

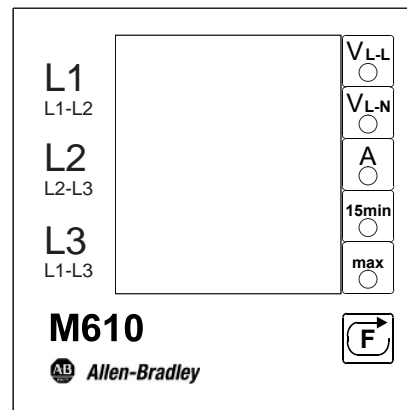


Bulletin 1405 (M610) Operating Instructions

Overview

The MiniPowermonitor (1405-M610) measures and displays voltage and current parameters of low voltage AC power systems:

- Line-to-neutral and line-to-line voltages
- Instantaneous currents
- 15-minute averaged currents
- Peak currents



The MiniPowermonitor is a compact unit, with a 96 x 96 mm (3.78 x 3.78 in) front panel and a depth of only 65 mm (2.56 in).

The module's display is arranged in 3 lines, each with 4 digits. The red 14 mm (0.55 in) high LED characters are easily readable from a distance, in high ambient light conditions, and from acute viewing angles. The measurement mode is indicated by 5 LED lamps that show which parameter is displayed at that time.

Phase voltage and current measurements are made by sequential scanning at 2 samples per second, so that 3 phase measurements are made in 1.5 seconds. The updated average current value is displayed approximately every 60 seconds, interjected into the cyclical sequence of displayed parameters. Parameter values can be read out of sequence, using the function (F) key on the front panel.

Installation

Only qualified personnel should install and wire this equipment. Refer to the following safety guidelines prior to installation.

ATTENTION



Only qualified personnel, following accepted safety procedures, should install and wire the MiniPowermonitor. Before beginning any work, disconnect all sources of power and verify that they are de-energized and locked out. Failure to follow these instructions may result in personal injury or death, property damage or economic loss.

ATTENTION



Never open a current transformer (CT) secondary circuit with primary current applied. Wiring between the CTs and the MiniPowermonitor should include a shorting terminal block in the CT secondary circuit. Shorting the secondary with primary current present allows other connections to be removed if needed. An open CT secondary with primary current applied produces a hazardous voltage, which can lead to personal injury, death, property damage or economic loss.

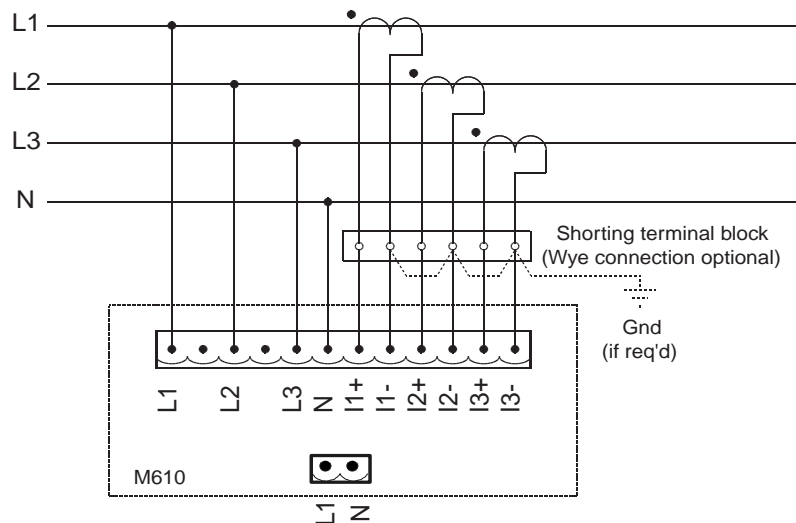
1. Install your MiniPowermonitor within a suitable enclosure. Make sure the enclosure provides adequate clearance for ventilation and wiring of the module. Refer to Dimensions on page 6 for dimensions and spacing guidelines for the MiniPowermonitor.
2. Determine your wiring mode and install wiring between the MiniPowermonitor and your power system. Refer to Input Connections on page 3 for more information.
3. Configure the current transformer (CT) ratios to match those used in your power system connections. Refer to Current Transformer Ratio Setting and Display Test on page 4 for more information.

Grounding

MiniPowermonitors do not need to be grounded because of the isolated enclosures. Follow all local requirements for grounding of PT and CT secondaries.

Input Connections

Input connections are at the rear, through a single 12-way plug-in terminal block with spring clamps. The terminal block can accept wire sizes from 28 to 14 AWG (0.08 to 2.5 mm²).



The module uses industry-standard current transformers with a 5A secondary for line current measurement.

- Internal shunt resistance for 5A current transformers: 0.01 ohm.

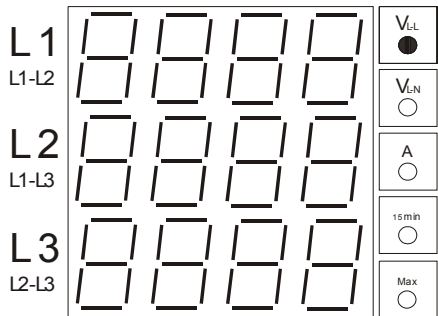
Aux Supply: With this option, instrument power is supplied by a separate 120V or 240V line, independent of the measured power lines. A second connector block (2-pin, spring-clamp terminals type) is added at the rear with this option.

TIP

Terminals 2 and 4 (counting from left to right) are not used. No connections should be made to these terminals.

A unit with the 120V supply option is not designed to operate on 240V or any other voltage. Likewise, a unit with the 240V supply option is not designed to operate on 120V or any other voltage. Units designed for 400V and 480V operation do not have an auxiliary supply connection and receive power from the measurement line. Ensure that each unit is properly supplied with a power source that matches the voltage designation of your unit.

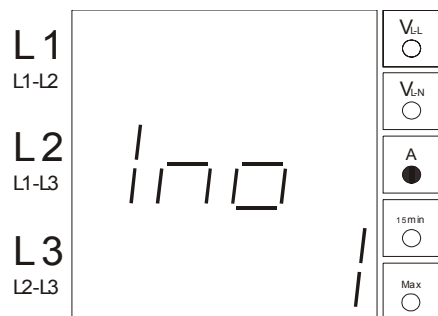
Current Transformer Ratio Setting and Display Test



To select one of the pre-programmed standard current transformer ratios, start with the module switched-off. Press and hold the function “F” key while switching on the power, and for about 3 additional seconds.

All segments of the LED displays and all the LED lamps light up one after the other in rapid sequence to confirm the integrity of the displays.

Press the function “F” key again to initiate the current transformer ratio setting routine. When it is pressed once, the value “1” is displayed on the third line of the display. This is the first in the series of industry-standard current ratio values that are pre-programmed in the 1405-M610. It is indicated as the nominal value of the line current (I_{nominal}).



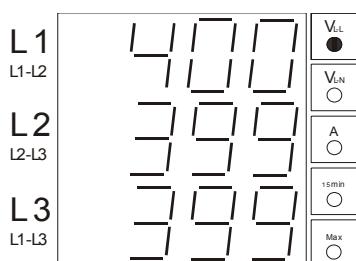
Pressing the function “F” key repeatedly steps the displayed value through each successive standard current transformer ratios. The transformer ratio is $I_{\text{nominal}}:1$ or $I_{\text{nominal}}:5$, depending on the current transformer secondary rating. You may select from the following values of I_{nominal} :

1 / 2⁽¹⁾ / 5 / 10 / 15 / 20 / 25 / 30 / 40 / 50 / 60 / 75 / 80 / 100 / 125 / 150 / 200 / 250 / 300 / 400 / 500 / 600 / 750 / 800 / 1000 / 1200 / 1250 / 1500 / 1600 / 1800 / 2000 / 2500 / 3000 / 4000.

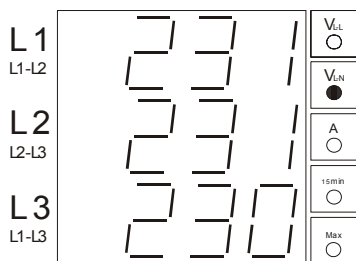
⁽¹⁾ The actual value is 2.5A

When the desired value is reached, the module is switched off without pressing the function key any further. The ratio is now set and protected against power interruptions. Now whenever the module is switched on, this pre-set value is used for measuring line currents. The ratio setting in existence when the power is switched off is the same value that is valid when the power is switched on again, without pressing the function key.

Measuring Operation

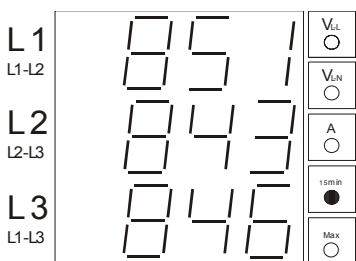


After the module has been switched on, the software version is displayed for three seconds, after which the module starts scanning, measuring, and displaying the power line parameter values. It starts with the parameter that was selected whenever the “n” function was last invoked. If a parameter was being held on display using the “r” function when the module was last switched off, the module displays the present values of that same parameter.



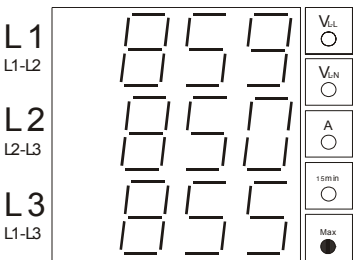
In its normal sequential display mode, the measured parameter values are displayed in the following sequence:

- Line-to-line voltages
- Line-to-neutral voltages
- Instantaneous phase currents
- Average phase currents
- Peak phase currents



Press and hold the function key (“F”) to select one of three functions. The selected function is indicated by the left-most character of lowest line, and interpreted as follows:

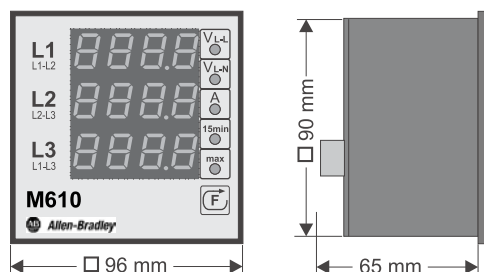
- ‘n’: Key pressed for 0 to 2 seconds: skips the present parameter, and displays the next parameter
- ‘r’: Key pressed for 2 to 4 seconds: sequential display of parameters, on/off
- ‘c’: Key pressed for 4 to 8 seconds: re-sets average and peak current values



The present parameter can be skipped and any other parameter displayed by manual stepping, even if the automatic sequencing mode (‘r’) is active. Similarly the ‘c’ mode can be invoked at any time to delete the existing average and peak current measurements.

Dimensions

Panel cut-outs should be 92 x 92 mm (3.6 x 3.6 in).



Panel cut-out: 92x92 mm per DIN 43700
 Panel installation using lateral pair of springs

Specifications

Table 1 Measured Parameters

Voltage	$V_{L1-L2} / V_{L2-L3} / V_{L3-L1}$ $V_{L1-N} / V_{L2-N} / V_{L3-N}$
Instantaneous Current Average Current (15 min.) Peak Current	$I_{L1} / I_{L2} / I_{L3}$
Measuring Rate	Approximately 2 measurements per second
Update Time	1.5 Seconds

Table 2 Digital Displays

Type	7 Segment LED, Red
Lines x Characters	3 x 4
Character Height	14 mm (0.55 in)

Table 3 General Parameters

Parameter	Value
Nominal Voltage	Per Catalog Version Units with separate 120V or 240V supply: 600V Units powered from 400V measurement line: 400V Units powered from 480V measurement line: 480V
Voltage Range	0.8 V to 1.1V * (nominal voltage)
Current Range	0.0 A to 6.0 A

Table 3 General Parameters

Parameter	Value
Temperature Coefficient	< 0.01% / K
Input Impedance (Voltage Inputs)	2 Mohm (Lx to N)
Input Impedance (Current Inputs)	0.01 ohm at 5A
Overload Rating	Voltage 110% (continuous) Current 200% (continuous)
Frequency Range	47 to 63 Hz
Power Consumption	3W typical
Operating Temperature	+5°C to +50°C (+41°F to +122°F)
Storage Temperature	-20°C to +70°C (-4°F to +158°F)
Protection Class	Enclosure IP 20 (IP 65 with optional protective hood ⁽¹⁾) Terminals IP 00
Weight	Approximately 0.3 kg
Front Dimensions	96 mm x 96 mm (3.78 in x 3.78 in)
Breakdown Rating	Per DIN 41700
Depth	65 mm (2.56 in)
Panel Mounting	Spring Clamps
Agency Certifications	UL, CE

⁽¹⁾ The optional hood, catalog number 1405-PRO, can be ordered separately. Contact your Rockwell Automation distributor for additional information.

Table 4 Measurement Accuracy and Range

Parameter	Percent of Reading	Nominal Value	Operating Range	Maximum Limit
Volts	±1%	240V rms	10V rms to 347V rms L-N or 17V rms to 600V rms L-L	400V rms L-N or 690V rms L-L
Current	±1%	5 Amps	0.1 Amps to 6 Amps	10 Amps

Product Approvals

UL/CUL

cULus Listed, File E96956, per UL508, the Standard for Industrial Control Equipment.

CE Certification

If this product bears the CE marking, it is approved for installation within the European Union and EEA regions. It has been designed to meet the following directives.

EMC Directive

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole, documented in a technical construction file:

- EN 50081-2 - Generic Emission Standard, Part 2 - Industrial Environment
- EN 61000-6-2 - Generic Immunity Standard, Part 2 - Industrial Environment.

This product is intended for use in an industrial environment.

Low Voltage Directive

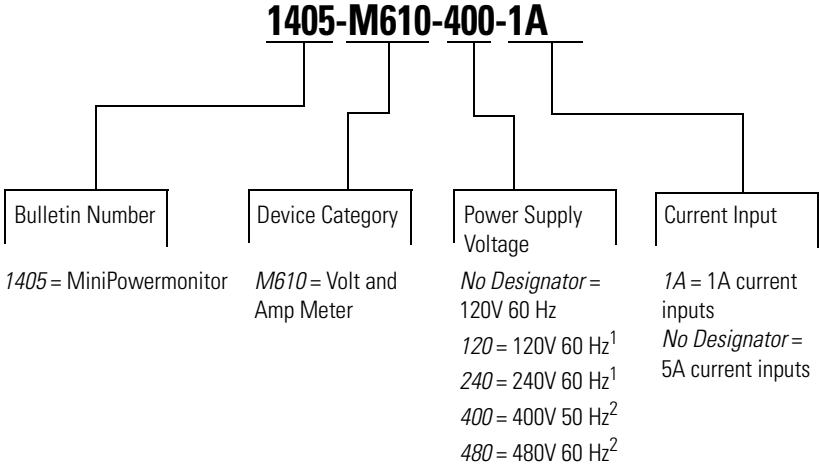
This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN/IEC 61010-1.

This equipment is classified as open equipment and must be installed (mounted) in an enclosure during operation as a means of providing safety protection.

International Standard IEC 529 / NEMA / UL 508 Degree of Protection

The MiniPowermonitor is rated as IP10 degree of protection per International Standard IEC 529. It is considered an open device per NEMA and UL 508.

Catalog Number Explanation



¹ - 120V and 240V connections are via a separate connection

² - 400V and 480V connections are via the measurement line

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using our products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of our products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

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