ControlMaster CM15

Universal process indicator, ⅛ DIN



Measurement made easy

For more information

Further publications for the ControlMaster CM15 indicator are available for free download from:

www.abb.com/measurement

or by scanning this code:

To access the IAMA help & support portal please scan the following code:

	Search for or click on:
Data sheet ControlMaster CM15 Universal process indicator, ⅛ DIN	DS/CM15-EN
User guide ControlMaster CM15 and CMF160	IM/CM/I-EN
Communications supplement ControlMaster CM10, CM15, CM30, CM50, CMF160 and CMF310 Universal process controllers and indicator, ⅛, ¼, ½ DIN and fieldmount	IM/CM/C-EN

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1 Health & Safety

Document symbols

Symbols that appear in this document are explained below:

⚠ WARNING

The signal word 'WARNING' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

NOTICE

The signal word 'NOTICE' indicates potential material damage.

Note.
'Note' indicates useful or important information about the product.

Safety precautions

Be sure to read, understand and follow the instructions contained within this manual before and during use of the equipment. Failure to do so could result in bodily harm or damage to the equipment.

⚠ WARNING

Installation and maintenance of this product must only be conducted by personnel authorized to work on electrical installations and in accordance with relevant local regulations.

Potential safety hazards
Electrical

⚠ WARNING

To ensure safe use when operating this equipment, the following points must be observed:

- Up to 240 V AC may be present. Be sure to isolate the supply before removing the terminal cover.
- Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.

Safety advice concerning the use of the equipment described in this manual or any relevant Material Safety Data Sheets (where applicable) can be obtained from the Company, together with servicing and spares information.

Safety standards

This product has been designed to satisfy the requirements of IEC61010-1:2010 3rd edition 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

EC Directive 89/336/EEC

Electrical – In order to meet the requirements of the EC Directive 89/336/EEC for EMC regulations, this product must be used in an industrial environment.

End-of-life disposal

The indicator contains a small lithium battery that must be removed and disposed of responsibly in accordance with local environmental regulations.

The remainder of the indicator does not contain any substance that causes undue harm to the environment and must be disposed of in accordance with the Directive on Waste Electrical and Electronic Equipment (WEEE). It must not be disposed of in Municipal Waste Collection.

...1 Health & Safety

...End-of-life disposal

ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible. The European Waste Electrical and Electronic Equipment (WEEE) Directive that initially came into force on 13 August 2005 aims to reduce the waste arising from electrical and electronic equipment; and improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment.

In conformity with European local and national regulations, electrical equipment marked with the above symbol may not be disposed of in European public disposal systems after 12th August 2005.

Cleaning

The indicator can be hosed down if it has been installed to IP66/NEMA 4X standards. Warm water and a mild detergent can be used.

Symbols

Symbols that appear on this product are shown below:

Protective earth (ground) terminal.

Both direct and alternating current supply.

This symbol, when noted on a product, indicates a potential hazard that could cause serious personal injury and/or death. The user must refer to this commissioning instruction for operation and/or safety information.

This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists. Only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.

Recycle separately from general waste under the WEEE directive

Restriction of Hazardous Substances (RoHS)

The European Union RoHS Directive and subsequent regulations introduced in member states and other countries limits the use of six hazardous substances used in the manufacturing of electrical and electronic equipment. Currently, monitoring and control instruments do not fall within the scope of the RoHS Directive, however ABB has taken the decision to adopt the recommendations in the Directive as the target for all future product design and component purchasing.

2 Specification

Mechanical data

Protection

- Front face IP66/ NEMA 4X
- Rear panel IP20

Dimensions

- Height – 50 mm (2.0 in)
- Width – 97 mm (3.8 in)
- Depth behind panel – 120 mm (4.8 in)

Materials of construction

Glass filled polycarbonate

Weight

0.38 kg (0.84 lb)

Electrical

Power supply ranges

- 100 to 240 V AC ±10 % (90 V min. to 264 V max.) 50/60 Hz
- 10 to 36 V DC (optional)

Power consumption

10 W max.

Inputs/Outputs

Analog inputs

- 1 universal
- 1 process

Analog outputs

- 1 standard
- 1 optional
- Galvanically isolated from the rest of the circuitry, 500V for up to 1 minute. Range programmable source and range 0 to 22 mA, maximum load 750 Ω @ 20 mA.

Relay outputs

- 1 standard
- 3 optional
- Fully programmable. Contacts rated at 5 A @ 240 V. Standard relays are changeover. Optional relays are selectable NO or NC by jumper.

Digital inputs/outputs

2 optional, user programmable as input or output.
Minimum input pulse duration: 125 ms

Input

- Volt free
- 24 V DC (1 signal 15 to 30 V, 0 signal -3 to 5 V)

Output

- Open collector output
- 30 V, 100 mA max. switched
- Conforms to IEC 61131-2

Update Rate

125 ms

Environmental data

Ambient operating temperature

0 to 55 °C (32 to 131 °F)

Ambient operating humidity

5 to 95 % RH non-condensing

Storage temperature

–20 to 70 °C (–4 to 158 °F)

Approvals, certification & general safety

- EN-61010-1
- cULus
- Overvoltage class III on mains, Class II on inputs and outputs
- Pollution category 2
- Insulation category 2

Emissions and Immunity

Meets the requirements of IEC 61326 for an industrial environment

3 Installation

- Locate the indicator in a position where its operating temperature and humidity limits will not be exceeded and ensure that it is suitably protected from direct sunlight, rain, snow and hail.
- Select a location away from strong electrical and magnetic fields. If this is not possible (particularly in applications where mobile communications equipment is used), use screened cables within flexible, earthed metal conduit.

Siting

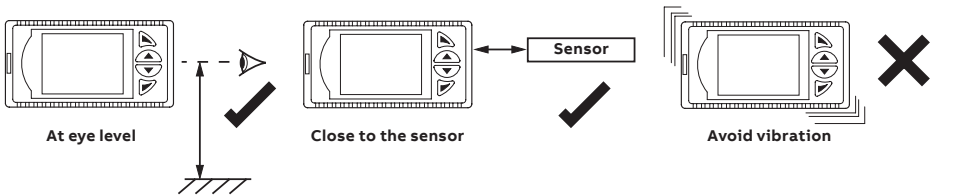


Figure 1 Siting

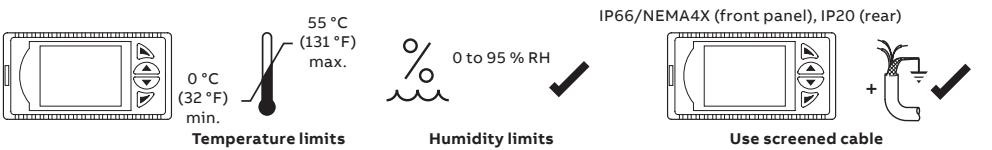


Figure 2 Environmental requirements

Mounting

ControlMaster CM15 is designed for panel mounting. For NEMA4X protection, a panel thickness of 2.5 mm (0.1 in) is required.

Referring to Figure 3:

1. Cut a hole of the correct size for the indicator in the panel.
2. Insert the indicator into the panel cut-out.

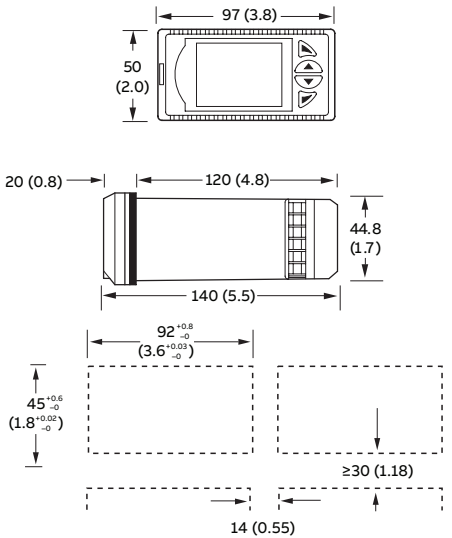


Figure 3 Mounting dimensions

...3 Installation

Referring to Figure 4:

1. Position one panel clamp (A) at the side of the case against the panel.
2. Locate the panel clamp anchor (B) in slot (C).
3. Tighten the panel clamp anchor screw (D) until panel clamp (A) is lightly touching the panel
4. Repeat steps 1 to 3 to fit the remaining panel clamp (E) and panel clamp anchor (F)
5. Torque tighten both panel clamp anchor screws to 0.1 N·m (0.9 lbf·in).

NOTICE

Do not over-tighten the screws.

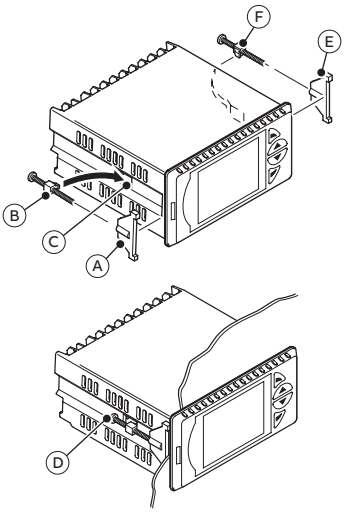


Figure 4 Panel clamp assembly

4 Electrical connections

⚠ WARNING

- The indicator is not fitted with a switch therefore a disconnecting device such as a switch or circuit breaker conforming to local safety standards must be fitted to the final installation. It must be fitted in close proximity to the indicator within easy reach of the operator and must be marked clearly as the disconnection device for the indicator. A fuse must be fitted – see page 15.
- Remove all power from the supply, relay and any powered control circuits and high common mode voltages before accessing or making any connections.
- Use cable appropriate for the current loads: 3-core cable rated 3 A and 90 °C (194 °F) minimum, that conforms to either IEC 60227 or IEC 60245. The terminals accept cables from 0.8 to 2.5 mm^2 (18 to 14 AWG).

- The indicator conforms to installation category II of IEC 61010.
- All connections to secondary circuits must have basic insulation.
- After installation there must be no access to live parts, for example, terminals.
- Terminals for external circuits are for use only with equipment with no accessible live parts.
- If the indicator is used in a manner not specified by the company, the protection provided by the equipment may be impaired.
- All equipment connected to the indicator's terminals must comply with local safety standards (IEC 60950, EN601010-1)

...4 Electrical connections

NOTICE

- Always route signal leads and power cables separately, preferably in earthed (grounded) metal conduit.
- Use screened cable for signal inputs and relay connections.
- Replacement of the internal battery (type Varta CR1620 3V lithium cell) must be carried out by an approved technician only

Accessing the connection terminals

Referring to Figure 5, press terminal cover release catch (A) and pull the terminal cover (B) away from the indicator body.

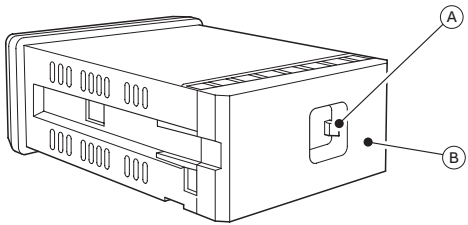
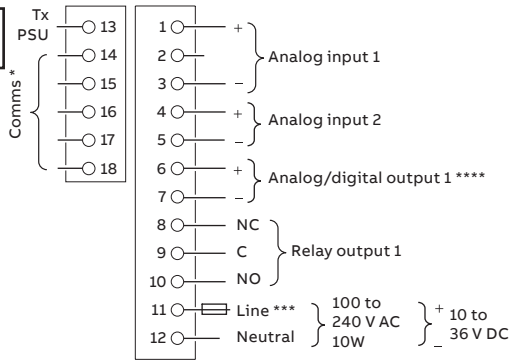


Figure 5 Removing the terminal cover

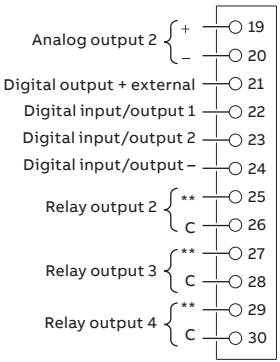
Rear view



Standard connections



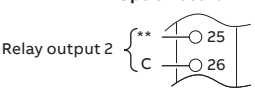
Option board 1



Rear view



Option board 1A



* Refer to the Communications Supplement (IM/CM/C-EN) for MODBUS connection details

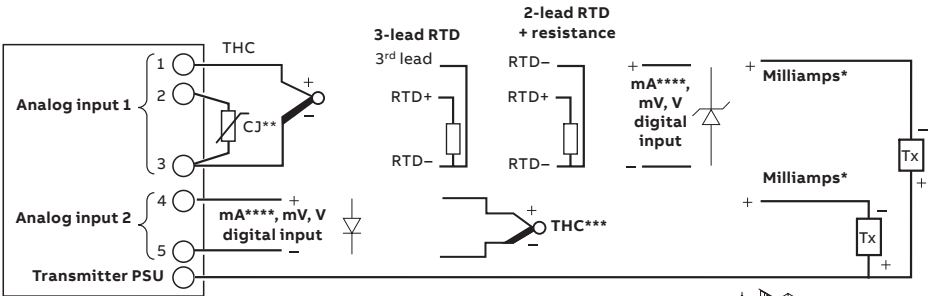
** N/O or N/C contact selection is made via internal jumper links. N/O is the factory default setting.

*** 200 mA type T fuse (mains AC) or 2 A type T fuse (120 V DC max.) and external isolating switch. For UL-marked indicators the fuse must be UL recognized.

**** Provides 24 V digital output (observe + and – connections).

...4 Electrical connections

Standard analog inputs (1 and 2)



* Using internal transmitter power supply.

** Fit the CJ sensor supplied if analog input 1 or 2 are THC inputs. Alternatively, it is possible to use an external fixed cold (reference) junction if the controller is programmed for use with millivolt inputs and the appropriate thermocouple linearizer is selected.

*** Analog input 2 can be used with THC inputs only if analog input 1 is also used as a THC input.

**** For mA input types, to ensure loop continuity when the indicator is switched off, fit a 2V7 Zener diode as shown.

Note. 3-lead RTD leads must have equal resistance, not exceeding 20 Ω each.

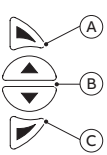
5 Front panel keys

Operation is performed using the keys on the front panel. These enable local navigation and selection of software options on all displays, acknowledgment of alarms and error messages, monitoring and access to all menus.

All diagnostics messages are displayed within the **Diagnostics View.**

Prompts associated with active keys are displayed on each screen. Diagnostic and display icon descriptions are included in this document.

Key functions for the indicator overlay are described below:



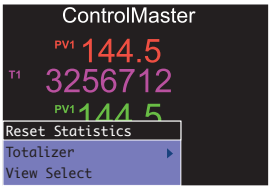
Navigation key (upper)/programmable soft key.

Up/Down keys – navigate up/down menu items and increase/decrease displayed values.

Navigation key (lower)/operator level access key.

Note. When a soft key option is assigned to key (A), the **Advanced Level** (see page 19) must be accessed using key (C).

6 Operator level menus



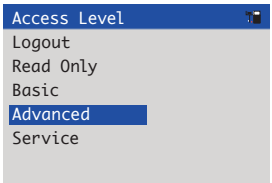
Operator level menus are used to start, stop and reset totalizers, reset statistics, select the view and to enter **Basic** and **Advanced** modes (via the **Access Level**).

To access **Operator Level** menus:

1. From the **Operator Page**, press to view the available menus.
2. Use the and keys to scroll through the menus and menu options.
3. Press to expand menu levels and to select menu options or press to return to the previous menu.

Reset Statistics	Resets current statistics.
Totalizer	Start, stop and reset totalizers.
View Select	Switches the view to an **Operator Page** or the **Diagnostic View**.
Enter Config. Mode	Displays the **Access Level** selection views.

7 Access levels and security options



The access level menus are used to enter the **Basic** and **Advanced** menus, view all parameters in read only mode and to logout (return to operator view mode).

To view **Access Level** menus:

1 From the operator view mode, press
OR
press to display the available operator menus and use the and keys to scroll to **Enter Config. Mode**, then press . The **Access Level** menu is displayed.

2 Use the and keys to scroll to the required/permitted level of access (basic or advanced), then press .

Logout	Displayed after basic or advanced level are accessed. Logs the user out of basic or advanced level. If passwords are set, a password must be entered to access the levels again after selecting log out.
Read Only	Enables all parameter settings to be viewed.
Basic	Enables access to the basic level and adjustment of totalizer count settings and alarm trip points.
Advanced	Enables configuration access to all parameters.
Service	Reserved for use by authorized personnel.

Security options

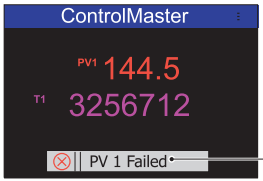
Passwords can be set to enable secure end-user access at 2 levels: **Basic** and **Advanced**. The **Service** level is password protected and reserved for factory use only.

Passwords are set, changed or restored to their default settings at the device setup/security setup parameter.

8 Diagnostics messages

The indicator is programmed to display diagnostics messages that provide information on servicing requirements and any other conditions that develop during operation.

When a diagnostics condition is detected, the associated NAMUR Icon, together with the highest priority diagnostics message are displayed in the status bar when in operator view. A list of all currently active diagnostic alarm states are displayed in the diagnostic view.

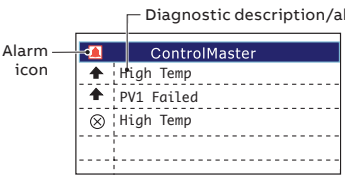




NAMUR (NE107) status icon

- Failure
- Maintenance
- Out of spec
- Check function
- High process alarm
- Low process alarm
- High latch alarm
- High latch alarm

Description of diagnostic or alarm tag. The highest priority diagnostic or alarm is displayed. Other active diagnostic/ alarm states can be viewed on the Diagnostic View – see below.



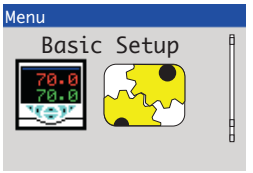
...8 Diagnostics messages

Icon	Number/ Message	Possible cause	Suggested action
⊗	F250.00 PV 1 Failed	Problem with input assigned to loop 1 (2) PV. Broken sensor leads, defective input source or input signal out of permitted range.	Check wiring. Check input source. Check if input signal is outside permitted limits.
⊗	F248.001 PV 2 Failed	Problem with Input assigned to loop 1 (2) PV. Broken sensor leads, defective input source or input signal out of permitted range.	Check wiring. Check input source. Check if input signal is outside permitted limits.
⊗	F222.014 CJ 1 Failed	Error in cold junction measurement associated with AIN1 (AIN3). Wiring fault or defective sensor.	Check cold junction device is correctly fitted. Ensure I/P 2 is turned off. Replace CJ sensor.
⊗	F220.015 CJ 2 Failed	Error in cold junction measurement associated with AIN1 (AIN3). Wiring fault or defective sensor.	Check cold junction device is correctly fitted. Replace CJ sensor.
⊗	F216.016 NV Error Proc Bd	Failure of non-volatile memory on processor display board or permanent corruption of its data.	Check all configuration parameters and correct any errors. Acknowledge error. If problem persists contact local service organization.
⊗	F214.017 NV Error Main Bd	Failure of non-volatile memory on main board or permanent corruption of its data.	Check calibration of AO1 and AO2. Recalibrate if necessary. Acknowledge error. If problem persists contact local service organization.

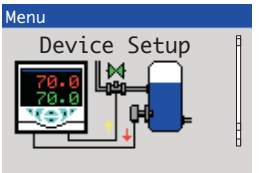
Icon	Number/ Message	Possible cause	Suggested action
⊗	F212.018 NV Error Opt Bd 1	Failure of non-volatile memory on option board 1 or permanent corruption of its data.	Check calibration of AIN1 and AIN2. Recalibrate If necessary. Acknowledge error. If problem persists contact local service organization.
⊗	F210.019 NV Error Opt Bd 2	Failure of non-volatile memory on option board 2 or permanent corruption of its data.	Check calibration of AIN3 and AIN4. Recalibrate If necessary. Acknowledge error. If problem persists contact local service organization.
⊗	F208.020 NV Error Comm Bd	Failure of non-volatile memory on communications board or permanent corruption of its data.	Acknowledge error. Check communications board is correctly identified by device. If problem persists contact local service organization.
⊗	F206.021 NV Error SW Key 1	Failure of non-volatile memory on Software key 1 or permanent corruption of its data.	Acknowledge error. Check software key functionality is enabled. If problem persists contact local service organization.
⊗	F204.022 NV Error SW Key 2	Failure of non-volatile memory on Software key 1 or permanent corruption of its data.	Acknowledge error. Check software key functionality is enabled. If problem persists contact local service organization.

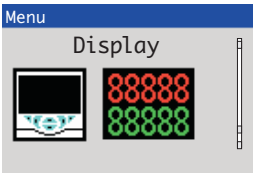
9 Instrument menus

Basic level



Advanced levels





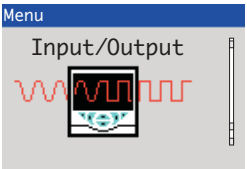
- Process Alarms
  - Alarm Trip 1
  - Alarm Trip 2
  - Alarm Trip 3
  - Alarm Trip 4
  - Alarm Trip 5
  - Alarm Trip 6
  - Alarm Trip 7
  - Alarm Trip 8

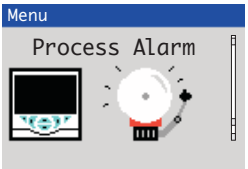
Additional parameters may be enabled and displayed at Basic Setup level depending on the parameters selected at Advanced Level.

- Initial Setup
  - App. Template
  - Instrument Tag
  - Mains Frequency
  - Config Action
  - Level 1 Indicator
  - Stats. Reset Source
  - Reset to Defaults
  - Custom
- Security Setup
  - Basic Password
  - Advanced Password
  - Reset Passwords
- Custom Config
  - Loop 1 PV
  - Volume 1
  - Loop 2 PV
  - Volume 2
- IrDA Configuration
  - Setup
  - Config. Description

- Language
- Operator Templates
  - Page 1 (4) Template
- Operator Functions
  - Autoscroll
  - Soft Key Function
  - Alarm Ack. Enable
  - Totalizer Stop/Go
  - Totalizer Reset
  - Stats Reset Enable
- Settings
  - Brightness
- Date & Time
  - Date Format
  - Time & Date
  - Daylight Saving
- Customise Pages
  - Page Number
  - Template Type
  - Titlebar Tag
  - Parameters
  - Icons
  - Page Colors

Note. When in **Advanced Level** (configuration) mode, press and hold the key to return to the standard Operator page





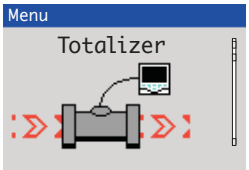
Continued overleaf

- Analog Inputs
  - Analog Input 1 (2)
- Analog Outputs
  - Analog Output 1 (2)
- Digital I/O
  - Digital IO 1 (2)
- Relays
  - Relay 1 (4)

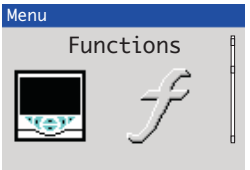
- Alarm 1 (8)
  - Type
  - Tag
  - Source
  - Trip
  - Hysteresis
  - Time Hysteresis
  - Display Enable
- Acknowledge Source
- Enable Source

...9 Instrument menus

...Advanced levels









Totalizer 1 (2)
- Mode
- Source
- Count Direction
- Units
- Count Rate
- Cutoff
- Stop Go Source
- Total DPs
- Preset Count
- Predet Count
- Intermediate Count
- Wrap Enable
- Reset Source
- Reset Days
- Reset Hour

Logic Equations
- Equation Number
- Operand 1 (8)
- Invert 1 (8)
- Operator 1 (7)

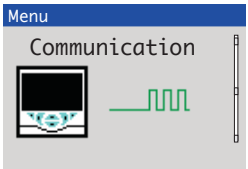
Math Blocks
- Math Block Number
- Block Type
- Eng. DPs
- Eng. Low
- Eng. High
- Eng. Units
- Fault Action
- Source 1 (2)
- Source 1 (2) Constant
- Reset Source
- Average Duration
- Operator 1 (3)
- Mux Selector

Linearizer 1 (2)
- Source
- Lin 1 (2) Breakpoints

Delay Timer 1 (2)
- Source 1 (2)
- Delay Time
- On Time

Real Time Alarms
- Real Time Alarm 1 (2)

Bank Control
- Bank Size
- Control Source
- Bank 1 (6)

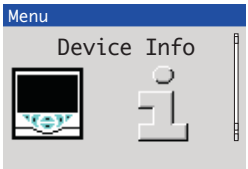


Refer to the Communications Supplement (IM/CM/C-EN) for Communication parameter details.



Diagnostic History

Source Analysis
- Analog Source
- Digital Source
- Invalid Sources



Instrument Type
I/O Build
No. Analog Inputs
No. Analog Outputs
No. Relays
No. Digital I/O
Functionality
Serial No.
Hardware Revision
Software Revision

Sales **Service** **Software**

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