Instruction manual
MTL gas analysers & systems

February 2017
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CROUSE-HINDS SERIES

GIR250

MTL dual gas analysers

EATON
Powering Business Worldwide

DECLARATION OF CONFORMITY

A printed version of the Declaration of Conformity has been provided separately within the original shipment of goods. However, you can find a copy of the latest version at -

http://www.mtl-inst.com/certificates

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1 INTRODUCTION

The GIR250 instruments are dual MTL gas analysers that measure oxygen concentration using a galvanic oxygen sensor, and carbon dioxide using an infrared optical bench.
A microprocessor is used to control the instrument and its associated digital circuitry to provide a user friendly gas analyser.

Standard features include a large graphical display, user programmable alarm levels, hysteresis and analogue output.

NOTE

- This instrument is designed for use in a laboratory environment.
- The relay operation and labelling "Normal" relates to process normal and not the electrical rest position of the relays.
  In process normal, the relays are energised.

1.1 Manual symbols

The following methods are used in this manual to alert the user to important information:-

WARNING

Warnings are provided to ensure operator safety and MUST be followed.

CAUTION

A Caution is provided to prevent damage to the instrument.

NOTE

These are used to give general information to ensure correct operation

1.2 Information

Waste Electrical and Electronic Equipment directive (WEEE) 2002/96/EC
(RoHS) directive 2002/95/EC

WARNING

This equipment must only be used in accordance with the manufacturer's specification, instructions for installation, use and maintenance to ensure that the protection of the operator is not impaired. It is the responsibility of the installer to ensure the safety and EMC compliance of any particular installation.

2 SPECIFICATION

2.1 Ranges

Gas	Range	Accuracy	Resolution
Oxygen	0 to 100%	± 0.25%	0.1%
	0 to 25%	± 0.1% (5 to 100% of scale)	0.1%
Carbon dioxide	0 to 10%	± 0.2%	0.1%

Consult to your local MTL Gas sales office for other concentration ranges for both gases.

2.2 Sample flow

Between 100 to 300 ml/min.

2.3 Sample pressure

Atmospheric (nominally)- set by vent pressure

5mb to 8bar maximum

2.4 Sample connections

Inlet and outlet 0.25" (suitable for 6mm) diameter tube.

Both ports are fitted with captive seal compression fittings.

2.5 Analogue outputs

Both channels give 4 to 20mA and are programmable to be proportional to anywhere between 0/20% and 0/100% of span. Maximum load 600 ohms per output.

2.6 Alarm outputs

Both channels are provided with two alarms and these may be user configured to be OFF, HIGH, or LOW. The hysteresis is also user programmable. The relay outputs are all rated at 48V AC or DC at 0.5A, and the relays are normally energised.

2.7 Ambient operating temperature range

0°C to 40°C (0-90% R.H. non-condensing)

2.8 Storage temperature range

0°C to 55°C (0-90% R.H. non-condensing)

2.9 Display

Dot Matrix LCD showing 2 or 4 lines of alphanumeric characters

2.10 Speed of response (T90)

Oxygen: 15 seconds typical

Carbon dioxide: 20 seconds typical

2.11 Power requirements

110 to 120V or 220 to 240V AC, 50/60Hz

Power consumption 20VA

2.12 Enclosure

Free standing case. Dimensions (mm): 255W x 170H x 260D- dimensions do not include case fittings.

2.13 Weight

6.0kg (approx.)

3 INSTALLATION

3.1 Unpacking and visual checking

Take all normal precautions when opening packages. In particular, avoid the use of long bladed cutters. Check for any sign of damage. Check that all pipe connections have captive seal nuts- search packing if any are missing.

3.2 Siting

The GIR250 is designed as a free standing, bench top instrument. It should be used and stored only in the temperature and humidity conditions specified in Section 3. Dust and dirt should be kept to a minimum.

WARNING

The case should not be exposed to water jets or drips.

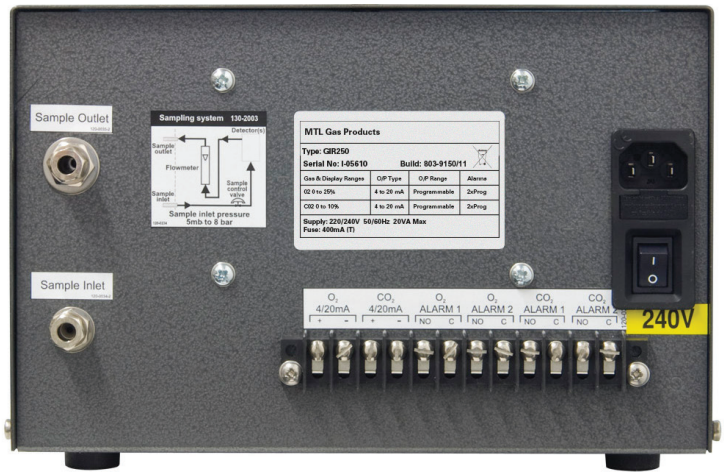


Figure 1 - Rear of instrument showing sample and electrical connections

3.3 Electrical connections

The instrument is fitted with a standard mains IEC connection socket at the rear and supplied with a mains lead and plug appropriate for the country of use.

CAUTION

It is recommended that all cabling used for external connections is double insulated.

The analogue and alarm-relay output connections are shown in Figure 2. The factory default supplies the common (C) and normally open (NO) alarm relay contacts to the terminal strip.

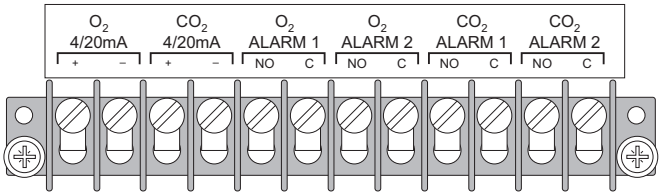


Figure 2 - Signal and alarm terminal strip

Normally closed (NC) operation can be specified at time of ordering. It is also possible for a suitably qualified user to convert the instrument to NC operation- consult your local MTL Gas sales office for further information.

WARNING

Although relay contacts are rated at 48V AC or DC, voltages above 33V AC are defined as hazardous by BS EN61010-1 (Safety requirements for electrical equipment for measurement, control and laboratory use).
Appropriate precautions should be taken when connecting signals to alarm terminals.

3.4 Sampling and piping

The standard connections are captive seal compression fittings suitable for 0.25" (or 6mm diameter tube on the sample inlet and sample outlet. It is important that the sample being supplied to the analyser is clean and non-corrosive. Filters or chemical absorbers will be necessary for those samples that contain particulatematter or corrosive components. It is particularly important that good pipework connectionsare made when low levels of oxygen are being measured.

CAUTION

The dew-point of the sample must always be less than the ambient temperature to avoid the risk of liquid droplets forming in the measuring cell.

If the instrument is to be installed permanently in a situation, it is advisable to fit a valve or valves in the sample line leading to, and possibly from, the analyser; this ensures that the process may be sealed when the cell is changed or removed. The use of a three-way valve on the inlet side is also useful in allowing easy connection of a standard gas for calibration checks.

The cells must not be pressurised, or be exposed to rapid pressure changes or a pulsating flow. Rapid pressure changes could damage the oxygen sensor, whilst pulsation will give an erratic display.

WARNING

Ensure the maximum sample pressure is not exceeded.

4 OPERATION

4.1 Controls and indicators

See Figure 3 for details of the front panel.

Figure 3- Front panel of a GIR250 instrument

4.1.1 Keyboard

The following buttons are fitted :-

View - used to enter View Mode and as an exit key

⇧ (Up Arrow) - used to scroll lines and increment values

⇩ (Down Arrow) - used to scroll lines and to decrement values

Edit - used in the editor and calibration mode

Calibrate - used to enter calibration mode

Measure Cal. Gas - used to trigger a measurement in calibration mode

4.1.2 Alarm LEDs

Four LED's are provided on the indicator panel, one for each alarm. The LED's are ON when the alarm is active and OFF when the alarm is "normal".

4.1.3 Pump button

An internal pump is available to propel the sample gas through the analyser if, for example, it is only available at atmospheric pressure. The button will latch on when pressed. Press again to switch off the pump.

4.1.4 Flow control

The flow control knob operates a valve to adjust the gas flow. The flow rate is displayed on the indicator to its right.

CAUTION

Do not close the valve with excessive force as this can damage the valve seat.

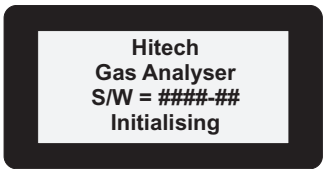
4.1.5 Sample flow indicator

The float indicates the flow rate of the sample gas over a range of 50 to 250ml/min. Adjust the flow rate with the flow control valve to the left of the indicator.

4.2 Initialization

When the instrument is switched on the display will show :-

(where ####.# is the software version number)



This information will remain for a few moments while the instrument goes through its initialisation program, after which it will change to measurement mode and display the measured values.

When in measurement mode, the display, alarm LED's, alarm relays and the two analogue outputs are continually updated with the latest measured values. If an alarm level is exceeded then the appropriate relay will be de-energised and the appropriate LED will be lit.

This display will remain for a few moments while the instrument goes through its initialisation program, after which it will change to measurement mode and display the measured values.

NOTE

When applied to the alarm relays, "NC", "NO" and "C" mean "normally closed", "normally open" and "common" respectively.

"Normal" refers to "process normal" and not the electrical rest position of the relay, which is "normally energised". The software automatically accommodates this logic when the alarm function is changed. For example, a high alarm will have the common terminal connected to the normally open terminal when the concentration is above the set point.

The hysteresis is set in percent units and is the amount by which the measured value must fall below the alarm set point before the alarm will reset.

When in measurement mode, the only two buttons active are the **View** button and the **Calibrate** button. Pressing the **View** button will cause the instrument to enter View mode as described below. Refer to the **CALIBRATION** section for details of the **Calibrate** button function.

4.2.1 View mode

This mode is used to view the instruments parameters (see list below) and is entered by pressing the **View** button.

On first entering this mode the display will show :-

Oxygen Alarm 1
→ Level = xx.x % (where xx.x is alarm level)
Mode = *** (where *** = Off or High or Low)
Hyst = x.x % (where x.x is hysteresis in % concentration)

The arrow pointer on the left-hand side indicates which parameter may be edited. The ⇧ and ⇩ buttons are used to move the arrow to the appropriate line. The parameters are displayed in sets.

Scrolling downwards from the bottom line moves the display onto the next set. Similarly, scrolling upwards from the top line moves the display to the previous set. Up to eight screens of parameter information are displayed:

- Oxygen Alarm 1

- Oxygen Alarm 2
- CO_2 Alarm 1
- CO_2 Alarm 2
- Calibration O_2 (span gas)
- Calibration CO_2 (span gas)
- O_2 20mA
- CO_2 20mA

Leave the View mode at any time by pressing the **View** button. The instrument then returns to measurement mode and displays the measured concentrations.

To change a value, move the arrow pointer to the appropriate line and pressing the **Edit** button. Alarm and analogue outputs are disabled during these changes and the instrument's operating system warns the user of this by displaying a warning screen; the operator is also permitted to withdraw from the operation at this stage.

When Edit mode is entered, a flashing cursor appears on the first digit. The ⇧ and ⇩ buttons are used to increment or decrement this digit. Press the **Edit** button to move to the next digit. When the **Edit** button is pressed at the final digit, the display will show briefly and then return to View mode displaying the new parameters. For editing a text string, such as an alarm function, the block cursor covers the whole word.

NOTE

The maximum hysteresis that can be set is 10% of the span of the particular channel. It is important not to set the hysteresis to a level greater than the alarm point, otherwise the alarm will never reset.

The following is a summary of the function of the buttons when in view and edit modes.

View mode (block cursor not displayed):

⇧ (Up Arrow) -	advances to the next entry
⇩ (Down Arrow) -	returns to the previous entry
View -	exits view mode and returns to measurement mode
Edit -	cursor displayed - warning screen displayed first. See below

Edit mode (block cursor displayed):-

⇧ (Up Arrow) -	increments the digit under the cursor
⇩ (Down Arrow) -	decrements the digit under the cursor
View -	saves on screen data and returns to view mode
Edit -	advances cursor to the next digit or, when on the last digit, stores the entry and returns to View mode.

5 CALIBRATION

WARNING

Ensure that any control loops that are connected to the instrument are disabled prior to calibrating the instrument. also ensure that the process is in a safe state and the exhaust of the calibration gas is fed to a safe area.

NOTE

The analogue output and alarms are "frozen" while the instrument is being calibrated.

5.1 General

Our analysers are extremely stable instruments and require only very occasional calibration. The exact calibration period depends on the type of sample and environment in which the instrument is used. In practice, check periods of less than one month are unlikely, with three to six month periods being more like the 'norm'. We recommend that any quality assurance procedures written for the instrument are written to allow 'verification' rather than calibration.

Verification involves checking that the instrument continues to provide the correct analysis of a standard gas, within the limits of the instrument; resorting to calibration only when a result outside of the limits is produced. The frequency of verification could then be in line with the sort of quality regime adopted by the user.

NOTE

The analogue output and alarms are 'frozen' or locked while the instrument is in calibration mode. Ensure that any control loops that are connected to the instrument are disabled prior to verifying or calibrating the instrument. Calibration mode can only be entered by pressing the **Calibration** button for approximately 8 seconds.

5.2 Piping

The piping carrying the calibration gas must not have any leaks. The flow of the gas must be controlled and should be the same as the flow rate of the sample from the process. Metal piping is preferred as it is less prone to damage and sealing problems.

NOTE

Pressure regulators and gauges that may be in the calibration gas lines all have a certain amount of dead space within them and so may require purging for several minutes before the delivered gas matches that of the cylinder contents. The regulator, etc. may be connected to the instrument and the purge monitored by using the instrument in measurement mode. Only when the reading is steady has the dead space been purged.

5.3 Calibration Gas Level.

A full calibration requires two standard gases. These gases are referred to as 'lower' and 'upper'. (These names are used to avoid the possible confusion caused by calling them 'zero' and 'span' on instruments with scales not starting at zero.The diagram on the next page shows the steps of the calibration process.

The calibration gas levels are entered as follows:

- Press the **View** button.
- Use the ⇧ ⇩ arrows to move to the entry for Calibration Gas.
- Press the **Edit** button. Then use the ⇧ ⇩ arrows to adjust the digit, and the **Edit** button to move to each digit in turn.
- When the level is correct, press **View** to return to the measuring mode.

NOTE
It is preferable that the calibration gas level is entered correctly before proceeding with a calibration routine.

5.4 Entering calibration mode

To enter calibration mode, press and hold the **Calibrate** button for approximately 8 seconds. The top level screen will be displayed where 'upper' or 'lower' calibration can be selected.

5.5 Lower point calibration

- Select Down arrow to enter the 'lower' calibration section.
- Pass the appropriate calibration gas and observe the reading of the measured value.
- When a steady reading is obtained press the **'Meas. Cal. Gas'** button to instruct the analyser to measure the gas and to re-calculate the 'lower' calibration point.

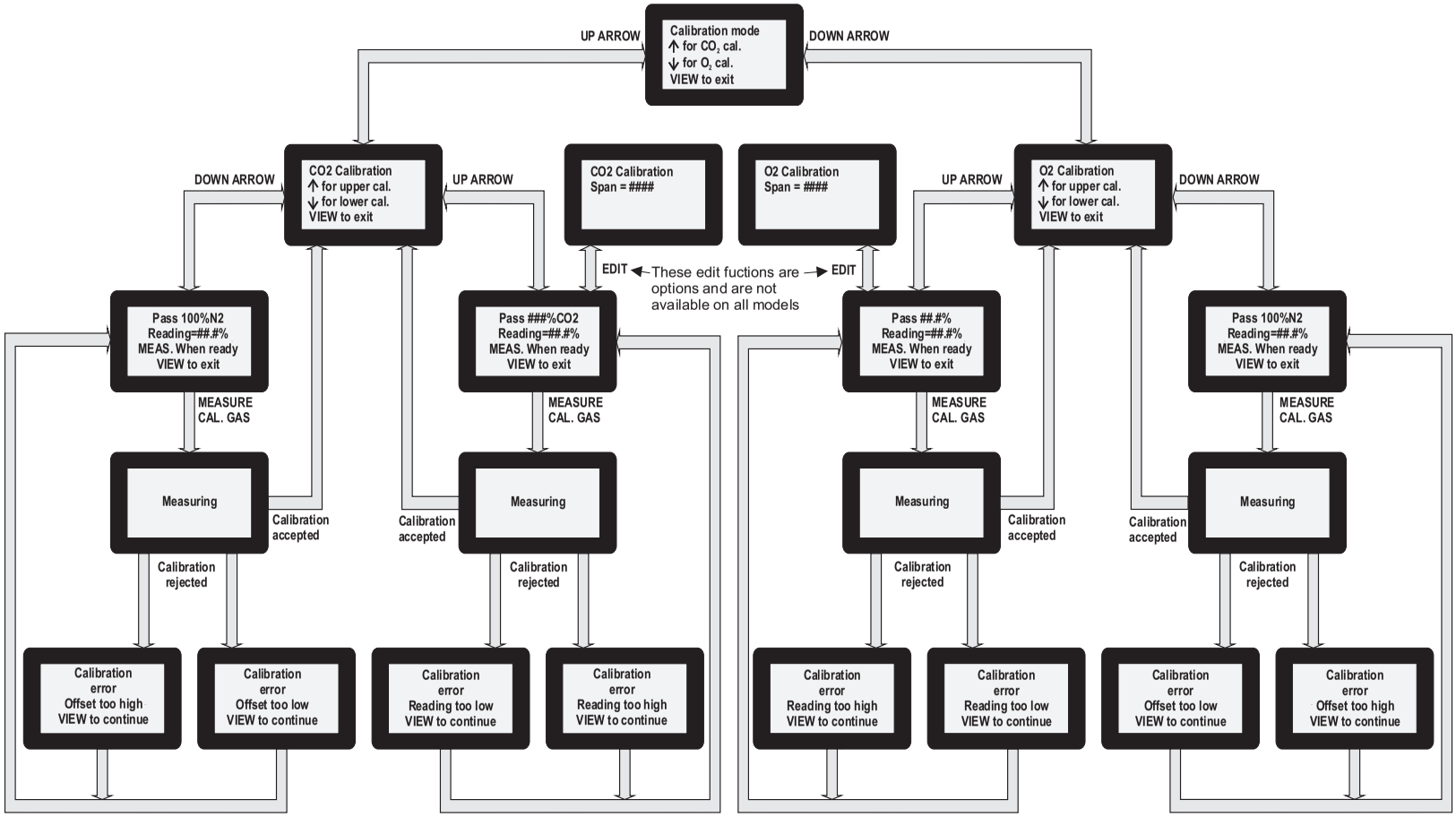
If the 'lower' calibration has been accepted, the analyser will display 'measuring..' and then return to the top level screen. If however the measured value is too high or low then an error message is displayed. If this occurs then the gas level and the piping should be checked.

5.6 Upper point calibration

The same procedure applies as the 'lower' point calibration except the 'upper' calibration section is reached by selecting Up arrow from the top level screen.

This completes the calibration process.

NOTE
If during the calibration procedure it is necessary to change the concentration of the calibration gas stored by the instrument, pressing the **Edit** button gives access to this routine.



Calibration mode KG1550

6 SERVICING AND MAINTENANCE

6.1 Infrared optical bench

The infrared optical bench used for carbon dioxide measurement is non-depleting and will last several years if not subjected to misuse. The sensor can be replaced only with the use of specialist equipment and has to be returned to your local MTL Gas sales office should a replacement be required.

6.2 Oxygen cell

The oxygen cell is a depleting cell that has a useful life in air of up to five years under favourable conditions. All known cell failure modes result in a loss or lowering of output. Thus, applications that look for oxygen depletion are automatically fail-safe.

6.2.1 Oxygen cell replacement

WARNING

Take care to ensure that AC power is not present on the wiring before removing the instrument cover. Ensure also that the cover is replaced before AC power is re-applied to the wiring.

Before replacing a cell ensure:

a) that any leakage of sample that may occur will not create a hazard

b) that any control loop using the outputs from the unit is disabled.

To replace the cell, first remove all power from the instrument. Next remove the instrument cover by removing the four screws that attach it to the chassis. The oxygen sensor is located on the rear panel of the electronic display/control module- see Fig 4. Disconnect the cell wires from the terminal block (terminals 20 & 21), then slacken the compression nut on the cell sample tube and withdraw the old cell. Replacement is the reverse of removal. Follow any instructions supplied with the spare cell.

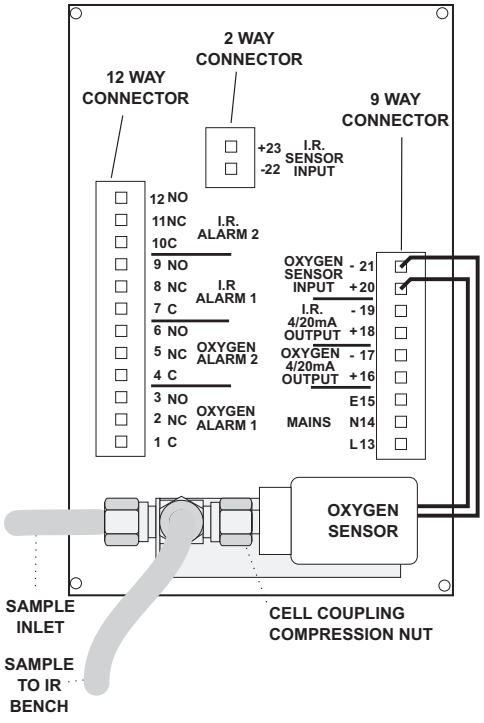


Figure 4- Rear panel of display unit

6.3 Ordering parts

The only part that is user serviceable is the replacement oxygen sensor. Should any failure occur, the instrument should be returned to your local MTL Gas sales office. When ordering spare cells or raising queries on the instrument, it is important that the serial number or job number are quoted. These numbers may be found on the data label on the rear of the instrument.

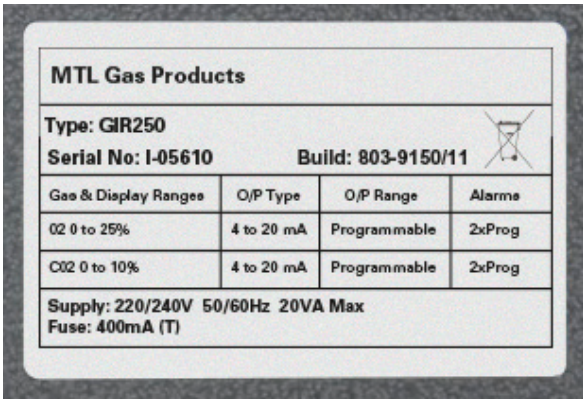


Figure 5 - Typical data label on the rear of the instrument

6.4 Storage of measuring cell

The E type cells have a maximum useful life of 5 years including any storage time. Each cell is dated during manufacture and "storage" starts from that time. The first two digits identify the month of manufacture and the second two the year. i.e. 1009 means October 2009. Ideally the cell should be stored in a refrigerator and the seal over the sample connector should be intact and undamaged. It is advisable, when the replacement date is predictable, to order a new cell from to your local MTL Gas sales office one month prior to this date. This ensures that a fresh cell is available at replacement time.

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AUSTRALIA
MTL Instruments Pty Ltd,
10 Kent Road, Mascot, New South Wales, 2020, Australia

Tel: +61 1300 308 374 Fax: +61 1300 308 463
E-mail: mtlsalesanz@eaton.com

BeNeLux
MTL Instruments BV
Ambacht 6, 5301 KW Zaltbommel
The Netherlands

Tel: +31 (0) 418 570290 Fax: +31 (0) 418 541044
E-mail: mtl.benelux@eaton.com

CHINA
Cooper Electric (Shanghai) Co. Ltd
955 Shengli Road, Heqing Industrial Park
Pudong New Area, Shanghai 201201

Tel: +86 21 2899 3817 Fax: +86 21 2899 3992
E-mail: mtl-cn@eaton.com

FRANCE
MTL Instruments sarl,
7 rue des Rosiéristes, 69410 Champagne au Mont d'Or
France

Tel: +33 (0)4 37 46 16 53 Fax: +33 (0)4 37 46 17 20
E-mail: mtlfrance@eaton.com

GERMANY
MTL Instruments GmbH,
Heinrich-Hertz-Str. 12, 50170 Kerpen, Germany

Tel: +49 (0)22 73 98 12- 0 Fax: +49 (0)22 73 98 12- 2 00
E-mail: csckerpen@eaton.com

INDIA
MTL India,
No.36, Nehru Street, Off Old Mahabalipuram Road
Sholinganallur, Chennai- 600 119, India

Tel: +91 (0) 44 24501660 /24501857 Fax: +91 (0) 44 24501463
E-mail: mtlindiasales@eaton.com

ITALY
MTL Italia srl,
Via San Bovio, 3, 20090 Segrate, Milano, Italy

Tel: +39 02 959501 Fax: +39 02 95950759
E-mail: chmninfo@eaton.com

JAPAN
Cooper Crouse-Hinds Japan KK,
MT Building 3F, 2-7-5 Shiba Daimon, Minato-ku,
Tokyo, Japan 105-0012

Tel: +81 (0)3 6430 3128 Fax: +81 (0)3 6430 3129
E-mail: mtl-jp@eaton.com

NORWAY
Norex AS
Fekjan 7c, Postboks 147,
N-1378 Nesbru, Norway

Tel: +47 66 77 43 80 Fax: +47 66 84 55 33
E-mail: info@norex.no

RUSSIA
Cooper Industries Russia LLC
Elektrozavodskaya Str 33
Building 4
Moscow 107076, Russia

Tel: +7 (495) 981 3770 Fax: +7 (495) 981 3771
E-mail: mtlrussia@eaton.com

SINGAPORE
Cooper Crouse-Hinds Pte Ltd
No 2 Serangoon North Avenue 5, #06-01 Fu Yu Building
Singapore 554911

Tel: +65 6645 9864 / 6645 9865 Fax: +65 6 645 9865
E-mail: sales.mtlsing@eaton.com

SOUTH KOREA
Cooper Crouse-Hinds Korea
7F. Parkland Building 237-11 Nonhyun-dong Gangnam-gu,
Seoul 135-546, South Korea.

Tel: +82 6380 4805 Fax: +82 6380 4839
E-mail: mtl-korea@eaton.com

UNITED ARAB EMIRATES
Cooper Industries/Eaton Corporation
Office 205/206, 2nd Floor SJ Towers, off. Old Airport Road,
Abu Dhabi, United Arab Emirates

Tel: +971 2 44 66 840 Fax: +971 2 44 66 841
E-mail: mtlgulf@eaton.com

UNITED KINGDOM
Eaton Electric Limited,
Great Marlings, Butterfield, Luton
Beds LU2 8DL

Tel: +44 (0)1582 723633 Fax: +44 (0)1582 422283
E-mail: mtlenquiry@eaton.com

AMERICAS
Cooper Crouse-Hinds MTL Inc.
3413 N. Sam Houston Parkway W.
Suite 200, Houston TX 77086, USA

Tel: +1 281-571-8065 Fax: +1 281-571-8069
E-mail: mtl-us-info@eaton.com

Powering Business Worldwide

Eaton Electric Limited,
Great Marlings, Butterfield, Luton
Beds, LU2 8DL, UK.
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com
www.mtl-inst.com

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EUROPE (EMEA):
+44 (0)1582 723633
mtlenquiry@eaton.com

THE AMERICAS:
+1 800 835 7075
mtl-us-info@eaton.com

ASIA-PACIFIC:
+65 6645 9864 / 9865
sales.mtlsing@eaton.com