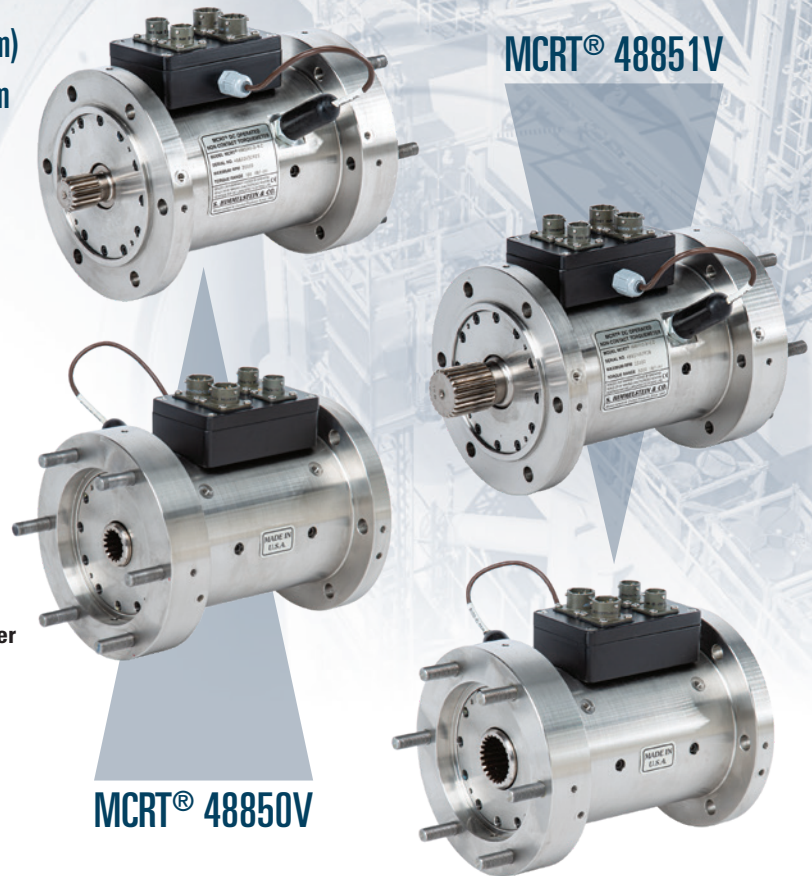




# MCRT® 48850V & 48851V PRECISION, NON-CONTACT SPLINED ROTARY TORQUE SENSORS WITH ANALOG AND DIGITAL OUTPUTS

Capacities from 50 to 10,000 lbf-in (5.65 to 1,130 N-m)  
Torque, Speed & Power Outputs in Analog & Digital Form  
300% Overload and 150% Overrange  
30,000 rpm Max Speed Permanently Lubricated  
0.0006% Temperature Performance  
0.03% Combined Nonlinearity and Hysteresis  
0.03% 48 Hour Drift  
Accredited\* ISO 17025:2017 CW and CCW Cal  
Bipolar Rotor Shunt Cal - NIST Traceable\*  
Hardened to EMI From Adjustable Speed Drives  
Shaft and Flanges per AND 10262 & 20002

- ±5.000/±10.000V Analogs of Torque, Speed & Power
- Engineering Unit Digital Outputs of Torque, Speed & Power
- 1 kHz Bandwidth; 13 Constant Delay Signal Filters
- Select from 33 Units of Measure Without Re-calibration
- Shaft Power Calculated 7800 Times/Second
- 128 µs Max/Min Data Acquisition
- Plated Maraging Steel Shaft, Stainless Steel Housing
- Compatible with Corrosive Red Oil and Skydrol
- Supports Large Overhung Moments



To power and display Torque only, use a Model 703+.  
For Torque, Speed and HP, use a Model 733+.



\*NIST traceable calibration performed in our accredited laboratory (NVLAP Lab Code 200487-0). For details visit [www.himmelstein.com](http://www.himmelstein.com) or follow the accreditation link at [www.nist.gov](http://www.nist.gov).

These strain gage Torque Meters measure and output shaft torque in analog and digital form. Option Z adds speed and shaft power. Their outstanding performance is due, in part, to industries highest Overrange which avoids clipping real-world torque peaks and torsionals. Without high Overrange, clipped peaks cause large errors; see AN 20805B.

Tight temperature compensation reduces drive heating and gradient effects. Also enhancing performance is elimination of pots subject to misadjustment from vibration and by

unauthorized users. The Torque Meters are hardened against VFD and other noise sources. Bipolar rotor shunt cal verifies calibration of the entire data chain in CW and CCW modes. Included software displays, plots and stores real-time data on your PC. It also Displays and Stores Max/Min and Spread Data. Choose RS232, RS422, RS485 or USB (option) communication. Input power is a single, unregulated voltage. Reverse polarity protection is provided. Password protection is supported.

Two Performance Grades are offered; Standard (Code N), and Enhanced (Code C). Ceramic Hybrid bearings and high speed grease are standard features. They provide very high speed operation without the complexities of air-oil mist lubrication.

Option Z adds conditioned speed and power outputs. All outputs are simultaneously available in both analog and digital form. A warning flag\* is generated should any output exceed its rating.

\* Option Z is required to generate a Speed flag.

Common Specifications	Performance Grade	
	Standard, Code N	Enhanced, Code C
<b>Torque and Speed (Option) Scaling</b>	Factory Set @ Transducer Torque Capacity and Maximum Speed. Field Resettable to any lower value.	
<b>Power (Option) Range – See Note 1</b>	Scaling is Factory Set @ the Product of Full Scale Torque, Speed and a Constant. <b>It is user re-settable.</b>	
<b>Units of Measure</b>	Default units are lbf-in, and if Option Z is specified, rpm and hp. Any of 33 supported units may be specified, or user selected with a PC and furnished software. See listing on page 3.	
<b>Torque - Combined Nonlinearity<sup>2</sup> and Hysteresis<sup>2</sup> (% of F.S.)</b>	≤±0.05	≤±0.03
<b>Speed &amp; Power (Option Z) - Combined Nonlinearity<sup>2</sup> and Hysteresis<sup>2</sup> (% of F.S.)</b>	≤±0.05	≤±0.03
<b>Nonrepeatability<sup>2</sup> (% of F.S.)</b>	Torque and Power: Code N ≤±0.02, Code C ≤±0.01; Speed ≤±0.01	
<b>Zero Drift (% of F.S./deg. F.)</b>	Torque and Power: Code N ≤±0.001, Code C ≤±0.0006; Speed : none	
<b>Span Drift (% of Rdg./deg. F.)</b>	Torque and Power: ≤±0.002; Speed : none	
<b>48 Hour Drift (% of F.S.)</b>	≤±0.03	
<b>Temperature Ranges (deg. F.)</b>	Compensated: +75 to +175; Usable: -25 to +185; Storage: -65 to +225	
<b>Overrange (% of F.S.)</b>	150, Combined Error in Overrange is ≤±0.1%, typical is ≤±0.05%	
<b>Signal Filter Cutoff Frequency<sup>4</sup>, Analog and Digital Data</b>	Field selectable from 0.1 to 1,000 Hz in thirteen 1-2-5 steps using furnished software. Torque, and Speed Filters are identical and their cutoff frequencies track.	
<b>Analog Output Signals, Auto Scaled</b>	Torque and when option Z is specified, Speed and Power. All are simultaneously available.	
<b>Full Scale Torque<sup>3</sup> and Power<sup>3</sup></b>	CW = +10V, CCW = - 10V or, CW = +5V, CCW = - 5V; field changeable (Default = ±10V)	
<b>Full Scale Speed<sup>3</sup></b>	+10V or +5V for CW and CCW directions; field changeable (Default = +10V)	
<b>Resistive Load</b>	10,000 ohms, Minimum	
<b>Capacitive Load</b>	0.05 uF, Maximum	
<b>Output Noise (% rms of F.S.)</b>	<0.02%	
<b>Minimum Resolution (% of F.S.)</b>	0.003 for both Analog and Digital Data.	
<b>Data Acquisition Time</b>	Torque: 128 μs, Speed: >800 rpm ≤1.25 ms, <800 rpm: 1000/rpm ms, Power: 128 μs.	
<b>Duplex Serial Communications Port Selectable as RS232, RS422 or RS485</b>	Outputs Torque, Speed and Power (option Z) with units of measure. Inputs range selections, scaling and null values, cal info, units of measure, etc. and test parameters.	
<b>BAUD Rate</b>	115,200. Drivers are Short circuit (current limit) and ±15kV ESD protected	
<b>120 Ω Termination (RS422/485)</b>	Software selectable.	
<b>Maximum Cable Length</b>	4,000 feet for RS422 and RS485, 50 feet for RS232	
<b>Supply Voltage<sup>5</sup> and Power</b>	10 to 26 VDC at 2.7 watt, nominal. (Series 700 Instrument compatible.)	
<b>Connector Pinouts</b>	See Page 6 tabulation.	

- Torque and Speed (option Z) scaling may be re-set at any value ≤ Transducer Full Scale Ratings. For example: If the set Torque range is 10,000 lbf-in, and the set Speed range is 5krpm then Power Range = 10,000\*5000/63025 = 793.34 HP = 10V analog output.
- Combined Error is the maximum deviation of ascending and descending calibration steps from the sensors' Best Fit Line. It includes the effects of Nonlinearity, Hysteresis and Non-return to the first calibration step. The specified values assume the scaling is set to the device rated torque.
- CW torque causes the shaft to turn CW when viewed from its driven end. CCW torque causes the opposite rotation. Power polarity tracks torque.
- Torque signal bandwidth upper limit is 1,000 Hz determined by integral Bessel response filters.
- Analog noise is measured by an Agilent U1520A Scope with bandwidth set to 10 kHz.
- Reverse polarity protected.
- "deg. F." denotes "degree Fahrenheit".
- Specifications are subject to change without notice.


## Standard Ratings<sup>1</sup> - Overload is three times rated torque capacity

MCRT® Model	Rated Capacity		Speed Rating	Shaft Stiffness <sup>2</sup>		Rotating Inertia		Weight	
	[lbf-in]	[N-m]	[rpm]	[lbf-in/rad]	[N-m/rad]	[ozf-in s <sup>2</sup> ]	[kg-m <sup>2</sup> ]	[lb]	kg
48850V(5-1)	50	5.65	0 to ±30,000	4,680	529	0.0454	0.000321	32.2	14.61
48850V(1-2)	100	11.30	0 to ±30,000	12,700	1,430	0.0457	0.000323	32.2	14.61
48850V(2-2)	200	22.6	0 to ±30,000	32,000	3,620	0.0461	0.000325	32.2	14.61
48850V(5-2)	500	56.5	0 to ±30,000	79,200	8,950	0.0471	0.000333	32.3	14.65
48850V(1-3)	1,000	113.0	0 to ±30,000	143,700	16,240	0.0481	0.000340	32.3	14.65
48851V(1-3)	1,000	113	0 to ±25,000	227,000	25,600	0.0729	0.000515	31.9	14.47
48851V(2-3)	2,000	226	0 to ±25,000	411,000	46,400	0.0744	0.000525	31.9	14.47
48851V(5-3)	5,000	565	0 to ±25,000	431,000	48,700	0.0720	0.000506	32.0	14.51
48851V(1-4)	10,000	1,130	0 to ±25,000	572,000	64,600	0.0760	0.000537	32.3	14.65

1. All models are balanced to G2.5 in accordance with ISO 1940/1.
2. Stiffness is conservatively rated and includes the torsion section and shaft-ends.

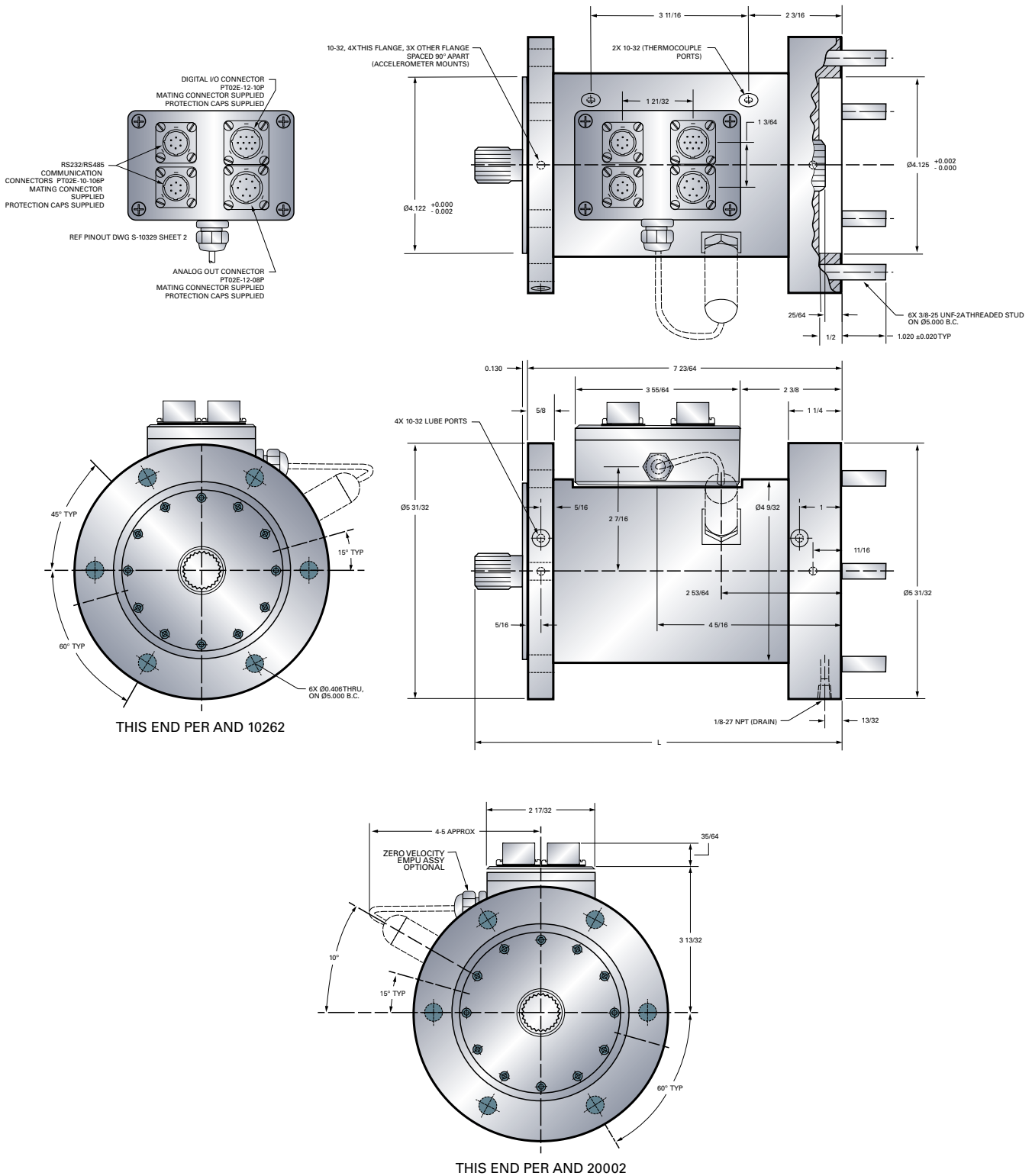
Supported Units of Measure	
<b>Torque</b>	lbf-in (default), lbf-ft, ozf-in, ozf-ft, N-m, kN-m, N-cm, kgf-m, kgf-cm, gf-cm
<b>Speed</b>	rpm (default), rps, rph, rad/s, rad/min, rad/h, degree/min, degree/s, degree/h, grad/s
<b>Power</b>	hp (default), hp (metric), kW, W, ft-lbf/min, ft-lbf/s, Btu/h, Btu/min, Btu/s, ton, cal/h, cal/min, cal/s

Available Red Hydraulic Oil and Skydrol Compatible Cables	
Cable lengths (XX) are 20, 50 and 100 feet. RS232 cables are limited to 50 feet. When purchased without cables, mating connectors are supplied at no added cost. Cables without the T suffix are available with the same functionality but without Skydrol compatibility at lower cost.	
<b>Torque Meter to Model 703+ P/N 224-8722T-XX</b>	Powers Torque Meter, displays Torque, Implements Model 703+ functions including Remote Cal, Tare, Analog Output, Zero, etc.
<b>Torque Meter to Model 733+ P/N 224-8800T-XX</b>	Powers Torque Meter, displays Torque <i>and</i> Speed, Implements Model 733+ functions including Remote Cal, Tare, Power Calculation, Analog Output, Zero, etc.
<b>Torque Meter to RS422/485 Host P/N 224-8360T-XX</b>	Connects Torque Meter to host computer and implements all Torque Meter functions. Requires external power input (10-26 VDC). It is unterminated at host end.
<b>RS485 Torque Meter to Torque Meter P/N 224-8361T-XX</b>	Provides Torque Meter interconnect when using RS485 protocol to read and control multiple Torque Meters with a single host computer.
<b>Torque Meter to RS232 PC Port P/N 224-8359T-XX</b>	Connects Torque Meter to RS232 host Port. Implements all Torque Meter functions. 50 feet maximum. Use RS422/485 connection in noisy environments or for long runs.

Order No. 	MCRT® 48851V	(1-4)	N	Z
	Model Number	Range	Performance Code: N or C	Speed/Power Option: Z if yes, N if no
An MCRT® 48851V(1-4)NZ is a 10,000 lbf-in Torque Meter with Standard Performance, 30,000 lbf-in Overload, Speed/Power option, 0 to ±25,000 rpm Speed Rating. It is Compatible with Skydrol and Corrosive Red Hydraulic Oil.				

**Outline Dimensions – All dimensions in inches**

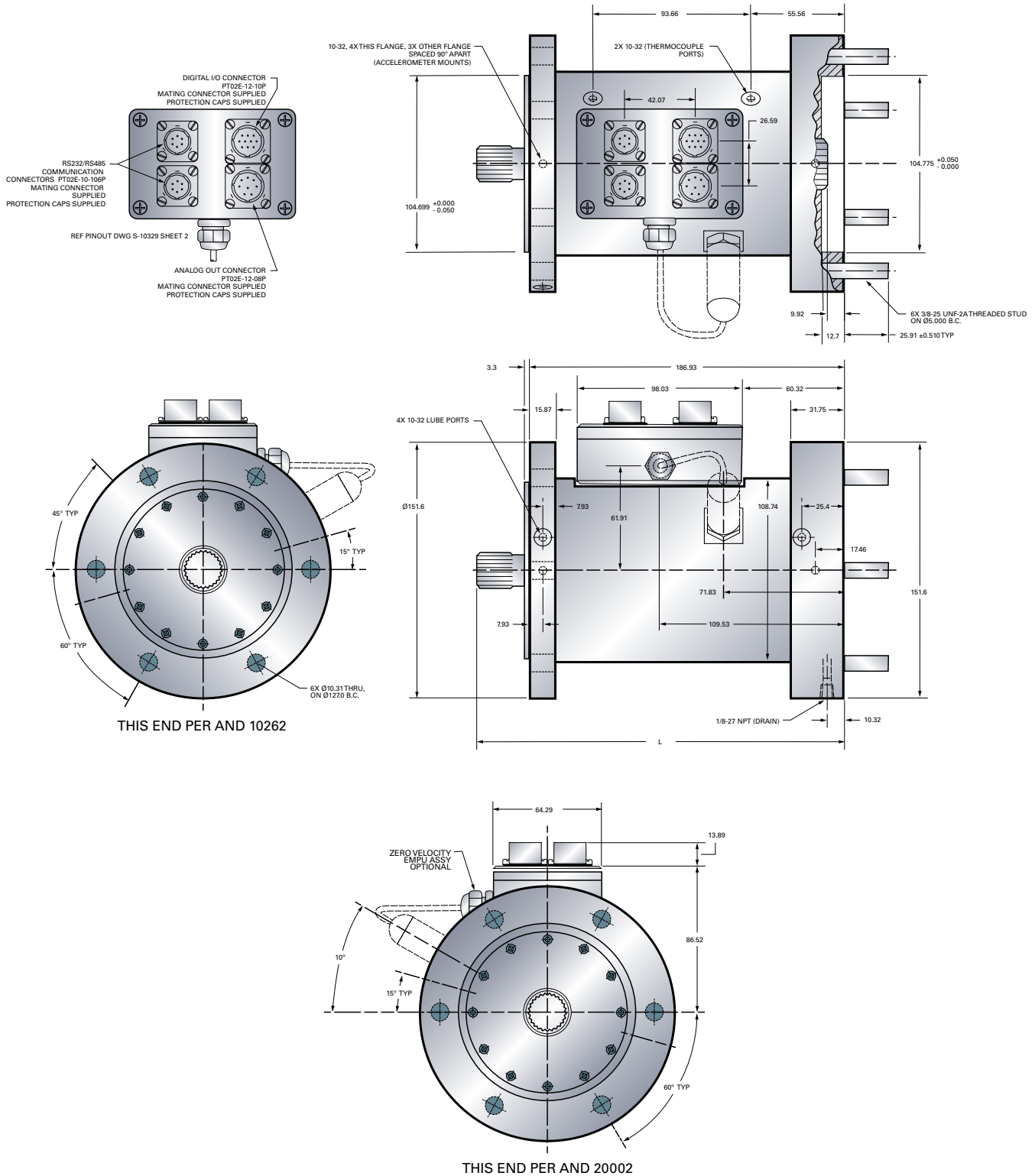
Dimensions subject to change without notice – contact factory for certified drawings



MCRT® Model	Outline Dimensions (inch)			
	Torque Range	Maximum Overhung Moment	Spline Data	Dimension L
48850V	All	4,000 lbf-in	16 teeth, 20/30 D.P., 30° Pressure Angle	8 37/64
48851V	All	4,000 lbf-in	24 teeth, 20/30 D.P., 30° Pressure Angle	9 5/64

## Outline Dimensions – Dimensions in SI Units

Dimensions subject to change without notice – contact factory for certified drawings



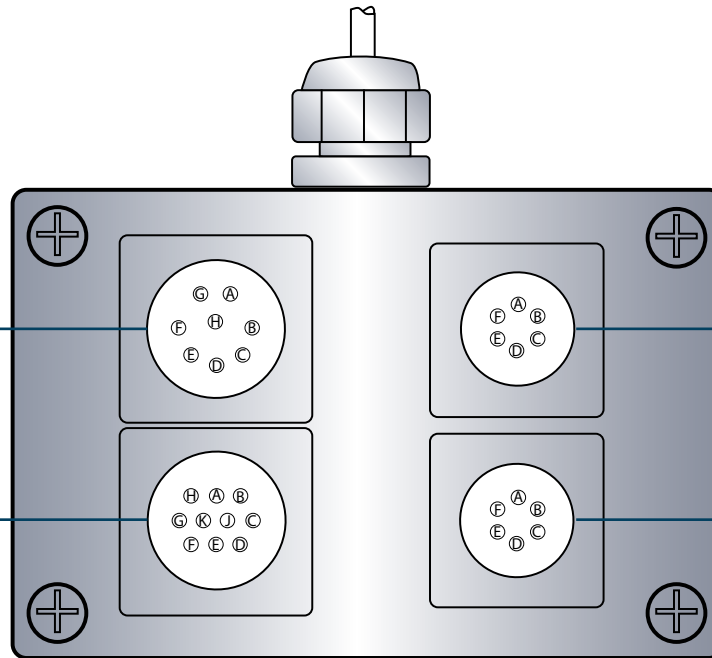
MCRT® Model	Outline Dimensions (SI Units)			
	Torque Range	Maximum Overhung Moment	Spline Data	Dimension L
48850V	All	452 N-m	16 teeth, 20/30 D.P., 30° Pressure Angle	218
48851V	All	452 N-m	24 teeth, 20/30 D.P., 30° Pressure Angle	231

## Stator Connector Layout

To optional Speed Pickup

Mating Connector 320-1295	
A	Speed Analog Output
B	Power Analog Output
C	Analog Signal Ground
D	+Power Input (10-26Vdc)
E	Invoke CW Cal
F	Invoke CCW Cal
G	Torque Analog Output
H	Digital Ground

Mating Connector 320-1255	
A	Invoke CW Cal
B	Tare Data
C	Clear Tare
D	Digital Ground
E	+Power Input (10-26Vdc)
F	Reset Max/Mins
G	Temperature Status
H	Torque Status
J	Speed Status
K	Invoke CCW Cal



Mating Connector 320-1271	
A	+TXD
B	Select
C	Ground
D	-RXD or TXD
E	+RXD or RXD
F	-TXD
Ground Pin B for RS485, Leave Pin B open for RS232.	

10 Pin Connector Pinout		Twin 6 Pin Connector Pinout		8 Pin Connector Pinout	
Pin A	Invoke CW Cal	Pin A	+ TXD	Pin A	Speed Analog Out (10.000V)
Pin B	Tare Data	Pin B	Ground for RS422/485, Open for RS232	Pin B	Power Analog Out (10.000V)
Pin C	Clear Tare	Pin C	Ground	Pin C	Analog Ground
Pin D	Ground Return	Pin D	- RXD or TXD	Pin D	+ Power Input
Pin E	+ Power Input	Pin E	+ RXD or RXD	Pin E	Invoke CW Cal
Pin F	Reset Max/Mins	Pin F	- TXD	Pin F	Invoke CCW Cal
Pin G	Temperature In Rating (will drive users optical relay)	To facilitate RS485 connection of multiple sensors two identical connectors are wired in parallel. Either may be used for RS232 or RS422 service. The terms TXD and RXD apply to RS232 applications. The terms ±TXD and ±RXD apply to RS422 and RS485 applications.		Pin G	Torque Analog Out (10.000V)
Pin H	Torque In Rating (will drive users optical relay)			Pin H	Digital Ground/Power Return
Pin J	Speed In Rating (will drive users optical relay)			Default pinout shown assume Option Z is present. When it is not, default is: Pins A and B are +5V and -5V analog Torque signals, i.e., they provide a differential 10V torque output. Pin G remains a 10V Torque signal. Outputs can be re-assigned to any combination of signals; 2 Torques, one Speed, etc.	
Pin K	Invoke CCW Cal				

# S. Himmelstein and Company

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