2000 MKIII SERIES
Velocity Meter

Model 2000V

User Guide

Reliability, Guaranteed

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Specification

Display	7 decade (or 6 decade and sign), 7-segment high brightness red LED, 10mm high	
Decimal point	Programmable via display	
Scaling	Programmable via display, retained in non-volatile memory	
Signal inputs	Protected to 100Vdc	
Standard sensitivity mode	From 90mV @ 10Hz, 170mV @ 10kHz	
High sensitivity mode	From 12mV @ 10Hz, 20mV @ 10kHz	
Frequency	50kHz maximum with single input (200Hz in Reed Mode) 30kHz maximum with dual inputs (200Hz in Reed Mode)	
Impedance	15kΩ minimum	
Accuracy	<0.01% with square wave at 1V peak	
Alarms	60Vdc maximum, sink of 150mA maximum	
Digital Output *("D" option only)*	Pulse to supply, internal 4.7kΩ pull-up to supply or sink of 150mA maximum	
Analogue Voltage & Current *("A" option only)*	User selectable as	0 - 5V, or 1 - 5V, or 0 - 10V, or 2 - 10V 0 - 20mA, or 4 - 20mA
Connections	Screw terminals on rear panel	
Power requirement		
DC	12 to 30Vdc via power connector or Vs and 0V terminals	
AC *("/AC" model only)*	100-250Vac 50/60Hz via integral mains cable	
Power Output *(when using AC supply)*	100mA @ 12Vdc nominal via Vs and 0V terminals	
Temperature range	**Operating** **Storage**	-20°C to +70°C -20°C to +85°C
Dimensions	96 x 48 x 120mm (panel cut-out 92 x 43mm)	
Weight	220g	

General description

The 2000 MKIII SERIES are 7-decade unsigned, or 6-decade signed, seven segment, high brightness red LED display instruments. They are built into half DIN (96 mm x 48 mm) panel mounting housings and operate on 12V-30Vdc power supplies, or from 110Vac/230Vac supply using either the supplied power adapter or via the integral mains cable (/AC model only).

The 2000V is a variation on the standard 2000T tachometer. It measures the time between pulses generated by an object passing between two sensors and from this calculates the velocity of the object.

Two signal inputs are available, “Start” and “Stop”. On a “Start” signal being detected, the unit will commence timing until a “Stop” signal is detected. On detecting the stop, the scaled result will be displayed unit reset. The unit can be reset manually either via the front panel touch switch or connecting an external switch to the rear “Reset” input, and also has an automatic reset setting which will reset the unit after the user selected number of seconds.

The 2000V MKIII has 2 configurable alarm outputs, which can be set to operate as either high or low alarms at the set scaled frequency thresholds.

2000V MKIII SERIES are available with factory fitted options, which must be specified when ordering. Additionally, **Logitech** will customise the programmed operating modes of these instruments to suit specialised applications. Please contact our sales office to discuss this.

2000V MKIII SERIES Variants

2000V - Standard 2000V MKIII Series Velocity Meter

2000VX - 2000V MKIII Series Tachometer with optional extra features, where X can be one or more of the following:

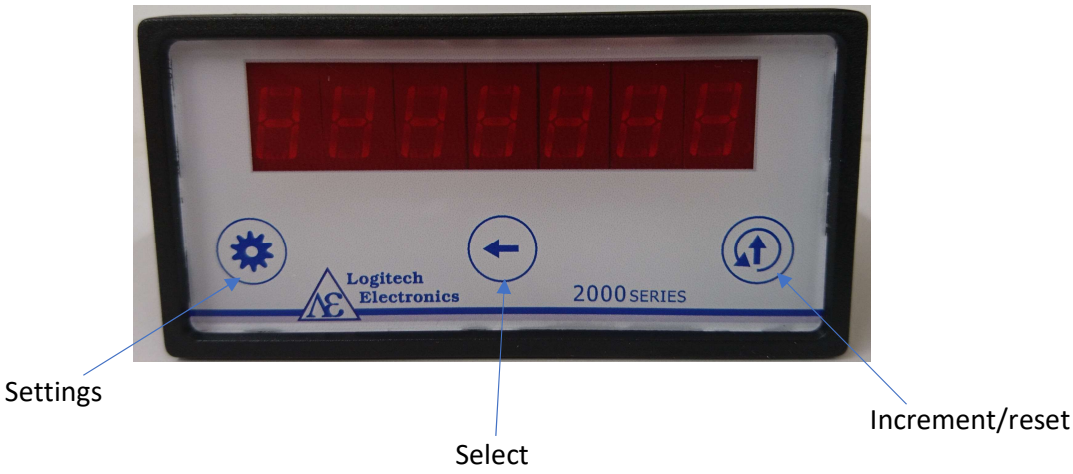
IF - RS232 Output

USB - USB Input/Output

Front Panel

The panel has three touch switches: settings, select and increment/reset.

The buttons are used to enter and configure the instrument's settings. These functions are indicated by the symbols shown on the buttons. Press and hold the reset button until "reset" appears on the display, to clear the current result and have the unit wait for the next start signal.



Rear panel terminals



The image above shows the rear panel of a 2000VIF/AC MKIII instrument. The actual terminals/cables available on the rear panel will vary depending on the model. Below are the definitions of each of the terminals that may be present. Refer to the terminal labels on the instrument and match these with the functions below.

Vs = Supply voltage, passed through from power connector, or apply 12-30Vdc to power unit.

12V = Nominal 12Vdc output when powered via mains lead (AC unit only). Alternatively, apply 12-30Vdc to power unit.

0V = 0V/ground passed through from power connector or connect to 0V if powering unit from rear terminals.

Ctrl = Control input. Connect to 0V to enable access to full settings menu and sensitivity setting. Otherwise only the reset functionality is available from the front panel.

Reset = Reset input. Used clear the current result and prepare the unit for the next start signal. Connect to 0V to activate the reset.

Alarm1 = Alarm Output 1. The alarm direction and threshold are user set.

Alarm2 = Alarm Output 2. The alarm direction and threshold are user set.

Start = Start signal, sensitivity is user set.

Stop = Stop signal, sensitivity is as set for the start signal.

NC = No connection (may also be blank).

AC Supply

Units fitted with the /AC supply option have an integral 3-core AC supply cable. These units may instead be powered with an AC voltage of 100Vac to 250Vac (50/60Hz), via this cable only. Under no circumstances should AC voltages be applied to any of the other terminals/connections on the instrument. A connection to earth must be provided when powering the unit with an AC supply.

Connections:	Brown	=	Live
	Blue	=	Neutral
	Yellow & Green	=	Earth

Programming the instrument

Calculating a scaling factor

The unit will calculate 1/t, where t is the time in seconds between the start and stop pulses, and multiply this by the scaling factor. In order to display velocity in the chosen units, it is necessary to enter an appropriate scaling factor.

e.g. distance between start and stop pulse is 2.5m, velocity required in m/s.

v = d/t so scaling factor is simply 2.5

The scaling factor range is 0.000001 to 9999999 (unsigned) or -999999 to 999999 (signed) and it may be necessary to round off the calculated value to fit within this range. When setting the scaling factor it is important to ensure that with the decimal point position selected, there are enough digits to display the maximum value for the application. Otherwise, the number of decimal places will need to be reduced or the display units altered, with the scaling factor adjusted accordingly.

Setting an Offset

The 2000V has an OFFSET facility that can be either positive or negative. It is a very useful addition to the scaling factor and can be used to display percentage difference between A and B, or show the deviation from a nominal value.

For example: If the nominal velocity is 20m/s, by setting the OFFSET to -20, the display will instead show the deviation from the 20m/s nominal.

Decimal Places

The decimal point position can be user set for each mode and adjusted to either increase or reduce the number of decimal places displayed. The result will automatically be rounded to the set number of decimal places. Alarms and other outputs will however always use the calculated result and not the rounded display value.

The number of decimal places is altered in the settings menu (DISP DP). When doing so, it is important to ensure that the maximum possible display value can be displayed in the remaining digits. The display will read HIGH when the result is larger than can be displayed with the current settings.

Please note that this differs from the method of setting the number of decimal places on the MK1/MK2 instruments.

Alarm Outputs

The 2000V MK3 has two configurable alarm outputs. Both outputs are NPN (switch to 0V on activation), with a maximum voltage of 60Vdc and sink current of 100mA.

When configured as a high alarm (HI), the alarm will be activated when the calculated velocity is greater than, or equal to, the programmed value.

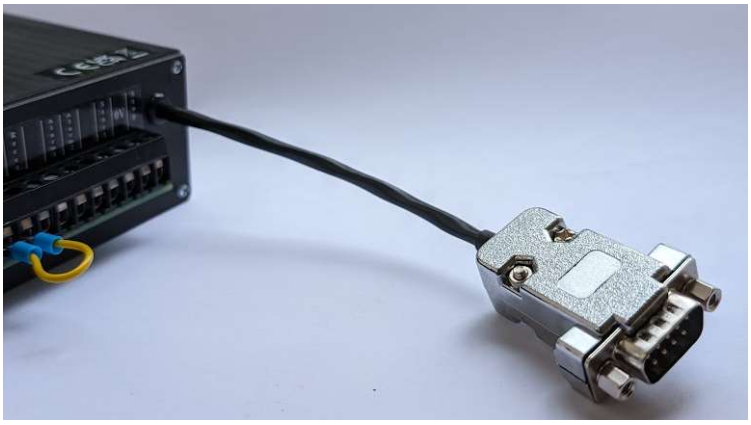
When configured as a low alarm (LO), the alarm is activated when the calculated velocity is less than, or equal to, the programmed value.

The alarm outputs reset on manual/automatic reset.

Refer to the alarm connections diagrams on page 12 for examples of how to connect the alarm outputs.

Output Options

IF – RS232



A serial output, which is RS232 compatible, is provided at 9600 baud with one start bit and two stop bits. The data is normally transmitted whenever the display is updated.

The data consists of a "start of message" character (ASCII 01) followed by a space or minus sign. The value is transmitted as ASCII digits with the decimal point in the appropriate position transmitted as ASCII 46. The final character of the transmission is a carriage return (ASCII 13).

The "inhibit" input will prevent the transmission of data when it is held at "true logic" level (-12V for RS232 signals). If the serial data is connected directly into a ticket printer then this input is normally used as a print request. The print request is initiated by momentarily deactivating the inhibit signal (connecting to +12V).

The instrument is supplied with a 9 pin male D-type connector which can be easily connected into the serial port of a PC using a standard lead with female connectors on each end. The required connections are shown in the tables below:

D connector

Pin No.	Connection
1	n/c
2	n/c
3	data output
4	linked to 6
5	common (0v)
6	linked to pin 4
7	inhibit, linked to 8
8	linked to pin 7
9	n/c

Connection Lead

Connect Pin	to Pin
1	1 (n/n)
2	3 (n/n)
3	2
4	6
5	5
6	4
7	8
8	7
9	9 (n/n)

(n/n = “not necessary”)

These connections will set the inhibit signal to a “false logic” level and allow the PC to receive all transmitted data.

USB

The unit can optionally be supplied with an integral USB port on the rear panel, which allows configuration and monitoring of the unit via a PC with our free to download USB software. The use of this USB software is covered in a separate user guide.

Changing Settings

On first power up from factory settings, the unit will enter set mode. Set Mode can also be accessed after initial configuration by holding the settings button ✸ and then with this held, pressing the increment touch button ↑.

In set mode press the settings button to move on to the next setting, select ← to move between digits or increment ↑ to modify the value.

Hold the settings touch button ✸ and then with this held press increment ↑ at any time to update the settings and return to Run Mode.

Text highlighted in red below shows what will appear on the display. Settings will typically be displayed in the order below, though the available settings will vary depending on the selected instrument.

A setting can be skipped by pressing settings ✸ when either the title or the setting value is displayed. Once all settings have been stepped through or skipped, the unit will return to setting 1. The unit will remain in set mode until run mode is entered as described above.

The settings will be displayed and can be altered as follows:

1. **SCALE** - Set scaling factor. [Default 1.00000]
   Enter the scaling factor to be applied to the measured frequency value. Depending on the calculation mode selected the measured frequency will either be multiplied or divided by this value.
   Press select ← to select digit and increment ↑ to change value. In unsigned mode, after cycling through all seven digits the decimal point position can be altered by pressing increment ↑. In signed mode, after cycling through all six digits, all digits will flash and the sign can be toggled by pressing increment ↑. Press select ← once the sign is set to then set the decimal point position.
   For the mode to be viewable via the mode select button, the scaling factor must have a non-zero value.
   Set all digits to 0 on all four frequency modes to restore default settings (the position of the decimal point does not matter when performing a restore to default).
   Press settings ✸ at any time to move to the next setting.

2. **DISP DP** – Set display decimal point position [Default 1DP]
   Select the number of decimal points to display the scaled frequency value to. The decimal point position can be altered by pressing increment ↑. This limits the range of values that can be displayed. The unit will display "high" when the calculated value

is greater than can be displayed on the number of digits available. Remaining settings (other than scaling factors) will also be limited to this number of decimal places.
Press settings ✸ or select ← to move to the next setting.
NOTE: This setting is now independent of the scaling factor value, e.g. a setting of 1 decimal place does not require the scaling factor to be multiplied by 10.

3. **OFFSET** – Set the offset to be added to the scaled frequency [Default 0]
   Refer to page X for details on the offset.
   Press select ← to select digit and increment ↑ to change value.
   In signed mode, after cycling through all six digits, all digits will flash and the sign can be toggled by pressing increment ↑.
   Press settings ✸ at any time to move to the next setting.

4. **ALARM 1** – Set alarm output 1 direction and threshold value
   Press increment ↑ to select from the below options.
   HI = High alarm (output switched to 0V when scaled frequency value ≥ value)
   LO = Low alarm (output switched to 0V when scaled frequency value ≤ value)
   Press select ← or settings ✸ once the alarm type is selected, to then set the alarm value.
   Enter the scaled frequency value below which the low alarm will be activated.
   Press select ← to select digit and increment ↑ to change value. The decimal point position is locked to the display value set under DISP DP.
   In signed mode, after cycling through all six digits, all digits will flash and the sign can be toggled by pressing increment ↑.
   Press settings ✸ at any time to move to the next setting.

5. **ALARM 2** – Set alarm output 2 direction and threshold value
   This is configured by following the same process as for ALARM 1.

6. **RESET** – Set the time in seconds before the unit will automatically reset [Default 0, Range 0 to 60]
   A setting of “0” disables automatic reset and the unit must instead be manually reset via the front panel or rear reset terminal. Press increment ↑ to increase the set value, or select ← to decrease the value.

Setting the Sensitivity [Default 45]

Press and hold the settings button ✸, then press the select ← button to enter sensitivity mode The display will show SENS and then the current value is displayed. Sensitivity ranges from 0 (least sensitive) to 63 (most sensitive). If the control ("Ctrl") input is not connected to 0V, the display will instead show "LOCKED", and sensitivity cannot be adjusted.

Press select ← to reduce the value or increment ↑ to increase it. After 2s of neither button being touched the unit will apply the selected sensitivity value and return to run mode. It is recommended that the sensitivity level is set only as high as necessary to obtain a steady signal. This minimises the risk of detecting spurious signals.

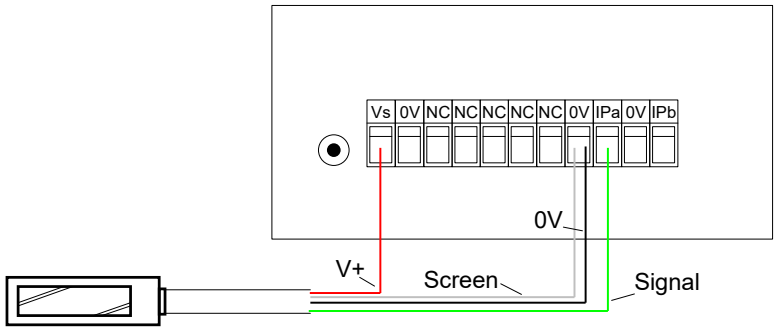
Unlocking the Settings

After the unit has been configured for the first time, the settings menu and sensitivity setting can only be accessed with the control ("Ctrl") input connected to 0V. Otherwise, the display will instead show "LOCKED". Connect the "Ctrl" terminal to 0V to allow access.

Input Connections

Electronic Sensors

The sensor can be supplied from the 12V terminal, provided that the sensor is rated to operate at this voltage. When using the AC supply option this terminal will provide a nominal 12Vdc to power the sensor. When using a DC supply option, the 12-30Vdc from the external DC supply will be passed through to this terminal. The sensors 0V connections should be made to any of the common 0V terminals, along with the cable screens if they are not connected to 0V at the sensor end. Both the start and stop sensors can be connected in this way, with the sensor outputs connected to the "Start" and "Stop" terminals respectively.

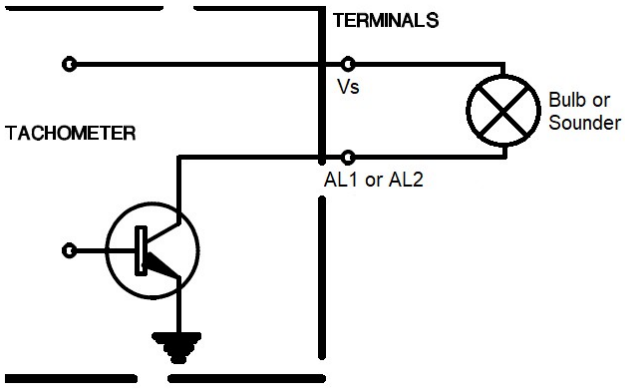


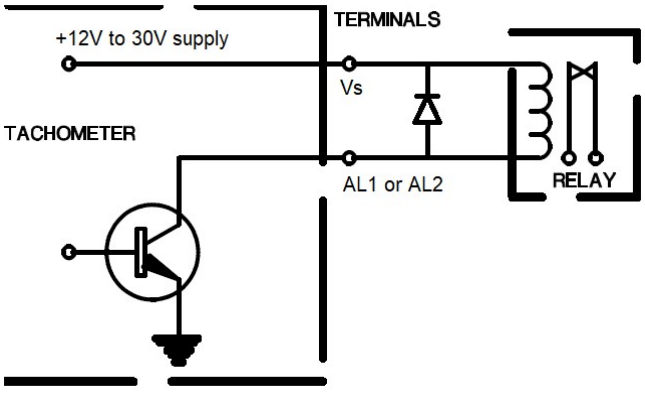
Alarm Connections

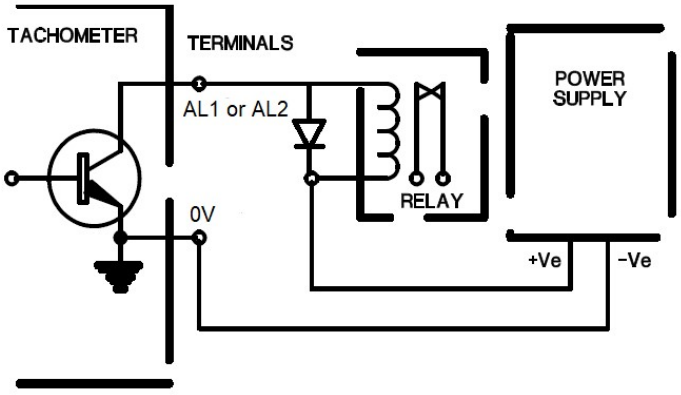
Example alarm configurations are shown below.

NOTE: Switching Relays.

If the relay module does not have integrated back EMF suppression, it is essential that a diode is connected across the coil as shown in the diagrams.







Electro-Magnetic Precautions

A great deal of noise immunity has been designed into the product in accordance with the EMC directive 2014/30/EU, the Electromagnetic Compatibility Regulations 2016, BS EN IEC 61000-6-2 and BS EN IEC 61000-6-4.

However, it is still vital to use good EMC (Electro-Magnetic 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 a screened lead with the screen connected to ground/0V at one end only.

Low Voltage Directive

When supplied via the AC power module, the mains supply to the instrument should be fused externally to no more than 1A. 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).

The instrument should be earthed via the earth (yellow & green) connection in the integral cable. If the instrument is not installed fully in accordance with the instructions in this User's Guide it may not comply with the requirements of the Low Voltage Directive.

Warranty

2000V MKIII SERIES Velocity Meters 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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