CE

User's Guide

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HHT11-R

Pocket Tachometer with Remote Sensor Input

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

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WARNINGS

Use of this equipment in a manner that is inconsistent with it's intended purpose, or in an environment that exceeds the rated specifications by the manufacturer, may impair the protection provided by the equipment.

Read sections 4 and 5 fully before making contact measurements.

Making measurements in direct contact with rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Keep the hand holding the instrument well behind the back end of the Contact Tip Assembly.

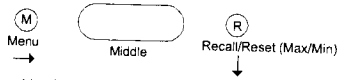
Properly replace all machinery guards after completing measurement.

Do not use for rotation greater than 20,000 RPM.

The socket on the side of the instrument is for use with a Remote Optical Sensor, Model HHT10-ROS, only.

MENU OVERVIEW - Simple to Operate!

Note: Instrument is factory preset in optical RPM mode.



- Press middle button to turn instrument on and begin measurement or menu selections.
- Scroll across (M) until the desired main menu selcetion is displayed.
- Scroll down (R) until the desired operating mode is displayed then press middle button to enter/save your selection.
- Press middle and (R) buttons simultaneously to shut off. Automatic shut-off after 90 seconds on inactivity.

Start

1. Press Middle Button (wait for O) 2. M (Menu) 3. **TYPE** M **DEC PT** M **TEST** M

TEST (R): Show all segments
Point at light read 7200 ±2 60Hz
6000 ±2 50Hz

TYPE: **RPM** (Optical) M **RATE** M **TOTAL** M **TIMER** M

RATE (R):
OT = Optical Tachometer
Use with Reflective Tape Only
- OT RPS
- OT RPM
- OT RPH

CT = Contact Tachometer
Use Contact Tip Assembly
- CT RPS
- CT RPM
- CT RPH

Linear Contact Wheel must be used for all linear measurements.
- Inch/S
- Inch/M
- Inch/H
- Feet/S
- Feet/M
- Feet/H
- Yard/S
- Yard/M
- Yard/H
- Mile/H
- CM/Sec
- CM/Min
- CM/H
- M/Sec
- M/Min
- M/Hour

TOTAL (R): Count; CT Rev; Inch, Feet, Yard, CM, Meter

TIMER (R): Auto; Manual

DEC PT (R): Auto; Set

TYPE = Bold Size - Main Menu
RATE = Medium Size - Sub Menu
MR = Small Size - Button Movement

How to measure Linear lengths of cables, belts, surfaces, etc.
A. Select under **DEC PT** - Auto
B. Select M (Menu) then, unter **TOTAL**, the desired unit of Inches, Feet, Yards, CM or Meters

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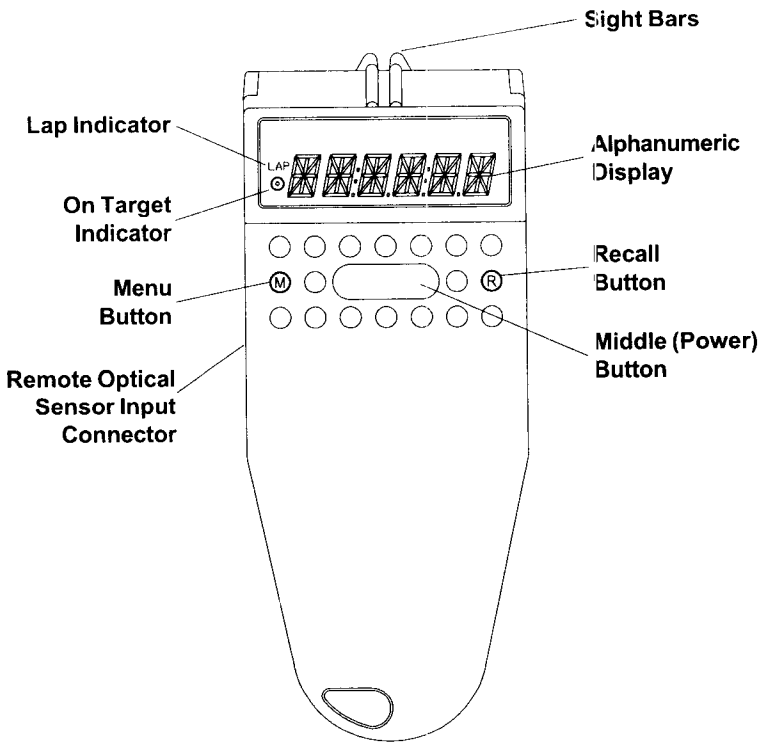


HHT11-R

1. SPECIFICATIONS

This product is designed to be safe for indoor use under the following conditions (per IEC1010-1).

Temperature:	5°C to 40°C
Humidity:	Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C.
Pollution Degree:	2 per IEC 664
Power:	9VDC @ 70mA MAX. Battery Type IEC-6LR61.

This product meets the requirements of 89/336/EEC EMC Directive and 73/23/EEC Low Voltage Directive.

Basic Measurement:

Modes:	RPM, Scaling, Totalizer, Timer. Internal or External Sensor.
Accuracy:	Non Contact ±0.01% of reading, Contact ±0.5% typ.
Display:	6-digit Alphanumeric LCD Display 0.3" digits. On-Target Indicator.
Memory:	Last Measurement, Minimum, Maximum and Lap time (in timer mode)
Resolution:	User Selectable - fixed format ±1 resolution, or floating format resolution to 0.0001.
Update Rate:	Twice per second for measurement, per count for Totalizer and Timer.

Measurement Ranges:

RPM:	Revolutions per Minute	2.5 to 100,000 RPM
	Revolutions per Second	0.042 to 1666.67 RPS
	Revolutions per Hour	150 to 999,999 RPH
RATES:	Inches per Second	0.165 to 750 IPS
	Inches per Minute	10 to 40,000 IPM
	Inches per Hour	360 to 999,999 IPH
	Feet per Second	0.015 to 65 FPS
	Feet per Minute	0.825 to 3,900 FPM
	Feet per Hour	50 to 235,000 FPH
	Yards per Second	0.005 to 20 YPS
	Yards per Minute	0.275 to 1200 YPM
	Yards per Hour	16.5 to 72,000 YPH
	Miles per Hour	0 to 44 MPH
	Centimeters per Second	0.43 to 2,000 cmPS
	Centimeters per Minute	25 to 120,000 cmPM
	Centimeters per Hour	1,500 to 999,999 cmPH
	Meters per Second	0.0042 to 20 mPS
	Meters per Minute	0.25 to 1,200 mPM
	Meters per Hour	15 to 72,000 mPH
TOTALIZER:	Counts	0 to 999,999
	Scale Totals in Inches, Feet, Yards, Centimeters or Meters	
	Input	Internal or external

TIMER (Stopwatch):

Minutes:Seconds:Hundredths to 59:59:99 Resolution 0.01 Second (1/100)
Hours:Minutes:Seconds to 99:59:59 - Resolution 1 second.
Pushbutton or Remote control.
Accuracy 0.01 second

Accessories Provided:

Contact Tip Assembly, Concave Tip, Convex Tip, Linear Speed Wheel
Latching Carry Case, Battery, Reflective Tape, Instruction Manual

2. INTRODUCTION

The HHT11-R-KIT consists of a hand-held Tachometer, the HHT11-R, a removable Contact Tip Assembly with two rubber tips, one concave, the other with a point, a linear speed wheel, a roll of Reflective Tape and a battery , all in a rugged plastic carry case.

HHT11-R is a versatile instrument with advanced features and options. In order to get acquainted with and know all the features of the HHT11-R KIT it is recommended that you **read this manual in its entirety before attempting to use the instrument.**

The HHT11-R is a multifunction Tachometer, Ratemeter, Totalizer and Timer. It has programmable options to allow it to measure in Revs, Inches, Feet, Yards, Miles, Centimeters and Meters using the included Contact Tip Assembly. It has an external input socket allowing an optional Remote Optical Sensor (HHT10-ROS) to be used. The Timer function operates as a simple stopwatch, or can be triggered by reflective targets. The unit can also totalize in various units to a maximum of 999,999.

The HHT11-R has a six digit alphanumeric display capable of displaying words and numbers. There are three control buttons. The **middle** button is the main control button and is the primary button used to operate the unit. The two smaller buttons are for programming and auxiliary functions. To the left, the button marked **M** is for the Menu function, while the button to the right marked **R** is for the Recall and Reset functions.

Once programmed, the unit is fairly straightforward to operate. The function of the buttons is dependent upon the current operating mode of the unit. There are three primary modes of operation:

Tachometer

Measures speed or linear rate with respect to time. Time intervals are seconds, minutes or hours. Rotational speed can be measured as Revolutions (Revs) per second, per minute or per hour. The most common measurement being RPM or Revs per minute using the optical tachometer mode. Measurement of units other than Revs requires the attachment of the linear contact wheel and contact tip assembly. With this easily attached wheel, the unit can measure RATE inputs - inches, feet, yards, centimeters and meters either per second, per minute or per hour, as well as miles per hour. The user can recall the maximum and minimum values with the **R** button.

Totalizer

Accumulates input on an ongoing basis. In the simplest form the unit acts as an optical counter, incrementing the display each time an input pulse is sensed. Using the Contact Wheel attachment the unit can totalize in inches, feet, yards, centimeters and meters. The user can freeze the display at any time without affecting the count by pressing the **R** button. Press the **middle** button to reset total to 0 (zero).

Timer

Accumulates time in hours, minutes, seconds and hundredths of a second. There are two modes of operation. The Manual mode operates like a stopwatch, the timing period being started and stopped by the **middle** button. The Auto mode can be stopped and started by the user or by a piece of reflective tape on the objects. A LAP time can be saved in either mode by pressing the **R** button.

3. NON-CONTACT MEASUREMENTS

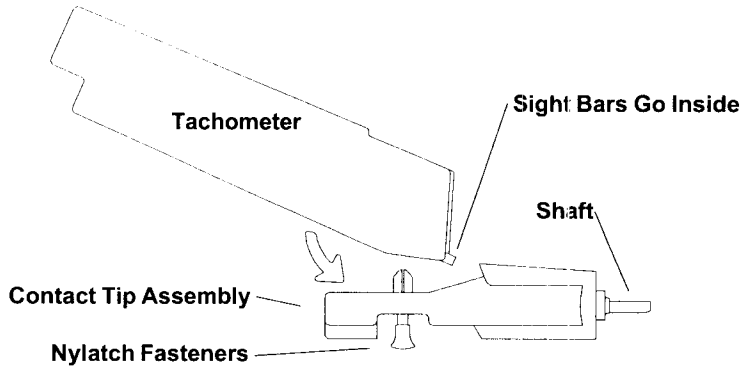
To prepare a shaft for non-contact measurement of speed, carefully clean an area of the shaft of all grease and dirt and apply a piece of Reflective Tape to the cleaned surface. Typically, a half inch square of Reflective Tape is convenient. For smaller shafts, smaller pieces of tape down to approximately 1/8 inch in length may be used. Always use Reflective Tape supplied. Additional tape is available in five foot rolls, part number HHT-RT-5.

The ergonomic design of HHT11-R makes the non-contact measurement of speed extremely simple. First, select RPM mode, and then aim HHT11-R at the reflective marker using the sight bars on the top surface of the instrument as an aid in locating the target. A light emanates from the underside of the HHT11-R parallel to the top surface and in line with the sight bars. This design allows you to view the target on the rotating shaft and the display on the instrument simultaneously. To measure, press and hold the **middle** button on the front panel and aim the instrument until a steady illumination of the on-target indicator or "bull's eye" indicates you are receiving valid data. Above 200 RPM wait for three updates of the display for the instrument to stabilize. At lower speeds, a few additional updates may be required for the instrument to initially "lock on". Once a measurement is complete, release the middle button while still viewing the target. The last reading will be held on the display for approximately 90 seconds and then the instrument automatically times out and shuts off. The operative speed range is from 5 to 100,000 RPM when using a Reflective Tape target.

4. CONTACT MEASUREMENTS

WARNING

Making measurements in direct contact with rotating equipment can be dangerous. Keep all loose clothing and hair away from exposed moving machinery. Keep the hand holding the instrument well behind the back end of the Contact Tip Assembly. Properly replace all machinery guards after completing measurement. Do not use for rotation greater than 20,000 RPM.



To measure rotational speed by directly contacting a shaft, the HHT11-R must be equipped with the HHT10-R-CTA-2P Contact Tip Assembly, speed range is 2.5 to 20,000 RPM. This accessory is attached to the bottom of the instrument with two Nylatch® fasteners which install in the holes provided for attachment.

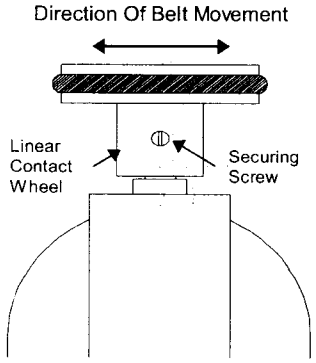
To assemble, first pull back on the grips on the two Nylatch® fasteners to insure they are in the released (pulled out) position. Do not attempt to pull them beyond the unlocked position (loose feel). Install the Contact Tip Assembly onto the HHT11-R by sliding the sight bars on the HHT11-R into the corresponding notch in the top of the Contact Tip Assembly (above the window exposing the shaft). Push the Contact Tip Assembly flush against the HHT11-R so that the fasteners fit into the two locating holes on the underside of the HHT11-R. Secure the tip assembly by pushing firmly on both of the Nylatch® fasteners until they snap securely in place. Select either a convex or concave tip appropriate for the measurement to be made and install it firmly on the shaft extension of the HHT10-CTA-2P. Note that the shaft has a flat surface on it which must align with the flat in the rubber tips. The convex (conical) tip is used for moderate to larger diameter shafts that are equipped with a turned center, while the concave (inverted conical) tip is used on smaller diameter shafts. To make a measurement, first select Rate (CT-RPM) mode, then start the equipment and carefully move the contact tip against the end of the rotating shaft. Keep the hand holding the instrument well behind the back edge of the Contact Tip Assembly. Only a moderate amount of pressure is required to keep the

rubber tip in contact with the rotating shaft. Depress the **middle** button and hold the instrument in position until the reading is complete. Once again, the on target indicator or "bull's eye" symbol will be your indication of reliable data being received. When the measurement is complete, release the middle button while still in contact with the shaft, remove the instrument from contact with the shaft, and HHT11-R will retain the last reading for approximately 90 seconds then automatically shut off. To disassemble the Contact Tip Assembly, pull the grip of each of the Nylatch® fasteners to release them from the back of HHT11-R, and remove the Contact Tip Assembly by gently pulling it from the back of the instrument.

5. SURFACE SPEED MEASUREMENTS

Surface speed measurements are made with the HHT10-CTA-2P Contact Tip Assembly and the Linear Speed Wheel. Install the Contact Tip Assembly on the HHT11-R as described previously. The Linear Speed Wheel must be pushed right back onto the shaft, aligning the flats. Secure the Linear Speed Wheel in position by tightening the small machine screw on the neck of the wheel.

WARNING: Do not attempt to use the Linear Speed Wheel if the securing screw is not tight.



To measure a linear surface speed such as a moving belt or web, first select Rate (Linear Contact) mode, then hold the HHT11-R at a right angle (90 degrees) to the direction of movement and gently contact the side of the rubber tip against the top surface of the object to be measured. For accurate results, be sure that the tip is held flat against the moving object. Only a very moderate amount of pressure is required. Excess pressure can load the HHT10-CTA-2P shaft and distort the rubber tip causing an erroneous reading and eventual wear in the bearings of the Contact Tip Assembly

Linear speeds are read out directly based on the operating mode previously selected in the menu modes. The "Per Minute" measurement ranges are: Inches, 10 to 40,000 Inch/M; Feet, .84 to 3,900 Feet/M; Yards, .28 to 1,200 Yard/M; Centimeters, 25.0 to 120,000 Cm/Min; Meters, .250 to 1,200 M/Min; Miles per Hour, 0 to 44 Mile/H.

6. OPERATION

The unit is started by pressing the **middle** button. The display will turn on with all segments lit, the unit will then indicate what operating mode has been preset. The display will then show *READY* and the display will go to 0 (zero). The unit will automatically shut off after 90 seconds of inactivity.

NOTE: To shut the unit OFF at any time, press the R and middle buttons simultaneously.

SELECTING OPERATING MODES (see Menu Overview chart in back):

To change the operating mode press the **M** button so that the display shows *MENU*. There are a number of Main Menu choices that can be selected by pressing the **M** button. These are:

TYPE Selects the primary operating mode - RPM, RATE, TOTAL, TIMER.

DEC PT Decimal Point- select SET for a resolution of one, or AUTO for auto ranging with moving decimal point (fractional resolution to 0.0001).

TEST All segments will be illuminated, then press the **middle** button, aim it at a fluorescent lamp and observe 7200 ± two counts. (Note: In countries with a 50 Hz, power line frequency, the Tachometer will read 6000 ± 2.)

When setting modes the **M** button acts as the primary select button and the **R** button acts as the secondary select button. The **middle** button is the enter/save button and will return the user to the new operating mode. The unit will remember all menu settings when turned off. Refer to the HHT11-R Menu overview sheet on the last page.

7. RPM MODE (Contact Tip CAN NOT be used in this mode)

NOTE: The instrument is factory preset in optical RPM mode of operation.

To select RPM mode, press the **middle** button until the display shows READY then O. Press and hold the **middle** button, aim the Tachometer at a reflective target up to 30 inches away and an angle not exceeding 30 degrees to take readings. Notice the on-target indicator "bulls eye" must be on steadily indicating the target is being hit correctly.

To measure RPM you can use the internal optics or a remote sensor, the HHT10-ROS.

In the INTERNAL mode it is necessary to press and hold the **middle** button to take a reading. The unit will shut itself off after 90 seconds of inactivity in all modes. It will also hold the last reading on the display for 90 seconds.

In the EXTERNAL mode the Remote Sensor is powered on continuously, taking readings all the time until it is shut off by pressing the **middle** and **R** buttons simultaneously or shuts off after 90 seconds of inactivity.

When measuring RPM the user can recall the **MAX**imum and **MIN**imum by pressing the **R** (Recall) button. Press once for MAX and again for MIN. Each time the **middle** button is pressed to begin readings, the MAX and MIN values are cleared.

8. RATE MODE (Use with Contact Tip for RPM, FPM, MPM and other Rate mode measurements)

The RATE mode is an extension of the RPM mode and, with the exception of Revs, all work with the 0.1 meter Linear Speed Wheel and Contact Tip Assembly attachment. This mode is used to measure linear rate, such as conveyer belt speed.

To select RATE Mode turn the unit on and press **M** twice so the display shows *TYPE*. Press **R** once to enter the TYPE menu then press **M** until the display shows *RATE*. Now press **R** until the operating mode you wish to measure is displayed. Press the **middle** button to save/enter your mode selection.

OT RPS, OT RPM and OT RPH are **O**ptical **T**achometer or non-contact measurements. CT RPS, CT RPM and CT RPH are **C**ontact **T**achometer measurements, and are used with the Contact Tip Assembly. The rest are linear measurements and must be used with the contact wheel. The contact tip and wheel use 2 pulses per Rev. Carefully place the Linear Contact Wheel or contact tip on the surface to be measured.

NOTE: /S = per second, /M = per minute, /H = per hour, CM/ = centimeters and M/ = meters.

9. TIMER MODE

To select the TIMER mode, turn the unit on and press the **M** button twice so the display shows *TYPE* then press the **R** button to access the TYPE menu. Press the M button until the display shows *TIMER*. Press the **R** button to select MANUAL or AUTO then press the **middle** button to enter the timer mode.

MANUAL mode acts like a stopwatch. Timing is started and stopped using the **middle** button. A LAP time can be held by pressing the **R** button while timing. The display will show the lap value and will blink *LAP* in the top left corner of the display. To return to the timing mode press **R** button again. To reset to 00:00:00 press **R** button when timer is stopped.

The AUTO mode is similar to the MANUAL mode except that the timing can be started and stopped from the internal optics or external sensor HHT10-ROS as well as the **middle** button.

The unit will time in hundredths of a second to 1 hour and will then change to seconds.

NOTE: Once timing is initiated, the unit needs to be TURNED OFF MANUALLY or the battery will go dead.

10. TOTALIZE MODE

To select TOTALIZE mode, turn the unit on and press the **M** button twice so the display shows *TYPE* then press the **R** button to access the TYPE menu. Press the **M** button until the display shows *TOTAL*. Press the **R** button to select the desired mode. The COUNT scale simply increments the display by one for each reflective optical pulse received.

The unit can totalize in units by selecting COUNT or REV or in distance by selecting INCHes, FEET, YARDs, CentiMeters or METERs.

Press the **middle** button to save/enter your selection.

In the TOTALIZE mode the lamp or external sensor HHT10-ROS is powered continuously. The reading on the display can be held without affecting the count by pressing the **R** button while totalizing. The display will hold the reading and will blink LAP in the top left corner indicating that the display is on hold. To revert back to the count display press **R** one more time. The display will be RESET to zero by pressing the **middle** button. To shut the unit off manually, press the **middle** and **R** buttons simultaneously.

Note that the total may have an uncertainty of ±0.5 revolution of the contact wheel circumference (0.05m or 1.8") depending on where the wheel starts or stops.

In TOTALIZER mode, the unit will shut off if no inputs are received or no buttons are pressed in 90 seconds.

11. DECIMAL POINT (DEC PT)

The instrument can display measurements in a "set" range format - 1234 with a resolution of 1 digit, or in an "auto" floating point format - 1234.56 for maximum resolution. It is not applicable to the TIMING mode.

The decimal point operation is selected by pressing the **M** (menu) button until the display **shows** *DEC PT*. Press the **R** button to select either *SET* or *AUTO* modes then press the **middle** button to return to the measurement.

12. TEST

The TEST mode is used to check the instrument calibration against a known standard, the AC mains frequency. The Contact Wheel Assembly or Remote Sensors must not be attached to the instrument. To enter the TEST mode turn the unit on and press the **M** button until the unit shows *TEST*. Press the **R** button. The display will show all segments on and then enter the RPM mode.

To test the unit, aim it at a fluorescent light. The display should show *7200 ±2 counts* for countries with 60 cycle AC mains and *6000 ±2 counts* for countries with 50 cycle AC mains. To exit the TEST mode press the **M** button then the **middle** button. The unit will remember the previous mode of operation. Note that this test does not check the internal lamp. This can be accomplished during the RPM mode by looking into the lens hole on the underside of the unit and pressing the **middle** button. Check to see that the lamp comes on and is bright white not yellow in color.

13. USING THE REMOTE SENSOR - HHT10-ROS

The Optional Remote Optical Sensor, part number HHT10-ROS, can be plugged (3.5mm phone plug) into the side of the instrument housing. The user can hold or mount the HHT10-ROS at the end of the 5 foot cable. The green LED on the HHT10-ROS is the on-target indicator while utilizing this sensor.

Operation in all modes is the same as using the internal optics of the instrument. The HHT10-ROS should be plugged into the HHT11-R while the power is off.

14. BATTERY

The HHT11-R is powered from a single NEDA Type 1604 (PM9) nine volt dc alkaline battery. The battery is installed by removing the sliding cover from the back of the instrument, connecting the battery to the battery snap, and installing the battery into the compartment with leads arranged so that they will not be damaged when replacing the battery compartment cover.

When the battery voltage in HHT11-R is getting low, the display will blink on and off to indicate this condition. At the time the low battery indication comes on, HHT11-R should operate another fifteen minutes.

15. CLEANING

To clean the instrument, wipe with a damp cloth using mild soapy solution.

16. OPTIONAL ACCESSORIES

HHT10-ROS	Remote Optical Sensor with 5 foot cable
HHT-RT-5	Reflective Tape, 5 foot roll, 1/2 inch wide

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- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- ☑ Transducers & Strain Gauges
- ☑ Load Cells & Pressure Gauges
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Datalogging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

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