MPD73LV-UL

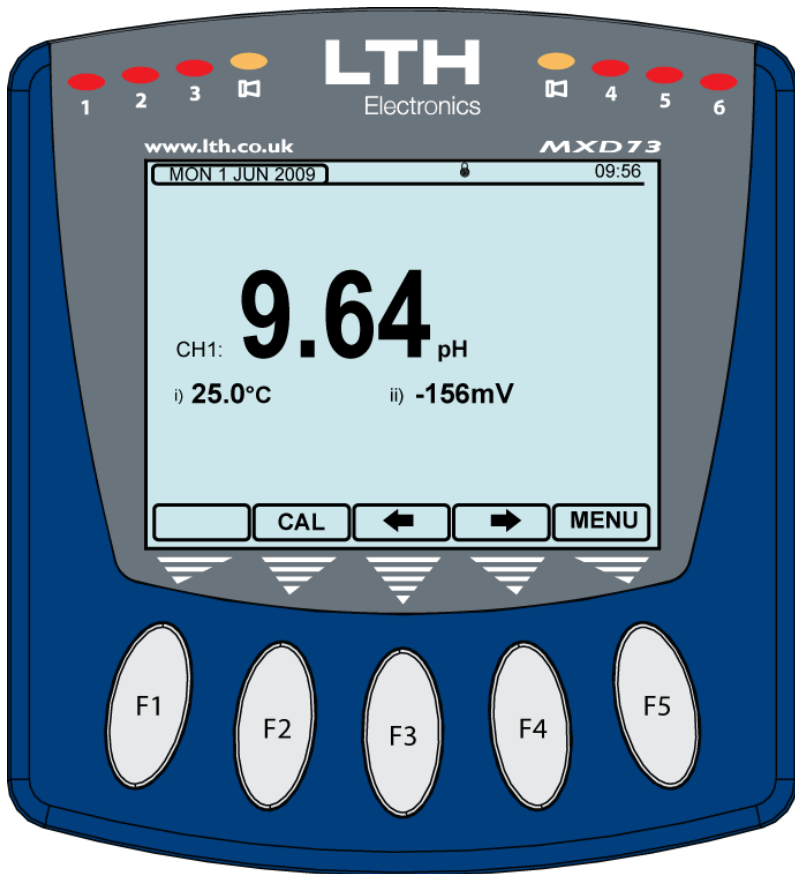## Low Voltage pH / Redox Monitor

Operating Guide

Preface

Product warranty

The MPD73LV-UL has a warranty against defects in materials and workmanship for three years from the date of shipment. During this period LTH will, at its own discretion, either repair or replace products that prove to be defective. The associated software is provided 'as is' without warranty.

Limitation of warranty

The foregoing warranty does not cover damage caused by accidental misuse, abuse, neglect, misapplication or modification.

No warranty of fitness for a particular purpose is offered. The user assumes the entire risk of using the product. Any liability of LTH is limited exclusively to the replacement of defective materials or workmanship.

Disclaimer

LTH Electronics Ltd reserves the right to make changes to this manual or the instrument without notice, as part of our policy of continued developments and improvements.

All care has been taken to ensure accuracy of information contained in this manual. However, we cannot accept responsibility for any errors or damages resulting from errors or inaccuracies of information herein.

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MPD73LV-UL is a trademark of LTH Electronics Ltd

First issue: February 2022

Manufacturing Standards

Electromagnetic compatibility

This instrument has been designed to comply with the standards and regulations set down by both the United Kingdom EMC Regulations S.I. 2016/1091 and the European EMC Directive 2014/30/EU using BS EN 61326-1: 2013.

Safety

This instrument has been designed to comply with the standards and regulations set down by the United Kingdom Equipment Safety Regulations S.I. 2016/1101, the European Low Voltage Directive 2014/35/EU, UL 61010-1, 3rd Edition, May 11, 2012, Revised July 19, 2019, and CAN/CSA-C22.2 No. 61010-1(2012-05), 3rd Edition, with revisions through 2018-1.

Restriction of Hazardous Substances

This instrument has been produced to comply with the standards and regulations set down by both the United Kingdom Equipment Restriction of Hazardous Substances Regulations S.I. 2012/3032 and the European Restriction of Hazardous Substances Directive 2011/65/EU using BS EN IEC 63000 : 2018.

Quality

This instrument has been manufactured under the following quality standard:

ISO 9001:2015. Certificate No: FM 13843

Note: The standards referred to in the design and construction of LTH products are those prevailing at the time of product launch. As the standards are altered from time to time, we reserve the right to include design modifications that are deemed necessary to comply with the new or revised regulations.

Disposal

As per regulation S.I. 2012/3032 and directive 2012/19/EU, please observe the applicable local or national regulations concerning the disposal of waste electrical and electronic equipment.

MPD73LV-UL pH / Redox Monitor
Operating Guide

Declaration of Conformity

DECLARATION OF CONFORMITY

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DECLARATION OF CONFORMITY

LTH Electronics Ltd

declare, accepting full responsibility, that the product(s)

MPD73LV-UL

conforms with all relevant United Kingdom regulations:

BS EN 61326-1 : 2013
(Electrical Equipment for Measurement, Control and Laboratory Use)

in accordance with the provisions of
the S.I. 2016/1091 (EMC) regulations.

BS EN 61010-1 : 2010 (Equipment Safety)

in accordance with the provisions of
the S.I. 2016/1101 (Equipment Safety) regulations.

BS EN IEC 63000 : 2018
(Electrical and Electronic Products)

in accordance with the provisions of
the S.I. 2012/3032 (RoHS) regulations.

Issued in the United Kingdom on
08th March 2021 for the company by:

Neil Adams
Managing Director

LTH Electronics Ltd

Directors:
N.Adams (Managing), S.Wotton, H. Thorn
Registered Office: As Above
Registered No. 908792 England
ISO9001:2015
BSI Registered, Cert. No. FM13843

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the 2014/30/EU (EMC) directive.

BS EN 61010-1 : 2010 (Equipment Safety)

in accordance with the provisions of
the 2014/35/EU (Low Voltage) directive.

BS EN IEC 63000 : 2018
(Electrical and Electronic Products)

in accordance with the provisions of
the 2011/65/EU (RoHS) directive.

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UL Certificate of Compliance

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information.

This Certificate of Compliance does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

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Contents

Introduction

The MPD73LV-UL is a microprocessor-controlled pH / redox measurement instrument.
Utilising a multifunction easy to read QVGA LCD the instrument displays readings and provides feedback to the operator on the status of the sensor and the instruments outputs.
In addition the instrument features two control relays, one 0/4 – 20mA current output, and 8 digital control inputs. These can be used to provide fully configurable control, alarm and feedback.
Finally the instrument also features an SD card interface which enables the user to backup and restore instrument settings, copy settings between instruments, log the sensor readings (optional extra) and to upgrade the instrument's software.
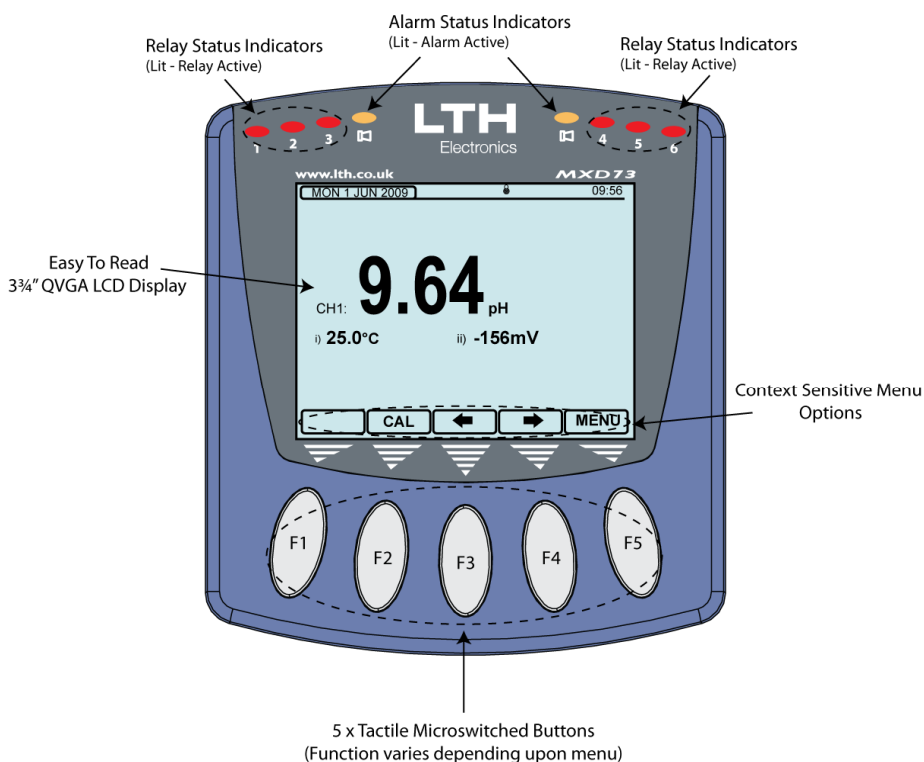
MPD73LV-UL Overview
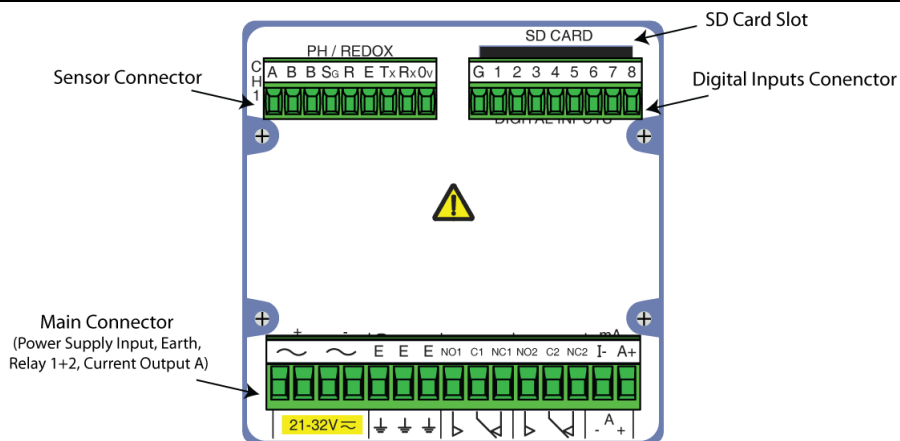
MPD73LV-UL Rear Termination Overview

MPD73LV-UL Instrument Specification

Measurement Input	Single ended or differential with solution ground. Up to 100 meters cable.
	pH Separate glass and reference electrode pair. Separate Antimony and reference electrode pair. Combination electrode. SensorTalk digital or hybrid electrode.
	Redox Separate glass and reference electrode pair. Separate Antimony and reference electrode pair. Combination electrode. SensorTalk digital or hybrid electrode.
	Other manufacturer's sensors can be accommodated.
Ranges of Measurement	0.00 to 14.00 pH, 0.000 to 14.000 pH
	-1999mV to +1999mV.
Accuracy	± 0.05 pH. ± 3mV.
Linearity	± 0.1% of range.
Repeatability	± 0.1% of range.

Operator Adjustment

	Slope	Offset
pH	60-120%	3 to 11pH
Antimony	60-120%	-4 to +4pH
Redox	NA	-400mV to +400mV

Calibration Methods	Automatic 4pH / 9pH Buffer Calibration. Manual Slope and Offset Adjustment. Automatic loading of stored calibration data from pre-calibrated SensorTalk electrodes. All methods feature post-calibration electrode condition indication.
Custom Buffer	13-point 4pH / 9pH custom buffer entry pre-loaded with standard LTH buffers.
Calibration Timer	Inbuilt calibration count down timer which will trigger an alarm when calibration interval has expired.
Sensor Input filter	Adjustable filter that averages the sensor input over a user selectable time (10sec – 5mins).
Temperature Sensor	Pt100, Pt1000, 3K Balco RTD input. Up to 100 meters of 3 wire cable. Temperature sensor can be mounted in the sensor or separately.

Range of Temperature Measurement	-50 °C to +160 °C (-58 °F to +320 °F) (223.15K to 433.15K) for full specification.
	Note. When units are set to temperature the reading will be calculated to 2 decimal points between -9.99 and +99.99.
Temperature Accuracy	± 0.2 °C (When using a 3 wire PT1000).
Operator Adjustment (Temperature)	± 50 °C, ± 122 °F or ± 50 K.
Temperature Compensation Type	Automatic or manual -20°C to +160°C.
Display	3 ¾" QVGA back lit LCD module.
Buttons	5 tactile feedback, micro-switched, silicone rubber.
Alarm LED's	2 Yellow LED's located above the main display area for instrument's alarm status, lit = active.
Digital Inputs	8 contact closures for remote activation of user defined operations. Can be configured to operate in either normally open or normally closed modes.
Current Output	1 as standard
Current Output Specification	Each selectable 0-20mA or 4-20mA into 750 ohms max, fully isolated to 2kV. Expandable up to 5% of any operating range and offset anywhere in that range.
Current Output Adjustment	±0.01mA, 3 point 0/4-20 mA for remote monitor calibration.
Setpoints and Control Relays	2 change over relays as standard
Setpoints and Control Relays Specification	Fully configurable setpoints with volt free contacts for each relay. Rated at 5A @ 30V AC/DC.
Setpoint LED's	Red LED's located above main display area for setpoint status indication, lit = relay energised.
Setpoint Modes	On/Off, Time Proportioning, Pulse Proportioning, Band and Latch.
	Delay timer adjustable from 00:00 to 59:59 mm:ss.
	Hysteresis 0 to 9.9%.
	Dose alarm timer, with supplementary initial charge function. Both adjustable from 00:00 to 59:59 mm:ss.
	Adjustable cycle time and proportional band in proportional modes.
Setpoint Cleaning	Cleaning mode with adjustable duration (max 10m) and interval times (max 24h), auto offline function with recovery timer.

Setpoint Alarm	Unit or channel alarm mode, whereby the relay can be energised under certain set conditions.
SD Card Interface	Enables backing up and restoring of instrument configuration, log the sensor readings (optional extra) and on site upgrading of instrument software. SD, SDHC and SDXC-FAT32 cards supported.
Terminals: Power Supply, Current Outputs, Relays	Tightening torque: 0.5Nm to 0.6Nm Single or stranded wires: 0.2 to 2.5mm^2 Stripping Length: 7mm Copper Wire Only
Terminals: Sensor, Digital Inputs	Tightening torque: 0.22Nm to 0.25Nm Single or stranded wires: 0.14 to 1.5mm^2 Stripping Length: 7mm Copper Wire Only
Power Supply	Low Voltage: 21 – 32 V AC (50-60Hz) or DC, 20W max.
Instrument Housing	UL 94-V0 PC/ABS. – Clean only with mild detergent using a soft cloth (do not use solvents).
Operating Conditions	Indoor use only.
Ingress Protection	4X to the front when panel mounted.
Ambient Operating Temperature	5°C to +50°C (-4°F to +122°F).
Ambient Operating Humidity	10 to 95% non-condensating.
Electrical Safety	Overvoltage Category II, Pollution Degree 2 .
Altitude	2000 meters max.
EMC	S.I. 2016/1091 & 2014/30/EU using BS EN 61326-1: 2013.
Low Voltage Directive	S.I. 2016/1101 & 2014/35/EU using BS EN 61010-1: 2010.
UL Standards	UL 61010-1, 3rd Edition, May 11, 2012, Revised July 19, 2019, CAN/CSA-C22.2 No. 61010-1(2012-05), 3rd Edition, with revisions through 2018-11
Weight	Maximum 880 grams (instrument only).
Dimensions Front	128 x 116 x 23 mm (H, W, D).
Dimensions Rear	89 x 89 x 161 mm (H, W, D), including connectors.

Installation – Safety & EMC

This chapter describes how to install the instrument and how to connect the unit to a power source and auxiliary equipment.

Although today's electronic components are very reliable, it should be anticipated in any system design that a component could fail and it is therefore desirable to make sure a system will **fail safe**. This could include the provision of an additional monitoring device, depending upon the particular application and any consequences of an instrument or sensor failure.

Symbols and Markings

⚠	Special conditions and danger points! Observe the safety instructions and information on the safe use of the product as outlined in the product documentation.

Wiring Installation

The specified performance of the instrument is entirely dependent on correct installation. For this reason, the installer should thoroughly read the following instructions before attempting to make any electrical connections to the unit.

⚠ **CAUTION!** LOCAL WIRING AND SAFETY REGULATIONS SHOULD BE STRICTLY ADHERED TO WHEN INSTALLING THIS UNIT. SHOULD THESE REGULATIONS CONFLICT WITH THE FOLLOWING INSTRUCTIONS, CONTACT LTH ELECTRONICS OR AN AUTHORISED LOCAL DISTRIBUTOR FOR ADVICE.

IF THE PRODUCT IS NOT INSTALLED OR USED AS PER DETAILED IN THIS MANUAL THEN ELECTRICAL SAFETY PROTECTION GRANTED BY THIS PRODUCT MAY BE IMPARED.

To maintain the specified levels of Electro Magnetic Compatibility (EMC, susceptibility to and emission of electrical noise, transients and radio frequency signals) it is essential that the types of cables recommended within these instructions be used. If the installation instructions are followed carefully and precisely, the instrument will achieve and maintain the levels of EMC protection stated in the specification. Any equipment to which this unit is connected must also have the same or similar EMC control to prevent undue interference to the system.

❖ Terminations at the connectors should have any excess wire cut back so that a minimal amount of wire is left free to radiate electrical pick-up inside or close to the instrument housing.

❖   The rear input card cover of the panel mount unit must be correctly re-assembled and securely fastened to maintain a continuous electro-magnetic shield around the instrument.

N.B. The use of CE marked equipment to build a system does not necessarily mean that the completed system will comply with the European requirements for EMC.

Noise suppression

In common with other electronic circuitry, the instrument may be affected by high level, short duration noise spikes arising from electromagnetic interference (EMI) or radio frequency interference (RFI). To minimise the possibility of such problems occurring, the following recommendations should be followed when installing the unit in an environment where such interference could potentially occur.

The following noise generating sources can affect the instrument through capacitive or inductive coupling.

❖ Relay coils
❖ Solenoids
❖ AC power wires, particularly at or above 100V AC
❖ Current carrying cables
❖ Thyristor field exciters
❖ Radio frequency transmissions
❖ Contactors
❖ Motor starters
❖ Business and industrial machines
❖ Power tools
❖ High intensity discharge lights
❖ Silicon control rectifiers that are phase angle fired

The instrument is designed with a high degree of noise rejection built in to minimise the potential for interference from these sources, but it is recommended that you apply the following wiring practices as an added precaution. Cables transmitting low level signals should not be routed near contactors, motors, generators, radio transmitters, or wires carrying large currents.

If noise sources are so severe that the instrument's operation is impaired, or even halted, the following external modifications should be made, as appropriate:

❖ Fit arc suppressors across active relay or contactor contacts in the vicinity.

❖ Run signal cables inside steel tubing as much as is practical.

❖ Use the internal relays to switch external slave relays or contactors when switching heavy or reactive loads.

❖ Fit an in-line mains filter close to the power terminals of the instrument.

❖ In cases of very high background RF and HF noise environments, LTH can supply a length of proprietary RF suppressing mains cable.

Installation – MPD73LV-UL

The MPD73LV-UL is a panel mount instrument, designed to be flush mounted and sealed in a square cut-out panel, and is held in place with the four screw clamps provided.
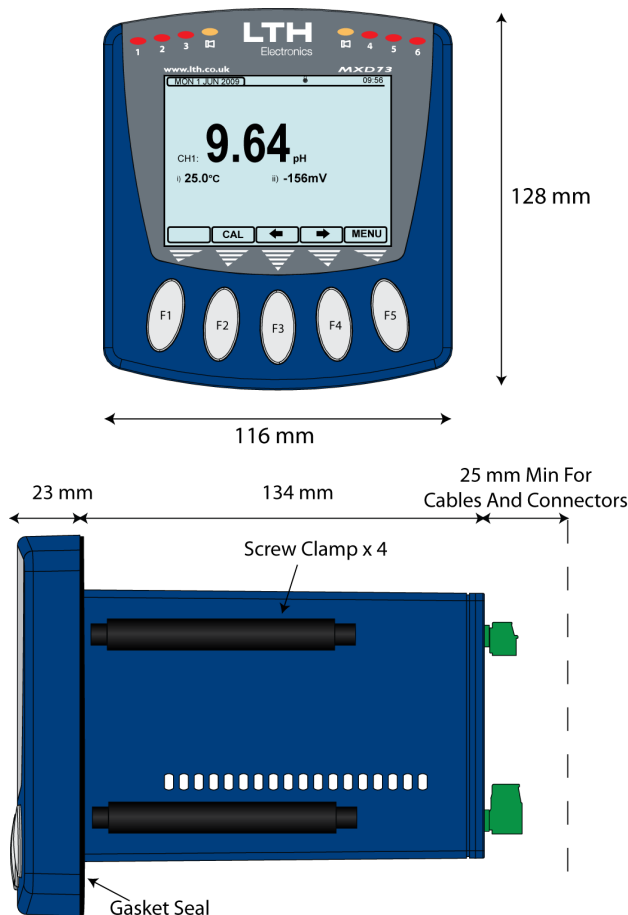
MPD73LV-UL Overall Dimensions

⚠️ **Caution!** Risk of losing the specified ingress protection rating if the following points are not followed:

❖ The panel cut-out for the instrument should be 92 mm x 92 mm (+1.0 -0.0)

❖ Take care to ensure that the gasket is correctly positioned before tightening the clamps.

❖ Four screw clamps are supplied with the instrument and are fitted from the back of the instrument. Recommend clamps are tightened to 0.25N m.

MPD73LV-UL Connections

Connections to the MPD73LV-UL panel mount instrument are made via the three plug and socket terminal blocks, accessible to the rear of the unit.
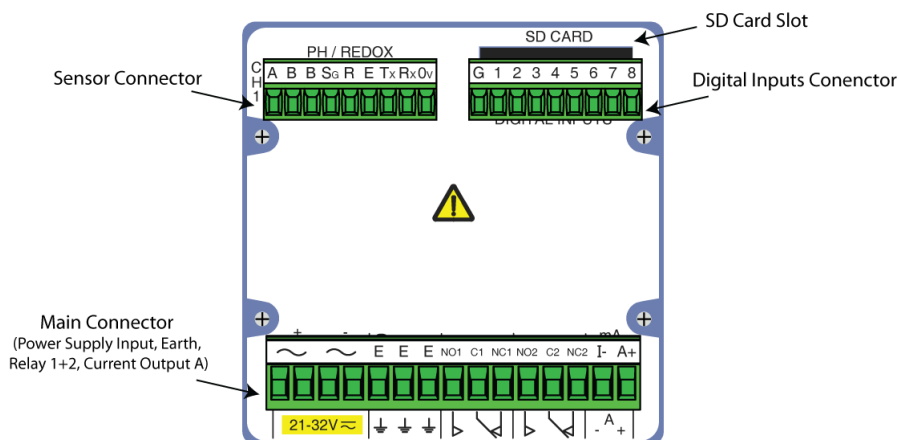
MPD73LV-UL Connections

The bottom connector houses the power input and the current and relay outputs. The top right connector houses the digital inputs and SD card slot. Finally, the remaining top left connector provides the sensor input.

Supply Voltage Connections

The MPD73 can be powered from either an low voltage AC or DC supply. The unit provides two terminals for each of the input connections **+** & **-**, plus an "Earth" terminal. This allows the supply to be "daisy chained" to the relay contacts and/or other instruments.

⚠️ **Caution!** Refer to the label adjacent to the power supply terminals for the input voltage limits. Exceeding these limits may damage the instrument.

Main Power + Basic Outputs Connector

Power Supply "+" In

Power Supply "+" Out (For Daisy Chaining)

Power Supply "-" In

Power Supply "-" Out (For Daisy Chaining)

Earth

Earth

Earth
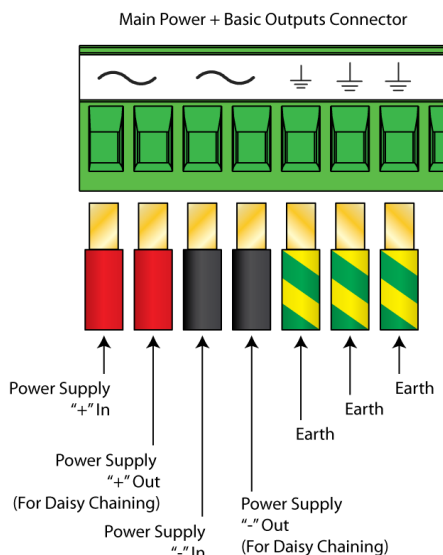
21-32V AC/DC
Power Connections

The power supply shall be supplied by an isolated power source which fulfils the requirements of: Limited-Energy Circuit in accordance with UL/CA 61010-1 or Limited Power Source (LPS) in accordance with (UL/CSA 60950-1 or EN 62368-1, Annex Q) or Class 2 supply source which complies with the National Electrical Code IEC), NFPA7O, Clause 725.121 and Canadian Electrical Code (CEC), Part I, C22.1.

The supply should be fused to a maximum of 3 Amps. If the using the incoming supply daisy chain with the relays and the total required power is greater than 3 Amps, then a separate supply for the relays will be required.

Current Output Connections

The MPD73LV-UL is supplied with a single current output designated A, which can terminate into a load resistance not exceeding 750Ω. For best noise immunity use a screened twisted pair cable, with the screen connected to Earth at one end. Use a sufficiently large cable to avoid a high resistance in the overall current loop.

Main Power + Basic Outputs Connector

I- A+

Current Output -   Current Output A+
(Common)
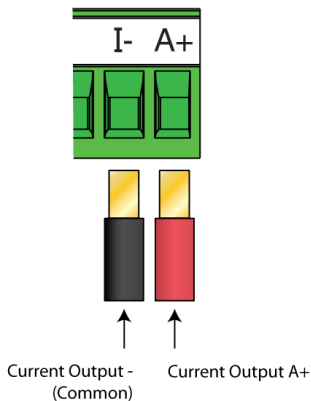
Current Output A Connection Detail.

Relay Connections

The MPD73LV-UL is supplied with 2 relays designated 1 & 2 the relays operate as changeover relays. The relay contacts are connected to the terminals only and are electrically isolated from the instrument itself.

⚠ **Caution!** Relays must be connected in series with a 5 Amp fuse.

In addition, a contact arc suppressor may be required to prevent excessive electrical noise, depending upon the load. To switch more than 5 Amps will require a slave relay. For convenience, the power can be looped across from the supply connections.

Main Power + Basic Outputs Connector

NO1 C1 NC1 NO2 C2 NC2

Relay 1 Normally Open Contact
Relay 1 Common Contact
Relay 1 Normally Closed Contact
Relay 2 Normally Closed Contact
Relay 2 Common Contact
Relay 2 Normally Open Contact
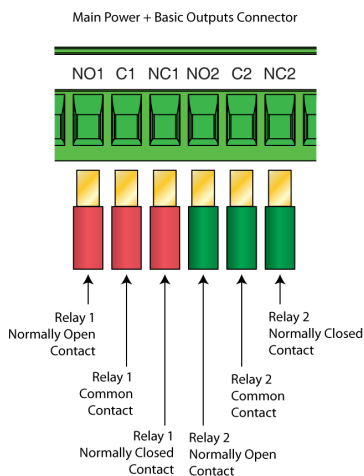
Relays 1 -2
Connection Details

Digital Inputs

The MPD73LV-UL features 8 digital inputs, which can be used to initiate a user configurable instrument operation by use of a volt free link, switch or relay. The instrument can be configured to initiate the appropriate action when the contact either closes or opens.

Digital Input Connector

G 1 2 3 4 5 6 7 8
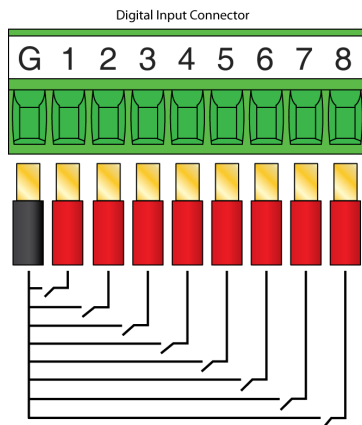
Digital Input Connection Details.

SD Card Interface

The MPD73LV-UL features a SD card interface which is compatible with SD, SDHC and SDXC formatted cards (N.B. SDXC cards may need formatting by the MPD73LV-UL before use – see user interface guide). The card can be removed whilst the instrument is on but only when the disk icon 🖫 is <u>not</u> shown at the top of the display.

To insert the card ensure that the corner notch is on the top right of the card, and then just push it all the way in to the socket. To remove the card push it in then release and the card should then come out of the socket. N.B. It may be required to pull the card out of the last bit of the socket.

SD Card Slot

SD CARD

PH / REDOX
A B B S$_G$ R E T$_X$ R$_X$ 0$_V$ G 1 2 3 4 5 6 7 8

DIGITAL INPUTS

~ ~ E E E NO1 C1 NC1 NO2 C2 NC2 I- A+
21-32V
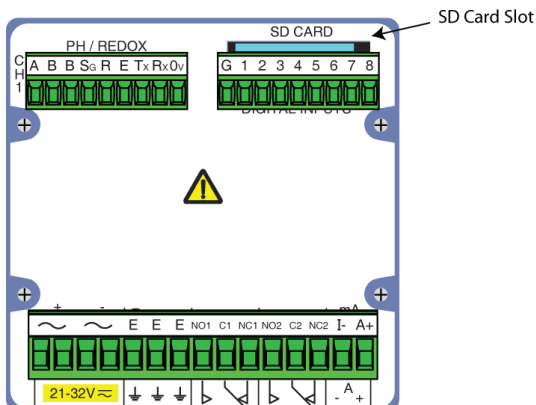
Installation and Choice of pH / Redox Electrodes

The choice of the correct type of pH / Redox electrode, how and where to mount it, so that it has a representative sample of solution are probably the two most important considerations when installing a pH / Redox system.

The following criteria are of great importance during selection:

- The chemical make up, temperature and the viscosity of the sample.
- The use of the correct materials for corrosion resistance.
- Position of electrode for robustness and service access.
- Ensuring a representative, uncontaminated solution sample.

The following tips might be useful. High temperature samples will restrict your choice to electrodes with high temperature references, note that low temperatures will also affect the response time of the electrode. When measuring high viscosity samples it is important that the junction is easy to clean. Samples with high pH or salt concentrations require electrodes with alkali-resistant membranes.

To ensure correct electrode mounting the following conditions should be observed:

- The electrode system can only measure what is in the immediate vicinity of the sensor area of the probe.
- A moderate flow is maintained to provide an "up to date" sample. Excessive flow rates, however, can cause certain electrodes to rapidly deplete, which will result in inaccurate readings. In this case a sealed reference is recommended.
- Ensure that both the glass electrode and reference are in contact with the sample.
- Avoid points where air can be trapped.
- Avoid points of high turbulence as air bubbles will affect the measurement.
- If the sample has solids present then use a guard or filter to protect the glass electrode. Alternatively use a flat pH bulb.
- The glass electrode contains a liquid, ensure that the probe is mounted so that the internal filling solution is in contact with the glass bulb.

When a new pH electrode is first fitted or changed it must be calibrated (see page 46). Depending on the application it may also need periodic re-calibration, the MPD73LV-UL provides an inbuilt count down timer which will trigger an alarm when calibration interval has expired (see page 53).

SensorTalk Interface

The smart capable version of the MPD73LV-UL pH/Redox card is capable of interfacing with the full range of Broadley James All-Digital Smart pH and Hybrid pH sensors. The Plug-and-Play functionality of the of the SensorTalk sensors enables "calibrate here use there". Sensors can be accurately pre-calibrated away from the operation area with the calibration data stored in the sensor, ready for later use. When the sensor is connected to the MPD73LV-UL series the instrument auto-loads and applies the sensor's calibration values.

For the biotech and pharmaceutical applications, ProCount enabled SensorTalk sensors will count all autoclave/SIP cycles autonomously even if disconnected from the instrument. Once reconnected the total count is accessible from the instrument.

Care and Maintenance of pH / Redox Electrodes

All pH and Redox electrodes contain an electrolyte solution, gel or polymer that has a limited life in both operation and on the shelf. The electrode shelf life depends on its storage conditions, it is recommended that the electrode should be used within six to twelve months after purchase.

For gel filled, non-flow electrodes the storage boot may become dried out during storage. This can result in evaporation of the water inside the electrode causing high impedance in the reference cell. If allowed to fully dry out the operation of the electrode will be irreversibly damaged. For electrodes in storage it is recommended that every three to four months the following procedure is carried out:

- Remove the black storage boot or transit cover at the end of the electrode
- Re-wet the fibre pack inside the storage boot with 3.8 Molar Potassium Chloride (KCl) saturated solution or if this is not available use a quantity of 4pH buffer solution. Note do not use deionised water.
- Re-seal the storage boot or transit cover.

For electrodes with soaker bottles ensure that the electrode is stored upright in the soaker bottle, and replace the bottle solution with 3.8 Molar Potassium Chloride (KCl) saturated solution approximately every 6 months.

Depending on the issue the following glass body pH electrode maintenance procedures can be carried out:

- Initial Cleaning – Wash the electrode with a solution of liquid detergent and warm water by gently scrubbing with a soft tooth brush or wet tissue. Follow this by thoroughly rinsing the electrode in deionised water or clean tap water.
- Inorganic Scale Deposits – Dissolve the deposit by immersing the electrode bulb only in a solution of dilute (10%) Hydrochloric Acid for a few minutes. Follow the supplier's data sheet when handling acids and dispose of as instructed by your local authority regulations.
- Organic Oil or Grease Films – Wash the electrode with a solution of liquid detergent and warm water by gently scrubbing with a soft toothbrush or wet tissue. Follow this by soaking the pH electrode for between 10 and 30 minutes in a 3.8 Molar KCl solution.
- Plugged or Dry Wick – Remove contaminate with one of the above cleaning procedures. Then soak the electrode in an 80°C, 3.8 Molar KCl solution for 30 minutes. Before allowing the electrode to cool in the same solution to promote flow of internal electrolyte through the liquid junction.

Smart Capable Input Card Termination Information

Smart pH / Redox Input Connector
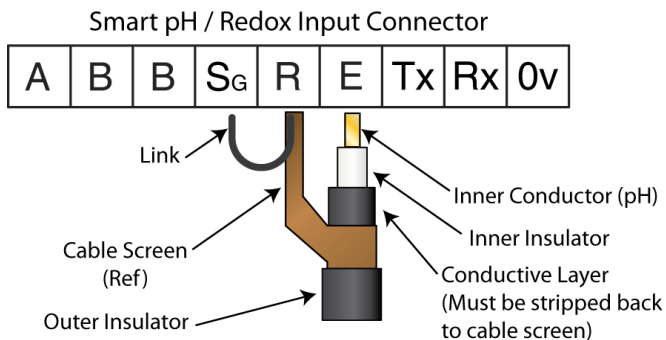
pH / Redox LN10 Coax Cable
(No TC) Connection Details

Smart pH / Redox Input Connector
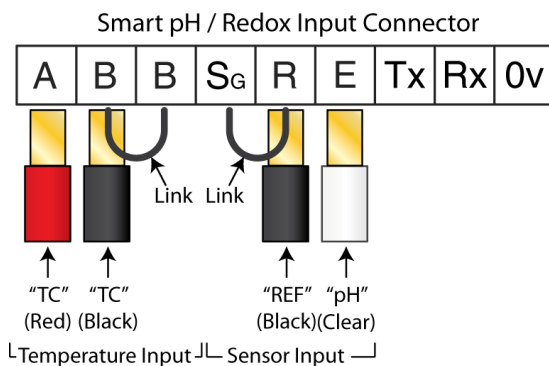
S400 ProcessProbe Cable (Solution Ground Not Fitted)
Connection Details

The Smart pH / Redox input card of the MPD73LV-UL Series also provides a differential input method of wiring the pH electrode. This provides better electrical noise immunity and allows the sensor to operate in solutions where flowing electrical currents may cause measurement problems.
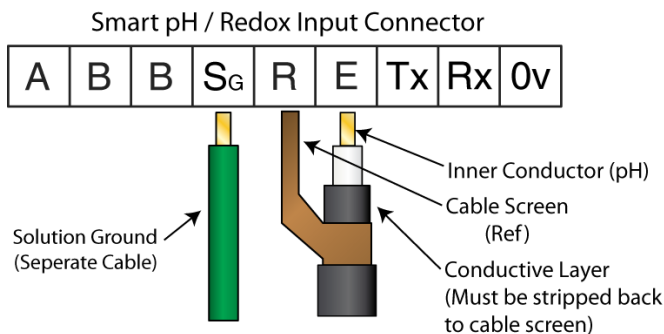
pH / Redox LN10 Coax Cable with Solution Ground (No TC) Connection Details
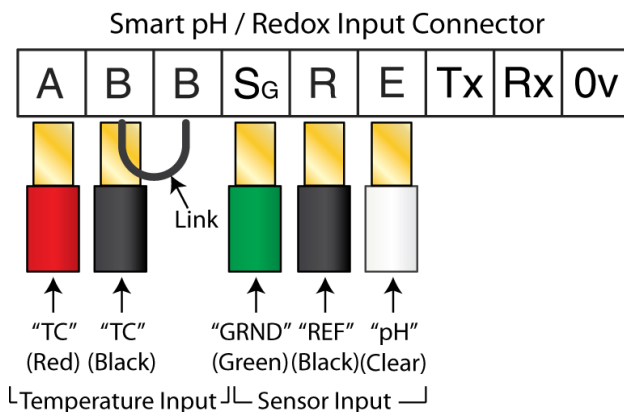
S400 ProcessProbe Cable (Solution Ground Fitted) Connection Details

Smart pH / Redox Input Connector

| A | B | B | S$_G$ | R | E | Tx | Rx | 0v |

MPD73LV-UL
Earth Terminal

"RTD IN"
(Green)

"RTD SENSE"
(Grey)

"RTD RTN"
(White)

"AUX"
(Blue)

"Reference"
(Red)

"Glass"
(Black/Clear)

Green \ Yellow
(Outer Screen)

Temperature Input — Sensor Input
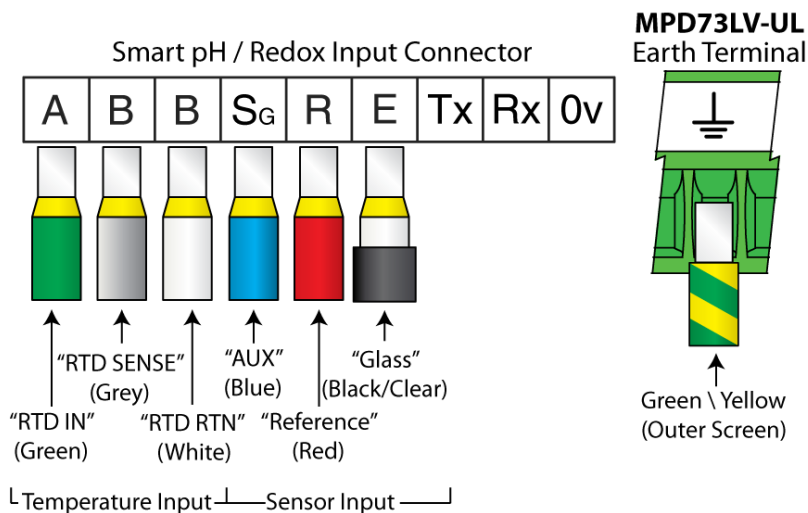
VP6 Detachable Cable Connection Details with "Solution Ground"

SensorTalk Sensors Termination Information

The Smart pH / Redox input card of the MPD73LV is capable of interfacing with the range of SensorTalk pH / Redox electrodes from Broadley James Corporation. This allows the user to take advantage of the unique calibration functionality these sensors provide. **Please note,** when unplugging an existing SensorTalk sensor from the instrument please wait for the probe is removed message to appear before attaching a different sensor.
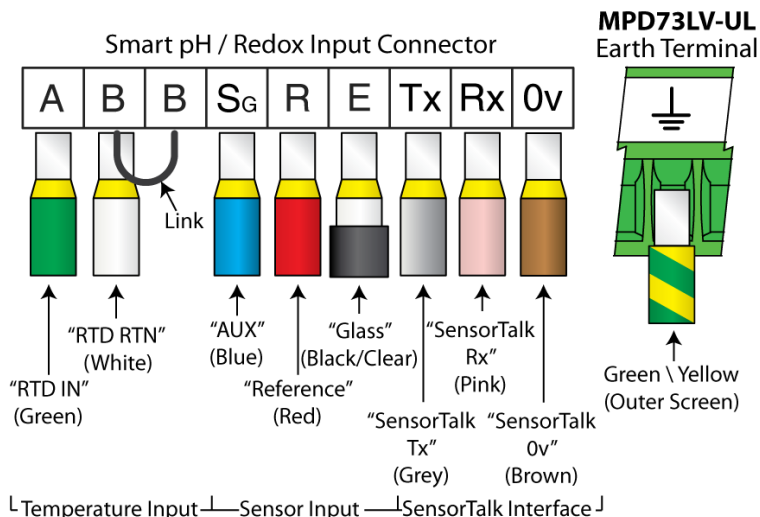
Hybrid SensorTalk Probe Cable Connection Details
(Solution Ground Fitted)
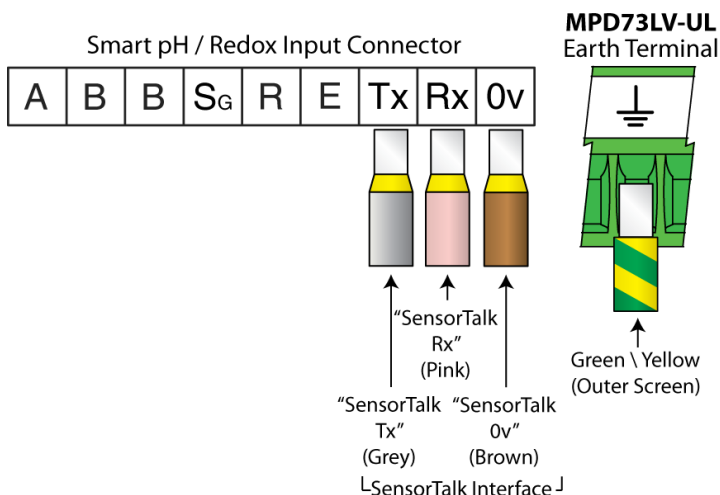
Digital SensorTalk Probe Cable Connection Details

Smart Capable Input Card LTH 54E Extension Cable Connection Information
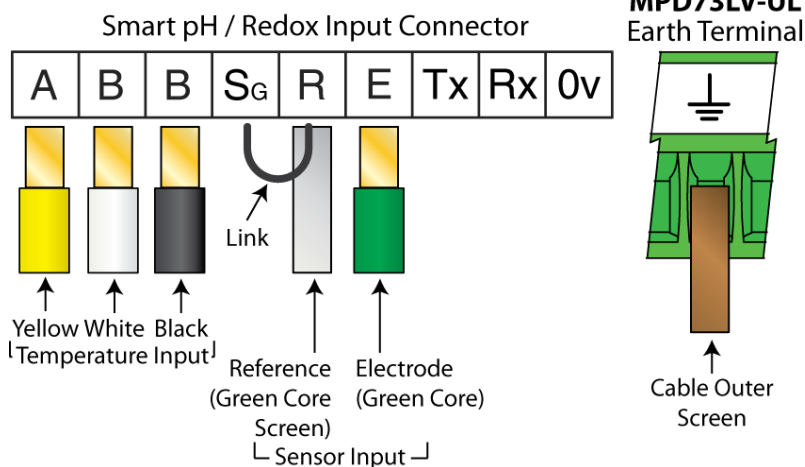
pH 54E Extension Cable Connection Details
(Solution Ground Not Fitted)
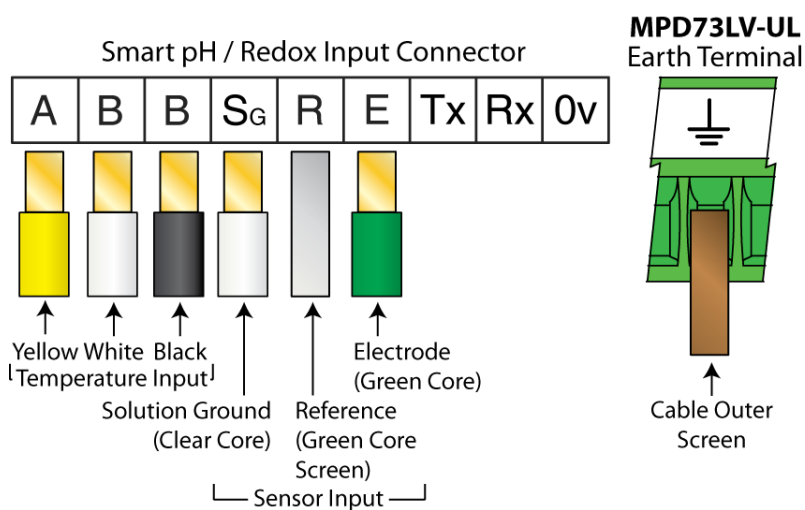
pH 54E Extension Cable Connection Details
(Solution Ground Fitted)
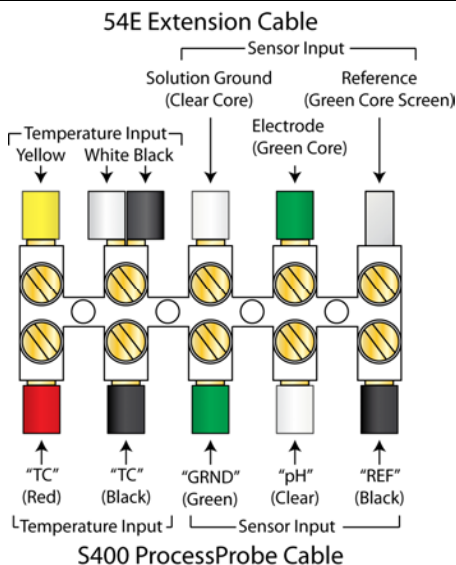
S400 ProcessProbe to 54E Extension Cable Connection Details
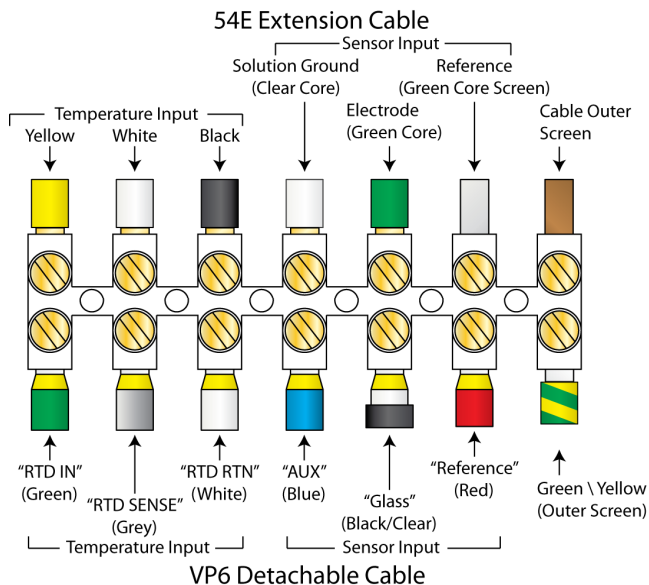
VP6 Detachable Cable to 54E Extension Cable Connection Details

Smart pH / Redox Input Connector

MPD73LV-UL
Earth Terminal

A B B S$_G$ R E Tx Rx 0v

Link

Clear Core
Screen

Solution
Ground
(White)

Electrode
(Green Core)

Blue   Black

Clear Core

Reference
(Green Core
Screen)

Yellow

Cable Outer
Screen

⌐Temperature Input⌐

└ SensorTalk Interface ⌐
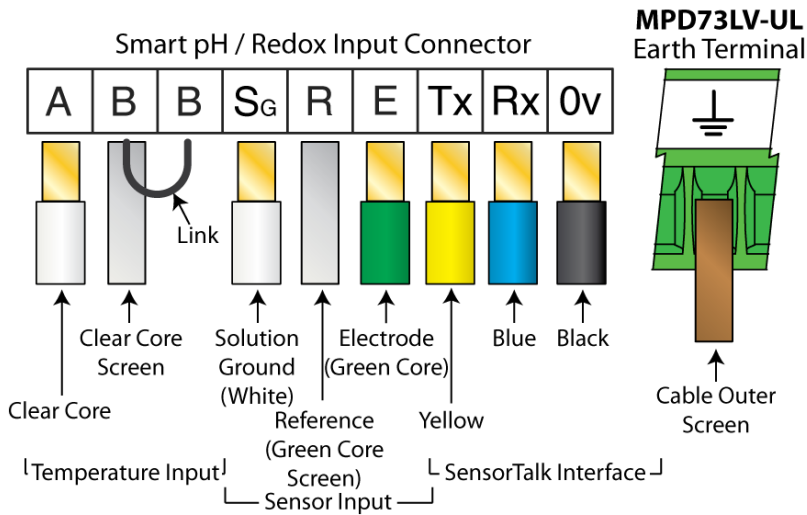
└ Sensor Input ⌐

**Hybrid SensorTalk 54E Extension Cable
Connection Details (Solution Ground Fitted)**

54E Extension Cable

Sensor Input

Temperature Input

Reference (Green
Core Screen)

SensorTalk Interface   Cable Outer
Screen

Clear Core Screen   Electrode
(Green Core)

Clear Core   White   Yellow   Blue   Black

"RTD IN"
(Green)

"RTD RTN"
(White)

"AUX"
(Blue)

"Glass"
(Black/Clear)

"Reference"
(Red)

"SensorTalk Tx"
(Grey)

"SensorTalk RX"
(Pink)

"SensorTalk 0v"
(Brown)

Green \ Yellow
(Outer Screen)

⌐Temperature Input⌐   └ Sensor Input ⌐   SensorTalk Interface

Hybrid SensorTalk Probe Cable

**Hybrid SensorTalk Probe Cable To 54E Extension Cable
Connection Details**

Smart Capable Input Card Temperature Sensor Connections

Sensor Input Connector
Smart Input Card

Link

RTD
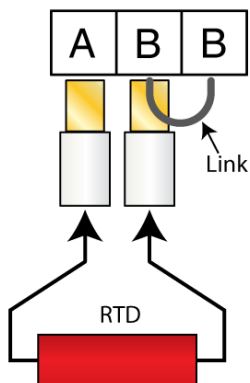
2 Wire RTD Temperature Connection

Sensor Input Connector
Smart Input Card

RTD
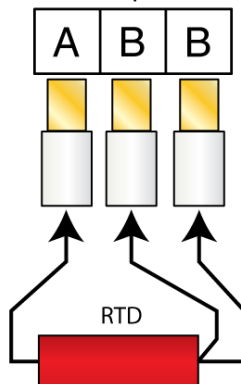
3 Wire RTD Temperature Connection

Sensor Input Connector
Smart Input Card

Not
Connected

RTD
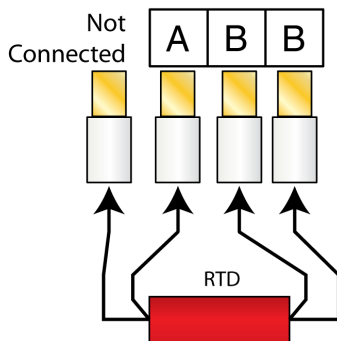
**4 Wire RTD
Connection**

4 Wire RTD Temperature Connection

User Interface

⚠️ **CAUTION!** BEFORE PROCEEDING, ENSURE THAT THE INSTALLATION INSTRUCTIONS HAVE BEEN FOLLOWED CORRECTLY. FAILURE TO DO SO MAY RESULT IN IRREPARABLE DAMAGE TO THE INSTRUMENT.

The MPD73LV-UL Series uses a high quality backlit 3¾" QVGA LCD to display the channel readings and settings. This is accompanied by 5 control buttons whose function varies depending upon which screen the user is viewing. The button function is indicated by the control section at the bottom of the display. Also present are Setpoint Status LEDs that when illuminated indicate which setpoint / relay is active. Located between the setpoint LEDs there are two Alarm Status LEDs which provide clear indication of a fault within the instrument.
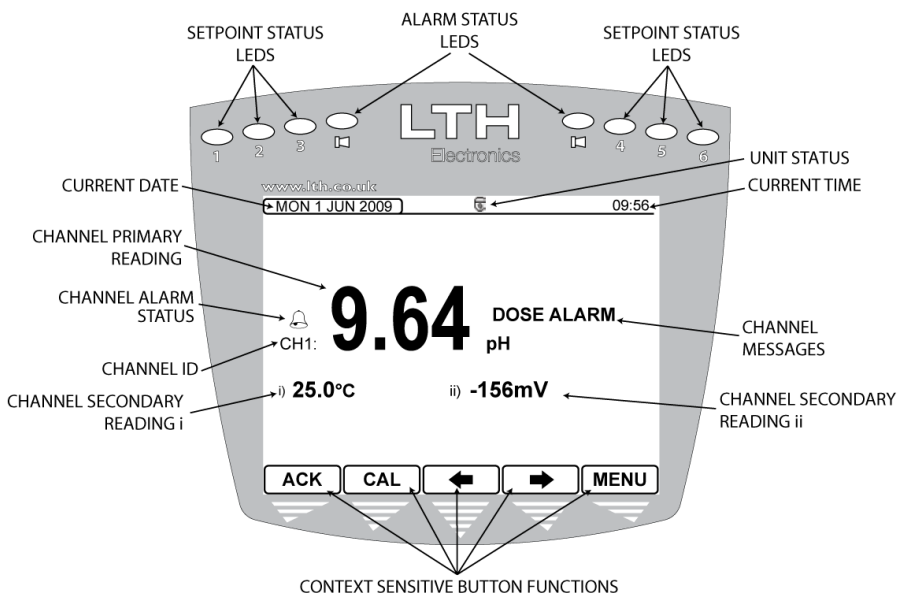
The Front Screen

The MPD73LV-UL front screen has the capability of showing the main sensor reading, two secondary readings and a channel label, all of which can be customised to the user's requirement. Also present is the ability to show the current output as a trend. Alternatively, a current output trend screen is available or if purchased, three live trend screens which can show up to 200 readings. See Setup Front Screen on page 91 for more information.
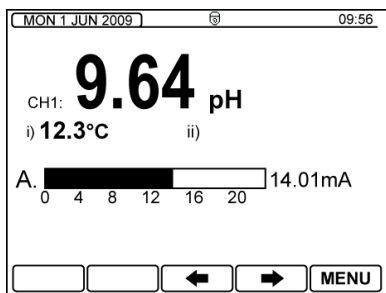
Front Screen Trends
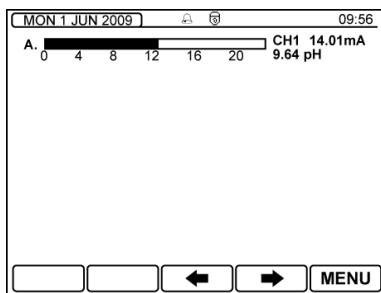
Current Output Trends
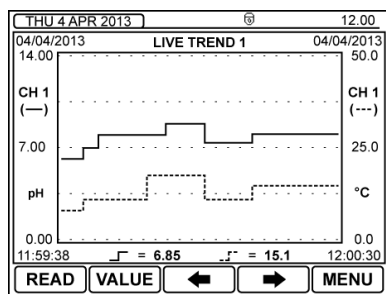
Live Trend (Optional Extra)

The Menu System

When the instrument is switched on it will complete a configuration check that will take approximately 20 seconds after this it will default to the front screen. The user interface is arranged in two ways, the first is a quick configuration overview which is accessible by scrolling left or right from the front screen as shown below.
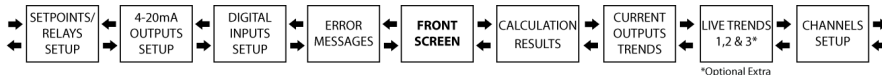
Scrolling Menu Layout

The second menu is accessible by pressing the menu button on the front screen. This then brings up the main menu from which the user can access the instruments settings.
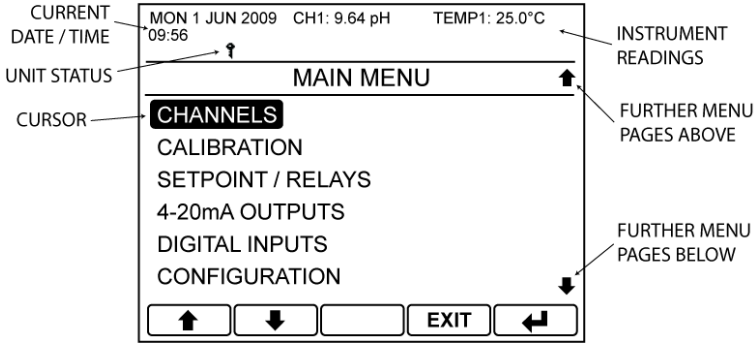
The main menu is split into two main sections. The top shows the current time & date, the unit status and the instrument's current readings. The bottom section shows the current options for that menu which may be selected by moving the cursor with the arrow buttons and pressing the enter button. The exit button is used to return to the previous menu or alternatively if held down for 3 seconds will take the instrument straight back to the front screen. If no buttons are pressed after 2 minutes the instrument will default back to the front screen. To the right of the menu screen arrows will indicate if there are further menu pages above or below the current one.
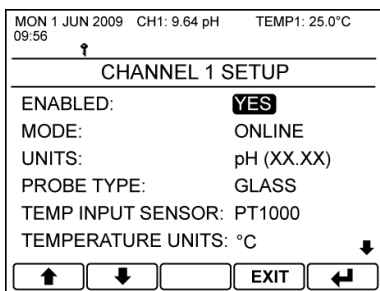
When changing a setting an option pop-up will appear from which the user can select an option or alternatively enter in a value. Note when looking at a list of options an arrow in the top right or bottom right corner of the pop-up indicates further options above or below the ones currently shown.
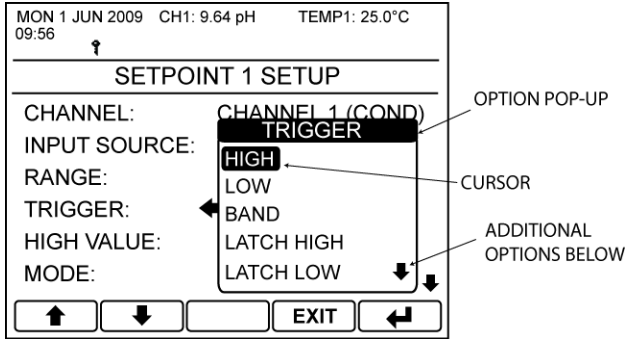
Security Code Access

To protect the instrument setup from unauthorised or accidental tampering, a security access code system is present. This is implemented via the instrument's menu system which operates in two modes, "locked" as indicated by a padlock symbol and "unlocked" as indicated by a key symbol. The locked mode allows the user to observe the instruments configuration but without the ability to change it. If the user wishes to change a setting then the "Security Code" pop-up will appear that will prompt them to enter the security code which will then change the instruments mode to "unlocked". Once unlocked, the user can change any setting without having to re-enter the security access code, however the instrument will automatically lock itself if no further buttons are pressed after 2 minutes 30 seconds.

The default security access code is 1000

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED: YES
MODE: ONLINE
UNITS: pH (XX.XX)
PROBE TYPE: GLASS
TEMP INPUT SENSOR: PT1000
TEMPERATURE UNITS: °C
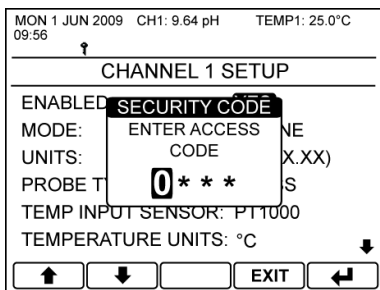
EXIT

Select the option you wish to change and press enter to bring up the Security Code pop-up.

⬆/⬇   – Select Option
EXIT   – Cancel
↵   – Chose Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED
MODE: NE
UNITS: X.XX)
PROBE T   S

SECURITY CODE
ENTER ACCESS CODE
0 * * *

TEMP INPUT SENSOR: PT1000
TEMPERATURE UNITS: °C

EXIT

Enter the required Access Code.

If the code is incorrect the user will be prompted to try again.

If the code is correct the padlock at the top of the screen will turn to a key and the unit will be unlocked

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT   – Cancel
↵   – Enter Code

Access Code Management

The user can select their own access code in the access code management menu, or alternatively they can disable the security system permanently by changing the access code to 0000.
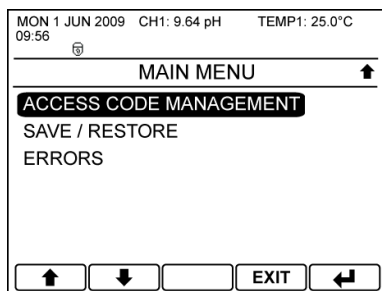
MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

 ACCESS CODE MANAGEMENT
 SAVE / RESTORE
 ERRORS

[⬆]   [⬇]   [ ]   EXIT   [↵]

Main Menu

From the front screen press the menu button to show the main menu options and select Access Code Management.

⬆/⬇   – Select Option
EXIT   – Return to Front Screen
↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

ACCESS CODE MANAGEMENT

 CHANGE USER ACCESS CODE
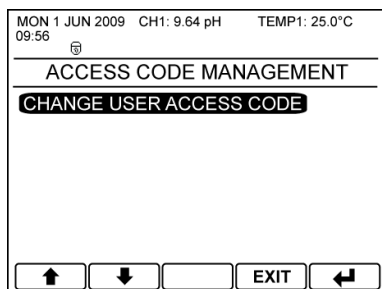
[⬆]   [⬇]   [ ]   EXIT   [↵]

Access Code Management

Select change user access code.

⬆/⬇   – Select Option
EXIT   – Return to Main Menu
↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

ACCESS CODE MANAGEMENT

 CHANGE SECURITY CODE E
            ENTER ACCESS
              CODE

          0 * * *
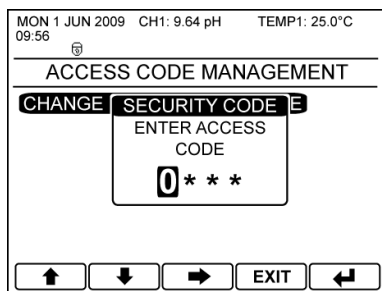
[⬆]   [⬇]   [➡]   EXIT   [↵]

Enter Current Code

The user is required to enter the existing security code before the new code can be entered.

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT   – Cancel
↵   – Enter Code

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

ACCESS CODE MANAGEMENT

SECURITY CODE
ENTER NEW USER
ACCESS CODE

0 ✻ ✻ ✻

⬆   ⬇   ➡   EXIT   ↵

Enter New Code

Enter the new security access code

NB. Set the new code to 0000 to disable the security access system and permanently unlock the instrument.

⬆/⬇	– Increase / Decrease Digit
➡	– Select Next Digit
EXIT	– Cancel
↵	– Save Code

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

ACCESS CODE MANAGEMENT

CONFIRM SELECTION
ARE YOU SURE?

EXIT   ↵

New Code Confirmation

Confirm the change of the security access code.

EXIT	– Cancel
↵	– Confirm Change

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

ACCESS CODE MANAGEMENT

SECURITY CODE
ACCESS CODE
CHANGED
SUCCESSFULLY

PRESS ENTER

↵

Change Confirmation

The instrument will then confirm that the security code has been successfully changed.

↵	– Exit

pH / Redox Input Channel Setup

The Channels Setup menu contains the basic configurations for the sensor's input.

The default security access code is _1000_

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

CHANNELS
CALIBRATION
SETPOINT / RELAYS
4-20mA OUTPUTS
DIGITAL INPUTS
CONFIGURATION

EXIT

Main Menu

From the front screen press the menu button to show the main menu options and select Channels.

⬆/⬇   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNELS SETUP

CHANNEL 1 → pH
CALCULATION 1
CALCULATION 2

EXIT

Select Channel

Select the (Smart) pH / Redox input channel you wish to edit.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED: **ENABLED**
MODE: **YES**
UNITS: NO
PROBE TYPE: GLASS
TEMP INPUT SENSOR: PT1000
TEMPERATURE UNITS: °C

EXIT

Enabled

Selecting no disables the channel and prevents it from appearing as an option in output and configuration menus, also disables any error messages associated with the channel.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009　CH1: 9.64 pH　　TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED:	YES
MODE:	◄ MODE
UNITS:	ON-LINE
PROBE TYPE:	OFF-LINE
TEMP INPUT SENSOR:	PT1000
TEMPERATURE UNITS:	°C

EXIT

Mode

Selecting off-line causes any control setpoints / Relays associated with this channel to de-energise (any active error relays will remain energised). Also causes any current outputs associated to hold their current value, useful for when commissioning or calibrating the instrument.

When the unit is placed in an off-line state "off-line" will appear in the channel messages section on the front screen.

If a "Cannot Edit Digital Input Has Control" message appears, then an associated digital input is currently controlling the on-line / off-line state of the channel.

⬆/⬇ – Select Option

EXIT – Cancel

⏎ – Save Selection

MON 1 JUN 2009　CH1: 9.64 pH　　TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED:	YES
MODE:	ONLINE
PROBE INFO:	ENTER
UNITS:	pH (XX.XX)
TEMP INPUT SENSOR:	PT1000
TEMPERATURE UNITS:	°C

EXIT

Probe Info

Shows the Model, Probe Version, First Use Date, Part Number, Serial Number, Manufacture Date and Operation Time of the connected SensorTalk probe.

Also allows the entry of customer name and asset number to be saved to the probe.

Only available when a SensorTalk capable probe is connected to the instrument.

⬆/⬇ – Select Option

EXIT – Return to Channel Setup Menu

⏎ – Enter Option

MON 1 JUN 2009　CH1: 9.64 pH　　TEMP1: 25.0°C
09:56

PROBE INFO

MODEL:	Hybrid pH Probe
PROBE VERSION:	0.14.20
PROBE FIRST USE:	11/31/2018 15:00
PART NO.:	H-123456
SERIAL NO.:	12345678
MFG DATE:	11/20/2018

EXIT

MON 1 JUN 2009　CH1: 9.64 pH　　TEMP1: 25.0°C
09:56

PROBE INFO

OPERATION TIME:	10 d 2 h 23 m
CUSTOMER NAME:	ABCDEFG
ASSET NO:	12345678

EXIT

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED: YES
MODE: ONLINE
UNITS: UNITS
PROBE TYPE: pH (XX.XX)
TEMP INPUT SENSOR: pH (XX.XXX)
                      REDOX (mV)
TEMPERATURE UNITS: TEMPERATURE

EXIT

Units

The channel can be configured as a pH, Redox or an exclusively temperature input.

When "pH (XX.XX)" is selected the channel will automatically apply the correct temperature compensation and probe type to the electrodes raw mV input to provide a display of pH. Note, the instrument can also display the raw mV as a secondary value on the front screen, see User Interface guide for more details.

When "pH (XX.XXX)" is selected the channel will do as above but will display pH to three decimal places.

When "Redox (mV)" is selected the instrument displays the unprocessed input voltage to the electrode terminals.

When "Temperature" is selected the channel only shows the temperature input. All other sensor inputs are ignored.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED: YES
MODE: ONLINE
UNITS: pH (XX.XX)
PROBE TYPE: PROBE TYPE
TEMP INPUT SENSOR: GLASS
TEMPERATURE UNITS: °C ANTIMONY

EXIT

Probe Type

The input channel can scale its readings to operate with either a glass or antimony probe. This sets the iso-potential point, for a glass electrode this is 7.00pH, for an antimony electrode it is 0.00pH.

! A sensor calibration must be performed when using a new sensor, see page 46 for details.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

ENABLED: YES
MODE: ONLINE
UNITS: TEMP INPUT SENSOR
PROBE TYPE   PT1000
TEMP INPUT   PT100
TEMPERATU   3K BALCO
                      DISABLED

EXIT

Temperature Input Sensor

Select the input channel's temperature sensor type for use with the sensor measurement's automatic temperature compensation.

If a temperature sensor is not connected to the input channel then this menu item should be set to disabled, else temperature input error messages will be shown.

Note. When disabled is set a manual temperature compensation value must be set.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Temperature Units

Sets the temperature units used.

Note. Kelvin is only available when units are set to temperature mode.

⬆/⬇ – Select Option

EXIT – Cancel

⏎ – Save Selection

Temperature Compensation Mode

To use temperature compensation from a measured input select "Auto", else select "Manual" to enable a fixed value entry. Only Available when units set to pH.

⬆/⬇ – Select Option

EXIT – Cancel

⏎ – Save Selection

Manual Temperature Input

The fixed temperature value used for manual temperature compensation.

Only available when temperature compensation mode is set to "manual".

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

⏎ – Save Value

Simulated Input

See Simulated Channels section of the Setpoints, Current Outputs, Digital Inputs Configuration Guide for more information.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

⏎ – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1 SETUP

TEMP COMP MODE: INPUT FILTER
MANUAL TEMP INPUT: OUT
SIMULATED INPUT: 10 SECS
INPUT FILTER: 20 SECS
                                       40 SECS
                                       1 MIN

EXIT

Input Filtering (Averaging)

When very noisy environments are encountered, this function will allow the user to filter the sensor readings by taking a running average over the time period selected (from 10 seconds to 5 minutes).

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Calibration

Calibration Procedures

Normal good practices should be observed when calibrating electrode systems against standard solutions.

- Always clean the electrode system before inserting in the standard solution to avoid contamination and to obtain the best response from the electrode system.
- Rinse the electrode system in clean (preferably demineralised) water between standard solutions.
- Allow time for the electrode system temperature to stabilise in each standard solution.
- Use standard solutions of known quality. If in doubt make up fresh solutions.
- Use clean beakers and bottles for standard solutions.
- The input channel can be taken offline, which de-energises the relays and holds the current outputs at their last values. This facility is useful when calibrating the system, however the operator must ensure the relays are in a safe state when using this feature.

pH Buffers

LTH supplies buffer powders which are prepared from pure dry chemicals, sealed in a sachet or capsule which prevents the absorption of moisture and subsequent deterioration. Buffer solutions should be prepared in accordance with the instructions supplied with them.

The MPD73LV-UL offers two different but simple methods of calibration for pH electrode systems.

Auto

In Auto calibration the instrument requires that the electrode is first placed in a 4pH buffer and then secondly in a 9pH buffer. These are nominal values for which the instrument carries the exact LTH buffer values due to temperature variations (other pH buffer solution values at temperature can also be entered). From these two points the instrument then calculates the Offset and Slope for the electrode. NB. Auto calibration mode is not available when the pH probe type is set to antimony.

In order for the auto calibration to work correctly, the buffer temperature must either be measured by the instrument during calibration, or if manual temperature compensation is being used the buffer temperature must be entered in the Calibration Manual Temperature Input in the calibration menu.

Manual

In Manual calibration mode it is possible to do single or two point calibration, using either the combined *Buffer* and *Slope* menu or individual Buffer menu. It is important to do the calibration at suitable values i.e.

Adjustment of the Buffer (Offset) value at 7.00pH
Adjustment of the Slope (Gain) value at any other pH (usually 4 or 9 pH).

The output from an ideal glass/reference electrode pair will normally be 0mV at 7pH, therefore the slope will have little or no effect at 7pH but increasing influence the further from 7pH the calibration point is.

If a single point calibration is required the buffer should be adjusted. As actual pH buffer values are used no compensation is made for the buffer solution with temperature in the instrument. It is important therefore to note the actual buffer value at the temperature of the solution, see page 33 for a table showing pH variations versus temperature for LTH's standard solutions.

Temperature has an effect on the output from the pH electrode as well, so it is important that the buffer temperature is entered into the Calibration Manual Temperature Input if manual temperature compensation is being employed. Alternatively any automatic temperature compensation element should be placed in the buffer solution with the pH sensor if Auto TC is being used.

Redox Standards

Unlike pH electrodes, the redox electrode's slope does not change. Nevertheless, incorrect redox potentials may be occasionally measured and the cause of these errors is usually a contaminated platinum (Pt) surface, or a contaminated or plugged reference junction. Calibration of an Redox Electrode is a single point adjustment calibration only.

For calibration and test purposes, standard solutions at various potentials can be purchased from LTH Electronics:

Part No. 138/175	124mV Redox Solution (500ml)
Part No. 138/176	358mV Redox Solution (500ml)

Calibration Menu

The calibration menu provides the facility to adjust the sensor inputs to the system in which it is operating.

The default security access code is 1000

Main Menu

From the front screen press the menu button to show the main menu options and select Calibration.

⬆/⬇   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

Select Channel

Select the (Smart) pH / Redox input channel you wish to edit.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

Mode

Selecting off-line causes any setpoints associated with this channel to de-energise. Also causes any current outputs associated to hold their current value, useful for when commissioning or calibrating the instrument.

When the unit is placed in an off-line state "off-line" will appear in the channel messages section on the front screen.

If a "Cannot Edit Digital Input Has Control" message appears, then an associated digital input is currently controlling the on-line / off-line state of the channel.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION PRII◄ CAL. PRINCIPLE
CAL MANUAL TEM   AUTO
pH BUFFER + SLO   MANUAL
    OFFSET VALUE: +0.00pH
    SLOPE VALUE: 100.0%

EXIT

Calibration Principle

This setting defines the operating mode of the pH Electrode calibration. In Auto mode the instrument automatically adjusts the offset and slope. In Manual mode the user manually adjusts the reading to match known values.

Only available when units set to pH in the channel setup menu and if available probe type is set to glass.

See page 46 for more details.

⬆/⬇   – Select Option

EXIT   – Cancel

⏎   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION   MANUAL TEMP INPUT
CAL MANUAL   ✚025.0°C
pH BUFFER + SLOPE CAL: ENTER
    OFFSET VALUE: +0.00pH
    SLOPE VALUE: 100.0%

EXIT

Calibration Manual Temperature Input

This setting allows a different fixed temperature value to be used when calibrating. Makes it easier to calibrate a standard solution at a different temperature to the process.

Only available when the units are set to pH and temperature compensation mode has been set to manual in the channel setup menu.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

⏎   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION PRINCIPLE: AUTO
CAL MANUAL TEMP INPUT: +25.0°C
pH CALIBRATION: ENTER
    OFFSET VALUE: +0.00pH
    SLOPE VALUE: 100.0%

EXIT

pH Calibration

Enter the pH Auto Calibration routine.

Only available when units set to pH in the channel setup menu and calibration principle is set to auto in this menu.

See page 56 for more details.

⬆/⬇   – Select Option

EXIT   – Return to Select Calibration Channel

⏎   – Enter pH Auto Calibration

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION PRINCIPLE: MANUAL
CAL MANUAL TEMP INPUT: +25.0°C
pH BUFFER + SLOPE CAL: ENTER
  OFFSET VALUE: +0.00pH
  SLOPE VALUE: 100.0%

EXIT

pH Buffer (Offset) + Slope Calibration

Enter the pH Manual Offset and Slope Calibration Routine

Only available when units set to pH in the channel setup menu and calibration principle is set to Manual in this menu.

See page 58 for more details.

⬆/⬇   – Select Option

EXIT   – Return to Select Calibration Channel

↵   – Enter pH Manual Offset Calibration

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION PRINCIPLE: AUTO
CAL MANUAL TEMP INPUT: +25.0°C
pH CALIBRATION: ENTER
  OFFSET VALUE: +0.00pH
  SLOPE VALUE: 100.0%

EXIT

Offset Value

Displays the electrode Offset currently being used by the instrument. Only available when units set to pH in the channel setup menu.

Cannot be edited.

Changed by either using the pH manual offset calibration, or by the pH auto calibration.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION PRINCIPLE: AUTO
CAL MANUAL TEMP INPUT: +25.0°C
pH CALIBRATION: ENTER
  OFFSET VALUE: +0.00pH
  SLOPE VALUE: 100.0%

EXIT

Slope Value

Displays the electrode Slope currently being used by the instrument. Only available when units set to pH in the channel setup menu.

Cannot be edited.

Changed by either using the pH manual slope calibration, or by the pH auto calibration.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

pH BUFFER (OFFSET) CAL: ENTER
TEMPERATURE OFFSET CAL: ENTER
  TEMP OFFSET VALUE: +0.0°C
CALIBRATION HISTORY   ENTER
  SENSOR CONDITION: GOOD
FRONT CAL ACCESS: NO

EXIT

pH Buffer (Offset) Calibration

Enter the pH Manual Offset Calibration Routine

Only available when units set to pH in the channel setup menu and calibration principle is set to Manual in this menu.

See page 58 for more details.

⬆/⬇   – Select Option

EXIT   – Return to Select Calibration Channel

↵   – Enter pH Manual Offset Calibration

MON 1 JUN 2009 CH1: -118.3 mV
09:56

CALIBRATE CHANNEL 1

MODE:
REDOX (C   REDOX CALIBRATION
  REDOX   -118.3 mV
CALIBRAT   ADJUST READING USING
FRONT CAL ACCESS: NO
CALIBRATION REMINDER: YES

Redox Offset Calibration

The Redox Offset calibration enables the user to adjust the sensor reading to match a known input. The current Redox sensor reading can be seen in the pop-up window and is adjusted by pressing the up and down arrows. When the reading is correct press the enter button to store the calibration.

Only available when units set to Redox in the channel setup menu.

⬆/⬇ – Adjust the Reading Up or Down

EXIT – Cancel

↵ – Save Calibration

MON 1 JUN 2009 CH1: -118.3 mV
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
REDOX (OFFSET) CAL: ENTER
  REDOX OFFSET VALUE: +0mV
CALIBRATION HISTORY   ENTER
FRONT CAL ACCESS: NO
CALIBRATION REMINDER: YES

Redox Offset Value

The Redox offset value currently being applied. The value will change depending on the result of the Redox offset calibration.

Cannot be edited

MON 1 JUN 2009 CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

pH BUF   TEMPERATURE OFFSET CAL
TEMPE   +25.0 °C
  TEMP   ADJUST TEMP USING
CALIBR   ⬆ AND ⬇ ARROWS
  SENSOR CONDITION: GOOD
FRONT CAL ACCESS: NO

Temperature Offset Calibration

The temperature offset calibration enables the user to adjust the temperature reading to match a known input. Only available when the channel's temperature input is not set to disabled.

The current temperature reading can be seen in the pop-up window and is adjusted by pressing the up and down arrows. When the reading is correct press the enter button to store the calibration.

⬆/⬇ – Adjust the Reading Up or Down

EXIT – Cancel

↵ – Save Calibration

MON 1 JUN 2009 CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

pH BUFFER (OFFSET) CAL: ENTER
TEMPERATURE OFFSET CAL: ENTER
  TEMP OFFSET VALUE: +0.3°C
CALIBRATION HISTORY   ENTER
  SENSOR CONDITION: GOOD
FRONT CAL ACCESS: NO

Temperature Offset Value

The temperature offset value currently being used. The value will change depending on the result of the temperature offset calibration.

Cannot be edited

Enter Calibration History

The MPD73LV-UL has a calibration history feature which allows the user to review the record of sensor solution calibrations.

To enter the calibration history menu press enter.

↵   – Enter Calibration History

Calibration History

The calibration history page provides a record of all Offset and Slope calibrations carried out.

The data includes the date and time of the calibration, the calculated Offset and Slope, the calibration principle used and the temperature compensation reading at the time.

⬆/⬇   – Move To Next Page Up or Down

EXIT   – Return To Calibration Menu

CLEAR   – Clear All of the Calibration History

Sensor Condition

The MPD73LV-UL is capable of analysing the result of the pH electrode offset and slope calibration and indicates to the user the condition the electrode is in.

- Good – The electrode is operating within set parameters.
- Replace Soon – The electrode is getting towards the end of is operating life.
- Replace – The electrode is exhausted and should be replaced.

Cannot be edited, only available when units set to pH in the channel setup menu.

Front Screen Calibration Access Enable

When enabled front calibration access allows direct entry into the calibration menu from the front screen. It also disables the security access system within the calibration menu enabling the calibration functions without having to enter the security access code.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection
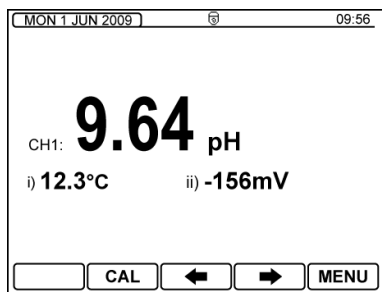
Front Screen Calibration Access

When the calibration access is enabled press the "CAL" button to bring up pop-up to select which channel to calibrate.

CAL – Enter Calibrate Channel Select Menu

◄/► – Scroll Around Menus

Menu – Access Main Menu
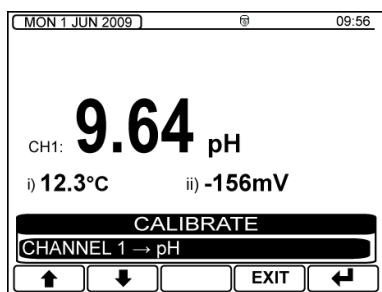
Select Channel to Calibrate

From the pop-up select the channel the user wishes to calibrate. Only channels whose front calibration access has been enabled will appear.

▲/▼ – Select Option

EXIT – Cancel

↵ – Enter Menu
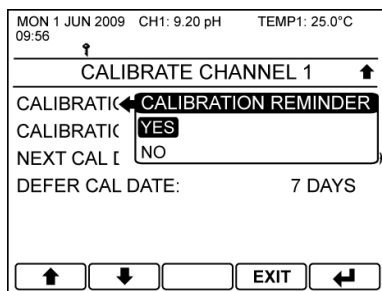
Calibration Reminder

By enabling the calibration reminder the user can configure a calibration interval, which when expired will activate an alarm and channel message on the front screen.

If the interval has expired and the alarm has activated, then on the completion of a successful sensor calibration the next cal date will be automatically incremented by calibration interval.

If the user completes a successful sensor calibration before the calibration interval has expired, then the instrument will ask the user whether they wish to update the next cal due date by the calibration interval.

▲/▼ – Select Option

EXIT – Cancel

↵ – Save Selection

Calibration Interval

Sets the interval time for the calibration alarm.

The Next Cal Date will update to show the date of the next calibration alarm.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

Next Calibration Date

Sets the exact date of the next calibration alarm.

The Calibration Interval will update to show the number of days to the next calibration date.

⬆/⬇ – Increase / Decrease Digit or Text

➡ – Select Next Item

EXIT – Cancel

↵ – Save Entry

Defer Calibration Date

Turns off the alarm and increases the calibration interval by an extra 7 days.

Only appears once the calibration interval has expired.

YES – Increase Interval

NO – Cancel

Custom Buffer Entry

Enters the custom buffer setup menu.

Only available when the pH calibration principle is set to auto.

⬆/⬇ – Select Option

EXIT – Return to Select Calibration Channel

↵ – Enter pH Manual Slope Calibration

MON 1 JUL 2013   CH1: 9.20 pH   TEMP1: 25.0°C
09:56

CUSTOM BUFFER 1

NUMBER OF POINTS: **13**

SETUP POINTS: ENTER

NOMINAL pH: 4.00pH   9.00pH
1)   +5°C: 4.00pH: 9.21pH:
2)   +10°C: 4.01pH: 9.21pH:
3)   +15°C: 4.01pH: 9.14pH:

⬆   ⬇   EXIT   ↵

Custom Buffer Menu

The custom buffer menu allows the user to enter in custom buffer solution values at fixed temperatures for the nominated pH values chosen, for use with the pH automatic calibration function.

Number of Points – Define the required number of data points to be entered (Maximum 13)

Setup Points – Automatically define the data points one after another. It is recommended that the points are added in ascending order of temperature.

Nominal pH – Define the two pH buffers chosen for Auto calibration

Data Points – Alternatively the user can edit a single temperature point by selecting it in the menu.

Reset Custom Buffer – Reset the points back to the LTH standard buffer defaults.

⬆/⬇	– Select option or Increase / Decrease Digit
➡	– Select Next Digit
EXIT	– Cancel or Return to Calibration Menu
↵	– Save Entry

Auto pH Sensor Calibration

The Auto pH sensor calibration is a two point offset and slope calibration, which requires the use of two pH buffer solutions chosen by the user. These are nominal values from which the instrument converts to exact buffer values due to temperature variations. To accomplish this, the instrument requires buffer values at different temperatures relevant to the buffer solutions chosen to be configured, refer to page 54 for the custom buffer instructions.

Alternatively the default configuration uses 4 and 9 pH buffer solutions with the buffer table pre-configured with the following two LTH buffers:

4pH – LTH Order Number 138/199
9pH – LTH Order Number 138/201

In order for the auto calibration to work correctly, the buffer temperature must either be measured by the instrument during calibration, or if manual temperature compensation is being used the buffer temperature must be entered in the "Calibration Manual Temperature Input" in the calibration menu.

Calibration Principle

To use Auto calibration first set the calibration principle to Auto.

Note. Calibration Principle is only available when units are set to pH and probe type to glass, both in the channel setup menu.

⬆/⬇ – Select Option
EXIT – Cancel
⏎ – Save Selection

pH Auto Calibration

To start the pH calibration, select the "pH Calibration" item from the desired channel's calibration menu.

⬆/⬇ – Select Option
EXIT – Return to Select Calibration Channel
⏎ – Enter pH Auto Calibration

MON 1 JUL 2013   CH1: 7.00 pH   TEMP1: 25.0°C
09:56

AUTO pH CALIBRATION

PLACE ELECTRODE IN 7.00pH BUFFER

ELECTRODE OUTPUT: 0mV
pH MEASUREMENT: 7.00pH
PRESS '↵' TO START CALIBRATION

NEW   EXIT   ↵

Place Electrode In Nominal pH Buffer 1

Place the electrode in the first nominated pH buffer and press enter to begin sampling.

Note. If the electrode is new, pressing the "new" button will reset the existing offset and slope and add a "new electrode" entry in the calibration history.

NEW   – Register New Electrode

EXIT   – Exit Calibration Without Saving

↵   – Initiate Nominated pH Calibration

MON 1 JUN 2009   CH1: 7.00 pH   TEMP1: 25.0°C
09:56

AUTO pH CALIBRATION

CHECK PROBE IS IN 7pH BUFFER

ELECTRODE OUTPUT: -100mV
pH MEASUREMENT: CAL ERROR.
PRESS RETRY TO REPEAT

RETRY   NEXT   EXIT   ↵

Calibration Error

If no problem has been detected the instrument will automatically progress to the next calibration point.
If it has encountered a problem this screen will appear.

Check that the electrode is connected correctly and that the correct buffer has been used. Then press "Retry" to repeat the calibration.

PREV   – Go to Previous Calibration Point

SKIP   – Skip to Next Calibration Point

EXIT   – Exit Calibration Without Saving

↵   – Initiate Calibration

MON 1 JUL 2013   CH1: 9.00 pH   TEMP1: 25.0°C
09:56

AUTO pH CALIBRATION

PLACE ELECTRODE IN 9.00pH BUFFER

ELECTRODE OUTPUT: -118mV
pH MEASUREMENT: 9.00pH
PRESS '↵' TO START CALIBRATION

EXIT   ↵

Place Electrode In Nominal pH Buffer 2

Place the electrode in the second nominated pH buffer and press enter to begin sampling.

If the calibration has been completed successfully the instrument will return back to the main calibration menu.

EXIT   – Exit Calibration Without Saving

↵   – Initiate Nominated pH Calibration

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE CHANNEL 1

MODE: ON-LINE
CALIBRATION PRINCIPLE: AUTO
CAL MANUAL TEMP INPUT: +25.0°C
pH CALIBRATION: ENTER
   OFFSET VALUE: -0.12pH
   SLOPE VLAUE: 96%

↑   ↓   EXIT   ↵

Offset and Slope

Once back in the main menu the calculated offset and slope values being used by the instrument will be displayed.

Lower down in the calibration menu the instrument will also display the sensor condition calculated from the span and offset values. See page 52 for more information.

Manual pH Sensor Calibration

When using Manual calibration mode it is possible to do either a single point Buffer (Offset) Cal or a combined two point Buffer and Slope calibration. This is accomplished by using either the *pH Buffer (Offset) Cal* or *pH buffer + Slope Cal* menu items. The combined Buffer and Slope calibration is done in the following order:

1. Adjustment of the Buffer (Offset) value at 7.00 pH.
2. Adjustment of the Slope (Gain) value at any other pH (usually 4 or 9 pH).

As actual pH buffer values are used no compensation is made for the variation of the buffer solution with temperature in the instrument. It is important therefore to know the actual buffer value at the temperature of the solution. The standard LTH 4, 7 and 9 pH values at temperature can be seen on page 61.

It is also important that the buffer temperature is entered into the Calibration Manual Temperature Input if manual temperature compensation is being employed. Alternatively any automatic temperature compensation element should be placed in the buffer solution with the pH sensor if Auto TC is being used.

Calibration Principle

The default method of calibration is "Manual" mode, however if the probe is pH and the type is glass then "Auto" mode may have been selected. If this is the case then calibration principle will need to be set to manual.

⬆/⬇ – Select Option

EXIT – Cancel

⏎ – Save Selection

pH Buffer + Slope Calibration – Buffer Calibration

The pH buffer calibration enables the user to adjust the sensor buffer until the displayed reading matches the known input. To activate the function, select "pH Buffer + Slope Cal" and press enter.

The current sensor reading can be seen in the pop-up window and is adjusted by pressing the up and down arrows. When the reading is correct press the enter button to store the calibration and progress to the slope calibration.

It is recommended that the buffer should be adjusted at 7pH (± 2pH) for a glass probe, and 0pH (+2pH) for an antimony probe.

Note. If the electrode is new, pressing the "new" button will reset the existing offset.

⬆/⬇ – Adjust the Reading Up or Down

NEW – Register New Electrode

EXIT – Cancel

⏎ – Progress to Slope Calibration

pH Slope Calibration

The pH slope calibration enables the user to adjust the sensor slope until the displayed reading matches the known input. If using the "pH Buffer + Slope Cal" menu, the instrument will automatically progress onto the slope calibration once the Buffer calibration has been done.

The current sensor reading can be seen in the pop-up window and is adjusted by pressing the up and down arrows. When the reading is correct press the enter button to store the calibration.

The slope limits are 80% to 110% for a glass electrode and 75% to 115% for a antimony electrode.

⬆/⬇   – Adjust the Reading Up or Down

EXIT   – Cancel

↵   – Save Calibration

Result

The adjusted offset and slope values, as well as the calculated sensor condition from the calibration routine is displayed here.

If only a single point calibration is required then use the following pH buffer calibration.

pH Buffer (Offset) Calibration

The pH buffer calibration enables the user to adjust the sensor buffer until the displayed reading matches the known input. To activate the function select "pH Buffer (Offset) Cal" and press enter.

The current sensor reading can be seen in the pop-up window and is adjusted by pressing the up and down arrows. When the reading is correct press the enter button to store the calibration.

It is recommended that the buffer should be adjusted at 7pH (± 2pH) for a glass probe, and 0pH (+2pH) for an antimony probe.

Note. If the electrode is new, pressing the "new" button will reset the existing offset and slope and add a "new electrode" entry in the calibration history.

⬆/⬇	– Adjust the Reading Up or Down
NEW	– Register New Electrode
EXIT	– Cancel
↵	– Save Calibration

Result

The adjusted offset value, as well as the calculated sensor condition from the calibration routine is displayed here.

Buffer Solutions

The following table gives the LTH buffer solution values. **NB.** Buffer solutions should be prepared and used in accordance with the instructions supplied with them.

pH variation against temperature			
Temperature (°C)	LTH 4pH Buffer	LTH 7pH Buffer	LTH 9pH Buffer
10	4.00	7.07	9.21
15	4.00	7.04	9.14
20	4.00	7.02	9.06
25	4.00	7.00	9.00
30	4.01	6.99	8.96
35	4.02	6.98	8.92
40	4.03	6.97	8.88
50	4.05	6.96	8.83
60	4.08	6.96	8.81

LTH Buffer Solutions Ordering Information

Type No	Part No	Description
SB-052-1610	138/199	4pH Buffer standard colour coded Red, 500ml.
SB-168-1610	138/200	7pH Buffer standard colour coded Clear, 500ml.
SB-054-1610	138/201	9pH Buffer standard colour coded Blue, 500ml.
SR-009-1610	138/175	124mV Redox solution. 500ml
SR-022-1610	138/176	358mV Redox solution. 500ml

Resetting the User Calibration

If required the user can reset the user calibrations to their default states.

MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 **MAIN MENU** CHANNELS `CALIBRATION` SETPOINT / RELAYS 4-20mA OUTPUTS DIGITAL INPUTS CONFIGURATION [↑] [↓] [ ] EXIT [↵]	**Main Menu** From the front screen press the menu button to show the main menu options and select Calibration. ↑/↓ – Select Option **EXIT** – Return to Front Screen ↵ – Enter Option

---

MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 **CALIBRATION** CHANNEL 1 → pH 4-20mA OUTPUTS `RESET USER CALIBRATION` [↑] [↓] [ ] EXIT [↵]	**Calibration** Select Reset User Calibration. ↑/↓ – Select Option **EXIT** – Return to Main Menu ↵ – Enter Option

---

MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 **RESET USER CALIBRATION** `RESET CHANNEL 1 → CALIB.(pH)` RESET 4-20mA OUTPUTS RESET ENTIRE UNIT [↑] [↓] [ ] EXIT [↵]	**Reset User Calibration** Select the required (smart) pH / Redox input channel. ↑/↓ – Select Option **EXIT** – Return to Calibration ↵ – Enter Option

---

MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 **RESET CHANNEL 1** RESET pH CAL: `RESET` RESET TEMPERATURE CAL: RESET RESET ENTIRE CHANNEL: RESET [↑] [↓] [ ] EXIT [↵]	**Reset Channel User Calibration** Select whether to reset the sensor calibration, the temperature calibration or reset all of the channel's user calibrations. ↑/↓ – Select Option **EXIT** – Return to Reset User Calibration ↵ – Enter Option

---

Blank

Setpoints

The MPD73LV-UL is be fitted with two setpoint relays designated 1 & 2 . Both Setpoints "Change Over" style relays. The Setpoint/Relays menu contains all of the necessary setup functions to configure the setpoint sources. The instrument indicates the status of the enabled setpoints by means of the LED indicators located above the main instrument display. A lit LED indicates that the setpoint / Relay is active. If the LED is blinking it indicates a dose alarm has occurred on that setpoint.

Main Menu

From the front screen press the menu button to show the main menu options and select Setpoint/Relays.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option

Setpoints / Relays Setup

Select the Setpoint you wish to edit.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option

Channel

The "Sensor Input Channel" the setpoint is to be associated with. The channels shown depend on the configuration of the instrument. For more information regarding the Unit Alarm option see the setpoint alarm mode section.
To disable the setpoint select the disabled option. This will turn off the setpoint and clear any error messages associated with it.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: SOURCE
TRIGGER: SENSOR
HIGH VALUE: TEMPERATURE
MODE: ALARM
DELAY: CLEANING

EXIT

Input Source

The input source for the selected setpoint.
Available options vary depending on whether the appropriate source is enabled in the channel's setup menu.
Alarm option – see the setpoint alarm mode section.
Cleaning option – see the setpoint cleaning mode section.

⬆/⬇   – Select Option
EXIT   – Cancel
↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: TRIGGER
TRIGGER: HIGH
HIGH VALUE: LOW
MODE: BAND
DELAY: LATCH HIGH
                   LATCH LOW

EXIT

Trigger

The setpoints can be configured to trigger in the following ways:

- High
- Low
- Band
- Latch High
- Latch Low

⬆/⬇   – Select Option
EXIT   – Cancel
↵   – Save Selection
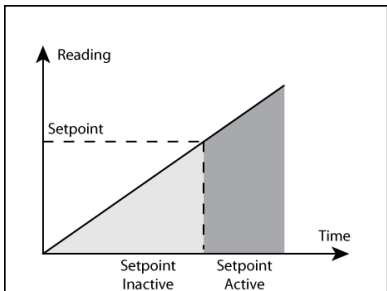
High

The setpoint will activate when the associated Sensor Input Channel's input becomes greater than the setpoint level.

Low
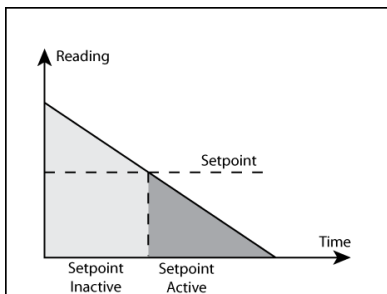
The setpoint will activate when the associated Sensor Input Channel's input becomes less than the setpoint level.
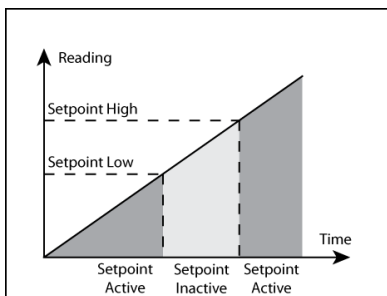
Band

The setpoint will activate when the associated Sensor Input Channel's input is either greater than the setpoint high level or less than the setpoint low level.
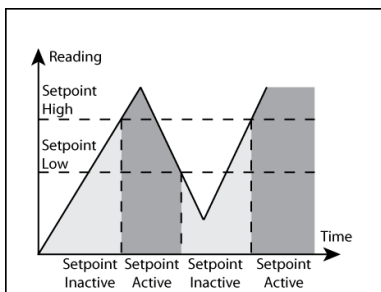
Latch Hi

The setpoint will activate when the associated Sensor Input Channel's input is greater than the setpoint high level and will remain active until the input falls below the setpoint low level. It will then remain inactive until the input level rises above the setpoint high level.
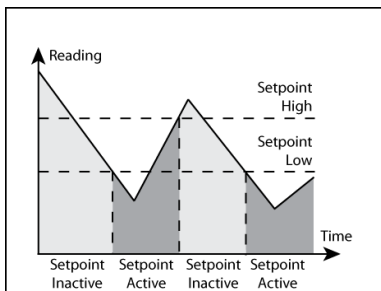
Latch Low

The setpoint will activate when the associated Sensor Input Channel's input is less than the setpoint low level and will remain active until the input rises above the setpoint high level. It will then remain inactive until the input level falls below the setpoint low level.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: SENSOR
TRIGGER: HIGH VALUE
HIGH VALUE: 04.00pH
MODE: ON/OFF
DELAY: 00:00mm:ss

EXIT

High Value

The Setpoint High value.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: SENSOR
TRIGGER: LOW VALUE
LOW VALUE: 09.00pH
MODE: ON/OFF
DELAY: 00:00mm:ss

EXIT

Low Value

The Setpoint Low value.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: MODE
TRIGGER: ON/OFF
HIGH VALUE: PULSE PROP
MODE: TIME PROP
DELAY: 00:00mm:ss

EXIT

Mode

The Setpoints can operate in one of three modes.

On/Off Mode – The setpoint energises when the setpoint is activated and de-energises when the setpoint is de-activated.

Pulse Proportional – See Setpoint proportional Mode Section.

Time Proportional – See Setpoint proportional Mode Section.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: SENSOR
TRIGGER: HIGH
HIGH VALUE: 4.00pH
MODE: DELAY
DELAY: 00:00mm:ss

⬆   ⬇   ➡   EXIT   ↵

Delay

In order to prevent short duration changes at the input affecting the setpoint operation a delay can be set before the setpoint is energised. If the input is still the same after the delay, then the setpoint will be energised.

Note- Only available when Trigger is set to High or Low and Mode is On/Off.

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT   – Cancel
↵   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

DELAY: 00:00mm:ss
HYSTERESIS: HYSTERESIS
DOSE ALARM: 01:00%

⬆   ⬇   ➡   EXIT   ↵

Hysteresis

A facility to apply hysteresis to the setpoint level allows the user to avoid setpoint "Chatter" when the sensor input level approaches the setpoint level.

"Chatter" is caused when the sensor input is sufficiently close to the set point value and noise on the signal repeatedly crosses the set point level, thus causing the relay to switch on and off rapidly.

The hysteresis level should therefore be set to be greater than the input noise level.

The Hysteresis value is a percentage of the setpoint value applied both + and – to the setpoint. For example, if the setpoint was 10.00 and the Hysteresis was 1% then the hysteresis band would operate from 9.90 to 10.10.

Hysteresis operates as follows:

Trigger High – The setpoint is inactive until the reading is greater than the Setpoint High + (Setpoint High X Hysteresis %). It remains active until it goes below Setpoint High – (Setpoint High X Hysteresis %).

Setpoint Trigger: High – Hysteresis

Trigger Low – The setpoint is inactive until the reading is less than the Setpoint Low – (Setpoint Low X Hysteresis %). It remains active until it goes above Setpoint Low + (Setpoint Low X Hysteresis %).

Trigger Band – The setpoint uses both high and low.

Note. Hysteresis is only available when setpoint trigger is set to High, Low or Band.

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT   – Cancel
↵   – Save Value

Setpoint Trigger: Low – Hysteresis
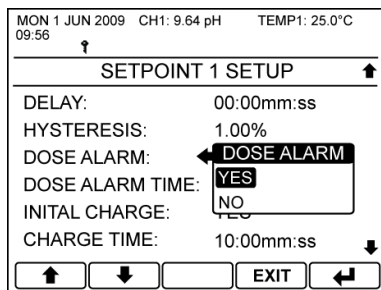
Setpoint Dose Alarm

The dose alarm timer can be used to prevent overdosing under many different fault conditions, such as sensor failure or application problems.
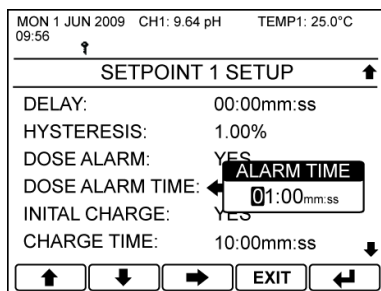
Dose Alarm

Enable the dose alarm for the selected setpoint.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Alarm Time

Sets the time which if the setpoint is active for longer than causes the dose alarm to activate.
During pulse or time proportional mode the cumulative "on" time that the setpoint is active will be measured.
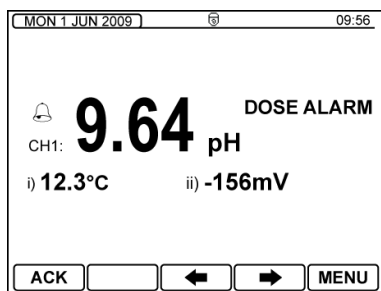
⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

Dose Alarm Active

When the dose alarm activates the following happens:-
- The setpoint will de-energise.
- The associated setpoint led will flash.
- The Dose Alarm error message will appear next to the associated input channel on the front screen.
- ACK will appear as a function to acknowledge the setpoint on the front screen.
- An error will be set for that input channel.

ACK – Enter Setpoint Acknowledge Menu

⬅/➡ – Scroll Around Menus

Menu – Access Main Menu

Dose Alarm Acknowledge

To cancel the dose alarm and reactivate the setpoint, select the required setpoint from the shown list and press enter.

Note – If, once reset, the setpoint again remains energised for the length of the dose alarm timer then the dose alarm will once again activate. If this problem persists then a dosing problem will need to be investigated.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Initial Charge

This allows the user to have a one time over-ride of the Dose Alarm to use for example when filling a tank for the first time.

The user enters a charge time and then initiates the charge time. The unit will then disable the dose alarm until either the relay becomes inactive because the setpoint has been reached or the charge timer reaches zero in which event the unit will automatically display a Dose Alarm.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Charge Time

Sets the initial charge time.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value
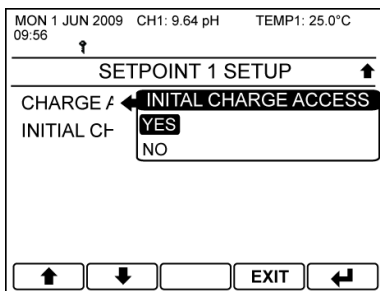
MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 SETPOINT 1 SETUP CHARGE A ◄ INITAL CHARGE ACCESS INITIAL CH YES NO ↑ ↓ EXIT ↵	**Initial Charge Access** Enabling this allows the user to initialise the initial charge by means of a menu on the front screen. **↥/↧** – Select Option **EXIT** – Cancel ↵ – Save Selection
MON 1 JUN 2009 ⏱ 09:56 CH1: **9.64** pH i) **12.3°C** ii) **-156mV** INIT ← → MENU	**Front Screen Initial Charge** Enter the Initial Charge Menu by means of the INIT button. **INIT** – Enter Initial Charge Menu **←/→** – Scroll Around Menus **Menu** – Access Main Menu
MON 1 JUN 2009 ⏱ 09:56 CH1: **9.64** pH i) **12.3°C** ii) **-156mV** ACKNOWLEDGE / INITIALISE INIT SETPOINT 1 INITIAL CHARGE ↑ ↓ EXIT ↵	**Initialise Initial Charge** Select which setpoint to initialise the initial charge. Note – Once started the Initial charge timer will appear next to the associated input channel on the front screen. **↥/↧** – Select Option **EXIT** – Cancel ↵ – Save Selection
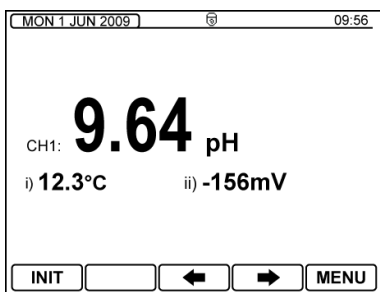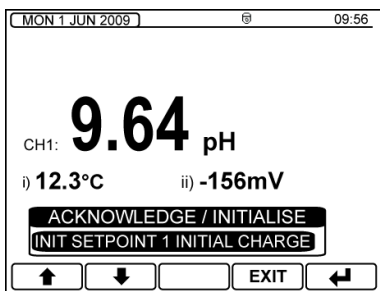
MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56
 	
SETPOINT 1 SETUP
CHARGE ACCESS: YES
INITIAL CHARGE: ◄ START CHARGE
                    YES
                    NO
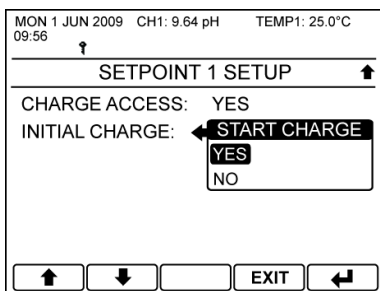 	
↑   ↓   EXIT   ↵
	Start Initial Charge
	The user can also start the initial charge via this option in the setpoint menu.
	Note – Once started the Initial charge timer will appear next to the associated input channel on the front screen.
	
	↥/↧ – Select Option
	EXIT – Cancel
	↵ – Save Selection

Setpoint Proportional Mode

In addition to On/Off mode the MPD73LV-UL also provides two forms of pseudo proportional control, which can be used to control the levels to a defined value when used in conjunction with a pump or valve. When the reading deviates from the programmed set point level the relay pulses at a rate proportional to that deviation. Note – Only available when Setpoint Trigger is set to either High or Low.

Pulse Proportional Mode

The Pulse Proportional mode is intended to drive solenoid type dosing pumps which have the facility to accept an external pulse input. The setpoint relay operates by producing a pulse of 0.2 seconds in duration and with a maximum period of one pulse per 30 seconds. The pulse rate increases as the measurement moves further from the set point, until it reaches the minimum period of one pulse per 0.4 seconds at the limit of the proportional band.

For example if the user sets a proportional band of 1.00, the setpoint trigger to LOW, and a setpoint value of 10.00. When the reading falls just below 10.00 the setpoint will begin to pulse at its longest period of once per 30 seconds. As the reading falls further from the setpoint the period will decrease until it reaches its minimum of one pulse every 0.4 seconds at the limit of the proportional band. (See Setpoint Pulse Rate – Pulse Proportional Mode section on the diagram below.)

Time Proportional Mode

Time Proportional Mode allows a user defined cycle time to control any on/off device such as a solenoid valve or dosing pump over a user set proportional band.

For example if the user sets a proportional band of 1.00, the setpoint trigger to LOW, and a setpoint value of 10.00. When the reading falls below 9.00 the setpoint would be energised 100% of the cycle time. As the input rises and approaches the set point the setpoint starts to cycle on and off with the on time reducing and the off time increasing, respectively until it reached the setpoint and would be off for 100% of the cycle time. The cycle time is adjustable and is the sum of the on and off times. (See Setpoint Cycle Time – Time Proportional Mode section on the diagram below.)
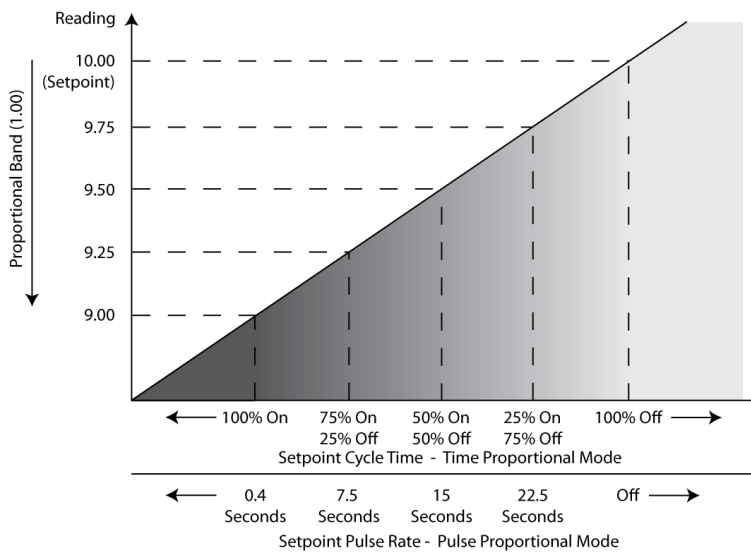
Cycle Time

Sets the cycle time (sum of both On and Off periods).

Note – Time Proportional mode only.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

Proportional Band

Enter the size of the proportional band in measurement units.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

Setpoint Alarm Mode

By Selecting Alarm in the setpoints input source the setpoint can be configured as an alarm output triggered by one of a number of events.

❖ **Sensor Error –**   When a sensor related error is detected on the associated sensor input channel.

❖ **Dose Alarm –**   When any of the dose alarms active on a setpoint associated with this setpoints sensor input channel.

❖ **Calibration –**   When a calibration is in progress on the associated sensor input channel.

❖ **Off-Line –**   When the associated sensor input channel has been taken "Off-Line."

❖ **Any Error –**   When any error is detected on the associated sensor input channel.

❖ **Cleaning –**   When a cleaning operation is in progress on a setpoint associated with this setpoints sensor input channel.

❖ **Calibration Due –**   When if enabled the calibration due timer has expired on the associated sensor input channel.

❖ **Power Failure –**   Holds the relay in a permanently energised state until the unit is powered down. Only available when using unit alarm

Note – By selecting Unit Alarm in the setpoint channel option each alarm option will activate if they occur on any of the instruments three sensor input channels.

Setpoint Cleaning Mode

The Setpoints can be configured to operate a jet spray wash or rotary electrode cleaning system on a timed cycle. Its purpose is to prevent accumulation of particulate matter on the active surfaces of the sensor. Note that cleaning is not available on all sensor input types.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP
CHANNEL: CHANNEL 1 (COND)
INPUT SOURCE: SOURCE
TRIGGER: SENSOR
HIGH VALUE: TEMPERATURE
MODE: ALARM
DELAY: CLEANING

EXIT

Input Source

If available select cleaning from the list of options.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP
CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: CLEANING
CLEAN DURATI   CLEAN DURATION
CLEAN INTERV   00:20mm:ss
TIME REMAIN: 00:00:00 hh:mm:ss
CLEAN MODE: ON-LINE

EXIT

Clean Duration

Enter the duration of the cleaning operation.
For the duration of the clean, cleaning will appear in the associated sensor input display section on the front screen.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP
CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: CLEANING
CLEAN DURATION: 00:20mm:ss
CLEAN INTERV   CLEAN INTERVAL
TIME REMAII   03:00mm:ss
CLEAN MODE: ON-LINE

EXIT

Clean Interval

Enter the time between cleaning operations.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: CLEANING
CLEAN DURATION: 00:20mm:ss
CLEAN INTERVAL: 03:00 hh:mm
   TIME REMAIN: 00:00:00 hh:mm:ss
CLEAN MODE: ON-LINE

EXIT

Time Remaining

Shows the time remaining till the next clean operation.

Note – Cannot be edited.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: CLEANING
CLEAN DURATION: 00:20mm:ss
CLEAN INTERVAL: 03:00 hh
   TIME REMAIN: CLEAN MODE   ss
CLEAN MODE: ON-LINE
                             OFF-LINE

EXIT

Clean Mode

Associated sensor input channel state when cleaning. It is recommended that off-line is selected. This will automatically take the associated sensor input channel offline, de-energise associated setpoints and hold associated current outputs, during a clean operation. This will prevent any undesired control actions resulting from spraying cleaning solution onto the sensor.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP

CLEAN RECOV   CLEAN RECOVERY
CLEAN DELAY: 01:00mm:ss
MANUAL CLEAN: START

EXIT

Clean Recovery

If cleaning "Off-line" then the user can introduce an additional post cleaning delay before coming back "On-line", this provides the sensor a period to stabilise.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP
CLEAN RECOVERY: 01:00mm:ss
CLEAN DELAY: CLEAN DELAY
MANUAL CLEAN: YES
                    NO

EXIT

Clean Delay

If enabled this causes the clean cycle to wait if any other control setpoints associated with the sensor input channel are active. This is shown by a clean delayed message on the front screen.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETPOINT 1 SETUP
CLEAN RECOVERY: 01:00mm:ss
CLEAN DELAY: NO
MANUAL CLEAN: START CLEAN
                    YES
                    NO

EXIT

Manual Clean

This manually starts a clean cycle.

Note this can also be accomplished via the digital inputs, see Digital Inputs section.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Current Output

The MPD73LV-UL is fitted with up a single current output designated A. The current output menu contains all of the necessary setup functions to configure the current output source.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

CHANNELS
CALIBRATION
SETPOINT / RELAYS
4-20mA OUTPUTS
DIGITAL INPUTS
CONFIGURATION

⬆ ⬇   EXIT   ↵

Main Menu

From the front screen press the menu button to show the main menu options and select 4-20mA Outputs.

⬆/⬇   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

4-20mA OUTPUTS SETUP

4-20mA OP A → CHANNEL 1(SENSOR)

⬆ ⬇   EXIT   ↵

Outputs Setup

Select the Current Output you wish to edit.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

4-20mA OUTPUT A SETUP

CHANNEL: CHANNEL
INPUT SOURCE: DISABLED
OUTPUT: CHANNEL 1 (pH)
ZERO (4mA):   0.00 pH
SPAN (20mA):   14.00 pH
ON ERROR: NO ACTION

⬆ ⬇   EXIT   ↵

Channel

The "Sensor Input Channel" the current output is to be associated with.
To disable the current output select the disabled option. This will turn off the output, remove it's reading from the front screen, the current output trend screen and the menu header. It will also clear any error messages associated with it.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

	Input Source
MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 4-20mA OUTPUT A SETUP CHANNEL: CHANNEL 1 (pH) INPUT SOURCE:◄ SOURCE OUTPUT: SENSOR ZERO (4mA): TEMPERATURE SPAN (20mA): 14.00 pH ON ERROR: NO ACTION ▲ ↓ EXIT ↵	The input source for the selected current output. Available options vary depending on whether the appropriate source is enabled in the channel's setup menu. ▲/↓ – Select Option **EXIT** – Cancel ↵ – Save Selection

	Output
MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 4-20mA OUTPUT A SETUP CHANNEL: CHANNEL 1 (pH) INPUT SOURCE: SENSOR OUTPUT: ◄ OUTPUT ZERO (4mA): 4 - 20mA SPAN (20mA): 0 - 20mA ON ERROR: NO ACTION ▲ ↓ EXIT ↵	The current output can be scaled across either 4 – 20mA or 0 – 20mA ▲/↓ – Select Option **EXIT** – Cancel ↵ – Save Selection

	Zero (0/4mA)
MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 4-20mA OUTPUT A SETUP CHANNEL: CHANNEL 1 (pH) INPUT SOURCE: SENSOR OUTPUT: ZERO (4mA) ZERO (4mA): ◄ 00.00$_{pH}$ SPAN (20mA): 14.00 pH ON ERROR: NO ACTION ▲ ↓ EXIT ↵	Enter the desired sensor value to be represented by 0mA or 4mA (depends on current output scaling). An inverse relationship can be achieved by setting the Zero greater than the Span. If the sensor reading falls outside this and the span value an error / alarm will be activated. ▲/↓ – Increase / Decrease Digit ➡ – Select Next Digit **EXIT** – Cancel ↵ – Save Value

	Span (20mA)
MON 1 JUN 2009 CH1: 9.64 pH TEMP1: 25.0°C 09:56 4-20mA OUTPUT A SETUP CHANNEL: CHANNEL 1 (pH) INPUT SOURCE: SENSOR OUTPUT: 4 - 20mA ZERO (4mA): SPAN (20mA) SPAN (20mA): ◄ 9.999$_{mS/cm}$ ON ERROR: NO ACTION ▲ ↓ EXIT ↵	Enter the desired sensor value to be represented by 20mA. An inverse relationship can be achieved by setting the Span less than the Zero. If the sensor reading falls outside this and the zero value an error / alarm will be activated. ▲/↓ – Increase / Decrease Digit ➡ – Select Next Digit **EXIT** – Cancel ↵ – Save Value

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

4-20mA OUTPUT A SETUP

CHANNEL: CHANNEL 1 (pH)
INPUT SOURCE: SENSOR
OUTPUT:
ZERO (4mA):
SPAN (20mA):
ON ERROR:

ON ERROR
NO ACTION
DRIVE TO 0mA
DRIVE TO 22mA
HOLD LEVEL

EXIT

On Error

The current outputs can be programmed to output 0mA, 22mA or Hold their value when an error is detected on the input source (i.e. Sensor Fault, Temperature Fault), to provide remote warning of error conditions or to ensure fail safe operation.
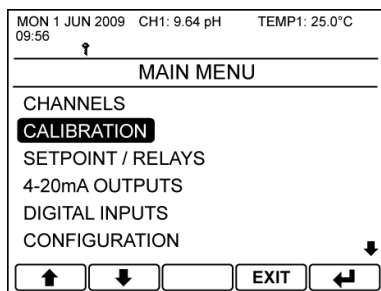
⬆/⬇   – Select Option

EXIT   – Cancel

⏎   – Save Selection

Current Output Calibration

The user is provided with an opportunity to adjust the current output to calibrate any equipment that may be being used to monitor the current output signal.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

CHANNELS
CALIBRATION
SETPOINT / RELAYS
4-20mA OUTPUTS
DIGITAL INPUTS
CONFIGURATION
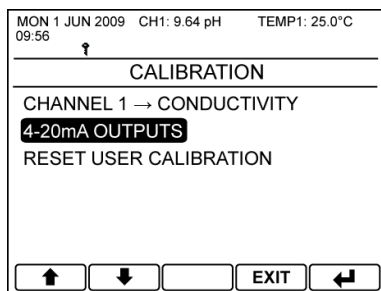
[↑] [↓] [   ] [EXIT] [↵]

Main Menu

From the front screen press the menu button to show the main menu options and select Calibration.

↑/↓ – Select Option
EXIT – Return to Front Screen
↵ – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATION

CHANNEL 1 → CONDUCTIVITY
4-20mA OUTPUTS
RESET USER CALIBRATION
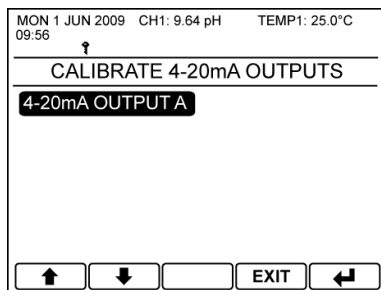
[↑] [↓] [   ] [EXIT] [↵]

Calibration

Select 4-20mA Outputs.

↑/↓ – Select Option
EXIT – Return to Main Menu
↵ – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE 4-20mA OUTPUTS

4-20mA OUTPUT A

[↑] [↓] [   ] [EXIT] [↵]

Calibrate 4-20mA Outputs

Select the current output you wish to calibrate.

↑/↓ – Select Option
EXIT – Return to Calibration
↵ – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE 4-20mA OUTPUTS

4-20mA   4-20mA OUTPUT A

SET OUTPUT ON DMM TO 0mA
USING ⬆ AND ⬇ ARROWS

⬆   ⬇   EXIT   ⏎

Adjust 0mA Output

Using the ⬇ and ⬆ buttons adjust the current output until it reads the desired value on your current meter. Please keep in mind that the current output cannot go below 0mA.

⬆/⬇   – Adjust Output

EXIT   – Cancel

⏎   – Save Adjustment

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE 4-20mA OUTPUTS

4-20mA   4-20mA OUTPUT A

SET OUTPUT ON DMM TO 4mA
USING ⬆ AND ⬇ ARROWS

⬆   ⬇   EXIT   ⏎

Adjust 4mA Output

Using the ⬇ and ⬆ buttons adjust the current output until it reads the desired value on your current meter.

⬆/⬇   – Adjust Output

EXIT   – Cancel

⏎   – Save Adjustment

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CALIBRATE 4-20mA OUTPUTS

4-20mA   4-20mA OUTPUT A

SET OUTPUT ON DMM TO 20mA
USING ⬆ AND ⬇ ARROWS

⬆   ⬇   EXIT   ⏎

Adjust 20mA Output

Using the ⬇ and ⬆ buttons adjust the current output until it reads the desired value on your current meter.

⬆/⬇   – Adjust Output

EXIT   – Cancel

⏎   – Save Adjustment

Resetting the current Output user Calibration

If required the user can reset the current output user calibration back to factory settings.

MON 1 JUN 2009   CH1: 517.2 µS/cm   TEMP1: 12.3°C
09:56   CH2: 9.64 pH   TEMP2: 25.0°C
                 CH3: 23.3%   TEMP3: 28.0°C
                     MAIN MENU

 CHANNELS
 CALIBRATION
 SETPOINT / RELAYS
 4-20mA OUTPUTS
 DIGITAL INPUTS
 CONFIGURATION

         [↑]   [↓]   EXIT   [↵]

Main Menu

From the front screen press the menu button to show the main menu options and select Calibration.

↑/↓   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56
                   CALIBRATION

 CHANNEL 1 → pH
 4-20mA OUTPUTS
 RESET USER CALIBRATION

         [↑]   [↓]   EXIT   [↵]

Calibration

Select Reset User Calibration.

↑/↓   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 517.2 µS/cm   TEMP1: 12.3°C
09:56   CH2: 9.64 pH   TEMP2: 25.0°C
                 CH3: 23.3%   TEMP3: 28.0°C
              RESET USER CALIBRATION

 RESET CHANNEL 1 → CALIB.(COND)
 RESET 4-20mA OUTPUTS
 RESET ENTIRE UNIT

         [↑]   [↓]   EXIT   [↵]

Reset User Calibration

Select Reset 4-20mA Outputs.

↑/↓   – Select Option

EXIT   – Return to Calibration

↵   – Enter Option

```
MON 1 JUN 2009   CH1: 9.64 pH        TEMP1: 25.0°C
09:56

        4-20mA OUTPUTS RESET

   4-20mA OUTPUT A:        RESET




        ↑        ↓                EXIT        ↵
```

4-20mA Outputs Reset

Select the required 4-20mA Output to Reset its user calibration back to factory settings.

↑/↓   – Select Option

EXIT   – Return to Reset User Calibration

↵   – Enter Option

Digital Inputs

The MPD73LV-UL is fitted with eight digital inputs designated 1 – 8. Each individual digital input can be assigned to the Sensor Input or to the instrument as a whole. The digital input menu contains all of the necessary setup functions to configure the digital input sources. These inputs are intended to be switched using a volt free link, switch or relay. The user can select whether closing or opening the contact initiates the configured action.
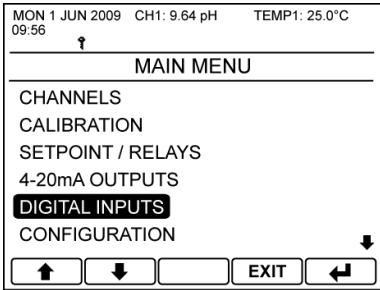
MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

CHANNELS
CALIBRATION
SETPOINT / RELAYS
4-20mA OUTPUTS
DIGITAL INPUTS
CONFIGURATION

EXIT

Main Menu

From the front screen press the menu button to show the main menu options and select Digital Inputs.

⬆/⬇   – Select Option

EXIT   – Return to Calibration

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

DIGITAL INPUTS SETUP

○ DIG IP 1 → CH 1(OFF-LINE)
● DIG IP 2 → CH 1(CLEAN)
○ DIG IP 3 → CH 1(SWITCH SETUP)
○ DIG IP 4 → UNIT
○ DIG IP 5 → DISABLED
○ DIG IP 6 → DISABLED
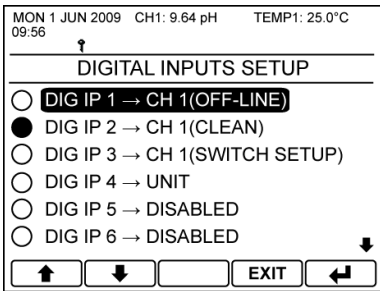
EXIT

Digital Inputs Setup

Select the Digital Input you wish to edit.

The status of the Digital Input is also shown to the left of each item.

○   – Digital Input Open Circuit

●   – Digital Input Closed Circuit

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

DIGITAL INPUT 1 SETUP

CHANNEL: CHANNEL
FUNCTION: DISABLED
POLARITY: CHANNEL 1 (pH)
4-20mA OP LEVEL: WHOLE UNIT
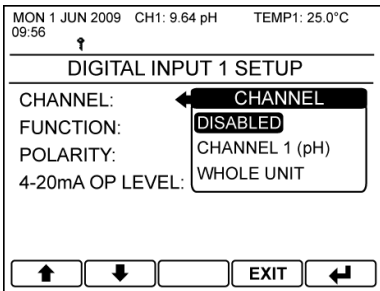
EXIT

Channel

The "Sensor Input Channel" the digital input is to be associated with. Alternatively, if Whole Unit is selected the action will affect all the input channels.
To disable the digital input, select the disabled option.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Function

The digital input can be configured to operate in the following ways:

❖ Offline
❖ Interlock
❖ Flow Switch Input
❖ Tank Level Switch
❖ Clean
❖ Switch Setup

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Offline, Interlock, Flow Switch Input, Tank Level Switch

These four functions when active will take the associated sensor input channel "offline". This causes any setpoints associated with the channel to de-energise.

They are also accompanied by a message on the front screen informing the user which action is currently active.

Note – When a digital input is assigned to one of these functions the user can no longer take the associated channel offline using the menu item in the channel setup menu or the channel calibration menu. As indicated by the "Cannot Edit, Digital Input Has Control" message.

In addition to de-energising any associated setpoints the user can also define the operation the current outputs associated with the sensor input channel.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Clean

If the selected Input Sensor Channel has a setpoint configured for a cleaning operation, a external cleaning cycle can be initiated using this function.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Switch Setup

The digital input is used to load in an alternative sensor input channel configuration (Sensor Setup, Setpoint Setup and Current Output Setup) that have been stored in one of the two internal channel stores. Whilst the digital input is active no parameters assigned to the sensor input channel can be edited. The original configuration is restored upon the digital input going inactive.

For information regarding saving the setup, see the Save and Restore section of the user interface guide.

NOTE – Only one store at a time can be loaded per channel.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Polarity

Configure whether the digital input activates on the closing of circuit (normally open) or the opening of the circuit (normally closed).

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

Simulate Channels

The facility exists within the MPD73LV-UL to simulate the input sensor levels to test the setpoint and current output operation. This function allows the user to cycle up and down through the sensor range whilst displaying the current output level, and with the relays responding accordingly.

Main Menu

From the front screen press the menu button to show the main menu options and select Channels.

⬆/⬇   – Select Option

EXIT   – Return to Front Screen

⏎   – Enter Option

Channels Setup

Select Simulate Channels, or alternatively to only simulate one channel select Simulated Input in the individual channel setup menu.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

⏎   – Enter Option

Simulate Channels

Select the sensor or temperature you wish to simulate and observe the associated setpoints operate and current outputs move. Only input sensors or temperatures with setpoints or current outputs associated with them will appear.

Note – This menu will not "time out" back to the front screen.

+   – Increase Selected Value

–   – Decrease Selected Value

NEXT   – Select Next Value

EXIT   – Return to Channels Setup

Configuration

The configuration menu enables the user to configure the basic operating parameters of the instrument.
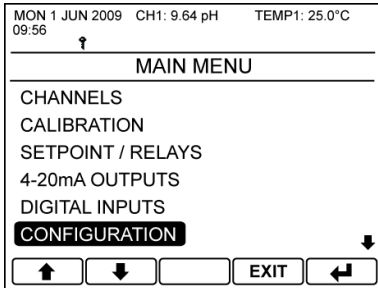
Main Menu

From the front screen press the menu button to show the main menu options and select Configuration.

⬆/⬇ – Select Option

EXIT – Return to Front Screen

↵ – Enter Option
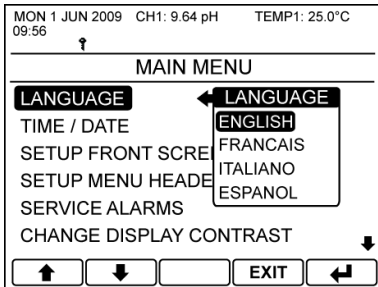
Language

The MPD73LV-UL has the ability to support multilingual menus. The language of choice can be selected from this menu.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection
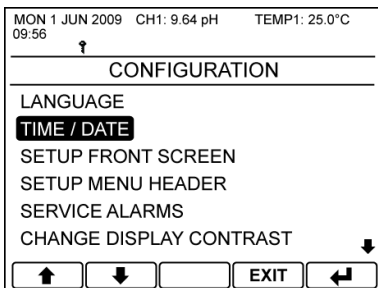
Time / Date

Configure the internal battery backed clock.

⬆/⬇ – Select Option

EXIT – Return to Main Menu

↵ – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

TIME / DATE

SET TIME: SET TIME
SET DATE: 09:56
DAYLIGHT SAVINGS: ENABLED
DST START DATE: LAST SUN MAR
DST START TIME: 01:00:00 hh:mm:ss
DST END DATE: LAST MON OCT

EXIT

Set Time

Sets the instruments time.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Time

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

TIME / DATE

SET TIME: 09:56
SET DATE: SET DATE
DAYLIGHT SAVING   MON 1 JUN 2009
DST START DATE: LAST SUN MAR
DST START TIME: 01:00:00 hh:mm:ss
DST END DATE: LAST MON OCT

EXIT

Set Date

Sets the instruments date.

⬆/⬇   – Increase / Decrease item

➡   – Select Next item

EXIT   – Cancel

↵   – Save date

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

TIME / DATE

SET TIME: 09:56
SET DATE: MON 01 JUN 2009
DAYLIGHT SAVINGS: ENABLED
DST START DATE: LAST SUN MAR
DST START TIME: 01:00:00 hh:mm:ss
DST END DATE: LAST MON OCT

EXIT

Daylight Savings

This allows the instrument to automatically adjust it's time for when daylight savings starts and ends. The start and end times may be adjusted to allow for local differences.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

LANGUAGE
TIME / DATE
SETUP FRONT SCREEN
SETUP MENU HEADER
SERVICE ALARMS
CHANGE DISPLAY CONTRAST

EXIT

Change Display Contrast

This allows the user to adjust the contrast of the display to compensate for environmental conditions that may affect the readability of the display.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

LANGUAGE
TIME / DATE
SETUP FRONT SCREEN
SETUP MENU HEADER
SERVICE ALARMS
CHANGE DISPLAY CONTRAST

EXIT

Setup Front Screen

This allows the user to customise the information the front screen displays

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETUP FRONT SCREEN

CHANNEL 1 → CONDUCTIVITY
4-20mA OUTPUT SLOT 1
4-20mA OUTPUT SLOT 2

EXIT

Select Front Screen Channel

Select which front screen channel you wish to edit

⬆/⬇   – Select Option

EXIT   – Return to Configuration Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CHANNEL 1

CHANNEL SHOWN   YES
i)   TEMPERATURE
ii)   4-20mA OUTPUT A
CHANNEL LABEL: TANK 1

EXIT

Channel Setup

- Channel shown – Select whether the channel is shown or not.

- i), ii) – Define which is displayed in the either of the two secondary reading slots. Available options depend on the selected input card type but include temperature, sensor current, pressure and any associated current output values.

- Channel Label – Define the channel label that appears on the front screen adjacent to the channel reading (7 characters maximum).

⬆/⬇   – Select Option

EXIT   – Return to Configuration Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETUP FRONT SCREEN

CHANNEL 1 →   4-20mA OP TREND
4-20mA OUTPU   DISABLED
4-20mA OUTPU   4-20mA OUTPUT A
                   4-20mA OUTPUT B

⬆   ⬇   EXIT   ↵

Front Screen Trend

If only one channel is displayed on the front screen the user has the ability to show up to two current output trends called 4-20mA Output Slot 1, and 4-20mA Output Slot 2. Note, that you will only be able to select the current outputs that are associated with the displayed channel.

⬆/⬇   – Select Option
EXIT   – Cancel
↵   – Save Selection

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

LANGUAGE
TIME / DATE
SETUP FRONT SCREEN
SETUP MENU HEADER
SERVICE ALARMS
CHANGE DISPLAY CONTRAST   ⬇

⬆   ⬇   EXIT   ↵

Setup Menu Header

This allows the user to customise the information the menu header displays.

⬆/⬇   – Select Option
EXIT   – Return to Main Menu
↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETUP MENU HEADER

i)   MON 1 JUN 2009   i)   ii)
ii)   09:56   iii)   iv)
                            v)   vi)
iii)
iv)
v)
vi)

⬆   ⬇   EXIT   ↵

Select Menu Header

By looking at the legend shown select which menu header location you wish to edit, then chose the value from the displayed pop-up.

⬆/⬇   – Select Option
EXIT   – Return to Configuration Menu
↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

LANGUAGE
TIME / DATE
SETUP FRONT SCREEN
SETUP MENU HEADER
SERVICE ALARMS
CHANGE DISPLAY CONTRAST

▲   ▼   EXIT   ↵

Service Alarms

The MPD73LV-UL has an inbuilt Service Alarm for the measurement channel which will activate when the maintenance engineer's service interval has expired. Note. By default, the alarms are disabled and can only be setup using the service access code which can be obtained from LTH Electronics.

↑/↓   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETUP SERVICE

CHANNEL 1 → pH

▲   ▼   EXIT   ↵

Select Service Alarm Channel

Select which service alarm the user wishes to edit.

↑/↓   – Select Option

EXIT   – Return to Configuration Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SETUP SERVICE 1

SERVICE DUE DATE: UPDATE
SERVICE REMINDER: YES
SERVICE INTERVAL: 365 DAYS
NEXT SERVICE DATE: 01 JUN 10
DEFER SERVICE DATE: 7 DAYS

▲   ▼   EXIT   ↵

Setup Service Alarm

Service alarm configuration:

- Service Due Date: Update – Automatically increment the next service date by the service interval. Requires service security code prior to use.

- Service Reminder – Turn the service alarm on or off. Requires service security code prior to use.

- Service Interval – Set the Service Interval. Requires service security code prior to use.

- Next Service Date – Sets the exact service date. Requires service security code prior to use.

- Defer Service Date – Only appears once the service interval has expired. Increases the service interval by an extra 7 days. Requires standard security code prior to use.

↑/↓   – Select Option

EXIT   – Return to Select Service Alarm Menu

↵   – Edit Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

SOFTWARE STATUS
UNLOCK SOFTWARE
UPDATE SOFTWARE
FORMAT SD CARD

EXIT

Software Status

Provides information about the software version and serial numbers of the instrument.

⬆/⬇   – Select Option
EXIT   – Return to Main Menu
↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SOFTWARE STATUS

SOFTWARE VERSION: V1.00
BASE UNIT SERIAL NO: 9000000
CHANNEL 1 SERIAL NO: 9300000
CHANNEL 2 SERIAL NO: NO CARD
CHANNEL 3 SERIAL NO: NO CARD
OUTPUT CARD SERIAL NO: 9200000

EXIT

EXIT   – Return to Configuration Menu

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

SOFTWARE STATUS
UNLOCK SOFTWARE
UPDATE SOFTWARE
FORMAT SD CARD

EXIT

Format SD Card

Allows the users to reformat SD cards which are incompatible with the instrument. For cards which are greater than 4GB this may take several minutes.

Update Software

The MPD73LV-UL operating software can be upgraded by saving the latest version from LTH onto a SD card, inserting it into the instrument and following the instructions below. All three files must be present on the SD card for the update to work. All units supplied after 1st October 2012 now support SDHC and SDXC cards using the fat32 format. If the card is not formatted correctly the instrument will inform the user, the card must then be reformatted using the Format SD Card function.

Caution! The MPD73LV-UL update may take up to 5 minutes, during which time the unit will not operate.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION

SOFTWARE STATUS
UNLOCK SOFTWARE
UPDATE SOFTWARE
FORMAT SD CARD
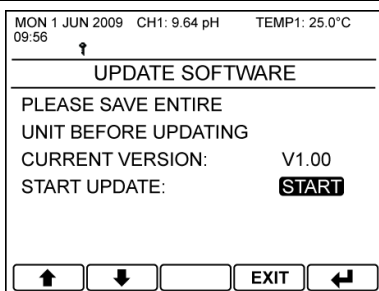
⬆   ⬇   EXIT   ↵

Update Software

Select the update software option from within the configuration menu.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

UPDATE SOFTWARE

PLEASE SAVE ENTIRE
UNIT BEFORE UPDATING
CURRENT VERSION: V1.00
START UPDATE: START

⬆   ⬇   EXIT   ↵
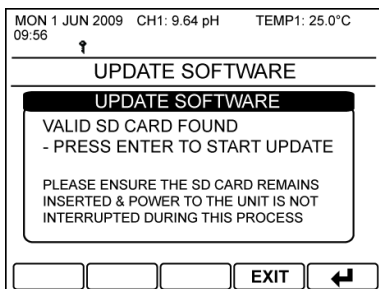
Update Software

Verify that the new software is of a higher version than the current one shown. It is recommended that the entire unit is saved before the update is started. See the "Save Setup" section for instructions.

Select start to continue.

⬆/⬇   – Select Option

EXIT   – Return to Configuration Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

UPDATE SOFTWARE

UPDATE SOFTWARE
VALID SD CARD FOUND
- PRESS ENTER TO START UPDATE

PLEASE ENSURE THE SD CARD REMAINS
INSERTED & POWER TO THE UNIT IS NOT
INTERRUPTED DURING THIS PROCESS

EXIT   ↵

Update Software

If the instrument has verified that all of the required software is present on the SD card press enter to begin the update.

During the update the display and LEDs will indicate the progress of the update.

Once finished the instrument will restart automatically.

EXIT   – Return to Update Software Menu

↵   – Begin Update

Optional Software Functions

The MPD73LV-UL series features optional software functions which when purchased will expand the instrument's capabilities. These functions by default are locked. They can be unlocked by LTH or your local distributor at the time of order. Alternatively the functions may be ordered after purchase by supplying LTH or your local distributor the serial number of your instrument along with the purchase order. In return they will supply you with an 8 digit unlock code that is unique to the instrument and the required function to be unlocked.

Unlocking Optional Software Functions

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

CHANNELS
CALIBRATION
SETPOINT / RELAYS
4-20mA OUTPUTS
DIGITAL INPUTS
CONFIGURATION

⬆   ⬇   EXIT   ↵

Main Menu

From the front screen press the menu button to show the main menu options and select Configuration.

⬆/⬇   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

CONFIGURATION   ⬆

SOFTWARE STATUS
UNLOCK SOFTWARE
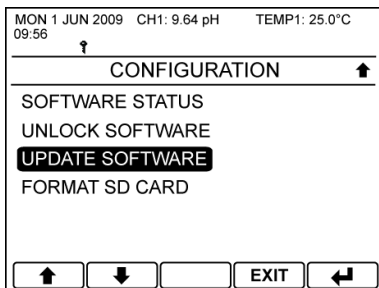UPDATE SOFTWARE
FORMAT SD CARD

⬆   ⬇   EXIT   ↵

Software Status

Select Software Status.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SOFTWARE STATUS

SOFTWARE VERSION: V1.00
BASE UNIT SERIAL NO: 9000000
CHANNEL 1 SERIAL NO: 9300000
CHANNEL 2 SERIAL NO: NO CARD
CHANNEL 3 SERIAL NO: NO CARD
OUTPUT CARD SERIAL NO: 9200000

EXIT

Software Status

Record the base unit serial number and supply it to LTH or your local distributor along with your purchase order.

EXIT   – Return to Configuration Menu

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

CONFIGURATION

SOFTWARE STATUS
UNLOCK SOFTWARE
UPDATE SOFTWARE
FORMAT SD CARD

⬆   ⬇   EXIT   ↵

Unlock Software

Upon receipt of the unlock code return to the Configuration menu and select Unlock Software.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

THU 4 APR 2012   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

UNLOCK SOFTWARE

DATA LOGGING: **LOCKED**

⬆   ⬇   EXIT   ↵

Unlock Software

Select the optional software function you wish to unlock.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

THU 4 APR 2012   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

UNLOCK SOFTWARE

DATA LOGGI
        UNLOCK CODE
        ENTER UNLOCK
            CODE

        █ _ _ _ _ _ _ _

⬆   ⬇   ➡   EXIT   ↵

Enter the required Unlock Code.

If the code is incorrect the user will be prompted to try again.

If the code is correct the function will now be unlocked

⬆/⬇   – Change Character

➡   – Select Next Character

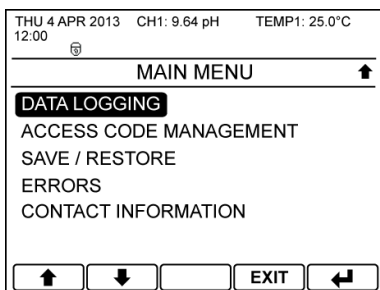**EXIT**   – Cancel

↵   – Enter Code

Data Logging

The Data logging optional software function expands the capabilities of the MPD73LV-UL by allowing the user to record over time the status of the instrument. It consists of two separate sections, Live Trending and SD Card Data Logging, which together will help the user to analyse and improve the performance of their application. Please note by default this function is locked. It can be unlocked by LTH or your local distributor at the time of order or through purchasing an unlock code, see page 96 for further information.

Live Trending

Live Trending provides the user with 3 separate live trend screens adjacent to the front screen with each showing 2 readings; these enable the user to instantly view the last 50 samples of each reading. The live trend screen also features a review mode where by the user can further analyse the last 200 samples of each reading, If the user finds something of note the software provides a facility to save those 200 readings to an excel compatible file on the SD card. Further analysis is provided by optionally displaying the minimum, maximum and average value of the 200 samples. The number of readings, the source of the readings, the displayed scale and the sample interval rate are all configurable by the user.

Setup Live Trending
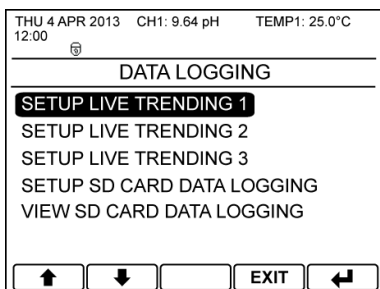
THU 4 APR 2013 CH1: 9.64 pH TEMP1: 25.0°C 12:00 ⏱ **MAIN MENU** ⬆ DATA LOGGING ACCESS CODE MANAGEMENT SAVE / RESTORE ERRORS CONTACT INFORMATION ⬆ ⬇ EXIT ↵	**Main Menu** From the front screen press the menu button to show the main menu options and select Data Logging. ⬆/⬇ – Select Option **EXIT** – Return to Front Screen ↵ – Enter Option
THU 4 APR 2013 CH1: 9.64 pH TEMP1: 25.0°C 12:00 ⏱ **DATA LOGGING** SETUP LIVE TRENDING 1 SETUP LIVE TRENDING 2 SETUP LIVE TRENDING 3 SETUP SD CARD DATA LOGGING VIEW SD CARD DATA LOGGING ⬆ ⬇ EXIT ↵	**Data Logging** Select the live trend you wish to setup. ⬆/⬇ – Select Option **EXIT** – Return to Main Menu ↵ – Enter Option

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP LIVE TRENDING 1
CONFIGURE T   CONFIGURE TREND
TRACE 1 (—):   NONE
TRACE 1 MIN: 1 TRACE
TRACE 1 MAX: 2 TRACES
TRACE 2 (---):   CH1 TEMP
TRACE 2 MIN: 0.0ºC
EXIT

Configure Trend

Select the number of traces to display. By selecting none the live trend is disabled and no longer visible from the front screen.

⬆/⬇   – Select Option
EXIT   – Cancel
↵   – Save Selection

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP LIVE TRENDING 1
CONFIGURE T   TRACE 1(—)
TRACE 1 (—):   CH1 pH
TRACE 1 MIN: CH1 mV
TRACE 1 MAX: CH1 TEMPERATURE
TRACE 2 (---):   CH1 TEMP
TRACE 2 MIN: 0.0ºC
EXIT

Trace 1 (—)

Select which measurement Trace 1 (left hand side axis) is to be associated with. The options shown depend on the configuration of the instrument.

⬆/⬇   – Select Option
EXIT   – Cancel
↵   – Save Selection

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP LIVE TRENDING 1
CONFIGURE TREND: 2 TRACES
TRACE 1 (—):   TRACE 1 MIN
TRACE 1 MIN: 07.00pH
TRACE 1 MAX: 14.00pH
TRACE 2 (---):   CH1 TEMP
TRACE 2 MIN: 0.0ºC
EXIT

Trace Min

Enter the Trace's minimum displayed value. Adjust in conjunction with the maximum displayed value to increase the measurements displayed resolution.

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT   – Cancel
↵   – Save Value

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP LIVE TRENDING 1
CONFIGURE TREND: 2 TRACES
TRACE 1 (—):   CH1 pH
TRACE 1 MIN: TRACE 1 MAX
TRACE 1 MAX: 400.0μS/cm
TRACE 2 (---):   CH1 TEMP
TRACE 2 MIN: 0.0ºC
EXIT

Trace Max

Enter Trace's maximum displayed value. Adjust in conjunction with the minimum displayed value to increase the measurements displayed resolution.

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT   – Cancel
↵   – Save Value

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP LIVE TRENDING 1

TRACE 2 MIN: 8.00pH
TRACE 2 MAX   14.00pH
TREND INTERVA   TREND INTERVAL
                   00:00:01 hh:mm:ss

⬆   ⬇   ➡   EXIT   ↵

Trend Interval

Enter the time interval between samples for both trace 1 and trace 2.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

Live Trend Screen

Once Configured the Live Trend screens can be found by moving right from the front screen. In addition the live trend screens will not "time out" back to the front screen. The screen operates in two modes "Live Mode" and "Review Mode", in Live Mode Screen shows the last 50 sampled readings whilst in Review Mode the user can scroll back through the last 200 readings.

Note. When in review mode the screen will no longer update with live readings, however the live readings are still being recorded and will be restored when review mode is exited.
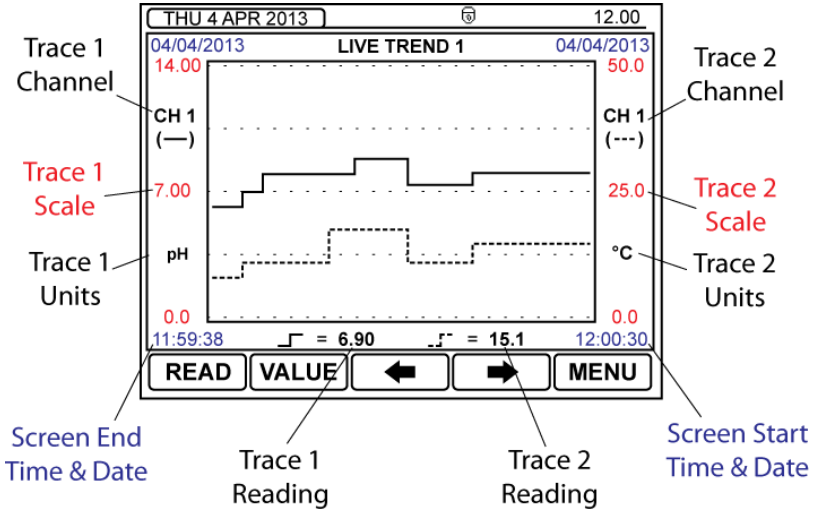
| READ/ MIN/ MAX/ AVG	– Indicates the status of the Trace Readings at the bottom of the screen when in Live Mode. Press to cycle between the available options: READ = Current Reading MIN = The minimum value of the last 200 readings MAX = The maximum value of the last 200 readings AVG = The average value of the last 200 readings
LINE/ PAGE	– When in Review Mode toggles between the cursor moving a line at a time or at a page at a time.
VALUE	– Press to enter the live trend Review Mode. Review mode allows the user to scroll back through the last 200 readings.
EXIT	– When in Review Mode, press to exit and return to the Live Mode.
⬅ or ➡	– When in Live Mode – return to the front screen or move on to the next live trend. – When in Review Mode - moves the cursor across the screen. The pointed to value will be displayed at the bottom of the screen and the time at the top.
MENU	– Enter the instruments main menu screen.
SAVE	– When in Review Mode and a SD card is present, saves a copy of the current 200 readings as a time stamped excel compatible file to the Live Trend folder on the SD card.

SD Card Data Logging

The SD Card Data Logging part of the data logging software enables the user to log over long periods the status of the instrument direct to the SD card. Variables logged include: the primary sensor readings, any secondary readings, the status of the setpoints, the current output readings, the status of the digital inputs and any error messages. This data can then be viewed either inside the instrument or removed and viewed in Microsoft Excel on a PC. Which channels are logged and logging interval are configurable by the user.

Setup SD Card Data Logging
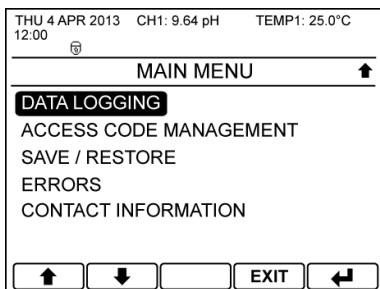
Main Menu

From the front screen press the menu button to show the main menu options and select Data Logging.

⬆/⬇   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

Data Logging

Select Setup SD Card Data Logging.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option
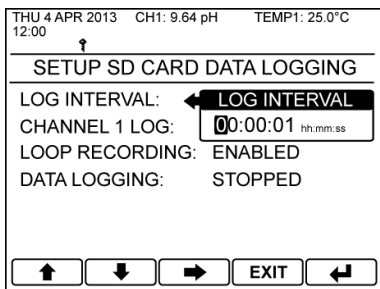
Log Interval

Enter the time interval of the SD card data logging.

Note. If logging at 1 sample per second, 1GB of space on the SD card will provide at least 40 Days of logging.

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP SD CARD DATA LOGGING

LOG INTERVAL: 00:00:01 hh:mm:ss
CHANNEL 1 LOG: ◄ CHANNEL 1 LOG
LOOP RECORDING   ENABLED
DATA LOGGING: DISABLED

⬆   ⬇   ➡   EXIT   ↵

Channel Log

Enables / Disables the SD card data logging of the channel and any setpoints, current outputs, digital inputs and error messages associated with the channel.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP SD CARD DATA LOGGING

LOG INTERVAL: 00:00:01 hh:mm:ss
CHANNEL 1 LOG: ENABLED
LOOP RECORDI   ◄ LOOP RECORDING
DATA LOGGING: ENABLED
                                 DISABLED

⬆   ⬇   ➡   EXIT   ↵

Loop Recording

If enabled, when the SD card becomes full the instrument will automatically delete the oldest data log file and then continue to log.
If loop recording is disabled the instrument will automatically stop recording if the SD card becomes full and set an error message.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

SETUP SD CARD DATA LOGGING

LOG INTERVAL: 00:00:01 hh:mm:ss
CHANNEL 1 LOG: ENABLED
LOOP RECORDI   DATA LOGGING
DATA LOGGING: ◄ START

⬆   ⬇   ➡   EXIT   ↵

Data Logging Start/Stop

Shows the current status of the data logging (Stopped / Recording) and allows the logging to be started and stopped. When the data logging is active the SD card active symbol 💾 will be shown at the top of the screen.
Note: If a large number of files are present on the SD card there may be a delay whilst the software is searching the card for a clear space. Whilst the card is being searched the SD card active symbol will flash.

⬆/⬇   – Select Option

EXIT   – Cancel

↵   – Save Selection

View SD Card Data Logging

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00
MAIN MENU   ⬆
DATA LOGGING
ACCESS CODE MANAGEMENT
SAVE / RESTORE
ERRORS
CONTACT INFORMATION

⬆   ⬇   EXIT   ↵
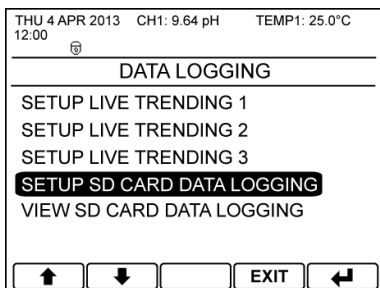
Main Menu

From the front screen press the menu button to show the main menu options and select Data Logging.

⬆/⬇   – Select Option
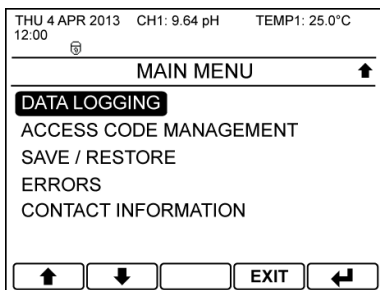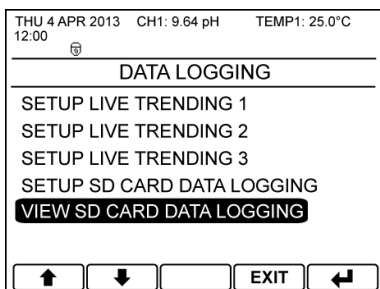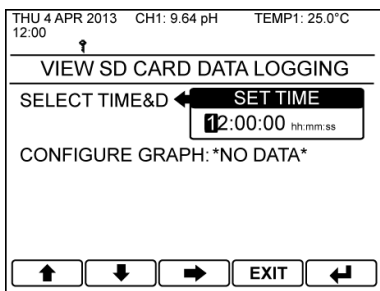
EXIT   – Return to Front Screen

↵   – Enter Option

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00
DATA LOGGING
SETUP LIVE TRENDING 1
SETUP LIVE TRENDING 2
SETUP LIVE TRENDING 3
SETUP SD CARD DATA LOGGING
VIEW SD CARD DATA LOGGING

⬆   ⬇   EXIT   ↵

Data Logging

Select View SD Card Data Logging.

⬆/⬇   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00
VIEW SD CARD DATA LOGGING
SELECT TIME&D   SET TIME
12:00:00 hh:mm:ss
CONFIGURE GRAPH: *NO DATA*

⬆   ⬇   ➡   EXIT   ↵

Select Time & Date

Enter the time and date of the data to be viewed. If the SD card contains no data at the selected time and date then the configure graph shows *No Data*.

Note. If the SD card contains many files then there may be a delay whilst the card is searched.
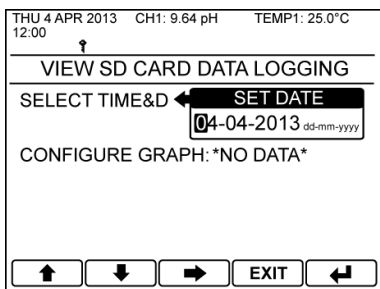
THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00
VIEW SD CARD DATA LOGGING
SELECT TIME&D   SET DATE
04-04-2013 dd-mm-yyyy
CONFIGURE GRAPH: *NO DATA*

⬆   ⬇   ➡   EXIT   ↵

⬆/⬇   – Increase / Decrease Digit

➡   – Select Next Digit

EXIT   – Cancel

↵   – Save Value

Configure Graph

Select how many traces to show on the graph.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Trace Channel

Select which channel the trace is assigned to. Available channels depend upon which channels have been recorded in the selected log.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Trace 1 (—)

Select which measurement Trace 1 (left hand side axis) is to be associated with. The options shown depend on the configuration of the instrument.

⬆/⬇ – Select Option

EXIT – Cancel

↵ – Save Selection

Trace Min

Enter the Trace's minimum displayed value. Adjust in conjunction with the maximum displayed value to increase the measurements displayed resolution.

⬆/⬇ – Increase / Decrease Digit

➡ – Select Next Digit

EXIT – Cancel

↵ – Save Value

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

VIEW SD CARD DATA LOGGING
TRACE 1 MAX: TRACE 1 MAX
TRACE 2 CHANNE   14.00pH
TRACE 2 (---):   CH2 TEMP
TRACE 2 MIN: 0.0 ºC
TRACE 2 MAX: 100.0ºC
VIEW GRAPH: ENTER

[↑] [↓] [➡] [EXIT] [↵]

Trace Max

Enter the Trace's maximum displayed value. Adjust in conjunction with the minimum displayed value to increase the measurements displayed resolution.

⬆/⬇   – Increase / Decrease Digit
➡   – Select Next Digit
EXIT – Cancel
↵   – Save Value

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

VIEW SD CARD DATA LOGGING
TRACE 1 MAX: TRACE 2(---)
TRACE 2 CHAN   CH1 pH
TRACE 2 (---): CH1 TEMPERATURE
TRACE 2 MIN: CURRENT OP A
TRACE 2 MAX: SETPOINT 1
VIEW GRAPH: SETPOINT 2

[↑] [↓] [➡] [EXIT] [↵]

Trace 2 (---)

Select which measurement Trace 2 (right hand side axis) is to be associated with. The options shown depend on the configuration of the instrument. Then configure trace 2's min and max as before with trace 1.

⬆/⬇   – Select Option
EXIT – Cancel
↵   – Save Selection

THU 4 APR 2013   CH1: 9.64 pH   TEMP1: 25.0°C
12:00

VIEW SD CARD DATA LOGGING
TRACE 1 MAX: 14.00 pH
TRACE 2 CHANNEL: CHANNEL 1
TRACE 2 (---):   CH1 TEMP
TRACE 2 MIN: 0.0 ºC
TRACE 2 MAX: 100.0 ºC
VIEW GRAPH: ENTER

[↑] [↓] [ ] [EXIT] [↵]

View Graph

View the configured graph.

⬆/⬇   – Select Option
EXIT – Cancel
↵   – Enter Option

SD Card Data Logging Graph

Once Configured the SD card Data Logging Graph starts by showing the closest reading to the one selected by the time and date. The user can then use the cursor to scroll backwards and forwards in time through the log on the SD card. Each screen shows 50 readings. For faster scrolling the user can turn on page mode where by the screen jumps a page at a time through the readings. Where a break occurs in the trace you have reached the end of one file and the beginning of the next. Note: there may be a delay in scrolling when new data is loaded from the SD card.
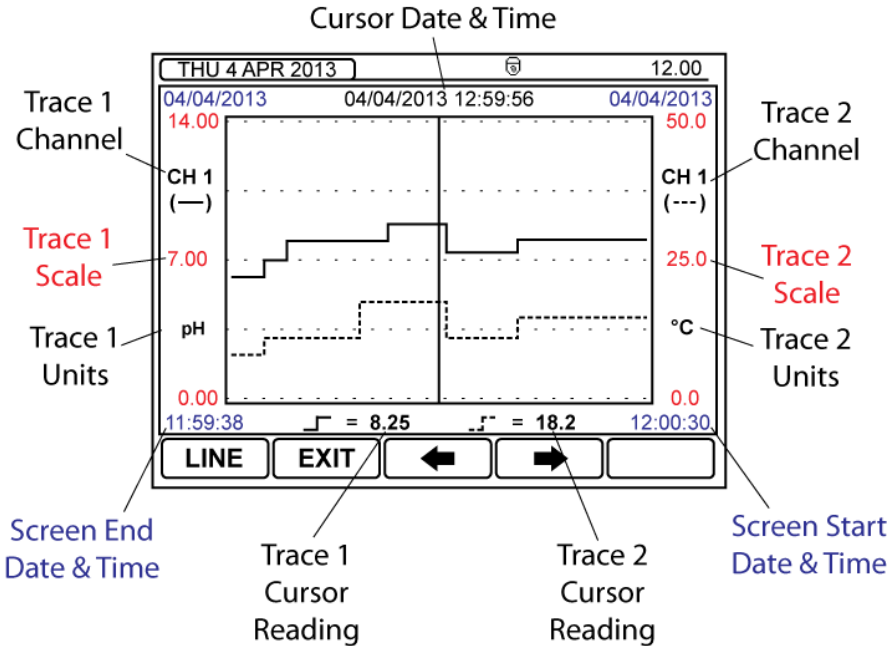
LINE/PAGE	– Toggles between the cursor moving a line at a time or at a page at a time.
EXIT	– Press to exit and return to View SD Card Data Logging menu.
← or →	– Moves the cursor across the screen. The pointed to value will be displayed at the bottom of the screen and the time at the top.

Viewing the SD Card Data Log on a PC

Before the user removes the card from the instrument they must first stop the SD Card data logging (see page 102) and the SD card active symbol 💾 must not be present at the top of the screen.
Once removed place the SD card in the card reader connected to the pc. Open the SD card in the file explorer and browse to either the Data Logging folder to view the SD card data logging or the Live Trend folder to view the live trend log saves.

Each file is limited to 65535 logs; when this limit is reached the instrument will automatically create a new file. The instrument will also automatically create a new file if the configuration of the instrument is changed whilst the data logging is active.

Each file name contains the date and time of when it was created. The data is stored as a comma separated variable (CSV), which can be read by Microsoft Excel.

The first column of data contains the date and time of each sample. Note: by default Excel hides the seconds value, to display this you need to apply a custom format to the column as follows: dd/mm/yyyy hh:mm:ss.

The proceeding columns contain:

• The main sensor reading and units,

• Any secondary readings and units i.e. temperature.

• The status of any setpoints associated with the logged channels, where 0 = off, 100 = fully on. When using a proportional control mode this number represents the setpoint output as a percentage of the proportional band.

• The output level of any current output associated with the logged channels.

• The status of any digital input associated with the logged channels, where 0 = inactive and 1 = active.

• Any active error messages.

! Beware the file is not protected; changes can be made and may be irreversible. If any changes are made it may affect the ability for the instrument to read the file if it is placed back into the instrument.

Error Messages

If the internal diagnostics have detected an error condition then the error LEDs will illuminate. This is accompanied by an alarm bell either next to the associated channel or in the unit status area. By pressing the left arrow on the front screen or by selecting the errors option in the main menu, the list of currently active errors can be seen. By selecting an error and pressing the help button a more detailed description of the error is shown along with suggested solutions to the possible causes of the error.
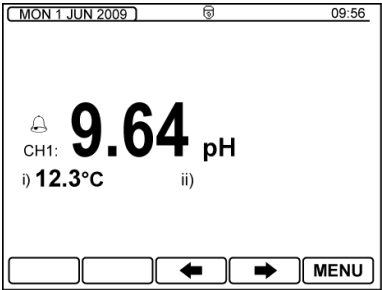
Error Menu Access

The error menu can be accessed by either pressing the scroll left button whilst on the front screen.

⬅	– Scroll Left (To Error Menu)
➡	– Scroll Right
Menu	– Access Main Menu
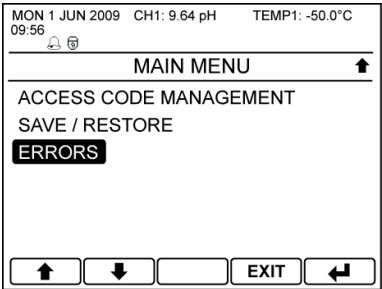
Or by selecting the Errors option from the main menu.

⬆/⬇	– Select Option
EXIT	– Return to Front Screen
↵	– Enter Option
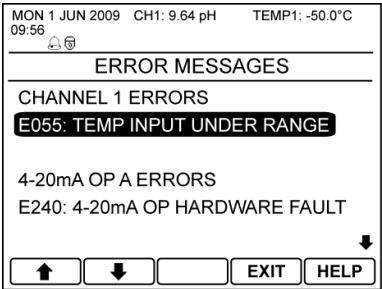
Error Messages

For more information regarding each error message select the required message and press the help button.

⬆/⬇	– Select Error
EXIT	– Return to Main Menu
HELP	– Extended Information

Save, Restore & Reset

The MPD73LV-UL features the ability to save and restore the current configuration of a channel and its associated setpoints, current outputs, and digital inputs, into either one of two save slots inside the instrument. Alternatively the configuration can be saved and restored via an SD card inserted into the unit, which allows the instruments configuration to be backed up. It also provides the ability to copy the configuration from one instrument to another, providing that the input card type for each channel is the same on the second instrument.

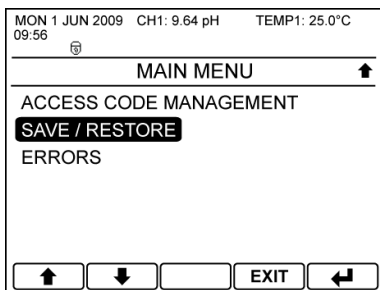The save and restore menu also features the ability to reset either the whole instrument or each channels configuration, user calibration; and it's associated setpoints, current outputs and digital inputs, back to their factory settings.

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

MAIN MENU

ACCESS CODE MANAGEMENT
SAVE / RESTORE
ERRORS

[↑] [↓] [ ] [EXIT] [↵]

Main Menu

From the front screen press the menu button to show the main menu options and select Save/Restore.

↑/↓   – Select Option

EXIT   – Return to Front Screen

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SAVE / RESTORE

SAVE SETUP
RESTORE SAVED SETUP
DELETE SAVED SETUP
RESET SETUP

[↑] [↓] [ ] [EXIT] [↵]

Save / Restore Menu

Select the operation you wish to carry out.

↑/↓   – Select Option

EXIT   – Return to Main Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SAVE SETUP

CHANNEL 1 → CONDUCTIVITY
ENTIRE UNIT
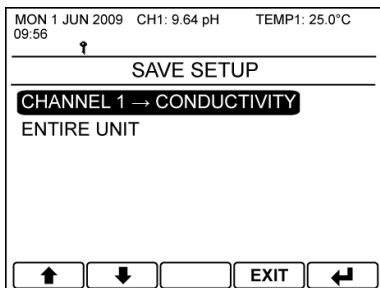
[↑] [↓] [ ] [EXIT] [↵]

Select Target

Select which channel or alternatively the whole unit.

↑/↓   – Select Option

EXIT   – Return to Save / Restore Menu

↵   – Enter Option

MON 1 JUN 2009   CH1: 9.64 pH   TEMP1: 25.0°C
09:56

SAVE CHANNEL 1

SAVE A: 10:00:34 18/05/2009
SAVE B: EMPTY SLOT
SD CARD A: 11:20:12 18/05/2009
SD CARD B: 11:30:24 18/05/2009
SD CARD C: EMPTY SLOT
SD CARD D: EMPTY SLOT

INFO   EXIT

Select Location

Select either Save A or Save B to access the instruments internal stores. Alternatively if inserted select SD Card A-H to use one of the 8 SD card saves.

If a save location is already being used, as indicated by a time - date stamp, then information about that save can be accessed by selecting it and pressing the INFO button.

⬆/⬇   – Chose Location

INFO   – Location Information

EXIT   – Return to Save / Restore Menu

↵   – Select Location

Appendix A - Temperature Data

The table below lists approximate resistance values of temperature sensors that may be used with the MPD73LV-UL.

Temperature (°C)	PT1000 RTD	PT100 RTD	3K Balco RTD
0	1000.0Ω	100.00Ω	2663 Ω
10	1039.0Ω	103.90Ω	2798 Ω
20	1077.9Ω	107.79Ω	2933 Ω
25	1097.3Ω	109.73Ω	3000 Ω
30	1116.7Ω	111.67Ω	3068 Ω
40	1155.4Ω	115.54Ω	3203 Ω
50	1194.0Ω	119.40Ω	3338 Ω
60	1232.4Ω	123.24Ω	3473 Ω
70	1270.7Ω	127.07Ω	3608 Ω
80	1308.9Ω	130.89Ω	3743 Ω
90	1347.0Ω	134.70Ω	3878 Ω
100	1385.0Ω	138.50Ω	4013 Ω

Appendix C - Error Messages

Internal Error Messages

E001	**UNIT**	**Processor RAM Read/Write Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E002	**UNIT**	**External RAM Read/Write Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E003	**UNIT**	**Internal Setup Checksum Error** The instrument configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists, Reset Whole unit from the Reset Unit Settings option in the Save/Restore menu or consult with your supplier, as this unit may require a repair.
E004	**UNIT**	**Output Card Setup Checksum Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E005	**UNIT**	**Internal Outputs Setup Checksum Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E006	**UNIT**	**For Future Use**
E007	**UNIT**	**Unit Setup Checksum Error** The instrument configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists Reset the whole unit from the Load Default Settings option in the Save/Restore menu or consult with your supplier, as this unit may require a repair.
E008	**UNIT**	**Unit Store A Checksum Error** The data in Unit Store A has been corrupted. Save the current setup back to Unit Store A in the Save/Restore menu.
E009	**UNIT**	**Unit Store B Checksum Error** The data in Unit Store B has been corrupted. Save the current setup back to Unit Store B in the Save/Restore menu.
E010 to E013	**UNIT**	**Maths Error** There has been an internal maths calculation failure. As such, it should not appear if the software is functioning properly. The error message should clear after approx. 5 seconds. If the error continues to be displayed consult with your supplier, as this unit may require to be returned for repair.
E014	**UNIT**	**Contrast Chip Error** The Contrast Chip is not operating correctly. Try switching the unit off and then on again. If the message persists, consult with your supplier, as this unit may require to be returned for repair.
E015	**UNIT**	**Unit SD Card Checksum Error** The SD Card store from which the entire unit was restored from has become corrupted. Check the unit's settings and then save the settings again to the SD card store.
E016	**UNIT**	**SD CARD FULL** The SD card has become full. To continue use, either replace with a blank SD card or remove existing files from SD card

Input Channel Errors

E030	**CH1**	**Input Card Checksum Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as the channel's input card may require to be returned for repair.
E031	**CH1**	**Setup Checksum Error** The current channel's configuration has for some reason become corrupted. Try switching the unit off and then on again. If the message persists reset the current channel from the Reset Unit Settings option in the Save/Restore menu or consult with your supplier, as the channel's input card may require to be returned for repair.
E032	**CH1**	**Store A Checksum Error** The data in the channel's Store A has become corrupted. Check the channel's current setup. Then save the setup back to channel's Store A in the Save/Restore menu.
E033	**CH1**	**Store B Checksum Error** The data in the channel's Store B has become corrupted. Check the channel's current setup. Then save the setup back to channel's Store B in the Save/Restore menu.
E034	**CH1**	**Factory Cal Checksum Error** Try switching the unit off and then on again. If the message persists, consult with your supplier, as the channel's input card may require to be returned for repair.
E035	**CH1**	**User Cal Checksum Error** The Channel's User Cal has for some reason become corrupted. Try switching the unit off and then on again. If the message persists Reset the Channel from the Reset User Calibration option in the Calibration menu or consult with your supplier, as the channel's input card may require to be returned for repair.
E036	**CH1**	**Sensor Cal Out Of Spec** The last Sensor Calibration was out of specification, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.
E037	**CH1**	**Sensor Zero Cal Out Of Spec** The last Sensor Zero Calibration was out of specification, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.
E038	**CH1**	**Sensor Span Cal Out Of Spec** The last Sensor Span Calibration was out of specification, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.
E043	**CH1**	**Sensor User Offset At Limit** The last Sensor Offset Calibration was out of limits, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.
E044	**CH1**	**Sensor User Slope At Limit** The last Sensor Slope Calibration was out of limits, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.

E045	CH1	**Sensor User Slope < Spec** The last Sensor Slope Calibration was less than the recommended specification, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.
E046	CH1	**Sensor User Slope > Spec** The last Sensor Slope Calibration was greater than the recommended specification, check sensor condition and connections and repeat calibration. If the message persists please consult with your supplier.
E051	CH1	**Sensor Input Over Range** The sensor reading is greater than the specified upper limit, check channel settings, Sensor condition and connections. If the message persists please consult with your supplier.
E052	CH1	**Sensor Input Under Range** The sensor reading is less than the specified limit, check channel settings, Sensor condition and connections. If the message persists please consult with your supplier.
E053	CH1	**Temp Sensor Fault** The temperature sensor is reading open or closed circuit, due in most cases to a damaged sensing element or incorrect wiring. Check that the temperature sensor is set to the correct type in the channel setup menu. Under this condition, the unit will default to the fixed temperature setting for compensation purposes. If the message persists please consult with your supplier.
E054	CH1	**Temp Input Over Range** The temperature sensor reading is greater than the specified upper limit, check channel settings, Sensor condition and connections. If the message persists please consult with your supplier.
E055	CH1	**Temp Input Under Range** The temperature reading is less than the specified limit, check channel settings, Sensor condition and connections. If the message persists please consult with your supplier.
E067	CH1	**Sensor 0mV Cal Out of Spec** The pH 0mV calibration for this channel is outside recommended specifications.
E068	CH1	**Calibration Due** The time since the last calibration was performed on this channel has exceeded the time set in the calibration menu.
E069	CH1	**Planned Service Due** The Planned Service interval for this unit has expired. Please contact LTH Electronics at the details below: LTH Electronics ltd Chaul End Lane Luton Beds LU4 8EZ Tel. 0044 (0) 1582 593693 Fax 0044 (0) 1582 598036 Email sales@lth.co.uk NB. LTH overseas users should contact their LTH distributor – See www.lth.co.uk for details.

E070	CH1	**SD Card Checksum Error** The SD Card store from which this channel was restored from has become corrupted. Check the channel's settings and then save the settings again to the SD card store.

Setpoint Errors

E180 E190	SP1 SP2	**Dose Alarm Error** The Setpoint has been dosing for longer than the Dose Alarm time as defined in the setpoint menu.
E185 E195	SP1 SP2	**Store A Checksum Error** The Store A Save for the Channel associated with this Setpoint has become corrupted. Check the setpoint's settings in the setpoint menu and then save the settings again in the Channel's Store A in the Save/Restore menu.
E186 E196	SP1 SP2	**Store B Checksum Error** The Store B Save for the Channel associated with this Setpoint has become corrupted. Check the setpoint's settings in the setpoint menu and then save the settings again in the Channel's Store B in the Save/Restore menu.
E187 E197	SP1 SP2	**Setup Checksum Error** The Setup for this Setpoint has become corrupted. Check and correct the setpoint settings and turn the unit off and on again. If the message persists please consult with your supplier.
E188 E198	SP1 SP2	**SD Card Checksum Error** The SD Card store from which this Setpoint was restored from has become corrupted. Check the setpoint's settings in the setpoint menu and then save the settings again to the SD card store.

Current Output Errors

E240	A	**Current OP Hardware Fault** The current output circuit has detected an error in the current output loop; this is most commonly due to either a broken loop or too large a load resistor.
E241	A	**Sensor IP<Current OP Zero** The sensor input level is below that set for the current output zero.
E242	A	**Sensor IP>Current OP Span** The sensor input level is above that set for the current output span.
E243	A	**Sensor IP<Current OP Span** The sensor input level is below that set for the current output Span.
E244	A	**Sensor IP>Current OP Zero** The sensor input level is above that set for the current output Zero.
	A	**Store A Checksum Error** The Store A Save for the channel associated with this current output has become corrupted. Check the current output's settings in the current output menu and then save the settings again in the Channel's Store A in the Save/Restore menu.
E246	A	**Store B Checksum Error** The Store B Save for the channel associated with this current output has become corrupted. Check the current output's settings in the current output menu and then save the settings again in the Channel's Store B in the Save/Restore menu.

E245	A	**Store A Checksum Error**
		The Store A Save for the channel associated with this current output has become corrupted. Check the current output's settings in the current output menu and then save the settings again in the Channel's Store A in the Save/Restore menu.
E246	A	**Store B Checksum Error**
		The Store B Save for the channel associated with this current output has become corrupted. Check the current output's settings in the current output menu and then save the settings again in the Channel's Store B in the Save/Restore menu.

Fault Finding

NOTE: THERE ARE NO USER SERVICEABLE PARTS INSIDE THE UNIT

The MPD73LV-UL has been designed to include a wide range of self diagnostic test, some of which are performed at switch on, and some on a continuous basis. This guide aims to provide a route to diagnosing and correcting any faults that may occur during normal operation. The table shown previously in this section gives a list of errors that the MPD73 generates, along with their probable causes. If after these checks the fault has not been cleared contact LTH. Please have as much of the following information available as possible in any communication with LTH, to enable quick diagnosis and correction of the problem.

- Serial number of the instrument, input and output cards.
- The approximate date of purchase.
- The software version of the instrument.
- Details of the program settings and application.
- Electrical environment and supply details.
- Circumstances under which the fault occurred.
- The nature of the fault or faults.
- Any error messages that are displayed.
- The sensor type, cable length and type.
- Current output configuration.
- Relay connection configuration.

It is often worthwhile to check the measurement by an independent method, for example using a handheld meter.

The Instrument Appears Dead
Check that power is available to the unit. Using a voltmeter, set to AC or DC, check the power supply voltage at the connector. The design of the MPD73LV-UL allows operation from 20 to 32V AC or DC, check the connection label for voltage specification. Check that the power cable is securely and correctly attached. There are no user serviceable fuses fitted within this unit.

The Access Code Does Not Work
It is probable that the access code has either been changed or the operator does not recall the code correctly. Contact LTH or your local distributor should this problem arise.

The Sensor Reading Is Constantly Over-range or Under-range
- Ensure that the sensor and temperature input is correctly connected (see Installation Section) and that the sensor is not faulty or damaged.
- Check that the correct probe type has been selected within the Channel Setup menu (see page 43).
- If the units are set to pH, check the temperature compensation state (see Channel Setup Section page 43). If the compensation is set to "Manual" check that the fixed temperature is at the correct level. If the compensation is "Automatic" check that the temperature reading on the main display is correct.

The Sensor Reading Is Incorrect
- If reading pH, check that the correct probe type has been selected (see pH / Redox Input Channel Setup, page 41).
- Check that no error messages are being displayed. Check that the sensor cable has been correctly connected (see Installation Section, Page 25).
- Check that the Temperature reading is correct.

- Check the instrument calibration using a pH simulator, Adjust the channel calibration if necessary (see Calibration Section).
- Use another instrument to check the sensor.

The Sensor Is Not Functioning Correctly

- Check that the sensor glass is not broken or cracked.
- Check the reference probe KCl (where applicable) for leakage or contamination.
- Ensure all probe protective caps have been removed.
- Check that any junction boxes used are correctly connected.
- Check that a suitable high impedance, low noise cable has been used.
- Check for damaged or broken cables.
- Check for damp, grease, or liquids near connectors, junction boxes, or terminations.
- Where extension cables have been used, try connecting the sensor directly to the instrument.

The Temperature Reading Is Incorrect

- Check that the temperature sensor is correctly attached. (Installation Section, page 34).
- Check that the temperature sensor type is correctly selected in the Channel Setup menu (See page 41)
- Where practical check the temperature sensor resistance against the table on page 112.

Current Output Is Incorrect or Noisy

- Check that the maximum load for the current loop has not been exceeded. (750Ω).
- Check that the terminals have been wired correctly.
- Check that the cable screen is attached to Earth at one end and that the cable does not pass too close to a power cable.
- Check that he current output has been configured properly.

Relays Appear to Malfunction

- Check that the unit is "On-Line" (see page 41)
- Check that the set point configuration is correct (see Setpoints, Current Outputs and Digital Input Configuration Guide)
- If the relays are vibrating or "chattering" as they pass the set point, check the hysteresis setting and increase if necessary.
- Ensure that the relays are connected properly (see page 23) and that the voltage/current levels are not exceeding 5A @ 30V AC/DC.
- Check that the instrument input cables are not picking up excessive noise.

Problems with Cables and Connectors

The cable connecting the pH probe to the instrument is the most common cause of problems in pH measurement systems. The importance of the following recommendations cannot be over stressed.

Input Resistance
The high input resistance, required for the optimum performance from a pH electrode system, will be seriously degraded if any grease, dirt, or dampness is allowed to collect around any of the connections between the probe and the instrument. This includes any connectors or junction boxes which may be used. Particular attention must be paid to the method of extending the pH electrode cable. A general rule would be the fewer connections there are, the less problems are likely to occur.

Input Cable
The choice of cable is important. Only polythene or PTFE cables are acceptable. Secondly, any vibration or cable movement on a standard co-axial cable will give rise to fluctuations in the readings. To prevent this a low noise cable must be employed. This type of cable can be identified as having a black impregnated polythene layer which is exposed when the outer braid is separated for connection. This must be completely removed at the terminations to avoid a possible short circuit between the electrode and reference pair.

In all cases the screening braid must not be separated from the core conductor by more than 5mm in order to avoid "hum" pickup.

Cables should be kept as short as possible and must be run separately (100mm separation typically) from any power carrying cable.

Cable Length
The response of the instrument to a sudden change in the sensor input will be determined mainly by the source resistance of the electrode and the length of the connection cable. For a typical pH electrode of 1000MΩ resistance, in combination with a typical cable, the time taken to settle to its new value is about 0.5 seconds per metre of cable (depending on the cable capacitance).

Problems with Electrodes
The combination electrodes supplied by LTH are of low resistance and will be less affected by humidity than other, high resistance systems. In any case, the connecting leads and cable connectors must be kept dry, and the cable screen must not be allowed to come into contact with any earthed metal parts. The glass bulb must be kept in a moist condition for correct operation. If the electrode is allowed to dry out, it may be recovered by immersing in a saturated KCl solution or dilute acid for at least 24 hours before use.

Electrodes can be expected to last for at least one year under normal operating conditions before replacement becomes necessary. However operation at elevated temperatures or pressures, and the presence of sulphides or ionic metals, will shorten the electrode life. If the electrode cannot be set up against solutions or shows a sluggish response to changes in pH, it should be replaced.

Guarantee and Service

Products manufactured by LTH Electronics Ltd are guaranteed against faulty workmanship and materials for a period of three years from the date of despatch, except for finished goods not of LTH manufacture, which are subject to a separate agreement.

All sensors made by LTH Electronics Ltd are thoroughly tested to their published specification before despatch. As LTH have no control over the conditions in which their sensors are used, no further guarantee is given, although any complaints concerning their operation will be carefully investigated.

Goods for attention under guarantee (unless otherwise agreed) must be returned to the factory carriage paid and, if accepted for free repair, will be returned to the customer's address free of charge. Arrangements can also be made for repair on site, in which case a charge may be made for the engineer's time and expenses.
If any services other than those covered by the guarantee are required, please contact LTH direct.

N.B. Overseas users should contact their LTH nominated representative. Special arrangements will be made in individual cases for goods returned from overseas.

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MPD73LV-UL pH / Redox Monitor
Operating Guide

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