Large digit load cell display

LD-SERIAL 4 digit version

Installation & Operating Manual

 ✓ Easy setup
 ✓ Addressable
 ✓ Flexible string extraction
 ✓ Can totalise numeric strings
 ✓ Optional Output 4-20mA / 0-10V isolated
 ✓ Optional Alarm output = 2 or 4 relays
 ✓ Optional Comms Output = RS232 or RS485
 ✓ 110-230V AC or 11-30V DC power

Caution: There is a risk of electrical shock if this instrument is not properly installed

Caution: Risk of danger: Read the whole manual before you install this meter

Software version F04.01  Revision 24  15 March 2017
Warranty

We warrant our products against defects in materials or workmanship for a period of three (3) years from the date of purchase.

In the event of a defect during the warranty period, the unit should be returned, freight (and all duties and taxes) prepaid by the Buyer to the authorised distributor from where the unit was purchased.

The Distributor, at its option, will repair or replace the defective unit. The unit will be returned to the Buyer with freight charges prepaid by the distributor.

LIMITATION OF WARRANTY
The foregoing warranty shall not apply to defects resulting from:

1. Improper or inadequate maintenance by the buyer.
2. Unauthorised modification or misuse.
3. Operation outside the environmental specification of the product.
4. Mishandling or abuse.

The warranty set forth above is exclusive and no other warranty, whether written or oral is expressed or implied. We specifically disclaim the implied warranties of merchantability and fitness for a particular purpose.

EXCLUSIVE REMEDIES
The remedies provided herein are the buyer’s sole and exclusive remedies.

In no event shall we be liable for direct, indirect, incidental or consequential damages (including loss of profits) whether based on contract, tort or any other legal theory.
Warnings

Please carefully read this manual and all warnings. Install the display ONLY when you are sure that you’ve covered all aspects.

⚠️ WARNING: Where the product is intended for "UL" installations, removal or addition of option boards is not permitted.

⚠️ WARNING: Check that the model number and supply voltage suit your application before you install the display.

⚠️ WARNING: Connect the display according to current IEE regulations, IEC61010 & NFPA:70 National Electric Code in USA.

⚠️ WARNING: Power supplies to this equipment must have anti-surge (T) fuses rated at 1A for 230V supply, 2A for 110V, 5A for 48VAC supply or 10A for DC supplies in the range 11-30VDC.

⚠️ WARNING: Don’t touch any circuitry after you have connected the display, because there may be lethal voltages on the circuit board.

⚠️ WARNING: Do not apply power to the display if its case is open.

⚠️ WARNING: Only adjust on-board switches or connections with the power turned off.

⚠️ WARNING: Make sure all screw terminals are tight before you switch the meter on.

⚠️ WARNING: Only clean the display’s case and window with a soft damp cloth. Only lightly dampen with water. Do not use any other solvents.

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Rear case screws - please note

The rear panel is held in place with finger-screws, which only need to be gently tightened. **Do not use tools to tighten or loosen the screws, as this could cause damage to the internal threads.**

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Safety First ...............Don't assume anything............ Always double check. If in doubt, ask someone who is QUALIFIED to assist you in the subject.
Introduction

Please contact us if you need help, if you have a complaint, or if you have suggestions to help us improve our products or services.

If you contact us about a product you already have, please tell us the full model number and serial number, so that we can give you accurate and fast help.

This product has a 3 year warranty. We will put right or replace any display which is faulty because of bad workmanship or materials. This warranty does not cover damage caused by misuse or accident.

If you return a unit for repair, please include a detailed description of the problem, and the name of a contact who we can refer to for any questions. Please mark for the attention of the QA Department.

**IMPORTANT**

If this equipment is important to your process, you may want to buy a spare to cover possible failure or accidental damage in the future.

This is because during factory shutdown periods, you may have to wait several weeks for an equivalent replacement, or we may have no stock at the time you urgently need it.

You may also need to pay extra carriage charges if you want a fast, guaranteed courier service. Warranty repairs or replacements are usually returned with a standard courier service.

We do not offer compensation for losses caused by failure of this instrument.

If you do not agree with these conditions, please return this item in unused condition, in its original packaging and we will refund the purchase price, excluding any carriage paid.

We thought you’d prefer to know about possible delays and extra charges now, rather than during a panic. A spare unit could help to avoid these issues.

We always try to improve our products and services, so these may change over time. You should keep this manual safely, because future manuals, for new designs, may not describe this product accurately.

We believe these instructions are accurate, and that we have competently designed and manufactured the product, but please let us know if you find any errors.
General Description

This series of displays accepts industrial sensors to allow various physical measurements to be made, such as weight, temperature, pressure, humidity etc. Different models are available for different sensor types.

The main function of this series is to give a clear numeric readout of the variable being monitored. Most models include an excitation power output, to power the sensor directly.

Various digit heights are available, to suit the maximum viewing distance required in each installation. For every 10 metres of viewing distance required, use 1” of digit height.

Various optional output modules are also available to give alarm relay outputs, analogue output or digital communications, or any combination of these options.

Displays are programmed using front panel pushbuttons. The front panel buttons can be disabled. In addition, you can connect 4 remote wired pushbuttons to the display, so that you can make adjustments while the display is mounted in an inaccessible location.

Displays have three power supply options: 100-240 VAC, 48 VAC or 11-30VDC.

These displays must be installed fully assembled, and must be installed according to local electrical installation rules.

When properly installed, and provided they have been ordered with cable glands exiting the lower surface of the case, they provide ingress protection to IP65 / NEMA4X from all directions.

Safety

Caution: There is a risk of electrical shock if this display is not properly installed

Caution: Risk of danger: Read the whole manual before you install this display

Obey all safety warnings in this manual, and install the display according to local wiring and installation regulations. Failure to follow these guidelines may cause damage to the display, connected equipment, or may be harmful to personnel.

Any moving mechanical device controlled by this equipment must have suitable access guards to prevent injury to personnel if the display should fail.
Suspension Mounting dimensions

You can order these displays with the cable glands in the bottom surface (as shown) the rear, or top.

Rear glands allow you to mount the display on top of a cubicle, using the brackets shown.

* Do not use longer bolt threads than 12 mm, or you will fracture the female boss and the case will no longer be sealed.

<table>
<thead>
<tr>
<th>Display Format</th>
<th>X mm</th>
<th>H mm</th>
<th>W mm</th>
<th>Y mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; 4 digit clock</td>
<td>231</td>
<td>154.5</td>
<td>291</td>
<td>247</td>
</tr>
<tr>
<td>2&quot; 4 digit numeric</td>
<td>219.5</td>
<td>154.5</td>
<td>279.5</td>
<td>249.5</td>
</tr>
<tr>
<td>2&quot; 6 digit clock</td>
<td>340</td>
<td>154.5</td>
<td>400</td>
<td>370</td>
</tr>
<tr>
<td>2&quot; 6 digit numeric</td>
<td>316</td>
<td>154.5</td>
<td>376</td>
<td>346</td>
</tr>
<tr>
<td>4&quot; 4 digit clock</td>
<td>393</td>
<td>195.5</td>
<td>453</td>
<td>423</td>
</tr>
<tr>
<td>4&quot; 4 digit numeric</td>
<td>374</td>
<td>195.5</td>
<td>434</td>
<td>404</td>
</tr>
<tr>
<td>4&quot; 6 digit clock</td>
<td>593</td>
<td>195.5</td>
<td>653</td>
<td>623</td>
</tr>
<tr>
<td>4&quot; 6 digit numeric</td>
<td>556</td>
<td>195.5</td>
<td>616</td>
<td>586</td>
</tr>
<tr>
<td>6&quot; 4 digit</td>
<td>520</td>
<td>246</td>
<td>580</td>
<td>550</td>
</tr>
<tr>
<td>6&quot; 6 digit</td>
<td>760</td>
<td>246</td>
<td>820</td>
<td>790</td>
</tr>
<tr>
<td>8&quot; 4 digit</td>
<td>690</td>
<td>290</td>
<td>750</td>
<td>720</td>
</tr>
<tr>
<td>8&quot; 6 digit</td>
<td>1012</td>
<td>290</td>
<td>1072</td>
<td>1042</td>
</tr>
<tr>
<td>12&quot; 4 digit</td>
<td>990</td>
<td>408</td>
<td>1050</td>
<td>1020</td>
</tr>
<tr>
<td>12&quot; 6 digit</td>
<td>1480</td>
<td>408</td>
<td>1540</td>
<td>1510</td>
</tr>
<tr>
<td>16&quot; 4 digit</td>
<td>1308</td>
<td>515</td>
<td>1368</td>
<td>1338</td>
</tr>
<tr>
<td>16&quot; 6 digit</td>
<td>1960</td>
<td>515</td>
<td>2020</td>
<td>1990</td>
</tr>
</tbody>
</table>
Wall Mounting dimensions

The 4 bracket holes are 5.2mm diameter

You can order these displays with the cable glands in the bottom surface (as shown) the rear, or top.

Rear glands allow you to mount the display on top of a cubicle, using the brackets shown.

* Do not use longer bolt threads than 12mm, or you will fracture the female boss and the case will no longer be sealed.

<table>
<thead>
<tr>
<th>Display Format</th>
<th>X mm</th>
<th>H mm</th>
<th>W mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; 4 digit clock</td>
<td>278</td>
<td>154.5</td>
<td>291</td>
</tr>
<tr>
<td>2&quot; 4 digit numeric</td>
<td>266.5</td>
<td>154.5</td>
<td>279.5</td>
</tr>
<tr>
<td>2&quot; 6 digit clock</td>
<td>387</td>
<td>154.5</td>
<td>400</td>
</tr>
<tr>
<td>2&quot; 6 digit numeric</td>
<td>363</td>
<td>154.5</td>
<td>376</td>
</tr>
<tr>
<td>4&quot; 4 digit clock</td>
<td>440</td>
<td>195.5</td>
<td>453</td>
</tr>
<tr>
<td>4&quot; 4 digit numeric</td>
<td>421</td>
<td>195.5</td>
<td>434</td>
</tr>
<tr>
<td>4&quot; 6 digit clock</td>
<td>640</td>
<td>195.5</td>
<td>653</td>
</tr>
<tr>
<td>4&quot; 6 digit numeric</td>
<td>603</td>
<td>195.5</td>
<td>616</td>
</tr>
<tr>
<td>6&quot; 4 digit</td>
<td>567</td>
<td>246</td>
<td>580</td>
</tr>
<tr>
<td>6&quot; 6 digit</td>
<td>807</td>
<td>246</td>
<td>820</td>
</tr>
<tr>
<td>8&quot; 4 digit</td>
<td>737</td>
<td>290</td>
<td>750</td>
</tr>
<tr>
<td>8&quot; 6 digit</td>
<td>1059</td>
<td>290</td>
<td>1072</td>
</tr>
<tr>
<td>12&quot; 4 digit</td>
<td>1037</td>
<td>408</td>
<td>1050</td>
</tr>
<tr>
<td>12&quot; 6 digit</td>
<td>1527</td>
<td>408</td>
<td>1540</td>
</tr>
<tr>
<td>16&quot; 4 digit</td>
<td>1355</td>
<td>515</td>
<td>1368</td>
</tr>
<tr>
<td>16&quot; 6 digit</td>
<td>2007</td>
<td>515</td>
<td>2020</td>
</tr>
</tbody>
</table>
Panel mounting dimensions

Panel cutout dimensions
A+3mm(h) x B+3mm(w)

Display Format | H mm | A mm | B mm | W mm
---|---|---|---|---
2” 4 digit clock | 172.5 | 154.5 | 291 | 309
2” 4 digit numeric | 172.5 | 154.5 | 279.5 | 297.5
2” 6 digit clock | 172.5 | 154.5 | 400 | 418
2” 6 digit numeric | 172.5 | 154.5 | 376 | 394
4” 4 digit clock | 213.5 | 195.5 | 453 | 471
4” 4 digit numeric | 213.5 | 195.5 | 434 | 452
4” 6 digit clock | 213.5 | 195.5 | 653 | 671
4” 6 digit numeric | 213.5 | 195.5 | 616 | 634
6” 4 digit | 264 | 246 | 580 | 598
6” 6 digit | 264 | 246 | 820 | 838
8” 4 digit | 308 | 290 | 750 | 768
8” 6 digit | 308 | 290 | 1072 | 1090
12” 4 digit | 426 | 408 | 1050 | 1068
12” 6 digit | 426 | 408 | 1540 | 1558
16” 4 digit | 533 | 515 | 1368 | 1386
16” 6 digit | 533 | 515 | 2020 | 2038

Detail showing bracket hardware fitting sequence

Fit first
M8 x 15 bolt
Spring washer
Flat washer
Wall Bracket

Fit last
M8 x 20 bolt, gasket comprresser
Connections

There is a wide range of possible locations for the input board, output board and power supply board/s. Their locations depend on the height of digits, number of digits, brightness of digits and any installed options. Because the permutation of possible locations is large, we will not describe the location of boards within the display, but simply identify the connectors and their functions on each board, below ...

Warning:
Disconnect all power before removing the rear of the display.
**Connections**

**Connectors and options**
Connectors may be present even if output options are not installed. Refer to rating label to see installed options.

<table>
<thead>
<tr>
<th>0, 2 or 4 Alarm Relay output options</th>
<th>Serial Data output option</th>
<th>Analog output option</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL4 AL3 AL2 AL1</td>
<td>Comm Enable</td>
<td>A B TxD</td>
</tr>
<tr>
<td>Rated 2A 250VAC Resistive</td>
<td></td>
<td>R S 4 8 5</td>
</tr>
</tbody>
</table>

Enable is used in mode C1 to activate or de-activate the RS232 or RS485 serial output. Connect to Comm to continually transmit data.

**Remote programming button connector**
On one of the display boards, you will find a 7 way connector, to which you can wire remote programming buttons, to allow adjustment of the display’s settings when the display is inaccessible.

You can also enable or disable the display’s front panel buttons, either by a remote contact closure, or by an on-board push-on jumper switch, which is located near to the remote button connector. When the contact is closed, or the push-on switch fitted, the front buttons are enabled.

**Rear case screws - please note**
The rear panel is held in place with finger-screws, which only need to be gently tightened. **Do not use tools to tighten or loosen the screws, as this could cause damage to the internal threads.**
Installation hints for best performance

This section offers several suggestions which will help you get the best performance from your system.

RS232 and RS485 use comparatively small signals which can easily be corrupted by the potentially high level of electrical noise which can be created by electrical machinery such as motors, welding systems, discharge lighting, AC power inverters and solenoids. These steps will ensure you get the best possible performance from your system.

RS232 has limited capability over long cable distances, due its low driving power (which causes the signal to reduce in level as cable length increases) and single ended signal (which is prone to interference by local electrical noise), as shown below...

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>RS232</th>
<th>RS485 or RS422</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>50m</td>
<td>1200m</td>
</tr>
<tr>
<td>9600</td>
<td>20m</td>
<td>150m</td>
</tr>
<tr>
<td>19200</td>
<td>10m</td>
<td>75m</td>
</tr>
<tr>
<td>38400</td>
<td>5m</td>
<td>30m</td>
</tr>
<tr>
<td>115200</td>
<td>2m</td>
<td>10m</td>
</tr>
</tbody>
</table>

1. Use good quality screened signal cable, with twisted pairs. Screened twisted pair CAT5 cable is ideal. The screen should be earthed at the display end only.

2. If you are using multi-pair twisted cable, each pair should be dedicated to a single display as shown opposite, for maximum noise immunity. This will ensure that any electrical noise induced in the cable is properly cancelled. Mixing destinations carelessly amongst the twisted pairs can easily corrupt data.

3. The cable should be routed away from noisy wiring and devices such as power feeds from inverters, discharge-lighting cables, welder cabling etc, and should preferably be routed in a dedicated low voltage signalling/instrumentation conduit or cable tray.

4. If you want to simulate data, a useful free terminal, with good flexibility is RealTerm, available from http://sourceforge.net/projects/realterm/
When using multi-core screened cable to connect several displays to several data sources, please be sure to use one twisted pair for each display and sensor.

Do NOT use a wire from one pair for signal positive and a wire from another pair for signal negative, as this will prevent the twisted cables from cancelling any induced electrical noise, and can couple noise from one source to another.
Declaration of CE Conformity

Declaration Reference : LD Mk2
Issue Date : 30 April 2007
Products Covered : LD Mk2 series
Title : DOC-INTUITIVE2

This is to confirm that the Product covered by this declaration has been designed and manufactured to meet the limits of the following EMC Standard:

EN61326-1:1997

and has been designed to meet the applicable sections of the following safety standards

EN61010-1:2001

Conditions

The meters are permitted a worst case error of 1% of A/D range during electro-magnetic disturbance, and must recover automatically when disturbance ceases without the need for human intervention, such as resetting, power-down etc.

The meters covered by this certificate must be installed in adherence to the following conditions :-

Signal cabling shall be routed separately to power carrying cabling (includes relay output wiring)

All signal cabling shall be screened. The screen shall only be terminated to the power earth terminal at the meter end of the cable.

Declared as true and correct, for and on behalf of London Electronics Ltd.

J.R.Lees      Director
48V AC power wiring option

230V AC ==> 177V AC

48V AC Power In
Connect Earth to
Display Brightness

You can adjust the display brightness at any time, provided the display is locked.

1. Lockout Switch must be ON
   - Press 3 seconds
   - Circuit board ON

2. Display shows br l
   - Each press of the UP button will select a new brightness level. There are 7 brightness levels to choose from. (Default = Full brightness)
   - Press for 3 seconds

3. Done!
   - Press to accept

Did you know, we make this display in two brightness versions? Standard brightness for use inside, and Daylight Viewing for use outside in direct sunlight. The Daylight Viewing version has suffix -DLV in its part number.
Display Modes

You can choose from three operating modes.

1. Lockout Switch must be OFF
   - Circuit board ON
   - Press 3 seconds

2. Display shows ASC, quan or q.tot
   - Press to select
   - ASC (ASCII) is used for any application where non-numeric characters may need to be displayed. You can not have alarms, analogue output, tare, peak, valley or any mathematical functions with this mode.
   - quan is used for any numeric display work which needs alarms, analogue output, tare, peak, valley or mathematical functions.
   - q.tot is used in applications where you want to sum values, for example to add together ingredient weights to get a combined weight.

3. Press to accept
   - Done!
### Serial Data settings

Choose the serial data settings to suit the transmitting device.

**1. Lockout Switch must be OFF**

- Circuit board ON

**2. Display**

- Display shows each of the parameters and you can edit or move on to the next one with the OK button.

- You can edit the settings with the DIGIT, UP and DOWN buttons. OK to accept.

- The default parameters are:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ad.01</strong></td>
<td>The display’s address, from 00 to FF. Choose 00 if you do not need addressing.</td>
</tr>
<tr>
<td><strong>S.C.02</strong></td>
<td>The Start Character. 02 = STX. Select 00 if you do not have a defined start character.</td>
</tr>
<tr>
<td><strong>E.C.03</strong></td>
<td>The End Character. 03 is ETX, 0d is Carriage return</td>
</tr>
<tr>
<td><strong>bAud 9600</strong></td>
<td>Choose a baud rate to suit the sender.</td>
</tr>
<tr>
<td><strong>8n 1</strong></td>
<td>Data format 8 data bits, no parity, 1 stop</td>
</tr>
<tr>
<td><strong>t.r.05</strong></td>
<td>Time to reply following a request, in mS</td>
</tr>
<tr>
<td><strong>t.c.00</strong></td>
<td>Time in mS between each character.</td>
</tr>
<tr>
<td><strong>t.o. 03</strong></td>
<td>Timeout Secs. if data lost. Display shows ------</td>
</tr>
<tr>
<td><strong>S.P.00</strong></td>
<td>Start position for data editing (see opposite)</td>
</tr>
<tr>
<td><strong>d.L.06</strong></td>
<td>Data length for editing (see opposite)</td>
</tr>
<tr>
<td><strong>d.d.d.d.</strong></td>
<td>Decimal point position for alarms</td>
</tr>
</tbody>
</table>

**3. Press to accept**

Done!
Serial Data setting examples

Sending data to an addressed display

Let us assume the display has address 45 and you want to send the value 123.4 to it at 19200 baud. Your data will be sent as \textless STX\textgreater 45123.4\textless CR\textgreater

Set
Ad.45, S.C.02, E.C.Dd, bRud 19200, 8n 1,
t.r.05, t.c.00, to. 03, S.P.00, d.L.06,

Extracting data from a complex string (data editing)

Let us assume the data is sent as a complex string at 1200 baud such as ...
\textless Start Char\textgreater \textless Address Characters\textgreater \textless Data: ligo6ho987hmw1234.56kg abcd\textgreater \textless End Char.\textgreater

and you want to display only the numeric weight value...

You would set....

Ad.78, S.C.02, E.C.03, bRud 1200, 8n 1,
t.r.05, t.c.00, to. 03, S.P.15, d.L.06,

Start Character | Address Characters | ligo6ho987hmw1234.56kg abcd | end character
--- | --- | --- | ---
STX | 78 | \textcolor{red}{1234.56kg abcd} | ETX

You would set....

Bias +5V on Sig B
Bias 0V on Sig A
120 Ohm termination resistor

Solder Switch closed

RS485 Version (IC3 missing)

RS232 Version (IC3 missing)
Logic input functions

The three contact closure inputs on the rear of the meter have default functions which are:-

Contact closure 1 = Tare  
Contact closure 2 = Peak/Valley display  
Contact closure 3 = Reset  

You can re-assign these to include : HOLD, Nett/Gross value display, Memory page address 1, 2 or 4 (only if Multi-memory MEM option is installed)

1. Lockout Switch must be OFF  
   Press 3 seconds

2. Press repeatedly until you see CC. 1, followed by the existing function for Contact Closure 1.  
   After you have set CC. 1, you will get the prompt CC. 2 to allow you to set Contact Closure 2 function and when you have set CC.2 you will get the prompt CC.3 to allow you to set Contact Closure 3 function

3. Use UP or DOWN buttons to select from these available functions:
   - TRrE = Tare display to 0
   - PU = Peak/Valley toggle
   - rSt = Reset
   - HoLd = Freeze display
   - n.t. 9r = Nett / Gross display
   - PR. 1 = Page Address 1*
   - PR. 2 = Page Address 2*
   - PR. 4 = Page Address 4*

4. Press to accept

* Only available if the Multi-memory MEM option is installed
Logic input connections and front buttons

The previous page explained how to select the functions of the 3 logic inputs. You can connect remote contact closures or open NPN collectors to activate these logic inputs.

The logic input provides a 5V DC signal. When you connect this to common, a current of 1mA will flow. Because this is a small signal, we recommend you use switches with gold plated contacts, or self cleaning contacts, for best long term reliability.

The logic inputs are not galvanically isolated from the input signal.

The logic inputs are only activated when the lockout switch is ON.

<table>
<thead>
<tr>
<th>Signal I/P &amp; Excitation</th>
<th>Logic Inputs</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td>7 8 9 10 11 12 13</td>
<td></td>
</tr>
</tbody>
</table>

- **Normally open (disables front panel Tare, Peak/Valley and Reset buttons)**
- **Normally closed (this enables front panel Tare, Peak Valley and Reset buttons also) Or simply link NPN (could be opto-isolators if you need the logic control lines to be galvanically isolated from the input signal.)**

- **tare** = Tares display to 0. Often used in weighing systems to zero a display prior to making a measurement. Net weight is shown once tared. When a display has been tared the small LED above the Set1 button will be illuminated.

- **PV** = Peak/Valley toggle. Allows you to view the maximum and minimum values which have been displayed since last reset. 0% LED illuminates when showing valley, 100% LED illuminates when showing peak.

- **rst** = Reset. This clears any tare, peak, valley, alarm latch

- **Hold** = Freezes the displayed value for as long as the Hold input is closed

- **nt.gr** = Allows you to toggle between Nett and Gross values on the display

- **PA.1 .. 4** = Page Addresses, if MEM option is installed.
Factory Defaults

You can return the display to its factory default conditions whenever you wish. If you do so, you will permanently lose all your settings and will need to start from the beginning again.

The calibration Audit Counter will NOT be reset, there is no way provided to reset this value, as it is intended as a secure record to indicate whether changes have been made to the display since it was last calibrated.

1. Lockout Switch must be OFF
   - Circuit board ON

2. Display shows:
   - def.0 (Defaults no)
   - Press the DOWN button to change the display to def.1 (Defaults Yes) if you want to return to default conditions.

3. Press to accept
   - Done!

Calibration audit number

Your display includes a non-resettable counter which increments each time you make a change to the display's calibration. This is useful if you want to check whether a display has been altered since it was last calibrated.

The Calibration audit number starts at CL 01 up to CL FF allowing up to 255 alterations to be recorded. Whenever you want to check the calibration audit number, press and hold the 2 outer buttons (Set1 + Alarms) for more than 3 seconds.

1. Press together for 3 seconds
   - Done!
Scale Factor adjustment

After you have calibrated your meter, you can use the SCALE feature to make fine adjustments to calibration, without affecting the calibration itself. You must have mode = Quan

Examples

1. Changing weight units of measure from kg to pounds
   You could also use the SCALE to convert your readout from kg to pounds, without affecting the calibration. Simply set SCALE = 2.205 and your meter which was calibrated in kg will now read in pounds.

2. Correcting for gravitational variance
   Your weighing system was calibrated where gravitational acceleration = 9.812m/s² (London) You then move the system to Bankok where gravitational acceleration is reduced to 9.782m/s²

   You can correct for this difference by setting Scale = 9.812 / 9.782 = 1.003, so that a given mass in Bangkok will show the same weight as it did in London. Set Offset = 0.0000

   See http://en.wikipedia.org/wiki/Earth%27s_gravity

1. Lockout Switch must be OFF
   Press 3 seconds

2. Press repeatedly until you see SCALE, followed by the existing scale factor. (Default = 1.000)

3. Use DIGIT button to select each digit in turn, UP or DOWN buttons to increase or decrease each digit’s value. Press OK when done.

4. Press to accept

   Done!

You may want to adjust an offset value also, see separate OFFSET page for this feature.
Offset adjustment

After you have calibrated your meter, you can use the **OF.St** feature to make fine additions or subtractions to the reading, without affecting the calibration itself.

You must have mode = **Quan**

For example if your weighing structure is altered after calibration and you want to subtract the effect of 37kg of extra metalwork which was welded to the hopper, you can easily do this by entering a value of -37 in the offset value.

1. **Lockout Switch must be OFF**
   - Press 3 seconds

2. Press repeatedly until you see **OF.St**, followed by the existing offset value. (Default is 0.000)

3. Use **DIGIT** button to select each digit in turn, **UP** or **DOWN** buttons to increase or decrease each digit’s value. If you want to set a negative value, use **DIGIT** to select the left hand digit, and press the down button to go below 0 to activate the - sign. Press **OK** when done.

4. **Done!**
   - Press to accept

You may want to adjust a **SCALE FACTOR** value also, without affecting calibration. See the separate **SCALE** page for this feature.
Menu timeout adjustment

The display has a default timeout of 60 seconds, to allow you sufficient time to refer to the manual between key operations.

You can make this period shorter, if you wish, once you become more familiar with the setup method.

1. **Set1 Set2 Output Alarms**
   - **Digit**
   - **OK**
   - **Max/Min**
   - **Reset**
   - **Lockout Switch** must be **OFF**
   - **Circuit board** must be **ON**
   - Press together, briefly

2. Press repeatedly until you see **dY. XX** where **XX** is the delay in seconds. Choices are ...
   - **dY. 10**
   - **dY. 20**
   - **dY. 30**
   - **dY. 60** (default)

3. Press briefly to toggle
   - Press DOWN or UP button briefly and repeatedly to choose from **dY. 10** or **dY. 20** or **dY. 30** or **dY. 60**

4. **Set1 Set2 Output Alarms**
   - **Digit**
   - **OK**
   - **Max/Min**
   - **Reset**
   - **Alarms**
   - **Done!**
   - Press to accept
Reverse Display function (mirror image)

If you need to be able to see a reflection of the display in a mirror or other reflective surface, for example in a simple heads-up system, or for drivers reversing into a bay, using mirrors only, you can set the display to show as a mirror image.

1. Lockout Switch must be OFF
   - Press together, briefly

2. Press OK button briefly and repeatedly until you see
   - rEU. 0 (Default)
   - or
   - rEU. 1

3. Press briefly to toggle
   - Press DOWN or UP button briefly and repeatedly to choose from rEU. 0 (normal display) or rEU. 1 (mirror image display)

4. Press to accept
   - Done!

Example of normal display format displaying the number 876543

Example of Mirror Reverse display format displaying the number 876543
**Bootup routine choices**

When you switch on your meter, it can be set to power up with 3 possible summary message combinations.

The choices are:-

- **bt 0** = Segment test, followed by a full summary of software revision, calibration audit number, model number, installed options.
- **bt 1** = Segment test followed by model number (Default)
- **bt 2** = No summary, meter displays the measurement value immediately power is applied.
- **bt 3** = Segment test which remains active until a button is pressed.

1. **Lockout Switch must be OFF**
   - Press together, briefly
   - Circuit board **ON**

2. **Press OK button briefly and repeatedly until you see bt 0 or bt 1 or bt 2 or bt 3 displayed.**

3. **Press DOWN or UP button briefly and repeatedly to choose from bt 0 or bt 1 or bt 2 or bt 3**

4. **Press to accept**
   - **Done!**

You can trigger the full summary message whenever you want, without having to power the meter off, by pressing and holding the 2 outer buttons (Set1 + Alarms) for more than 3 seconds.
Multi-Program Memory option MEM

The three contact closure inputs on the rear of the meter may be used to call up between 1 to 7 additional meter setup memories (pages), if the MEM option has been installed. This allows you to save up to 8 complete sets of independent calibrations, alarm settings, analogue output settings and serial comms settings.

First decide how many memory pages you want, as this will determine how many logic inputs you will need to use for the addressing. Logic inputs not required for Page Addressing can be used for other functions such as Tare, Reset, Display Hold, Peak/Valley display.

If you have used all 3 logic inputs for Page Addressing, you can still use the meter’s front panel buttons to perform Tare, Reset and peak/Valley view.

See “Contact Closure Input Functions” page for CC.1, CC.2, CC.3 and COP settings

<table>
<thead>
<tr>
<th>Total number of pages</th>
<th>Logic Inputs required for addressing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>none, standard single page meter</td>
</tr>
<tr>
<td>2</td>
<td>1 Set CC.1 = PA.1</td>
</tr>
<tr>
<td>3 or 4</td>
<td>2 Set CC.1 = PA.1, Set CC.2 = PA.2</td>
</tr>
<tr>
<td>5 to 8</td>
<td>3 Set CC.1 = PA.1, Set CC.2 = PA.2, Set CC.3 = PA.4</td>
</tr>
</tbody>
</table>

1. Set lockout switches OFF, and set page address to 0 or unplug the logic connector.
2. Set the copy instruction to COP.0 in page address 0 (found after you set CC3).
3. Press all 4 buttons together, display shows def. n
4. Press the Up arrow to change display to def. Y and press OK.
5. If you want all channels to share a common setting, eg calibration, do that setting now.
6. When you want to do separate settings for each channel, set COP.0

Programming and recalling individual pages
Plug the logic input connector back in, if you removed it earlier.
Select a page address using the switch combinations shown below, wired to the Logic Input connector ...

Page address 0 All logic inputs open
Page address 1 CC.1 closed to Common
Page address 2 CC.2 closed to Common
Page address 3 CC.1 and CC.2 closed to Common
Page address 4 CC.4 closed to Common
Page address 5 CC.1 and CC.3 closed to Common
Page address 6 CC.2 and CC.3 closed to Common
Page address 7 All logic inputs closed to Common

Perform the settings you require, according to the pages in this manual. Do this for all page addresses required. Then put the lockout switch in its ON position. Now, if you select a page address, the meter will briefly confirm the chosen page address on screen, and will then function according to the settings you programmed for that address.

Suitable BCD coded switches are available from many electrical supply stores. For example consider Kraus & Naimer part A540-600 E24 or Apem part number IRBC10N1248 or London Electronics part number SW2P-8W-BCD, which also provides separate 2 pole 8 way signal selection function.
1. Display shows minus signs.

This tells us that there is no response to input data, either because....

a) There is no data, and the display has timed out  
b) There is an error in the data wiring.  
c) One or more of the menu settings may be wrong.

You can test for a) and b) with a simple data monitor which you can make  
with 2 diodes and a resistor, as shown below.

The Green LED should be on for most of the time, and you should see the  
red LED flicker as data is sent.

If the red LED is lit most of the time, with the green flickering, your wiring may  
be transposed.

If neither LED is lit, check your data source to make sure it is configured to  
transmit continuously, and check your connections to make sure the cabling  
and connector terminals used are correct.

If the Green LED is on, but no flickering of the red is seen, check that the  
data source has been set to transmit permanently. If the data source is  
another London Electronics Display, make sure it has been set to mode C1  
and that the enable terminal on the serial output connector is connected to  
data common.

---

2. You can use your PC to generate and monitor serial data, with a free  
program called RealTerm which you can download from :-  
http://sourceforge.net/projects/realtterm/

This can be very useful in diagnosing communication problems.
How to install option boards

Where the product is intended for “UL” installations, removal or addition of option boards is not permitted.

Warning: Disconnect power before you expose the internals of the display.

If you want to open your display to install or modify option boards, follow these steps...

1) Switch off power to the display and unplug all connectors.

2) Undo all the thumb screws on the rear case, store them safely and remove the back panel.

3) Locate the main option board, which will be similar in appearance to the diagram below. If a main option board is absent, which will be the case if the display was ordered without any output options, then a main option board will need to be fitted.

The board assemblies will look like this...

The analogue output and RS232 or RS422 plug-in option boards are fixed to the main option board with white plastic pillars. You must apply a firm force when fitting or removing these options.

Always be careful to connect the pins to sockets accurately. When reassembling, make sure option boards are firmly fixed to the upper option board.
Waste Electrical Electronic Equipment (WEEE)

In Europe, this equipment must be disposed of in accordance with European Parliamentary Directive 2002/96/EC.

This directive encourages recycling and the reduction of waste materials in the environment.

This means it must be sent to an approved recycling plant if you want to dispose of it.

It must not be thrown away with general rubbish.

If you are unable to dispose of this item locally, you may send it to us for recycling.

Conditions:

1. We will only accept items of our manufacture.

2. You must pay for the transport of the goods to us.

3. We will only accept items if they include a signed declaration by an authorised person in your organisation, stating that:

   i. The item is safe to handle and has no contaminants which may be harmful to health.

   ii. You wish us to dispose of or destroy the item(s)
Equipment Specifications

**Case Material**  Heavy duty welded uPVC

**Connectors**  Internal detachable Screw Terminal connectors accessed via compression glands.

**Environmental**  Storage Temperature range -20 to +70°C, non condensing
Operating temperature range 0 to 50°C. Internal heater option available for use in conditions down to -25°C. Please allow 30 minutes for the display to reach thermal equilibrium.

**Power**  100-240 VAC, 45 to 60Hz, 48V AC or 11-30 VDC optional

**Burden**  40VA maximum

**Sealing**  IP65 all round, provided the display is mounted vertically and that all cable glands and rear case-closure screws are properly secured.

**Input Signals**  RS232 on model INT2-S2
RS422 and RS485 on model INT2-S4

Baud rate selectable from 300 to 115200
Data format selectable 701,7e1,7n2,80,8E,8n,8n2
Address 00 to FF
Inter message delay time 00 to 99 mS
Inter character delay time 00 to 99 mS

**Display update rate**  10 readings per second

**Display range**  -1999 to 9999

**Plug-In Output Options**

**Analogue O/P**  See analogue output manual for details.

**Alarm Relay O/P**  See alarm output manual for details.

**ASCII Data O/P**  See serial output manual for details.

**Calendar/Clock option**  See serial output manual for details.
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 September 2010</td>
<td>Version F0.18 Software released. Manual format revised to improve clarity and segregate easy from advanced menu functions. Optional outputs now described in their own dedicated manuals. DIN Rail mounting option added. Cabling guidance added.</td>
</tr>
<tr>
<td>14 February 2011</td>
<td>Version F00.21 software released.</td>
</tr>
<tr>
<td>28 February 2011</td>
<td>Warranty increased to 3 years and terms added.</td>
</tr>
<tr>
<td>8 August 2014</td>
<td>Version F00.23 software released.</td>
</tr>
<tr>
<td>21 January 2016</td>
<td>Mounting dimensions amended for flush case bosses</td>
</tr>
</tbody>
</table>
### ASCII Hex codes and displayed characters

<table>
<thead>
<tr>
<th>Hex</th>
<th>Function</th>
<th>Hex</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>STX</td>
<td>2c</td>
<td>,</td>
</tr>
<tr>
<td>03</td>
<td>ETX</td>
<td>2d</td>
<td>-</td>
</tr>
<tr>
<td>04</td>
<td>EOT</td>
<td>2e</td>
<td>.</td>
</tr>
<tr>
<td>0a</td>
<td>Line Feed</td>
<td>2f</td>
<td>/</td>
</tr>
<tr>
<td>0c</td>
<td>Form Feed</td>
<td>3c</td>
<td>&lt;</td>
</tr>
<tr>
<td>0d</td>
<td>Carriage Return</td>
<td>3e</td>
<td>&gt;</td>
</tr>
<tr>
<td>1b</td>
<td>Escape</td>
<td>5c</td>
<td>\</td>
</tr>
<tr>
<td>20</td>
<td>Space</td>
<td>5e</td>
<td>^</td>
</tr>
<tr>
<td>21</td>
<td>!</td>
<td>5f</td>
<td>_</td>
</tr>
<tr>
<td>25</td>
<td>%</td>
<td>60</td>
<td>`</td>
</tr>
<tr>
<td>26</td>
<td>&amp;</td>
<td>7b</td>
<td>{</td>
</tr>
<tr>
<td>28</td>
<td>(</td>
<td>7c</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>)</td>
<td>7d</td>
<td>}</td>
</tr>
<tr>
<td>2a</td>
<td>*</td>
<td>7e</td>
<td>~</td>
</tr>
<tr>
<td>2b</td>
<td>+</td>
<td>7f</td>
<td>DEL</td>
</tr>
</tbody>
</table>
These examples show a single ASCII character 2C (0010 1100) which is a Comma, so that you can see the voltages in RS485 and RS232 systems.

**Typical UART output**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>8</th>
<th>10</th>
<th>20</th>
<th>40</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

RS485 data line levels 8n1

<table>
<thead>
<tr>
<th></th>
<th>A+</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>0</th>
<th>1</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
</tbody>
</table>

RS232 data line levels 8n1

<table>
<thead>
<tr>
<th></th>
<th>+4V</th>
<th>to</th>
<th>+25V</th>
<th>0V</th>
<th>0V</th>
<th>0V</th>
<th>0V</th>
<th>0V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-4V</td>
<td>to</td>
<td>-25V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
</tbody>
</table>

**Special data commands**

These messages are not handled by the normal data parsing. If the escape character ‘~’ is the first available character the whole message is treated as a command message.

Message format is: <S.Chr><Addr>~[Command]<E.Chr>.

Display Brightness Control  ‘~Bx’ where ‘x’ is 1(dim) to 8(bright)
The brightness setting is not saved to non-volatile memory

Clear display  ‘~C’  Clears display and indicators (meter looks like it’s turned off)
The display will return to its illuminated state on the next receipt of normal data.

Set/Clear Alarm Indicator  ‘~Aas’ where ‘a’ is the Indicator ID (0 to 3)
where ‘s’ is the state (0 or 1)
When this command is received normal alarm indication is suspended until the meter is rebooted