User manual

Compressor Controller

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1. General information



Figure 1: Controller visualization

1.1. Controller description

Controller dedicated for compressors with a power of up to 500 kW. The controller can work with compressors operating in a star-delta configuration or equipped with an inverter.

Controller features:

- 4.3" touchscreen display
- Built-in web server
- · Charts of the most important compressor operation parameters and creating statistics
- Supervision function: network pressure, oil pressure, oil temperature, motor, air, motor power consumption and dew point
- · Control of oil heaters, air dryer and condensate drain
- Freely configurable controller input and output
- Automatic operation restart function
- Inverter control using the Modbus RTU protocol (selection of standard Yaskawa, Danfoss and Delta inverter)
- Star-delta or direct start-up (for compressors without inverter)
- Analog inverter control
- · Service parameters and user with access control menu
- · Service counters and working time counters
- Network operation mode supporting up to 6 compressors

- Remote operation mode (using digital input)
- Operation scheduling with a division into cyclical and one time events, up to 28 events in total
- Software update via USB port

1.2. Input and output list

- The controller is equipped with 4 RTD inputs to support resistive temperature sensors and has the possibility of independent configuration of each input to a selected sensor (PT100, PT1000, KTY84, PTC). Thanks to the RTD temperature inputs, the controller can control the following parameters:
 - Oil temperature
 - Motor temperature
 - Compressor outlet air temperature
 - Ambient temperature
- 2. The controller is equipped with 3 analog inputs to support 4-20 mA sensors. The measuring range can be configured from the controller. Supported parameters:
 - Network pressure
 - Oil pressure
 - Dewpoint sensor
- 3. The controller is equipped with 1 analog input to operate a 5 A standard current transformer. The primary winding current can be freely configured from the controller level.
- 4. The controller is equipped with 8 digital inputs to support sensors or binary signals with the possibility of configuring the default logic (normally open/normally closed) for each input independently. Supported sensors or signals:
 - Suction sensor
 - Dryer ready
 - Remote start-stop
 - Remote load-unload signal
 - Ready status
 - Emergency stop
 - Power supply asymmetry
 - Phase sequence error signal
 - Overload relay error signal
 - Air filter error signal
 - Oil filter error signal
 - Separator error signal
 - Fan error signal
 - Inverter error signal
- 5. The controller is equipped with 9 configurable digital (relay) outputs, including:

- 4 outputs with common potential
- 4 outputs with independent potential
- 1 NO/NC output with independent potential

Functions that can be configured on each of the outputs:

- Main power supply
- Star
- Delta
- Y valve
- Condensate drain
- Inverter start-stop signal
- Fan
- Dryer
- Heater 1
- Heater 2
- Warning
- Error
- Warning/error status
- Ready
- Running
- Compressing
- Service
- High dew point warning
- Low dew point warning
- 6. The controller is equipped with 2 USB sockets and 1 Ethernet socket

1.3. Language versions

Controller has 4 language versions:

- Polish
- English
- German
- Russian

It is possible to develop other language versions in consultation with the compressor manufacturer or distributor.

2. Safety information



Before controller installation and start, refer to the user's manual and warranty terms and conditions. Incorrect installation and operation not in line with the manual will void the warranty.



All connection and assembly work must be carried out with the power supply disconnected.



Installation work should be carried out by an authorized service provider or authorized personnel.



To comply with safety standards, the PE terminal of the controller should be connected to the PE protective conductor.



Any use or operation of the controller without the housing installed is not allowed, as this poses a risk of electric shock.



Exposing the controller to water or operating in conditions of excessive humidity may cause damage.



Before starting, check that all connections are correct, according to the connection diagram in the user's manual.



Before starting the controller, check that the power supply meets the requirements specified in the user's manual.



Repairs must only be carried out by the manufacturer's service. Repairs carried out by an unauthorized person will make the warranty null and void.

3. Description of connectors



Figure 2: Electrical outlets of the controller (housing rear wall)



Figure 3: Controller communication connectors (housing side wall)

Table 1: Description of digital outputs (DIGITAL OUTPUTS)

Name	Description
COM 1-4	Common output of relay outputs from 1 to 4

Name	Description
REL1	Configurable relay output 1
REL2	Configurable relay output 2
REL3	Configurable relay output 3
REL4	Configurable relay output 4
REL5	Two outputs of the configurable relay 5
REL6	Two outputs of the configurable relay 6
REL7	Two outputs of the configurable relay 7
REL8	Two outputs of the configurable relay 8
REL9 NC	N/C contact (normally closed) of relay 9
REL9 COM	Configurable relay output 9
REL9 NO	N/O contact (normally open) of relay 9

Table 1: Description of digital outputs (DIGITAL OUTPUTS)

Table 2: Description of digital inputs (DIGITAL INPUTS)

Name	Description
+24V	Internal reference voltage output
DI1	Configurable digital input 1
DI2	Configurable digital input 2
DI3	Configurable digital input 3
DI4	Configurable digital input 4
DI5	Configurable digital input 5
DI6	Configurable digital input 6
DI7	Configurable digital input 7
D18	Configurable digital input 8

Table 3: Description of RS-485 connector leads

Name	Description
A	RS-485 interface non-reversing line
В	RS-485 interface reversing line
GND	RS-485 interface ground

Table 4: Description of RS-485 ISO connector leads

Name	Description
GND	Isolated RS-485 interface ground
В	Isolated RS-485 interface reversing line
A	Isolated RS-485 interface non-reversing line

Table 5: Description of power outlets (POWER)

Name	Description
PE	PE Connector
VAC	Controller supply voltage (24 VAC)
VAC	Controller supply voltage (24 VAC)

Table 6: Description of analog outputs (ANALOG OUTPUTS)

Name	Description
GND	Analog output 1 ground
A01	Analog output 1
GND	Analog output 2 ground
AO2	Analog output 2

Table 7: Description of analog inputs (ANALOG INPUTS)

Name	Description
+24V	24 VDC power output
+24V	Analog input 1 power supply
All	Analog input 1
+24V	Analog input 2 power supply
AI2	Analog input 2
+24V	Analog input 3 power supply
AI3	Analog input 3
GND	MC1 analog input ground
MC1	Motor current measurement MC1 analog input
GND	Ground terminal

Table 8: Description of RTD analog inputs (TEMPERATURE INPUTS)

Name	Description
GND	Resistive temperature sensor 1 ground
RTD1	Resistive temperature sensor input 1
GND	Resistive temperature sensor 2 ground
RTD2	Resistive temperature sensor input 2
GND	Resistive temperature sensor 3 ground
RTD3	Resistive temperature sensor input 3
GND	Resistive temperature sensor 4 ground
RTD4	Resistive temperature sensor input 4

Table 9: Description of communication outputs

Name	Description
USB 1	USB port
USB 2	USB port
ETH	Ethernet port (RJ45)

The controller is equipped with a housing ground terminal, which is located under one of the housing screws.

4. User interface

4.1. Controller front

The front panel contains:

- 2 buttons ("START", "STOP")
- 2 LEDs indicating the compressor status
- A touchscreen displaying the graphical user interface



Figure 4: Controller front panel

Table 10: Description of LED signals

LED	Colour	LED signal		
START	Green	Continuous - the motor is running (compression, idle)		
		Pulse - the motor is starting		
STOP	Red	Continuous - the motor is stopped		
		Pulse - the compressor is stopping or waiting for pressure drop		

Table 11: Description of buttons

Button	Function
START	Starts the compressor
STOP	Stops the compressor

5. Graphical user interface

5.1. Main view



Figure 5: Main view divided into sections

Description of each section:

- 1. Network pressure, pressure settings and bargraph
- 2. Main menu icon
- 3. Active errors and warning icons
- 4. Current compressor status icon
- 5. Operation scheduling icon (calendar operations)
- 6. Network operation icon
- 7. Current date and time
- 8. Compressor status text message field
- 9. Basic compressor operation parameters display field

The individual elements of the main view in the controller are also shortcuts to other sections of the graphical user interface. To use them, click on the icon on the screen.

Main view items and sections lead to:

- Network pressure indicator network pressure chart
- · Pressure setting network pressure setting
- Operation scheduling icon operation scheduling menu
- · Current date and time date and time settings
- Network operation icon network operation view (only if a controller is operating as a master controller)

5.2. Compressor status icon

The status icon visible in the sidebar of the user interface displays the current compressor status.



5.3. Error and warning icons

Error and warning icons indicate errors and warnings that are currently occurring in the controller, or have occurred in the past. They may have different visual representations, depending on their location in the graphical user interface.



5.4. Bargraph

The bargraph available in the main view of the graphical user interface informs about the speed of pressure changes in the network.

Information about the rate of pressure increase or decrease in the network is displayed in the form of coloured rectangles in the area of the bargraph bar. The more rectangles are displayed, the higher the rate of change. In the event of pressure increase, the rectangles are green, and in the event of pressure decrease, they are red.

Bargraph sensitivity can be adjusted (User Preferences \rightarrow Display \rightarrow Bargraph sensitivity) in the range of 0.02-0.3 bar/s, this value is represented by a single rectangle, e.g., for a set sensitivity of 0.3 bar/s, 3 full green rectangles will denote 0.9 bar/s, as shown in the figure below.

5.5. Navigating the graphical user interface

The graphical user interface is operated through a touch screen. The basic principles of graphical user interface navigation are described below. More detailed descriptions can be found in chapters dedicated to individual functions.

5.5.1. Navigating the main view

From the main view, you can go to the "Active warnings and errors" tab by clicking the motor or error/warning icon. To return to the main view, click the "Close" button.

	Active warning and errors
	⚠ Oil filter fault [OF]
\otimes	Short circuit of oil temperature sensor Emergency stop
\triangle	 Thermal overload fault Fan fault
Þ	
0.5 bar	Confirm events Close

Figure 6: "Active warnings and errors" tab

The list icon in the upper left corner of the screen opens the main menu of the controller. When the main menu opens, the list icon is replaced with an icon that allows you to return to the previous tab. This mechanism applies to the entire interface.



Figure 7: Main menu icon

The main menu of the controller contains icons of all available subtabs, at the same time allowing the user to continuously preview the selected parameters of the main view. Icons that allow you to navigate to individual subtabs also appear in other places of the user interface, also in the form of rectangular tiles with a description.



Figure 8: Controller main menu

5.5.2. Basic menu types

he user interface has 2 basic types of menus (tabs). They differ in the way they can be viewed. Navigating the subpages of the first menu can be done using the arrows displayed on the controller screen. Depending on the number of icons displayed, the arrows may be at the bottom or right side of the screen. The number of the currently viewed page and the total number of pages is displayed between the arrows. E.g. 2/3 means that subpage 2 of 3 is being displayed. A scroll list is the second type of menu. On the right side of the screen you will see a white scroll bar with a blue thumb representing the currently viewed list item. The size of the blue thumb corresponds to the size of the list. The smaller the blue thumb, the longer the list. While keeping your finger on the screen, swipe up or down to scroll the list. The faster you move your finger, the more rows will be scrolled. It is also possible to scroll the list using the blue thumb. Click an area on the scroll bar to go to the corresponding place on the list.



Figure 9: Sample navigation arrows menu (left) and scroll list (right)

5.5.3. Sidebar

A rectangular bar on the left side of the screen is always displayed in the graphical user interface. The motor icon visible on the sidebar displays the status of the compressor and allows you to go to the active errors and warnings tab, without having to go back to the main view. The menu icon, interchangeably with the return icon, allows you to navigate the graphical user interface. The sidebar displays the current pressure in the network, also when the user is not in the main view. Current controller errors and warnings are displayed as icons on the sidebar.



Figure 10: Sidebar with network pressure and error and warning icons

5.5.4. Login screen

Some elements of the interface require user or service authorization. To this end, select the appropriate access level icon, and then enter the password and confirm by clicking the "LOGIN" button. The entered password is masked and appears as dots. The eye icon on the right allows you to show the entered password. The password will be previewed as long as the icon is pressed.



Figure 11: Selecting access level

<	Password for user		1	2	3
		0	4	5	6
A			7	8	9
6.5	LOGIN		•	0	\bigotimes

Figure 12: Authorisation screens

5.5.5. Configuring parameters

The graphical user interface stores parameters in subgroups, which are displayed in the form of tiles with descriptions. To move to the selected subgroup, press the corresponding tile.

<	Operation Parameters	
	Operation modes	
	Pressure	1/3
	Control timings	
7.4	Drain	

Figure 13: Tiles with parameter subgroups for operation parameters

After moving to the selected subgroup, the parameters will be displayed in the form of tiles with the name of the parameter and its current value (in the blue field at the right end of the tile). To edit a parameter, click on the field with its value.



Figure 14: Parameter tiles of a network operation configuration parameters subgroup

The configuration of a selected parameter, depending on its type, is done by entering a value from the on-screen keyboard or by selecting an value from a predefined drop-down list. The on-screen keyboard may vary depending on the parameter being edited, and entering negative values is possible in some instances (use the negative symbol to enter negative values). After entering the new parameter value, confirm your choice by clicking the "SAVE" button. The allowed parameter range is displayed below the parameter value field. To cancel a change, click the return icon and the new value will be discarded.



Figure 15: On-screen keyboard for motor start minimum oil temperature

The second method of editing parameters is selecting a value from the drop-down list. The dropdown lists are divided into basic and advanced. The basic ones offer a choice between two values, e.g. "Enable" and "Disable". The currently selected value is marked with a blue frame and a darker background colour. The advanced list offers several values and can have its own subpages. The currently selected value is marked with a blue frame and a square tick icon. To exit the basic or advanced value editing mode, select a value or click anywhere on the dimmed user interface.



Figure 16: Example of a basic list (left) and an advanced list (right)

5.5.6. Screen messages

SThe controller displays messages addressed to the user in the upper right corner of the screen, in the form of a message windows. You can close the message window by clicking anywhere on the screen. The messages help the user and inform, for example, about entering an incorrect password or software update progress. Messages are not archived in the controller's memory.

<	Digital input 1	Too low permission to change this parameter				
	Digital input 2	NC	Thermal overload			
	Digital input 3	NO	Free			
Ð	Digital input 4	NO	Free			
7.6 bar		←	1/2 ->			

Figure 17: Example of a screen message

5.6. Main menu

To go to the main menu, click on its icon which can be found on the main view. From there is then possible to select the available sub-tabs.

List of sub-tabs:

- Parameter menu
- Search parameter
- Information
- Sensors
- Counters
- Events
- Statistics



Figure 18: Main menu

5.6.1. Search parameter

The "Search parameter" tab allows you to go to a specific parameter or group of parameters by entering its number in the search engine.

<	Parameter number	1	2	3
		4	5	6
	User	7	8	9
9.8	SHOW		0	\bigotimes

Figure 19: User parameter search menu

No.	Parameter
1	Operation scheduling
2	Service counters
3	Language
4	Network operation ON/OFF
5	Rotation time of pressure limits during operation
6	Controller information
7 and 18	Event list preview
8 and 25	RS-485 settings
11	Time settings
12	Date settings
15	Run time after exceeding the upper pressure setting, after
	which the compressor goes into standby
18	Event list preview
25	RS-485 settings
26	Network operation algorithm selection
27	Network operation menu
28	Network operation menu
30	Dryer settings
40	Condensate drain settings
51	Display brightness and screen saver settings
61	Enable automatic idle timing
90	Controller auto restart settings
111	Restore user settings
423	User password setting
500	Safety valve test

Table 14: User pa	rameter numbers
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5.6.2. Information

The "Information" tab contains basic data about the compressor and the controller. Here you will also find the button which initiates the controller software update procedure.

List of data stored in the information tab:

- Software version
- Compressor serial number
- Controller serial number
- Compressor manufacturer information
- Compressor start-up method
- Controller IP address
- Controller MAC address



Figure 20: Information tab

5.6.3. Sensors

In the "Sensors" tab, a preview of the current values of measurements made by the controller and read from the inverter is available. The preview is only available for active sensors, configured in the input and output parameters. Each value is displayed in a given unit, except for motor temperature for the PTC sensor (in this case, the user can read the correct temperature marked with the " \checkmark ", symbol, or the incorrect temperature marked with "X").

List of values in the sensors tab:

- · Network pressure
- Oil pressure
- Oil temperature

- Motor temperature
- Air temperature
- Ambient temperature
- Motor current
- Motor power
- · Dew point
- Output frequency



Figure 21: Sensor menu 1 / 2.

5.6.4. Counters

The "Meters" tab allows you to view the current values of service counters and modify them. Each counter is presented in the form of a tile containing information about the date of the next service and the remaining number of working hours. The service counter can be configured for both of the previously mentioned values or only for one of them. If you do so, only the configured value will be displayed. If the counter is inactive, an "OFF" icon will be displayed on its tile.

(۲)	Service counters				
	General maintenance counter	01-01-2024 3000 h			
	Oil change counter	01-01-2024 3000 h	1/3		
	Oil filter counter	01-01-2024 3000 h			
6.5	Air filter counter	01-01-2024 3000 h			
bar	L	300011			

Figure 22: The "Service counters" tab

5.6.5. Events

The "Events" tab allows you to check the history of errors and warnings that occurred on the controller. Each event has a date and time, content and symbol. The list archives 200 events, and when this number is exceeded, the oldest events are deleted.

			Messages	
Ľ	01-03-2023	19:40:04	Oil temperature too high	П
	01-03-2023	19:40:04	No oil temperature sensor	
	01-03-2023	19:40:03	Thermal overload fault	
	01-03-2023	19:40:03	Emergency stop	
	01-03-2023	19:35:48	Oil temperature too high	
(D)	01-03-2023	19:35:48	No oil temperature sensor	
65	01-03-2023	19:35:48	🚹 Oil temperature high	
bar	01-03-2023	19:35:47	Thermal overload fault	

Figure 23: Events tab

5.6.6. Statistics

The controller aggregates measurements from sensors and information about the operation of the compressor and presents them in the form of statistics (which are divided into 2 categories: consumption and charts). Information about the time and cycles of the compressor is stored in the "Consumption" tab. The types of load data are different for star-delta start-up compressors and inverter compressors.

Parameter name	Parameter description		
Total running time	Total motor run time		
Run time under load	Total compressor time		
Medium load	Total run time to run time under load ratio		
Motor start-up counter	Total number of motor start-ups		
Average number of motor	Average number of motor start-ups per hour		
start-ups			
Y-valve engagement counter	Total number of Y-valve engagements		
load 80% - 100% ^F	Total run time in a given load range		
load 60% - 80% ^F	Total run time in a given load range		
load 40% - 60% ^F	Total run time in a given load range		

Table 15: '	"Consump	otion" tab	parameters
-------------	----------	------------	------------

^F-Parameter available only for compressors equipped with an inverter

<	Util	Utilisation				
	Running hours	15 h	CHANGE			
	Load hours	14 h	CHANGE			
	Average utilisation	93.33 %				
	Motor starts	150	CHANGE			
Ð	Average motor starts	10.00 / h				
6.5	Y valve switch-ons	128	CHANGE			
bar						

Figure 24: Consumption tab

The controller creates charts from selected data from the following time periods: last hour, last day, last week. The preview range can be set by the user, independently for each of the charts.

List of data from which charts are generated:

- Network pressure
- Oil temperature
- Motor temperature
- Air temperature
- Motor current
- Output frequency



Figure 25: Network pressure chart

6. User preferences

The user can configure his preferences in the "User preferences" tab **User parameters** \rightarrow **User preferences**, under the set of settings that do not have a direct impact on the operation of the compressor, but have an impact on the user's comfort of use.

List of sub-tabs:

- Display
- Units
- Language
- Date & time
- Compressor name

6.1. Adjust screen brightness

The brightness of the screen in the controller can be adjusted in the "Display" tab **User parameters** \rightarrow **User preferences** \rightarrow **Display**. The brightness level is selected by changing the position of the slider, the minimum available brightness level is 0%, the maximum is 100%

6.2. Screen saver setup

The screen saver can be enabled or disabled by going to the **User Parameters tab** \rightarrow **User Preferences** \rightarrow **Display**, by setting the "Screen Saver" toggle to "On" or "Off", respectively. The "Screen Saver Delay" parameter defines the number of seconds after which the screen saver will turn on in the event of inactivity.

6.3. Bargraph sensitivity configuration

The sensitivity of the bargraph displayed in the main view of the controller can be configured by going to the **User parameters tab** \rightarrow **User preferences** \rightarrow **Display**. decrease in pressure that is represented by one bargraph scale.

The available configuration range is 0.02 bar/s to 0.2 bar/s.

6.4. Pressure measurement accuracy

The accuracy of the pressure measurement can be configured by going to the **User parameters tab** \rightarrow **User preferences** \rightarrow **Display**. The user can choose a range with one decimal place or two. The selected range is visible in every place of the user interface, except for the "Sensors" tab, where the pressure is always displayed to 2 decimal places.

6.5. Units

The controller allows you to configure the units in which the values from individual sensors are displayed, the configuration is available in the **User parameters tab** \rightarrow **User preferences** \rightarrow **Unit**.

List of temperature units:

• °C

• °F

List of pressure units:

- bar
- psi

6.6. Controller language

In order to select a different language version of the user interface, go to the User parameters tab \rightarrow User preferences \rightarrow Language.

List of language versions:

- Polish
- English
- German
- Russian

6.7. Date & time settings

In order to set the correct date and time on the controller, go to the **User parameters tab** \rightarrow **User preferences** \rightarrow **Date and time**, or use the shortcut by clicking on the date and time on the main controller view. The controller also allows you to change the display format of the hour to 12 hours.

6.8. Compressor name

The controller allows the user to give a name to each compressor, which allows for quick compressor identification from the Web server. To enter a compressor name, go to the **User Parameters tab** \rightarrow **User preferences** \rightarrow **Compressor name**, and then enter the name using the on-screen keyboard.

7. User parameters

Primary user password: 0000

User parameters are available in the "Parameters menu" tab. Access requires a user password, default password is "0000". Parameters are grouped into several submenus. Some parameters are only available in preview mode. The value of parameters in the preview mode can only be viewed. When attempting to modify a parameter that is available for preview only, the controller will display a screen message saying "Too low permission level to change this parameter". The visibility and range of individual parameters may depend on the values of other interdependent parameters.

Name	Modification	Range	Location
Display brightness	Yes	0-100 %	User preferences → Display
Screensaver	Yes	On; Off	User preferences \rightarrow Display
Screensaver delay	Yes	≥0 s	User preferences → Display
Sensitivity of the barograph	Yes	0.02-0.3 bar/s	User preferences \rightarrow Display
Number of decimal places in displayed pressure measurements	Yes	1; 2	User preferences → Display
Temperature unit	Yes	°C; °F	User preferences \rightarrow Units
Pressure unit	Yes	bar; psi	User preferences \rightarrow Units
Language	Yes	Polish; Eng- lish; German; Russian	User preferences → Language
Time	Yes	hh:mm	User preferences \rightarrow Date and time
Date	Yes	dd-mm-rrrr	User preferences → Date and time
Time format	Yes	24h; 12h	User preferences → Date and time
Automatic change to daylight saving time	Yes	On; Off	User preferences → Date and time
Compressor name	Yes		User preferences → Com- pressor name
Operation mode	Yes	AUTO; CONST	Operation parameters → Opera- tion modes
Remote mode	Yes	LOCAL; NET; REM; RVM	Operation parameters → Opera- tion modes
Network pressure high warning	Yes		Operation parameters → Net- work pressure
Unload pressure	Yes		Operation parameters → Net- work pressure
Set pressure ^F	Yes		Operation parameters → Net- work pressure
Load pressure	Yes		Operation parameters → Net- work pressure
Low network pressure warning	Yes		Operation parameters → Net- work pressure
Restart delay	No		Operation parameters → Time parameters
Main contactor delay	No		Operation parameters → Time parameters
Motor acceleration time	No		Operation parameters → Time parameters
Y valve on delay	No		Operation parameters → Time parameters
Idle time	Yes	10-32767 s	Operation parameters → Time parameters
Adaptive idle (AutoTlse)	Yes	On; Off	Operation parameters → Time

Table	16 [.]	List of	user	parameters
TUDIC	то.		usu	parameters

Table 16: List of user parameters

Name	Modification	Range	Location
Motor deceleration time	Yes	≥0 s	Operation parameters → Time parameters
Star-delta changeover time	No		Operation parameters → Time
Condensate drain function	Yes	On; Off	Operation parameters → Con- densate drain
Drain open time period	Yes	0-720 min	Operation parameters → Con- densate drain
Drain open time	Yes	0-600 s	Operation parameters → Con- densate drain
Fan function	No		Operation parameters \rightarrow Fan
Fan on	No		Operation parameters \rightarrow Fan
Fan off	No		Operation parameters \rightarrow Fan
Dryer function	No		Operation parameters \rightarrow Dryer
Drying time before compressor start	No		Operation parameters \rightarrow Dryer
Drying time after compressor stop	No		Operation parameters \rightarrow Dryer
Duration of pulse mode after compressor	No		Operation parameters \rightarrow Dryer
stop			
Pulsation period time	No		Operation parameters \rightarrow Dryer
Enable time in pulse mode	No		Operation parameters \rightarrow Dryer
Waiting time in pulse mode	No		Operation parameters \rightarrow Dryer
Heater 1	No		Operation parameters \rightarrow Heater \rightarrow Heater 1
Heater 1 hysteresis	No		Operation parameters \rightarrow Heater \rightarrow Heater 1
Heater 2	No		Operation parameters \rightarrow Heater \rightarrow Heater 2
Heater 2 temperature offset	No		Operation parameters \rightarrow Heater \rightarrow Heater 2
Heater 2 hysteresis	No		Operation parameters \rightarrow Heater \rightarrow Heater 2
Idle reheating	No		Operation parameters \rightarrow Heater \rightarrow Idle reheating
Idle reheating on temperature	No		Operation parameters \rightarrow Heater \rightarrow Idle reheating
Idle reheating off temperature	No		Operation parameters \rightarrow Heater \rightarrow Idle reheating
High dew point warning	No		Operation parameters → Dew point
High dew point warning level	No		Operation parameters → Dew point
Low dew point warning	No		Operation parameters \rightarrow Dew point
Dew point too low warning level	No		Operation parameters \rightarrow Dew point
Dew point too high error	No		Operation parameters → Dew point
Dew point too high error level	No		Operation parameters → Dew point
Dew point too low error	No		Operation parameters \rightarrow Dew point
Dew point too low error level	No		Operation parameters \rightarrow Dew point
Dew point temperature event delay	No		Operation parameters \rightarrow Dew point
Restart after power failure	Yes	On; Off	Operation parameters → Auto restart
Restart after error	Yes	On; Off	Operation parameters → Auto restart

Table 16: List of user parameters

Name	Modification	Range	Location
Reboot delay	Yes	≥0 s	Operation parameters → Auto restart
Maximum number of restart attempts	Yes	≥1	Operation parameters → Auto restart
Power loss restart	No		Operating parameters \rightarrow Temperature switch
Temperature source	No		Operating parameters \rightarrow Temperature switch
Upper temperature switching	No		Operating parameters \rightarrow Temperature switch
Lower temperature switching	No		Operating parameters \rightarrow Temperature switch
Restore user settings from local backup	Yes		Factory settings → Restoring and saving settings
Restore user settings from external data carrier	Yes		Factory settings → Restoring and saving settings
Save logs to data carrier	Yes		Factory settings \rightarrow Service logs
User password	Yes	1-10 digits	Factory settings → Passwords
Function and logic of each digital input	No		Inputs/outputs configuration → Digital outputs
Function and logic of each digital output	No		Inputs/outputs configuration → Digital outputs
Function and range of each analog input	No		Inputs/outputs configuration → Analog outputs
Function of each analog output	No		Inputs/outputs configuration → Analog outputs
Baud rate	Yes	2400; 4800; 9600; 19200; 38400; 57600; 115200; 230400	RS-485/RS-485 ISO
Parity	Yes	None; Even; Odd;	Inputs/outputs configuration → RS-485/RS-485 ISO
Stop bits	Yes	1; 1.5; 2	Inputs/outputs configuration → RS-485/RS-485 ISO
RS-485/RS-485 ISO function	Yes	None; Master; Slave	Inputs/outputs configuration → RS-485/RS-485 ISO
Modbus address	Yes	1-255	Inputs/outputs configuration → RS-485/RS-485 ISO
Assigning an IP address	Yes	Auto(DHCP); Static (without DHCP)	Inputs/outputs configuration → IP settings
IP address	Yes		Inputs/outputs configuration → IP settings
Subnet mask	Yes		Inputs/outputs configuration → IP settings
Gateway	Yes		Inputs/outputs configuration → IP settings
Turn on Y valve	Yes	Enable; Disable	Diagnostics → Manual Y-valve control
Safety valve test	Yes	< 15.5 bar	Diagnostics → Safety valve test
Master compressor communication timeout	Yes	≥0 s	Network operation \rightarrow Configuration
Operate as master compressor	Yes	Enable; Disable	Network operation \rightarrow Configuration
Network operation algorithm	Yes	SEQ; CAS	Network operation \rightarrow Configuration
Number of slave compressors	Yes	0-5	Network operation \rightarrow Configuration

Name	Modification	Range	Location
Switching delay between slave com-	Yes	0-60 s	Network operation \rightarrow Configura-
pressors			tion
Rotation time	Yes	≥ 1 min	Network operation \rightarrow Configura-
			tion
Unload pressure for master compressor	Yes		Network operation \rightarrow Configura-
			tion
Load pressure for master compressor	Yes		Network operation → Configura-
			tion
Automatic pressure limits reconfiguration	Yes	Enable;	Network operation \rightarrow Configura-
		Disable	tion
Network operation point	Yes		Network operation \rightarrow Configura-
			tion
Unload pressure (slave compressor)	Yes		Network operation \rightarrow Com-
			pressor 1/2/3/4/5
Load pressure (slave compressor)	Yes		Network operation \rightarrow Com-
			pressor 1/2/3/4/5
Interface (slave compressor)	Yes	RS-485; RS-	Network operation \rightarrow Com-
		485 ISO	pressor 1/2/3/4/5
Modbus address (slave compressor)	Yes	1-255	Network operation \rightarrow Com-
			pressor 1/2/3/4/5
Scheduled work	Yes	Enable;	Operation scheduling
		Disable	
Add event	Yes		Operation scheduling \rightarrow One-
			time events/Recurring events

Table 16: List of user parameters

^F-Parameter available only for compressors equipped with an inverter

7.1. Changing user password

To change the default user password, go to the User parameters \rightarrow Factory settings \rightarrow Passwords, tab and then enter a value in the "User password" parameter. The password can be 1 to 10 digits long.

In case of forgetting the user password, please contact the service.

8. Operating algorithm

The controller is equipped with several motor control algorithms depending on the type of compressor. The control algorithm is configured according to the compressor's specifications during the production stage. The controller allows for determining the following starting methods:

- Star-Delta
- Analog inverter
- Modbus inverter
- Direct

The above methods of electric motor control and their operating principles are described in the subsections below.

8.1. Operating algorithm diagram in Star-Delta configuration



Figure 26: Engine control algorithm

The basic operating algorithm of a compressor in a star-delta configuration:

- 1. Start (e.g., pressing the START button)
- 2. Activate the star contactor (start the motor in star configuration)
- 3. Main contactor delay
- 4. Activate the main contactor
- 5. Startup motor acceleration time

- 6. Deactivate the star contactor
- 7. Star-delta switching time
- 8. Activate the delta contactor (start the motor in delta configuration), and start the actual operation
- 9. Compression delay delay in opening the Y valve
- 10. Open the Y valve and then start the compression
- 11. Compression The Y valve is controlled by the operating algorithm according to the required upper and lower pressure settings. Deactivating the Y solenoid valve relieves the compressor, and the motor enters an idle state
- 12. Stop operation ((e.g., pressing the **STOP** button)
- 13. Close the Y valve, and go to an idle state
- 14. Stopping motor stopping time
- 15. Deactivate the delta and main contactors
- 16. Restart delay

8.1.1. Compressor operating time parameters

Settings for all times and delays used in the control algorithm can be found in: User parameters \rightarrow Operating parameters \rightarrow Time parameters.



Figure 27: View of the menu with time parameter settings for the Star-Delta configuration

Table 17: List of compresso	operating time parameters
-----------------------------	---------------------------

Name	Unit	Description
Restart delay	S	The minimum time between compressor shutdown and the next start. If the compressor is restarted before this time elapses, the motor will start with an appropriate delay
Main contactor delay	ms	The time between turning on the main contactor and turning on the star configuration contactor

Name	Unit	Description
Motor ramp-up time	S	The time it takes for the electric motor to ramp up. The time it takes to switch from the star configura- tion to the delta configuration
Y-Valve activation delay	S	The waiting time for pressurization, during which the motor is idling
Idle running time	S	The time the motor is idling after exceeding the upper pressure limit
Motor stop time	S	The time the motor is idling after pressing the STOP button
Star-Delta switching Time	ms	The time between turning off the star configura- tion contactor and turning on the delta configura- tion contactor.
Adaptive idle run (AutoTlse)		Described in the chapter 10.1.2. Adaptive idle run (AutoTise)

Table 17: List of compressor operating time parameters

8.2. Scheme of the control algorithm in the inverter configuration

The operating principle of the control algorithm for Inverter Modbus and Inverter analog configurations is the same. The difference lies in the method of communication between the inverter and the controller.



Figure 28: Motor control algorithm

The primary algorithm for compressor operation in the Inverter configuration:

- 1. Starting the operation (e.g., pressing the START button)
- 2. Startup motor acceleration time
- 3. Compression delay delay in turning on valve Y
- 4. Valve Y activation and then start of compression
- 5. Compression during compression, pressure is controlled by turning valve Y on and off, and motor speed is controlled by the PID algorithm. Turning off solenoid valve Y releases the compressor and puts the motor in idle mode.
- 6. Stopping the operation (e.g., pressing the **STOP** button)
- 7. Delay in deactivating valve Y
- 8. Deactivation of valve Y, transition to idle mode
- 9. Stopping motor stopping time
- 10. Restart delay

8.2.1. Compressor operating time parameters

Settings for all times and delays used in the control algorithm can be found in: User parameters \rightarrow Operating parameters \rightarrow Time parameters.



Figure 29: Menu view with time parameter settings for the Inverter configuration

Name	Unit	Description
Restart delay	S	The minimum time between compressor shutdown and the next start. If the compressor is restarted before this time elapses, the motor will start with an appropriate delay.
Motor acceleration time	S	The time it takes for the electric motor to accelerate. A gradual motor startup procedure (SOFT-START) to the minimum speed.
Y-Valve activation delay	S	The waiting time for pressurization, during which the motor is idling.
Y valve deactivation delay	S	The delay in deactivating Valve Y after pressing the button STOP
Idle running time	S	The time the motor is idling after exceeding the upper pressure limit.

	40					
lable	18:	LIST OF	compres	sor oper	ating time	e parameters
			00	00.000.		

Name	Unit	Description
Motor stop time	S	The time it takes for the electric motor to stop.
		Gradual engine stop procedure (SOFT-STOP)
Adaptive idle run		Described in the chapter 10.1.2. Adaptive idle run
(AutoTlse)		(AutoTlse)

Table 18: List of compressor operating time parameters

8.2.2. PID Controller

The output frequency of the drive motor is controlled by a PID algorithm based on the current and desired pressure values. The controller will aim to maintain the appropriate rotational speed of the compressor shaft to optimize the compression process and reduce electrical energy consumption.

8.2.3. Set pressure

For configurations with a drive motor in the control algorithm, in addition to the lower and upperpressure limits, the set pressure value is also taken into account. This is the so-called PID algorithm control point, which is the desired pressure value in the network, and the algorithm strives to continuously maintain this pressure value through smooth compressor output adjustment.

Its value can be set, along with the other pressure settings, in the section:

User parameters \rightarrow Operating parameters \rightarrow Network pressure.

The value of this parameter is also displayed on the main screen of the controller. For other control algorithms, such as Star-Delta, this parameter is not visible.

रि	Network pressure						
	Network high pressure warning	10.30	bar				
	Unload pressure	10.00	bar				
	Pressure setpoint	9.10	bar				
Þ	Load pressure	8.50	bar				
8.3	Low network pressure warning	0.00	bar				
8.3 bar	Load pressure Low network pressure warning	8.50 0.00	bar bar				

Figure 30: Network pressure settings

8.3. Primary operation algorithm in Direct Start configuration



Figure 31: Motor control algorithm

Primary operation algorithm in Direct Start configuration:

- 1. Starting work (e.g., pressing the START button)
- 2. Main contactor activation
- 3. Motor startup motor ramp-up time
- 4. Compression delay delay in turning on valve Y
- 5. Valve Y activation and the start of compression
- 6. Compression. Valve Y is switched on/off by the operation algorithm according to the required upper and lower pressure limits
- 7. Stopping work (e.g., pressing the **STOP** button)
- 8. Turning off valve Y, transition to idle mode
- 9. Stopping motor stopping time
- 10. Main contactor deactivation

8.3.1. Compressor operating time parameters

The settings for all times and delays used in the control algorithm can be found in: User parameters \rightarrow Operation parameters \rightarrow Time parameters.



Figure 32: View of the menu with time parameter settings for Direct Start configuration

Name	Unit	Description		
Restart delay	S	The minimum time between compressor shutdown and the next start. If compressor operation re- sumes before this time elapses, the motor will start with the appropriate delay		
Motor ramp-up time	S	Time it takes for the electric motor to reach full speed		
Y-valve activation delay	S	Waiting time for pressurization, during which the motor is idling		
Idle run time	S	Time of free operation after exceeding the upper pressure limit		
Motor stopping time	S	Time of free operation after pressing the STOP button		
Adaptive idle run (AutoTlse)		Described in the chapter 10.1.2. Adaptive idle run (AutoTise)		

Table 19:	List of ti	me param	eters for	compressor	operation
10010 10.		me param		001110100001	oporation

8.4. Idle run

The idle run of the compressor is a part of every operating mode provided in the controller. It is accomplished by closing the Y-valve and keeping the motor running. This allows the machine to quickly return to the air compression state in case of pressure drop, without the need for a full motor restart.

The idle run time can be defined by going to the tab:

User parameters \rightarrow Operating parameters \rightarrow Time parameters \rightarrow Idle run time.

The available range for idle run time setting depends on the specific compressor model. When the idle run time ends the motor is stopped.

8.5. Decompression control method

The controller can control decompression using several methods, including a suction sensor, time delay, or oil pressure sensor.

9. ULTRA SPEED function

A standard compressor equipped with an inverter regulates the rotation of the drive motor as a function of pressure. The controller transmits the reference frequency to the inverter, which matches the output frequency to it. The power on the motor shaft then increases as the pressure increases, while the compressor capacity remains constant.

In this case, the rotational speed is included within the limits between the minimum frequency setpoint (for discharge pressure above the set pressure) and the maximum setpoint on the compressor controller (for pressures below the set pressure).

The ULTRA SPEED function is an additional PID controller, which is designed to increase the output frequency of the inverter in the range from the maximum frequency set on the controller to the maximum frequency of the ULTRA SPEED function related to the construction of the compression stage and the drive motor (additionally limited by the internal parameters of the inverter). The controller is designed to keep the currently consumed power as close as possible to the rated value of the motor. This translates into an increase in speed and thus efficiency when operating the compressor at pressures lower than nominal and has a positive impact on electricity savings. The ULTRA SPEED function is particularly useful in moments of excessive demand for compressed air.

10. Compressor and controller operation settings

Compressor operation mode settings can be found in the User Parameters \rightarrow Operation Parameters \rightarrow Operating Modes tab. The operation mode settings are divided into 2 independent groups: Operation mode and Remote mode. The first one defines the compressor's operation algorithm, the second one defines the way the compressor is controlled.

10.1. Operation modes

Available operation modes:

- AUTO
- CONST

10.1.1. Automatic mode (AUTO)

The automatic operating mode involves the compressor starting and stopping automatically when predefined load and unload pressure values are reached. To initiate automatic operation, press the green START button.

When the network pressure reaches the maximum set value, the compressor will enter an idle state. If the network pressure falls below the minimum set value before the idle time elapses, the compressor will resume loading. If the idle time ends, and the network pressure falls within the set pressure range, the engine will be stopped. The compressor will automatically restart when the pressure drops below the minimum pressure value. To disable automatic operation, press the red STOP button.

During automatic operation, it is possible to force the transition from the idle state to the loading state before the load pressure is reached by pressing the START button, provided the current network pressure is lower than the unload pressure.

10.1.2. Adaptive idle run (AutoTlse)

Optimally setting the idle run time is crucial for economic reasons. A time set too long results in unnecessary idle running of the engine, leading to increased electrical energy consumption. Conversely, setting a short idle run time can lead to frequent compressor start and stop cycles, causing an increase in electrical energy consumption and reducing the mechanical components' lifespan. Utilizing the algorithm allows for automatic control of the engine's idle run time in the automatic compressor operation mode. The system continuously analyzes the historical and current tank pressure value, taking into account the following parameters:

- pressure monotonicity,
- pressure rise/fall rate,
- reference pressure values to upper and lower limits,
- pressure rise/fall times in previous compressor start/stop cycles,
- set idle run time,
- estimated number of compressors starts per hour.

Based on the gathered information, the function **AutoTise** scontrols the idle run time mainly by reducing it, ensuring that it is never shorter than the minimum idle run time set in the time parameters in the controller's factory settings. If there is little demand for pressure in the network during idle operation and the pressure decreases slowly or not at all, the algorithm accelerates the compressor's shutdown. If there is an anticipated need to restart the compressor shortly after the motor is turned off, the compressor remains in idle run mode.

The Adaptive idle run function can be used both on standalone compressors and compressors in a network.

To enable this function AutoTlse go to the User parameters screen \rightarrow Work parameters \rightarrow Time parameters and set the "Adaptive idle run" parameter to "Enable."

10.1.3. Continuous mode (CONST)

The continuous operation mode keeps the compressor motor in a continuous state of operation. This is done through infinite idling time. To start the continuous mode, press the green START button. When the network pressure reaches the setpoint (max.), the compressor will idle until the network pressure falls below the setpoint (min.), after which it will start compressing again. When the compressor is started with the START button and the network pressure is within the set pressure, the motor will not start. The motor will be started for the first time when the pressure drops below the minimum value. Press the red stop button to deactivate the continuous operation mode. During continuous operation, it is possible to force the transition from idle run to the compression state before the load pressure is reached by pressing the START button, provided that the current network pressure is lower than the offload pressure.

10.2. Remote modes

Available remote modes:

- LOCAL
- NET
- REM
- RVM

10.2.1. Local control mode (LOCAL)

In local control mode, the compressor operates according to pressures set on the controller (minimum and maximum). The compressor is controlled by the START and STOP buttons, and its operation is governed by internal algorithms of the controller, depending on the selected operation mode.

10.2.2. Network mode NET

In network operation mode, the compressor operates according to the pressure settings provided by the master controller via Modbus RTU. The NET mode is dedicated to the operation of the compressor as a slave. The master controller is responsible for starting the operation of the compressor, you do not have to press the START button.

10.2.3. Remote control mode REM

In REM remote control mode, the compressor does not control the network pressure setting. It is done through a digital input configured as "Remote load - unload signal". Pressure control is carried out externally, e.g. via the master controller.

When the load signal appears on the controller's digital input, the compressor will behave in the same way as if the pressure dropped below the setpoint (min.). When the signal on the digital input is changed to unload, the compressor will behave as if the upper limit of the set pressure (max.) was exceeded.

Apart from the above mentioned differences, the operation of the compressor control algorithm is carried out according to the selected operating mode. When the REM remote control mode is selected in the main interface view, pressure ranges will be replaced by an "External pressure control" message. Despite the lack of supervision over the set pressure in the network, the controller continuously controls the pressure limits set by the compressor manufacturer. If the measured pressure in the network exceeds the maximum pressure value, the compressor will be stopped.

Note!

To start the compressor in the REM remote control mode, press the START button on the controller.

10.2.4. REM remote control mode configuration

To configure remote control in REM mode, set the "Remote mode" parameter to "REM" (User parameters \rightarrow Operation parameters \rightarrow Operation modes \rightarrow Remote mode). In order to enable remote control in REM mode, one of the digital inputs of the controller should be assigned the function "Load-relief remote signal". To verify, go to the digital input configuration parameters (User parameters \rightarrow Configure inputs/outputs \rightarrow Digital inputs). If none of the digital inputs is configured as "Remote load - relief signal", please contact the compressor.

10.2.5. RVM remote control mode

In REM remote control mode, the compressor does not control the network pressure setting. It is done through a digital input configured as "Remote load - unload signal". Pressure control is carried out externally, e.g. via the master controller.

When the load signal appears on the controller's digital input, the compressor will behave in the same way as if the pressure dropped below the setpoint (min.). When the signal on the digital input is changed to unload, the compressor will behave as if the upper limit of the set pressure (max.) was exceeded.

Apart from the above mentioned differences, the operation of the compressor control algorithm is carried out according to the selected operating mode. When the REM remote control mode is selected in the main interface view, pressure ranges will be replaced by an "External pressure control" message. Despite the lack of supervision over the set pressure in the network, the controller continuously controls the pressure limits set by the compressor manufacturer. If the measured pressure in the network exceeds the maximum pressure value, the compressor will be stopped.

Note!

To start the compressor in the REM remote control mode, press the START button on the controller.

10.2.6. RVM remote control mode configuration

To configure remote control in RVM mode, set the "Remote mode" parameter to "RVM" (User parameters \rightarrow Operation parameters \rightarrow Operation modes \rightarrow Remote mode).

10.2.7. Remote start function

The remote compressor start function allows the user to control the compressor using digital input. Remote control operates to pressing the START or STOP button was pressed on the controller. **Note!**

The START and STOP buttons override the remote start function, which means that pressing the START button is necessary to grant permission to remote start. If all remote start conditions are met the compressor will start. Whereas, if there are any issues with input signal, the message "Waiting for remote start signal" will be displayed in the text message. Pressing the stop button cancels the start permission until the START button is pressed again.

10.2.8. Remote start configuration

The configuration of remote start is done by assigning the "Remote start-stop" function to one of the digital inputs of the controller. In order to verify which input is assigned to above mentioned function, go to the digital input configuration parameters (**User parameters** \rightarrow **Input/output configuration** \rightarrow **Digital inputs**). If none of the digital inputs is configured as "Remote start-stop", please contact the compressor.

10.2.9. Differences between REM and RVM remote modes and the remote start function

Remote REM/RVM is a special controller mode which controls network pressure externally. In RE-M/RVM mode, the controller operates based on an external load and relief signal that replaces pressure settings. This mode is dedicated to master control, in which the master controller is responsible for controlling network pressure.

The remote start function as opposed to the remote REM/RVM mode is only a signal that can be assigned to one of the digital controller inputs. It does not affect the control algorithm. The compressor will operate according to the selected operating modes. The remote start function is an additional condition that must be met for the compressor to start. This function allows, for example, to assign an a compressor start-stop switch to an external operator panel. It can also be used to run simple algorithms in master operation.

11. Other functions

11.1. Fan function (compressor cooling)

The fan function is dependant on the oil temperature measurement and allows the oil temperature to be kept in the optimum range. The fan turns on and off at specified oil temperature levels. This function is only active when the START button is pressed.

The parameters of the fan function can be found in the User parameters tab \rightarrow Operation parameters ers \rightarrow Fan. Modification of these parameters requires service level authorization.

The fan will stop when the motor is stopped using the stop button or an error occurs when the fan is on. However, if the motor stops during a standard work cycle, the fan will not be turned off, until the oil temperature drops below the fan shutdown temperature. **Note!**

In order for the fan function to work correctly, one of the digital outputs must be assigned the "Fan" function

11.2. Dryer function

The dryer function allows you to control the dryer using one of the digital (relay) controller outputs. There are 2 independent dryer modes: Standard and pulsating.

In standard mode, the dryer is switched on during motor operation, and it is also possible to configure the drying time before starting and after finishing operation.

The pulse mode consists in switching the dryer on and off cyclically in order to maintain the relevant parameters. The pulse mode starts only when the machine motor is stopped when idling time elapses after the set pressure is reached. The dryer will go into pulsed mode (if configured) when the standard operation mode is complete.

When the dryer function is enabled, the user is informed about the remaining time of the dryer operation in the main view of the controller.

The dryer configuration requires service authorization, to view the current configuration go to the tab User parameters \rightarrow Operation parameters \rightarrow Dryer.

Note!

In order for the dryer function to work correctly, one of the digital outputs must be assigned the "Dryer" function

11.3. Condensate drain function

The controller has a built-in condensate drain valve operation function. The valve is opened using one of the digital (relay) outputs of the controller, the time interval and the operating time are defined by the user.

11.3.1. Condensate drain function configuration

In order to configure the condensate drain function, go to the **User parameters tab** \rightarrow **Operation parameters** \rightarrow **Condensate drain**. The "Condensate drain function" parameter allows the user to enable or disable the function.

The "Valve open period" parameter specifies the time interval in minutes between successive valve openings. The maximum value that can be set is 720 minutes.

The "Valve open time" parameter determines the time in seconds during which the drain valve will be

opened. The maximum value that can be set is 600 seconds.

Note!

In order for the Condensate drain function to work correctly, one of the digital outputs must be assigned the "Condensate drain" function

11.4. Auto restart function

The auto restart function allows the compressor to resume automatically when a power failure or error occurs. Not all errors allow auto restart. The full list of errors divided into those allowing and preventing auto restart, can be found in the "Warnings and errors" section.

The automatic compressor restart function in the event of an error that allows for an auto restart requires the user to confirm the error and to start the compressor. In the event of failure (if it is not possible to confirm the error), the controller will make further attempts at auto restart (the number of attempts and the time interval between attempts are defined by the user).

The procedure for automatic compressor restart in the event of a power failure works in the same way as described above, with the difference that it initiates only after a power failure.

The user is informed about the ongoing auto restart procedure by through a message displayed in the main controller view in the message field.

If the auto restart fails, the function will be reset after the compressor is started manually.

11.4.1. Auto restart function configuration

To configure the auto restart function, go to the **User parameters tab** \rightarrow **Operation parameters** \rightarrow **Auto restart**. The "Restart after power failure" and "Restart after error" parameters allow the user to select the function range. One or both can be enabled at the same time.

The "Restart delay" parameter allows the user to determine the time in seconds the controller will wait before proceeding to the automatic restart procedure. At the same time, it is also the time interval that the controller will wait between subsequent auto restart attempts.

The "Maximum number of restart attempts" parameter determines the number of auto restart attempts that the controller will make.

11.5. Heater function

The heater function allows the user to start the oil heater using one of the digital (relay) controller outputs. It is also possible to prevent excessive oil cooling by using idle. The controller provides the possibility of oil heating in 3 independent modes.

The user can view the settings of the heater parameters in the User parameter tabs \rightarrow Operation parameters \rightarrow Heater. Their modification requires service authorizations.

11.5.1. Heater 1

The function of heater 1 starts when the motor starts and the oil temperature is lower than the minimum starting oil temperature foreseen by the compressor manufacturer. A message informing about the operation of the heater will be visible in the main view of the controller. The start-up will take place when the oil temperature reaches the minimum value for start-up + heater 1 hysteresis value. **Note!**

In order for the heater 1 function to work correctly, the "Heater 1" function must be assigned to one of

11.5.2. Heater 2

The function of heater 2 allows the oil temperature to be maintained in a range that allows the motor to start immediately, regardless of the compressor operation algorithm. This means that the heater will start when the compressor is stopped in order to maintain the oil temperature within the specified temperature range.

Note!

In order for the heater 2 function to work correctly, the "Heater 2" function must be assigned to one of the digital outputs

11.5.3. Idle heating

The idle heating function consists in using the idle speed of the compressor in order to prevent the oil temperature from falling below the minimum temperature for start-up. Idle heating starts only when the compressor is able to reach the set pressure. This means that this function will not work if the compressor is stopped.

The user is informed about the activation of the idle heating function through a message in the main view of the controller.

11.6. Temperature switch function

The function of the temperature switch is to link the current value of one of the temperature measurements to one of the transmitters. This allows one of the transmitters to be turned on and off depending on the temperature measured by a specific temperature sensor.

Attention! For the temperature switch function to work properly, the "Temperature switch" function must be assigned to one of the digital outputs

Configuration of the temperature switch function requires service authorizations, To view the current configuration, go to the tab: User parameters \rightarrow Operating parameters \rightarrow Temperature switch.

11.7. Restoring and saving settings

The controller can save and restore settings from a local copy or an external data carrier. From the user access level, it is only possible to restore user settings in the controller. Service authorizations are required to save or restore the settings of service parameters.

The option of restoring and saving settings on external data carriers allows you to copy settings between controllers.



Figure 33: View of the screen with restoring settings at the user level

To restore or save the settings, go to the tab:

User parameters \rightarrow Factory settings \rightarrow Restoring and saving settings.

The user can restore the settings from a local copy saved in the controller's memory or from an external data carrier connected to one of the controller's USB ports. The scope of restored settings includes only user parameters. To restore the service settings, logging in from the service technician level is required. Restoring compressor settings overwrites the data and will not be able to be restored. After selecting the recovery source, you must confirm the warning.



Figure 34: Warning about overwriting user settings

12. Diagnostic Functions

The controller is equipped with additional diagnostic tools that can facilitate compressor service and diagnostics. In order to use the diagnostic functions of the controller, go to the **Service parameters** \rightarrow **Diagnostics** tab.

12.1. Safety valve test



Safety valve testing may only be performed by authorized persons

Carrying out the safety valve test involves setting the target pressure and pressing the "Start test" button. This will start the compressor, which will compress the air until the set limit is reached.



Figure 35: View of the controller screen in the manual control tab of the Y valve

Note that the controller at this point ignores all pressure limits and compresses to the pressure set in the "Target pressure" field. In order for the safety valve to open, the set pressure limit should be higher than the valve operating level.

Before starting the test, read the information displayed on the controller screen.

	Safety valve test
Ţ	Warning! You are about to start the safety valve test, it means that the pressure will increase above a safe level. Monitor the manometer reading during the test. It can not be any active error on the controller to perform the test. For safety, please do the Y-valve test before doing this test.
	IUNDERSTAND



13. Service counters

Service counters are designed to remind you of the need to carry out specific service activities. Each meter has 2 operating modes, counting down the remaining operating hours of the compressor or counting down the time to a specific date. Both modes are independent, only one or two of them can be active simultaneously. The remaining operating hours are counted only during motor operation, the hours are not counted when the compressor is switched off or is in an idle mode. The countdown to a specific date takes place independently of the compressor operation. The controller has 9 independent service counters:

- General service counter
- Oil change counter
- Oil filter counter
- Air filter counter
- Separator counter
- Drive belt counter
- Motor bearing lubrication counter
- General purpose counter 1
- General purpose counter 2

In the case of direct drive compressors, the drive belt counter is not available. It is replaced by general purpose counter 3.

(Service counters					
	General maintenance counter	01-01-2024 3000 h				
	Oil change counter	01-01-2024 3000 h	1/3			
Ð	Oil filter counter	01-01-2024 3000 h				
6.5 bar	Air filter counter	01-01-2024 3000 h				

Figure 37: The "Service counters" tab"

Each counter is displayed in the form of a tile with the name of the counter. The counter status is visible to the right of its name. If the counter is active, depending on the operating mode of the counter, the date of the next inspection or the number of operating hours remaining to the inspection or both are displayed at the same time. If the counter is inactive, the information "off" is displayed next to it. If any of the active counters counts down the hours to 0, or reaches the service due date, a warning will appear on the controller with information referring to the meter that needs attention, e.g., "Change oil"

13.1. Restarting service counters

The service counters can be restarted by selecting the tile of one of the counters and then pressing the "RESTART" button. Before the restart, a confirmation message will be displayed containing the values to which the counter will be restarted. Service intervals are assigned by the service provider or compressor manufacturer.

14. Statistics

The controller aggregates measurements from sensors and information about the operation of the compressor and presents them in the form of statistics (which are divided into 2 categories: consumption and charts). Information about the time and cycles of the compressor is stored in the "Consumption" tab. The types of load data are different for star-delta start-up compressors and inverter compressors.

14.1. Consumption statistics

In the "Consumption" tab, the compressor operating parameters are visible in the form of rows with individual parameters and their values. The "CHANGE" button allows the user to manually enter the values of the selected parameters. Service level authorization is required.

Parameter name	Parameter description
Total run time	Total motor run time
Run time under load	Total compression time
Medium load	Total run time to run time under load ratio
Motor start-up counter	Total number of motor start-ups
Average number of motor	Average number of motor start-ups per hour
start-ups	
Y-valve engagement counter	Total number of Y-valve engagements
Load 80% - 100% ^F	Total run time in a given load range
Load 60% - 80% ^F	Total run time in a given load range
Load 40% - 60% ^F	Total run time in a given load range
Load 20% - 40% ^F	Total run time in a given load range

Table 20:	Parameters	of the	"Consum	ption" tab
		0. 0.0	Concann	

^F-Parameter available only for compressors equipped with an inverter

<	Utilisation					
	Running hours	15 h	CHANGE			
	Load hours	14 h	CHANGE			
	Average utilisation	93.33 %				
	Motor starts	150	CHANGE			
	Average motor starts	10.00 / h				
6.5	Y valve switch-ons	128	CHANGE			
bar						

Figure 38: Consumption tab

14.2. Charts

The controller creates charts from selected data from the following time periods: last hour, last day, last week. The preview range can be set by the user, independently for each of the charts.

List of data from which charts are generated:

- Network pressure
- Oil temperature
- Motor temperature
- Air temperature
- Motor current
- Output frequency



Figure 39: Network pressure diagram

15. Operation scheduling

The controller is equipped with a compressor operation scheduling function. This allows the compressor to be automatically switched on and off according to a pre-determined schedule. It is schedule to plan up to 28 events, including 8 recurring events and 20 one-off events.

One-time events are set by entering a specific date and time, while cyclical events are configured according to the plan for each day of the week, which repeats in a 7-day cycle.

To go to the "Work Scheduling" tab, use the shortcut with the calendar icon from the main view or select the "Work Scheduling" tile in the user parameters.

The tab shows the status of scheduled operations (according to the scheduled events) of the controller, and the number of activated events, broken down by their type. Individual events are visible on the lists, and are available after selecting one of the 2 event setting buttons. Lists allow the user to view the parameters of configured events. To remove an event from the list, hold down the tile with a given event, wait until it becomes red and the message "DELETE EVENT" is displayed, and then press it again.



Figure 40: The "operation scheduling" tab and sample list of events

15.0.1. Configuring a one-time event

A one-time event can be configured using the following parameters:

- Operation mode
- Event start date and time
- Event end date and time
- Event activation/deactivation



Figure 41: Example of one-time event configuration

To configure the operating mode press the "Operation mode" button and select one of the items from the list. In addition to the standard operation modes (AUTO and CONST), the user can also select the "STOP - compressor stopped" operation mode, which allows the creation of an exception to the cyclic event. The time range of the event can be configured from the on-screen keyboard, after selecting the appropriate date and time fields. The event can be activated or deactivated using the "ACTIVATE"/"DEACTIVATE" button.

15.0.2. Recurring event configuration

A one-time event can be configured using the following parameters:

- Operation mode
- Days of the week on which the event is to take place
- Event start time for selected days
- Event end time for selected days
- Event activation/deactivation



Figure 42: Example of a recurring event configuration

To configure the operating mode press the "Operation mode" button and select one of the items from the list. Standard operating modes (AUTO and CONST) are available for cyclic events.

The fields with the names of the days of the week are used to select the days on which the event is to take place. When the user presses on any field, it will highlight in blue, indicating that a given day

has been selected. Pressing the same field again cancels the previous selection.

The time range of the event can be configured from the on-screen keyboard, after selecting the appropriate time fields.

The event can be activated or deactivated using the "ACTIVATE"/"DEACTIVATE" button.

15.0.3. Operation scheduling algorithm

In order for the compressor to operate in line with the configured events, the scheduled operation must be activated in the "Operation scheduling" tab by pressing the "ACTIVATE" button. When scheduled operation is active, the "ACTIVATE" button will change to "DEACTIVATE" and the message "Scheduled operation is active" will be displayed on the screen.

Moreover, in order for the operation scheduling algorithm to control the operation of the compressor, the user must grant prior permission by pressing the "START" button on the controller. If, in line with the scheduled events, the compressor should be idle at a given moment, then after granting permission to start, the main view of the graphical interface will display the message "Stopped by scheduled operation"

The scheduled operation algorithm takes into account only events that are active.

NOTE!

One-time events have a higher priority than cyclical events. This makes it possible to make "exceptions" from cyclical events, e.g. on public holidays. At the same time, events that are higher on the list have a higher priority than those lower on the list. This means that in the situation when two or more scheduled events overlap, the compressor will operate in accordance with the higher priority event.

16. Network operation

The controller can manage a group of up to 6 compressors (including itself) as the master controller, using one of two available algorithms: Sequential (**SEQ**) or cascading (**CAS**). All controllers in the network must be connected to each other via RS-485 or RS-485 ISO ports. The communication protocol used for network operation is Modbus RTU.

16.1. Network operation view

From the master controller, the user gains access to a preview of the status of all controllers in the network. When the controller is configured as master, the main view of the controller shows the network operation icon together with the letter "M", pressing it will take you to the network operation view. The network operation view shows all connected slave controllers (marked with numbers from 1 to 5) and the master controller (marked with the letter "M").

The number of visible slave compressors depends on the number of compressors configured in the master controller. Each of the tiles in the network operation view allows the user to read the current pressure settings on each of the compressors and the status of each of the compressors in the form of a short message. In the event of an error or warning on any of the compressors in the network, an error or warning icon will be displayed in its tile field.

If the controller is configured as a slave, a network operation icon with the letter "S" will be displayed in its main view. It is not possible to display the network operation view from the level of the slave controller.

		Network operation	n view	
Ċ	M Deactivated	Pu: 8.00bar 1 D Pd: 7.50bar	eactivated Pu Pd	: 8.00bar : 7.00bar
	2 Deactivated	Pu: 10.00bar Pd: 6.50bar		
9.61 bar		Network	operation is: DIS	SABLED

Figure 43: Network operation view

16.2. Starting network operation and changing the settings of the slave controllers

To start the network operation algorithm, go to the network operation view on the master controller, and then press the "Network operation is: DISABLED" button. When the algorithm is enabled, the button will change its name to "Network operation is: ENABLED". In order for the master controller to properly manage the compressor assembly, before starting network operation on the master compressor, press the START button on each of the slave compressors.

Disabling the network operation algorithm will stop all slave compressors. If the stop button has not been pressed on the slave compressors in the meantime, restarting them only requires pressing the "Network operation is: DISABLED" button in the network operation view on the master controller.

In order to configure the pressure on any of the controllers in the network, press its tile and then enter the appropriate pressure values.

16.3. Errors and events in network operation

If an error occurs in the compressor or in one of the slave compressors, it will be automatically disabled from operation in the master control algorithm. Restoring such a compressor to operation in the algorithm will be only possible when the fault is removed and the error is confirmed on its controller. If an error occurs in the master controller, it will be excluded from the master operation algorithm, however, it will still control the operation of slave compressors.

If the connection to one or more of the slave controllers is interrupted, the status window of the slave compressor will display the message "Communication error". Such a compressor will be excluded from the master operation algorithm, however, if there are no additional errors in the slave compressor, this compressor will operate according to the last pressure settings received from the master controller. This also means that in the event of a loss of communication with the master controller network, the remaining compressors will not shut down, but will operate in accordance with the last pressure settings received.

16.4. Sequential operation algorithm (SEQ)

The sequential algorithm is designed for network operation of a group of compressors of similar power. The assumption of the algorithm is to evenly distribute the run time between all compressors in the network. This is done by rotating the load pressure (Pd) and relief pressure (Pu) settings by a specified rotation time, which can be configured by going to the **User Parameters tab** \rightarrow **Network operation** \rightarrow **Configuration**.

During the rotation phase, individual compressors do not stop. The compressor may be stopped/started only as a result of the reference of the current pressure in relation to its newly set Pu - Pd limits. Only active compressors are involved in the pressure rotation procedure.

Exclusionary, step intervals are an example, recommended setting of Pu - Pd pressure limits in the sequential algorithm. With such a distribution, the compressor with the highest limit range will be switched off at the last (when the required network pressure is reached) and switched on as the first, because it has the highest lower Pd pressure limit.

The second example of Pu - Pd limit settings in the sequential algorithm is to give the compressors identical upper Pu limits and lower step limits. In this situation, all compressors will be switched off at the same time, and switched on at pressure drops below the subsequent lower Pd limits.

Be	fore r	otation	Aft	er firs	st rotation	Aft	er seo	cond rotation	cd.
ID	Pd	Pu	ID	Pd	Pu	ID	Pd	Pu	
1	6.0	7.0	1	3.0	7.0	1	4.0	7.0	
2	5.0	7.0	2	6.0	7.0	2	3.0	7.0	
3	4.0	7.0	3	5.0	7.0	3	6.0	7.0	
4	3.0	7.0	4	4.0	7.0	4	5.0	7.0	

Compressors stopped manually or as a result of a critical error are automatically given the lowest pressure limits (with the automatic reconfiguration function turned on), and their limits are transferred to active compressors with the lowest Pu - Pd limits. For example, if in the first instance the compressor with ID 2 is stopped manually, then after reconfiguration, the distribution of boundaries will look like in the second instance. If the compressor with ID 2 is still inactive during the rotation procedure, the pressure distribution will look like in the third instance.

16.5. Cascading algorithm (CAS)

The cascade operation algorithm is designed for network operation of a group of compressors of different power capacities. This algorithm assumes that the compressor with the lowest power will be switched on and off most often. The compressor with the highest power will be started only in cases of high demand for air in the network.

An example, recommended setting of Pu - Pd limits in the cascade algorithm is to give the compressors identical upper Pu limits and lower step limits (instance 1). In this situation, all machines will compress air until the required network pressure is reached, and then they will be switched off at the same time. With a low pressure demand, the compressor with the lowest power (ID=4) will be switched on. If, despite its operation, the pressure falls below the lower limit of the compressor with ID=3, this compressor will also be switched on.

1. All active				2. (Comp	resso	or ID=2 not active
ID	Pd	Pu	Power	ID	Pd	Pu	Мос
1	3.0	7.0	120kW	1	4.0	7.0	120kW
2	4.0	7.0	100kW	2	3.0	7.0	100kW
3	5.0	7.0	50kW	3	5.0	7.0	50kW
4	6.0	7.0	20kW	4	6.0	7.0	20kW

In the cascade algorithm, the Pu - Pd pressure limits are permanently assigned to a given compressor identifier. There is no rotation procedure (the rotation time parameter is not taken into account). Thus, when setting pressure limits, their order relative to ID is important. With the automatic reconfiguration function enabled, compressors stopped manually or as a result of an error are automatically assigned the lowest Pu - Pd pressure limits in the network. This shifts the lower limits up one position. For example, if in instance 1 a critical error occurs in the compressor with ID=2, then after automatic reconfiguration, the distribution of Pu - Pd pressure limits will look like in instance 2. When the compressor with ID=2 is restored to operation, the boundary distribution will return to instance 1.

16.6. Master controller configuration

In order to configure the master controller for network operation, the communication parameters of the RS-485 port must first be configured. There are 2 independent RS-485 ports available in the controller, one of them is isolated (RS-485 ISO). Any of the ports can be used for controller network operation.

To configure the parameters of the selected RS-485 port, go to the User parameters tab \rightarrow Configuration of inputs/outputs \rightarrow RS-485/RS-485 ISO.

Communication parameters: The band rate, parity, and stop bits should be configured the same for all devices in the network.

For long distances between controllers, it is recommended to set lower band rates.

The "RS-485 function" parameter must be set to "Master".



Figure 44: The RS-485 port configuration menu

In the next step, configure the network operation parameters. To do this, go to the User parameters tab \rightarrow Network operation \rightarrow Configuration. The "Operate as master compressor" parameter should be set to "Enable", this will automatically set the "Remote mode" parameter to "NET".

In the remaining parameters, select the number of slave compressors (excluding the master compressor), the operation algorithm of the master control (sequential or cascading).

The parameter "Switching delay between slave compressors" determines the delay of starting subsequent compressors in the network and aims to protect the power network from overloading as a result of starting too many compressors at once.

The parameter "Rotation time" applies only to the sequential mode and determines the interval in which the pressure settings will be changed between successive compressors.

The "Master compressor load/relief pressure" parameters determine the pressure settings for the master compressor.

The "Automatic reconfiguration of pressure limits" parameter, if enabled, is responsible for transferring the pressure settings from the compressor in which the failure occurred to the compressor that is operating correctly.

In the case of network operation involving compressors equipped with an inverter, the operating point is common to all compressors in the network, it is configured in the "Network operation point" parameter. This setting is sent to all slave compressors equipped with an inverter.



Figure 45: Network operation configuration menu 1/3

	Network setup			
Ċ	Delay between slave compressors activations	8	s	
	Rotation time	240	min	
	Unload pressure for master compressor	10.00	bar	2/3
Þ	Load pressure for master compressor	6.50	bar	\checkmark
9.61 bar	Automatic pressure limits reconfiguration	ON		_

Figure 46: Network operation configuration menu 2/3

ر ا	Network setup		
	Network operating point	0.00 bar	\uparrow
			3/3
Þ			\checkmark
9.60 bar			

Figure 47: Network operation configuration menu 3/3

The last step in the parameterization of the master controller is the configuration of each of the slave compressors. The sub-compressor configuration tabs are available in **User parameters** \rightarrow **Network operation** \rightarrow **Compressor**. The number of compressors that can be configured depends on the number of slave compressors entered. Each of the slave compressors is configured in the same way by entering the pressure settings of the selected compressor in the "Relief pressure" and "Load pressure" parameters.

In the "Interface" parameter, select which RS-485 port of the master controller the slave compressor is connected to ("RS-485" or "RS-485 ISO")..

The "Modbus address" parameter specifies the modbus address that was assigned to a given slave compressor, it should be rewritten from the slave compressor controller after its configuration.

Note!

Controller addresses within a single network may not be duplicated. Each of the slave compressors should have a different address.

रि	Network operation					
	Configuration					
	Compressor 1	1/2				
Þ	Compressor 2					
9.60 bar	Compressor 3					

Figure 48: Network operation menu

	Slave compressor 1 configuration					
Ċ	Unload pressure	8.00 bar				
	Load pressure	7.50 bar				
	Interface	RS-485 ISO				
Þ	Modbus address	1				
9.61 bar						

Figure 49: Slave compressor 1 configuration menu

16.7. Slave controller configuration

In order to configure each of the slave controllers, first configure the RS-485 port to which the network is connected. Go to the User parameters tab \rightarrow Configuration of inputs/outputs \rightarrow RS-485/RS-485 ISO.

The communication parameters of the selected RS-485 port, i.e. "Bitrate", "Parity" and "Stop bits", must be configured in the same way as on the master controller.

Select "Slave" in the "RS-485/RS-485 ISO function" parameter

Enter any address that will coincide with the selected slave compressor configured in the master controller in the "Modbus address" parameter.

Note!

Controller addresses within a single network may not be duplicated. Each of the slave compressors should have a different address.

The whole process must be repeated on each of the slave compressors.

र	RS-485		
	Baud rate	9600	
	Parity	None	
	Stop bits	1	
Ð	RS-485 function	Slave	
9.60	Modbus address	2	

Figure 50: The RS-485 port configuration menu

The last step in the configuration of the slave compressor is to change the remote mode to "NET". To make a change, go to the **User parameters tab** \rightarrow **Operation parameters** \rightarrow **Operation modes**.

<	Operating mode				
	Operating mode	Αυτο			
	Remote mode	NET			
\triangle					
Þ					
9.60 bar					

Figure 51: Remote mode setup menu

17. Web server (Visualization system)

The controller is equipped as standard with a visualization system (web server), enabling real-time monitoring of the compressor via the local LAN.

The web server is presented in the form of a website. The website is hosted directly from the controller on the local network, which does not require the installation of any software. For correct operation a web browser on a computer with access to the LAN to which the controller is connected will suffice It is possible to browse the web server page by several users at the same time, on several computers.



The web server does not have the ability to remotely change the controller parameters.

17.1. Web server - description of the graphical user interface

The web server is divided into many subpages corresponding to individual tabs in the controller. Many of them are extended on the web server.

Regardless of the content of the subpage that the user is currently browsing, the navigation bar on the web server and the top bar are always visible.

The side navigation bar allows the user to go to any subpage of the visualization system, and indicates which subpage the user is currently viewing.

List of subpages of the web server:

- Desktop
- Sensors
- · Charts
- Consumption
- Messages
- Service counters
- · Scheduled operation
- Information



Figure 52: Web server navigation sidebar

The top bar allows the user to view the basic parameters of the compressor regardless of the subpage the user is viewing.

List of parameters visible in the top bar:

- Compressor name
- Current pressure
- Abbreviated compressor status
- Fan operation icon
- · Motor icon that changes colours in the same way as on the controller
- Date and time from controller

9.60 bar Stopped 😵 🕒 12:08 20:07:2023

Figure 53: Top web server info bar

17.2. Web server - Desktop

The "Desktop" subpage " is the default view of the web server. It shows all the most important compressor parameters.

List of parameters visible on the Dashboard subpage

Nazwa testowa

- Pressure
- Current pressure settings
- Bargraph and bargraph reading
- Motor frequency
- · Pressure chart for the last 8 hours
- Oil temperature
- Compressor status
- Motor status
- Operation mode
- List of active messages
- Network operation icon
- Scheduled operation icon
- Fan operation icon
- Dryer operation icon
- Heater operation icon
- Condensate drain icon

Compressor and controller basic information

	Nazwa testowa		9.60 bar Stopped 😵 🕒 12:08 20-07-2023
🖵 Desktop	DESKTOP		
Sensors	Network pressure Pressure estilings Pressure drop/increase	Oil temperature	Operation mode
Charts	9.60 bar Load pressure 8.50 bar	51.0 °C	AUTO
LLL Consumption	bar 12	Compressor status	Automatic mode
🖂 Messages			Motor status
Service counters		Deactivated	
Planned operation			Motor stopped
Hetwork operation	9389 9659 97397 9659 9750 10307 1138 1230		
① Information	Active messages	Network operation Planned operation	Serial plate
	Unter FIUUI Status Messange		Software version v1965 Controller serial number NOT_SET
		Master disabled Enabled	Controller model
		Fan DisaBLED Fan NOT AVAILABLE DisaBLED Dryer DisaBLED DisaBLED	Controller serial number abed12245 Compressor nume Nazwa testowa Start up method Star-detta Manufacturer

Figure 54: Web server dashboard view

17.3. Web server - Sensors

The "Sensors" subpage corresponds to the "Sensors" tab in the controller. Only values of the sensors configured in the controller are displayed in it.

List of sensors available for viewing on the "Sensors" subpage:

- Network pressure
- Oil pressure
- Oil temperature
- Motor temperature
- Air temperature
- Ambient temperature
- Motor current
- Motor power
- Dew point
- Output frequency

17.4. Web server - Charts

The "Charts" subpage presents charts available on the controller. The ranges of time intervals are the same as on the controller (hour, day, week). In addition, the web server allows he user to overlay charts of the same types of parameters, e.g. temperatures. After hovering the cursor over a given place on the chart, a window will appear with information about the exact value on the chart along with the date and time.

List of data from which charts are generated:

- Network pressure
- Oil temperature
- Motor temperature
- Air temperature
- Motor current
- Output frequency

17.5. Web server - Consumption

The "Consumption" subpage presents time statistics from the controller, extending them with a circular diagram of the load and relief work distribution, or in the case of compressors equipped with an inverter, a bar graph showing the work distribution over individual load ranges.

17.6. Web server - Messages

The "Messages" subpage allows the user to view the history of messages (Errors and Warnings) that have occurred in the controller in the past or are active at a given moment. Active messages are highlighted with a blue flag symbol. The web server allows the user to filter events in the list by type (error, warning, active, inactive) or by date. It is also possible to search for events by name.

17.7. Web server - Service counters

The "Service counters" subpage shows the service counters active in the controller and their values. Additionally, the progress bar of each meter is also displayed. The progress bar shows 100% in the case of a reset counter, this value decreases with run time / when the date of the next inspection approaches.

17.8. Web server - Scheduled operation

The "Scheduled operation" subpage presents all events configured in the controller with their parameters and status, divided into one-off and cyclic events.

17.9. Web server - Information

The "Information" subpage duplicates the information from the "Information" tab in the controller.

17.10. Initiating and configuring connection with the web server

In order to configure the web server, go to the User parameters tab \rightarrow Configure inputs/outputs \rightarrow IP settings. Next, select from the list how the IP address will be assigned to the controller in the local network. The avilable modes are auto (DHCP) and static.

In the automatic mode, the IP address will be assigned automatically via the DHCP server running on the network (this depends on the individual configuration of the local network).

In the static mode, the user can configure the standard parameters of the network device.

List of parameters that can be configured in static mode:

- IP address
- Subnet mask
- Gateway

Note!

After each change press the "SAVE" button, otherwise the parameters will not be saved.

(IP se	IP settings				
	Assigning an IP address	Static (without DHCP)				
	IP address	10.12.1.2				
	Subnet mask	255.255.255.0				
Þ	Gateway	10.12.1.1				
9.61 bar	After entering parameters, necessary to save them	it is SAVE				

Figure 55: IP address configuration menu

To check the assigned IP address, go to the "Information" tab available from the main menu of the controller. The MAC address of the device is also available there.



Figure 56: The "Information" tab with the IP and MAC address.

18. Warnings and errors

The controller displays current errors and warnings in the form of icons on the sidebar of the user interface. The icons will remain visible on the screen until the user confirms the event in the "Active warnings and errors" tab, only if the error or warning has been resolved. After confirmation, the message will disappear from the list. If the message is still visible, the root cause of the error or warning has not been resolved. Error information is also displayed in the form of a text message on the main interface view. This also applies to errors and warnings of internal inverters. The controller reads the inverter messages and displays them along with a description. The messages can be sorted by their impact on the compressor operation:

Warning - does not affect compressor operation Critical error - emergency (immediate) motor stop Non-critical error - standard motor stop

In the event of any error, it will not be possible to restart the motor as long as the error remains active.

18.1. Warnings

18.2. Warnings of the controller

Error code	Warning Name	Туре	Description
W01	Inspection Necessary	Warning	The date set by the service techni- cian on which the overhaul should be performed has arrived.
W02	Service due soon	Warning	The service date set by the service technician is due soon.
W03	Network pressure too high	Warning	The network pressure is close to the maximum value set by the service technician.
W04	Low network pressure	Warning	The network pressure is close to the minimum value set by the service technician.
W05	Received pressure values are invalid	Warning	Driver returns information that the pressure values are invalid.
W06	Oil replacement due soon	Warning	The oil replacement date set by the service technician is due soon.
W07	High motor oil temperature warning	Warning	The oil temperature is close to the maximum value set by the service technician.
W08	Necessary oil change	Warning	The date set by the service tech- nician on which the oil should be changed has arrived.
W09	Oil filter replacement time due soon	Warning	The oil filter replacement date set by the service technician is due soon.
W10	Necessary oil filter inspection	Warning	The date set by the service techni- cian for the oil filter inspection has arrived.

Table 21: Warnings

Error code	Warning Name	Туре		Description
W11	Oil filter error [OF]	Warning		The oil filter sensor reports that an
				error has occurred.
W12	Oil separator replacement	Warning		The oil separator replacement date
	due soon			set by the service technician is due
				soon.
W13	Necessary oil separator re-	Warning		The date set by the service techni-
	placement			cian on which the oil separator filter
				inspection must be performed has
				arrived.
w14	Separator error [SEP]	Warning		The separator sensor reports that
				an error has occurred.
W15	Air filter replacement due	Warning		The air filter replacement date set
	soon			by the service technician is due
				soon.
VV16	Necessary air filter replace-	vvarning		I he date set by the service techni-
	ment			cian for the air filter inspection has
	Air filtor orror [A E]	Morning		Occurred.
VV17	Air liller erfor [AF]	vvarning		orrer bas accurred
\\/10	Air tomporature concer short	Marning		The senser has been connected in
VVIO	All temperature sensor short	vvarning		correctly or it is faulty
W/10	No air tomporaturo sonsor	Warning		The controller informs that an air
VV19	No all temperature sensor	vvarning		temperature sensor is not connec-
				ted to the compressor
W20	Belt tension check time is due	Warning		Service technician set date to check
1120	soon	Varning		belt tension is due soon.
W21	Belt Tension Check Neces-	Warning		The date set by the service techni-
	sary	g		cian to check the belt tension has
	, ,			arrived.
W22	Ambient temperature sensor	Warning		The sensor has been connected in-
	short circuit			correctly or it is faulty.
W23	No ambient temperature	Warning		The controller informs that an ambi-
	sensor			ent temperature sensor is not con-
				nected to the compressor.
W24	Dryer not ready	Warning	renew-	The dryer is not ready for operation.
		able		
W25	Battery warning	Warning		Due to a battery issue, the controller
				does not save the date.
W26	Controller battery low	Warning		The controller battery is low.
W27	Controller battery critically	Warning		The controller battery is critically
	low			low.
W28	CT short circuit	Warning		Sensor has been misconnected or
				some part has been damaged.
W29	No CT	Warning		Driver returns information that the
14/00				compressor nas no CT connected.
W30	Dew point too low	Warning		The dew temperature is close the
				minimum value set by the service
				technician.

Error code	Warning Name	Туре	Description
W31	Dew point too high	Warning	The dew temperature is close to the maximum value set by the service technician.
W32	Dew point sensor short circuit	Warning	The sensor has been connected in- correctly or it is faulty.
W33	No dew point sensor	Warning	The controller informs that a dew point sensor is not connected to the compressor.
W34	Network operation commu- nication error	Warning	The controller informs that there was a network operation problem.
W35	Slave compressor 1 commu- nication error	Warning	Slave compressor 1 is not connec- ted to the network, or there is a com- munication error.
W36 Slave com- pressor 2 commu- nication error	Warning	Slave com- pressor 2 is not connected to the network, or there is a communication error.	
W37 Slave com- pressor 3 commu- nication error	Warning	Slave com- pressor 3 is not connected to the network, or there is a communication error.	
W38 Slave com- pressor 4 commu- nication error	Warning	Slave com- pressor 4 is not connected to the network, or there is a communication error.	
W39 Slave com- pressor 5 commu- nication error	Warning	Slave com- pressor 5 is not connected to the network, or there is a communication error.	
W40	Network operation has been disabled on master controller	Warning	Network operation has been dis- abled or lost connection on master controller.
W41	User Counter 1 necessary in- spection	Warning	The date set by the service techni- cian on which to perform the inspec- tion of the user counter 1.

Error code	Warning Name	Туре	Description
W42	User Counter 2 necessary in-	Warning	The date set by the service techni-
	spection		cian on which to perform the inspec-
			tion of the user counter 2.
W43	User Counter 1 review date is	Warning	Service technician set date ap-
	due soon		proaching for general Inspection.
W44	User Counter 2 Inspection is	Warning	Service Technician set date ap-
	due soon		proaching for general Inspection.
W45	Inverter Warning	Warning	A warning occurred on the inverter.
W46	Flow sensor short circuit	Warning	Flow sensor short circuit.
W47	No flow sensor	Warning	No flow sensor connected to input.
W48	Motor bearing lubrication re-	Warning	Motor bearing lubrication service
	quired		counter exceeded set value.
W49	Motor Bearing Lubrication	Warning	Warning of Bearing Lubrication Ser-
	Time Approaching		vice Counter Approaching Expira-
			tion.
W54	Additional Temperature Too	Warning	Additional Temperature too Low.
	Low		
W55	Additional temperature too	Warning	Additional temperature too high.
	high		
W56	No dew point temperature	Warning	No dew point sensor connected.
	sensor		
W57	Dew Point Temperature	Warning	Dew Point Sensor Short-circuit
	Sensor Short-circuit		

18.3. DANFOSS inverter warning information

Error code	Error description
W1	Low 10V voltage
W2	Live zero error (W2)
W3	No motor
W4	Power loss
W5	High DC circuit voltage
W6	Low DC circuit voltage
W7	DC circuit overvoltage
W8	DC circuit voltage below minimum
W9	Inverter overload
W10	ETR motor overheating
W11	Motor overheating
W12	Torque limitation
W13	Overcurrent
W14	Ground error
W17	TO controller control
W25	Brake resistor
W26	Brake overload

Table 22: Inverter warnings
Error code	Error description
W27	IGBT brake
W28	Brake check
W34	Fieldbus error
W36	Power failure
W47	Low 24V power supply
W49	Maximum speed limit
W59	Current limit
W62	Output frequency limit
W64	Voltage limit
W65	Control card temperature
W66	Low temp.
W68	Safe stop
W69	Power card overheating
W90	Encoder signal loss

Table 22: Inverter warnings

18.4. YASKAWA inverter warning information

Table 23: Inverter warnings

Error code	Error description
dEv	Speed deviation
CALL	Communication error
oH2	Inverter overheat warning
oH3	Motor overheat warning
DC Uv	Supply voltage too low

18.5. Delta inverter warning information

Table 24: Inverter warnings

Error Code	Error Description
CE1	Invalid Modbus RS-485 function code
CE2	Invalid Modbus RS-485 data address
CE3	Invalid Modbus RS-485 data value
CE4	Modbus RS-485 data writing is set to read-only
CE10	Modbus RS-485 timeout
SE1	Keypad 1 copy error: Timeout expired
SE2	Keypad 2 copy error: Error writing parameters
oH1	AC motor detects IGBT overheating and above protection level warning oH1
oH2	The controller has detected capacitor overheating
PID	PID Feedback information loss (Analog feedback warning; only works when PID is enabled)
ANL	Analog input current loss (includes all 4-20mA analog signals)

Error Code	Error Description
uC	Low current
PGFB	PG Information return error warning
oSPD	Overspeed warning
dAvE	Overspeed deviation warning
PHL	Input Phase Loss Warning
ot1	Excess torque warning 1
ot2	Over torque warning 2
oH3	Engine overheating warning. The AC motor drive detects that the tem-
	perature inside the motor is too high
oSL	Over slip warning.
tUn	and auto-tuning of parameters are in progress. The keypad displays
	"tUn" during auto-tuning
OPHL	Output phase loss
SE3	Keypad 3 copy error: copy model error
CGdn	CANopen protection timeout 1
CHbn	CANopen heart rate error
CbFn	CANopen bus disable error
Cldn	CANopen index error
CAdn	CANopen station address error (only supports 1–127)
CFrn	CANopen memory error
CSdn	SDO transmission timeout (visible only on the master station)
CSbn	CANopen SDO receives a register overflow
CPtn	CANopen protocol format error
PLrA	PLC (RTC) is not adjusted
PLiC	InnerCOM Error
Plrt	PLC Error (RTC)
PLod	PLC download error warning
PLSv	Data error while saving PLC work
PLdA	Data error during PLC operation
PLFn	PLC download function code error
PLor	PLC register overflow
PLFF	Function code error during PLC operation
PLSn	PLC checksum error
PLEd	No PLC termination command
PLCr	PLC MCR command error
PLdF	PLC download failed
PLSF	The PLC scan time exceeds the maximum allowable time
PCGd	CANopen master protection error
PCbF	CANopen master BUS disabled
PCnL	CANopen master node error
PCCt	CANopen master cycle timeout
PCSF	CANopen master SDO overflow
PCSd	CANopen master SDO timeout
PCAd	CANopen master station address error
РсТо	When the disk receives an invalid packet, it means that there is interfer-
	ence or the command from the master unit does not match the CANopen
	format command

Error Code	Error Description
ECid	Duplicate MAC ID error. Node address setting error
ECLV	Communication card low voltage
ECtt	The communication card is in test mode
ECbF	The communication board detected too many errors in the BUS file, then
	went into BUS-OFF mode and stopped communication
ECnP	DeviceNet is missing power
ECFF	Factory Default
ECiF	Serious Internal Error
ECio	Connection of inputs and outputs broken
ECPP	Profibus parameter data error
ECPi	Profibus configuration data error
ECEF	Ethernet cable not connected
ECto	Communication time limit reached for communication card and master unit
ECCS	Communication card and drive checksum error
ECrF	Communication card returns to default settings
ECo0	MODBUS TCP exceeds the maximum communication value
ECo1	Ethernet/IP exceeds the maximum communication value
ECiP	IP setting error
EC3F	Mail Alert: An alarm message will be sent when the communication card
	establishes
Ecby	Communication card busy: Too many packets received
ECCb	Communication Card error warning
CPLP	Copy PLC password error. When KPC-CC01 processes the PLC copy
	and the PLC password is invalid, and the CPLP warning appears
CPL0	Copy PLC read mode error
CPL1	Copy PLC write mode error
CPLv	Copy PLC version error. When a non-C2000 embedded PLC is copied
	to a C2000 drive, a CPLv warning appears
CPLS	Copy PLC capacity size error
CPLF	Use the KPC-CC01 PLC copy function when the PLC is turned off
CPLt	Copy PLC timeout
ictn	Internal communication timeout
SpdR	Estimated speed are in the opposite direction of the actual direction of
	operation
dEb	Braking energy reserve

18.6. Errors

Table 25: Błędy

Error code	Warning name	Туре		Description
E01	Power asymmetry error	Critical (auto possible)	error restart	Power supply phase shift

Error code	Warning name	Туре	Description
E02	Phase sequence error	Critical error	Incorrect phase sequence detec-
			ted.
E03	Thermal fault	Critical error	Motor temperature exceeded.
E04	Network pressure too high	Critical error	The controller informs that the net-
			work pressure is too high.
E05	No network pressure sensor	Critical error	The controller informs that there is a
			problem with the pressure sensor.
E06	Network pressure sensor	Critical error	The sensor has been connected in-
	short-circuit		correctly or it is faulty.
E07	No pressure sensor selected	Critical error	Select a pressure sensor.
E08	Oil temperature too high	Critical error	The controller informs that the oil
			temperature is too high.
E09	Oil temperature too low	Recurring error	The compressor cannot operate
			correctly because the oil temperat-
			ure is too low.
E10	Oil temperature rise too slow	Critical error	Oil temperature is increasing too
			slowly for the compressor to work
			correctly.
E11	Oil temperature sensor short-	Critical error	The sensor has been connected in-
	circuit		correctly or it is faulty.
E12	No oil temperature sensor	Critical error	The controller informs that there is
			a problem with the oil temperature
			sensor.
E13	Motor undercurrent after	Critical error	The current to the motor is too low
	start-up		after start-up to maintain correct
			compressor operation.
E14	Motor overcurrent	Critical error	The current to the motor is too high.
E15	Power failure	Recurring error	Power supply received inadequate
			voltage level.
E16	Motor temperature too high	Critical error	The controller informs that the mo-
			tor temperature is too high.
E17	No motor temperature sensor	Critical error	The controller informs that there is
			a problem with the fan.
E18	Motor temperature sensor	Critical error	The sensor has been connected in-
	short circuit		correctly or it is faulty.
E19	Dew point temperature too	Critical error	The controller informs that the dew
	high		point temperature is too high.
E20	Dew point temperature too	Non-critical error	The controller informs that the dew
	low		point temperature is too low.
E21	Fan error	Non-critical error	The controller informs that there is
		(auto restart pos-	a problem with the fan.
		sible)	
E22	Dryer not ready	Recurring error	The dryer is not ready for operation.
E23	Emergency stop	Critical error	C The controller informs that some
			factor caused an emergency stop of
			the compressor.
E24	Controller memory has been	Critical error	The controller has been restored to
	cleared		factory settings.

Table 25: Błędy

Error code	Warning name	Туре	Description
E25	Inverter error	Critical error	An error occurs on the inverter.
E26	Communication error with in- verter	Critical error	Incorrect communication with in- verter.
E27	Short-circuit of auxiliary tem- perature sensor	Non-critical error	Short-circuit at auxiliary temperat- ure sensor input.
E28	No auxiliary temperature sensor	Non-critical error	No auxiliary temperature sensor connected.
E29	Auxiliary temperature too low	Non-critical error	Measured auxiliary temperature value below minimum level.
E30	Auxiliary temperature too high	Non-critical error	Measured auxiliary temperature value above maximum level.
E31	24 V circuit voltage too low	Critical error	24 V circuit voltage below minimum level.
E36	Short-circuit of oil pressure sensor	Critical error	Short-circuit at oil pressure sensor input.
E37	Oil pressure sensor not con- nected	Critical error	No oil pressure sensor connected.

18.7. DANFOSS inverter errors

Table 26: Inverter errors

Error code	Error type	Error description
A2	Critical error	Live zero error
A4	Critical error	Phase loss
A7	Critical error	DC circuit overvoltage
A8	Critical error	DC circuit voltage below minimum
A9	Critical error	Inverter overload
A10	Critical error	ETR motor overheating
A11	Critical error	Motor overheating
A12	Critical error	Torque limitation
A13	Critical error	Overcurrent
A14	Critical error	Ground error
A16	Critical error	Short circuit
A17	Critical error	TO controller control
A25	Critical error	Brake resistor
A26	Critical error	Brake overload
A27	Critical error	GBT brake
A28	Critical error	Brake check
A30	Critical error	U phase loss
A31	Critical error	V phase loss
A32	Critical error	W phase loss
A33	Critical error	Pre-charging system error in start-up
		phase
A34	Critical error	Communication bus error
A36	Critical error	Power failure

Table 26: Inverter errors

Error code	Error type	Error description
A38	Critical error	Internal error
A47	Critical error	Low 24V power supply
A48	Critical error	Low 1.8V power supply
A63	Critical error	Brake error
A65	Critical error	Control card temperature
A67	Critical error	Option change
A68	Critical error	Safe stop
A69	Critical error	Power card temperature
A80	Critical error	Inverter running

18.8. YASKAWA inverter errors

Table 27: Inverter errors

Error code	Error type	Error description
Uv1	Critical error	DC supply voltage too low
SC	Critical error	Output short circuit or IGBT error
GF	Critical error	Ground error
oC	Critical error	Overcurrent
OV	Critical error	DC supply overvoltage
оН	Critical error	Heat sink overheat
oH1	Critical error	Heat sink overheat
oL1	Critical error	Motor overloaded
oL2	Critical error	Inverter overload
PF	Critical error	Input phase loss
LF	Critical error	Output phase loss
oH4	Critical error	Motor overheating
CE	Critical error	Modbus communication error
EF1	Critical error	External error - S1 terminal
SCF	Critical error	Safety system fault
oH3	Critical error	Motor overheating

18.9. Delta inverter errors

Table 28: Inverter errors

Error code	Error description
ocA	The output current exceeds 2.4 times the rated current during acceleration. When ocA occurs, the drive closes the output gate immediately. The engine is idling and the display shows the ocA error
ocd	The output current exceeds 2.4 times the rated current during deceleration. When ocd occurs, the drive closes the output gate immediately. The engine is idling and the display shows ocd error

Error code	Error description
ocn	The output current exceeds 2.4 times the rated current during deceleration. When
	ocn occurs, the drive closes the output gate immediately. The engine is idling and
	the display shows an ocn error
GFF	When one of the output terminals is grounded, the short circuit current is greater
	than the Pr setting value
000	A short circuit has been detected between the upper bridge and the lower bridge of
	the IGBT module
ocS	Excessive current or hardware error in stopping current detection. After ocS occurs,
	turn on the power. If a nardware failure occurs, cd1, cd2, or cd3 will appear on the
	UISPIRY.
OVA	DC bus overvollage during acceleration, when over occurs, the unvercioses the
ovd	Excess DC bus voltage during deceleration. When every lago occurs the drive
000	immediately closes the output gate, the motor is idling, and the display shows over
	error
ovn	Excessive DC bus voltage during deceleration. When an overvoltage occurs, the
	drive immediately closes the output gate, the motor is idling, and the display shows
	the ovn error
ovS	Power surge when stopping
LvA	The DC bus voltage is lower than the Pr setting value. 06-00 during acceleration
Lvd	The DC bus voltage is lower than the Pr setting value. 06-00 during acceleration
Lvn	The DC bus voltage is lower than the Pr setting value. 06-00 at constant speed
LvS	The DC bus voltage is lower than the Pr value. 06-00 value at stop. Voltage detec-
	tion hardware failure
Orp	Input power phase loss
oH1	The IGBT temperature exceeds the protection level
oH2	The capacity temperature exceeds the protection level
tH10	IGBT hardware error in temperature detection
tH20	Hardware error in capacitor temperature detection
OL	The AC motor drive detects excessive current. The overload capacity persists for 1
	minute when the drive is outputting 120% of the drive's rated output current.
EOLI	Electronics Thermal transmitter protection 1. Drive stops to stop when activated
EULZ	Electronics thermal transmitter protection 2. Drive stops to stop when activated
0H3	Engine overnealing
ot2	When the output current exceeds the over-torque detection level
	Low current detection
	When MIX=45 (ferward run limit) or MIX=44 (reverse run limit) during operation 1 MIT
	error will appear
cF1	The internal EEPROM cannot be programmed
cF2	The internal EEPROM cannot be read
cd1	U phase current detection error when power on
cd2	Phase V current detection error when power on
cd3	W phase current detection error when power on
Hd0	cc (current terminal) hardware protection error when power is on
Hd1	Oc hardware protection error with power on
Hd2	Hardware protection error after power-up

Error code	Error description
AUE	Auto engine tuning error
AFE	PID Feedback Loss (analog feedback signal is only valid when PID function is en- abled)
PGF1	The motor runs in the opposite direction to the control direction frequency of the control direction
PGF2	Pr. 10-00 and Pr. 10-02 are not set in PG control mode in PG control mode. When you press the "RUN" button, a PGF2 error will occur
PGF3	In PG mode, when the motor frequency exceeds the stall level of the encoder ob- server (Pr. 10-10) and the error time starts longer than the encoder observer over- load detection time (Pr. 10-11). encoder observer (Pr. 10-11), PGF3 error occurs. PGF3 error occurs.
PGF4	In PG mode, when the motor frequency exceeds the encoder observer slip range (Pr. 10-13) and the error time is longer than the encoder observer slip detection time (Pr. 10-14), PGF4 error will occur. encoder observer slip (Pr. 10-14), PGF4 error will occur
ACE	Signal Loss on Analog Input (including all 4-20mA analog signals)
EF	External error. When the drive decelerates based on the Pr setting. 07-20, EF error is displayed on the keypad
EF1	When the MIx=EF1 contact is turned on, the output stops immediately and displays EF1 on the keypad. The engine is idling
bb	When the MIx=bb contact is on, the output stops immediately and displays bb on the keypad. The engine is idling
Pcode	Entering the wrong password three times in a row
CE1	The communication command is invalid
CE2	Data address is invalid
CE3	The data value is invalid
CE4	Data is written to a read-only address
CE10	MODBUS transmission timeout occurred
bF	Motor drive brake transistor is abnormal (for models with built-in brake transistor)
ydc	The error occurs when $Y-\Delta$ switches
dEb	When Pr. 07-13 is not 0, the power will be turned off suddenly, causing the DCBUS voltage to be lower than the dEb operating level, the dEb function will operate and the motor will stop. The Keypad then displays dEb
oSL	Based on the maximum traction limit set with Pr. 10-29, speed deviation is abnormal. When the motor drives at a constant speed, F>H or F <h exceeds="" level="" set="" the="" with<br="">Pr. level set with Pr. 07-29 and exceeds the time set with Pr. 07-30, oSL will appear. oSI occurs only in induction motors. Only.</h>
ryF	Electric valve switch error when performing soft start function
PGF5	PG card hardware error
SdRv	The direction of rotation is different from the direction detected without a sensor
SdOr	Overspeed detected sensorless
SdDe	Large deviation between rotation speed and command detected by sensorless
WDTT	Watchdog error
SSTL1	STO1 - SCM1 internal loop detection error
S1	Emergency stop for external safety
Brk	External mechanical brake error The MO terminal is active when MOx=12, 42, 47 or 63, but MIx=55 does not receive a signal for mechanical brake operation during the time set in Pr. 02-56.

Error code	Error description
STO	Active safe torque off function
STL2	STO2-SCM2 inner loop detection error
STL3	Inner loop detection STO1-SCM1 and STO2-SCM2 error
OPHL	Output phase loss
OPHL	V phase output phase loss
OPHL	Phase loss at W phase output
AboF	ABZ line disabled for protection when using PG02U
UvoF	UVW line disabled for protection when using PG02U
oL3	Low frequency and high current protection
RoPd	Rotor position detection error protection
Fstp	Keypad forced PLC to stop
TRAP	Processor failure
CGdE	CANopen protection error
ChbE	CANopen heartbeat error
CbFE	CANopen bus disable error
CldE	CANopen index error
CAdE	CANopen station address error (only supports 1-127)
CFrE	CANopen memory error
ictE	Internal communication timeout
SfLK	The inverter has a RUN command with the output frequency, but the permanent
	magnet motor does not rotate
AUE1	No feedback current error when motor parameter automatically detects
AUE2	Motor phase loss error when motor parameter automatically detects
AUE3	No-load current measurement error IO when motor parameter automatically detects
AUE4	Lsigma leakage inductance measurement error when motor parameter automatic-
	ally detects
CBM	Error matching control card

19. Technical specification

19.1. Electrical parameters

Parameter	Value
Supply voltage	24 VAC 50/60 Hz
Power consumption	Up to 10 W
Relays - maximum switching voltage	250 VAC
Maximum load sum of REL1, 2, 3, 4 relay group (resistive)	4 A
Maximum load of each of the REL5, 6, 7, 8 relays (resistive)	3 A
REL9 relay maximum load (resistive)	3 A
Maximum relays load (inductive)	0,5 A
Maximum current in the current loop	28 mA
Maximum power consumption from internal reference	250 mA
voltage	
Digital inputs - minimum voltage	-0,5 VDC
Digital inputs - maximum voltage	24,7 VDC
Analog inputs - minimum voltage	-0,5 VDC
Analog inputs - maximum voltage	24,7 VDC

Table 29: List of electrical parameters

19.2. Mechanical parameters

Table 30: Mechanical parameters

Parameter	Value
Housing dimensions	180 x 110 x 74 mm
Weight (without packaging)	951 g
Assembly	Clips

19.3. Operating conditions

Table 31: Permissible operating conditions

Parameter	Value
Operating temperature	-15 ÷ 50°C
Storage temperature	-20 ÷ 70°C
Relative humidity	10 ÷ 90%, no condensation

20. Controller dimensions





15.0