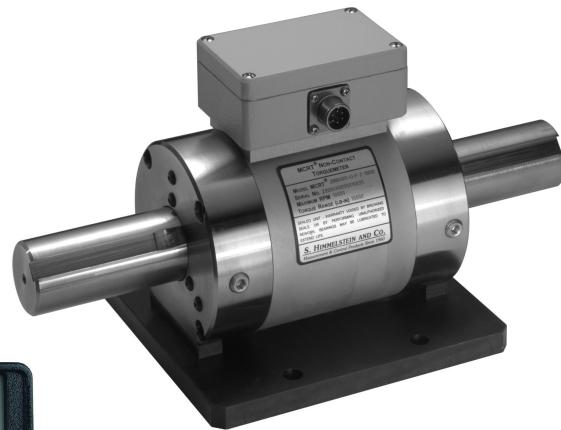


MCRT[®] 28000T Series Non-Contact mV/V Output Strain Gage TORQUEMETERS

- ✓ **2X Overload Rating**
- ✓ **Hardened to EMI From Adjustable Speed Drives**
- ✓ **Ferrite-free Rotary Transformer Coupling**
- ✓ **Bidirectional Operation Includes Stall**
- ✓ **NIST Traceable* Dead Weight Calibration**
*Calibration performed in our accredited metrology laboratory (NVLAP Lab Code 200487-0). For details see www.himmelstein.com or accreditation link at www.nist.gov.
- ✓ **Splashproof, Corrosion Resistant Construction**
- ✓ **mV/V Output, Compatible With Carrier Amplifiers**
- ✓ **Unexcelled Immunity To Machinery Magnetic Fields**



To excite and display Torque only, use a Model 701. To excite and display Torque, Speed and HP, use a Model 721. See Bulletins 370 & 371.



Torque Ranges: 0.625 to 4,000,000 lbf-in (0.071 to 452,000 Nm)

No Slip Rings, Brushes, LVDT's, Optical Paths or Radio Transmitters

S. HIMMELSTEIN AND COMPANY

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Torquemeter Description

When installed between a driver and its load, MCRT® 28000T torquemeters measure static (stall) and dynamic shaft torque and speed (an option). A strain gaged, single piece shaft measures torque and cancels bending and thrust. Robust, ferrite-free rotary transformers connect the gages to noise immune carrier amplifiers¹. Rotary transformers don't generate noise or wear, are immune to magnetic fields, noise, vibration, lubricants and other hostile environments. Unlike ferrite transformers, Himmelstein ferrite-free units aren't susceptible to cracking and impact induced damage. All models incorporate advanced, noise reduction technology that

hardens these sensors to interference (EMI) from IGBT-based adjustable speed drives (ASD's).

Choose Either A Flanged Or Shaft End Model

Shaft end models cost less than flanged models, and can be floated or foot mounted. Foot mounted sensors are favored for high speed. Flanged models are very short. They are used when space is limited and to handle large² axial loads without special mounting considerations. They are frequently used in marine and vehicle drives, to support the weight and thrust of a mixers' impeller, and in other similar circumstances. A flanged torquemeter must be installed as a floating shaft.

General Specifications

	Code N Standard Performance	Code C Enhanced Performance
Nonlinearity (end point method, % of F.S.):	$\leq \pm 0.1$	$\leq \pm 0.05$
Hysteresis (% of F.S.):	$\leq \pm 0.1$	$\leq \pm 0.05$
Nonrepeatability (% of F.S.):	$\leq \pm 0.05$	$\leq \pm 0.02$
Accuracy (combined nonlinearity, hysteresis and non-repeatability, % of F.S.):	$\leq \pm 0.1$	$\leq \pm 0.07$
Stability, 6 Months (% of F.S.):	$\leq \pm 0.15$	$\leq \pm 0.10$
Rotational Effect on Zero (% of F.S.):	$\leq \pm 0.05$	$\leq \pm 0.02$
Calibration Accuracy ³ (% of F.S. @ 75 deg. F., traceable to NIST):	$\leq \pm 0.05$	$\leq \pm 0.02$
Temperature Effects:		
Zero (% of F.S./deg. F.):	$\leq \pm 0.002$	$\leq \pm 0.001$
Span (% of Rdg./deg. F.):	$\leq \pm 0.002$	$\leq \pm 0.001$
Compensated Range:	+75 to +175 deg. F.	
Minimum Usable Range:	-25 to +185 deg. F.	
Storage Range:	-65 to +225 deg. F.	
Output (nominal):		1.5 mV/V
Zero Balance:	$\leq \pm 1\%$ of F.S.	
Excitation Voltage:	= < 6 volts rms, 3 kHz $\pm 10\%$, sine wave only.	
Readout: A strain gage carrier amplifier meeting the stated excitation requirements. Use Himmelstein Models 701, or 711, or 721 or System 6 or 7 Series Instrumets for optimum performance.		

Notes

- When ordered with amplifier and cable, the system is dead weight calibrated traceable to NIST.
- Generally a thrust in lbs. equal to the sensors' full scale rating in lbf-in.
- If ordered with cable and amplifier, see Note 1. Torquemeters only are dead weight calibrated with factory cable and amplifier. Calibration transfer is guaranteed only when used with Himmelstein amplifier and cable with like part numbers.

- "F.S." denotes "Full Scale". "Rdg." denotes "Reading".
- "deg. F." denotes "degree Fahrenheit".
- Speed ratings are for continuous, bi-directional operation.
- These torquemeters operate in a condensing atmosphere, and if wetted with non-corrosive fluids and mud. When used in contaminated conditions, clean regularly or cover to deflect contaminants. They are not submersible.
- Specifications are subject to change without notice.

Available Options: Available options are listed. Consult the factory should you have special requirements.

Enhanced Performance - Code C, or N if Standard


This option reduces measurement errors by a factor of two or more; see specifications. Not available on Model MCRT® 28001T(25-0).

Zero Velocity Speed Pick-up - Code A, Z, or N if None

Outputs 60 voltage pulses/revolution. Code A amplitude is proportional to speed. Code Z requires 5 to 15 V dc power; its output pulse amplitude is approximately the input supply voltage less 0.5 volts.

Foot Mount - Code F, or N if None

Foot mounts provide a rigid stator mounting. They are only available on shaft end torquemeters. Refer to outline drawing for dimensions.

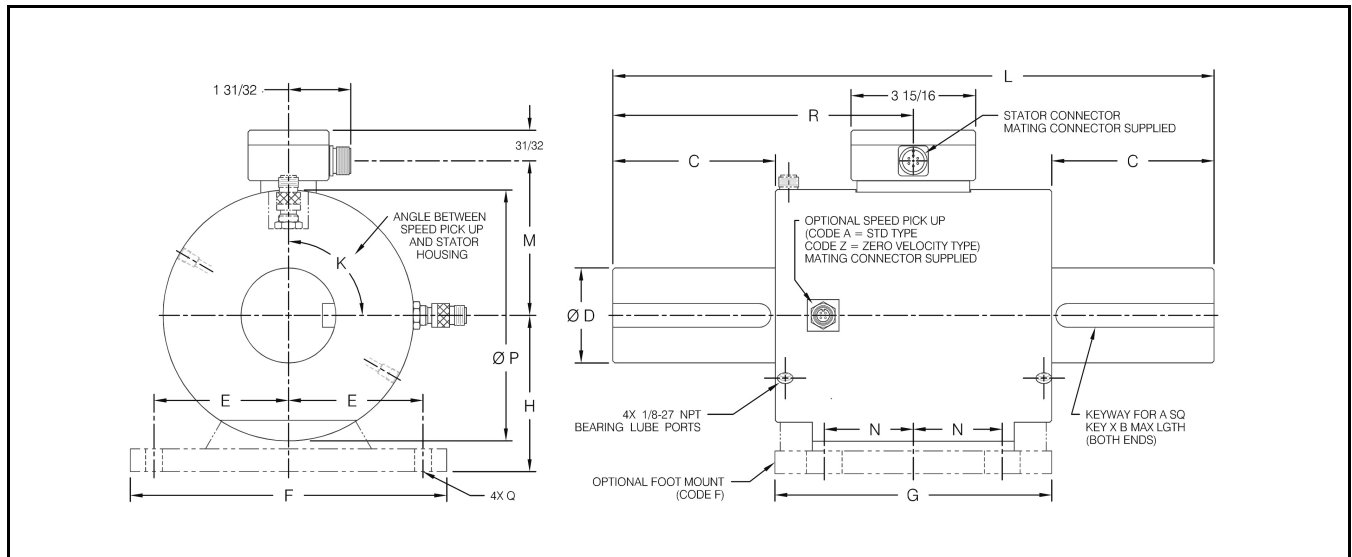
Order No. 	MCRT® 28070T	(96-3)	C	N	Z
	Model Number	Range	Performance Code	Foot Mount	Speed Pickup
An MCRT® 28070T(96-3)CNZ is a 96,000 lbf-in flanged torquemeter with the following options: enhanced performance (C) and zero velocity speed pickup (Z).					

Standard Ratings, MCRT® 28000T Series Shaft End Models

MCRT® MODEL	TORQUE RANGE		TORQUE OVERLOAD		SPEED RATING	SHAFT STIFFNESS*		ROTATING INERTIA		MAX WT.
	[lbf-in]	[N-m]	[lbf-in]	[N-m]	[rpm]	[lbf-in/rad]	[N-m/rad]	[in-ozf sec ²]	[N-m sec ²]	[lbs]
28000T	See Bulletin 716 for low range (10 ozf-in through 200 ozf-in) models; rated 25,000 rpm.									
28001T(25-0)**	25	2.82	50	5.65	0 to ±15,000	2.15X10 ³	2.43X10 ²	0.034	0.00024	6
28001T(5-1)	50	5.65	100	11.3	0 to ±15,000	6.03X10 ³	6.82X10 ²	0.034	0.00024	6
28001T(1-2)	100	11.3	200	22.6	0 to ±15,000	1.47X10 ⁴	1.66X10 ³	0.034	0.00024	6
28001T(2-2)	200	22.6	400	45.2	0 to ±15,000	1.89X10 ⁴	2.14X10 ³	0.034	0.00024	6
28002T(5-2)	500	56.5	1,000	113	0 to ±15,000	5.79X10 ⁴	6.54X10 ³	0.035	0.00025	7
28002T(1-3)	1,000	113	2,000	226	0 to ±15,000	7.01X10 ⁴	7.92X10 ³	0.035	0.00025	7
28003T(2-3)	2,000	226	4,000	452	0 to ±8,500	2.60X10 ⁵	2.94X10 ⁴	0.15	0.0011	11
28004T(5-3)	5,000	565	10,000	1,130	0 to ±8,500	5.80X10 ⁵	6.55X10 ⁴	0.19	0.0013	14
28004T(1-4)	10,000	1,130	20,000	2,260	0 to ±8,500	6.05X10 ⁵	6.83X10 ⁴	0.19	0.0013	14
28006T(2-4)	20,000	2,260	40,000	4,520	0 to ±8,000	1.80X10 ⁶	2.03X10 ⁵	2.3	0.016	105
28006T(4-4)	40,000	4,520	80,000	9,040	0 to ±8,000	2.70X10 ⁶	3.05X10 ⁵	2.4	0.017	105
28007T(5-4)	50,000	5,650	100,000	11,300	0 to ±6,000	5.70X10 ⁶	6.44X10 ⁵	2.8	0.020	115
28007T(1-5)	100,000	11,300	200,000	22,600	0 to ±6,000	7.10X10 ⁶	8.02X10 ⁵	3.0	0.021	115
28008T(2-5)	200,000	22,600	400,000	45,200	0 to ±3,600	2.90X10 ⁷	3.28X10 ⁶	11.0	0.078	150
28008T(375-3)	375,000	42,400	750,000	84,700	0 to ±3,600	3.80X10 ⁷	4.29X10 ⁶	11.7	0.083	150
28009T(75-4)	750,000	84,700	1,500,000	169,000	0 to ±1,800	1.15X10 ⁸	1.30X10 ⁷	205	1.45	775
28009T(15-5)	1,500,000	169,000	3,000,000	339,000	0 to ±1,800	1.36X10 ⁸	1.54X10 ⁷	212	1.50	790
28010T(3-6)	3,000,000	339,000	6,000,000	678,000	0 to ±1,200	2.21X10 ⁸	2.50X10 ⁷	567	4.00	1455
28010T(4-6)	4,000,000	452,000	7,350,000	830,000	0 to ±1,200	2.27X10 ⁸	2.56X10 ⁷	582	4.11	1475

*Stiffness is conservatively rated and includes the torsion section and both shaft ends.

**Code C Performance is not available on this model.



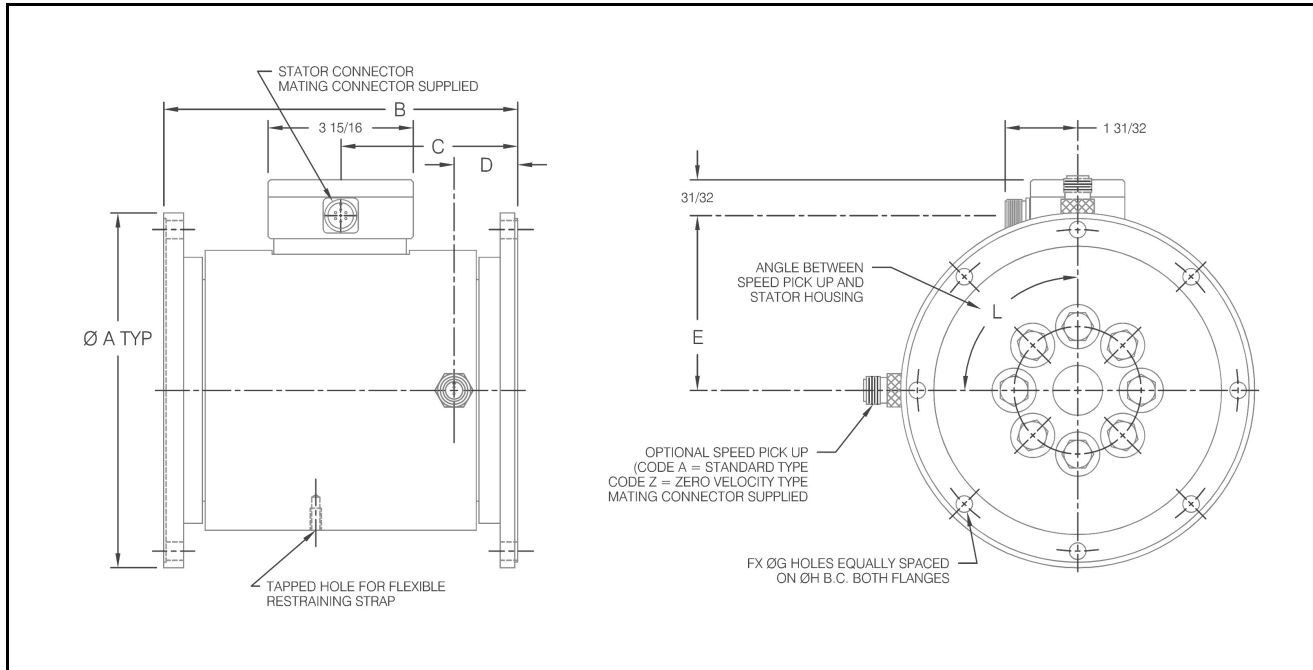
MCRT® MODEL	DIMENSIONS [inches]														
	A	B	C	D ¹	E	F	G	H	L	M	N	P	K	Q	R
28001T	0.187	1.125	1.50	0.625	2.25	5.50	5.50	2.250	8.50	3 13/64	1 ½	3 15/32	3	0.406D	4 ½
28002T	0.187	1.625	2.00	0.750	2.25	5.50	5.50	2.250	9.50	3 13/64	1 ½	3 15/32	3 7/16	0.406D	5
28003T	0.250	1.750	2.31	1.000	2.625	6.25	5.50	2.500	10.00	3 ½	1 ½	3 31/32	3 25/32	0.406D	5 5/8
28004T	0.375	2.750	3.69	1.500	2.625	6.25	5.50	2.500	12.75	3 ½	1 ½	3 31/32	5 5/32	0.406D	7
28006T	0.625	3.500	4.13	2.500	4.25	10.00	8.75	5.000	17.00	5 3/8	2 13/16	7 15/16	4 9/16	Note 2	8 ½
28007T	0.750	4.500	5.13	3.000	4.25	10.00	8.75	5.000	19.00	5 3/8	2 13/16	7 15/16	5 9/16	Note 2	9 ½
28008T	1.000	6.500	7.56	4.500	4.25	10.00	7.75	5.000	23.00	5.85	2 13/16	8 ½	9 11/16	Note 2	12 27/32
28009T	Note 3	8.000	9.00	7.750	7.00	15.50	18.00	8.00	36.00	8 3/8	7 7/8	13 7/8	9 5/8	Note 2	18
28010T	Note 4	12.00	13.50	9.375	8.50	18.50	20.00	9.75	47.00	10	8 7/8	17	14 1/8	Note 2	23 ½

1. Tolerance on D diameter is +0.0000/-0.0005 for diameters ≤ 2.5" and +0.000/-0.001 for diameters > 2.5". 2. Slotted 0.531 wide by 1-1/8 long.
 3. Dual rectangular keyways at each end are 2" wide by 1.50" high. 4. Dual rectangular keyways at each end are 2.50" wide by 1.75" high.

Standard Ratings, Compact MCRT® 2800T Series Flanged Models

MCRT® MODEL	TORQUE RANGE		TORQUE OVERLOAD		SPEED RATING	SHAFT STIFFNESS*		ROTATING INERTIA		MAX WT.
	[lbf-in]	[N-m]	[lbf-in]	[N-m]	[rpm]	[lbf-in/rad]	[N-m/rad]	[ozf-in sec ²]	[N-m sec ²]	[lbs]
28060T(1-3)	1,000	113	2,000	226	0 to ±8,000	6.02X10 ⁵	6.80X10 ⁴	0.6	4.24X10 ⁻³	11
28060T(2-3)	2,000	226	4,000	452	0 to ±8,000	1.38X10 ⁶	1.55X10 ⁵	0.6	4.24X10 ⁻³	11
28060T(4-3)	4,000	452	8,000	904	0 to ±8,000	2.64X10 ⁶	2.98X10 ⁵	0.6	4.24X10 ⁻³	11
28061T(6-3)	6,000	678	12,000	1,360	0 to ±8,000	2.43X10 ⁶	2.75X10 ⁵	0.9	6.36X10 ⁻³	14
28061T(1-4)	10,000	1,130	20,000	2,260	0 to ±8,000	2.93X10 ⁶	3.31X10 ⁵	0.9	6.36X10 ⁻³	14
28061T(18-3)	18,000	2,030	36,000	4,070	0 to ±8,000	3.53X10 ⁶	3.99X10 ⁵	0.9	6.36X10 ⁻³	14
28070T(24-3)	24,000	2,710	48,000	5,420	0 to ±5,500	6.80X10 ⁶	7.68X10 ⁵	8.24	5.82X10 ⁻²	50
28070T(48-3)	48,000	5,420	96,000	10,800	0 to ±5,500	1.22X10 ⁷	1.43X10 ⁶	8.27	5.84X10 ⁻²	50
28070T(96-3)	96,000	10,800	192,000	21,700	0 to ±5,500	1.79X10 ⁷	2.02X10 ⁶	8.33	5.89X10 ⁻²	51
28080T(2-5)	200,000	22,600	400,000	45,200	0 to ±3,600	3.92X10 ⁷	4.43X10 ⁶	54.5	3.84X10 ⁻¹	150
28080T(375-3)	375,000	42,400	750,000	84,700	0 to ±3,600	5.31X10 ⁷	6.00X10 ⁶	54.9	3.88X10 ⁻¹	152
28090T(75-4)	750,000	84,700	1,500,000	169,000	0 to ±1,800	1.37X10 ⁸	1.55X10 ⁷	480	3.39	974
28090T(15-5)	1,500,000	169,000	3,000,000	339,000	0 to ±1,800	1.64X10 ⁸	1.85X10 ⁷	487	3.44	988
28091T(3-6)	3,000,000	339,000	6,000,000	678,000	0 to ±1,200	2.82X10 ⁸	3.19X10 ⁷	1,838	12.98	1,502
28091T(4-6)	4,000,000	452,000	7,350,000	830,000	0 to ±1,200	2.92X10 ⁸	3.30X10 ⁷	1,852	13.08	1,516

* Stiffness is conservatively rated from flange face-to-face.



MCRT® MODEL	DIMENSIONS [inches]							
	A	B	C	D	E	F	G	H
28060T	4.250 ± 0.001 (Flange faces are pilotless)	5 3/16	2 11/32	1 3/32	3 1/2	8	3/8-24UNF-2B	3.625
28061T	4.250 ± 0.001 (Flange faces are pilotless)	5 15/16	2 23/32	1 15/32	3 1/2	8	3/8-24UNF-2B	3.625
28070T**	8 (Flange faces have male and female pilots*)	8	3 1/2	1 7/16	4 29/32	8	0.377 + 0.002/-0.000	7.250
28080T	12 (Flange faces have female pilots*)	15 1/4	6 7/16	5 5/8	5 7/8	16	0.630 + 0.002/-0.000	10.375
28090T	23 (Flange faces have female pilots*)	31	15 1/2	7 1/8	8 3/8	32	0.755 + 0.002/-0.000	20.625
28091T	30 (Flange faces have female pilots*)	37	18 1/2	9 1/8	10	32	1.005 + 0.002/-0.000	27.000

*Contact the factory for a print of flange details.

**MCRT® 28070T flanges mate with Spicer Series 1700/1800 drivelines.