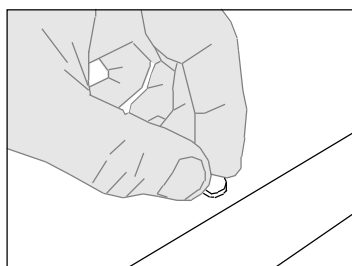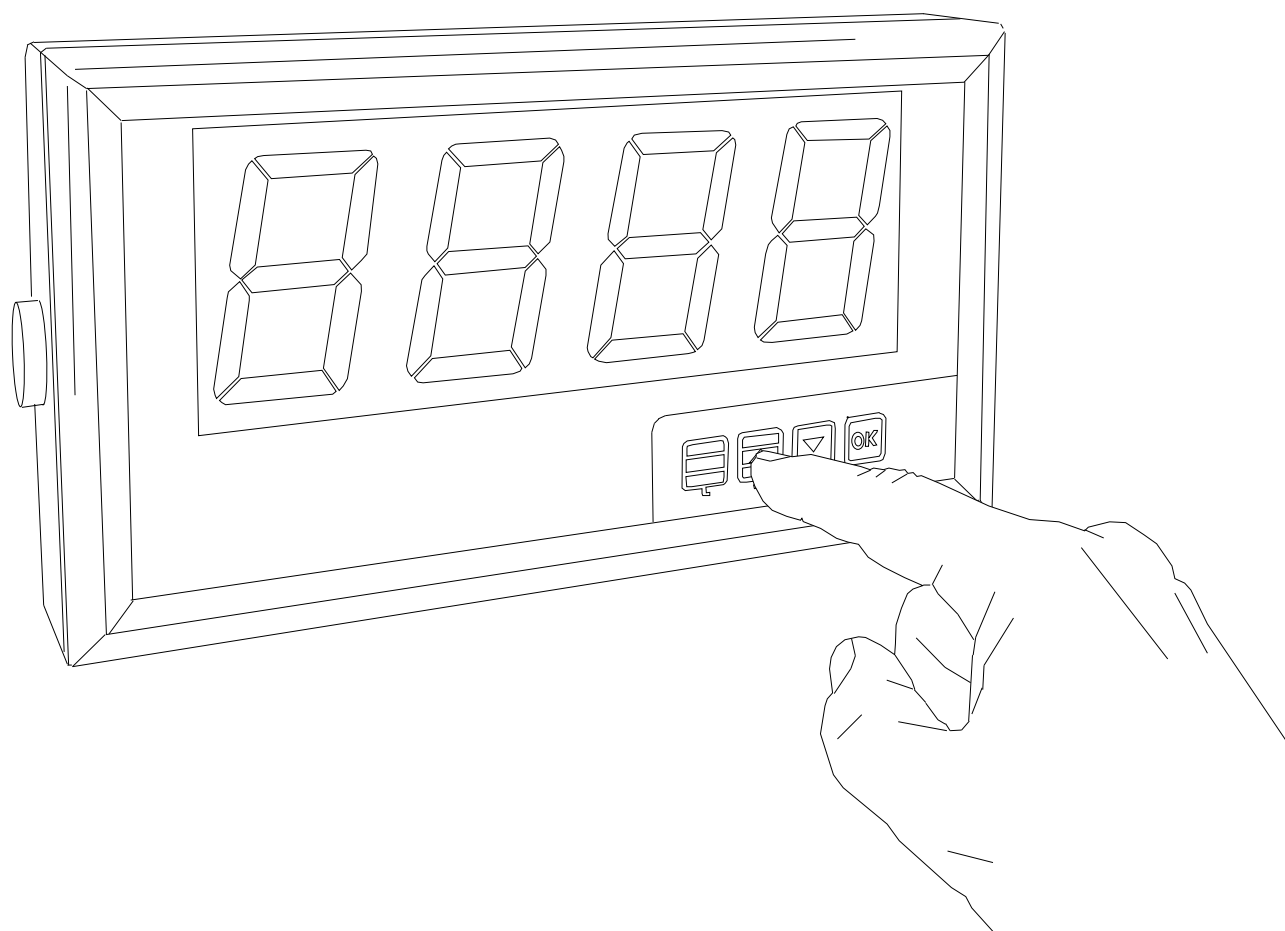# London Electronics Limited

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www.london-electronics.com   help@london-electronics.com

Large display pulse input counter & frequency meter
EasyReader Model ER2C
Connection details, scaling and general information

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.

Alphabetic Index

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 for you.

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 2 year warranty. We will put right or replace any meter which is faulty because of bad workmanship or materials. This warranty does not cover damage caused by misuse or accident.

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 at some times, for example during our factory shutdown periods, you may have to 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 normally returned with a standard courier service.

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

If you do not agree with these conditions, please return this item now, in unused, clean 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.

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.

Warnings

⚠

Please carefully read all warnings and ONLY install the meter when you are sure that you've covered all aspects.

* Connect the meter according to current IEE regulations and separate all wiring according to IEC1010.

* Power supplies to this equipment must have anti-surge (T) fuses at 125mA for 230V supply, 250mA for 110V supply or 1A for DC supplies in the range 11-30VDC.

* Check that the model number and supply voltage suit your application before you install the meter.

* Don't touch any circuitry after you have connected the meter, because there may be lethal voltages on the circuit board.

* We designed this meter for Pollution-Degree 2 environments only. This means you must install it in a clean, dry environment.

* Only adjust on-board switches or connections with the power turned off.

* Make sure all screw terminals are tight before you switch the meter on.

* Only clean the meter with a soft damp cloth. Only lightly dampen with water. Do not use any other solvents.

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

General Description

The EasyReader C displays are large versions of the popular "Intuitive" counter and ratemeter family.

They accept pulse inputs from digital sensors such as NPN, PNP or contact closure proximity detectors.

Their main function is to monitor production lines, counting items and monitoring rate of production, but they can also be used for accurate measurement of frequency and speed.

They also accept quadrature input signals, so are ideal for bidirectional position monitoring too.

Their unique INTUITIVE programming system gives the simplest possible setup procedure.

You can scale the counter and ratemeter so that a given number of pulses gives a certain display value. The scaling is digital and highly stable, thanks to a trimmed quartz-crystal timing oscillator. Scale factors from 0.001 to 9999 give wide calibration possibilities.

An excitation supply gives you 24V DC at up to 100mA, useful if you want to power an optical sensor, proximity switch etc.

Getting Started

First, check that the display will suit your application and the available power source (either 95-265 VAC or 11-30 VDC).

If you asked us to configure the display for you, please check that the scaling and settings agree with your requirements.

We fully tested and calibrated your display for you, but a pre-installation test may be useful to check that everything works as needed.

Remove the screws which hold the rear panel in place.

Feed the signal and power cables through the cable glands.
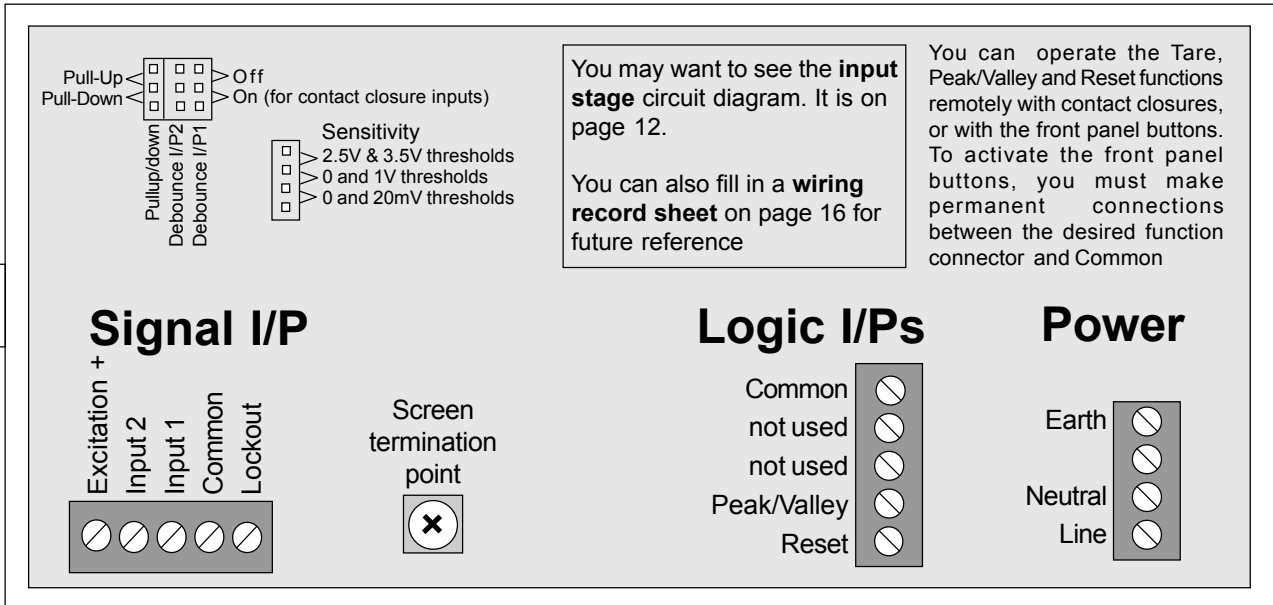
Connect the signal and power cables to the appropriate screw terminal connectors. See our connection drawing to check that you are using the correct terminals.

Check, before switching on, that the power is suitable for the unit.

Switch on, and the display should show 'Ec.X.X' for a second or two. (where Ec.X.X is the software version). Units with custom software will have a different prompt.

Connections

We supply detachable screw terminal connectors to make installation as easy as possible for you. You should use multistrand insulated wire with ferrules to DIN46228/1. You can use stripped wire with cross sectional area from 0.5 to 2.5mm². Strip back insulation 7mm.

Pull-Up | Off
Pull-Down | On (for contact closure inputs)

Pullup/down I/P2
Debounce I/P2
Debounce I/P1

Sensitivity
2.5V & 3.5V thresholds
0 and 1V thresholds
0 and 20mV thresholds

You may want to see the **input stage** circuit diagram. It is on page 12.

You can also fill in a **wiring record sheet** on page 16 for future reference

You can operate the Tare, Peak/Valley and Reset functions remotely with contact closures, or with the front panel buttons. To activate the front panel buttons, you must make permanent connections between the desired function connector and Common

Signal I/P

Excitation +
Input 2
Input 1
Common
Lockout

Screen termination point

Logic I/Ps

Common
not used
not used
Peak/Valley
Reset

Power

Earth
Neutral
Line

Rear-case Finger-Screws - please read carefully

Only gently tighten these screws. There is no need to fit them so tight that your fingers hurt. We use this type of screw to prevent damage from being caused to the threads. **Do not use hand or power tools to tighten these screws.**
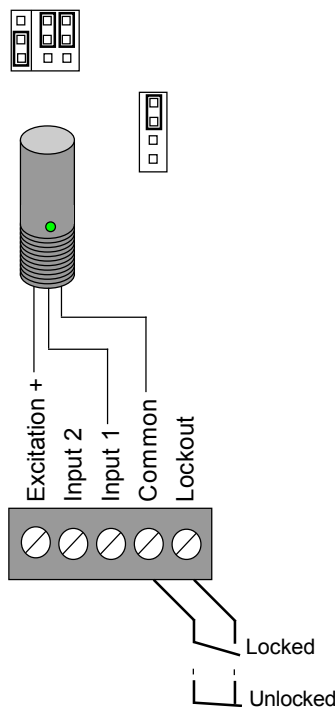
Use screened cable for the input signal and connect the screen to power earth at the meter end of the cable only. For best performance, keep the signal cable well away from the power cables, which could carry electrical noise likely to interfere with your measurement.

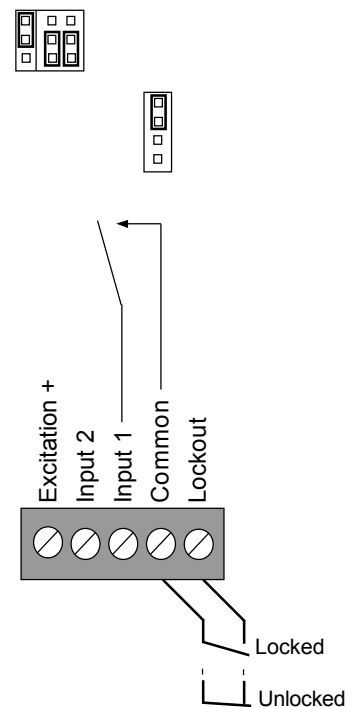**Some Input Connection and jumper positioning examples:**

NPN Sensor
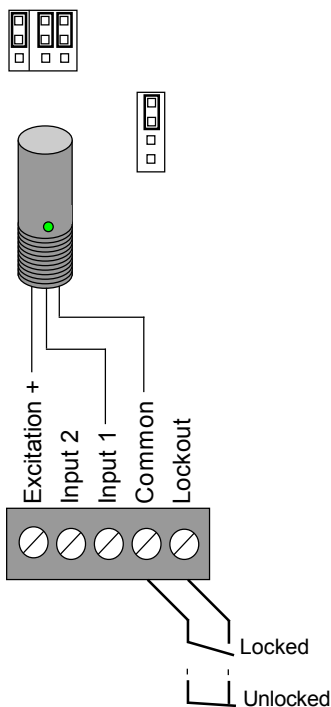
PNP Sensor

Contact Closure (Default)

Excitation +
Input 2
Input 1
Common
Lockout

Locked
Unlocked

Modes

The EasyReader-C has 7 display modes to suit various counting and rate measurement functions.

Here is how to select one of these modes:-

1. Connect the Lockout terminal to the Common terminal, then apply power to the display
2. Press the Mode button for 3 seconds, then release.
3. Use the UP arrow or Down arrow button to select from this list :

tot.

1. **Basic Totaliser 1 pulse input**
   Can be scaled with positive (count up) or negative (count down) scale factor.

gAtE

2. **Gated totaliser 1 pulse input and 1 gate input.**
   Can be scaled with positive (count up) or negative (count down) scale factor. The gate is on INPUT2.
   Gate open = HI Gate closed = LOW

1 u.d.

3. **Totaliser 1 pulse input and 1 direction input**
   If you use a positive scale factor, the counter will increase for pulses on INPUT1 if INPUT2 is high, decrease if INPUT2 is LOW.
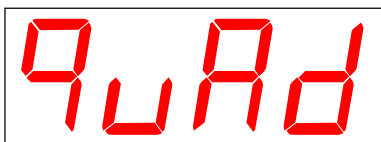
2 u.d.

4. **Totaliser 1 input UP count, 1 input DOWN count.**
   Pulses on INPUT1 count down
   Pulses on INPUT 2 count up

2 u.u.

5. **Totaliser with 2 pulse inputs for UP counting**
   Pulses on both INPUT1 and INPUT2 count up

quAd

6. **Quadrature counter with 2 phased inputs**
   Phased pulses on INPUT1 and INPUT2 count up or down depending on phase.

rAtE

7. **Rate meter - Single input**
   Displays the frequency or scaled rate of pulses on INPUT1

4. **Press OK** when you have made your choice. Now you need to scale your display ...

Scaling for the 6 Counter modes...

On the previous page, you saw how to select from one of 7 different modes. The first 6 modes are all counter functions, which all have the same method of scaling.

To select a mode, you pressed OK. If you selected one of the first 6 counter modes, your display should now show:-
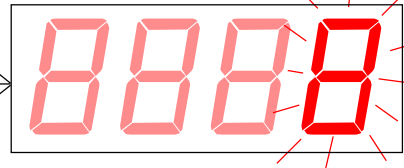
Pulses In
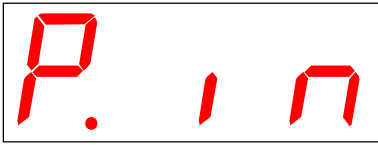
P. in

Display

d ISP

The value you can set for each of these 3 variables

8888

You'll see one digit brighter than the others - this means you can change its value with the UP or DOWN button.

Use DIGIT button to select other digits.

Preset (pre-load)

P.Set

P.Set lets you start the counter from some value other than 0.

For example if you wanted to fit a new counter into a system which has already passed 1367 litres, you would set P.Set to 1367 and the counter would start counting from this value.

Select decimal-point with the DIGIT button if you want to change the decimal-point position. Move the decimal-point with UP/DOWN buttons.

Press OK when you have set the whole number, to move on to the next variable

Typical examples:

On a production line you get 1 pulse for every item. You want to count number of items. P.in = 1 dISP = 1 P.Set = 0	**You have a rotary encoder** which gives 5000 pulses per rotation (360 degrees). You want to display degrees rotation P.in = 5000 dISP = 360 P.Set = 0
In a paper mill, you want to measure length. You have a wheel sensor which gives 433 pulses per metre of material. You want to count metres to 1 decimal place (tenths of a metre) P.in = 433 dISP = 1.0 P.Set = 0.0	**A flow sensor** gives 2345 pulses per litre You want to count milli-litres (cc). You want the display to start from 450 ml P.in = 2345 disp = 1000 P.Set = 450

IMPORTANT To protect your settings, disconnect the LOCKOUT link on the input connector.

Scaling for the Ratemeter Mode

The Ratemeter mode is ideal if you want to measure Frequency, Speed, Rate of production etc.

Frequency In (Hz.)

F. in

Display

d iSP.

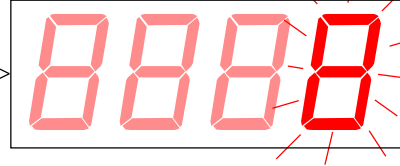**The value you can set for each of these 3 variables**

8888

The scaling method is simple. Specify a Frequency in Hz and a reading the display should show for that Frequency.

For example, if you have a sensor which gives 200Hz at 5 litres per minute and you want to measure flowrate in litres/minute...

F.in   = 200
disp   = 5 or 5.0 or 5.00 depending on the resolution you want.

You'll see one digit brighter than the others - this means you can change its value with the UP or DOWN button.

Use DIGIT button to select other digits.

Select decimal-point with the DIGIT button if you want to change the decimal-point position. Move the decimal-point with UP/DOWN buttons.

Press OK when you have set the whole number, to move on to the next variable

Averaging

Av. 0 · · · · · · · · · · *Av.64*

Possible values = 0,2,4,8,16,32 and 64
Averaging is useful if the input frequency is not stable. The bigger the averaging number, the more stable will be the display. Big averaging numbers also make the display respond less quickly to sudden changes in input frequency. The largest averaging number is 64, which means that 64 readings will be averaged.

Time-Out (seconds)

t.o. 3 · · · · · · · · · · *t.o.60*

Possible values = 3,10,30 and 60
The time-out function is normally set to 3 seconds. This means that if the input pulses stop for any reason, the display will hold the last reading for 3 seconds, after which it will go to 0. You can increase this delay up to 60 seconds.

IMPORTANT To protect your settings, disconnect the LOCKOUT link on the input connector.

Contact closure inputs

The contact closure inputs allow you to operate the Max/Min and reset functions remotely, but **only when the meter is 'locked'.**

The switched signal is 5V DC at a current of 1.5mA

Remote contact-closure inputs

	Common
	not used
	not used
Min/Max	Peak/Valley
Reset	Reset
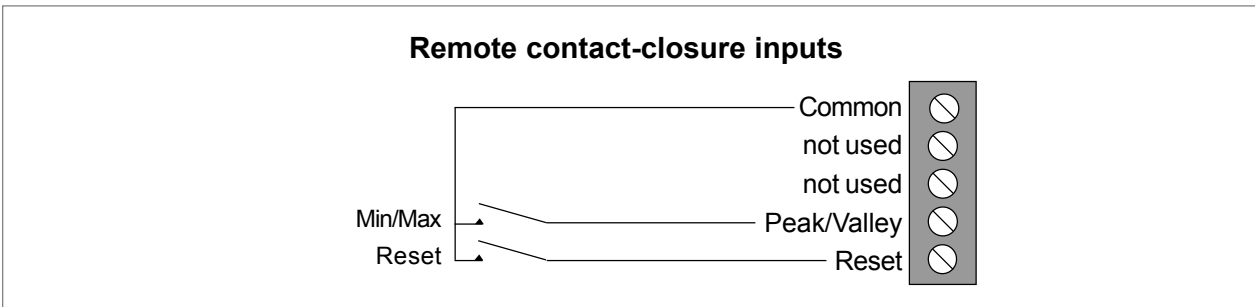
Min/Max
In Rate mode only, Contact closure sequentially displays the Maximum and Minimum scaled Rate or Frequency values, since the display was last reset.

The display will time out and return to showing the actual input after 3 seconds.

** If you make a permanent connection between Common and Min/Max, you can access this function with the button labelled Max/Min on the display's front panel
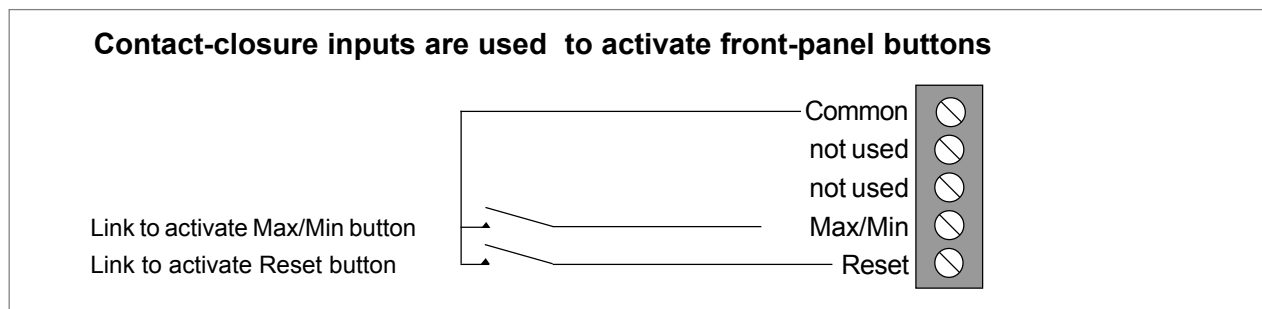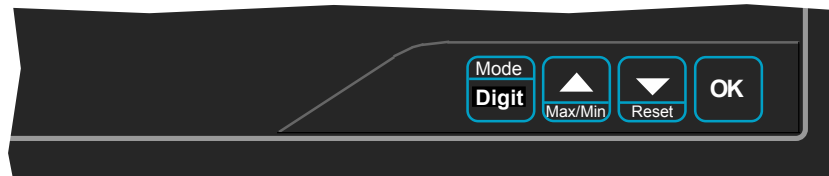
RESET
In any one of the 6 Totalsing modes, contact closure will reset the accumulated total. In Rate mode, Contact closure will reset the stored Max and Min and averaging history values.

** If you make a permanent connection between Common and Reset, you can access this function with the button labelled Reset on the display's front panel

Front panel controls

Control Type   4 pushbutton switches located behind a flexible overlay.

Function   Depends on whether locked or in setup mode.

Also depends on remote input contact status - see below..

Contact-closure inputs are used to activate front-panel buttons

	Common
	not used
	not used
Link to activate Max/Min button	Max/Min
Link to activate Reset button	Reset

Normal running mode (Locked)

MAX / MIN   Selects max/min/current rate or frequency readings (When in Rate mode), in turn if the remote MIN/MAX terminal is connected to Common.

RESET   Press to reset any, max., min. and filter history if the remote Reset terminal is connected to Common.

Setting mode (unlocked)

Mode   Press for more than 3 seconds. Lets you adjust the functional mode of the display if the display is unlocked.

DIGIT   Chooses a digit to be changed on the display, while adjusting a variable when the display is unlocked

UP arrow   Each press increases a chosen digit value, while adjusting a variable when the display is unlocked

DOWN arrow   Each press decreases a chosen digit value, while adjusting a variable when the display is unlocked

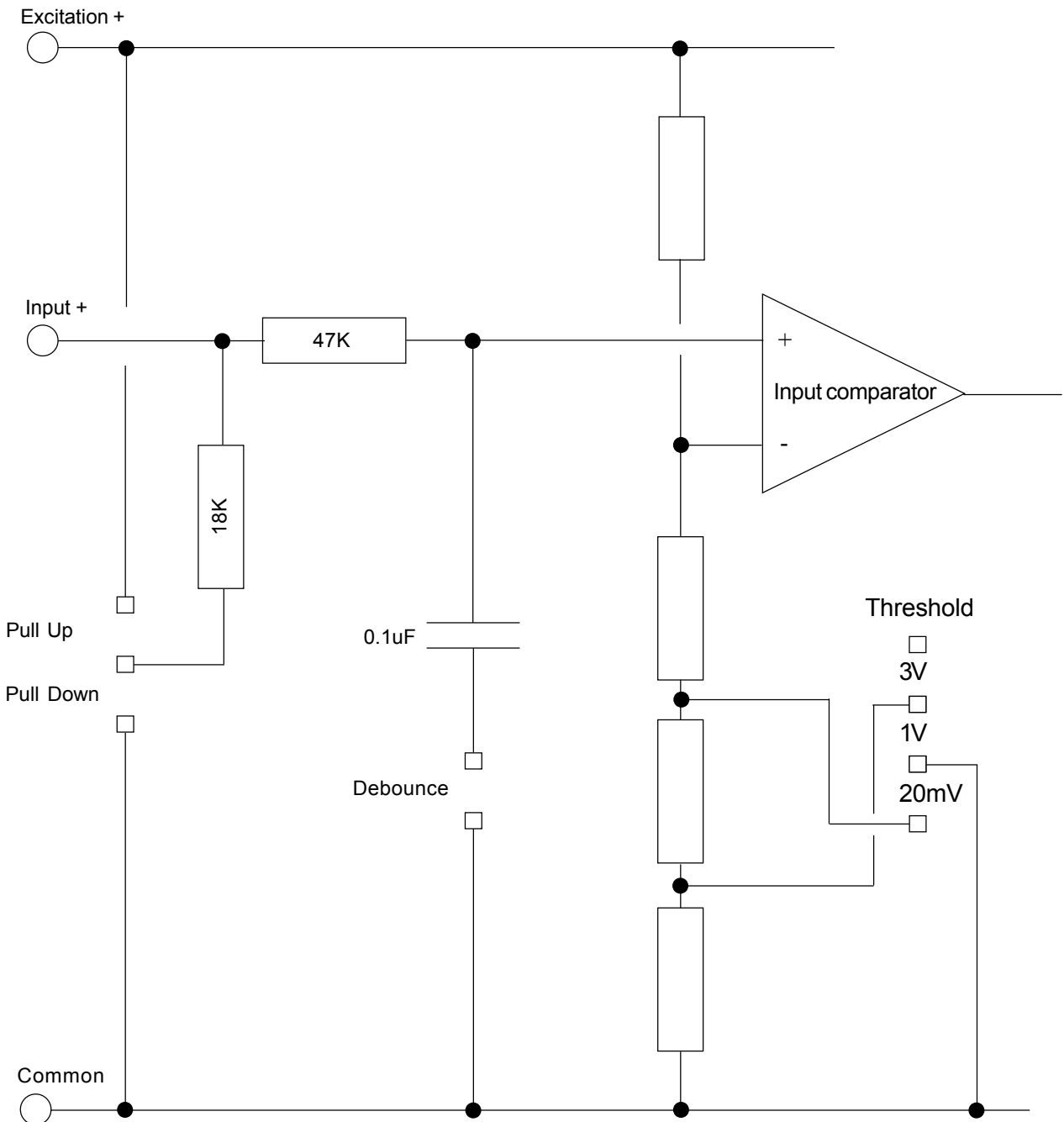**OK**   Confirms any changes made or skips to next step.

Specifications

Bezel size	260mm wide x 140mm high
Case Depth	75mm
Weight	600 grammes
Case Material	Black uPVC with Acrylic lens
Connectors	Internal Detachable Screw Terminal connectors
Operating Temp.	0 to 50 degrees C, non condensing humidity
Storage Temp.	-20 to 70 degrees C
Power supply	95-265 VAC or 11-30 VDC optional
Power consumption	8 watts maximum
Input Signals	3 Jumper selectable thresholds with hysteresis:-

<div style="margin-left:2em">
1. 2.5 to 3.5V (default) for signals 0-5V to 0-30V
2. 1V AC or more
3. 0-20mV RMS or more
</div>

Accepts any of these sensor types:-
- NPN proximity or opto
- PNP proximity or opto
- Contact closure
- CMOS 5V to 18V
- PLC 5V, 12V 24V or 48V Logic
- Passive inductance pickup, signal more than 40mV p-p

Pull up/down resistor	22 Kilohms to Excitation + or 0V respectively
Input Frequencies	With debounce jumpers 0 to 30 Hz. scalable
	Without debounce jumpers 0 to 50 KHz. scalable
Operating Overload	Can accept up to 60V without damage
Display type	High efficiency LED, red or green
Digit height	57mm (A 102mm high model is also available)
Viewing distance	25 metres (50 metres with 102mm digit model)
Accuracy	+/-0.05% of range +/-2 counts in Frequency mode
Scaling tempco	20ppm/Degree Celsius max. for Rate/Frequency
Excitation voltage	24VDC +/- 20% rated at 100mA. Noise 200mV max (50Hz-100KHz)
Filtering	Selectable time constants up to 5 secs in 0.5sec increments

Display update rate   **In any of the 6 Counting modes:**

> The display will update with each incoming pulse up to 10 updates per second for frequencies above 10 Hz.

In rate mode:

> For frequencies above 3Hz., display will update 3 times per second.
> For frequencies below 3 Hz. the display will update on each input pulse, provided the interval between pulses is less than the chosen timeout period of 3, 10, 30 or 60 seconds.

Memory   Programme settings and accumulated total have 10 year data retention in solid-state memory which does not need batteries to operate.

Notes

Circuit diagram showing one of the two input stages.

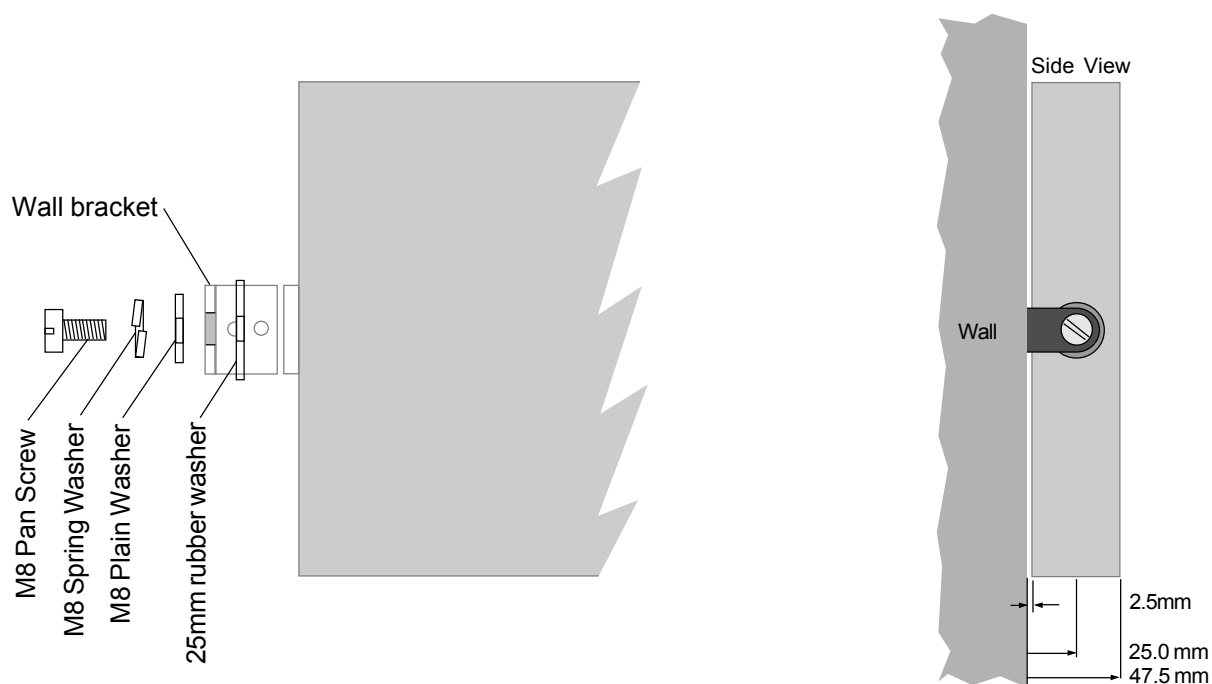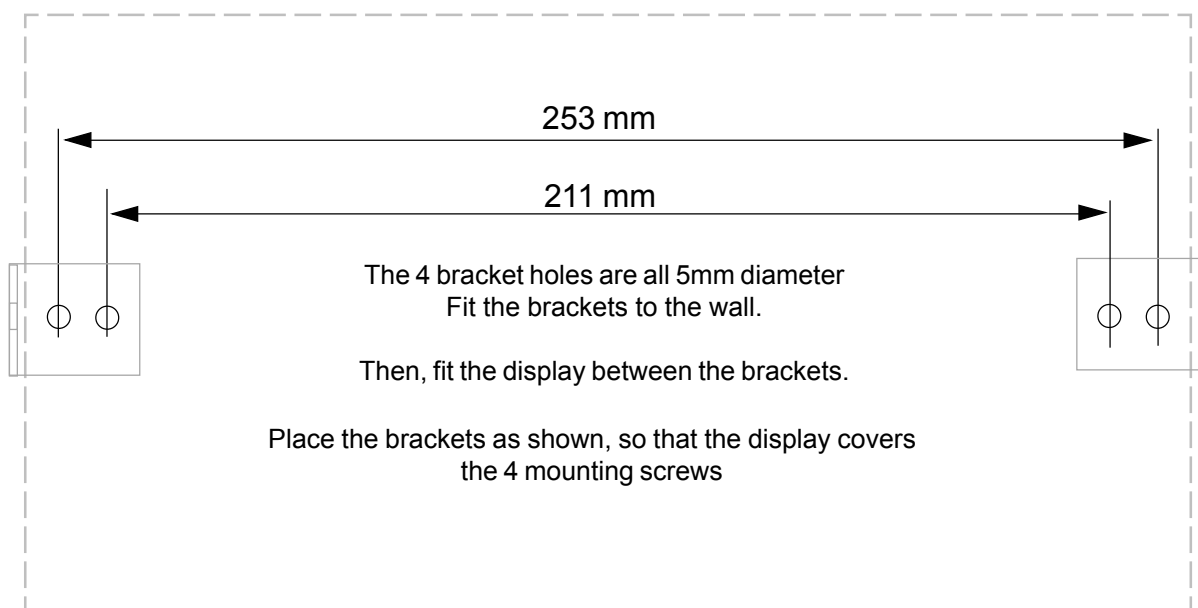This shows the pullup, debounce and sensitivity setting methods.

Excitation +

Input +

47K

18K

Pull Up

Pull Down

Common

0.1uF

Debounce

Input comparator

+

-

Threshold

3V

1V

20mV

How to Mount your display

1. Wall Mounting

Wall mount your EasyReader display in a clean, dry environment.

Drill 4 holes in your wall, spaced as you see in this diagram...

The mounting screws you use should have a diameter between 3.4 and 4.6 mm and should be suitable for the material of the wall. You may need to use wall plugs or other screw accessories, if the wall material is not suitable to take screws directly.

253 mm

211 mm

The 4 bracket holes are all 5mm diameter
Fit the brackets to the wall.

Then, fit the display between the brackets.

Place the brackets as shown, so that the display covers
the 4 mounting screws

Side View

Wall bracket

Wall

M8 Pan Screw

M8 Spring Washer

M8 Plain Washer

25mm rubber washer

2.5mm

25.0 mm

47.5 mm

Route cables neatly away from the display. If the cables may become damaged in the environment, protect them with suitable conduit or trunking.

How to Mount your display ... continued

1. Suspension Mounting

Suspension mount your EasyReader display in a clean, dry environment.

The mounting screws you use should have a diameter between 3.2 and 3.8 mm and should be suitable for the supporting material. You may need to use screw plugs or other screw accessories, if the material is not suitable to take screws directly.

Mount the brackets first, then fit the display to the brackets.
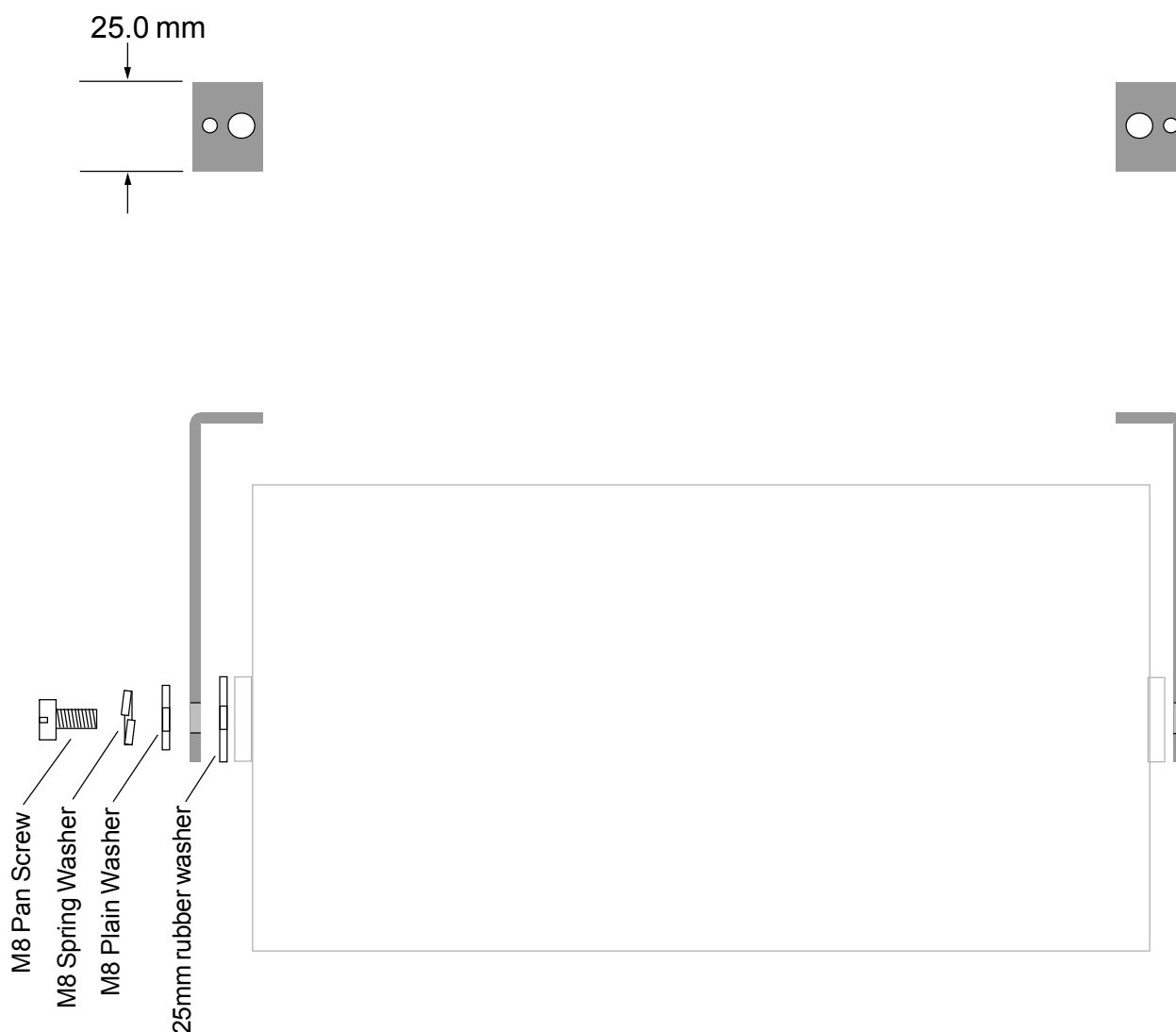
25.0 mm

M8 Pan Screw
M8 Spring Washer
M8 Plain Washer
25mm rubber washer

Route cables neatly away from the display. If the cables may become damaged in the environment, protect them with suitable conduit or trunking.

Record of Revisions

30 January 2004   Product released
16 February 2004   Added input stage diagram to page 12
25 March 2004   Added wiring and jumper record sheet on page 16
30 June 2009   Address updated

Wiring and jumper record

For future reference, record all the jumper positions and wiring colours you used in your installation.
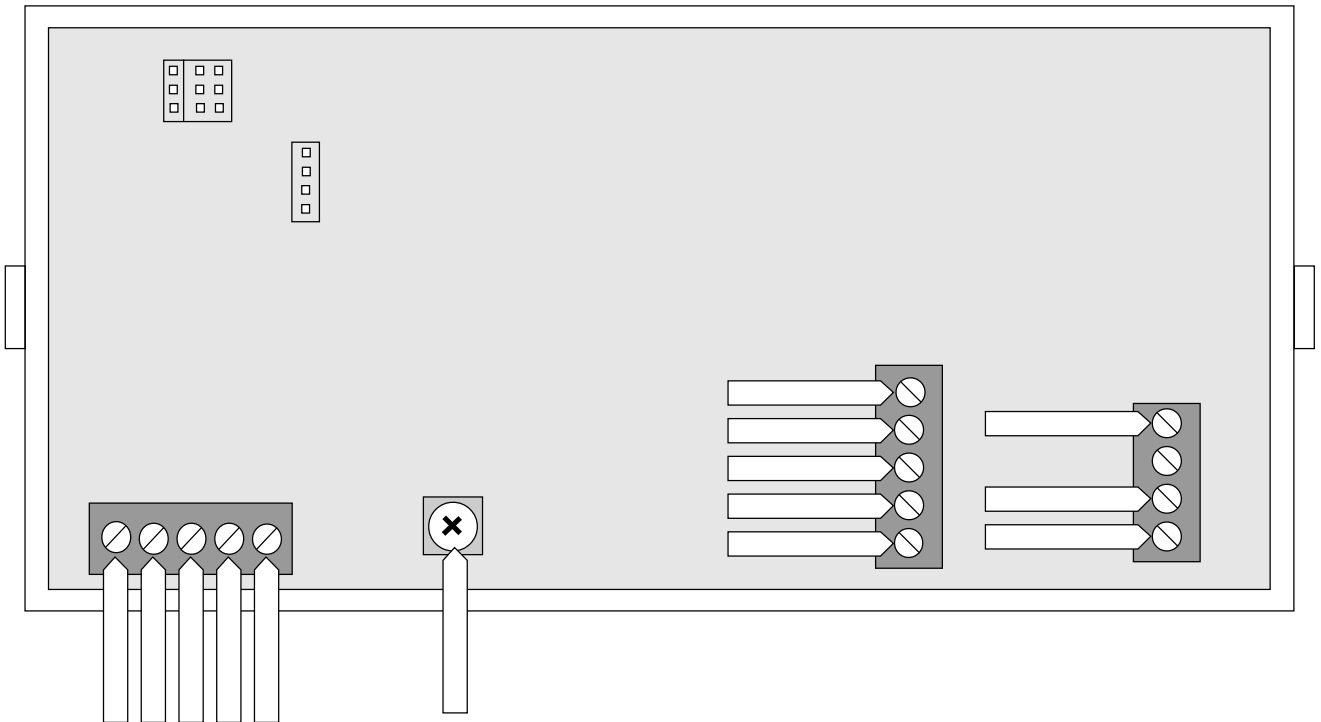
Declaration of Conformity

Declaration Reference   : EasyReader
Issue Date   : 16 December 2003
Products Covered   : EasyReader series
Title   : DOC-EasyReader

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 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

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

J.R.Lees   Director