

# DYNALCO®

3211 Fruitland Ave  
Los Angeles, CA 90058

## MTH-103E

### Tachometer/Hourmeter/Trip

## Installation and Operation Manual



### Rev. H

P/N 145F-13048

PCO - 00011342

© Copyright 2014-2019, Barksdale® Inc.

All Rights Reserved

Published: March 18, 2014

Revised: May 06, 2019

## **IMPORTANT - PLEASE READ BEFORE PROCEEDING!**

The Dynalco model MTH103E is designed for reliable and rugged operation on engines, turbines and other rotating equipment. This product has been designed and tested to meet the demands required in many industrial and hazardous locations meeting critical CSA standards. The performance is directly related to the quality of the installation and knowledge of the user in operating and maintaining the instrument. To ensure continued operation to the design specifications, personnel should read this manual thoroughly before proceeding with installation, operation and maintenance of this instrument. If this product is used in a manner not specified by Dynalco, the protection provided by it against hazards may be impaired. Dynalco® is a Barksdale® brand.



## **WARNING**

- Failure to follow proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.
- For clarification of instructions in this manual or assistance with your application, contact Dynalco as below:  
Tech Support: [Technical-dynalco-support@barksdale.com](mailto:Technical-dynalco-support@barksdale.com) or 1-866-227-8528  
Customer Care: [Sales-Dynalco@barksdale.com](mailto:Sales-Dynalco@barksdale.com) or 1-800-835-1060  
Or by mail:  
Barksdale Inc.  
Barksdale® and Dynalco® Products  
3211 Fruitland Ave  
Los Angeles, CA 90058
- Additional manuals and CSA certificates are available at [www.dynalco.com](http://www.dynalco.com)
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Use only qualified personnel to install, operate, program and maintain the product.
- Educate your personnel in the proper installation, operation, and maintenance of the product.
- Install equipment as specified in the installation section of this manual. Follow appropriate local and national codes. Only connect the product to power sources and end devices specified in this manual.
- Any repair is only to be performed by Dynalco using factory documented components. Tampering or unauthorized substitution of parts and procedures can affect the performance and cause unsafe operation of your process.
- All equipment doors must be closed and protective covers must be in place unless qualified personnel are performing maintenance.
- Shutdown / alarms should be tested monthly for proper operation (see page 8)
- Please see pages 9 & 10 for CSA specific installation instructions.

## System Overview

This manual contains a general product description of the MTH-103E Microprocessor-Based Tachometer/Hourmeter/Trip. It also supplies information about the MTH-103E features, functional design, specifications, and configuration.

## Basic operation

The MTH-103E is a microprocessor-based 5-digit tachometer, hourmeter, and trip. The trip can be programmed to activate on overspeed, underspeed (Class C), or hours. The unit may be magnetic pickup or DC powered. The MTH-103E is CSA approved for Class I, Division 2, Groups A, B, C & D hazardous locations. When pickup powered the MTH103E is rated Class I, Division 1, Groups A, B, C & D.

## Features

The MTH-103E tachometer provides the following features:

- Both signal and power can be derived from a magnetic pickup.
- High accuracy: 5-digit display; 1 RPM resolution; 100,000 hour range.
- Universal: Can be field configured from front keypad for any number of pulses per revolution, trip point value, and preset/reset hours.
- Displays speed, hours, and the setpoint on command. Fast overspeed reaction time of 100 milli-seconds.
- Design incorporates hardware and materials creating a weatherproof unit that allows installation in poorly protected areas. This is ideal for both indoor and outdoor installations.
- Standard Society of Automotive Engineers (SAE) case fits engine panels with 3-3/8 inch (86 millimeter) openings.
- Unit is highly shock and vibration resistant. Face plate is gasketed and spray proof.
- Unit is highly resistant to electrical noise.

## Specifications

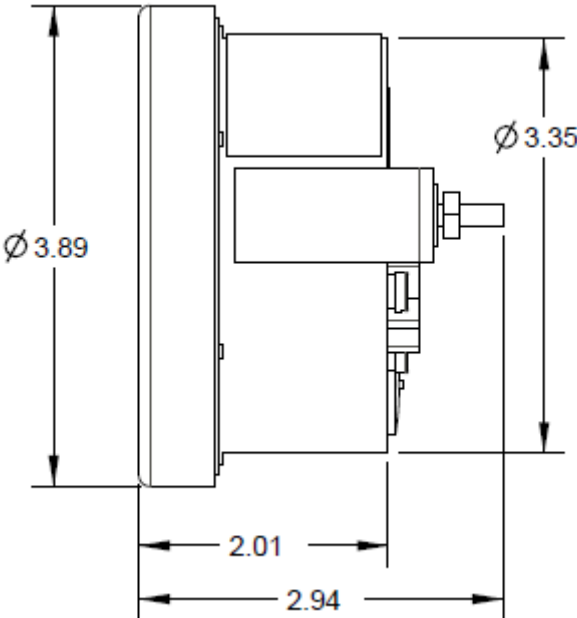
Input Signal	Passive (variable reluctance) 2-wire magnetic pickup
Digital Output	TRIAC rated @ 0.15 A / 40 VDC
Input Power	9 – 30 VDC or pickup power
Display	Backlit Graphic Display
Connections	Screw Terminals
Operating Temperature Range	- 20 to + 70 Deg C
Certification	CSA Class I, Division 1 & 2, Groups A, B, C, D

## User Interface

The MTH-103E is configured via the keypad on the front panel which includes a graphical backlit LCD display capable of displaying alpha numeric values. The keypad implements a menu system, which is navigated using the up, down, left, right, enter and escape buttons. The display backlight is enabled only when DC powered.

**Installation:**

The MTH-103E is designed to be panel mounted. The dimensions are shown below.

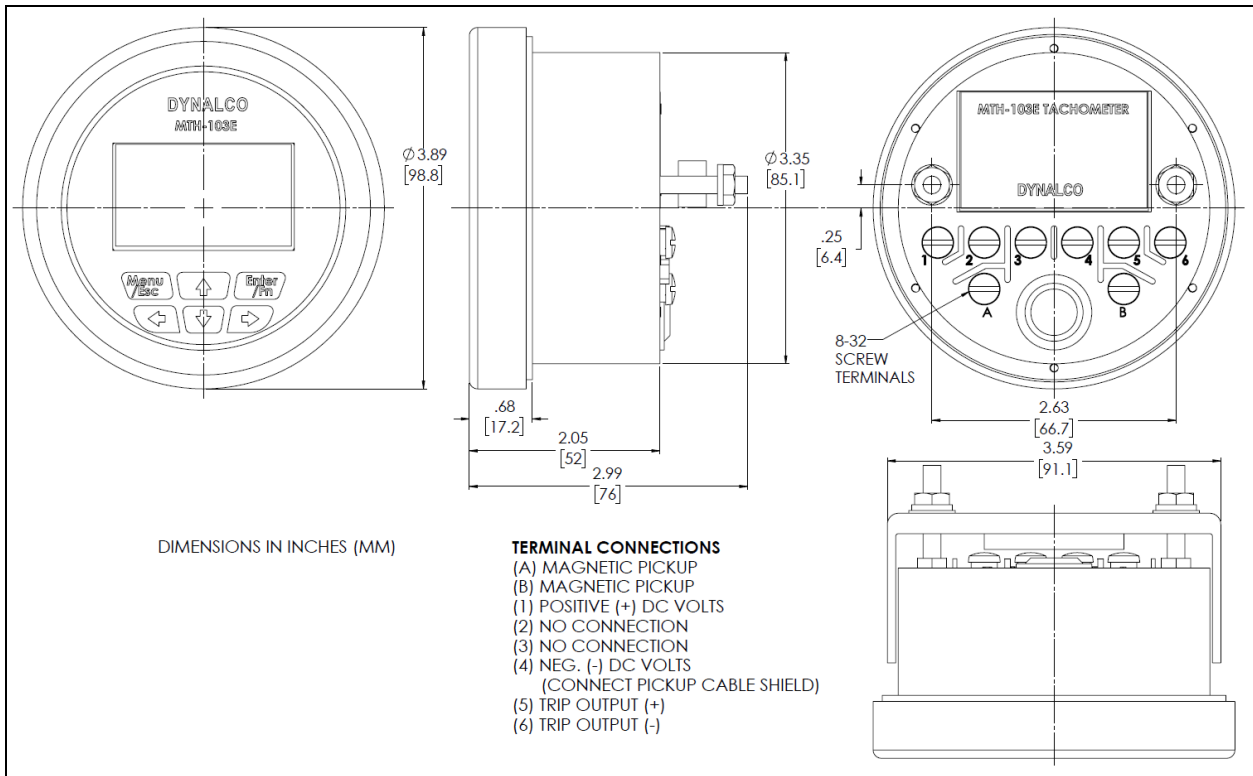


The MTH-103E includes a bracket for securing into the panel.



## Terminal Connections

All connections are made to terminals on the back of the unit.



*Terminal screws to be tightened to 8 inch-pounds torque.*

*See pages 9 & 10 for complete wiring information.*

## Programming Overview



All programming is accomplished through the front keypad.  
Below is a brief description of each key.



Press to enter or exit the configuration screens



Press to enter or accept values or to reset the alarm



Select up



Select down



Go back one screen



Select and advance to next screen

Initial configuration consists of the following steps:

- 1) Programming the # gear teeth
- 2) Selecting over / under speed setpoints (if required)
- 3) Pre-setting hourmeter (if required)

## Programming Instructions

**Important:** *The MTH-103E must first be programmed prior to operation.*

When initially powering up the unit, the display will first indicate the firmware version and then go to the operational mode.

To configure each input, first go to the main programming screen by pressing the Menu / Escape key:



*Note: If a screen is displayed showing a keypad, this indicates that a security code has been enabled. Please see “System Settings” section on page 7 for the description of setting a security code.*

The main configuration screen shows the following icons:



Gear Teeth Settings

- for selecting number of gear teeth



Hourmeter Settings

- configures hourmeter count up or count down



Alarm Settings

- for enabling low / high alarms



Alarm Logs

- for accessing alarm log info



System Settings

- for selecting default display

### Configuration of “Gear Teeth Settings”

Using the arrows on the keypad, select the “Gear Teeth Settings” icon and press enter.

Here, you will need to set the number of gear teeth for proper RPM display. The MTH-103E will allow any number from 1 to 360 teeth.


Always use the right arrow key  for selecting and advancing to the next screen.

Pressing  at any time during configuration will prompt you to save the changes. Select “Yes” to save any changes made. Selecting “No” will not save changes.

## Configuration of “Hourmeter Settings”



Using the arrows on the keypad, select the “Hourmeter Settings” icon.

The first screen will allow you to configure the hourmeter to either count up or count down by pressing the up / down arrows to select, then pressing the right  arrow to navigate to the next screen. Here, you will be able to either leave the hourmeter to the current setting or pre-select any number up to 99999 hours. Following this, you will be asked to save the changes.

## Configuration of “Alarm Settings”



Using the arrows on the keypad, select the “Alarm Settings” icon.

Here, you can either enable or disable the RPM Alarm and select both underspeed (RPM Alarm Low) and overspeed (RPM Alarm High) setpoints. Note that if underspeed is not required, the parameter should be set to “0.” The next screen to the right will allow configuration of the “Hourmeter Alarm” if required. This will allow you to preset an hourmeter value that may be used to alert the user of maintenance required, for example.

## System Settings



Using the arrows on the keypad, select the “System Settings” icon.

There are (2) display layouts available, either “Large RPM Digit” or “RPM + Hourmeter.”

*Note that you are selecting the default layout type. You will be able to change the layout during normal operation by pressing the left / right arrows.*

After setting the layout type, pressing the right arrow will allow the user to either enable or disable a “Security Option.” The security option allows the user to set a 4-digit security code for locking out the programming function. If this is not required, select “Disable” and press the right arrow. You will then be asked to save any changes.

If you would like to enable the security option, select “Enable” and press the right arrow. The next screen will allow configuration of any 4-digit security code from 1000 to 9999. Pressing “Enter” will allow the code to be set. After pressing the right arrow, you will be asked to save the new settings.

Note that if the security code is enabled, the display will always ask the user to enter the 4-digit code if the “Menu” key is pressed.

In case the security code is mis-placed or forgotten, there is a master code for gaining access to the programming function. The master code is “5034381”



## Operation

Apply power from either:

- a. A signal frequency generator or a magnetic pickup (minimum 4.0 VRMS; maximum 15 VRMS) connected to terminals (A) and (B) (no polarity).

Or...

- b. 9 – 30 VDC power source connected to terminals (1)(+) and (4)(-). (minimum 1.5V RMS pickup input signal required).

The software revision number will display for one second when power is initially applied.

## Alarm / Shutdown Output

The MTH-103E will alarm or shutdown when the RPM is above or below limits as specified. If an alarm condition is met, an alarm indication on the display will blink and the digital output will trip. The alarm / shutdown triggers a TRIAC rated at 150 mA for switching either an annunciator input or an external relay. This TRIAC is similar to the SCR used in the previous version MTH-103D in that current flow must be removed to reset the TRIAC.

Below are the steps to reset the alarm and TRIAC

1. Lower the rpm below 'high threshold' and above the 'low threshold'.
2. Press the 'Enter/Fn' key to reset the alarm.
3. Short 'Pin 5' and 'Pin 6' at output terminals to reset the TRIAC.



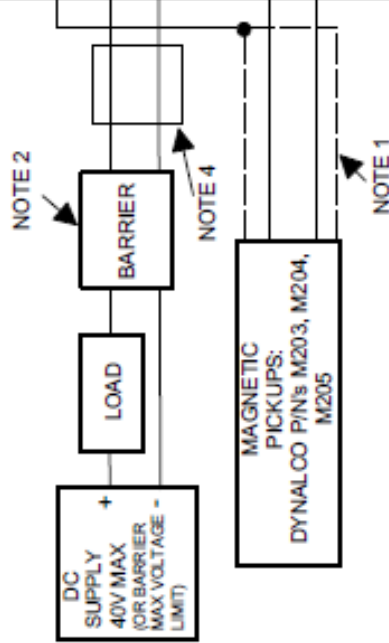
### **WARNING:**

**Terminal connection screws to be tightened to 8 inch-pounds torque.**

**The alarm / shutdown output should be tested monthly for proper operation, especially if being used for engine overspeed shutdown or other critical function.**

# CSA CLASS 1 DIVISION 1 PICKUP POWERED CONNECTIONS

- WARNING:**
- SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
  - DO NOT DISCONNECT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.



## REVISIONS

LTR	DESCRIPTION	DATE	APPD
A	PCO 8242, Initial Release	9/17/12	JLR.
B	PCO 8304, CSA Changes	2/11/13	JLR.

MTH-103E NOTE 3

NOTES:

- THE MAGNETIC PICKUP MUST BE CONNECTED TO THE MTH-103E WITH SHIELDED CABLE. SHIELD MUST BE CONNECTED ONLY TO TERMINAL 4 OF THE MTH-103E.
- IF CLASS 1, DIVISION 1, GROUPS A, B, C, D IS REQUIRED THEN THE TRIP OUTPUT (TERMINAL 5) MUST BE CONNECTED TO THE LOAD THROUGH A CSA CERTIFIED ZENER BARRIER RATED AT 30V MAX., 330 OHMS MIN. IF ONLY GROUPS C, & D CLASSIFICATION IS NEEDED THEN A CSA CERTIFIED ZENER BARRIER RATED AT 30V MAX., 150 OHMS MIN IS REQUIRED.
- THE MTH-103E IS CERTIFIED FOR MOUNTING IN A SUITABLE ENCLOSURE. SUITABILITY OF THE FINAL COMBINATION IS TO BE DETERMINED BY CSA OR THE INSPECTION AUTHORITY HAVING JURISDICTION.
- THE WIRING TO THE TRIP OUTPUT (TERMINALS 5 & 6) MUST CONNECT THE BARRIER, LOAD AND POWER SUPPLY THROUGH A CSA APPROVED SOLID OR FLEXIBLE CONDUIT.

TERMINALS  
ON REAR  
OF  
ENCLOSURE

THE MTH-103E IS CSA CERTIFIED FOR USE IN CLASS 1, DIVISION 1, GROUP A, B, C, & D LOCATIONS WHEN POWERED BY A DYNALCO M203, M204, OR M205 PICKUP AND WHEN THE TRIP OUTPUT ON TERMINAL 5 IS CONNECTED THROUGH A CSA CERTIFIED ZENER BARRIER RATED AT 30V MAX., 330 OHMS MINIMUM.

THE MTH-103E IS CSA CERTIFIED FOR USE IN CLASS 1, DIVISION 1, GROUPS C & D LOCATIONS WHEN POWERED BY A DYNALCO M203, M204 OR M205 PICKUP AND WHEN THE TRIP OUTPUT ON TERMINAL 5 IS CONNECTED THROUGH A CSA CERTIFIED ZENER BARRIER RATED AT 30V MAX., 150 OHMS MINIMUM.

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
AND TOLERANCES ARE:

FRACT.	DEC.	ANGLES
+/- .184	.XXX +/- .005	+/- .12
	XX +/- .01	DEGREE

MATERIAL:

FINISH:

# DYNALCO

PRODUCT/PART	DRAWN	DATE
MTH-103E	Jose Rivero APPROVED	2/14/13

TITLE	SCALE	SIZE	DRAWING NUMBER	REV.
INTERCONNECTION DRAWING CSA CERTIFIED UNITS - PICKUP POWERED		A	800-13049	SHT. 1 OF 2

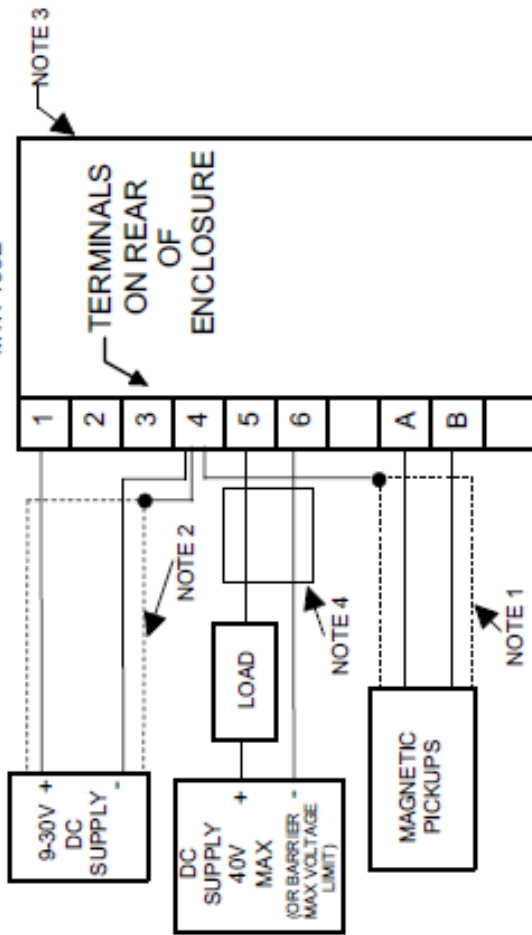
**DO NOT SCALE THIS DRAWING**

THIS DOCUMENT, ALL INFORMATION CONTAINED HEREIN, AND ALL INFORMATION RELATED THERETO, IS THE PROPERTY OF DYNALCO CONTROLS (A UNIT OF CRANE CORPORATION), IS CONFIDENTIAL TO IT, AND NO PART THEREOF NOR ANY SUCH INFORMATION MAY BE COPIED, DISSEMINATED OR USED IN SUCH A MANNER WHATSOEVER WITHOUT THE PRIOR WRITTEN CONSENT OF DYNALCO AND IS TO BE RETURNED TO DYNALCO UPON REQUEST.

N:\PRODUCTS\MTH-ELD\WGVA\_800-13049\_01\_REV.B.dsf

# CSA CLASS 1 DIVISION 2 DC POWERED CONNECTIONS OR PICK-UP POWERED CONNECTIONS

MTH-103E



**NOTES:**

1. THE MAGNETIC PICKUP MUST BE CONNECTED TO THE MTH-103E WITH SHIELDED CABLE. SHIELD MUST BE CONNECTED ONLY TO TERMINAL 4 OF THE MTH-103E.
2. THE DC SUPPLY MUST BE CONNECTED TO THE MTH-103E WITH SHIELDED CABLE. SHIELD MUST BE CONNECTED ONLY TO TERMINAL 4 OF THE MTH-103E.
3. THE MTH-103E IS CERTIFIED FOR MOUNTING IN A SUITABLE ENCLOSURE. SUITABILITY OF THE FINAL COMBINATION IS TO BE DETERMINED BY CSA OR THE INSPECTION AUTHORITY HAVING JURISDICTION.
4. THE WIRING TO THE TRIP OUTPUT (TERMINALS 5 & 6) MUST CONNECT THE LOAD AND POWER SUPPLY THROUGH A CSA APPROVED SOLID OR FLEXIBLE CONDUIT.

THE MTH-103E IS CSA CERTIFIED FOR USE IN **CLASS 1, DIVISION 2, GROUP A, B, C, & D** LOCATIONS WHEN DC POWERED BY 9-30 VDC AND HAVING THE SIGNAL PROVIDED BY DYNALCO M201, M202, M203, M204, M205, M207, M208, M231, M233 or M281 MAGNETIC PICKUP. THE TRIP OUTPUT (TERMINAL 5) MAY BE CONNECTED TO A LOAD NOT TO EXCEED 40V MAX, 0.15 AMP MAX.

THE MTH-103E IS CSA CERTIFIED FOR USE IN **CLASS 1, DIVISION 2, GROUPS A, B, C, & D** LOCATIONS WHEN PICK-UP POWERED BY A DYNALCO M203, M204, M205, M207, M208 OR M281 PICKUP AND THE TRIP OUTPUT ON TERMINAL 5 IS CONNECTED DIRECTLY TO A LOAD NOT TO EXCEED 40V MAX., 0.15 AMP MAX.

- WARNING:**
1. SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
  2. DO NOT DISCONNECT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

N:\PRODUCTS\MTH-E\DWG\A\_800-13049\_01\_REV\B.dwg

THIS DOCUMENT, ALL INFORMATION CONTAINED HEREIN, AND ALL INFORMATION RELATED THERETO, IS THE PROPERTY OF DYNALCO CONTROLS (A UNIT OF CRANE CORPORATION), IS CONFIDENTIAL TO IT AND NO PART THEREOF NOR ANY SUCH INFORMATION MAY BE COPIED, DISSEMINATED OR USED IN SUCH A MANNER WHATSOEVER WITHOUT THE PRIOR WRITTEN CONSENT OF DYNALCO AND IS TO BE RETURNED TO DYNALCO UPON REQUEST.

**DO NOT SCALE THIS DRAWING**

DYNALCO		DRAWN Jose Rivero	DATE 2/14/13
MTH-103E		APPROVED	
TITLE INTERCONNECTION DRAWING CSA CERTIFIED UNITS - DC POWERED			
SCALE	SIZE	DRAWING NUMBER	REV.
	A	800-13049	SHT. 2 OF 2
			B