

# MCRT<sup>®</sup> 79800V Ultra Precise, Dual Range, Torquemeters Have Analog & Digital Outputs, Plus The Best Accuracy of Any Shaft Style, Dual Range Torque Sensor

**Simultaneous  $\pm 10.000V/\pm 5.000V$  Analogs of Torque, Speed & Power  
Engineering Unit Digital Output of Torque, Speed & Power - Software Included  
1:1 and 1:5 NIST Traceable\* Ranges • 1,000% and 200% Overload Ratings  
Low Ranges: 40 to 75,000 lbf-in (4.52 to 8.48 kN-m) with Overage  $\geq 150\%$   
High Ranges: 200 to 375,000 lbf-in (22.6 to 42.4 kN-m) with Overage  $\geq 150\%$   
Accredited, NIST Traceable\* CW/CCW Cal • Traceable\* CW/CCW Rotor Shunt Cal  
0.03% Combined Nonlinearity and Hysteresis • 0.0006% Temperature Performance  
Hardened to EMI From Adjustable Speed Drives**

- 1 kHz Bandwidth; 13 Constant Delay Signal Filters
- Shaft Power Calculated 7800 Times/Second
- Select From 33 Units of Measure Without Re-calibration
- 128  $\mu s$  Max/Min Data Acquisition
- Plated Alloy Steel Shaft, Stainless Steel Housing
- No Manual Adjustments



\*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 devices accurately measure low running and high load torques without the cost and inconvenience of swapping conventional sensors. Moreover, they will safely and accurately measure normal torques when large transients are present, avoiding the necessity of over-sizing a conventional torquemeter at the cost of measurement accuracy.

Without Option Z (Speed/Power), all analog outputs are assigned to Torque. With Option Z, they report High and Low Torque Ranges and Speed but can be re-assigned to any combination of Torque Speed and Power. Analog default output is 10.000V; re-scalable to any optimized test value.

Temperature compensation and load calibrations are performed on each range. Documentation includes a NVLAP approved calibration certificate certifying NIST traceability and confirming our laboratory operation and quality management systems meet ISO/IEC 17025:2005.

Included software interfaces Windows-based PC's, displays and plots real time data, max/min data, and does time and X-Y plots (with option Z). Use it to select 5V or 10V analog outputs, filter cutoff frequency, units of measure, output data, save data, initiate calibration, zero, tare, clear tare, etc.

## **S. HIMMELSTEIN AND COMPANY**

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

Both High Range and Low Range Torque Outputs are always present. The Torque Low Range is 20% of its High Range. Torque Overload ratings are 1,000% of the Low Range and 200% of the High Range. Torque Overrange is  $\geq 150\%$ ; **combined error is guaranteed  $\leq 0.1\%$  in Overrange.**

Option Z adds conditioned Shaft Speed and Power outputs. All outputs are simultaneously available in both analog and digital form. Should the Torque, Speed\* or Rotor Temperature exceed the Torquemeters ratings, a warning flag(s) is generated.

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

| Common Specifications  | High Range   | Low Range  |
|--|--|--|
| Torque and Speed (Option Z) Scaling  | Factory Set @ Transducer Torque Capacity and Maximum Speed. Field Re-settable to any lower value.  |  |
| Power (Option Z) Range - See Note 1  | Scaling is Factory Set @ the Product of Full Scale Torque. Speed and a Constant. <b>It is user re-settable.</b>  |  |
| Units of Measure   | 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.  |  |
| Torque<br>Combined Nonlinearity <sup>2</sup> and Hysteresis <sup>2</sup>   | $\leq \pm 0.03$ (% of F.S.)  | $\leq \pm 0.05$ (% of F.S.)                              |
| Speed & Power (Option Z)<br>Combined Nonlinearity <sup>2</sup> and Hysteresis <sup>2</sup>                             | $\leq \pm 0.03$ (% of F.S.)  | $\leq \pm 0.05$ (% of F.S.)                              |
| Nonrepeatability <sup>2</sup> (% of F.S.)  | Torque and Power $\leq \pm 0.01$ ; Speed $\leq \pm 0.01$   | Torque and Power $\leq \pm 0.02$ ; Speed $\leq \pm 0.01$ |
| Zero Drift (% of F.S./deg. F.)   | Torque and Power $\leq \pm 0.0006$ ; Speed = none  | Torque & Power $\leq \pm 0.003$ ; Speed = none           |
| Span Drift (% of Rdg./deg. F.)   | Torque and Power $\leq \pm 0.002$ ; Speed = none   | Torque & Power $\leq \pm 0.002$ ; Speed = none           |
| 24 Hour Drift (% of F.S.)  | $\leq \pm 0.01$  | $\leq \pm 0.03$  |
| Temperature Ranges (deg. F.)   | Compensated: +75 to +175; Usable: -25 to +185; Storage: -65 to +225  |  |
| Overrange, (% of F.S.)   | 150 (Combined Nonlinearity and Hysteresis $\leq 0.1\%$ in Overrange)   |  |
| Signal Filter Cutoff Frequency <sup>4</sup><br>Bessel filters have constant envelope delay and minimal overshoot error | 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. Units are set to 10Hz (default) unless Purchase Order specifies another frequency. |  |
| Analog Output Signals, Auto Scaled   | Torque and when option Z is specified, Speed and Power. All are simultaneously available.  |  |
| Full Scale Torque <sup>3</sup> and Power <sup>3</sup>  | CW = +10V, CCW = - 10V or, CW = +5V, CCW = - 5V; field changeable (Default = $\pm 10V$ )   |  |
| Full Scale Speed <sup>3</sup>  | +10V or +5V for CW and CCW directions; field changeable (Default = +10V)   |  |
| Resistive Load   | 10,000 ohms, Minimum   |  |
| Capacitive Load  | 0.05 uF, Maximum   |  |
| Minimum Resolution (% of F.S.)   | 0.003 for both Analog and Digital Data.  |  |
| Data Acquisition Time  | Torque: 128 $\mu$ s, Speed: >800 rpm $\leq 1.25$ ms, <800 rpm: 1000/rpm ms, Power: 128 $\mu$ s.  |  |
| Duplex Serial Communications Port<br>Selectable as RS232, RS422 or RS485   | 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.  |  |
| BAUD Rate  | 115,200. Drivers are Short circuit (current limit) and $\pm 15kV$ ESD protected  |  |
| 120 $\Omega$ Termination (RS422/485)   | Software selectable.   |  |
| Maximum Cable Length   | 4,000 feet for RS422 and RS485, 50 feet for RS232  |  |
| Supply Voltage <sup>5</sup> and Power  | 10 to 26 VDC at 2.7 watt, nominal. (Series 700 Instrument compatible.)   |  |
| Connector Pinouts  | See Page 3 tabulation.   |  |

- Torque and Speed (option Z) scaling may be re-set at any value  $\leq$  Transducer Full Scale Rating. *For example:* If the set Torque range is 10,000 lbf-in, and the set Speed range is 5krpm then Power Range =  $10,000 \cdot 5000/63025 = 793.34$  HP = 10V analog output.
- Assumes torque scale is set to the device torque rating.
- 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.
- Reverse polarity protected.
- "deg. F." denotes "degree Fahrenheit".
- Specifications are subject to change without notice.

|  |              |       |                               |                                       |
|--|--------------|-------|-------------------------------|---------------------------------------|
| Order No. #  | MCRT® 79804V | (5-3) | F                             | Z                                     |
|  | Model Number | Range | Foot Mount: N if no, F if yes | Speed/Power Option: Z if yes, N if no |
| An MCRT® 79804V(5-3)FZ is a Dual Range Digital Torquemeter with a 1,000 lbf-in Low Range, a 5,000 lbf-in High Range, a 10,000 lbf-in Overload, a 7,500 lbf-in Overrange, a Foot Mount, and a Speed/Power Option. |              |       |                               |                                       |

# MCRT® 79800V Series Ultra Precision, Dual-Range Digital Torquemeters

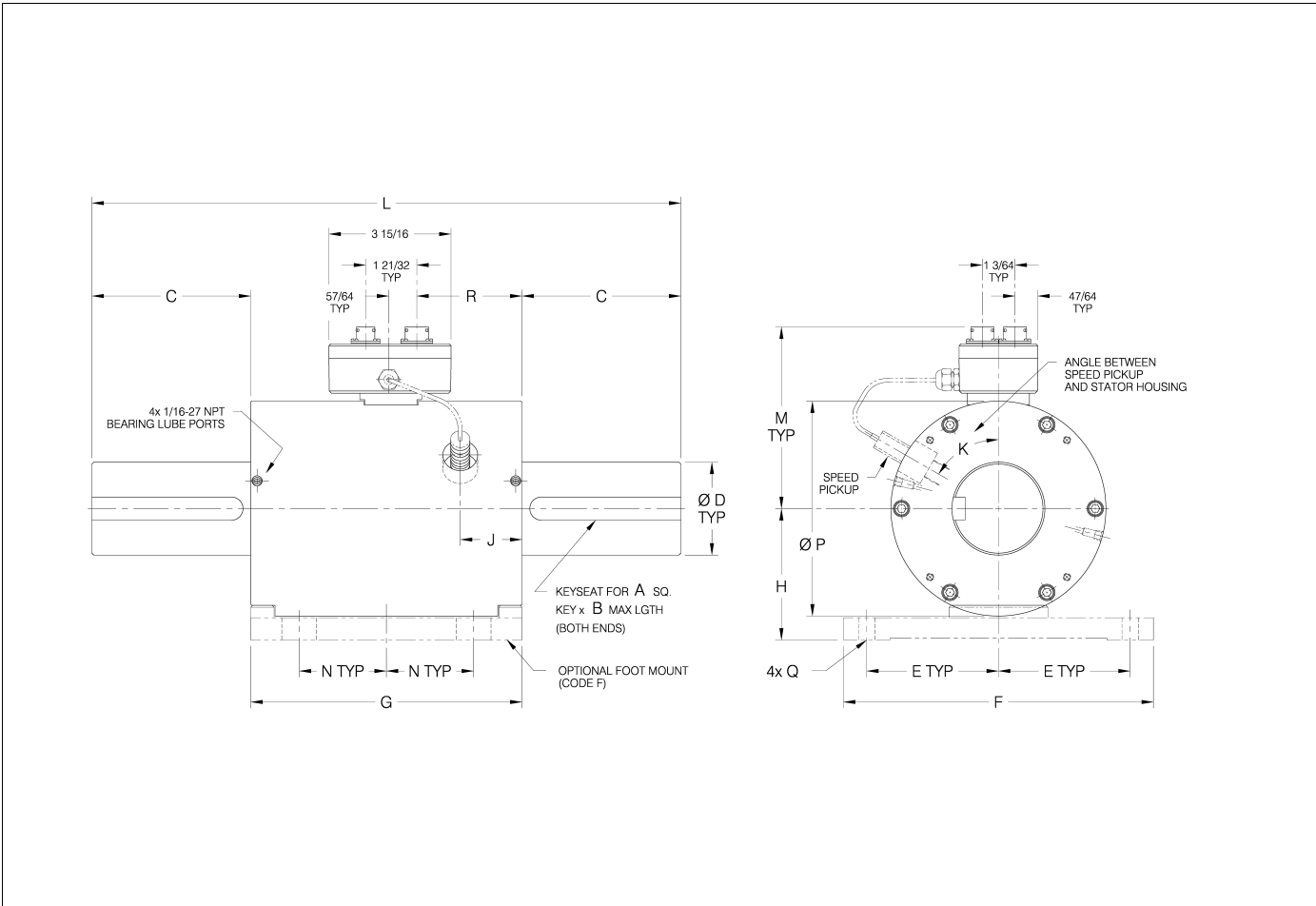
| MCRT® Model   | Torque Ratings |       |            |        | Speed Rating  | Shaft Stiffness <sup>1</sup> |              | Rotating Inertia |                          | Weight               |      |    |
|---------------|----------------|-------|------------|--------|---------------|------------------------------|--------------|------------------|--------------------------|----------------------|------|----|
|               | Low Range      |       | High Range |        |               | [rpm]                        | [lbf-in/rad] | [N-m/rad]        | [ozf-in s <sup>2</sup> ] | [kg-m <sup>2</sup> ] | [lb] | kg |
|               | [lbf-in]       | [N-m] | [lbf-in]   | [N-m]  |               |                              |              |                  |                          |                      |      |    |
| 79801V(2-2)   | 40             | 4.52  | 200        | 22.6   | 0 to ± 15,000 | 24,400                       | 2,760        | 0.0149           | 0.000104                 | 12.5                 | 5.67 |    |
| 79802V( 5-2)  | 100            | 11.30 | 500        | 56.5   | 0 to ± 15,000 | 42,300                       | 4,780        | 0.0168           | 0.000119                 | 12.7                 | 5.76 |    |
| 79802V( 1-3)  | 200            | 22.6  | 1,000      | 113    | 0 to ± 15,000 | 49,900                       | 5,640        | 0.0170           | 0.000120                 | 12.7                 | 5.76 |    |
| 79803V( 2-3)  | 400            | 45.2  | 2,000      | 226    | 0 to ± 10,000 | 263,000                      | 29,800       | 0.0900           | 0.000636                 | 13.2                 | 5.99 |    |
| 79804V( 5-3)  | 1,000          | 113.0 | 5,000      | 565    | 0 to ± 10,000 | 458,000                      | 51,700       | 0.1240           | 0.000873                 | 15.8                 | 7.17 |    |
| 79804V( 1-4)  | 2,000          | 226   | 10,000     | 1,130  | 0 to ± 10,000 | 620,000                      | 70,100       | 0.1280           | 0.000904                 | 16.0                 | 7.26 |    |
| 79806V( 2-4)  | 4,000          | 452   | 20,000     | 2,260  | 0 to ± 8,000  | 2,710,000                    | 306,000      | 1.387            | 0.00979                  | 70.7                 | 32.1 |    |
| 79806V(4-4)   | 8,000          | 904   | 40,000     | 4,520  | 0 to ± 8,000  | 3,800,000                    | 430,000      | 1.417            | 0.00100                  | 71.3                 | 32.3 |    |
| 79807V( 5-4)  | 10,000         | 1,130 | 50,000     | 5,650  | 0 to ± 6,000  | 5,960,000                    | 674,000      | 2.401            | 0.01700                  | 81.7                 | 37.1 |    |
| 79807V(1-5)   | 20,000         | 2,260 | 100,000    | 11,300 | 0 to ± 6,000  | 7,320,000                    | 827,000      | 2.462            | 0.01740                  | 82.5                 | 37.4 |    |
| 79808V(2-5)   | 40,000         | 4,520 | 200,000    | 22,600 | 0 to ± 3,600  | 27,500,000                   | 3,110,000    | 12.61            | 0.08905                  | 170.4                | 77.3 |    |
| 79808V(375-3) | 75,000         | 8,480 | 375,000    | 42,400 | 0 to ± 3,600  | 31,500,000                   | 3,560,000    | 12.96            | 0.09153                  | 172.2                | 78.1 |    |

1. Stiffness is conservatively rated and includes the torsion section and shaft-ends.

| Supported Units of Measure (default units are in boldface) |   |
|--|---|
| <b>Torque</b>  | <b>lbf-in</b> , lbf-ft, ozf-in, ozf-ft, N-m, kN-m, N-cm, kgf-m, kgf-cm, gf-cm                                       |
| <b>Speed</b>   | <b>rpm</b> , rps, rph, rad/s, rad/min, rad/h, degree/min, degree/s, degree/h, grad/s                                |
| <b>Power</b>   | <b>hp</b> (550ft-lbf/s), hp (metric), kW, W, ft-lbf/min, ft-lbf/s, Btu/h, Btu/min, Btu/s, ton, cal/h cal/min, cal/s |

| 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,<br>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                   | Torque In Rating      | 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                   | Temperature In Rating |   |   | Pin H   | Digital Ground/Power Return |
| Pin J                   | Speed In Rating       |   |   | * 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        |   |   |   |                             |

|   |   |
|---|---|
| <b>Available Cables</b>                             | Cable lengths (XX) are 20, 50 and 100 feet. RS232 cables are limited to 50 feet. If purchased without cables, mating connectors are supplied at no added cost.  |
| <b>P/N 224-8800-XX<br/>79800V to Model 733</b>      | Displays High & Low Torque or, Torque & Speed or, Torque & Power. Implements Model 733 functions including Remote Cal, Tare, Zero, Analog Outputs, etc.         |
| <b>P/N 224-8360-XX<br/>79800V to RS422/485 Host</b> | Connects Torquemeter to host computer. Implements all Torquemeter functions. Requires external power (10 - 26 VDC). It is unterminated at host end.             |
| <b>P/N 224-8361-XX<br/>RS485 79800V to 79800V</b>   | Provides Torquemeter to Torquemeter interconnect when using RS485 protocol to read and control multiple Torquemeters from a single host computer.               |
| <b>P/N 224-8359-XX<br/>79800V to RS232 PC Port</b>  | Connects Torquemeter to RS232 host port. Implements all Torquemeter functions. 50 feet maximum. Use RS422/485 connection in noisy environment or for long runs. |



| MCRT® Model | Outline Dimensions [ inch ] |       |      |                |       |       |      |       |       |         |      |         |     |        |         |
|-------------|-----------------------------|-------|------|----------------|-------|-------|------|-------|-------|---------|------|---------|-----|--------|---------|
|             | A                           | B     | C    | D <sup>1</sup> | E     | F     | G    | H     | L     | M       | N    | P       | K   | Q      | R       |
| 79801V      | 0.187                       | 1.125 | 1.50 | 0.625          | 2.250 | 5.50  | 5.50 | 2.250 | 8.50  | 3 55/64 | 1.50 | 3 15/32 | 90° | 0.406  | 1 7/64  |
| 79802V      | 0.187                       | 1.625 | 2.00 | 0.750          | 2.250 | 5.50  | 5.50 | 2.250 | 9.50  | 4 1/8   | 1.50 | 3 15/32 | 90° | 0.406  | 1 7/64  |
| 79803V      | 0.250                       | 1.719 | 2.22 | 1.000          | 2.625 | 5.65  | 5.65 | 2.500 | 10.00 | 4 3/32  | 1.50 | 3 31/32 | 60° | 0.406  | 1 29/32 |
| 79804V      | 0.375                       | 2.750 | 3.59 | 1.500          | 2.625 | 5.65  | 5.65 | 2.500 | 12.75 | 4 3/32  | 1.50 | 3 31/32 | 60° | 0.406  | 1 29/32 |
| 79806V      | 0.625                       | 3.500 | 4.13 | 2.500          | 4.250 | 10.00 | 8.75 | 4.250 | 17.00 | 5 5/8   | 2.81 | 6 15/16 | 60° | Note 2 | 2 23/64 |
| 79807V      | 0.750                       | 4.500 | 5.13 | 3.000          | 4.250 | 10.00 | 8.75 | 4.250 | 19.00 | 5 7/8   | 2.81 | 6 15/16 | 60° | Note 2 | 2 23/64 |
| 79808V      | 1.000                       | 6.500 | 7.50 | 4.500          | 4.250 | 10.00 | 8.50 | 5.000 | 23.03 | 6 19/64 | 2.81 | 8 3/16  | 60° | Note 2 | 2 1/64  |

Tolerance of D diameter is +0.0000/-0.0005 for D ≤ 2.5" and +0.000/-0.001" for D > 2.5". 2. Slotted 0.531" wide by 1-1/8" long.

| MCRT® Model | Outline Dimensions [ mm ] |       |       |                |       |       |       |       |       |       |      |       |     |        |      |
|-------------|---------------------------|-------|-------|----------------|-------|-------|-------|-------|-------|-------|------|-------|-----|--------|------|
|             | A                         | B     | C     | D <sup>1</sup> | E     | F     | G     | H     | L     | M     | N    | P     | K   | Q      | R    |
| 79801V      | 4.75                      | 28.6  | 38.1  | 15.9           | 57.2  | 139.7 | 139.7 | 57.2  | 215.9 | 98.0  | 38.1 | 88.1  | 90° | 10.3   | 28.2 |
| 79802V      | 4.75                      | 41.3  | 50.8  | 19.1           | 57.2  | 139.7 | 139.7 | 57.2  | 241.3 | 104.8 | 38.1 | 88.1  | 90° | 10.3   | 28.2 |
| 79803V      | 6.35                      | 43.7  | 56.4  | 25.4           | 66.7  | 158.8 | 143.5 | 63.5  | 254.0 | 104.0 | 38.1 | 100.8 | 60° | 10.3   | 48.4 |
| 79804V      | 9.53                      | 69.9  | 91.2  | 38.1           | 66.7  | 158.8 | 143.5 | 63.5  | 323.9 | 104.0 | 38.1 | 100.8 | 60° | 10.3   | 48.4 |
| 79806V      | 15.88                     | 88.9  | 104.8 | 63.5           | 108.0 | 158.8 | 222.3 | 108.0 | 431.8 | 142.9 | 71.4 | 176.2 | 60° | Note 2 | 59.9 |
| 79807V      | 19.05                     | 114.3 | 130.2 | 76.2           | 108.0 | 254.0 | 222.3 | 108.0 | 482.6 | 142.9 | 71.4 | 176.2 | 60° | Note 2 | 59.9 |
| 79808V      | 25.40                     | 165.1 | 192.0 | 114.3          | 108.0 | 254.0 | 215.9 | 127.0 | 585.0 | 159.9 | 71.4 | 208.0 | 60° | Note 2 | 51.2 |

1. Tolerance of D diameter is +0.0000/-0.0127 for D ≤ 63.5 and +0.000/-0.001" for D > 63.5. 2. Slotted 13.5 wide by 28.6 long.