



**MOWDEN CONTROLS LTD
NORTHALLERTON, UK**

**TEMPERATURE LOGGER + LEVEL ALARM TYPE M355CE
INSTRUCTION MANUAL**



REVISION STATUS

REV	DATE	REVISION DETAILS	BY	CHKD	APPD
A	10/04	First Issued	GHL	NM	NM
1	01/05	Updated for V1.0 firmware	GHL	NM	NM
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INSTALLATION AND OPERATING INSTRUCTIONS FOR THE TYPE M355CE TEMPERATURE LOGGER AND LEVEL ALARM

1. DESCRIPTION.

The M355 Temperature Logger and Level Alarm is designed to monitor the environment within Cryogenic Storage Containers.

Monitoring is by means of a Thermistor Level Sensor and a Thermocouple temperature sensor. Temperature is displayed on a Liquid Crystal Display.

An Alarm is triggered if the level of Liquid Nitrogen in the storage Vessel falls below the level of the Thermistor Sensor or if the temperature within the vessel exceeds a preset limit.

The M355 also stores a record of temperature for verification of correct storage conditions. The Interval between measurements is adjustable between 1 and 30 minutes.

Pluggable screw terminal connectors are provided for Sensor and Power Connections. A standard miniature thermocouple socket is used for the Thermocouple Connection. A 9 way D plug provides a method of connecting a PC.

PC Software is supplied with the M355. The Software is used to set up the M355 and collect and display logged data. Logged data may be printed as a report or graphs may be generated using the Spreadsheet output.

The M355 is powered by internal batteries (3x AA cells) and/or an external DC power supply.

Battery Life is 1 year approx.

A warning is given when the battery is approaching the end of its life.

2. INSTALLATION.

2.1 Batteries

If not already fitted unscrew the two halves of the case and fit 3 off AA size alkaline cells. The screws are have covers which may be easily prised out. Note that even if it is intended to power the unit from a mains PSU the batteries should be fitted. This will prevent loss of the clock settings or mis-operation during power interruptions.

After fitting/changing the batteries the Manual setup procedure should be used to reset the clock.

2.2 Mounting the unit

The M355 may be wall mounted or laid on a convenient surface. A mounting kit is provided for wall mounting. The four mounting feet are attached by removing the four screws which retain the case halves and refixing with the plastic feet in position as shown.



2.3 External Power

To maximize battery life or if the Remote Alarm feature is required an AC-DC adaptor may be used.

The input voltage range is 9V – 16V DC. The maximum current requirement is 100mA.

Any unregulated 9V adaptor should be suitable.

Connect the adaptor to the +V and 0V terminals on the 6 way terminal block. Note polarity.

Note: To comply with EMC regulations the DC power lead should be no longer than 3m unless Additional precautions are taken to protect from interference.

2.4 Sensor Connections.

Position the thermocouple and thermistor sensors as required within the Cryogenic Vessel and plug into the sockets on the M355.

2.5 PC Software

The PC Software is designed to run under Windows 98 or later operating systems.

The recommended minimum spec for the PC is:-

*233Mhz Pentium type PC
Windows 98 or later
CDROM Drive
5Mb Free Hard Disk space
Serial Port*

*Microsoft Excel is not required to generate the spreadsheet files
Microsoft Excel or a compatible program is required to read the spreadsheet files.*

The Software is supplied on CD-ROM or alternatively by e-mail.

To install from CD insert the CD-ROM and *Start* and *Run* using the Windows *Start Menu*.

If the Software is received by e-mail save the attachments to a folder of your choice and then double click on *setup.exe*.

In both instances follow the on screen instructions to complete the Installation.

3. SETTING UP AND OPERATION

The unit may be set up using the PC Software or via the front panel. If setting up for temperature logging the PC Software must be used.

3.1. Manual Set up

The Manual Setup Procedure allows the various settings and parameters to be altered using the LCD and switches.

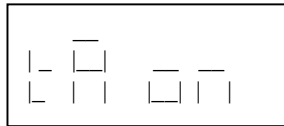
The 'Return' key (Right hand key on the front panel) is used to step through the options.

The '+' and '-' keys are used to select options and/or set parameters.

Pressing the 'Mute' key (Left hand key on the front panel) exits the setup menu.

To enter manual set-up press the 'Return' key.

The Current Firmware version will be shown briefly on the display followed by :-



3.1.1

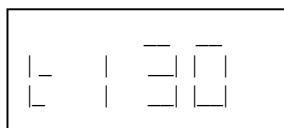
This is the Temperature Alarm Option. The Temperature Alarm is optional and may be switched on or off as required.

Use the '+' key to switch the temperature alarm on.

Use the '-' key to switch the temperature alarm off (--. displayed).

Press the Return key to proceed.

If the Temperature Alarm is enabled the following will appear (Example), otherwise proceed to 3.1.3:-



3.1.2

This is the Alarm Temperature set point. It is adjustable in 5 degree steps between -50°C and -150°C.

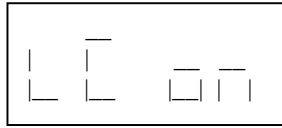
Note that the minus sign is not displayed.

Use the '+' and '-' keys to adjust the temperature.

Press the Return key to proceed.

The following will appear :-

3.1.3



This is the Level Checking Option. Level Checking is optional and may be switched on or off as required.

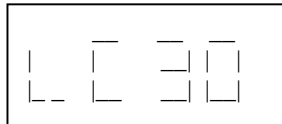
Use the '+' key to switch Level Checking on.

Use the '-' key to switch Level Checking off. (--. displayed).

Press the Return key to proceed. If Level Checking is turned off proceed to 3.1.8, otherwise:

The following will appear (Example) :-

3.1.4



This is the Level Check Interval. To conserve battery power Level Checking is only performed every 30 or 60 minutes.

While external power is connected this setting is over-ridden and Level Checking is carried out several times per minute.

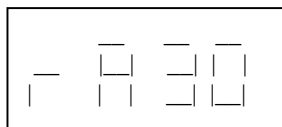
Use the '+' key to select 60 minutes.

Use the '-' key to select 30 minutes.

Press the Return key to proceed.

The following will appear:-

3.1.5



This is the Remote Alarm Delay Timer.

If any alarm is present for more than a preset time the remote alarm relay is de-energised. The contacts of the relay may be used to remotely indicate an alarm condition or a loss of power.

Note: The remote alarm will only function if eternal power is supplied to the M355

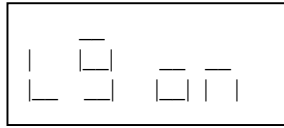
The Remote Alarm delay is adjustable between 0 and 60 minutes in 5 minute steps.

Use the '+' and '-' keys to adjust the Remote Alarm Delay Time.

Press the Return key to proceed.

The following will appear:-

3.1.6.



This is the Temperature Logging Option. Temperature Logging is optional and may be switched on or off as required.

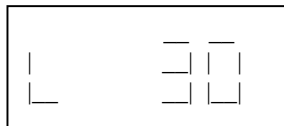
Use the '+' key to switch Temperature Logging on.

Use the '-' key to switch Temperature Logging off. (--. displayed).

Press the Return key to proceed. If Level Checking is turned off proceed to 3.1.7, otherwise:

The following will appear (Example) :-

3.1.7.



This is the Temperature Logging Interval.

Options are 1, 5, 10, 15 or 30 minutes.

Use the '+' and '-' keys to select the required Logging Interval.

Press the Return key to proceed.

The following will appear:-

3.1.8.



This is the start of the Clock Setting routine (Year Setting).

Use the '+' and '-' keys to correctly set the Year.

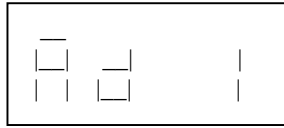
Press the Return key to proceed.

Repeat for Month, Day (prefix 'd' on LCD), hour (prefix 'h' on LCD) and minute.

Press the Return key to proceed.

The following will appear:-

3.1.9



This is the Logger 'address'.

If more than one M355 is in use, each should be set to a different address.

Use the '+' and '-' keys to set the Address.
Press the Return key to finish.

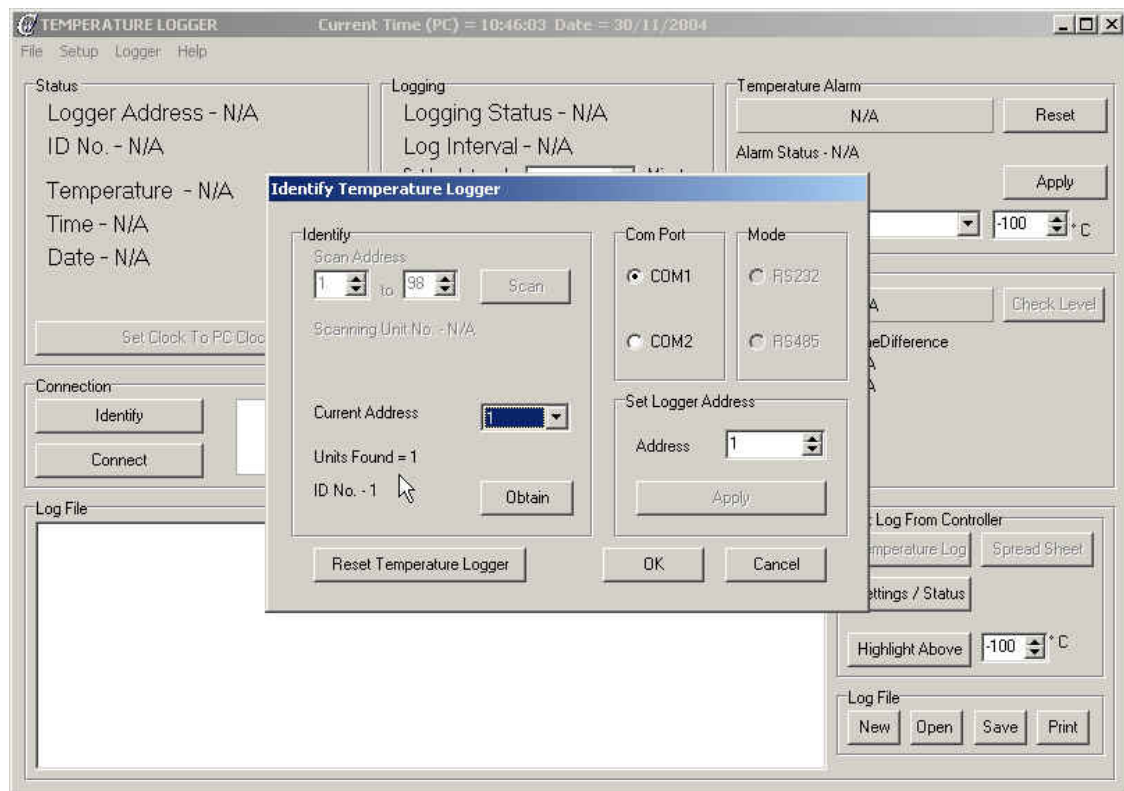
The LCD will display the temperature, or - - - - if the thermocouple is disconnected.

3.2 'CryoWatch' PC Software.

If temperature logging is required it is recommended that set-up is carried out using the PC software.

Connect a PC serial port to the M355 using the cable provided. Wait for a few seconds to allow the M355 to 'see' the PC then Start the PC software.

After the opening screen the following should appear.



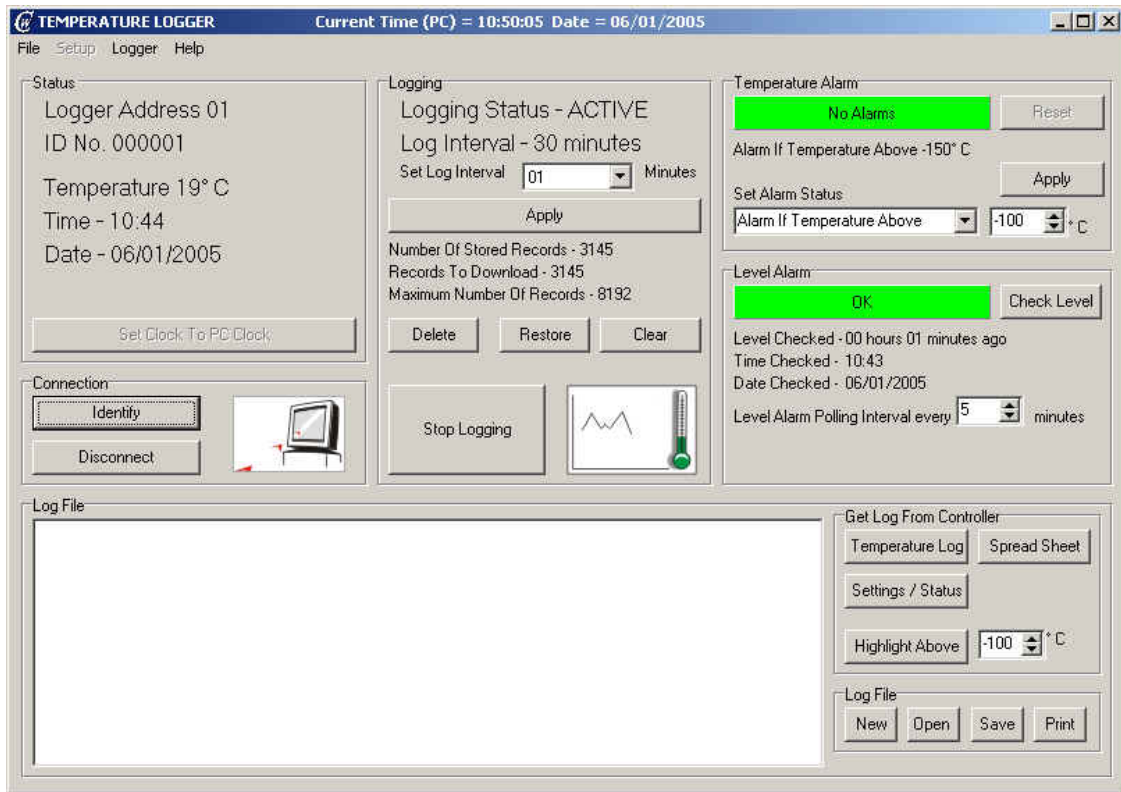
The first time this Software is used it may be necessary to set the COM port.

If the 'Current Address' box shows N/A click on the 'Reset Temperature Logger' button and then the 'Obtain' button. The logger address should appear in the 'Current Address' box.

If required the address can be altered in the 'Set Logger Address' box. Use the up and down arrows to set the required address and click on the Apply button.

Click on OK to proceed.

The 'Identify' window will close leaving the 'Main' window displaying the current status as shown below.



While the Logger is connected it is polled at intervals and the display is updated.
 While the PC is polling the M355 the PC with flying arrows icon will be displayed in the 'Connection' window.
 The functions of each section of the display are described below.

3.2.1 Status box

This displays the following:-

Logger address

This is set up via the front panel or 'Identify' screen.
 All commands sent from the PC to the Logger are prefixed with an address between 01 and 98. The Logger will only respond to commands with the correct address.

ID Number

This is a unique Serial Number.

Temperature

This is the current temperature as seen by the Thermocouple

Date and Time.

The time and date refer to the internal clock in the Logger. The PC clock setting is displayed in the main header.

The logger clock can be set to match the PC clock by clicking on the 'Set Clock to PC Clock' button. Note that this can only be done when the Logger is in Standby mode, i.e. not Logging. (See 3.2.2). At other times the button will be greyed out.

3.2.2 'Logging' Window

This area shows the current Logging Status , Logging Interval and Data Store Status.

Logging Status

Logging Status may be set to Active or Standby.

In active mode a record of temperature is stored at preset intervals.

In standby mode temperature and level is monitored but no record is kept.

Logging is started and stopped using the button at the bottom of the Logging window.

The 'Graph and Thermometer' icon gives a graphical indication of the Logging Status.

Set Log Interval

Clicking on the arrow in the Set Log interval box gives a drop down menu which displays the valid logging intervals. Choose one from the list and click on the 'Apply' button to select.

Approximate maximum logging periods for the different log intervals are

5 days @ 1 minute
27 days @ 5 minutes
54 days @ 10 minutes
80 days @ 15 minutes
160 days @ 30 minutes

Data Store status

The status of the data store is indicated here.

To avoid downloading records which have already been read, click on the 'Delete' button.

This will change the '*Number Records to Download*' to zero but will leave the '*Number of Stored Records*' unchanged.

The 'Delete' button marks existing records as having been read. At the next download only records collected after the last Delete command will be output.

To undo the Delete command click on the 'Restore' button.
The 'Restore' button resets the memory to allow all records to be downloaded.

To permanently delete all stored records click on the 'Clear' Button.
This will change the '*Number Records to Download*' and the '*Number of Stored Records*' to zero.

3.2.3 Temperature Alarm Window

This temperature alarm may be set between -50°C and - 150°C (5°C steps).
The drop down 'Set Alarm Status' menu may be used to enable or disable the alarm.
After setting the Alarm status and Alarm Temperature click on the Apply button.

As the PC polls the M355 the alarm status is shown on the indicator either as Red (Temperature Alarm) or Green (OK).

3.2.4 Level Alarm Window

While the PC is connected the level is checked periodically and displayed.
The level is shown on the indicator as one of the following:-

- Green - OK.
- Yellow - Checking Level.
- Red - Low level or Sensor Fault.

3.2.5 Log File Window

Reports are generated and displayed in this window.
Reports may be generated in one of two formats.

The 'Temperature Log' button creates a report of time against temperature formatted in columns. A header with the Logger ID and address is printed at the start of each day's records.

The 'Highlight Above' button changes the colour of displayed temperatures above the preset value. This allows for quick identification of 'out of range' readings.

The 'Spreadsheet' button outputs a comma delimited list. This may be saved as a *.xls* file or imported as a *.txt* file into a spreadsheet program and used to generate graphs or alternative report formats.

The downloaded data is displayed in the data window.
When downloading is complete the data may be viewed and edited in the window
Use the 'New', 'Open', 'Save' and 'Print' buttons to store and print reports.

The 'Settings/Status' button gives a summary of the current status and some of the key settings including Calibration data.

3.3 Setting up using 'CryoWatch' PC Software.

Prior to operating the M355 connect to the PC. and establish communication as in 3.2 The M355 is set up as follows:

- 3.3.1 **If logging is 'ACTIVE' set to 'STANDBY'.** Do this by clicking on the 'Stop Logging' button.
- 3.3.2 **Check the clock.** First check the PC clock shows the correct time. Adjust this if necessary and then click on the 'Set Clock to PC clock' button.
Note that this button will be greyed out if the PC clock and logger clock show the same time.
- 3.3.3 **Select the required Log Interval.** The 'Set Log Interval' box has a drop down list giving valid settings. Select the required interval and then click the 'Apply' button. When selecting the Log interval bear in mind the required period for logging and the maximum number of records. (see 3.2).
- 3.3.4 **Clear the memory.** The Temperature Log Record shows how many records are Stored. To erase old data click on the 'Clear' button. If you wish to retain the previous data use the 'Delete' button. This will allow it to be retrieved using the 'Restore' button.
- 3.3.5 Enable Temperature Alarm (if required) and set the Alarm temperature
- 3.3.6 Enable Level Alarm (if required).
- 3.3.7 **Start Logging.** Click on the 'Start Logging' button. The 'Number of Stored Records' count will increment by one (or two if this is a logging point) and Logging Status will change to 'ACTIVE'.
Disconnect the PC cable and note that the 'OK' LED flashes every 6 seconds to indicate that logging is active.

3.4 Normal Operation

In normal operation the PC is disconnected. Operation varies depending on whether the unit is operating from batteries only or an external supply is connected.

If the unit is operating from batteries only the temperature is checked and the display is updated every 5 seconds. The 'OK' LED flashes once to indicate this.

When a logging point is reached the 'OK' LED flashes twice. and a temperature measurement is stored in the data log.

The level is checked once every 30 or 60 minutes, depending on the M355 settings.

Additional level checks may be performed at any time by pressing the Return key to enter the setup menu and then the mute key to exit again.

If the unit is operating from an external PSU temperature and level are checked approximately every 2 seconds.

Periodically (once per 24hrs while logging) the battery is tested.

If a low battery condition is detected the Lo Bat Symbol in the display is switched on.

3.5 Alarms

An Alarm will be generated by the following conditions:-

Low Temperature (If temperature alarm is enabled)

Low Level or Sensor fault (If level alarm is enabled)

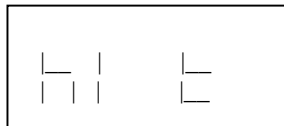
Remote Alarm

An alarm is indicated by a single short bleep from the Sounder every 5 seconds or a sequence of 3 bleeps every two seconds if an external PSU is connected.

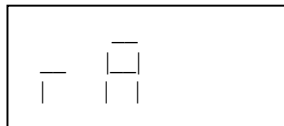
The red alarm LED will flash also.

To silence the alarm press the Mute Key. This will stop the sounder and briefly indicate the Alarm condition on the LCD as follows:-

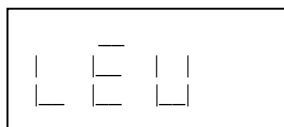
High Temperature



Remote Alarm



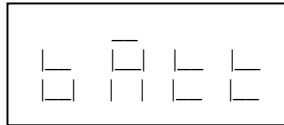
Low Level



Sensor Fault



Low Battery



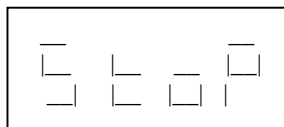
3.6 Remote Alarm

The Remote alarm will only function if an external PSU is connected.
Connection to the remote alarm relay contact is made on the 6 way terminal block.

The Remote Alarm Relay is normally energised.
After a preset period following an alarm, or in the event of a power failure the relay is de-energised.

3.7 Suspend mode

It may be necessary to disable Logging and Alarms in order to make adjustments or remove materials from the storage vessel.
To suspend logging press the '-' key. The display will show:-



To restart monitoring and logging press the '+' key.

If the + key is not pressed, normal operation will resume after 10 minutes.

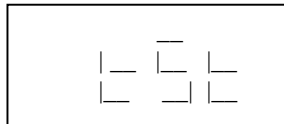
3.8 Test mode

Test mode may be used to check for correct operation of the Remote Alarm and Thermistor sensor.

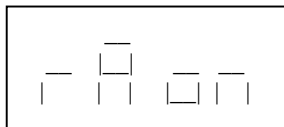
To enter test mode press and hold the Return key until the firmware version appears in the display, then hold for a further couple of seconds The following will be displayed:-



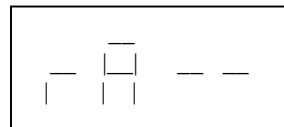
Press the '+' key to select Test mode. The following will be displayed:-



Press the Return key. Depending on the current state of the Remote Alarm one of the following will be displayed:-



(Remote alarm relay de-energised)



(Remote alarm relay energised)

The '+' and '-' keys may be used to change the state of the Remote Alarm relay.

To test this function an external DC power supply must be connected.

Press the '+' key to de-energise the relay (Remote Alarm on).

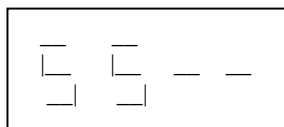
Press Press the '-' key to energise the relay (Remote Alarm off).

Note that the relay will take 5-10 seconds to de-energise when the Remote Alarm is switched on.

If no key is pressed normal operation is resumed after 30 seconds.

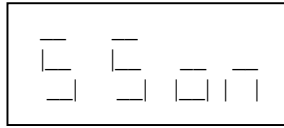
Press the return key to move on to the Sensor Test or the Mute key to resume normal operation.

If the return key is pressed the following will be displayed:-



In this condition the Sensor supply is turned off.

Press the '+' key to switch the Sensor Supply on. The following will be displayed:-



In this condition the Sensor Supply is turned on. If no sensor is connected there should be 26.0V on the terminals.

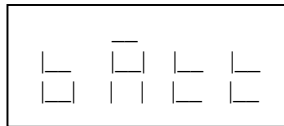
With the sensor connected the voltage will vary between 50mV approx with the sensor in air at room temperature to 24V approx in Liquid Nitrogen.

The low level trip point is 21.5V approx.

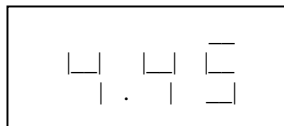
Press the return key to continue to the battery test or the mute key to resume normal operation.

If no key is pressed normal operation is resumed after 30 seconds.

If the return key is pressed the following will be displayed:-



Followed shortly by (example):-



This is the battery voltage

This sequence will repeat until the return key or mute key is pressed.

If no key is pressed normal operation is resumed after 30 seconds.

DECLARATION OF CONFORMITY



Manufacturer: Mowden Controls Limited
Northallerton
U.K.
DL6 2YD

Declares that the following product:

Product Description: *Liquid Nitrogen Level Control System Type M355CE*

Type Nos: *M355CE (LOGGER LEVEL ALARM)*

THERMOCOUPLE SENSOR FOR M355

THERMISTOR SENSOR FOR M355

when installed in accordance with the instructions conforms to the following Directive(s) and Norm(s)

2004/108/EC

EN61326-1:2006 (EMC – Equipment for measurement, control and laboratory use)

Signed



N Maclean (Technical Director)

Date 5/1/2011.