



**Logitech Electronics Limited**

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**2000 MKII SERIES™**

Counters

**Model 2000C**

User Guide

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# Specification

<b>Display</b>	6 decade and sign 7-segment red LED, 10mm high
<b>Decimal point</b>	Programmable from front panel
<b>Scaling</b>	Programmable via front panel, retained in non-volatile memory.

## Signal inputs

### Standard (Count Up and Count Down)

<b>Standard sensitivity</b>	180mV to 10V — protected to 100V
<b>Frequency</b>	0—100kHz
<b>Impedance</b>	15k $\Omega$ minimum
<b>Maximum Pulse Count</b>	4,000,000,000

### Optional

<b>High sensitivity version</b>	12mV to 1V — protected to 100V
<b>Analogue input module</b>	(specified as 0–1V, 0–5V, 0–10V, 0–20mA, 4–20mA)

<b>Control inputs</b>	Opto-isolated — requires sink to 0V of 220 $\Omega$ maximum. Start, Stop, Reset (0.3ms signal duration)
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## Outputs

### Standard

<b>Transducer supply</b>	10—12V DC nominal unregulated @ 100mA max
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### Optional

Analogue 0–1V, 0–5V, 0–10V, 0–20mA, 4–20mA  
Dual Relay module — can switch 8A @ 240V AC  
Serial Interface  
Higher transducer supply voltage 24V DC @ 50mA max

<b>Connections</b>	Screw terminals on rear panel.
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## Power requirement

<b>AC</b>	Factory set to 115V or 230V a.c. 50/60 Hz, loading 3VA.
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<b>DC</b>	Mains Counters can also be powered by providing 10V to 15V DC @ 300mA max via the 10V terminal (refer to <b>WARNING</b> on page 11) Alternatively, if specified at time of order, they can be configured to operate from 24V DC only.
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## Temperature range

<b>Operating</b>	0°C to +50°C
<b>Storage</b>	-20°C to +80°C

<b>Dimensions</b>	96 x 48 x 113mm (panel cut-out 92 x 43mm).
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<b>Weight</b>	500g (standard mains supply version)
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# General Description

The [2000T MKII SERIES™ Counters](#) are 6-decade seven segment high brightness red LED display instruments based on the industry standard 8051 series architecture microprocessor.

They are built into half DIN (96 mm x 48 mm) panel mounting housings and can be supplied to operate on 115V or 230V AC or 24V DC power supplies (see [Transformer Connections](#) on page 5).

[2000T MKII SERIES™ Counters](#) are available with several factory fitted options which must be specified when ordering – see [Specification](#) on page 3 for details.

Additionally, **Logitech** will customise the programmed operating modes of these Tachometers to suit specialised applications.

Many variations on the standard software have been developed — please contact the Sales Office if this service is required for your installation.

## Note:

Two versions of [2000T MKII SERIES™](#) instruments are available - either with a **full** switch set accessible externally on the front panel, or with only a **single** function switch (**FUNC**) accessible unless the bezel and front panel are temporarily removed. The following setting-up instructions assume the front panel has been removed if using a **single** switch version.

# Safety Information for EU Users

**WARNING** This instrument must be earthed when powered from a mains supply (see also [Mains Earth](#) on page 8). Refer to the rating label for the pre-set voltage and ensure that the instrument voltage corresponds to the intended supply voltage.

Important: The wires in the power lead fitted to mains instruments are coloured in accordance with the following code:

Green and Yellow	.....	Earth
Blue	.....	Neutral
Brown	.....	Live

As the colours of the supply lead fitted to mains supply instruments may not correspond with the coloured markings identifying the terminals in your plug, connections should be made as follows:

- Connect the green and yellow wire to the terminal marked with the letter E or identified with the  $\perp$  (earth) symbol.
- Connect the blue wire to the terminal marked with the letter N or coloured black.
- Connect the brown wire to the terminal marked with the letter L or coloured red.

The mains supply to this instrument must be protected with a 1 Amp fuse.

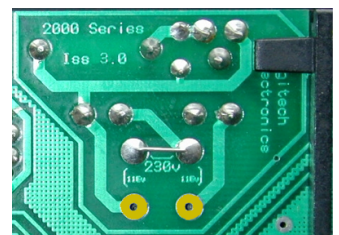
## Transformer Connections

**2000 MKII SERIES™** instruments for use on mains power can operate on either a 230V or 115V 50/60Hz AC supply.

Instruments are factory pre-set to operate from the mains voltage specified at time of ordering.

If, for any reason, the user needs to change the mains operating voltage the following procedure must be adhered to:

1. Disconnect the Mains Supply.
2. Gently prise off the front panel bezel surround and allow the front panel to fall forward and out.
3. Remove the two nuts at the rear of the case, then push the instrument out through the case front.
4. Pads which select the operating voltage are located on the underside of the printed circuit board. The existing link(s) should be removed and new link(s) should be soldered across the appropriate pads, and the instrument reassembled (one link is used for 230V AC, two links are needed for 115V AC).



# Switches and Connections

## RUN/SET Switch

This switch is located in the top right hand corner of the front panel and is used to switch the instrument between normal **RUN** mode to **SET** mode in order that the user programmable factors can be entered.

**RUN** mode. While the unit is in **RUN** mode all switches except for the **RUN/SET** switch are disabled. Pressing this switch changes the Counter to the **SET** mode and enables the **DP**, **0–9**, and the **±** (polarity) switches (see [Setting a scaling factor](#) on page 9).

## FUNCTION (FUNC) Switch

This is located directly below the **RUN/SET** switch and is used in **SET** mode when it is required to check or set the programmable parameters. Pressing the **FUNC** switch toggles between the two following parameters:

**SCALE** (Scaling Factor)  
**OFFSET**

Each of the above function names is displayed for one second before the display automatically changes to display the value that has been set for the parameter. At this stage it is necessary to enter a value, if required, or step to the next parameter by a single depression of the **FUNC** switch.

When the Counter is being used and is operating in **RUN** mode, the **FUNC** switch can be used as a **RESET** if a link is wired on the rear panel terminal block between **RST** (terminal 6) and **0V** (terminal 3).

## DP (Decimal Point) Switch

This is located under the **FUNC** switch and is used to set the position of the decimal point as required.

A single depression of the switch will move the decimal point one decade. Holding the switch depressed will cause the point to move in decade steps from right to left at a pre-determined rate.

This switch is only active when setting either the scaling factor or the offset (the DP position in the normal display)

## 0–9 Switch

Located under each decade, these switches are used to set the value of all programmable parameters. Each depression increments the display one digit. Holding the switch depressed steps the display through **0** to **9** at a pre-determined rate.

## +/- Switch

Located at the lower left hand corner of the front panel, this switch selects negative values when required by displaying a negative sign. No sign is displayed for + (positive) values.

## Rear Panel Terminals

1		Not used
2		Not used
3	0V	Common
4	$\div$	Mains earth
5	10V	+10V DC (unregulated) @ 80mA
6	RST	Reset
7	STP	Stop count
8	GO	Start count
9	0V	Common
10	CU	Count Up
11	0V	Common
12	CD	Count Down

## Sensitivity Control

This is located to the right of the terminal block on the rear panel and is factory preset. However, should it be necessary during on-site installation, adjustment is accessible through a hole in the rear panel itself.

Maximum sensitivity is obtained when the control is turned fully clockwise. It is recommended that the sensitivity level is increased only as far as necessary to obtain a steady signal. This minimises the risk of detecting spurious signals.

## Control inputs (RST, STP, GO)

Depending on the mode of operation requested at the time of ordering, a [2000C](#) can be factory set to enable operate of these functions in one of two ways:

### Fully manually controlled

The control inputs are activated by momentarily connecting to 0V. After a reset signal (or immediately after the instrument is turned on) a **START** signal must be applied before the instrument will accept count signals.

If required, the count can be *paused* by using the **STP** input. After the count is stopped it may be restarted with a signal on the **GO** input, and the accumulative count will continue from the paused displayed value.

At any time, a reset signal will stop the count and reset the counter to zero.

### Quick start

The control inputs are activated by momentarily connecting to 0V. After a reset signal (or immediately after power is applied) the instrument is automatically ready to start counting as soon as input signals are detected.

If required, the count can be gated by using the **STP/GO** inputs. After the count is stopped it may be restarted with a signal on the **GO** input (to carry on with the count) or by applying a reset.

A reset signal will reset the counter to zero and then enable counting.

## Mains Earth

[2000 MKII SERIES™ Counters](#) are supplied with a three core mains cable. The earth lead from this cable is connected to terminal 4 on the rear panel terminal block.

For most applications this Earth terminal should be linked to common terminal 3 (0V) — see also [Safety information for EU users](#) on page 5 and [Electromagnetic Precautions](#) on page 15.

Exceptions to this are if the Common is connected to Earth elsewhere in the system (care must be taken to avoid Earth loops); or it is found that the mains earth is of poor quality; or when it is essential that the signal input or the analogue output of the instrument is floating.



# Programming the Instrument

## Setting a scaling factor

Once a scaling factor has been set it is retained in memory upon power down. When power is reinstated the unit will immediately be ready for operation without need for a reset command. If no scaling factor has been set, when power is applied the unit will enter the **SET** mode (operation of the unit without a pre-set scaling factor is not possible).

To access the **SET** mode when a scaling factor has already been set press the **RUN/SET** button. The display will show **SET .... SCALE** (.... signifies a one second delay before the display changes) and then show the scaling factor that is currently contained in memory. The digits can be changed by pressing the buttons beneath each decade. The position of the decimal point is changed by pressing the bottom right hand button to step to the position required.

## Calculating the scaling factor

The displayed count in the **2000C** is calculated  $D = Sc$  where **S** is the Scaling Factor and **c** is the number of input pulses counted — ignoring the decimal point in the display.

For example, if for each fifteen (15) pulses received you want the display to count once, the scaling factor should be set as one fifteenth (0.06667).

Similarly, if for each pulse received you want the display to increment by ten (10) then a scaling factor of 10 should be set.

## Increasing the discrimination of the display

Once you have calculated the required scaling factor it may be advantageous to increase the discrimination of the display. This can be achieved by moving the decimal point when setting the scaling factor.

For example, in a system where metres need to be displayed and where twenty (20) pulses = one (1) metre the scaling factor would be one twentieth (0.05). If this factor was used the display would indicate metres only (displayed as **123456**).

The discrimination can be increased by setting a scaling factor of 0.5 or 5, effectively multiplying the displayed value by 10 or 100 respectively and then altering the position of the displayed decimal point using the OFFSET facility (displayed as **12345.6** or **1234.56**).

## Using the OFFSET facility (setting the decimal point in the display)

After setting the scaling factor, if the function button FUNC is pressed the display will show **OFFSET** for one second followed by the value contained in memory. The digits and decimal point position are altered as above and the position set for the decimal point is the position of the decimal point in the final display.

If a non-zero offset value is entered then this value will be loaded into the display before counting commences. This feature is used whenever it is required to add or subtract a constant from the totalised count, for example to compensate for valve opening/closing delay.

## Operating the instrument

(If the instrument is in **SET** mode, the **RUN/SET** button should be pressed once to return to **RUN** mode).

The display will indicate **RUN** for 1 second and will then show the stored value that was retained when power was removed from the unit.

**NOTE: Going into SET mode causes the count to be reset to zero.**

The display will be incremented or decremented, depending on whether the signal is received on the count up (CU) input or count down (CD) input terminal, whenever the requisite number of pulses are received.

The count can be reset to zero (**0**), or to the value as entered for **OFFSET**, at any time by connecting the **RESET (RST)** input on the back panel to 0V (see page 6).

Alternatively, if the **RESET** input is permanently linked to 0v then the **FUNC** button on the front panel can be used as a reset.

The instrument will increment or decrement the displayed count until it has filled all the decades. Once a count of **999999** or **-999999** is stored and displayed, the next count will cause the display to read **High**.

If this situation arises any further received signals will be lost and the counter must be reset to zero before operation can continue.

## Output Options: DC or Analogue

### 0–1V, 0–5V, 0–20mA, or 4–20mA outputs

When Counters are fitted with any of these options the output is available via a red (+ve) and a black (-ve) socket on the rear panel.

**Note: Outputs are proportional to the display reading, not the input signal.**

With the Counter in the **SET** mode, each depression of the **FUNC** switch will step through the parameters in the following sequence:

<b>SCALE</b>									
<b>OFFSET</b>									
<b>REF</b>	(0V)	or	(0V)	or	(0V)	or	(0mA)	or	(4mA)
<b>F.S.</b>	(1V)	or	(5V)	or	(10V)	or	(20mA)	or	(20mA)

When using the outputs, values should be set for these parameters as appropriate for the analogue option supplied.

The **REF** will probably be zero but it can be set to any value. When the displayed value is at or below the value set for **REF** then the analogue output will be set to minimum (0V, 0mA or 4mA). Sign is taken into account such that a large negative number is taken to be below a small negative number.

The Full Scale (**F.S.**) value will depend on the application and the range of display readings expected. A negative value may be entered if required.

If the **REF** is set at the lowest value expected and **F.S.** to the highest value expected then the full range of analogue output can be obtained for normal operating limits.

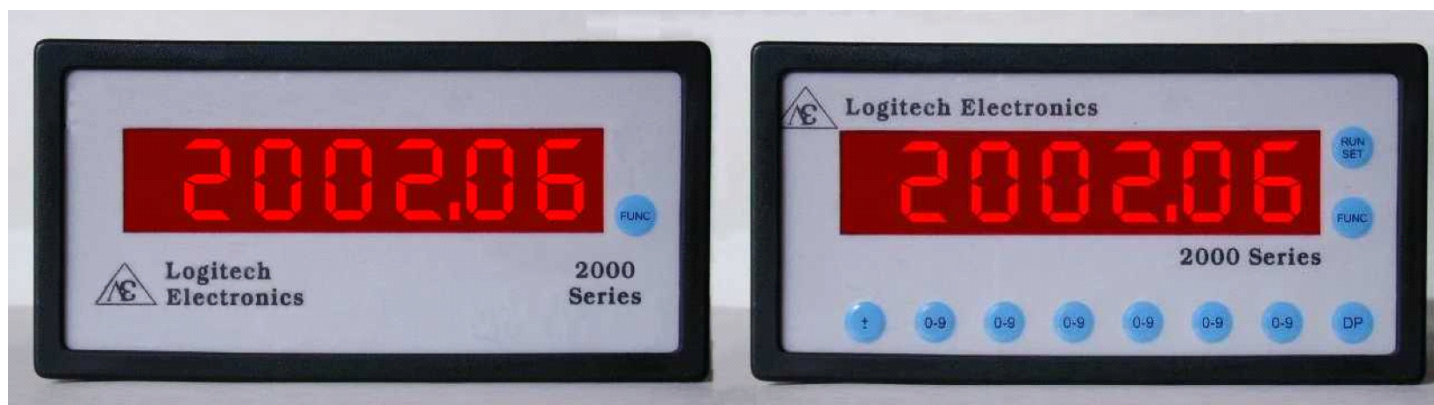
## WARNING

**2000 SERIES** mains powered instruments cannot normally be operated on an external 10V to 15V DC supply when an optional Analogue Output is specified.

If it is necessary that an external DC supply is used, then the facility to do so should be requested when discussing the specification of the instrument with our Sales Office and it **must** be specified on the purchase order.

# Diagrams

## Front Panel Layout



Note: On instruments with the SINGLE switch set option only the FUNC switch is accessible unless the bezel and front panel are removed

## Rear panel layout

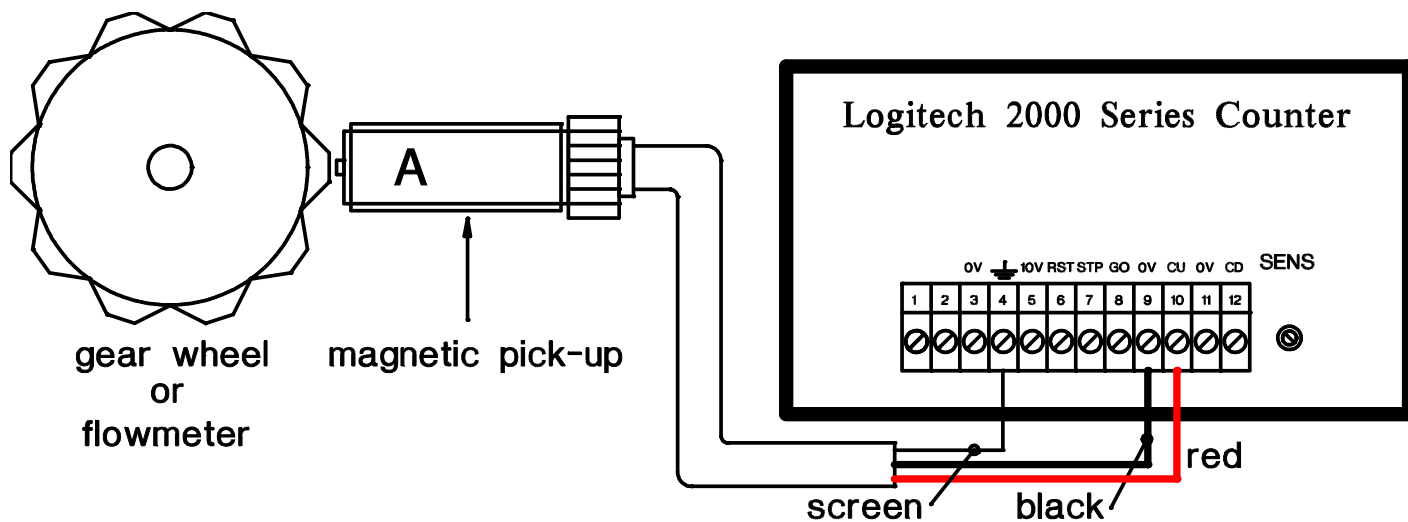


Sensitivity Control

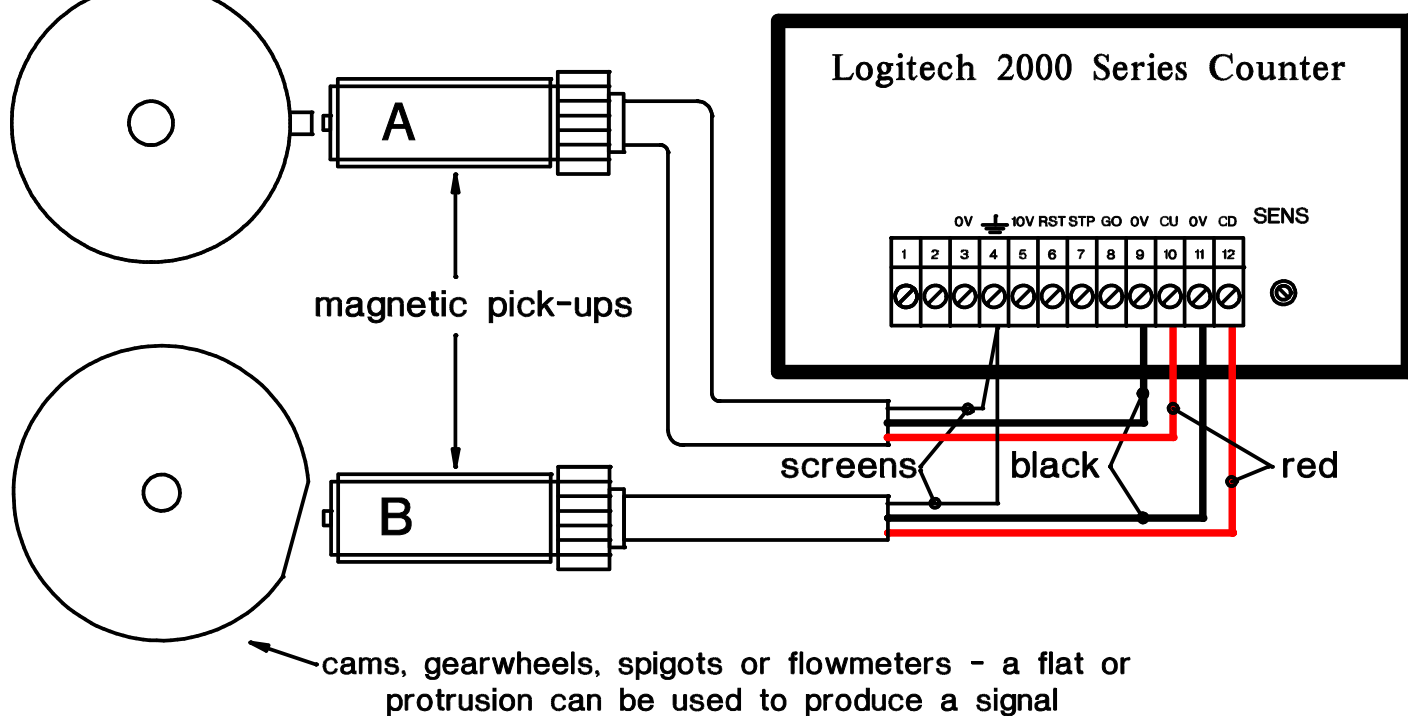
## Connection diagrams – typical applications

### Variable reluctance Magnetic Pick-ups

#### Single-input operation

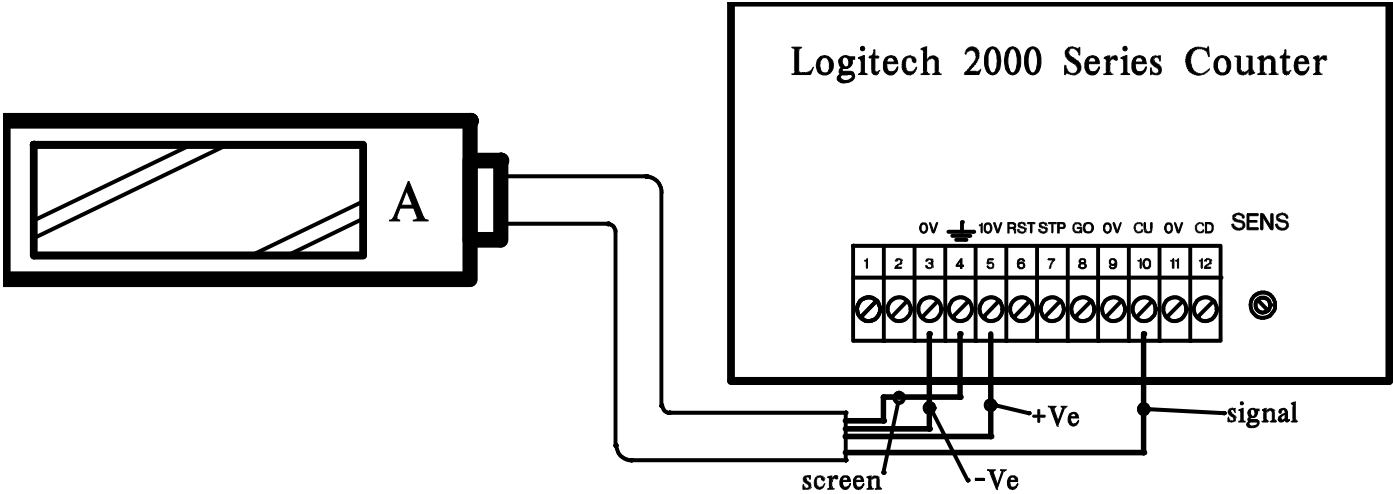


#### Dual-input operation

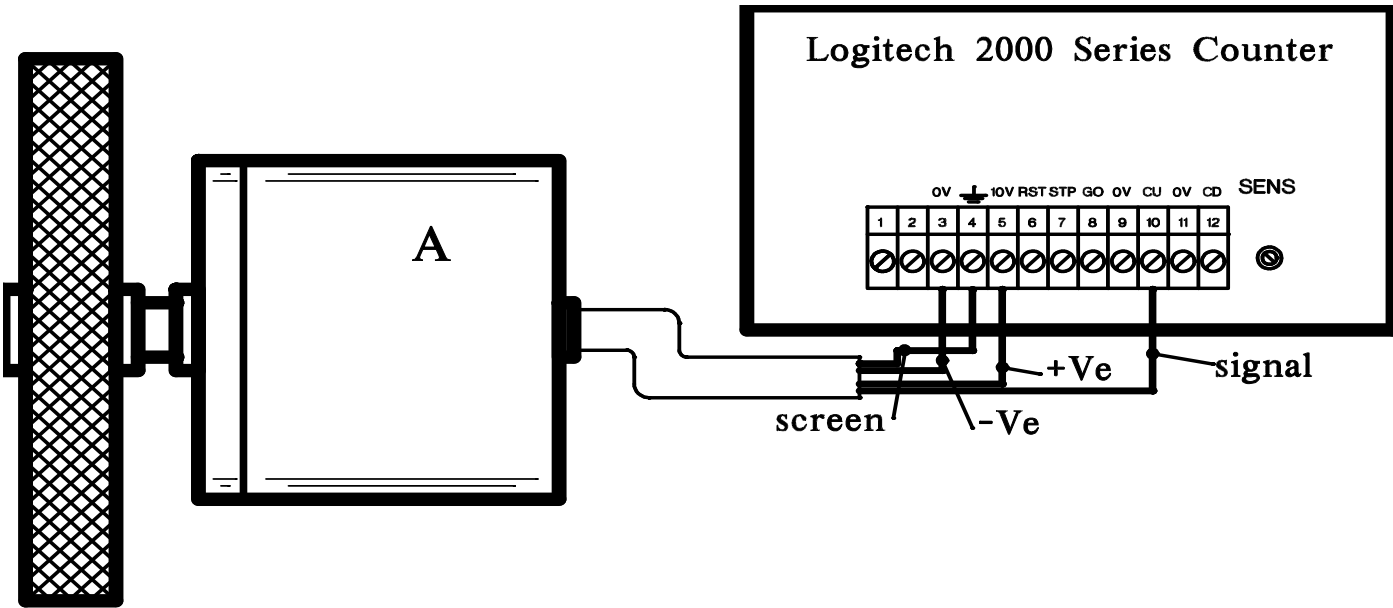


Electronic Sensors and Rotary Encoders

Photo-electric sensor or Proximity probe



Digitising encoder (shown with optional Measuring Wheel)



# Additional Information

## Electromagnetic Precautions

Logitech have designed in a great deal of noise immunity into the product in accordance with EN5001-2 and EN5002-2 (radiated emissions, conducted emissions, ESD, radiated susceptibility and fast burst transient testing)

However it is still vital to use good EMC (Electromagnetic Compatibility) techniques on installation of both this and other associated electronic equipment and sensors in order to ensure reliable operation.

It is important to note that if used with systems that radiate high levels of harmonic noise such as DC Drives, AC Inverters and Servo Drives then the levels of imposed interference can greatly exceed that of the European Standards.

In such cases it is important to ensure that mains leads are routed as far as possible from all cables carrying power to such equipment and that the supply should, if viable, be taken from a clean source.

Where this is not possible, it is advisable to use a good quality mains filter mounted as close to the instrument as possible, ensuring that the cable between the filter and the instrument is kept separate from any cables carrying high levels of current or any fast switching transients.

All signal connections to the instrument should be made using screened lead with the screen connected to mains earth at one end only.

Wherever possible, it is advisable to connect the 0V terminal to mains earth, unless it is found that the mains earth is of poor quality or when it is essential that the signal input is floating — see [Mains Earth](#) on page 8.

## Low Voltage Directive

It is essential that the mains supply to the instrument is fused externally to no more than 1A and that the cabling supplying power to the instrument is rated for at least 3A.

Low voltage signal cables should not be run in the same conduit or twisted or tied to cables carrying voltages in excess of 50V (AC or DC).

**If the instrument is not installed fully in accordance with the instructions in this User Guide it may not comply with the requirements of the Low Voltage Directive.**



## Warranty

**2000T MKII SERIES™** Counters carry a two year warranty that is only valid where there is no damage caused by accident, negligence, misapplication, or repairs/modifications attempted by unauthorised personnel. The warranty only extends to the original user.

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*Reliability, Guaranteed*



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