



OPERATOR INTERFACE
24VDC ETHERNET

mOI215

mOI215 Operator Interface

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Revision Notes

Initial Release June 15, 2005

Revision A – May 15, 2006

- Product number changed

Revision B – March 6, 2007

- Watchdog Counter details added

Revision C – October 1, 2010

- Update specifications and AC power connection details

Revision D – November 30, 2012

- Correct Modbus map to include register 40513



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1. Overview

The mOI215 is an operator interface and web server that can configure, display, and data log up to 256 process sensors on a desktop PC equipped with commonly available web browsers and Java™ software. No additional software is required. The sensors are displayed in a web page using a tabbed format, grouped by the user to simplify organization of the sensor readings. Up to four alarms for each display position can be entered. The Interface has both external contact and e-mail alerts, and is provided in a compact wall mount enclosure.

The Interface can service up to 8 CMCIEL mBC08x Bus Converters over an RS485 network. Each Bus Converter can process 32 CMCIEL digital sensors. Bus Converters are available for both Industrial/Commercial and Intrinsically Safe hazardous area environments. A complete line of pre-packaged process sensors is available. The wiring system is fully specified and includes field interconnect components. In addition to the web server, the Interface has a Modbus TCP/IP Slave interface for connection to remote PLC and computer systems.

Caution: This device contains electronic components that can be damaged by static discharge. Proper ESD handling procedures should be observed at all times.



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2. Description of Connections, Switches and Indicators

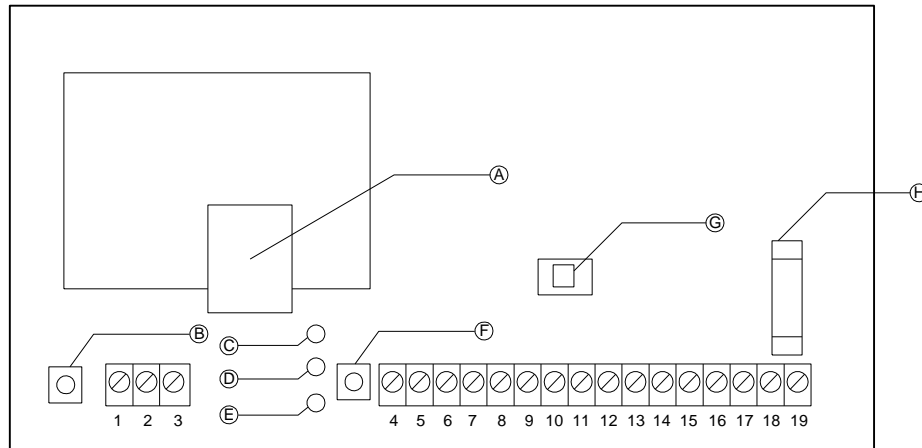


Figure 1 - Keypad and Indicators

ID	Label	Description of Operation
A		Ethernet connector
B	RELOAD	Reload factory IP address (press and hold for 10 seconds) or Reload entire factory setup (press during power up or reset)
C	STATUS1	Status indicator 1 – for details see: Appendix 1 – Status 1 Flash Codes
D	STATUS2	Status indicator 2
E	CHARGE	Battery charging indicator, battery is being charged when lit
F	RESET	Restart microprocessor (logged data is erased)
G	TERMINATE	Terminate mBC08x RS485 connection
H		3A fuse for battery

ID	Label	Description of Connection
1	ACK	Acknowledges all alarm conditions, turns off Horn and Alarm relays and stops email alerts until a new warning, alarm, or system event occurs.
2	COM	Common connection for ACK and SILENCE switches
3	SILENCE	Turns off the Horn relay if currently active
4	COM	Common connection for the Alarm relay
5	NO	Normally Open connection for the Alarm relay
6	NC	Normally Closed connection for the Alarm relay



7	COM	Common connection for the Horn relay
8	NO	Normally Open connection for the Horn relay
9	NC	Normally Closed connection for the Horn relay
10	COM	Common connection for the mBC08x Bus Converters
11	DAT_L	Data Low connection for the mBC08x Bus Converters
12	EARTH	Earth Ground connection for the mBC08x Bus Converters
13	DAT_H	Data High connection for the mBC08x Bus Converters
14	PWR	Power connection for the mBC08x Bus Converters
15	AC	16.5V AC voltage input from transformer (connection 1)
16	EARTH	Earth Ground connection
17	AC	16.5V AC voltage input from transformer (connection 2)
18	NEG	Backup battery negative terminal
19	POS	Backup battery positive terminal

Table 1 - Description of Connections, Switches and Indicators



3. External Connections

The mOI215 provides connections for mBC08x bus converters, Ethernet, input switches, output alarms and backup battery.

Caution: This device contains electronic components that can be damaged by static discharge. Proper ESD handling procedures should be observed at all times.

3.1 Ethernet Connection

The mOI215 is connected to a single computer or a Local Area Network using standard CAT5 cable.

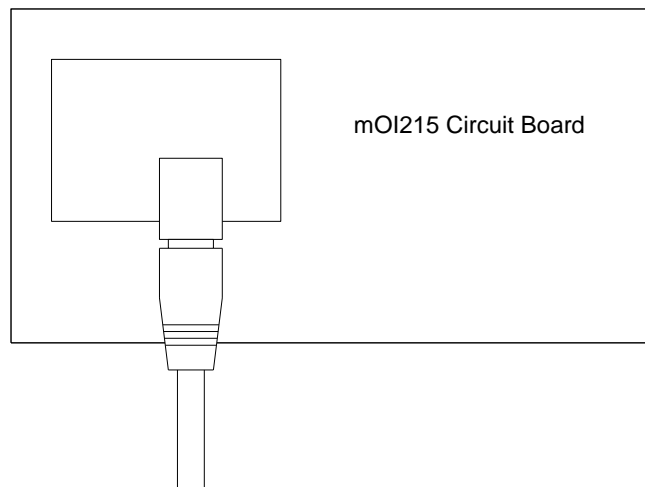


Figure 2 - Ethernet connection

3.2 Alarm Outputs

Two dry contact relay outputs are provided. They are configured separately and work independently. Although not limited to these uses, one is nominally intended as an alarm output for sensing by a remote system, while the other is intended to operate a horn or Sonalert®. See Section 6: Specifications for contact ratings.

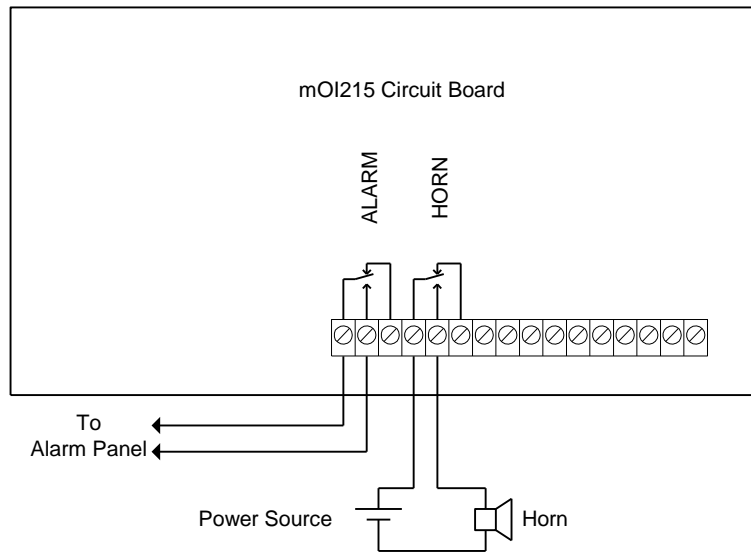


Figure 3 - Suggested Alarm Connection

3.3 Input Switches

Connections are provided to allow the user to acknowledge alarms and silence the horn remotely. The ACK (Alarm Acknowledge) input turns off both relays and suppresses email messages pertaining to any existing warnings, alarms, and system events. The SILENCE (Silence Horn) input turns off the Horn Contact relay only, and does not affect the email system.

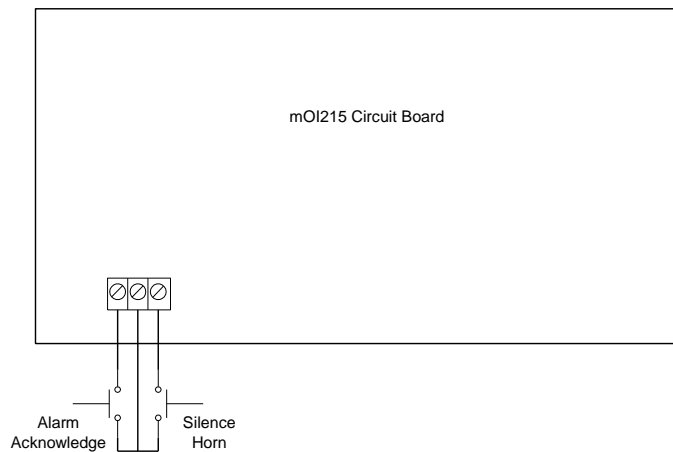


Figure 4 - User Input connections

3.4 Bus Converters

mBC08x bus converters are to be connected using 4-conductor shielded cable as shown in Figure 5.

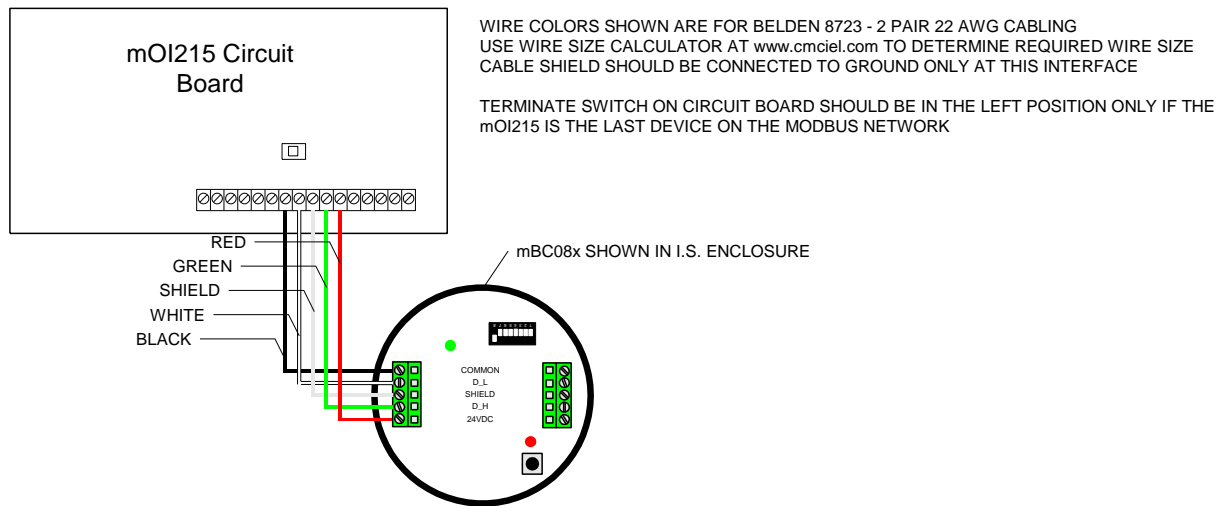


Figure 5 - Bus Converter Connections

Note: Only Bus Converters with their address switches set to an address between 1 and 8 will be detected by the mOI215.

3.5 Backup Battery

The backup battery should be connected as shown in Figure 6, using the supplied cable harness. Connect the red wire to the positive (+) terminal and the black wire to the negative (-) terminal.

Saving system and position setups to the Interface is denied while the Interface is running on its backup battery. This is to avoid the possibility of corrupting setup records because of insufficient power availability. Saving setups is re-enabled when AC power is restored.

If the battery is connected with positive and negative terminals reversed, fuse F2 will blow. See Section 6, Specifications, for the fuse specification.

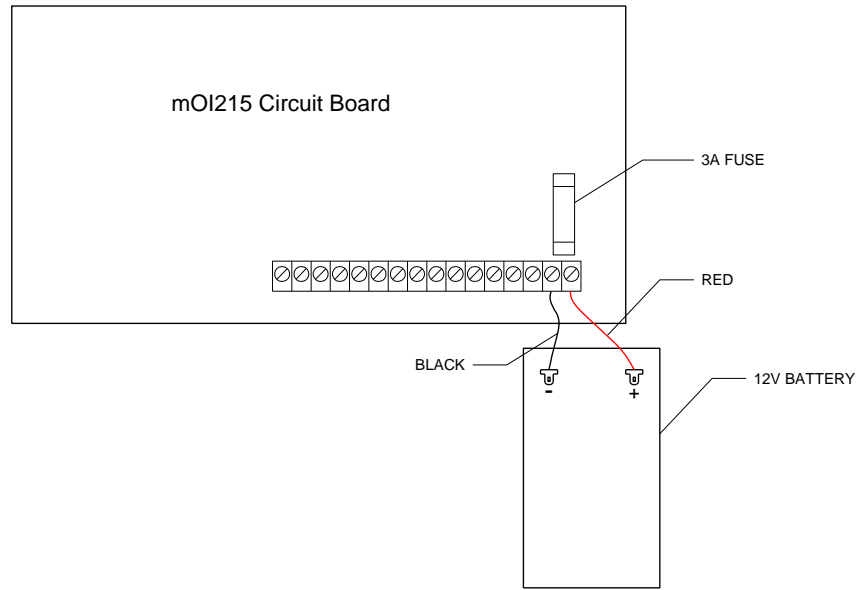


Figure 6 - Battery Connection

3.6 AC Power Connection

An AC power transformer is included with the interface. The transformer plugs into a standard 120VAC wall outlet. The transformer should be located with 50 feet of the interface and should be connected to the interface using 18 gauge or larger wire. Connect the enclosure to earth ground using the provided grounding screw. The Interface is shipped with its earth ground connection terminated in the enclosure.

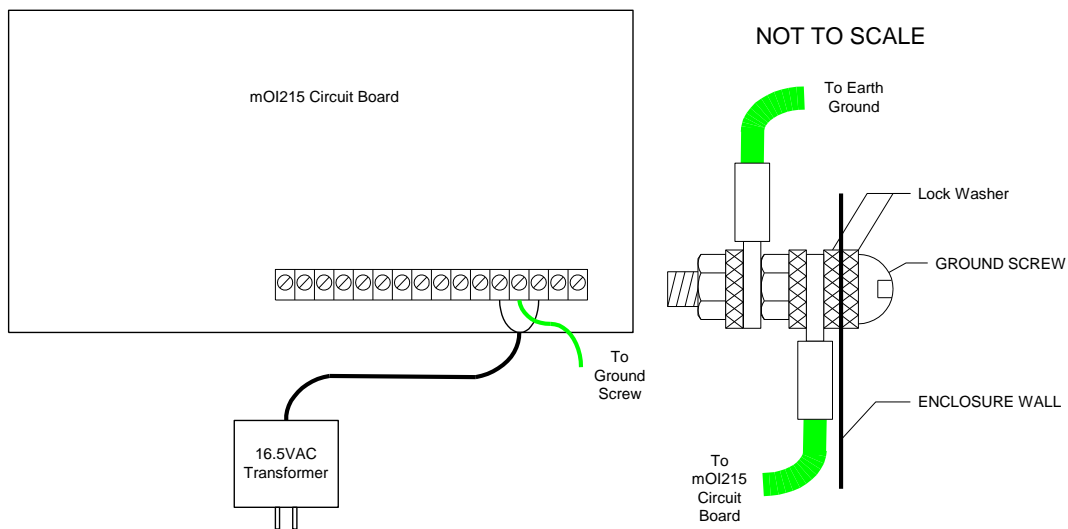


Figure 7 - AC Power Connections



4. Web Server

The web server included in the mOI215 system provides an easy to use interface for displaying, configuring alarms and logging the process values being monitored.

4.1 Java

The web server requires a PC equipped with an Internet browser and Java™ virtual machine (VM) to operate. If you cannot see the 'Status' tab in your browser after logging in to the interface, you need to install Java on your computer. Visit <http://www.java.com/en> and follow the instructions to install the latest version of Java.

4.2 IP Address

The default IP address of the mOI215 is 192.168.1.111. When you type 192.168.1.111 into the address bar of your Internet browser, the mOI215 will display the login screen. Configuration of the Interface, including the desired IP address, is performed after logging in.

4.3 Login

There are two possible login IDs, one for administrators and one for other users.

The factory default login IDs and passwords are:

Access Level:	Administrator	User
Login ID:	admin	user
Password:	Blank – no password	Blank – no password

Table 2 - Factory Login IDs and Passwords

Administrators should change these default IDs and passwords during initial configuration of the Interface, and as often thereafter as deemed necessary. Note that login IDs and passwords are case-sensitive.

Keep the administrator ID and password in a secure location. It is not possible to reconfigure the Interface without them. Reloading the factory default settings may restore access to the Interface, but all previously entered setup data will be erased.

4.4 Administrator Login

An Administrator can configure the Interface and perform all User functions. Access to the setup tabs is granted to the first Administrator login, with only one Administrator login allowed at a time. Additional Administrator logins are denied access to the Interface setup tabs while the previous Administrator session is in progress.



4.5 User Login

Users are limited to viewing status and group tabs, and acknowledging alarms. Multiple concurrent User logins are allowed, although performance of time-critical functions such as data logging may be degraded if the number of connected users is large.

4.6 Logging Out

Administrators and users are automatically logged out of the Interface when the browser window containing the Interface applet is closed.

4.7 Status Tab

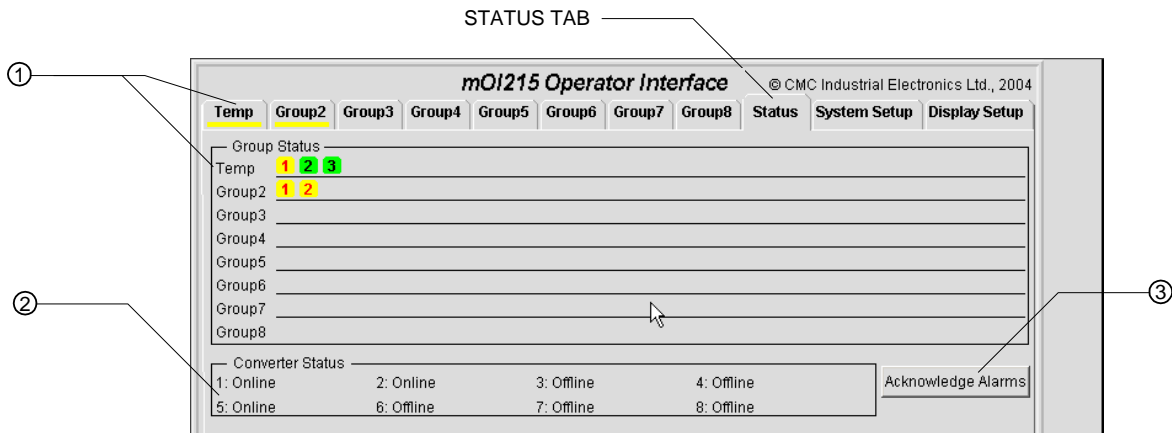


Figure 8 - Status Tab

ID	Label	Description
1	Temp	One of 8 user configurable display groups.
2	Converter Status	Shows the status of each of the 8 possible bus converters. Will report 'Online' under normal conditions.
3	Acknowledge Alarms	Acknowledges all alarm conditions – turns off horn and alarm relays and stops email alerts. The outputs will remain off until a new alarm is declared.

Table 3 - Status Tab

Sensor display positions are organized into eight groups. The name of each group is user selectable (up to six characters) and appears on the group tab and in the Group Status section. Within each group, there are 32 display positions, used to link a physical process name (e.g. "Belt 3 Takeup RPM") with a sensor serial number (e.g. "160-2-14-55-140-177-205"). The same sensor can appear in more than one group. Duplicate display position names are allowed, and the same sensor may be given different names on any and all group tabs. Configurations for each display position are independent, and the same sensor may be used in different display positions to generate warning and alarm events with different thresholds, if desired.



The status of each sensor in the group is displayed in the Group Status section. The following colors are indicated:

Color	Meaning
Green	Sensor is functioning and is not in alarm condition
Yellow	Sensor is functioning and is in warning condition
Red	Sensor is functioning and is in alarm condition
Black	Sensor is faulted, or not found on the network
Grey	Sensor is disabled, and will not generate events

The color bar on each group’s tab changes from green to yellow, red, or black if any of the sensors in the group are in warning, alarm, or fault states. The color displayed is prioritized, with fault (black) having the highest priority, followed by alarm (red), warning (yellow), and nominal condition (green), in that order.

The Acknowledge Alarms button is used to reset the alarm relays and suppress email alerts on existing conditions. If enabled in setup, relays are activated and emails are generated by any new system or position event.

4.8 System Setup Tab

This tab is enabled only when someone logs in as an administrator.

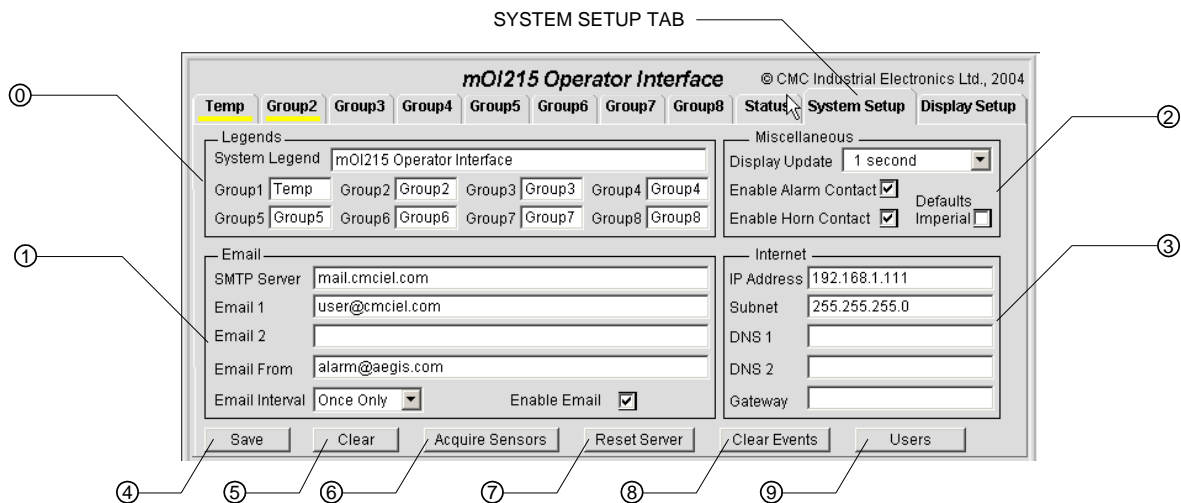


Figure 9 – System Setup Tab

ID	Label	Description
0	Legends	System Legend – Subject of email notifications and title of user display window Group1-8 – name of each sensor display group (6 characters max each)



- | | | |
|---|-----------------|---|
| 1 | Email | <p>SMTP Server – name of SMTP server used to send email alerts</p> <p>Email1,2 – email addresses where email alerts are sent (32 characters max each, one address per box)</p> <p>Email From – this text appears in ‘from’ address field of email alerts. This should follow the format: name@host.com to prevent it from being rejected by SMTP servers</p> <p>Email Interval – sets how often repeat alert emails are sent if they are not acknowledged. A maximum of 20 unacknowledged emails will be sent.</p> <p>Enable Email – Clear this check box to disable all email alerts</p> |
| 2 | Miscellaneous | <p>Display Update – controls how often the user display is updated</p> <p>Enable Alarm Contact – Uncheck this box to keep the alarm relay from operating when an alarm condition occurs</p> <p>Enable Horn Contact - Uncheck this box to keep the horn relay from operating when an alarm condition occurs</p> <p>Defaults Imperial – When sensors are being configured, the default units for the sensors will appear in Imperial units if this box is checked</p> |
| 3 | Internet | <p>IP Address – set to the IP address to be used by the mOI215 (factory default is 192.168.1.111)</p> <p>Subnet – set to the subnet mask to be used by the mOI215 (factory default is 255.255.255.0)</p> <p>DNS1,2 – set to the IP address of the Domain Name Server to be used to resolve the email address</p> <p>Gateway – set to the IP address of the Gateway to be used to access the internet when email alerts are sent.</p> |
| 4 | Save | <p>Saves the system setup currently displayed. If the save button is not pressed, any changes will be lost.</p> |
| 5 | Clear | <p>Erases the contents of all boxes on the System Setup tab. Changes are not saved unless Save is also pressed, but recovering the information requires closing the web browser and logging in again.</p> |
| 6 | Acquire Sensors | <p>Causes the mOI215 to scan the network and detect all sensors present. This process is not complete until “Retrieval Complete” is displayed in the events window at the bottom of the screen. This process can take several minutes depending on the number of sensors present.</p> |
| 7 | Reset Server | <p>Causes the mOI215 to reset in the same way as if all power was removed and then restored. All logged data is lost, but the system setup is preserved.</p> |
| 8 | Clear Events | <p>Clears the events window at the bottom of the screen.</p> |
| 9 | Users | <p>Opens a window where all logon IDs and passwords can be set.</p> |

Table 4 – System Setup Tab



4.9 Display Setup Tab

This tab is enabled only when someone logs in as an administrator.

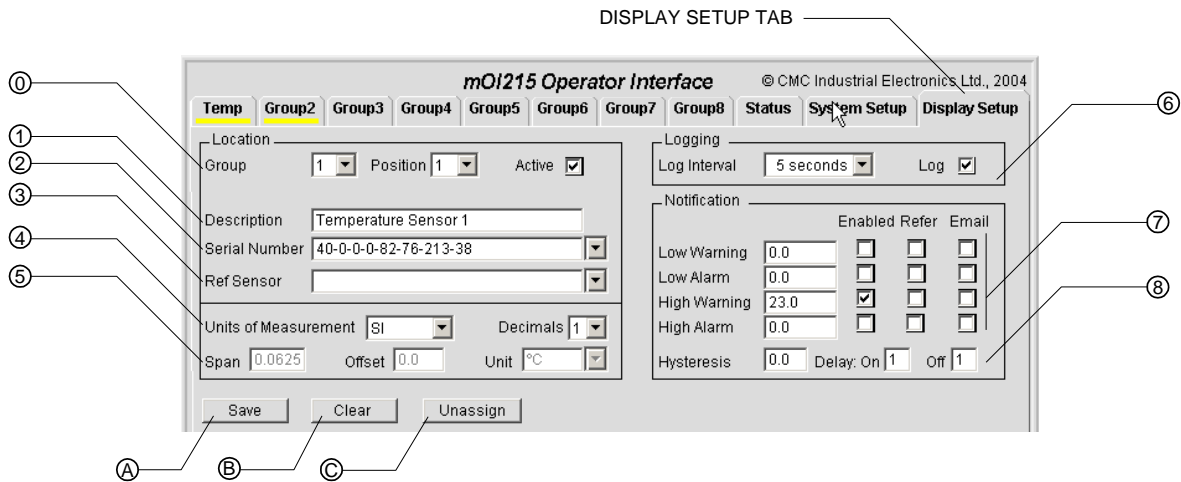


Figure 10 - Display Setup Tab

ID	Label	Description
0	Group Position Active	Use these controls to select which display group (1-8) and position (1-32) within the group is currently being configured. Uncheck the Active box to disable alarms for this display position without having to change any other parameters.
1	Description	Display name for this group and position (max 20 characters)
2	Serial Number	Serial number of the sensor to display in this group and position.
3	Ref Sensor	Serial number of the sensor to use as the reference if the alarm condition is to be with respect to a reference sensor.
4	Units of Measurement	Sets the display to SI or Imperial units for mOI215 known sensor types. For unknown sensor types, select User and enter the information discussed below.
	Decimals	Decimals sets the number of decimal places to display.
5	Span Offset Unit	To configure a User type display value, set Offset to the displayed reading when the sensor reports a value of 0. Set the Span to the displayed reading when the sensor reports 1. Set Unit to the units to be displayed.
6	Logging	Set the number of seconds between readings and check the Log box to enable logging for this display position. Note: The logged data is volatile and is erased on power up and system reset.
7	Notification	High and low warning and high and low alarm thresholds can be set. For each, the alarm and/or horn relay contacts will operate when the threshold is crossed if the Enabled box is checked. An email notification will be sent if the Email box is checked when the threshold is crossed. If more than four thresholds are desired, the same sensor can be assigned to



more than one position or group.

If the Refer box is checked, then the threshold values are no longer absolute, but detect the difference between the sensor and the reference sensor's readings. Thresholds below the reference sensor value need to be preceded by a negative sign.

- 8 Hysteresis Once the threshold is crossed, hysteresis controls how far away from the threshold the reading must go before the alarm or warning condition is cancelled.
- Delay Delay controls how many seconds the alarm or warning condition must exist before the change in condition is reported. Both turn-on and turn-off delay times can be specified. Note: Fault events are reported immediately regardless of this setting.
- A Save Saves the displayed settings in the mOI215. Changes do not take effect until the Save button is pressed.
- B Clear Clears all the fields for the currently selected display position. This does not remove the position from the status display.
- C Unassign The current group and position will no longer appear in the status display.

Table 5 - Display Setup tab

4.10 Group Tabs

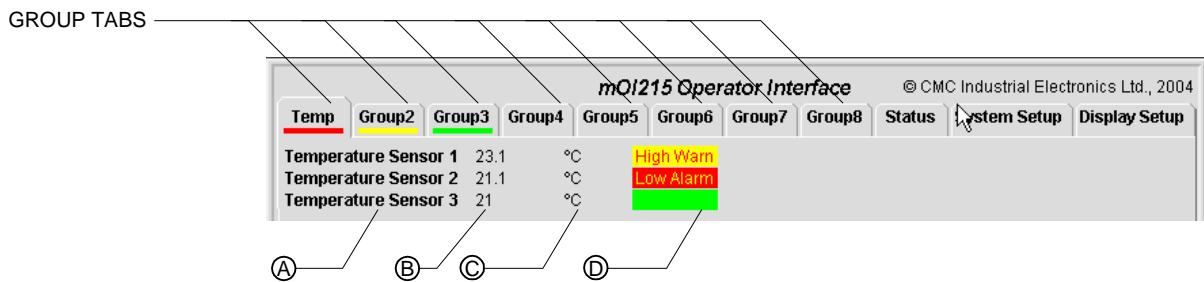


Figure 11 - Group tabs

The group tabs allow the user to view the current values of all the sensors within each group. All sensors can be assigned to one or more groups up to the maximum of 8 groups and 32 sensors per group.

ID	Description
A	Position name: Grey when alarm disabled. Bold text used when position is being logged
B	Current reading value
C	Current reading units
D	Current status

Table 6 - Group tabs



Double clicking on one of the positions will cause a graph of the logged data for that position to be displayed.

4.11 Graphing Data

To zoom in, draw a rectangle around the area to zoom in on using the left mouse button. To zoom all the way out, click the right mouse button.

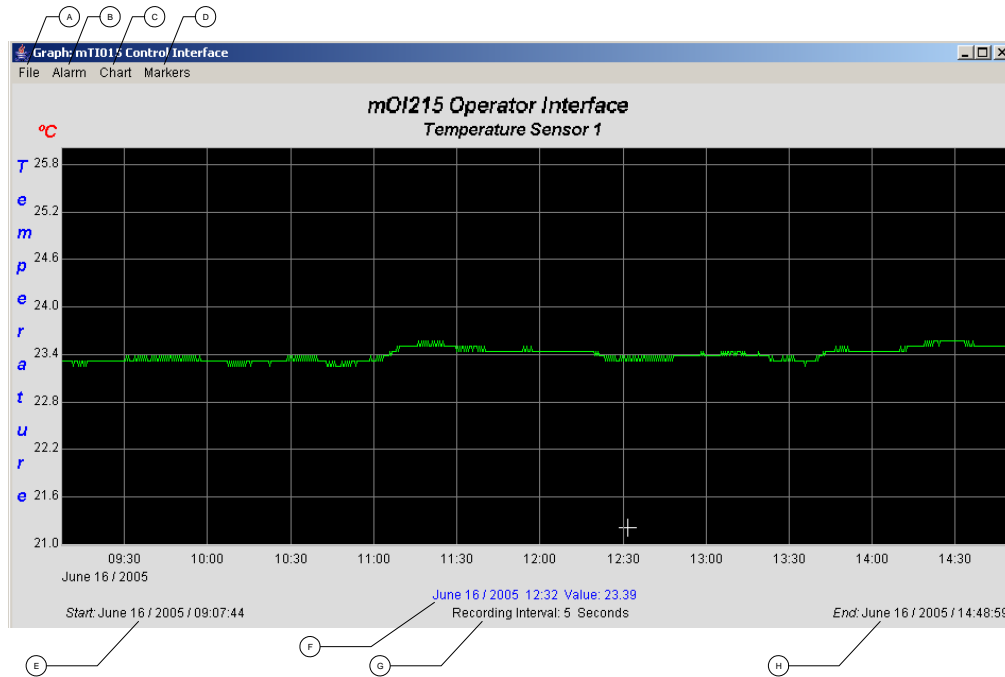


Figure 12 - Sample Graph

ID	Label	Description
A	File	Exit – closes graph. Print – print color graph. Print b/w – print black & white graph. To best utilize the paper, it may be necessary to change the printer setting to landscape using the ‘Properties’ button on the print dialog box.
B	Alarm	Draws a line at any of the CURRENT warning and alarm values. If these values have changed, the values that were in effect when the data was logged cannot be shown.
C	Chart	When there are more data points available than can fit horizontally on the graph, the data is compressed (several points equate to 1 point on the graph). When ‘Peak’ is selected, the data line (green) follows the minimum and maximum values within the group. When ‘Average’ is selected, the data line follows the average of the values within the group. When ‘Range’ is selected, the line follows the average values within the



		group and the peak values are shown in blue.
D	Markers	When markers are turned on, the data points are highlighted with dots.
E	Start	Indicates the timestamp of the first data point
F		Indicates the time and reading value at the current mouse position
G	Recording Interval	Indicates the period of time between logged data
H	End	Indicates the timestamp of the last data point

Table 7 - Graph Operation



5. Setup

This section describes how to get the mOI215 system going for the first time. Please read sections **Error! Reference source not found.** and **Error! Reference source not found.** of this document prior to proceeding.

5.1 LAN IP Configuration

1. Ask your network administrator for a static IP address and mask to be used by the mOI215
2. The LAN must be configured to allow ports 502 or 443 for Modbus/TCP and 25 for SMTP if email alerts are desired.
3. Connect the mOI215 access panel to a PC using the supplied crossover cable
4. Connect the transformer to the mOI215 board as described in section 3.6 and plug into a 120V outlet.
5. From within Windows, make note of the current settings and then change the computer's IP address to 192.168.1.110
6. Open Windows Explorer and type in the address 192.168.1.111 in the address bar
7. Login as administrator
8. Change the IP address and mask on the system tab to the ones provided by the network administrator
9. Save changes – at this point, connection to the mOI215 should be lost
10. Disconnect the crossover cable and connect both the computer and mOI215 to your Local Area Network.
11. Restore the computer's IP settings
12. Open Windows Explorer and type the mOI215 IP address in the address bar – the logon screen should appear.

5.2 Mounting considerations

Proper ESD precautions should be observed while working in the vicinity of the circuit board.

The mOI215 case should be mounted in a location that is free from excessive vibration, temperature and humidity. The proximity to a 120V outlet, Ethernet connection and mBC08x Bus Converter will also need to be considered when choosing a location.

The enclosure should be mounted with the circuit board at the top so the backup battery can sit in the bottom of the enclosure.

If the mOI215 is the last device on the Modbus network, the terminate switch on the circuit board should be turned on.



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6. Troubleshooting

This section describes solutions to various problems you may have with setup or operation of the interface.

6.1 Unable to see the mOI215 on the Local Area Network

Possible Cause	Solution
AC power not present	Confirm outlet is powered and wiring is correct between transformer and mOI215 circuit board.
Ethernet cable connection problem	If a previously unused Ethernet jack is being used for the mOI215, confirm the jack is connected to the LAN. Check the cable is OK.
IP address conflict	Confirm the IP address chosen for the mOI215 does not conflict with other IP addresses on the network.
Router's MAC address table is not automatically updated	Consult the router's user manual and rebuild its address table as recommended.

6.2 Cannot Save Setups

The mOI215 will not save setup information when it detects that it is battery powered in case a low battery causes the setup to be corrupted.

Possible Cause	Solution
AC power not present	Confirm outlet is powered and wiring is correct between transformer and mOI215 circuit board.

6.3 Cannot Access Setup Tabs

Only one user may login as an administrator at a time. If a second person logs in as an administrator, the second will be logged in as a user.

Possible Cause	Solution
Administrator already logged in	Wait for first administrator to log out.

6.4 Multiple Emails on the Same Event

Measured readings tend to fluctuate slightly. The mOI215 will send an email every time the sensor crosses the alarm threshold into an alarm state.

If set up, the mOI215 will continue to send up to a maximum of 20 emails if the alarm condition is not acknowledged.



Possible Cause	Solution
Event not acknowledged	<ol style="list-style-type: none">1. Acknowledge the event by the hardware input or via the web server.2. Change the 'Email Interval' on the System Setup tab to 'Once only'.
Sensor reading repeatedly crossing threshold	Increase the hysteresis value associated with that sensor.

6.5 Email is not Working

Possible Cause	Solution
Email From field not correct format	Change the field to a format: name@host.com
Gateway or DNS IP addresses incorrect	Confirm the IP addresses are correct
Port not enabled	Confirm the network is configured to allow port 25 for SMTP
Global email disabled	Confirm the 'Enable Email' box on the System Setup tab is checked.
Individual email disabled	Confirm the Email box associated with the email event is checked.
Email Address field incorrect	Confirm Email 1 & 2 fields are correct.

6.6 Graph Time/Date Disagrees with Email Alert

The time and date for displaying logged events is derived from the user's computer whereas the SMTP server generates the time and date of an email alert. This situation could cause a discrepancy between the graphed data and the time when email alerts are sent.

Possible Cause	Solution
User's computer has and incorrect Time and Date	Correct the time and date on the user's computer.

6.7 Graph Doesn't Show Emailed Event

The graphed data is sampled at the interval the user selects. If a threshold event is shorter in duration than the logging interval, the event may not be seen on the graph.

Possible Cause	Solution
Short Event	Change the logging interval to the fastest interval.



6.8 Bus Converters Are Not Detected

Possible Cause	Solution
Bus Converter address not in the range 1-8	Change the Bus Converter address switches to an address between 1 and 8



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7. Specifications

Description	Characteristics
Power Supply	
Voltage	120VAC
Current	0.35A (40VA)
Ethernet	
10BaseT	RJ-45 jack
Bus Converter Communication	
Standard	RS485 differential
Distance	500m (1640ft.)
Input load	12K ohm, standard
Termination	120Ω balanced line
Environment	
Temperature	0 to 50C (32 to 122°F)
Relative Humidity	0 to 95% non-condensing
Dimensions	
Depth	76.2 cm (3.0 in)
Width	20.7 cm (8.13 in.)
Height	26.0 cm (10.25 in)



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8. Appendix 1 – Status 1 Flash Codes

Under normal circumstances, the Status1 indicator will turn on for approximately one second and off for approximately 1 second continuously.

A continuous flashing pattern of approximately 0.25 seconds on and off indicates:

1. Currently operating under battery power or
2. System has been reloaded to factory settings

When an error occurs, the pattern will change to one or more flashes followed by a longer delay. The number of flashes indicates what problem has been detected as follows:

Flashes	Meaning
1	Corrupted Display Position Record
2	Corrupted System Setup Record
3	No Ethernet connection detected
4	TCP Initialization failure

Table 8 - Status 1 Flash Codes



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9. Appendix 2 – Email Symbols Description

The email messages sent have been designed to minimize the number of characters required so they can be sent to devices with a limited message size.

The messages are separated into two sections:

1. System level events including: power loss, system reset, and converter faults
2. Sensor level events including: sensor warnings, alarms and faults

9.1 System Events

The number of Bus Converters (conv) and number of sensors (sen) currently operating is always reported. In addition, the following messages can be reported in this section:

Message	Meaning
Sys reset	The mOI215 has been reset due to power being restored or the user pushing the reset button.
Conv flt	A fault has been detected on one or more bus converters
Conv recov	A bus converter has recovered from a fault

Note: Previous events will be included each time a new email is generated if the user does not acknowledge these events.

9.2 Sensor Events

The following symbols are used:

Symbol	Meaning
F	Fault
R	Fault Recovered
H	High Alarm
h	High Warning
L	Low Alarm
l	Low Warning
*	New event (reason email was sent)



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10. Appendix 3 - Modbus Communications

The mOI215 communicates with a host computer or PLC using the Modbus/TCP protocol. The Modbus slave address for the mOI215 is 1. The memory has been configured to simulate a PLC with 16 bit registers. These registers are allocated as follows:

Register	Type	Description																														
40001 to 40511 odd addr	R	Sensor Readings for display positions 1 through 256.																														
40002 to 40512 even addr	R	<p>Flags for each display position (1 through 256). A list of the bits and their functions follows:</p> <table> <tr> <td>0</td> <td>Alarm High</td> <td>High alarm threshold has been crossed</td> </tr> <tr> <td>1</td> <td>Alarm Low</td> <td>Low alarm threshold has been crossed</td> </tr> <tr> <td>2</td> <td>Warning High</td> <td>High warning threshold has been crossed</td> </tr> <tr> <td>3</td> <td>Warning Low</td> <td>Low warning threshold has been crossed</td> </tr> <tr> <td>4-10</td> <td colspan="2">Not used</td> </tr> <tr> <td>11</td> <td>Reference Fault</td> <td>A fault exists on the reference sensor</td> </tr> <tr> <td>12</td> <td>Sensor Fault</td> <td>A fault exists for this sensor</td> </tr> <tr> <td>13</td> <td>Corrupt Setup</td> <td>Setup record is corrupted</td> </tr> <tr> <td>14</td> <td>Position Active</td> <td>Active box checked (alarms enabled)</td> </tr> <tr> <td>15</td> <td>Assigned</td> <td>Position set for display</td> </tr> </table>	0	Alarm High	High alarm threshold has been crossed	1	Alarm Low	Low alarm threshold has been crossed	2	Warning High	High warning threshold has been crossed	3	Warning Low	Low warning threshold has been crossed	4-10	Not used		11	Reference Fault	A fault exists on the reference sensor	12	Sensor Fault	A fault exists for this sensor	13	Corrupt Setup	Setup record is corrupted	14	Position Active	Active box checked (alarms enabled)	15	Assigned	Position set for display
0	Alarm High	High alarm threshold has been crossed																														
1	Alarm Low	Low alarm threshold has been crossed																														
2	Warning High	High warning threshold has been crossed																														
3	Warning Low	Low warning threshold has been crossed																														
4-10	Not used																															
11	Reference Fault	A fault exists on the reference sensor																														
12	Sensor Fault	A fault exists for this sensor																														
13	Corrupt Setup	Setup record is corrupted																														
14	Position Active	Active box checked (alarms enabled)																														
15	Assigned	Position set for display																														
40513	R	<p>Server Status Register A</p> <p>A list of the bits and their functions follows:</p> <table> <tr> <td>0</td> <td>S/N Acquisition</td> <td>Serial Number acquisition in progress</td> </tr> <tr> <td>1</td> <td>SMTP Failure</td> <td></td> </tr> <tr> <td>2</td> <td>Serials Table Changed</td> <td></td> </tr> <tr> <td>3</td> <td>S/N Retrieval</td> <td>Serial Number retrieval in progress</td> </tr> <tr> <td>4</td> <td>All Channels Allocated</td> <td></td> </tr> <tr> <td>5</td> <td>Modbus Command Failed</td> <td></td> </tr> <tr> <td>6</td> <td>Administrator Logged in</td> <td></td> </tr> <tr> <td>7</td> <td>Not used</td> <td></td> </tr> <tr> <td>8</td> <td>Bus Converter #1 Fault</td> <td></td> </tr> <tr> <td>9</td> <td>Bus Converter #2 Fault</td> <td></td> </tr> </table>	0	S/N Acquisition	Serial Number acquisition in progress	1	SMTP Failure		2	Serials Table Changed		3	S/N Retrieval	Serial Number retrieval in progress	4	All Channels Allocated		5	Modbus Command Failed		6	Administrator Logged in		7	Not used		8	Bus Converter #1 Fault		9	Bus Converter #2 Fault	
0	S/N Acquisition	Serial Number acquisition in progress																														
1	SMTP Failure																															
2	Serials Table Changed																															
3	S/N Retrieval	Serial Number retrieval in progress																														
4	All Channels Allocated																															
5	Modbus Command Failed																															
6	Administrator Logged in																															
7	Not used																															
8	Bus Converter #1 Fault																															
9	Bus Converter #2 Fault																															



Register	Type	Description
		10 Bus Converter #3 Fault 11 Bus Converter #4 Fault 12 Bus Converter #5 Fault 13 Bus Converter #6 Fault 14 Bus Converter #7 Fault 15 Bus Converter #8 Fault
40514	R	Server Status Register B A list of the bits and their functions follows: 0 System Setup 0 Corrupt 1 System Setup 1 Corrupt 2 Pos'n Record(s) Corrupt 3 Record Write Failed 4 Power Supply Fault 5-12 Not used 13 Program Memory Corrupt 14 RAM Fault 15 FLASH Memory Fault
40515 - 40522	R	Bus Converter Status Registers for Converters 1 - 8 This register indicates the internal status of the converter and the sensor bus. A set bit indicates a fault. The fault assigned to each bit is as follows: 0 Bus data shorted low The sensor bus data wire is shorted to the common wire. 1 Bus data shorted high The data wire is shorted to the 5VDC wire. 2 No Sensors present No sensors are present on the sensor bus, or the sensor bus data wire is open. 3 Bus power overload The 5VDC wire is shorted to the common wire. 4 Excessive bus errors During a serial number acquisition, the converter detected excessive bus errors. This condition would indicate faulty sensor bus cabling, or excessive electrical interference on the sensor data bus. 8 Sensor bus fault A sensor bus fault is present as indicated by bits 0 – 4.



Register	Type	Description
		<p>9 Sensor table overflow More than 32 sensors were detected during a sensor serial number acquisition.</p> <p>10 Unsupported Sensor detected A sensor was detected on the sensor bus that is not supported by this converter.</p> <p>11 In acquire A sensor acquisition is in progress.</p> <p>13 RAM fault The converters RAM did not pass the power on test.</p> <p>14 Parameter table fault The parameter table checksum is invalid or a write to the parameter table Flash memory has failed.</p> <p>15 Firmware fault The converters Flash memory firmware failed the power on CRC test.</p>
40523 - 24	R	Sensor Status Bus Converter 1 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40523 represents sensor 1. Bit 31 of register 40524 represents sensor 32.
40525 – 26	R	Sensor Status Bus Converter 2 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40525 represents sensor 1. Bit 31 of register 40526 represents sensor 32.
40527 – 28	R	Sensor Status Bus Converter 3 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40527 represents sensor 1. Bit 31 of register 40528 represents sensor 32.
40529 - 30	R	Sensor Status Bus Converter 4 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40529 represents sensor 1. Bit 31 of register 40530 represents sensor 32.
40531 - 32	R	Sensor Status Bus Converter 5 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40531 represents sensor 1. Bit 31 of register 40532 represents sensor 32.
40533 - 34	R	Sensor Status Bus Converter 6 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40533 represents sensor 1. Bit 31 of register 40534 represents sensor 32.
40535 - 36	R	Sensor Status Bus Converter 7 Each bit of these registers represents a single sensor. If the bit is set the



Register	Type	Description
		sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40535 represents sensor 1. Bit 31 of register 40536 represents sensor 32.
40537 - 38	R	Sensor Status Bus Converter 8 Each bit of these registers represents a single sensor. If the bit is set the sensor is faulted and not available. If the bit is clear is sensor is online. Bit 0 of register 40537 represents sensor 1. Bit 31 of register 40538 represents sensor 32.
40539	R	WatchDog counter. This counter is cleared to 0 when the Interface is reset. The counter increments continuously at one second intervals to a maximum value of 65535, and then rolls over to 0.
40601-8	R	Known Serial Numbers table. Sensor 1 starts at this location. 40601 - family code 40602 to 7 - digits 2 to 7 10608 – CRC-8
40609 - 42648	R	Remainder of Known Serial Numbers table. Follows the pattern above for the remaining 255 sensors.
42649 - 42990	X	Unused
42991	W	Command Word A list of the bits and their functions follows: <ul style="list-style-type: none"> 0 Load Logged Data Data is from the position specified below 1 Not Used 2 Clear Administrator bit Set when Administrator logged out 3 Acquire Serial Numbers Scan all Bus Converters and rebuild serial number list 4 Reset mOI215 All logged data is lost 5 Acknowledge alarms 6 Acknowledge S/N change 7-15 Not Used
42992	W	Logged Data Position. Used with bit 0 of 42991. Position is a number between 1 and 256
42993 - 43000	X	Unused
43002	R/W	Display update interval (seconds)
43003	R/W	Re-email interval in seconds. Once Only = 0
43004 - 43006	R/W	Group 1 name (6 bytes)
43007 - 43009	R/W	Group 2 name (6 bytes)
43010 - 43012	R/W	Group 3 name (6 bytes)
43013 - 43015	R/W	Group 4 name (6 bytes)
43016 - 43018	R/W	Group 5 name (6 bytes)



Register	Type	Description
43019 - 43021	R/W	Group 6 name (6 bytes)
43022 - 43024	R/W	Group 7 name (6 bytes)
43025 - 43027	R/W	Group 8 name (6 bytes)
43028 - 43043	R/W	System Legend (32 bytes)
43044 - 43059	R/W	SMTP Server (32 bytes)
43060 - 43075	R/W	Email address 1 (32 bytes)
43076 - 43091	R/W	Email address 2 (32 bytes)
43092 - 43099	R/W	Email from address (16 bytes)
43100 - 43200	X	Unused
43201 - 43208	R/W	IP Address (16 bytes)
43209 - 43216	R/W	Subnet Mask (16 bytes)
43217 - 43224	R/W	Gateway Address (16 bytes)
43225 - 43232	R/W	DNS 1 Address (16 bytes)
43233 - 43240	R/W	DNS 2 Address (16 bytes)
43273 - 43999	X	Unused
44000	R	Firmware Version: Upper byte. Revision: Lower byte

The following registers form the setup table for the first display position. The information is repeated for each display position (256 times in total). The second position setup starts at 44051. The last used register is 56800.

Register	Type	Description
44001	R/W	Position Setup Flags A list of the bits and their functions follows: 0 Enable High Alarm 1 High Alarm is Referential 2 Enable High Alarm Email 3 Enable Low Alarm



		4 Low Alarm is Referential 5 Enable Low Alarm Email 6 Enable High Warning 7 Warn High is Referential 8 Enable Warn High Email 9 Enable Low Warning 10 Warn Low is Referential 11 Enable Low Warn Email 12 Data Logging Enabled 13 Not Used 14 Position is Active 15 Assigned for Display
44002	R/W	Notification On Delay
44003	R/W	Notification Off Delay
44004	R/W	Low Alarm Threshold
44005	R/W	Low Warning Threshold
44006	R/W	High Warning Threshold
44007	R/W	High Alarm Threshold
44008	R/W	Hysteresis
44009	R/W	Logging interval (seconds)
44010 - 44017	R/W	Assigned Sensor Serial Number
44018 - 44025	R/W	Reference Sensor Serial Number
44026	R/W	Units of Measure
44027 – 44028	R/W	Span (floating point value)
44029 – 44030	R/W	Offset (floating point value)
44031 - 44034	R/W	Units (8 characters)
44035	R/W	Display Decimal Places
44036 - 44045	R/W	Position Description (20 characters)