

MCRT® 86011V & 88711V Very High Capacity Bearingless Digital Torque Sensors

MCRT® 86011V Single Range Models: 500, 750 and 1,000 kNm Capacities

MCRT® 88711V Dual Range Models: 500/100 kNm, 750/150 kNm and 1,000/200 kNm Capacities

Best Performance Under Real-World Conditions

Outputs Analog, Digital and FM Data
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 Load Cal
Simple, Non-critical Installation

- 0.1% Combined Nonlinearity & Hysteresis
- Torque Bridge Carrier Amplification
- 200% to 2,000% Overload Ratings
- 150% Overrange Rating
- 0.1% Accuracy Class
- 0.003%/°C Compensation
- 10 Units of Measure
- 14 Bessel Data Filters
- 48 µS Max/Min Update
- 3 kHz Measurement Bandwidth
- Zero Velocity Speed Pickup Option



*Verified by an ISO/IEC 17025:2017 calibration performed in our accredited laboratory (NVLAP Lab Code 200487-0). Details at our website or the accreditation link at www.nist.gov. Load calibration limited to 452 kNm.

MCRT® 86011V and 88711V 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) from Variable Frequency Drives, ISM devices and other industrial noise sources - enhanced by use of strain gage carrier amplification.

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. It is installed without an additional coupling resulting in a torsionally stiff driveline, with low deflection, low overhung moment, and 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 Ease of Installation and Operating Efficiency

Unlike competitive devices, these Torque Senors have stator antenna that are neither hoops or calipers nor do they have axial mounting restrictions. What is more, they have generous radial and axial clearances (see specification). As a result, they are readily installed without the need for special alignment tools.

Furthermore, they don't require tight restrictions on rotor runout. The allowable clearances also permit significant thermal and mechanical growths which are commonly experienced in large machine installations.

Rotor to stator gap specifications are all inclusive. That is, the MCRT® 86011V and MCRT®88711V Series can be operated anywhere within the envelope defined by their axial and radial gap specifications.

The antenna and electronic circuit design boasts world class efficiency. For example, the power needed to operate the antenna and standard rotor and stator electronics, which include many data processing functions not found in competitive devices, is one third or less than needed by competitive devices.

Common Specifications *	MCRT 86011 Single Range	MCRT 88711 Dual Range	
		High Range	Low Range
Torque Range	Factory Set @ Transducer Full Scale Torque; see Table Below and Note 1.		
Units of Measure	User may select from, N-m, kN-m, N-cm, kgf-m, kgf-cm, gf-cm, lbf-in, ozf-in, ozf-ft without re-calibration.		
Temperature Units of Measure	Select °C or °F without re-calibration		
Combined Nonlinearity & Hysteresis² (% of Range, Best Fit Line Basis - see Tech Memo 230104)	≤±0.1	≤±0.1	≤±0.1
Overload (% of Range)	200 to 400, range dependent – see table.	200 to 400 see table.	1,000 to 2,000 – see table.
Repeatability (% of Range)	≤±0.03	≤±0.03	≤±0.04
Accuracy Class³	≤±0.1 % of Range	≤±0.1 % of Range	≤±0.1 % of Range
Calibration Signal⁴	100% of full scale for clockwise and counterclockwise directions		
Zero Drift (% of Range/deg. C.)	≤±0.003	≤±0.003	≤±0.01
Span Drift (% of Reading./deg.C.)	≤±0.005	≤±0.005	
48 Hour Drift (% of Range - applies to all outputs)	≤±0.04	≤±0.04	≤±0.06
Temperature Ranges (deg. C.)	Compensated Range: +24 to +79.4; Usable Range: -32 to +85; Storage Range: -54 to +107		
Rotor to Stator Maximum Misalignment (mm)	±7.6 Axial (15.2 total travel), 7.6 Radial without Optional Speed Pickup; refer to Speed Option below.		
Analog Output Signals⁶, Auto-Scaled	Allowable Load: 10k resistive, minimum; 0.05 uF capacitive, maximum.		
Full Scale Torque²	±10 V with ±15 V overrange. User may select ±5 V with ±7.5 V overrange. Caution: see Notes 2 and 7.		
	±5 V with ±15 V overrange. User may select ±10 V with ±15 V overrange. Caution: see Notes 2 and 7.		
Signal Filter Cutoff Frequency⁴	Field selectable from 0.1 Hz to 1 kHz in thirteen 1-2-5 steps plus 3 kHz selected from a remote PC using furnished software. Filters have Bessel Response; they 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)	0.005		
Output Noise⁷, 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 ±15kV 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 -18 to 85 deg. C.; Accuracy is ±1 degree, nominal. See above for status LEDs.		
Optional Zero Velocity Speed Pickup	Magnetic (Code Z) pickup outputs 270 ppr. Magnetic type restricts radial alignment to 1 -2 mm.		
Supply Voltage/Power⁵	10 to 26 VDC @ 5 watts with Antenna aligned to 7 watts with maximum specified misalignments.		

Specification Notes:

- Outputs may be set at any value \leq Torquemeter Full Scale Rating. *For example:* If the Full Scale Rating is 1,000 kN-m, the user may re-scale to 500 kN-m. Then the analog output would be 5 or 10 Volts at 500 kN-m and the digital output, at the Com Port, would be 500 kN-m. 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.
- 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. These devices will provide accurate data when torque peaks are as great as 150% of rated capacity; If you are using the analog output, it is linear to 15 volts. That corresponds to 150% of full scale on the 10 volt output setting and 300% on the 5 volt output setting. The Torquemeters have infinite fatigue life for full reversals up to half their overload rating. Above that, you risk a fatigue failure. Therefore they should not be used continuously or for long periods above half their overload rating. An MCRT 86011V/88711V will not yield when torque peaks are 200% of full scale.
- Accordingly, if you expect torque peaks greater than 150% of full scale, you should switch to the 5 volt setting.
- The greatest of Combined Error, Repeatability, Zero Drift and Span Drift over 10°C. It is expressed as a percent of full scale.
- CW torque causes CW rotation if viewed from the driving end. CCW torque causes the opposite rotation.
- Power input and all outputs are protected. Digital inputs are reverse polarity and over-voltage protected.
- 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 principle contribution is determined by its torsional stiffness; see Application Note 221101D for further information.
- Analog noise is measured by an Agilent U1520A Scope with bandwidth set to 10 kHz.
- 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 RS232/485 adapter is available, if needed specify P/N 330-0002.
- Fused and reverse polarity protected.
- * Specifications are subject to change without notice.

Standard Ratings, Very High Capacity MCRT® 86011V/88711V Bearingless Digital Torquemeters


MCRT® Model	Single Range Torque Sensors			Dual Range Torque Sensors					
				88711V(5-5Nm)		88711V(75-4Nm)		88711V(1-6 Nm)	
	86011V(5-5Nm)	86011V(75-4Nm)	86011V(1-6Nm)	High Range	Low Range	High Range	Low Range	High Range	Low Range
Rated Torque (Nm)	500,000	750,000	1,000,000	500,000	100,00	750,000	150,000	1,000,000	200,000
Overload (Nm)	2,000,000			2,000,000					
Rated Speed (rpm)	750			750					
Stiffness (kNm/rad)	1,890,000			1,890,000					
Max. Deflection	0.015°	0.023°	0.030°	0.015°	0.003°	0.023°	0.005°	0.030°	0.006°
Rotating Inertia ²	72.3 (kg-m ²)			72.3 (kg-m ²)					
Thrust (kN)	3,200			3,200					
Bending (kNm)	200			200					
Shear (kN)	3,200			3,200					
Rotor Weight ³ (kg)	462			462					

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

- Add 11.6 kg-m² if equipped with speed pickup, Option Z.
- Add 69 kg if equipped with speed pickup, Option Z.
- Contact the factory for special ranges or increased performance.

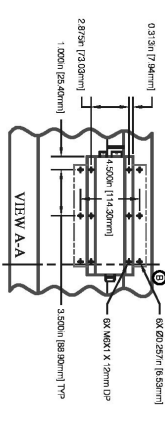
ORDER NUMBER FORMAT MCRT® **A B C D**

- A = Model Number from tables; either 86011V or 88711V.
- B = Range from tables above; (5-5 Nm), or (1-6 Nm), etc.
- C = Performance Code; N for Standard Performance.
- D = Optional Zero Velocity Speed Pickup; N for None, Z for Magnetic Type.

ORDER NUMBER EXAMPLE  **MCRT® 86011V(1-6 Nm)NN** specifies a Bearingless Torquemeter with a 1,000 kNm Torque Rating, a 200% Torque Overload Rating, Standard Performance and No Speed Pickup.

Please note, dimensions subject to change without notice. Contact factory for certified drawings.

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2490 Pembroke Avenue, Hoffman Estates, Illinois 60169, USA • Tel: 847-843-3300 • Fax: 847-843-8488