditions set in this Manual. That is why it is advised to designate entitled people to operate the device the first time the device is launched. This screen allows the administrator to add new users with various levels access to machine functions. One writes in the names in the displayed lines. The access status is of three degrees: STANDARD – gives the user the access to every function of the device with the possibility to view the settings parameters of the device – with no possibility to change them. EXTENDED – allows the user to access all the functions of the device with the option to modify every settings parameter of the device. ADMINISTRATOR – gives the users all the eligibilities, including users account management.
G. Network settings		
14		Adding a phone number enables communication with the machine by means of text messages. Once the phone number is added, the machine will notify the user in the case of alarm. In order to activate this function, it is necessary to install a GSM card in the device's modem. **SMS TEST** – a test for sending messages after completing a given task. **ALARM SMS TEST** – a test for sending messages in the case of alarm occurrence.

5.2.4 Cleaning media exchange

To start certain working functions, one might need to get the cleaning and diagnostic (also maintaining) liquids ready.

IMPORTANT! The cleaning and maintaining liquids do not constitute the part of the standard order delivery. The liquids are to be prepared on your own by mixing dedicated chemicals with water. Producer's recommendations for the types of the chemicals will be found in 0 section of this manual.

WARNING!
Each action to prepare cleaning liquids, filling in or emptying the containers shall be taken with special care and with the use of the individual care precautions like: protective filter P2 mask, protective gloves, protective apron and protective glasses.

Water makes the basic ingredient of the cleaning agent. The volume of the cleaning container is 100L (26,4 gallons) and the diagnostic-maintaining container's volume is 45L (approx. 11,9 gallons). The desired water level shall be esteemed by the water level detector placed in the containers.

Filling the container with water shall be done with the use of the workplace system water in correspondence with the directions displayed on the controller screen of the device.

CAUTION!
Do not fill the containers with liquids when the device is running, realizing programmed functions.

A. Automatic filling the containers with mains water

1. Connect the mains water (if it has not been already done accordingly to the section 4.3 of this manual) with a hose to located in the device and labeled as **„IN”**.

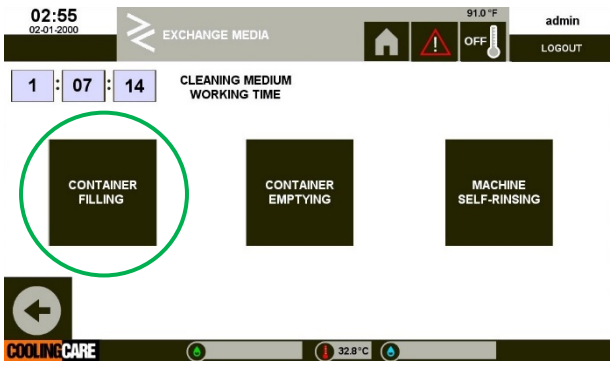
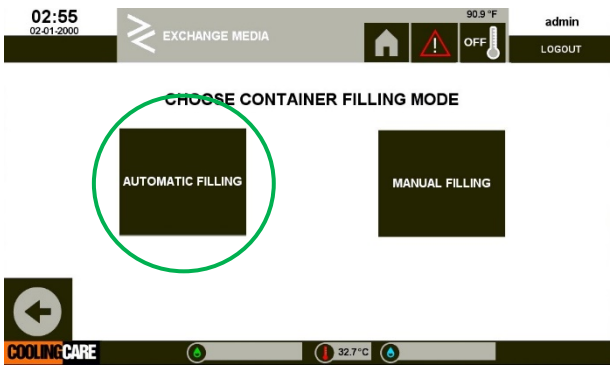
External water supply pressure must be at least 1 bar.

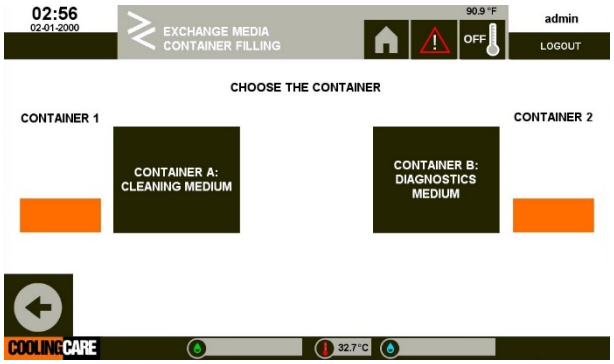
A pressure sensor is installed on the machine's water inlet with a minimum pressure threshold of 1 bar. Connecting external water supply with pressure lower than 1 bar with pressures less than 1 bar will not activate machine functions dependent on the external water supply.

2. The quick connector of the second hose shall be placed on the port located on the device and labeled **„OUT”** (if it has not been already done so accordingly to the section 4.3 of this manual).
3. Bridge the sixth cleaning circuit of the CoolingCare device with the elastic hose (Fig. 10) by firmly fixing the quick connector on one side of the hose on the upper port /**1**/, and the quick connectors the other end of the hose on the vertically placed lower port /**2**/.
4. Lift the main cover (Fig. 2) and remove the container covers (no. 3 and 4, Fig. 3).
5. Select the **„MEDIA EXCHANGE”** button from the main menu on screen /**2**/. Screen /**15**/ is displayed where the user will find the directions as to how to prepare the above-mentioned liquids in correspondence to the procedure described below.

1 – ports on the blue fields to connect to the inlets of the mold cooling channels,
2 – ports on the red fields to connect to the outlets of the mold cooling channels,
3 – removable cover,
4 – valve terminal cover

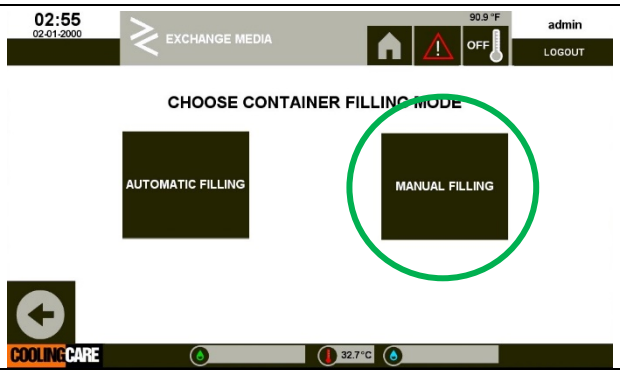
Fig. 10. Pump connection section (a view with a cover on)

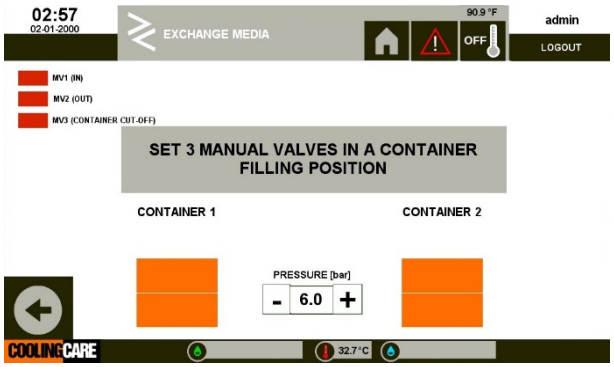
Screen number	*Screen*	*Screen description*
15		Select the icon **„CONTAINER FILLING”**
16		Select the fill in the container mode – if the mains water is connected to the device, choose **„AUTOMATIC FILLING”.**

17		Choose the container to be filled. When one chooses the **A Container** (cleaning agent) the following description will appear at the bottom of the screen: **IN ORDER TO FILL IN THE CONTAINER A, BRIDGE SECTION 6 OF THE MACHINE AND THEN PRESS START. INCORRECT CONNECTION MAY RESULT IN LEAKAGE.** When selecting **Container B** (diagnostic agent) bridging the circuits is not necessary. Start the filling process with the **„START"** button on the console. The device will automatically finish the process of filling the container once the proper water level in the container has been reached.

B. Manual container filling

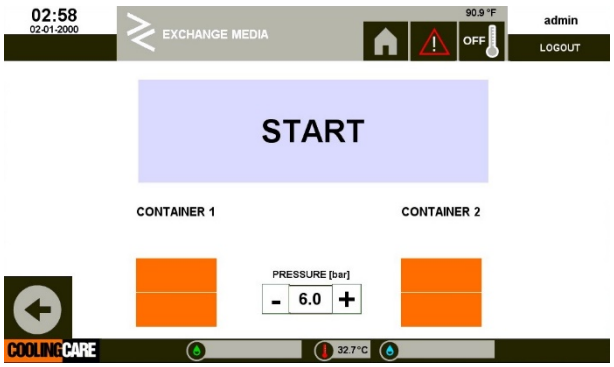
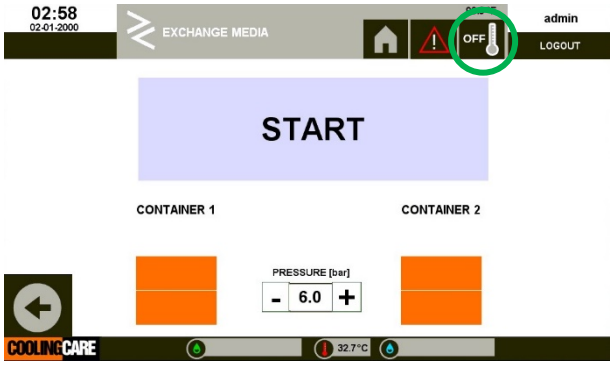
1. Lift the main cover (Fig. 2) and remove the plastic container covers (no. 3 and 4, Fig. 3).
2. Connect the external water tank with a hose ended with a quick coupling to the connector located on the device marked / MV1 - Supply / (no. 1, Fig. 3).
3. Quick-connect the drain hose located in the cleaning / diagnostic tank of the device, put on the connector located on the device marked / MV2 - Return / (no. 2, Fig. 3).
4. Bridge (connect) the CoolingCare cleaning circuits with flexible hoses (Fig. 10) by firmly securing the quick couplings of one end of six hoses to the upper nipples, while the quick-release couplings of the other ends of these hoses to the lower set of nipples.
5. Select the „MEDIA EXCHANGE" button from the main menu (screen **2**). The screen no. /**15**/ will be displayed. Next, select the „FILL IN THE CONTAINERS" button – screen no /**16**/ will be displayed.

Screen number	*Screen*	*Screen description*
16		Choose the mode „**MANUAL FILLING**".

18		Overdrive manual valves **MV1** and **MV2** (no. 1 and 2, Fig. 3) (access to the valves available after lifting the main cover of the containers – Fig. 2) as well as the **MV3 valve** (no. 2, Fig. 11) in right position in correspondence to the designation and the message on the controller. Green color signals valve positioning ready for filling/emptying the containers. When all three manual valves are set in position, the **"START"** button will appear in the center of the screen. ***WARNING!*** **It is forbidden to change the position of the manual valves while the device is running the programmed actions.**

1 – Air preparation unit,
2 – Main cleaning medium suction filter,
3 – Compressed air supply input,
4 – MV3 valve

Fig. 11. View of the rear side of the device

Screen number	*Screen*	*Screen description*
19a		Press the „**START**” icon on the screen in order to start the filling process. The values of the pressure might be changed while filling with the „**+**” and „**-**” buttons. During the process one can stop it by pressing the **„STOP”** button and resume it by pressing the button again. The fill-in process will be automatically finished after having reached the desired level of liquids in containers. ***ATTENTION!*** ***The device continues filling the tank until it reaches the level that causes the second float to rise.***
19b		Having filled the cleaning liquid container with water one should activate the process of heating the water by pressing the thermometer icon surrounded by the green loop. Heating shall be activated immediately after filling in the container. Hot medium enhances the process of mixing the chemicals. The safety mechanism of the device disables one to activate the heating while the container is empty.

6. Having filled the containers one should overdrive the manual valves **MV1, MV2** and **MV3** to their starting position. The pulsating orange signal on the console screen will inform about the improper valves setting.

C. Preparation of cleaning medium in the container

CAUTION!
BEFORE PREPARATION OF CLEANING MEDIUM IT IS NECESSARY TO HEAT UP WATER IN THE CONTAINER TO MIN. 50˚C (122˚F)!

1. Lift the device's lid (Fig. 2).
2. Remove the cover of the cleaning container (no. 3, Fig. 3).
3. After heating the water (up to min. 50˚C) pour into the filter basket (no. 1, Fig. 12) located in the cleaning tank.
4. In order to properly dissolve the powder, one should hold the filter box handles (no. 2, Fig. 12) and move it up and down, causing gradual mixing of powder with heated water. This action shall be repeated until no powder is left in the filtration box.

5. Repeat the process until all the cleaning media powder has dissolved. Shift the filtration box back, so that it can be used as a return filter for cleaning medium pumped back into the container.
6. Close the cover of the container.

Fig. 12. Filtration box

D. Preparing the liquid in the diagnostics container

The diagnostic container is to be filled with mains water (see point A above). If the device is not connected to the system water, the container has to be filled manually (see point B above). Depending on the medium used the diagnostic container can hold the function of:

Scenario 1: No mains water connection

In such case the container will be filled manually with water. It will be used to run the flow rate diagnostics as well as rinse the system once the cleaning is complete to increase the pH level to neutral. Rinsing the cleaned system with the water from the diagnostic container once the cleaning is complete will eventually lead to the water acidification. One should control the water pH in the container using the manual pH-meter added to the device. It should be seen to that the water of pH less than 5 will not be used to rinse the system – it might lead to the derivate corrosion inside the channels once the cleaning process is complete.

Scenario 2: Main water is connected

In such a case, the medium in the diagnostic container will be used only to diagnose the flow rates and will be preceded by rinsing the system with mains water to decrease the possibility of lowering the agent's pH value. In this scenario the container can be used to provide additional protection against corrosion after cleaning. To do so, one should add the corrosion inhibitor of 2÷5% concentration to water. The user might choose the corrosion inhibitor among the products available on the market.

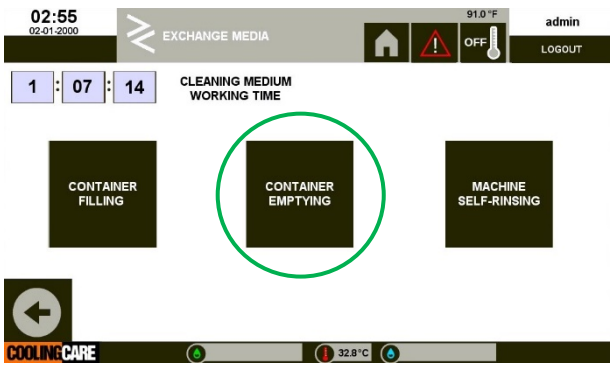
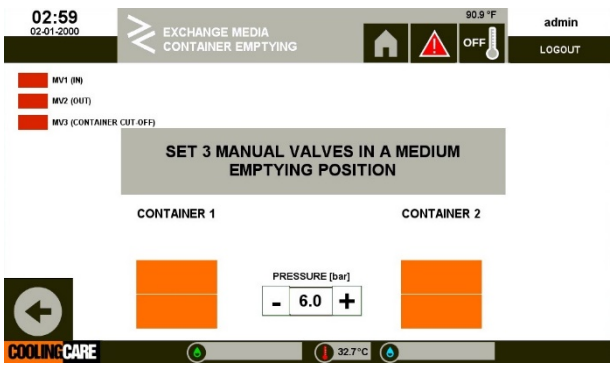
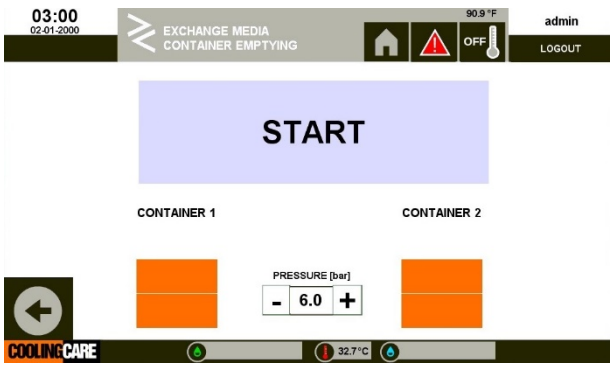
E. Emptying the containers

1. Turn off the heating on the control panel of the device.
2. Open the main cover of the containers (Fig. 2).
3. Remove the lids from the containers (no. 3 and 4, Fig. 3).
4. Connect the dedicated hoses to the pumping system in accordance with the markings on the connections (MV1 - suction, MV2 - return) - place the blue suction hose with an oblique filter in the tank to be emptied and connect with a quick coupling to the connector on the device marked / MV1 /, and place the transparent (transparent) return hose in a container resistant to chemical agents and proper capacity and connect with a quick connector to the connector on the device marked / MV2 /.

CAUTION!

Make sure to position the return hose in the container in a way that prevents the end of the hose from falling out during the container emptying process.

5. Select – screen no. /**2**/ – **„Media exchange" from the main menu** – screen no. /**15**/ will be displayed.

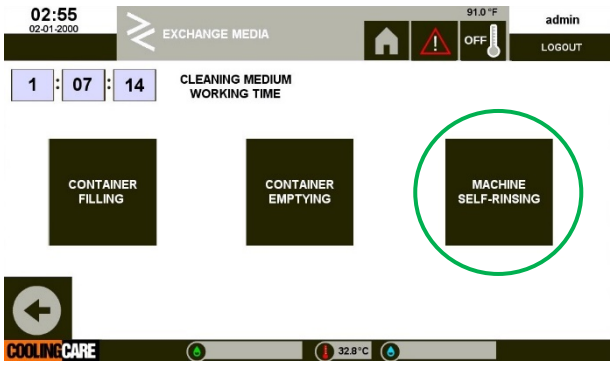
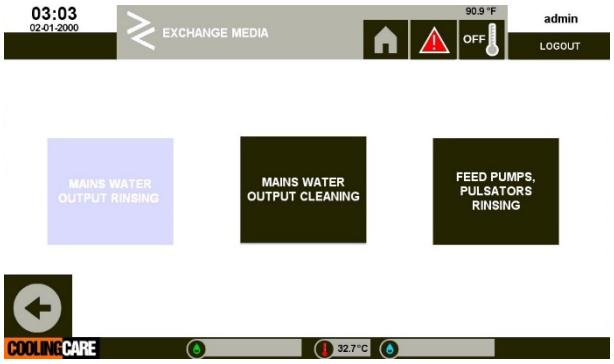
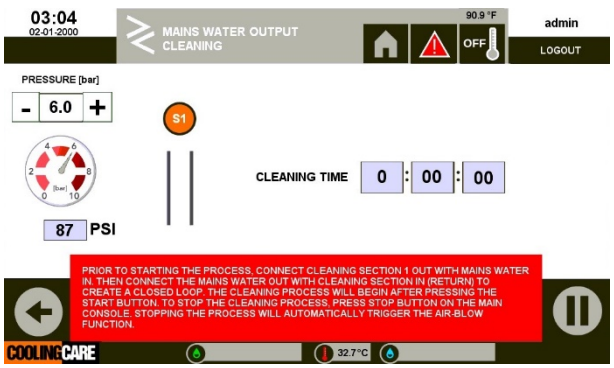
Screen number	*Screen*	*Screen description*
15		Select **„CONTAINER EMPTYING".**
20		Set the pressure to pump out the agent. Set manual valves **MV1**, **MV2**, **MV3** in right positions to pump out the medium accordingly to the indication and the information on controller. Green light next to valve names on the screen will signalize the valves have been set properly and the icon „**START**" will show on the controller's screen.
21		Pumping out begins after having pressed the „**START**" button on the screen. This process can be stopped by pressing the button again. The pressure can be changed using the „**+**" and „**-**" buttons.

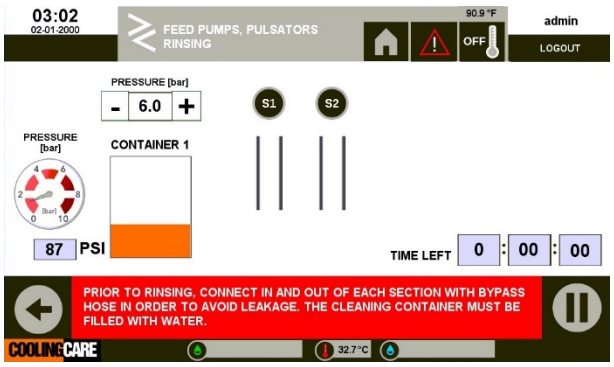
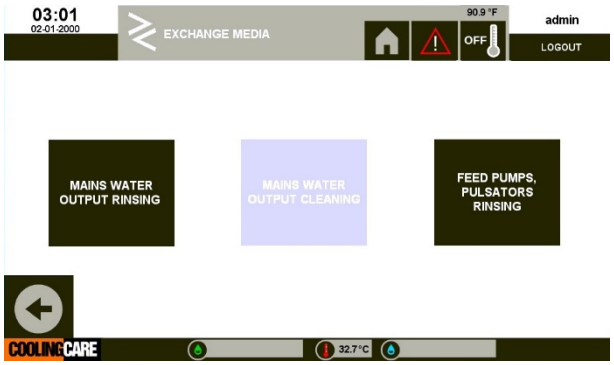
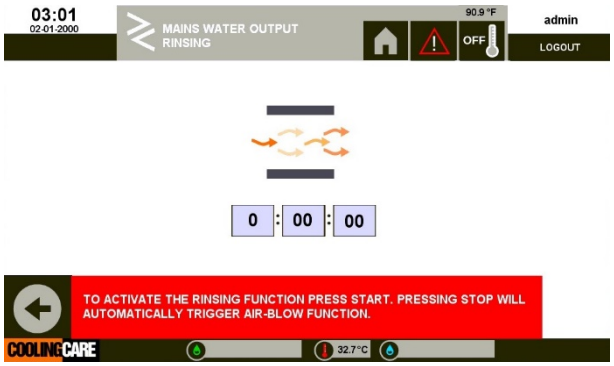
6. Having completed pumping out process, one should check the bottom of the container. Should it be dirty, rinse it with water and empty it again. Solids and other remaining contamination are to be removed manually.
7. Having completed the process of emptying the containers, one should set the manual valves **MV1**, **MV2** and **MV3** to their starting position – improper setting will be marked by pulsating orange

light on the signaler. Next, disconnect the hoses and close the containers with the lids and the main cover.

F. Rinsing the system

Select „MEDIA EXCHANGE" on screen /**2**/ – screen no. /**15**/ will be displayed.

Screen number	*Screen*	*Screen description*
15		Select **„ MACHINE SELF RINSING".** The following screen will be displayed (Screen no. **22**).
22		After selecting the option "**MACHINE SELF RINSING**" 3 options will be available. **Option 1**: flushing the mains water circuit - aims to pass the mains water through the bypass, bypassing the entire machine hydraulic system and mold to flush the mains water outlet with clean water. The option is available only when external water supply is connected. **Option 2**: cleaning the mains water circuit - aims to clean the mains water system in the machine using cleaning medium. **Option 3** - pump and pulsator rinsing - the purpose is to flush the machine's cleaning system (pumps and pulsators) and remove the residual chemicals in them. The procedure should be performed when the machine is to be stopped for more than a week.
22a		Option 2. To clean the mains water return, connect the output (power) of the 1 cleaning section to the mains water supply, and then connect the mains water return with the hose back to section 1. The cleaning process will start after pressing the "START" button. Stopping the process with the "STOP" button will activate the purge function.

22b		Option 3. Select circuits for rinsing by pressing the icons "S1" to "S6". Start rinsing by pressing the "START" button on the control panel.
22c		When the pressure sensor detects the mains water connection, Option 1 is activated and Option 2 is deactivated
22d		Option 1. To activate the flushing function for the mains water output on the bypass, press the "START" button. Pressing the "STOP" button will automatically start the purge function.

5.2.5 Connecting the machine to cooling channels

The CoolingCare CA–2 device enables the user to simultaneously clean 2 cooling channels. The mold is to be placed in a way that will make it possible to easily connect the hoses to the cleaning device.

The device should be connected to the mold channels by means of attested hoses ended with quick connectors. Make sure the hoses are made of materials suitable for work with aggressive, acid-based chemicals (in accordance with EN 12115:2011 requirements). In example, the inner tube of the hose made of UHMWPE (UPE – Ultra High Molecular Weight Polyethylene) gives proper protection. One end of the hoses feeding the mold with the cleaning agent should be plugged into the upper ports of the device (no. 1, Fig. 10), and the other end plugged into clean mold cooling channel inlets.

Quick connectors on one side of the return hoses should be plugged into the lower ports of the device (no. 2, Fig. 10), while the other end is to be plugged into the channel outlets. It is crucial to match the inlet and outlet of the same channel, as improper connection may result in leakage. It should be noticed that the hoses lie loosely, with no tension or sharp bends.

5.2.6 Automatic mode

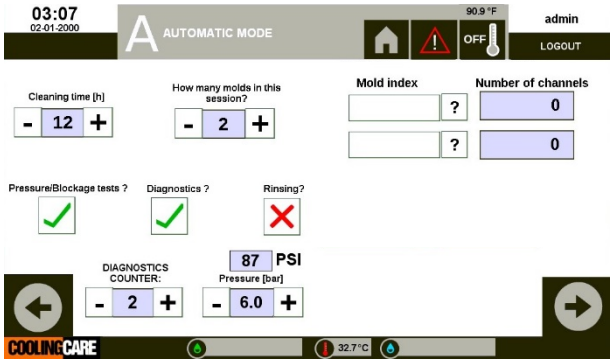
This device can run in automatic or manual mode. In automatic mode the device performs a string of actions one after another.

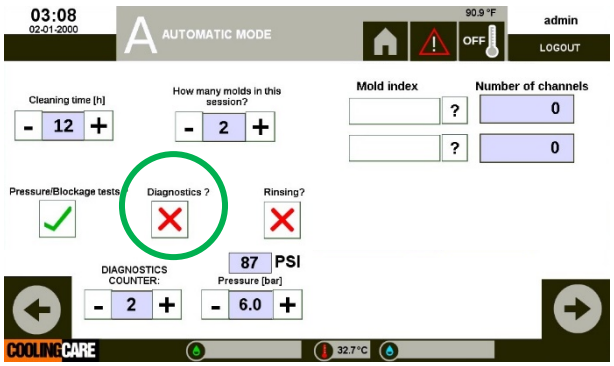
The following scheme makes the full mold automatic mode cleaning procedure:

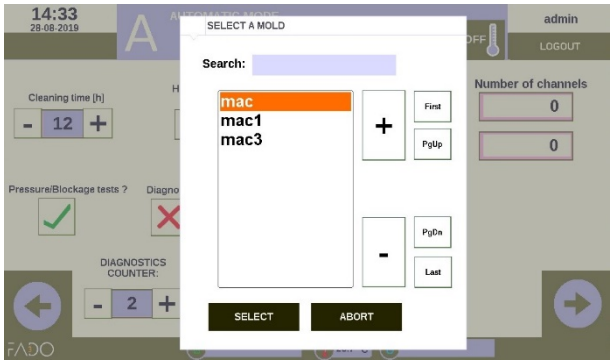
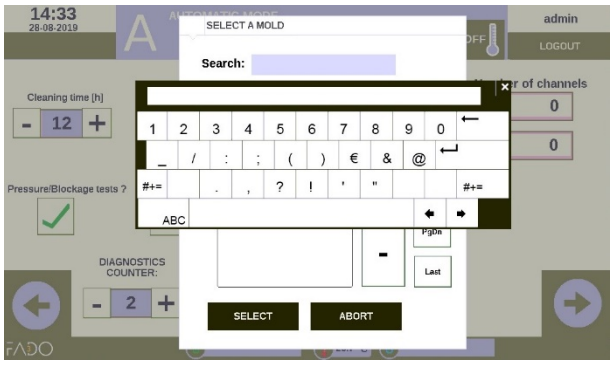
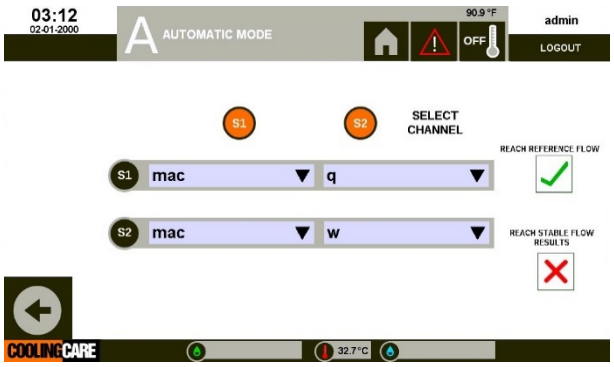
- pressure and blockage tests,
- rinsing the channels with mains water,
- channels air blow (mains water out),
- flow rate measurement,
- channels air blow (diagnostic container),
- rinsing the channels with mains water,
- channels air blow (mains water out),
- cleaning,
- air blow (cleaning container),
- rising the channels with mains water,
- channels air blow (mains water out),
- flow rate measurement,
- channels air blow (diagnostic container),
- pressure/blockage test.

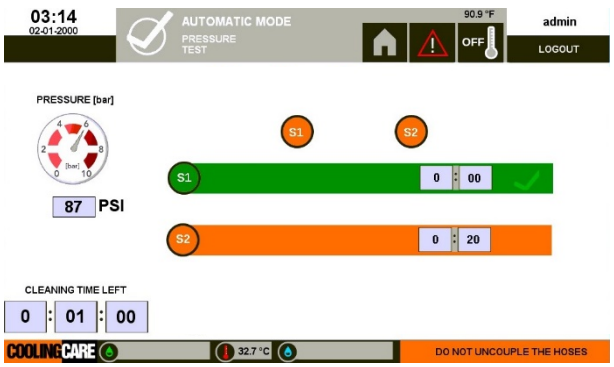
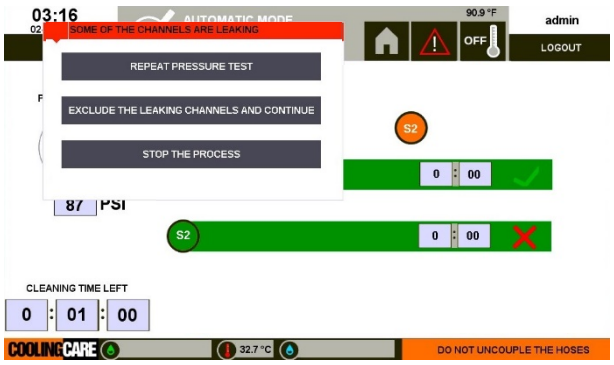
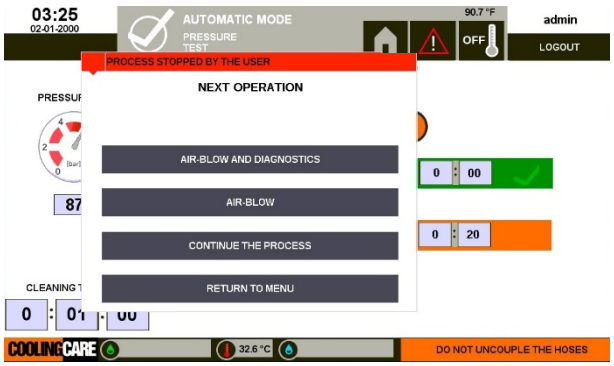
In the case of lack of mains water connection, the device will automatically modify the procedure, omitting the rinsing function and the following actions of blowing with the compressed air.

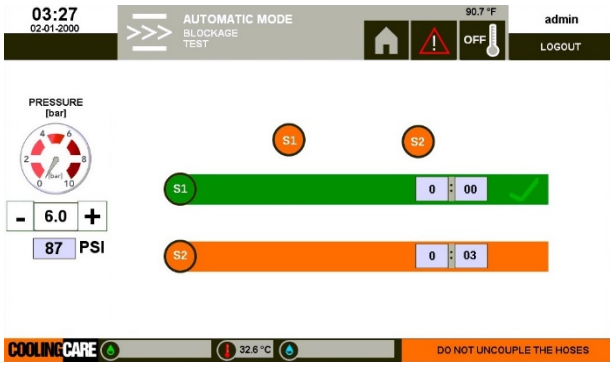
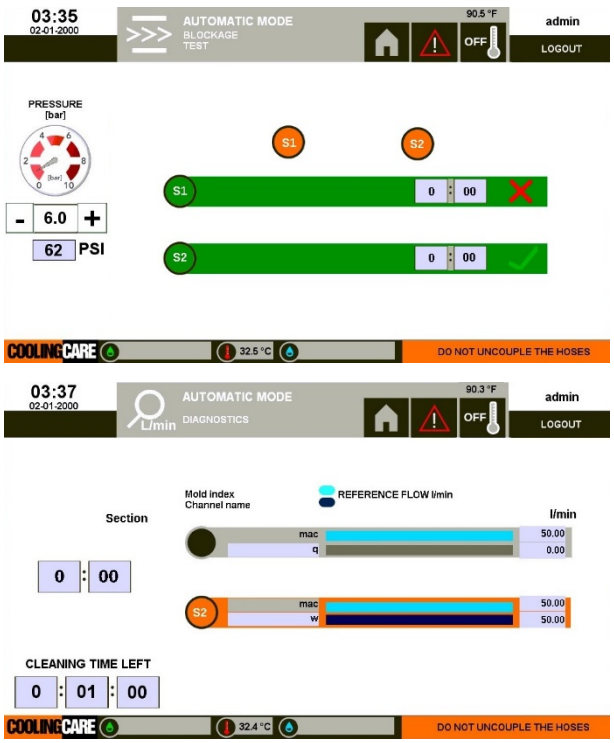
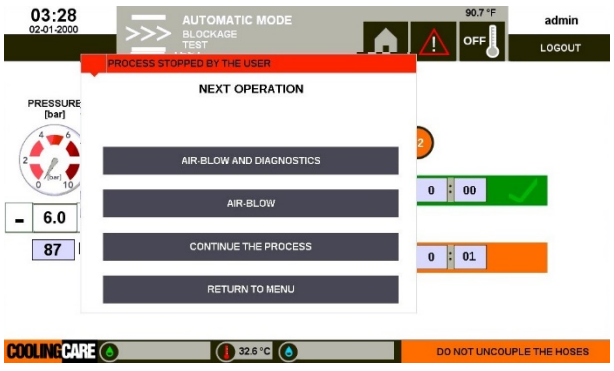
Having chosen the **"AUTOMATIC MODE"** option, the user defines basic process parameters on screen no. **2** and selects the mold(s) they wish to clean (screen no. **23**).

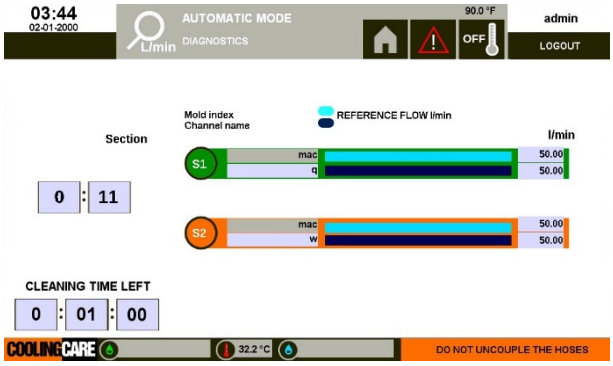
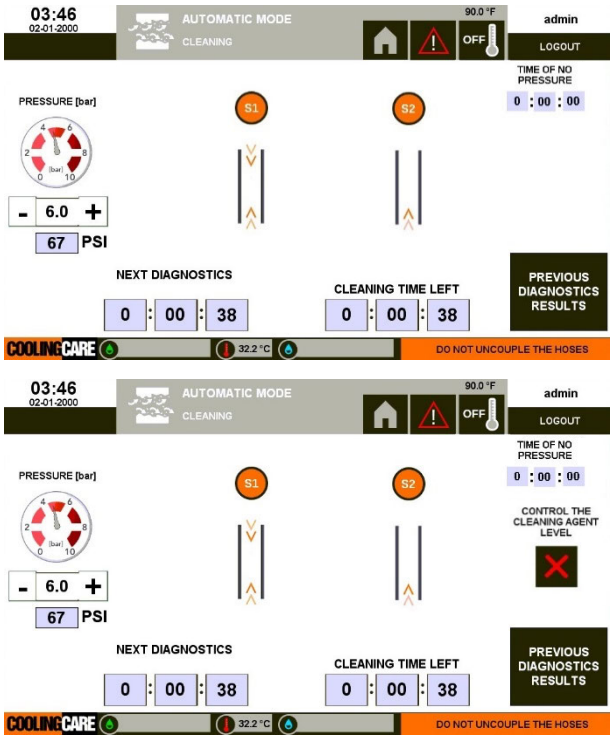
Screen number	*Screen*	*Screen description*
A. Process setup in automatic mode		
23		The time of the cleaning process can be defined by pressing „**+**" and „**-**''. One defines the number of molds simultaneously connected to the CoolingCare device by pressing „**+**'' and „**-**'' on the screen right under the inscription: "**How many molds in this session**". The user can choose up to two molds per session. Choosing the number of the molds will activate the rectangular "**Mold Index**" and "**Number of Channels**" icons. After selecting the mold from the database, the number of channels of the given mold will automatically appear. **It is not recommended to bridge the circuits as such solution might have negative impact on the dynamics of the cleaning process.** User might choose the option to run the pressure/blockage tests, run the diagnostics and rinse the channels. **The rinsing option will be available only if mains water connection is detected.** In the case of lack of mains water connection, the rinsing icon remains inactive. It is also possible to determine how many additional flow rate measurements throughout the cleaning process the machine is to perform ("**NUMBER OF DIAGNOSTICS**"). Such an option allows the user to determine the curve line of the flow rate increase over time, yet it shall be remembered it goes together with prolonging the cleaning process (diagnostics is performed with different agent, which results in additional air-blows between the operations of cleaning and diagnostics, and in the case of mains water connection, additional rinsing between operations). When the user selects a mold which has reference flow rates saved in the database, an additional cleaning option

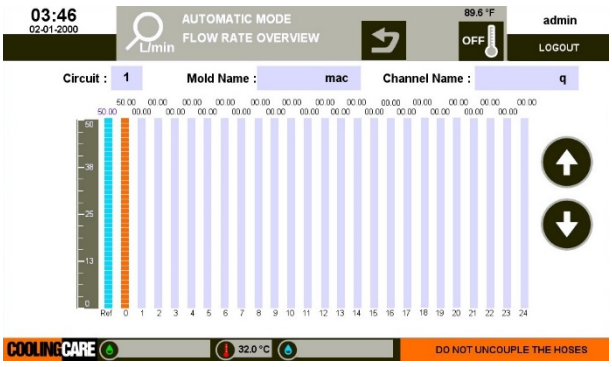
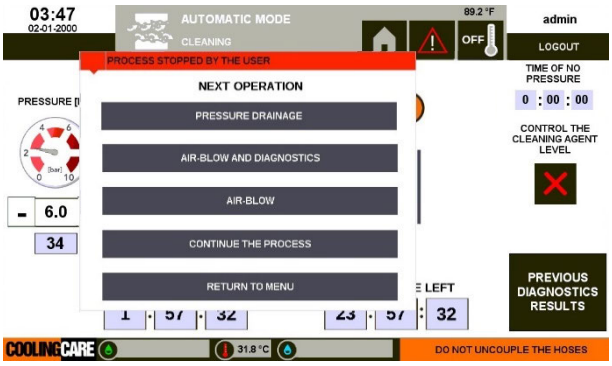
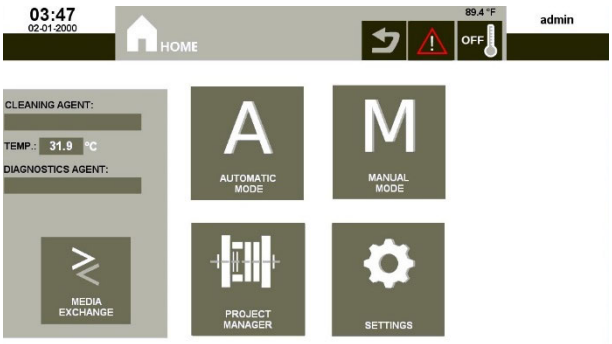
		appears on the screen, which allows them to clean the channels until a given flow rate is achieved - the "CLEAR FOR REFERENCE" option. The user specifies the percentage to which the device should aim in the Parameter settings. Selecting this cleaning function automatically activates additional diagnostics that are performed every 2 hours. The cleaning process ends when diagnostic results are achieved within the pre-defined range, however, it does not last more than 24 hours. Having defined all the cleaning parameters the user, by pressing the 'right arrow' icon, proceeds to the screen number /**24**/, that will enable them to assign certain circuits of the cleaning device (S1 – S2) to certain cooling channels of the mold(s) or their groups.
23a		When using DS3 cleaning media dedicated to oily channels, do not diagnose the flow of ducts before cleaning, but only after. **Failure to comply with the above recommendations may lead to damage to the rotor pump responsible for the measurements.** Therefore, to use the automatic mode, deactivate the "diagnostics" function, and after the cleaning process, measure the flow in manual mode.

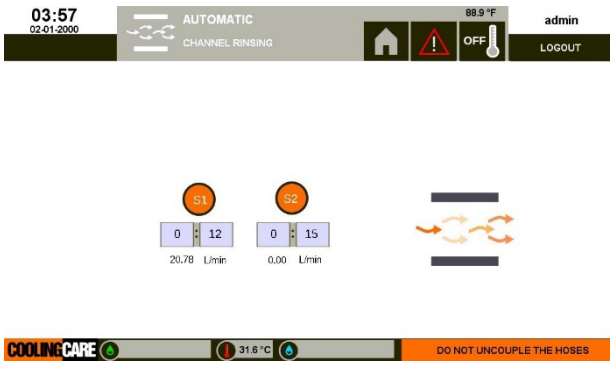
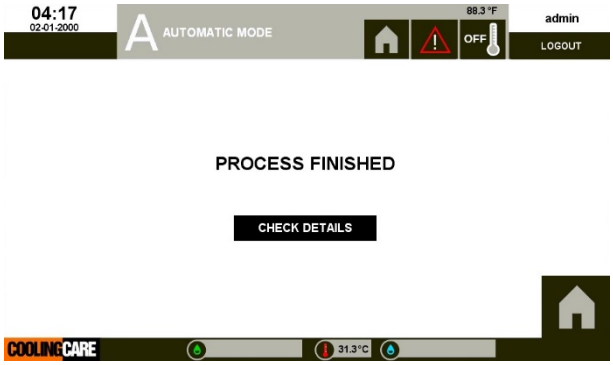
23b	 	In order to select a mold from the database click icon /? / on screen /23/. Scroll the database with „**+**”, „**-**”, „**First**”, „**Last**”, „**PgUp**” i „**PgDn**”. To find a mold click “Search” area and put the name of the mold, acknowledge the choice with ↵ button. After selecting the mold from the list click **“Select”** to continue.
B. Assigning the circuits to the channels of the mold		
24		S1 to S2 buttons on the top of the screen correspond to the number of sections available in the machine. Select the number of sections you want to activate. Next, assign the mold name and channel number to the section. The first column corresponds to the mold/s selected on the previous screen. The column on the right is a list of channels for a particular mold we selected. If all channels of a mold we selected have referential flow rates saved in the database, additional cleaning option will appear on the right side of the screen, allowing the channels to be cleaned until they reach the reference flow rate value. Choosing this option will change the cleaning time to 24 hours and activate additional diagnostics, which will run every 2 hours. Once the desired flow rate of a particular channel is reached, the machine deactivates that circuit and continues cleaning other channels. The process is continued for 24 hours or until the reference flow rate is reached. We can also tell the machine to continue cleaning until repeatable flow rate results are reached – if we select this option, the

		cleaning time will be automatically changed to 24h with diagnostics every two hours. The process is similar to the one described above. Pressing the green button "**START**" on the main console will launch the device.
	C. Pressure test	
25		The device starts the process in the automatic mode and proceeds to the pressure test screen. First the test will run for all circuits simultaneously. Should leakage be found, the test will be repeated, this time for every single circuit one by one to identify the leakage source.
26		Leakage will be signalized by the "**X**" appearing in the line of the given circuit. The user will be asked to take some action. In the case no decision has been made within the following 5 minutes, the device will automatically cut off the leaking channel(s) and will continue the process for the other circuits.
27		The process might be stopped by the user at any time. Having pressed the red "**STOP**" button on the main console, a pop-up window will appear with the following options to choose from: Air–blow and diagnostics Air–blow Continue the process Return to menu

D. Blockage test		
28		Once the pressure test has been completed, the device will move on to the blockage test.
29		If the channel (s) turns out to be clogged (this is indicated by the appearance of the "X" on the line of the given circuit), the device proceeds to flow rate diagnostics bypassing clogged circuits. After completing the leakage / patency tests, the device starts flushing the system with mains water (if mains water is connected to the device and the "Rinse?" Function on the automatic mode screen has been activated - screen No. / 23 /), and then measures the flow rate for each circuit. Rinsing with mains water is intended to remove water in the channels so as to avoid unnecessary contamination of the cleaning / diagnostic medium. In the absence of a mains water connection, the device automatically goes to the diagnostic screen.
30		The blockage test might be stopped at any time by the user. Pressing the “**STOP**” icon (red one on the main console) will result in a pop-up screen appearing in the middle of the screen. The user will be asked to select from one if the options: Air–blow and diagnostics Air–blow Continue the process Return to menu
	***If clogging is diagnosed, do not disconnect the hoses. The pressure buildup in the system could result in bursting the contents during a disconnection attempt. The pressure should be released using the valve located between the cleaning and diagnostic tank (Fig. 3).***	

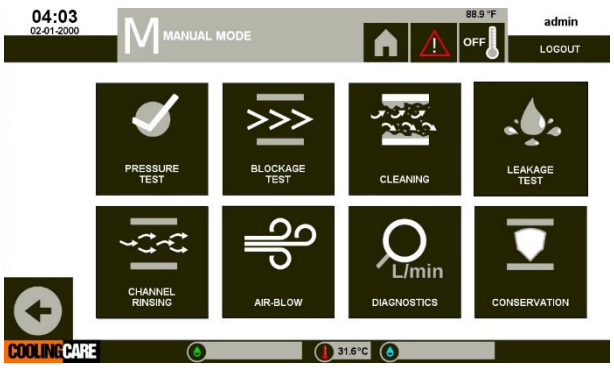
E. Flow rate diagnostics		
31		Once the pressure and blockage tests are completed, the device proceeds to the flow rate diagnostics. The test runs on the diagnostic agent from the diagnostic container. The light blue color indicates the reference flow rate value. If the channel does not have the reference flow saved in the database, the light blue color will depict the flow rate value reached in 1st diagnostics. The navy blue refers to the current flow rate reached. The diagnostics ends with the automatic air-blow to the diagnostic container and then the channel cleaning process begins.
F. Cleaning		
32		Cleaning process takes place in two steps – first, the channel is filled with the cleaning agent. The filling time is determined in the “**SETTINGS**” – screen /**10**/, the standard time is 30 seconds. The second stage is the dynamic pulsation mode. The pulsation time is similar to the filling time. “**PREVIOUS DIAGNOSTICS RESULTS**” button shows the flow rate results reached so far – screen /**33**/. The user might as well proceed to the main menu by pressing the “**HOME**” icon in the upper task bar – they will be redirected to screen number /**36**/. This option allows the user to view the Project Manager while the device is on the run. Other main menu options are unavailable when the machine is working.

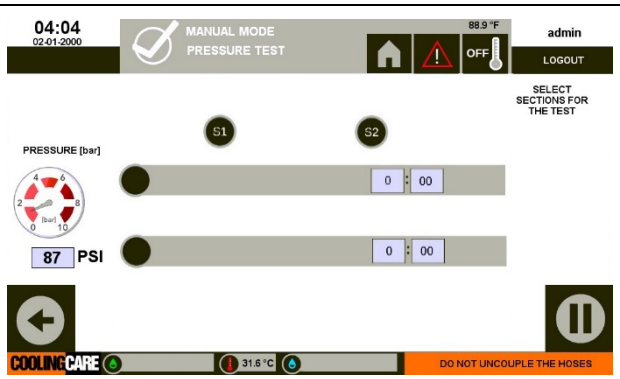
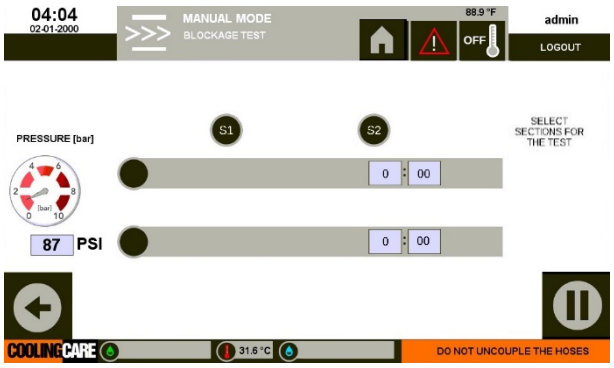
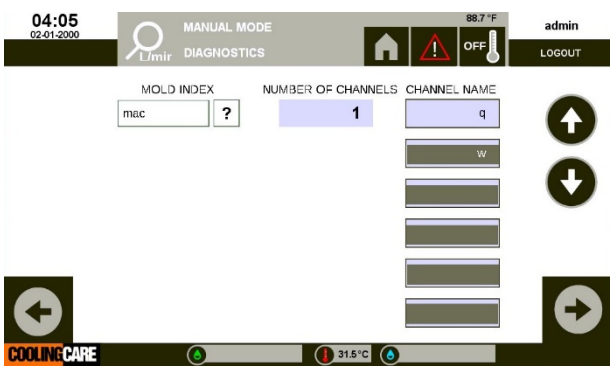
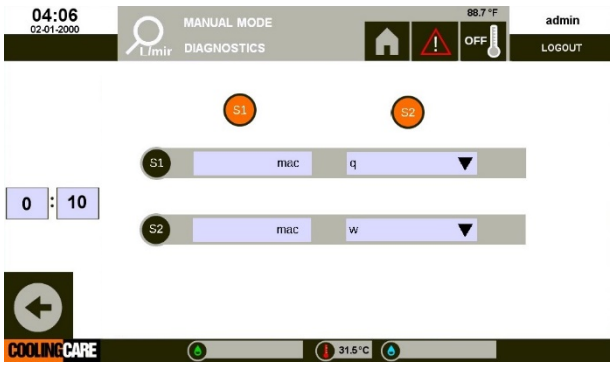
33		Flow rate values curve screen. Arrows "**up**" and "**down**" enable the user to preview the changes in the flow for given particular channels. The user can at any time return to the current device's run screen by pressing  located in the top bar on the screen.
34		The user can at any time stop the process by pressing the "STOP" button on the control panel, a message will appear on the screen (screen next to it).
35		The user can at any time stop the cleaning process by pressing the "**STOP**" button on the main console. Should the cleaning process be stopped manually before the cleaning is completed, the controller screen will show the information seen on the screen on the left.
36		The user can at any time return to the current device's run screen by pressing  located in the top bar on the screen.

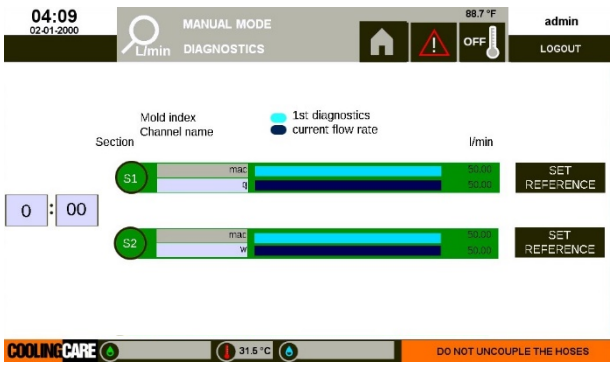
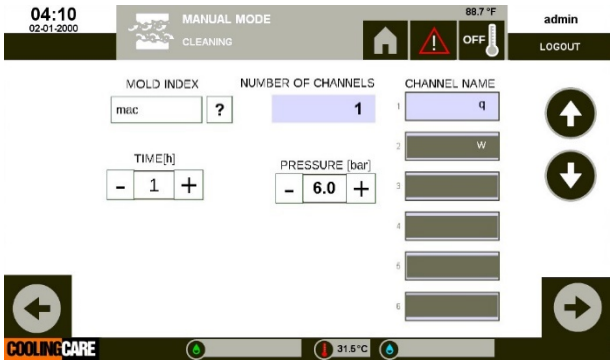
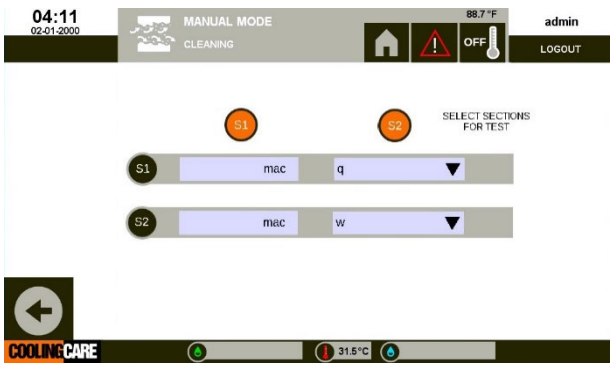
37		Rinsing screen, the function is available to be marked when the mains water is connected to the machine. After selecting the option "Rinsing" - screen No. / 23 /, the device performs rinsing with external water supply at the beginning and at the end of the process.
38		After the cleaning process, the channels are automatically blown with compressed air, and then flushed with mains water (if we have a mains water connection). The next step is to re-diagnose the flow rate and do the leakage test of the channels. Cleaning time and cleaned channels are saved in the history of the project and are available from the "PROJECT MANAGER" folder.

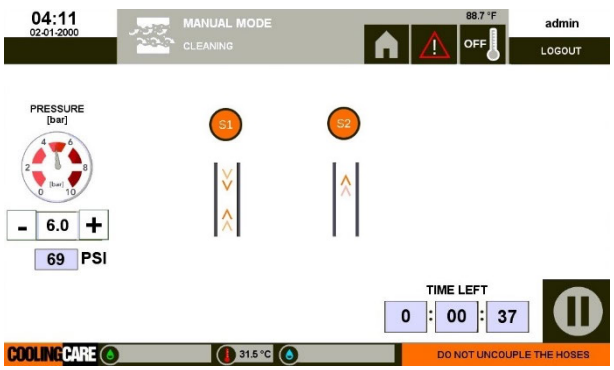
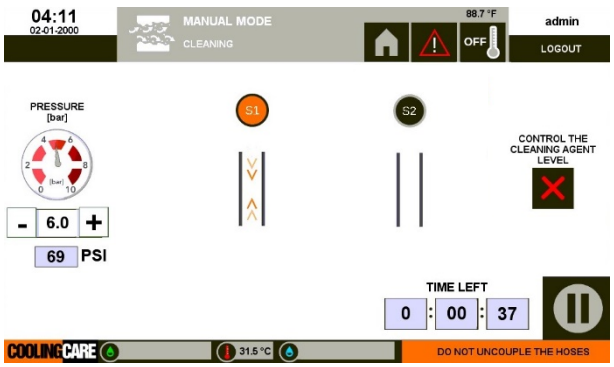
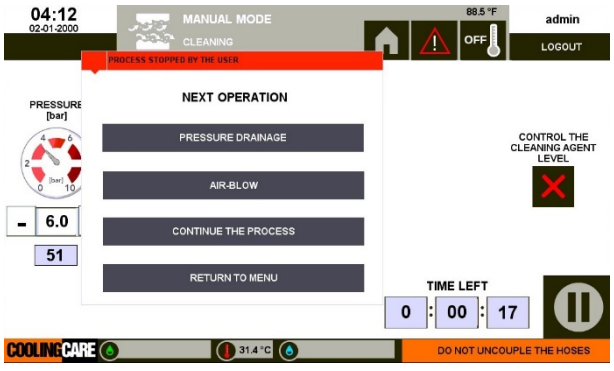
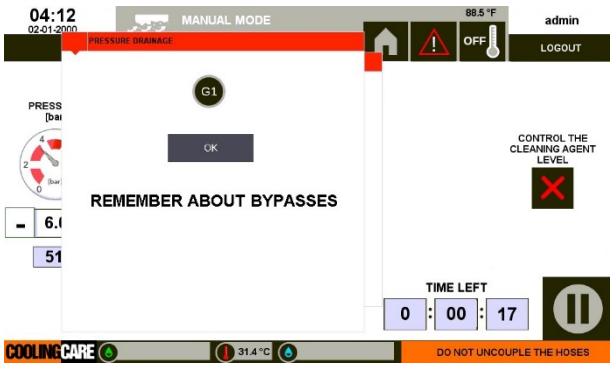
5.2.7 Manual mode

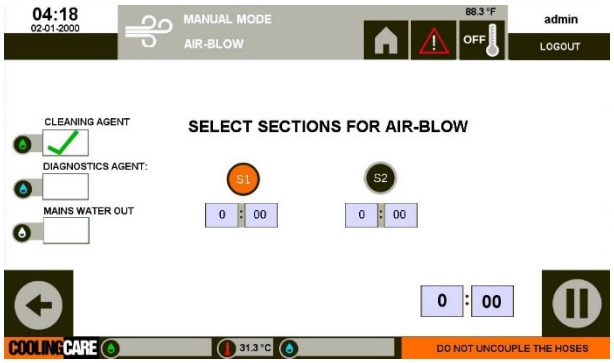
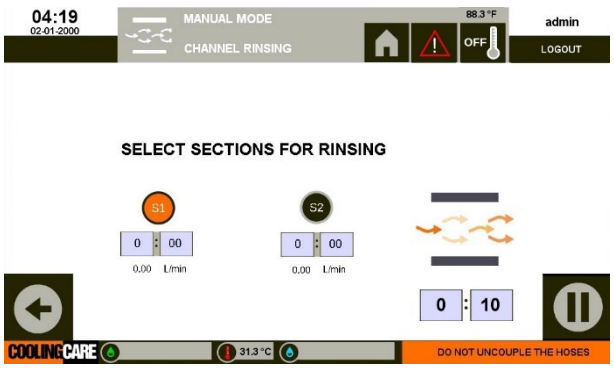
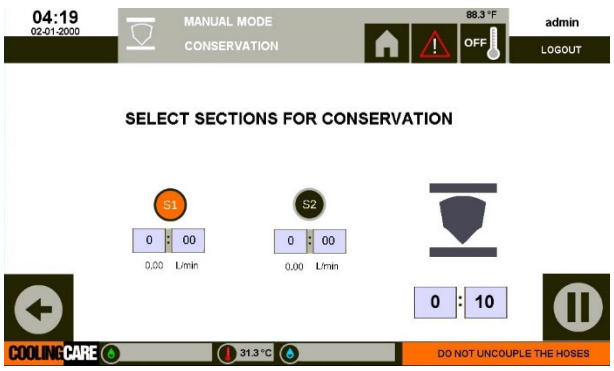
Manual mode is available after pressing the “**MANUAL MODE**” button on screen number /**2**/ – screen no. /**39**/ will open.

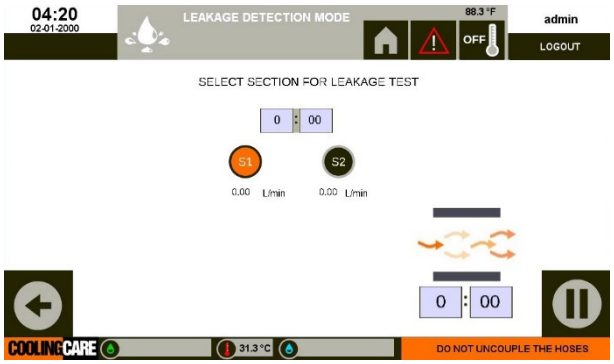
Screen number	*Screen*	*Screen description*
39		Manual mode enables the user to choose individual functions of the device available in the automatic mode, independent from one another. If there is no mains water connection, the rinsing function will be greyed out.

	A. Pressure test	
40		"**PRESSURE TEST**" allows users to identify leakage issues with compressed air. The user marks circuits of choice and launches the process with the green" START" button on the main console**.**
	B. Blockage test	
41		The "**BLOCKAGE TEST**" enables the user to check the blockage of given circuits with the compressed air. The user marks circuits of choice and launches the process with the green "**START**" button on the main console.
	C. Diagnostics	
42		Pressing the "**DIAGNOSTICS**" button on the screen number /**39**/ opens the screen on the left. The user selects the mold from the data base and by pressing the 'continue' arrow in the bottom right corner proceeds to the screen no. /**43**/.
43		The machine operator selects the mold channels to undergo the test and assigns them to the circuits of the device. Pressing the "**START**" button launches the process (green button on the main console). The test runs on diagnostics agent.

44		Pressing "**START**" button takes the operator to screen /44/ and activates the rotary pump. The measurement is performed for each channel individually. The results are depicted in graphic and digit form. If diagnostics is performed for the first time, the machine will not show "1st diagnostics" results, only "current flow rate" will appear. The process is followed by air-blow of channels. Once the measurement is over, a button "**SET REFERENCE**" will appear. Pressing this button next to each flow rate will save the reached flow rate value as the reference point for future cleaning.
	D. Cleaning	
45		Having chosen the "**CLEANING**" button – screen /**39**/ – in the manual mode the user will be asked to choose a mold for cleaning and define cleaning parameters. After defining the cleaning parameters, the operator will proceed to the screen no /**46**/ by pressing the bottom right corner arrow.
46		This screen enables the user to assign particular system's circuits to the cleaned channels and then launches the process by pressing the "**START**" button on the main console.

47	 	Cleaning process takes place in two steps – first, a channel is filled with the cleaning agent. The filling time is determined in the "**SETTINGS**" – screen /**10**/, default time is 30 seconds, but can be adjusted by the operator depending on the channel length, diameter, etc. The second stage is the dynamic pulsation mode. The pulsation time is similar to the filling time. If the machine is equipped with ultrasonic sensor measuring the amount of liquid in the cleaning container, on the right-hand side you will see additional button 'Control agent level. It activates liquid level monitoring.
48	 	The process can be stopped at any time by the user. After pressing the 'STOP' button (red icon on the main console) a pop-up screen will appear, showing three options: Pressure drainage Air–blow Continue the process Return to menu The following actions will take place accordingly to the chosen operation. Selecting "**PRESSURE DRAINAGE**" option opens another pop-up screen, where the operator is asked to select one of three groups (**G1**) where pressure drainage is to take place.

E. Air–blow		
49		The "**AIR–BLOW**" allows to remove the remaining liquid and dry out the channels. The user can choose where the air from the system will be blown out. The user selects where to blow whatever is left inside the channels (option 1 – cleaning agent container, option 2 – diagnostic agent container, option 3 – the mains water outlet). Having chosen the channels to be blown the process will launch by pressing the "**START**" button on the main console.
F. Rinsing		
50		The "**RINSING**" option requires mains water connection. If the device does not detect the connection, the "**RINSING**" icon will not be greyed out. This function allows the user to rinse the circuits with mains water to remove all the cleaning agent residue and increase the pH value to neutral. It is significant that once the cleaning is completed, there is no acidic environment left inside the channels – it might lead to the accelerated corrosion of the system.
G. Conservation		
51		The '**CONSERVATION**' function allows the user to provide channels with additional corrosion protection once the cleaning is completed. From the process perspective, it is identical to the diagnosis process. The operator chooses the channels to be the conservation and launches the process with the 'START' button on the main console. **ATTENTION!** **To run the conservation, it is essential to add corrosion inhibitor to the diagnostic container filled with water prior to running this process.**

H. Leakage detection mode		
52		If a leak is detected during the pneumatic leak test (pressure test), the user can run the water-based leakage test function based on the diagnostic tank. The user selects the channel where the leak was detected and then starts the process with the "START" button. He then observes the mold cycle to identify the location of the leakage. After locating the cause of the leak, he stops the process and purge the system with compressed air. Then the cause of the leakage in the mold should be eliminated. Never proceed with the cleaning process when leakage has been detected, as this may result damaging the mold.

5.2.8 CoolingCare Connect feature

It is possible for the machine to communicate with the user by means of text messages. These are sent to operators in the event of alarms (Table 1), unexpected occurrences (failed pressure/patency tests in automatic mode), or end of the cleaning procedure. Operators can also ask the machine for its current status by sending a text message with a capital letter S (S stands for Status). In order to activate the CoolingCare Connect function, one must insert a GSM card (similar to the ones in mobile phones) into the machine's modem.

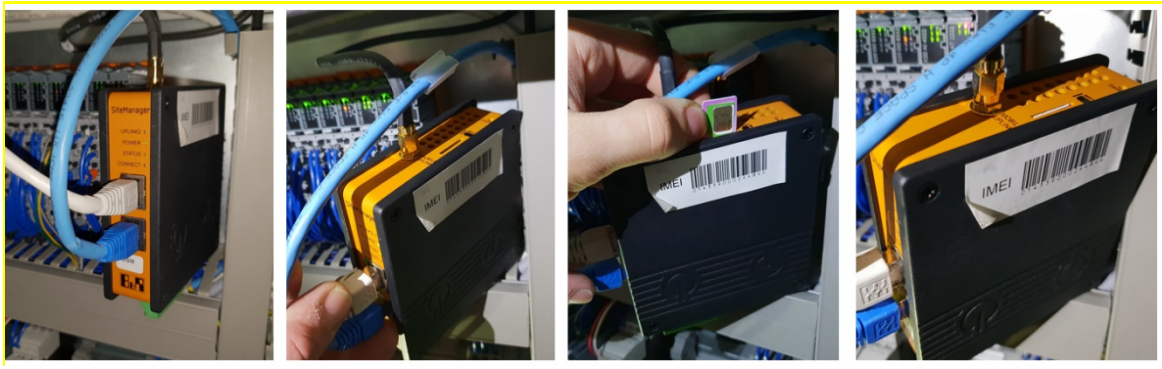


Fig. 13. GSM card installation

1. Disconnect the machine from the power supply.
2. Open the electrical box.
3. Take out the modem (it is placed just beneath the PLC, in the upper are of the electrical box).
4. Place the GSM card in the card slot, correct positioning of the card will be indicated by distinctive 'click' sound.
5. Put the modem back to its place.
6. Connect the machine and turn it on.
7. If the machine is able to detect the card, the UPLINK2 diode on the modem glows green.

8. Go to machine settings – Network Settings and add operators' phone numbers for communication.

Attention!
For proper operation of the machine, permanent access to the Internet must be ensured.

5.2.7 Alarms

The CoolingCare device has been equipped with functions to detect failure in its run. The operator will be informed of any possible perturbation while running the processes by the light signals located on the main console (no. 7, Fig. 7) and by the „**ALARM**" icon on the LCD screen. The task of the operator is to remove the alarm by implementing corrections in accordance with descriptions in this manual (from 0 to 0).

Detailed alarm descriptions are presented in Table 1 below.

ATTENTION!

All actions related to opening the electrical box in the machine can be performed only by suitable people with electrical qualifications.

ATTENTION!

Toutes les actions liées à l'ouverture du boîtier électrique de la machine ne peuvent être effectuées que par des personnes qualifiées ayant les qualifications requises.

Table 1. List of alarms

No.	ALARM CODE	Alarm description	Outcome/meaning	Required action
1	**1006**	TDR level sensor – cleaning agent tank	Damage to the cable connecting the measuring probe to the receiver. Damage to the measuring probe or the electrical component of the sensor. The connection between the sensor and the electric box is damaged.	Check all connections and the sensor itself for mechanical damage. Contact the service.
2	**1007**	Floater sensor error – diagnostics tank	Indication of bottom floater sensor – if during the container filling the middle floater goes up but the bottom one stays down, the alarm will be triggered.	Check if there is no dirt obstructing the movement of the bottom floater sensor, wash the sensors with running water and confirm the alarm.

3	**1005**	Liquid level too high – cleaning agent tank	The TDR level sensor indicates reaching critical liquid level – possible overflow. The process is stopped until the liquid level in the container does not drop so that operator can confirm the alarm.	Remove the excess water in the container so that alarm on the PLC panel can be confirmed. Check if the outlet nipples are not clogged. Possible internal leakage of three-way valves. Call for service support.
4	**1004**	Liquid level too low - cleaning agent tank	Machine stops, tank needs to be refilled until the alarm can be confirmed. Possible leakage/ leaking one of three-way valves.	Run pressure test to identify the leakage issue. Put bypasses and run the test. If it is a machine leakage, call for service support.
5	**1009**	Liquid level too high - diagnostics tank	Third floater sensor was reached – possible overflow. The process is stopped until the liquid level in the container does not drop so that the third (upper) floater returns to its original position.	Remove the excess water in the container so that the third floater drops. Check if the outlet nipples are not clogged. Possible internal leakage of three-way valves. Call for service support.
6	**1008**	Liquid level too low - diagnostics tank	Machine stops, tank needs to be refilled until the second floater goes up. Possible leakage/ leaking one of three-way valves.	Run pressure test to identify the leakage issue. Put bypasses and run the test. If it is a machine leakage, call for service support.
7	**1003**	Emergency button pressed	Emergency alarm appears on the screen, machine remains turned on, but all electrical/pneumatic components are cut off.	Unlock the emergency button by pressing and twisting it.
8	**1010**	No mains water connection	Some machine functions are not available (automatic container filling, rinsing with mains water), apart from that machine is fully operational.	Connect mains water input and output to water source and drain.
9	**1012**	Error – F1, F2 or F6.1 fuse switched off/tripped	F1 – diagnostics pump overload protection of M1 motor has been triggered. F2 – heater protection, possible heater damage. Machine stops.	Open the electrical box and put F1 fuse back to its position. If the error occurs again, check the pump motor. F2 – switch it on manually, if it trips again call for service support.
10	**1013**	No power supply to the output modules	F6.2 fuse damaged running the process impossible.	Fuse exchange required.

11	**1011**	Air pressure too low	Compressed air supply efficiency is too low for the machine to operate properly	Increase the air supply input to the machine (min. required air pressure is 6 bars).
12	**1001**	Three–way valve 1–4 error	Overflowing of containers /failing diagnostics/pressure tests. One of the valves has not confirmed its position, possible damage to a microswitch confirming the position in a valve.	Reset the valves, check the air pressure. Solenoid valve coil might be damaged, Call service for support.
13	**1018**	Incorrect positioning of manual valves during the process	Changing the position of manual valves while the machine is working will cause the process to stop.	Put the manual valves in their original position. The operator is required to change their position only for pumping out/manual container filling.
14	**1016**	PT100 sensor error	Damaged or disconnected PT100 liquid temperature sensor, heating not available.	PT100 sensor exchange required – call service for support.
15	**1015**	Error – permissible liquid level drop has been exceeded	Ultrasonic probe triggered the stop of the process due to drop of liquid in the cleaning container, possible leakage.	Possible leakage. If the alarm has been false, continue the process. Set different liquid value triggering the alarm.
16	**1026**	Heater error (overheating protection)	Heater is overheating, heater might be covered with sediment/cleaning agent, **RT1 or RT2 regulator** could be damaged, turning on heater impossible.	Empty the container and clean the heater/s check RT1/RT2 regulators, call service for support.
17	**1020**	No phase or failure of phase	Missing phase or wrong phase sequence due to the difference in the order of cable connection between the machine layout and the mains connection at the machine workstation.	Check the presence of all three phases. If necessary, swap the order of the wires in the machine's plug to match the standard in the socket.
18	**1021-1024**	Auxiliary valve errors (ZN3-ZN4)	The auxiliary valves do not confirm the correct position.	Solenoid valve coil might be damaged, Call service for support.
19	**1025**	Release manual valve error	The position sensor at the valve returns an error due to the valve being set in the wrong position when the operator wants to start a cleaning/diagnostic operation.	Set the manual valve (Z-ODP) to the closed position.

20	**1027**	Defective / clogged chemical tank filter	The vacuum sensor detected a clogged filter. The vacuum sensor is faulty.	Clean the filter. If the error does not disappear after cleaning, check the electrical connection of the vacuum sensor. Contact the service support.
21	**1028**	Defective / clogged diagnostic tank filter	The vacuum sensor detected a clogged filter. The vacuum sensor is faulty.	Clean the filter. If the error does not disappear after cleaning, check the electrical connection of the vacuum sensor. Contact the service support.
22	**1029**	Phase control sensor error (CZF1)	The circuit between the contactor K2 and the thermostat has been broken. Possible activation of the thermostat cut-off protection or CZF1 sensor damage.	Press the red thermostat button in the cutout on the back of the machine. Replace CZF1 sensor. Contact service support.
23	**1030**	Thermal protection	Reaching a temperature higher than the temperature set in the machine settings by the heater.	Check if machine is supplied with enough air. Check the chemical filter for cloggage. Contact service support if problem occurs repeatedly.
24	**1031**	K.2 contactor error	Contactor K.2 has failed.	Replace the contactor or contact service support.
25	**1032**	Pressure sensor error	The machine detected an incorrect value returned by the pressure sensor.	Check the connection of the plug and the pressure sensor cable itself. Replace the sensor.
26	**1033**	Humidity sensor S50 error	Humidity sensor short circuit. Indicates moisture in the pneumatic system.	Check the input filter. Blow out the system with compressed air. Look for the source of moisture entering the system.
27	**1034**	Humidity sensor S51 error	Humidity sensor upstream of the AR system short circuit. Indicates moisture in the pneumatic system.	Disassembly AR system. Blow out the system with compressed air. Look for the source of moisture entering the system.
28	**1035**	T1-T2 algorithm error	The initial heating system check algorithm reports an error. It may result from improper operation of the heating pump and/or air in the system. It may also result from damage to one of the temperature sensors.	Bleed the heating system of the chemistry tank by running the heating pump several times. Check the correctness and tightness of the chemistry filter. Check the correctness of the readings of the sensor PT1 - in the filter, and the sensor PT2 in

				the heater tank - for this purpose, contact the service.
29	**1036**	Heating algorithm error	The second part of the heating system check algorithm indicated an error. The cause could be incorrect operation of the heating system pump and/or a airblocked system.	Bleed the heating system of the chemistry tank by running the heating pump several times. Check the correctness and tightness of the chemistry filter.
30	**1037**	One of the channels is blocked	One or more channels are blocked.	Check the connection to the cleaning object. Check for cloggage.
31	**1038**	Channel CH1 – CH6 is blocked	Specific channel is blocked.	Check the connection to the cleaning object. Check for cloggage.

5.3. Safe usage

Use only dedicated cleaning agents for this device, defined by the machine manufacturer. The device is to be stored in a dry place not exposed to temperatures over 35˚C and shall be placed on a surface that will disable the leak of any liquid that could penetrate the ground.

When working with the cleaning agents directly the user should:

- read this Manual,
- **always wear protective gloves, protective glasses, protective uniform and face mask, protecting the respiratory track**.

The device might constitute danger if used improperly or for the purpose not determined in this Manual or in the case of not observing the following safety principles for the user and operator:

1. Only trained staff can be around the device while it is running.
2. Should any emergency occur, immediately press the 'safety' button, disconnect the device from electrical supply and call in the entitled staff.
3. Do not lean against the device when it is connected to the electrical power supply.
4. Do not place any tools or other objects on the device while it’s running or during the breaks.
5. Do not modify the device either in terms of its mechanics or the water circuit. Unauthorized modifications and changes might have impact on the safety of its usage and are not allowed.
6. It is forbidden to change any part of the device. The FADO company shall hold no responsibility for unauthorized alternations and modifications within the device.
7. It is forbidden to remove the outer metal sheet covers (except for the ones required for periodical maintenance and/or necessary repairs) during the warranty period without written consent of the manufacturer.
8. It is recommended to clean the device with a dry or slightly detergent-soaked cloth on regular basis. Do not use any solvent or petrol to clean the device.
9. In the case of planned downtimes, the containers should be emptied, cleaned and refilled with water. Then the hydraulic system should be rinsed with water (put bypasses on sex sections and perform 10min cleaning in manual mode with water in the containers).
10. Always use flexible protective gloves when operating on the cleaning agents/tanks/hoses, etc.
11. Only authorized and trained person is to operate on the device.
12. Once the work is completed the device shall be shut down with the main switch.

13. For the conventional use the operator shall use only the agents and accessories determined by the producer in the manual.
14. Only original parts provided by the producer or the authorized service shall be used for repair.
15. Removable covers of both containers shall be closed while the device is on the run.
16. The user shall become familiar with and follow the information and instructions on the pictogram labels on the device. Such labels shall not be removed or covered and have to be immediately replaced with new ones once they get damaged.
17. Red button 'STOP' is not the emergency shut down button and does not shut down the electrical power supply. The power supply will be shut down by switching "**MAIN POWER**" switch and pressing "**EMERGENCY**", found on the main control panel.
18. Keep every screw and nuts tightened to make sure the device is in safe working condition.

5.4. Misuse

1. It is forbidden to operate on the device without proper training.
2. Connecting electrical power, pneumatic and water supply incompatible with the Manual is forbidden.
3. Removing the main cover / container lids while the cleaning process is running is forbidden.
4. Only one operator can operate on the machine at a time.
5. It is forbidden to clean channels that have been cooled/heated with media different than water (oil-based liquids).
6. It is forbidden to perform diagnostics (and all other functions using rotary pump) that have been cooled/heater with media different than water (oil-based liquids). Such an action might damage the pump motor.
7. It is forbidden to connect the device to the electric socket other than the three-pin plug with grounding and neutral conductor. Connecting the device to the network with no neutral conductor might result in serious damage of the device.
8. The device has to be connected to the socket with the grounding pin with the original power cable supplied with the machine.
9. It is forbidden do hand-wash the device when it is on the run.
10. Should any failure or abnormality in the run of the device occur, the device has to be stopped immediately and the service technician is to be contacted with.
11. It is forbidden to operate the device when under the influence of alcohol, drugs or medicines disturbing one's judgement.
12. The device should be leveled and placed on stable surface, disenabling the device from uncontrolled moving.
13. In the case of connecting other workplace health and safety measures (safety mats, light barriers, shield opening controllers, etc.) contact the producer.
14. Use only original, authorized accessories approved by the producer of this device. Read, understand and follow any instruction provided with the approved accessories. Should any unforeseen in this manual situation occur, remain cautious and use sound judgement. Resort to the supplier for help.
15. In the case of making multicomponent cleaning or conservation liquid outside the device, use special containers.
16. Caution should be exercised whenever working with cleaning agents/liquids.
17. It is forbidden to move the device on uneven, slippery surface.
18. When pumping out processed agents from the containers, use hoses equipped with oblique filter, provided by the machine manufacturer. Using hoses without proper filtration might damage the diaphragm pump used for liquid removal

ATTENTION!

These regulations do not limit the general principles of the workplace health and safety instructions and constitute their supplement.

5.5. Emergency situation conduct

In case of any emergency situation (an emergency situation shall not be the disturbances mentioned in 0 section of this manual) the electrical power supply has to be shut down. The emergency shall be immediately reported to the supervisor and a proper warning information like "**DEVICE DAMAGED**" shall be placed on the device.

ATTENTION!

Every case of emergency shall be noted down in the 'Maintenance and repair history' included at the end of this manual.

Should the emergency situation or damage occur during the warranty time and has been caused by the construction failure in the device it shall be immediately reported to the producer's service. The service will provide necessary information as to the steps to be taken and the time of the repair. The warranty has been described in the Warranty Conditions.

Majority of the emergency situations result from not following the procedures of the necessary servicing or misuse of the machine by the users. Most of these emergency situations can be fixed by the user. Ways to identify and repair the failure are described below. All failures should be reported to a manufacturer/service technician in writing.

Table 2. Examples of machine failures

Symptoms	Cause	Solution
1. Diaphragm feed pump not working	Pump is seized	Disassemble the pump and exchange the motor (element joining the diaphragms).
	Faulty solenoid valves at valve terminal	When all sections are working, check if individual diodes indicating proper connection to solenoid valves lit up. If not, refer to the electrical schematics and check all wiring/connections. Start with verifying if proper controller output is controlled. (Indicated by means of a LED diode).
	Automatic regulator is damaged	Check the diode colour where the wire is connected to the regulator (green colour signalizes correct work, red colour signalizes error). Replacement of the regulator is suggested.
	Pressure too low	Check compressed air supply, minimum required pressure is 4,5 bars.
	Fuse F6.2 damaged	Replace the fuse.
	Pneumatic tube feeding the pump with compressed air bended/disconnected/fractured	Replace/put the hose back to its place.
2. 'Pressure too low' alarm	Too low pressure in the system	Check air pressure in the system, minimum required pressure is 4,5 bars.

	Clogged air filter	Replace the filter with a new one. The whole pressure system should be checked as well.
	Damaged S26 sensor (digital pressure sensor)	Check sensor connection to power supply. Check if there is a signal coming from the sensor to the DI.1 inlet module. Check if a LED diode (4) lights up on the controller's inlet module DI.1.
	Pneumatic tube feeding the pump with compressed air bended/disconnected/fractured	Replace/put the hose back to its place.
3. Feed pump is one section starts working and then stops	Poppet valve is not opening (ZO1 – ZO6): Cause 1 – too low pressure on manual pressure regulator (should be 4.5 bar) Cause 2 – no pressure in the system Cause 3 – one of the solenoid valves is damaged (yZO1 – yZO6) Cause 4 – Damaged F6.2 fuse	Cause 1 – check the manometer setting and set the correct value Cause 2 – Check compressed air supply, minimum required pressure is 4,5 bars. Cause 3 – check if the diodes at the valve terminal light up, if not, check the electrical connection between valve terminal and PLC controller input. Cause 4 – replace the fuse.
	Incorrect ZW1 – ZW4 actuator position: Cause 1 – Solenoid valve yZW1 – yZW4 does not receive electrical signal Cause 2 – too low pressure in the system Cause 3 – solenoid valve coil damaged (yZW1 – yZW4) Cause 4 – solenoid valve damaged Cause 5 – F6.2 fuse damaged Cause 6 – actuator or three-way valve is mechanically blocked (pressure is not able to shift the valve position)	Cause 1 – check the connection between the valve and controller's input (is the controller giving voltage to the valve?) Replace the whole module if necessary. Cause 2 – see point 2a. Cause 3 – replace the coil. Cause 4 – replace the solenoid valve. Cause 5 –replace the fuse. Cause 6 – replace the actuator or the three-way valve.
	Clogged channel generates pressure build-up	Press STOP button and select Pressure drainage option, then select one of three groups and press OK.
4. Pulsator not working	Pulsator is seized	Pulsator is to be disassembled and the motor is to be replaced (a part connecting diaphragms).

	Faulty valves at valve terminal	When all sections are working, check if individual diodes indicating proper connection to solenoid valves lit up. If not, refer to the electrical schematics and check all wiring/connections. Start with verifying if proper controller output is controlled. (Indicated by means of a LED diode).
	Automatic pressure regulator is damaged	Check the diode colour where the wire is connected to the regulator (green colour signalizes correct work, red colour signalizes error). Replacement of the regulator is suggested.
	Too low pressure in the system	Check compressed air supply, minimum required pressure is 4,5 bars.
	F6.2 fuse damaged	Replace the fuse.
5. Heater not heating the liquid	F2 fuse damaged	Replace/switch to position 1.
	Damaged K2 contactor or: a) Thermostat – cut off protection b) Fuse F2 failure c) Heater failure	K2 – is controlled from the PLC screen – if it doesn't work, we have too high liquid temperature
	Filter covered with undissolved cleaning agent/sediment	Clean the tank and filter from dirt/undissolved cleaning agent
	DO1 module is damaged	DO1 module is to be replaced – failure means it's not turning on K2 contactor
6. Heater is heating bot not showing the temperature value / showing wrong temperature value	PT1 sensor or sensor wire is damaged	PT1 sensor checkup and/or replacement
	AT0 module damaged	AT0 module is to be replaced.
7. Heater overload error	Heater covered with undissolved cleaning agent/other dirt	Empty the tank and clean the heater from the undissolved cleaning agent. Heater error is to be deleted by the administrator.
	Heater feed pump damaged	Check the pump.
8. Incorrect floater indication in diagnostic tank	One of the floaters is damaged	Exchange the floater with all sensors.
	One of the floaters is jammed	Clean each floater with running water/cloth
	Damaged DI1 module/s	Damaged module is to be replaced.
	Broken connection between floaters and a module	Check wires/wire connections.

9. Container emptying function not working (one or many sensors do not confirm their current position) and/or turning on diagnostics/cleaning function is impossible	inductive sensor is mechanically damaged	Inductive sensor replacement.
	insufficient distance between a sensor and a metal plate	Correction of sensor's position with a metal plate (activator).
	F6.1 fuse damaged	Damaged fuse replacement
	DI1 module damaged	DI1 module replacement
	Sensor is damaged	Sensor it to be replaced
	Connection between the sensor and the module is damaged	Verification/replacement of wires.
10. Feed pumps not working / feed pump starts working and then stops	Dirt from the container causes clogging of quick couplings/ quick nipples/ suction filter is clogged	Filter, connector nipples and quick couplings need to be cleaned.
11. The pump stops pulling liquid despite continuous pumping	Hoses/quick couplings are not tight (system airlock)	Exchange of hoses and/or quick couplings.
12. Diagnostics pump is working but the flowmeter is showing 0,04 flow or in the first phase flow rate appears but then decreases to 0.04	Diagnostics pump system is airlocked	Bleed the system with a bleed valve.
	If diagnostics medium is flowing back to the container on the return, the flowmeter is damaged.	Exchange the flowmeter.
	Either ZN1 poppet valve or yZN1 solenoid valve on valve terminal is damaged	ZN1 poppet valve connection and work need to be checked. yZN1 solenoid valve proper work needs to be checked. Exchange of faulty component.
	Damaged ZN2 poppet valve or solenoid valve on valve terminal responsible for that particular valve (yZN2)	Power supply checkup, ZN2 poppet valve work checkup, solenoid valve uZN2 checkup. Exchange of faulty component
13. Flowmeter is showing wrong value (negative value)	Check flowmeter connection with AI0 module	Exchange of wire with connection and/or AI0 module exchange.
14. Pump is not working or is making weird sounds	Components inside a pump have worn off	Exchange the pump.
	Pump seizure due to dry work without liquid	Exchange the pump.
	F1 fuse damaged	F1 fuse exchange.
	K1 contactor damaged	K1 contactor exchange.

	Filter is damaged or has been removed, as a result of which the pump got polluted and damaged.	Filter exchange. Damaged pump exchange.
15. Pressure is falling below 3 bars, despite 6 pars available pressure in the system	Check the compressed air connection with the machine. Maybe the compressed air hose is bent or damaged, or its diameter is less than fi12 mm	Exchange the compressed air hose.
16. Working pressure 0 bars. Hissing sound coming from the regulator, pressure on the regulator as well as the PLC screen shows 0 bars	Automatic regulator is damaged due to oily air in the pneumatic system	Temporary solution: regulator exchange. Proper solution: replacement of pneumatic system with a new one, oil removal.
17. Low flow rates on all channels connected to the machine/lower process dynamics	Use of safe–lock couplings	Use regular couplings instead of safe-lock couplings.
18. Diaphragm pumps are working despite lack of regulation from the PLC controller	Damaged solenoid valves on valve terminal as a result of wear/dampness/oiling	Exchange of valve terminal.
19. Incorrect indication of flowmeter (lack of repeatability of results)	Contamination of filters in diagnostics tank	Thorough cleaning of the diagnostics tank and filters.
	Rotary pump is airlocked	Bleed the pump with a valve.

6. USER MAINTENANCE INSTRUCTIONS

The CoolingCare device has been designed and made to last and work failure-free, to eliminate the necessity of servicing or repair. Nevertheless, in respect of the functions of the device, it is necessary to run periodic servicing and repair activities when needed, the schedule of which has been enclosed in 6.1 section.

Activity connected with replacement or repair processes have been explained in details in 6.2 section.

6.1. Everyday operations and maintenance activities

WARNING!

Prior to any repair or servicing, disconnect the device from the power, compressed air supply and water supply.

AVERTISSEMENT!

Avant toute réparation ou entretien, débranchez l'appareil de l'alimentation électrique, de l'alimentation en air comprimé et de l'alimentation en eau.

ATTENTION!

The servicing shall be conducted by trained personnel.

ATTENTION!

Le service est formé par du personnel qualifié.

In the course of the warranty time and the post-warranty time the user has to realize all required maintenance activities. The schedule of such activities is included in Table 3.

It should be noted that if such activities have not been proceeded, it will result in losing the right to the warranty. Such activities and removing minor damages resulting from normal use and exploitation of the material parts are essential to keep the device in proper technical condition, necessary to maintain the proper safety level.

Control of the electrical box means activities including connection control on the control panel and the terminal blocks. All the wires should be tightened. Fresh air should be allowed to access through the air holes. Wire ducts derived from the board shall not be excessively bent. In case the power cable should be longer, replace the whole cable. Its length shall not exceed 5m and shall be in good condition.

In case of the cable's isolation or wire or the plug damage, replace the damaged part after contacting the producer. Wire diameter of the supplying cord shall not be smaller than 2,5mm^2. It is recommended to check the condition of the power socket and the grounding wire.

Verifying the condition of the connecting hoses, connectors, inlet and outlet ports is necessary. Should any hose damage (bends, breaks, leaking), damage on the ports surface or quick-connectors be noticed, replace them with the new ones.

Rinse the containers, quick connectors and filters with the pressurized clean, preferably warm water.

The stainless-steel conservation products are recommended to be used to maintain the metal outer elements of the device's body after it has been cleaned and all the impurities have been removed from the device.

Table 3. Schedule of the servicing activities

Actions to be taken		Frequency of actions						
		When necessary	Before every use	After every container emptying	After every cleaning	Once a week	Once a month	Once every quarter
Switch cabinet	wires, pins, sockets					K		
Diagnostics / conservation container		C	K	C				
Cleaning medium container		C	K	C				
Suction filters		C		C				
Air filter			K					
External water supply circuit rinsing					C *			
External water supply circuit cleaning							C	
Pumps and pulsators rinsing		C **					C	
Four feed pumps	diaphragms	W						
	connecting ports	W						
Hoses connecting the device with a mold	quickconnectors						C	
	hoses	W	K					
Hoses/cables connecting the device to plant's water, electricity and compressed air supplies		W	K					
Six pulsators	pneumatic tubes	W					K	
	connectors	W						K
	diaphragms	W						
Other	wheels						K	
	outer connecting ports	W					K	
	technical condition of the device and installation		K					

C – cleaning, **W** – replacement, **K** – control, * – assuming the molds are rinsed with eternal water supply, ** – if the machine is not used for more than a week

6.2. Periodic service & maintenance

WARNING!

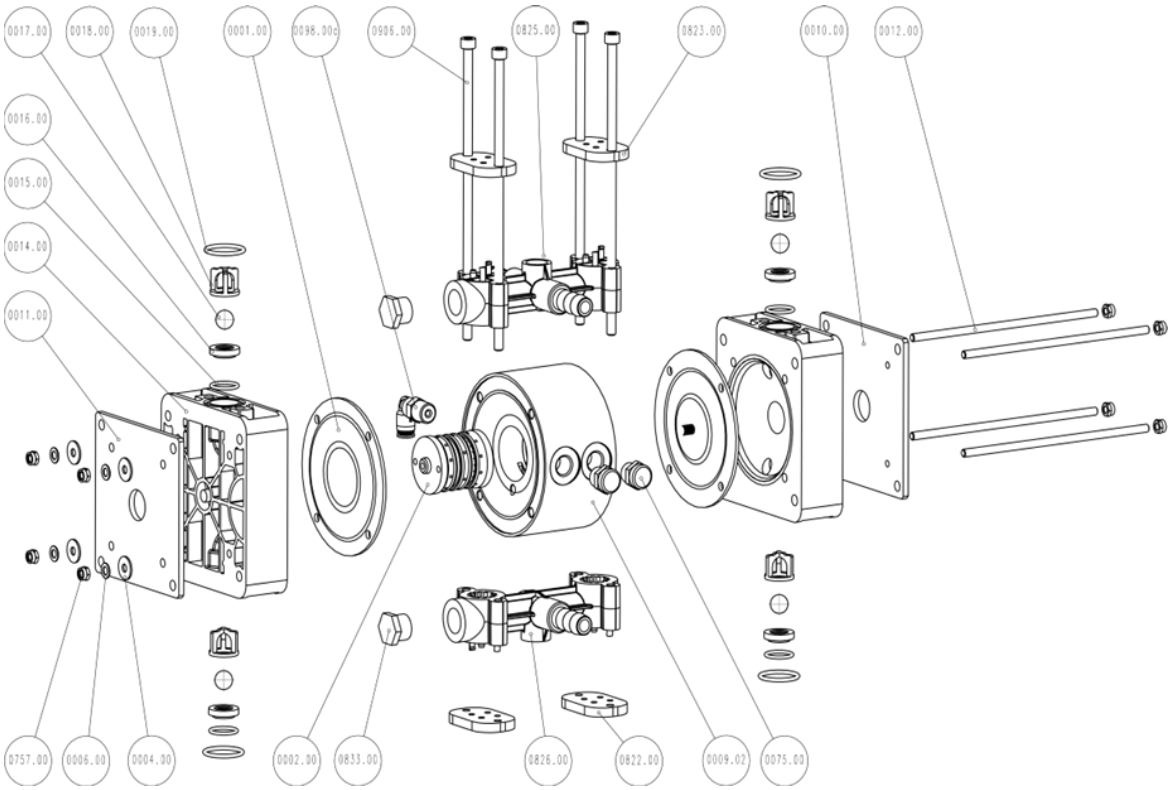
Prior to any repair or servicing, disconnect the device from the power, compressed air supply and water supply.

ATTENTION!

The servicing shall be conducted by trained personnel.

The device has been made of the highest-quality materials. Nevertheless, the working conditions for some parts working in the environment of chemically active cleaning agent removing impurities from the channels, as well as with the process of pulsating, may lead to gradual wear of these elements. Such components are eg. pump diaphragms and filters. The procedures of parts replacement have been described below.

A. The main feed pump diaphragms check and replacement (no. 5,* Fig. 6*):



Main components of a diaphragm pump

0014 – pump's side block, 0009 – central body, 0001 – diaphragm, 0002 – pump motor, (0015, 0016, 0017, 0018, 0019) – check valves, 0098 – pneumatic hose nipple, 0023 – hydraulic hoses nipples, 0022 – upper manifold, 0020 – lower manifold

Fig. 14. Components of the diaphragm feed pump (FP1)

To replace he worn feed pump diaphragms (broken, leaking, etc.) proceed according to the following (Fig. 15):

Tools:

- Drill-driver
- Torque wrench
- Socket wrench 8mm
- Allen key cap 5mm
- ratchet
- set of allen keys

WARNING!
Every check or replacement of diaphragm pump components requires safety precautions. Wear a protective mask with P2 filter, protective gloves, protective apron and safety glasses.

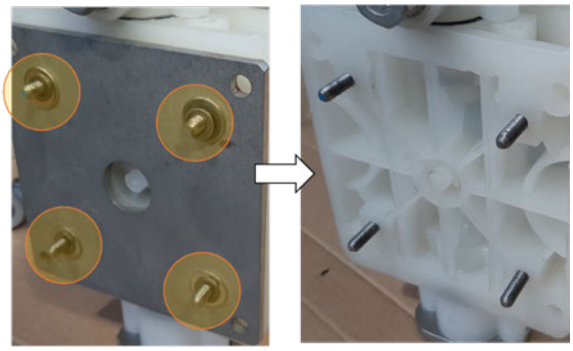
ATTENTION!
Chaque vérification ou remplacement des composants de la pompe à membrane nécessite des précautions de sécurité. Porter un masque de protection avec filtre P2, des gants de protection, un tablier de protection et des lunettes de sécurité.

1. Remove the metal cover of the pump section (no. 3, Fig. 10).
2. Remove the 2 screws (front) / 1 / of the upper pump body.
3. Loosen 2 screws (rear) / 1 / of the upper pump body.
4. Undo four nuts / 2 / fixed on pins / 8 / - remove nuts and washers.
5. Remove the cover plate / 4 /.
6. Loosen the hose clamp / 3 / and slide it out of the holder.
7. Slide the outer body / 5 / off the pins / 8 / with two hands.
8. With two hands slide the central body / 7 / off the pins / 8 / - check the condition of the diaphragms / 6 / fixed on both sides of the central body / 7 /.

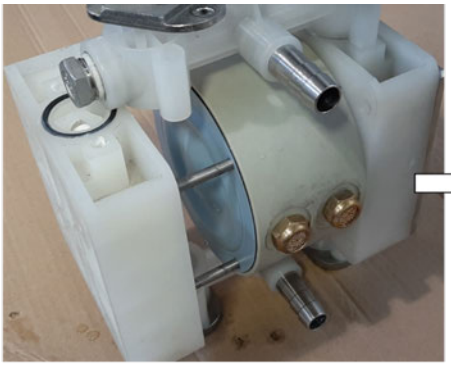
STEP 1: Unplug the compressed air supply hose

STEP 2: loosen the screws at the back of the pump

STEP 3: remove the screws at the front of the pump

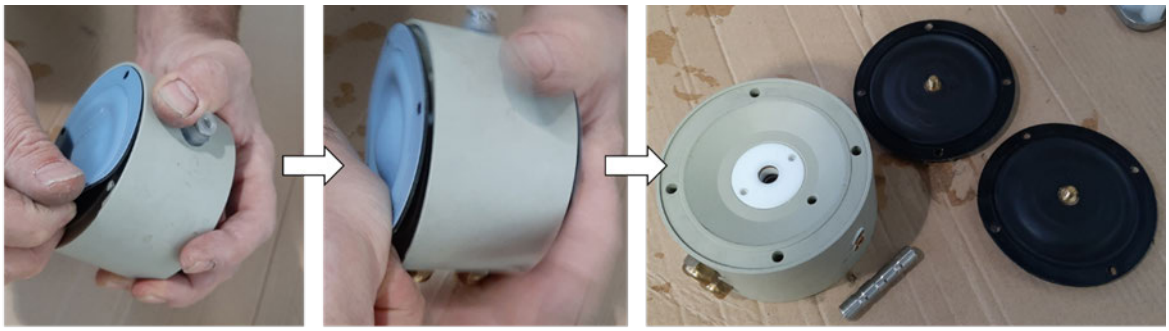


STEP 4: Unscrew four nuts fixed on pins, then remove the reinforcement plate.



STEP 5: Gently remove the side cover of the pump. Pay attention not to keep the o-rings in place.

STEP 6: Gently remove the middle body of the pump mounted on the four pins



STEP 7: Unscrew the diaphragm from the body of the pump

STEP 7: Pay attention not to scratch the pin when unscrewing it from the diaphragm.

Fig. 15. Checking or replacing the diaphragms of the diaphragm pumps of the cleaning sections

In the case of damaged diaphragms, they must be replaced:

9. Holding the membrane with the palm of the hand on one side, with the other hand pressing slightly on the other membrane, turn counterclockwise until they disengage. (Fig. 16).
10. Replace the diaphragms with new ones.
11. Insert the diaphragms into the central body / 7 / and screw them together by turning in the opposite direction, maintaining the central position in the central body / 7 / until you feel resistance - the diaphragms should not be deformed

Fig. 16. Diaphragms and pump main body

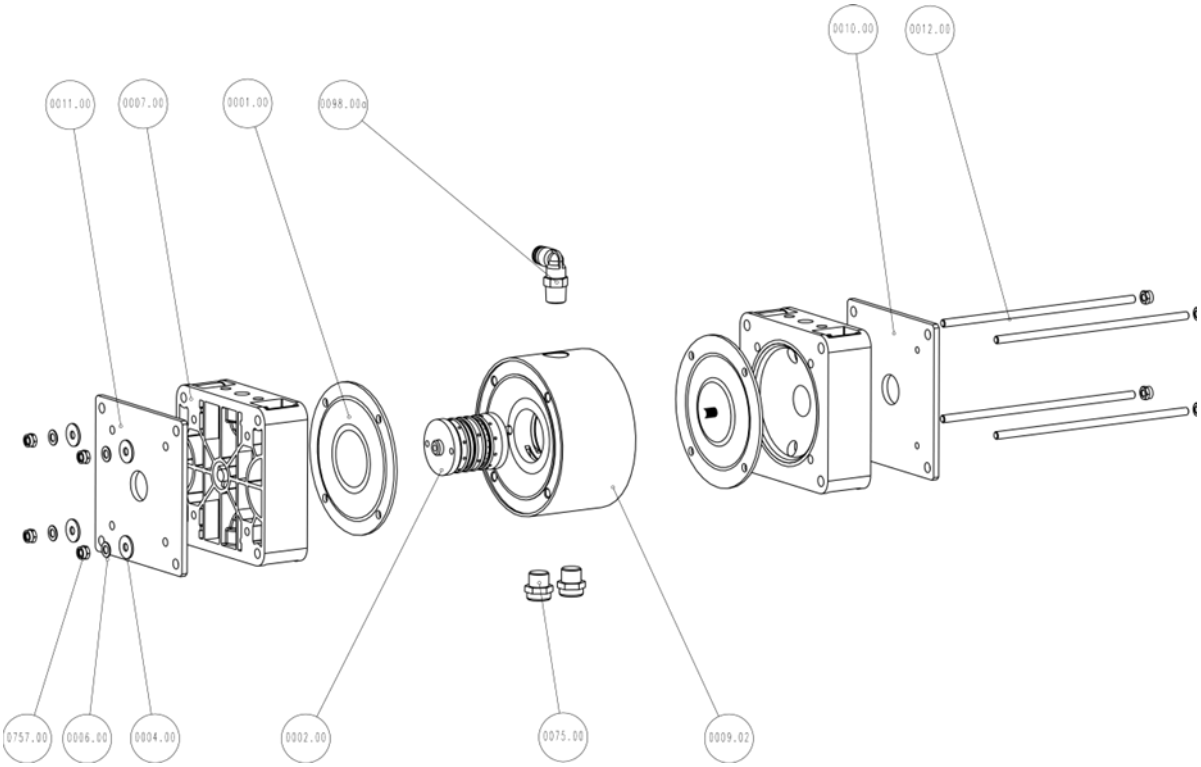
12. Adjust the diaphragms so that the mounting holes for the central body / 7 / on the pins / 8 / coincide with the holes for the membranes.
13. Mount the central body / 7 / on the pins / 8 /.
14. Mount the outer body / 5 / on the pins / 8 /.

ATTENTION: In the outer body there are check valves, during assembly it is necessary to make sure that the elements of the check valves do not fall out and are not damaged.

15. Insert the cover plate / 4 /, put washers on the pins / 8 / and then screw on the four nuts / 2 / (do not tighten the nuts). **Note: Pay attention to the tightening sequence, screw the nuts crosswise.**
16. Install 2 screws (front) / 1 / pump upper body.
17. Screws (front and rear) / 1 / tighten (do not tighten the screw as far as it will go).
18. Tighten with a torque wrench (set to 7 Nm) tighten the bolts (front and rear) / 1 / until the clutch in the torque wrench works. Note: Observe the tightening sequence, tighten the screws crosswise.
19. Tighten the nuts / 2 / until the clutch in the torque wrench works with a torque wrench (with a tightening force of 5 Nm). Note: Pay attention to the tightening sequence, tighten the nuts crosswise.
20. Insert pneumatic hose / 3 / into the holder.
21. Mount the metal cover on the connection and pump section.

B. Checking and replacing diaphragms of the pulsators

Pulsators (no. 4, Fig. 6) are made of 3 elements (Fig. 17): two outer side /**0007**/ and one middle one /**0009**/. Two diaphragms /**0001**/ have been placed between the outer and the middle body. Compressed air is supplied to the middle body by means of a hose fixed on a port /**0005**/. Compressed air puts the diaphragms in bi-directional movement, causing pulsation of the cleaning liquid going through the outer body parts through flexible hoses attached on the ports /**0023**/ and /**0035**/.



Główne elementy pulsatora:

0007 – pulsator's side block, 0009 – central body, 0001 – diaphragm, 0002 – pulsator air motor, 0005 – pneumatic hose nipple, 0035 – hydraulic hose upper nipple, 0023 – hydraulic hose lower nipple, 0033 – sealing rings

Fig. 17. Pulsator assembly

To check or remove faulty (broken, leaking) diaphragms of pulsators (Fig. 17) follow these steps (Fig. 18):

Tools:

- Drill-driver
- Torque wrench
- Socket wrench 8mm
- Allen key cap 5mm
- ratchet
- set of allen keys

WARNING!
Every check or replacement of diaphragm pump component requires safety precautions. Wear a protective mask with P2 filter, protective gloves, protective apron and safety glasses.

ATTENTION!
Chaque vérification ou remplacement des composants de la pompe à membrane nécessite des précautions de sécurité. Porter un masque de protection avec filtre P2, des gants de protection, un tablier de protection et des lunettes de sécurité.

- [x] 1. Remove the metal cover of the connection and pump section (no. 3, Fig. 10).
- [x] 2. Unscrew four nuts / 1 / fixed on pins / 7 / - remove nuts and washers.
- [ ] 3. Remove the cover plate / 3 /.
4. Loosen the hose clamp / 2 / and slide it out of the holder.
5. Slide the outer body / 4 / off the pins / 7 / with two hands.
6. With two hands slide the central body / 6 / from the pins / 7 / - check the quality of the membranes / 5 / fixed on both sides of the central body / 6 /.

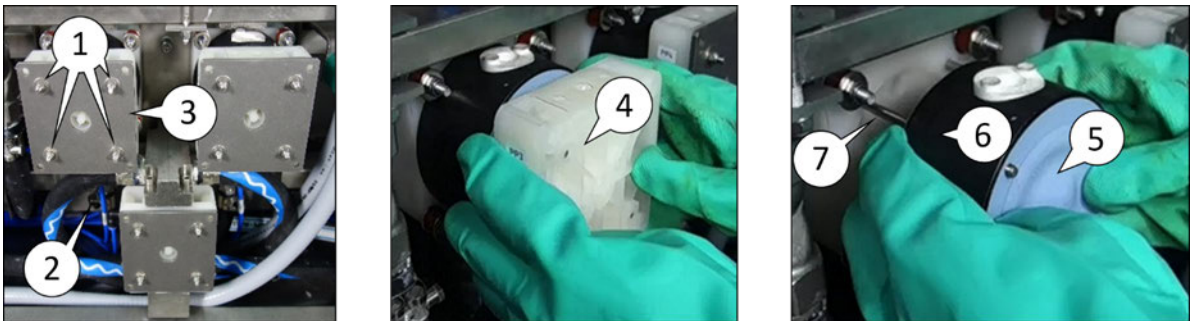


Fig. 18. Checking or replacing diaphragms in pulsate section.

In the case of damaged diaphragms, they must be replaced:

- [x] 1. Holding the diaphragm with the palm of your hand on one side, pressing the other hand with a slight pressure on the other diaphragm, turn counterclockwise until they disengage (Fig. 16).
- [x] 2. Replace the diaphragms with new ones.
- [ ] 3. Insert the membranes into the central body / 6 / and screw them together by turning in the opposite direction, maintaining the central position in the central body / 6 / until you feel resistance - the membranes should not be deformed.
4. Position the membranes so that the mounting holes for the central body / 6 / on the pins / 7 / match the holes for the membranes.
5. Mount the outer body / 4 / on the pins / 7 /.

C. Checking and replacing the sealing rings of the pulsators

Tools:
- **screwdriver**
- **torque wrench**
- **socket wrench 8mm, 10mm**
- **10mm spanner**
- **ratchet**
- **a set of allen keys**

WARNING!
Every check or replacement of diaphragm pump components requires safety precautions. Wear a protective mask with P2 filter, protective gloves, protective apron and safety glasses.

ATTENTION!
Chaque vérification ou remplacement des composants de la pompe à membrane nécessite des précautions de sécurité. Porter un masque de protection avec filtre P2, des gants de protection, un tablier de protection et des lunettes de sécurité.

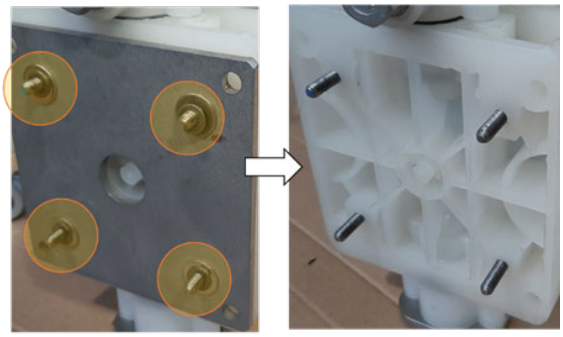
To check or replace damaged sealing rings on the hydraulic hose connectors of the flushing section pulsators, follow these steps (Fig. 19):

1. Remove the metal cover of the connection and pump section (no. 3, Fig. 10).
2. Use a wrench to loosen the hose clamps / 1 /, slide the hydraulic hoses off the pump section connectors.
3. Loosen air hose / 2 / pump clamp and pulsators and slide it out of the holder.
4. Remove 5 screws with washers / 3 / mounting plate of the pump section.
5. Carefully slide the pump section out of the machine body, loosen the clamping of the pneumatic hose / 4 / poppet valves and slide it out of the holder.

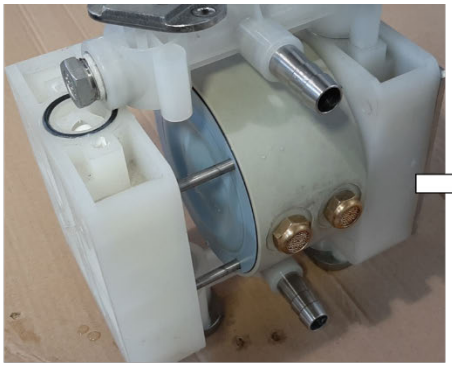
STEP 1: Unplug the compressed air supply hose

STEP 2: loosen the screws at the back of the pump

STEP 3: remove the screws at the front of the pump

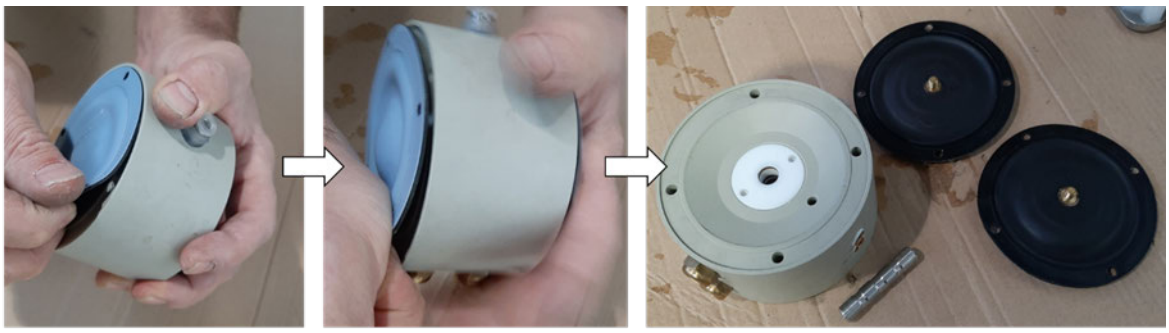


STEP 4: Unscrew four nuts fixed on pins, then remove the reinforcement plate.



STEP 5: Gently remove the side cover of the pump. Pay attention not to keep the o-rings in place.

STEP 6: Gently remove the middle body of the pump mounted on the four pins



STEP 7: Unscrew the diaphragm from the body of the pump

STEP 7: Pay attention not to scratch the pin when unscrewing it from the diaphragm.

Fig. 19. Disassembly of the pump section

6. Unscrew 2 screws with washers / 5 / upper connector plates and pulsator poppet valve.

7. Check the condition of the viton O-rings / 6 /, if they are damaged - replace with new ones.

8. Screw the washers / 5 / upper connector plates and pulsator poppet valve (do not tighten the screws).

9. tighten screws with torque wrench (with set tightening force 7 Nm) / 5 / until the clutch in the torque wrench works.

10. Mount the pump section to the machine body, push the pneumatic hoses / 4 / poppet valves into the holders.

11. Fasten with the washers / 3 / mounting plate of the pump section

to the machine body, insert pneumatic hoses / 2 / pumps and pulsators into the holders.

12. Push the hydraulic hoses / 1 / onto the connectors of the pump section and tighten the hose clamps / 1 /.

13. Mount the metal cover on the connection and pump section.

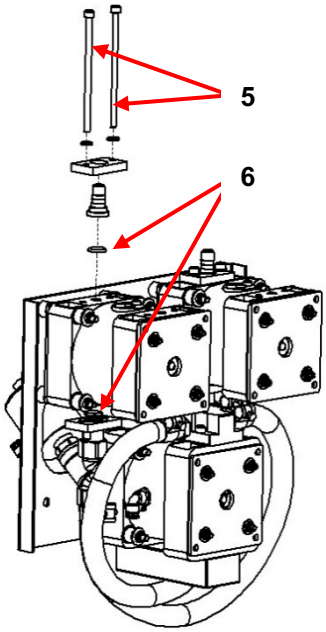


Fig. 20. Control or exchange of pulsator sealing rings

D. Check–up and replacement of the main outer filter

Tools:

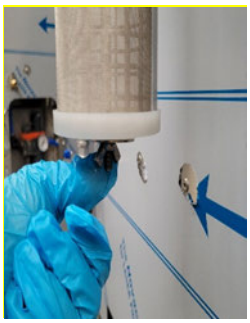
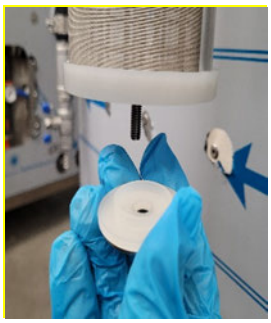
- Socket wrench 17mm
- ratchet

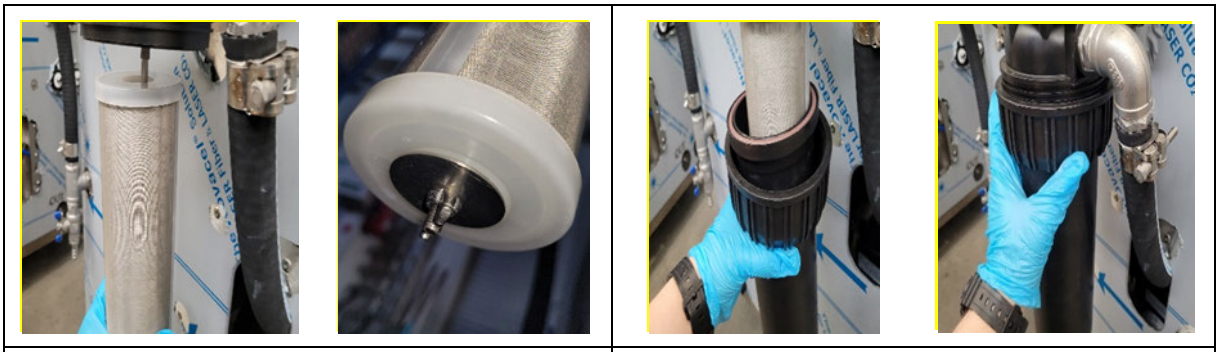
WARNING!
The main cleaning agent suction filter is placed in the vertical housing. Checking up its purity and replacing the filter should be done with all the safety measures kept like in case of the cleaning agent exchange, that is wearing protective apron uniform , face mask, protective gloves, since the chemicals are found in the housing of the filter.

ATTENTION!
Le filtre d'aspiration de l'agent de nettoyage principal est placé dans le boîtier vertical. Le contrôle de la pureté et le remplacement du filtre doivent être effectués avec toutes les mesures de sécurité conservées, comme dans le cas d'un échange de détergent, portant un uniforme de tablier de protection, un masque, des gants de protection, car les produits chimiques se trouvent dans le boîtier du filtre.




To check the condition of the main filter the user should follow these instructions (Fig. 21):

 	Step 1		Step 2		Step 3
 	Step 4		Step 5		Step 6



Step 7	Step 8

Fig. 21. Checking or replacing the filter sleeve of the main filter

☑ ☑ ☐

1. There may be liquid in the filter sleeve housing, so before removing it, place a container with a minimum capacity of 2 liters.
2. Loosen the bleed screw on the filter head body and unscrew the plug at the bottom of the housing and drain the liquid.
3. After draining the liquid, screw in the plug and tighten the bleed screw.
4. Unscrew and loosen the clamping element securing the housing to the head.
5. Remove the clamping element.
6. Remove the filter housing.
7. Loosen the filter sleeve locking nut.
8. Remove the filter sleeve from the housing.
9. Check the condition of the filter - clean if dirty, and replace it if damaged.
10. Insert the cleaned or new filter sleeve into the head socket, screw in the lock nut - the sleeve should be firmly connected to the head without supporting.
11. Remember to prime the filter housing with the filter head with clean water to facilitate venting the system.
12. Install the filter housing.
13. Holding the filter housing, attach the clamping element and tighten it.

E. Check–up and cleaning of the cleaning tank

WARNING!

All activities related to emptying the tank must be carried out with extreme caution and the use of personal protective equipment such as: protective mask with P2 filter, protective gloves, protective apron and safety glasses.

ATTENTION!

Toutes les activités liées à la vidange du réservoir doivent être effectuées avec une extrême prudence et au moyen d'équipements de protection individuelle tels que: masque de protection avec filtre P2, gants de protection, tablier de protection et lunettes de sécurité.

The tank with the cleaning medium should be cleaned with every chemical change. To check and clean the tank, do the following:

1. The process of cleaning and maintaining the tank begins with pumping the used medium out of the tank. The pumping process is described in chapter 0 subpoint E.

Particular attention should be paid to obstructing the suction hose filter mounted on the suction hose included in the pump out kit.

Fig. 22. Suction hose filter

To clean the suction hose filter (no. 1, Fig. 22), take if off from the suction hose housing and then rinse it under running water.

After rinsing, screw it into the housing.

2. Cleaning the tank involves rinsing with clean running water to remove all dirt from the walls and bottom. Excess rinsing water must be pumped out. Hard deposits and / or dirt can be removed with a dry, clean cloth.

F. Checking and cleaning the diagnostic tank together with the suction filter

WARNING!

All activities related to emptying the tank must be carried out with extreme caution and the use of personal protective equipment such as: protective mask with P2 filter, protective gloves, protective apron and safety glasses.

Due to its intended use, the diagnostic tank should be kept particularly clean, i.e. the neutral pH of the medium and low concentration of solid particles should be ensured. It is recommended to clean the diagnostic tank with every chemical change in the cleaning tank.

The suction filter (no. 1, Fig. 5) located in the device's diagnostic tank is intended for multiple use. The filter is located on the right-hand thread - tightened clockwise. The filter has an internal thread, while the tank connection has an external thread.

To check and clean the tank together with the suction filter, do the following:

1. 1. First, the cleaning and maintenance process for both the tank and filter begins with pumping the used medium out of the tank. The pumping process is described in chapter 0 subpoint E.

Particular attention should be paid to obstructing the oblique filter mounted on the suction hose included in the pump out kit. The filter cleaning process has been described above.

1. Cleaning the tank involves rinsing with clean running water to remove all dirt from the walls and bottom. Excess rinsing water must be pumped out. Hard deposits and / or dirt can be removed with a dry, clean cloth.
2. When the tank is empty and cleaned by the operator, unscrew the suction filter (no. 1, Fig. 5). The filter is to be rinsed outside the machine under running water, thus removing any visible dirt. It should be remembered that in the case of a suction filter, deposits accumulate on its outer wall.
3. The cleaned filters must be screwed into place before refilling the tank. The filter must be tightened by hand without tools (e.g., spanner). Tightening the filter too tightly can result in difficulties in unscrewing it, and in the worst-case damage to the tank connection.

ATTENTION!
In the case of planned machine downtime, make sure to leave diagnostics tank filled with water, so that the suction filter is fully submerged. If this has not been done, before running the process bleed the pump with a bleed plug at the side of the rotary pump.

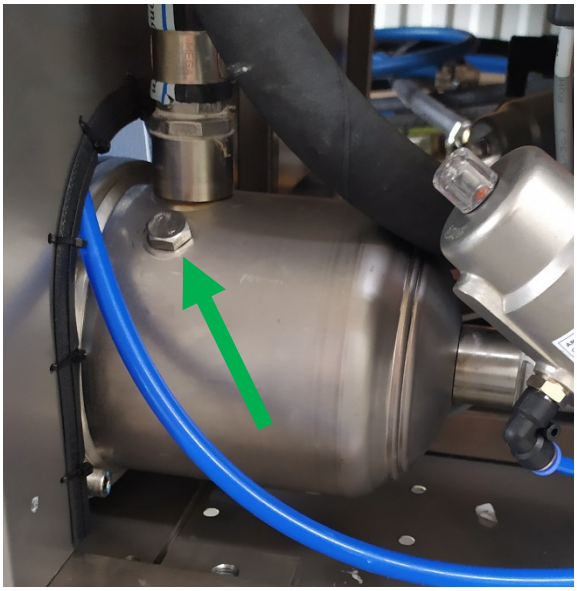


Fig. 23. Air bleeding the rotary pump

G. G. Replacement of connection stubs for connecting with mold cooling channels

Tools:
- Set of allen keys
- spanner 22mm, 27mm

WARNING!

Perform all activities related to the replacement of connection stubs with extreme caution and use personal protective equipment such as: protective mask, protective gloves, protective apron and safety glasses.

In order to replace the connector stub pipes for connecting with the mold cooling channel sockets, perform the following actions: (Fig. 24):

1. 1. Remove the metal cover of the connection and pump section (pos. 3, Fig. 10).
2. Hold the nipple / 2 / with a 27mm spanner.
3. Unscrew the connection stub / 1 / from the nipple / 2 / with a 22mm wrench.

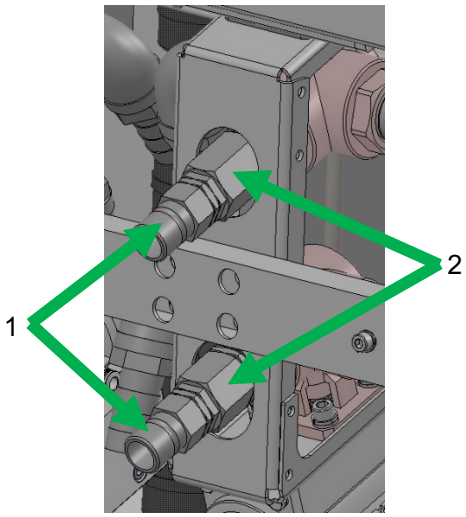
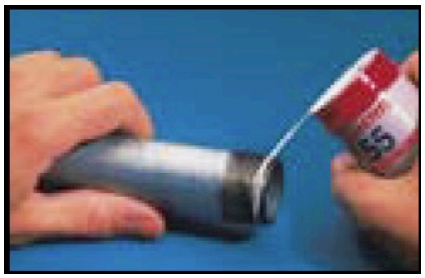


Fig. 24. Connection stubs for connecting with mold cooling channel sockets

4. Screw the new connector stub / 1 / into the nipple / 2 / by hand.
   Note: Before mounting on the thread of the connecting stub, wind the thread sealing thread as described below.
5. Hold the nipple / 2 / with a 27mm spanner, tighten the connecting spigot / 1 / with a 22m spanner.
6. Mount the metal cover on the connection and pump section.

1 

2 

- rough the thread surface with a saw blade or file
- wind the thread, starting from one of the first winds alternately, along the length of the thread connection, slightly tensioning it. It is not recommended to wind the thread precisely
- after winding, cut the required length of thread using a blade built into the packaging. Smooth the tip so that it adheres well to the thread

Suggested number of thread coils depending on the type of thread					
thread	coils	thread	coils	thread	coils
1/2"	6 – 8	1 1/2"	10 – 15	3"	25 – 35
3/4"	7 – 9	2"	15 – 25	3 1/2"	30 – 40
1"	8 – 12	2 1/2"	20 – 30	4"	35 – 45

7. RISK RELATED TO THE MACHINE USE

The CoolingCare device has been designed and made with due diligence, with all the protective measures kept. Nevertheless, there will always be slight risk that might occur in the course of exploitation and constitute so called the residual risk for the staff. It might be:

a. mechanical damage of the power system wires (tear, wipe, bend, break, etc.), of the electrical system components (tear off, overheat, dampness, etc.) as well as mechanical damage of the pneumatic-hydraulic hoses (bend, cut, etc.) – once noticed, report any damage to the supervisors; in case of the accident risk shut down the device, disconnect it and label it with information "**DEVICE OUT OF ORDER**",
b. slippery floor (results from the water spill nearby the device) – the regulations for maintaining the workplace floor nearby the device clean and dry should be fully observed and followed,
c. fumes of the hot cleaning liquid – the liquid container has to be closed while the device is on the run,
d. trip over the connecting hoses – maintain caution and use proper shoes and clothes,
e. bump, hit, when the device in being moved – maintain caution, watch the transportation path,
f. the quick coupling slides down the connecting nipple – check the port and the quick connector surface condition before connecting them together and surely fix the quick connector on the port.
g. Whenever working with the machine, operator should wear protective glasses

8. PARTS LIST

8.1. Wear parts list

During the course of the warranty period, the producer is obliged to replace faulty parts accordingly to what has been stated by their servicing staff. The warranty does not apply to wear parts, as due to their work character they are subject to faster wear.

A list of wear parts not included in the warranty is presented in Table 4.

Table 4. Wear parts list

Ref. number	Description
0001	Pulsator/feed pump diaphragm
0002	Pump/pulsator air motor (element joining diaphragms)
0037	Vibration-dumping pads
0016	Feed pump basket seal
0017	Feed pump ball
0018	Feed pump basket
0190	Diagnostics suction filter
0219	Cleaning container – suction filter cartridge
0225	Air filter cartridge
0226	2A glass fuse placed in F6, F6.1 fuse terminals
0227	3A glass fuse placed in F6.2 fuse terminal

8.2. List of most important spare parts

During the course of the warranty period, the producer is obliged to replace faulty parts accordingly to what has been stated by their servicing staff. The most important spare parts have been listed in Table 5. After the warranty period, the spare parts can be provided when necessary and reported by the client, accordingly to the device documentation.

ATTENTION!

Quick couplings/nipples, flexible tubes, hoses, sealing products, cleaning agents and other consumables constitute commercial materials and shall not be included to the list of the spare parts secured by the producer.

Table 5. A list of the most important spare parts

Ref. number	Description
0337	Solenoid valve of a pneumatic actuator (in the case of using the actuator from RQS)
0338	Solenoid valve of a pneumatic actuator (in the case of using the actuator from RQS)
0147	Flowmeter

0228	Heater
0229	Capacitance probe
0230	Temperature sensor
0191	Floater sensor (diagnostics tank)
0207	Rotary pump
0057	Pressure sensor
0200	Check valve
0201	Pressure transmitter
0232	Valve terminal for poppet valves
0231	Valve terminal for pumps/pulsators
0065	Ball valve
0030	Oblique valve /poppet/ 1/2
0047	Oblique valve /poppet/ 3/4
0238	Hydraulic hose 1/2"
0237	Hydraulic hose 3/4"
0233	Pneumatic tube Ø6
0234	Pneumatic tube Ø8
0235	Pneumatic tube Ø10
0236	Pneumatic tube Ø12
0240	Proportional pressure regulator
0400	Manual pressure regulator
0241	Air preparation module

8.3. Electrical parts list

Schematics symbol.	Name/part number	Manufacturer
BR	Communication module BR X20 BR 9300 + base X20 (c) BM 01 + connection X20 TB12	B&R
DI	Digital input module X20 DI 9371–(12DI) + base X20 (c) BM 11 + connection X20 TB12	B&R
DO	Digital output module X20 DO 8332–(8DO) + base X20 (c) BM 11 + connection X20 TB12	B&R
AI	Analog input module X20 AI 4322–(4AI) + base X20 (c) BM 11 + connection X20 TB12	B&R
AT	Temperature module X20 AT 2222–(2PT100) + base X20 (c) BM 11 + connection X20 TB12	B&R
AO	analog output module X20 AO 2622–(2AO0) + base X20 (c) BM 11 + connection X20 TB12	B&R
T1	Switch mode power supply WIPOS 24–5	WIELAND
F0	Main circuit breaker B25/2 (5SY6225–6)	SIEMENS

K0	Main contactor 3RT2026–2BB40 + auxiliary plug 3RH2911–2HA22	SIEMENS
MODEM	Modem ORMSM 1135.4G-SU	B&R
PB1	Safety relay 3SK1111–2AB30	SIEMENS
PB2	Safety relay 3SK1121–2AB40	SIEMENS
F1	Pump protection, motor switch 3RV2011–1HA10 + auxiliary plug 3RV2901–1E + terminal block 3RV2928–1H	SIEMENS
F2	Heater protection B20/2 (5SY6220–6) + styk pomocniczy (5 ST 3010)	SIEMENS
F5	Transformator protection B6/2 (5SY6206–6)	SIEMENS
F6; F6.1	fuse 2A size 5x20 (0234002.MXP)	LITTELFUSE
F6.2	fuse 3A size 5x20 (0234003.MXP)	LITTELFUSE
F7.1, CZF1, CZF2	Analog monitoring relay 3UG4512-2AR20	SIEMENS
K1	Rotary pump contactor 3RT2016–2BB41 + auxiliary plug 3RH2911–2HA22	SIEMENS
K2	Heater contactor 3RT2025–2BB40 + auxiliary plug 3RH2911–2HA22	SIEMENS
KR1–KR4	Microswitch SS–5GL	OMRON
S28, S29, S30	Induction sensor for manual valves (MV1; MV2; MV3) IME08–03BPSZTOK	SICK
S50, S51	Humidity sensors	FADO
B4, B5	Vacuum sensor (895.14-e) 0-1bar, 4-20mA	WIKA
B6	1100211 FTMG-ISD15AXX (DN15)	SICK
PD	PLC touchpanel 4PPC70.101G–20B + plug C70 OTB6102.2110–01 + plug OTB5104.2110–01	B&R
-	Antenna ORMSM.AMB–10	B&R
-	Control cabinet 1038.500	RITTAL
-	Touchscreen housing 9523.000	RITTAL
-	plug housing H16B–TGB–PG21	TE CONNECTIVITY
-	socket housing H16B–SDR–BO–PG21	TE CONNECTIVITY
-	male connection HDC–HK4/0–004–M	TE CONNECTIVITY
-	female connection HDC–HK4/0–004 F	TE CONNECTIVITY
-	Power plug L6 250V/30A	-
Q1M	Cam switch T3–1–102/EA/SVB + switch housing H3–TO	EATON
S1	Emergency stop button M22–PVT + mounting plate M22–A + NC contact M22–CK01 (2 szt.) + pad M22–XBK	EATON
S10/S11	START/STOP button M22–DDL–GR–GB1/GB0 + mounting plate M22–A + NC contact M22–CK01 + NO contact M22–CK10	EATON
G1	USB slot M22–USB–SA	EATON
G2	RJ slot 45 M22–RJ45–SA	EATON
H1/H2/H3	Signal column LED 1359398 + mounting pad 960.698.01	WERMA

9. FINAL REMARKS

Unless the agreement states otherwise, the device hand-over and reception is done with the hand-over protocol report.

The same procedure is valid while removing the damages on warranty. In such a case it is acceptable to make and use memos, where both sides confirm carrying certain technical activities.

In this document, the CoolingCare has been referred to as the device or the machine. The names used for the device shall refer to the one and only product and are equal.

9.1. Appendixes

9.1.1 Dedicated cleaning and neutralization agents

Dedicated CoolingCare clening and neutralization agents are presented in Table ***6***.

Table 6. Dedicated cleaning agents

No.	Function	Marking	Use
1	Cleaning	**DS1**	For removing deposits with high iron oxide content. Contains corrosion inhibitors. Recommended cleaning with a 10% solution with a working temperature of 50˚C. Packed in bags of 2.5 kg (5.5 lbs).
2	Cleaning	**DS2**	For removing carbonate scale with a high content of calcium carbonate, magnesium carbonate and magnesium hydroxide. Contains corrosion inhibitors. Recommended cleaning with a 10% solution with a working temperature of 50˚C. Packed in bags of 2.5 kg (5.5 lbs).

Warning!

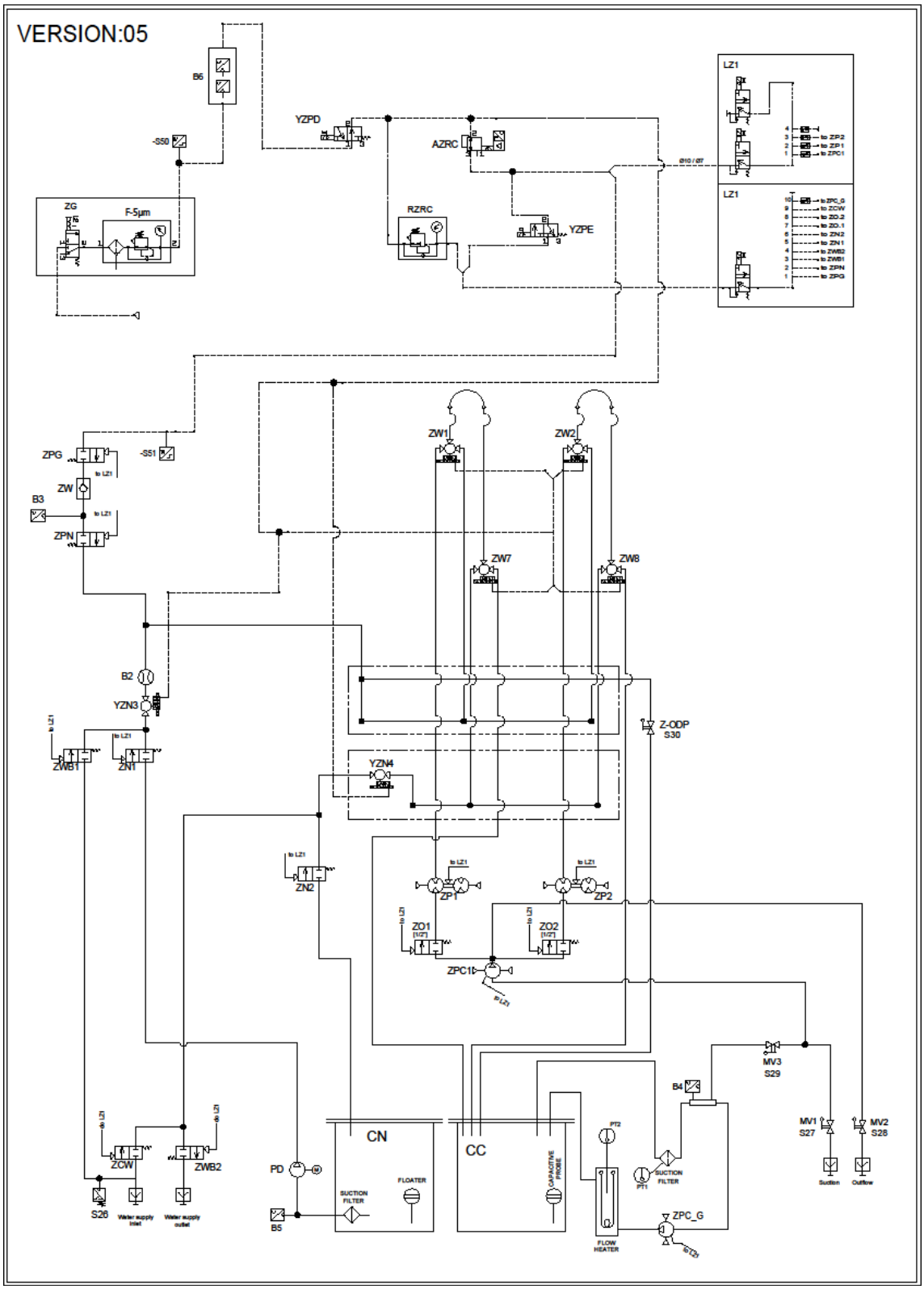
Mentioned above chemicals are dedicated to be utilized only with CoolingCare devices.

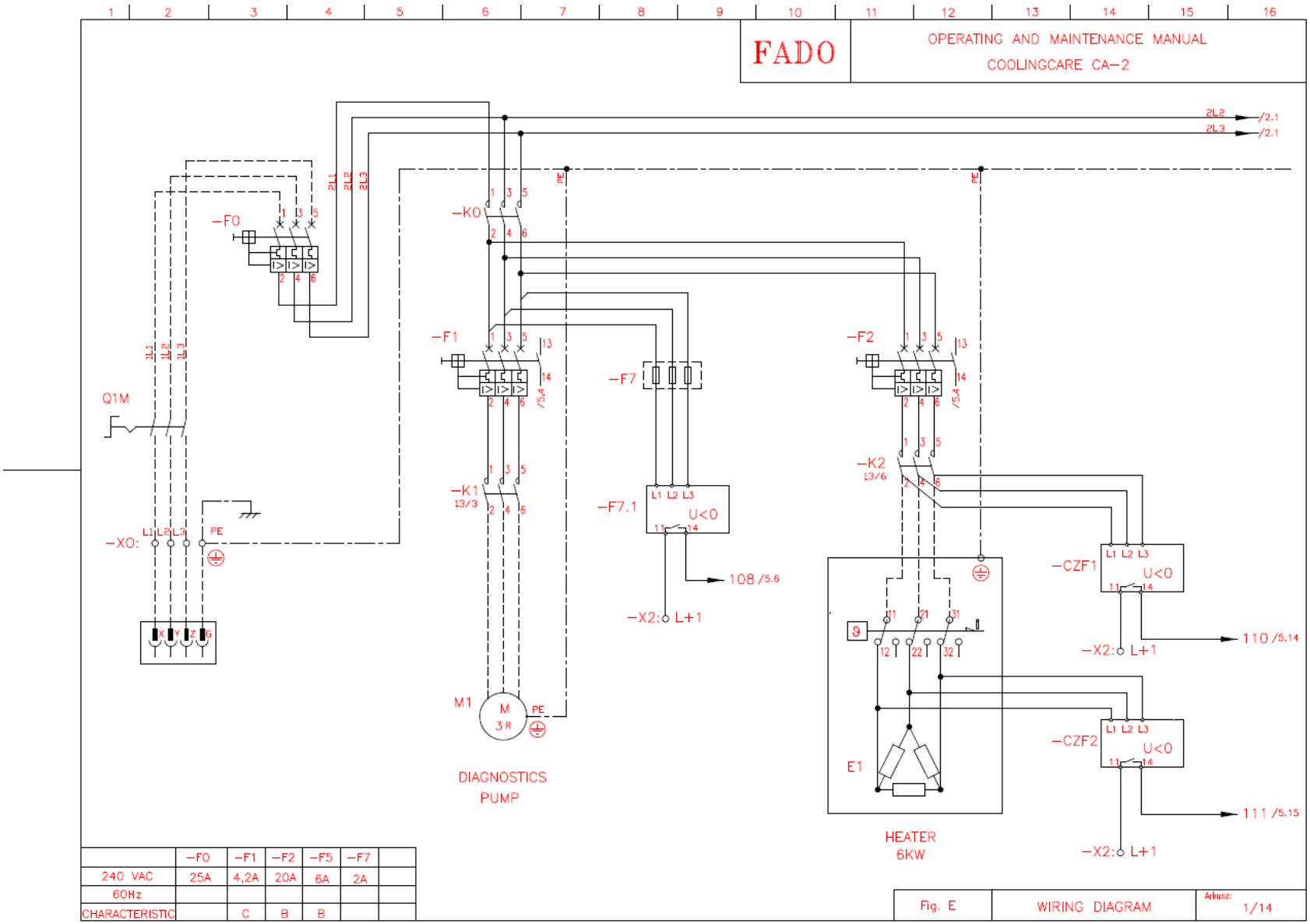
Proper usage and utilization of above-mentioned chemicals as well as CoolingCare devices are in a sole discretion of the End User.

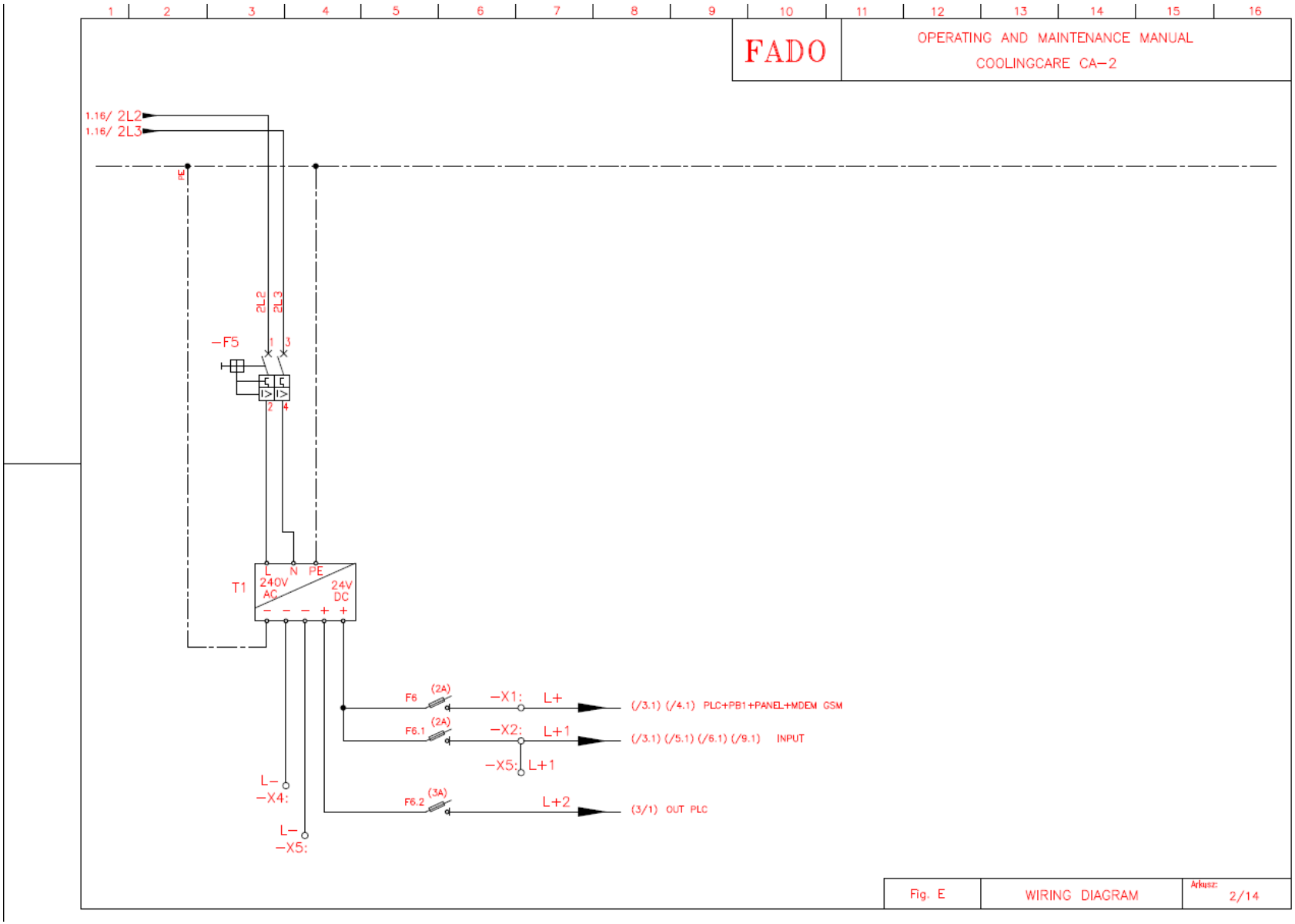
The local regulations might differ from region to region and FADO takes no responsibility for misuse, unconformity in safety or utilization with regard to the usage of:

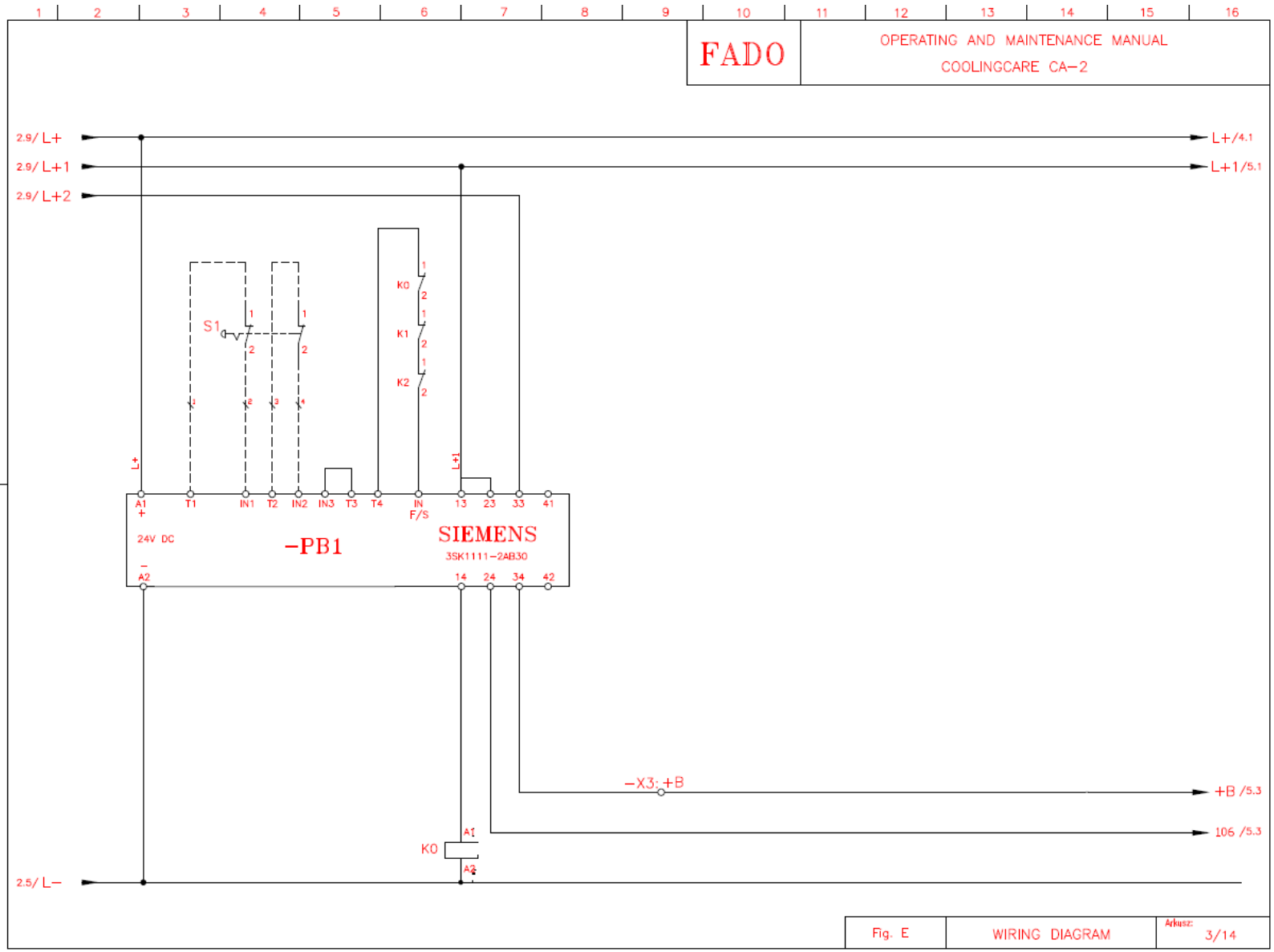
- **CoolingCare devices;**
- **above mentioned cleaning and neutralization agents.**

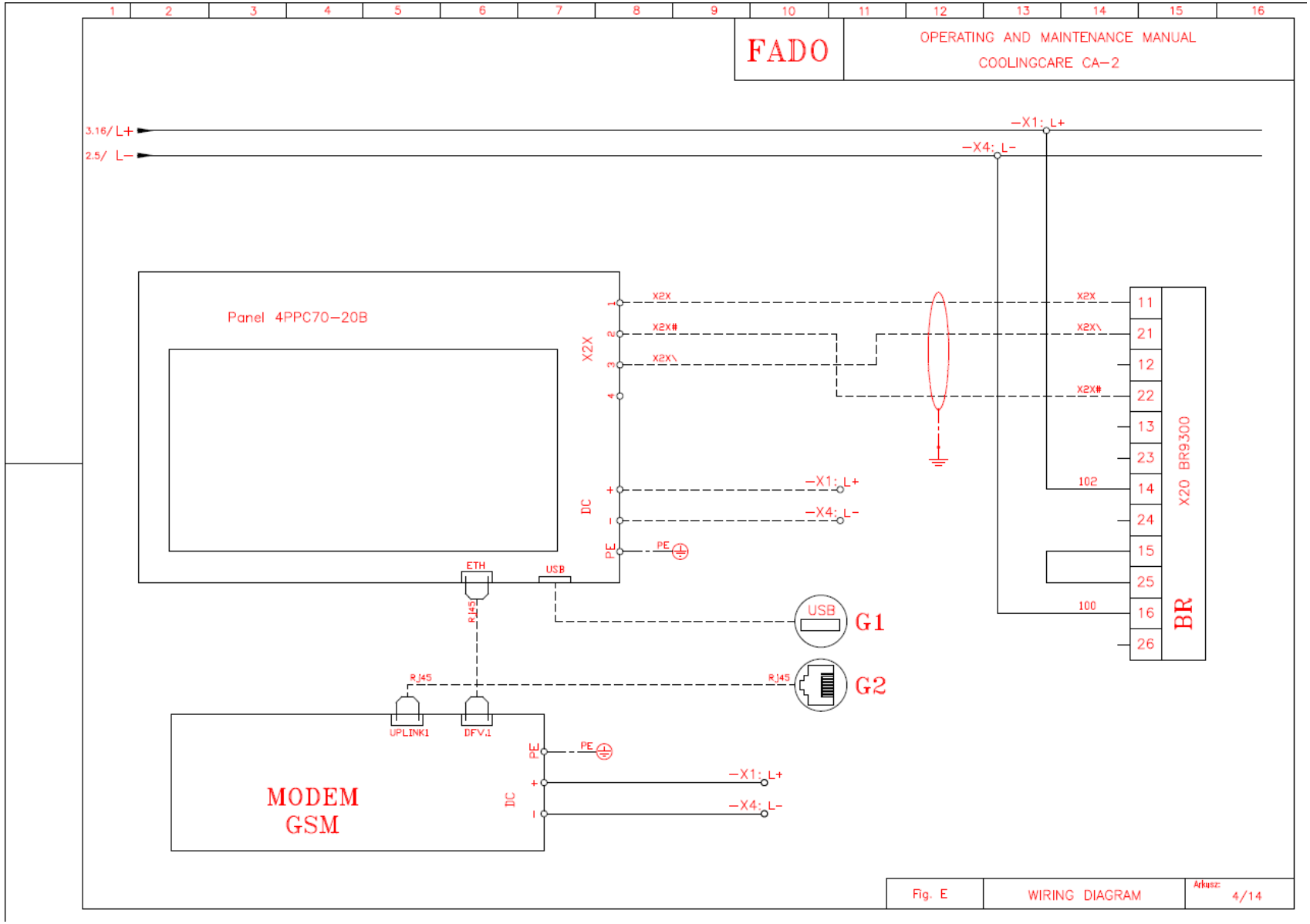
9.1.2 Electrical, pneumatic and hydraulic schematic

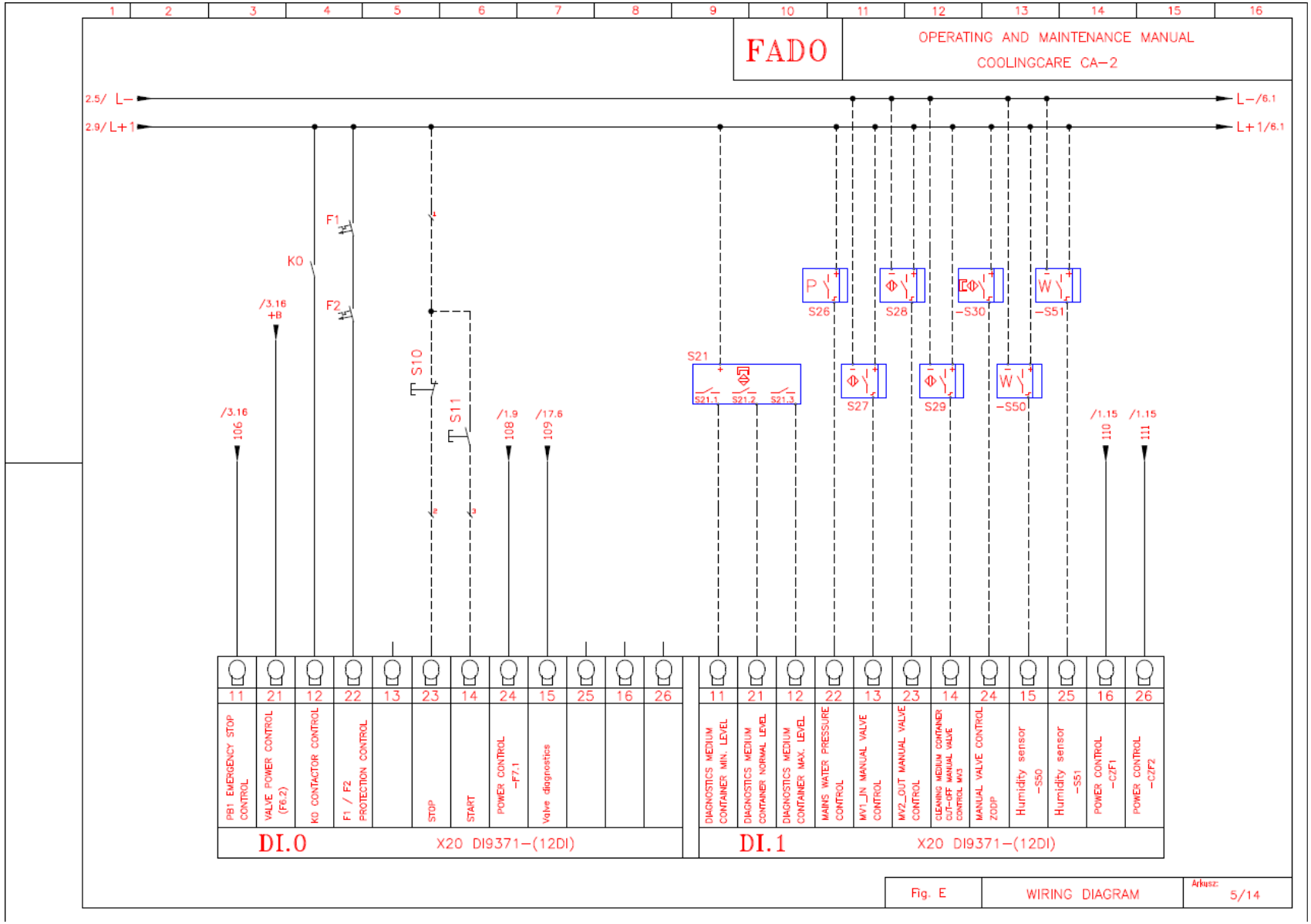


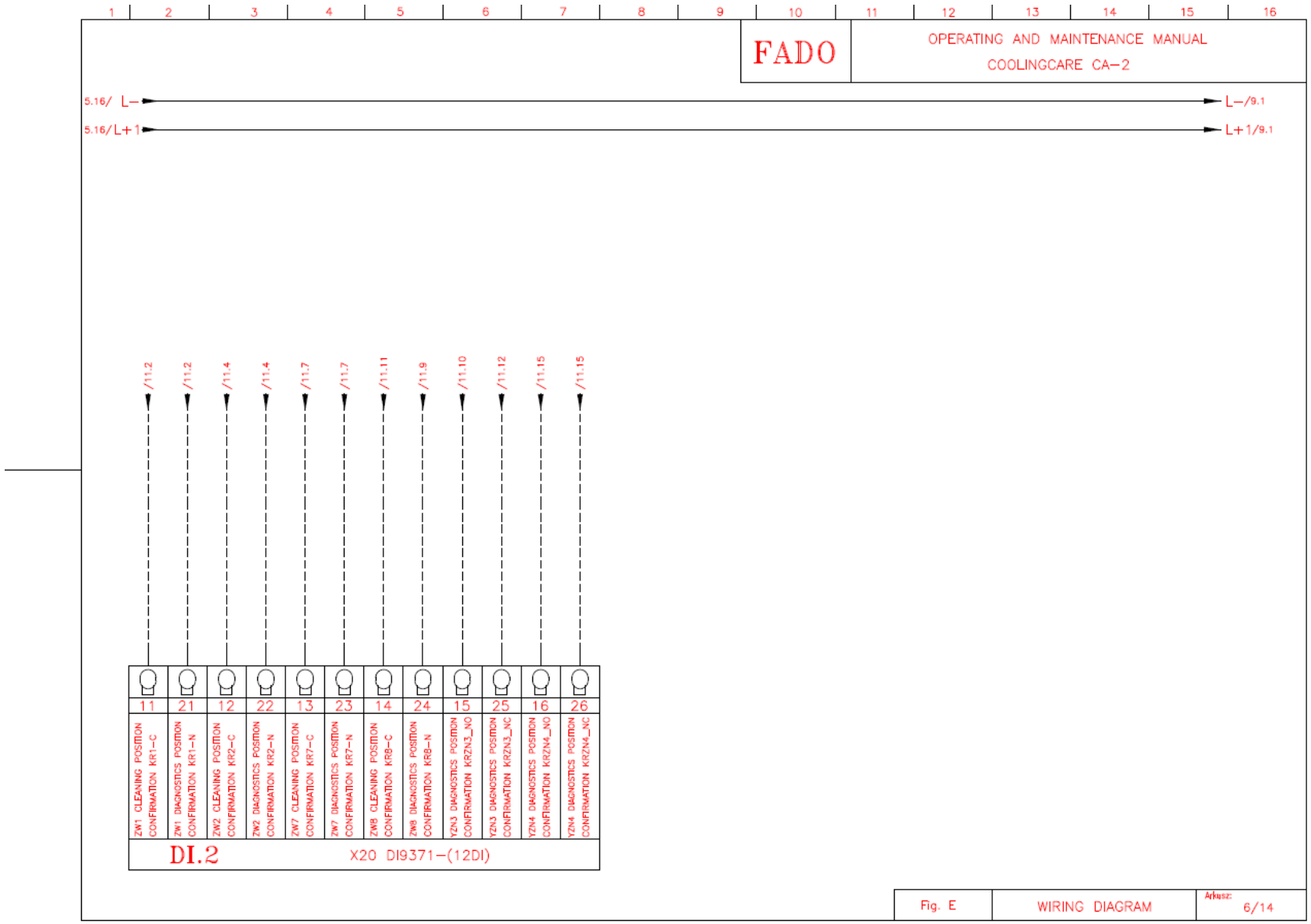

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
2L2 /2.1
2L3 /2.1
–F0
–K0
–F1
–F7
–F2
Q1M
–K1
13/3
–K2
13/6
–F7.1
U<0
–CZF1
U<0
–CZF2
U<0
–X0:
PE
108 /5.6
–X2: L+1
110 /5.14
–X2: L+1
111 /5.15
–X2: L+1
M1
M
3 R
DIAGNOSTICS
PUMP
E1
HEATER
6KW
–F0 –F1 –F2 –F5 –F7
240 VAC 25A 4,2A 20A 6A 2A
60Hz
CHARACTERISTIC C B B
Fig. E
WIRING DIAGRAM
Arkusz: 1/14

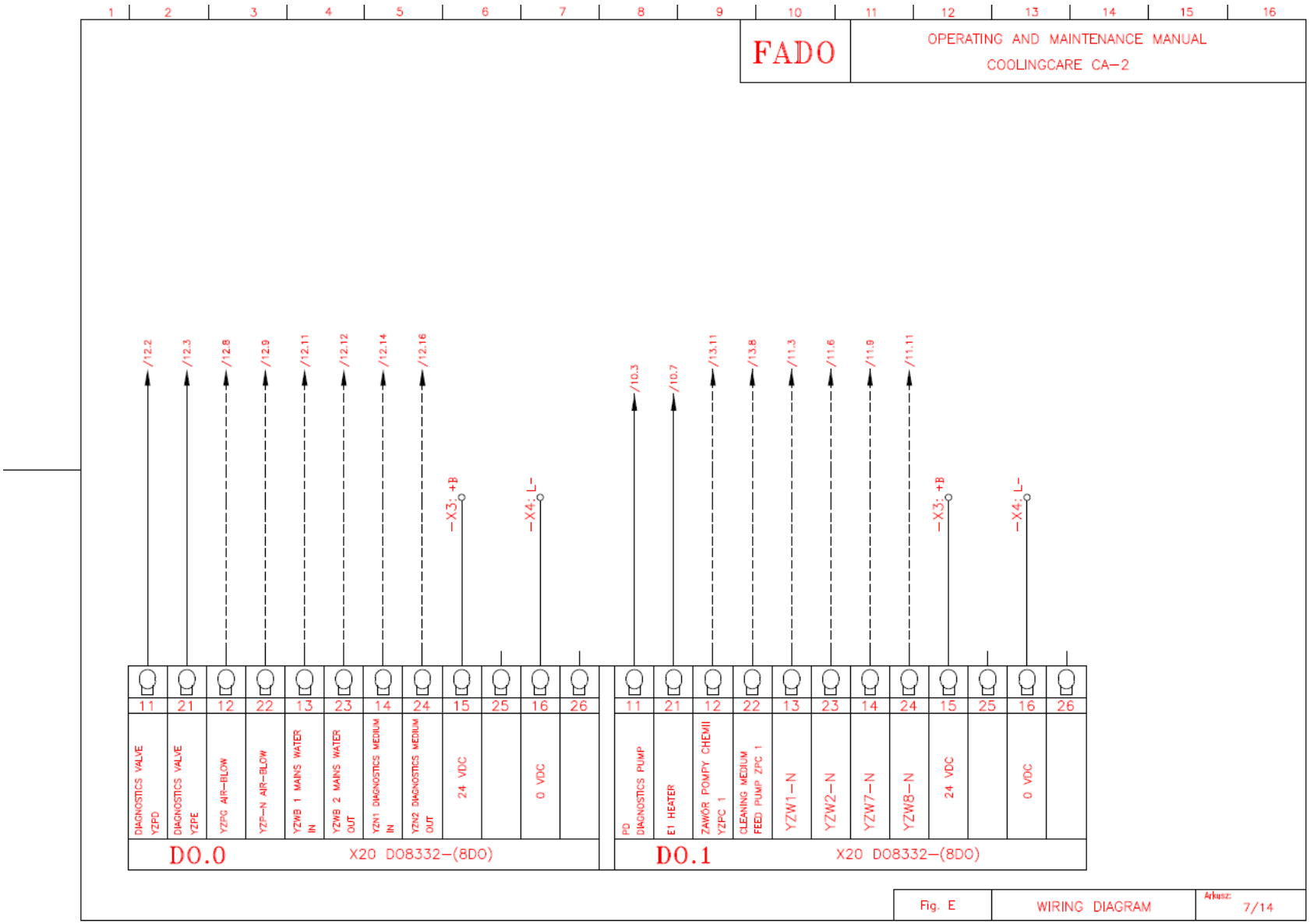

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
1.16/ 2L2
1.16/ 2L3
PE
2L2
2L3
–F5
1 3
2 4
T1
L N PE
240V AC
24V DC
– – – + +
F6 (2A)
–X1: L+
(/3.1) (/4.1) PLC+PB1+PANEL+MDEM GSM
F6.1 (2A)
–X2: L+1
(/3.1) (/5.1) (/6.1) (/9.1) INPUT
–X5: L+1
L–
–X4:
F6.2 (3A)
L+2
(/3.1) OUT PLC
L–
–X5:
Fig. E
WIRING DIAGRAM
Arkusz: 2/14

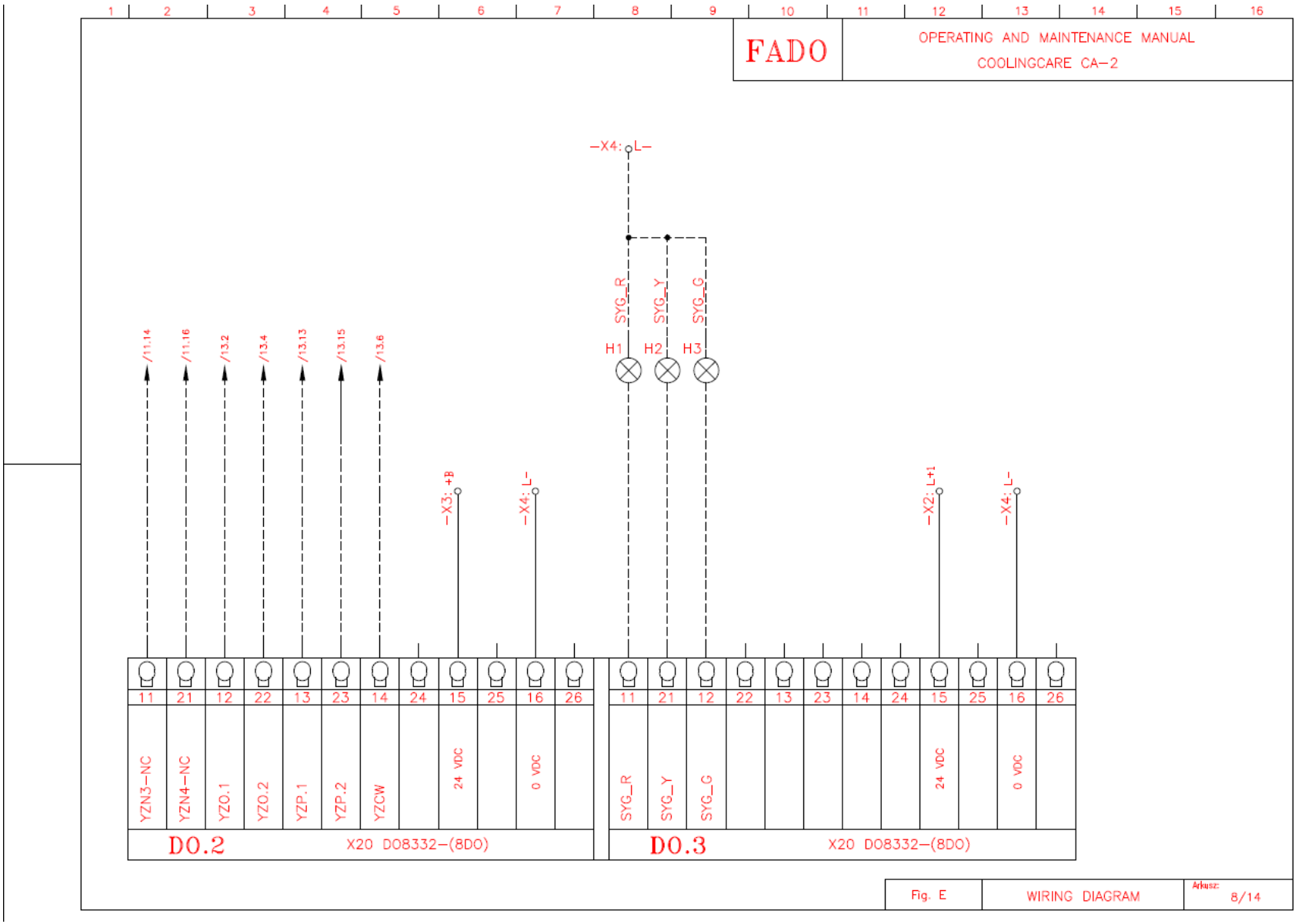

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
2.9/ L+
2.9/ L+1
2.9/ L+2
L+/4.1
L+1/5.1
S1
K0
K1
K2
L+
L+1
A1
T1
IN1
T2
IN2
IN3
T3
T4
IN F/S
13
23
33
41
24V DC
–PB1
SIEMENS
3SK1111–2AB30
A2
14
24
34
42
–X3: +B
+B /5.3
106 /5.3
K0
A1
A2
2.5/ L–
Fig. E
WIRING DIAGRAM
Arkusz:
3/14

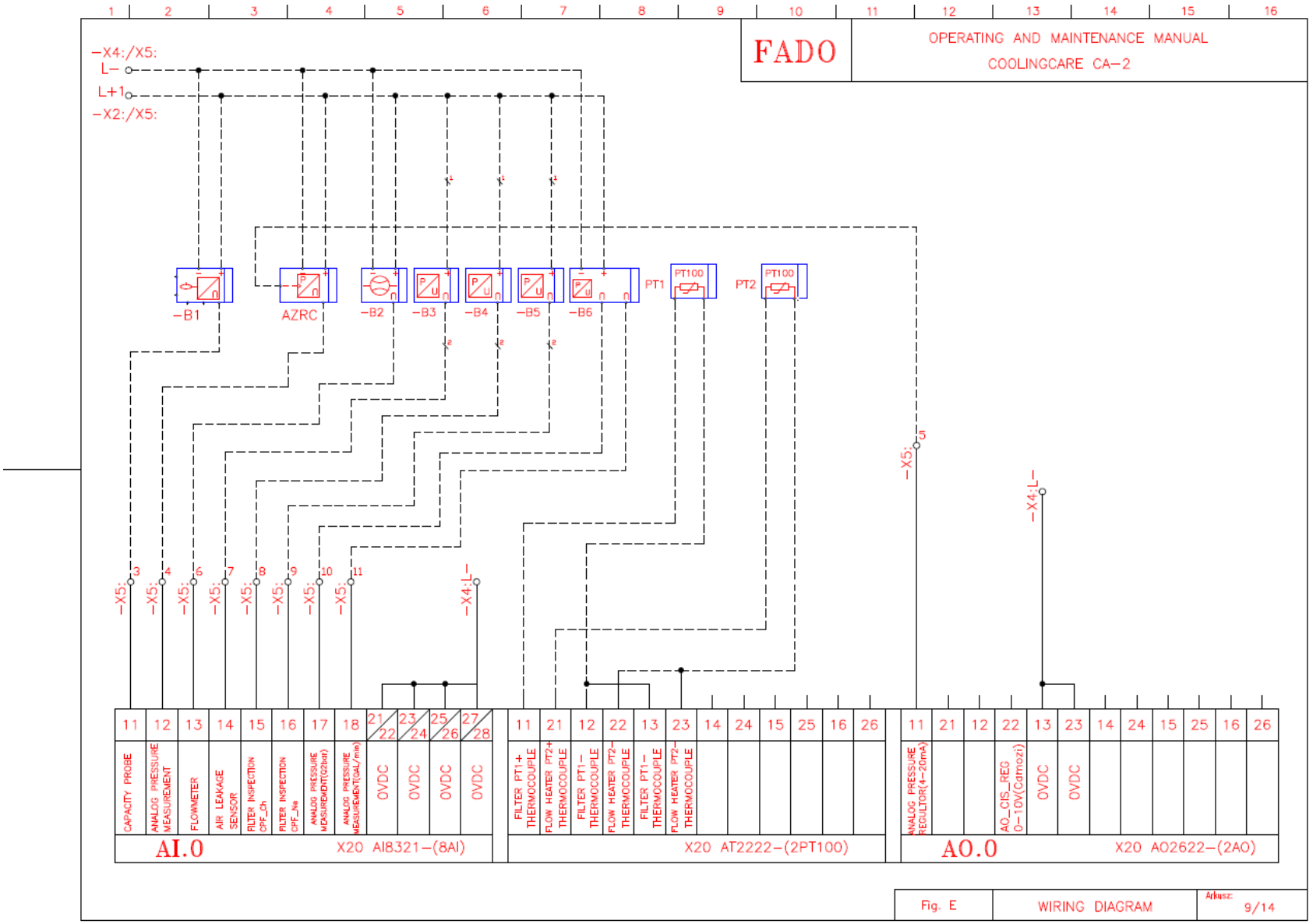

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
3.16/ L+
2.5/ L–
–X1: L+
–X4: L–
Panel 4PPC70–20B
X2X
X2X#
X2X\
DC
PE
ETH
USB
RJ45
USB
G1
G2
UPLINK1
DFV.1
MODEM
GSM
X20 BR9300
BR
102
100
Fig. E
WIRING DIAGRAM
Arkusz: 4/14

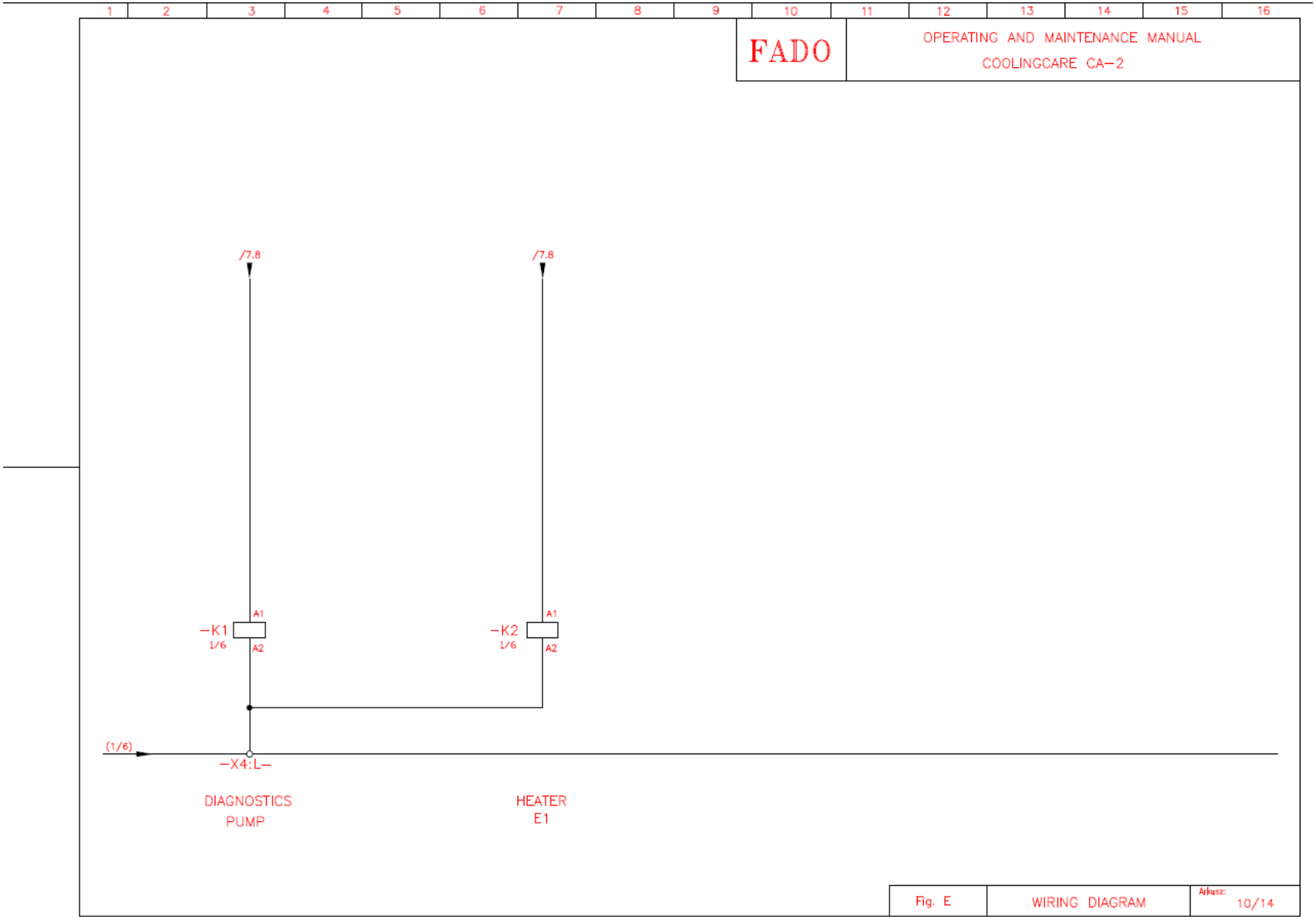

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
2.5/ L–
2.9/ L+1
L–/6.1
L+1/6.1
F1
F2
K0
/3.16
+B
S10
S11
S21
S26
S28
–S30
–S51
S27
S29
–S50
/3.16
106
/1.9
108
/17.6
109
/1.15
110
/1.15
111
11 21 12 22 13 23 14 24 15 25 16 26
PB1 EMERGENCY STOP CONTROL
VALVE POWER CONTROL (F6.2)
K0 CONTACTOR CONTROL
F1 / F2 PROTECTION CONTROL
STOP
START
POWER CONTROL –F7.1
Valve diagnostics
DI.0
X20 DI9371–(12DI)
11 21 12 22 13 23 14 24 15 25 16 26
DIAGNOSTICS MEDIUM CONTAINER MIN. LEVEL
DIAGNOSTICS MEDIUM CONTAINER NORMAL LEVEL
DIAGNOSTICS MEDIUM CONTAINER MAX. LEVEL
MAINS WATER PRESSURE CONTROL
MV1_IN MANUAL VALVE CONTROL
MV2_OUT MANUAL VALVE CONTROL
CLEANING MEDIUM CONTAINER CUT-OFF MANUAL VALVE CONTROL MV3
MANUAL VALVE CONTROL ZODP
Humidity sensor –S50
Humidity sensor –S51
POWER CONTROL –CZF1
POWER CONTROL –CZF2
DI.1
X20 DI9371–(12DI)
Fig. E
WIRING DIAGRAM
Arkusz: 5/14

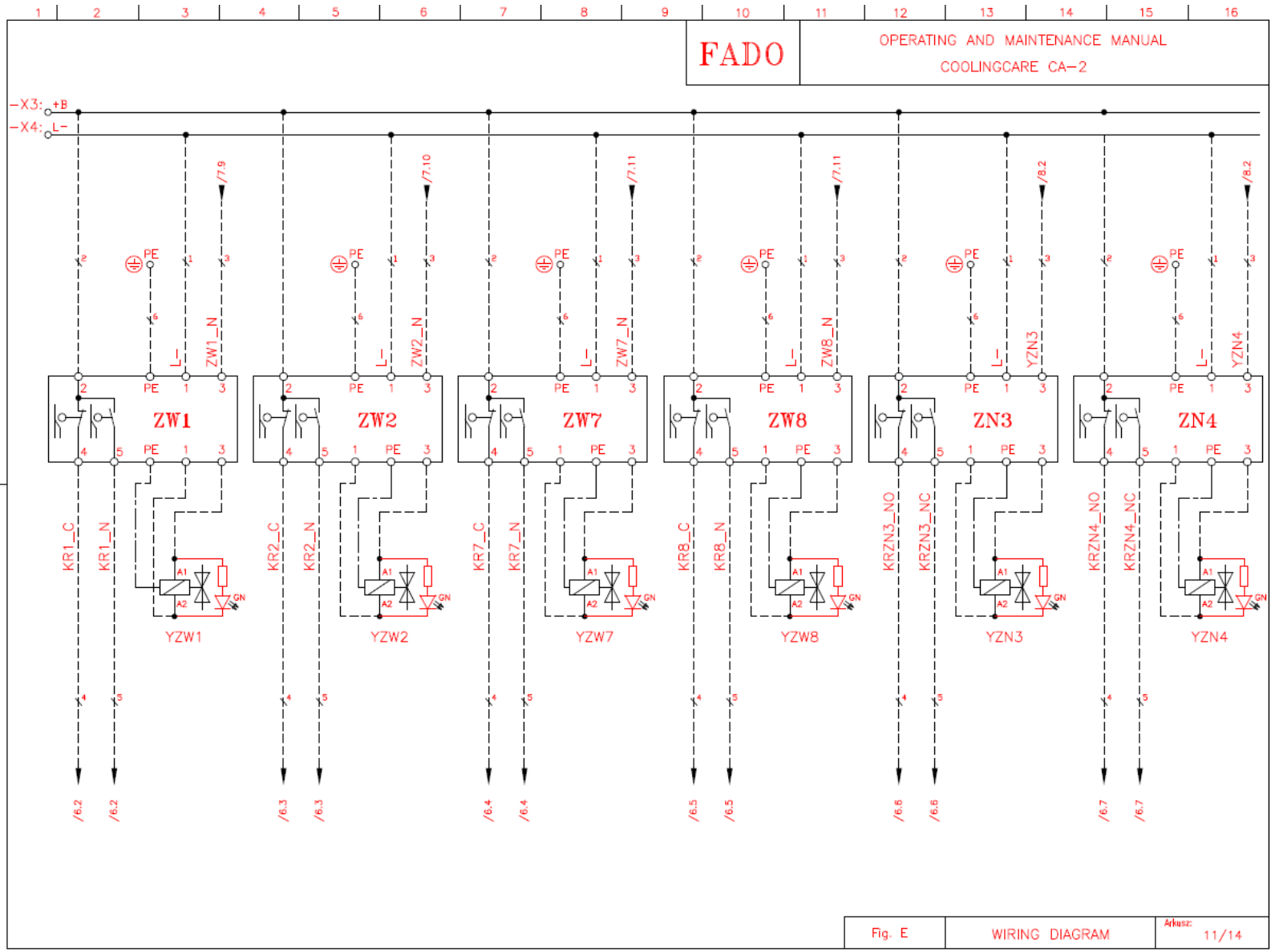

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
5.16/ L–
5.16/L+1
L–/9.1
L+1/9.1
/11.2
/11.2
/11.4
/11.4
/11.7
/11.7
/11.11
/11.9
/11.10
/11.12
/11.15
/11.15
11 21 12 22 13 23 14 24 15 25 16 26
ZW1 CLEANING POSITION CONFIRMATION KR1–C
ZW1 DIAGNOSTICS POSITION CONFIRMATION KR1–N
ZW2 CLEANING POSITION CONFIRMATION KR2–C
ZW2 DIAGNOSTICS POSITION CONFIRMATION KR2–N
ZW7 CLEANING POSITION CONFIRMATION KR7–C
ZW7 DIAGNOSTICS POSITION CONFIRMATION KR7–N
ZW8 CLEANING POSITION CONFIRMATION KR8–C
ZW8 DIAGNOSTICS POSITION CONFIRMATION KR8–N
YZN3 DIAGNOSTICS POSITION CONFIRMATION KRZN3_NO
YZN3 DIAGNOSTICS POSITION CONFIRMATION KRZN3_NC
YZN4 DIAGNOSTICS POSITION CONFIRMATION KRZN4_NO
YZN4 DIAGNOSTICS POSITION CONFIRMATION KRZN4_NC
DI.2
X20 DI9371–(12DI)
Fig. E
WIRING DIAGRAM
Arkusz: 6/14

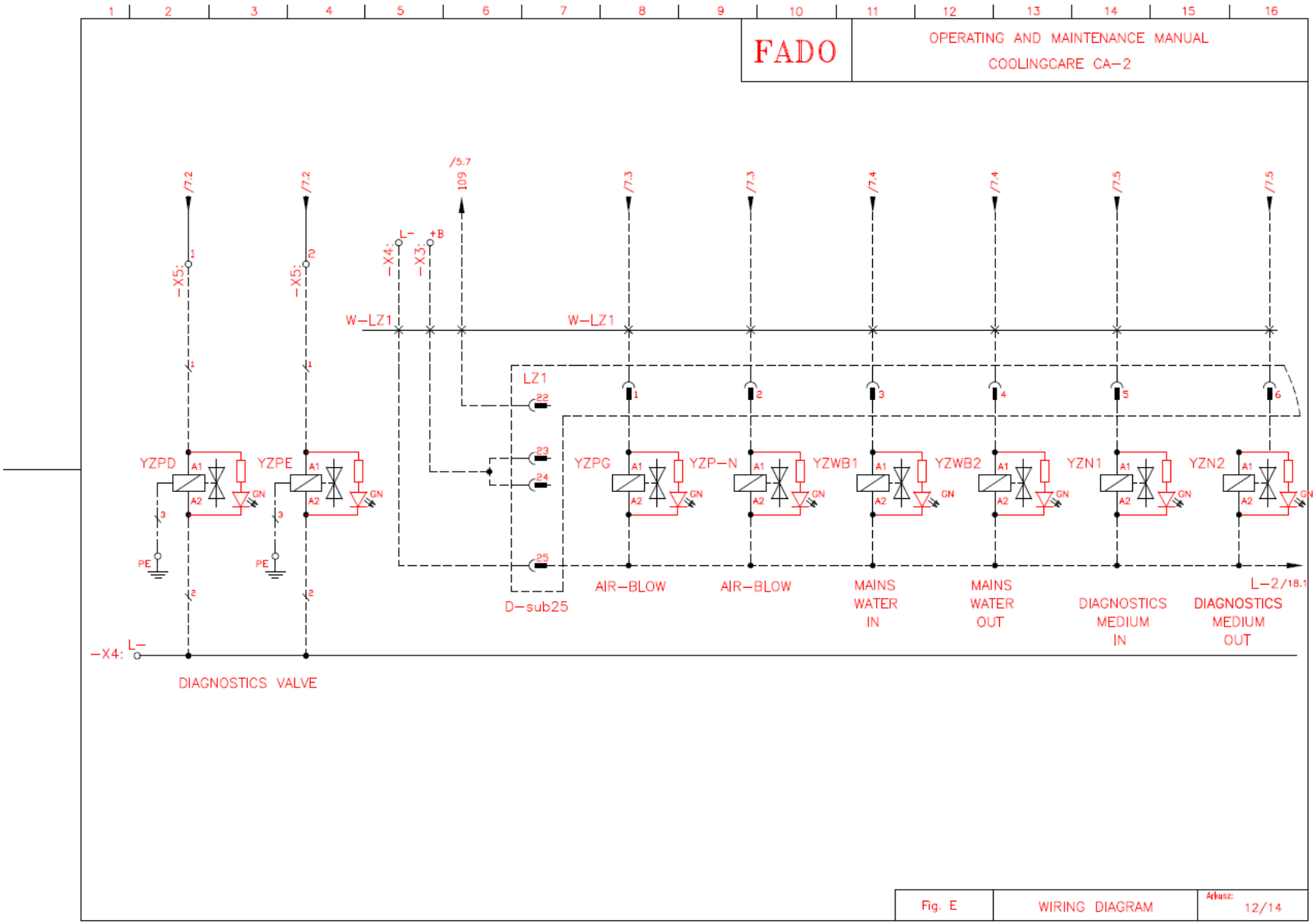

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
/12.2
/12.3
/12.8
/12.9
/12.11
/12.12
/12.14
/12.16
–X3: +B
–X4: L–
/10.3
/10.7
/13.11
/13.8
/11.3
/11.6
/11.9
/11.11
–X3: +B
–X4: L–
11 21 12 22 13 23 14 24 15 25 16 26
DIAGNOSTICS VALVE YZPD
DIAGNOSTICS VALVE YZPE
YZPG AIR–BLOW
YZP–N AIR–BLOW
YZWB 1 MAINS WATER IN
YZWB 2 MAINS WATER OUT
YZN1 DIAGNOSTICS MEDIUM IN
YZN2 DIAGNOSTICS MEDIUM OUT
24 VDC
0 VDC
DO.0
X20 DO8332–(8DO)
11 21 12 22 13 23 14 24 15 25 16 26
PD DIAGNOSTICS PUMP
E1 HEATER
ZAWÓR POMPY CHEMII YZPC 1
CLEANING MEDIUM FEED PUMP ZPC 1
YZW1–N
YZW2–N
YZW7–N
YZW8–N
24 VDC
0 VDC
DO.1
X20 DO8332–(8DO)
Fig. E
WIRING DIAGRAM
Arkusz: 7/14

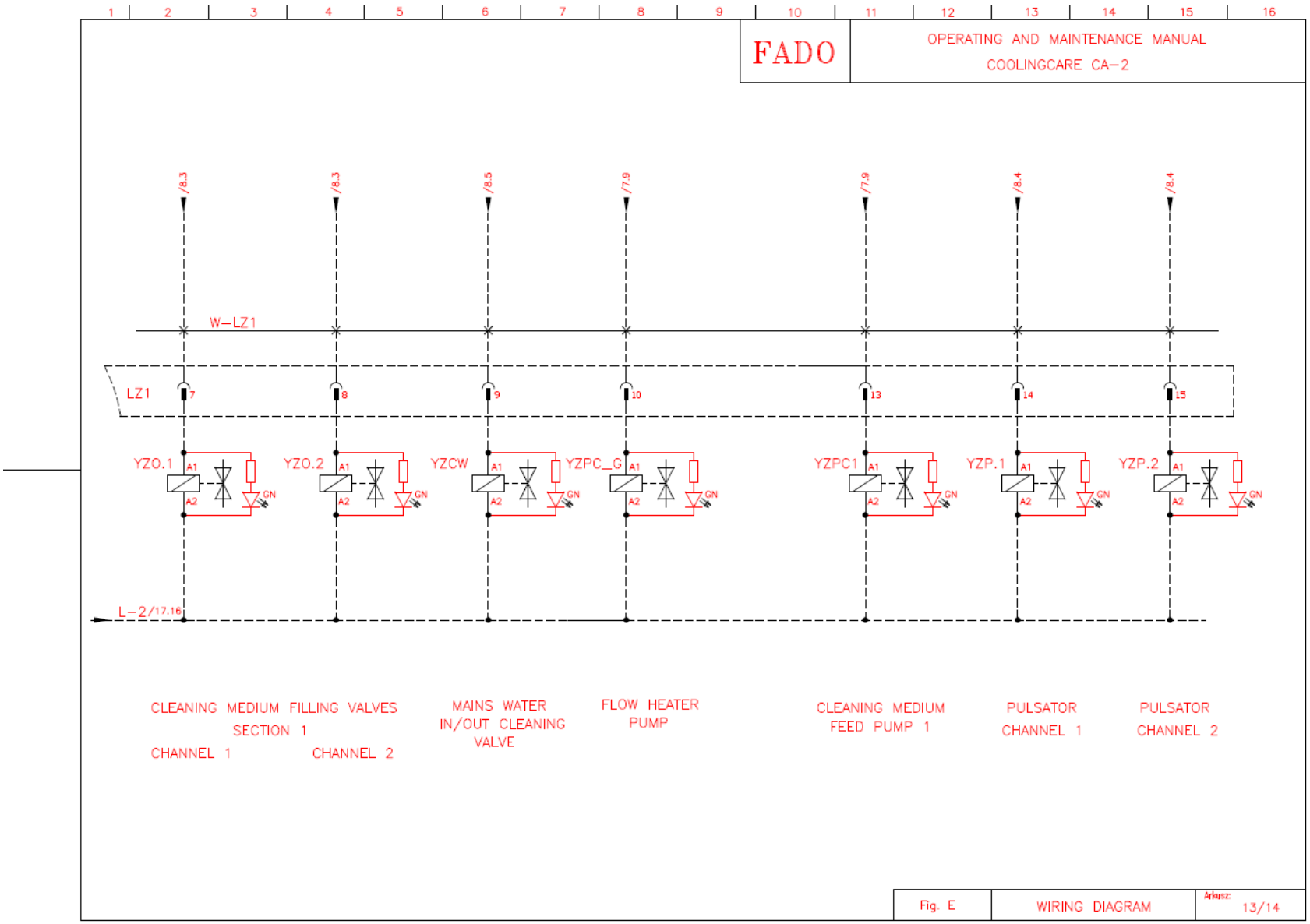

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
–X4: L–
SYG_R
SYG_Y
SYG_G
H1
H2
H3
/11.14
/11.16
/13.2
/13.4
/13.13
/13.15
/13.6
–X3: +B
–X4: L–
–X2: L+1
–X4: L–
YZN3–NC
YZN4–NC
YZO.1
YZO.2
YZP.1
YZP.2
YZCW
24 VDC
0 VDC
SYG_R
SYG_Y
SYG_G
24 VDC
0 VDC
DO.2
X20 DO8332–(8DO)
DO.3
X20 DO8332–(8DO)
Fig. E
WIRING DIAGRAM
Arkusz
8/14


FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
–X4:/X5:
L–
L+1
–X2:/X5:
–B1
AZRC
–B2
–B3
–B4
–B5
–B6
PT1
PT100
PT2
PT100
–X5:
–X4:L–
CAPACITY PROBE
ANALOG PRESSURE MEASUREMENT
FLOWMETER
AIR LEAKAGE SENSOR
FILTER INSPECTION CPF_Ch
FILTER INSPECTION CPF_Na
ANALOG PRESSURE MEASUREMENT(02bar)
ANALOG PRESSURE MEASUREMENT(04L/min)
0VDC
AI.0
X20 AI8321–(8AI)
FILTER PT1+ THERMOCOUPLE
FLOW HEATER PT2+ THERMOCOUPLE
FILTER PT1– THERMOCOUPLE
FLOW HEATER PT2– THERMOCOUPLE
FILTER PT1– THERMOCOUPLE
FLOW HEATER PT2– THERMOCOUPLE
X20 AT2222–(2PT100)
ANALOG PRESSURE REGULTOR(4–20mA)
AO_CIS_REG 0–10V(Cadmozi)
0VDC
AO.0
X20 AO2622–(2AO)
Fig. E
WIRING DIAGRAM
Arkusz:
9/14


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
/7.8
/7.8
–K1
1/6
A1
A2
–K2
1/6
A1
A2
(1/6)
–X4:L–
DIAGNOSTICS
PUMP
HEATER
E1
Fig. E
WIRING DIAGRAM
Arkusz:
10/14

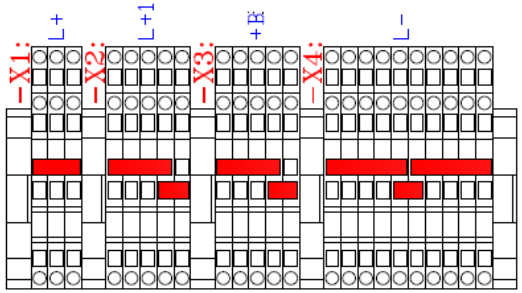

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
-X3: +B
-X4: L-
ZW1
ZW2
ZW7
ZW8
ZN3
ZN4
YZW1
YZW2
YZW7
YZW8
YZN3
YZN4
KR1_C
KR1_N
KR2_C
KR2_N
KR7_C
KR7_N
KR8_C
KR8_N
KRZN3_NO
KRZN3_NC
KRZN4_NO
KRZN4_NC
ZW1_N
ZW2_N
ZW7_N
ZW8_N
YZN3
YZN4
Fig. E
WIRING DIAGRAM
Arkusz: 11/14

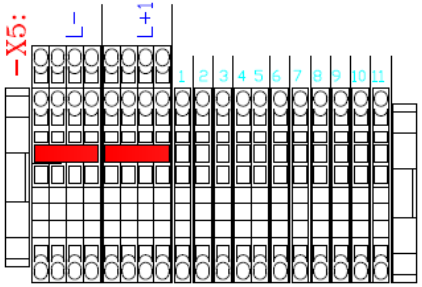

FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
/5.7
109
/7.2
/7.2
/7.3
/7.3
/7.4
/7.4
/7.5
/7.5
–X5:
–X5:
–X4:
–X3:
L–
+B
W–LZ1
W–LZ1
LZ1
22
23
24
25
1
2
3
4
5
6
YZPD
YZPE
YZPG
YZP–N
YZWB1
YZWB2
YZN1
YZN2
A1
A2
GN
PE
D–sub25
AIR–BLOW
AIR–BLOW
MAINS WATER IN
MAINS WATER OUT
DIAGNOSTICS MEDIUM IN
DIAGNOSTICS MEDIUM OUT
L–2/18.1
–X4: L–
DIAGNOSTICS VALVE
Fig. E
WIRING DIAGRAM
Arkusz:
12/14

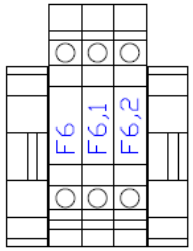

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
/8.3
/8.3
/8.5
/7.9
/7.9
/8.4
/8.4
W–LZ1
LZ1
7
8
9
10
13
14
15
YZO.1
YZO.2
YZCW
YZPC_G
YZPC1
YZP.1
YZP.2
A1
A2
GN
L–2/17.16
CLEANING MEDIUM FILLING VALVES
SECTION 1
CHANNEL 1
CHANNEL 2
MAINS WATER
IN/OUT CLEANING
VALVE
FLOW HEATER
PUMP
CLEANING MEDIUM
FEED PUMP 1
PULSATOR
CHANNEL 1
PULSATOR
CHANNEL 2
Fig. E
WIRING DIAGRAM
Arkusz:
13/14

FADO

OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2







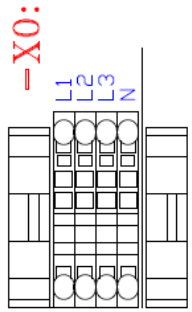
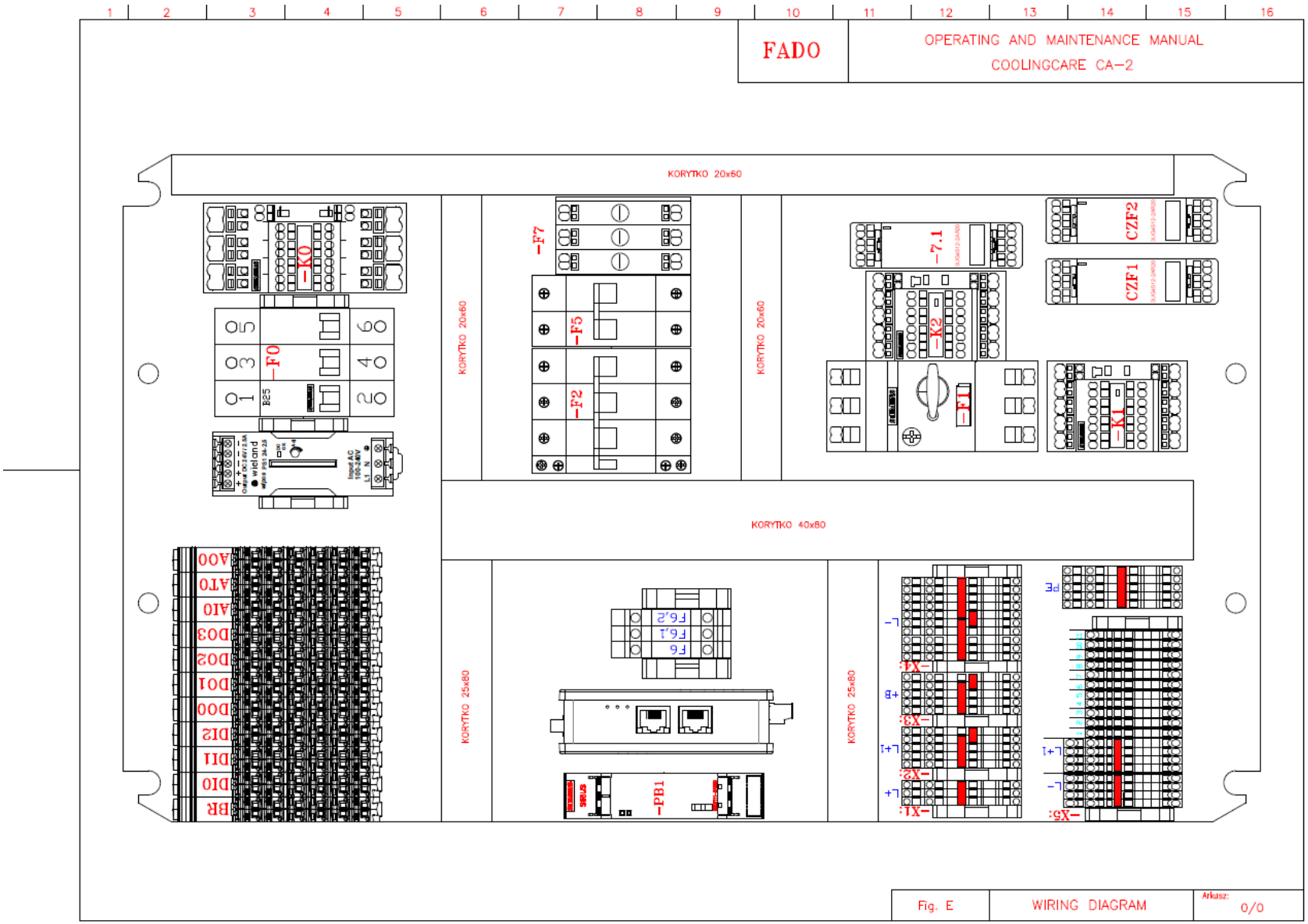


Fig. E | WIRING DIAGRAM | Arkusz: 14/14


FADO
OPERATING AND MAINTENANCE MANUAL
COOLINGCARE CA–2
KORYTKO 20x60
KORYTKO 20x60
KORYTKO 20x60
KORYTKO 40x80
KORYTKO 25x80
KORYTKO 25x80
-K0
-F0
-F7
-F5
-F2
-7.1
-K2
-F1
-K1
CZF2
CZF1
-PB1
Fig. E
WIRING DIAGRAM
Arkusz: 0/0

MAINTENANCE AND REPAIR WORK HISTORY SHEET

No.	Date and time of maintenance or repair	Comments on the existing technical condition (irregularities, damage, etc.)	Name of the person performing the maintenance or repair	Type of maintenance work carried out or repair	Signature of the person performing the maintenance or repair
1	2	3	4	5	6

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