User Manual

Software

Husky IMM
AvtoVaz

Document Information:

Revision	Date	Author	Change
V1Rev0	220124	Silvester Jakša	First version

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1 Introduction

This document will describe important machine functionality, how to use software installed on Husky IMM, how to parametrize certain machine functionality, safety functions and will introduce special HMI screens in detail.

2 User Interface Structure

2.1 Main user interface structure

There is a following main user interface screen structure on the touch panel:

1. Startup screen
2. Alarms
3. Core 1
4. Core 2
5. Core 3
6. Core 4
7. Ejector
8. Holding pressure
9. Injection
10. Injection unit
11. Mould clamping overview
12. Mould close
13. Mould open
14. Program management
15. QMC mould load
16. QMC mould unload
17. Recovery
18. Robot
19. Root screen
20. Sequential injection control
21. Statistics
22. Temperature zone extruder
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25. Temperature zones mould 3
26. Temperature zones mould 4 (if applicable)
27. Temperature zones mould 5 (if applicable)
28. Temperature zones mould 6 (if applicable)
29. Times info
30. Various settings

2.1.1 Startup screen

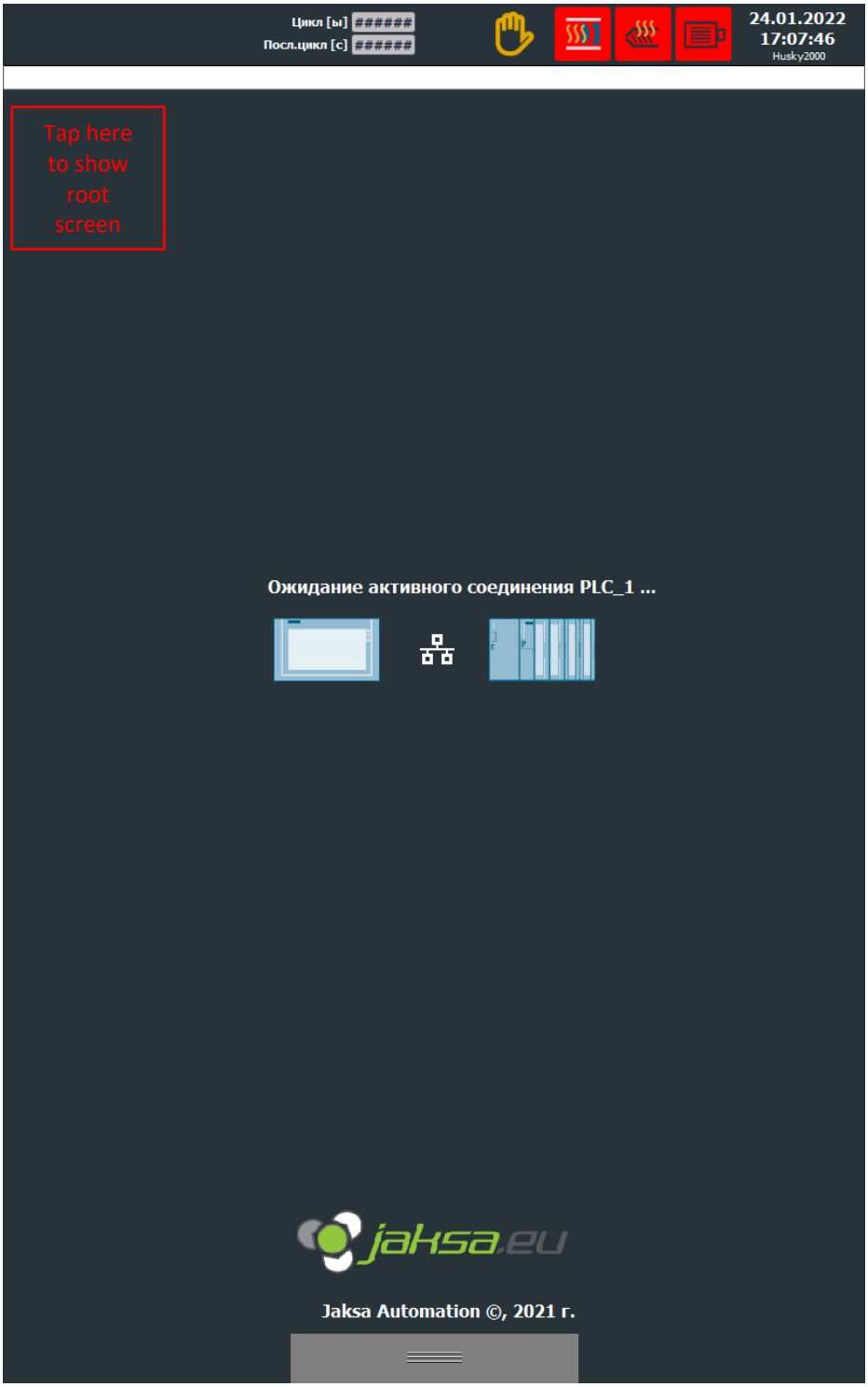


Figure 1:Startup screen

Startup screen shows only at the beginning of the startup of the touch panel. When touch panel initiates and establishes successful connection with the PLC, it disappears.
If the screen does not disappear after 5 minutes and there is something wrong, there is a possibility to get out of it by tapping once the upper left corner of grey area below the alarm line. This shows the root screen, from where it is possible to enter diagnostics or check in the alarm screen if there are possible errors which require attention.

2.1.2 Root screen

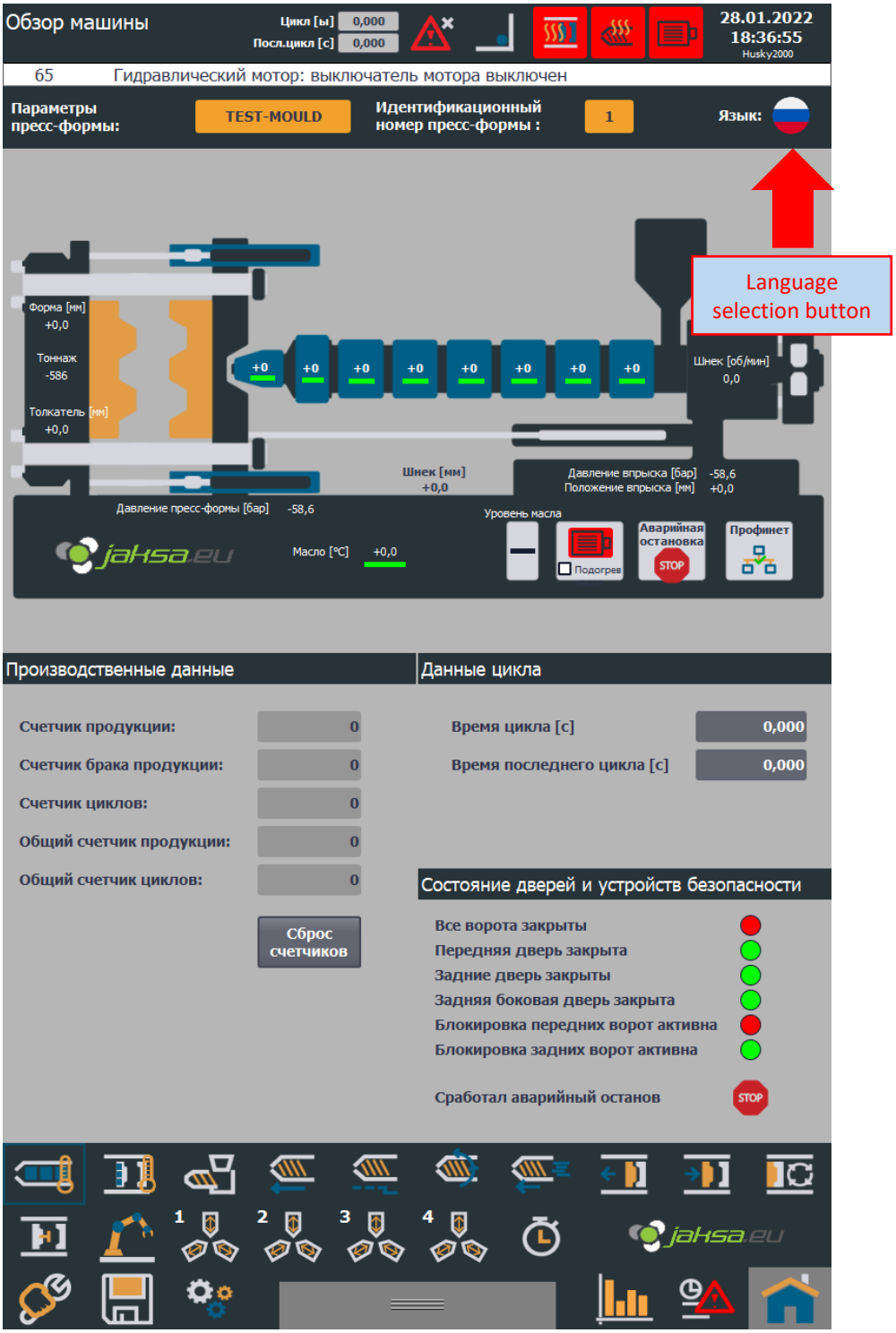


Figure 2:Root screen

This screen loads directly after startup screen is done with the initialization. This screen allows user to see basic cycle information, basic machine data and selected recipe data. There is also an overview of gates and emergency stop status. There is a shortcut in the top right corner which allows user to change the user interface language. Another option to do it is in the diagnostics menu, which will be mentioned later in the document.

2.1.3 Alarms

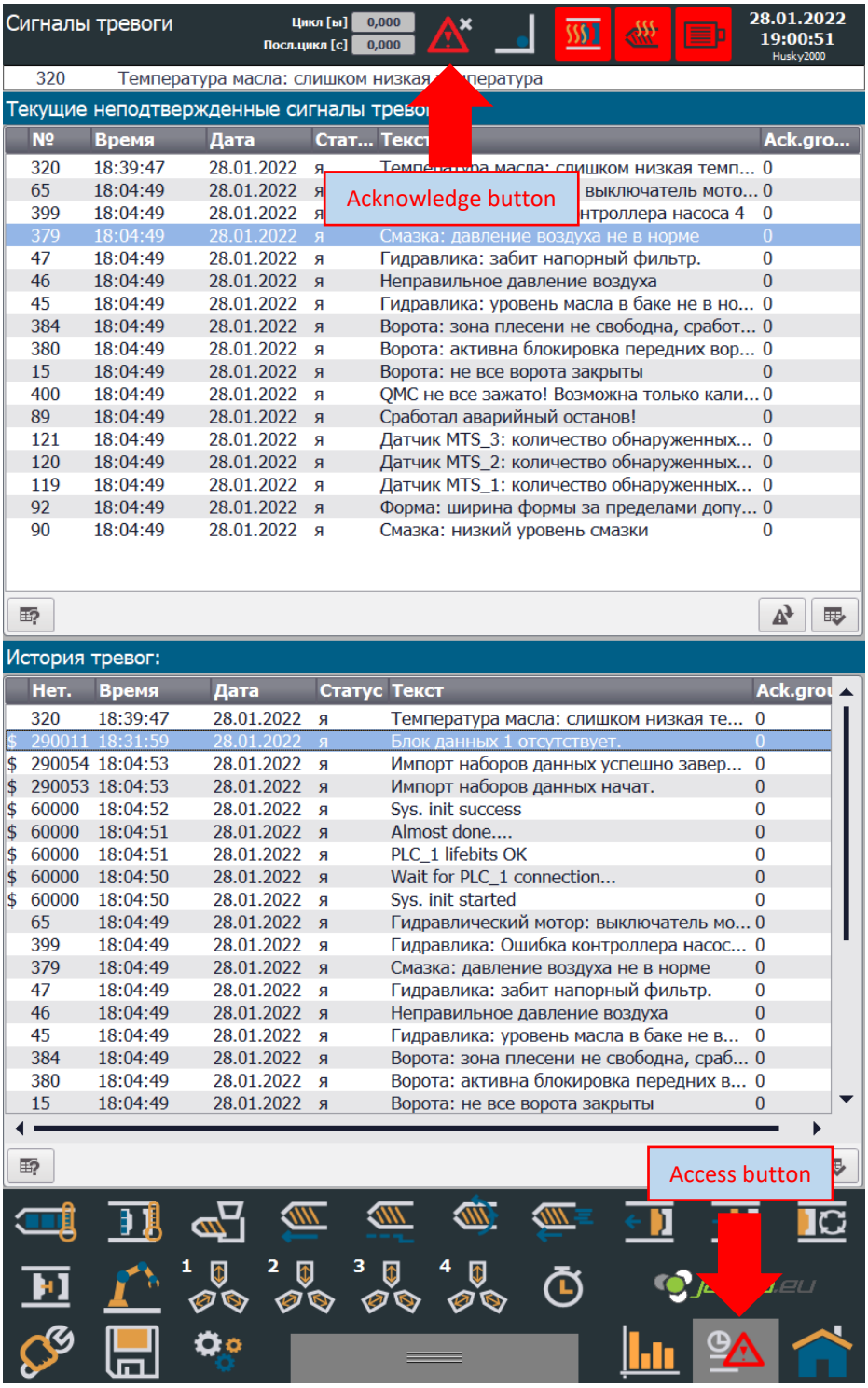


Figure 3:Alarms

This screen shows in the upper table active alarms, which have not been acknowledged yet. Acknowledge button is located in the top section of the screen in the middle. In the bottom table there is an alarm history of all acknowledged alarms.

2.1.4 Program management

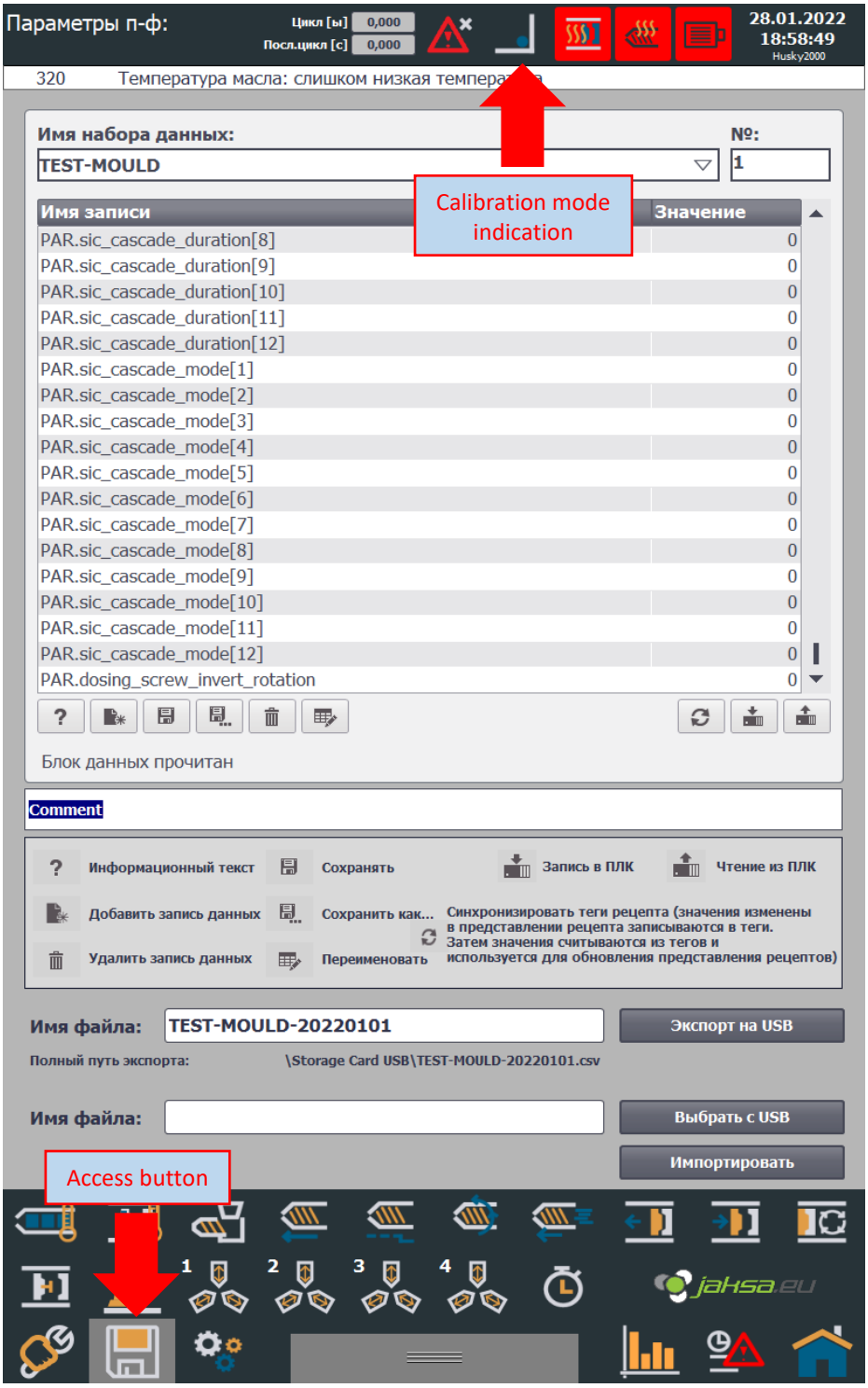


Figure 4:Program management

This screen allows user to manipulate machine programs. Machine operating mode needs to be switched to Calibration mode to be able to change anything about programs. Detailed description of program handling will be described later in the document.

2.1.5 Core x

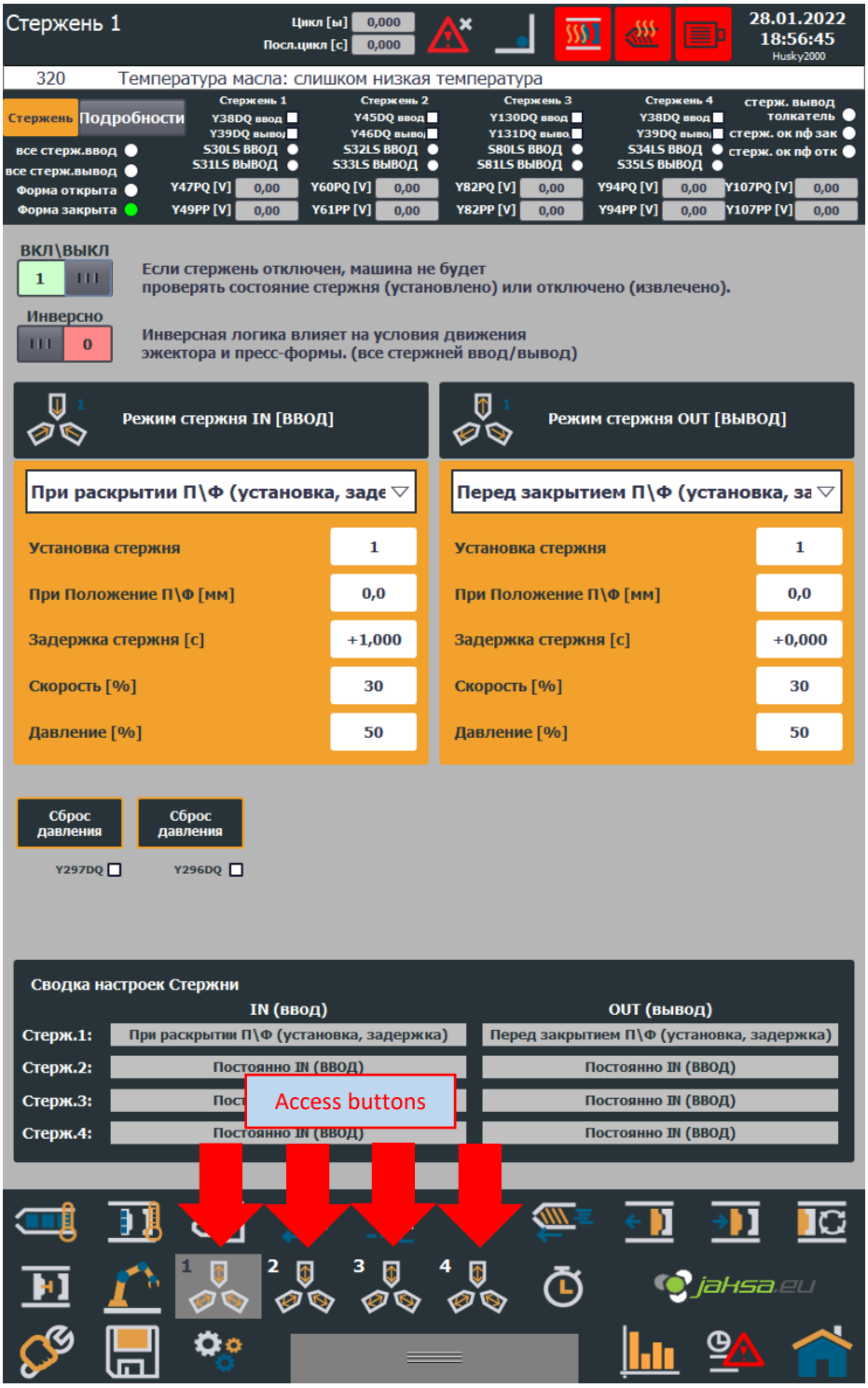


Figure 5:Core x

2.1.6 Ejector

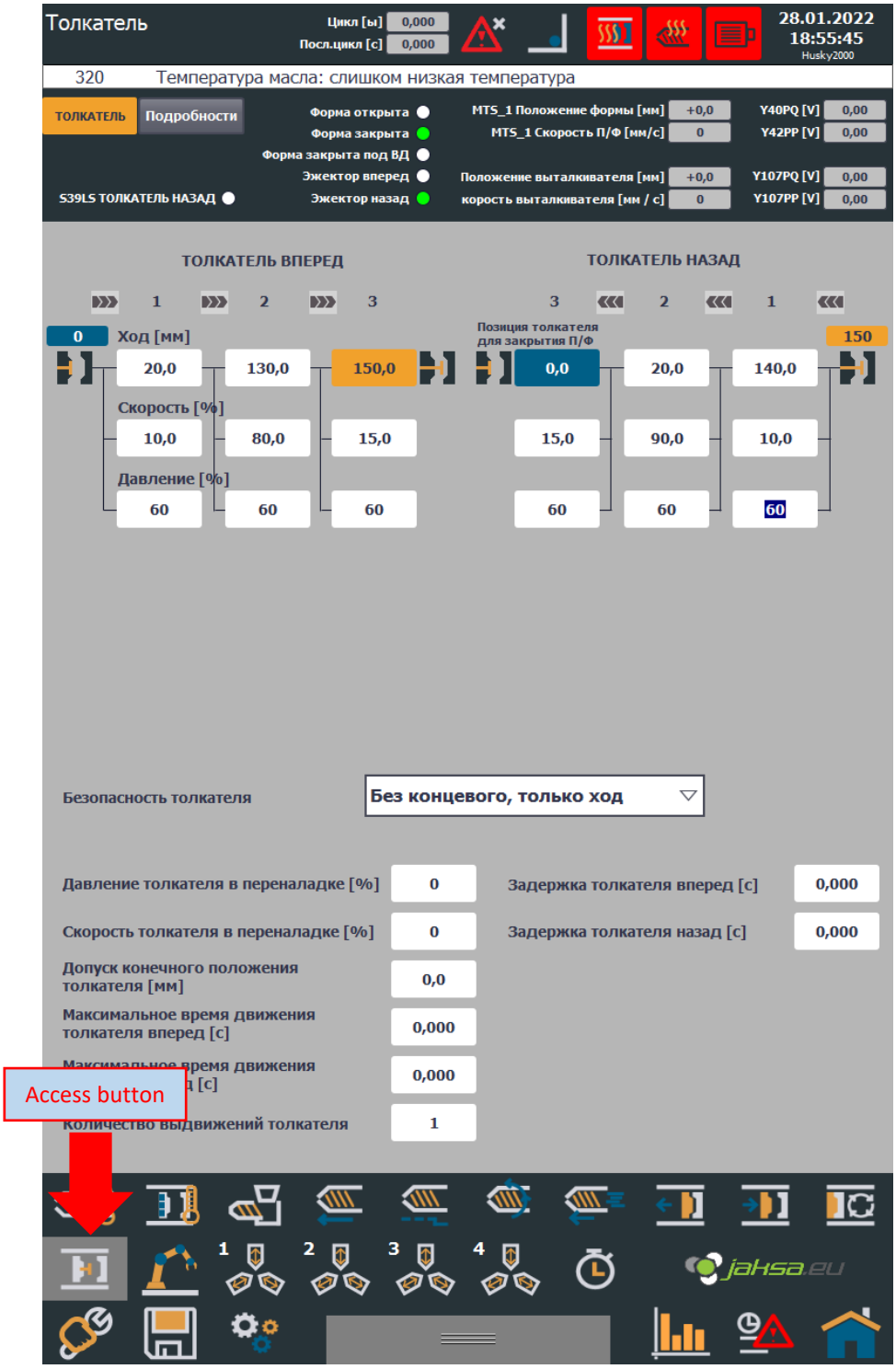


Figure 6:Ejector

2.1.7 Injection unit

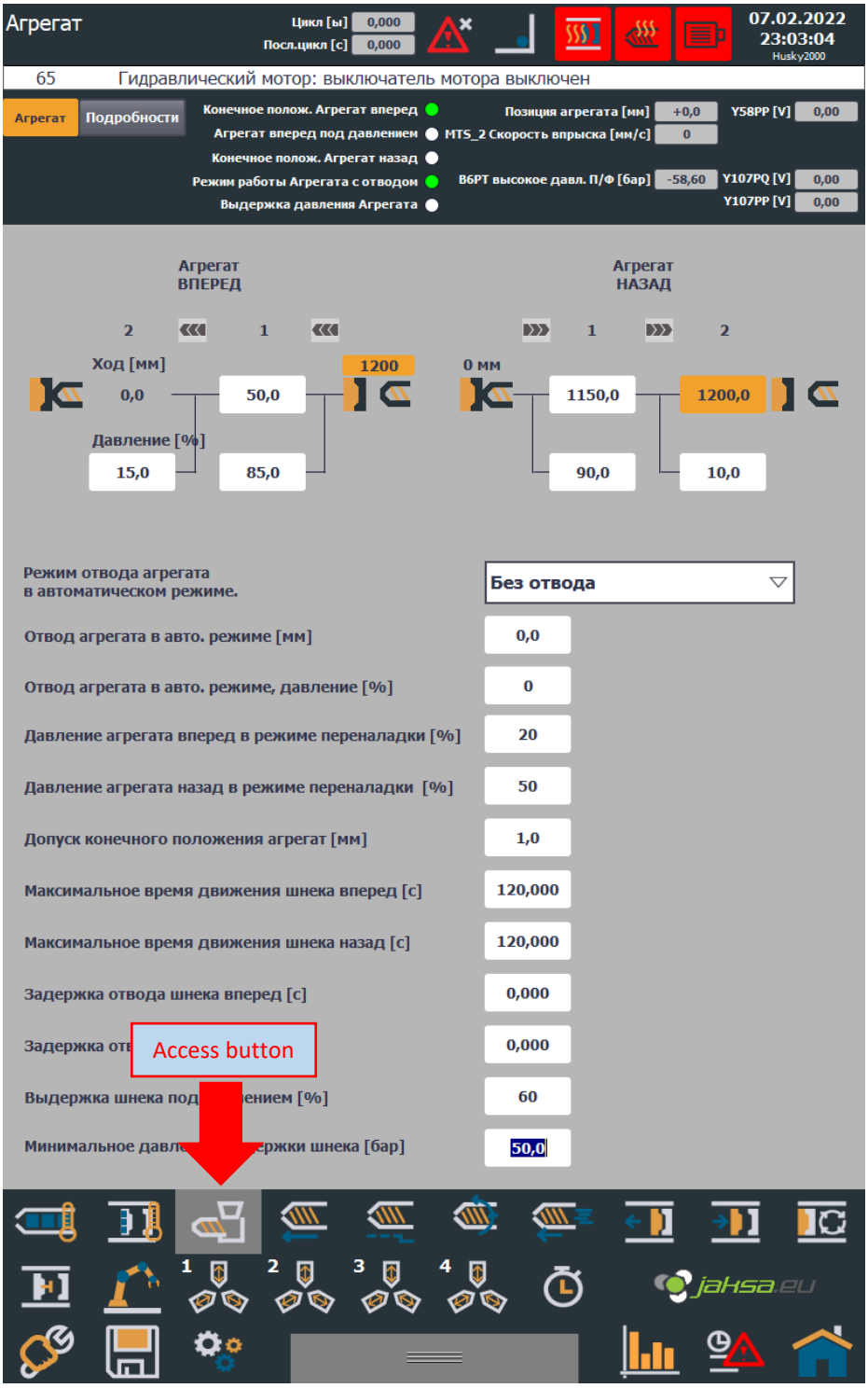


Figure 7:Injection unit

2.1.8 Robot

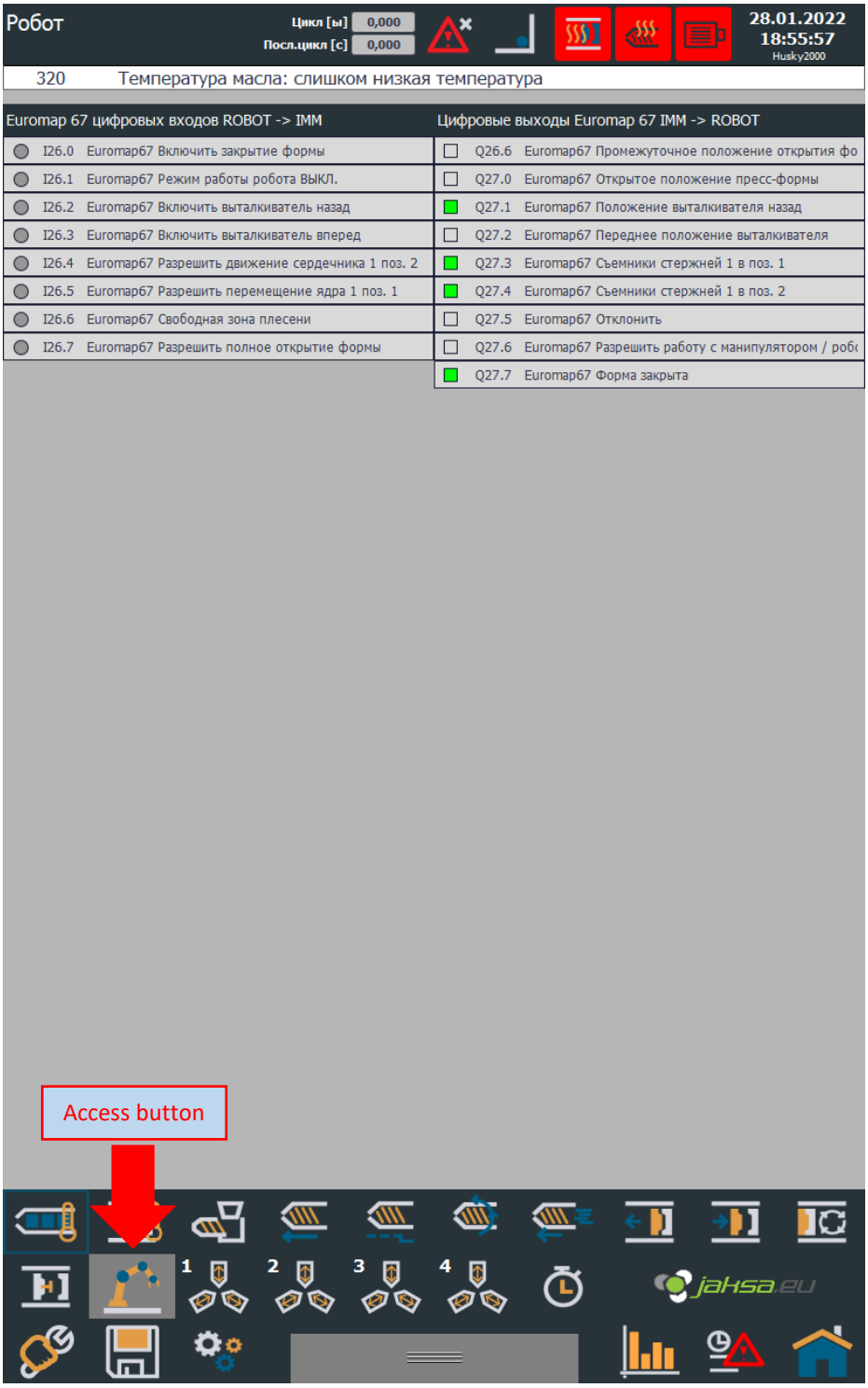
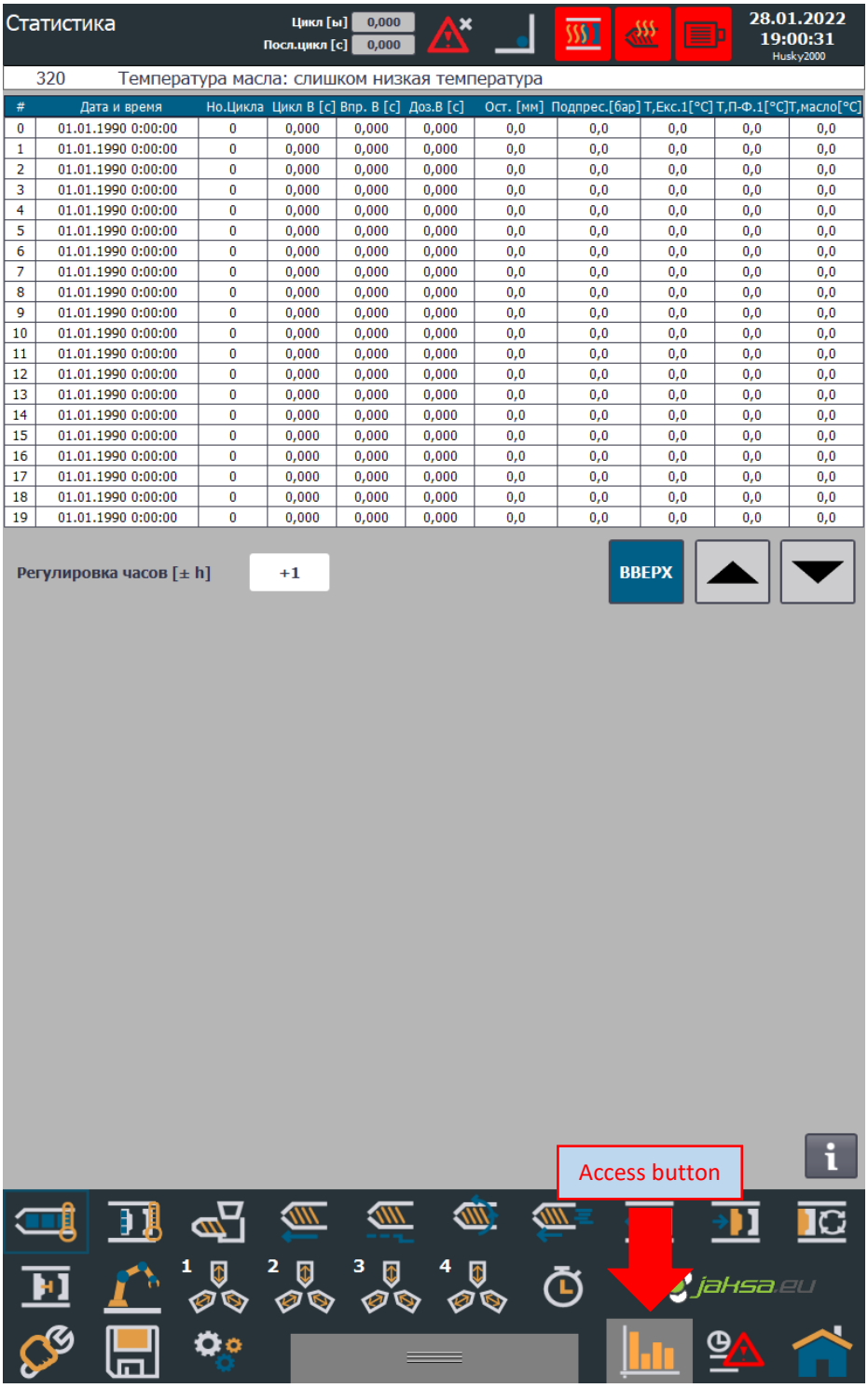


Figure 8:Robot

2.1.9 Statistics



#	Дата и время	Но.Цикла	Цикл В [с]	Впр. В [с]	Доз.В [с]	Ост. [мм]	Подпрес.[бар]	Т,Екс.1[°C]	Т,П-Ф.1[°C]	Т,масло[°C]
0	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
1	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
2	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
3	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
4	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
5	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
6	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
7	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
8	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
9	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
10	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
11	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
12	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
13	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
14	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
15	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
16	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
17	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
18	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0
19	01.01.1990 0:00:00	0	0,000	0,000	0,000	0,0	0,0	0,0	0,0	0,0

Figure 9:Statistics

2.1.10 Times info

Figure 10:Times info

2.1.11 Various settings

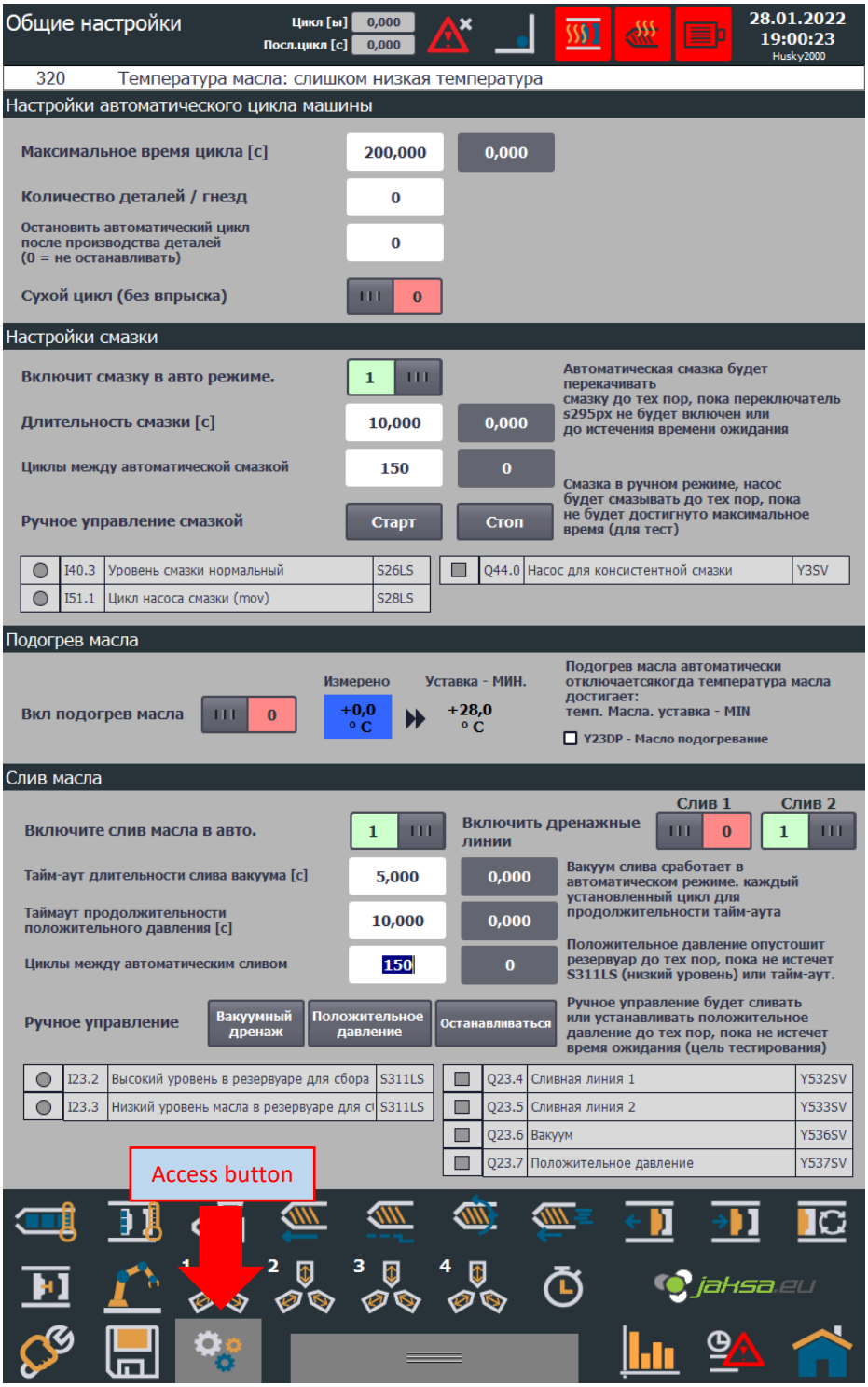


Figure 11:Various settings

2.1.12 Injection

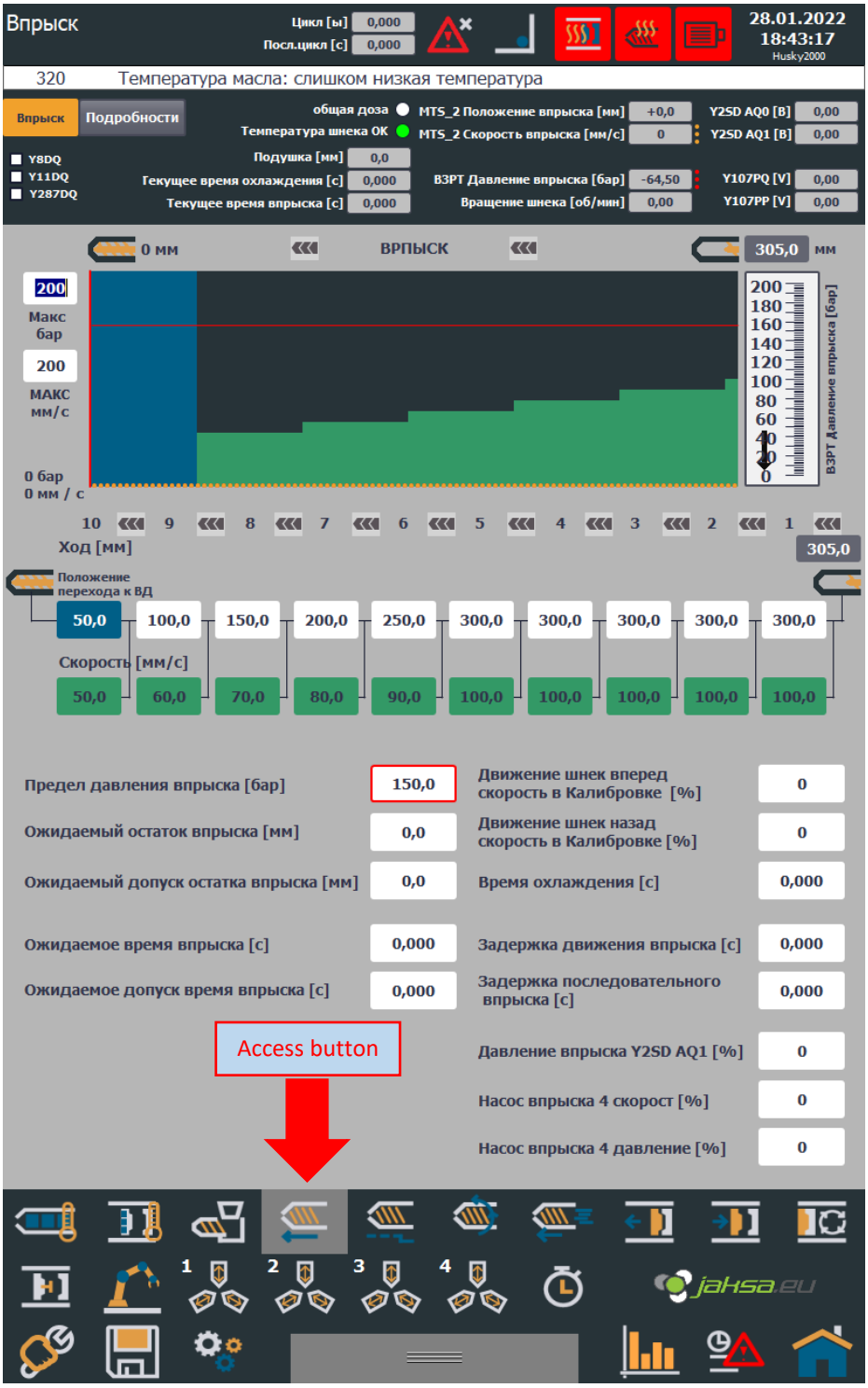


Figure 12:Injection

2.1.13 Holding pressure

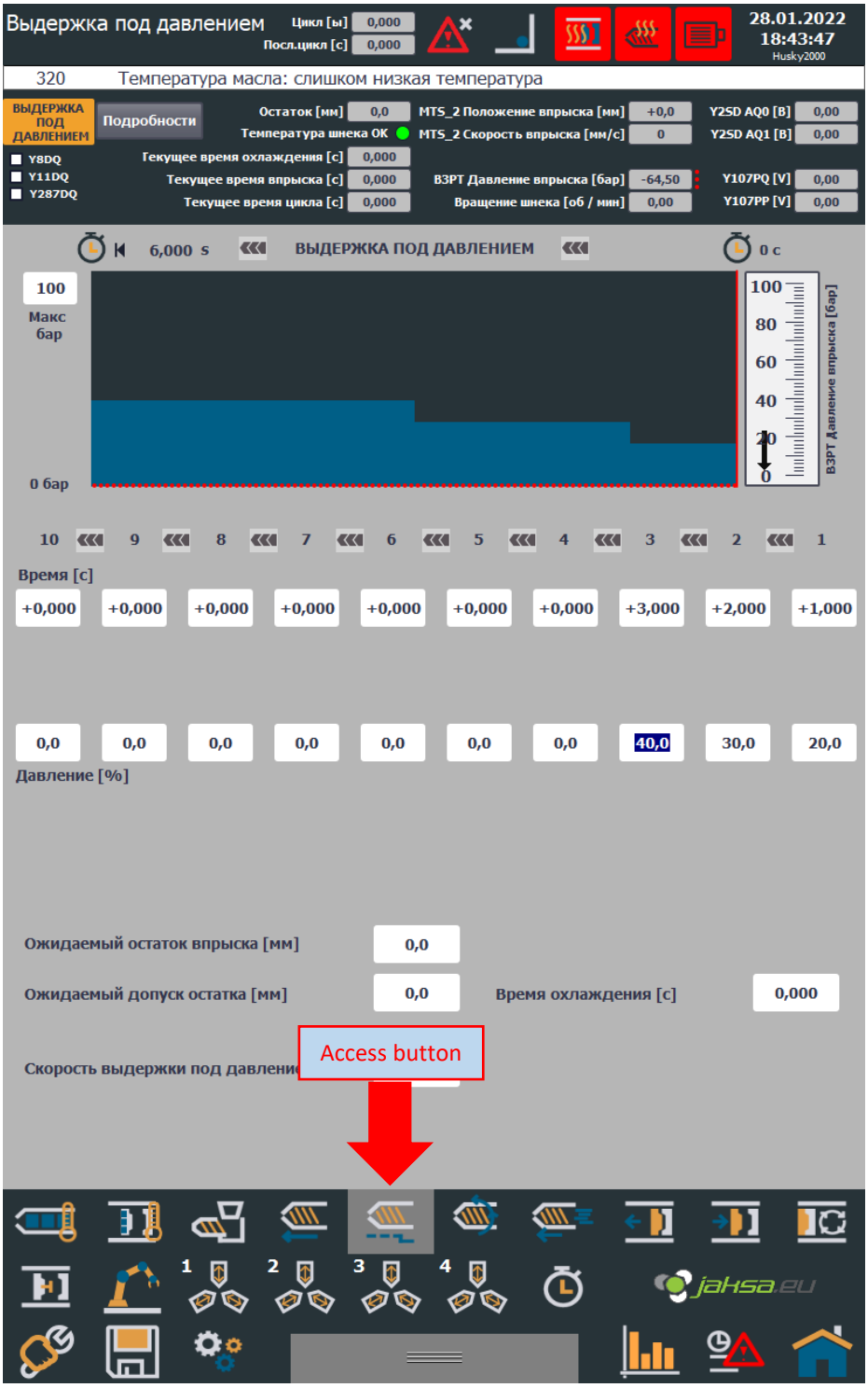


Figure 13:Holding pressure

2.1.14 Recovery

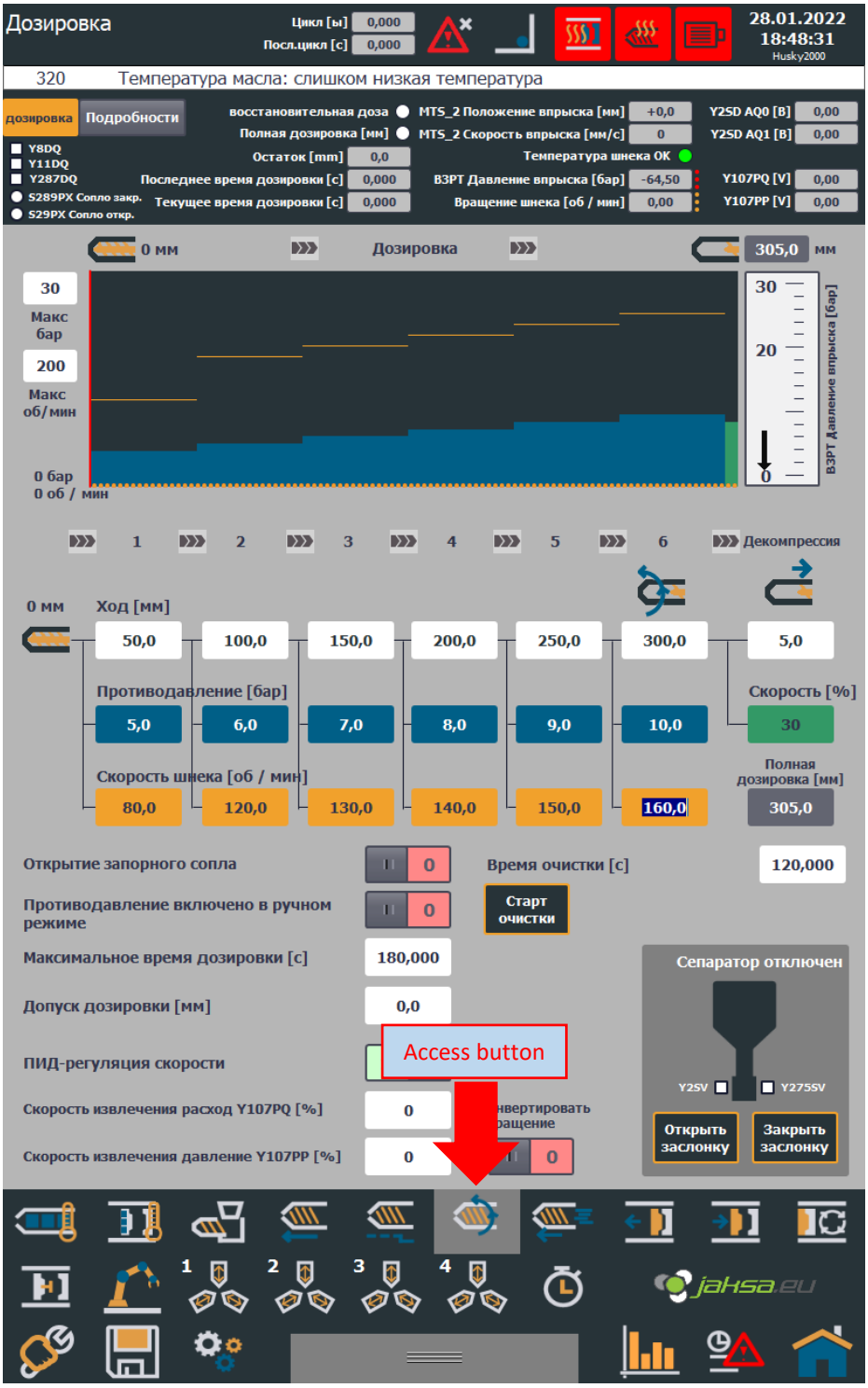


Figure 14:Recovery

2.1.15 Sequential injection control

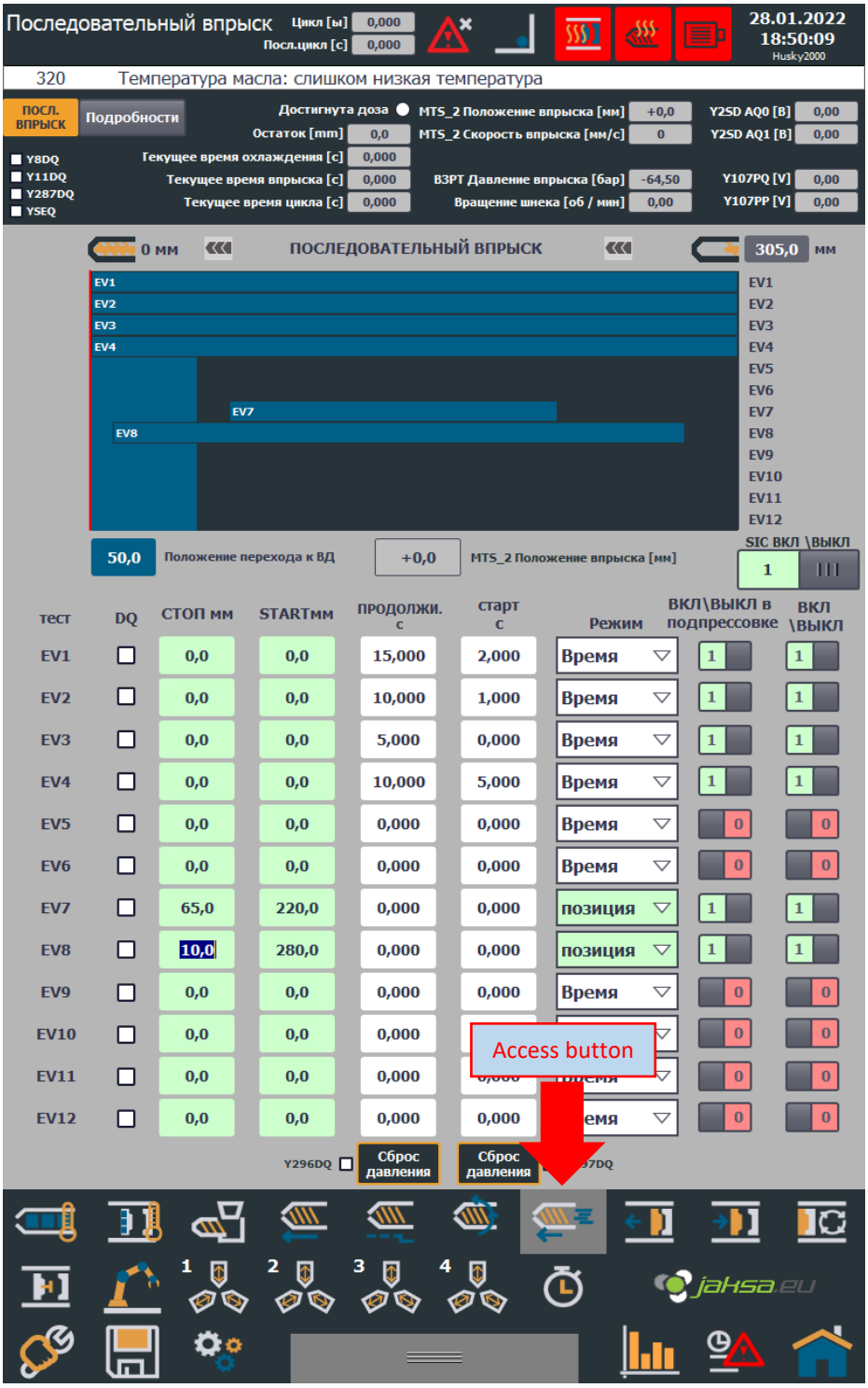


Figure 15:Sequential injection control

2.1.16 Mould close and Mould clamping overview

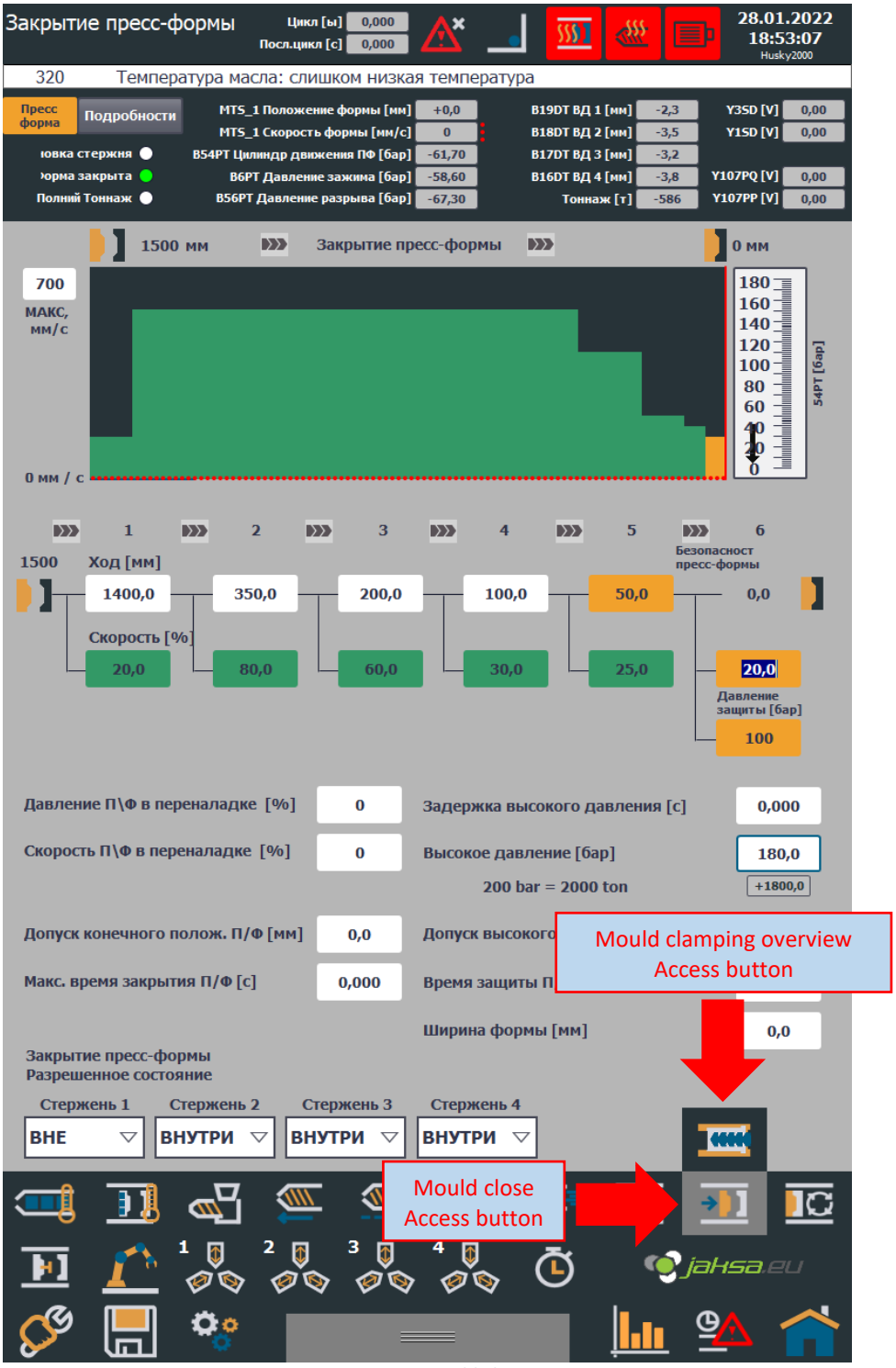


Figure 16:Mould close

2.1.17 Mould clamping overview

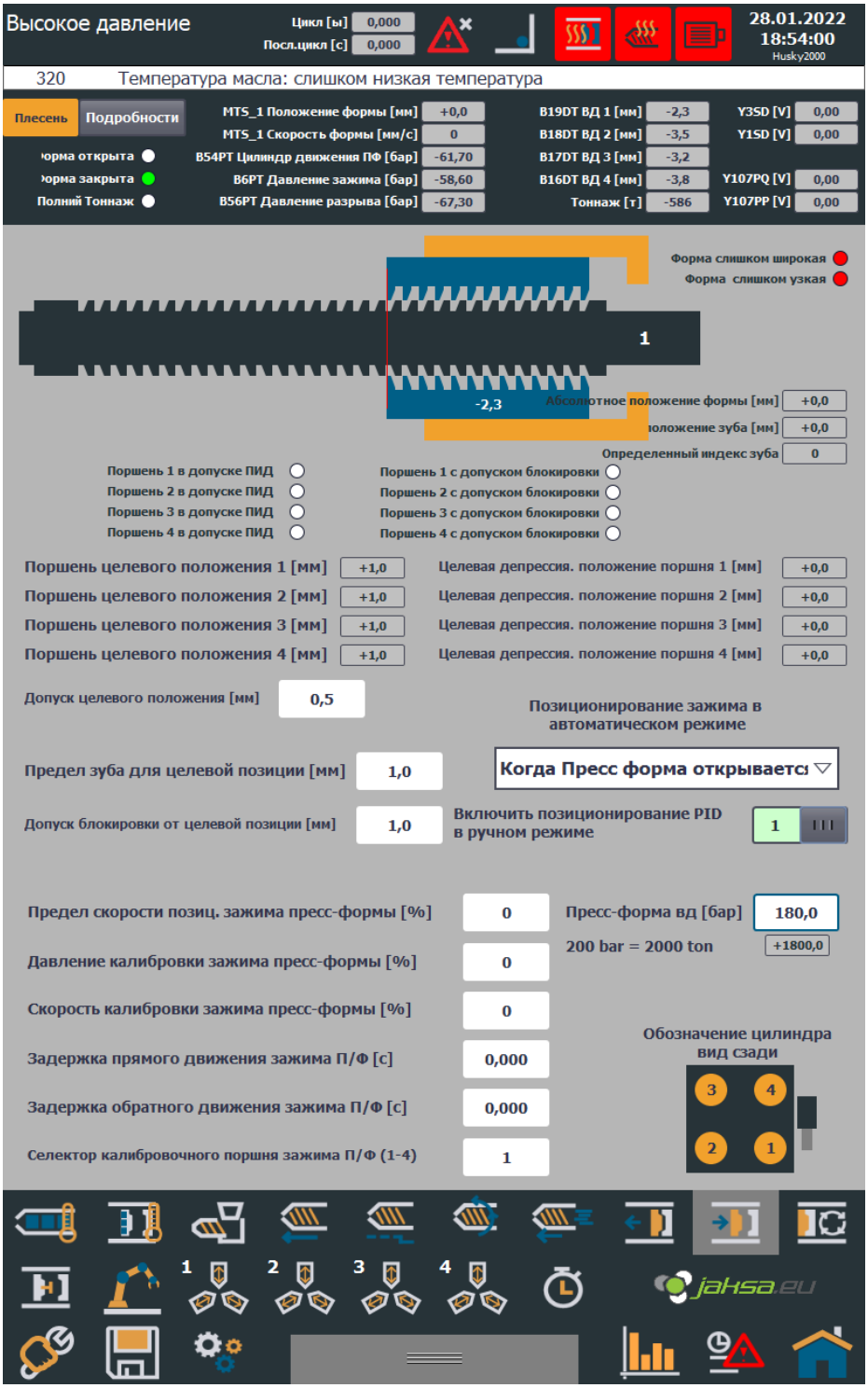


Figure 17:Mould clamping overview

2.1.18 Mould open

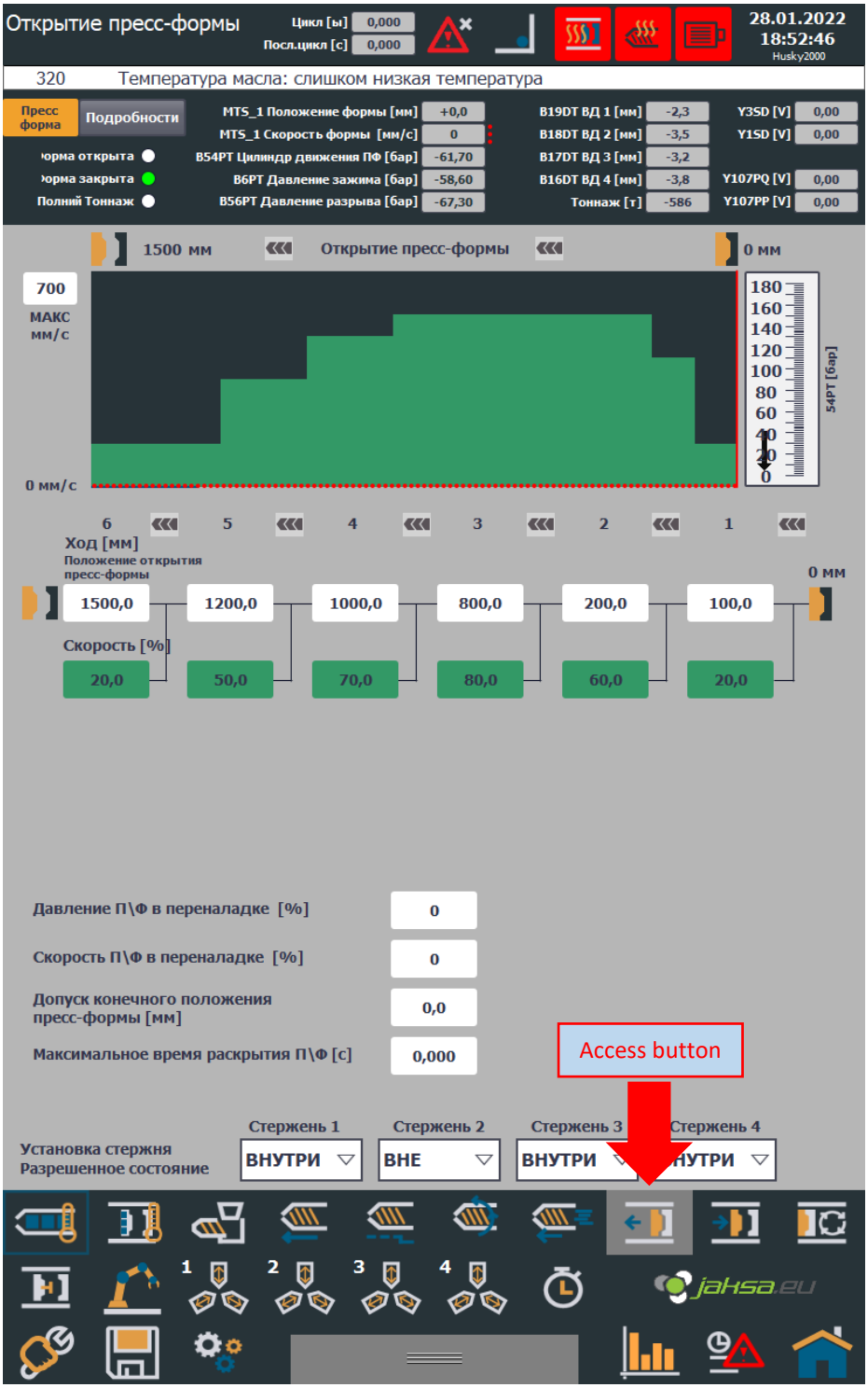


Figure 18:Mould open

2.1.19 QMC Mould load

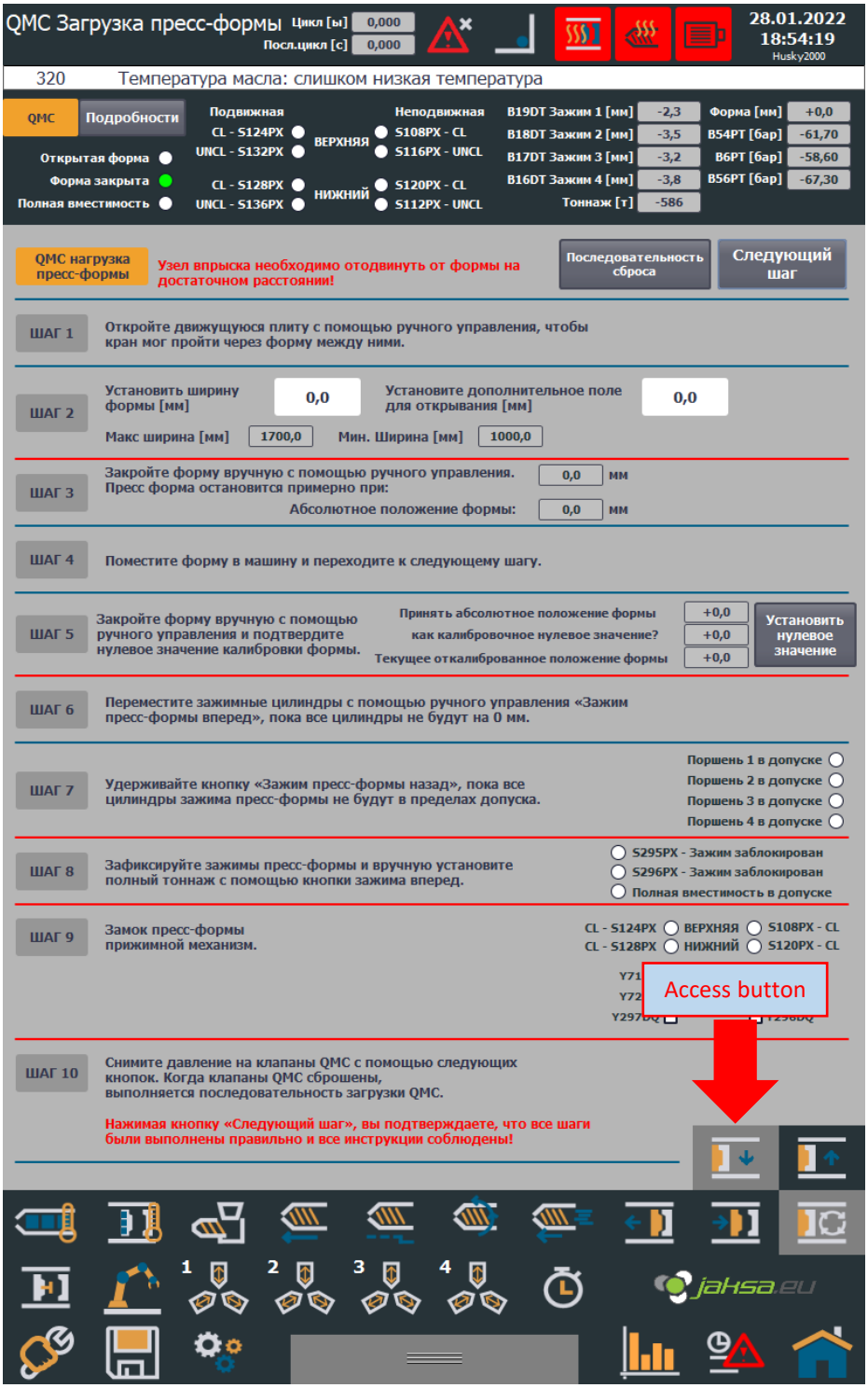


Figure 19:QMC Mould load

2.1.20 QMC Mould unload

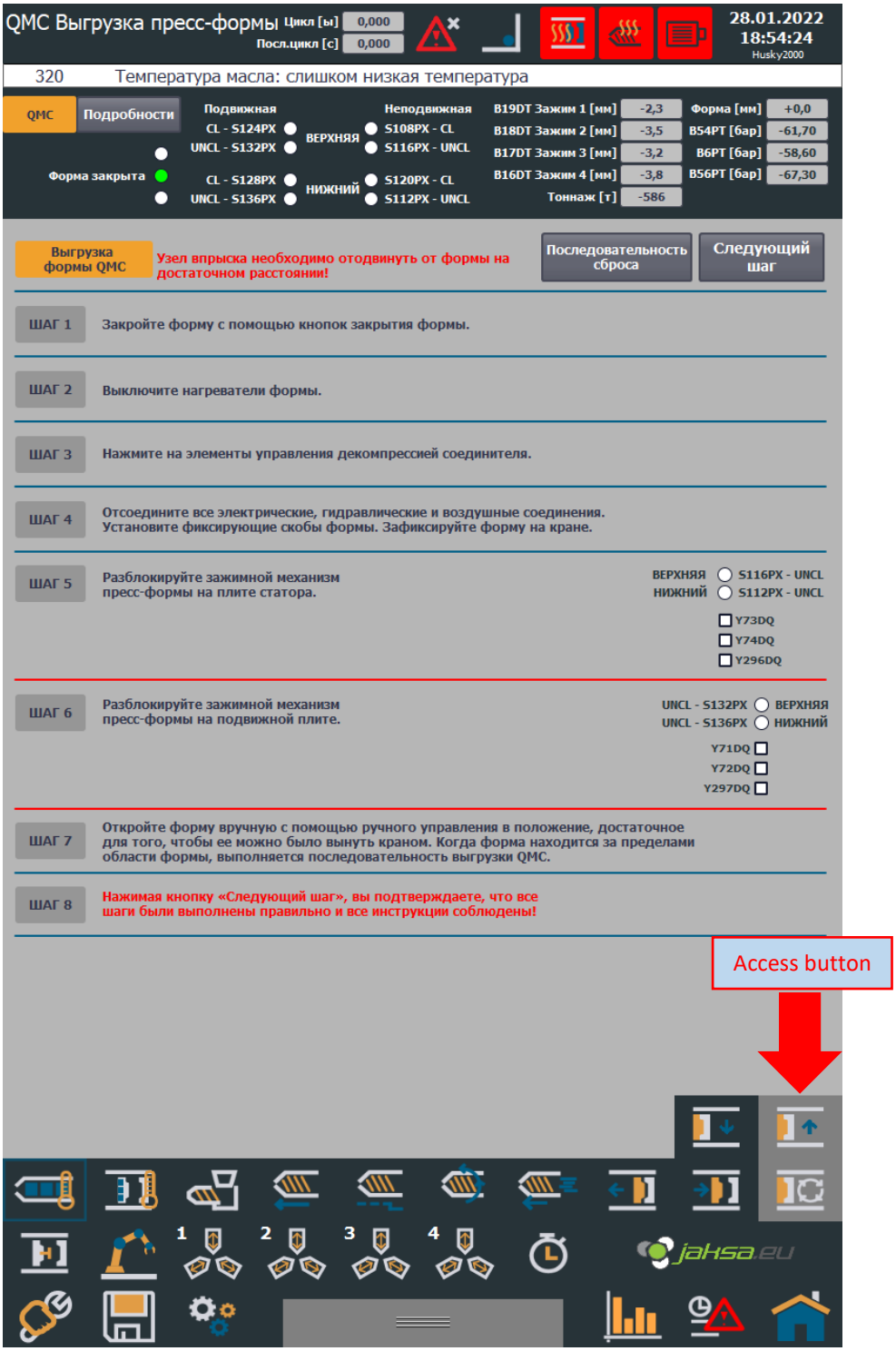


Figure 20:QMC Mould unload

2.1.21 Temperature zones extruder

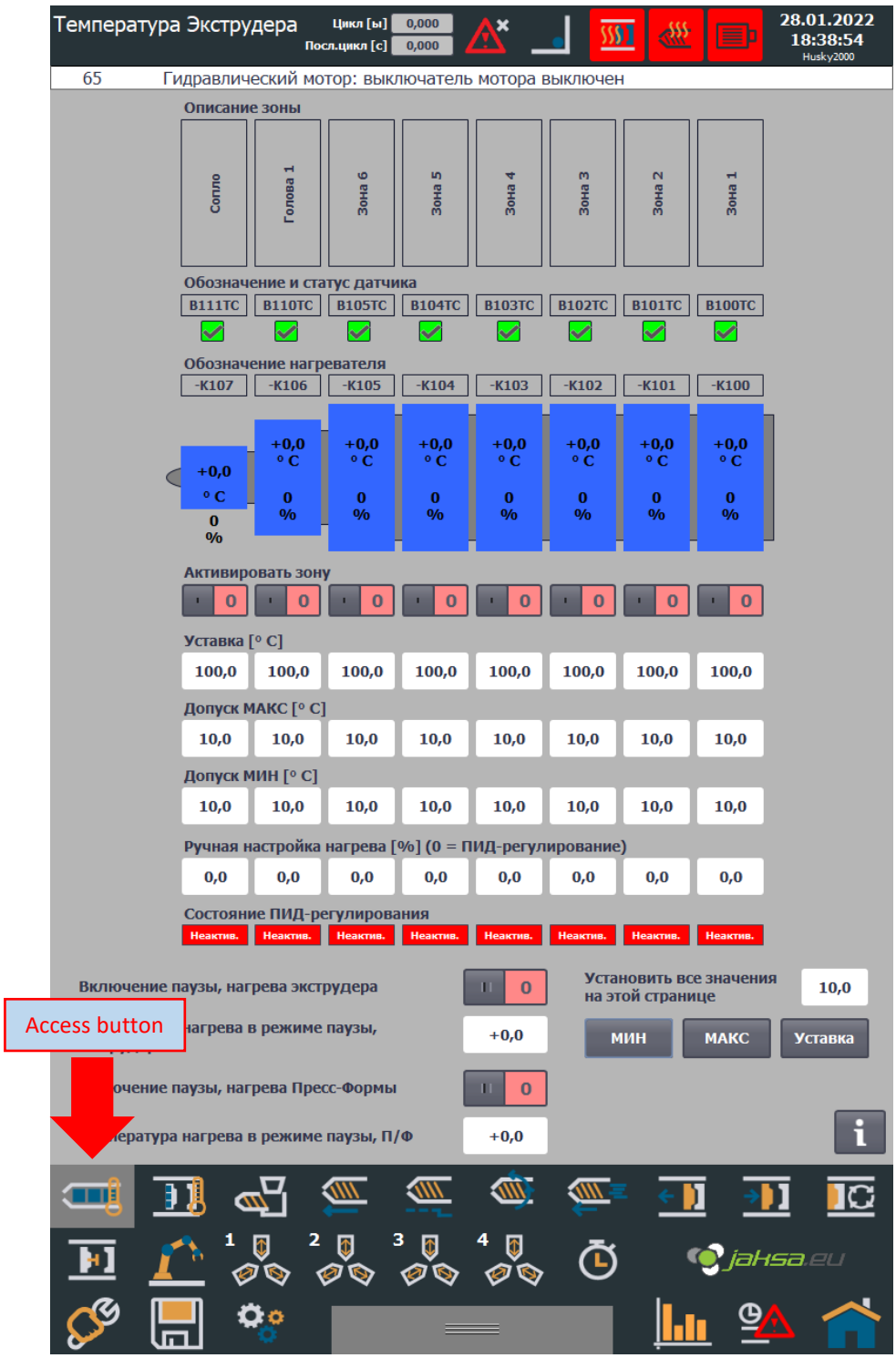


Figure 21:temperature zones extruder

2.1.22 Temperature zones mould and other

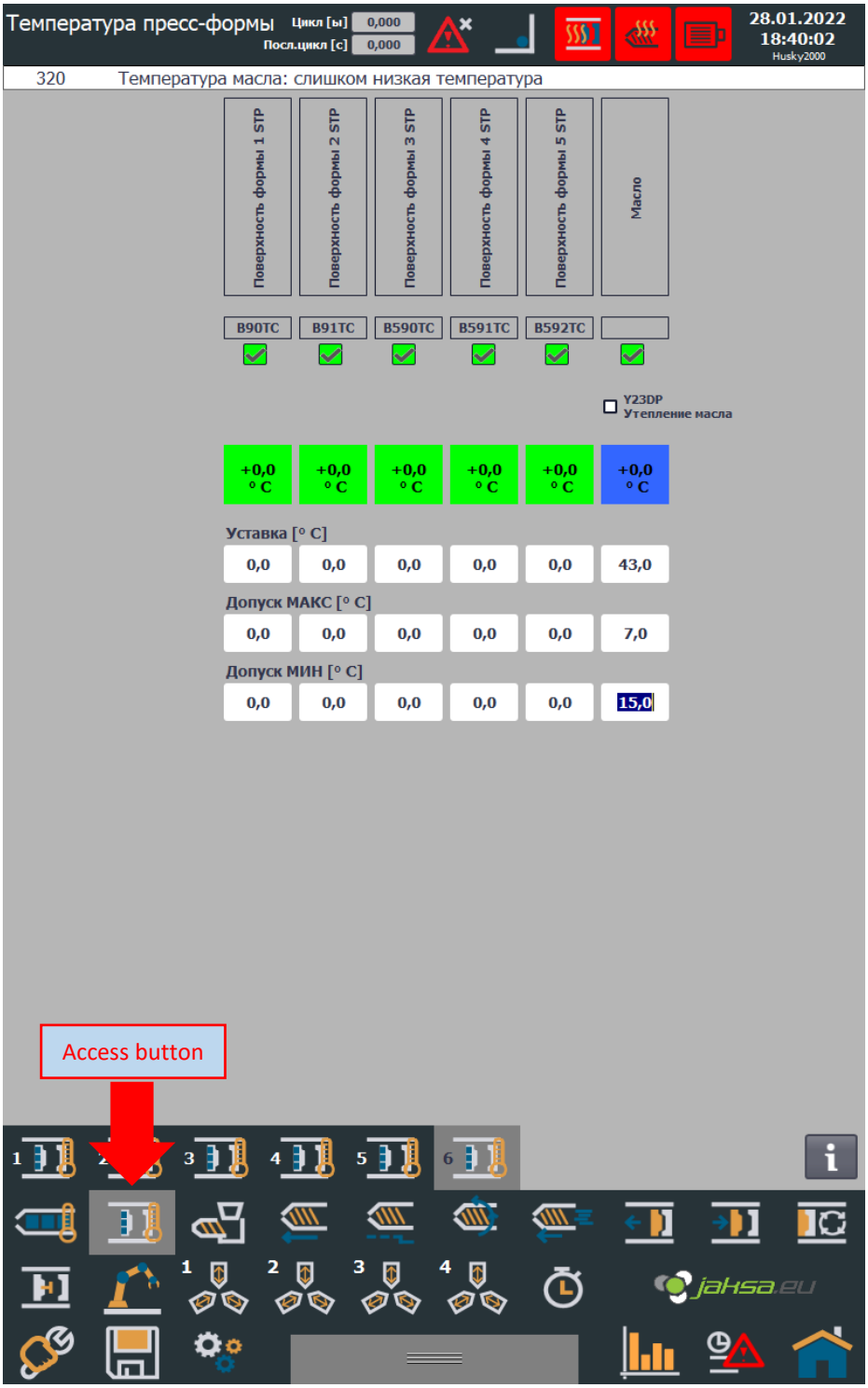


Figure 22:Temperature zones mould and other

2.2 Diag user interface structure

There is a following diag user interface screen structure on the touch panel:

1. PLC_1 (sub screens: General, AI, AQ, DI)
2. RIO_1 (sub screens: General, AI, AQ, DI, DQ, TC)
3. RIO_2 (sub screens: General, AI, AQ, DI, DQ, TC)
4. RIO_3 (sub screens: General, AI, AQ, DI, DQ, TC)
5. RIO_4 (sub screens: General, AI, AQ, DI, DQ, TC)
6. RIO_5 (sub screens: General, AI, AQ, DI, DQ, TC)
7. RIO_6 (sub screens: General, AI, AQ, DI, DQ, TC)
8. MTS_1
9. MTS_2
10. MTS_3
11. Temperatures overview
12. Temperatures PID calibration
13. Injection, dosing (recovery) setup
14. Mould, ejector setup
15. Mould lock (clamping) setup
16. Analog OUT overview
17. Hydraulic system
18. Network
19. System settings
20. User administration

Warning!

Entering diagnostics screens should be proceeded with caution! There are several crucial machine information and parameters, which should be manipulated only by a skilled professional!

2.2.1 Diag PLC_1

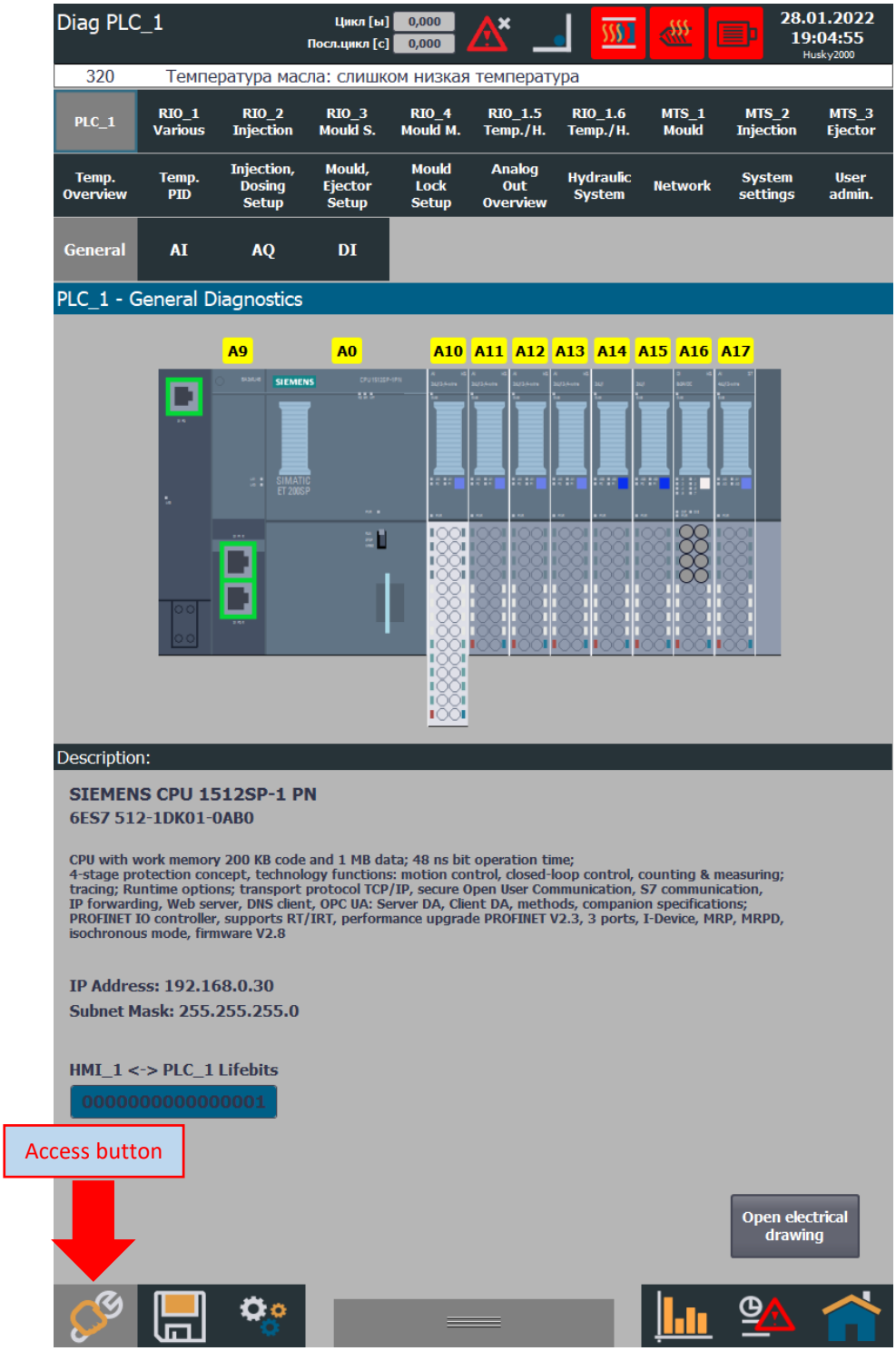


Figure 23:Diag PLC_1

3 Machine Functions

This chapter will introduce essential machine functionality and how to manipulate certain settings and parameters respectively.

3.1 Program management

Select Program management screen from the menu in the bottom.

3.1.1 Create new empty program recipe and fill it with current PLC parameters

1. Tap **Add data record** button

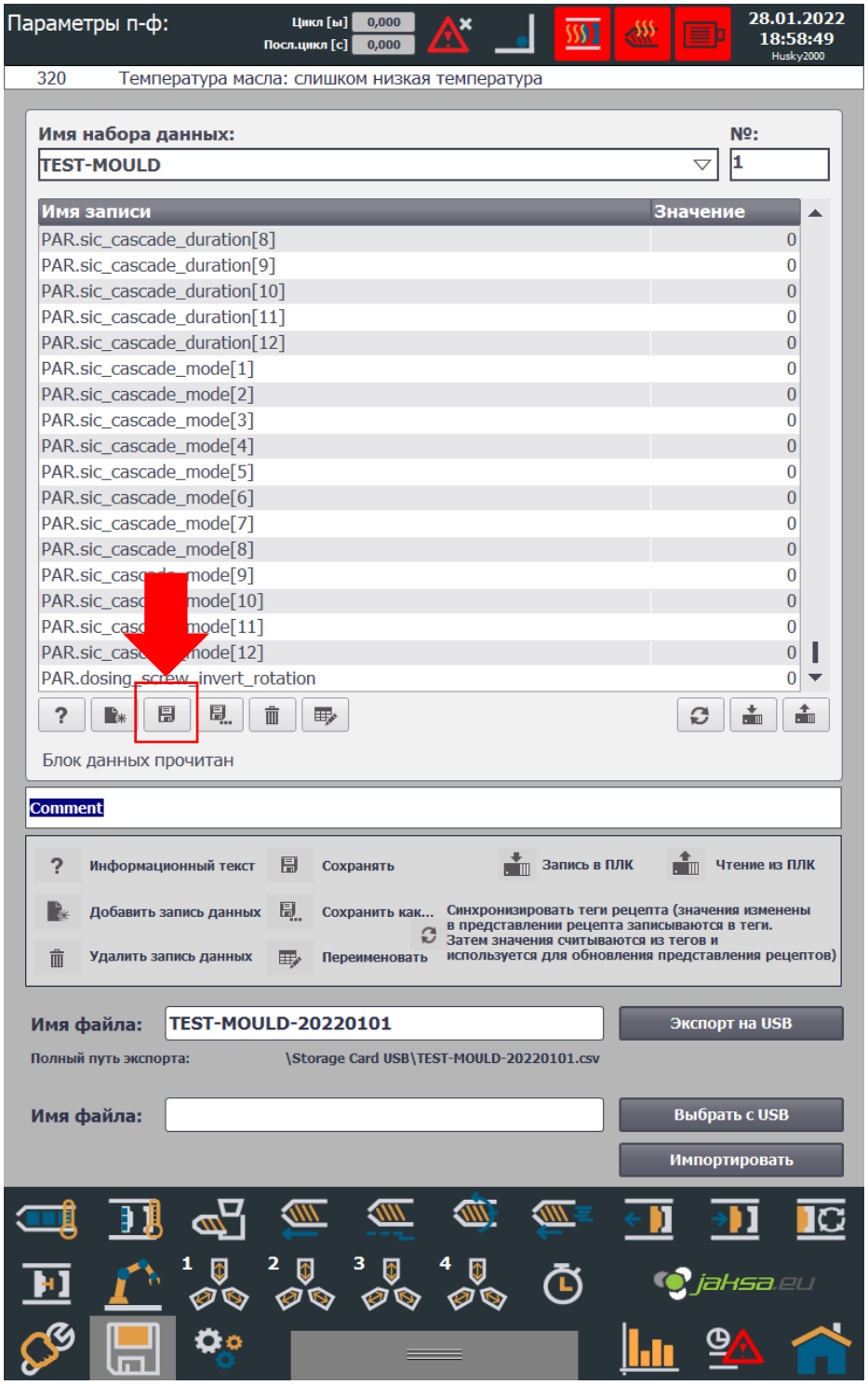


Figure 24:Tap Add data record button

2. Tap on the **Data Record Name:** field, on-screen keyboard will appear. Write data record name using the on-screen keyboard and tap ENTER button.

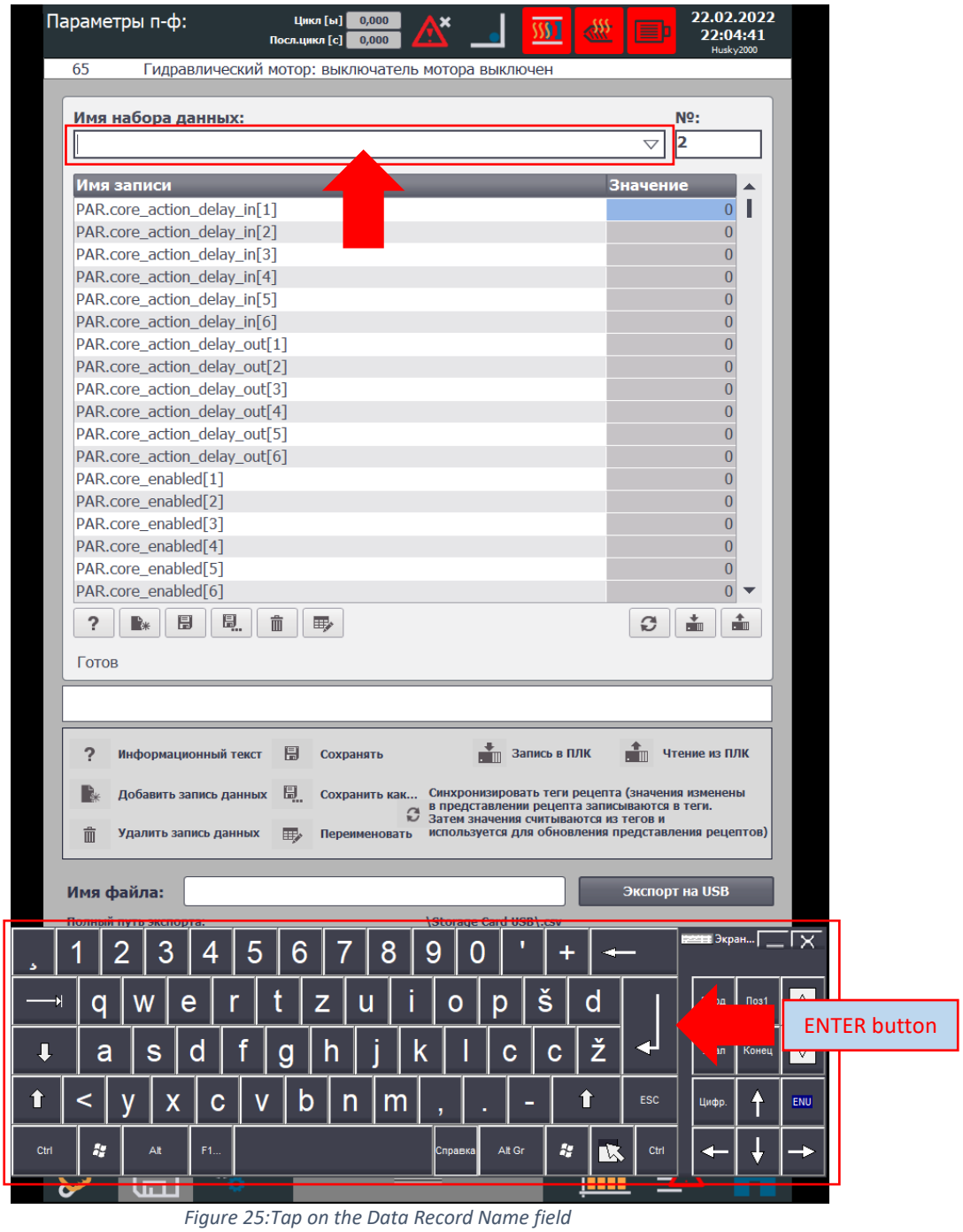


Figure 25:Tap on the Data Record Name field

3. Save the data record by tapping the **Save** button.

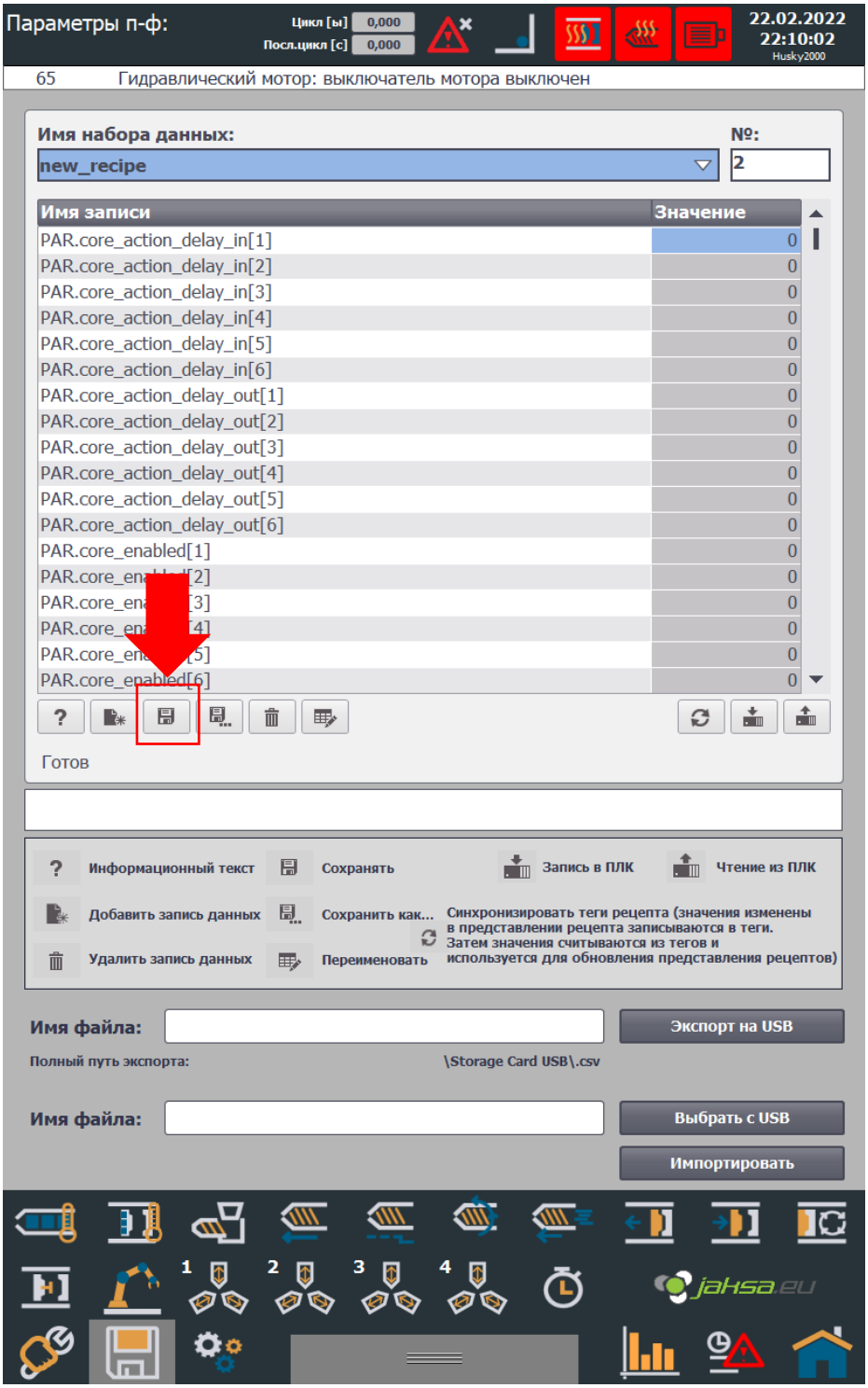


Figure 26:Save the data record

4. Program is successfully saved (indicated by the status bar marked with red below) and contains only default parameters. If you want to transfer current PLC parameters to this newly created program, go to next step, otherwise empty program creation is complete.

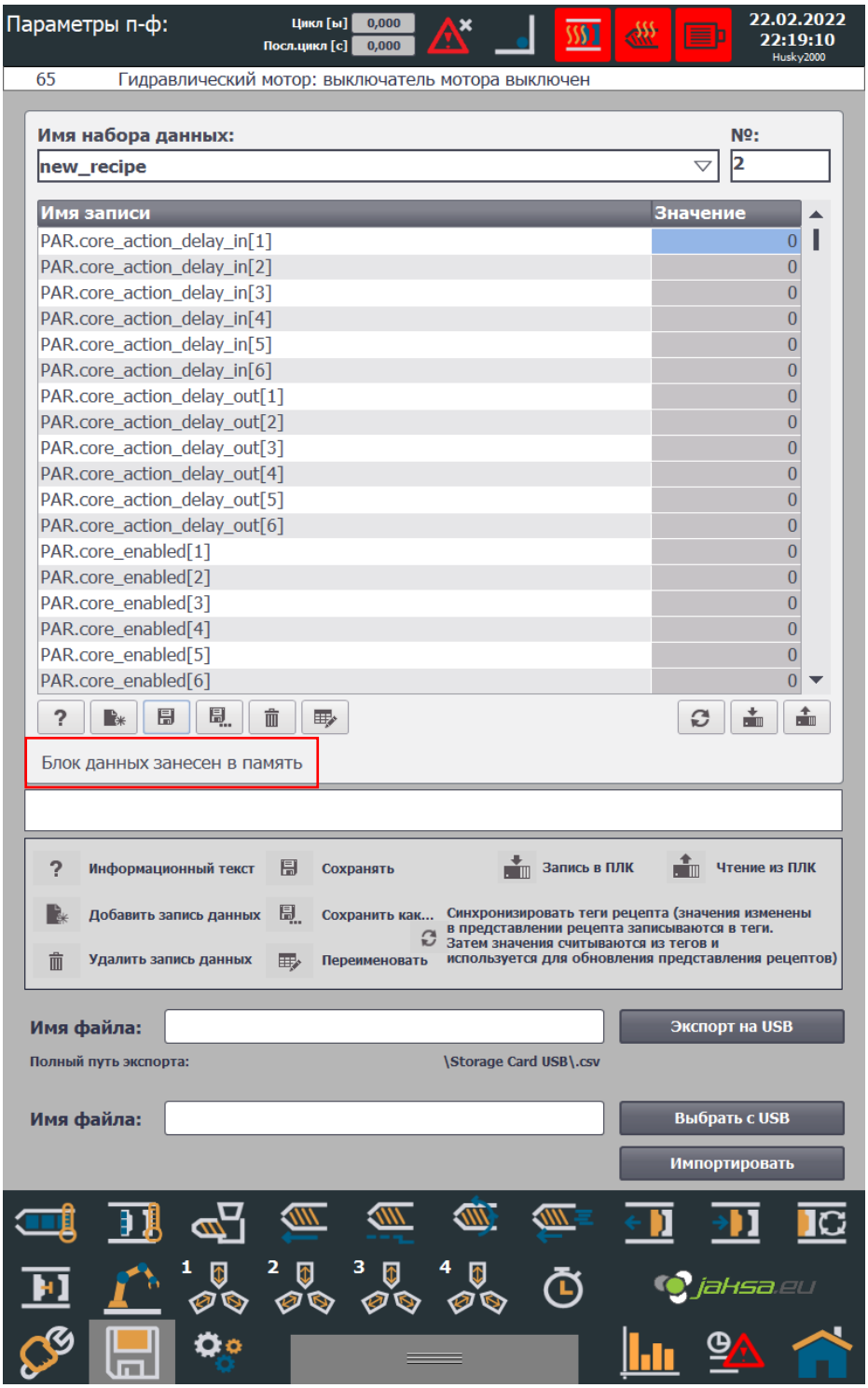


Figure 27:Program successfully saved

5. Transfer PLC parameters to data record by tapping **Read from PLC** button.

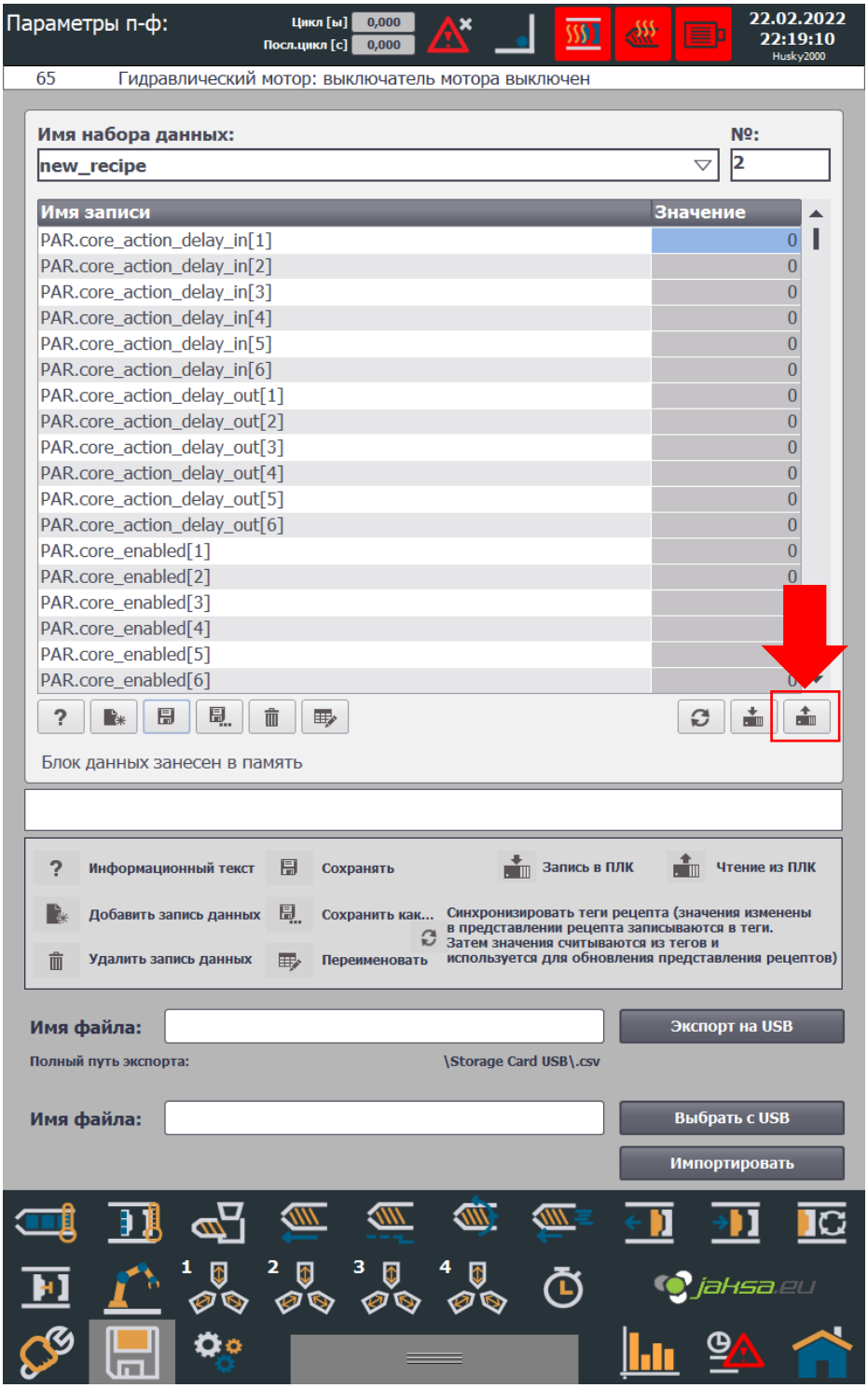


Figure 28:Transfer PLC parameters to recipe

6. Parameters have been successfully transferred (indicated by the status bar marked with red below). Parameter values can be observed in the scrollable list.

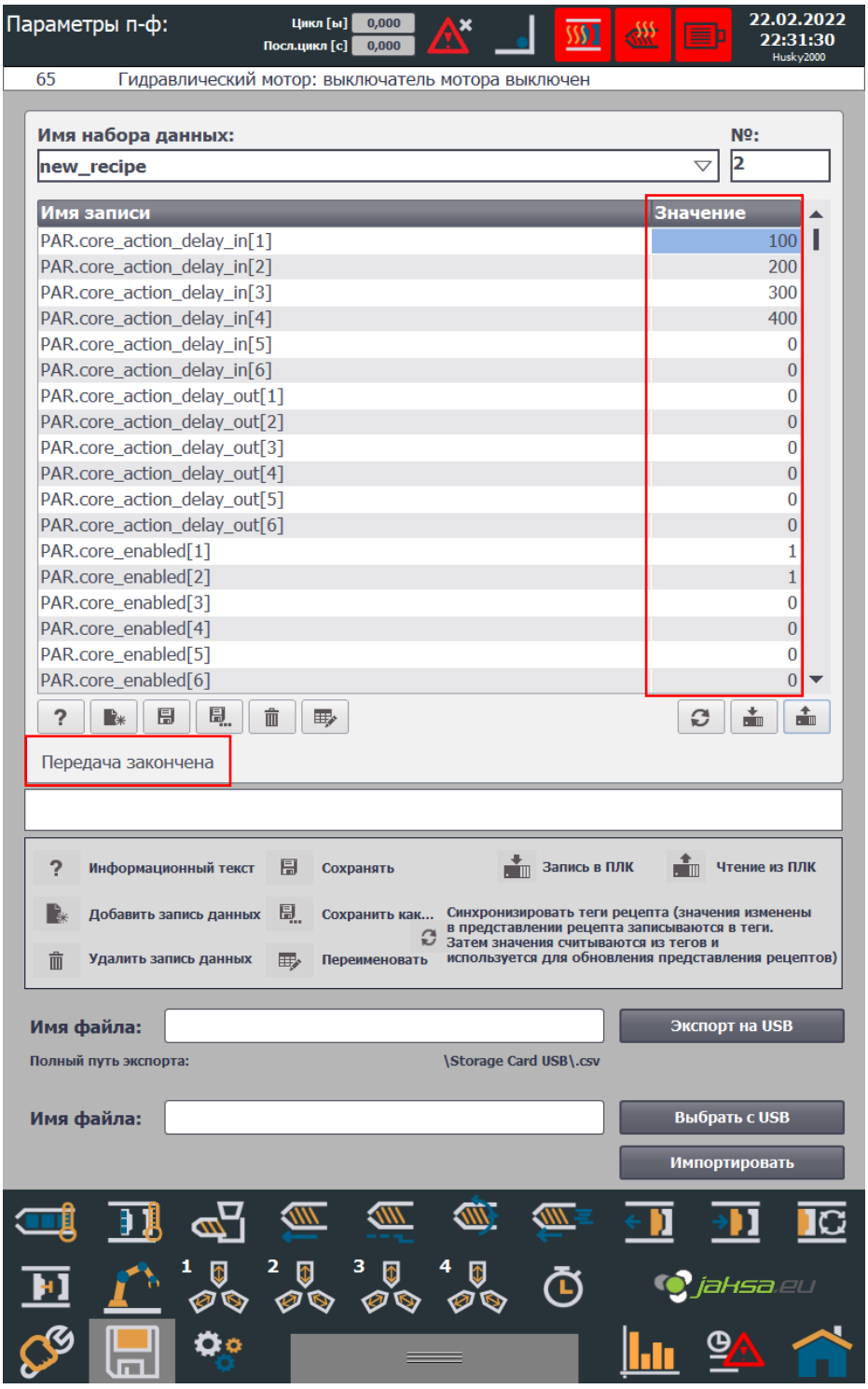


Figure 29:Successfully transferred parameters

7. Save parameters by tapping **Save** button. System will prompt you before you proceed.

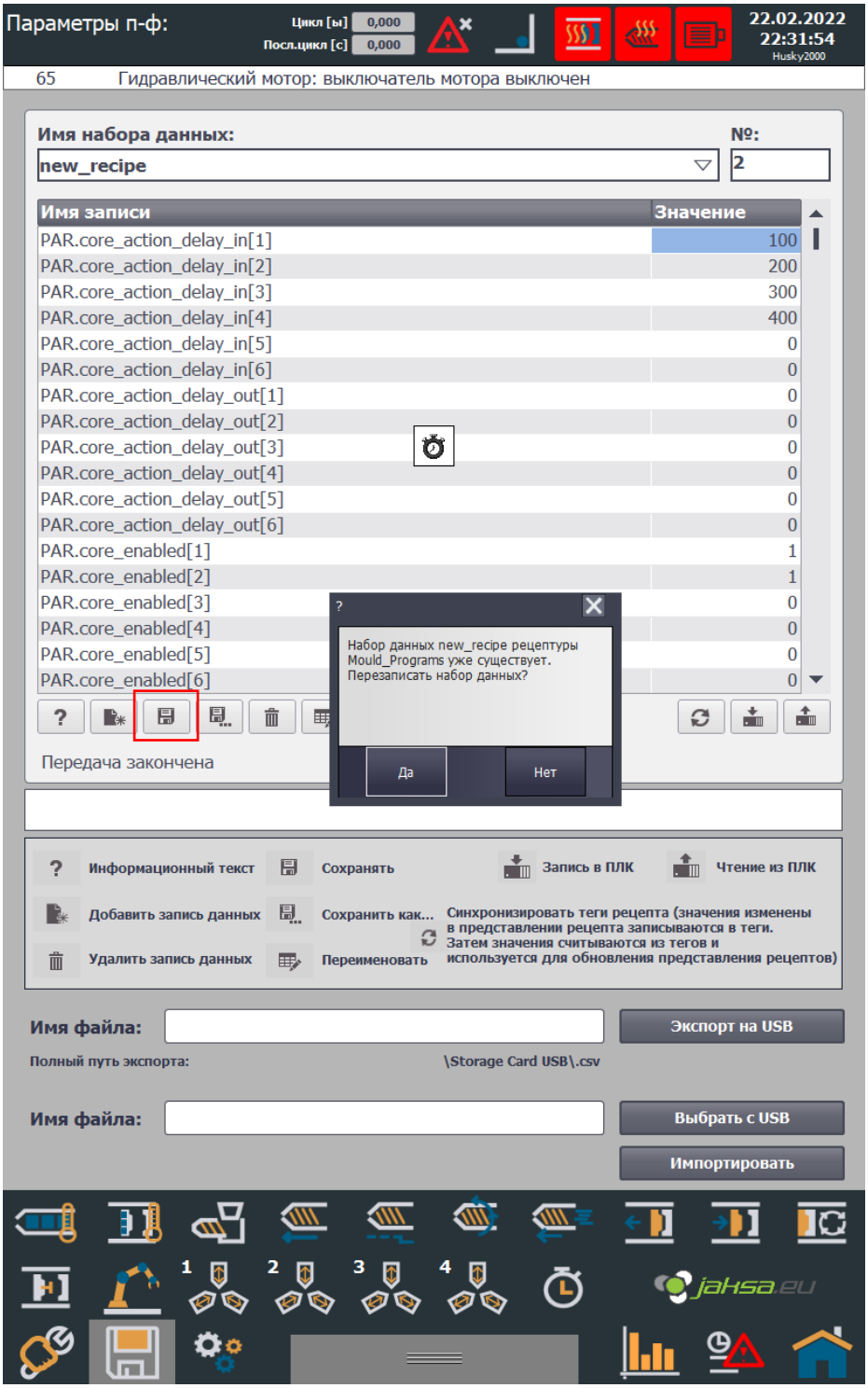


Figure 30:Save newly transferred parameters

8. Procedure is complete.

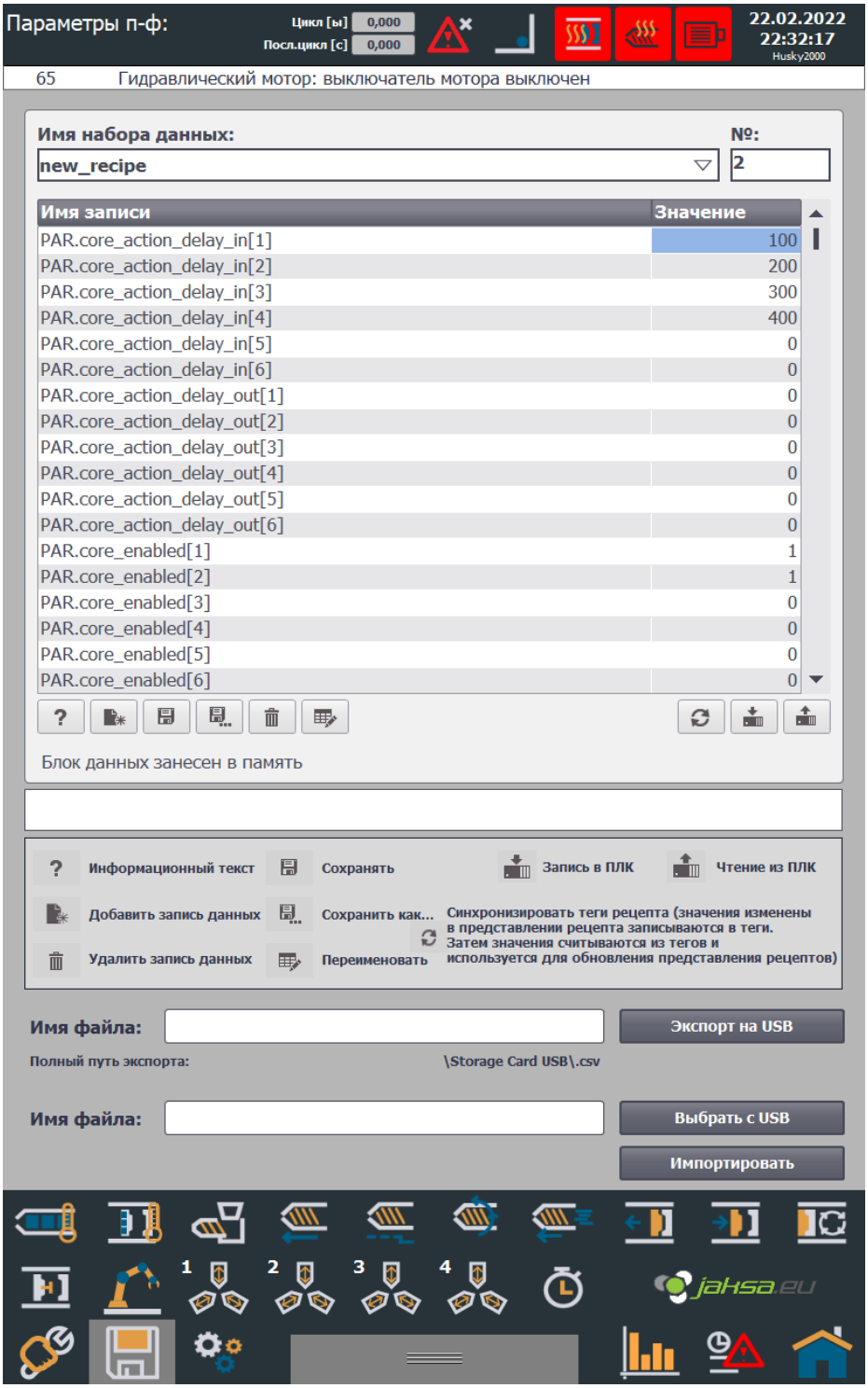


Figure 31:Procedure complete - creating new recipe data record

3.1.2 Create new program recipe from existing recipe

1. Select desired recipe data record from the drop-down menu. This selected recipe will be copied afterwards.

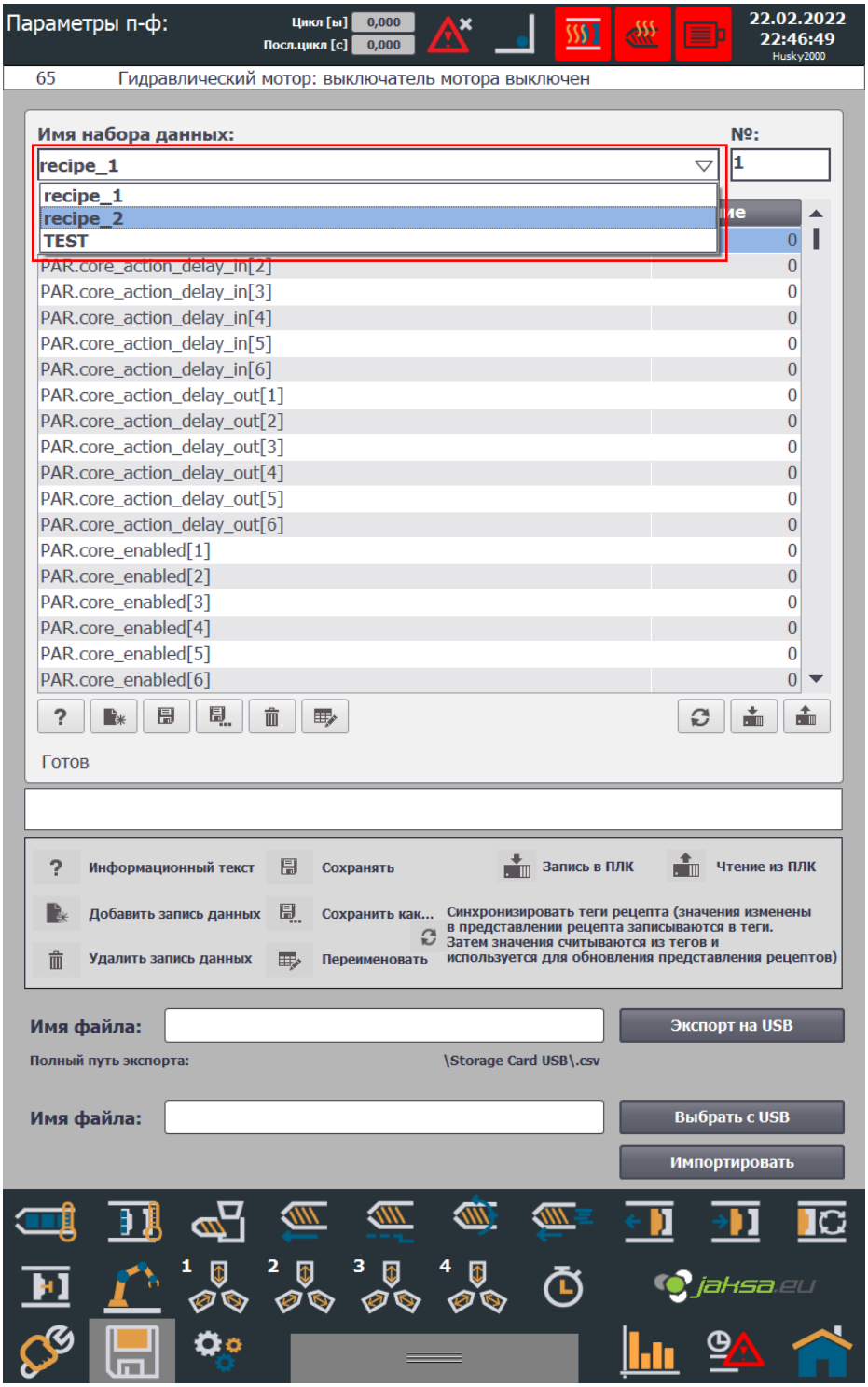


Figure 32:Select recipe from the drop-down menu

2. Tap **Save as** button.

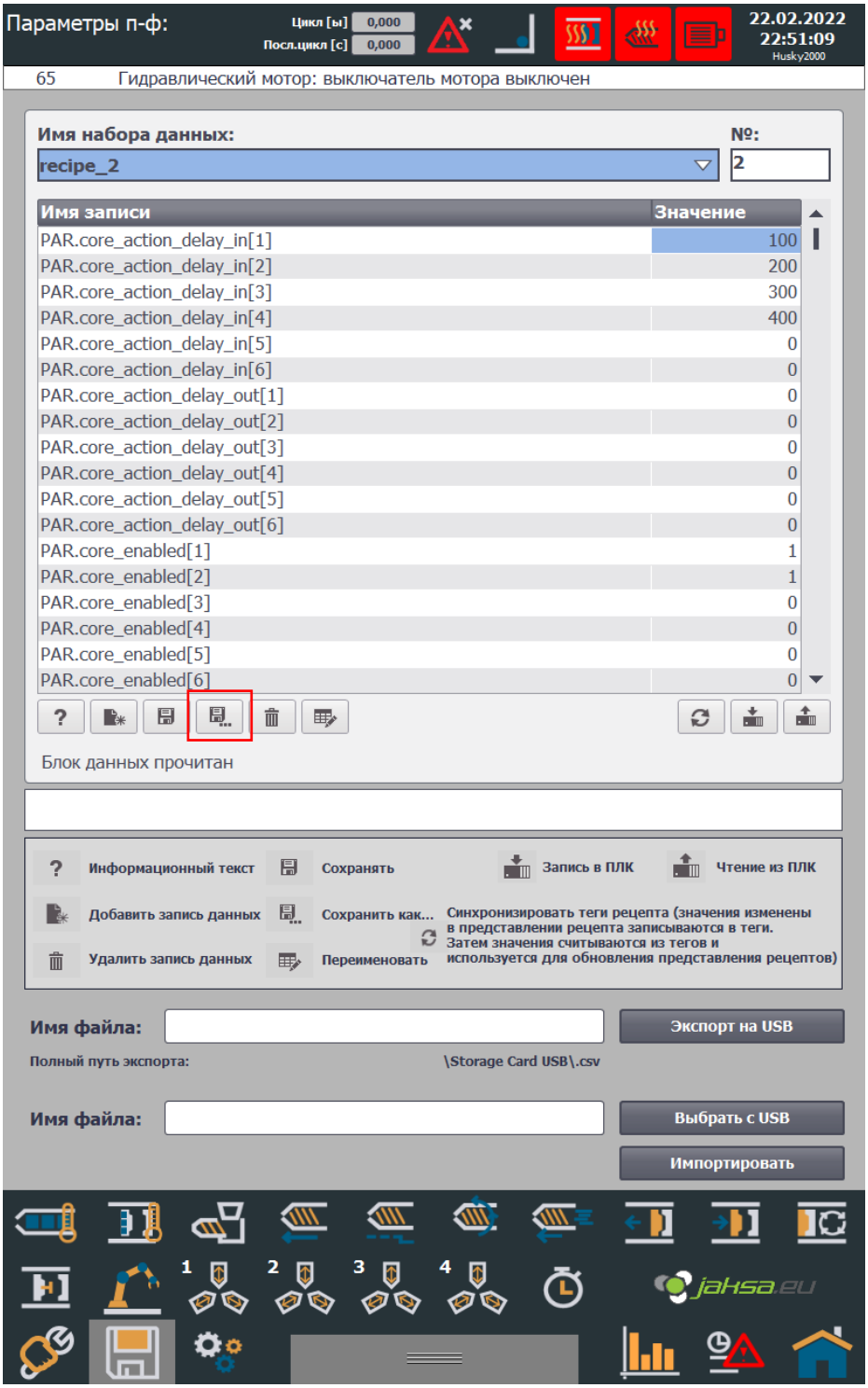


Figure 33:Tap Save as button

3. Pop-up window and on-screen keyboard will appear. Enter new name in the text field in the pop-up window and tap **OK** button.

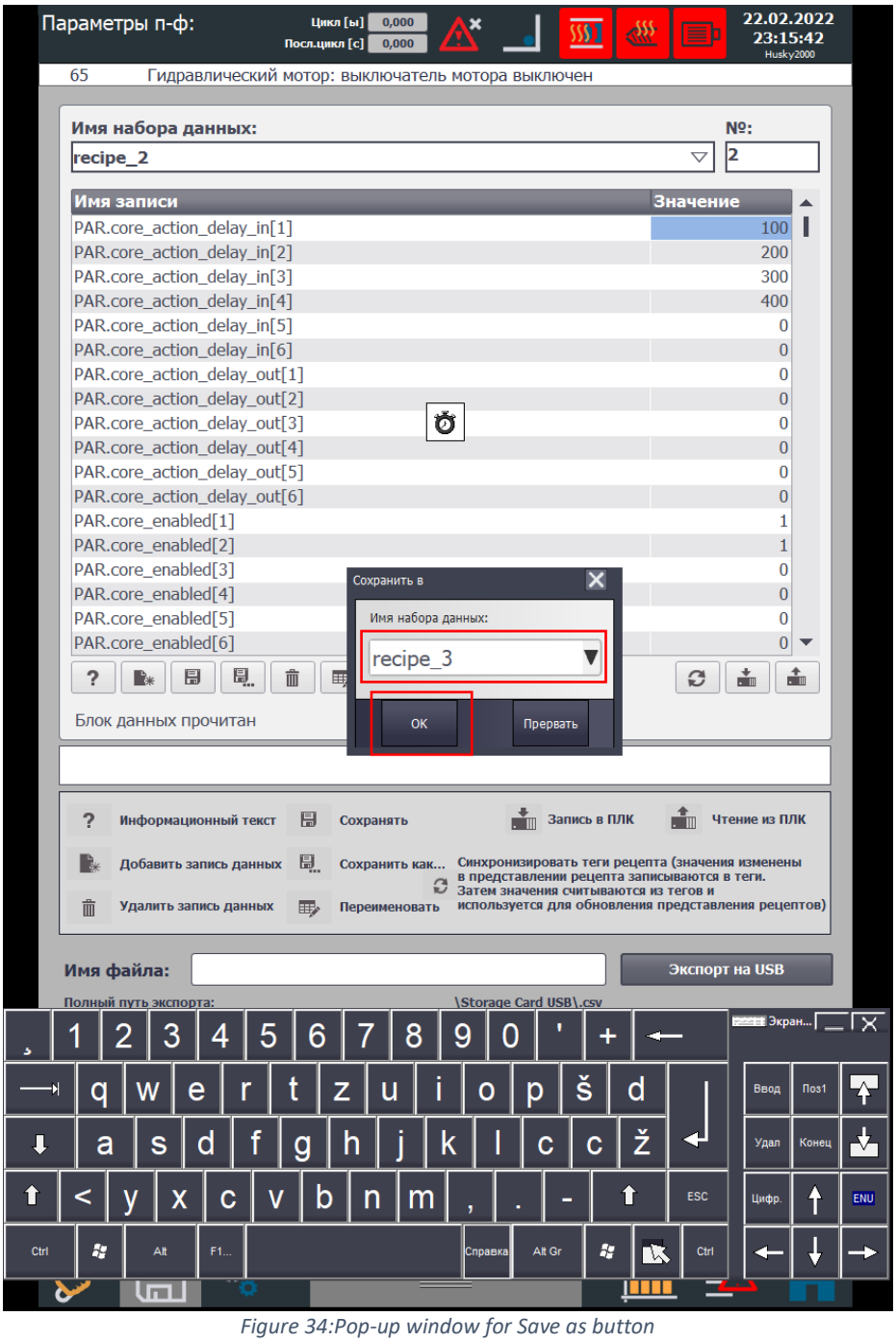


Figure 34:Pop-up window for Save as button

4. Procedure is complete.

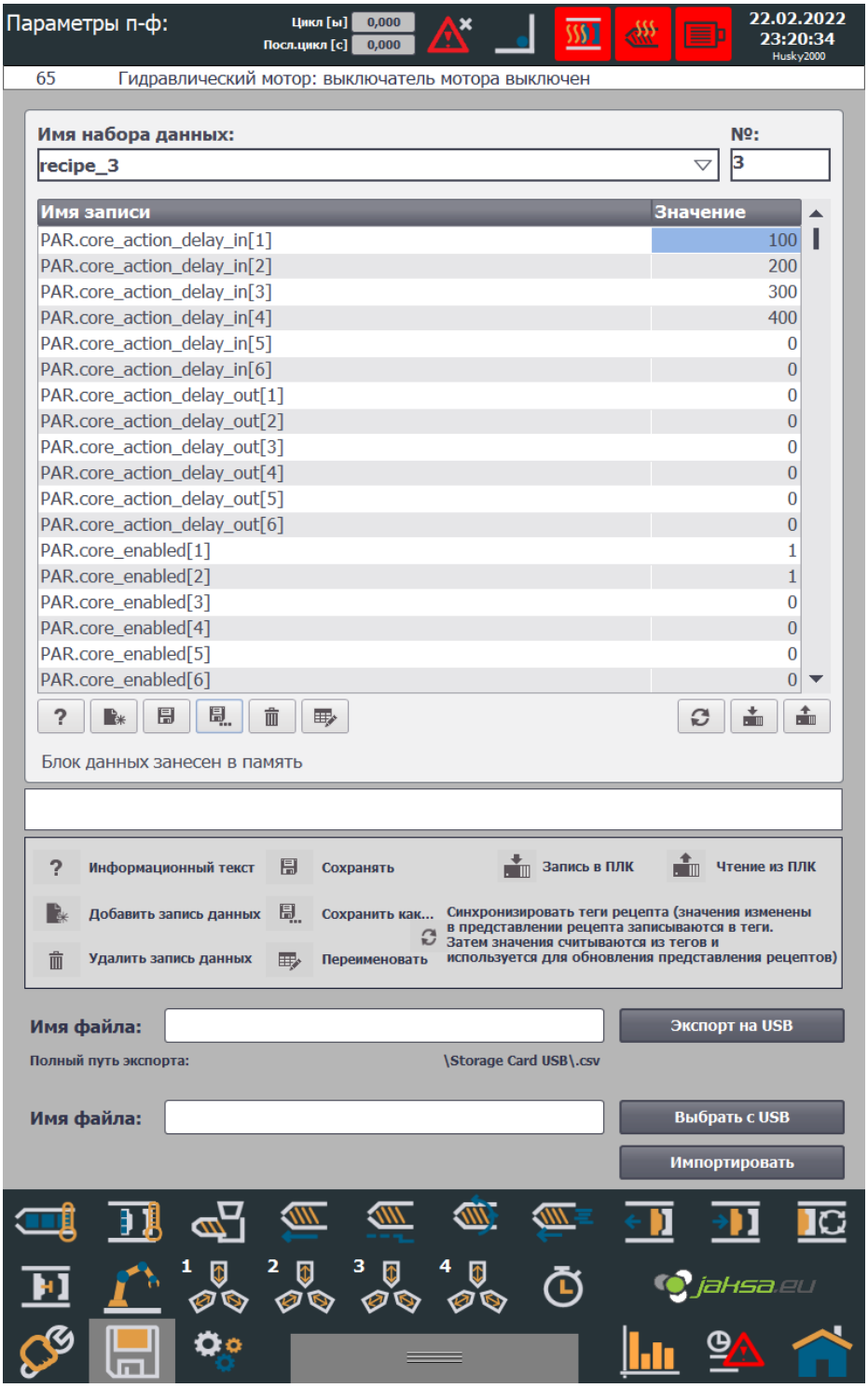


Figure 35:Procedure complete - create new recipe from existing one

3.1.3 Transfer PLC parameters to recipe

If PLC parameters are changed during the machine operation or during setup, they need to be transferred and saved. If parameters are not transferred from PLC to recipe and saved, next transfer from recipe to PLC can override changes and setup can be overwritten.

1. Tap **Read from PLC**

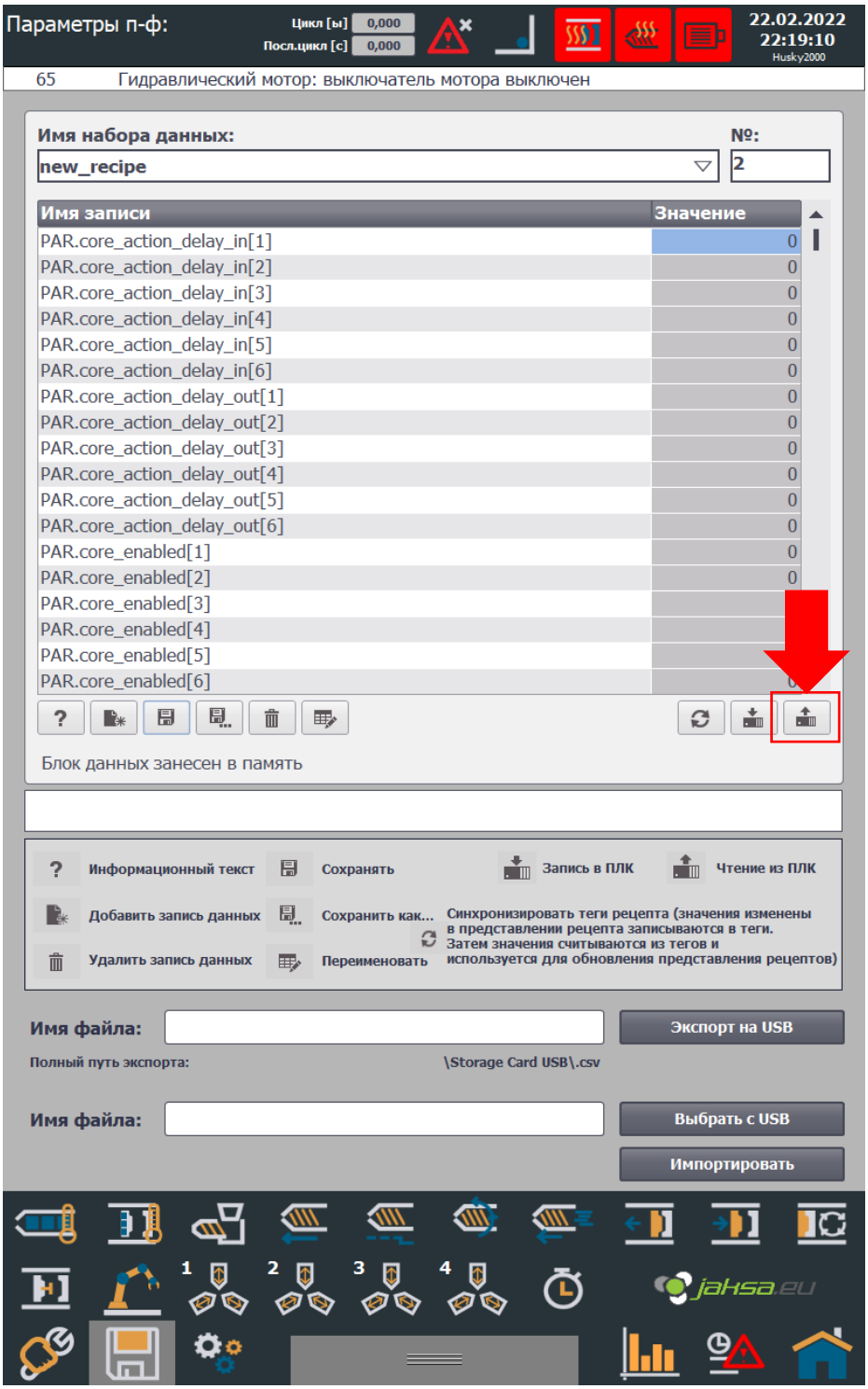


Figure 36:Tap read from PLC

2. Tap **Save**

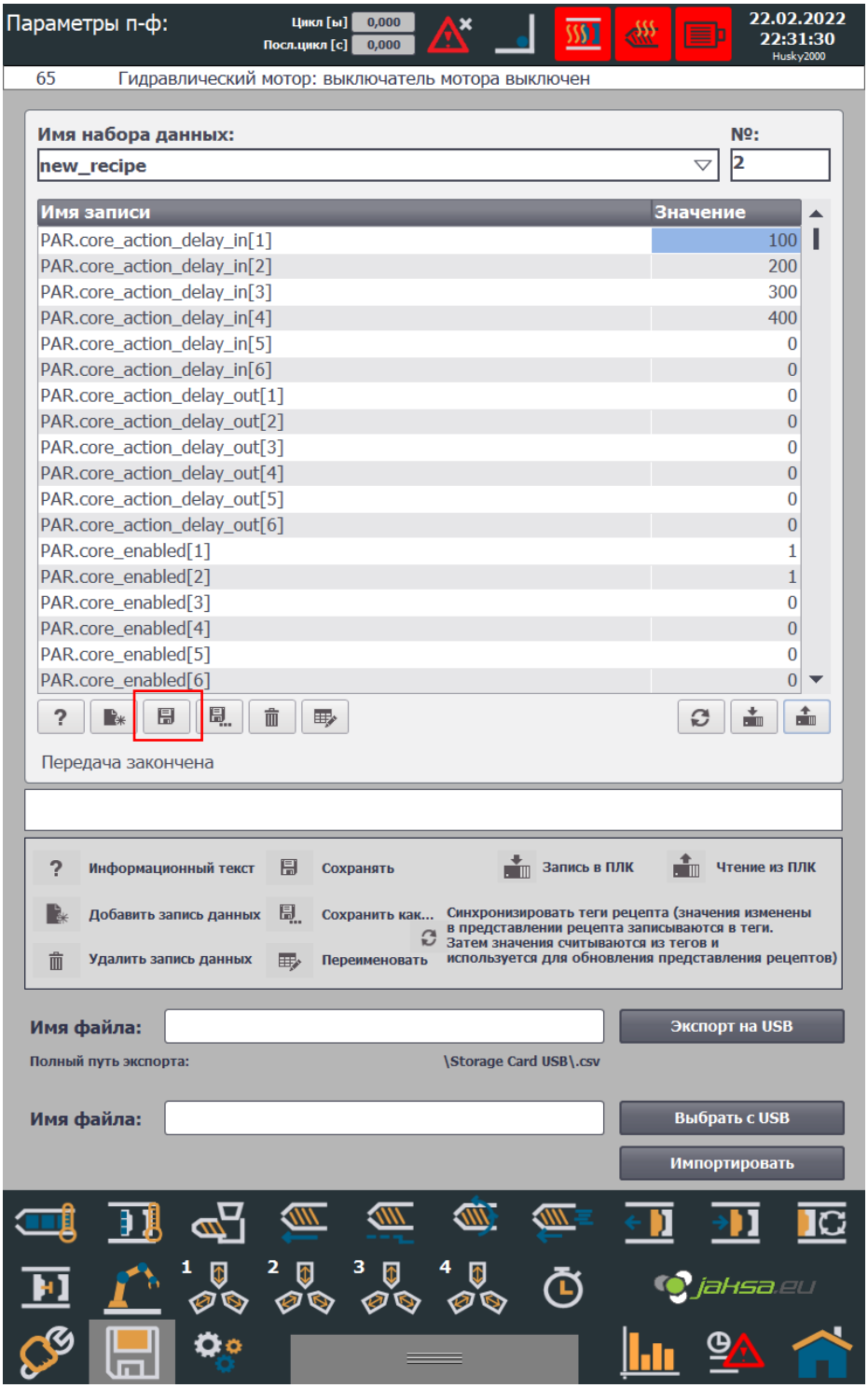


Figure 37:Tap Save

3.1.4 Transfer recipe to PLC parameters

1. Select desired recipe data record from the drop-down menu. This selected recipe will be transferred afterwards.

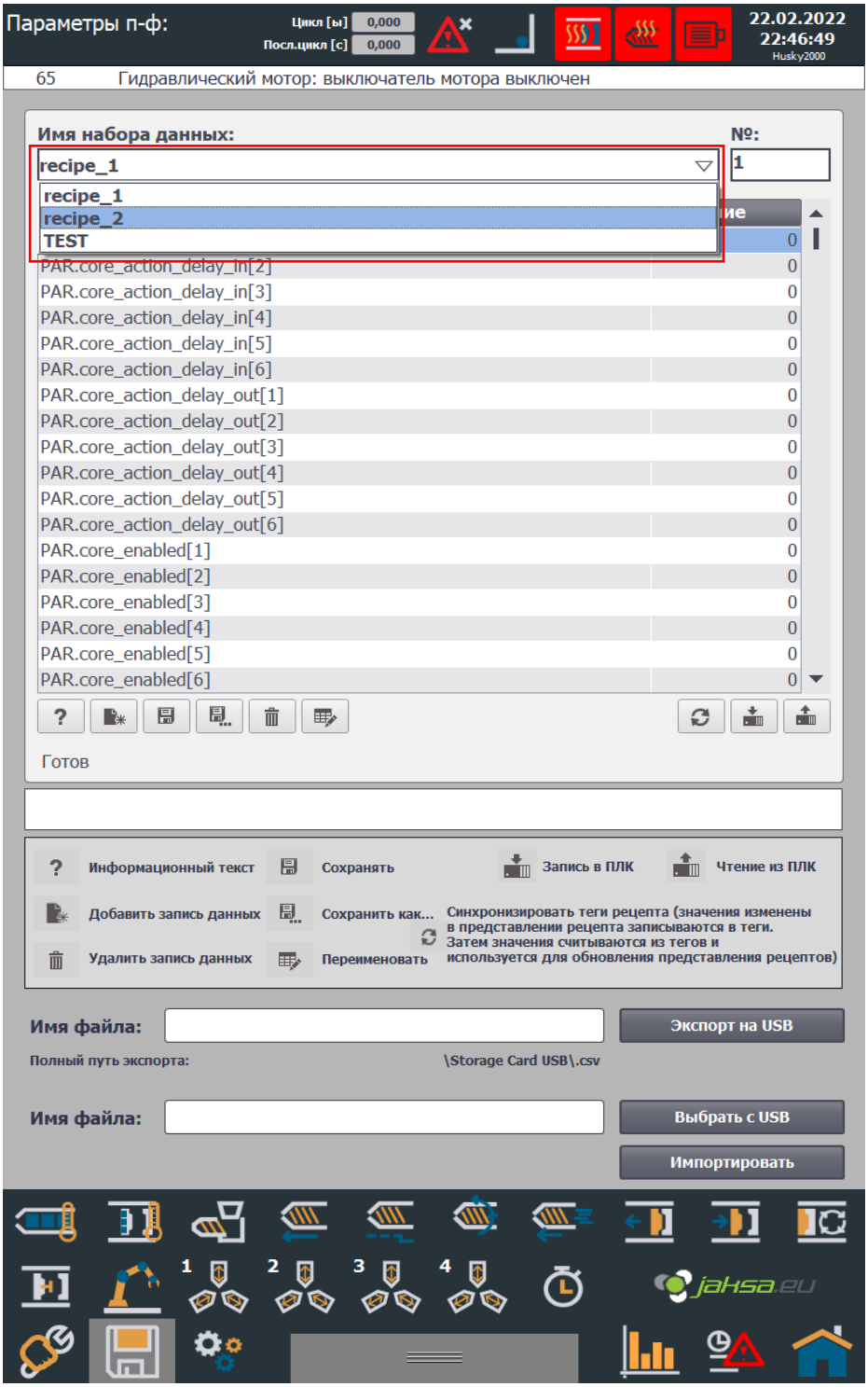


Figure 38:Select recipe to transfer to PLC

2. Tap **Write to PLC** button

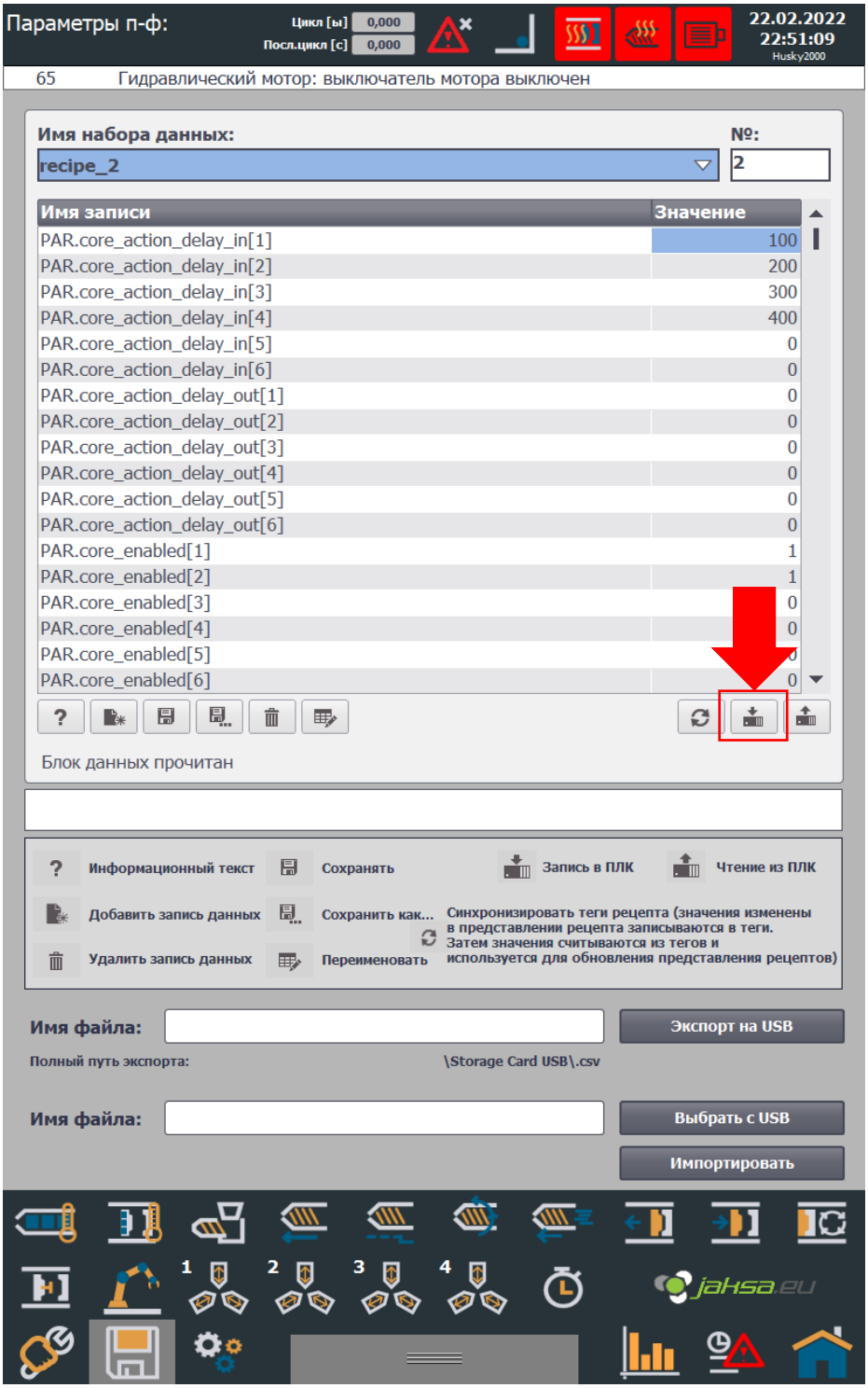


Figure 39:Tap write to PLC to transfer recipe to PLC

3.1.5 Delete recipe

Tap button **Delete.** System will prompt you before the action is finally done.

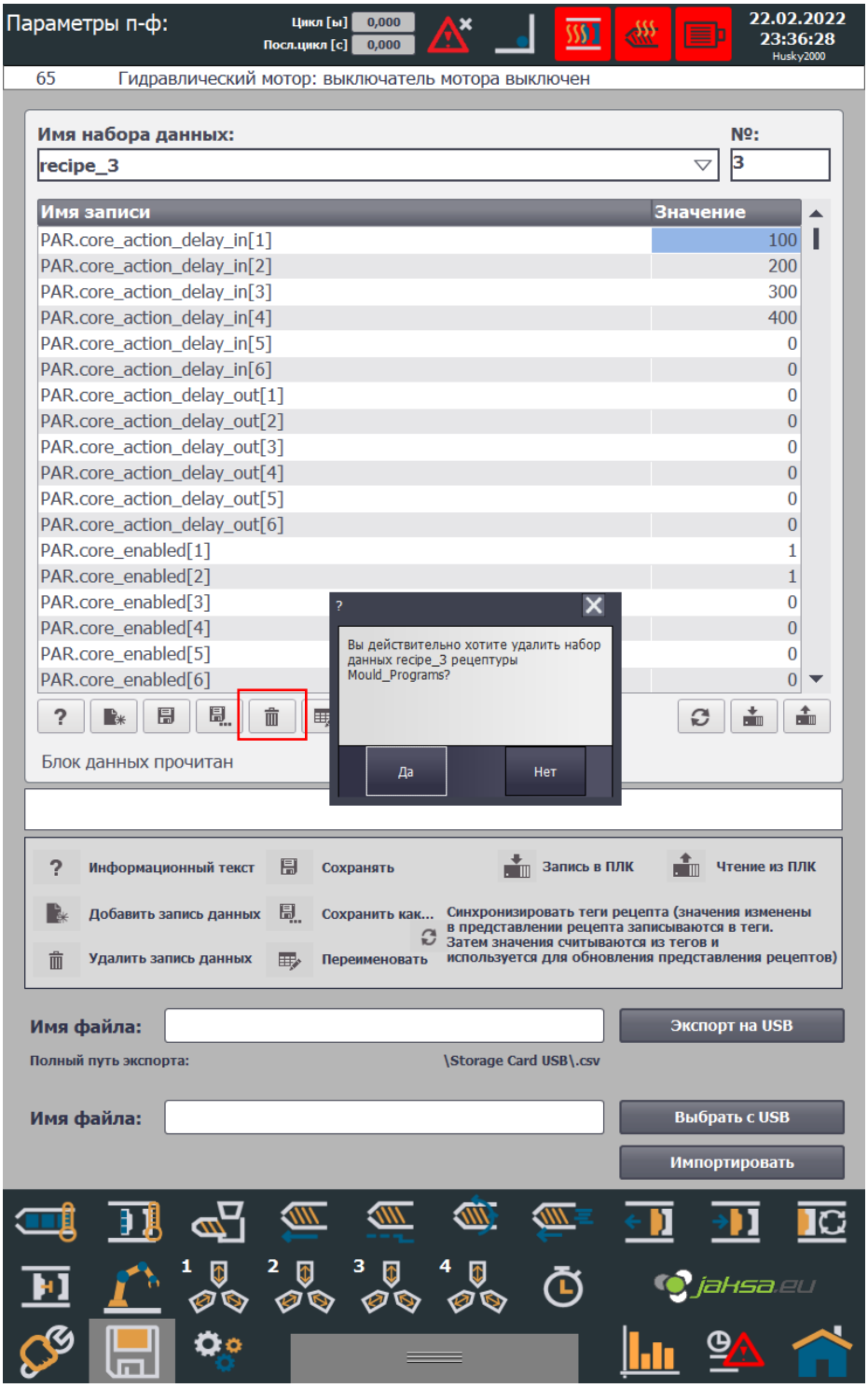


Figure 40:Delete recipe.

3.1.6 Rename recipe

1. Tap **Rename** button.

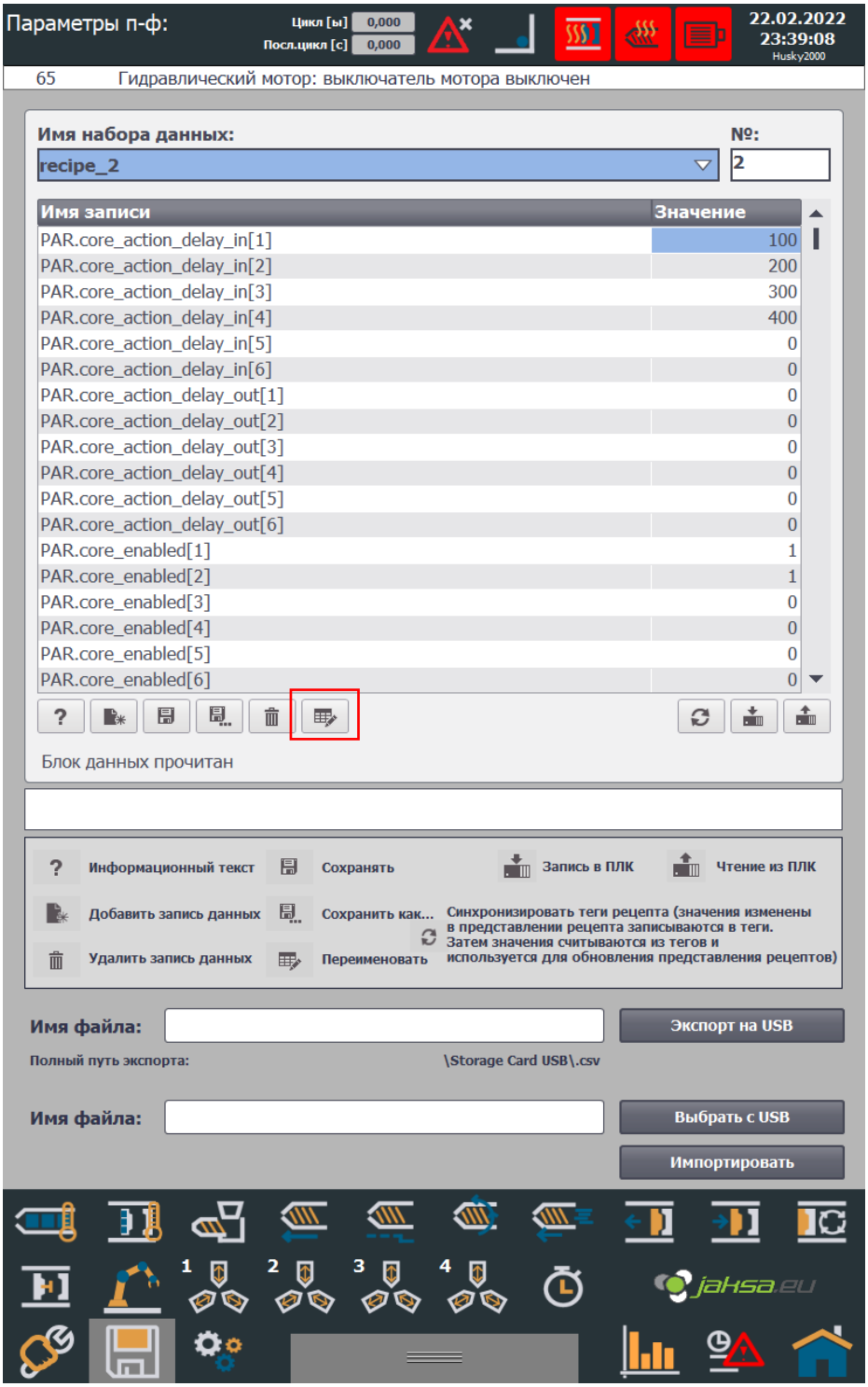


Figure 41:Rename recipe

2. On-screen keyboard will appear. Enter desired name and press **OK** to confirm recipe rename.

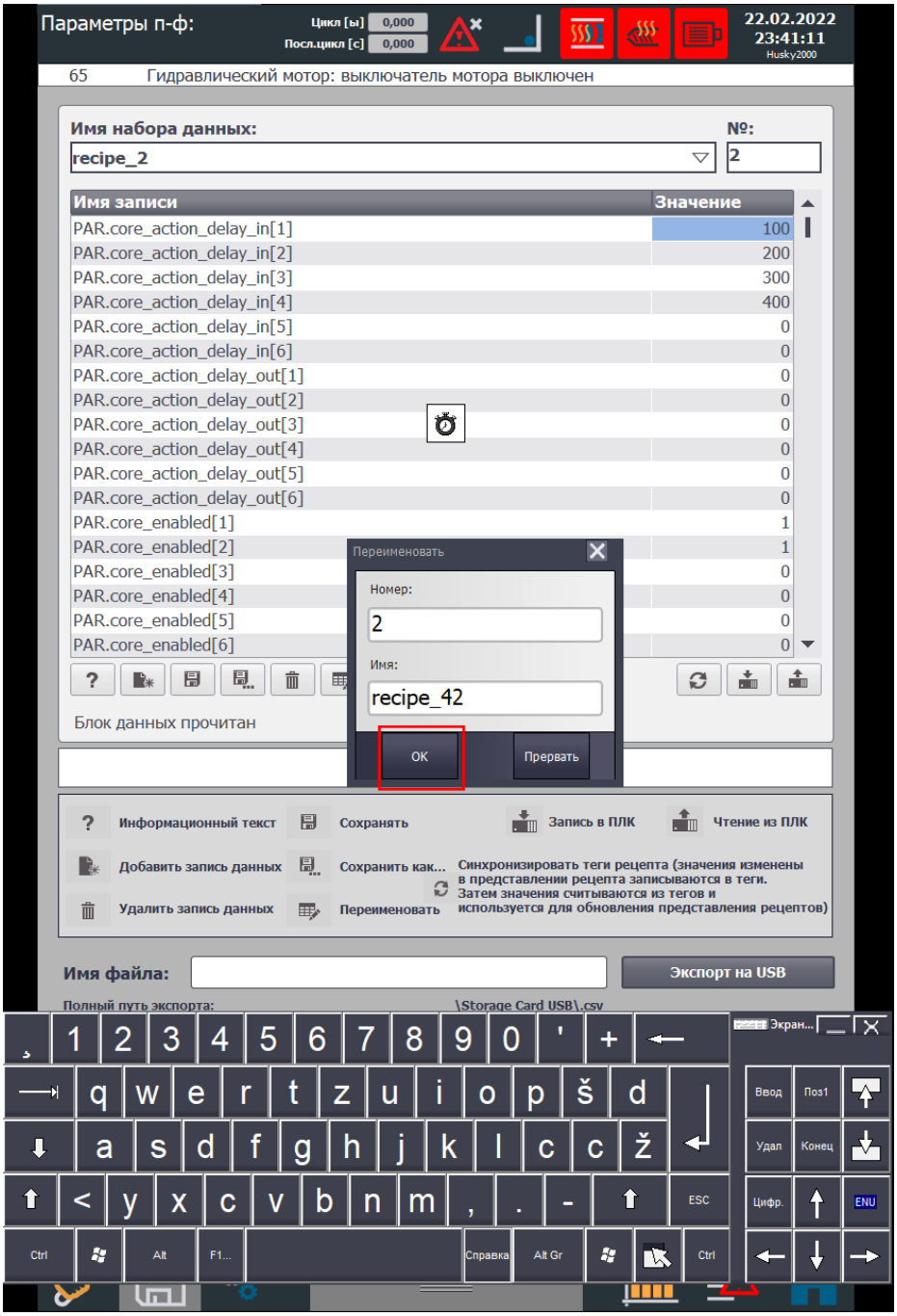


Figure 42:Confirm recipe rename

3.1.7 Export recipe to USB storage

This function exports selected recipe to USB storage device in its root folder.

Before you proceed, insert USB stick in the USB slot on the main panel below HMI device:

Figure 43:HMI panel with USB slot

1. Tap on the text field which indicates file name for the exported recipe.

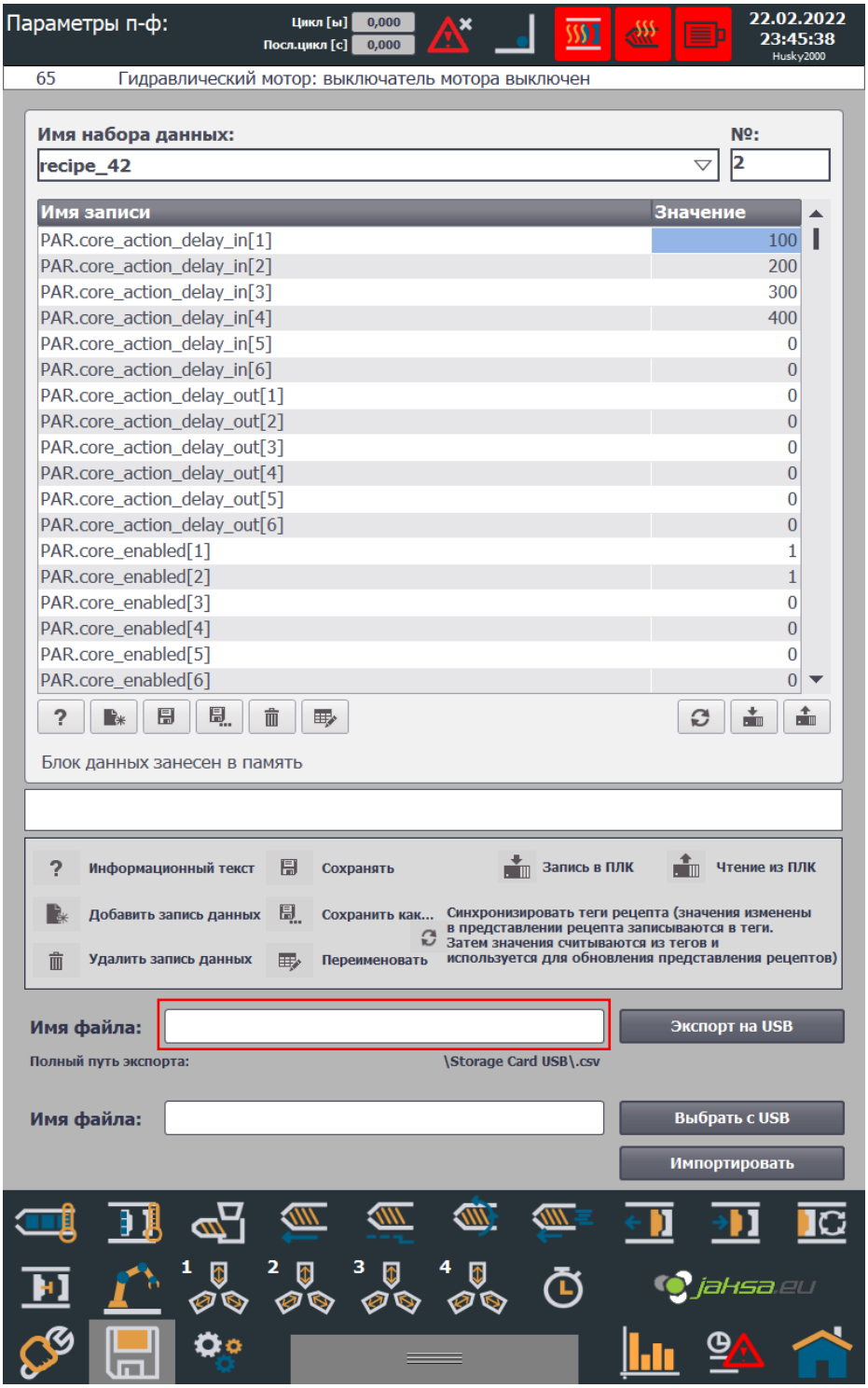


Figure 44:Export recipe to USB tap file name text field

2. On-screen keyboard will appear. Enter desired file name and press **ENTER.**

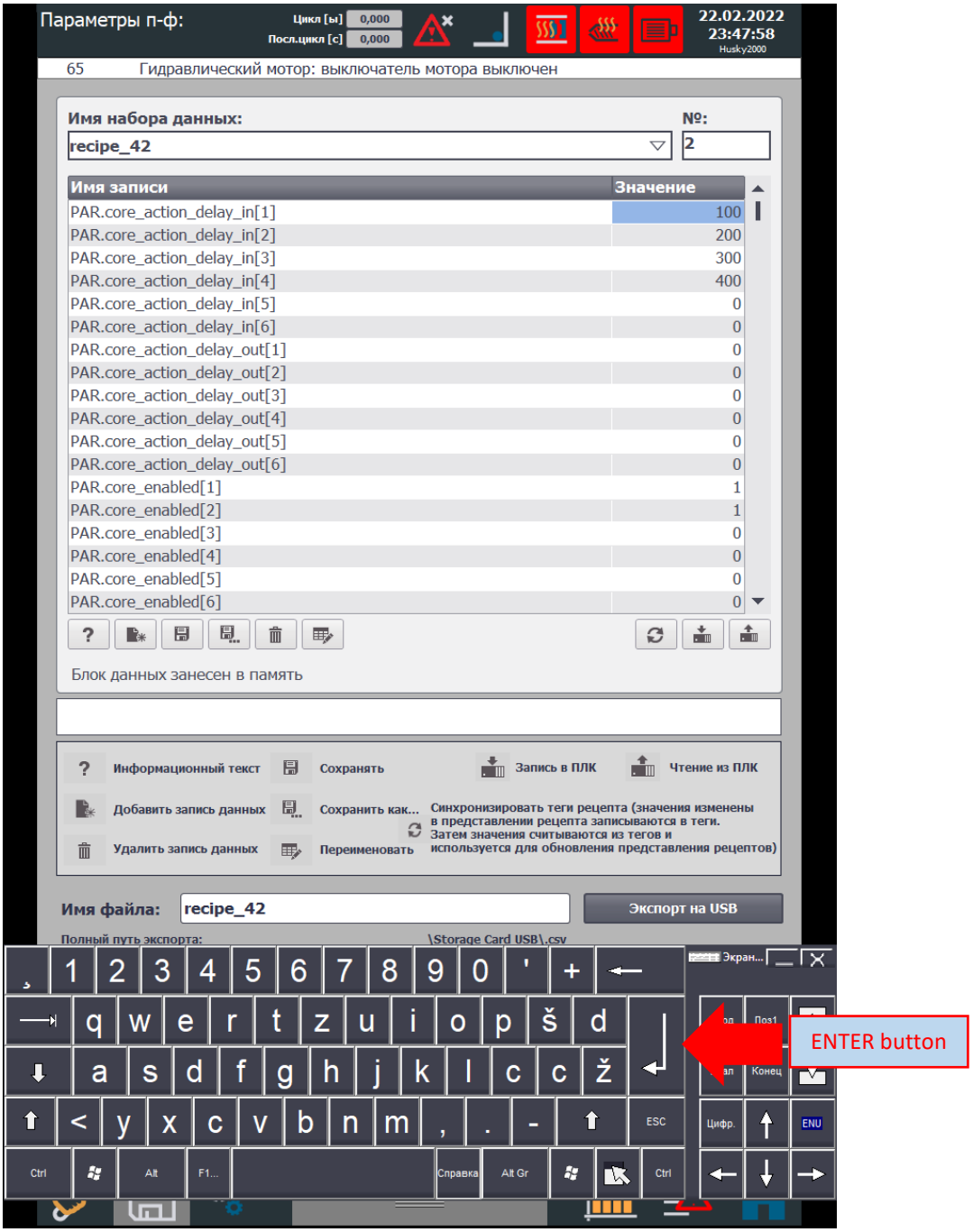


Figure 45:Enter file name at recipe export

3. Tap **Export to USB stick** button. Information window will appear afterwards, indicating successful transfer.

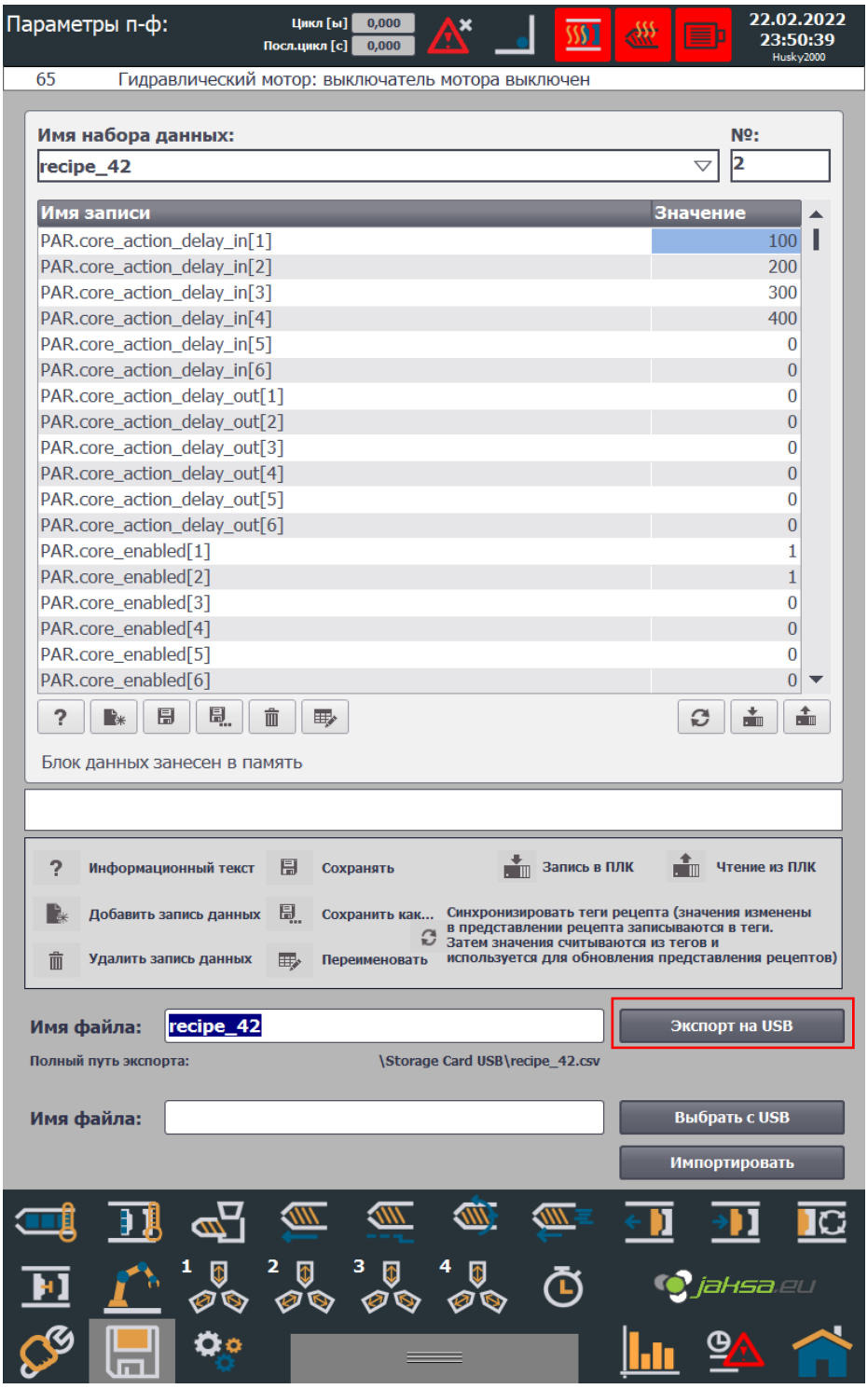


Figure 46:Tap export to USB button

3.1.8 Import recipe from USB storage

Before you proceed, insert USB stick in the USB slot on the main panel below HMI device:

Figure 47:HMI panel with USB slot

1. Tap **Select from USB stick** button

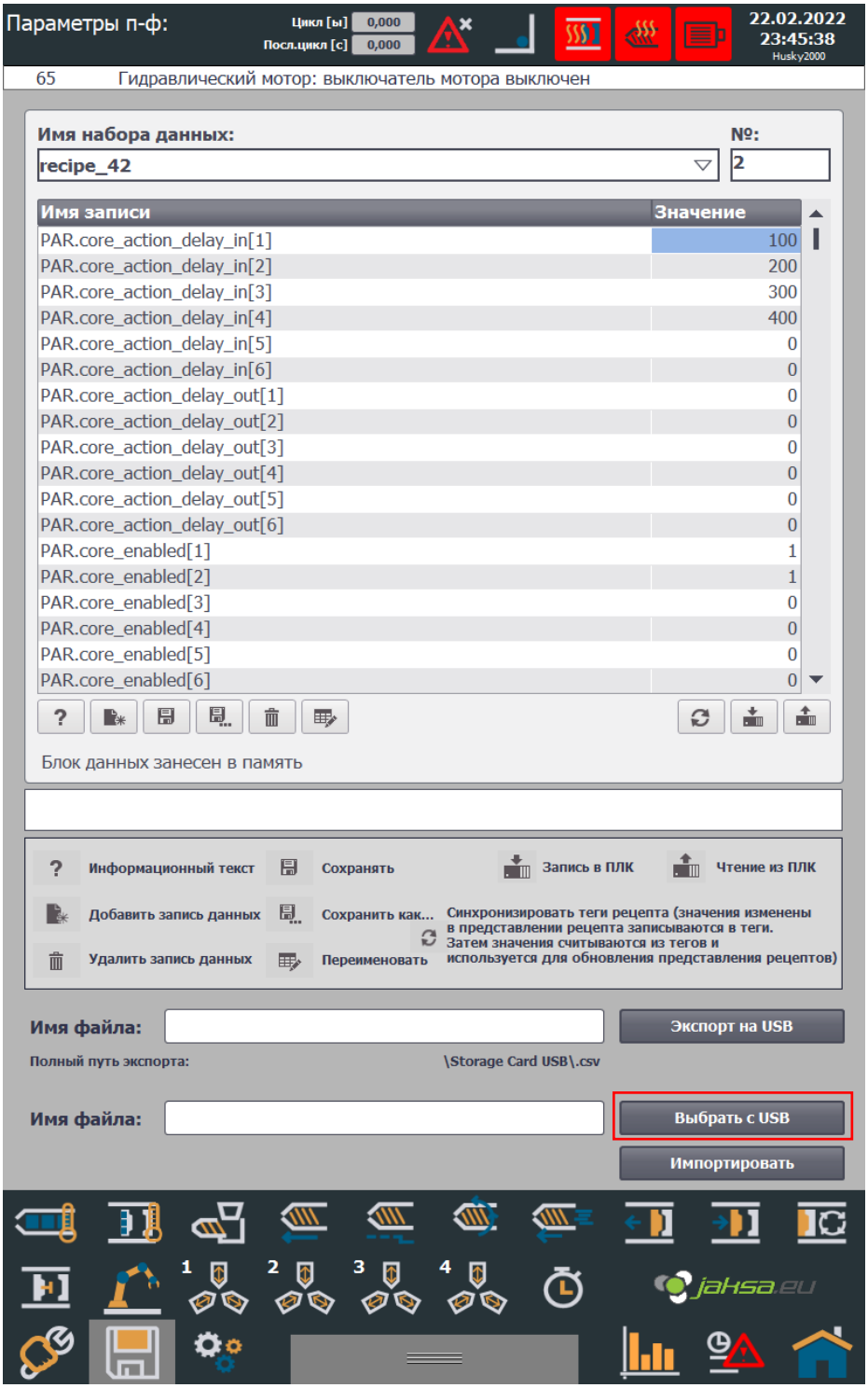


Figure 48:Tap select from USB stick

2. Pop-up file selector window will appear. Navigate through the file system and press **OK**.
   Recipe file must be previously exported file, with exact file format and data record number!

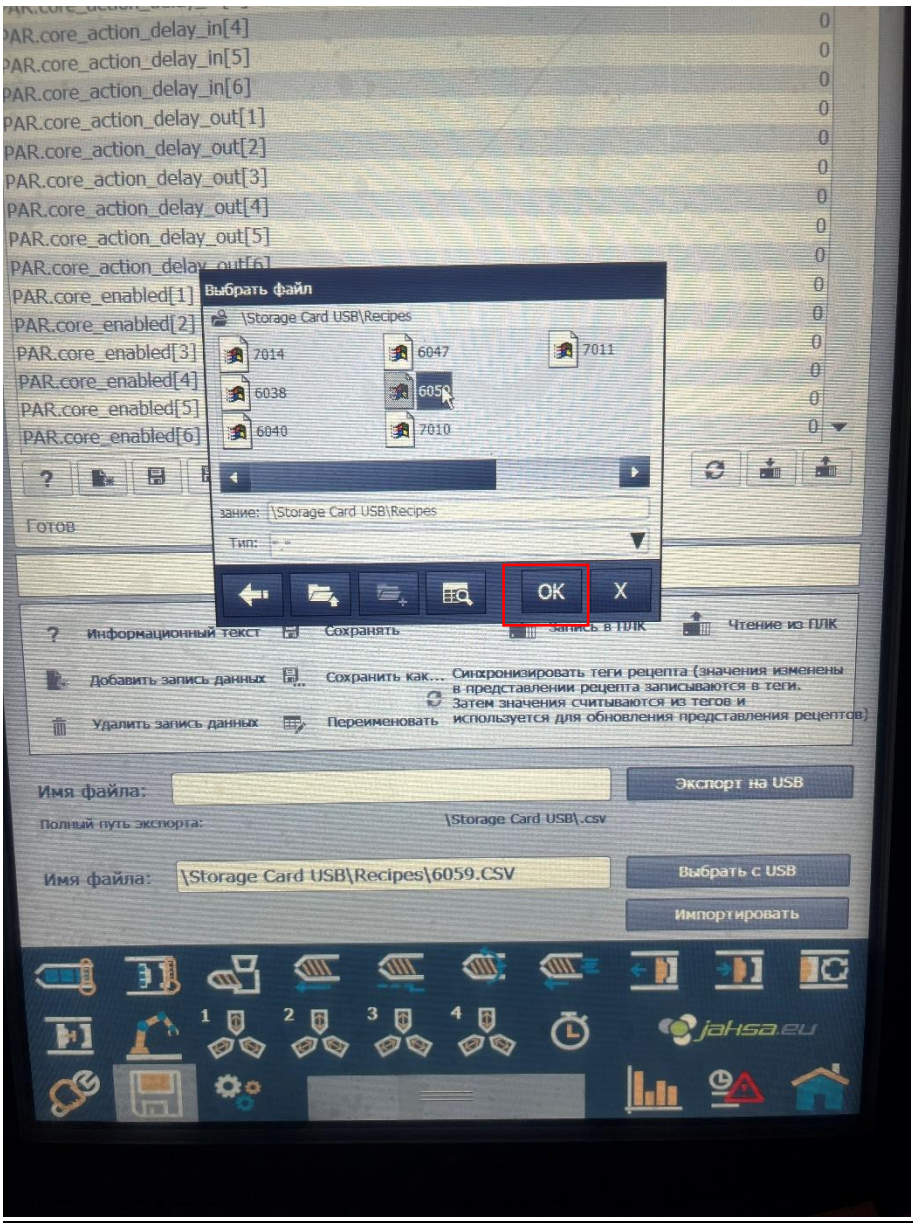


Figure 49:File selector USB import

3. Tap **Import** button

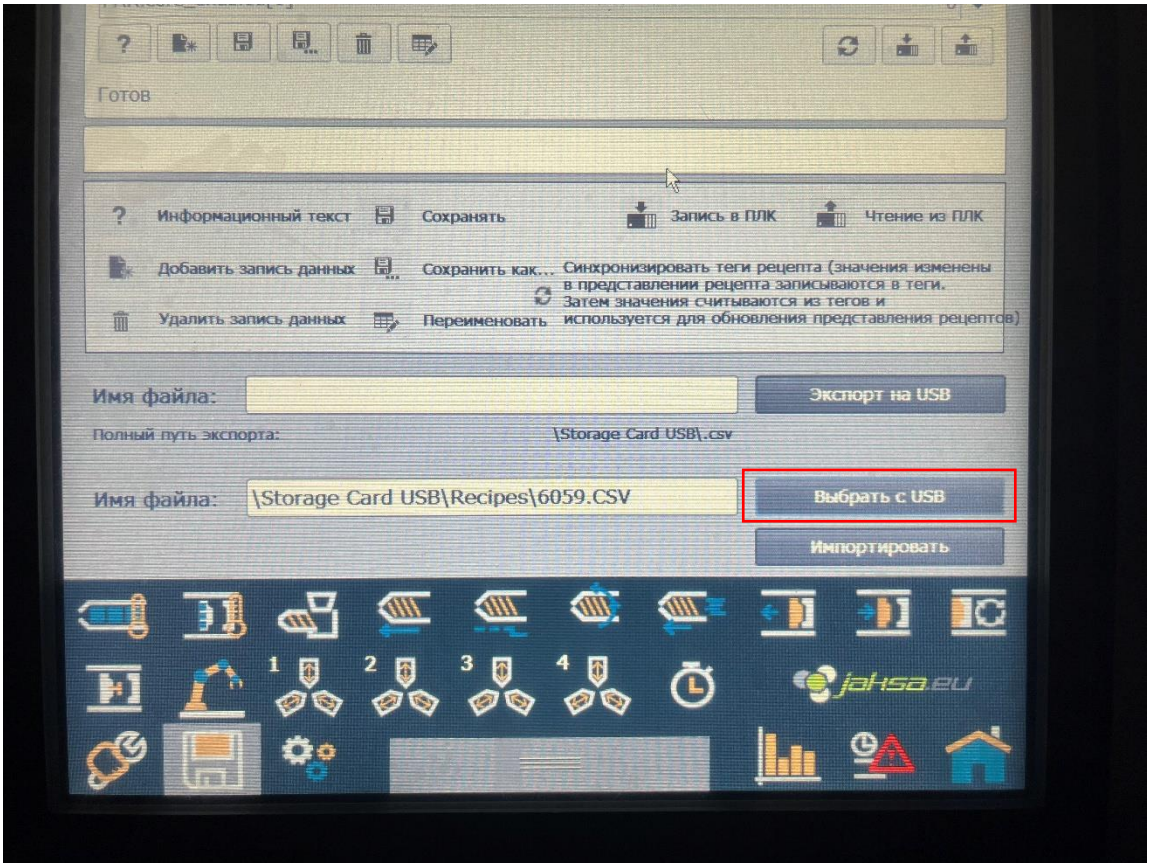


Figure 50:Tap import from USB stick

3.2 Production data

3.2.1 Production data description

To access and observe production data you must navigate to home screen.

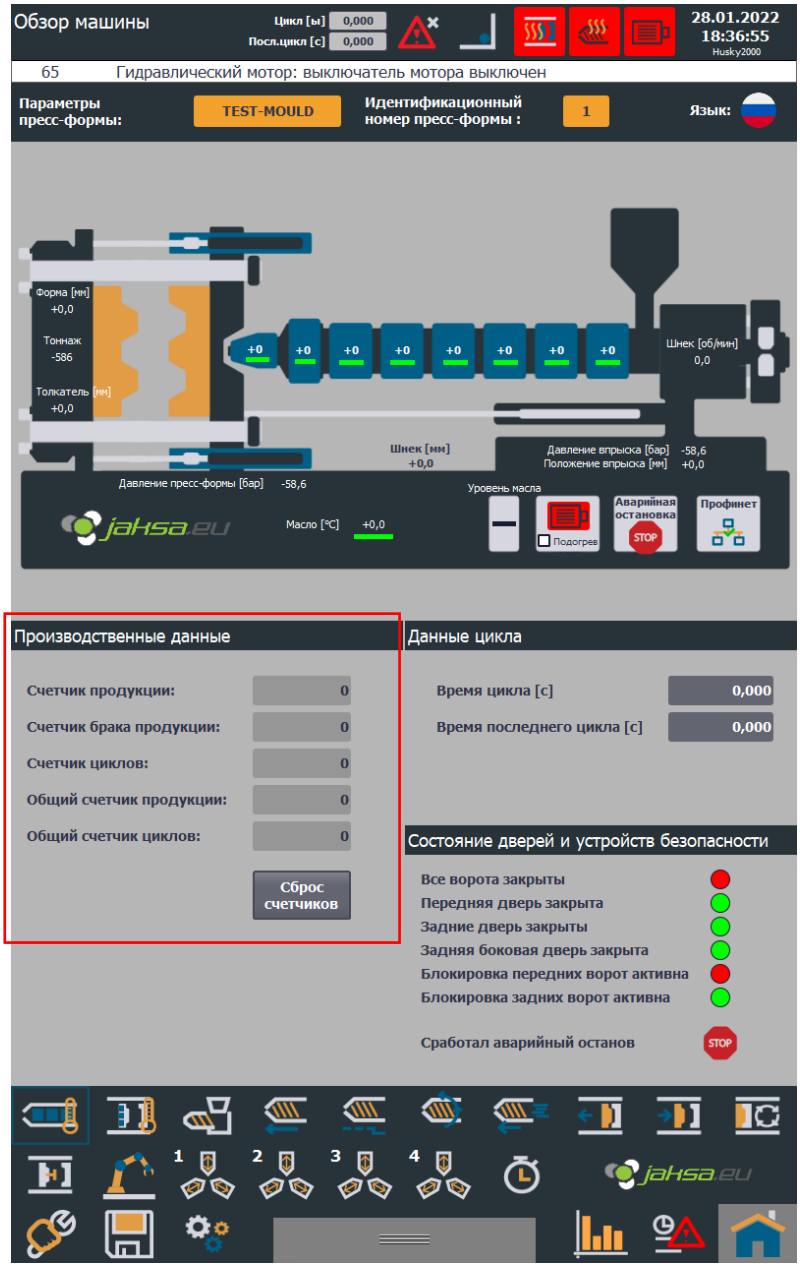


Figure 51:Production data on home screen

Description of the fields:

- **Production counter**

Will increment according to the parameter in **Various settings** screen named **Number of products in the mould.** This parameter is resettable.

Example:

Cycle counter	Number of products in the mould = 1	Number of products in the mould = 3
1	Production counter = 1	Production counter = 3
2	Production counter = 2	Production counter = 6
3	Production counter = 3	Production counter = 9
…	…	…

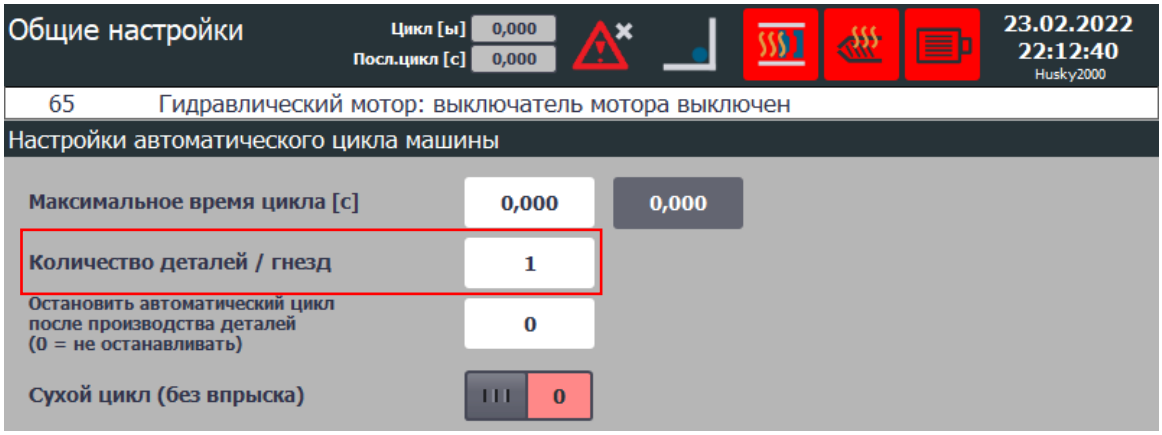


Figure 52:Parameter number of products in the mould

- **Product rejection counter**

Will increment by 1 if cushion size or injection time are not within tolerances. This parameter is resettable.

If cushion and injection time are not within tolerances, **Euromap67 Reject (Q27.5)** digital output will be active until the end of the cycle.

Parameters that cause product rejection counter to increment:

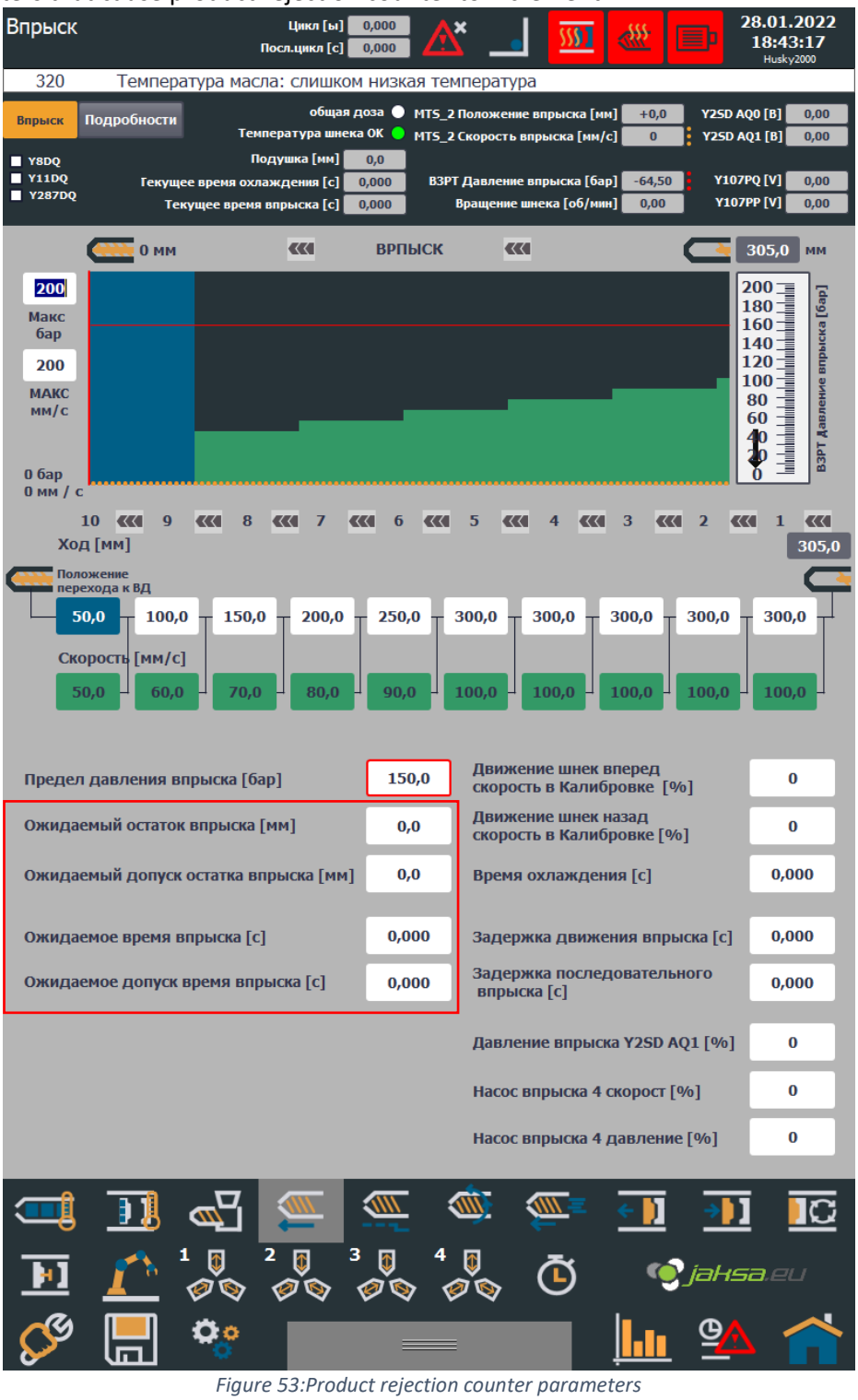


Figure 53:Product rejection counter parameters

- **Cycle counter**

  Will increment by 1 every finished machine cycle. This parameter is resettable.

- **Total production counter**

  Will increment in the same manner as **Production counter**. This parameter is NOT resettable. Purpose of this data is to track production count of machine's lifetime.

- **Total cycle counter**

  Will increment in the same manner as **Cycle counter**. This parameter is NOT resettable. Purpose of this data is to track cycle count of machine's lifetime.

3.2.2 Reset production data

Reset production data can be performed from the home screen using **Reset counters** button.

1. Tap **Reset counters** button

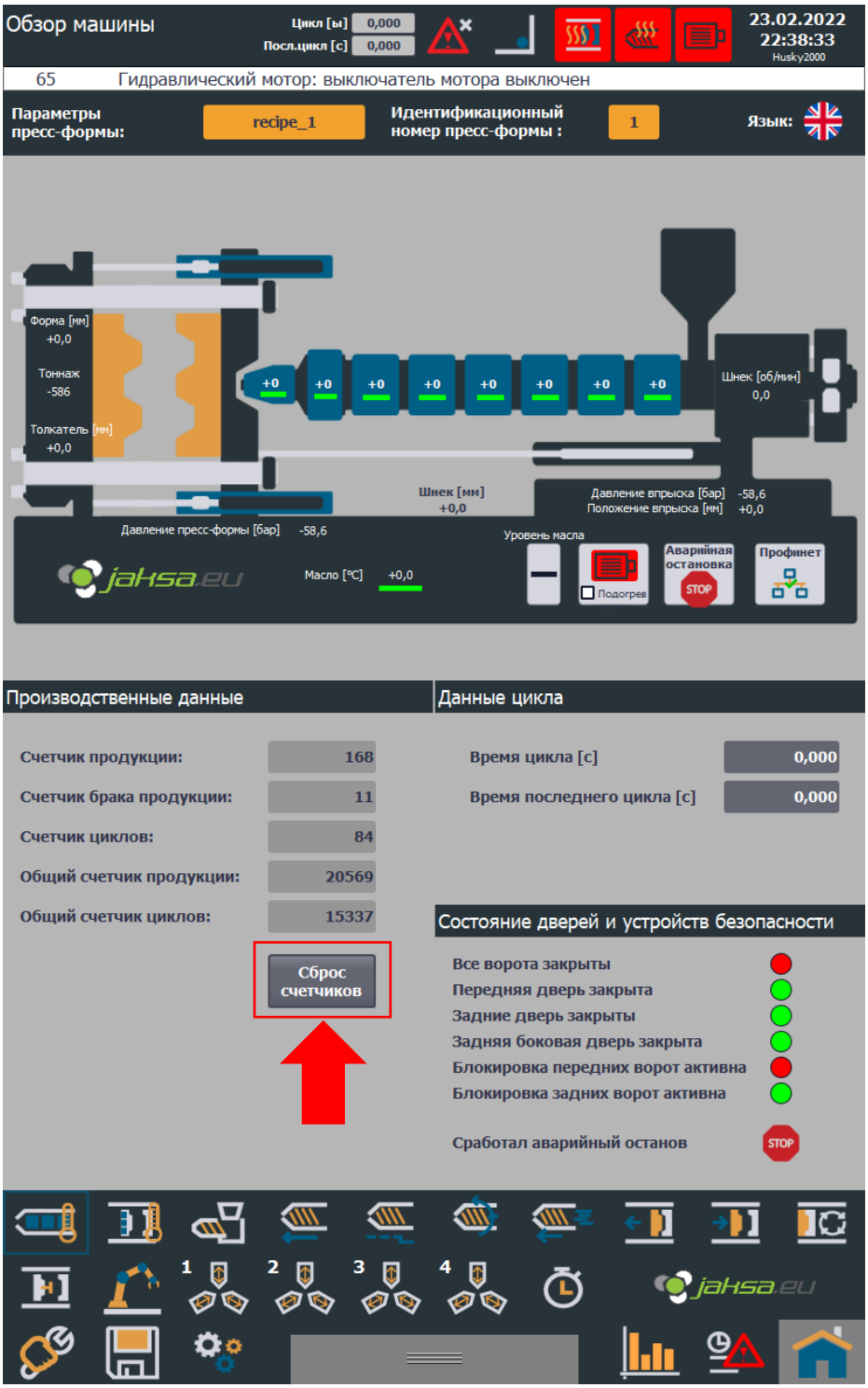


Figure 54:Tap reset counters button

2. System will ask you to enter safety username and password. Enter following credentials using the on-screen keyboard and tap OK button:

   Username: **pilot**
   Password: **3434**

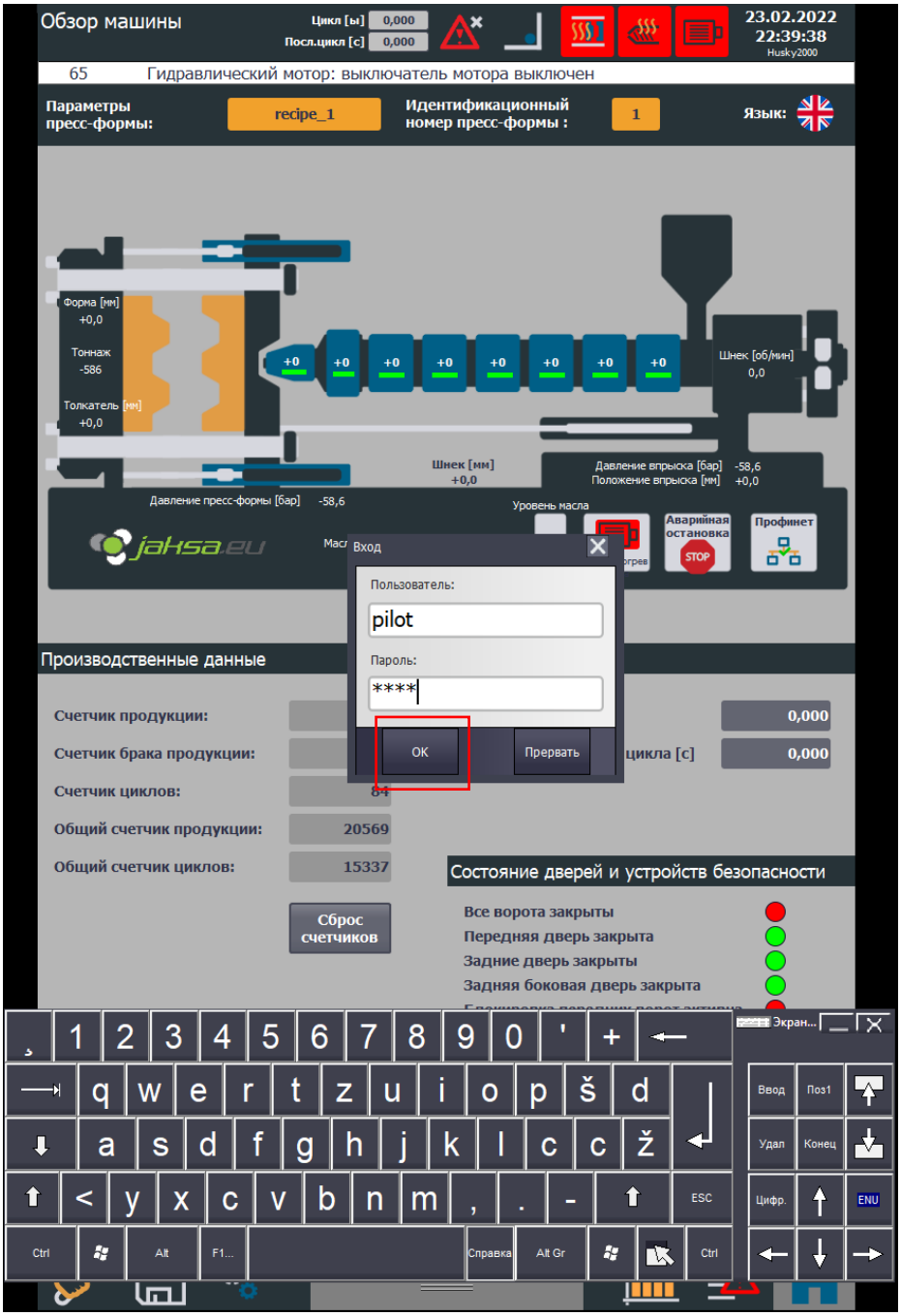


Figure 55:Enter credentials for resetting production data

3. Tap **Reset counters** button again. System will prompt you before proceeding.

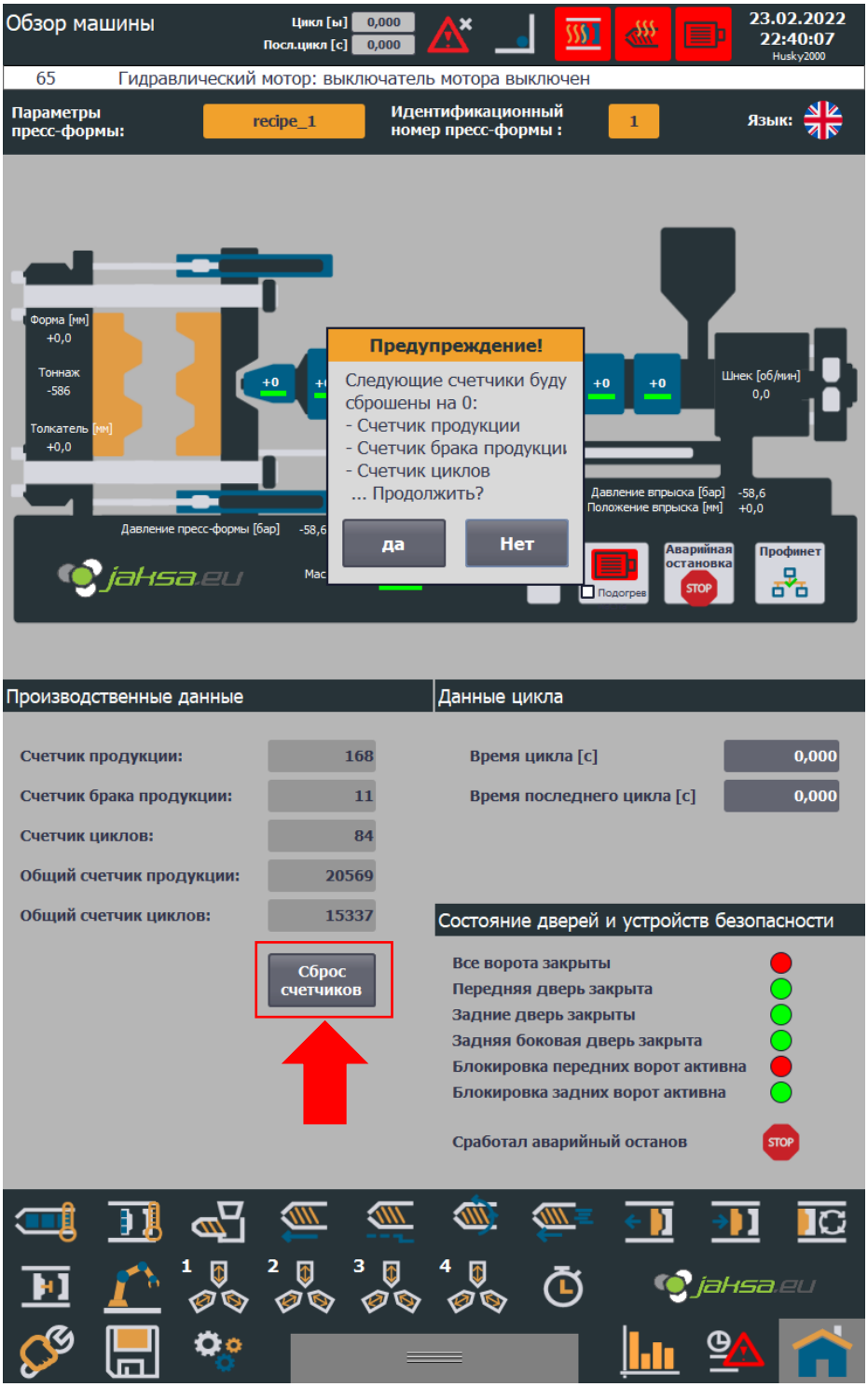


Figure 56:Prompt before resetting counters

4. Procedure is complete. Production counter, Product rejection counter and Cycle counter are set to 0 (zero).

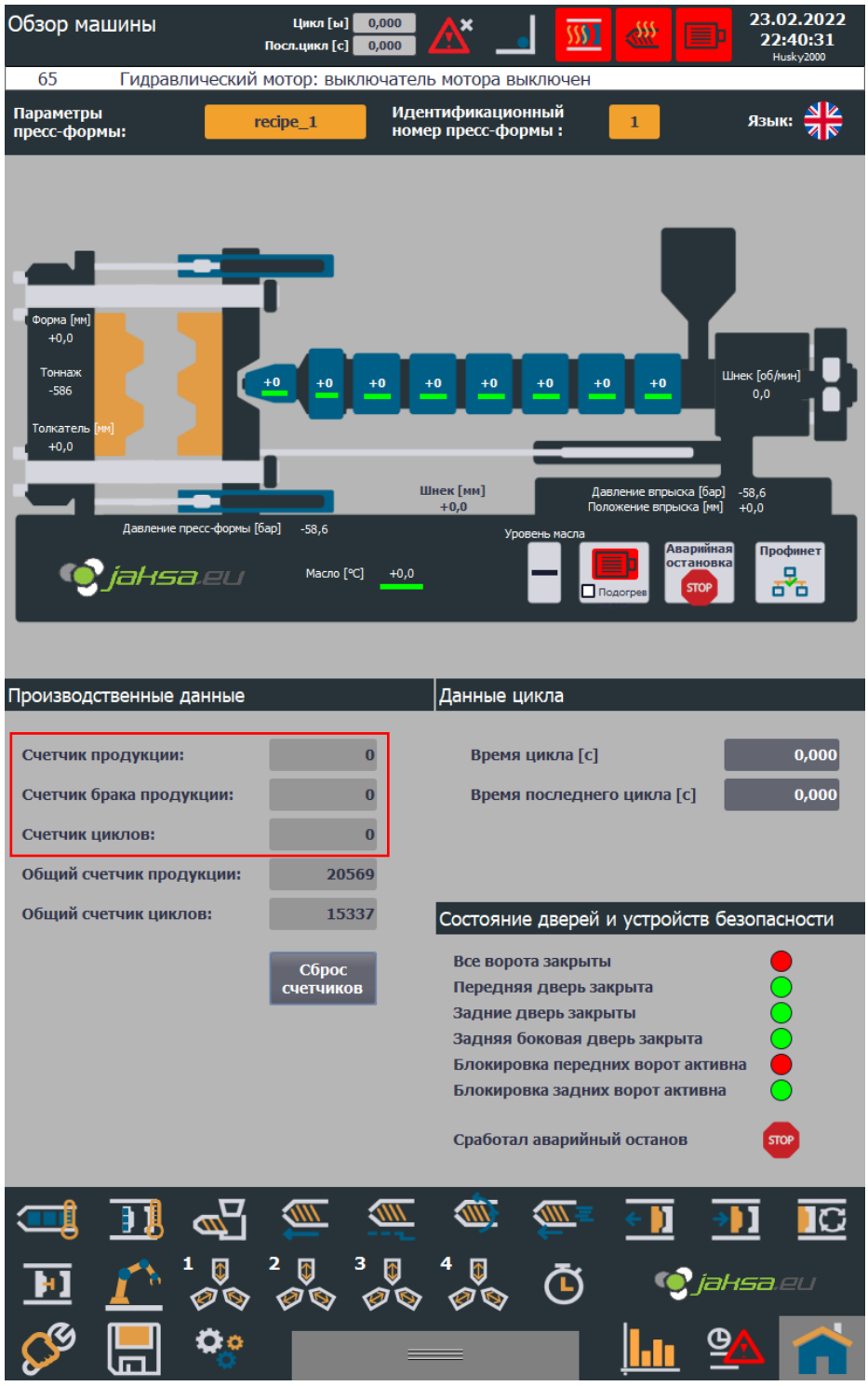


Figure 57:Production data set to 0

3.3 System language

System supports 3 languages: Russian, English and Slovenian. Change can be performed either from home screen or from diagnostics menu.

3.3.1 Change system language from home screen

1. Tap flag button
2. Choose one of 3 available languages by tapping the flag

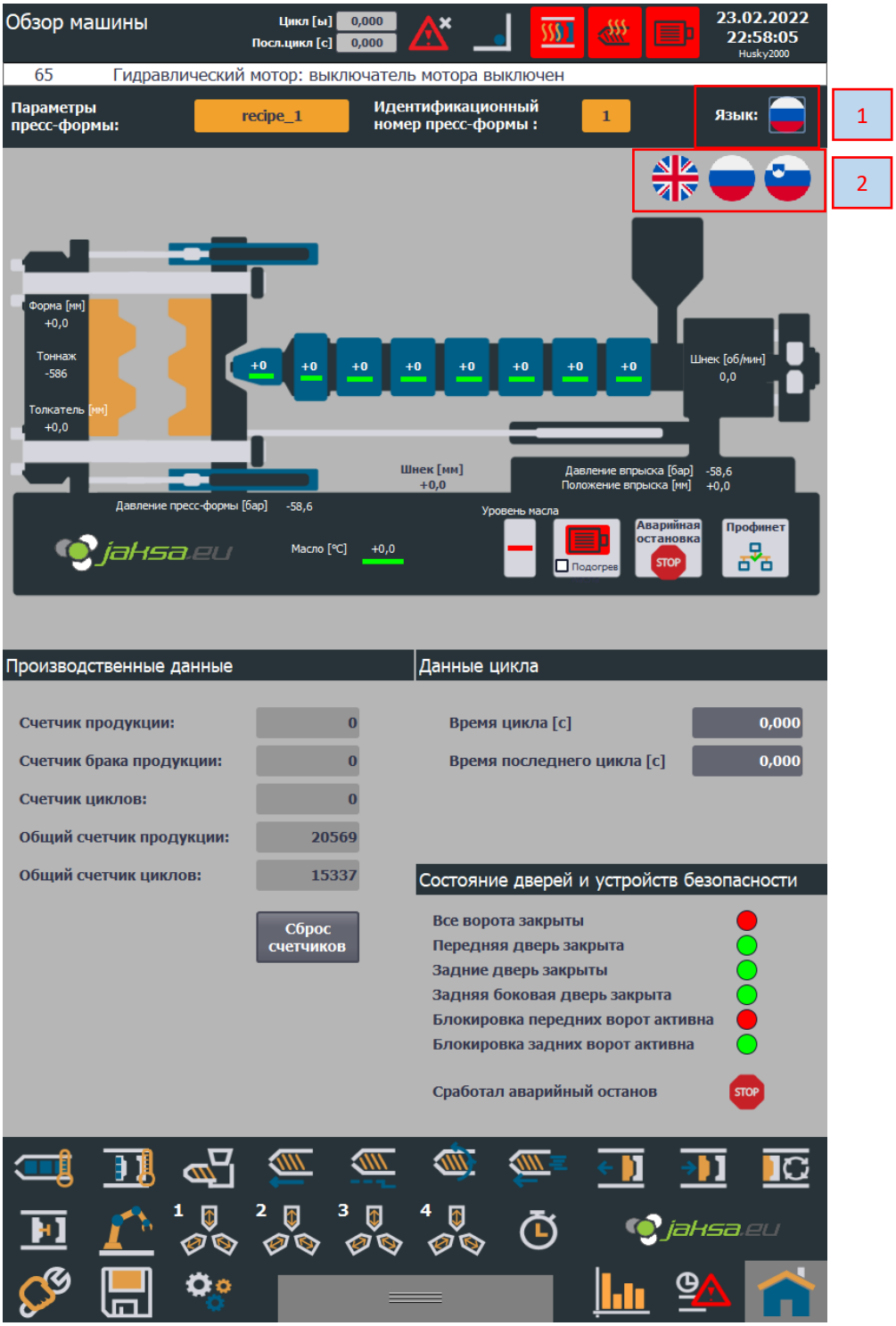


Figure 58:Change system language from home screen

3.3.2 Change system language from diagnostics menu

1. Tap **System settings** button
2. Choose one of 3 available languages by tapping the flag

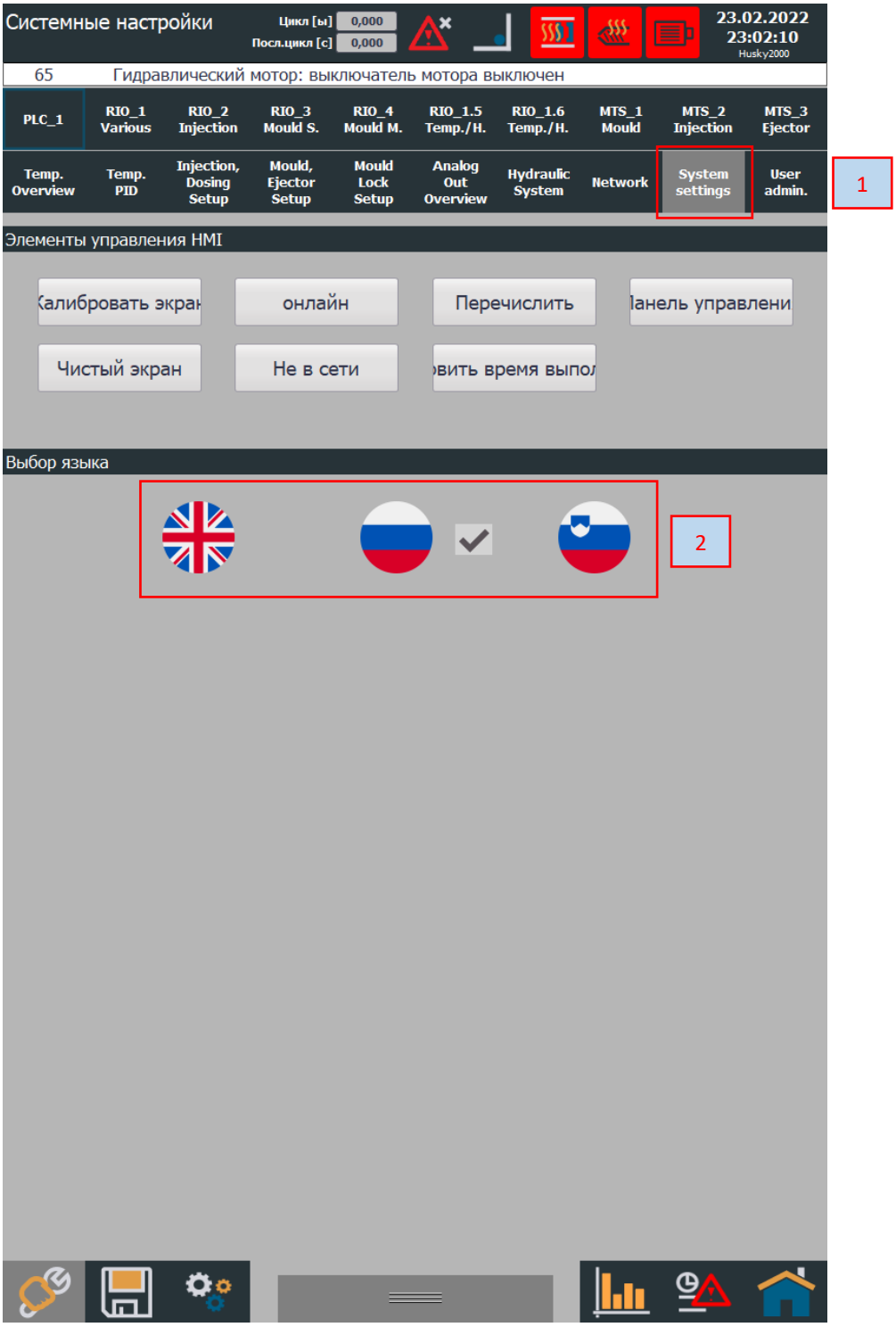


Figure 59:Change system language from diagnostics menu

3.4 Machine hand controls

Hand controls can be shown on any screen. The panel for hand controls is shown when one taps the gray button in the bottom of the screen or tapping the gray button and swiping up from the bottom of the screen.

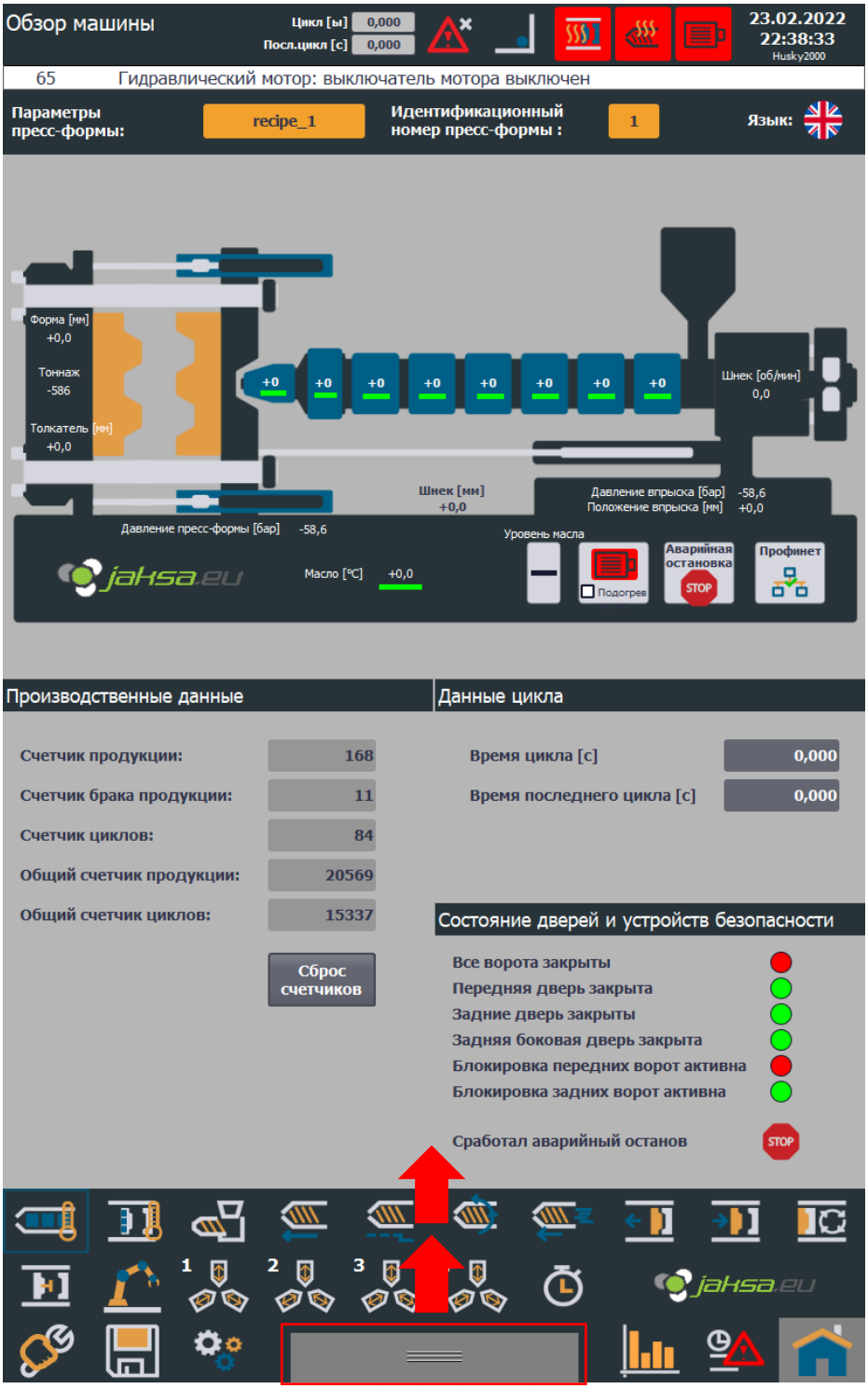


Figure 60:Machine hand controls swipe up

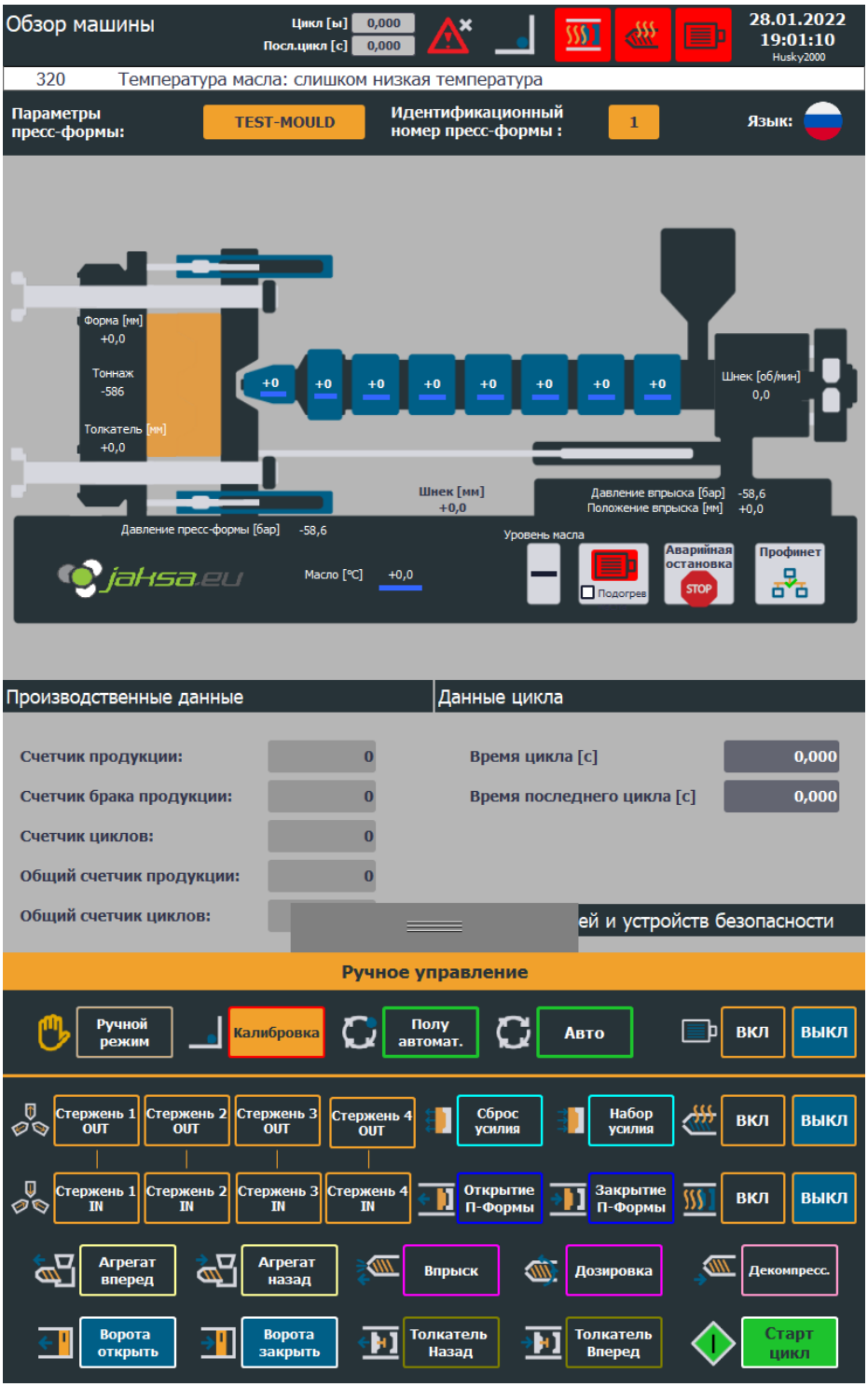
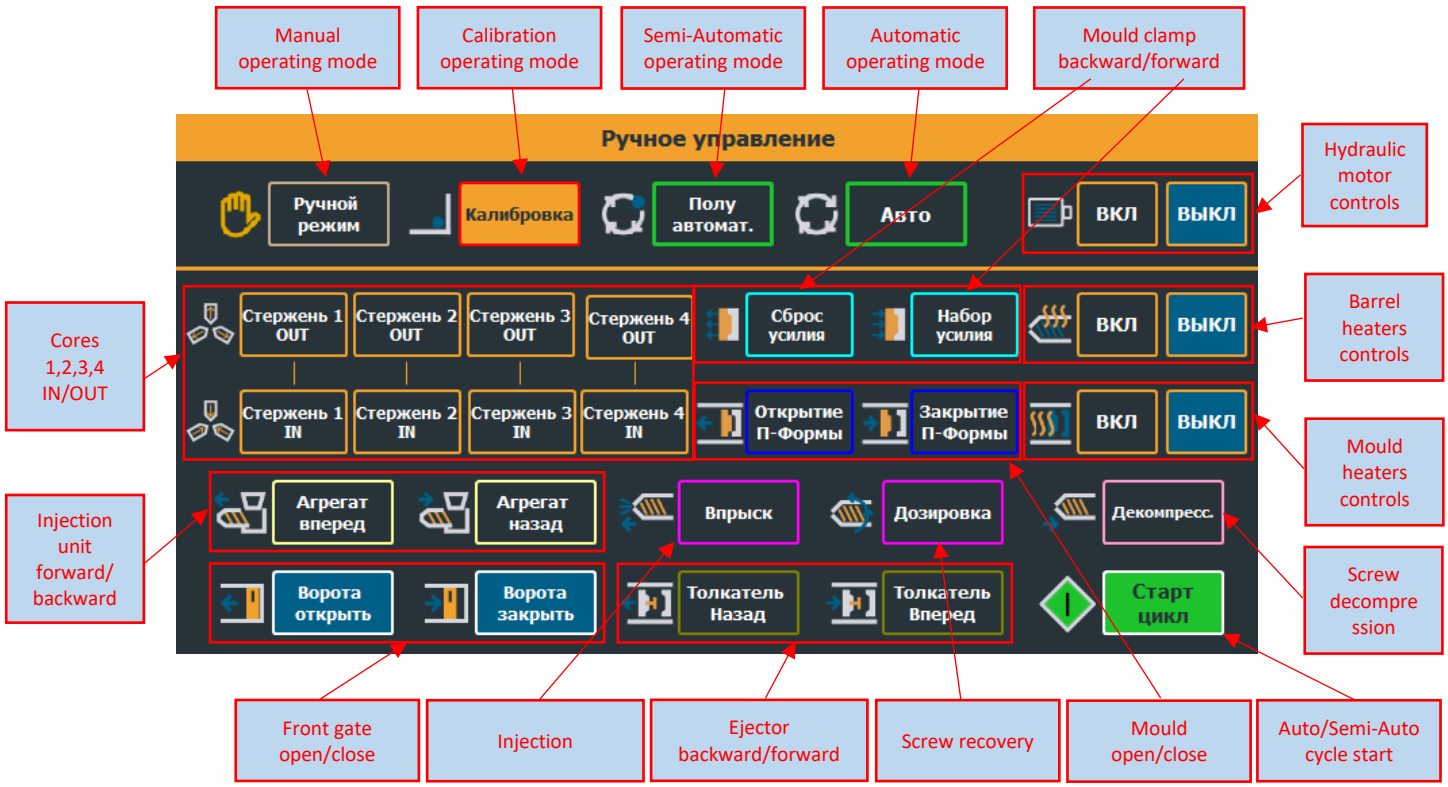


Figure 61:Machine hand controls

3.4.1 Machine hand controls break down



3.4.2 Machine hand controls - operating modes and cycle start

1. **Manual operating mode**: each movement can only be controlled separately. There are no connected movements. Parameters for manual operating mode are the same in automatic and semi-automatic mode.
2. **Calibration operating mode**: each movement can only be controlled separately. There are no connected movements. Parameters for calibration are special and a common practice is that they are set to low values. Calibration is used for calibrating end positions of moving parts. No speed or position regulations are present in calibration mode.
   When releasing any movement calibration buttons, a pop-up window appears which gives a possibility to enter/confirm end position of a moving part under calibration.
   Calibration pop-up window appears when whether button for injecting, decompression, mould open/close, ejector forward/backward or injection unit forward/backward is pressed.

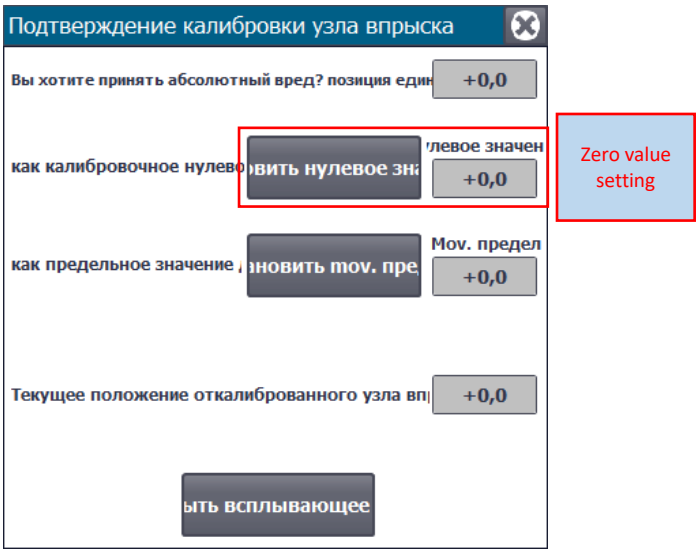


Figure 62:Calibration pop-up window

Calibration operating mode is forced if QMC mould lock is not in lock position.

3. **Semi-Automatic operating mode:** when this mode is selected, manual and calibration controls do not work. After pressing **Start Cycle** this mode makes the machine to perform one cycle and then waits until **Start Cycle** button is pressed again. After cycle is finished, if robot is disabled, front gates open automatically. If robot is enabled, front gates do not open after cycle finishes. All movements in this operating mode are identical to movements in manual operating mode.
4. **Automatic operating mode**: when this mode is selected, manual and calibration controls do not work. After pressing **Start Cycle** this mode makes the machine working non-stop until operator interrupts it by changing the operating mode or if any error occurs.
5. **Auto/Semi-Auto cycle start:** this button starts automatic or semi-automatic cycle depending on which operating mode is selected. Condition for successful cycle start and continuation lies within each movement action and is not part of the main auto-cycle routine.

3.4.3 Machine hand controls - hydraulic motor and heaters

1. **Hydraulic motor controls:** hydraulic motor can be switched on by tapping ON button and switched off by tapping OFF button.
   Hydraulic motor switches off automatically if any of the following errors occur:
   - Oil temperature is above “setpoint + tolerance MAX”
   - Motor breaker is OFF
   - Motor overload protection is triggered
   - Oil filter is clogged
   - Oil level is too low
   - Rexroth pump controller is not OK
   - Rear gate is not closed
   - Back door is not closed

2. **Barrel heaters controls:** barrel heaters can be switched on by tapping ON button and switched off by tapping OFF button.
   Barrel heaters switch off automatically if any of the following errors occur:
   - Any barrel temperature probe shows higher temperature reading than "setpoint + 40°"
   - Barrel heaters contactor is off

3. **Mould heaters controls:** mould heaters can be switched on by tapping ON button and switched off by tapping OFF button.
   Mould heaters switch off automatically if any of the following errors occur:
   - Any mould temperature probe shows higher temperature reading than "setpoint + 40°"
   - Mould heaters contactor is off

3.4.4 Machine hand controls – movement controls

1. **Mould clamp forward/backward**
2. **Mould open/close**
3. **Cores 1,2,3,4 IN/OUT**
4. **Injection unit forward/backward**
5. **Front gate open/close**
6. **Ejector forward/backward**
7. **Injection**
8. **Recovery**
9. **Decompression**

3.5 Mould change

Mould change requires special procedures because of its unique QMC system (quick mould change). This chapter will not describe procedures for loading and unloading a mould in detail, since the procedures are well described in the HMI screens themselves and are self-explanatory.

3.5.1 QMC – Quick Mould Change

Is a special hydraulic system mounted on both moving and static platen on the machine. Its purpose is to hold mould in correct position and prevents it from moving.

Any failure of this system can result in catastrophic consequences for machine, it's equipment (robot,…) or people around the machine!

Maintenance and operator personnel must always keep this system in mint condition. Checking correct functionality of end switches and taking care of hydraulic components.

If system indicates that not all QMC cylinder clamps are in state LOCKED, machine switches automatically to calibration operation mode and forces it in calibration operating mode until problem is resolved.

QMC Controls are enabled only when mould load or unload procedures are active (step is not equal 0 (zero)).

3.5.2 Mould load

Is step-by-step procedure for loading new mould into machine, when machine does not yet have a mould mounted.

For detailed description refer to text in the HMI screen from chapter 2.1.19.

3.5.3 Mould unload

Is step-by-step procedure for unloading the mould that is currently in the machine between the platens.

For detailed description refer to text in the HMI screen from chapter 2.1.20.

3.6 Gates, safety platforms and emergency stop

Gates and emergency stop buttons are the most important safety functions on the machine.

Gates act as a physical barrier and prevent people from entering the close machine surroundings while machine is operating.

Safety platforms detect people inside the machine and prevent machine movements even though all gates are closed.

Emergency stop is an electromechanical safety feature in a form of chain of push buttons, that hard stop all machine movements when pressed.

The status of all safety features can be observed on the home screen:

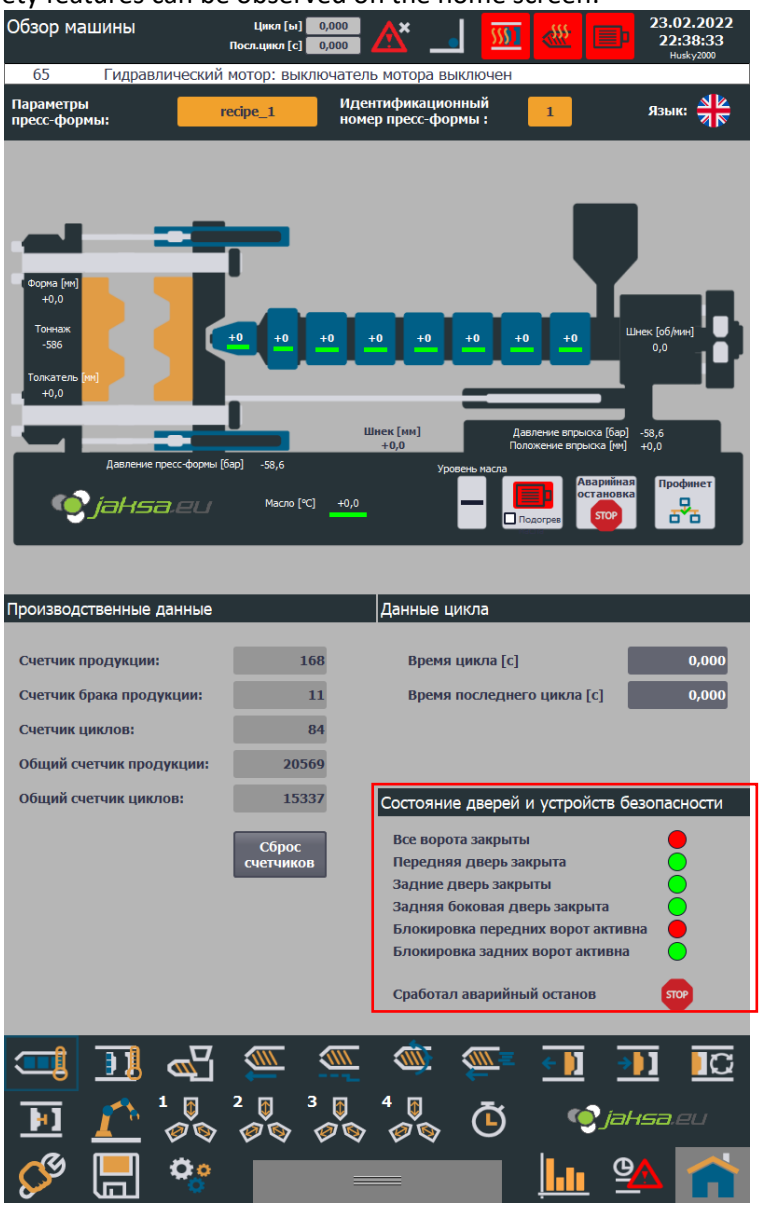


Figure 63:Gates and emergency stop status

Green circle: STATUS OK
Red circle: STATUS NOT OK
Stop sign: STATUS NOT OK

3.6.1 Front gate

Front gate is the only gate on the machine that is powered by the electrical motor and is controlled via the HMI hand controls screen.

When front gate is opened, machine movements are stopped and not allowed to continue, however hydraulic motor keeps running.

Every time that front gate gets opened, front gate interlock flag becomes active. It prevents any machine movements until flag is reset. It can be reset by pressing the black push button located under the HMI on the front panel.

Figure 64:Front gate interlock push button location

3.6.2 Back door

Back door is the door on the moving platen side of the machine.

When back door is opened, machine movements are stopped and not allowed to continue. Hydraulic motor stops.

3.6.3 Rear gate

Rear gate is the gate on the back side of the machine, opposite of the front gate.

When rear gate is opened, machine movements are stopped and not allowed to continue. Hydraulic motor stops.

Every time that rear gate gets opened, rear gate interlock flag becomes active. It prevents any machine movements until flag is reset. It can be reset by pressing the black push button located next to the rear gate opening handle.

3.6.4 Injection unit safety cover

Injection unit safety cover is located on the top of the tip of the barrel. It protects surroundings from hot plastic during injection.

When injection unit safety cover is opened, machine movements are stopped and not allowed to continue, however hydraulic motor keeps running.

It does not have its own signal. Door contact is bound to “All gates closed” signal.

3.6.5 Safety platforms

There are 2 safety platforms on the machine: on the back side of the moving platen and in between both platens.

Safety platforms only have 1 (one) signal.

When safety platforms are triggered, machine movements are stopped and not allowed to continue, however hydraulic motor keeps running.

3.6.6 Emergency stop push buttons

There are several emergency stop push buttons on the machine.

One of the emergency stop push buttons is located on the front panel below the HMI:

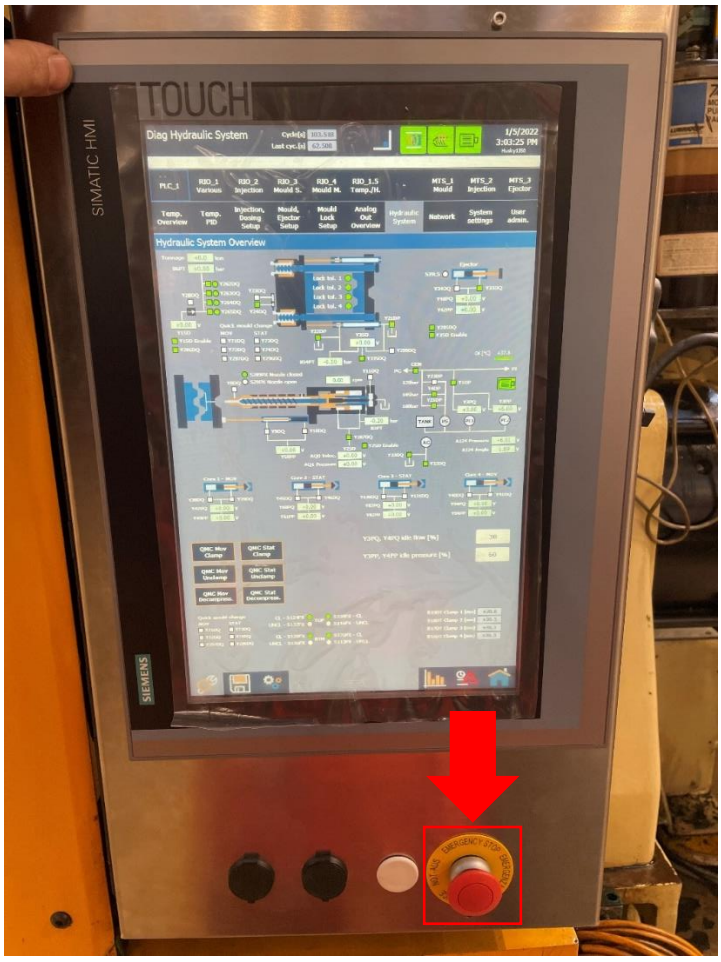


Figure 65:Emergency stop push button on the front panel below HMI

Emergency stop push buttons are the highest level of security on the machine. All push buttons on the machine are connected into the chain, meaning that when one is pressed, seems like all are pressed.

When emergency stop push button is pressed, it cuts the supply voltage for hydraulics, hydraulic motor, and other machine functions.

Summary when emergency push button is pressed:

- Motor stops
- Motor breaker is off
- Robot stops
- All machine movements stop
- HMI and PLC preserve their functionality
- Push button gets stuck in triggered position and needs to be reset by either turning it or just pulling it vertically out of its triggered position

3.7 Automatic operation cycle flow

State	Description	Conditions for next step
0	Wait for hand control “Start cycle”	1. “Start cycle” button is pressed 2. Air pressure is normal
3	Action EJECTOR IN	1. EJECTOR IN sequence is done
4	a. Check if robot is enabled b. Action MOULD CLOSE if robot is disabled	a. Wait for robot signal to close mould b. MOULD CLOSE sequence is done
5	Action MOULD CLOSE if robot is enabled	1. MOULD CLOSE sequence is done
6	Action MOULD CLAMP FORWARD	1. MOULD CLAMP FORWARD sequence is done
7	Check if dry cycle is enabled	a. Dry cycle is enabled jump to action MOULD CLAMP BACKWARDS b. Dry cycle is disabled
10	Action INJECTION UNIT FORWARD	1. INJECTION UNIT FORWARD sequence is done
11	Action INJECTING	1. INJECTING sequence is done
12	Check if injection unit backwards in auto before recovery is enabled	a. Injection unit backwards in auto before recovery is enabled jump to action INJECTION UNIT BACKWARDS b. Injection unit backwards in auto before recovery is disabled
13	Action INJECTION UNIT BACKWARDS before recovery	1. INJECTION UNIT BACKWARDS sequence is done
20	Action DOSING (recovery)	1. DOSING sequence is done
21	Check if injection unit backwards in auto after recovery is enabled	a. Injection unit backwards in auto after recovery is enabled jump to action INJECTION UNIT BACKWARDS b. Injection unit backwards in auto after recovery is disabled
22	Action INJECTION UNIT BACKWARDS after recovery	INJECTION UNIT BACKWARDS sequence is done
25	Wait for cooling time to expire and cores to be in correct position if any of cores is enabled	1. Cooling time expired 2. Cores in correct positions
30	Action MOULD CLAMP BACKWARDS	1. MOULD CLAMP BACKWARDS sequence is done
31	a. Check if robot is enabled b. Action MOULD OPEN if robot is disabled	a. Wait for robot signal to open mould b. MOULD OPEN sequence is done
32	Action MOULD OPEN if robot is enabled	1. MOULD OPEN sequence is done
33	a. Check if all mould clamps are in tolerance and positioning of mould clamps is not set to: after mould opening b. Action MOULD CLAMP BACKWARDS if not all mould clamps are in tolerance and positioning of mould clamps is set to after mould opening	a. All mould clamps are in tolerance or positioning of mould clamps is not set to after mould opening, jump to ejector b. MOULD CLAMP BACKWARDS sequence is done
34	a. Check if robot is enabled b. Check if robot is not enabled	a. Robot is enabled, jump to robot-controlled ejector

		b. Robot is disabled, jump to PLC-controlled ejector
61	Wait for robot to control EJECTOR OUT	1. Robot signals EJECTOR OUT
62	Action EJECTOR OUT, robot controlled	1. EJECTOR OUT sequence is done
63	Wait for robot cores OUT control	1. Robot signals CORES OUT
64	Action CORE 1/2/3/4 OUT	1. All cores in correct states
66	Wait for robot to control EJECTOR IN	1. Robot signals EJECTOR IN
67	Action EJECTOR IN, robot controlled	1. EJECTOR IN sequence is done
68	Wait for robot cores IN control	1. Robot signals CORES IN
69	Action CORE 1/2/3/4 IN	1. All cores in correct states
70	Wait for robot to signal euromap67 enable mould closure to return to the start of the cycle*	1. Euromap67 enable mould closure is set to TRUE
80	a. Check number of ejections parameter – not equal 0 (zero) b. Check number of ejections – equal 0 (zero)	a. Ejector is enabled, jump to PLC controlled ejector out action b. Ejector is disabled, jump to step 83
81	Action EJECTOR OUT, PLC controlled	1. EJECTOR OUT sequence is done
82	Check number of ejections parameter – higher than 1 (one)	1. EJECTOR IN action and wait for the action to finish
83	a. Check number of ejections parameter – lower than actual ejections b. Check number of ejections parameter – equal to actual ejections	a. Return to EJECTOR OUT action b. Ejections are reached, return to the start of the cycle*

*If Semi-Auto operation mode is selected, cycle needs to be restarted using the HMI hand controls screen button **Start Cycle.** If Auto operation mode is selected, cycle restarts itself.

3.8 Machine indications description

Indication	Description
Mould clamps are locked	TRUE if: - DI clamp piston is locked op-side and; - DI clamp piston is locked non-op-side
Mould width is within the limits	TRUE if: - Par *mould width* >= Par *mould min width* and; - Par *mould width* <= Par *mould max width*
Mould is open	TRUE if: - Calibrated MTS mould position >= (Par *mould open interval position 6* – Par *mould end position tolerance)*
Mould is closed	TRUE if: - Calibrated MTS mould position <= (Par *mould close interval position 6 +* Par *mould end position tolerance)*
Mould is closed with high pressure (full tonnage)	TRUE if: - Mould clamps are locked and; - Pressure sensor mould clamp pressure >= Par *tolerated high pressure value*
Piston 1/2/3/4 is in lock tolerance	TRUE if: - Calibrated mould clamp cylinder position >= (Par *mould clamp target position piston* – Par *mould clamp lock tolerance from target position tolerance) and;* - Calibrated mould clamp cylinder position <= (Par *mould clamp target position piston* + Par *mould clamp lock tolerance from target position tolerance)*
All mould clamps are in lock tolerance	TRUE if: - Piston 1 is in lock tolerance and; - Piston 2 is in lock tolerance and; - Piston 3 is in lock tolerance and; - Piston 4 is in lock tolerance
Ejector is forward	TRUE if: - Calibrated MTS ejector position >= (Par *ejector forward interval position 3* – Par *ejector end position tolerance)*
Ejector is back (retracted)	TRUE if: - Ejector retracted mode = Position and; - Calibrated MTS ejector position <= (Par *ejector back interval position 3 +* Par *ejector end position tolerance)* - Ejector retracted mode = Position and switch S39LS and; - Calibrated MTS ejector position <= (Par *ejector back interval position 3 +* Par *ejector end position tolerance) and;* - DI ejector is back S39LS switch signal is high
Injection unit is forward	TRUE if: - Calibrated MTS injection unit position <= (Par *injection unit forward interval position 2 +* Par *injection unit end position tolerance)*
Injection unit is back	TRUE if: - Calibrated MTS injection unit position >=

	(Par injection unit back *interval position 2* - Par injection unit *end position tolerance)*
Injection unit is back in auto	TRUE if: - Calibrated MTS injection unit position >= (Par *injection unit back in auto position* - Par *injection unit end position tolerance)*
Injection unit is forward with pressure	TRUE if: - Injection unit is forward and; - AQ 144 is equal to Par *injection unit holding velocity percentage*
Cushion in limits	TRUE if: - Injecting cushion in millimetres >= (Par *injecting expected cushion* – Par *injecting expected cushion tolerance) and;* - Injecting cushion in millimetres <= (Par *injecting expected cushion* + Par *injecting expected cushion tolerance)*
Expected injecting time in tolerance	TRUE if: - Injecting last time >= (Par *injecting expected time* – Par *injecting expected time tolerance) and;* - Injecting last time <= (Par *injecting expected time* + Par *injecting expected time tolerance)*
Recovery total dose reached	TRUE if: - Calibrated MTS injection position >= (Par *recovery back pressure interval position 6* + Par *recovery screw pull back position* – Par *recovery end position tolerance)*

3.9 Euromap67 robot signals

IMM and robot use Euromap 67 standard for movement coordination. Euromap 67 is an Electrical Interface between Injection Moulding Machine and Handling Device / Robot.

3.9.1 Used Euromap 67 signals ROBOT -> IMM

Contact	Signal designation	Description
A6	Enable mould closure	HIGH signal when the handling device / robot is retracted enough for start of mould closure. The signal must remain HIGH at least until "Mould closed" (see table 1: injection moulding machine signals contact No ZA6) is available. If the signal is LOW as a result of a fault, mould closing must be interrupted. The signal "Enable mould closure" must not be a logical "or" with either other signals, e.g. "Close safety guard" or a push button in any operation mode. The signal must be HIGH if the handling device / robot is switched off. It is recommended to have HIGH signal when the handling device / robot is unselected.
B2	Handling device / robot operation mode (operation with handling device / robot)	LOW signal when the handling device / robot mode switch is "Operation with injection moulding machine". HIGH signal when the handling device / robot mode switch is "No operation with injection moulding machine". HIGH signal when the handling device / robot is switched off.
B3	Enable ejector back	HIGH signal when the handling device / robot enables the movement for ejector back. The signal must remain HIGH at least until "Ejector back" signal is given by injection moulding machine (see table 1: injection moulding machine signals contact No ZB3).
B4	Enable ejector forward	HIGH signal when the handling device / robot enables the movement for ejector forward. The signal must remain HIGH at least until "Ejector forward" signal is given by the injection moulding machine (see table 1: injection moulding machine signals contact No ZB4).
B5	Enable movement of core pullers 1 to position 1 (Enable movement for handling device / robot to approach freely)	HIGH signal when the handling device / robot is in position to enable the movement of the core pullers 1 to position 1. It is recommended that the signal remains HIGH at least until "Core pullers 1 in position 1" signal is given by injection moulding machine (see table 1: injection moulding machine signals contact No ZB5). The signal shall remain at least until position 2 has been left. (see table 1: injection moulding machine signals contact No ZB6).
B6	Enable movement of core pullers 1 to position 2 (Enable core pullers 1 to remove the moulding)	HIGH signal when the handling device / robot is in position to enable the movement of the core pullers 1 to position 2. It is recommended that the signal remains HIGH at least until "Core pullers 1 in position 2" signal is given by injection moulding machine (see table 1: injection moulding machine signals contact No ZB6). The signal shall remain at least until position 1 has been left. (see table 1: injection moulding machine signals contact No ZB5).

A3 C3	Mould area free	The switch contact is closed when the handling device / robot is outside the mould area and does not interfere with mould opening and closing movements. The switch contact must be opened when the handling device / robot leaves its start position. If the switch contact is open neither opening nor closing of the mould may occur. However the injection moulding machine may ignore this signal when mould opening is carried out after e.g. an intermediate stop (see table 1: injection moulding machine signals contact No ZA8), if the optional sequence is selected on the injection moulding machine. The signal must have the described effect even when the handling device / robot is switched off. It is recommended to close the switch contact when the handling device / robot is unselected.
A7	Enable full mould opening	HIGH signal when the handling device / robot has taken the part and allows to continue mould opening. The signal must remain HIGH until "Mould open" signal is given by the injection moulding machine (see table 1: injection moulding machine signals contact No ZA7).

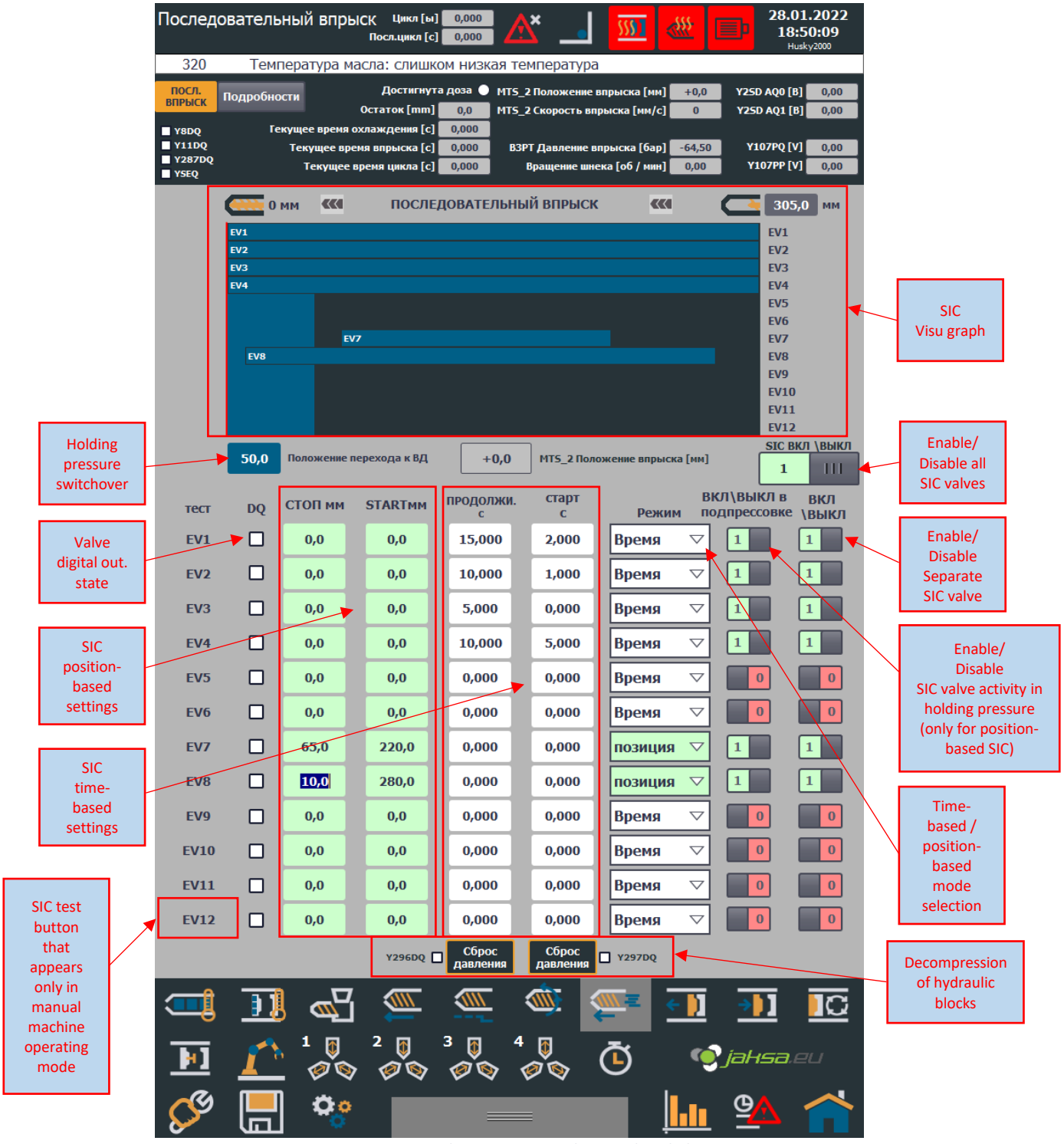
3.9.2 Used Euromap 67 signals IMM -> Robot

Contact	**Signal designation**	**Description** (for detailed states descriptions refer to chapter 3.8)
ZA8	Intermediate mould opening position	HIGH signal if: - Mould NOT open and; - Mould NOT closed and; - Mould clamps NOT locked
ZA7	Mould open position	HIGH signal if: - Mould is open
ZB3	Ejector back position	HIGH signal if: - Ejector is back (retracted)
ZB4	Ejector forward position	HIGH signal if: - Ejector is forward
ZB5	Core pullers 1 in position 1 (Core pullers 1 free for handling device / robot to approach)	HIGH signal if: - All cores are IN
ZB6	Core pullers 1 in position 2 (Core pullers 1 in position to remove moulding)	HIGH signal if: - All cores are OUT
ZA5	Reject	HIGH signal if: - Injecting time not within tolerances or; - Cushion is not within tolerances
ZB2	Enable operation with handling device / robot (Automatic)	HIGH signal if: - Machine operating mode is Automatic or; - Machine operating mode is Semi Automatic
ZA6	Mould closed	HIGH signal if: - Mould is closed or; - Mould clamps are locked

3.10 SIC - Sequential injection control

Sequential injection control controls opening of cascade valves during injection and during holding pressure. There are 12 equivalent SIC valves on the machine. They are located on the hydraulic block on the static platen.

It has 2 operating options (depends on the HMI software): time-based and position-based.
The following screen shows software with both options:



Holding pressure switchover

Valve digital out. state

SIC position-based settings

SIC time-based settings

SIC test button that appears only in manual machine operating mode

SIC Visu graph

Enable/ Disable all SIC valves

Enable/ Disable Separate SIC valve

Enable/ Disable SIC valve activity in holding pressure (only for position-based SIC)

Time-based / position-based mode selection

Decompression of hydraulic blocks

Figure 66:Sequential injection control screen break down

3.10.1 SIC Visu graph

If separate SIC valve is disabled, bar will not be shown on the graph.
If separate SIC valve is in time-based mode, its width will be 100% of SIC visu graph's width.
If separate SIC valve is in position-based mode, its width will be relative to its settings.
If separate SIC valve digital output is on, its graph bar will be painted orange.

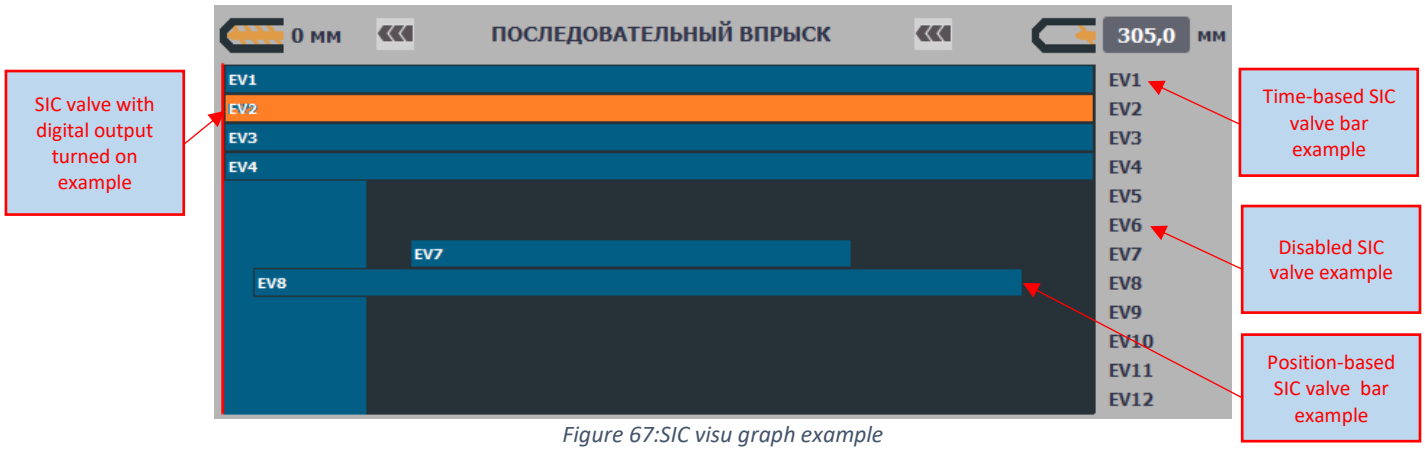


Figure 67:SIC visu graph example

3.10.2 Time-based SIC

- **START** parameter [seconds]: delay which indicates after how many seconds, when injection has started, valve must be turned on.
- **DURATION** parameter [seconds]: indicates for how long the valve has to be turned on

For this mode parameter *Active in holding pressure* does not have any effect.

3.10.3 Position-based SIC

- **START** parameter [millimetres]: position trigger point which indicates when valve turns on relative to Injection MTS calibrated position.
- **STOP** parameter [millimetres]: position trigger point which indicates when valve turns off relative to Injection MTS calibrated position.

STOP parameter value must be lower or equal than START parameter value.

For this mode parameter *Active in holding pressure* has an effect, meaning if this parameter is set to TRUE (1), SIC valve will be turned on during entire duration of holding pressure

3.10.4 SIC Test

In manual machine operating mode, button for SIC valve test will appear, which is useful at initializing new mould to test reliability and functionality of the valves and nozzles in mould.

Holding the button will turn on the valve. Releasing the button will torn off the valve.

3.10.5 SIC – Hydraulic block decompression

Before the mould is being changed, there is recommended a decompression of both hydraulic blocks on static and moving platen including turning off the main SIC valve.

Procedure is as follows:

1. Disable all SIC valves by double tapping **Enable/Disable all SIC valves** button (refer to an image from chapter 3.10) until it turns red with a text 0 on it.
2. Tap and hold button **Decompression of hydraulic block Y296DQ** for 2 seconds
3. Tap and hold button **Decompression of hydraulic block Y297DQ** for 2 seconds

3.11 Cores

Machine has 4 hydraulic core systems. 2 are located on the hydraulic block on the moving platen and 2 are located on the hydraulic block on the static platen. All 4 cores are equivalents. Each core system has its own HMI screen. Each core can move IN (set) or can move OUT (pull).

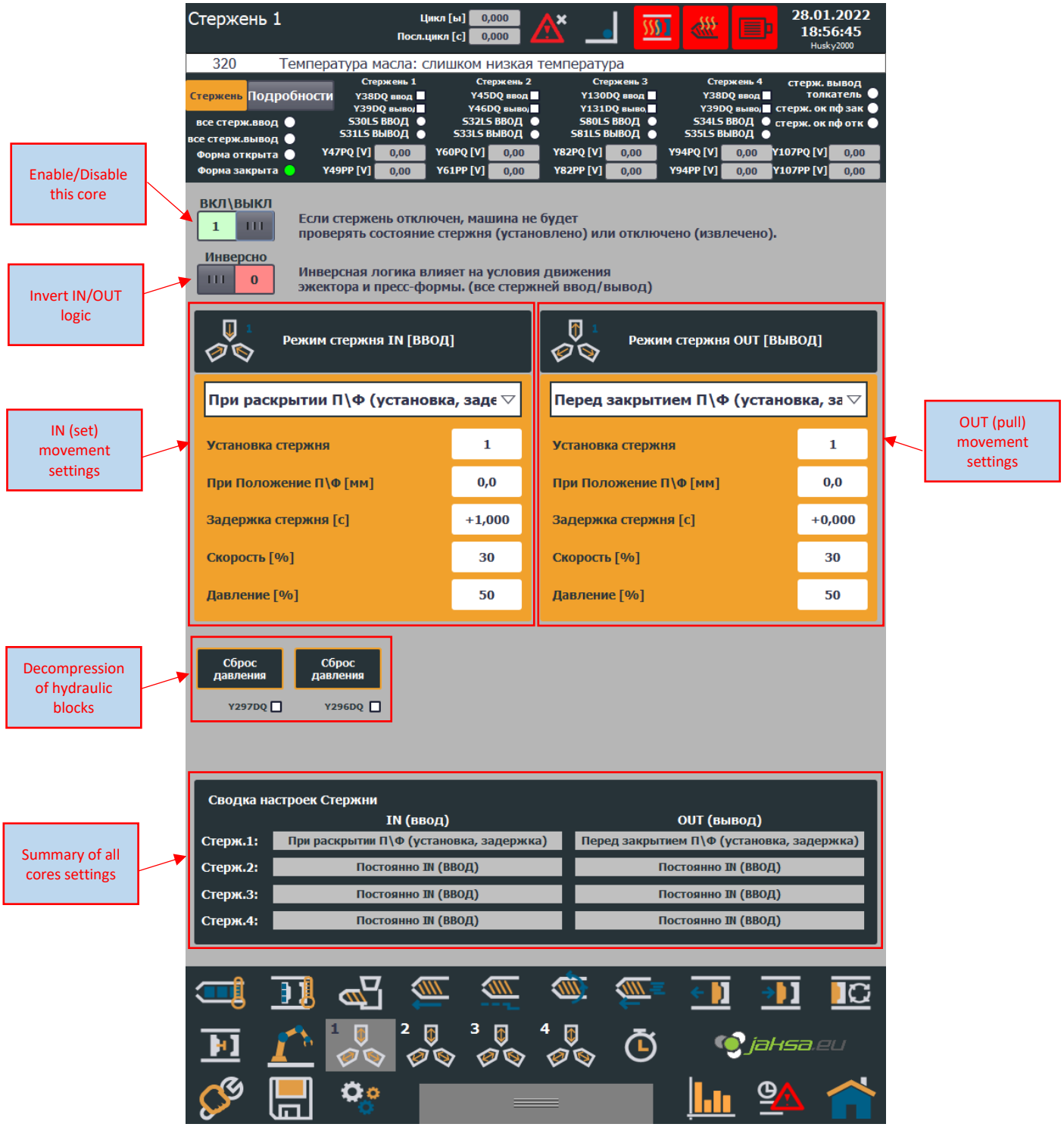


Figure 68:Core HMI screen

3.11.1 Enable/Disable this core

This button enables or disables core from all security checks, and it enables or disables its functionality.

3.11.2 Invert IN/OUT core logic

This button acts as a virtual core connector input/output wire inversion. It shall be used when the actual core behaviour tested through hand controls in manual machine operation mode does not suit the principle of IN/OUT behaviour.

Example:
Mould core gets connected to the machine via a Harting connector. Operator tests the core behaviour and core functions in an inverted way as it is expected. When hand control CORE IN gets pressed, core gets out and when CORE OUT hand control gets pressed, core gets in.
To avoid physical wire change and ruining mould's inter-machine consistency, machine virtually switches the wires for inputs and outputs of this specific core.

3.11.3 Cores – Hydraulic block decompression

Before the mould is being changed, there is recommended a decompression of both hydraulic blocks on static and moving platen.

Procedure is as follows:

1. Tap and hold button **Decompression of hydraulic block Y296DQ** for 2 seconds
2. Tap and hold button **Decompression of hydraulic block Y297DQ** for 2 seconds

3.11.4 Cores settings

1. Core IN/OUT mode:

Mode	Description
Permanently IN	Default core mode. Core does not move in any case.
When mould opens (order, delay)	Core moves IN/OUT at the moment when state Mould is open* is TRUE. Order and delay parameters are considered during this core mode movement.
Before mould closes (order, delay)	Core moves IN/OUT at the moment when state Mould is closed* is TRUE. Order and delay parameters are considered during this core mode movement.
During mould opening (stroke)	Core moves IN/OUT during mould opening movement. Core movement is triggered when Position MTS mould >= Core stroke parameter. Order and delay parameters are not considered during this core mode movement.
During mould closing (stroke)	Core moves IN/OUT during mould closing movement. Core movement is triggered when Position MTS mould <= Core stroke parameter Order and delay parameters are not considered during this core mode movement.
When mould closes with HP (order, delay)	Core moves IN/OUT at the moment when state Mould is closed with high pressure (full tonnage)* is TRUE. Order and delay parameters are considered during this core mode movement.
In active cooling (order, delay)	Core moves IN/OUT at the moment when injecting is finished and machine enters in cooling state. Order and delay parameters are considered during this core mode movement.
Robot (delay)	Core moves IN/OUT when state Mould is open* is TRUE and Euromap 67** signal is active accordingly.

*For states description refer to chapter 3.8 .
**For detailed Euromap 67 description refer to chapter 3.9 .

2. **Core order:**
This parameter applies only to certain core modes.
If there are more cores in the same mode, Core order parameter defines the moving order. If more cores have same order parameter, they move at the same time.

3. **Core stroke:**
This parameter applies only to certain core modes.
It defines at which position should core start its movement.

4. **Core delay:**
This parameter applies only to certain core modes.
It defines a time delay when a core should start its movement after it has been told to do so.

5. **Velocity:**
This parameter applies to all core modes and is mandatory. If parameter is too low or zero, core will not move.
It defines core's proportional valve velocity in percent.

6. **Pressure:**
This parameter applies to all core modes and is mandatory. If parameter is too low or zero, core will not move.
It defines core's proportional valve pressure in percent.

3.11.5 Mould open/close cores conditions – allowed states

Second layer of mould cores safety are settings in mould open and mould close HMI screens.
Operator must manually set those parameters correctly to ensure no core gets broken in the process of opening or closing the mould.

Those parameters are allowed cores states before mould open or close is performed. If those conditions are not fulfilled, mould will not perform movement and Alarm will be reported.

Those parameters are mandatory!

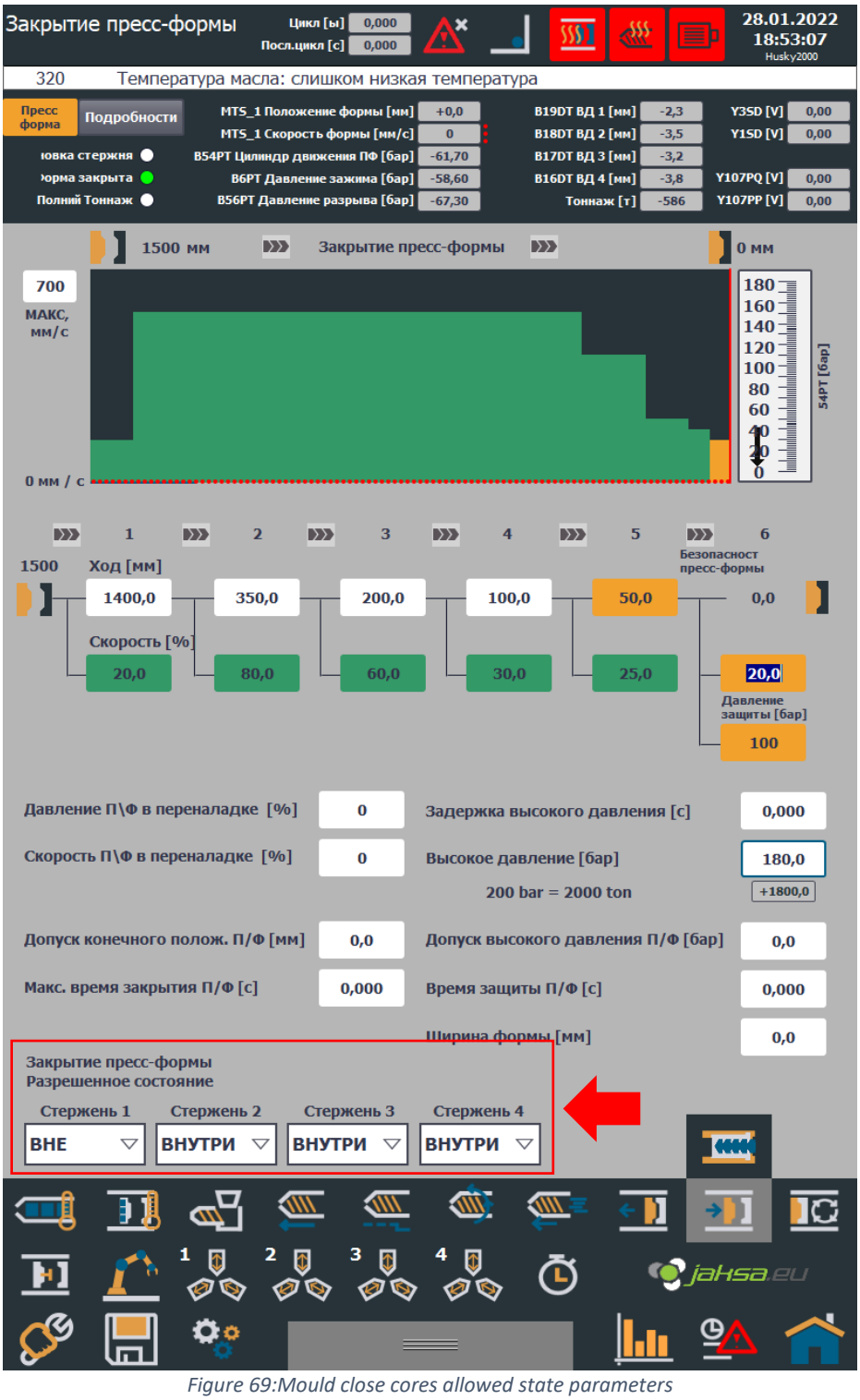


Figure 69:Mould close cores allowed state parameters

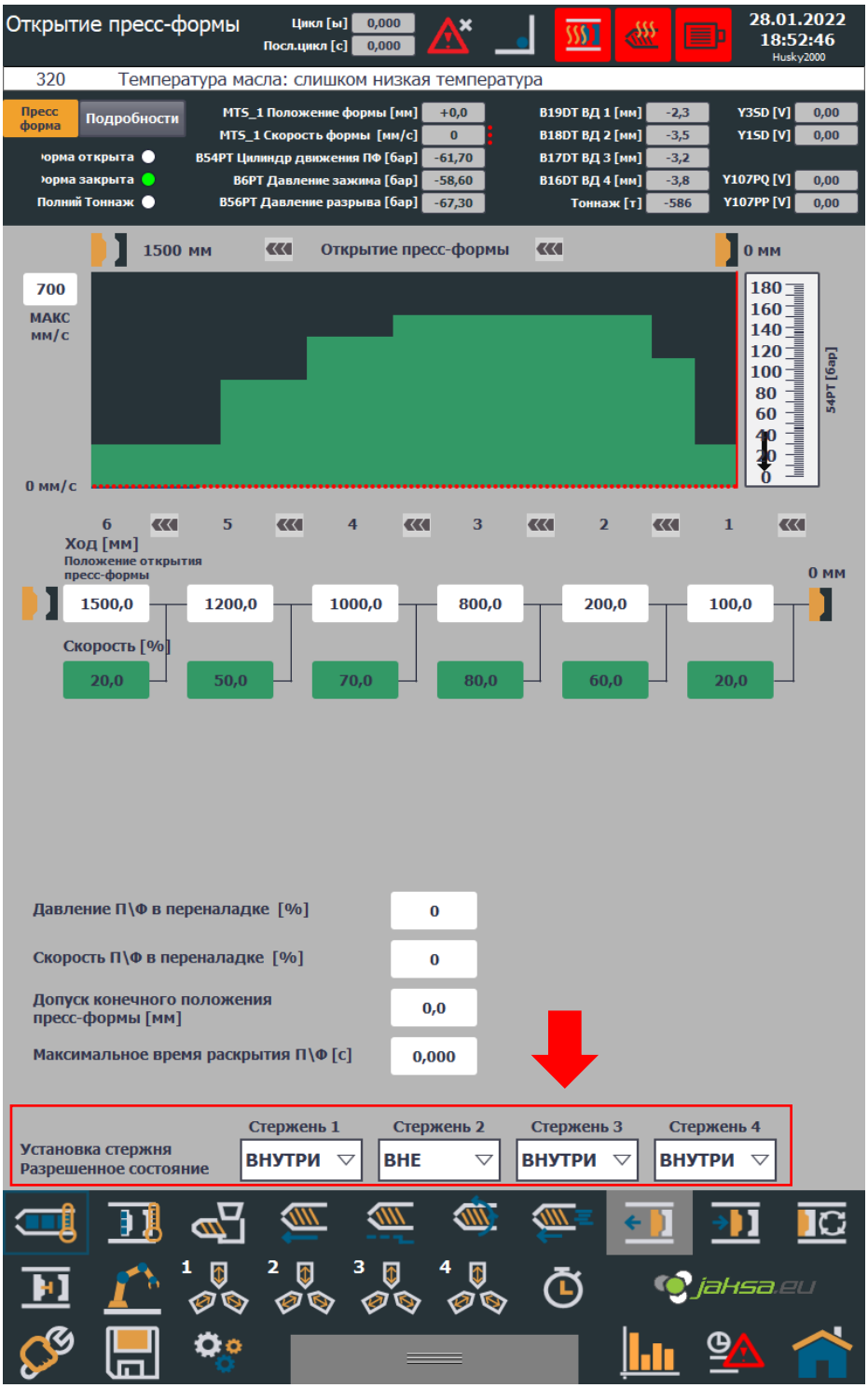


Figure 70:Mould open cores allowed state parameters

3.12 Heating zones and temperatures

Machine has automatically regulated heating zones on mould and extruder. Number of zones depends on the machine.

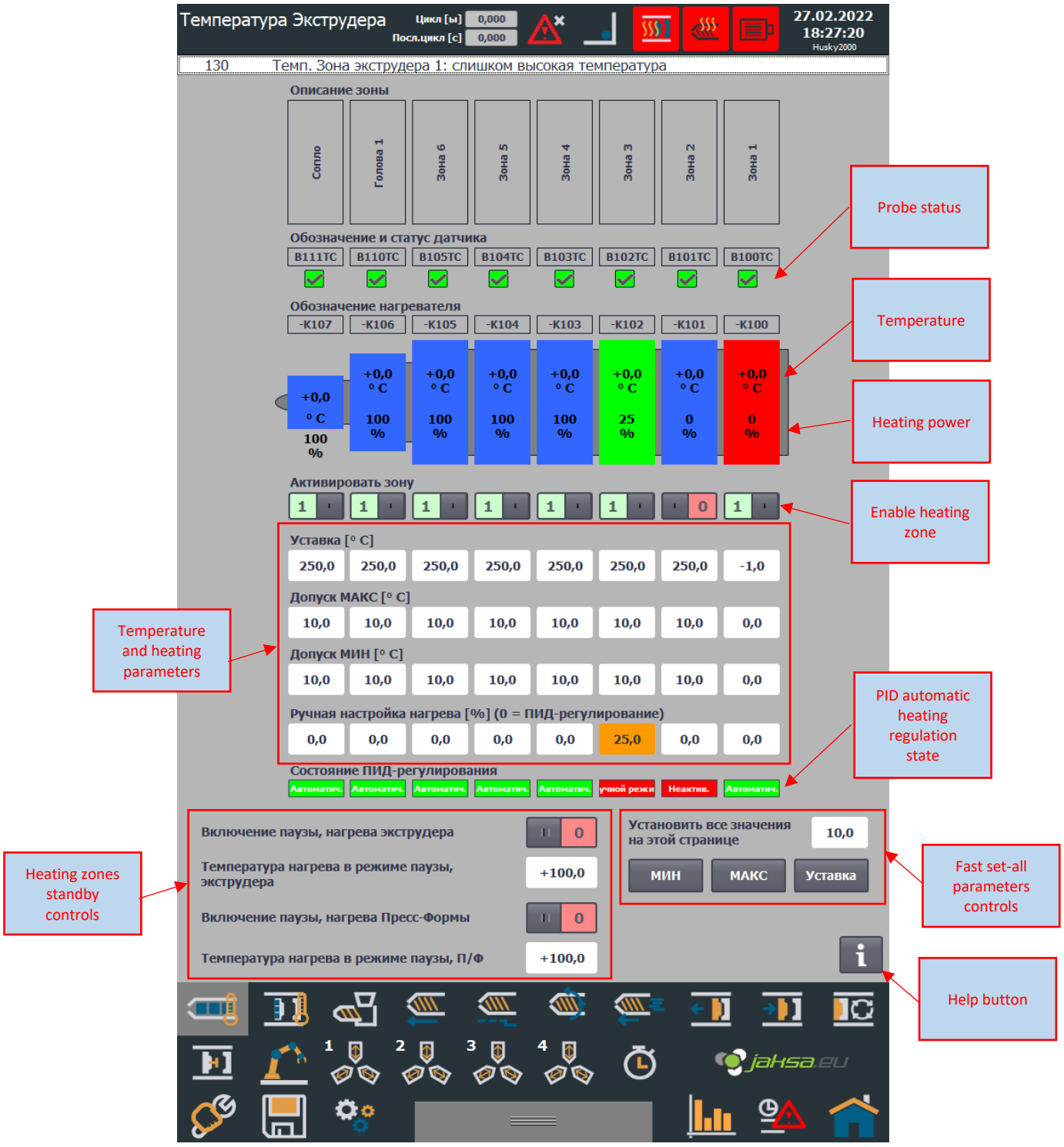


Figure 71:Extruder heating zones HMI screen

3.12.1 Probe status

Green square = STATUS OK
Red square = STATUS NOT OK

3.12.2 Heating power

Heating power is a percentage of a duty cycle of a PID regulator.

Example if a duty cycle is 2 seconds:
0% - heating is off
25% - 0,5 second heating is on, 1,5 seconds heating is off and cycle repeats
50% - 1 second heating is on, 1 second heating is off and cycle repeats
75% - 1,5 seconds heating is on, 0,5 seconds heating is off and cycle repeats
100% - heating is on all the time

3.12.3 Enable heating zone

If heating zone is enabled (double tap on the switch) meaning that its color is green and text shows "1", heating will be performed for this zone and temperature checks will report alarms. Except if heating zone manual setting is not equal zero, then alarms will not be reported.

3.12.4 Setpoint and MIN/MAX tolerances

Setpoint is a desired temperature value. Automatic temperature regulator will maintain temperature around this value.
MIN/MAX tolerances define minimum and maximum tolerance for the temperature to be considered OK.

Example:
Setpoint = 250
Tolerance MAX = 10
Tolerance MIN = 15

Max tolerated temperature = 260 degrees (Setpoint + Tolerance MAX).
Min tolerated temperature = 235 degrees (Setpoint – Tolerance MIN).

Temperature is considered to be ok and will be coloured green if it is between 235 and 260 degrees.
Temperature is considered to be too low and will be coloured blue if it is under 235 degrees.
Temperature is considered to be too high and will be coloured red if it is under over 260 degrees.

3.12.5 Manual heating setting

This setting is usually used if probe is faulty or probe is non existent for this heating zone.
When manual heating setting is not equal to 0 (zero), PID control is ignored. Heaters maintain constant power equal to the setting. No temperature alarms will appear.

3.12.6 PID automatic heating regulation states

State	Description
0	Inactive
1	Pretuning
2	Fine tuning
3	Automatic
4	Manual
5	Substitute output value with error monitoring

3.12.7 Heating zones standby controls

If standby switch is enabled, heating regulation for the zones with automatic regulation settings will regulate all zones around parametrized standby value.

This option is useful for lunch breaks for example.

3.12.8 Fast set-all parameters controls

These settings are shortcut for setting all parameter groups **only for current visible page** at once.

3.12.9 Help button

Help button shows pop-up which contains quick explanation of the current screen.

Figure 72:Temperature HMI screen help pop up

4 Alarms

List of alarms arranged alphabetically according to the description and their possible solutions:

ID	Alarm description	Possible solutions
46	Air pressure not ok	Check air pressure. Open air pressure supply valve.
6	Cores: Ejector not retracted	Cores not setup properly. Retract ejector with hand controls.
5	Cores: Mould not open	Cores not setup properly. Open mould with hand controls.
7	Cores: Mould temperatures not ok	Check mould tolerances. Turn on mould heaters. Wait for temperatures to cool down.
8	Cycle: Automatic cycle stopped due to reached amount of production parts	Restart cycle with Cycle start button in HMI hand controls.
13	Cycle: Cycle time is too long	Increase cycle duration timeout in HMI screen Various Settings. Check why cycle time reached its timeout – usually one of the actions gets stuck.
377	Cycle: Cycle will not start, air pressure not ok	Check air pressure. Open air pressure supply valve.
11	Cycle: Dry cycle is enabled	Disable dry cycle in HMI screen Various Settings.
12	Cycle: Euromap67 prevented cycle to finish mould closing	Check Euromap 67 signals. Turn on robot.
10	Cycle: Euromap67 prevented cycle to finish mould opening	Check Euromap 67 signals. Turn on robot.
385	Diagnostic DQ force is active. Disable DQ force immediately!	Disable DQ force in diagnostics HMI screens.
30	Ejector forward: Emergency stop not ok	Check emergency stop buttons – chapter 3.6.6
29	Ejector forward: Gates open	Close all gates. Reset gates interlock.
31	Ejector forward: Mould not open	Open mould with hand controls.
32	Ejector forward: Not all cores are out (pulled)	Cores not setup properly.
34	Ejector forward: Sequence timeout reached	Check ejector velocity and pressure settings. Check for mechanical obstacles.
26	Ejector retract: Emergency stop not ok	Check emergency stop buttons – chapter 3.6.6
25	Ejector retract: Gates open	Close all gates. Reset gates interlock.
27	Ejector retract: Mould not open	Open mould with hand controls.
23	Ejector retract: Not all cores are out (pulled)	Cores not setup properly.
24	Ejector retract: Sequence timeout reached	Check ejector velocity and pressure settings. Check for mechanical obstacles.
89	Emergency stop triggered!	Check emergency stop buttons – chapter 3.6.6
18	Gates: back door open	Close back door.
380	Gates: front gate interlock active, reset with push button	Reset front gates interlock. – chapter 3.6.1
17	Gates: front gate open	Close front gates.

16	Gates: front gate safety edge triggered	Open front gates.
384	Gates: mould area not free, safety platform triggered	Someone is standing on the safety platforms, this person should leave the safety platform area.
15	Gates: not all gates closed	Close all gates.
381	Gates: rear gate interlock active, reset with push button	Reset rear gates interlock. – chapter 3.6.3
14	Gates: rear gate open	Close rear gates.
322	Heaters protection: heaters contactors off, due to 40 degrees temperature excess	Replace broken SSR. Temperature setpoint or tolerances are not correctly set. Replace broken probe.
39	Holding pressure: Cushion not in tolerance	Check expected cushion and its tolerance setting. Injection is not setup properly.
40	Holding pressure: Temperatures after injection were not ok	Check temperatures settings. Wait for the temperatures to cool down to correct setting. Wait for the temperatures to rise to correct setting.
378	Hopper shut off: Air pressure not ok	Check air pressure. Open air pressure supply valve.
65	Hydraulics motor: Motor breaker off	Turn on motor breaker.
66	Hydraulics motor: Motor overload	Check oil filter. Check hydraulic acumulator.
67	Hydraulics motor: Motor stopped	Turn on hydraulic motor.
41	Hydraulics: CEN safety valve closed	Turn off motor and check CEN safety valve.
43	Hydraulics: Oil collection tank level too high	Drain oil collection tank manually using Various settings HMI screen hand controls.
44	Hydraulics: Oil collection tank level too low	/
45	Hydraulics: Oil tank level not ok	Add hydraulic oil to machine's main hydraulic oil tank
42	Hydraulics: Oil warming active	Wait for oil warming to reach its working temperature.
47	Hydraulics: Pressure filter clogged	Check oil filter. Replace oil filter.
382	Hydraulics: Pump controller 1 error	Check Rexroth pump controller in electrical cabinet.
383	Hydraulics: Pump controller 2 error	Check Rexroth pump controller in electrical cabinet.
398	Hydraulics: Pump controller 3 error	Check Rexroth pump controller in electrical cabinet.
399	Hydraulics: Pump controller 4 error	Check Rexroth pump controller in electrical cabinet.
57	Inj. Unit Back: Gates open	Close all gates. Reset gates interlock.
58	Inj. Unit Back: Inj. Unit not in place	/

56	Inj. Unit Back: Movement timeout	Check injection unit velocity and pressure settings. Check for mechanical obstacles.
60	Inj. Unit Forward: Gates open	Close all gates. Reset gates interlock.
64	Inj. Unit Forward: Inj. Unit not in place	/
62	Inj. Unit Forward: Mould not closed with high pressure	Close mould with high pressure (full tonnage)
61	Inj. Unit Forward: Movement timeout	Check injection unit velocity and pressure settings. Check for mechanical obstacles.
49	Injection: Auto cycle: Injection unit does not hold pressure against the mould	Check injection unit parameter: Injection unit holding pressure on mould
55	Injection: Auto cycle: Total dose not reached	Switch to manual machine operating mode and reach recovery dose manually using HMI hand controls. Restart auto cycle afterwards.
53	Injection: Entire injection sequence timeout reached	Check injection velocity and pressure settings. Check for mechanical obstacles.
54	Injection: Gates open	Close all gates. Reset gates interlock.
52	Injection: Injection time not in tolerance	Check injection settings. Check expected injection time ind tolerance parameters.
48	Injection: Injection time too long	Check injection unit velocity and pressure settings.
3	Injection: Mould temperatures not ok for sequential injection control	Check temperatures settings. Wait for the temperatures to cool down to correct setting. Wait for the temperatures to rise to correct setting.
51	Injection: Temperatures not ok	Check temperatures settings. Wait for the temperatures to cool down to correct setting. Wait for the temperatures to rise to correct setting.
379	Lubrication: Air pressure not ok	Check air pressure. Open air pressure supply valve.
91	Lubrication: Grease did not reach sensor on mould mov.	Check lubrication system pipes. Replace lubrication sensors.
90	Lubrication: Grease level low	Add grease into lubrication tank.
393	Mould clamp backwards calibration: Mould clamped	Switch to manual machine operating mode. Unclamp mould clamps using HMI hand controls button Mould clamp backward.
394	Mould clamp backwards: Clamp positioning failed. In this step all pistons should be in tolerance.	Switch to calibration machine operating mode and use HMI hand controls button Mould clamp forward until all clamps stop. Switch to manual machine operating mode and hold button Mould clamp backward.
392	Mould clamp backwards: Emergency stop not ok	Check emergency stop buttons – chapter 3.6.6

391	Mould clamp backwards: Gates open	Close all gates. Reset gates interlock.
390	Mould clamp backwards: Sequence timeout reached	Check mould clamp velocity and pressure settings. Check for mechanical obstacles.
1	Mould clamp calibration: Clamps not correctly calibrated	Check mould clamp velocity and pressure settings. Switch to calibration machine operating mode and use HMI hand controls button Mould clamp forward until all clamps stop. Switch to manual machine operating mode and hold button Mould clamp backward.
389	Mould clamp forward calibration: Mould clamped	Switch to manual machine operating mode. Unclamp mould clamps using HMI hand controls button Mould clamp backward.
388	Mould clamp forward: Emergency stop not ok	Check emergency stop buttons – chapter 3.6.6
387	Mould clamp forward: Gates open	Close all gates. Reset gates interlock.
2	Mould clamp forward: Mould not closed	Close mould using HMI hand controls.
397	Mould clamp forward: Mould too thin. Min limit for clamping exceeded.	You cannot use this mould on this machine. Use wider mould.
396	Mould clamp forward: Mould too wide. Max limit for clamping exceeded.	You cannot use this mould on this machine. Use thinner mould.
395	Mould clamp forward: Not all clamp cylinders are in position tolerance	Repeat calibration of mould clamp cylinders.
386	Mould clamp forward: Sequence timeout reached	Check mould clamp velocity and pressure settings. Check for mechanical obstacles.
77	Mould close calibration: Not all cores are set (in)	Cores not setup properly.
81	Mould close: Core switches are not functioning properly	Core switches report double states, check end switches of cores.
76	Mould close: Ejector not retracted	Retract ejector with hand controls.
80	Mould close: Emergency stop not ok	Check emergency stop buttons – chapter 3.6.6
74	Mould close: Euromap67 - Mould area free = FALSE	Check Euromap 67 signals from robot. Robot prevents machine from closing the mould
79	Mould close: Gates open	Close all gates. Reset gates interlock.
75	Mould close: Mould clamped	Switch to manual machine operating mode. Unclamp mould clamps using HMI hand controls button Mould clamp backward.
78	Mould close: Mould protection timeout reached	A mechanical piece prevents mould from closing. Open mould manually and remove the obstacle.
71	Mould close: Not all cores are ok for mould close	Cores allowed states are not setup properly. Check chapter 3.11.5.
69	Mould close: Sequence timeout reached	Check mould close velocity and pressure settings. Check for mechanical obstacles.

83	Mould open: Core switches are not functioning properly	Core switches report double states, check end switches of cores.
87	Mould open: Emergency stop not ok	Check emergency stop buttons – chapter 3.6.6
84	Mould open: Euromap67 - Mould area free = FALSE	Check Euromap 67 signals from robot. Robot prevents machine from opening the mould
88	Mould open: Gates open	Close all gates. Reset gates interlock.
82	Mould open: Mechanical movement limit is reached	Stop opening the mould. Mould can only close on this point.
86	Mould open: Mould clamped	Switch to manual machine operating mode. Unclamp mould clamps using HMI hand controls button Mould clamp backward.
4	Mould open: Not all cores are ok for mould open	Cores allowed states are not setup properly. Check chapter 3.11.5.
85	Mould open: Sequence timeout reached	Check mould open velocity and pressure settings. Check for mechanical obstacles.
92	Mould: Mould width not within the limits	Mould width setting is not within machine physical limitations. Refer to step 2 in QMC Mould Load procedure. Choose different setting.
321	Oil Temperature: probe error	Replace oil temperature probe.
319	Oil Temperature: temperature too high	Wait for oil to cool down.
320	Oil Temperature: temperature too low	Wait for oil to warm up.
97	Profinet: Communication error MTS_1	Check communication and power supply wiring. Call maintenance department.
98	Profinet: Communication error MTS_2	Check communication and power supply wiring. Call maintenance department.
99	Profinet: Communication error MTS_3	Check communication and power supply wiring. Call maintenance department.
96	Profinet: Communication error RIO_1	Check communication and power supply wiring. Call maintenance department.
100	Profinet: Communication error RIO_1.5	Check communication and power supply wiring. Call maintenance department.
101	Profinet: Communication error RIO_1.6	Check communication and power supply wiring. Call maintenance department.
95	Profinet: Communication error RIO_2	Check communication and power supply wiring. Call maintenance department.
93	Profinet: Communication error RIO_3	Check communication and power supply wiring. Call maintenance department.
94	Profinet: Communication error RIO_4	Check communication and power supply wiring. Call maintenance department.
400	QMC not all clamped! Only calibration possible.	Enter Mould load HMI screen and follow the procedure.
20	Recovery: Gates open	Close all gates. Reset gates interlock.
21	Recovery: Sequence timeout reached	Check recovery velocity and pressure settings.
19	Recovery: Temperatures not ok	Check temperatures settings. Wait for the temperatures to cool down to correct setting.

		Wait for the temperatures to rise to correct setting.
102	Robot: Error	Check robot.
123	Sensor A124: Pump actual pressure value analog input overflow	Check sensor wiring. Replace sensor.
124	Sensor A124: Pump actual pressure value analog input underflow	Check sensor wiring. Replace sensor.
125	Sensor A124: Pump actual swivel angle value analog input overflow	Check sensor wiring. Replace sensor.
126	Sensor A124: Pump actual swivel angle value analog input underflow	Check sensor wiring. Replace sensor.
108	Sensor B16DT: Mould clamp cylinder 4 position analog input overflow	Check sensor wiring. Replace sensor.
103	Sensor B16DT: Mould clamp cylinder 4 position analog input underflow	Check sensor wiring. Replace sensor.
110	Sensor B17DT: Mould clamp cylinder 3 position analog input overflow	Check sensor wiring. Replace sensor.
109	Sensor B17DT: Mould clamp cylinder 3 position analog input underflow	Check sensor wiring. Replace sensor.
112	Sensor B18DT: Mould clamp cylinder 2 position analog input overflow	Check sensor wiring. Replace sensor.
111	Sensor B18DT: Mould clamp cylinder 2 position analog input underflow	Check sensor wiring. Replace sensor.
106	Sensor B19DT: Mould clamp cylinder 1 position analog input overflow	Check sensor wiring. Replace sensor.
113	Sensor B19DT: Mould clamp cylinder 1 position analog input underflow	Check sensor wiring. Replace sensor.
116	Sensor B3PT: Injection pressure analog input overflow	Check sensor wiring. Replace sensor.
105	Sensor B3PT: Injection pressure analog input underflow	Check sensor wiring. Replace sensor.
104	Sensor B54PT: Mould stroke cylinder rod side pressure analog input overflow	Check sensor wiring. Replace sensor.
114	Sensor B54PT: Mould stroke cylinder rod side pressure analog input underflow	Check sensor wiring. Replace sensor.
107	Sensor B56PT: Mould break pressure analog input overflow	Check sensor wiring. Replace sensor.
115	Sensor B56PT: Mould break pressure analog input underflow	Check sensor wiring. Replace sensor.
117	Sensor B6PT: Mould clamp pressure analog input overflow	Check sensor wiring. Replace sensor.
118	Sensor B6PT: Mould clamp pressure analog input underflow	Check sensor wiring. Replace sensor.
119	Sensor MTS_1: Number of magnets detected is lower than parametrized	One or more magnets do not work properly. Check distance between measuring rod and magnets.
120	Sensor MTS_2: Number of magnets detected is lower than parametrized	One or more magnets do not work properly. Check distance between measuring rod and magnets.

121	Sensor MTS_3: Number of magnets detected is lower than parametrized	One or more magnets do not work properly. Check distance between measuring rod and magnets.
147	Temp. Zone Barrel Head: probe error	Check probe wiring. Replace probe.
146	Temp. Zone Barrel Head: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
143	Temp. Zone Barrel Head: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
131	Temp. Zone Extruder 1: probe error	Check probe wiring. Replace probe.
130	Temp. Zone Extruder 1: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
129	Temp. Zone Extruder 1: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
127	Temp. Zone Extruder 2: probe error	Check probe wiring. Replace probe.
140	Temp. Zone Extruder 2: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
133	Temp. Zone Extruder 2: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
138	Temp. Zone Extruder 3: probe error	Check probe wiring. Replace probe.
128	Temp. Zone Extruder 3: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
141	Temp. Zone Extruder 3: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
132	Temp. Zone Extruder 4: probe error	Check probe wiring. Replace probe.
137	Temp. Zone Extruder 4: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
136	Temp. Zone Extruder 4: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
134	Temp. Zone Extruder 5: probe error	Check probe wiring. Replace probe.
139	Temp. Zone Extruder 5: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
135	Temp. Zone Extruder 5: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
151	Temp. Zone Extruder 6: probe error	Check probe wiring. Replace probe.
156	Temp. Zone Extruder 6: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
155	Temp. Zone Extruder 6: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
150	Temp. Zone Extruder 7: probe error	Check probe wiring. Replace probe.
145	Temp. Zone Extruder 7: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.

142	Temp. Zone Extruder 7: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
144	Temp. Zone Extruder 8: probe error	Check probe wiring. Replace probe.
154	Temp. Zone Extruder 8: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
153	Temp. Zone Extruder 8: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
X	Temp. Zone Mould Heat X: probe error	Check probe wiring. Replace probe.
X	Temp. Zone Mould Heat X: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
X	Temp. Zone Mould Heat X: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
X	Temp. Zone Mould Surface STP X: probe error	Check probe wiring. Replace probe.
X	Temp. Zone Mould Surface STP X: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
X	Temp. Zone Mould Surface STP X: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
157	Temp. Zone Nozzle Adapter: probe error	Check probe wiring. Replace probe.
159	Temp. Zone Nozzle Adapter: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
158	Temp. Zone Nozzle Adapter: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.
152	Temp. Zone Shut Off Head: probe error	Check probe wiring. Replace probe.
148	Temp. Zone Shut Off Head: temperature too high	Wait for heating zone to cool down. Adjust tolerance or setpoint parameter.
149	Temp. Zone Shut Off Head: temperature too low	Wait for heating zone to warm up. Adjust tolerance or setpoint parameter.