MCRT ® 81008V 10, 15, 20 and 25 kN·m
Bearingless Digital Torquemeters

BEST* REAL WORLD ACCURACY OF ANY SIMILAR TORQUEMETER, TORQUE SENSOR OR TORQUE TRANSDUCER

WIDE INSTALLED MEASUREMENT BANDWIDTH AND FAST INSTALLED RESPONSE
SIMPLE TO INSTALL, TOLERANT OF ROTOR-STATOR MISALIGNMENT
HAS METRIC PILOTS, BOLT CIRCLES AND FASTENERS
HIGH OVERRANGE AND HIGH OVERLOAD
0.03% COMBINED NONLINEARITY & HYSTERESIS
NOISE TOLERANT CARRIER AMPLIFICATION
BI-DIRECTIONAL ROTOR SHUNT CALIBRATION
NO HOOP OR CALIPER ANTENNAE

- **Digital Output of Torque & Temperature**
- **Analog and FM Outputs**
- **3 kHz Signal Bandwidth**
- **Max/Min's Updated @ 20 kHz**
- **200% Overload, 150% Overrange**
- **0.00054%/°C Compensation**
- **Optional Zero Velocity Speed Pickup**
- **13 Selectable Bessel Data Filters**
- **Interface Software Furnished**
- **Select from 10 Units of Measure Without Recalibration**

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

MCRT®81008V Torquemeters have *very high accuracy in real-world applications, not just in the cal lab.* That's due to very *high stiffness which yields wide installed bandwidth and very fast response to torsional transients*[1]. Furthermore, *industries highest Overrange avoids errors*[2] *which occur when torque peaks are clipped.*

A Carrier Amplifier, immune to dc and low frequency signals, handles the strain gage torque bridge output. Hardening against interference (EMI) generated by VFD's and other noise sources further enhances performance. SI unit dimensioned pilots and bolt circles plus use of metric fasteners simplify installation in countries outside North America. A Zero Velocity Speed Pickup is optional.

Bi-directional rotor shunt cal verifies calibration and

1. See Application Note 221101D   2. See Application Note 20805B

operation of the entire data chain in *both CW and CCW modes.* It is invoked via stator switches, I/O line or from your computer. Multiple bridges and elegant design provide *exceptional immunity to clamping and other extraneous loads.* These devices have high stiffness, low deflection and provide superlative static and dynamic system response. The Torquemeter is installed without an additional coupling resulting in a *torsionally stiff driveline*, with low overhung moment and a short overall length.

The torque signal is digitized on the rotor and sent to the stator where analog, frequency and Com Port outputs are created. Choose RS232/RS422/RS485 or USB (option) communication. Included software interfaces with your Windows-based PC. It displays Real-time, Max/Min and Spread Torque, Rotor Temperature, does limit checks, torque versus time plots and stores test results. Password protection may be invoked.

S. HIMMELSTEIN AND COMPANY

Designing and Making the World's Best Torque Instruments Since 1960

Exceptional Immunity To Noise And Interference From ISM Transmitters

All bearingless Torquemeters necessarily use unshielded antennae. As a result, any device (including a like Torquemeter) operating at or near their carrier frequency, can cause interference. FCC rules allow Industrial, Scientific and Medical (ISM) devices to generate unlimited energy. Such ISM devices are commonly used for inventory control, parts tracking, controlling personnel access, induction heating, etc. Most Bearingless Torquemeters use an ISM frequency for data transfer. As a result, they are susceptible to interference from other ISM devices. Since FCC rules only allow narrow band (typically ±7 kHz) transmission for unlicensed use, wideband ISM frequency Torquemeters risk violation of FCC regulations. Himmelstein Bearingless Torquemeters use non-ISM frequencies for power and data, have field strengths within FCC rules, powerful 12 pole signal filters and near field (not radiated field) signal transfer.

Common Specifications*	Performance Grade		
	Code N	Code C	Code J
Torque Range[1]	Factory Set @ Transducer Full Scale Torque; see Note 1.		
Torque Units of Measure	Select lbf-in, lbf-ft, ozf-in, ozf-ft, N·m, kN·m, N·cm, kgf-m, kgf-cm, gf-cm without re-calibration		
Temperature Units of Measure	Select °F or °C without re-calibration.		
Combined Nonlinearity & Hysteresis (0 to ±100% of full scale) (Best Fit Line Basis - see Tech Memo 230104)	≤±0.1%	≤±0.05%	≤±0.03% Not available on 25k range.
Overrange[2] (% of Range)	150. Applies to all outputs. Combined Error is < 0.1% in Overrange.		
Repeatability	≤±0.015% of Range		≤±0.01% of Range
Accuracy Class [3]	0.1	0.05	0.036
Calibration Signal[4]	100.00% of full scale for clockwise and counterclockwise directions		
Zero Drift (% of Range per °F/per °C)	≤±0.001/0.0018		≤±0.0003/0.00054
Span Drift (% of Reading per °F/per deg °C)	≤±0.002/0.0036		≤±0.002/0.0036
48 Hour Drift (% of Range - applies to all outputs)	≤±0.02		≤±0.01
Temperature Ranges (°F/. °C.)	Compensated Range: +75 to +175/+24 to +79.4; Usable Range: -25 to +185/-32 to +85 Storage Range: -65 to +225/-54 to +107		
Rotor to Stator Maximum Misalignment (inches/mm)	Axial: ±0.2/±5, Radial: 0.2/5 without Speed Pickup Option. If Speed Pickup Option (Code Z) is installed, then both maximums become 0.06/1.5..		
Effect of Clamping Loads (% of Range)	≤±0.1	≤±0.06	≤±0.03
Analog Output Signals[5], Auto-Scaled	Allowable Load: 10k resistive, minimum; 0.05μF capacitive, maximum.		
Full Scale Torque	±10V with ±15V overrange. User may select ±5V with ±7.5V overrange.		
Signal Filter Cutoff Frequency[6]	From 0.1 Hz to 1 kHz in thirteen 1-2-5 steps plus 3 kHz. Selected from a remote PC using furnished software.		
Frequency Modulated Output[5]	Frequency: 10±5/20±10/40±20 kHz; field changeable (Default = 10±5 kHz); TTL square wave		
Peak-Peak Digital Output[5] Noise vs Filter Cutoff Frequency (% of Range)	<0.001 @ 0.1Hz, 0.002 @ 1 Hz, 0.004 @ 10 Hz, 0.01 @ 100 Hz, 0.0372 @ 1 kHz, 0.06 @t 3 kHz		
Peak-Peak Analog Output[5,7] Noise vs Filter Cutoff Frequency (millivolt)	On 10V Setting: 6 @ 0.1 to 100 Hz, 8 @ 1 kHz and 12 @ 3 kHz. On 5V Setting: 6 @ 0.1 to 100 Hz, 7 @ 1 kHz and 8 @ 3 kHz.		
Torque Sampling Rate and Bandwidth	Sampled @ 20 kHz. Torque 3 dB bandwidth is 3 kHz reducible by filters (see Note 6)		
Rotor-to-Stator Transfer Rate	1.25 Mbaud		
RS232/RS422/RS485/USB Communication[8]	Com port outputs Torque and Temperature with units of measure. Inputs torque range if other than sensor full scale, selects units of measure, selects filter cutoff, etc. and permits remote computer control of the test. For USB interface specify Option U.		
Baud Rate	115,200; Drivers are protected for short circuit (current limit) and ±15 kV ESD protected.		
Maximum Cable Length	RS232 = 50 feet, RS422/485 = 4,000 feet; access 120 Ω termination via Com Port.		
Interface Software With Torque Limits	Provided to interface with Windows-based PC. Includes 20 foot interconnect cable[7] for a PC.		
I/O Lines and FM Output[5]	Input lines are +Cal, -Cal, Tare, Clear Tare, Reset Max/Min. Output lines are Data OK & FM Out. Output		
Status LED's (on Stator Keypad)	Power (Yellow = Power-up, Green = OK, Red = Fault); Data (Green = OK, Red = Error); Rotor Temperature (Green = In Operating Range, Red = Out of Operating Range).		
Keypad Control Switches	+ CAL invokes CW Rotor Shunt Cal, -CAL invokes CCW Rotor Shunt Cal, Both held simultaneously for 5 seconds invokes Tare.		
Rotor Temperature	Rotor Temperature is output via Com Port. Range is 0 to 185 °F.; Accuracy is ±2 °F.		
Optional Zero Velocity Speed Pickup	Code Z Optional Speed Pickup outputs 120 pulses/revolution.		
Supply Voltage/Power[9]	10 to 26 VDC @ 6 to 11 watt nominal, varies with rotor misalignment.		

Specification Notes:

1. Outputs may be set at any value equal to or less than the Torquemeter Full Scale Rating. For example: If the Full Scale Rating is 15 kN·m, the user may re-scale to10 kN·m. Then the analog output would be 5 or 10 volt at 10 kN·n and the digital output, at the Com Port, would be 10 kN·n . However, the above specification still defines measurement accuracy. In other words, you can use this capability to change the scaling but it will not change measurement accuracy; see Application Note 20804 for further details on Torquemeters operated with extended measuring range.

2. *In the Overrange region* all outputs are guaranteed to have combined nonlinearity and hysteresis lower than 0.1% of full scale. This avoids large average and peak torque errors that driveline resonance and pulsating driver and load devices can cause near the high end of the sensor range. See Application Note 20805B for more complete information. Torquemeters have infinite fatigue life for full reversals up to half their overload rating. Above that, you risk a fatigue failure.

   An MCRT® 81008V will provide accurate data, without yielding, when torque peaks are 150% of its full scale rating. It will not yield if torque peaks are < = 200% of its full scale rating, however, its fatigue life will be reduced and, therefore, *it should not be used continuously or for long periods above half its overload rating.* Additionally, if you are using the analog output, it is linear up to 15 volt. That corresponds to 150% of full scale on the 10 volt output setting and 300% on the 5 volt output setting. Accordingly, if you expect torque peaks greater than 150% of full scale, you should switch to the 5 volt setting.

3. The greatest of Combined Error, Repeatability, Zero Drift and Span Drift over 18°F(10°C). It is expressed as a percent of full scale.

4. CW torque causes CW rotation if viewed from the driving end. CCW torque causes the opposite rotation.

5. Power Input and all outputs are protected. Digital inputs are reverse polarity and overvoltage protected.

6. Torque signal bandwidth upper limit is 3 kHz determined by the integral anti-aliasing filter. Realizable, installed measurement bandwidth is limited by driveline components. A Torquemeters principal contribution is determined by its torsional stiffness; see Application Note 221101D for further information.

7. Analog noise is measured by an Agilent U1520A Scope with bandwidth set to 10 kHz.

8. A 20 foot long Torquemeter to RS422/485 PC port cable is shipped with each Torquemeter. That communication protocol provides for long, robust connection in a noisy industrial environment, and permits connection of multiple Torquemeters to a single, host computer. An optional USB to RS422/485 adapter is available, if needed; specify option U.

9. Fused and reverse polarity protected

* Specifications are subject to change without notice.

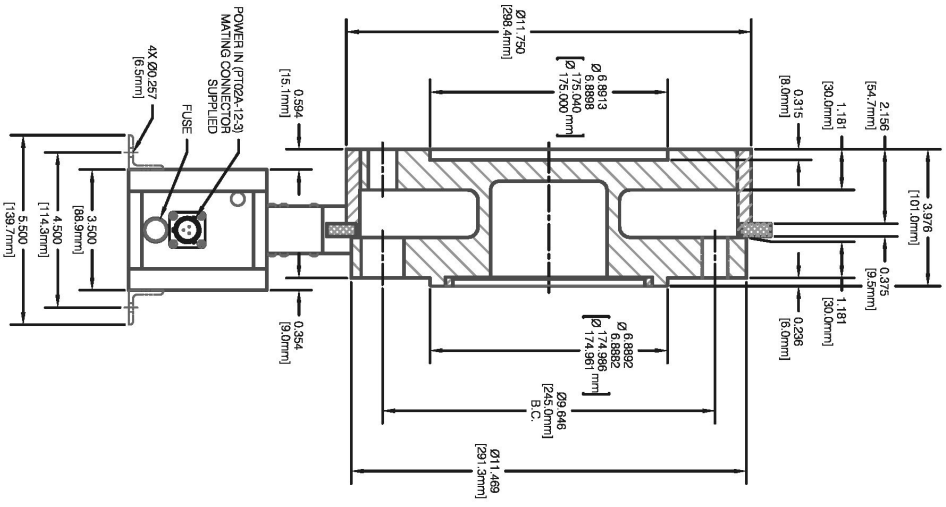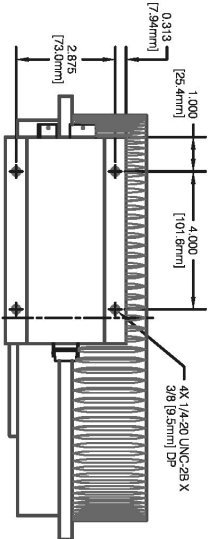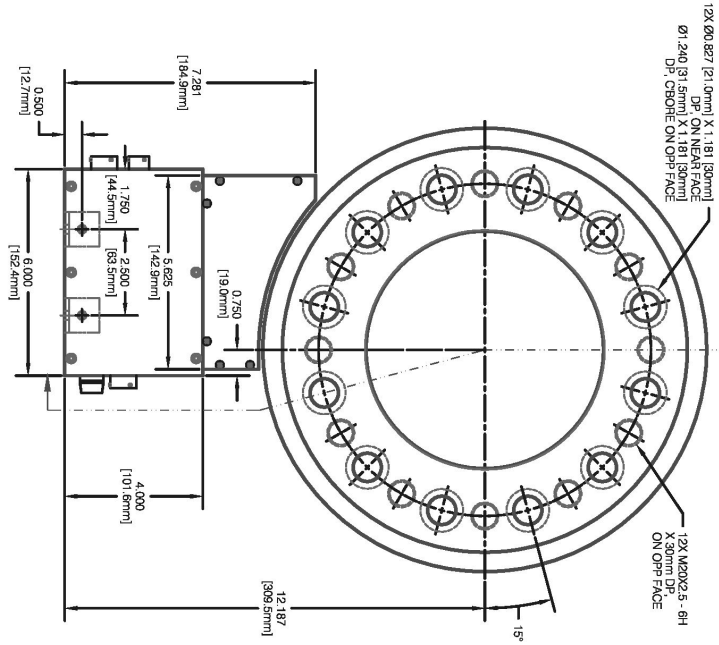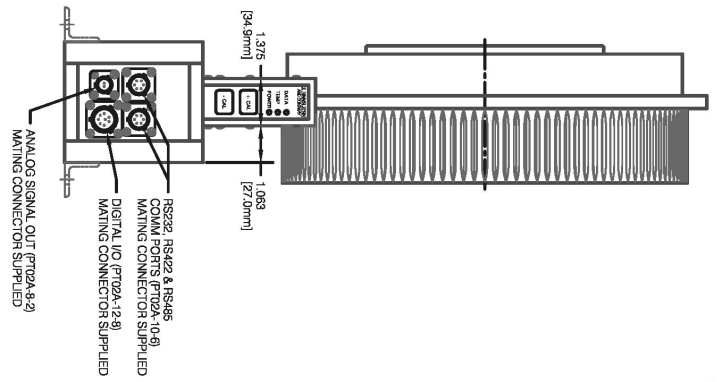| MCRT® Model	Torque Rating		Speed Rating	Torsional Stiffness	Maximum Angular Deflection	Rotating Inertia	Maximum Extraneous Loads[1]			Max Rotor Wt.
	Range	Overload					Thrust	Bending	Shear	
SI Units	**[kN-m]**		**[rpm]**	**[N·m/rad]**	**[degree]**	**[kg-m^2]**	**[N]**	**[N·m]**	**[N]**	**[kg]**
81008V(1-4 Nm)	10	20	0 to ±8,500 Suffix H or, 0 to ±6,000 Suffix B	8,260,000	0.069	0.326	78,740	3,330	39,370	27.6
81008V(15-3 Nm)	15	30		12,230,000	0.070	0.327	118,110	5,000	59,060	27.8
81008V(2-4 Nm)	20	40		16,090,000	0.071	0.327	157,480	6,670	78,740	28.0
81008V(25-3 Nm)	25	50		19,870,000	0.072	0.328	196,850	8,330	98,430	28.1
English Units	**[lbf-in]**		**[rpm]**	**[lbf-in/rad]**	**[degree]**	**[ozf-in s^2]**	**[lbf]**	**[lbf-in]**	**[lbf]**	**[lb]**
81008V(1-4 Nm)	88,510	177,000	0 to ±8,500 Suffix H or, 0 to ±6,000 Suffix B	73,100,000	0.069	46.20	17,700	29,500	8,850	60.8
81008V(15-3 Nm)	132,760	272,800		108,300,000	0.070	46.30	26,550	44,250	13,280	61.3
81008V(2-4 Nm)	177,000	354,000		142,400,000	0.071	46.30	35,400	59,000	17,700	61.7
81008V(25-3 Nm)	221,300	442,400		175,800,000	0.072	46.40	44,250	73,730	22,130	61.9

Notes: 1. Maximum extraneous loads and rated torque may be applied simultaneously without damage

ORDER NUMBER FORMAT ☞ MCRT® A B C D E F

   A = Model Number from table: 81008V.
   B = Range from table: (1-4 Nm), (15-3 Nm), (2-4 Nm) or (25-3 Nm).
   C = Performance Code: N for Standard, C for Enhanced, J for Ultra Performance.
   D = Optional Zero Velocity Speed Pickup; N for None, Z for Magnetic Type.
   E = Speed Rating Suffix; H designates 8,500 rpm rating, B designates 6,000 rpm rating.
   F = USB Interface; U when RS422/485 adapter is furnished, N when omitted.

ORDER NUMBER EXAMPLE ☞ MCRT® 81008V(25k)CZHU specifies a Bearingless Torquemeter with a 25 kN·m (221,200 lbf-in) Torque Rating, a 50 kN·m Torque Overload Rating, Enhanced Performance, an Optional Speed Pickup, a 8,500 rpm Speed Rating, and a USB Adapter.

ANALOG SIGNAL OUT (PT02A-8-2)
MATING CONNECTOR SUPPLIED

DIGITAL I/O (PT02A-12-8)
MATING CONNECTOR SUPPLIED

RS232, RS422 & RS485
COMM PORTS (PT02A-10-6)
MATING CONNECTOR SUPPLIED

1.375
[34.9mm]

1.063
[27.0mm]

0.313
[7.94mm]

2.875
[73.0mm]

1.000
[25.4mm]

4.000
[101.6mm]

4X 1/4-20 UNC-2B X
3/8 [9.5mm] DP

7.281
[184.9mm]

0.500
[12.7mm]

1.750
[44.5mm]

2.500
[63.5mm]

5.625
[142.9mm]

6.000
[152.4mm]

0.750
[19.0mm]

4.000
[101.6mm]

12.187
[309.5mm]

15°

12X Ø0.827 [21.0mm] X 1.181 [30mm]
DP, ON NEAR FACE
Ø1.240 [31.5mm] X 1.181 [30mm]
DP, CBORE ON OPP FACE

12X M20X2.5 - 6H
X 30mm DP,
ON OPP FACE

4X Ø0.257
[6.5mm]

POWER IN (PT02A-12-3)
MATING CONNECTOR
SUPPLIED

FUSE

0.594
[15.1mm]

3.500
[88.9mm]

4.500
[114.3mm]

5.500
[139.7mm]

0.354
[9.0mm]

Ø11.750
[298.4mm]

Ø 6.8913
6.8898
[Ø 175.040
175.000 mm]

Ø 6.8982
6.8882
[Ø 174.996
174.961 mm]

Ø9.646
[245.0mm]
B.C.

Ø11.469
[291.3mm]

0.315
[8.0mm]

1.181
[30.0mm]

2.156
[54.7mm]

3.976
[101.0mm]

0.375
[9.5mm]

1.181
[30.0mm]

0.236
[6.0mm]

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