MONARCH INSTRUMENT

Instruction Manual

ACT-1B Series
Panel Tachometers

CE

SAFEGUARDS AND PRECAUTIONS

Read and follow all instructions in this manual carefully, and retain this manual for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

Be sure the power supplied to this instrument matches the specification indicated on the rear panel on the instrument.

Be sure all power is removed before making or removing any connections to or from this instrument.

This instrument is not user serviceable. For technical assistance, contact the sales organization from which you purchased the product.

In order to comply with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE): This product may contain material which could be hazardous to human health and the environment. DO NOT DISPOSE of this product as unsorted municipal waste. This product needs to be RECYCLED in accordance with local regulations; contact your local authorities for more information. This product may be returnable to your distributor for recycling; contact the distributor for details.

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Monarch Instrument's Limited Warranty applies.

Warranty Registration and Extended Warranty Coverage information is available

1.0 OVERVIEW

The ACT-1B is an economical and easy-to-use digital tachometer that displays rotational speed directly in RPM or RPS on a 5-digit red 0.56" high LED display using a speed sensor providing a single (or multiple) pulse(s) per revolution. The number of pulses per rev is factory set at time of ordering and can be user programmed from 1 to 999 using the optional USB Programming Cable and PM Remote Software. Power may be either universal 100 to 240 V ac (50/60Hz), or optionally, 12 V dc or 24 V dc isolated. The ACT-1B accepts input signals from optical, proximity, magnetic, infrared or laser sensors, or direct TTL or external ac inputs. The ACT-1B is suitable for panel mounting or benchtop use with convenient screw terminal connections on the rear panel of the instrument.

If specified at time of order placement, the ACT-1B may be equipped with either an optional 4 to 20 mA current output (IO) or 0 to 5 V dc analog output (AO) proportional to speed, and/or a TTL pulse repeater output (PO).

2.0 INSTALLATION AND POWER

The ACT-1B enclosure is a standard 1/8 DIN size requiring a 3.58" wide by 1.74" high [91 mm x 44 mm] mounting hole.

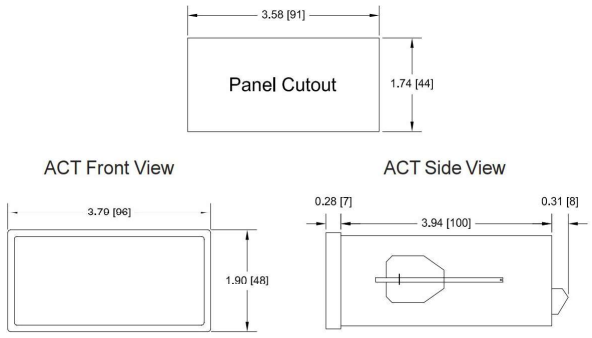

Figure 1 Dimensions in inches [mm]

2.1 Installation

Remove the mounting clips (if fitted) and install the unit into the panel from the front. From the rear of the unit, install the mounting clips on each side and tighten the mounting screws against the rear of the panel.

⚠ **WARNING: Do not over tighten the mounting screws.**

2.2 Power

Power to the unit is connected to the terminals under the section labeled POWER on the rear panel. Be sure the power supplied matches the specification indicated on the rear panel. Refer to Figure 2 below.

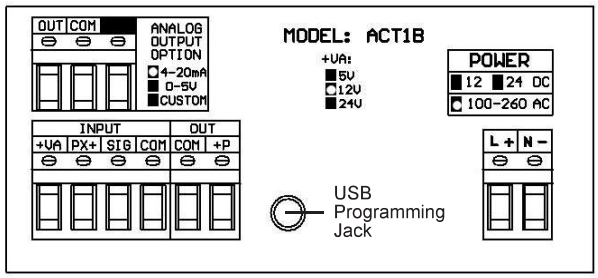

Figure 2 ACT-1B Rear Panel

If the unit is **AC powered** (100-240 V ac), connect the live (hot) wire to the terminal marked **L+** and Neutral (Return) wire to the terminal marked **N-**.

If the unit is **DC powered**, connect the DC supply Positive to the terminal marked **L+** and the DC supply Negative or Common to the terminal marked **N-**.

2.3 USB Programming Cable and Software

The 3.5 mm connection "hole" in the center bottom of the rear panel is for the optional USB Programming Cable (PN 6180-031), which comes with Windows™ compatible **PM (Panel Meter) Remote Software**. The cable and software combination allows the user to configure: operation mode, analog output scaling, decimal places, display update rate and pulses per input. The user can also view real-time data in digital format and/or through Excel®. Software instructions are included with the software downloaded from _____

3.0 SENSOR CONNECTIONS

A speed sensor (not included) is connected to the terminals under the section labeled INPUT on the rear panel. Refer to Figures 2 and 3. Connections and their functions are as follows:

+VA Positive +12 V dc to provide power to optical, laser, infrared or amplified magnetic sensors. Maximum load is 75 mA dc. Optionally 5 or 24 V dc supply may be ordered.

PX+ Positive +12 V dc supply for use with two-wire proximity sensors. Maximum load for proper operation with two-wire sensors is 25 mA.

SIG Positive input signal from the speed sensor. Accepts TTL pulses or ac signals, unipolar and bipolar, from 1.5 V ac to 50 V ac. (Contact the factory for increased sensitivity.) Connect the signal wire from three-wire sensors or the positive side of two-wire magnetic sensors to this terminal. Typical input impedance is 10 kilo ohms.

COM Common or Negative connection for both signal and power from most sensors.

Refer to Figure 3 (next page) for connection of Monarch standard sensors. The connections are typical for these types of sensors.

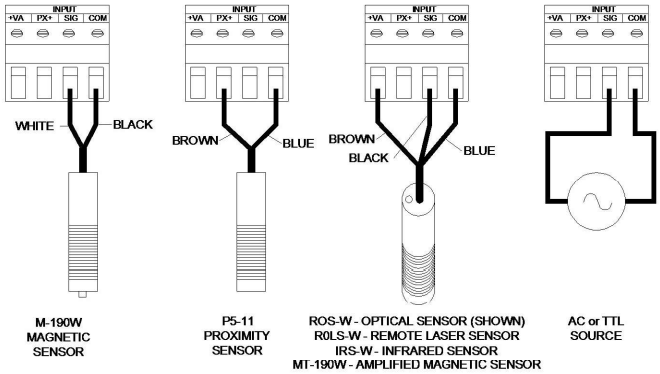

Figure 3 Sensor Connections

4.0 OUTPUT OPTIONS

The ACT-1B may be equipped with either a Current Output (IO) or an Analog Output (AO), and/or a TTL Pulse Output (PO).

Note: Full scale RPM settings must have been specified when ordered or may be user programmed using the optional USB Programming Cable and PM Remote Software.

The Current or Analog Outputs are connected to the terminals in the section labeled **ANALOG OUTPUT OPTION** on the rear panel. The actual output is marked. The Pulse Output is connected to the terminals under the section labeled **OUT** on the rear panel.

⚠ **CAUTION:** The IO or AO **COM** may ***NOT*** be isolated from the other **COM** connections.

4.1 Current Output Option (IO)

The current output is 4 to 20 mA. This output is a current source and has a 12 V dc internal compliance voltage. (Optional 24 V dc may be ordered).

Typical connections are as follows: (See Figure 4 below.)

Connect the Positive side of the load to the terminal marked OUT and the other (Negative) side of the load to the terminal marked COM.

Do not use an external voltage supply.

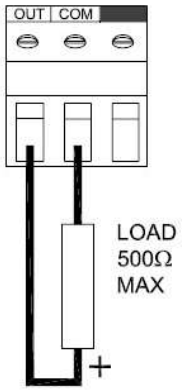

Figure 4 Current Output Option Connections

Note: With the internal 12 V dc compliance voltage, the maximum load for the current loop is 500 ohms.

If the optional 24 V dc compliance option is ordered, the maximum load will be 1000 ohms.

4.2 Analog Output Option (AO)

The analog output is 0 to 5 V dc.

Connect the Positive side of the signal to the terminal marked **OUT**, and the Return side of the signal to the terminal marked **COM**.

Note: If your ACT-1B is equipped with either a current output or an analog output, the full-scale output has been factory preset to the speed range specified at the time of purchase. The output range may be programmed using the optional USB Programming Cable and PM Remote Software.

4.3 Pulse Repeater Output Option (PO)

The Pulse Repeater output provides a conditioned TTL positive going 5 V pulse out for each pulse in.

Connect the Positive signal wire (+5 V pulse) to terminal marked **+P** and the Return to the terminal marked **COM** in the rear panel section labeled **OUT**.

Note: The polarity of the optional pulse output can be set by the user using the optional USB Programming Cable and PM Remote Software.

5.0 SPECIFICATIONS

Specifications*	ACT-1B Panel Tachometer
Range	5 to 99,999 RPM
Accuracy	±1 RPM or 0.005% of reading
Resolution	1 RPM (user-programmable to 0.0001†)
Display	5-digit, 0.56" [14 mm] high red LED
Display Update	Twice per second above 120 RPM (user-programmable to 0.5, 1, or 1.5 second†)
Dimensions	1/8 DIN by 4.5" [114 mm] deep
Power Supply	Standard: 100-240 V ac ±10%, 50/60 Hz, 5 VA Optional: 12 or 24 V dc ±10%, Isolated, 5 Watts
Inputs	Universal input for optical, proximity, two-wire or three-wire magnetic, infrared or laser sensors TTL input or 2 V ac to 50 V ac peak to peak input Standard input is 1 pulse per revolution (user-programmable from 1 to 999†)
Sensor Excitation	12 V dc at 20 mA for proximity sensors, 12 V dc at 75 mA for all other sensors; Optional 5 or 24 V dc available
Recommended Sensors	Optical: Monarch ROS-W Proximity: Monarch P5-11 Magnetic: Monarch M-190W or MT-190W Infrared: Monarch IRS-W Laser: Monarch ROLS-W or RLS-W
IO Option	4 to 20 mA out, 16 bit resolution 12 V dc compliance voltage Full scale RPM settings as specified when ordered (user-programmable†)

Specifications*	ACT-1B Panel Tachometer
AO Option	0 to 5 V dc out, 5 mA 16-bit resolution Full scale RPM settings as specified when ordered (user-programmable†)
PO Option	0 to 5 V TTL pulse, non-inverting, one pulse out for each pulse in (Positive or negative out programmable†)
This product is designed to be safe for indoor use under the following conditions (per IEC61010-1):	
Installation Category II per IEC 664	
Pollution Degree Level II per IEC 664	
Operating Temperature	32 °F - 122 °F (0 °C - 50 °C)
Humidity	Maximum relative humidity 80% for temperature up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 104 °F (40 °C)

***Specifications are subject to change without notice.**
†Requires optional USB Programming Cable and PM Remote Software

6.0 OPTIONS

IO	4 to 20 mA current output
AO	0 to 5 V dc analog output **Note:** Full-scale RPM must be specified for the above options when ordering unless the USB Programmable Cable and PM Remote Software is ordered as a separate item
PO	0 to 5 V TTL compatible pulse output **Note:** Pulses out per revolution equal pulses in per revolution.
CAL-NIST	NIST Traceable Certificate of Calibration

7.0 ACCESSORIES

See Accessories webpage for details.

USB Programming Cable with PM Remote Software
Download the PM Remote Software from _____. Use the USB Programming Cable and software to change the ACT-1B settings or remotely monitor the RPM
PN: 6180-031

ROLS-W Sensor: Remote Optical Laser Sensor with 8 ft. cable
PN: 6180-030

ROS-W Sensor: Remote Optical LED Sensor with 8 ft. cable
PN: 6180-056

ROS-P-25 Sensor: Remote Optical LED Sensor with 25 ft. cable **(must cut off plug)**
PN: 6180-057-25

ROS-HT-W-25 Sensor: Remote Optical High-Temp Sensor with 25 ft. cable
PN: 6180-058-25

P5-11 Sensor: Proximity Sensor with 10 ft. cable
PN: 6180-013

M-190W Sensor: Magnetic Sensor with 10 ft. cable
PN: 6180-012

MT-190W Sensor: Magnetic Trigger Sensor with amplifier
PN: 6180-037

GE-200HP Sensor: Inductive Sensor with 15 ft. cable
PN: 6180-014

IRS-W Sensor: Infrared Sensor with 8 ft. cable
PN: 6180-021

Reflective Tape
T-5 (single pack), 5 feet - PN: 6180-070
T-5 (2-pack), 5 feet each - PN: 6180-069
T-50, 50 feet - PN: 6180-072
T-5WP (waterproof), 5 feet - PN: 6180-079

APPENDIX A - Serial Programming Commands

Programming the unit requires the optional USB Programming Cable with associated PM Remote Software and a PC running Windows XP or later with an available USB port.

All serial commands are @ then two or more characters or words separated by a delimiter "/". One or two numbers follow some commands. All valid commands respond immediately with an "OK" or data, or "ERR" if incorrect. Default baud rate is 9600.

Communication requires the USB Programming Cable.

@PI	Product Information, Shows Product name \n Firmware revision \n
@C2	Shows all settings
@D0	Sends current display value once
@D1	Sends display data continuously (at up to display update rate)
@D2	Stops sending data
@MX	Sends Max reading
@MN	Sends Min reading
@RE 32	Resets Max
@RE 64	Resets Min
@RE 96	Resets Max and Min
@CH_A/TYPE	Shows current type
@CH_A/TYPE = RPM	Sets scale to 60 so displays in RPM
@CH_A/TYPE = FREQ	Sets scale to 1 so displays in hertz
@CH_A/TYPE = SCALE	Scale mode. Enter Scale factor
@CH_A/TYPE/SCALE = 30.00	This will set the SCALE factor to 30.00
@CH_A/INPUT	Shows sense of the trigger input
@CH_A/INPUT = POS (or NEG)	Sets the sense of the input trigger
@CH_A/LOEND	Sets how long (in secs) with no pulses before the tachometer shows 0.

@CH_A/LOEND = 12 (or 1_SEC, HALF)	Sets low end time. This allows a min reading of 5 RPM, 60 RPM, or 120 RPM
@CH_A/GATE	Shows Gate Speed (default is 12)
@CH_A/GATE = STD (1/100 Second) or FAST (1/1000 second)	Sets Gate Speed (default is 1/100)
@DECPT	Shows the number of decimal places displayed
@DECPT = NONE, 1, 2, or 3	Sets the maximum number of decimal places
@DAC1/ FSCAL	Shows Analog Out Full Scale
@DAC1/FSCAL = xxx.xx	Sets the Reading value that the Analog output will output Full Scale (5 V or 20 mA) depends on TYPE
@DAC1/0SCAL	Shows Analog Out Zero Scale
@DAC1/0SCAL = xxx.xx	Sets the Reading value that the Analog output will output Zero Scale (0 V or 4 mA); depends on TYPE (default is 0.00)
@OUTPT	Shows pulse output polarity
@OUTPT = POS or NEG	Sets pulse output polarity
@DISPR	Shows Display Update Rate
@DISPR = HALF or 1_SEC or 1.5_S.	This sets the maximum display update rate to one half a second, 1 second or 1 ½ seconds between updates
@SERNO	Shows unit Serial Number

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Monarch Instrument is committed to excellence and quality in manufacturing, sales, and service.

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