Elimko E-PR-200
PAPERLESS RECORDER
USER MANUAL

Manufacturer / Technical Support
Elimko Electronic Production and Control Co. Ltd.
8. Avenue 68. Street No:16 06510 Emek- Ankara / TURKEY
Phone: + 90 312 212 64 50 Fax: + 90 312 212 41 43
www.elimko.com.tr e-mail:elimko@elimko.com.tr

1. INDEX

1. INDEX ---- **2**

2. FIGURES ---- **3**

3. WARNINGS ---- **5**

4. DESCRIPTION ---- **6**

4.1. TYPE CODING ---- 6
4.2. TECHNICAL SPECIFICATION ---- 7
4.3. DIMENSIONS ---- 8
4.4. PANEL MOUNTING ---- 8

5. USAGE ---- **9**

5.1. FRONT PANEL ---- 9
5.2. TREND PAGE ---- 11
5.3. BAR GRAPHIC PAGE ---- 14
5.4. DIGITAL VIEW PAGE ---- 14
5.5. OVERVIEW PAGE ---- 15
5.6. ALARM LOG ---- 16
5.7. TOTALIZER LOG ---- 16
5.8. INSTRUMENT LOG ---- 17
5.9. OPERATOR LOG ---- 17
5.10. DIGITAL LOG ---- 18
5.11. DIGITAL 2 ---- 18

6. MENU PAGES ---- **19**

6.1. ADJUSTING PARAMETERS ---- 19
6.2. MAIN MENU ---- 19
6.3. DEVICE PAGE ---- 20
6.4. SECURITY PAGE ---- 21
6.5. HARDWARE PAGE ---- 21
6.6. CHANNELS PAGE ---- 25
6.6.1. RELAY OUTPUT CARD ADJUSTMENTS ---- 26
6.6.2. DIGITAL OUTPUT CARD ADJUSTMENTS ---- 26
6.6.3. ANALOG INPUT CARD ADJUSTMENTS ---- 28
6.6.4. ANALOG OUTPUT CARD ADJUSTMENTS ---- 30
6.6.5. ALARM ADJUSTMENTS ---- 31
6.6.6. TOTALIZER ADJUSTMENTS ---- 32
6.6.7. RECORD ADJUSTMENTS ---- 33
6.6.8. DIGITAL INPUT CARD ADJUSTMENTS ---- 34
6.6.9. MODBUS CHANNELS PAGE ---- 34
6.6.10. MATH CHANNEL ADJUSTMENTS ---- 35
6.7. REAL TIME CHANNELS PAGE ---- 36
6.8. GROUPS PAGE ---- 37
6.9. CUSTOM TABLES ---- 43
6.10. ARCHIVE ---- 43
6.11. E-MAIL ---- 44
6.12. PID ---- 46

7. CONNECTION DIAGRAMS ---- **50**

8. DATA TRANSFER COMMUNICATION PROTOCOLS ---- **53**

9. APPENDIXES ---- **53**

APPENDIX 1: ETHERNET CONNECTION ---- 53
APPENDIX 2: EQUATION CREATION USING MATH EDITOR ---- 54
APPENDIX 3: MODBUS RTU COMMUNICATION ADDRESSES ---- 55
APPENDIX 4: BARCODE READER ---- 55

2. FIGURES

Figure 4.1 E-PR-200 dimensions and Panel Mounting..... 8
Figure 4.2 E-PR-200 Panel Cut Hole 8
Figure 5.1 Trend View..... 9
Figure 5.2 Operation keys..... 9
Figure 5.3 Trend View Screen 11
Figure 5.4 Active buttons and meaning in the Trend view screen 12
Figure 5.5 Active buttons and options on the Trend view screen 13
Figure 5.6 Start Batch Screen 13
Figure 5.7 Bar View Screen 14
Figure 5.8 Digital View Screen 14
Figure 5.9 Totalizer reset and add operator messages (Digital View Page)..... 15
Figure 5.10 Batch Screen View..... 15
Figure 5.11 Alarm Log screen..... 16
Figure 5.12 Totalizer Log screen..... 16
Figure 5.13 Instrument Log screen 17
Figure 5.14 Operator Log screen..... 17
Figure 5.15 Digital Log screen..... 18
Figure 5.16 Digital 2 screen..... 18
Figure 6.1 Password input window to the main menu 19
Figure 6.2 Main Menu..... 20
Figure 6.3 Device Page 20
Figure 6.4 Date and Time adjustments page..... 20
Figure 6.5 Security Adjustments Page (Admin Adjustment) 21
Figure 6.6 Security Adjustments Page (User Adjustment)..... 21
Figure 6.7 Hardware Slot Settings Page..... 21
Figure 6.8 Hardware Relay Output Test Page 22
Figure 6.9 Analog Input Card Calibration Page..... 22
Figure 6.10 Analog Output Card Calibration Page 23
Figure 6.11 Hardware Ethernet Page (Obtain an IP address via DHCP)..... 24
Figure 6.12 Hardware Ethernet Page (Manual Set) 24
Figure 6.13 Hardware Serial Port screen..... 24
Figure 6.14 Hardware Screen Adjustments..... 25
Figure 6.15 Drawing Options Adjustments..... 25
Figure 6.16 Color selection screen..... 25
Figure 6.17 Slot Channels Page 25
Figure 6.18 Relay Output Card Adjustments 26
Figure 6.19 Digital Output Card Adjustments..... 27
Figure 6.20 Analog Input Card Input adjustmens 28
Figure 6.21 Input Type Selection 29
Figure 6.22 Linearization Select 29
Figure 6.23 Linearization Select 29
Figure 6.24 Linearization Select 29
Figure 6.25 Disabled CJ Type, CJ Temperature and CJ Source parameters 29
Figure 6.26 CJ Type selections..... 30
Figure 6.27 Analog Output Card Adjustments..... 30
Figure 6.28 Source Process Value & Output Value (Analog Output Card) 31
Figure 6.29 Alarm 1 Type selection..... 31
Figure 6.30 Alarm 2 Type selection..... 31
Figure 6.31 Alarm Type selection..... 31
Figure 6.32 Low and High Alarm Forms 32
Figure 6.33 Slow Rate and Fast Rate Alarm Forms 32
Figure 6.34 Analog Input Totalizer adjustments..... 32
Figure 6.35 Analog Input Record adjustments 33
Figure 6.36 Digital Input Card, Input adjustments 34
Figure 6.37 Digital Input Card, recording settings..... 34
Figure 6.38 MODBUS Channels..... 35
Figure 6.39 Register Types..... 35
Figure 6.40 Math Analog Page 35
Figure 6.41 Math Digital Page 35
Figure 6.42 Real Time Channels (RTC) Page 36
Figure 6.43 Real Time Channels (RTC) source selection..... 36
Figure 6.44 Real Time Channels (RTC) period selection..... 36

Figure 6.45 Groups Page (1…6) 37
Figure 6.46 Groups Page (7…12) 37
Figure 6.47 Groups Page group selection 37
Figure 6.48 Trend Page (Trend Type Circular) 38
Figure 6.49 Changing alarm set values 38
Figure 6.50 Graphical drawing direction selection from Groups menu 38
Figure 6.51 If Trend Type HORIZONTAL is selected 38
Figure 6.52 If Trend Type VERTICAL is selected 38
Figure 6.53 If Trend Type CIRCULAR is selected 38
Figure 6.54 Grup Konfigürasyon Sayfası 39
Figure 6.55 Source Selection Page 39
Figure 6.56 Digital input active 40
Figure 6.57 Digital input passive 40
Figure 6.58 Digital input active 40
Figure 6.59 For example, GROUP-1 Trend Page 41
Figure 6.60 Press to select Open/Stop Batch 41
Figure 6.61 GROUP-1 Page, Open Batch 41
Figure 6.62 GROUP-1 Page, Stop Batch 41
Figure 6.63 Custom Tables Page 43
Figure 6.64 Analog Input page table selection 43
Figure 6.65 Archive Synchronization Page 44
Figure 6.66 Archive Backup Page 44
Figure 6.67 E-MAIL Server Page 44
Figure 6.68 E-MAIL Recipients Page 45
Figure 6.69 E-MAIL Sources Page 45
Figure 6.70 E-MAIL Events Page 46
Figure 6.71 PID Configuration Window 46
Figure 6.72 Definition of PID Source to Analog Output 47
Figure 6.73 Definition of PID Source to Relay Output 47
Figure 6.74 PID Trend Page 48
Figure 6.75 PID Control Page 48
Figure 6.76 PID Control Page 49
Figure 7.1 E-PR-200 Rear Panel 50
Figure 7.2 Power, Transmitter Supply, RS-485 and Ethernet Connections 50
Figure 7.3 Analog Input Card Connection Diagrams (3 Channels) 51
Figure 7.4 Analog Input Card Connection Diagrams (6 Channels) 51
Figure 7.5 Digital Input&Output Cards Connection Diagrams 52
Figure 7.6 Relay Output Card Connection Diagrams 52
Figure 7.7 Analog Output Card Connection Diagrams 52
Figure 9.1 Computer Connection 53
Figure 9.2 Crossover Cable Connection 53
Figure 9.3 MATH EDITOR Page 54
Figure 9.4 Script selection button 54
Figure 9.5 Operator and Function description 54
Figure 9.6 MODBUS Table 55
Figure 9.7 Digital Channel Data Format 55

3. WARNINGS

E-PR-200 recorder is designed for panel mounting and should be used in industrial environment.

- The package of E-PR-200 recorder contains;
  Recorder
  4 pieces of mounting clamps
  1 piece M3 bolt nut
  User Manual
  Guarantee Certificate
  Elimko Data Explorer Pro Cd.
- After opening the package, please check the contents with the above list. If the delivered product is wrong type, any item is missing or there are visible defects, contact the vendor from which you purchased the product.
- Before installing and operating the controller, please read the user manual thoroughly.
- The installation and configuration of the recorder must only be performed by a person qualified in instrumentation.
- Keep the unit away from flammable gases that could cause explosion.
- Do not use alcohol or other solvents to clean the recorder. Use a clean cloth soaked in water tightly squeezed to gently wipe the outer surface of the recorder.
- Do not use any sharp objects or abrasives to avoid damaging the device.
- The product life of this instrument is 10 years.

CE

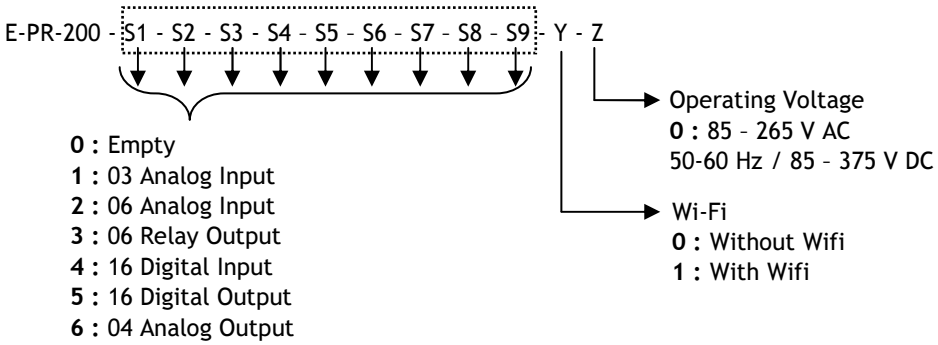
- This recorder complies with the European Low Voltage Directive 2006/95/EC, by the application of safety standard TS EN 61010-1. (Pollution Degree 2)
- This recorder complies with the EMC Directive 2004/108/EC by the application of EMC standard TS EN 61326.

4. DESCRIPTION

E-PR-200 series industrial recording and control devices complies with IEC/TR 60668 standard with its 288x288mm front panel. These series has a high brightness and high resolution, 1024x768 pixel TFT touch panel and features several analog and digital interfaces.

- 12.1 " , 1024x768 , touch panel TFT screen
- Up to 54 universal Analog Input Channels
- Up to 18 Relay Outputs
- TCP/IP Modbus Master and Slave Protocol
- RS-485 Modbus Master and Slave Protocol
- Data connection with internal HTTP and FTP Server
- Up to 144 Digital Input Channels
- Up to 32 Digital Output Channels
- Up to 18 Analog Output Channels
- Standard RS-485 communication port
- 10/100 Mbit Ethernet Port
- Wi-Fi® (Optional)
- USB Host Port

4.1. TYPE CODING



Coding Examples

E-PR-200-2-2-3-3-0-0-0-0-0-0-0	12 (6+6) analog input, 12 (6+6) relay output
E-PR-200-2-2-2-2-2-2-2-2-0-0-0	48 (6+6+6+6+6+6+6+6) analog input
E-PR-200-1-1-6-3-0-0-0-0-0-1-0	6 (3+3) analog input, 4 analog output, 6 relay output, with Wi-Fi

Note: The total number of relay and analog output should not exceed 18. Digital Output number is limited to 64.

4.2. TECHNICAL SPECIFICATION

Input Types	**TC** (B, E, J, K, L, N, R, S, T, U) **RT** (Pt-50, Pt-100, Pt-500, Pt-1000, Ni-100, Ni-200, Ni-500, Ni-1000) 0 / 20 mA, 4 / 20 mA, -2000 mV / 2000 mV, 0 / 10 V
Accuracy	**TC :** ±%0.5 of the reading value or ±1°C, **RT :** ±%0.5 of the reading value or ±1°C Voltage / Current : ±%0.5 FS
Operating Voltage	85 - 265 V AC; 50 - 60 Hz / 85-375 V DC
Power Consumption	40 W max.
Data Storage Memory	8 GB Micro SD Flash
Communication	10 - 100 Mbit Ethernet, RS-485, USB Host, 802.11bgn 2.4GHz Wi-Fi®
Sampling Rate	100 ms (For all channels)
Configuration Ports	Touch Panel, USB Mouse and Keyboard connections
Screen Type	12.1" TFT LCD, 1024×768 resolution, 18 bit color, Touch panel
Operating Temperature	0°C / 50°C
Storage Temperature	-10°C / 85°C
Analog Inputs	Max. 54 Analog Inputs 16 bit (isolation of channels 1000 V AC) **(See Section 7. CONNECTION DIAGRAMS) (*).**
Analog Outputs	0 - 20 mA / 0 - 10 V can be configured. Number of analog outputs is limited to 18 **(*)**.
Digital Inputs	Max. Digital Inputs **(See Section 7. CONNECTION DIAGRAMS) (*).**
Digital Outputs	Max. 144 Digital Outputs, 24 V DC, 40 mA **(See Section 7. CONNECTION DIAGRAMS) (*).**
Relay Outputs	Max. 18 Relay Outputs, SPST-NO ; 250 V AC, 5 A Mechanical Life > 10.000.000 operation (The relay life depends on the usage configuration) Electrical Life > 1.000.000 operation (1/10 load) **(See Section 7. CONNECTION DIAGRAMS)**
Transmitter Supply	Max 12 two wire transmitter(2 x 130 mA)(*)
Language	Turkish, English
Password Protection	Adjustable different authority (Max. for 5 user)
Protection Class	Front Panel: IP65, Rear Panel: IP20
Weight	Approx. 4.0 kg

(*) Configuration dependent. Number of analog outputs, relay outputs and transmitter supply capacity are interdependently limited.
(See Section 7. CONNECTION DIAGRAM).

4.3. Dimensions

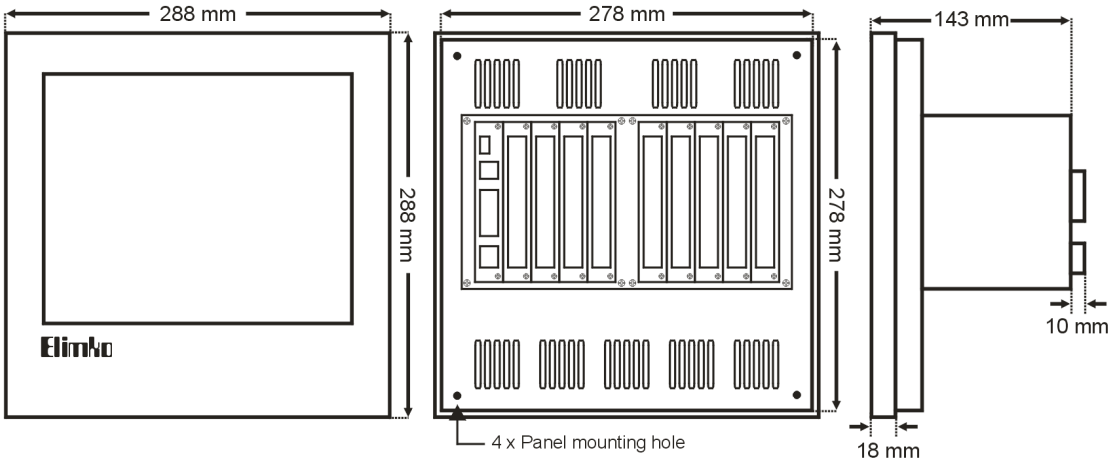


Figure 4.1 E-PR-200 dimensions and Panel Mounting

4.4. Panel Mounting

Punch a mounting cutout according to Figure 4.2 into the panel. Slide the device into the cutout from the front of the panel. Fit the mounting clamps to the device, ensuring the lugs are located in their slots. Fasten the mounting clamps using the retaining screws.

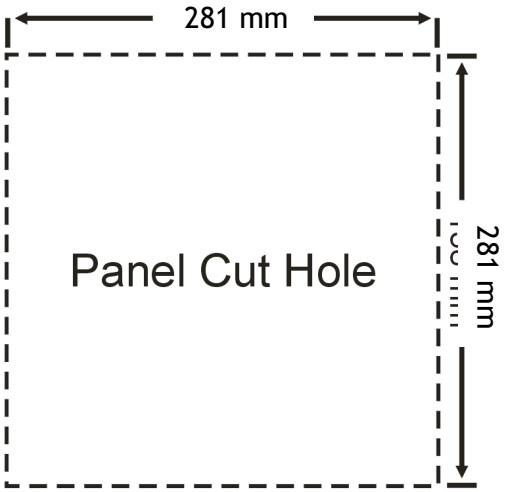


Figure 4.2 E-PR-200 Panel Cut Hole

ATTENTION:

- E-PR-200 device should be installed inside a suitable grounded metal enclosure (panel). This must prevent the live parts being accessible to human hands and metal tools. **(See Section 7. CONNECTION DIAGRAMS)**.
- E-PR-200 does not include a power switch. Therefore, the power supply of the device and power outputs must be wired through the proper fuse or circuit breaker.
- To minimize the pick-up of electrical noise, the wiring of low voltage lines, particularly the sensor input should be routed away from the high-current power cables. Where it is not possible, use shielded cables which are grounded at both ends.
- The cables used for powering the controller and the power outputs must conform to the standards IEC 60245 and IEC 60227.

5. USAGE

5.1. Front Panel

In the event of a new alarm, the background color of the title area flashes between red and blue. After the alarms were acknowledged, the flashing ceases and the title area appears in blue (**see Figure 5.1**).

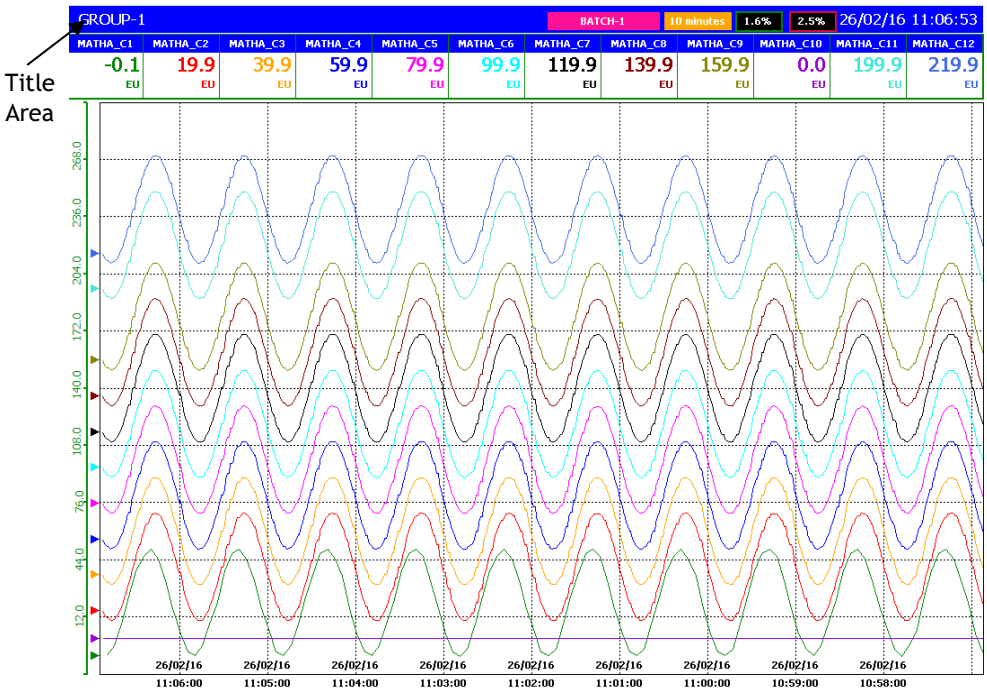


Figure 5.1 Trend View

During normal operation, the operation buttons are hidden to increase the display area. Hidden operation buttons can be made visible by touching the bottom of the screen (**see Figure 5.2**). Explanations are given below regarding the operation buttons.

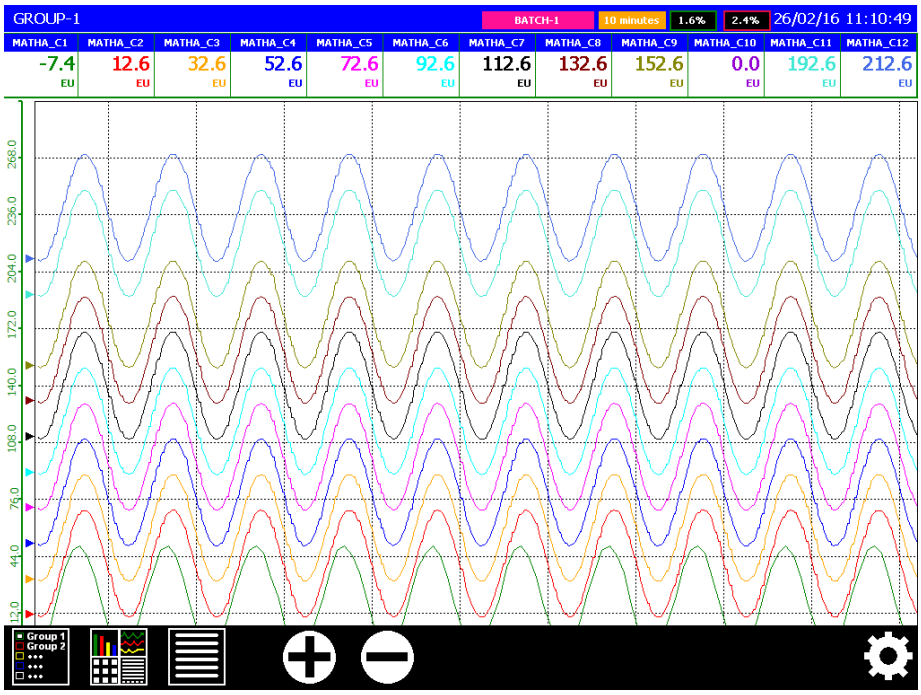
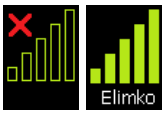


Figure 5.2 Operation keys

ATTENTION: The capacitive touch sensor device only works with the human hand and capacitive pens.

OPERATION BUTTONS	
	This button is used to select one of the 12 groups and is active only TREND, BAR, DIGITAL and DIGITAL 2 views.
	This button is used to select any of the TREND, BAR, DIGITAL, OVERVIEW, ALARM LOG, TOTALIZER LOG, INSTRUMENT LOG, OPERATOR LOG, DIGITAL LOG, DIGITAL 2 and SCAN VIEWS options.
	This button allows the operator access to the menu of selected view. Each view has a different menu and detailed explanations of the menus are given in the related description of the views.
	This button is active only in the trend view. Used to increase or decrease the width of the screen.
	This button allows access to the configuration pages.
	Used to set up a Wi-Fi connection. If the Wi-Fi connection is not installed, the button appears. This button is pressed to establish a Wi-Fi connection. In the window that opens, enter the network SSID and Password. The network connection is established by pressing the Connect button. If the network connection is established, the symbol appears. Under the Wi-Fi icon, it writes the SSID of the connected network.

5.2. Trend Page

Traces, process values, and alarm states of the channels in selected group are viewed. By pressing button the menu given **Figure 5.5** is opened. In Trend Page while not in **History** mode, newest recorded data is drawn on the screen continuously. To view historical data, **History** mode should be selected in Operator Menu. While in history mode, process values, date and time seen on the screen are the values at the time of cursor location. By touching the screen, the location of the cursor can be changed. While in history mode, date and time on the screen are written in red. By **Go To Date, One Grid Forward, One Grid Back,** buttons, desired date and time can be chosen.

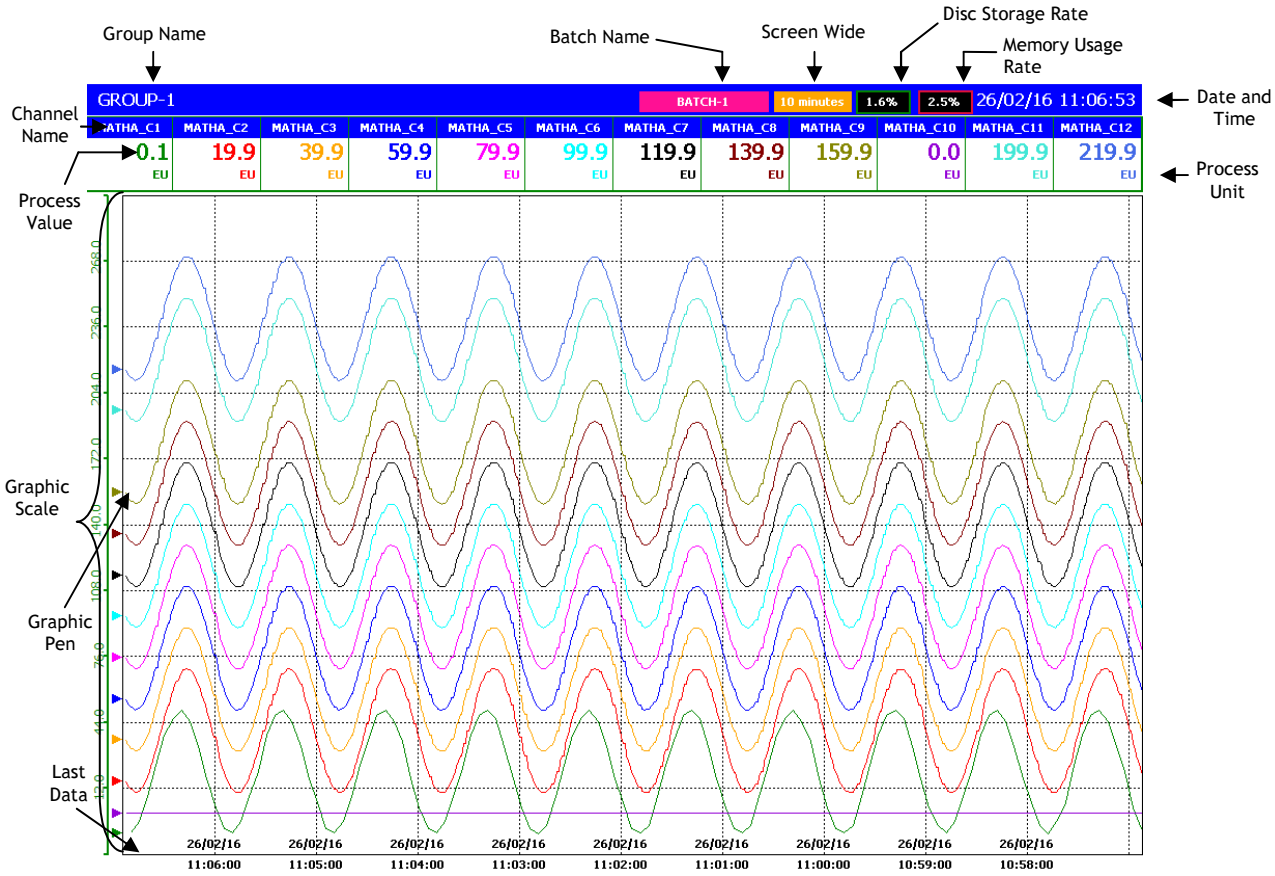


Figure 5.3 Trend View Screen

One Grid Forward	Historical mode must be selected for this key to be active. This button scrolls the graph forward by a grid interval.
One Grid Back	Historicaly mode must be selected for this key to be active. This button scrolls the graph backwards by a grid interval.
Start Batch	Starts a new batch.
Open/Stop Batch	Opens batch management window in which user can stop running batches and open completed batches for review.
History	Selects Historical mode.
Go To Date	While History is selected, any past date can be chosen to review. The desired time can be entered by the keyboard.
Screen Witdh	Determines time interval that will be shown on the screen. According to selected sampling rate, some time intervals can appear disabled in a purpose to limit number of data points to be displayed.
Traces	The traces that desired to be seen can be chosen with this parameter. Desired traces can be opened or closed in Traces Menu.
Axis	The axis of the channel to be seen on the trend can be chosen with this parameter.
Add Operator Message	Adds operator messages. User must login in order to reach this menu. (**see Section 6 Menu Page**)
Exit	Used to exit the screen. The same operation can be performed by touching an empty area on the screen.

Figure 5.4 Active buttons and meaning in the Trend view screen

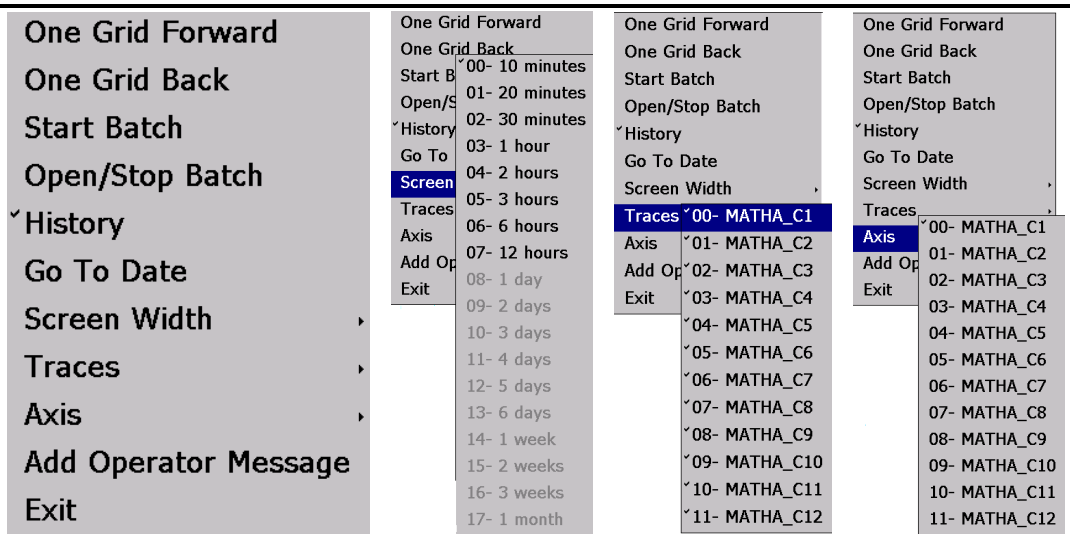


Figure 5.5 Active buttons and options on the Trend view screen

Recording can be made continuously or batch base. To start a batch in any time, **Start Batch** is selected in **Operator Menu**. **Start Batch** screen will be opened as shown below. In this screen **Batch Name, Operator, Part No** and **Serial No** can be filled to any values depending on batch process and **Start** is selected. When the batch starts, Batch Name is written on the top of Trend Page. **Stop Batch** command in Operator Menu provide access to manage running and recorded batches. Start/Stop batch operations can also be performed with a barcode reader. (**see Appendix 4**)

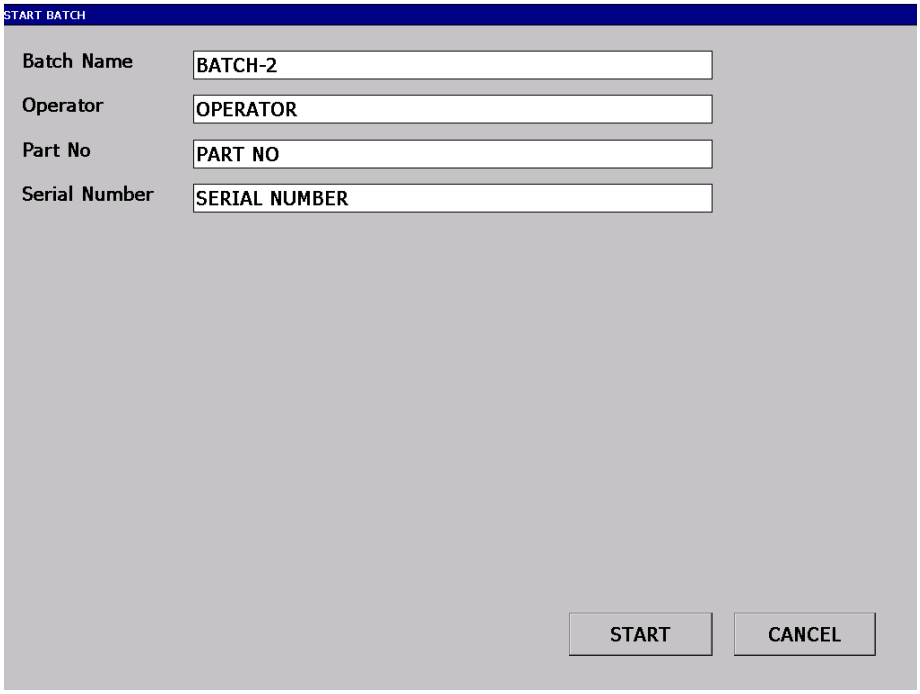


Figure 5.6 Start Batch Screen

5.3. Bar Graphic Page

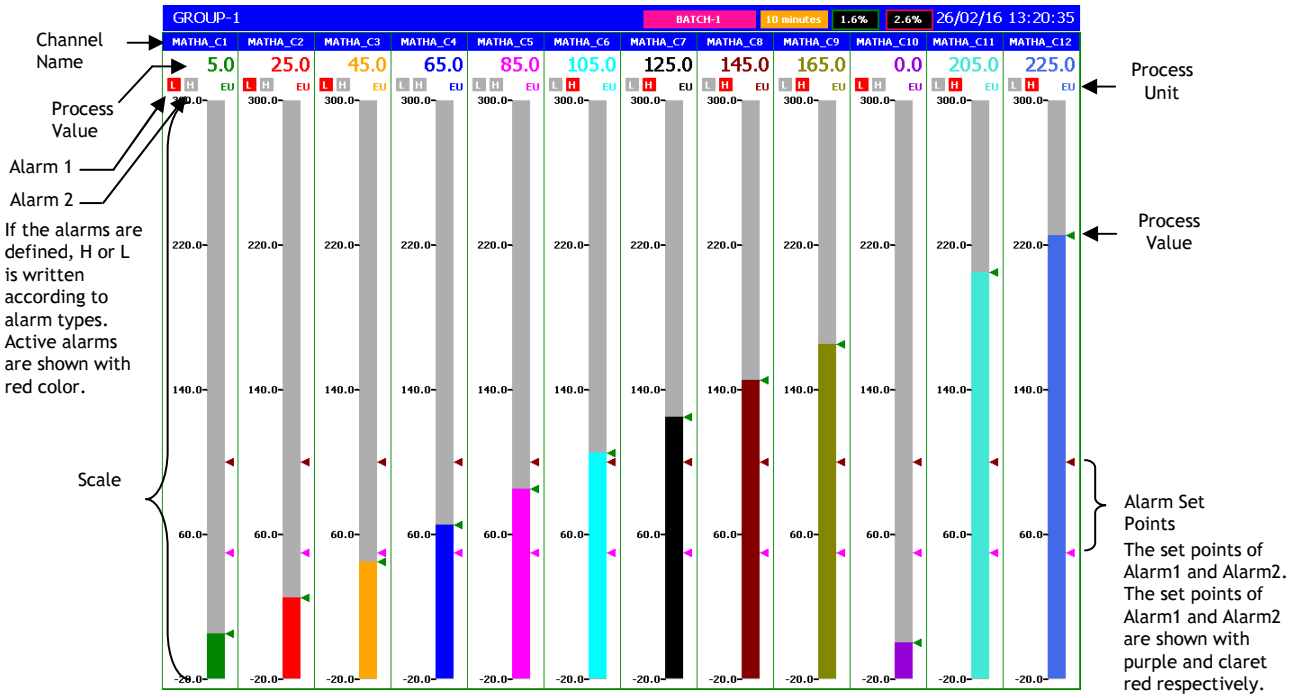


Figure 5.7 Bar View Screen

In Bar Graphic Page, bar graphics, process values, and alarm states of 12 channels in selected group are viewed.

5.4. Digital View Page

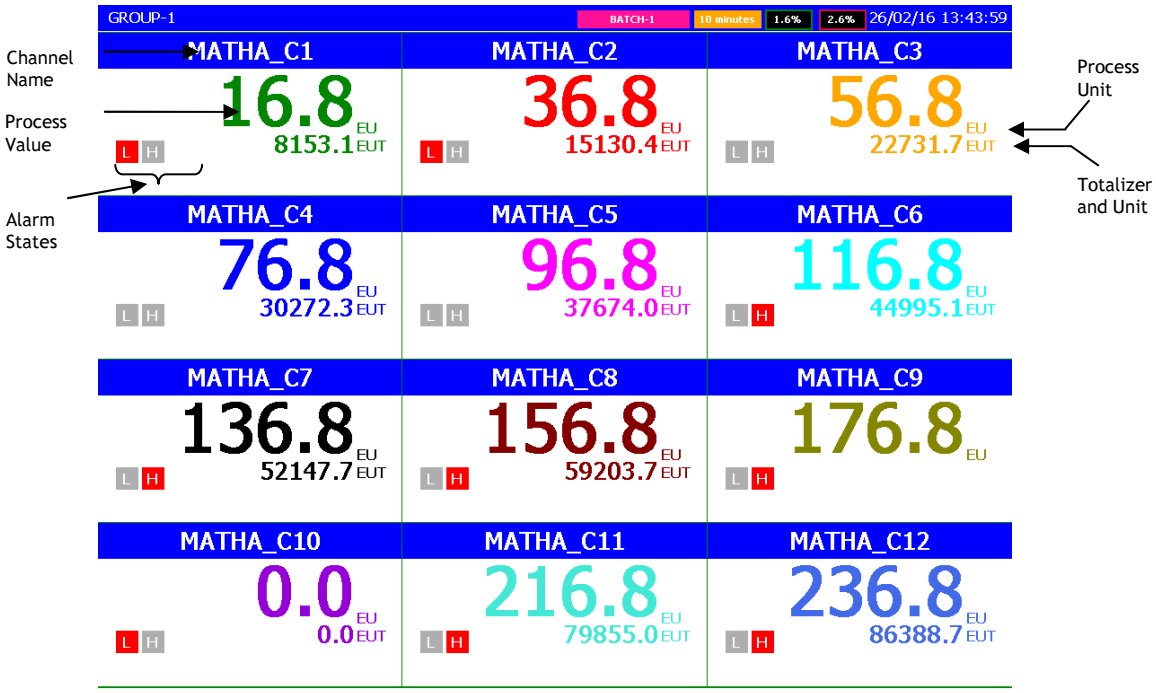


Figure 5.8 Digital View Screen

In Digital View Page, totalizer values, process values, and alarm states of 12 channels in selected group are viewed.

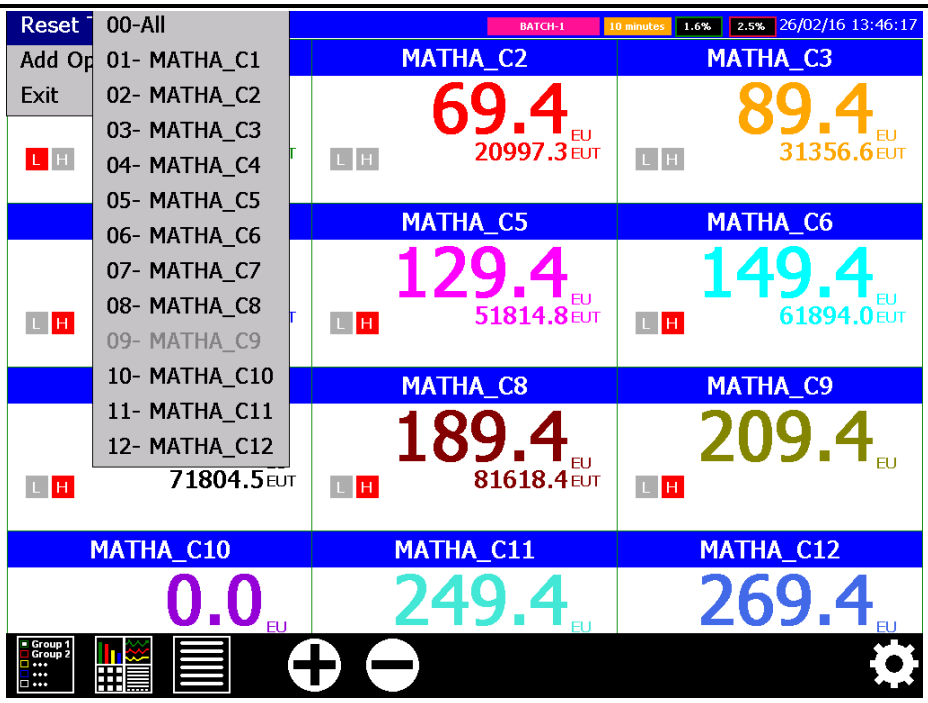
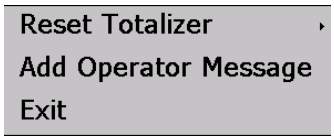


Figure 5.9 Totalizer reset and add operator messages (Digital View Page)



Operator Menu for Digital View Page is opened by pressing button. To reset the totalizer of an individual source, select the corresponing source name in sub menus of Reset Totalizer menu. To reset the totalizers of all sources in selected group, **All** can be selected.

Add Operator Message : Adds a operator message.It is only active when the user is logged in. (**See Section 5.MENUS**).

5.5. Overview Page

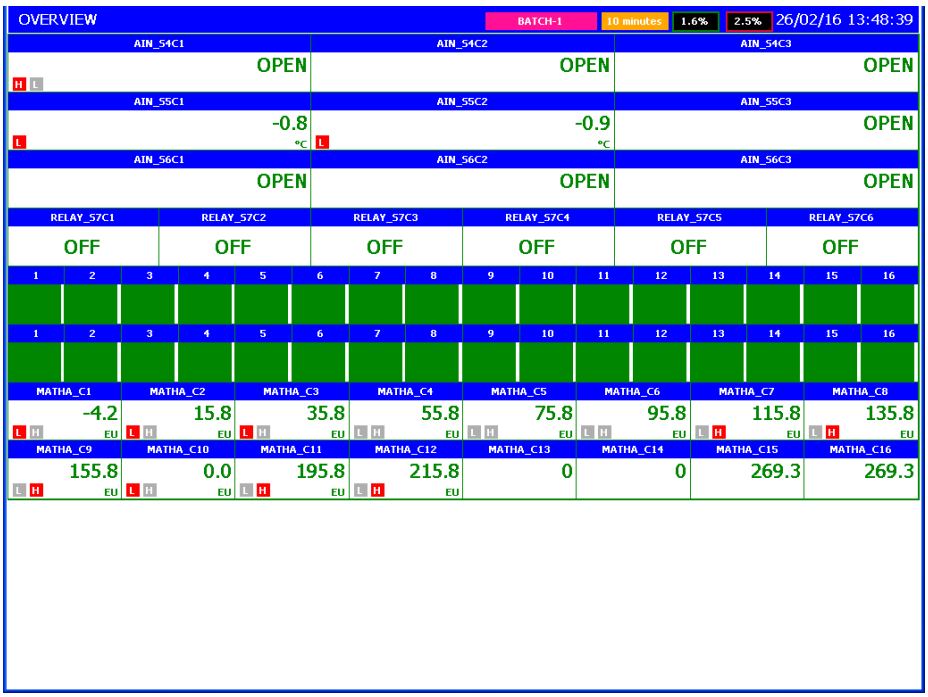
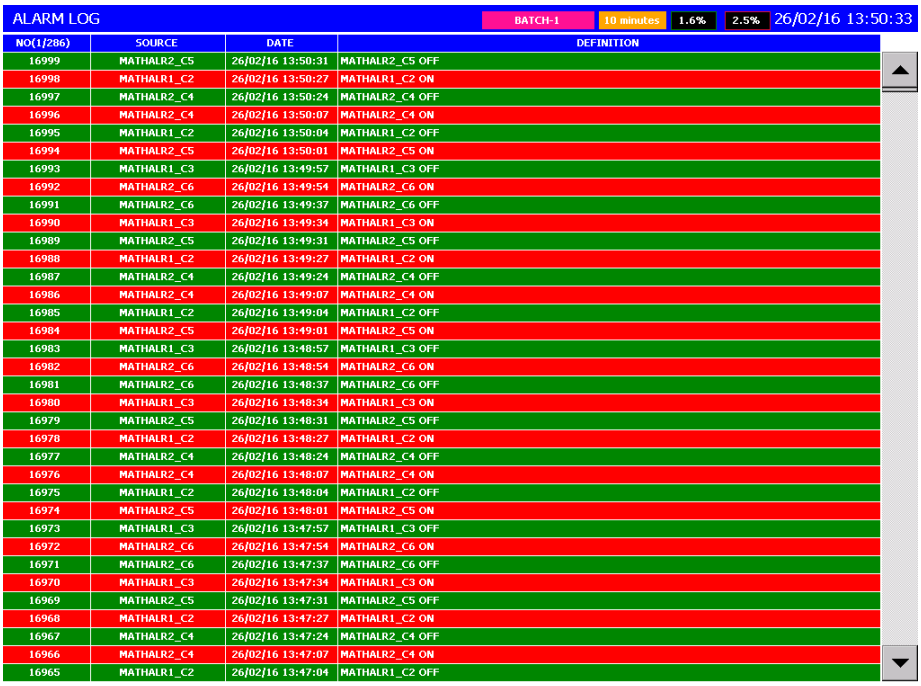


Figure 5.10 Batch Screen View

All channels can be viewed in this page together. Process values of all available sources can be viewed in a single page. Each row in the page corresponds to a process group from one of the available slots, Modbus Channels or Math Analog Channels. Empty slots and undefined MATH and MODBUS channels are not shown. Analog process groups having more than 8 channels occupy two rows and due to overall row limitation, some of the process groups appears intermittently.

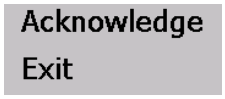
5.6. Alarm Log



NO(1/286)	SOURCE	DATE	DEFINITION
16999	MATHALR2_C5	26/02/16 13:50:31	MATHALR2_C5 OFF
16998	MATHALR1_C2	26/02/16 13:50:27	MATHALR1_C2 ON
16997	MATHALR2_C4	26/02/16 13:50:24	MATHALR2_C4 OFF
16996	MATHALR2_C4	26/02/16 13:50:07	MATHALR2_C4 ON
16995	MATHALR1_C2	26/02/16 13:50:04	MATHALR1_C2 OFF
16994	MATHALR2_C5	26/02/16 13:50:01	MATHALR2_C5 ON
16993	MATHALR1_C3	26/02/16 13:49:57	MATHALR1_C3 OFF
16992	MATHALR2_C6	26/02/16 13:49:54	MATHALR2_C6 ON
16991	MATHALR2_C6	26/02/16 13:49:37	MATHALR2_C6 OFF
16990	MATHALR1_C3	26/02/16 13:49:34	MATHALR1_C3 ON
16989	MATHALR2_C5	26/02/16 13:49:31	MATHALR2_C5 OFF
16988	MATHALR1_C2	26/02/16 13:49:27	MATHALR1_C2 ON
16987	MATHALR2_C4	26/02/16 13:49:24	MATHALR2_C4 OFF
16986	MATHALR2_C4	26/02/16 13:49:07	MATHALR2_C4 ON
16985	MATHALR1_C2	26/02/16 13:49:04	MATHALR1_C2 OFF
16984	MATHALR2_C5	26/02/16 13:49:01	MATHALR2_C5 ON
16983	MATHALR1_C3	26/02/16 13:48:57	MATHALR1_C3 OFF
16982	MATHALR2_C6	26/02/16 13:48:54	MATHALR2_C6 ON
16981	MATHALR2_C6	26/02/16 13:48:37	MATHALR2_C6 OFF
16980	MATHALR1_C3	26/02/16 13:48:34	MATHALR1_C3 ON
16979	MATHALR2_C5	26/02/16 13:48:31	MATHALR2_C5 OFF
16978	MATHALR1_C2	26/02/16 13:48:27	MATHALR1_C2 ON
16977	MATHALR2_C4	26/02/16 13:48:24	MATHALR2_C4 OFF
16976	MATHALR2_C4	26/02/16 13:48:07	MATHALR2_C4 ON
16975	MATHALR1_C2	26/02/16 13:48:04	MATHALR1_C2 OFF
16974	MATHALR2_C5	26/02/16 13:48:01	MATHALR2_C5 ON
16973	MATHALR1_C3	26/02/16 13:47:57	MATHALR1_C3 OFF
16972	MATHALR2_C6	26/02/16 13:47:54	MATHALR2_C6 ON
16971	MATHALR2_C6	26/02/16 13:47:37	MATHALR2_C6 OFF
16970	MATHALR1_C3	26/02/16 13:47:34	MATHALR1_C3 ON
16969	MATHALR2_C5	26/02/16 13:47:31	MATHALR2_C5 OFF
16968	MATHALR1_C2	26/02/16 13:47:27	MATHALR1_C2 ON
16967	MATHALR2_C4	26/02/16 13:47:24	MATHALR2_C4 OFF
16966	MATHALR2_C4	26/02/16 13:47:07	MATHALR2_C4 ON
16965	MATHALR1_C2	26/02/16 13:47:04	MATHALR1_C2 OFF

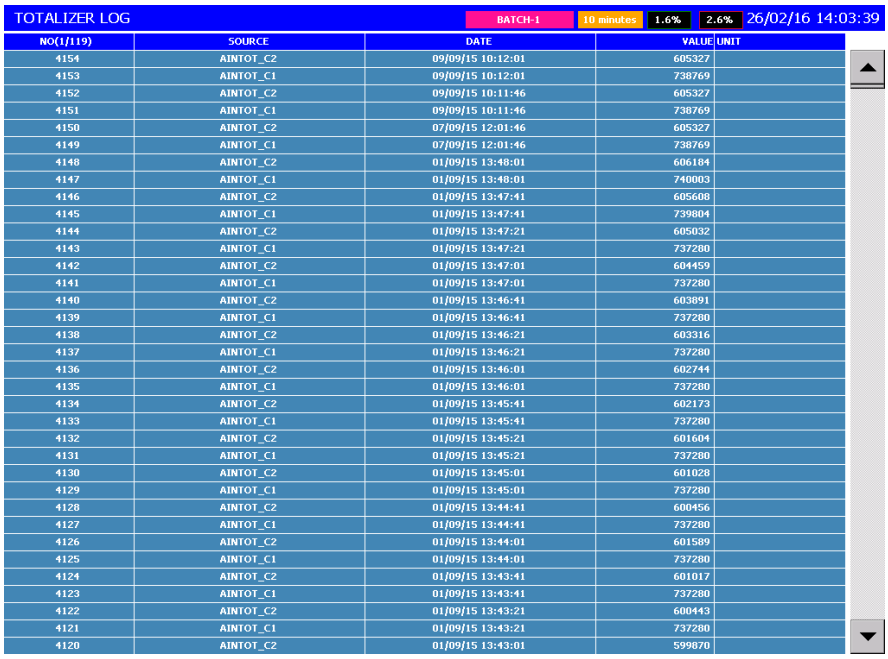
Figure 5.11 Alarm Log screen

The last occurred and released 10000 alarms with date and definitions are listed in Alarm Page. The latest alarm is on the top of the list. The list can be scrolled by pressing ▲ and ▼ buttons. Active alarms are shown in red color and released alarms are shown in green color. Active alarms which appear in red turn green after the alarms were acknowledged by selecting **Acknowledge Alarms** parameter.



Operator Menu for Alarm Page can be opened with ▤ button. Alarms are acknowledged with selecting **Acknowledge Alarms** parameter.

5.7. Totalizer Log

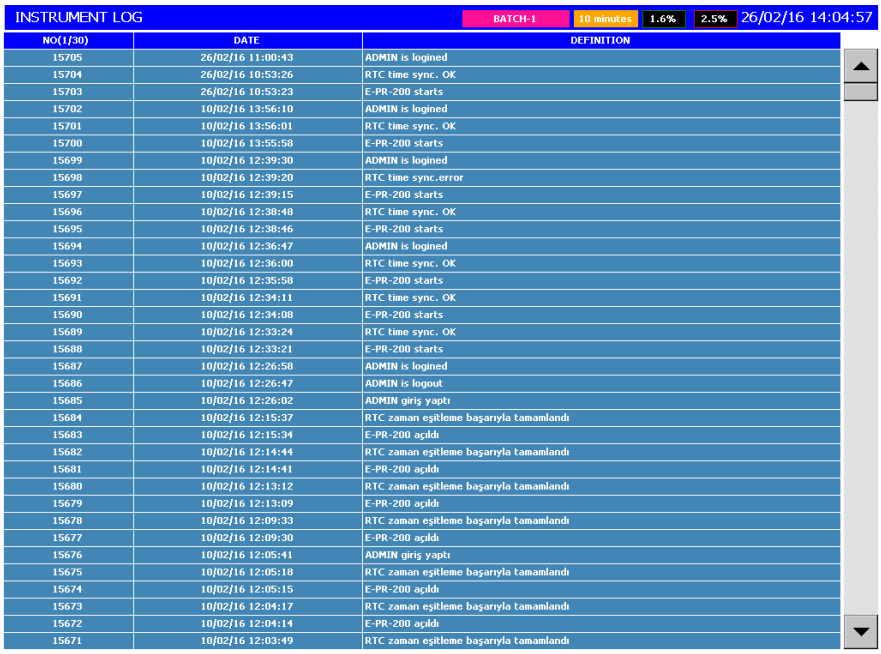


NO(1/119)	SOURCE	DATE	VALUE	UNIT
4154	AINTOT_C2	09/09/15 10:12:01	605327	
4153	AINTOT_C1	09/09/15 10:12:01	738769	
4152	AINTOT_C2	09/09/15 10:11:46	605327	
4151	AINTOT_C1	09/09/15 10:11:46	738769	
4150	AINTOT_C2	07/09/15 12:01:46	605327	
4149	AINTOT_C1	07/09/15 12:01:46	738769	
4148	AINTOT_C2	01/09/15 13:48:01	606184	
4147	AINTOT_C1	01/09/15 13:48:01	740003	
4146	AINTOT_C2	01/09/15 13:47:41	605608	
4145	AINTOT_C1	01/09/15 13:47:41	739804	
4144	AINTOT_C2	01/09/15 13:47:21	605032	
4143	AINTOT_C1	01/09/15 13:47:21	737280	
4142	AINTOT_C2	01/09/15 13:47:01	604459	
4141	AINTOT_C1	01/09/15 13:47:01	737280	
4140	AINTOT_C2	01/09/15 13:46:41	603891	
4139	AINTOT_C1	01/09/15 13:46:41	737280	
4138	AINTOT_C2	01/09/15 13:46:21	603316	
4137	AINTOT_C1	01/09/15 13:46:21	737280	
4136	AINTOT_C2	01/09/15 13:46:01	602744	
4135	AINTOT_C1	01/09/15 13:46:01	737280	
4134	AINTOT_C2	01/09/15 13:45:41	602173	
4133	AINTOT_C1	01/09/15 13:45:41	737280	
4132	AINTOT_C2	01/09/15 13:45:21	601604	
4131	AINTOT_C1	01/09/15 13:45:21	737280	
4130	AINTOT_C2	01/09/15 13:45:01	601028	
4129	AINTOT_C1	01/09/15 13:45:01	737280	
4128	AINTOT_C2	01/09/15 13:44:41	600456	
4127	AINTOT_C1	01/09/15 13:44:41	737280	
4126	AINTOT_C2	01/09/15 13:44:01	601589	
4125	AINTOT_C1	01/09/15 13:44:01	737280	
4124	AINTOT_C2	01/09/15 13:43:41	601017	
4123	AINTOT_C1	01/09/15 13:43:41	737280	
4122	AINTOT_C2	01/09/15 13:43:21	600443	
4121	AINTOT_C1	01/09/15 13:43:21	737280	
4120	AINTOT_C2	01/09/15 13:43:01	599870	

Figure 5.12 Totalizer Log screen

Source Name, record date, totalizer value and unit of the last recorded 10000 totalizer values are listed in Totalizer Page. The last recorded totalizer is displayed at the top of the list. Totalizer values can be scrolled by ▲ and ▼ buttons. The time intervals of totalizers are defined with the **Logging Source** parameter of related Totalizer.

5.8. Instrument Log

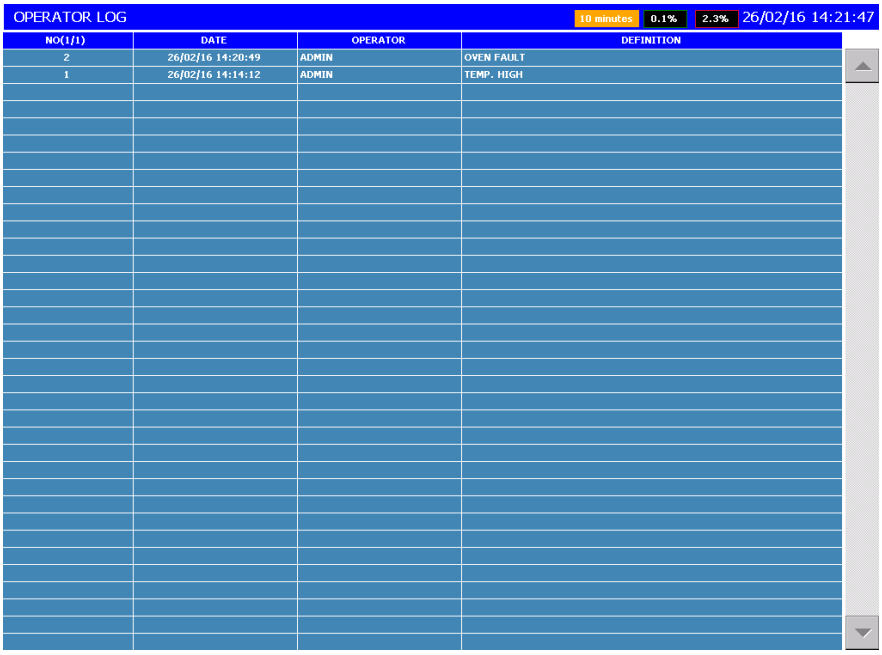


NO(1/30)	DATE	DEFINITION
15705	26/02/16 11:00:43	ADMIN is logined
15704	26/02/16 10:53:26	RTC time sync. OK
15703	26/02/16 10:53:23	E-PR-200 starts
15702	10/02/16 13:56:10	ADMIN is logined
15701	10/02/16 13:56:01	RTC time sync. OK
15700	10/02/16 13:55:58	E-PR-200 starts
15699	10/02/16 12:39:30	ADMIN is logined
15698	10/02/16 12:39:20	RTC time sync.error
15697	10/02/16 12:39:15	E-PR-200 starts
15696	10/02/16 12:38:48	RTC time sync. OK
15695	10/02/16 12:38:46	E-PR-200 starts
15694	10/02/16 12:36:47	ADMIN is logined
15693	10/02/16 12:36:00	RTC time sync. OK
15692	10/02/16 12:35:58	E-PR-200 starts
15691	10/02/16 12:34:11	RTC time sync. OK
15690	10/02/16 12:34:08	E-PR-200 starts
15689	10/02/16 12:33:24	RTC time sync. OK
15688	10/02/16 12:33:21	E-PR-200 starts
15687	10/02/16 12:26:58	ADMIN is logined
15686	10/02/16 12:26:47	ADMIN is logout
15685	10/02/16 12:26:02	ADMIN giriş yaptı
15684	10/02/16 12:15:37	RTC zaman eşitleme başarıyla tamamlandı
15683	10/02/16 12:15:34	E-PR-200 açıldı
15682	10/02/16 12:14:44	RTC zaman eşitleme başarıyla tamamlandı
15681	10/02/16 12:14:41	E-PR-200 açıldı
15680	10/02/16 12:13:12	RTC zaman eşitleme başarıyla tamamlandı
15679	10/02/16 12:13:09	E-PR-200 açıldı
15678	10/02/16 12:09:33	RTC zaman eşitleme başarıyla tamamlandı
15677	10/02/16 12:09:30	E-PR-200 açıldı
15676	10/02/16 12:05:41	ADMIN giriş yaptı
15675	10/02/16 12:05:18	RTC zaman eşitleme başarıyla tamamlandı
15674	10/02/16 12:05:15	E-PR-200 açıldı
15673	10/02/16 12:04:17	RTC zaman eşitleme başarıyla tamamlandı
15672	10/02/16 12:04:14	E-PR-200 açıldı
15671	10/02/16 12:03:49	RTC zaman eşitleme başarıyla tamamlandı

Figure 5.13 Instrument Log screen

The date and definition of last recorded 1000 events of the device are listed in Instrument Log Page. The last recorded event appears on the top. and buttons are used to scroll the list up or down.

5.9. Operator Log

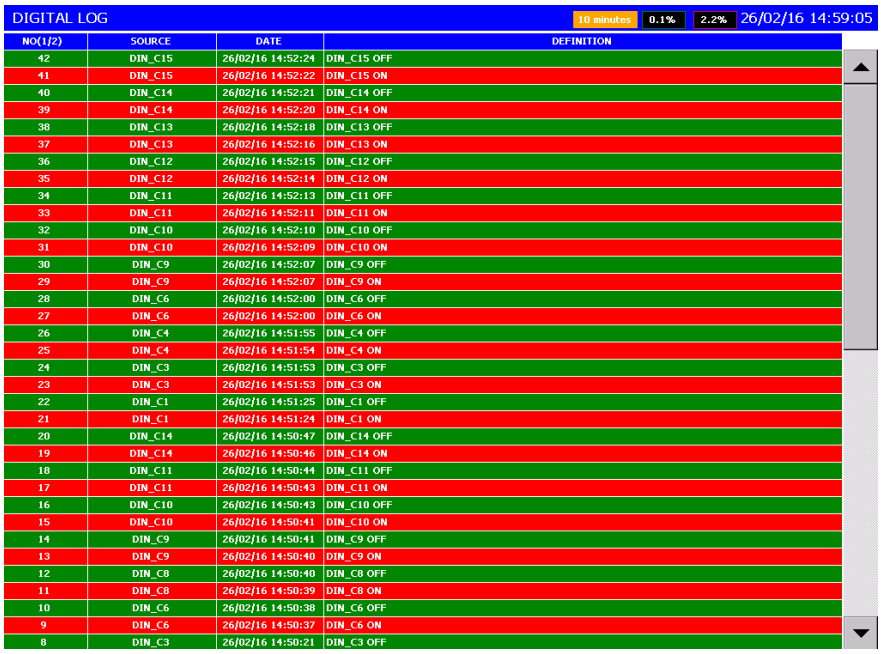


NO(1/1)	DATE	OPERATOR	DEFINITION
2	26/02/16 14:20:49	ADMIN	OVEN FAULT
1	26/02/16 14:14:12	ADMIN	TEMP. HIGH

Figure 5.14 Operator Log screen

Operators can add messages anytime while operating the device in order to assert certain events and information. In order to add messages, the operator must login first and should press Add Operator Message menu in the Operator Menu. Operator message with descending date order are listed in Operator Log Page. and keys scrolls the page up and down direction **(see 5.2 TREND PAGE ve 5.4 DIGITAL VIEW PAGE)**.

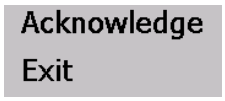
5.10. Digital Log



NO(1/2)	SOURCE	DATE	DEFINITION
42	DIN_C15	26/02/16 14:52:24	DIN_C15 OFF
41	DIN_C15	26/02/16 14:52:22	DIN_C15 ON
40	DIN_C14	26/02/16 14:52:21	DIN_C14 OFF
39	DIN_C14	26/02/16 14:52:20	DIN_C14 ON
38	DIN_C13	26/02/16 14:52:18	DIN_C13 OFF
37	DIN_C13	26/02/16 14:52:16	DIN_C13 ON
36	DIN_C12	26/02/16 14:52:15	DIN_C12 OFF
35	DIN_C12	26/02/16 14:52:14	DIN_C12 ON
34	DIN_C11	26/02/16 14:52:13	DIN_C11 OFF
33	DIN_C11	26/02/16 14:52:11	DIN_C11 ON
32	DIN_C10	26/02/16 14:52:10	DIN_C10 OFF
31	DIN_C10	26/02/16 14:52:09	DIN_C10 ON
30	DIN_C9	26/02/16 14:52:07	DIN_C9 OFF
29	DIN_C9	26/02/16 14:52:07	DIN_C9 ON
28	DIN_C6	26/02/16 14:52:00	DIN_C6 OFF
27	DIN_C6	26/02/16 14:52:00	DIN_C6 ON
26	DIN_C4	26/02/16 14:51:55	DIN_C4 OFF
25	DIN_C4	26/02/16 14:51:54	DIN_C4 ON
24	DIN_C3	26/02/16 14:51:53	DIN_C3 OFF
23	DIN_C3	26/02/16 14:51:53	DIN_C3 ON
22	DIN_C1	26/02/16 14:51:25	DIN_C1 OFF
21	DIN_C1	26/02/16 14:51:24	DIN_C1 ON
20	DIN_C14	26/02/16 14:50:47	DIN_C14 OFF
19	DIN_C14	26/02/16 14:50:46	DIN_C14 ON
18	DIN_C11	26/02/16 14:50:44	DIN_C11 OFF
17	DIN_C11	26/02/16 14:50:43	DIN_C11 ON
16	DIN_C10	26/02/16 14:50:43	DIN_C10 OFF
15	DIN_C10	26/02/16 14:50:41	DIN_C10 ON
14	DIN_C9	26/02/16 14:50:41	DIN_C9 OFF
13	DIN_C9	26/02/16 14:50:40	DIN_C9 ON
12	DIN_C8	26/02/16 14:50:40	DIN_C8 OFF
11	DIN_C8	26/02/16 14:50:39	DIN_C8 ON
10	DIN_C6	26/02/16 14:50:38	DIN_C6 OFF
9	DIN_C6	26/02/16 14:50:37	DIN_C6 ON
8	DIN_C3	26/02/16 14:50:21	DIN_C3 OFF

Figure 5.15 Digital Log screen

Source Name, record date and definition of the last recorded 65536 digital log values are listed in Digital Log Page. The last recorded digital log value is displayed at the top of the list. Digital log values can be scrolled by ▲ and ▼ buttons.



Operator Menu for Digital Log Page can be opened by pressing ▤ button. Alarms are acknowledged by selecting **Acknowledge** digital logs menu.

Note: In "NO(X/Y) column, X is page number and Y is number of pages.

5.11. Digital 2

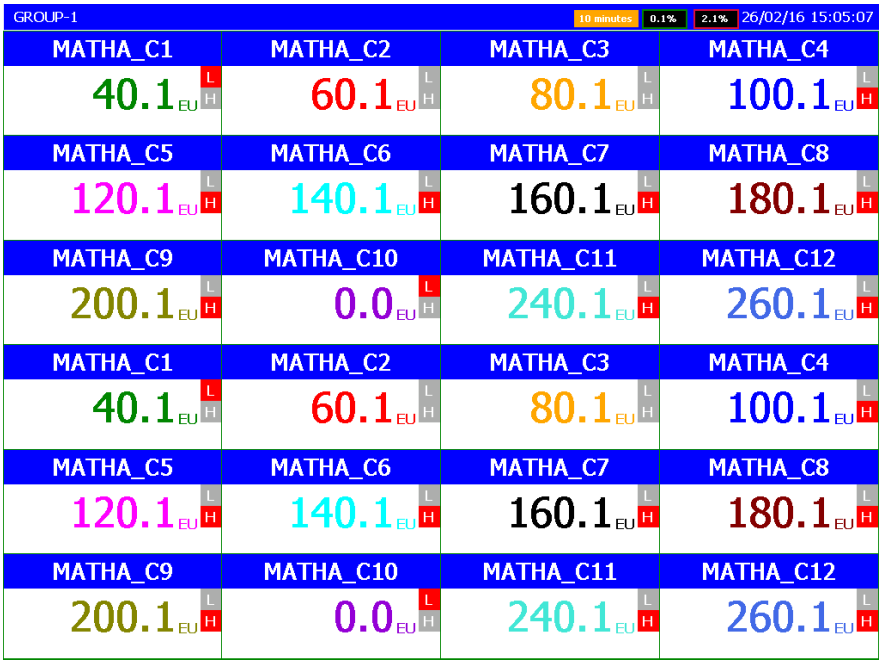


Figure 5.16 Digital 2 screen

Two consecutive groups (selected group and the following group which may wrap to first or last group depending on selected group) can be viewed digitally on the same page.

6. MENU PAGES

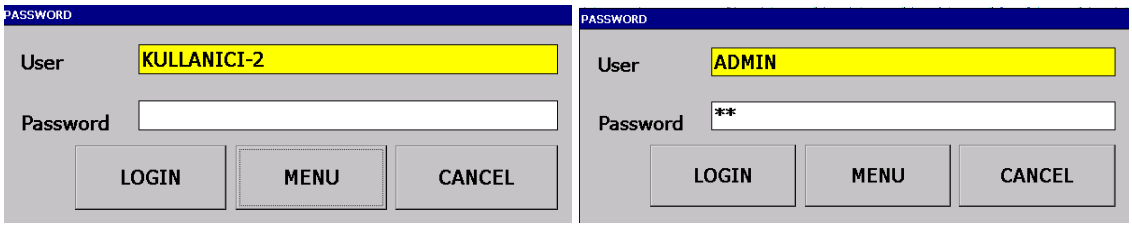


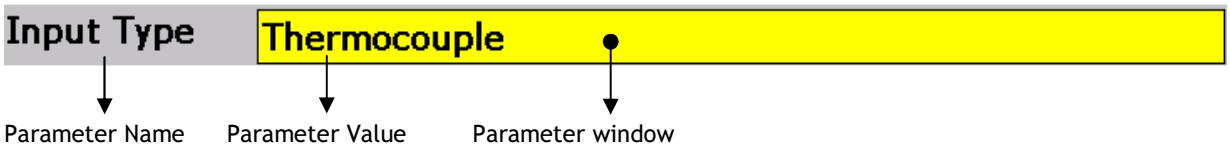
Figure 6.1 Password input window to the main menu

Pressing ⚙ key accesses to Menu page. Upon pressing ⚙ key authentication window opens and user name/ password are asked. After selecting UserName and Password, main menu is reached by either pressing MENU or LOGIN button. LOGIN access does not require authentication on subsequent entries until LOGOUT is pressed from Main Menu. Depending on previously defined authorization rights, some of the sub menus may appear disabled (**see Section 6.4. Security**). Default values for the user password are given:

USERS	PASSWORD
ADMIN	10
User 2	02
User 3	03
User 4	04
User 5	05
User 6	06

6.1. Adjusting Parameters

All of the parameters can be adjusted by touch panel. An example of a parameter editing screen is given below.



The parameter window of the parameter to be adjusted should be touched in order to access adjustment page.

6.2. Main Menu

Detailed descriptions of the pages that can be accessed from the main menu are described in the sections indicated in **Figure 6.2**. **OS** button allows access to the operating system. All operating systems menus are hidden as factory settings. To access to the start menu of the OS, pointer of the mouse connected to the USB port must be dragged down to the bottom edge of the screen.

Please check the **6.MENU** section for **LOGOUT** button. **EXIT** button allows operator to exit from the main menu. **MODBUS TABLE** button provides access to Modbus RTU Communication Addresses (**see Appendix 3**).

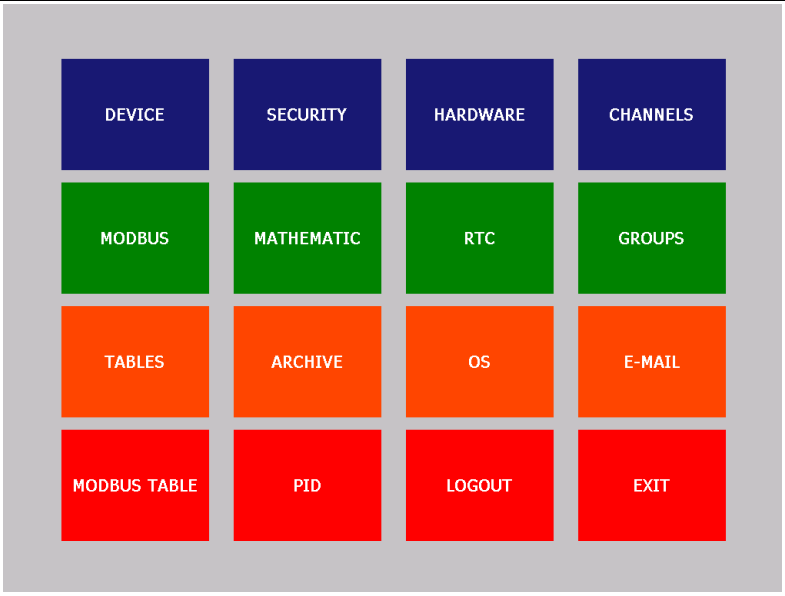


Figure 6.2 Main Menu

6.3. Device Page

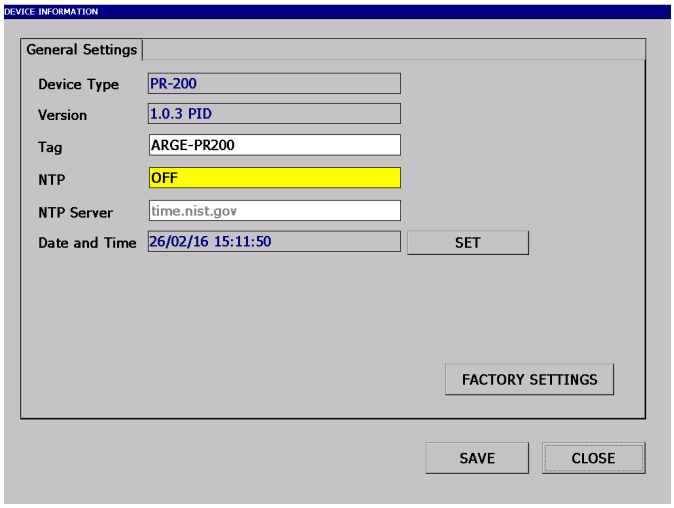


Figure 6.3 Device Page

In Device Page, Device Type and Version are shown. Date and Time adjustments and factory settings reset are made in this page.

Tag: Tag value determines synchronization directory name and alias of the device therefore should be unique for each recorder in order to prevent data corruption when same data storage media is used for data synchronization.

NTP: Enables or disables network time protocol. When enabled, date/time is synchronized every 6 hours by connecting NTP server defined in **NTP Server** parameter. In case of a connection problem, the synchronization
Is retried every 1 hour until the connection is established.
NTP Server: The NTP Server name is entered.

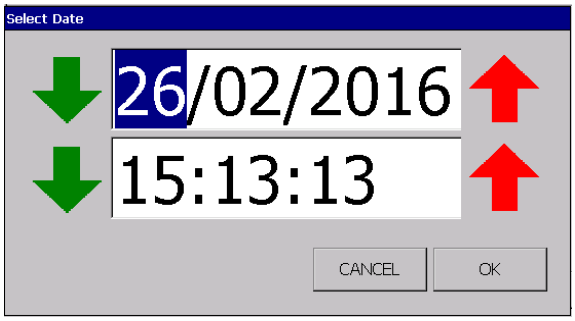


Figure 6.4 Date and Time adjustments page

6.4. Security Page

User names, passwords and access rights of users are determined in Security Page. There is no restriction for ADMIN user rights and access rights of other users are determined by ADMIN user.

User: Determines the user that will be adjusted.

Name: Determines the user name. The name can consist of 15 characters at most.

Password: Determines the password of selected user. The password can consists 10 characters at most.

Access Rights: The rights of the users below **Access Rights** headline can be chosen **ON** or **OFF**.

After adjusting security settings, the adjustments should be saved by pressing **SAVE** button.

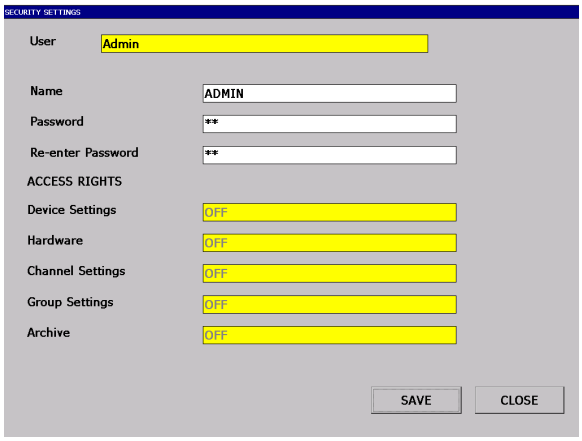


Figure 6.5 Security Adjustments Page (Admin Adjustment)

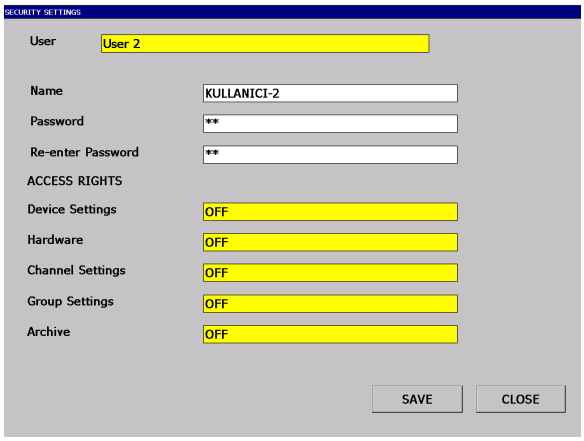


Figure 6.6 Security Adjustments Page (User Adjustment)

6.5. Hardware Page

The hardware adjustments are made in this page. **HARDWARE Page** consists of 4 tabs as **Slot, Ethernet, Serial Port** and **Screen**.

6.5.1. Slot Adjustments

ATTENTION: The calibration parameter adjutment resides in this tab. Any erroneous operation in Analog Input Card Calibration Page will corrupt the calibration parameter and measurements become faulty. The parameters of this page are adjusted by precision measurement and source devices. If accurate calibration devices are not available, any recalibration attempt is not advised.

In case of any modification on slot hardware, **SCAN** button in Slot Tab should be selected to activate slot configuration. After scanning of the cards, card types on the slots are viewed in SLOT1, SLOT2, SLOT3, SLOT4, SLOT5, SLOT6, SLOT7, SLOT8 and SLOT9 windows. To calibrate or test a card, corresponding slot window should be selected. All of the cards are calibrated in the factory and do not need recalibration.

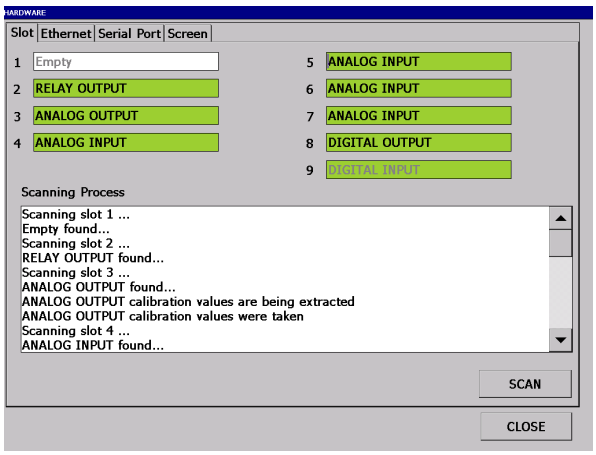


Figure 6.7 Hardware Slot Settings Page

Output states of the Digital Output cards for test purposes can be changed by pressing corresponding ON and OFF buttons. There is no testing and calibration page of digital input cards. Like the digital output cards, relays states can be changed by pressing ON or OFF in Relay Card Test page for test purposes.

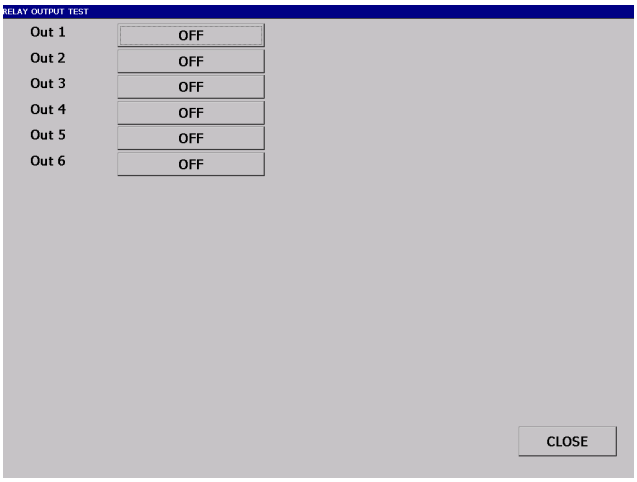


Figure 6.8 Hardware Relay Output Test Page

Analog Input Card Calibration Adjustments:

For the calibration of Analog Input cards, firstly, the channel to be calibrated should be selected from **Channel** window. The calibration parameters are explained below. From a general point of calibration operations, required signals specified below are applied to the correspoinding channels and **Press to Calibrate** button is pressed. After stable value was seen, the value is recorded by selecting the same button. **Cancel** button is used to cancel active calibration.

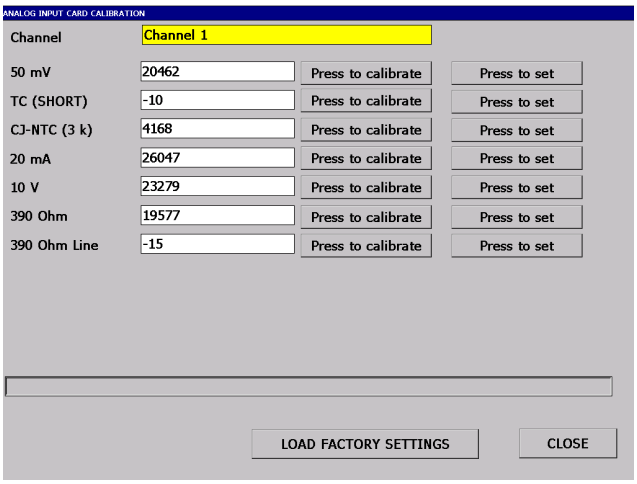


Figure 6.9 Analog Input Card Calibration Page

50 mV: Set the calibrator as a millivolt source and adjust the calibrator output 50.000 mV. Apply the calibrator output to the millivolt input of the related channel.

TC (SHORT), CJ-NTC (3 k): Set the calibrator as a resistance source and adjust the calibrator output 3000.00 Ω. Short circuit the TC input terminals of the related channels. Apply the calibrator output to the input terminals of the related channel.

20 mA: Set the calibrator as a milliampere source and adjust the calibrator output 20.00 mA. Apply the calibrator output to the milliampere input of the related channel.

10 V: Set the calibrator as a voltage source and adjust the calibrator output 10.00 V. Apply the calibrator output to the volt input of the related channel.

390 Ohm: Set the calibrator as a resistance source and adjust the calibrator output 390.00 Ω. Apply the calibrator output to the RT input of the related channel. 3. RT line should be short-circuited by the wiring diagram.

390 Ohm Line: Same as 390 Ohm. Just save after making 390 ohm calibration without changing anything

Analog Output Card Calibration Adjustments:

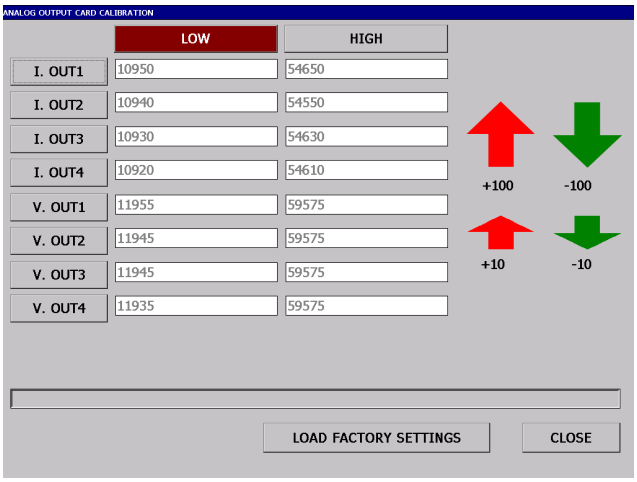


Figure 6.10 Analog Output Card Calibration Page

The current and voltage outputs of analog ouput channels provided with Analog Output cards can be calibrated on the screen given in **Figure 6.10**. For each current and voltage outputs, 2 LOW and 2 HIGH calibration values must be saved. By selecting the channels to be calibrated from left of the screen (I.OUT 1-4, V.OUT1-4), and calibration type HIGH or LOW from top of the screen, calibration process is initiated for selected output type and calibration value. After this process, the font color of selected channel and calibration type turn burgundy, the calibration value screen turns yellow. A Voltmeter (3(-), 4(+)) or ampermeter (1(+), 2(-)) is connected to the outlet of the channel depending on the type of calibration of the selected channel. The value of the calibration is set using the up and down keys. For ease of calibration, up and down keys are given as two pieces of 100 levels and 10 levels. 100 steps for coarse changes, 10 steps are used for fine adjustments. **LOW** and **HIGH** calibration values of current outputs are 4 mA and 20 mA respectively. **LOW** and **HIGH** calibration values of voltage output is 2 V and 10 V respectively. Calibration values are saved by pressing corresponding channel button which has been turned to burgundy to initiate calibration. To cancel the calibration process, press the **CANCEL** button under the screen.

6.5.2. Ethernet Adjustments

TCP/IP settings are done by defining the **IP Address**, **Subnet Mask** and **Default Gateway**. Definitions of these parameters are made either manually or automatically by DHCP depending on selected IP type. If TCP/IP application needs fixed IP address, user is recommended to use Manual Settings. **Save** button saves the settings restarts the device.

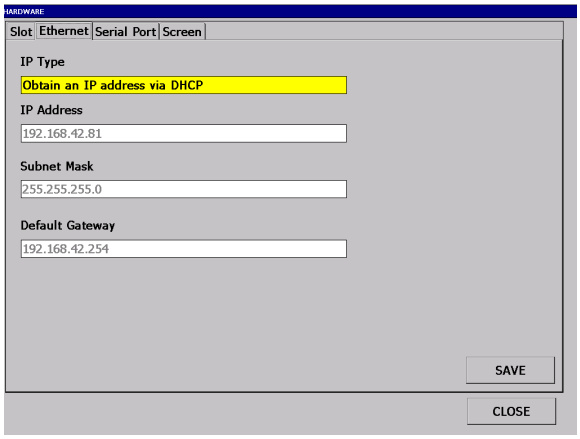


Figure 6.11 Hardware Ethernet Page (Obtain an IP address via DHCP)

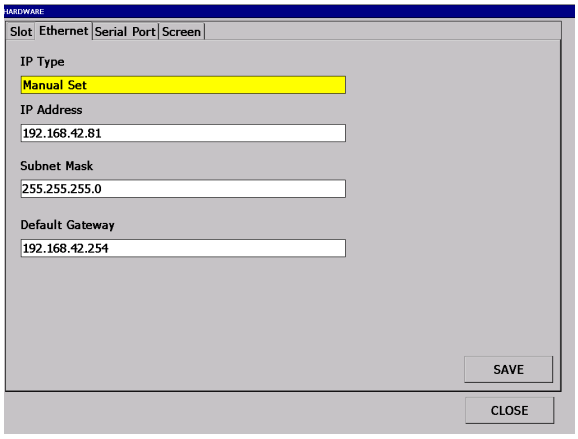


Figure 6.12 Hardware Ethernet Page (Manual Set)

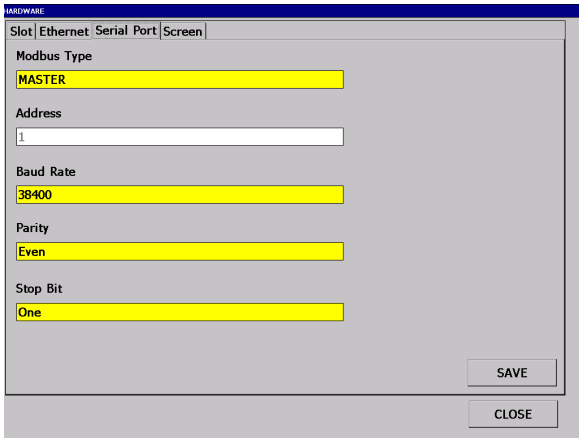
6.5.3. Serial Port Adjustment

The communication parameters of RS-485 port (Boud Rate, Parity and Stop Bit) are adjusted in this tab.

Modbus Type: Set as either master or slave.

Address: Determines modbus slave communication address. Only functional when slave mode is selected.

Baud Rate, **Parity** and **Stop Bit** determine serial communication parameters.



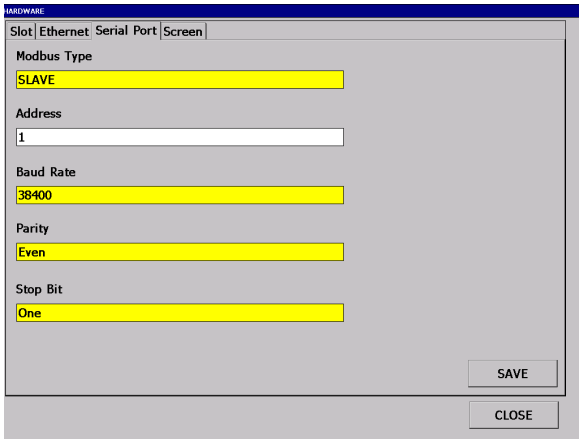


Figure 6.13 Hardware Serial Port screen

6.5.4. Screen Adjustment

Language: The language of the device can be chosen either Turkish or English.

Brightness: This parameter determines the brightness of the screen. Brightness can be adjusted between %20 and %100.

Screen Saver: ON or OFF selectable.

Screen Saver Time: Determines the time period after that the device starts screeen saver if no operation takes place.

DRAWING OPTIONS button opens color selection window in which trace colors of the group channels can be configured as desired. In addition to trace colors, the background and foreground (standart text color and line color) can be chosen. Please take precaution while assigning the colors in order to prevent conflicting color selection. Assigning same colors to the channels may cause confusion and setting same color to background and any of the channels causes the channel traces disappear.

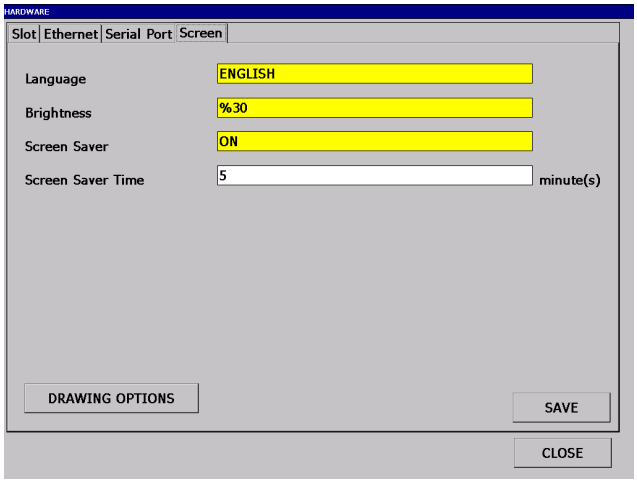


Figure 6.14 Hardware Screen Adjustments

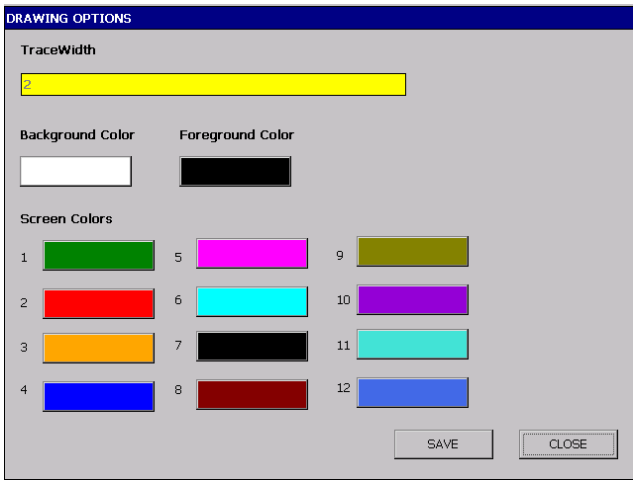


Figure 6.15 Drawing Options Adjustments

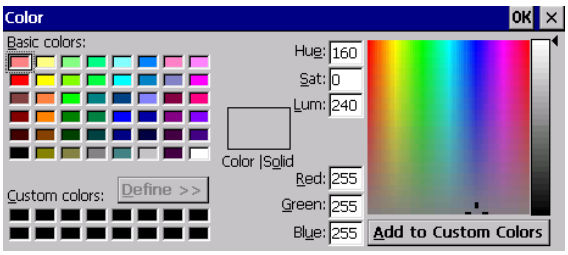


Figure 6.16 Color selection screen

6.6. Channels Page

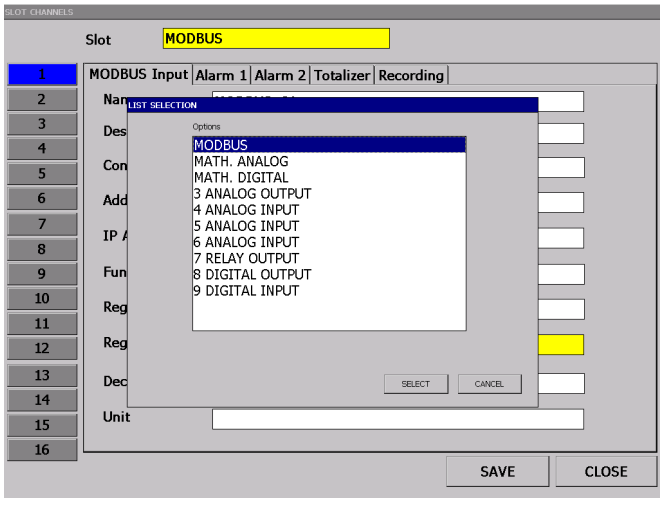


Figure 6.17 Slot Channels Page

After selecting the slot from top window and the channel from the left buttons, related content is loaded to the screen. After required adjustment, **SAVE** button saves the values.

6.6.1. Relay Output Card Adjustments

Name: The name of the related Relay Output can be written by this parameter. (maximum length of 12 characters)
Description: Maximum 50 characters long description.
Off Message: Maximum 100 characters long alarm off message.
On Message: Maximum 100 characters long alarm on message.
Source 1-5: when any of digital **Source 1 to 5** becomes ON, the relay output activates (energised)
PWM Source: PWM source can be assigned to one of the 12 PID, relay or digital output sources.
PWM Period: Determines the PWM period when a PWM Source other than the PID Sources is assigned.

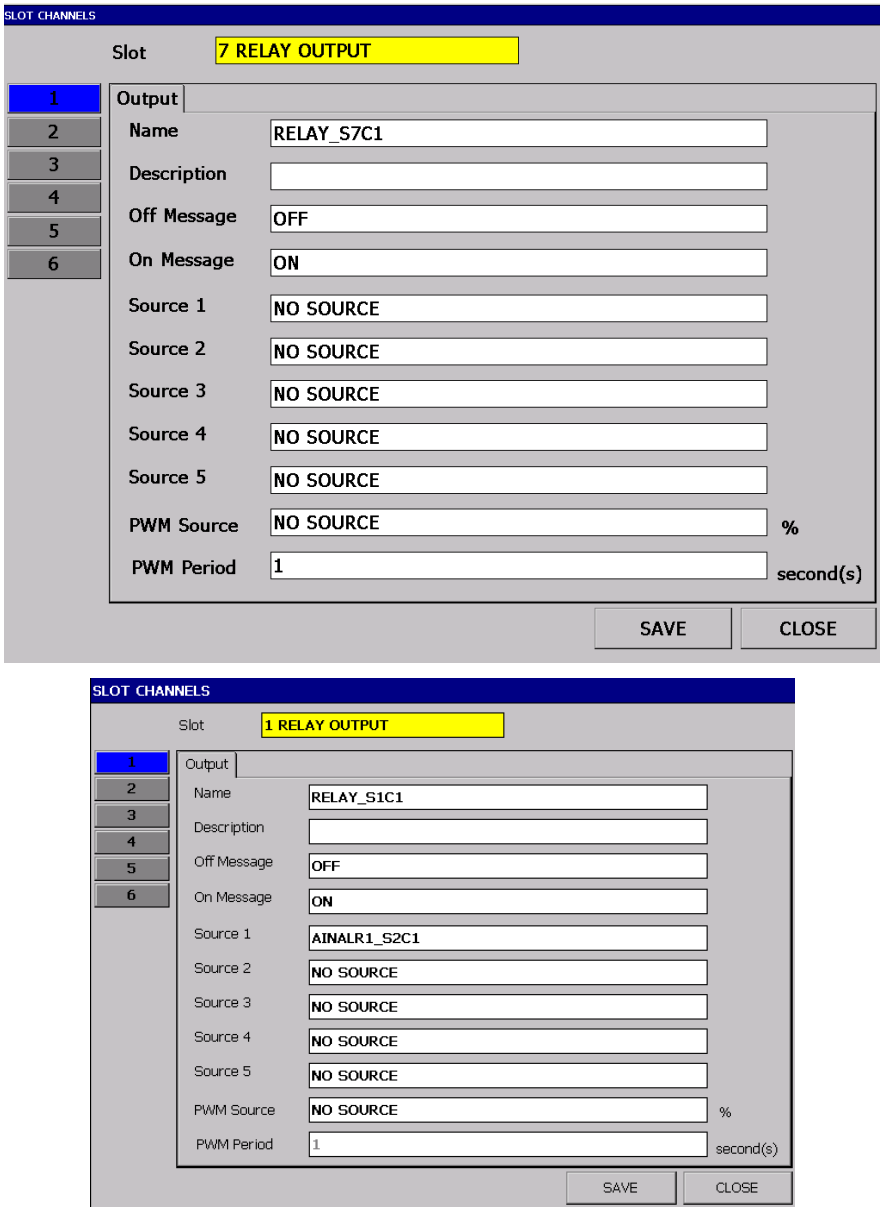


Figure 6.18 Relay Output Card Adjustments

6.6.2. Digital Output Card adjustments

Please see section 6.6.1 for a description of parameters.

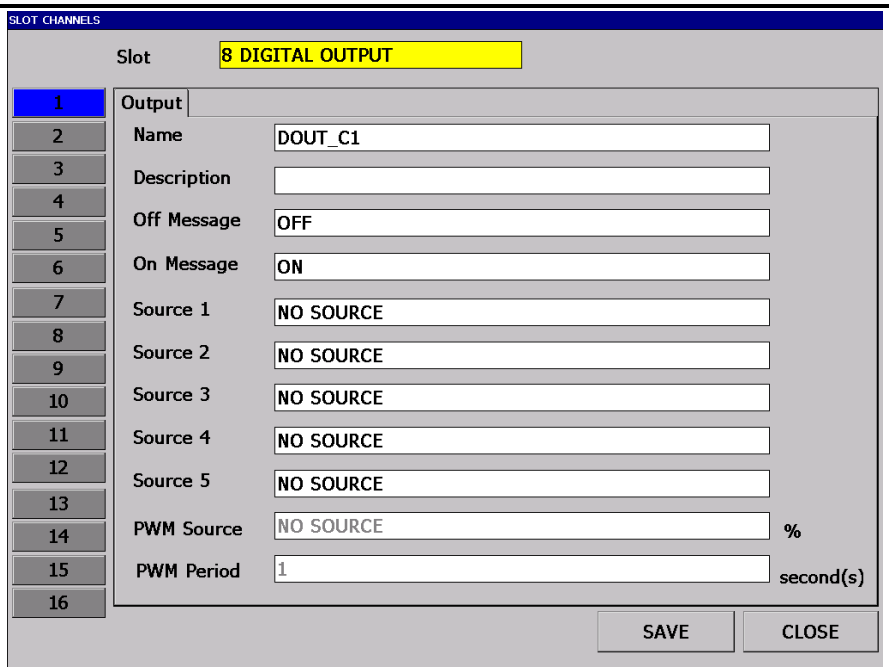


Figure 6.19 Digital Output Card Adjustments

6.6.3. Analog Input Card adjustments

Name : The channel can be named with using maximum 12 characters.
Description : Maximum 50 characters long description.
Input Type : Determines input type. The parameter can be selected as, **Thermocouple, Resistance Thermometer, Ohm, Milivolt, Miliamper or Volt.**
Range Low : Determines minimum input value that will be applied to the channel. This parameter is active only for linear inputs.
Range High : Determines maximum input value that will be applied to channel. This parameter is active only for linear inputs.

Range Low - Range High Values for Linear Inputs are given below.

INPUT	Min. Input	Max. Input
Miliamper	-20 mA	20 mA
Milivolt	-2000 mV	2000 mV
Ohm	0 ohm	5000 ohm
Volt	-10 V	10 V

Linearization : Determines sensor type for Thermocouple and Resistance Thermometer and how to linearize the Linear Inputs while the process value is calculated.
Decimal Point : Determines the position of decimal point. The parameter can be adjusted as **0** , **0.0** , **0.00** or **0.000.**
Zero - Span : Determines process value for TC and RT sensors in the case of sensor break depending on **Sensor Break** parameter. The parameter determines the scale for linear inputs.
Sensor Break : Determines process value in the case of sensor break. Process value will be equal to Zero when **SET LOW** is selected and will be equal to Span when SET HIGH is selected.
Shift Value : Determines shift value of process value.
Unit : Determines the unit of the input.
CJ Type : Determines the cold juction compensation type for TC inputs. **DISABLED** selection disables the compensation. **CONSTANT** selection fixes the cold junction temperature to CJ Temperature parameter. **RESERVED and EXTERNAL** selections use external E-CJ-NTC-01 terminal NTC sensor. **CHANNEL CJ** selection assigns cold junction temperature to the cold junction temperature of another channel defined by **CJ Source** and likewise **CHANNEL** selection assigns cold junction temperature to the process value of the channel defined by **CJ Source**.
CJ Temperature
CJ Source

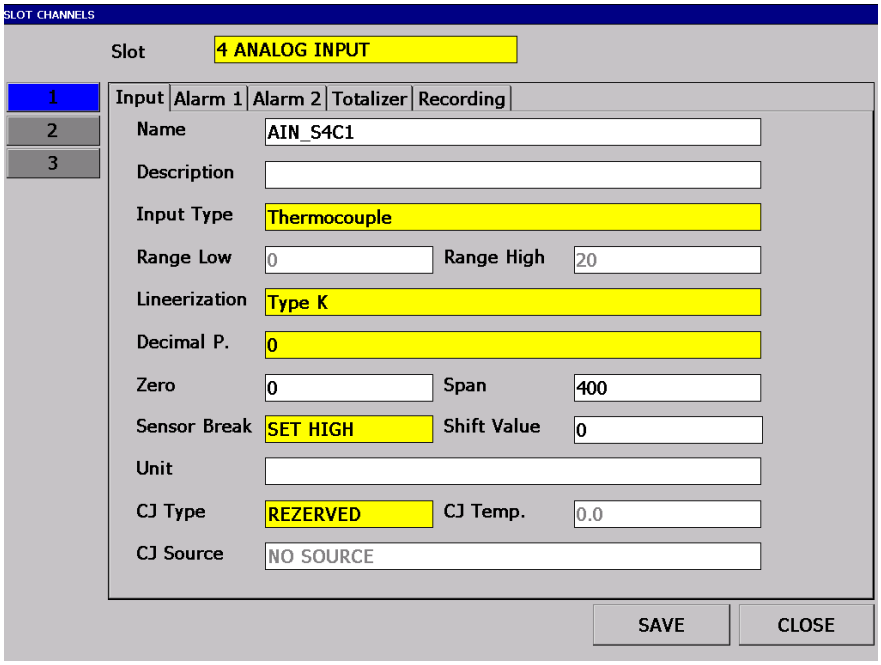


Figure 6.20 Analog Input Card Input adjustmens

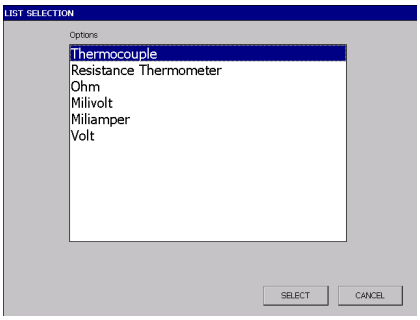


Figure 6.21 Input Type Selection

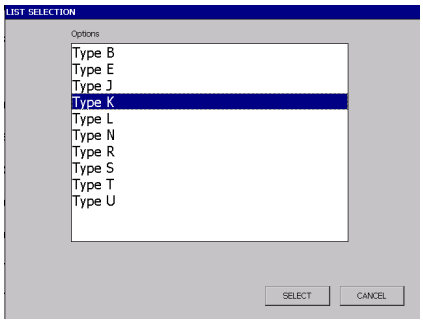


Figure 6.22 Linearization Select
(Input Type Thermocouple)

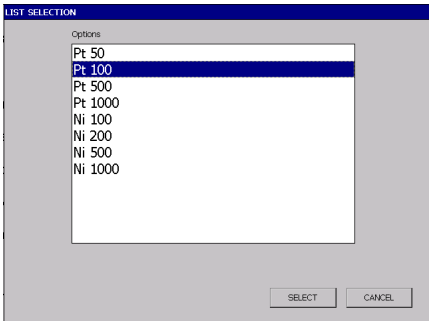


Figure 6.23 Linearization Select
(Input Type Resistance Thermometer)

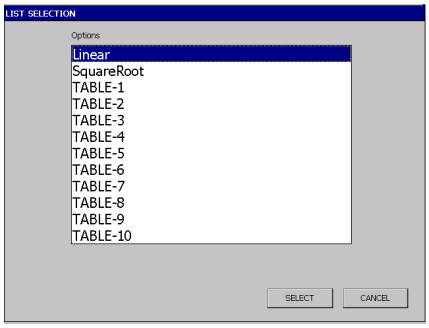


Figure 6.24 Linearization Select
(Input Type Ohm, Milivolt, Miliamper or Volt)

ATTENTION:

CJ Type, CJ Source and CJ temperature parameters are active only TC inputs(**see Figure 6.25**).

For TC sensor connection, **E-CJ-NTC-01 compensation sensor** should be used when the CJ Type is selected as EXTERNAL.

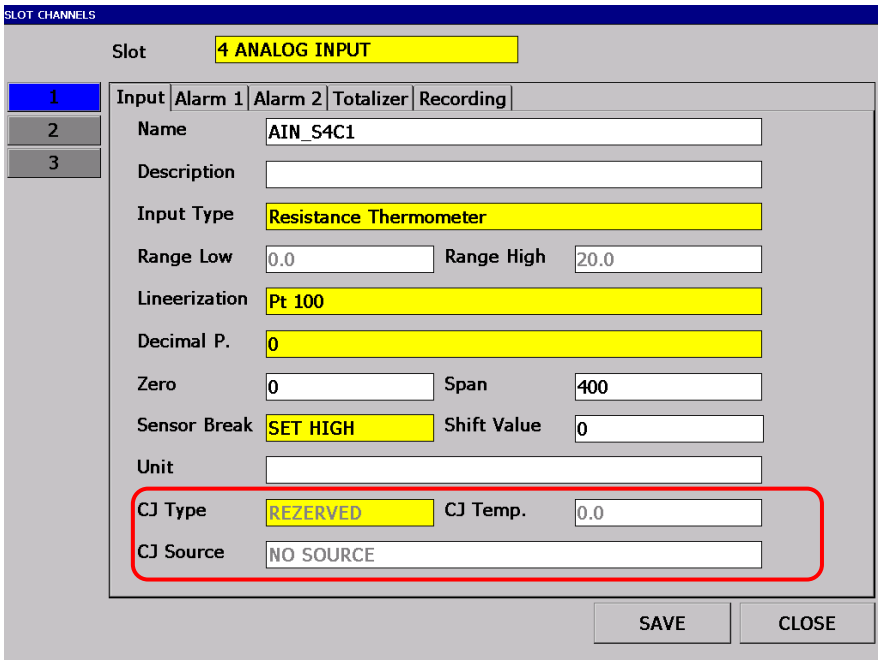


Figure 6.25 Disabled CJ Type, CJ Temperature and CJ Source parameters

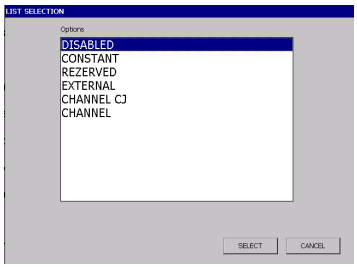
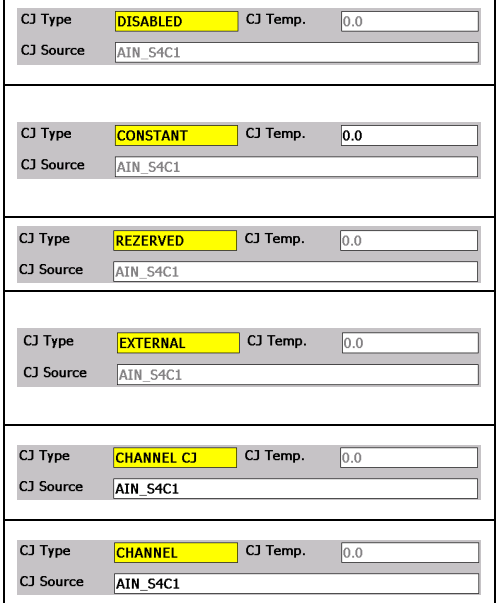
CJ TYPE	OPTIONS	DEFINITIONS
		**DISABLED** selection disables the compensation. **CONSTANT** selection fixes the cold junction temperature to **CJ Temp** paremeter. **RESERVED and EXTERNAL** selections use external E-CJ-NTC-01 terminal NTC sensor. **CHANNEL CJ** selection assigns cold junction temperature to the cold junction temperature of another channel defined by **CJ Source** and likewise **CHANNEL** selection assigns cold junction temperature to the process value of the channel defined by **CJ Source**.

Figure 6.26 CJ Type selections

6.6.4. Analog Output Card adjustments

Name : The related channel input can be named with using maximum 12 character.
Description : Maximum 50 characters long description.
Source : Determines the analog source by which the analog output is controlled
Type : Output type mA or Volt can be selected. Only one of them can be activated at a time.
Min : Minimum value of the output. For **mA** outputs, the value should be in the range of 0 to 20 mA, for **Volt** outputs should be in the range of 0 to 10 V.
Max : Maximum value of the output. For **mA** outputs, the value should be in the range of 0 to 20 mA, for **Volt** outputs should be in the range of 0 to 10 V.
Zero : Together with the **Span** paremeter, determines the analog output scale. When the process value of the source channel equals to **Zero** value, the output is set to **Min** output value.
Span : Together with the **Zero** paremeter, determines the analog output scale. When the process value of the source channel equals to **Span** value, the output set to **Max** output value.

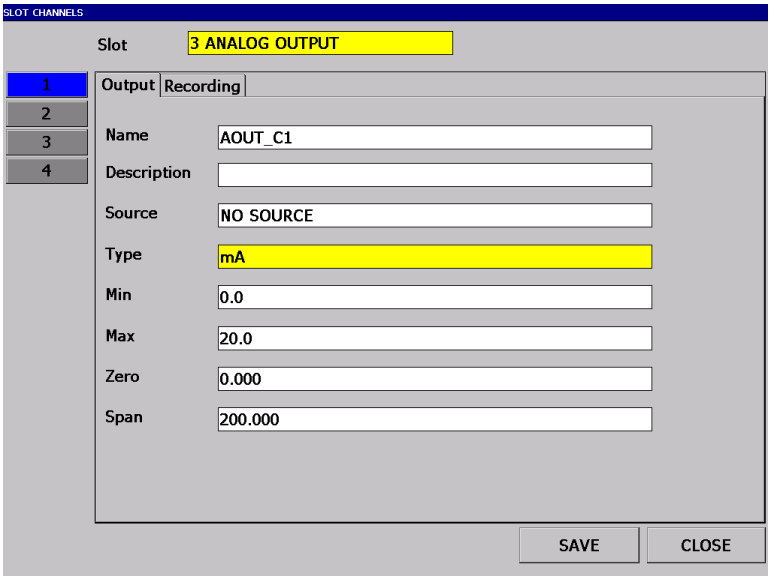


Figure 6.27 Analog Output Card Adjustments

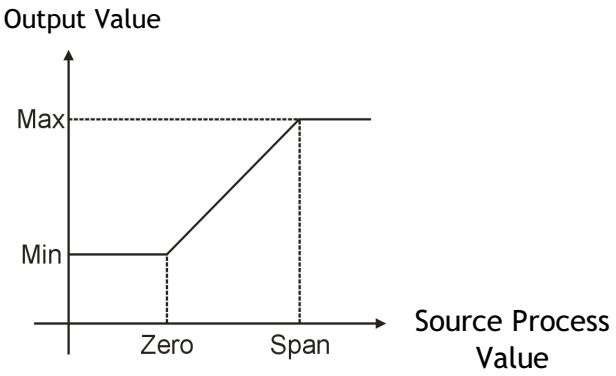


Figure 6.28 Source Process Value & Output Value (Analog Output Card)

6.6.5. Alarm adjustments

For each **Math Analog**, **Analog Input** and **Modbus channels,** two alarms are defined and can be configured to several ouput forms (**see Figure 6.30** and **Figure 6.31**).

Name: Maximum 12 characters long alarm name. Any character string can be entered in order to name the alarm.

Type: Any of **OFF**, **LOW**, **HIGH**, **SLOW RATE, FAST RATE** alarm types can be assigned to alarms. Please check **Figure 6.30** and **Figure 6.31** for output forms.

Set/Deviation: Defines set point for LOW and HIGH alarm types; deviation for SLOW RATE and FAST RATE types.

Hysteresis: Defines alarm hysteresis for LOW and HIGH alarms.

Latch Enable: Enabling latch causes alarm on state to persist until being acknowledged even if the alarm condition is over.

Delay: Alarms can be delayed for a certain amount of time in order to make sure the alarm condition persists long enough. Any value between 0 and 9999 can be set in seconds.

Derivation Time: Define derivation time for SLOW and FAST RATE alarms. Please check **Figure 6.33**

Filter: Process values can be averaged in order to smooth unavoidable abrupt changes which may cause false alarms. The filter value which can be set to any value from 1 to 10 determines number of process values to be averaged for alarm calculations.

Off Message: Maximum 100 characters long alarm off message.

On Message: Maximum 100 characters long alarm on message.

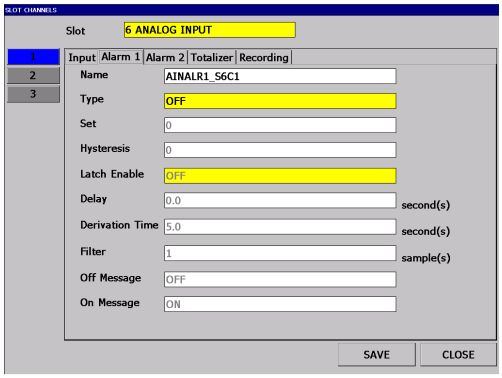


Figure 6.29 Alarm 1 Type selection

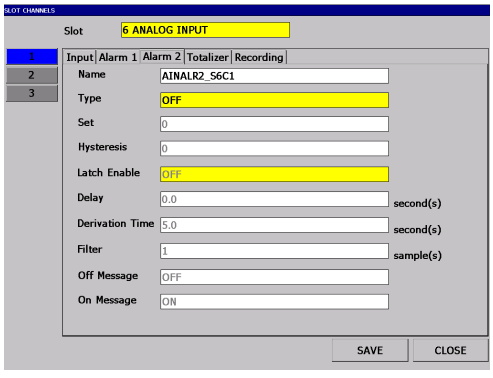


Figure 6.30 Alarm 2 Type selection

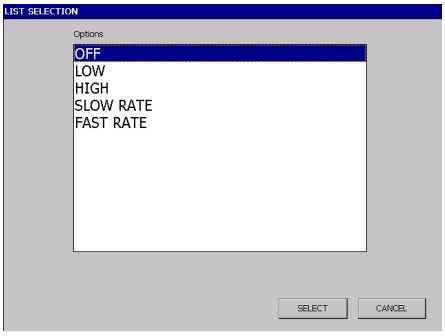


Figure 6.31 Alarm Type selection

Working forms of alarm types are described below.

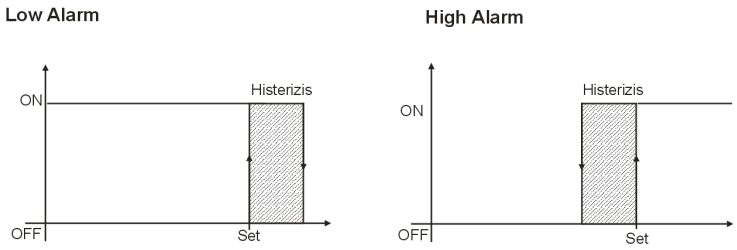


Figure 6.32 Low and High Alarm Forms

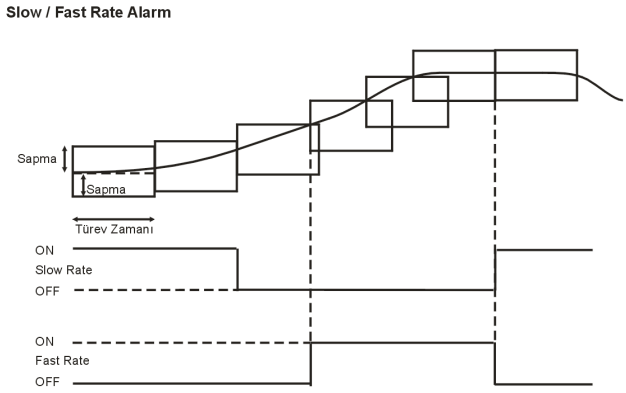


Figure 6.33 Slow Rate and Fast Rate Alarm Forms

6.6.6. Totalizer Adjustments

One totalizer is defined for each slot analog input, math analog and Modbus analog channels.

Name: Totalizer of related channel can be named with using 12 characters.
Enable: Determines if totalizer is active or not.
Period: Determines time unit of channel to be totalled. The parameter can be selected as **/Second**, **/Minute** or **/Hour.**
Cutoff: Determines the lowest process value that the totalizer will be active.
Unit: Determines the unit of totalizer.
Reset Source: Determines digital source for reset.
Logging Source: Determines digital source for logging.

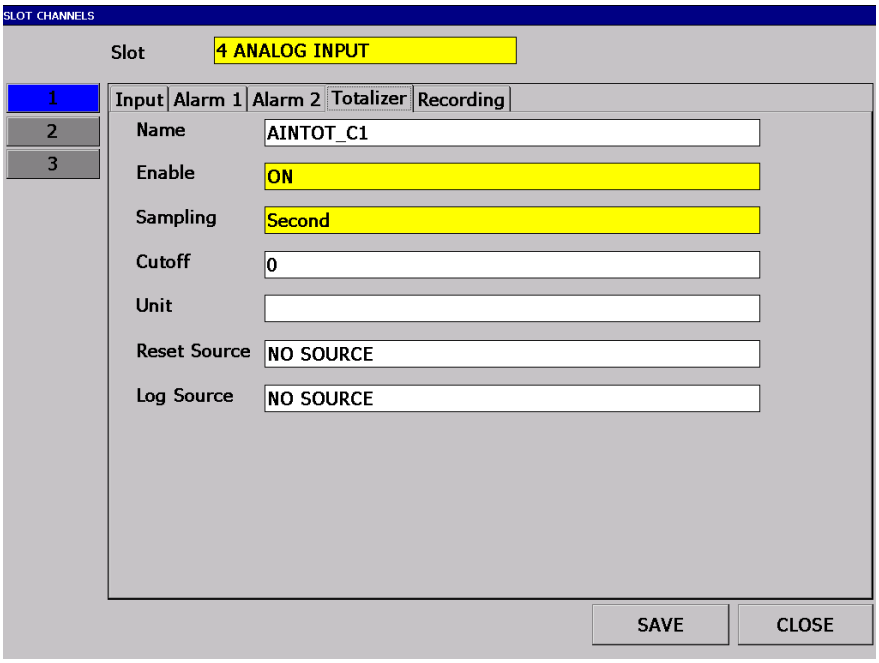


Figure 6.34 Analog Input Totalizer adjustments

6.6.7. Record Adjustments

Enable: Determines whether the channel recording is activated or not. The parameter can be selected as **ON** or **OFF**.

Sampling: Determines the recording period.

Filter: Sampling period of the internal ADCs are fixed at 100 ms regardless of recording period. For each recording period option, certain number of sampled values are collected depending on selected recording period (Total Number Of Samples = Recording Period (ms) / 100). Filter parameter determines the way how these sampled values will be processed prior to the recording. If **Instantaneous** is set for filtering, the value at the time of recording is recorded. Maximum and Minimum selects the maximum and minimum of the sampled values respectively for recording. Average value of the sampled values can be recorded using **Average Filter.**

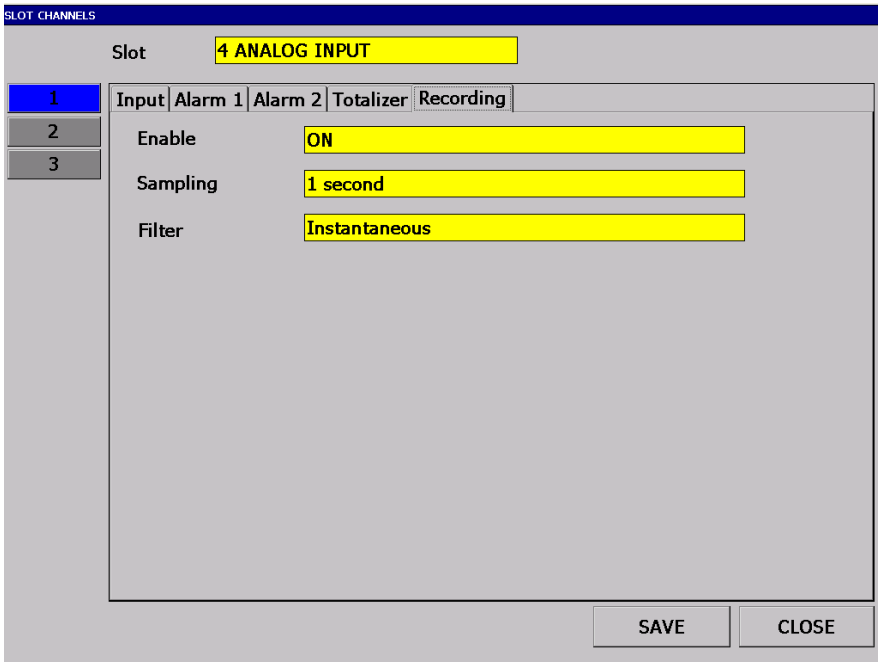


Figure 6.35 Analog Input Record adjustments

Changing the recording period parameter causes losing of the relevant channel's archived data recorded in that day at which the modifition takes place. Daily memory usage for each recording channel can be calculated using below equation in bytes.

Memory Usage (Bytes) = (86400/Recording Period (sec))*4

As an example, when all slots are plugged with Analog Input Cards and the recording of all analog channels are activated with a 1 sec recording period, 350 Kbytes of memory is used for each channel in a day and that corresponds to 4.2 MByte memory usage for all channel. With 8000 MByte Micro SD Flash, recording belonging to the last 5 years can be hold internally without any corruption. When the internal memory is full, old records are either deleted or backup depending on Backup Type. Please see **Archive Page** for backup configuration (**see Section 6.10**).

6.6.8. Digital Input Card adjustments

Name: The name of the related digital input can be written by this parameter (maximum length of 12 characters).
Description: Maximum 50 characters long description.
Off Message: Maximum 100 characters long alarm off message.
On Message: Maximum 100 characters long alarm on message.

State changes in all digital input channels are recorded to **DIGITAL LOG**. In addition, the channels can also be recorded periodically. Please check section **6.6.7 Record Adjustments** for digital input card for periodic recording.

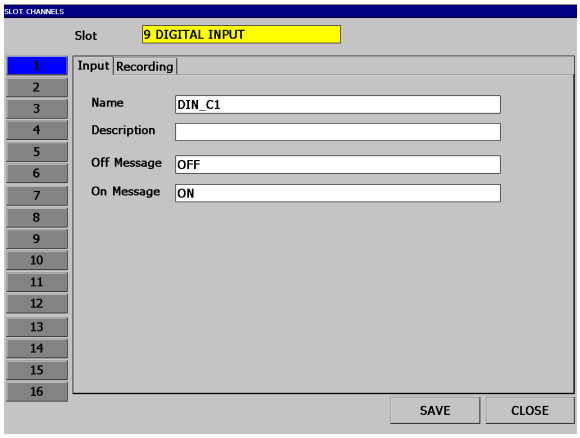


Figure 6.36 Digital Input Card, Input adjustments

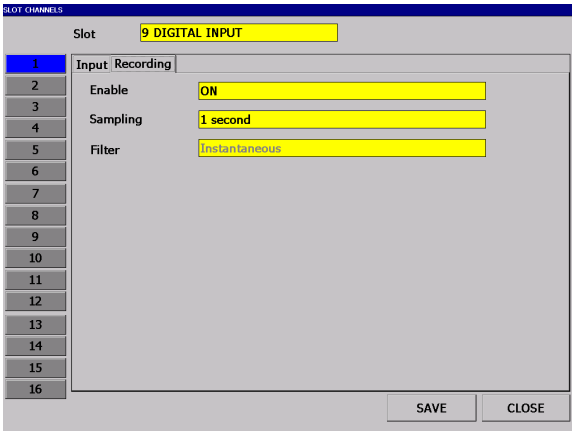


Figure 6.37 Digital Input Card, recording settings

6.6.9. Modbus Channels Page

Up to 16 MODBUS RTU channels can be configured by this page. Firstly, channel number is clicked from the left of the screen before starting the configuration. MODBUS channel process values are transferred from slave MODBUS RTU devices over the RS-485 port or TCP. RS- 485 serial communication settings can be done from Serial Port Tab in the **HARDWARE** menu. Slot Analog Channel and MODBUS channel have almost same features except the way channel rocess values are assigned. While the former extracts the channel values from certain sensors, the latter uses RS-485 bus or TCP by querying the slave device with **Device Address** and **Reg. Address** parameters to get the channel process values. If an error occurs while querying the slave device, the process value of the relevant channel is set to the configured **Fault Value.**

Name: Determines the name of the selected channel with using maximum 12 characters.
Description: Maximum 50 characters long description.
Connection: This parameter determines connection type. When selected as OFF, the channel is disabled and is closed for message transaction. Available connections are RS-485 and TCP.
Time Out: Only functional for RS-485 connections and determines time out value in miliseconds. This parameter can be adjusted between 100 and 500 miliseconds.
Address: This parameter defines modbus slave address of RS-485 modbus connection and can be set between 1 and 127.
IP Address: This parameter determines IP address of TCP/IP connection and is only required for TCP type connections.
Function: Determines the function code which will be used when querying. 03 or 04 can be selected.
Reg. Start Adr.: Starting adress of modbus reading query.
Reg. Count: Number of register to be read in query.
Index: When the **Address**, **Reg. Start Adr.** and **Reg. Count** parameters are set to the same values for more than one channel, the **Index** parameter determines the register which will be assigned to channel process value. By this way, number of transaction can be decrased in order to increase query frequency by using same transaction for more than one channel.
Reg. Type:
- Short (Signed 2 Byte), Short (Unsigned 2 Byte),
- Integer (Signed 4 Byte), Integer (Unsigned 4 Byte),
- Long (Signed 8 Byte), Long (Unsigned 8 Byte),
- Float (4 byte)
Decimal Point: Determines the position of decimal point. The parameter can be set as **0** , **0.0**, **0.00** or **0.000**
Fault Value: Determines the value of the channel in fault status.
Unit: Determines the unit.

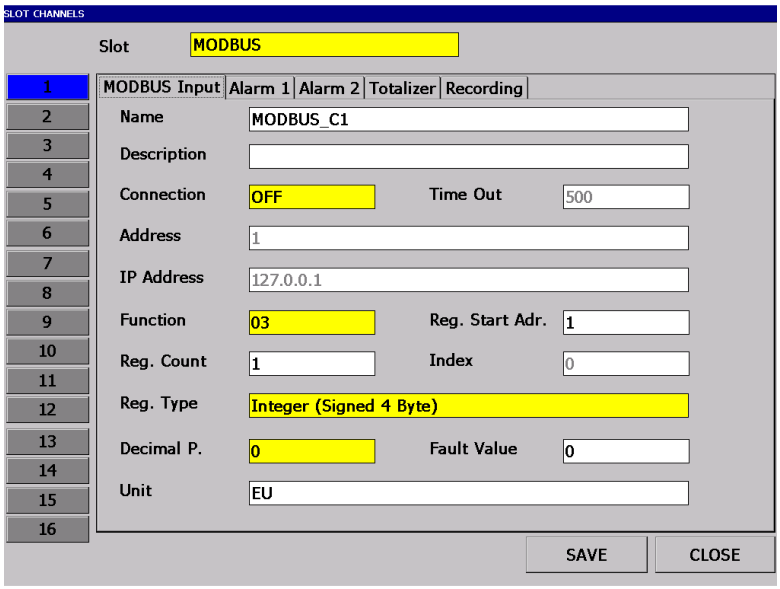


Figure 6.38 MODBUS Channels

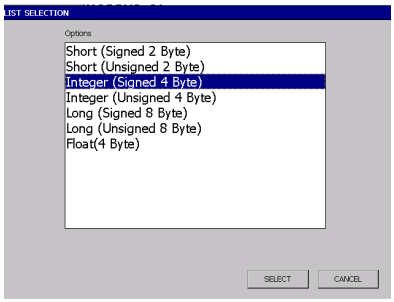


Figure 6.39 Register Types

6.6.10. Math Channel adjustments

There are 16 analog and 16 digital math. channels which can be defined with mathematical equations. Alarm, Totalizer and Recording adjustments of Math Analog Channels are same with Slot Channels Adjustments given in **6.6. Slot Channels Page.**

Equation: The equation can be defined using **MATH EDITOR** screen. (See. Appendix2).

Fault Value: Determines the value of the Math Channel when there is a problem in the calculation of math equation like Divede by Zero etc.

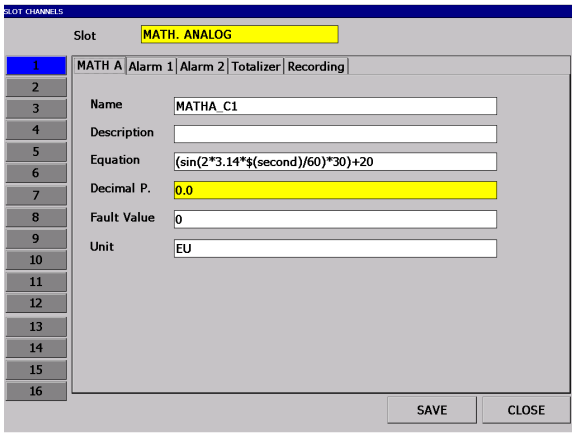


Figure 6.40 Math Analog Page

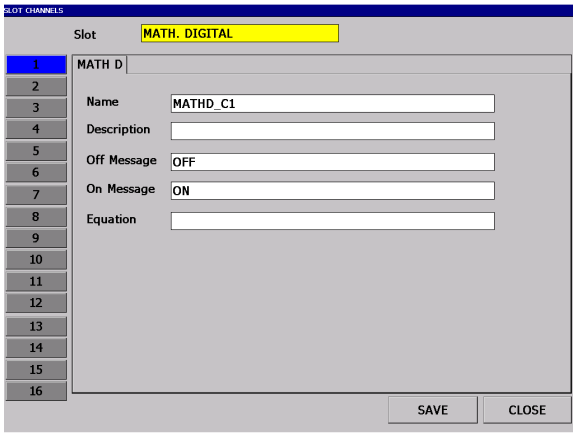
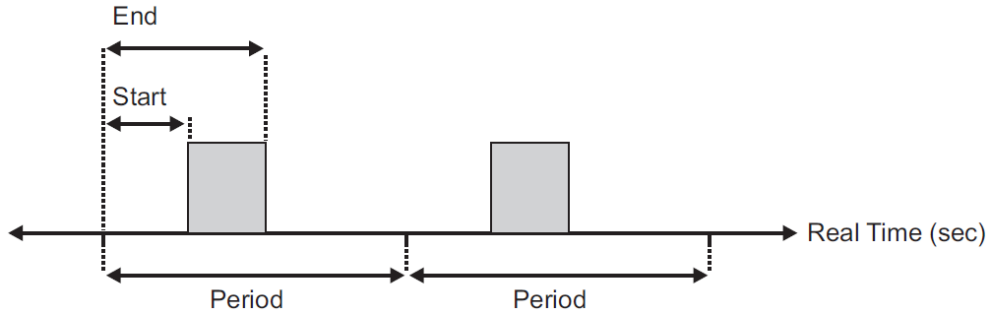


Figure 6.41 Math Digital Page

6.7. Real Time Channels Page

Source: Real Time channel to be adjusted.
Name: Desired channel can be named with maximum 12 characters.
Description: Maximum 50 characters long description.

Period, Start, and **End** parameters determine the real time interval in which the related real time source will be active as shown below. For example if **Period, Start**, and **End** are adjusted as **Every Minute**, **0, 5** respectively, the related channel will be active in first 5 seconds of every minute. Unit of **Start** and **End** parameters are in seconds. Real Time channels can be used for Totalizer Log Source, Totolizer Reset Source, Periodic Alarm etc.



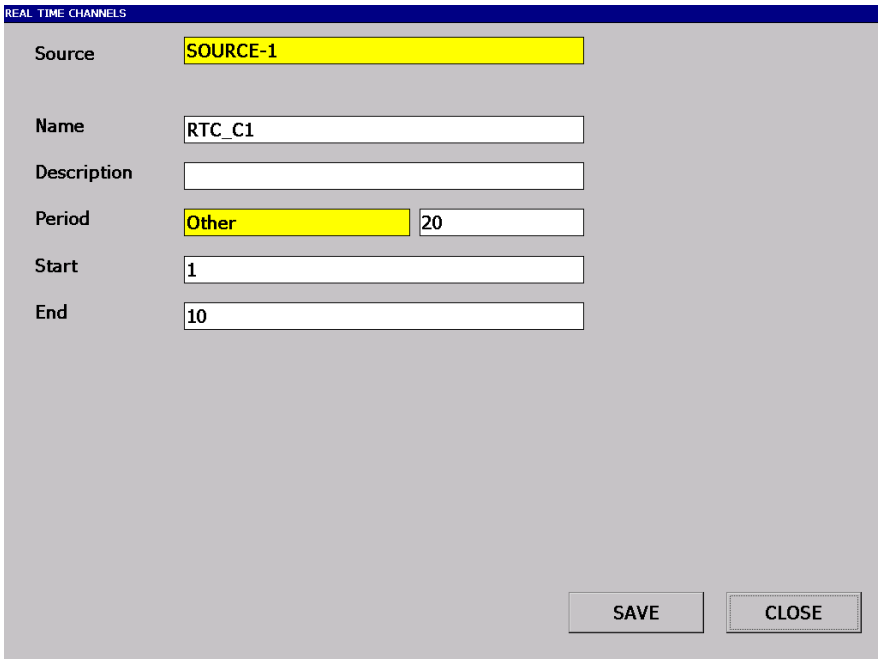


Figure 6.42 Real Time Channels (RTC) Page

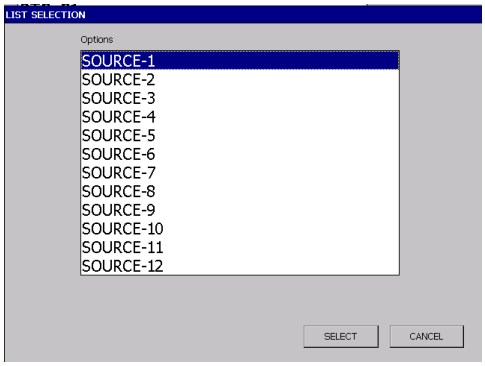


Figure 6.43 Real Time Channels (RTC) source selection

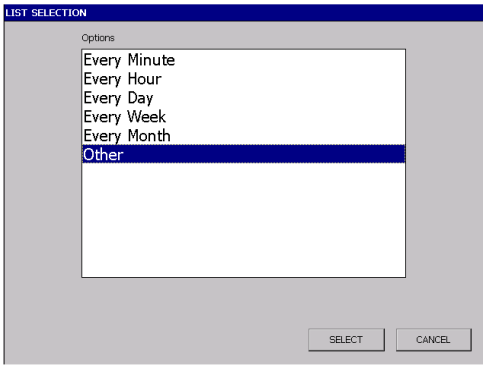


Figure 6.44 Real Time Channels (RTC) period selection

6.8. Groups Page

12 process group with 12 channels can be defined in the device. The channels of the process groups can be chosen from slot analog channels, modbus channels or math analog channels. After selecting the channels and their scales, these channels can be viewed in Bar Graphic, Digital and Trend Pages. The Digital 2 page shows two consecutive groups at the same group. As shown in **Figure 6.44** selected group **(*)** appear in the display indicates that the group was configured.

Group: Selects the group to be adjusted.
Name: The group name can be determined with maximum 12 characters.
Description: Maximum 50 characters long description.
Trend Type: The graphical selection direction can be changed by selecting Horizontal, Vertical and Circular.
Batch Start Input: The desired group is selected from 12 groups. Batch Start Input of the selected group can be defined.
Sources 1 to 12 Group Sources. Assigned to any of the sources valid in the device.
Minimum: Determines minimum value of the scale.
Maximum: Determines maximum value of the scale.

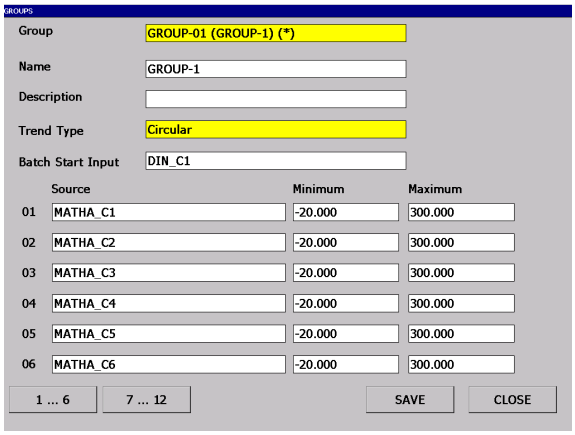


Figure 6.45 Groups Page (1…6)

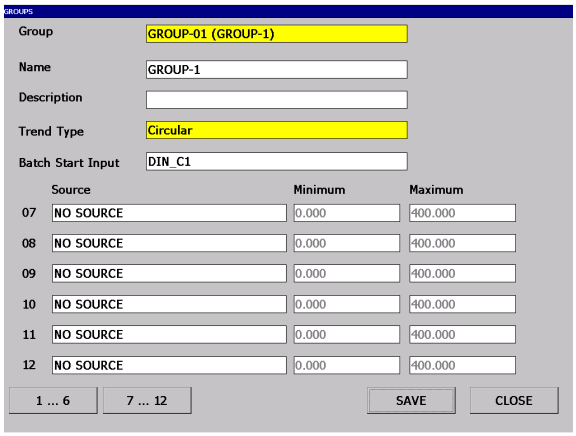


Figure 6.46 Groups Page (7…12)

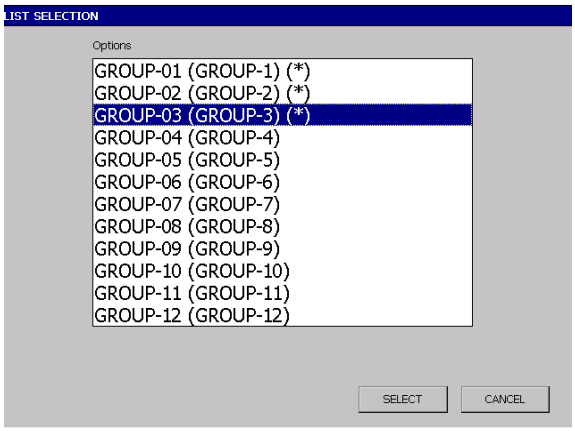


Figure 6.47 Groups Page group selection

6.8.1. Changing Alarm Set Values in Trend View

While the user is in Trend view, the alarm set value can be changed by touching the defined channel (**see Figure 6.49**). In order for the user to access the Alarm Set window in the Trend view, the user must log in to the Main Menu as **ADMIN** and be logged in. The user must be logged in with the **Channel Settings** entry authority **ON** and **LOGIN**. Otherwise, the user can not change alarm sets while in Trend view.

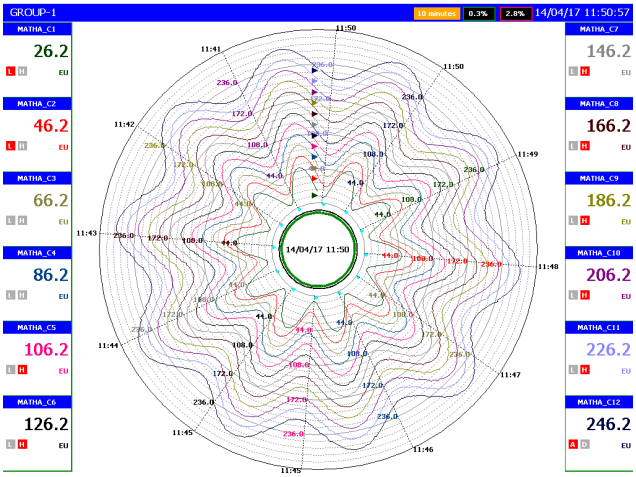


Figure 6.48 Trend Page (Trend Type Circular)

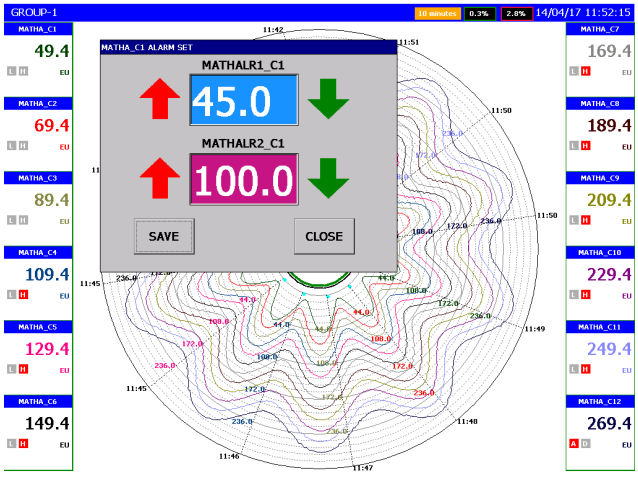


Figure 6.49 Changing alarm set values

To change the graphic drawing direction in the trend view, the **GROUPS** menu should be selected from the Main Menu. Graphic Type, **Horizontal**, **Vertical** or **Circular** can be selected from the Groups menu (see Figure-6.50). Figure 6.51, Figure 6.52, and Figure 6.53 show the graphical representation of the Graphic Type selection in the Trend view.

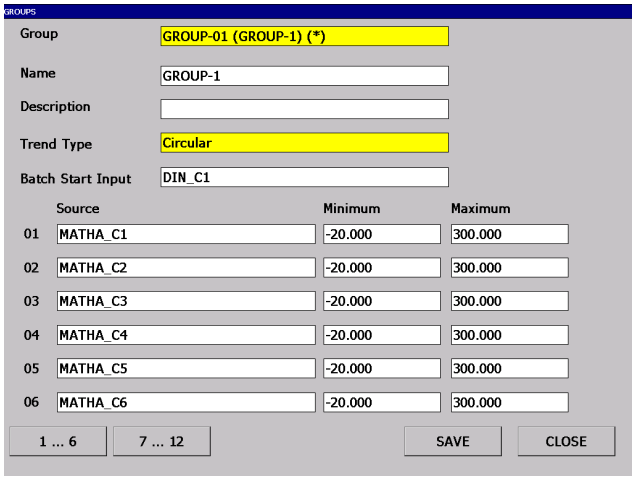


Figure 6.50 Graphical drawing direction selection from Groups menu

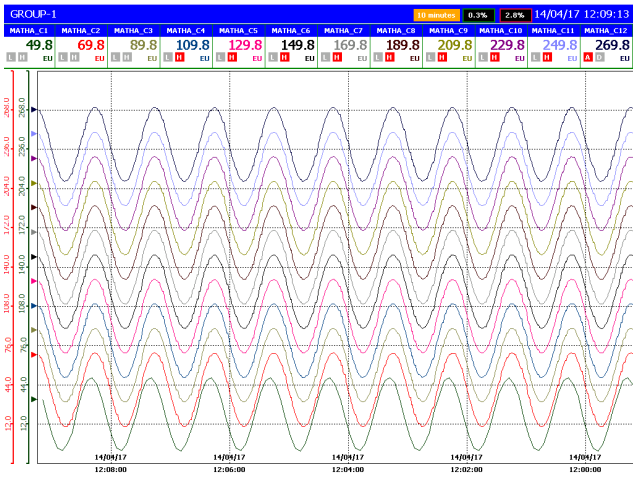


Figure 6.51 If Trend Type HORIZONTAL is selected

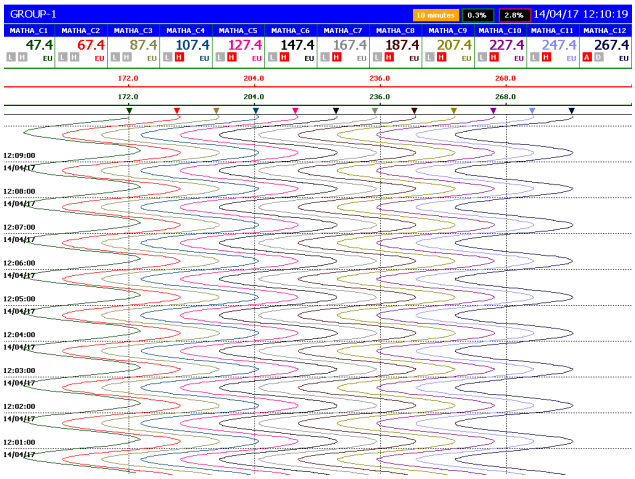


Figure 6.52 If Trend Type VERTICAL is selected

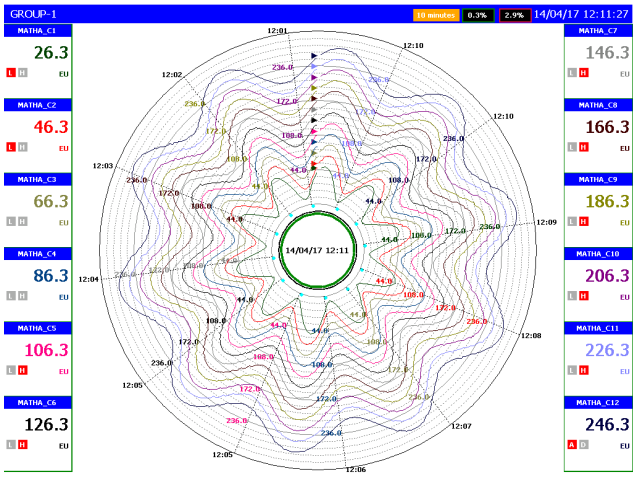


Figure 6.53 If Trend Type CIRCULAR is selected

6.8.2. Batch Start Input

Actions can also be initiated manually via the menus on the screen, and can also be initiated and stopped via digital inputs. This feature is activated in the group configuration by assigning the Start Start Input parameter of the relevant group to one of the 16 digital inputs found in the device. Groups for which the process start function has been defined by the digital input are activated with the assigned digital input, and the last registered operation number is incremented by one to start a new process. This process continues as long as the digital input is active, and the process is stopped by recording the interruption of the digital input.

When entered into the GROUPS menu, the **Batch Start Input** is defined (**Figure 6.54**). The desired group is selected from 12 groups. The Process **Batch Start Input** for the selected group is defined. For example, in Figure 6.54, group 1/1 digital input / 12 sources are selected.

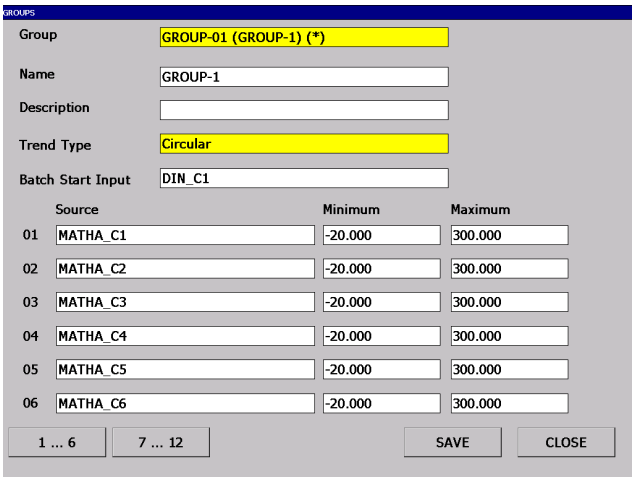


Figure 6.54 Group Configuration Page

When the Batch Start Input key is pressed, the window shown in Figure 6.55 appears. Here, Digital Inputs are selected. Channels are given in order from 1 to 16. If the channel is selected, the process is started when that channel is activated and the process is stopped when it is inactive.

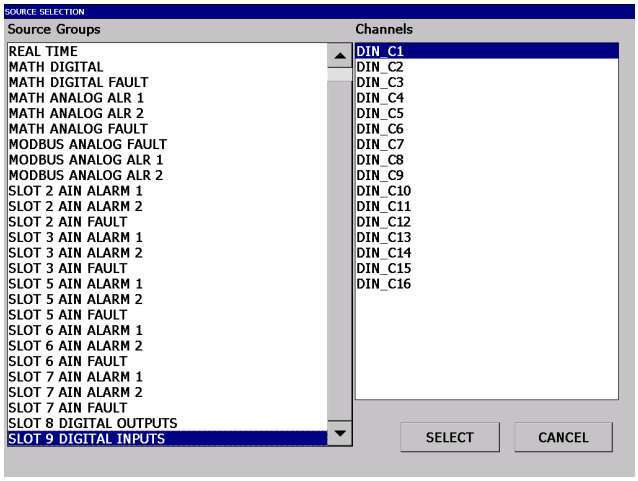


Figure 6.55 Source Selection Page

Figure 6.56 shows the process number initiated when the digital input is activated, **Figure 6.57** shows the passivation status of the digital input, and **Figure 6.58** shows the case where the process number is incremented and the new process is started when the digital input is reactivated.

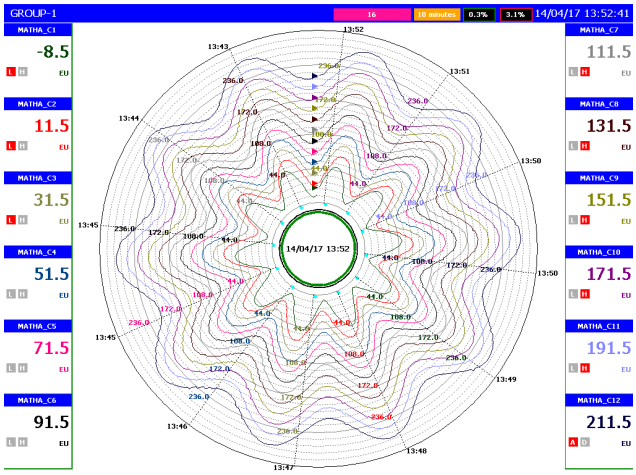


Figure 6.56 Digital input active

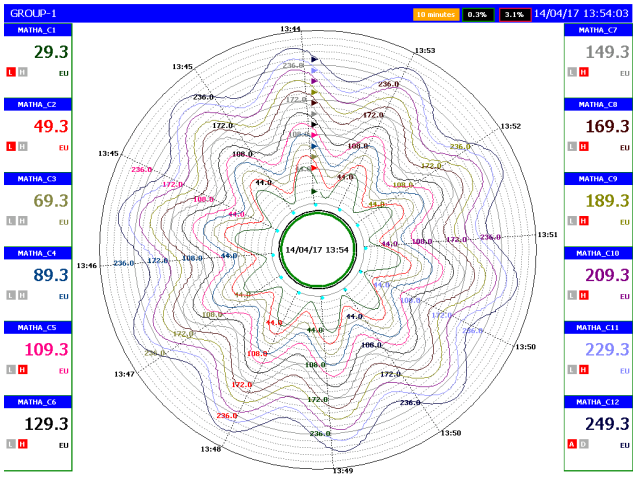


Figure 6.57 Digital input passive

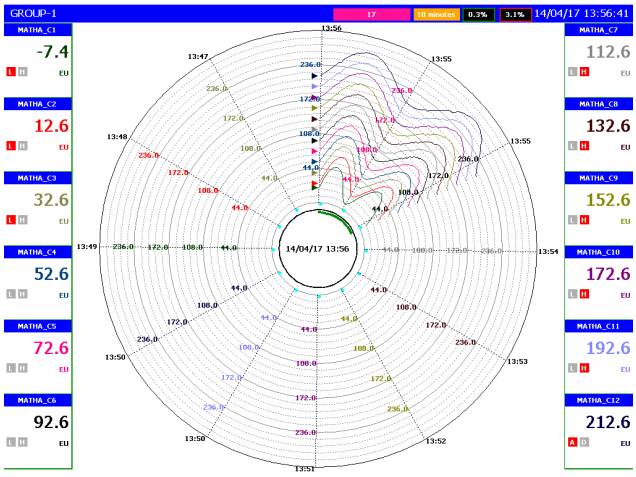


Figure 6.58 Digital input active

The transaction table for each group is separated. If the **Trend Page** is displayed in which group, the process table of that group can be displayed. When the **Trend Page** of the relevant group is selected, the running processes and previously completed processes can be displayed by pressing the button (**see Figure 6.59, Figure 6.60, Figure 6.61 and Figure 6.62**). Trend can be watched by selecting a previously completed process and pressing **Open**. The Stop key **Stops** the selected operation if it is running. The system automatically restarts with a new transaction number even if the operation that is activated by the digital input is stopped.

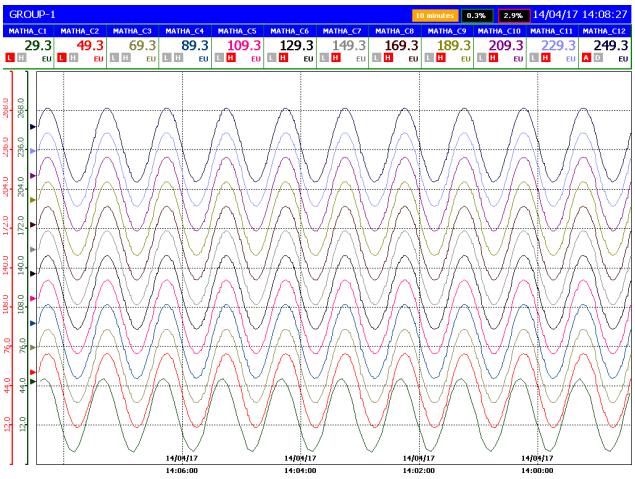


Figure 6.59 For example, GROUP-1 Trend Page

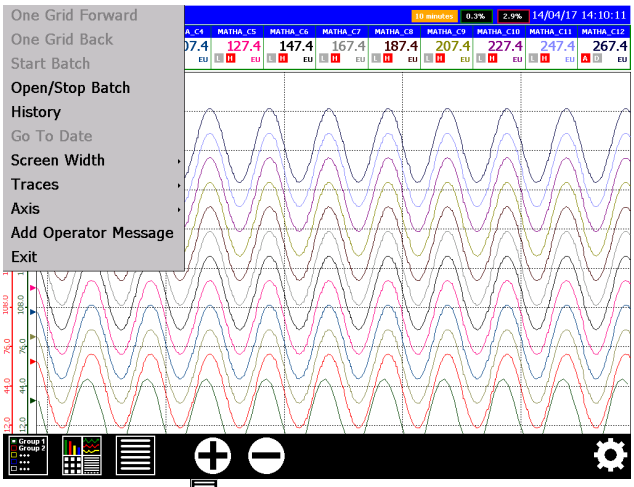
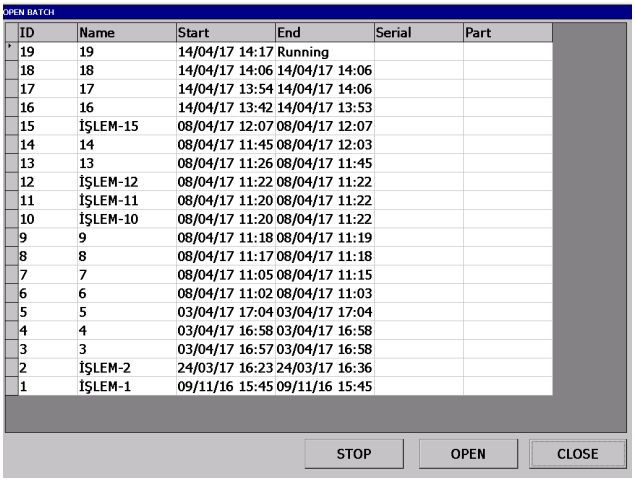
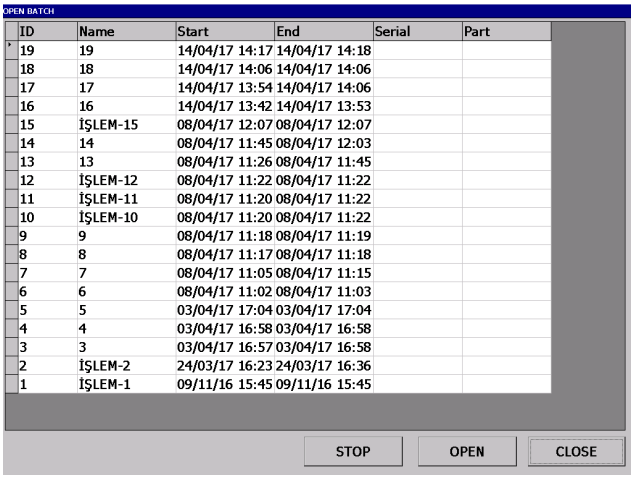


Figure 6.60 Press to select Open/Stop Batch



ID	Name	Start	End	Serial	Part
19	19	14/04/17 14:17	Running		
18	18	14/04/17 14:06	14/04/17 14:06		
17	17	14/04/17 13:54	14/04/17 14:06		
16	16	14/04/17 13:42	14/04/17 13:53		
15	İŞLEM-15	08/04/17 12:07	08/04/17 12:07		
14	14	08/04/17 11:45	08/04/17 12:03		
13	13	08/04/17 11:26	08/04/17 11:45		
12	İŞLEM-12	08/04/17 11:22	08/04/17 11:22		
11	İŞLEM-11	08/04/17 11:20	08/04/17 11:22		
10	İŞLEM-10	08/04/17 11:20	08/04/17 11:22		
9	9	08/04/17 11:18	08/04/17 11:19		
8	8	08/04/17 11:17	08/04/17 11:18		
7	7	08/04/17 11:05	08/04/17 11:15		
6	6	08/04/17 11:02	08/04/17 11:03		
5	5	03/04/17 17:04	03/04/17 17:04		
4	4	03/04/17 16:58	03/04/17 16:58		
3	3	03/04/17 16:57	03/04/17 16:58		
2	İŞLEM-2	24/03/17 16:23	24/03/17 16:36		
1	İŞLEM-1	09/11/16 15:45	09/11/16 15:45		

Figure 6.61 GROUP-1 Page, Open Batch



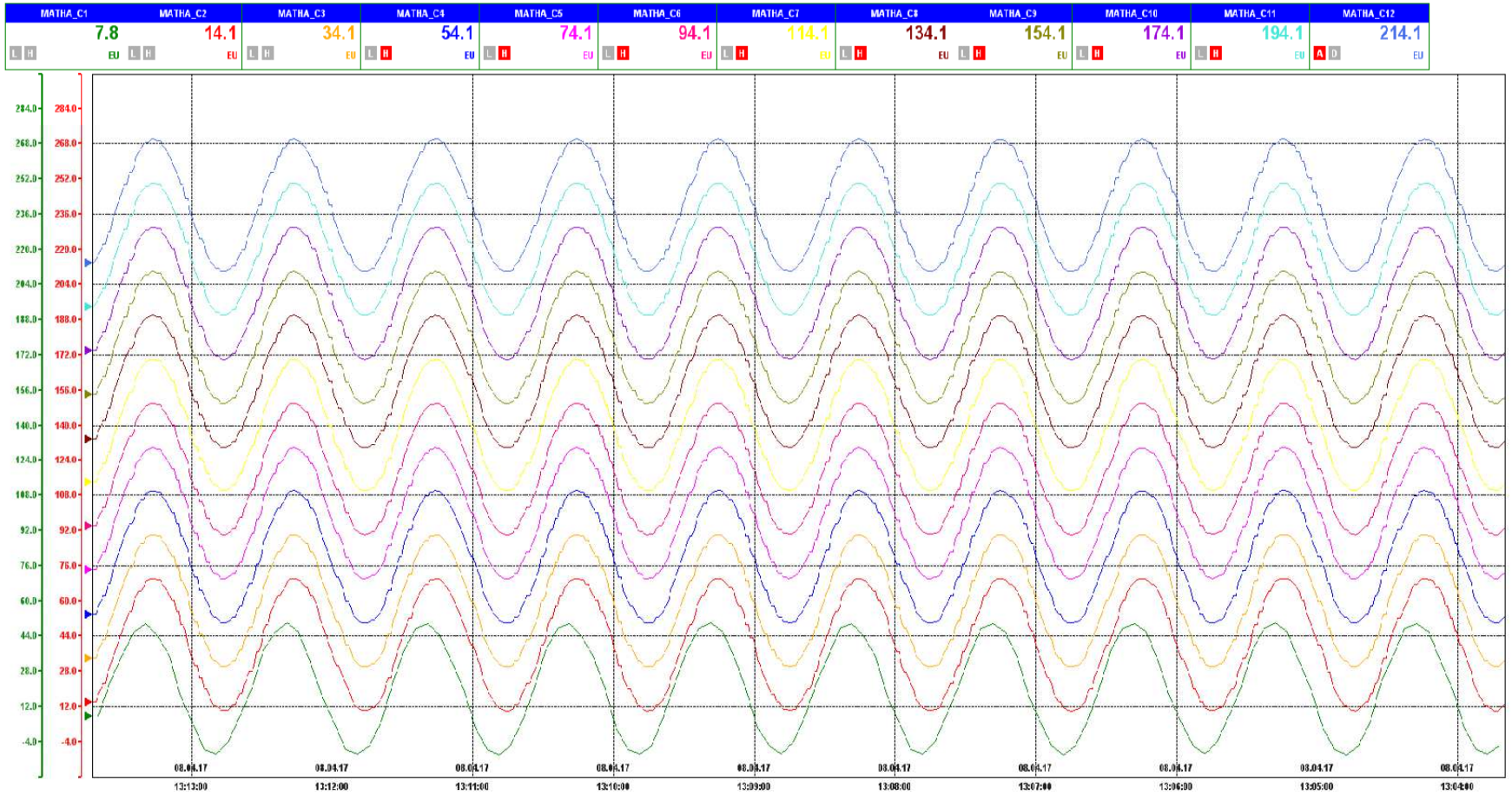
ID	Name	Start	End	Serial	Part
19	19	14/04/17 14:17	14/04/17 14:18		
18	18	14/04/17 14:06	14/04/17 14:06		
17	17	14/04/17 13:54	14/04/17 14:06		
16	16	14/04/17 13:42	14/04/17 13:53		
15	İŞLEM-15	08/04/17 12:07	08/04/17 12:07		
14	14	08/04/17 11:45	08/04/17 12:03		
13	13	08/04/17 11:26	08/04/17 11:45		
12	İŞLEM-12	08/04/17 11:22	08/04/17 11:22		
11	İŞLEM-11	08/04/17 11:20	08/04/17 11:22		
10	İŞLEM-10	08/04/17 11:20	08/04/17 11:22		
9	9	08/04/17 11:18	08/04/17 11:19		
8	8	08/04/17 11:17	08/04/17 11:18		
7	7	08/04/17 11:05	08/04/17 11:15		
6	6	08/04/17 11:02	08/04/17 11:03		
5	5	03/04/17 17:04	03/04/17 17:04		
4	4	03/04/17 16:58	03/04/17 16:58		
3	3	03/04/17 16:57	03/04/17 16:58		
2	İŞLEM-2	24/03/17 16:23	24/03/17 16:36		
1	İŞLEM-1	09/11/16 15:45	09/11/16 15:45		

Figure 6.62 GROUP-1 Page, Stop Batch

The data stored in the device can be downloaded to the computer via USB or ETHERNET connection with the E-PR-110 DATA EXPLORER program and the printer output can be retrieved. A sample output is displayed below.

TREND OUTPUT

Date	08.04.17 13:14:13	**Operator Name**	Elimko
Batch Name	xxxxx	**Batch Start**	xxxxx
Batch End	xxxxx	**Batch Serial**	xxxxx
Batch Part No	xxxxx	**Group Name**	GROUP-1
Tag-1	xxxxx	**Tag-2**	xxxxx
Tag-3	xxxxx	**Tag-4**	xxxxx
Sayfa	1/1		



6.9. Custom Tables

Up to 10 custom linearization tables can be defined for linear channels. These tables define input and output relations for non standart sensors.

Table Name: 10 character long table name.
Step Count: Determines number of linearization steps. It can be maximum 20 steps.
X (%): Determined percentage of the input values in the respective linearization step.
Y: **X (%) d**etermines the value to be displayed in response.
Up-Down: Both keys can be used to scroll between steps.

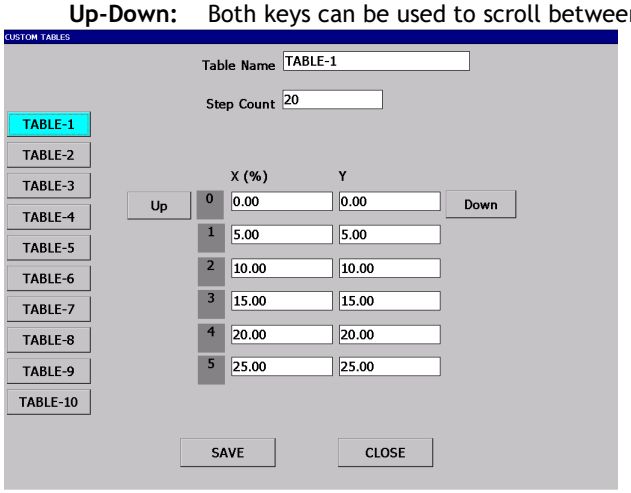


Figure 6.63 Custom Tables Page

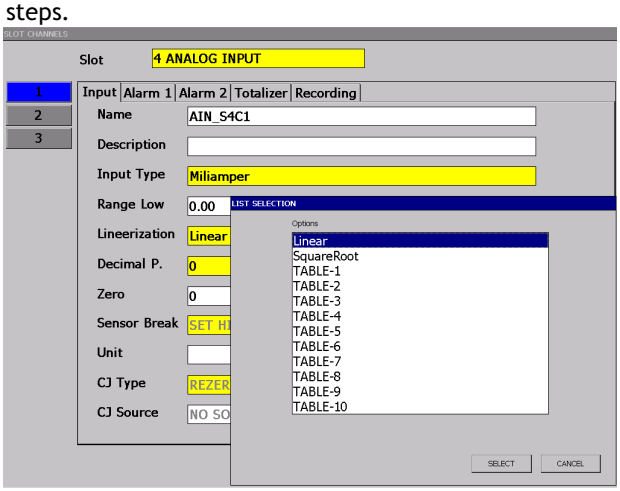


Figure 6.64 Analog Input page table selection

6.10. Archive

The configuration and archived data saved in the device's non-volatile memory can be easily synchronized to an external flash memory by connecting a USB Flash Memory to the USB port of the recorder. Prior to the synchronization, user should select the external memory device using **Directory Name** parameter. After selecting the external memory device, synchronization is initiated by pressing **SYNCHRONIZE** button. While synchronizing, user is strongly advised not to perform any operation. Synchronized data can be used for further data analysis in Data Explorer Pro Software**. RESET ARCHIVE** button is used to delete all stored data archives. Resetting archive causes all records to be lost irreversibly.

Sync. Direction: **Sync. Direction** determines synchronization direction. **DEVICE TO DISC** option transfers the data from device to external disc. **DISC TO DEVICE** does the reverse operation.

Directory Name: Directory name selected directory located on the external disc. Synchronization reads or writes the data to/from the directory **[Selected Directory]\E-PR-200-[Tag]\Archive** depending on synchronization direction.

Sync. Type: Three different data transfer options are available for synchronization **COMPLETE** option transfers all data available for synchronization. **UP TO DATE** option transfer only the new data which is saved after the last synchronization. From the date option transfers data starting from the date which is set in **FROM A DATE** parameter.

Get From Old Format: Get from old format button converts old format data saved by the versions older than 1.7.X to new format.

Backup: Backup device is selected by **Directory Name** parameter.

Backup Type: Two options with different capabilities and functions are available for Backup Type. User has the chance of either periodic data synchronization or memory extension by selecting **COMPLETE BACKUP** or **MEMORY EXTENSION** respectively.

Backup Period: Determines backup period when Backup Type is set to **COMPLETE BACKUP.** Selectable periods are **every day**, **every week** and **every month.**

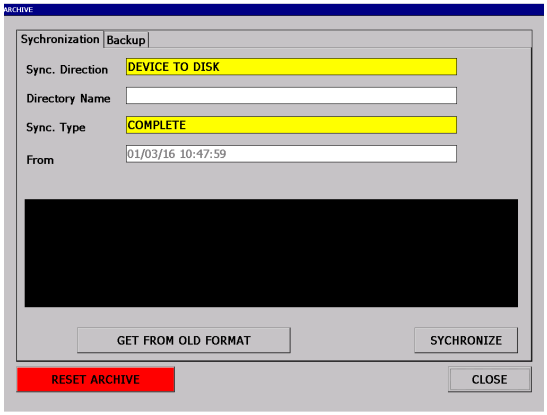


Figure 6.65 Archive Synchronization Page

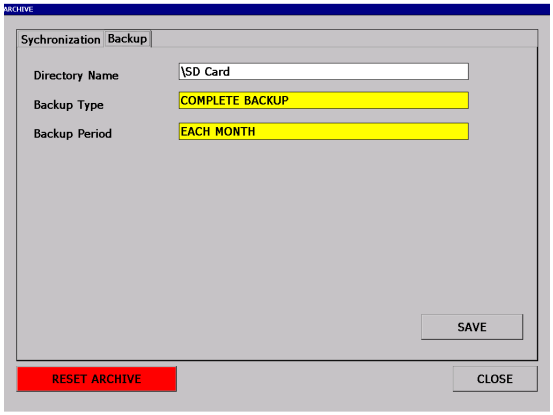


Figure 6.66 Archive Backup Page

6.11. E-mail

Recorder can be configured to send e-mail reports contaning instanteneous process values and states up to 4 recipients at adjustable periodic times or by multiple configurable triggers such as sources and general events.

6.11.1. Server Adjustments

Server: SMTP incoming mail server
Port: SMTP port number
SSL: Disable or Enable SSL.
User: User Account Name
Password: User Account Password

Example settings for free Google mail service;
Server: smtp.google.com
Port: 587
SSL: ON

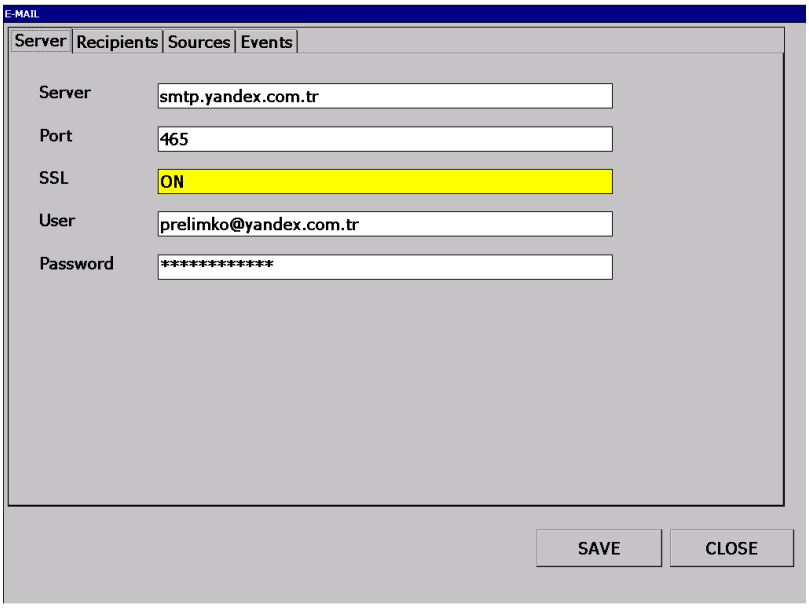


Figure 6.67 E-MAIL Server Page

6.11.2. Recipient adjustments

Recipient 1-4: Up to 4 recipient can be defined for e-mail reports. Unused recipients should be left blank.

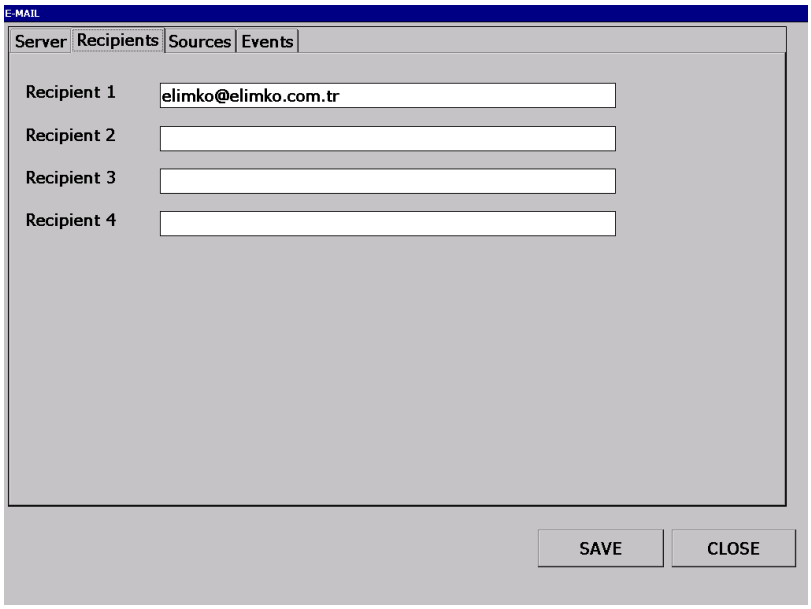


Figure 6.68 E-MAIL Recipients Page

6.11.3. Source adjustments

Source 1-8: Up to 8 sources which will trigger e-mail notification to the recipients can be defined. For periodic e-mail notification, one of the real time channels with required interval should be assigned to any of the sources.

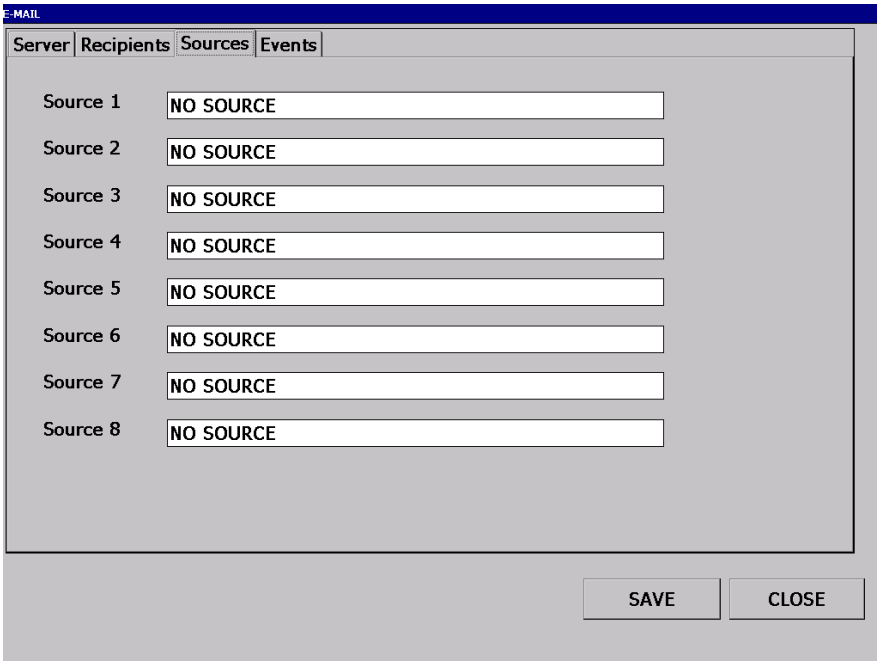


Figure 6.69 E-MAIL Sources Page

6.11.4. Events

On New Alarm: ON or OFF selectable. If ON is selected, a new e-mail is sent when an alarm occurs.

On New Instrument Log: ON or OFF selectable. If ON is selected, a new e-mail is sent when a new instrument log is added.

On New Operator Log: ON or OFF selectable. If ON is selected, a new e-mail is sent when a new operator log is added.

On New Digital Log: ON or OFF selectable. If ON is selected, a new e-mail is sent when a new digital log is added.

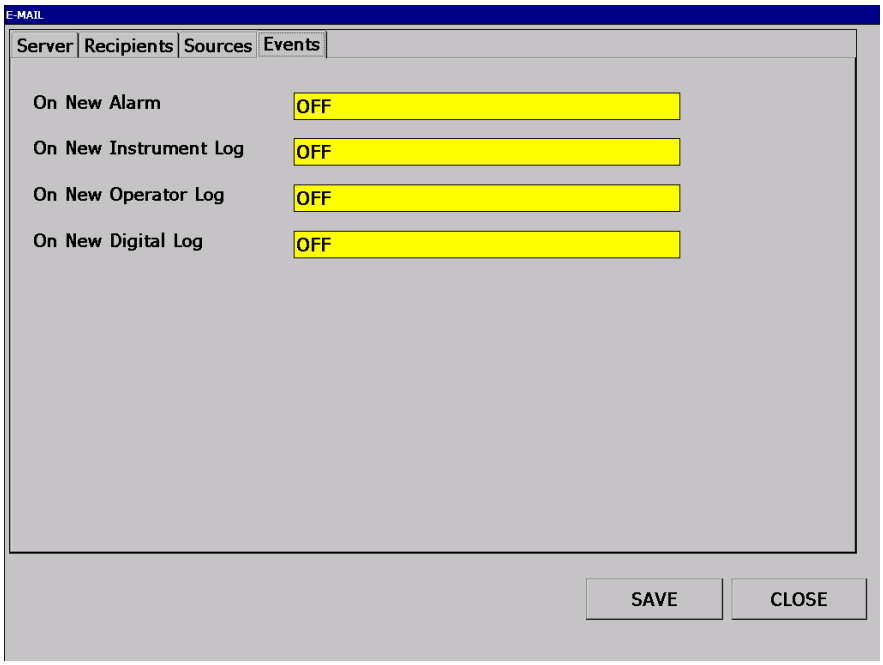


Figure 6.70 E-MAIL Events Page

6.12. PID

PID configuration window is accessed from MAIN MENU by pressing PID button. 12 PID control loop with different control parameters can be defined for various control applications.

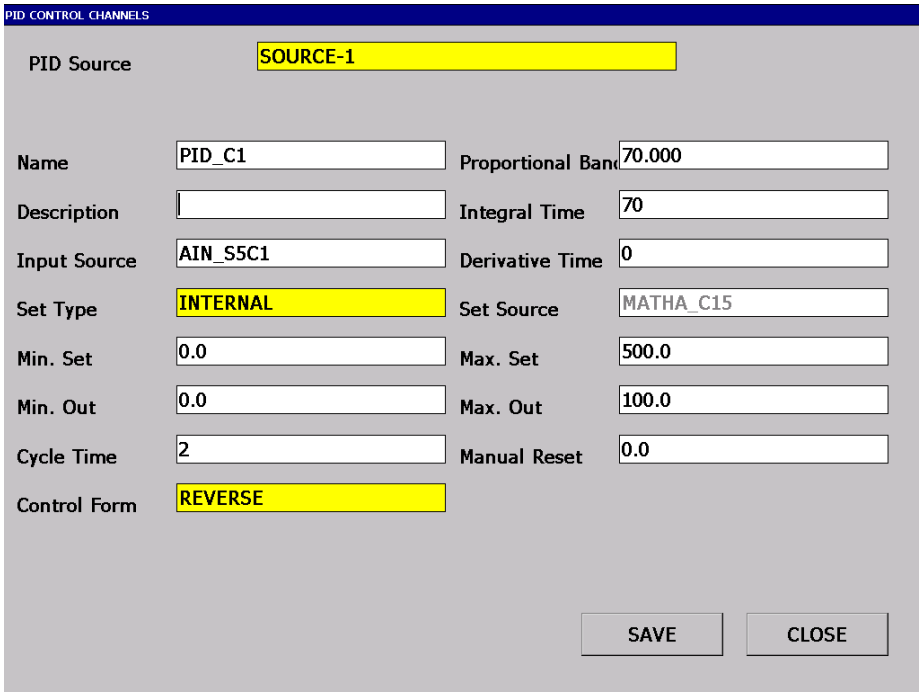


Figure 6.71 PID Configuration Window

PID Source : PID Source to be configured.
Name : Maximum 12 characters can be entered. Defines the PID Source name.
Description : Maximum 50 characters can be entered. Additional explanation can be entered.
Input Source : Determines PID control loop input variable (the process variable to be controlled). The input source can be assigned one of the analog channels defined in the recorder. It can be slot analog inputs, modbus channels or math channels)
Set Type : Determines set input style of PID control loop. When selected as **INTERNAL**, set input is entered manually using on screen keyboard (see Figure 6.56). Conversely, when selected as **EXTERNAL** , set input is applied using an external analog source which is defined by the parameter **Set Source**.

Min. Set	:	Minimum configurable internal set value.
Max. Set	:	Maximum configurable internal set value.
Min. Out	:	Minimum output value in %percentage. When the calculated output value is less than the minimum output value, the output value is set to minimum output value.
Max. Out	:	Maximum output value in %percentage. When the calculated output value is more than the maximum output value, the output value is set to maximum output value.
Cycle Time	:	Cycle time determines the PID PWM ouput period and is only applied to the digital outputs and is entered in seconds. Short values of cycle times result more precisional and accurate contol but may cause the control element (actuator) wear faster than would be with long cycle times.
Control Form	:	Determines the control form of PID output. REVERSE output form makes the control output increase when the error signal (Process Value – Set) increases, conversely FORWARD selection makes the control output decreases when the error signal increases. When deciding the control form of PID Loop, how the control output will affect the process variable should be in mind. For instance cooling outputs causes a reverse reaction of temperature output.
Proportional Band	:	Proportional band of PID loop in engineering unit.
Integral Time	:	PID loop integral time in seconds. 0 value of integral time disables integration.
Derivative Time	:	PID loop derivative time in seconds. 0 value of derivative time disables derivation.
Set Source	:	Please see **Set Type** parameter.
Manual Reset	:	Output value corresponding to zero error signal(PV-Set). %50 is recommended if there is no priory information.

PID Sources can be directed to analog output, relay or digital output channels. When the analog outputs are used for control signal, Zero and Span parameter of the analog output should be assigned 0 and 100 respectively. When the digital output sources are used for control signal, PWM sources of the digital sources should be assigned to the PID source to be directed.

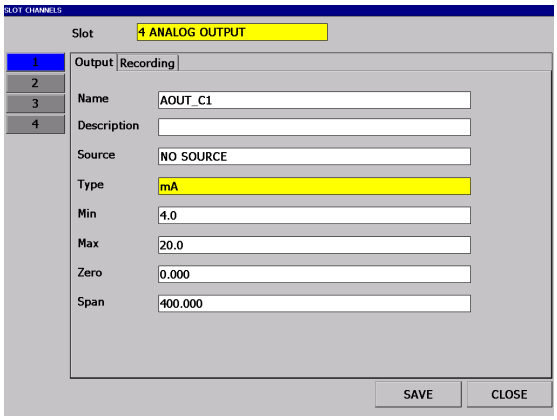


Figure 6.72 Definition of PID Source to Analog Output

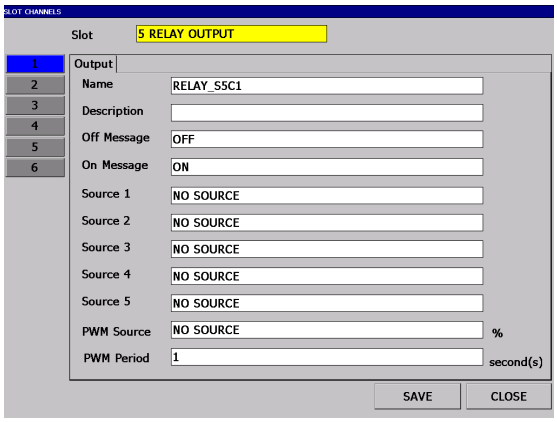


Figure 6.73 Definition of PID Source to Relay Output

When the fisrt group channel of an group is assigned to a PID source, usual Trend View appears different and turns to PID control page form which provides a clear display of PID process variables and enables user to enter manual set and control output. Please see **Figure 6.74** and **6.75**.

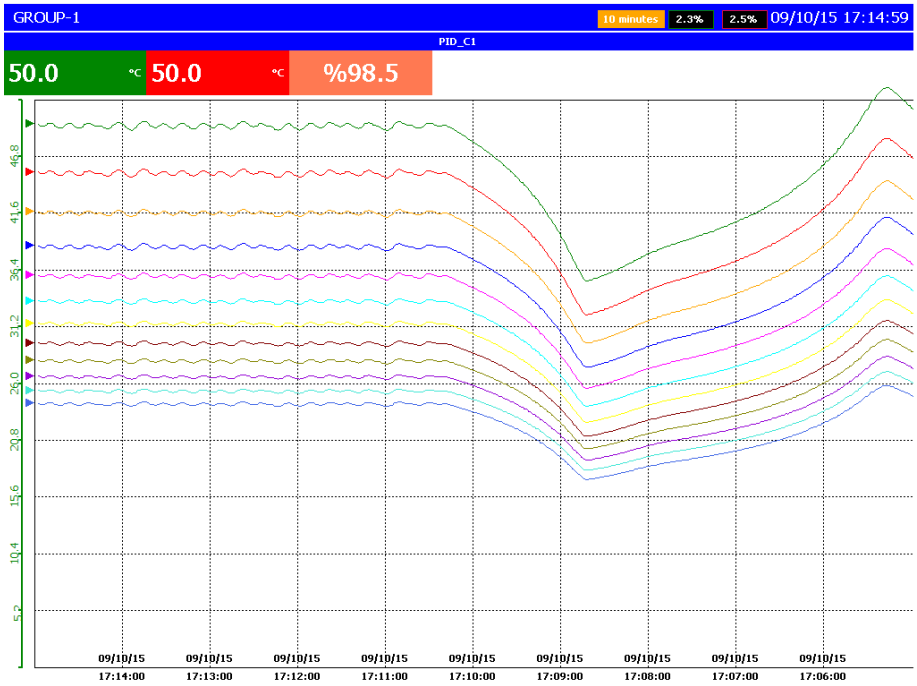


Figure 6.74 PID Trend Page

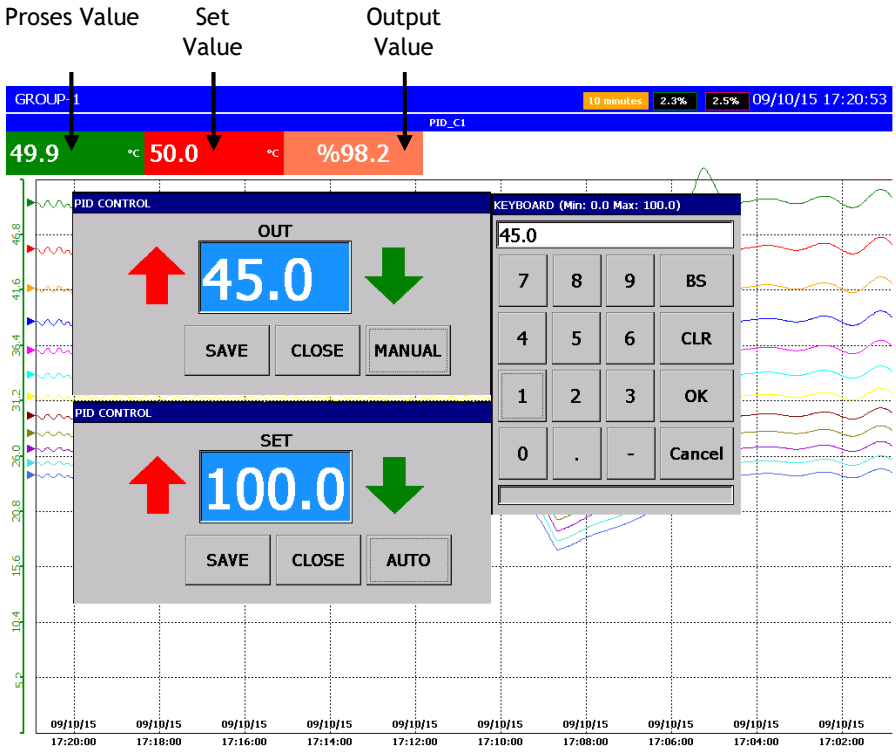


Figure 6.75 PID Control Page

To change the set value, click on Set Value on TREND view screen and click PID Source on the BAR or DIGITAL view screen to open the PID CHECK window. By using the set value arrows from the opened window, you can change it by entering set value directly from the keyboard which is opened by touching SET on the yada. PID CONTROL pences can only be opened by users who have the authority to enter the ADMIN and Channel Settings menu while in TREND, BAR and NUMERIC VIEW. If the Set Type of the PID source is EXTERNAL selected, the PID CONTROL window will not open (see Section 6.12 PID, Set Type parameter).

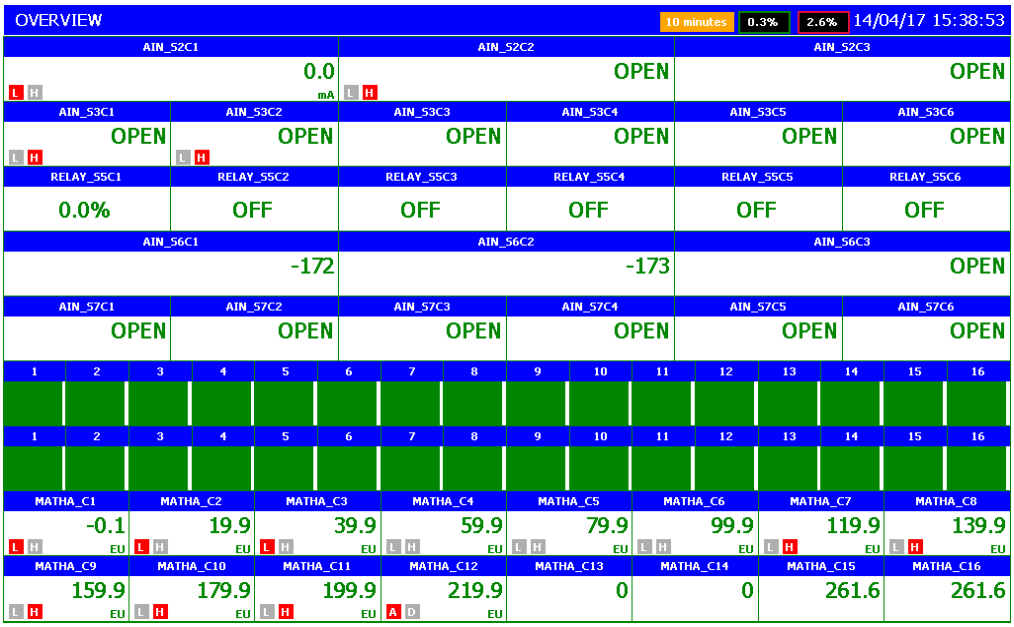


Figure 6.76 PID Control Page

Figure-6.76 also shows the percentage of the output on the **Overview Page**, rather than the status indication at the relay outputs assigned to the PWM Source.

7. CONNECTION DIAGRAMS

The back panel view of E-PR-200 device is shown at the below figure. There are 9 slots at the back panel.

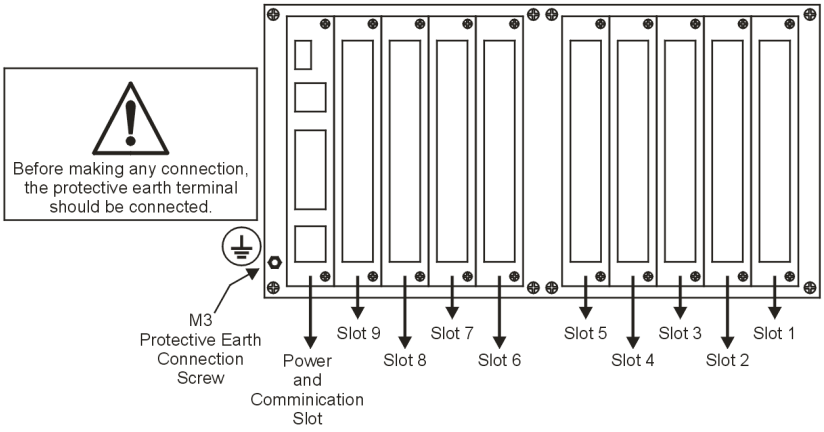


Figure 7.1 E-PR-200 Rear Panel

The Power and Communication Slot is fixed for every device and Power Supply, Transmitter Supply, RS-485 and Ethernet connections are made to this slot (**see.Figure 7.2 , Appendix-1**). Slots 1-9 can be any of Analog Input, Digital Input, Digital Output, Analog Output or Relay Output depending on configuration.

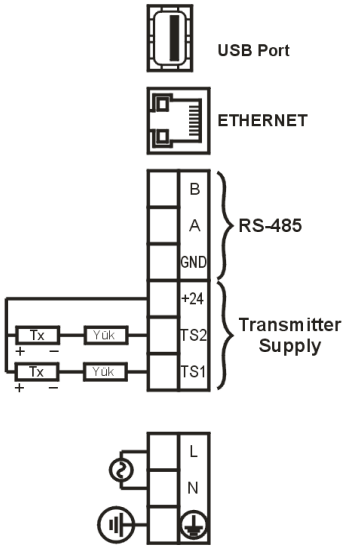
- Analog Input (3 Channels, AIN), Analog Input (6 Channels, AIN), Analog Output (4 Channels, AOUT)
- Digital Input (16 Channels, DIN), Digital Output (16 Channels, DOUT)
- Reyal Output (6 Channels, RELAY)

The connection of Analog Input, Digital Input/Output or Relay Output cards are given in **Figure 7.3**, **Figure 7.4**, **Figure 7.5** and **Figure 7.6** respectively.

In order to change the cards on 1-9 slots, dismantle top and bottom screws of the related slot and pull out the card. After placing the desired card fix the screws again. During changing or adding card, device should be powered off. After each new card configuration, it must be registered by scanning new configuration. Please see **Section 6.5**.

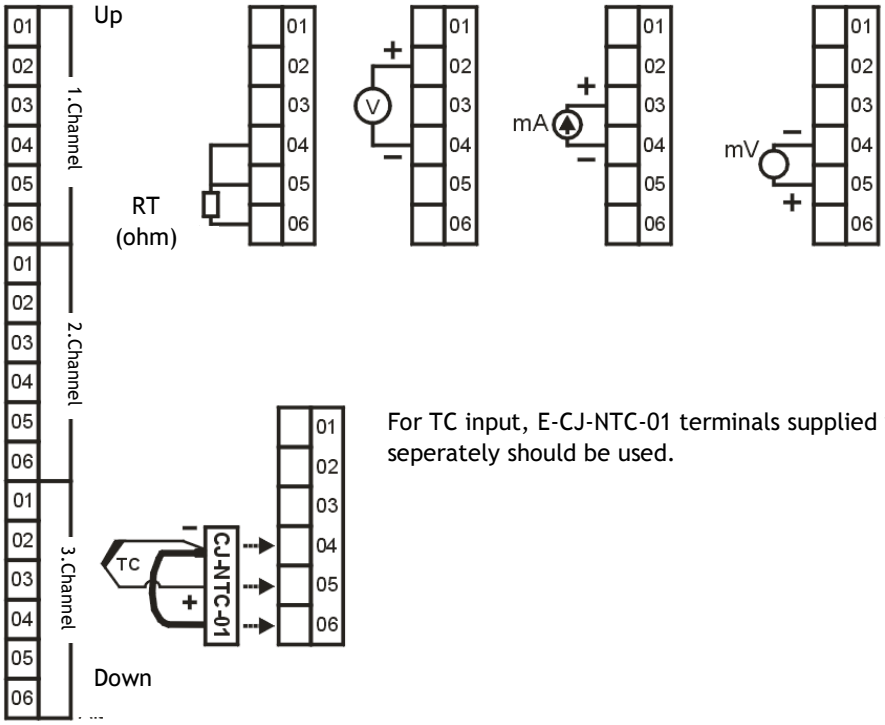
ATTENTION:

- Before making any connection, the protective earth terminal must be connected.
- The terminals of the device are electrically live. While the device is powered, never touch to the terminals.
- Before operating the device, ensure that the device is correctly configured. Incorrect configuration could result malfunction.



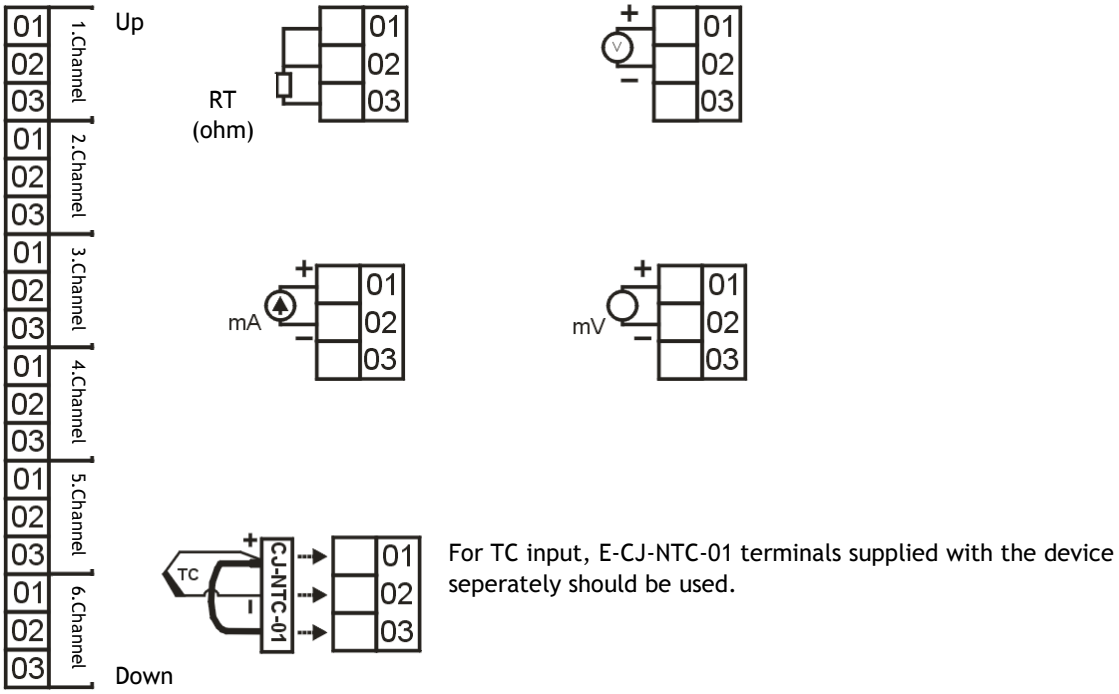
Depending on analog output and relay output card configuration, certain number of 2 wire transmitter can be supplied by TS1 and TS2 returns as shown on the **Figure 7.2** .The loads shown on the figure can be the mA inputs of analog input cards. For each lines (TS1 and TS2), maximum number of 2 wire transmitter is limitted 6 (Max. 130 mA for each of them). In addition, the total number of transmitters to be supplied is also limitted by the total number of relay and analog outputs such that the total number of relay, analog outpus and 2 wire trasmitters is limitted to 18.

Figure 7.2 Power, Transmitter Supply, RS-485 and Ethernet Connections



For TC input, E-CJ-NTC-01 terminals supplied with the device seperately should be used.

Figure 7.3 Analog Input Card Connection Diagrams (3 Channels)



For TC input, E-CJ-NTC-01 terminals supplied with the device seperately should be used.

Figure 7.4 Analog Input Card Connection Diagrams (6 Channels)

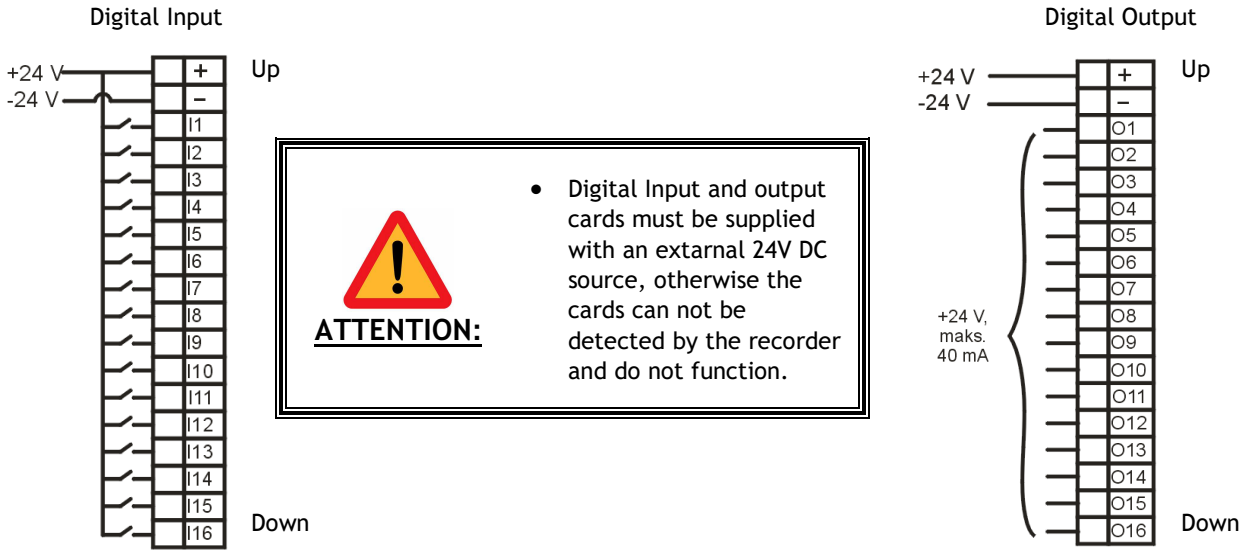
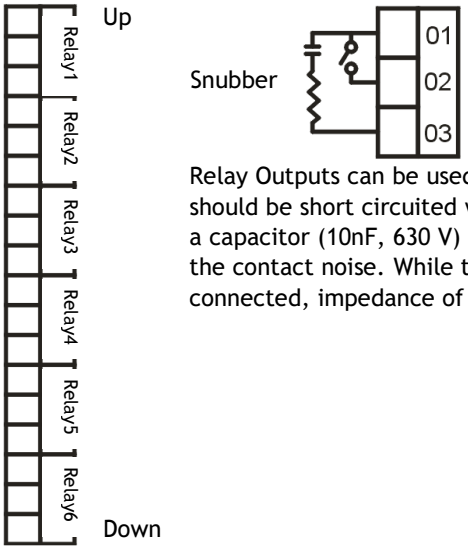


Figure 7.5 Digital Input&Output Cards Connection Diagrams



Relay Outputs can be used with snubbers. To use with snubber, the terminals 2 and 3 should be short circuited with a suitable cable. Snubber consist of serially connected a capacitor (10nF, 630 V) and a resistance (100 Ω, 1/4 W) and can be used to suppress the contact noise. While the contact is used for switching AC signals and snubber is connected, impedance of the snubber should be taken into consideration.

Figure 7.6 Relay Output Card Connection Diagrams

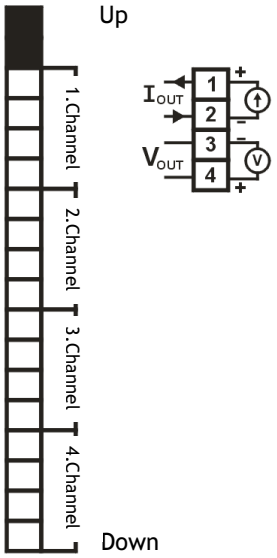


Figure 7.7 Analog Output Card Connection Diagrams

8. DATA TRANSFER COMMUNICATION PROTOCOLS

E-PR-200 series recording devices has several standard connectivity options for easy transfer of recorded data. Standard of the shelf USB Mass storage disks up to 4 GB can be plugged from front panel USB ports and all data can be synchronized with a couple of click on the screen. Highly prevalent and known TCP/IP standards such as FTP, HTTP, Modbus TCP/IP are all available at no cost.

1) USB Mass Storage Device
Rear panel USB port provides easy connection of USB mass storage devices. Only FAT16 and FAT32 formatted disks up to 4 GB supported. For data transfer, please check **Section 6.10 ARCHIVE**.

2) HTTP and FTP Server Connection

Only just entering the IP address of the recorder to web browser enables user to connect Web server to monitor instantaneous values all in one place (http:// IP Address). In the same way accessing Web Server, FTP server can be utilized by entering FTP address of the recorder which is in the form of ftp://IP address, to the FTP supported web browsers or FTP clients. FTP and HTTP accessed are write protected (read only).

3) TCP/IP Modbus Master and Slave Connection
In addition to HTTP and FTP protocol support, the recorder serves as a Modbus Slave or Master unit over TCP/IP network. All registers given in **Appendix 3** can be read or write depending on access rights.

4) RS-485 Modbus Master and Slave Connection
The recorder can also be configured run as a Modbus Master or Slave over RS-485 communication network. All registers given in **Appendix 3** can be read or write depending on access rights.

5) Barcode Scanner Connection

Please check Appendix 4 for detailed explanation.

6) Wi-Fi®

Indicates that the Wi-Fi connection is not installed. The icon is pressed to establish a Wi-Fi connection. In the window that opens, enter the network **SSID** and **Password**. The network connection is established by pressing the Connect button.

Indicates that the network connection is installed. Under the Wi-Fi icon, the SSID of the network to which the connection is made is named.

9. APPENDIXES

Appendix 1: Ethernet Connection

E-PR-200 recorder can connect to the Ethernet networks with its standard 10/100 M Bit Ethernet port (**see Connection Diagram**). Communication is performed using standard TC/IP. Please see **HARDWARE** menu for TCP/IP settings. Only FTP application is available in standard software. FTP address of the recorder is always in the form of ftp://ipadress and there is no password protection. Recorded data and configuration can be reached using FTP Clients. In addition to that, recorded data can be analyzed offline with E-PR-200 Data Explorer Software by instant one-click FTP synchronization.

1.Ethernet Network Connections

Ethernet connection is done through the RJ 45 connector located at the bottom of E-PR-200 (**See User Manual Connection Diagram**). The device can be connected to a PC directly (**Figure 9.1**) or a network hub. While the device connected to a PC crossover cable must be used. (**Figure 9.2**) Normal cable should be used for hub connection. The pin numbers and signals for RJ 45 connector are given below.

***NOTE**: Maximum cable length is limited to 100m. If longer cable required, repeaters and gateways must be used to boost signal strengths.*

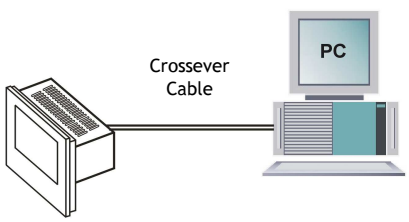


Figure 9.1 Computer Connection

Pin Number	Signal
1	TD + (Transmit +)
2	TD - (Transmit -)
3	RD + (Receive +)
4	Unused
5	Unused
6	RD + (Receive +)
7	Unused
8	Unused

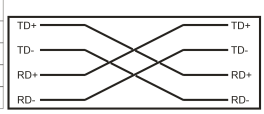


Figure 9.2 Crossover Cable Connection

Appendix 2: Equation Creation Using Math Editor

Equation for Math Analog and Math Digital can be easily created using Math Editor. User can apply arithmetic operators (+,-,*,/), comparison operators (>,<,>=,<=,==), constants, channel process values and miscellaneous functions into equations. Parenthesis can be added to equations for grouping the operations, if necessary. The most left operator in the same parenthesis has the highest precedence. Operator precedence can be changed using parenthesis. **Home** key sets the cursor to the left most position, **End** key sets the cursor to the right most position, key shifts the cursor one character left and key shifts the cursor one character right. **Delete** and **Back Space** keys delete one character towards to the left or right respectively. **Clear** key clears the existing equation. Channel process values can be included in to the equations by pressing **SOURCE** key. **RUN** key runs the equation for testing. Pressing **OK** key saves the equation, **CANCEL** key cancels all operations.

Script is defined in the key device used for the incorporation of equality of a team ready to function. When pressed **Script** out the following options.

$(second): Count of seconds indicates that the system time.
$(minute): The system indicates that the clock match minute.
$(hour): It displays the system time.
$(year): Which it indicates that year on the system.
$(month): Indicates that the system on which month.
$(day): Indicates that the day on which the System.
$(coretemp): The device shows the core temperature of the processor.
$(moduletemp): The device displays the temperature of the processor module.
cj(): CJ (SlotNo, ChannelNo) is used with parameters. The channel parameters gives the cold spot temperature of the specified slot. Slot and Channel Number should be a zero index (cj (0,0) 1.Slot channel 1 's cold spot temperature data.).
microvolt(): Microvolts (Slotno, ChannelNo) is used with parameters. Parameters of the analog input channels of the slot referred to as raw data the value of reading microvolts. Slot and Channel Number should be a zero index (microvolts (0.0) 1.Slot 's channel 1' s value in microvolts is reading.).

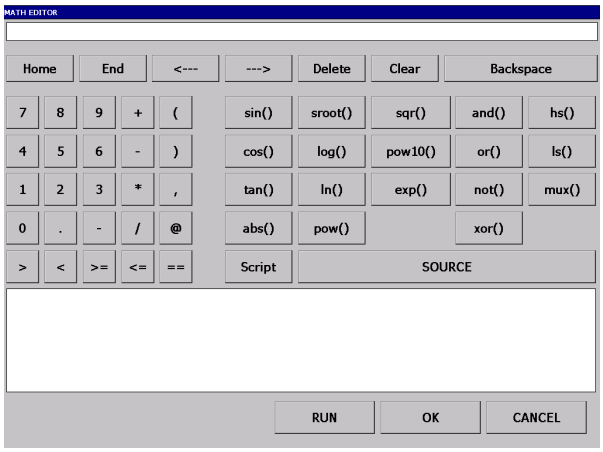


Figure 9.3 MATH EDITOR Page

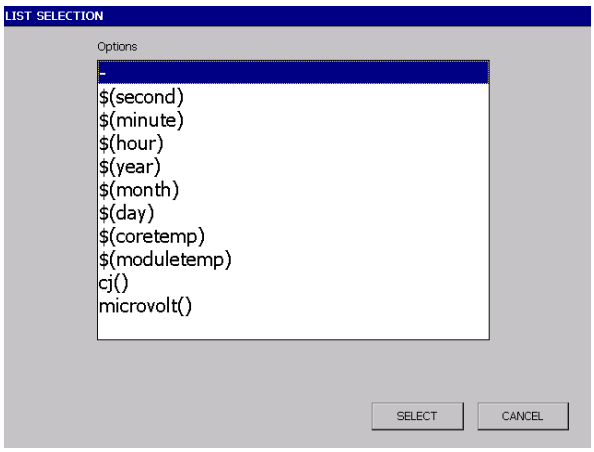


Figure 9.4 Script selection button

Function	Usage	Description
<	Op1 < Op2	If Op1 is smaller than Op2 1, other states 0
>	Op1 > Op2	If Op1is bigger than Op2 1, other states 0
<=	Op1 <= Op2	If Op1 is smaller and equal than Op2 1, other states 0
>=	Op1 >= Op2	If Op1 is bigger and equal than Op2 1, other states 0
==	Op1 == Op2	If Op1 is equal Op2 1,other states 0
sin()	sin(Op)	Op is radian
cos()	cos(Op)	Op is radian.
tan()	tan(Op)	Op is radian
abs()	abs(Op)	Op is absolute value
sroot()	sroot(Op)	Square root
log()	log(Op)	The base-10 Logarithm
ln()	ln(Op)	The natural logarithm
pow()	Pow(Op1,Op2)	$Op1^{Op2}$
sqr()	sqr(Op)	Op^2
pow10()	pow10(Op)	10^{Op}
exp()	exp(Op)	e^{Op}
and()	and(Op1,Op2,...,Opn)	Digital AND operator
or()	or(Op1,Op2,...,Opn)	Digital OR operator
not()	not(Op1,Op2,...,Opn)	Digital NOT operator
xor()	xor(Op1,Op2,...,Opn)	Digital XOR operator
hs()	hs(Op1,Op2,...,Opn)	Select the biggest
ls()	ls(Op1,Op2,...,Opn)	Select the smallest
mux()	Mux(i,Op1,Op2,...,Opn)	Op1, beeing zero, select operandi

Figure 9.5 Operator and Function description

Appendix 3: Modbus RTU Communication Addresses

Modbu RTU Register addresses can be reached from **MODBUS TABLE** window by presing the MODBUS TABLE button in the **Main Menu**. Digital channel grouped by slots are respresented with a single address. Data format of this representation is given in **Figure 9.7.**

MODBUS TABLE

Address	Group	Name	Size	Type
0500	SLOT 1 ANALOG	AIN_S1C1	4 Byte (Float)	ANALOG
0502	SLOT 1 ANALOG	AIN_S1C2	4 Byte (Float)	ANALOG
0504	SLOT 1 ANALOG	AIN_S1C3	4 Byte (Float)	ANALOG
0506	SLOT 1 AIN ALARM 1	-----	4 Byte (Integer)	DIGITAL
0508	SLOT 1 AIN ALARM 2	-----	4 Byte (Integer)	DIGITAL
0510	SLOT 1 AIN FAULT	-----	4 Byte (Integer)	DIGITAL
0512	SLOT 1 RELAY	-----	4 Byte (Integer)	DIGITAL
0514	REAL TIME	-----	4 Byte (Integer)	DIGITAL
0516	MATH DIGITAL	-----	4 Byte (Integer)	DIGITAL
0518	MATH DIGITAL FAULT	-----	4 Byte (Integer)	DIGITAL
0520	MATH ANALOG	MATHA_C1	4 Byte (Float)	ANALOG
0522	MATH ANALOG	MATHA_C2	4 Byte (Float)	ANALOG
0524	MATH ANALOG	MATHA_C3	4 Byte (Float)	ANALOG
0526	MATH ANALOG	MATHA_C4	4 Byte (Float)	ANALOG
0528	MATH ANALOG	MATHA_C5	4 Byte (Float)	ANALOG
0530	MATH ANALOG	MATHA_C6	4 Byte (Float)	ANALOG
0532	MATH ANALOG	MATHA_C7	4 Byte (Float)	ANALOG
0534	MATH ANALOG	MATHA_C8	4 Byte (Float)	ANALOG
0536	MATH ANALOG	MATHA_C9	4 Byte (Float)	ANALOG
0538	MATH ANALOG	MATHA_C10	4 Byte (Float)	ANALOG
0540	MATH ANALOG	MATHA_C11	4 Byte (Float)	ANALOG

CLOSE

Figure 9.6 MODBUS Table

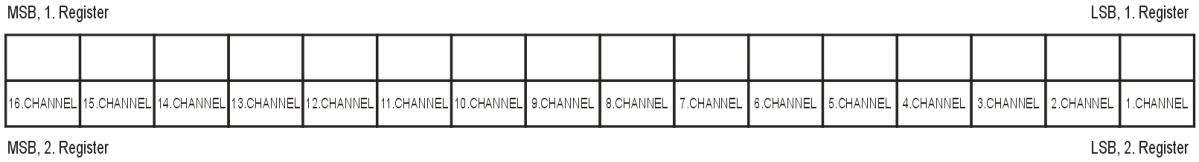


Figure 9.7 Digital Channel Data Format

Appendix 4: Barcode Reader

Rear panel USB port serve as a hub to 2D Barcode scanners which are prevalently adapted in certain industrial application for easy and secure data input devices. All standard input windows in the device such as digital and text boxes support barcode scanner input. In addition, barcode scanners provide several advantges in batch recording operations. These operations are Start Batch, Stop Batch and Batch Name Input. Barcode scanner should be configured as an USB keyboard emulator and barcode termination character should be set to horizontal tab (ASCII 9). In order to start a batch, "**START**" barcode is scanned first and than Batch Name barcode is scanned just afterward in 15 seconds. Any scan after that time period will be discarded. Batches can be run concurrently thus user can start additional batches in the same way described earlier. Scanning **STOP** barcode first and scanning the Batch Name barcode afterward stops the respective batch.

START and **STOP** barcodes are given below.

START

STOP