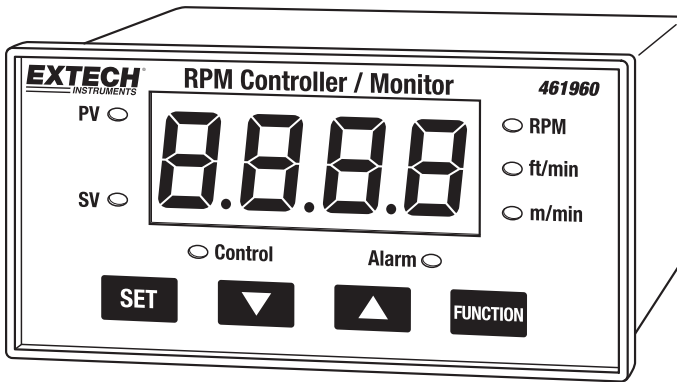# User's Guide

EXTECH
INSTRUMENTS ®

RPM Controller / Monitor

Model 461960

Introduction

Congratulations on your purchase of the Extech 461960 RPM Controller/Monitor. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

Features

* Professional Tachometer (RPM, m/min., ft/min.) monitor and controller.

* Build in control relay and alarm relay.

* Alarm Relay will close when the measured value reaches the high or low alarm value.

* Control Relay will close when the measured value reaches the control value.

* Hysteresis value setting for control and alarm function.

* Set the number of input pulses per revolution.

* Settable roller diameter for the surface speed (m/min., ft/min.) function.

* Works in conjunction with the optional proximity or photo sensor.

* Large easy to read red LED display.

* RS232 computer interface for use with optional software.

* Microprocessor circuit ensures high accuracy and provides special functions and features.

* Standard 96 X 48 mm DIN case.

* Optional data acquisition software.

Warranty

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for **one year** from date of shipment (a six month limited warranty applies to sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website www.extech.com for contact information. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

Safety

International Safety Symbols

Caution : Risk of electric shock !
This symbol, adjacent to a terminal, indicates that, under normal use, hazardous voltages may be present

Caution : Risk of electric shock !
This symbol, adjacent to another symbol or terminal, indicates the user must refer to the manual for further information.

Equipment protected throughout by Double Insulation or Reinforced Insulation.

Safety Procedures

* Do not use fingers or any tool to touch the Wire Terminals.

* Do not exceed 0.5A relay contact load.

* The instrument contains no user serviceable parts and should not be opened by the user.

* Repair or service should be done by a qualified technician only.

* Always apply the correct ACV power voltage

* Cleaning - Only use the dry cloth to clean the plastic case !

Operating conditions

* Comply with EN61010. Transient overvoltage at Mains Supply 2500V.

* Pollution Degree 2.

* Altitude up to 2000 meters.

* Indoor use.

* Relative humidity 80% max.

Meter Description

1. Display
2. PV (process value) indicator
3. SV (set value) indicator
4. Set Button
5. ▼ Button
6. ▲ Button
7. Function Button
8. Control relay indicator
9. Alarm relay indicator
10. RPM indicator
11. ft/min indicator
12. m/min indicator
13. Wire terminals
14. Case holder
15. RS232 terminal
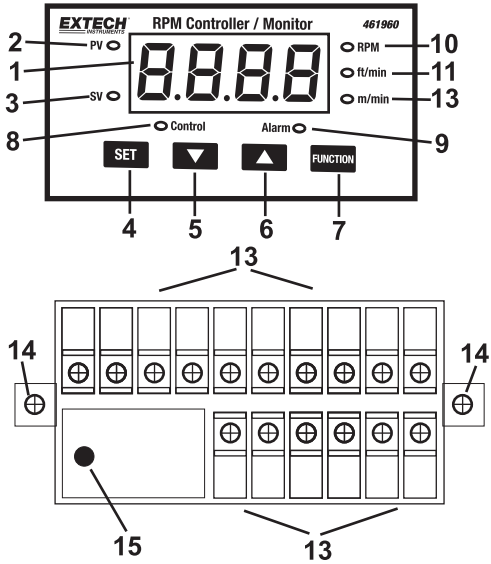
Terminal connections

⚠ **Do not input an over voltage to the AC input terminals**

1. Input the ACV power (90 to 260 ACV) to T1, T2.

2. Connect the "Control Relay" output from T3, T4.

3. Connect the "Alarm Relay" output from T5, T6. 3)

4. Connect the proximity or photo sensor to the input terminal T8, T9, T10.
   T8 is DC 12 V power supply terminal.
   T9 is the ground (-) terminal.
   T10 is the pulse input terminal.
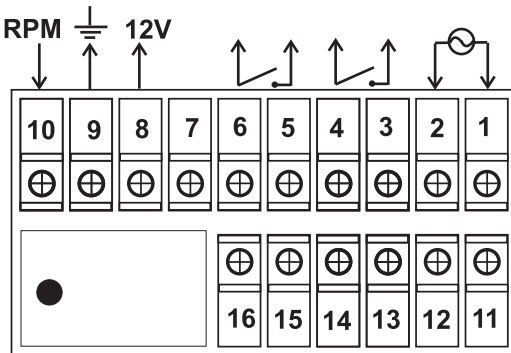
Operation

RPM measurement

1. Apply power to the meter.
2. Press the "Function Button" once until the "RPM" and the "PV" indicators are on.
3. The display will indicate the RPM value.
4. The RPM value equals :

$$\frac{\text{Total input signal (pulse) per min.}}{\text{Number of pulses per revolution}}$$

Example:
  If the total signal (pulse) input per minute is 5,124, the number of pulses per revolution is set to 1, the RPM value will be;

$$5,124/1 = 5,124$$

Surface speed (m/min., ft/min.) measurement

1. Apply power to the meter
2. Press the "Function" button once until the "m/min" indicator is on. The display will show the m/min. value.
3. Press the "Function" button once until the "ft/min" indicator is on. The display will show the ft/min. value.
4. Under the surface speed measurement, the "PV" indicator will also light.
5. To calculate m/min:

$$\frac{\textit{Total input signal (pulse) per min.}}{\text{Number of pulses per revolution}} \textbf{ x roller diameter (cm) x 3.14} \div 100$$

Example: If the total input signal (pulse) per minute is 501, the number of pulses per revolution is set to 1, the roller diameter is 10 cm the m/min. value will be;

$$501/1 \text{ x } 10 \text{ x } 3.14/100 = 157.3$$

6. To calculate ft/min:

$$\frac{\textit{Total input signal (pulse) per min.}}{\text{Number of pulses per revolution}} \textbf{ x roller diameter (cm) x 3.14} \div 30.48$$

Example: If the total input signal (pulse) per minute is 501, the number of pulses per revolution is set to 1, the roller diameter is 10 cm the ft/min. value will be;

$$501/1 \text{ x } 10 \text{ x } 3.14/30.48 = 516.1$$

1st layer setting procedures

CtSP	Control value setting
LoLt	Low limit value setting
HILt	High limit value setting

Control Value Setting

1. Press the "Set" button" once, the display will show " CtSP ", the meter is now ready for the " Control value " setting.
2. Use the "▼" button and the "▲" to adjust the desired "Control value".

Note: When adjusting the value, the "SV" indicator will light.

Low Limit Value Setting

1. Press the "Set" button" twice, the display will show " LoLt ", the meter is now ready for the " Low Limit value " setting.
2. Use the "▼" button and the "▲" to adjust the desired "Low limit value ".

Note: When adjusting the value, the "SV" indicator will light.

High Limit Value Setting

1. After setting the "Low Limit" value, press the "Set" button twice, the display will show "HILt", the meter is now ready for the humidity "High Limit" value setting.
2. Use the "▼" button and the "▲" to adjust the desired "High limit value ".

Note: When adjusting the value, the "SV" indicator will light.

1st layer setting considerations;

1. Under the normal display, if the "Function" button is set to the "RPM function" and the "RPM" indicator is on, then the 1st layer setting procedures will ready for the "RPM" function.
2. Under the normal display, if the " Function" button is set to the "m/min. function", and the "m/mi" indicator is on, then the 1st layer setting procedures will ready for "m/min." function.
3. 3) Under the normal display, if the "Function" button is set to the "ft/min. function" and the "ft/min" indicator " is on, then the 1st layer setting procedures will ready for "ft/min." function.

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2nd layer setting procedures

PULS	Pulse no. per revolution setting
dIA	Roller diameter value setting
CtHy	Control Hysteresis value setting
ALHy	Alarm Hysteresis value setting

Pulse no. per revolution setting

1. Press the "Set" button continuously for at least two seconds, the display will show "PULS", now the meter is ready for the "Pulse no. per revolution" setting.
2. Use the "▼" button and the "▲" button to adjust the desired "Pulse no. per revolution".

Note: When adjusting the value, the "SV" indicator will light.

Roller diameter value setting

1. After setting the "Pulse no. per revolution", press the " Set" button twice, the display will show dIA ", now the meter is ready for the "Roller diameter value" setting.
2. Use the "▼" button and the "▲" button to adjust the "Roller diameter value" in the unit of cm.

Note: When adjusting the value, the "SV" indicator will light.

Control Hysteresis value setting

1. After setting the "Roller diameter value", press the "Set" button twice, the display will show "CtHy", now the meter is ready for the "Control Hysteresis value" setting.
2. Use the "▼" button and the "▲" button to adjust the desired Hysteresis value".

Note: When adjusting the value, the "SV" indicator will light.
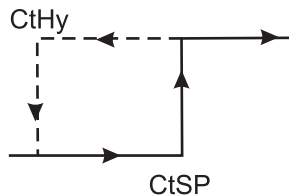
Example: Control value : 500, Control Hysteresis value : 5

The state of the control relay will stay On for measured values up to 500. The control relay will turn Off when the measured value goes down to 495.

Alarm Hysteresis value setting

1. After selecting the "Control Hysteresis value" , press the "Set" button twice, the display will show " ALHy ", the meter is now ready for the "Alarm Hysteresis" value setting.
2. Use the "▼" button and the "▲" button to adjust the desired Alarm Hysteresis value.

Note: When adjusting the value, the "SV" indicator will light.

Example :

High limit value : 100, Low limit value : 20, Alarm Hysteresis value : 5
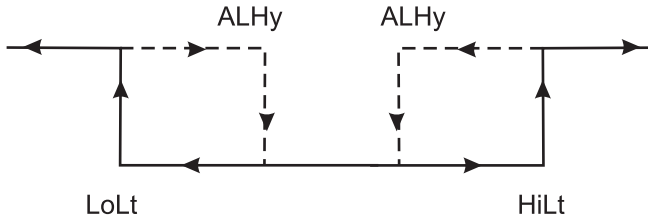
1. The alarm relay will be On when measuring value up to 100. The alarm relay will turn Off again when measuring value down to 95.
2. The alarm relay will be On when measuring value down to 20. The alarm relay will turn Off when measuring value up to 25.

SYSTEM RESET

Power on the meter. Use two fingers to press the "Set" button and "Function" button continuously for more than 5 seconds until the display show the text "rSt". Release the buttons. "rSt" will flash 2 times and the display will then to the normal screen. The meter system will be reset, all the calibration data will be cleared and the meter's internal functions will return to the default values.

Specifications

General Specifications

Display	4 digits red LED, digit size : 14 mm.	
Unit	RPM	RPM
	Surface speed	m/min (meter per min.)
		ft/min (feet per min.)
Circuit	Custom chip of microprocessor LSI circuit.	
Sampling Time	Approx. 1 second. * Input : one pulse per revolution, ≥ 60 RPM	
Relay Output	Two relays: Relay 1; Control relay, Relay 2; Alarm relay	
	Max Load: 0.5 ACA/250 ACV 0.5 DCA/24 DCV	
	Note: Do not apply a load current that exceeds 0.5A. Large currents will damage the relay and also void the warranty.	
Setting Value	Control value setting. Alarm high limit value setting. Alarm low limit value setting. Pulse no. of each revolution. Roller diameter value setting. Hysteresis value setting. * Setting for RPM, m/min., ft/min.	
Input Signal Time base	Pulse, Quartz crystal	
Sensor Power Supply	DC 12 V, 50 mA max.	
Data Output	RS 232 PC serial interface.	
Operating Temperature	32 to 122°F (0 to 50 °C).	
Operating Humidity	Less than 80% R.H.	
Power Supply	90 to 260 ACV, 50/60 Hz.	
Power Consumption	Approx. 4.7 VA/AC 110V. Approx. 5.3 VA/AC 220V.	
Weight	384 g/ 0.84 LB.	
Dimension	DIN size : 96 x 48 mm. Depth : 110 mm.	
Optional Accessories	Proximity sensor, 461955. * Photo sensor, 461957. Data Acquisition software, 407001A	

Electrical Specifications (23±5 °C)

Range	*Photo Tachometer :* 10 to 99,999 RPM		
	Surface Speed (m/min.) :0.05 to 9,999 m/min. *Surface Speed (ft/min.)* :0.2 to 32,805 ft/min.		
Accuracy	± (0.1 % + 1 digit).		
Resolution	RPM	0.1 RPM	< 1,000 RPM
		1 RPM	1,000 to 9,999 RPM
		10 RPM	10,000 to 99,999 RPM
	m/min.	0.01 m/min.	<100 m/min.
		0.1 m/min.	100 to 999 m/min.
		1 m/min.	1,000 to 9,999 m/min.
	ft/min.	0.1 ft/min.	< 1000 ft/min.
		1 ft/min.	1,000 to 9,999 ft/min.
		10 ft/min.	10,000 to 32,805 ft/min.

- *Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.*

461955 Proximity Sensor Specifications (23±5 °C)

Output method	PNP, NO(normal open)
Sensing direction	Vertical.
Sensing distance	4 mm.
Operating voltage	10-30 VDC.
Standard Sensing object	Iron 18 x 18 x 1 mm.
Current consumption	8 mA, no load.
Response frequency	600 Hz.
Output current	250 mA max.
Leakage current	1.1 mA.
Residual voltage	0.9 VDC.
Operating Temperature	-4 to 158°F (-20 to 70 °C)
Operating Humidity	35 to 95% RH.
Wire Dimension	4.7 mm Dia. x 2 m x 3 cores.
Cable length	6 ft (1.8 meters)

461957 Photoelectric Sensor Specifications

Range	Up to 6000 RPM (100 Hz)
Power	12 - 24VDC ±10%; Consumption: 40mA max.
Response time	< 1ms
Output	NPN transistor; Max load 80mA
Photo beam color	Green
Photo beam wavelength	5500 Angstroms
Cable length	6 ft (1.8 meters)

Calibration and Repair Services

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Care Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

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Support line (781) 890-7440

Technical Support: Extension 200; E-mail: support@extech.com

Repair & Returns: Extension 210; E-mail: repair@extech.com

Product specifications subject to change without notice

For the latest version of this User Guide, Software updates, and other up-to-the-minute product information, visit our website: www.extech.com

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