

MCRT[®] 86008V & MCRT[®] 87008V

Bearingless Digital Torquemeters

Torque Ranges: 150,000 to 750,000 lbf-in (17.0 to 84.8 kNm)

Best Performance Under Real-World Conditions

Industries Highest Overrange and Overload
 World Class Temperature Performance
 Greatest Immunity to External Noise
 Very High Stiffness and Low Deflection
 Bipolar Rotor Shunt Cal
 Accredited*, CW and CCW Dead Weight Cal
 Simple, Non-critical Installation

- 0.05% Accuracy*, 21,000 Samples/Sec
- 200% & 400% Overload
- 300% Overrange
- 0.0006%/°F Compensation
- 3 kHz Data Bandwidth
- Analog and FM Outputs
- Digital Output with Temperature
- 10 Units of Measure
- 11 Bessel Data Filters
- 48 μ S Max/Mins Update
- Interface Software Furnished
- Zero Velocity Speed Pickup Options



*NIST traceable CW & CCW, full load calibration performed in our accredited laboratory (NVLAP Lab Code 200487-0). Details at our website or the accreditation link at www.nist.gov.

MCRT[®]86008V and 87008V Torquemeters have **high accuracy in real-world applications, not just in the cal lab**. That's due, in part, to **industries highest Overrange**. High Overrange avoids clipping real-world torque peaks and driveline torsionals. **Without high Overrange, clipped peaks produce large measurement errors¹**.

World class temperature performance greatly reduces drive heating and gradient errors. Also enhancing real world performance is noise hardening against electromagnetic interference (EMI) generated by Variable Frequency Drives, ISM transmitters and other industrial noise sources - see overleaf.

Bi-directional rotor shunt cal verifies calibration and operation of the entire data chain *in CW and CCW*

1. See Application Note 20805B.

modes. It is invoked via stator switches, I/O line or from your computer. Multiple bridges provide immunity to extraneous loads. The short torque path yields high stiffness, low deflection and provides excellent *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 sensors' output is digitized on the rotor and sent to the stator where analog, frequency and Com Port outputs are created. Choose RS232, RS422, or RS485 communications. Included software interfaces with your Windows-based PC. It displays Real-time, Max/Min and Spread Torque, does limit checks, torque versus time plots and stores test results. Password protection may be invoked when needed.

S. HIMMELSTEIN AND COMPANY

Designing and Making the Worlds Best Torque Instruments Since 1960

Exceptional Immunity to Noise And Interference From ISM Transmitters

To achieve short length, high stiffness and wide signal bandwidth, bearingless sensors use unshielded antennae. As a result, any device operating at or near their operating frequency, can cause interference.

FCC rules allow Industrial, Scientific and Medical (ISM) devices to generate unlimited energy. High-power ISM devices are commonplace in industry where they are used for inventory control, parts tracking, controlling personnel access, induction heating, etc.

Most bearingless Torquemeters use a *single ISM frequency* for power and data. As a result, they are susceptible to Interference from ISM devices. Also, since FCC rules allow high power only in a narrow band (typically ± 7 kHz) for unlicensed use, single ISM frequency Torquemeters, which transmit wideband data, risk violation of FCC regulations.

Himmelstein Bearingless Torquemeters use separate 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*	Code N Performance	Code C Performance
Torque Range	Factory Set @ Transducer Full Scale Torque; see Note 1.	
Units of Measure	User may select from lbf-in, lbf-ft, ozf-in, ozf-ft, N-m, kN-m, N-cm, kgf-m, kgf-cm, gf-cm without re-calibration.	
Accuracy ² (Nonlinearity, Hysteresis repeatability)	$\leq \pm 0.1$ (End Point, % of Range)	$\leq \pm 0.05$ (End Point, % of Range)
Bipolar Shunt Calibration Enable	From Stator Switches (one CW, one CCW), via TTL I/O, or PC Com Port using furnished software.	
Zero Drift (% of Range/deg. F.)	$\leq \pm 0.001$	$\leq \pm 0.0006$
Span Drift (% of Reading./deg. F.)	$\leq \pm 0.002$	$\leq \pm 0.002$
Temperature Ranges (deg. F.)	Compensated Range: +75 to +175; Usable Range: -25 to +185; Storage Range: -65 to +225	
Rotor to Stator Maximum Misalignment (inches)	Axial: ± 0.25 , Radial: 0.3; If Magnetic (Code Z) Speed Pickup Option is installed then maximums are reduced - see below.	
Rotational Effects (% of Range)	$\leq \pm 0.01$	
Analog Output Signals ⁶ , Auto-Scaled	Allowable Load: 10k resistive, minimum; 0.05 uF capacitive, maximum.	
MCR [®] 86008V Full Scale Torque ³	Default is ± 10 V with ± 15 V overrange. User may select ± 5 V with ± 7.5 V overrange. Caution: see Note 7.	
MCR [®] 87008V Full Scale Torque ³	Default is ± 5 V with ± 15 V overrange. User may select ± 10 V with ± 15 V overrange. Caution: see Note 7.	
Signal Filter Cutoff Frequency ⁴	Field selectable from 1 Hz to 1 kHz in ten 1-2-5 steps plus 3 kHz selected from a remote PC using furnished software. Filters have Bessel Response; and are free of delay distortion and overshoot errors.	
Frequency Modulated Output, Auto-Scaled	Frequency: 10 ± 5 kHz or 20 ± 10 kHz or 40 ± 20 kHz; field changeable (Default = 10 ± 5 kHz); TTL square wave output.	
Overrange (% of Range; see Application Note 20805)	150 to 300; model/user selection dependent - see above. Applies to analog, Digital and FM (except for CCW side) Outputs.	
System Resolution ² (% of Range)	0.01	
Output Noise, All Outputs (% of Range)	<0.01 at 1 Hz, <0.01 at 10 Hz, <0.015 at 100 Hz, <0.028 at 1 kHz and <0.041 at 3 kHz.	
Torque Sampling Rate and Bandwidth	Torque is sampled @ 21kHz. Its 3dB bandwidth is 3 kHz but can be reduced by filters (see above).	
Rotor-to-Stator Data Transfer Rate	1.25 Mbaud	
RS232, RS422, RS485 Communications Port	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.	
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; 120 ohm termination may be accessed via software.	
Interface Software With Torque Limits	Provided to interface with Windows-based PC. Includes 20 foot RS232 interconnect cable for PC. Flags on PC screen classify user-set High and Low Limits for Current, or Max/Min or Spread (Max - Min) Torque data.	
I/O Lines and FM Output	5 input and 2 output lines. Input lines are +CAL, -CAL, TARE, CLEAR TARE, and RESET MAX/MIN. Output lines are Data OK and FM Torque signal.	
Status LEDs (on Stator Keypad)	Three Color Coded LEDs: Power (Yellow = Power-up, Green = OK, Red = Fault); Data (Green = OK, Red = Data 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, Auxiliary Measurement	Rotor temperature is output via Com Port. Range is 0 to 185 deg. F.; Accuracy is ± 2 degrees, nominal. See above for status LEDs.	
Optional Zero Velocity Speed Pickups	Optical (Code O) and Magnetic (Code Z) pickups output 60 ppr. Magnetic type restricts radial alignment to 40 ± 10 mils.	
Supply Voltage/Power ⁵	10 to 26 VDC @ 6 watts with Antenna aligned to 10 watts with maximum specified misalignments.	

Notes:

- Outputs may be set at any value \leq Torquemeter Full Scale Rating. *For example:* If the Full Scale Rating is 10,000 lbf-in, the user may re-scale to 5,000 lbf-in. Then the analog output would be 5 or 10 Volts at 5,000 lbf-in and the digital output, at the Com Port, would be 5,000. However, the specification still defines measurement accuracy, i.e., 0.1% (for code N) or 0.05% (for code C) of the sensor full scale range – a possible error of 10 lbf-in (code N) or 5 lbf-in (code C). 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.
 - Assumes torque range is set to the device full scale torque rating.
 - CW torque causes CW rotation if viewed from its driven end. CCW torque causes the opposite rotation.
 - Torque signal bandwidth upper limit is 3 kHz determined by the integral anti-aliasing filter. Realizable measurement bandwidth is limited by driveline components; see Technical Memorandum 8150.
 - Fused and reverse polarity protected.
 - All outputs are fused. Digital inputs are reverse polarity and overvoltage protected.
 - Torquemeters have infinite fatigue life for full reversals up to half their overload rating. Above that, you risk a fatigue failure. Outputs are linear to the overrange rating which, for the 87000V, exceeds the infinite fatigue life threshold (50% of the overload rating). Do not knowingly operate in this region.
- *. Specifications are subject to change without notice.

Standard Ratings, MCRT[®] 86008V Bearingless Digital Torquemeters With 200% Overload (Call for Other Capacities)

MCRT [®] Model	Torque Ratings		Speed Rating	Torsional Stiffness	Maximum Angular Deflection	Rotating Inertia	Maximum Extraneous Loads ²			Max Rotor Wt.
	Range	Overload					Thrust	Bending	Shear	
	[lbf-in] ¹									
			[rpm]	[lbf-in/rad]	[degree]	[oz-in s ²]				[lbs]
86008V(3-5)	300,000	600,000	0 to ±5,000	360,000,000	0.047	72.2	15,000	100,000	15,000	78
86008V(5-5)	500,000	1,000,000	0 to ±5,000	490,000,000	0.058	73.8	25,000	150,000	25,000	80
86008V(75-4)	750,000	1,500,000	0 to ±5,000	580,000,000	0.075	75.3	37,500	250,000	37,500	82

Notes: 1. To convert lbf-in to Nm multiply by 0.112985. 2. Maximum extraneous loads and rated torque may be applied simultaneously without damage.

Standard Ratings, MCRT[®] 87000V Bearingless Digital Torquemeters With 400% Overload (Call for Other Capacities)

MCRT [®] Model	Torque Ratings		Speed Rating	Torsional Stiffness	Maximum Angular Deflection	Rotating Inertia	Maximum Extraneous Loads ²			Max Rotor Wt.
	Range	Overload					Thrust	Bending	Shear	
	[lbf-in] ¹									
			[rpm]	[lbf-in/rad]	[degree]	[oz-in s ²]				[lbs]
87008V(15-4)	150,000	600,000	0 to ±5,000	360,000,000	0.024	72.2	15,000	100,000	15,000	78
87008V(25-4)	250,000	1,000,000	0 to ±5,000	490,000,000	0.029	73.8	25,000	150,000	25,000	80
87008V(375-3)	375,000	1,500,000	0 to ±5,000	580,000,000	0.037	75.3	37,500	250,000	37,500	82

Notes: 1. To convert lbf-in to Nm multiply by 0.112985. 2. Maximum extraneous loads and rated torque may be applied simultaneously without damage.


ORDER NUMBER FORMAT  MCRT[®] A B C D

A = Model Number from tables; either 86008V or 87008V.

B = Range from tables above; (3-5), or (5-5), etc.

C = Performance Code; N for Standard Performance or C for Enhanced Performance.

D = Optional Zero Velocity Speed Pickup; N for None, Z for Magnetic Type, O for Optical Type.

ORDER NUMBER EXAMPLE  MCRT[®] 86008V(5-5)CO specifies a Bearingless Torquemeter with a 500,000 lbf-in Torque Rating, a 200% Torque Overload Rating, Enhanced Performance and an Optical Speed Pickup.

