

# Instruction Manual

# PLT200 - POCKET LASER TACH 200 Tachometer/Rate Meter/Totalizer/Timer





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#### SAFEGUARDS AND PRECAUTIONS





LASER 2



Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 of June 2007.

Diode Laser

Max. Output Power: <1 milliwatt

Wavelength: 650 nanometers (visible light)

Beam Divergence: <18 milliradian

Output: Continuous (CW)

Laser Hazard Classification: Class 2

#### Laser Hazards:

Eye injury from beam - Do not look into the direct or reflected beam; can cause eye injury up to 25 ft. [7.5 m] away.

Visual interference (glare) with pilots and drivers - Interferes with vision up to 525 ft. [160 m] away. Can be a distraction up to 1 mile [1.6 km] away. NEVER point any laser towards aircraft or vehicles; it is unsafe and illegal.

#### Safe Use Guidance:

Class 2 lasers are considered safe for accidental eye exposure. Do not look or stare into beam. Do not aim at aircraft. *This is not a toy.* Always supervise children.

#### Manufacturer:

Monarch Instrument 15 Columbia Drive Amherst, NH 03031 USA Country of Origin: USA

Contact info: www.monarchinstrument.com



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.

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.

Monarch Instrument's Limited Warranty applies. See <a href="https://www.monarchinstrument.com">www.monarchinstrument.com</a> for details.

Warranty Registration and Extended Warranty Coverage information is available online at  $\underline{www.monarchinstrument.com}.$ 

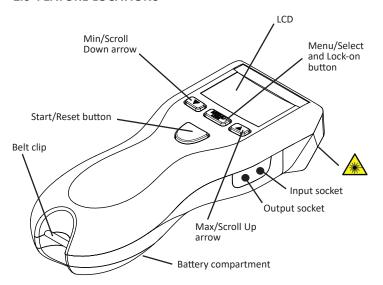
# **TABLE OF CONTENTS:**

1.0 DESCRIPTION	д
2.0 FEATURE LOCATIONS	1
3.0 LCD SYMBOLS	2
4.0 INPUT/OUTPUT	3
5.0 REMOTE CONTACT ASSEMBLY	
5.1 RCA Connection Detail	
6.0 PREPARATION FOR MEASUREMENT	
6.1 Connecting External Sensors	5
6.3 Direct Contact Preparation Using RCA	
7.0 TAKING MEASUREMENTS	
7.1 Noncontact Measurements	
7.2 Direct Contact Measurements	
8.0 TACHOMETER MODE	8
8.1 TACHometer Setup	
8.2 TACHometer Operation	10
9.0 RATE MODE	
9.1 RATE Setup	
9.2 RATE Operation	
10.0 TOTALIZER MODE	
10.1 TOTALizer Setup	14
-	
11.0 TIMER MODE	
11.2 TIMER Operation	
12.0 BATTERIES	
13.0 SPECIFICATIONS	
14.0 CLEANING	
15.0 SENSORS	
16.0 ACCESSORIES	27

#### 1.0 DESCRIPTION

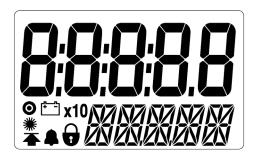
The Pocket Laser Tach 200 is a multifunction tachometer, rate meter, totalizer and timer. It is programmable to read in English or metric units. An input socket accepts remote sensing devices and an output socket allows for pulse output to external indicating devices. The PLT200 can be tripod mounted and locked-on for accurate and continuous operation. This tachometer also stores minimum, maximum and last measurement in memory.

#### 2.0 FEATURE LOCATIONS



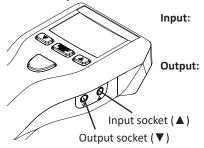


#### 3.0 LCD SYMBOLS



- On-Target Indicator blinks whenever there is an input signal and will appear to be solid on at higher frequencies
- Low Battery icon indicates that the batteries are low and need to be replaced
- **X10** Times Ten icon indicates that the value shown is ten times that which is displayed
- \*\* Laser Indicator red laser is on when this indicator is illuminated
  - Lock icon indicates that the unit is locked and making continuous measurements (Lock Mode)

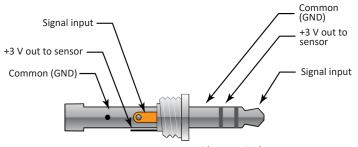
## 4.0 INPUT/OUTPUT



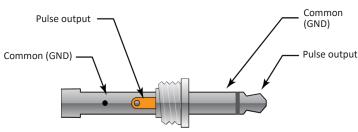
Accepts remote sensor or Remote Contact Assembly (RCA) 1/8" [3.5 mm] stereo phone plug

1 pulse per revolution TTL output on internal operation; pulse repeater with external sensors

1/8" [3.5 mm] mono phone plug



# Input Connector Detail (stereo plug)



Output Connector Detail (mono plug)

#### 5.0 REMOTE CONTACT ASSEMBLY

The **Remote Contact Assembly (RCA)** is an accessory (sold separately) for measuring contact RPM, linear speeds or totalizing lengths. It needs to be plugged into a tachometer to be functional. It is supplied with two rubber contact tips (one concave and one convex) and a 10 cm linear wheel. An optional 12-inch linear wheel is available. When used with the Monarch Pocket Laser Tach 200, the unit outputs 12 pulses per revolution (PPR). The maximum operating range of the RCA is 20,000 RPM when used with a contact tip and 12,000 RPM when used with a linear wheel.

#### 5.1 RCA Connection Detail

Connector pinouts are shown in Figure 1.

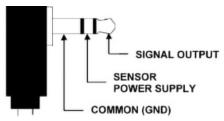
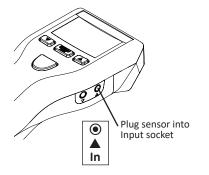


Figure 1 RCA Output Connector - Connection Detail

# 6.0 PREPARATION FOR MEASUREMENT

# 6.1 Connecting External Sensors





Remote Contact Assembly (RCA) (shown with optional 12-inch Wheel)



Remote Optical Sensor (ROS-P)



Infrared Sensor (IRS-P)



Magnetic Sensor with Amplifier (MT-190P)

Please visit <u>www.monarchinstrument.com</u> for additional sensor options.

#### **6.2 Noncontact Preparation**

Follow the steps below for internal operation (red laser) or external operation using optional Remote Optical Sensor (ROS-Red LED):

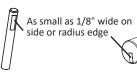
1. Clean shaft.



2. Apply 1/2" square of T-5 Reflective tape.



For small shafts:

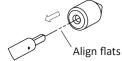


# 6.3 Direct Contact Preparation Using RCA

Plug the RCA into the 3.5 mm stereo input jack of the PLT200.

# Select and install contact option:

**1.** Contact Tip (convex tip shown) Use concave tip for small shafts



2. 10 cm Wheel

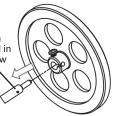
<u>OR</u>

3. 12 in. Wheel



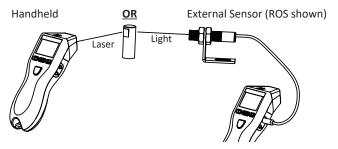
Tighten screw securely into flat on shaft

Install with pin in shaft fully seated in slot; tighten screw

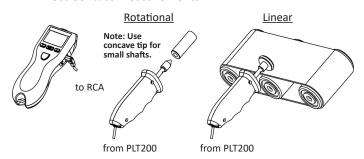


#### 7.0 TAKING MEASUREMENTS

#### 7.1 Noncontact Measurements



#### 7.2 Direct Contact Measurements



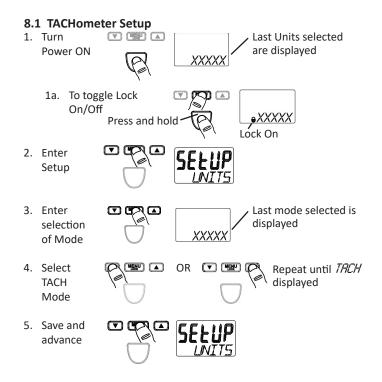


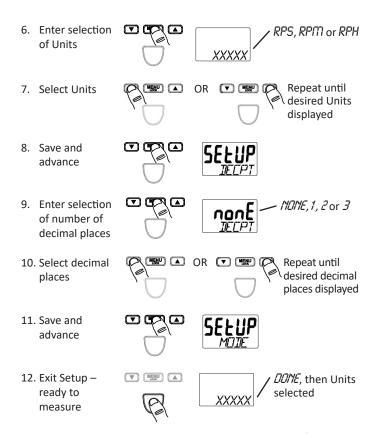
#### **ONLY USE MODERATE PRESSURE**

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 Remote Contact Assembly. Properly replace all machinery guards after completing measurement. Do not use for rotation greater than 20.000 RPM.

#### 8.0 TACHometer MODE

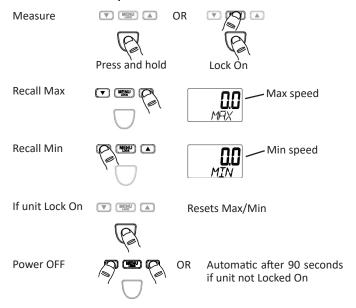
A tachometer measures speed or linear rate with respect to time; time intervals are seconds, minutes, or hours. Rotational speed can be measured in Revolutions (Revs) per second, per minute, or per hour. The most common measurement is RPM or Revs per minute using the optical Tachometer Mode.





The unit will remember these settings (including Lock On/Off) even if turned off then back on.

#### 8.2 TACHometer Operation



#### 9.0 RATE MODE

Measurement of units in addition to Revs requires the attachment of the Remote Contact Assembly and tips/wheels. With this attachment, the unit can measure RATE inputs-revs, inches, feet, yards, centimeters and meters either per second, per minute or per hour, as well as miles per hour.

**Note:** External Remote Contact Assembly (RCA) must be inserted into input socket.

# 9.1 RATE Setup

1. Turn Power ON



EXTRM, then scrolling message, then last Units selected

1a. To toggle Lock On/Off

Press and hold





Enter Setup





3. Enter selection of Mode





OR

Last mode selected is displayed

4. Select RATE Mode





Toggles between RATE and TOTAL; select RATE

5. Save and advance





6. Enter selection of Units





Rotational: *CRPS*, *CRPM* or *CRPH* 

Linear: IPS. IPM. IPH. FT/S. FT/M, FT/H, YPS.YPM, YPH. MPH. CM/S. CM/M. CM/H. M/SEC, M/MIN. M/H

#### RATE Setup (continued):

7. Select Units



OR



Repeat until desired Units displayed

8. Save and advance



SEŁUP OR SEŁUP Rotational Units

Linear Units

Only for Linear Units:

8a. Enter selection 🔽 of Wheel





Last wheel selected is displayed

8b. Select Wheel



OR



**Toggles** between 10CM and 121N

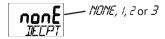
8c. Save and Advance





9. Enter selection of number of decimal places





10. Select decimal places





Repeat until desired decimal places displayed

11. Save and advance



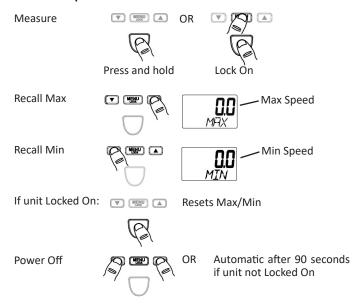


12. Exit Setup – ready to measure

| Variable | Variabl

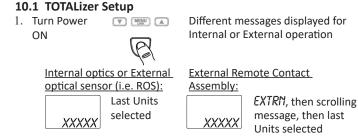
The unit will remember these settings (including Lock On/Off) even if turned off then back on.

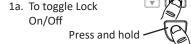
# 9.2 RATE Operation



#### **10.0 TOTALIZER MODE**

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 Remote Contact Assembly with various tips and wheels, the unit can totalize in revs, inches, feet, yards, centimeters, and meters.







2. Enter Setup





Enter selection of Mode





Last mode selected is displayed

Select TOTAL Mode



R C



Repeat until

TOTAL displayed

5. Save and advance



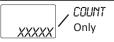


6. Enter selection of Units

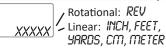


Different options displayed for Internal or External operation

**Internal or External ROS:** 



**External Remote Contact Assembly:** 



7. Select Units



OR



Repeat until desired Units displayed

Save and advance



SELUP JECPT COUNT or REV OR



Only for Linear Units:

8a. Enter selection of Wheel





Last Wheel selected is displayed

8b. Select Wheel



OR



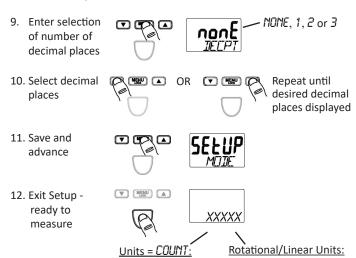
Toggles between 1000 and 1210

8c. Save and Advance





# **TOTALizer Setup (continued):**



The unit will remember these settings (including Lock On/Off) even if turned off then back on.

DONE.

USE CONTACT TIP or [wheel selected], then Units selected

DONE.

then COUNT

# 10.2 TOTALizer Operation





OR



Press and hold

Lock On

Recall Max or Min





Max or Min Speed (in last selected Tach or Rate mode units)

Recall Time in seconds





Shows time in seconds from when the Start/ Reset button is pressed until the last input signal measured

If unit is Locked On:



Resets Max/Min, Total and Measurement Time

Power Off



Automatic after 90 seconds if unit not Locked On

Note: Pressing



OR

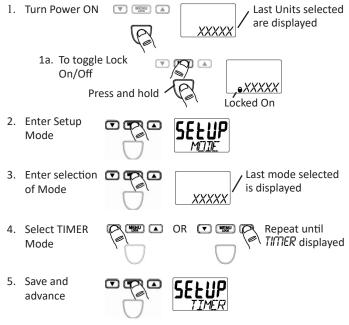


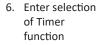
Once before 90 seconds will keep measurements in memory and the display turned on longer

#### 11.0 TIMER MODE

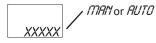
Accumulates time in minutes, seconds, and tenths of a second. There are two modes of operation. The Manual mode operates like a stopwatch, the timing period being started and stopped by the user. The Auto mode can be stopped and started by the user or a piece of reflective tape on objects. The user can freeze the display-and view/record a LAP time-at any time without affecting the count.











7. Select Timer function



OR C



Toggles between
Manual and
Auto

8. Save and advance





9. Exit Setup – ready to measure





DONE, then Units selected

Unit will remember these settings (including lock on/off) even if turned off and back on.

# 11.2 TIMER Operation

Measure:

Manual



Each press toggles Start and Stop



Auto



OR Start and Stop triggered by external remote optical sensor (ROS) or internal optics

Reset



With Timer stopped - resets time to 00:00.0

# TIMER Operation (continued):

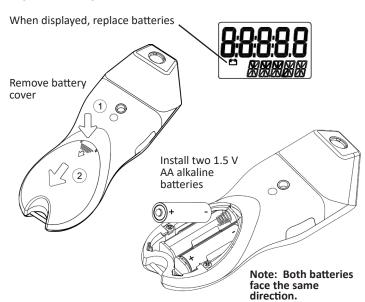
Lap Wisto to Power Off OF

With Timer running stops at elapsed time to date; to continue, press again

OR If Timer stopped automatic after 90 seconds if unit not Locked On

OR Automatic after 99:59.9

#### 12.0 BATTERIES



# 13.0 SPECIFICATIONS

Specifications*	PLT200 Pocket Laser Tachometer	
Laser Specifications:		
Classification	Class 2 (per IEC 60825-1:2014) This product complies with IEC60825-1 Ed.3 and 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 of June 2007	
Max Laser Output	< 1 mW	
Pulse Duration	Continuous	
Laser Wavelength	650 nm	
Beam Divergence	18 mrad	
Beam Diameter	4 mm x 7 mm typical @ 2 meters	
Laser Diode Life	8,000 operating hours MTBF (1 year warranty)	
Noncontact Specifications:		
RPM Range	5-200,000	
RPS Range	0.084-3,333.3	
RPH Range	300-999,999	
Resolution - Fixed	1 (10 above 99,999)	
Resolution - Autoranging	0.001 to 1.0 (10 above 99,999)	
Accuracy	±0.01% of reading or resolution limit	
Operating Range	Up to 25 ft. [7.62 m] or up to 70 degrees off perpendicular to T-5 Reflective Tape target	
Contact Specifications using optional Remote Contact Assembly:		
Range - Contact Tips	0.5-20,000 RPM	
Range - Wheels	0.5-12,000 RPM	

Specifications*	PLT200 Pocket Laser Tachometer		
Contact Specifications (continued):			
Resolution - Fixed	1 (10 above 99,999)		
Resolution - Autoranging	0.001 to 1.0 (10 above 99,999)		
Accuracy - Revs	±0.05% of reading (RPM) or resolution limit (with no slippage)		
Accuracy - Linear	±0.5% of reading or resolution limit (with no slippage)		
Contact Measurement Ranges:			
Tachometer:			
RPM	0.5-20,000		
RPS	0.0833-333.33		
RPH	30-999,999		
Rates:	Wheel Circumferences		
Inches per Second	10 cm: 0.033 to 1312.3 12 in.: 0.100 to 2,400.0		
Inches per Minute	10 cm: 1.969 to 78,740 12 in.: 6.000 to 144,000		
Inches per Hour	10 cm: 118.11 to 999,990 12 in.: 360.00 to 999,990		
Feet per Second	10 cm: 0.003 to 109.36 12 in.: 0.009 to 200.00		
Feet per Minute	10 cm: 0.164 to 6,561.7 12 in.: 0.500 to 12,000		
Feet per Hour	10 cm: 9.843 to 393,700 12 in.: 30.000 to 720,000		
Yards per Second	10 cm: 0.001 to 36.453 12 in.: 0.003 to 66.667		

Specifications*	PLT200 Pocket Laser Tachometer	
Rates (continued):	Wheel Circumferences	
Yards per Minute	10 cm: 0.055 to 2,187.2 12 in.: 0.167 to 4,000.0	
Yards per Hour	10 cm: 3.281 to 131,233 12 in.: 10.000 to 240,000	
Miles per Hour	10 cm: 0.002 to 74.564 12 in.: 0.006 to 136.36	
Centimeters per Second	10 cm: 0.084 to 3,333.3 12 in.: 0.21 to 3,048.0	
Centimeters per Minute	10 cm: 5.000 to 200,000 12 in.: 15.240 to 365,760	
Centimeters per Hour	10 cm: 300.00 to 999,990 12 in.: 914.40 to 999,990	
Meters per Second	10 cm: 0.001 to 33.333 12 in.: 0.003 to 60.960	
Meters per Minute	10 cm: 0.050 to 2,000.0 M/MIN 12 in.: 0.153 to 3,657.6 M/MIN	
Meters per Hour	10 cm: 3.000 to 120,000 12 in.: 9.144 to 219,460	
Totalizer:		
Counts	0 to 999.999	
Scale Totals in Inches, Feet, Yards, Centimeters, or Meters		
Input	Internal or external optics or contact wheel	
Timer Specifications:		
Minutes:Seconds, tenths to 99:59.9		
Accuracy	±0.2 second	
Resolution	0.1 second	

Specifications*	PLT200 Pocket Laser Tachometer	
Display	Dual LCD: 5-digit upper/scrolling and 5-digit alphanumeric lower display	
Batteries	Two (2) AA 1.5 V = (DC) alkaline included (Note: Batteries are NOT rechargeable.)	
Battery Life	30 hours continuous typical with batteries provided	
External Input:		
Absolute Max	-0.3 V to 5 V <b>_</b> (DC) pulse	
Minimum	Low below 1.2 V and high above 2 V (TTL compatible)	
Edge	Triggers on Positive edge	
Power Out	3.0 V nominal, approx. 2.8 V @ mA max	
Pulse Output	0 V to 3.3 V (DC) pulse Same shape as External Input signal or high when internal optics sees a reflection	
Dimensions (HxWxD)	6.92 in. x 2.4 in. x 1.6 in. [17.58 cm x 6.10 cm x 4.06 cm]	
Weight	Approx. 7 oz. (210 g)	
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	
Temperature	40 °F to 105 °F (5 °C to 40 °C)	
Humidity	Max relative humidity of 80% for temperatures up to 88 °F (31 °C) decreasing linearly to 50% relative humidity at 100 °F (40 °C) Humidity non-condensing	

<sup>\*</sup>Specifications are subject to change without notice.

#### 14.0 CLEANING

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

#### 15.0 SENSORS

See webpage for the complete list of accessories.

ROS-P	PN: 6180-057	Remote Optical Sensor with 8 ft. [2.5 m] cable
ROS-P-25	PN: 6180-057- 25	Remote Optical Sensor with 25 ft. [7.6 m] cable

The following sensors are compatible when used with the Self-Powered Sensor Interface Module (SPSR-IM, PN: 6150-021) and CA-4044-6 Input/Output Cable (PN: 6280-037):

ROLS-P	PN: 6180-029	Remote Optical Laser Sensor with 8 ft. [2.5 m] cable
ROLS-P-25	PN: 6180-029- 25	Remote Optical Laser Sensor with 25 ft. [7.6 m] cable
RLS-P	PN: 6180-081	Rugged Laser Sensor with removable 10 ft. [3 m] cable
MT-190P	PN: 6180-036	Amplified Magnetic Sensor
IRS-P	PN: 6180-020	Infrared Sensor with 8 foot [2.5 m] cable for use without reflective target at 0.5 inch [12 mm] gap
GE200 HP	PN: 6180-014	Gas Engine Inductive Sensor with 15-foot [4/ m] cable (requires magnetic amplifier PN: 4180-405)



ROS-P Remote Optical Sensor PN: 6180-057



ROS-P-25 Remote Optical Sensor PN: 6180-057-25



SPSR
Self-Powered Sensor
Interface Module
PN: 6150-021



ROLS-P Remote Optical Laser Sensor PN: 6180-029



ROLS-P-25 Remote Optical Laser Sensor PN: 6180-029-25



RLS-P Rugged Laser Sensor PN: 6180-081



MT-190P Amplified Magnetic Sensor PN: 6180-036



IRS-P Infrared Sensor PN: 6180-020



GE200 HP Inductive Sensor PN: 6180-014



Input/Output Cable CA-4044-6 6 ft. TTL cable PN: 6280-037

#### 16.0 ACCESSORIES

# See webpage for the complete list of accessories.

**Extension Cable EC-25P** PN: 6180-028 25 ft. extension cable with male/female

1/8" phone plug connectors

Padded Pouch (with belt loop) PN: 6180-047

Latching Plastic Carry Case CC-11 PN: 6180-048



**Reflective Tape:** 

T-5 (single pack), 5 feet PN: 6180-070 T-50, 50 feet PN: 6180-072 T-5WP Waterproof, 5 feet PN: 6180-079



# Remote Control Assembly (RCA)

includes two contact tips (concave and convex) and a 10 cm linear contact wheel

PN: 6180-074



12 in. Linear Wheel

for use with RCA

PN: 6580-011



Contact Tip Pack and 10 cm Linear Wheel PN: 6580-010

replacement rubber concave and convex tips and wheel for use with RCA

911

Replacement 10 cm Linear Wheel PN: 6180-077

for use with RCA

Replacement Contact Tip Pack PN: 6180-078

rubber concave and convext tips (1 each) for use with RCA



# THE PROFESSIONAL'S CHOICE

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



Portable. Tachometers



Track-It<sup>™</sup> Data Loggers



Panel Tachometers



Fixed Mounted Strohes



Portable Strobes



Frequency Converters







DataChart<sup>™</sup> Paperless Recorders



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