interface

Ideale Lösungsmöglichkeiten für Ihre Anwendungen: www.nbn-elektronik.ch

Low Profile™ (Pancake Style)

N Metric Series	lbf English Series	1000 Fatigue Rated Pg. 8	1100 Ultra Precision Pg. 12	1200 Standard Pg. 16	1216 Axial Torsion Pg. 66	1200 Flange Style Pg. 22	1700 Fange Syle Pg. 24	1500 Low Capacity Pg. 25	1600 Calibration Pg. 40	1800 Calibration Pg. 44	2101 Dual Range Pg. 72	2400 Stainless Pg. 26	3200 Stainless Pg. 30	4600 Tank Weighing Pg. 71	5200 Multi-Axis Pg. 67
125	25							•							
250	50							•							
500	100							•				•			
1,000	200							•							
1,250	250	•			•							•			
1,500	300		•	•				•							
2,500	500	•	•	•	•				•			•			
3,300	750														
5,000	1,000	•	•	•	•				•		•	•			•
10,000	2,000		•	•	•		•		•	•		•			•
12,500	2,500	•											•	•	
13,000	3,000		•	•											
25,000	5,000	•	•	•			•		•	•	•	•	•	•	•
50,000	10,000		•	•					•	•	•	•	•	•	•
50,000	12,500	•					•								
90,000	20,000									•		•			
110,000	25,000	•	•	•					•		•		•	•	•
130,000	30,000					•									
250,000	50,000	•	•	•		•			•	•	•		•	•	•
450,000	100,000	•	•	•		•			•		•		•		
600,000	135,000	•													
900,000	200,000	•	•	•		•			•		•		•		
1,200,000	270,000			•		•									
1,800,000	400,000	•		•											
2,700,000	600,000			•											
4,500,000	1,000,000	•		•											
9,000,000	2,000,000			•											

Mini Series

		MINI TENSION/COMPRESSION										MINI BEAM				OTHER				
		Pg. 46	Pg. 47	Pg. 48	Pg. 51	Pg. 49	Pg. 50	Pg. 52	Pg. 60	Pg. 61	Pg. 63	Pg. 62	Pg. 54	Pg. 58	Pg. 56	Pg. 69	Pg. 68
N Metric Series	lbf English Series	SM Standard	SSM Sealed	SMT Overload Protected	SML Low Height	SMA Miniature	ULC Ultra Low Capacity	WMC Small Diameter	MB Miniature	MBP Overload Protected	SSB Sealed	MBI Overload Protected	LBM/LBS	LW Load Washer	MSC Miniature Column	SPI Single Point	BPL Pedal Load Cell
.5	.1						•										
1	.25						•										
2	.5						•										
5	1.1			•													
10	2.2			•						•		•					
15	3.0															•	
20	5.0			•	•			•	•	•		•	•	•			
30	7.5															•	
45	10	•			•			•	•				•	•			
50	11			•													
60	15															•	
100	22			•													
110	25	•			•			•	•				•	•		•	
225	50	•	•	•	•			•	•		•		•	•		•	•
330	75								•				•				
450	100	•	•		•	•		•	•		•		•	•		•	•
500	112			•													
700	150	•				•			•							•	
900	200				•	•								•			•
1,000	225			•													
1,000	250	•	•					•	•		•		•	•			
1,300	300				•												•
2,000	450			•													
2,200	500	•	•		•			•			•		•	•			•
3,300	750		•														
4,500	1,000	•	•		•			•			•		•	•			
9,000	2,000		•					•					•	•			
11,000	2,500																
13,000	3,000		•					•						•			
25,000	5,000		•					•					•	•			
33,000	7,500							•						•			
50,000	10,000							•					•	•			
55,000	12,500																
65,000	15,000													•	•		
90,000	20,000												•	•	•		
100,000	25,000													•			
135,000	30,000													•	•		
250,000	50,000												•	•			
450,000	100,000													•			

Why Interface?

- **WE ARE #1 . . . THE WORLD LEADER IN HIGH ACCURACY LOAD CELLS FOR FORCE MEASUREMENT**
  - + Performance guarantee: Our load cells will outperform our competition's load cells**—PERIOD!**
  - + Our Gold Standard™ Calibration System is just that—the gold standard, the only comprehensive system available that allows companies to calibrate their load cells. (How do you think many calibration labs and even some of our competitors calibrate **their** load cells?)
  - + Every cell we make is individually tested and calibrated (no sampling).
  - + Temperature characteristics are tested at both low and high temperature.
  - + Self-temperature compensating strain gages manufactured from proprietary alloy.
  - + Cells are creep tested to the tightest specification in the industry.
  - + World's largest producer of low profile load cells. Each uses 8 gages to assure highest accuracy and each is moment compensated to minimize sensitivity to extraneous loads.
  - + Higher output (up to 4mV/V output on low profile load cells).
  - + Our vertical integration means shorter lead times, better quality control and lower costs. Many of our competitors farm out their CNC work, for example, but **our** machining is programmed directly from the same software used to design the load cell.
  - + CATALOG ITEMS: Most load cells in our catalog are stocked for immediate shipment.
  - + CUSTOM LOAD CELLS: **We will work with you to provide precisely what you need . . . quickly and cost-effectively.**

- **INDUSTRY LEADERSHIP CARRIES A RESPONSIBILITY FOR SERVICE LEADERSHIP.** You don't have to be an expert in force measurement...because **we are.** Talk to us about what sort of forces or torques you need to measure, and under what conditions and constraints. We'll walk you through the load cell specification process...quickly and efficiently.

- **WHEN ACCURACY IS IMPORTANT, BEWARE OF COPYCAT PRODUCTS THAT DO NOT MEASURE UP . . . LITERALLY.** We're proud of our innovation. Our load cells are 100% US-designed and manufactured, and Interface is 100% US-owned. But the real answer to the question, "Why Interface?" is the quality and accuracy of the products themselves.

Table of Contents

LOW PROFILE™ GENERAL PURPOSE AND CALIBRATION LOAD CELLS

1000 Fatigue Rated
See page 8

- Capacities from 250 lbf to 100Klbf
- Metric capacities from 1.25 kN to 450 kN
- For fully reversed high cycle

1100 Ultra Precision
See page 12

- Capacities from 300 lbf to 200Klbf
- Metric capacities from 1.5 kN to 900 kN
- Highest accuracy

1200 Standard
See page 16

- Capacities from 300 lbf to 2000Klbf
- Metric capacities from 1.5 kN to 900 kN
- Eccentric load compensated

1200 Flange
See page 22

- Metric capacities from 140 kN to 1500 kN
- Mounts directly to flange cylinders
- Eccentric load compensated

1700 Flange
See page 24

- Metric capacities from 10 kN to 20 kN
- Mounts directly to flange cylinders
- Eccentric load compensated

1500 Standard Low Capacity
See page 25

- Capacities from 25 to 300 lbf
- Metric capacities from 125 to 1500 N
- Very good for eccentric loads

2400 Standard Stainless Steel
See page's 26,28

- Capacities from 100 lbf to 20Klbf
- Metric capacities from 450 N to 90 kN
- Welded diaphragm/connector

3200 Standard Stainless Steel
See page 30

- Capacities from 2.5Klbf to 100Klbf
- Metric capacities from 22 kN to 450 kN
- Eccentric load compensated

Interface Amplified Load Cells
See page 35

- Capacities from 300 lbf to 2000Klbf
- Avaliable in 2 or 3 wire configurations
- Eliminates need for external signal conditioning

3-Wire shown

1600 Gold Standard™ Calibration Load Cell
See page 40

- Capacities from 500 lbf to 100K
- Metric capacities from 2.2 kN to 450 kN
- Guaranteed to 4% lower load limit

1800 Platinum Standard™ Calibration Load Cell
See page 44

- Capacities from 1.1K to 155Klbf
- Metric capacities from 5 kN to 250 kN
- Integral adapter

COLUMN/ROD END LOAD CELLS

WMC Rod End
See page 64

- Capacities from 20Klbf to 50Klbf
- Stainless Steel
- Tension & compression

2100 High Capacity Column Load Cell
See page 65

- Capacities to 1000Klbf
- Metric capacities to 4450 kN
- Universal or compression only

MULTI-AXIS

1216 Axial Torsion
See page 66

- Measures torque & load
- Minimal crosstalk
- Fatigue rated

5200 Multi-Axis
See page 67

- Measures load & moment
- Low deflection
- Low crosstalk

MINIATURE

SM S-Type
See page 46

- Capacities from 10 lbf to 1Klbf
- Metric capacities from 50 N to 5 kN
- High accuracy "S" type cell

SSM Sealed S-Type
See page 47

- Capacities from 50 lbf to 5 lbf
- Metric capacities from 200 N to 20 kN
- Sealed "S" type cell

SMT S-Type Overload Protected
See page 48

- Capacities from 1.1 lbf to 450 lbf
- Metric capacities from 5 N to 2 kN
- Safe overload to 10X capacity

SMA Miniature S-Type
See page 49

- Capacities from 15 lbf to 200 lbf
- Compact design
- Tension & compression

ULC Ultra Low Capacity
See page 50

- Capacities from 2 oz to 7 oz
- Metric capacities from 0.5 N to 2 N
- Safe overload to 10X capacity

SML Low Height
See page 51

- Capacities from 5 lbf to 1Klbf
- Metric capacities from 20 N to 4.5 kN
- Only 3/4" high

WMC Miniature Sealed Stainless Steel
See page's 52,53

- Capacities from 5 lbf to 10Klbf
- Stainless steel
- Tension & compression

LBM Compression
See page 54

- Capacities from 25 lbf to 50Klbf
- Metric capacities from 110 N to 225 kN
- Low height

LBS Miniature Compression
See page 55

- Capacities from 5 lbf to 1K lbf
- Metric capacities from 20 N to 4.5 kN
- Small diameter/low height

MSC Small Diameter High Capacity
See page 56

- Capacities from 15Klbf to 30Klbf
- Compact design
- Stainless steel

LW Load Washer
See page 58

- Capacities from 5 lbf to 100Klbf
- Metric capacities from 22 N to 450 kN
- Thru hole design

MB Miniature Beam
See page 60

- Capacities from 5 lbf to 250 lbf
- Metric capacities from 20 N to 1.1 kN
- High accuracy beam type cell

MBP Miniature Beam Overload Protected
See page 61

- Capacities from 2.5 lbf to 10 lbf
- Metric capacities from 10 N to 50 N
- 10X overload protection

MBI Fatigue Rated Miniature Beam Overload Protected
See page 62

- Capacities from 2.5 lbf to 10 lbf
- Metric capacities from 10 N to 50 N
- 10X overload protection

SSB Sealed Beam
See page 63

- Capacities from 50 lbf to 1Klbf
- Metric capacities from 225 N to 4.5 kN
- Environmentally sealed

SPECIAL APPLICATIONS

BPL Pedal Load Cell
See page 68

- Capacities from 50 lbf to 500 lbf
- Ultra low height
- For use with gas, brake or clutch pedal

SPI Platform Scale 3-15 lbf
See page 69

- 400% compression overload protection
- Eccentric load compensated
- Tension & compression overload protection

SPI Platform Scale 25-150 lbf
See page 70

- Compensated strain gages
- Safe overload to 200%
- Eccentric load compensated

A4200 & A4600 Weighcheck
See page 71

- Capacities from 2.5K to 50K
- Metric capacities from 1.1 kg to 23K kg
- For tank and specialty weighing

2101 Dual Range Standard Compression-Only
See page 72

- Capacities from 5Klbf/1Klbf to 125Klbf/25Klbf
- Metric capacities from 25 kN/5 kN to 550 kN/125kN
- Dual range compression

3400 Coil Tubing Load Cell
See page 73

- Capacities from 30Klbf to 50Klbf
- Hermetically sealed cell
- Eccentric load compensated

TORQUE

RT10E & RT12E Rotary Transformer
See page's 78,80

- Capacities from 25 lb-in to 2M lb-in
- Metric capacities of 3 Nm to 450K Nm
- High accuracy rotary transformer

RT8E Low Cost Rotary Torque Cell
See page 82

- Capacities from 25 to 10K lb-in
- ±10V, ±5V output
- Long, maintenance-free life

RT13L & RT14L Low Capacity Rotary Transformer
See page 84

- Capacities from 10 oz-in to 200 oz-in
- Metric capacities from 0.1 Nm to 1.4 Nm
- High accuracy

RT15S & RT16S Spline Drive Rotary Transformer
See page 86

- Capacities from 50 to 10Klb-in
- Metric capacities from 5.6 Nm to 1130 Nm
- Spline drive

5300 Reaction Torque Cell
See page 88

- Capacities from 1 lb-in to 100Klb-in
- Metric capacities from .1 Nm to 11K Nm
- Shaft, flange & hollow flange

MRT Miniature Reaction Torque Cell
See page 91

- Capacities from 1.77 lb-in to 177 lb-in
- Metric capacities from 0.2 Nm to 20 Nm
- High accuracy

INSTRUMENTATION & CALIBRATION SYSTEMS

500 In-Line Signal Conditioner
See page 94

- Output of ±5 VDC Bipolar & 4-20 mA
- 12-24 VDC power
- DE-9 connector

SGA AC/DC Powered Signal Conditioner
See page 95

CE

- User selectable analog output ±10V, ±5V, 4-20 mA
- 110 VAC, 220 VAC, or 18-24 VDC power
- Selectable filtering 1 Hz to 5K Hz

DMA DIN Rail Mount Signal Conditioner
See page 96

- User selectable analog output ±10V, ±5V, 4-20 mA
- 12-24 VDC power
- Selectable input ranges

DCA Vehicle Compatible Signal Conditioner
See page 97

- 10-28 VDC power
- NEMA 4X enclosure
- User selectable analog output ±10V, ±5V or 4-20mA

9820 General Purpose Indicator
See page 98

CE

- 5 digit bipolar LED display
- Nonlinearity < ±0.01%
- Front panel shunt calibration

9830 High Speed Digital Indicator
See page 99

- 120 readings per second
- Programmable analog output
- Front panel shunt calibration

9840 Intelligent Indicator
See page 100

- 24 bit internal resolution
- 5 & 6 point linearization
- ±999,999 display counts

9850 Rotary Torque Indicator
See page 101

- AC carrier excitation
- 2000 readings/second
- Torque, Speed and HP display

9320 Hand Held Battery Powered Indicator
See page 102

CE

TEDS enabled

- TEDS enabled (see Page 118)
- 7 1/2 digit LCD display
- Environmentally sealed

9300 Weight Indicator
See page 103

CE

- 6-digit display
- Powers up to 8 load cells
- 15 readings/second typical

9390 Battery Powered Weight Indicator
See page 104

CE

- 100,000 display graduations
- Powers up to 4 load cells
- Battery powered

UMC 600 Weight Indicator/Controller
See page 105

CE

- Powers up to 8 load cells
- 10 readings/second with adjustable digital averaging
- 5-point linearization

Gold Standard™ Load Cell Calibration System
See page 107

- Reduces calibration time 50-90%
- Eliminates errors
- Automatic calculation & archiving

Gold Standard™ E4 Machine Calibration System
See page 108

- Portable
- Eliminates errors
- Reduces verification times up to 90%

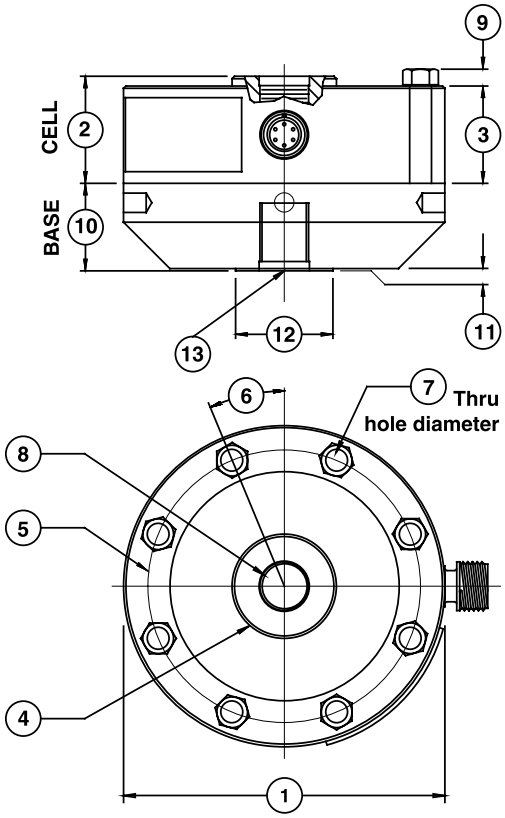
Precision mV/V Load Cell Simulator
See page 109

- Most accurate simulator
- Special low thermal emf construction
- Instrument substitution testing

Model 1000 Fatigue Rated Load Cell (U.S. & Metric)

Why the Interface model 1000 Fatigue Rated Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **100 million fully reversed cycles**
- **Performance to 0.03%**
- **Eccentric load compensated**
- **Low deflection**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Barometric compensation**
- **Shunt calibration**
- **Tension and compression**



DIMENSIONS

See Drawing	MODEL 1010		1020		1032	
	CAPACITY					
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	250, 500, 1K, 2.5K, 5K	1.25, 2.5 5, 12.5, 25	12.5K, 25K	50, 125	50K	225
	inch	mm	inch	mm	inch	mm
①	4.13	104.8	6.06	153.9	8.00	203.2
②	1.38	34.9	1.75	44.5	2.50	63.5
③	1.25	31.7	1.63	41.4	2.25	57.2
④	1.34	34.0	2.65	67.3	3.76	95.2
⑤	3.50	88.9	5.13	130.3	6.50	165.1
⑥	22.5°	22.5°	15.0°	15.0°	11.25°	11.25°
⑦	0.28	7.10	0.41	10.4	0.53	13.5
	8 places		12 places		16 places	
⑧	5/8-18 UNF-3B	M-16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H	1 3/4-12 UNF-3B	M42 X 2-4H
	1.12 in deep	28.4 mm deep	1.40 in deep	35.6 mm deep	2.15 in deep	54.6 mm deep
⑨	0.20	5.10	0.30	7.60	0.40	10.2
⑩	1.13	28.6	1.75	44.5	2.00	50.8
⑪	0.03	0.80	0.03	0.80	0.03	0.80
⑫	1.25	31.8	2.25	57.2	3.00	76.2
⑬	5/8-18 UNF-3B	M-16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H	1 3/4-12 UNF-3B	M42 X 2-4H
	.87 in deep	22.1 mm deep	1.40 in deep	35.6 mm deep	1.75 in deep	44.5 mm deep

SPECIFICATIONS

PARAMETERS	MODEL 1010	1010	1020	1032
	CAPACITY			
U.S. Models (lbf)	250, 500, 1K	2.5K, 5K	12.5K, 25K	50K
Metric Models (kN)	1.25, 2.5, 5	12.5, 25	50, 125	225
ACCURACY – (MAX ERROR)				
Static Error Band–% FS	±0.03	±0.04	±0.05	±0.05
Nonlinearity–% FS	±0.04	±0.04	±0.05	±0.05
Hysteresis–% FS	±0.03	±0.04	±0.05	±0.05
Nonrepeatability–% RO	±0.02	±0.02	±0.02	±0.02
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.1	±0.1	±0.1	±0.1
Eccentric Load Sensitivity–%/in	±0.1	±0.1	±0.1	±0.1
TEMPERATURE				
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Zero–%RO/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL				
Rated Output–mV/V (Nominal)	1.0	2.0	2.0	2.0
Excitation Voltage–VDC MAX	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000
MECHANICAL				
Safe Overload–% CAP	±300	±300	±300	±300
Deflection @ RO–inch	0.0005	0.001	0.001	0.002
Deflection @ RO–mm	0.013	0.025	0.025	0.050
Optional Base–P/N (Metric)	B101 (M)	B102 (M)	B103 (M)	B112 (M)
Natural Frequency–kHz	5.0, 6.9, 9.8	6.6, 9.4	6.5, 7.0	5.8
Weight–lb	1.5	3.3	9.5	26
Weight–kg	0.7	1.5	4.3	12
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	T & C	T & C	T & C	T & C

OPTIONS* Page 115

Base (Recommended)
Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation
Loading Hardware

**See appendix for more technical information*

STANDARD CONFIGURATIONS

10 ft Integral Cable (10xxAJ-nn)
<or> PC04E-10-6P Connector (10xxAF-nn)
Installed Base (-B suffix)

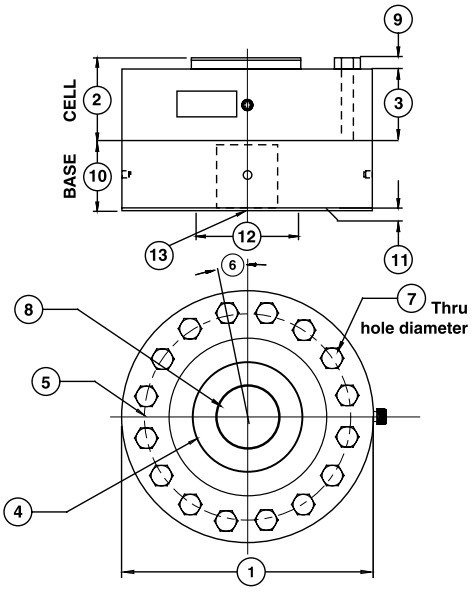
Shown with optional base

Model 1000 Fatigue Rated High Capacity Load Cell (U.S. & Metric)

Why the Interface model 1000 Fatigue Rated High Capacity Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **100 million fully reversed cycles**
- **Performance to 0.06%**
- **Eccentric load compensated**
- **Low deflection**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Barometric compensation**
- **Shunt calibration**
- **Tension and compression**

Shown with optional base



DIMENSIONS

See Drawing	MODEL 1040		1044		1050		1060		1080		1090	
	CAPACITY											
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	100K	450	135K	600	200K	900	300K	1500	500K	2250	1000K	4500
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	11.0	279.0	11.0	279.0	12.0	304.8	15.5	393.7	20.50	520.7	26.00	660.4
②	3.50	88.9	4.00	101.6	4.50	114.3	5.50	139.7	6.25	158.8	7.75	196.9
③	3.00	76.2	3.25	82.6	4.25	108.0	5.00	127.0	6.00	152.4	7.50	190.5
④	4.81	122.2	4.81	122.2	5.68	144.3	7.73	196.3	10.55	267.9	13.79	350.3
⑤	9.00	228.6	8.75	222.2	9.50	241.3	12.68	322.1	16.5	419.1	20.50	520.7
⑥	11.25°	11.25°	11.25°	11.25°	9.00°	9.00°	7.50°	7.50°	6.43°	6.43°	5.63°	5.63°
⑦	0.65	16.5	0.79	20.1	0.79	20.1	0.94	23.9	1.06	27.0	1.31	33.3
	16 places		16 places		20 places		24 places		28 places		32 places	
⑧	2 3/4-8 UNF-3B	M72 X 2-4H	2 3/4-8 UNF-3B	M72 X 2-4H	3 1/2-8 UN-3B	M90 X 3-4H	4 1/4-8 UN-3B	M120 X 4-4H	6.00-8 UN-3B	M150 X 4-4H	8.00-8 UN-3B	M200 X 4-4H
	3.25 in deep	82.6mm deep	3.75 in deep	96.3 mm deep	3.75 in deep	95.3 mm deep	4.25 in deep	108.0 mm deep	5.63 in deep	130 mm deep	7.00 deep	178 mm deep
⑨	0.50	12.7	0.50	12.7	0.59	15.0	0.69	17.5	1.00	25.4	1.25	31.3
⑩	3.00	76.2	4.00	101.6	4.50	114.3	5.00	127.0	7.00	177.8	9.00	228.6
⑪	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.10	2.5
⑫	4.50	114.3	4.50	114.3	6.00	152.4	7.75	196.9	10.55	267.9	14.00	355.6
⑬	2 3/4-8 UNF-3B	M72 X 2-4H	2 3/4-8 UNF-3B	M72 X 2-4H	3 1/2-8 UN-3B	M90 X 3-4H	4 1/4-8 UN-3B	M120 X 4-4H	6.00-8 UN-3B	M150 X 4-4H	8.00-8 UN-3B	M200 X 4-4H
	2.75 in deep	69.8 mm deep	3.75 in deep	95.3 mm deep	3.75 in deep	95.3 mm deep	4.25 in deep	108.0 mm deep	6.38 in deep	162 mm deep	7.25 deep	184 mm deep

Specifications subject to change.

SPECIFICATIONS

PARAMETERS	MODEL 1040	1044	1050	1060	1080	1090
	CAPACITY					
U.S. Models (lbf)	100K	135K	200K	300K	500K	1000K
Metric Models (kN)	450	600	900	1500	2250	4500
ACCURACY – (MAX ERROR)						
Static Error Band–% FS	±0.06	±0.07	±0.10	±0.10	±0.15	±0.20
Nonlinearity–% FS	±0.06	±0.08	±0.10	±0.10	±0.15	±0.20
Hysteresis–% FS	±0.06	±0.08	±0.10	±0.10	±0.15	±0.20
Nonrepeatability–% RO	±0.02	±0.02	±0.02	±0.02	±0.02	±0.02
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.1	±0.25	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.1	±0.25	±0.25	±0.25	±0.25	±0.50
TEMPERATURE						
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Zero–%RO/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL						
Rated Output–mV/V (Nominal)	2.0	2.0	2.0	2.0	2.0	2.0
Excitation Voltage–VDC MAX	20	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000	5000
MECHANICAL						
Safe Overload–% CAP	±300	±300	±300	±300	±300	±300
Deflection @ RO–inch	0.003	0.003	0.004	0.004	0.005	0.005
Deflection @ RO–mm	0.075	0.076	0.10	0.10	0.13	0.13
Optional Base–P/N (Metric)	B105 (M)	B116 (M)	B121 (M)	B122 (M)	B123 (M)	B125 (M)
Natural Frequency–kHz	4.9	5.0	5.5	5.5	5.5	5.5
Weight–lb	68	70	100	200	450	860
Weight–kg	30.9	31.8	45	90	205	390
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	T & C	T & C	T & C	T & C	T & C	T & C

OPTIONS*Page 115

Base (Recommended)
Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
See Low Profile Options
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES*Page 119

Mating Connector
Instrumentation
Loading Hardware

See appendix for more technical information

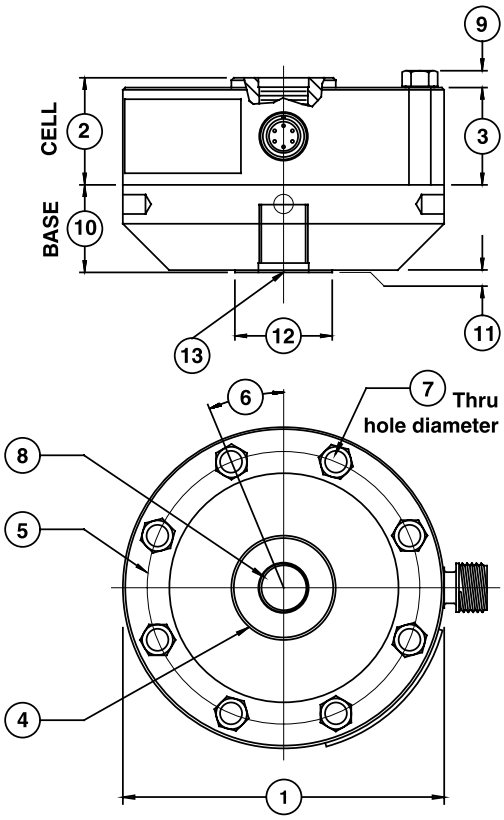
STANDARD CONFIGURATIONS

10 ft Integral Cable (10xxAJ-nn)
<or> PC04E-10-6P Connector (10xxAF-nn)
<or> PT02E-10-6P Bayonet Connector (12xxCDS-nn)
Installed Base (-B suffix)

Model 1100 Ultra Precision Load Cell (U.S. & Metric)

Why the Interface model 1100 Ultra Precision Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .02%**
- **High output – to 4 mV/V**
- **Eccentric load compensated**
- **Low deflection**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Shunt calibration**
- **High precision base included**
- **Barometric compensation**
- **Tension and compression**



DIMENSIONS

See Drawing	MODEL 1110		1120		1132		1140	
	CAPACITY							
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	300, 500, 1K, 2K, 3K, 5K, 10K	1.5, 2.5 5, 10, 25, 50	25K, 50K	100, 250	100K	450	200K	900
	inch	mm	inch	mm	inch	mm	inch	mm
①	4.13	104.8	6.06	153.9	8.00	203.2	11.0	279.0
②	1.38	34.9	1.75	44.5	2.50	63.5	3.50	88.9
③	1.25	31.7	1.63	41.4	2.25	57.2	3.00	76.2
④	1.34	34.0	2.65	67.3	3.76	95.2	4.81	122.2
⑤	3.50	88.9	5.13	130.3	6.50	165.1	9.00	228.6
⑥	22.5°	22.5°	15.0°	15.0°	11.25°	11.25°	11.25°	11.25°
⑦	0.28	7.10	0.41	10.4	0.53	13.5	0.65	16.5
⑧	5/8-18 UNF-3B	M-16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H	1 3/4-12 UNF-3B	M42 X 2-4H	2 3/4-8 UNF-3B	M72 X 2-4H
	1.12 in deep	28.4 mm deep	1.40 in deep	35.6 mm deep	2.15 in deep	54.6 mm deep	3.25 in deep	82.6mm deep
⑨	0.20	5.10	0.30	7.60	0.40	10.2	0.50	12.7
⑩	1.13	28.6	1.75	44.5	2.00	50.8	3.00	76.2
⑪	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80
⑫	1.25	31.8	2.25	57.2	3.00	76.2	4.50	114.3
⑬	5/8-18 UNF-3B	M-16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H	1 3/4-12 UNF-3B	M42 X 2-4H	2 3/4-8 UNF-3B	M72 X 2-4H
	.87 in deep	22.1 mm deep	1.40 in deep	35.6 mm deep	1.75 in deep	44.5 mm deep	2.75 in deep	69.8 mm deep

SPECIFICATIONS

PARAMETERS	MODEL 1110	1110	1120	1132	1140
	CAPACITY				
U.S. Models (lbf)	300, 500, 1K, 2K, 3K	5K, 10K	25K, 50K	100K	200K
Metric Models (kN)	1.5, 2.5, 5, 10	25, 50	100, 250	450	900
ACCURACY – (MAX ERROR)					
Static Error Band–% FS	±0.02	±0.03	±0.04	±0.05	±0.06
Nonlinearity–% FS	±0.03	±0.04	±0.04	±0.05	±0.06
Hysteresis–% FS	±0.02	±0.04	±0.05	±0.05	±0.06
Nonrepeatability–% RO	±0.01	±0.01	±0.01	±0.01	±0.01
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.1	±0.1	±0.1	±0.1	±0.1
Eccentric Load Sensitivity–%/in	±0.1	±0.1	±0.1	±0.1	±0.1
TEMPERATURE					
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0004	±0.0004	±0.0004	±0.0004	±0.0004
Effect on Zero–%RO/˚C – MAX	±0.0007	±0.0007	±0.0007	±0.0007	±0.0007
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL					
Rated Output–mV/V (Nominal)	2.0	4.0	4.0	4.0	4.0
Excitation Voltage–VDC MAX	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000
MECHANICAL					
Safe Overload–% CAP	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.002	0.004	0.004	0.006	0.012
Deflection @ RO–mm	0.05	0.10	0.10	0.15	0.20
Base Part Number (Ref) (Metric)	B101 (m)	B102 (m)	B103 (m)	B112 (m)	B105 (m)
Natural Frequency–kHz	2.7, 3.5, 4.9, 7.0, 8.5	4.7, 6.6	4.6, 5.0	4.0	3.5
Weight–lb	3.3	7.3	21.5	52	146
Weight–kg	1.5	3.3	9.8	24	66
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	T & C	T & C	T & C	T & C	T & C

OPTIONS*Page 115

Compression Overload Protection
Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES*Page 119

Mating Connector
Instrumentation
Loading Hardware

STANDARD CONFIGURATIONS

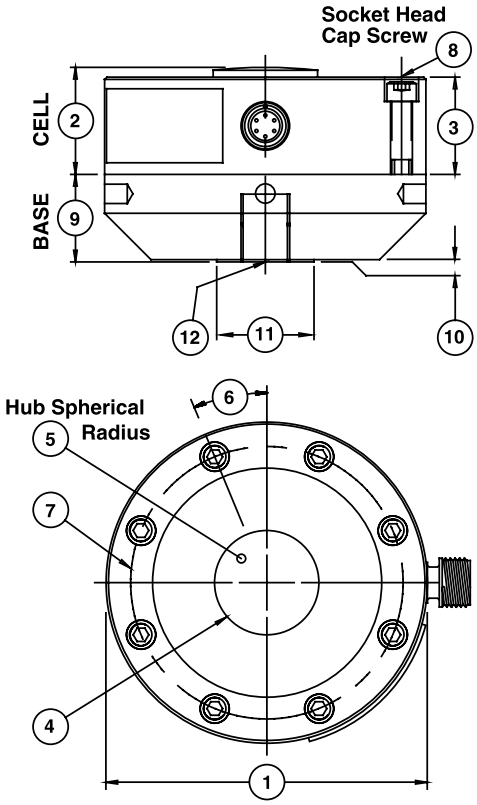
10 ft Integral Cable (11xxAJ-nn)
<or> PC04E-10-6P Connector (11xxAF-nn)
<or> PTO2E-10-6P Bayonet Connector (11xxACK-nn)

See appendix for more technical information

Model 1101 Ultra Precision Compression-Only Load Cell (U.S. & Metric)

Why the Interface model 1101 Ultra Precision Compression-Only Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .02%**
- **High output – to 4 mV/V**
- **Eccentric load compensated**
- **Low deflection**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Shunt calibration**
- **High precision base included**
- **Barometric compensation**



DIMENSIONS

See Drawing	MODEL 1111		MODEL 1121	
	CAPACITY			
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	1K, 2K, 5K, 10K	5, 10, 25, 50	25K 50K	100 250
	inch	mm	inch	mm
①	4.13	104.8	6.06	153.9
②	1.38	34.9	1.75	44.5
③	1.25	31.7	1.63	41.4
④	1.34	34.0	2.65	67.3
⑤	6.00	152.4	8.00	203.2
⑥	22.5°	22.5°	15.0°	15.0°
⑦	3.50	88.9	5.13	130.3
⑧	8 places		12 places	
⑨	1.13	28.7	1.75	44.5
⑩	0.03	0.80	0.03	0.80
⑪	1.25	31.8	2.25	57.2
⑫	5/8-18 UNF-3B	M-16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H
	.87 in deep	22.1 mm deep	1.40 in deep	35.6 mm deep

SPECIFICATIONS

PARAMETERS	MODEL 1111	1111	1121
	CAPACITY		
U.S. Models (lbf)	1K, 2K	5K, 10K	25K, 50K
Metric Models (kN)	5, 10	25, 50	100, 250
ACCURACY – (MAX ERROR)			
Static Error Band–% FS	±0.02	±0.03	±0.03
Nonlinearity–% FS	±0.03	±0.04	±0.04
Hysteresis–% FS	±0.02	±0.04	±0.04
Nonrepeatability–% RO	±0.01	±0.01	±0.01
Creep, in 20 min–%	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.1	±0.1	±0.1
Eccentric Load Sensitivity–%/in	±0.1	±0.1	±0.1
TEMPERATURE			
Compensated Range–˚F	15 to115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0004	±0.0004	±0.0004
Effect on Zero–%RO/˚C – MAX	±0.0007	±0.0007	±0.0007
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015
ELECTRICAL			
Rated Output–mV/V (Nominal)	2.0	4.0	4.0
Excitation Voltage–VDC MAX	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000
MECHANICAL			
Safe Overload–% CAP	±150	±150	±150
Deflection @ RO–inch	0.002	0.004	0.004
Deflection @ RO–mm	0.05	0.10	0.10
Base Part Number (Ref)	B101	B102	B103
Natural Frequency–kHz	4.5, 6.4	4.3, 6.1	4.1, 4.6
Weight–lb	3.3	7.3	21.5
Weight–kg	1.5	3.3	9.8
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	Compression	Compression	Compression

OPTIONS* Page 115

Compression Overload Protection
Integral 10 ft Cable
Multiple Bridge
Bayonet Connector
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation
Loading Hardware

STANDARD CONFIGURATIONS

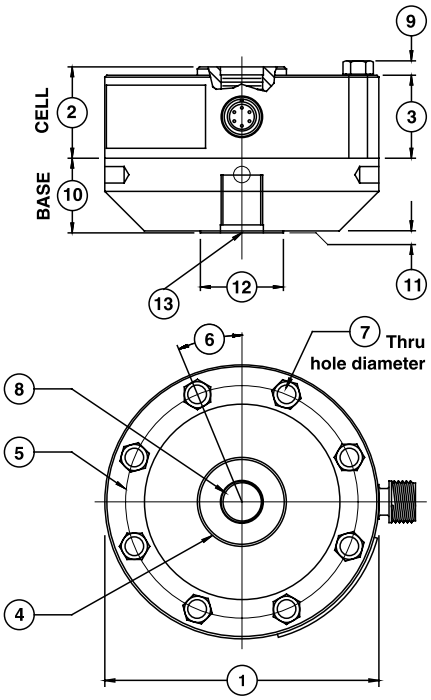
10 ft Integral Cable (11xxEX-nn)
<or> PC04E-10-6P Connector (11xxHL-nn)
<or> PTO2E-10-6P Bayonet Connector (11xxBAY-nn)

See appendix for more technical information

Model 1200 Standard Load Cell (U.S. & Metric)

Why the Interface model 1200 Standard Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .04%**
- **High output – to 4 mV/V**
- **Eccentric Load compensated**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**
- **Tension and compression**
- **Compact size**



DIMENSIONS

See Drawing	MODEL 1210		1220		1232	
	CAPACITY					
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	300, 500, 1K, 2K, 5K, 10K	1.5, 2.5 5, 10, 25, 50	25K, 50K	100, 250	100K	450
	inch	mm	inch	mm	inch	mm
①	4.13	104.8	6.06	153.9	8.00	203.2
②	1.38	34.9	1.75	44.5	2.50	63.5
③	1.25	31.7	1.63	41.4	2.25	57.2
④	1.34	34.0	2.65	67.3	3.76	95.2
⑤	3.50	88.9	5.13	130.3	6.50	165.1
⑥	22.5°	22.5°	15.0°	15.0°	11.25°	11.25°
⑦	0.28	7.10	0.41	10.4	0.53	13.5
	8 places		12 places		16 places	
⑧	5/8-18 UNF-3B	M16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H	1 3/4-12 UNF-3B	M42 X 2-4H
	1.12 in deep	28.4 mm deep	1.40 in deep	35.6 mm deep	2.15 in deep	54.6 mm deep
⑨	0.20	5.10	0.30	7.60	0.40	10.2
⑩	1.13	28.6	1.75	44.5	2.00	50.8
⑪	0.03	0.80	0.03	0.80	0.03	0.80
⑫	1.25	31.8	2.25	57.2	3.00	76.2
⑬	5/8-18 UNF-3B	M16 X 2-4H	1 1/4-12 UNF-3B	M33 X 2-4H	1 3/4-12 UNF-3B	M42 Xx 2-4H
	.87 in deep	22.1 mm deep	1.40 in deep	35.6 mm deep	1.75 in deep	44.5 mm deep

SPECIFICATIONS

PARAMETERS	MODEL 1210	1210	1220	1232
	CAPACITY			
U.S. Models (lbf)	300, 500, 1K, 2K	5K, 10K	25K, 50K	100K
Metric Models (kN)	1.5, 2.5, 5, 10	25, 50	100, 250	450
ACCURACY – (MAX ERROR)				
Static Error Band–% FS	±0.04	±0.05	±0.05	±0.06
Nonlinearity–% FS	±0.04	±0.05	±0.05	±0.05
Hysteresis–% FS	±0.03	±0.05	±0.06	±0.06
Nonrepeatability–% RO	±0.01	±0.01	±0.01	±0.01
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25
TEMPERATURE				
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Zero–%RO/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL				
Rated Output–mV/V (Nominal)	2.0	4.0	4.0	4.0
Excitation Voltage–VDC – MAX	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000
MECHANICAL				
Safe Overload–% CAP	±150	±150	±150	±150
Deflection @ RO–inch	0.001	0.002	0.002	0.003
Deflection @ RO–mm	0.03	0.05	0.05	0.08
Optional Base–P/N (Metric)	B101 (M)	B102 (M)	B103 (M)	B112 (M)
Natural Frequency–kHz	3.9, 5.0, 6.9, 9.8	6.6, 9.4	6.5, 7.0	5.8
Weight–lb	1.5	3.3	9.5	26
Weight–kg	0.7	1.5	4.3	11.8
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	T & C	T & C	T & C	T & C

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Base (Recommended)
Compression Overload Protection
Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation
Loading Hardware

**See appendix for more technical information*

STANDARD CONFIGURATIONS

10 ft Integral Cable (12xxAJ-nn)
<or> PC04E-10-6P Standard Connector (12xxAF-nn)
<or> PT02E-10-6P Bayonet Connector (12xxACK-nn)
Installed Base (-B suffix)

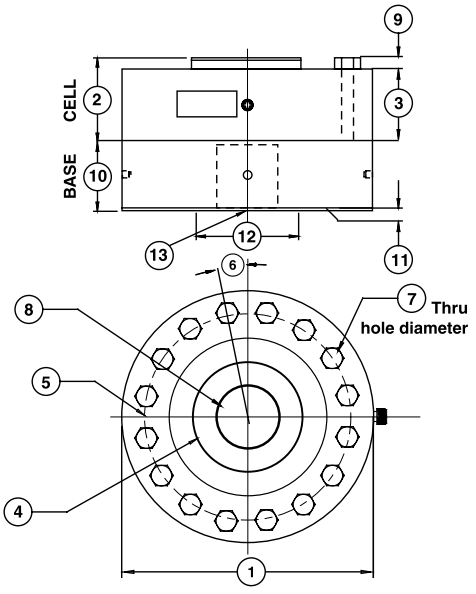
Shown with optional base

Model 1200 Standard High Capacity Load Cell (U.S. & Metric)

Why the Interface model 1200 Standard High Capacity Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .07%**
- **High output – to 4 mV/V**
- **Eccentric Load compensated**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**
- **Tension and compression**
- **Compact size**

Shown with optional base



DIMENSIONS

See Drawing	MODEL 1240		1244		1250		1260		1280		1290	
	CAPACITY											
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	200K	900	270K	1200	400K	1800	600K	2700	1000K	4500	2000K	9000
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	11.0	279.0	11.0	279.0	12.0	304.8	15.5	393.7	20.50	520.7	26.00	660.4
②	3.50	88.9	4.00	101.6	4.50	114.3	5.50	139.7	6.25	158.8	7.75	196.9
③	3.00	76.2	3.25	82.6	4.25	108.0	5.00	203.2	6.00	152.4	7.50	190.5
④	4.81	122.2	4.81	122.2	5.68	144.3	7.73	196.3	10.55	267.9	13.79	350.3
⑤	9.00	228.6	8.75	222.2	9.50	241.3	12.68	322.1	16.5	419.1	20.50	520.7
⑥	11.25°	11.25°	11.25°	11.25°	9.00°	9.00°	7.50°	7.50°	6.43°	6.43°	5.63°	5.63°
⑦	0.65	16.5	0.79	20.1	0.79	20.1	0.94	23.9	1.06	27.0	1.31	33.3
	16 places		16 places		20 places		24 places		28 places		32 places	
⑧	2 3/4-8 UNF-3B	M72 X 2-4H	2 3/4-8 UNF-3B	M72 X 2-4H	3 1/2-8 UN-3B	M90 X 3-4H	4 1/4-8 UN-3B	M120 X 4-4H	6.00-8 UN-3B	M150 X 4-4H	8.00-8 UN-3B	M200 X 4-4H
	3.25 in deep	82.6mm deep	3.75 in deep	96.3 mm deep	3.75 in deep	95.3 mm deep	4.25 in deep	108.0 mm deep	5.63 in deep	130 mm deep	7.00 deep	178 mm deep
⑨	0.50	12.7	0.50	12.7	0.59	15.0	0.69	17.5	1.00	25.4	1.25	31.3
⑩	3.00	76.2	4.00	101.6	4.50	114.3	5.00	127.0	7.00	177.8	9.00	228.6
⑪	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.10	2.5
⑫	4.50	114.3	4.50	114.3	6.00	152.4	7.75	196.9	10.55	267.9	14.00	355.6
⑬	2 3/4-8 UNF-3B	M72 X 2-4H	2 3/4-8 UNF-3B	M72 X 2-4H	3 1/2-8 UN-3B	M90 X 3-4H	4 1/4-8 UN-3B	M120 X 4-4H	6.00-8 UN-3B	M150 X 4-4H	8.00-8 UN-3B	M200 X 4-4H
	2.75 in deep	69.8 mm deep	3.75 in deep	95.3 mm deep	3.75 in deep	95.3 mm deep	4.25 in deep	108.0 mm deep	6.38 in deep	162 mm deep	7.25 deep	184 mm deep

Specifications subject to change. Call factory for additional information on the 1250 and 1260.

SPECIFICATIONS

PARAMETERS	MODEL 1240	1244	1250	1260	1280	1290
	CAPACITY					
U.S. Models (lbf)	200K	270K	400K	600K	1000K	2000K
Metric Models (kN)	900	1200	1800	2700	4500	9000
ACCURACY – (MAX ERROR)						
Static Error Band–% FS	±0.07	±0.07	±0.12	±0.12	±0.15	±0.20
Nonlinearity–% FS	±0.07	±0.08	±0.12	±0.12	±0.15	±0.20
Hysteresis–% FS	±0.07	±0.08	±0.12	±0.12	±0.15	±0.20
Nonrepeatability–% RO	±0.01	±0.02	±0.02	±0.02	±0.02	±0.02
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25	±0.25	±0.50
TEMPERATURE						
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Zero–%RO/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL						
Rated Output–mV/V (Nominal)	4.0	4.0	4.0	4.0	4.0	4.0**
Excitation Voltage–VDC MAX	20	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000	5000
MECHANICAL						
Safe Overload–% CAP	±150	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.005	0.006	0.007	0.008	0.008	0.010
Deflection @ RO–mm	0.13	0.15	0.18	0.2	0.2	0.25
Optional Base–P/N (Metric)	B105 (M)	B116 (M)	B121 (M)	B122 (M)	B123 (M)	B125 (M)
Natural Frequency–kHz	4.9	5.0	5.5	5.5	5.5	5.5
Weight–lb	68	70	100	200	450	860
Weight–kg	30.9	31.8	45	90	205	390
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	T & C	T & C	T & C	T & C	T & C	T & C

OPTIONS* Page 115

Base (Recommended)
Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
See Transducer Electronic Data Sheet (TEDS) Page 118

STANDARD CONFIGURATIONS

10 ft Integral Cable (12xxAJ-nn)
<or> PC04E-10-6P Standard Connector (12xxAF-nn)
<or> PT02E-10-6P Bayonet Connector (12xxCDS-nn)
Installed Base (-B suffix)

**Calibrated to 1000K Only

ACCESSORIES* Page 119

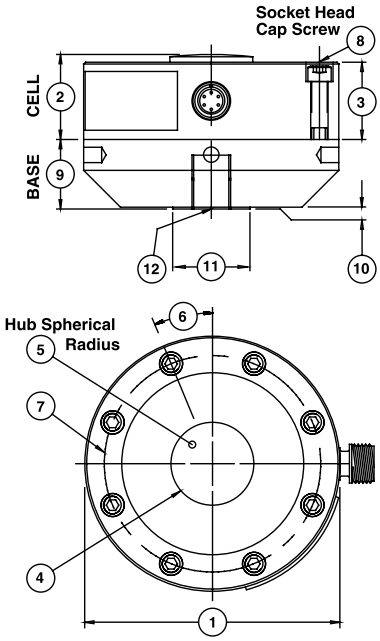
Mating Connector
Instrumentation
Loading Hardware

See appendix for more technical information

Model 1201 Standard Load Cell Compression-Only (U.S. & Metric)

Why the Interface model 1201 Standard Load Cell Compression-Only is the best in class:

- **Performance to 0.03%**
- **High output – to 4 mV/V**
- **Eccentric load compensated**
- **.0008%/°F (.0013%/°C) temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**
- **Compact size**
- **Counterbored mounting holes**



DIMENSIONS

See Drawing	MODEL 1211		1221		1231		1241		1243	
	CAPACITY									
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	1K, 2K, 5K, 10K	5, 10, 25, 50	25K, 50K	125, 250	100K	450	200K	900	300K, 400K	1350, 1800
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	4.13	104.8	4.75	120.7	7.50	190.5	8.25	210	11.0	279.0
②	1.38	34.9	1.75	44.5	2.25	57.2	3.25	82.5	3.50	88.9
③	1.25	31.7	1.63	41.4	2.00	50.8	3.00	76.2	3.00	76.2
④	1.34	34.0	1.57	39.9	3.13	79.5	3.16	80.3	4.81	122.2
⑤	6.00	152.4	6.00	152.4	8.00	203.2	12.0	304.8	18.0	457
⑥	22.5°	22.5°	45.0°	45.0°	15.0°	15.0°	15.0°	15.0°	11.25°	11.25°
⑦	3.50	88.9	4.00	101.6	6.25	158.8	6.75	171.5	9.00	229
⑧	1/4-28x1 1/4		5/16-24x1 3/4		7/16-20x2		5/8-18x3		5/8-18x3.5	
	8 places		4 places		12 places		12 places		16 places	
⑨	1.13	28.7	1.25	31.8	2.00	50.8	2.50	63.5	3.50	88.9
⑩	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80
⑪	1.25	31.8	2.00	50.8	3.00	76.2	3.00	76.2	4.50	114
⑫	5/8-18 UNF-3B	M16 X 2-4H	1/2-20 UNF-3B	M16 X 2-6H	1 3/4-12 UNF-3B	M42 X 2-4H	3/4-16 UNF-3B	M27 X 2-4H	1 1/2-12 UNF-2B	M42 X 2-4H
	0.87 in deep	22.1 mm deep	0.88 in deep	22.4 mm deep	1.75 in deep	44.5 mm deep	1.50 in deep	38.1 mm deep	2.00 in deep	50.8 mm deep

SPECIFICATIONS

PARAMETERS	MODEL 1211	1211	1221	1231	1241	1243
	CAPACITY					
U.S. Models (lbf)	1K, 2K	5K, 10K	25K, 50K	100K	200K	300K, 400K
Metric Models (kN)	5, 10	25, 50	125, 250	450	900	1350, 1800
ACCURACY – (MAX ERROR)						
Static Error Band–% FS	±0.03	±0.04	±0.04	±0.04	±0.05	±0.05
Nonlinearity–% FS	±0.03	±0.04	±0.05	±0.05	±0.05	±0.05
Hysteresis–% FS	±0.03	±0.04	±0.05	±0.05	±0.05	±0.05
Nonrepeatability–% RO	±0.01	±0.01	±0.01	±0.01	±0.01	±0.01
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25	±0.25	±0.25
TEMPERATURE						
Compensated Range–°F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–°C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–°F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–°C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/°F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Zero–%RO/°C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
Effect on Output–%/°F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/°F – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL						
Rated Output–mV/V (Nominal)	2.0	4.0	4.0	4.0	4.0	3.0, 4.0
Excitation Voltage–VDC – MAX	20	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000	5000
MECHANICAL						
Safe Overload–% CAP	±150	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.001	0.002	0.002	0.003	0.004	0.005
Deflection @ RO–mm	0.03	0.05	0.05	0.08	0.10	0.13
Optional Base–P/N	B101	B102	B106	B104	B108	B124
Natural Frequency–kHz	6.4, 9.0	6.1, 8.6	8.2, 11.7	7.6	6.7	5.0
Weight–lb	1.5	3.3	6.8	13.5	40	74
Weight–kg	0.7	1.5	3.1	6	18	34
Connector	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P	PC04E-10-6P
Calibration	Compression	Compression	Compression	Compression	Compression	Compression

OPTIONS* Page 115

Base (Recommended)
Compression Overload Protection
Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation
Loading Hardware

**See appendix for more technical information*

STANDARD CONFIGURATIONS

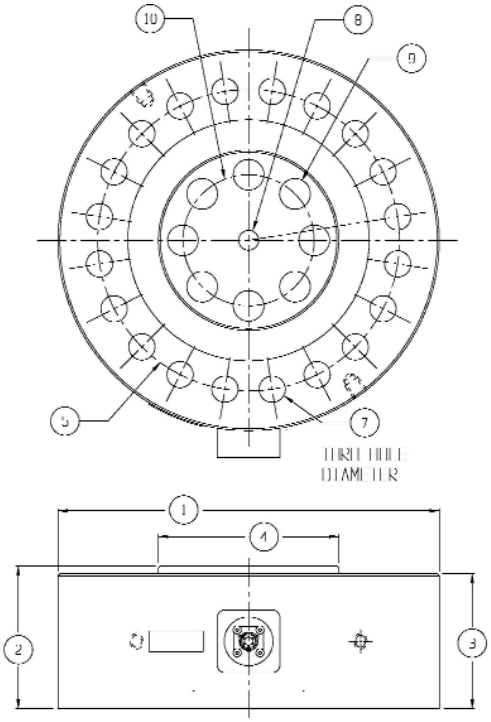
10 ft Integral Cable (12xxEX-nn)
<or> PC04E-10-6P Standard Connector (12xxHL-nn)
<or> PT02E-10-6P Bayonet Connector (12xxBAY-nn)
Installed Base (-B suffix)
Counterbored Mounting Holes Except 1243

Shown with optional base

Model 1200 Flange Load Cell

Why the Interface model 1200 Flange Load Cell is the best in class:

- **Standard flange design mounts directly to cylinders**
- **Proprietary Interface temperature compensated strain gages**
- **Performance to .05%**
- **Eccentric load compensated**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**
- **Tension and compression**



DIMENSIONS

See Drawing	MODEL 1228		1238		1248		1258		1268	
	CAPACITY									
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	30K	140kN	55K	250kN	110K	500kN	220K	1000kN	330K	1500kN
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	6.06	153.9	8.00	203.2	11.00	279.4	12.00	304.8	15.50	393.7
②	1.75	44.5	2.5	63.5	3.50	88.9	4.5	114.9	5.50	139.7
③	1.63	41.4	2.25	57.2	3.00	76.2	4.25	108.0	5.00	127.0
④	2.41	61.2	3.76	95.5	4.81	122.2	5.68	144.3	7.75	196.9
⑤	5.13	130.3	6.50	165.1	9	228.8	9.50	241.3	12.68	322.1
⑥	15°		11.25°		11.25°		9.0°		7.5°	
⑦	0.41	10.4	0.50	12.7	0.66	16.8	0.83	21.0	0.97	24.6
	12 places		16 places		16 places		20 places		24 places	
⑧	0.316	8.03	0.631	16.02	0.631	16.02	0.631	16.02	0.788	20.02
⑨	0.41	10.4	0.65	16.5	0.65	16.5	0.97	24.6	0.97	24.6
	8 places		8 places		8 places		8 places		12 places	
⑩	1.77	45.0	2.80	71.0	2.80	71.0	4.13	105.0	5.91	150.0

Dimensions are approximate. Contact factory for current drawings.

SPECIFICATIONS

PARAMETERS	MODEL 1228	1238	1248	1258	1268
	CAPACITY				
U.S. Models (lbf)	30K	55K	110K	220K	330K
Metric Models (kN)	140kN	250kN	500kN	1000kN	1500kN
ACCURACY – (MAX ERROR)					
Static Error Band–% FS	±0.05	±0.05	±0.06	±0.10	±0.12
Nonlinearity–% FS	±0.05	±0.05	±0.07	±0.10	±0.12
Hysteresis–% FS	±0.05	±0.05	±0.06	±0.10	±0.12
Nonrepeatability–% RO	±0.01	±0.01	±0.01	±0.01	±0.01
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25	±0.25
TEMPERATURE					
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Zero–%RO/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚C – MAX	±0.0015	±0.0015	±0.0015	±0.0015	±0.0015
ELECTRICAL					
Rated Output–mV/V (Nominal)	2.2	2.2	2.2	2.2	2.2
Excitation Voltage–VDC – MAX	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350±3.5	350±3.5	350±3.5	350±3.5	350±3.5
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000
MECHANICAL					
Safe Overload–% CAP	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.001	0.002	0.004	0.005	0.006
Natural Frequency–kHz	7	5.9	4.4	5	5.1
Weight–lb	9.5	26	71	100	204
Weight–kg	4.3	11.8	32.2	46.7	92.5
Connector	PTO2E-10-6P	PTO2E-10-6P	PTO2E-10-6P	PTO2E-10-6P	PTO2E-10-6P
Calibration	T & C	T & C	T & C	T & C	T & C

OPTIONS* Page 115

Integral 10 ft Cable
PC04E-10-6P Connector
Multiple Bridge
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation

**See appendix for more technical information*

Model 1700 Flange Load Cell

Why the Interface model 1700 Flange Load Cell is the best in class:

- **Standard flange design mounts directly to cylinders**
- **Proprietary Interface temperature compensated strain gages**
- **Performance to .05%**
- **Eccentric load compensated**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**
- **Tension and compression**

STANDARD CONFIGURATIONS

- 10 ft Integral Cable (12xxAJ-nn)
  <or> PC04E-10-6P Standard Connector (12xxAF-nn)
  <or> PT02E-10-6P Bayonet Connector (12xxACK-nn)

OPTIONS* Page 115

Integral 10 ft Cable
Bayonet Connector
Multiple Bridge
Standardized Output
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Instrumentation

**See appendix for more technical information*

SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity - % FS……±0.04
Hysteresis - % FS……±0.03
Nonrepeatability - % RO……±0.01
Creep, in 20 min - %……±0.025

TEMPERATURE
Compensated Range - °F……15 to 115
Compensated Range - °C……-10 to 45
Operating Range - °F……-65 to 200
Operating Range - °C……-55 to 90
Effect on Output - %/°F – MAX……±0.0008
Effect on Output - %/°C – MAX……±0.0015
Effect on Zero - % RO/°F – MAX……±0.0008
Effect on Zero - % RO/°C – MAX……±0.0015

ELECTRICAL
Rated Output- mV/V (nominal)……2.0
Zero Balance - %RO……±1.0
Bridge Resistance – Ohm (nominal)……350+/-3.5
Excitation Voltage – MAX……20 VDC
Insulation Resistance – Megohm……5000

MECHANICAL
Calibration……Tension
Safe Overload - % CAP……±150
Length – ft……5

DIMENSIONS

See Drawing	MODEL 1710		1720		1730	
	CAPACITY (lbf)					
	U.S. (lbf) 550, 1.1K	Metric (N) 2.5K, 5K	U.S. (lbf) 2.2K, 4.5K	Metric (N) 10K, 20K	U.S. (lbf) 11K	Metric (N) 50K
	inch	mm	inch	mm	inch	mm
①	Consult factory for details		3.74	95.0	3.98	101.1
②			1.57	39.9	1.57	39.9
③			3.15	80.0	3.39	86.1
④			1.18	29.9	1.18	29.9
⑤			0.26	6.6	0.26	6.6
			8 places			
⑥			0.31	7.9	0.315	7.9
⑦			1.22	31.0	1.22	31.0
⑧			0.04	1.0	0.04	1.0

Model 1500 Standard Low Capacity Load Cell (U.S. & Metric)

Why the Interface model 1500 Standard Low Capacity Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .05%**
- **Compact 2¾ in (70 mm) diameter**
- **Fatigue rated**
- **Eccentric load compensated**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Shunt calibration**
- **Low deflection**

OPTIONS* Page 115

Dual Bridge
Standardized Output
See Transducer Electronic Data Sheet (TEDS) Page 118

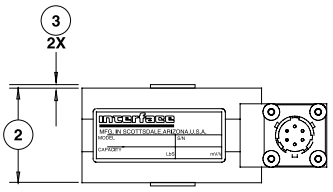
ACCESSORIES* Page 119

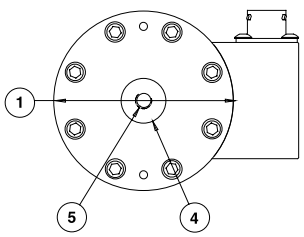
Mating Cable
Instrumentation
Mounting Hardware

**See appendix for more technical information*

STANDARD CONFIGURATIONS

Single Bridge (1500ASK-nn)
Dual Bridge (1500ASL-nn)





SPECIFICATIONS

ACCURACY – (MAX ERROR)

Static Error Band–% FS	±0.05
Nonlinearity–% FS	±0.05
Hysteresis–% FS	±0.05
Nonrepeatability–% RO	±0.02
Creep, in 20 min–%	±0.025
Eccentric Load Sensitivity–%/in	±0.25

TEMPERATURE

Compensated Range–°F	15 to 115
Compensated Range–°C	-10 to 45
Operating Range–°F	-65 to 200
Operating Range–°C	-55 to 90
Effect on Output–%/°F – MAX	±0.0008
Effect on Output–%/°C – MAX	±0.0015
Effect on Zero–% RO/°F – MAX	±0.0015
Effect on Zero–% RO/°C – MAX	±0.0027

ELECTRICAL

Rated Output–mV/V (Nominal)	2.0
Zero Balance–% RO	±1.0
Bridge Resistance–Ohm (Nominal)	700
Excitation Voltage – VDC - MAX	20
Insulation Resistance – Megohm	5000

MECHANICAL

Calibration	Tension & Compression
Safe Overload–% CAP.	±150
Connector	PT02E-10-6P
Deflection @ RO–inch	0.003 (0.08mm)

Natural Frequency

lbf	N	Hz
25	125	2000
50	250	2500
100	500	4000
200	1000	6000
300	1500	7500

Weight ..... 1 lb (0.45 Kg)

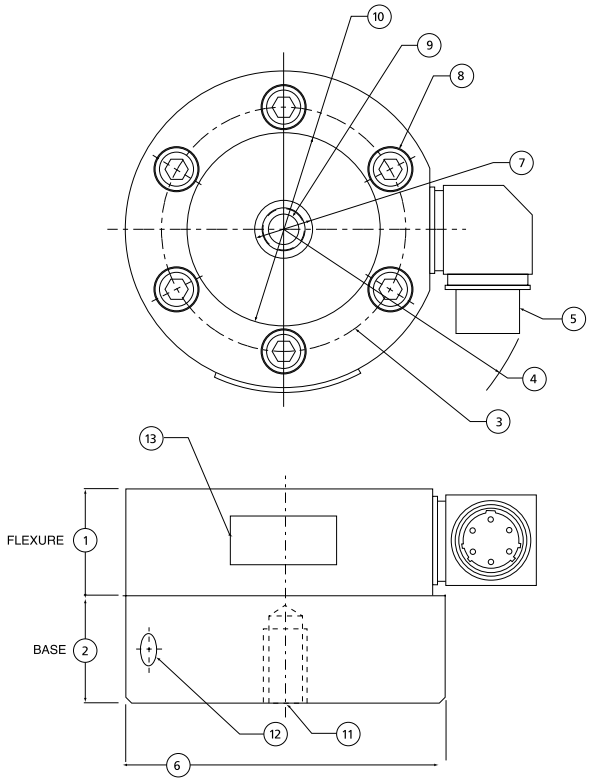
DIMENSIONS

See Drawing	CAPACITY	
	U.S. (lbf)	Metric (N)
	25, 50, 100, 200, 300	125, 250, 500, 1000, 1500
	inch	mm
①	2.75	69.8
②	1.50	38.1
③	0.03	0.6
④	0.69	17.5
⑤	1/4-28 UNF 0.25 in deep	M6 X 1-6H 6.4 mm deep

Model 2400 Standard Stainless Steel Load Cell
Capacities 100 lbf-5Klbf

Why the Interface model 2400 Standard Stainless Steel Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Stainless steel construction**
- **Hermetically sealed**
- **Tension and compression**
- **Compact size**
- **Counterbored mounting holes**



shown with optional tension base

DIMENSIONS

See Drawing	MODEL 2420 CAPACITY (lbf) 100, 250, 500, 1000 inch	mm	MODEL 2430 CAPACITY (lbf) 2K, 5K inch	mm
①	1.00	25.4	1.00	25.4
②	1.00	25.4	1.00	25.4
③	2.25	57.2	2.63	66.7
④	2.43	61.7	2.68	68.1
⑤	PTWIH-10-6P			
⑥	3.00	76.2	3.50	88.9
⑦	0.55	14.0	0.81	20.5
⑧	Counterbored for 1/4-28 S.H.C.S.		Counterbored for 5/16-24 S.H.C.S.	
⑨	3/8-24 UNF-3B thru		1/2-20 UNF-3B thru	
⑩	1.81	46.0	2.07	52.5
⑪	3/8-24 UNF 0.70 Deep		1/2-20 UNF 0.70 Deep	
⑫	Spanner holes 2 SPACED @ 180°			
⑬	Identification Label			

SPECIFICATIONS

PARAMETERS	MODEL	
	2420	2430
	CAPACITY (lbf)	
	100, 250, 500, 1000	2K, 5K
ACCURACY – (MAX ERROR)		
Static Error Band–% FS	±0.10	±0.10
Nonlinearity–% FS	±0.10	±0.10
Hysteresis–% FS	±0.08	±0.08
Nonrepeatability–% RO	±0.02	±0.02
Creep, in 20 min–%	±0.05	±0.05
TEMPERATURE		
Compensated Range–˚F	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 121	-55 to 121
Effect on Zero–%RO/˚F – MAX	±0.002	±0.002
Effect on Output–%RO/˚F – MAX	±0.002	±0.002
ELECTRICAL		
Rated Output–mV/V (Nominal)	3.0	3.0
Excitation Voltage–VDC – MAX	15	15
Bridge Resistance–Ohm (Nominal)	350	350
Zero Balance–% RO	±2.0	±2.0
Insulation Resistance–Megohm	5000	5000
MECHANICAL		
Safe Overload–% CAP	±150	±150
Deflection @ RO–inch	.003, .002, .002, .002	.002
Optional Base–P/N	B318-2	B319-2
Natural Frequency–kHz	2.2, 4.4, 6.0, 8.3	9.1, 11.7
Weight–lb	1.5	2.0
Connector	PTWIH-10-6P	
Seal	Glass-metal hermetic	
Flexure Material	Stainless steel	

OPTIONS* Page 115

Tension Base
Submersible with Integral Cable
Special Connectors
Load Button
70-170°F Compensated Temperature Range
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation
Loading Hardware

Please call for additional information

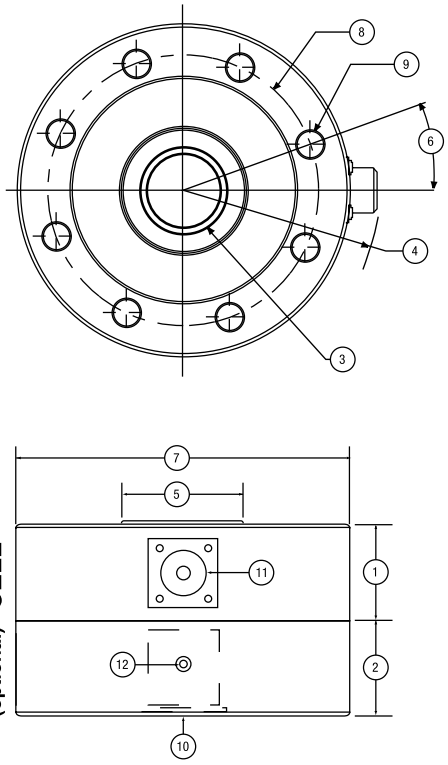
STANDARD CONFIGURATIONS

PTWIH-10-6P Connector (24xxBLX-nn)

Model 2400 Standard Stainless Steel Load Cell
Capacities 10Klbf and 20Klbf

Why the Interface model 2400 Standard Stainless Steel Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Stainless steel construction**
- **Welded diaphragm**
- **Tension and compression**
- **Compact size**
- **10Klbf & 20Klbf capacity**
- **Counterbored mounting holes in 10Klbf model**



DIMENSIONS

See Drawing	MODEL 2440 CAPACITY (lbf) 10K inch	10K mm	20K inch	20K mm
①	1.80	45.7	1.80	45.7
②	1.75	44.5	1.75	44.5
③	1-14 UNF-3B		1 1/2-12 UNF-3B	
④	3.56	85.2	3.55	90.1
⑤	1.71	43.5	2.23	56.6
⑥	22.5°		20.0°	
⑦	5.50	139.7	6.00	152.4
⑧	4.50	114.3	4.88	123.8
⑨	.41	10.4	.53	13.5
	8 places		8 places	
⑩	1-14 UNF-3B		1 1/2-12 UNF-3B	
⑪	MS3102E-14S-6P			
⑫	Spanner holes 4 SPACED @ 90°			

SPECIFICATIONS

PARAMETERS	MODEL 2440	MODEL 2450
	CAPACITY (lbf) 10K	CAPACITY (lbf) 20K
ACCURACY – (MAX ERROR)		
Static Error Band–% FS	±0.10	±0.10
Nonlinearity–% FS	±0.10	±0.10
Hysteresis–% FS	±0.08	±0.08
Nonrepeatability–% RO	±0.02	±0.02
Creep, in 20 min–%	±0.03	±0.05
TEMPERATURE		
Compensated Range–˚F	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0015	±0.0015
Effect on Output–%RO/˚F – MAX	±0.0008	±0.0008
ELECTRICAL		
Rated Output–mV/V (Nominal)	3.0	3.0
Excitation Voltage–VDC – MAX	20	20
Bridge Resistance–Ohm (Nominal)	350	350
Zero Balance–% RO	±2.0	±2.0
Insulation Resistance–Megohm	5000	5000
MECHANICAL		
Safe Overload–% CAP	±150	±150
Deflection @ RO–inch	0.002	0.002
Optional Base–P/N	B323-2	B320-1
Natural Frequency–kHz	9.4	–
Weight–lb	6	9
Connector	MS3102E-14S-6P	
Seal	Environmental	
Flexure Material	Stainless steel	

OPTIONS* Page 115

Tension Base
Submersible Cable
Standardized Output
Special Connectors
Load Button
Overload Protection
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

STANDARD CONFIGURATIONS

MS3102E-14S-6P Connector (24xxBXM-nn)
Installed Base (-B suffix)

ACCESSORIES* Page 119

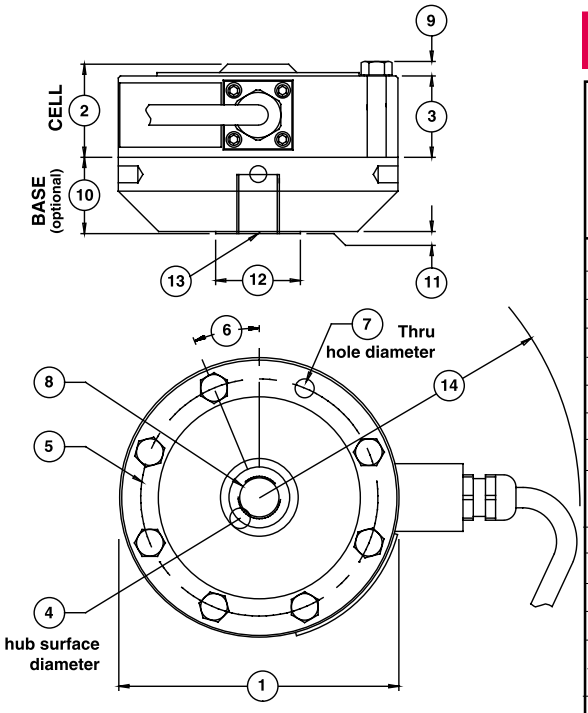
Mating Connector
Instrumentation
Loading Hardware

Please call for additional information

Model 3200 Standard Stainless Steel Load Cell

Why the Interface model 3200 Standard Stainless Steel Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Hermetically sealed cell**
- **Performance to .05%**
- **Compact size**
- **High 4 mV/V output**
- **Eccentric load compensated**
- **.0008%/°F temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**



DIMENSIONS

See Drawing	MODEL 3210		3220		3232	
	CAPACITY (lbf)					
	2.5K, 5K, 10K		25K, 50K		100K	
	inch	mm	inch	mm	inch	mm
①	4.13	104.9	6.06	153.9	8.00	203.2
②	1.38	35.1	1.75	44.5	2.50	63.5
③	1.20	30.5	1.58	40.0	2.20	55.9
④	0.90	22.9	1.97	50.0	3.14	79.8
⑤	3.50	88.9	5.13	130.3	6.50	165.1
⑥	22.5°	22.5°	15.0°	15.0°	11.25°	11.25°
⑦	0.28	7.10	0.41	10.4	0.53	13.5
⑦	8 places		12 places		16 places	
⑧	5/8-18 UNF-3B		1 1/4-12 UNF-3B		1 3/4-12 UNF-3B	
⑧	1.12 in deep		1.40 in deep		2.15 in deep	
⑨	0.20	5.10	0.30	7.60	0.31	7.90
⑩	1.13	28.6	1.75	44.5	2.00	50.8
⑪	0.03	0.80	0.03	0.80	0.03	0.80
⑫	1.25	31.8	2.25	57.2	3.00	76.2
⑬	5/8-18 UNF-3B		1 1/4-12 UNF-3B		1 3/4-12 UNF-3B	
⑬	0.87 in deep		1.40 in deep		1.75 in deep	
⑭	4.80	121.9	5.52	140.2	5.30	134.6

SPECIFICATIONS

PARAMETERS	MODEL 3210	3210	3220	3220	3232
	CAPACITY (lbf) 2.5K, 5k	10k	25k	50k	100k
ACCURACY – (MAX ERROR)					
Static Error Band–% FS	±0.05	±0.05	±0.05	±0.05	±0.06
Nonlinearity–% FS	±0.05	±0.05	±0.05	±0.05	±0.05
Hysteresis–% FS	±0.06	±0.06	±0.06	±0.06	±0.06
Nonrepeatability–% RO	±0.01	±0.01	±0.01	±0.01	±0.01
Creep, 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25	±0.25
TEMPERATURE					
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
ELECTRICAL	(2.5K 2.0)				
Rated Output–mV/V (Nominal)	4.0	4.0	4.0	4.0	4.0
Excitation Voltage–VDC – MAX	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000
MECHANICAL					
Safe Overload–% CAP	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.002	0.002	0.002	0.002	0.003
Optional Base–P/N	B302	B302	B303	B303	B312
Natural Frequency–kHz	6.6	9.4	6.5	7.0	5.8
Weight–lb	3.3	3.3	9.5	9.5	26
Calibration	T & C	T & C	T & C	T & C	T & C

OPTIONS* Page 115

Base (Recommended)
Submersible Cable
Compression Overload Protection
Cable length (20 ft Standard)
Multiple Bridge
Standardized Output
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Instrumentation
Loading Hardware
Load Button
Top & Bottom Plates

**See appendix for more technical information*

STANDARD CONFIGURATIONS

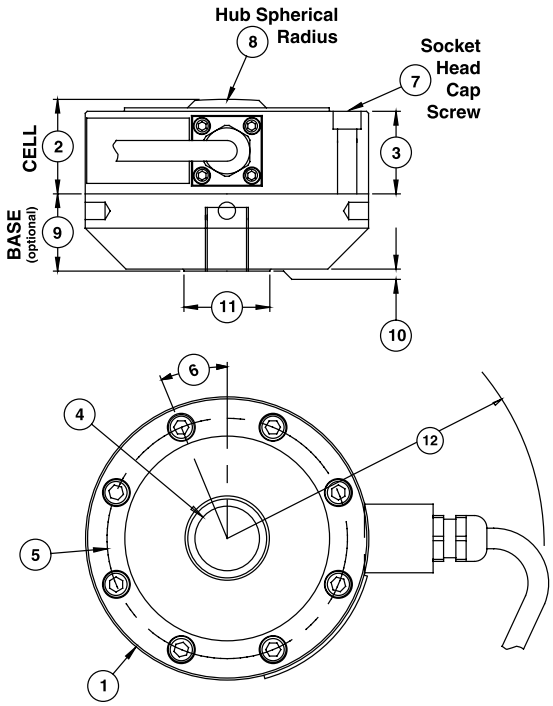
Integral 20 ft Cable (32xxBFG-nn)
Installed Base (-B suffix)

Optional base

Model 3200 Standard Stainless Steel Load Cell Compression-Only

Why the Interface model 3200 Standard Stainless Steel Load Cell Compression-Only is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Hermetically sealed cell**
- **Performance to .04%**
- **Compact size**
- **High 4 mV/V output**
- **Eccentric load compensated**
- **.0008%/°F temp. effect on output**
- **Low deflection**
- **Shunt calibration**
- **Barometric compensation**



DIMENSIONS

See Drawing	MODEL 3211		3221		3231	
	CAPACITY (lbf) 2.5K, 5K, 10K		25K, 50K		100K	
	inch	mm	inch	mm	inch	mm
①	4.13	104.9	4.75	120.7	7.50	203.2
②	1.38	35.1	1.75	44.4	2.25	57.2
③	1.20	30.5	1.58	40.1	1.95	49.5
④	0.90	22.9	1.19	30.2	2.67	67.8
⑤	3.50	88.9	4.00	101.6	6.25	158.8
⑥	22.5°	22.5°	45.00°	45.0°	15.0°	15.0°
⑦	1/4-28 x 1 1/4 8 places		5/16-24 x 1 1/2 4 places		7/16-20 x 2 12 places	
⑧	6.00	152.40	6.00	152.40	8.00	203.20
⑨	1.13	28.70	1.25	31.80	2.00	50.80
⑩	0.03	00.80	0.03	00.80	0.03	00.80
⑪	1.25	31.80	2.00	50.80	3.00	76.20
⑫	4.80	121.90	5.61	142.50	5.30	134.60

SPECIFICATIONS

PARAMETERS	MODEL 3211	3211	3221	3221	3231
	CAPACITY (lbf) 2.5K, 5K	10K	25K	50K	100K
ACCURACY – (MAX ERROR)					
Static Error Band–% FS	±0.04	±0.04	±0.04	±0.04	±0.04
Nonlinearity–% FS	±0.05	±0.05	±0.05	±0.05	±0.05
Hysteresis–% FS	±0.06	±0.06	±0.06	±0.06	±0.06
Nonrepeatability–% RO	±0.01	±0.01	±0.01	±0.01	±0.01
Creep, 20 min–%	±0.025	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25	±0.25
TEMPERATURE					
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
ELECTRICAL	(2.5K 2.0)				
Rated Output–mV/V (Nominal)	4.0	4.0	4.0	4.0	4.0
Excitation Voltage–VDC MAX	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000
MECHANICAL					
Safe Overload–% CAP	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.002	0.002	0.002	0.002	0.003
Optional Base–P/N	B302	B302	B306	B306	B304
Natural Frequency–kHz	6.1	8.6	8.2	11.7	7.6
Weight–lb	3.3	3.3	6.8	6.8	13.5
Calibration	Compression	Compression	Compression	Compression	Compression

OPTIONS* Page 115

Base (Recommended)
Submersible Cable
Compression Overload Protection
Cable length (20 ft Standard)
Multiple Bridge
Standardized Output
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Instrumentation
Load Button
Top & Bottom Plates

**See appendix for more technical information*

STANDARD CONFIGURATIONS

Integral 20 ft Cable and Counterbored Mounting Holes (32xxBBE-nn)

Optional base

Can’t find the load cell you need?

Call us at 1-800-947-5598
to discuss your application
with one of our application engineers.

Interface Amplified Load Cells

Why the Interface Amplified Load Cells are the best in class:

- **High level voltage or current output**
- **Increased signal to noise ratio**
- **2-wire 4-20**
- **Zero and span adjustment**
- **3-wire 4-20, ±5 or ±10 VDC**
- **Internal shunt calibration**
- **Bipolar or unipolar**

In addition to our many external signal conditioning options, Interface also offers load cells with internal amplifiers. Benefits of an internal amplifier include increased signal to noise ratio, fewer components to troubleshoot and high output directly from the load cell package. Both a 2-wire and 3-wire version are available. Each is reverse voltage protected to prevent damage from accidental mis-wiring. Common features include shunt calibration and pots for zero and span adjustment. In standard configuration the pots are protected by removable screw caps but by request can be sealed at the factory, preventing field adjustment.

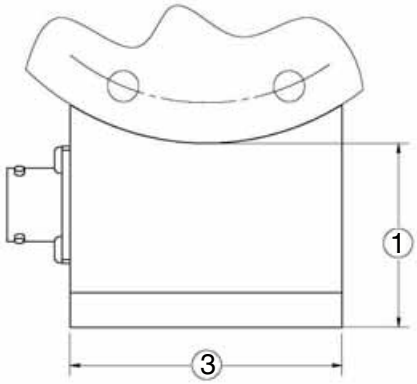
The 2-wire amplifier is a 4-20 mA loop powered device. Featured in our model 2404 series cell, the 2-wire amplifer is suitable for process control and rugged industrial use. The 2404 series is an environmentally sealed Stainless Steel load cell based on our popular 2400 series. Output is either 4-20 mA compression, 4-20 mA tension, or 12 mA ±8 mA tension and compression. O-ring seals protect the pots. Internal shunt calibration is optional. Supply voltage is 9-28 VDC.

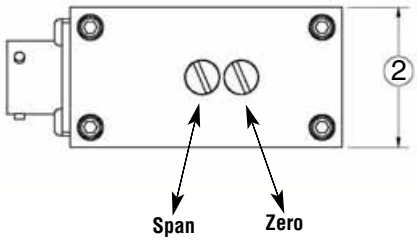
The 3-wire amplifier is available as an option on our model 1200 series Low Profile load cells capacities from 300 to 1 million lbf. Configured as a factory add-on option, the 3-wire amplifier can be added to any of our stocked Low Profile load cells. Powered between 11 and 28 VDC, the 3-wire amplifier is suitable for vehicle or battery powered applications. Available outputs are ±5 VDC, ±10VDC, 4-20 mA or 12 ±8 mA. For current output maximum load resistance is 500 ohms. A precision internal shunt resistor is included for easy field adjustment.

Model 1200 Standard 3-Wire Amplified Load Cell Universal or Compression-Only (U.S. & Metric)

Why the Interface model 1200 Standard 3-Wire Amplified Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Eccentric load compensated**
- **Low deflection**
- **Shunt calibration**
- **Tension and compression**
- **Compact size**
- **3-wire internal amp choice of 4-20 mA, ±5V, ±10V, 0-5V, 0-10V**





DIMENSIONS

See Drawing	Amplifier Housing	
	inch	mm
①	1.13	28.7
②	1.48	37.59
③	2.18	55.37

Load cell dimensions same as Standard 1200 series, See pages 16-21.

SPECIFICATIONS

PARAMETERS	MODEL			
Universal	1210	1210	1220	1232
Compression-Only	1211**	1211	1221	1231
	CAPACITY			
U.S. Models (lbf)	300, 500, 1K, 2K	5K, 10K	25K, 50K	100K
Metric Models (kN)	1.5, 2.5, 5, 10	25, 50	100, 250	450
ACCURACY – (MAX ERROR)				
Static Error Band–% FS	±0.06	±0.07	±0.07	±0.07
Nonlinearity–% FS	±0.06	±0.07	±0.07	±0.07
Hysteresis–% FS	±0.03	±0.05	±0.06	±0.06
Nonrepeatability–% RO	±0.02	±0.02	±0.02	±0.02
Creep, in 20 min–%	±0.025	±0.025	±0.025	±0.025
Side Load Sensitivity–%	±0.25	±0.25	±0.25	±0.25
Eccentric Load Sensitivity–%/in	±0.25	±0.25	±0.25	±0.25
TEMPERATURE				
Compensated Range–˚F	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F-20 to 185	-65 to 200	-65 to 200	-65 to 200	
Operating Range–˚C-29 to 85	-55 to 90	-55 to 90	-55 to 90	
Effect on Zero–%RO/˚F – MAX	±0.005	±0.003	±0.003	±0.003
Effect on Zero–%RO/˚C – MAX	±0.009	±0.005	±0.005	±0.005
Effect on Output–%/˚F – MAX	±0.005	±0.005	±0.005	±0.005
Effect on Output–%/˚C – MAX	±0.009	±0.009	±0.009	±0.009
ELECTRICAL				
Rated Output	4-20 mA, ±5V, ±10V, 0-5V, 0-10V			
Supply Voltage–VDC – MAX	11 to 28	11 to 28	11 to 28	11 to 28
Span Adjust Range–% RO	±10	±10	±10	±10
Zero Adjust Range–% RO	7	3.5	3.5	3.5
Insulation Resistance–Megohm	5000	5000	5000	5000
MECHANICAL				
Safe Overload–% CAP	±150	±150	±150	±150
Deflection @ RO–inch	0.001	0.002	0.002	0.003
Deflection @ RO–mm	0.03	0.05	0.05	0.08
Optional Base–P/N (Metric)	B101 (M)	B102 (M)	B103 (M)	B112 (M)
Bandwidth Hz	200	200	200	200
Weight–lb	1.5	3.3	9.5	26
Weight–kg	0.7	1.5	4.3	11.8
Connector	PT02E-10-6P	PT02E-10-6P	PT02E-10-6P	PT02E-10-6P
Calibration	T & C	T & C	T & C	T & C

***300 & 500 available in Universal only*

OPTIONS* Page 115

Base (Recommended)
Compression Overload Protection
Multiple Bridge
Connector Protection
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES*

Mating Connector
Instrumentation
Loading Hardware

**See appendix for more technical information*

STANDARD CONFIGURATIONS

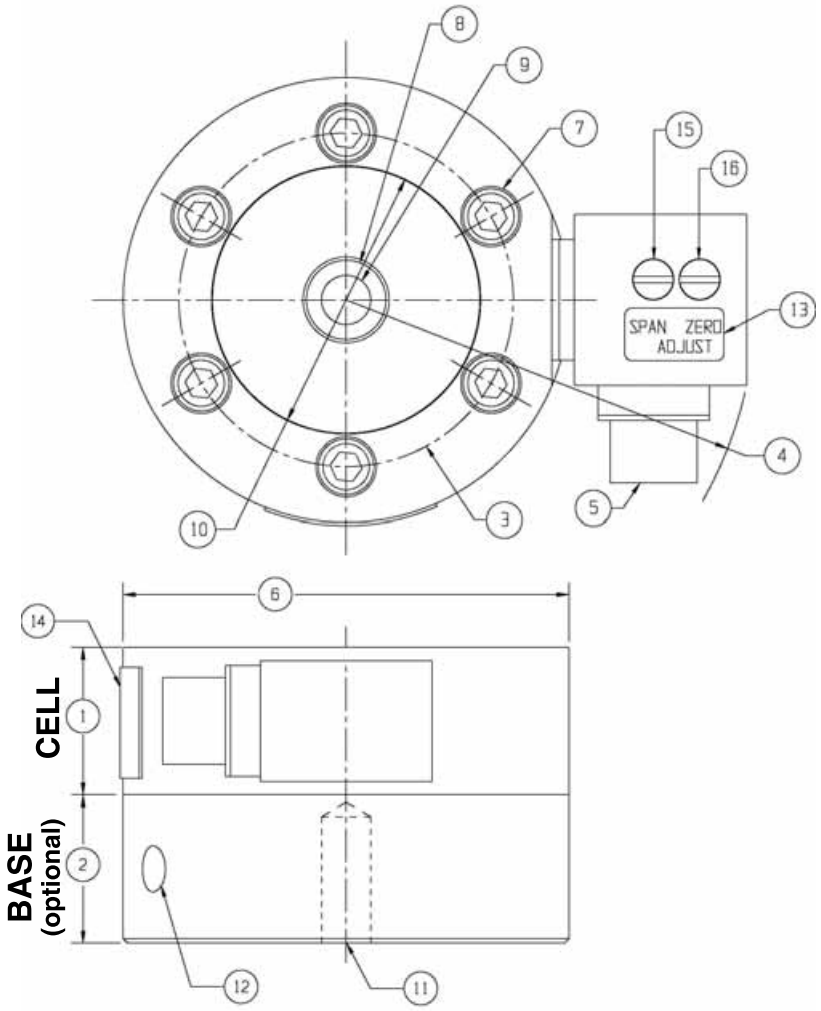
PT02E-10-6P Bayonet Connector
Installed Base (-B suffix)

CONNECTOR PINOUT	
PIN	FUNCTION
A	+SUPPLY
B	SUPPLY GND
C	OUTPUT GND
D	OUTPUT
E	SHUNT CAL
F	SHUNT CAL

Model 2404 Standard Stainless Steel 2-Wire Amplified Load Cell 50 lbf thru 5K

Why the Interface model 2404 Standard Stainless Steel 2-Wire Amplified Load Cell is the best in class:

- **Stainless steel construction**
- **Hermetically sealed**
- **Tension and compression**
- **Counterbored mounting holes**
- **Internally amplified with 4-20 mA output**
- **Proprietary Interface temperature compensated strain gages**



DIMENSIONS

See Drawing	MODEL 2424 CAPACITY (lbf) 50,100,250,500,1000 inch	mm	MODEL 2434 CAPACITY (lbf) 2K, 5K inch	mm
①	1	25.4	1	25.4
②	1	25.4	1	25.4
③	2.25	57.2	2.625	66.68
④	2.76	70.1	3.01	76.3
⑤	PTWIH-10-6P			
⑥	3	76.2	3.5	88.9
⑦	Counterbored for 1/4-28 S.H.C.S.		Counterbored for 5/16-24 S.H.C.S.	
⑧	0.55	14	0.81	20.5
⑨	3/8-24 UNF-3B thru		1/2-20 UNF-3B thru	
⑩	1.81	46	2.07	52.5
⑪	3/8-24 UNF 0.70 Deep		1/2-20 UNF 0.70 Deep	
⑫	(2) Spanner holes spaced at 180°			
⑬	Label			
⑭	Identification label			
⑮	Span Adjust			
⑯	Zero Adjust			

SPECIFICATIONS

PARAMETERS	MODEL	
	2424	2434
	CAPACITY (lbf)	
	50, 100, 250, 500, 1000	2K, 5K
ACCURACY – (MAX ERROR)		
Nonlinearity–% FS	±0.10	±0.10
Hysteresis–% FS	±0.08	±0.08
Nonrepeatability–% RO	±0.03	±0.03
Creep, in 20 min–%	±0.05	±0.05
TEMPERATURE		
Compensated Range–˚F	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45
Operating Range–˚F	-20 to 200	-20 to 200
Operating Range–˚C	-30 to 93	-30 to 93
Effect on Zero–%RO/˚F – MAX	±0.005	±0.005
Effect on Output–%RO/˚F – MAX	±0.009	±0.009
ELECTRICAL *Rated Output mA		
*Tension or Compression (unipolar)	+16.000 ±0.032	
*Universal Tension (bipolar)	+8.000 ±0.016	
*Universal Compression (bipolar)	-8.000 ±0.016	
Zero Balance	4.000 ±0.100 (unipolar) 12.000 ±0.100 (bipolar)	
Zero Adjustment	1 mA range	
Span Adjustment	5% range	
Supply Voltage range VDC	9-28	
Bandwidth Hz	2000	
MECHANICAL		
Safe Overload–% CAP	±150	
Deflection @ RO–inch	50 & 100: 0.003, 250 thru 5K: 0.002	
Optional Base–P/N	B319-2	
Natural Frequency–kHz	1.3, 2.2, 4.4, 6.0, 8.3, 9.1, 11.7	
Connector	PTWIH-10-6P	

OPTIONS* Page 115

Tension Base
Submersible with Integral Cable
Special Connectors
Load Button
70-170°F Compensated Temperature Range
Other Capacities Available
See Transducer Electronic Data Sheet (TEDS) Page 118

ACCESSORIES* Page 119

Mating Connector
Instrumentation
Loading Hardware

Please call for additional information

STANDARD CONFIGURATIONS

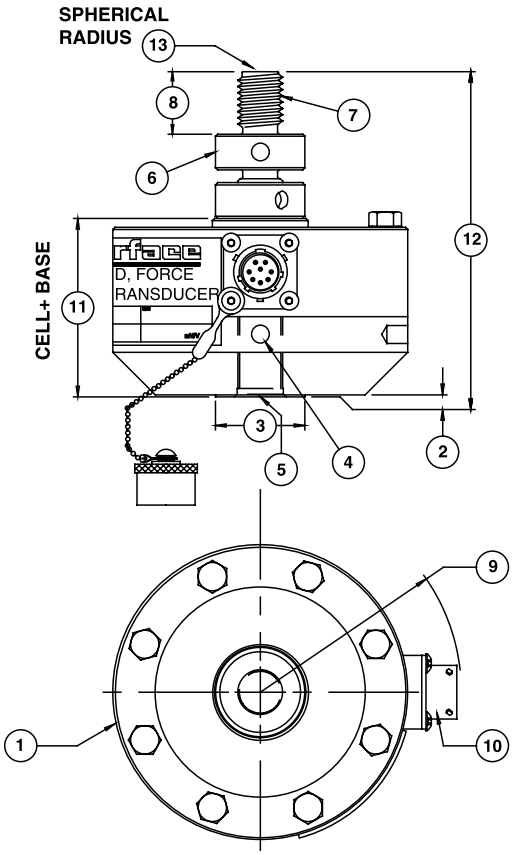
PTWIH-10-6P Connector (24xxBLX-nn)

CONNECTOR PINOUTS	
PIN	FUNCTION
A	+SUPPLY
B	NO CONNECTION
C	NO CONNECTION
D	+OUTPUT (4-20 mA)
E	CASE GROUND
F	NO CONNECTION

Model 1600 Gold Standard™ Calibration Load Cell

Why the Interface model 1600 Gold Standard™ Calibration Load Cells are the best in class:

- **Tension and compression in one unit**
- **.005% nonrepeatability**
- **.01% creep**
- **High output – to 4 mV/V**
- **High precision base installed**
- **3 run NIST traceable ASTM E74 calibration**
- **Factory installed calibration adapter**
- **Eccentric load compensated**
- **.0008%/°F temp. effect on output**
- **4% lower load limit per ASTM E74**



DIMENSIONS

See Drawing	MODEL 1610		1620		1632		1640	
	CAPACITY (lbf)							
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	500, 1K, 2K, 5K,10K	2.2, 4.5, 9, 22, 45	25K ,50K	110, 225	100K	450	200K	900
	inch	mm	inch	mm	inch	mm	inch	mm
①	4.13	104.80	6.06	153.90	8.00	203.20	11.00	279.00
②	0.03	00.80	0.03	00.80	0.03	00.80	0.03	00.80
③	1.25	31.80	2.25	57.20	3.00	76.20	4.50	114.30
④	0.25	06.40	0.31	07.90	0.31	07.90	0.31	07.90
	0.29 deep	7.4 deep	0.31 deep	7.9 deep	0.31 deep	7.9 deep	0.31	07.90
⑤	5/8-18 UNF-3B	M16x2-4H	1 1/4-12 UNF-3B	M33x2-4H	1 3/4-12 UNF-3B	M42x2-4H	2 3/4-8 UNF-3A	M72x2-4H
	0.87 deep	22.1 deep	1.40 deep	35.6 deep	1.75 deep	44.45 deep	2.75 deep	69.8
⑥	CA-101	CA-201	CA-102	CA-202	CA-103	CA-203	Integral	
⑦	5/8-18 UNF-3A	M16x2-4h	1 1/4-12 UNF-3A	M33x2-4h	1 3/4-12 UNF-3A	M42x2-4h	2 3/4-8 UNF-3A	M72x2-4h
⑧	0.75	19.1	1.50	38.1	2.00	50.8	2.75	72
⑨	2.81	71.4	3.50	88.9	4.50	114.3	6.19	157
⑩	PT02E-12-8P		PT02E-12-8P		PT02E-12-8P		PT02E-12-8P	
⑪	2.50	63.5	3.50	88.9	4.50	114.3	6.50	165
⑫	4.38 ±.12	111.3 ±3.1	6.38 ±.12	162.1 ±3.1	8.62 ±.12	18.9 ±3.1	10.5 ±.12	267 ±3.1
⑬	6.00	152.4	6.00	152.4	12.0	305.0	18.0	457

SPECIFICATIONS

PARAMETERS	MODEL 1610	1610	1610	1620	1632	1640
	CAPACITY (lbf)					
U.S. Models (lbf) / Metric Models (kN)	500 / 2.2	1K, 2K / 4.5, 9	5K, 10K / 22, 45	25K, 50K / 110, 225	100K / 450	200K / 900
ACCURACY – (MAX ERROR)						
Static Error Band–% FS	±0.02	±0.02	±0.025	±0.03	±0.05	±0.05
Nonlinearity–% FS	±0.03	±0.03	±0.04	±0.04	±0.05	±0.05
Hysteresis–% FS	±0.02	±0.02	±0.04	±0.05	±0.05	±0.05
Nonrepeatability–% RO	±0.005	±0.005	±0.005	±0.005	±0.005	±0.05
Creep, 20 min–%	±0.01	±0.01	±0.01	±0.01	±0.01	±0.01
Side Load Sensitivity–%	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1
Eccentric Load Sensitivity–%/in	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1
Lower Load Limit–% Cap. (ASTM E74 CLASS A)	4.0	4.0	4.0	4.0	4.0	4.0
TEMPERATURE						
Compensated Range–˚F	15 to115	15 to 115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0004	±0.0004	±0.0004	±0.0004	±0.0004	±0.0004
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
ELECTRICAL						
Rated Output–mV/V (Nominal)	2.0	2.0	4.0	4.0	4.0	4.0
Excitation Voltage–VDC – MAX	20	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000	5000
MECHANICAL						
Safe Overload–% CAP	±150	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.002	0.002	0.004	0.004	0.006	0.010
Weight–lb	3.8	3.8	8.0	23.5	58	171
Connector	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P
Calibration	T & C	T & C	T & C	T & C	T & C	T & C

OPTIONS*

Compression Overload Protection
Multiple Bridge - Addt'l Bridges to Meet 1200 Series Specifications
Standardized Output
ASTM E74 Calibration
Connector Protection
See Low Profile Options Page 115

ACCESSORIES*

Precision mV/V Transfer Standard
Instrument Cable Assemblies
Signal Conditioning Boards
Calibration Software

**See appendix for more technical information*

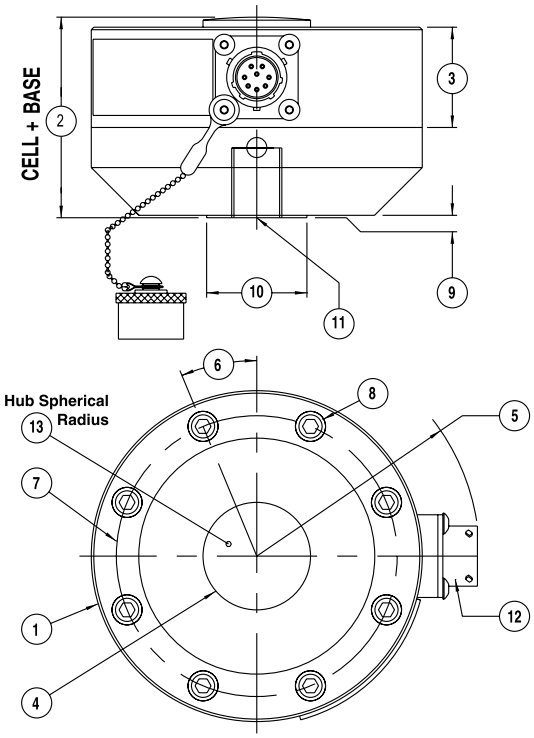
STANDARD CONFIGURATIONS

PT02E-12-8 Connector (16xxAJH-nn)

Model 1600 Gold Standard™ Calibration Compression-Only Load Cell

Why the Interface model 1600 Gold Standard™ Calibration Compression-Only Load Cell is the best in class:

- .005% nonrepeatability
- .01% creep
- High output – to 4 mV/V
- High precision base installed
- 3 run NIST traceable ASTM E74 calibration
- Eccentric load compensated
- .0008%/°F temp. effect on output
- 4% lower load limit



DIMENSIONS

See Drawing	MODEL 1611 CAPACITY (lbf) 1K, 2K, 5K,10K		MODEL 1621 CAPACITY (lbf) 25K, 50K		MODEL 1633 CAPACITY (lbf) 100K	
	inch	mm	inch	mm	inch	mm
①	4.13	104.8	6.06	153.9	8.00	203.2
②	2.50	63.5	3.50	89.0	4.50	114.3
③	1.25	31.7	1.63	41.4	2.25	57.2
④	1.34	34.0	2.41	61.2	3.76	95.5
⑤	2.78	70.0	3.50	89.0	4.47	113.0
⑥	22.5°	22.5°	15.0°	15.0°	11.25°	11.25°
⑦	3.50	88.9	5.13	130.3	6.50	165.1
⑧	8 SHCS		12 SHCS		16 HHCS	
⑨	0.03	0.80	0.03	0.80	0.03	0.80
⑩	1.25	31.8	2.25	57.2	3.00	76.2
⑪	5/8-18 UNF-3B		1 1/4-12 UNF-3B		1 3/4-12 UNF-3B	
	0.87 in deep		1.40 in deep		1.75 in deep	
⑫	PTO2E-12-8P		PTO2E-12-8P		PTO2E-12-8P	
⑬	6.00	152.0	8.00	203.0	12.0	305.0

SPECIFICATIONS

PARAMETERS	MODEL 1611	1611	1611	1621	1633
	CAPACITY (lbf) 1K	2K	5K,10K	25K, 50K	100K
ACCURACY – (MAX ERROR)					
Static Error Band–% FS	±0.02	±0.02	±0.025	±0.03	±0.04
Nonlinearity–% FS	±0.03	±0.03	±0.04	±0.04	±0.04
Hysteresis–% FS	±0.02	±0.02	±0.04	±0.04	±0.05
Nonrepeatability–% RO	±0.005	±0.005	±0.005	±0.005	±0.005
Creep, 20 min–%	±0.01	±0.01	±0.01	±0.01	±0.01
Side Load Sensitivity–%	±0.1	±0.1	±0.1	±0.1	±0.1
Eccentric Load Sensitivity–%/in	±0.1	±0.1	±0.1	±0.1	±0.1
Lower Load Limit–% Cap. (ASTM E74 CLASS A)	4.0	4.0	4.0	4.0	4.0
TEMPERATURE					
Compensated Range–˚F	15 to115	15 to 115	15 to 115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0004	±0.0004	±0.0004	±0.0004	±0.0004
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008	±0.0008	±0.0008
ELECTRICAL					
Rated Output–mV/V (Nominal)	2.0	2.0	4.0	4.0	4.0
Excitation Voltage–VDC – MAX	20	20	20	20	20
Bridge Resistance–Ohm (Nominal)	350	350	350	350	350
Zero Balance–% RO	±1.0	±1.0	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000	5000	5000
MECHANICAL					
Safe Overload–% CAP	±150	±150	±150	±150	±150
Deflection @ RO–inch	0.002	0.002	0.004	0.004	0.006
Weight–lb	3.3	3.3	7.5	21.5	52
Connector	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P
Calibration	Compression	Compression	Compression	Compression	Compression

OPTIONS*

Compression Overload Protection
Multiple Bridge
Standardized Output
ASTM E74 Calibration
Connector Protection
See Low Profile Options Page 115

ACCESSORIES*

Precision mV/V Transfer Standard
Instrument Cable Assemblies
Signal Conditioning Boards
Calibration Software

**See appendix for more technical information*

STANDARD CONFIGURATIONS

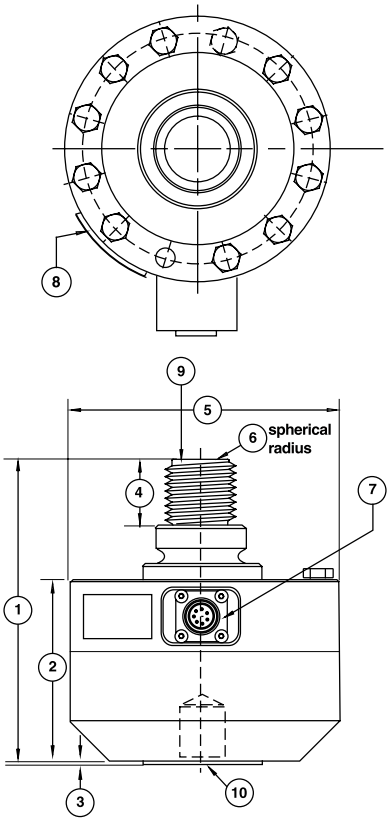
PT02E-12-8P Connector (16xxAJH-nn)

Model 1800 Platinum Standard™ Calibration Load Cell

Why the Interface model 1800 Platinum Standard™ Calibration Load Cell is the best in class:

- **Handcrafted excellence for the most demanding calibration requirements**
- **Tension and compression in one unit**
- **.005% nonrepeatability**
- **2% lower load limit per ASTM E74**
- **High precision base installed**
- **ASTM E74 calibration standard**
- **Internal electronic ID**
- **Eccentric load compensated**
- **.0008%/°F temp. effect on output**
- **Connector protector standard**

**Additional capacities available, call factory for details*



DIMENSIONS

See Drawing	MODEL 1810		1820		1830	
	CAPACITY (lbf)					
	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	1.1K,2.2K 3.3K,5.5K	5,10 15, 25	11K, 22K	50, 100	55K	250
	inch	mm	inch	mm	inch	mm
①	4.65	118.1	6.85	174.0	8.26	209.7
②	3.28	83.3	4.13	104.9	5.00	127.0
③	0.03	0.80	0.03	0.80	0.03	0.80
④	0.75	19.1	1.50	38.1	1.88	47.8
⑤	4.13	104.9	6.06	154.0	8.00	203.2
⑥	6.00	152.4	6.00	152.4	8.00	203.2
⑦	PT02E-12-8P					
⑧	Identification Label					
⑨	5/8-18 UNF-3A	M16x2-4h	1 1/4-12 UNF-3A	M33x2-4h	1 3/4-12 UNF-3A	M42x2-4h
⑩	5/8-18 UNF-3B	M16x2-4H	1 1/4-12 UNF-3B	M33x2-4H	1 3/4-12 UNF-3B	M42x2-4H
	0.75 deep	19.1	1.25 deep	31.8	2.00 deep	50.8

SPECIFICATIONS

PARAMETERS	MODEL 1810	1820	1830
	CAPACITY		
U.S. Models (lbf)	5.5K	11K, 22K	55K
Metric Models (kN)	25	50, 100	250
ACCURACY – (MAX ERROR)			
Static Error Band–% FS	±0.020	±0.020	±0.025
Nonlinearity–% FS	±0.020	±0.020	±0.020
Hysteresis–% FS	±0.025	±0.025	±0.030
Nonrepeatability–% RO	±0.005	±0.005	±0.005
Creep, in 20 min–%	±0.01	±0.01	±0.01
Side Load Sensitivity–%	±0.1	±0.1	±0.1
Eccentric Load Sensitivity–%/in	±0.05	±0.05	±0.05
Lower Load Limit - % Cap. (ASTM E74 CLASS A)	2.0	2.0	2.0
TEMPERATURE			
Compensated Range–˚F	15 to115	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90	-55 to 90
Effect on Zero–%RO/˚F – MAX	±0.0004	±0.0004	±0.0004
Effect on Output–%/˚F – MAX	±0.0008	±0.0008	±0.0008
ELECTRICAL			
Rated Output–mV/V (Nominal)	2.0	2.0	2.0
Excitation Voltage–VDC MAX	20	20	20
Bridge Resistance–Ohm (Nominal)	700	700	700
Zero Balance–% RO	±1.0	±1.0	±1.0
Insulation Resistance–Megohm	5000	5000	5000
MECHANICAL			
Safe Overload–% CAP	±300	±300	±300
Deflection @ RO–inch	0.001	0.001	0.002
Weight–lb	9	25	62
Connector	PT02E-12-8P	PT02E-12-8P	PT02E-12-8P
Calibration	T & C	T & C	T & C

ACCESSORIES*

Precision mV/V Transfer Standard
Instrument Cable Assemblies
Signal Conditioning Boards
Calibration Software

**See appendix for more technical information*

STANDARD CONFIGURATIONS

PT02E-12-8P Connector

Model SM S-Type Load Cell (U.S. & Metric)

Why the Interface model SM S-Type Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **High performance**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **Lowest creep — 0.025%**
- **Tension and compression**

STANDARD CONFIGURATION

5 ft Integral Cable (SM-nn)

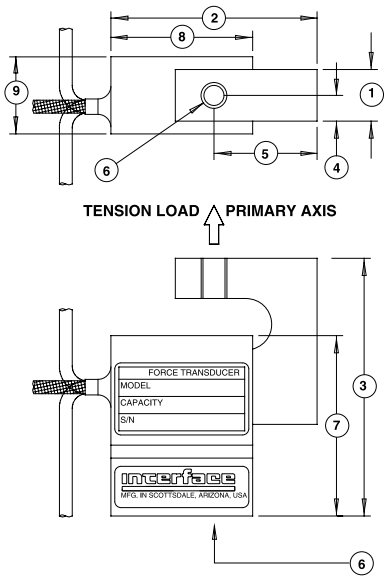
OPTIONS*

Extra Cable Length
Standardized Output

ACCESSORIES*

Load Button
Mounting Hardware
Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.03
Hysteresis–% FS .....±0.02
Nonrepeatability–% RO .....±0.01
Creep, in 20 min–% .....±0.025

TEMPERATURE
Compensated Range–°F .....0 to 150
Compensated Range–°C .....-15 to 65
Operating Range–°F .....-65 to 200
Operating Range–°C .....-55 to 90
Effect on Output–%/°F – MAX .....±0.0008
Effect on Output–%/°C – MAX .....±0.0015
Effect on Zero–% RO/°F – MAX .....±0.0015
Effect on Zero–% RO/°C – MAX .....±0.0027

ELECTRICAL
Rated Output–mV/V (Nominal) 3.0
Zero Balance–% RO .....±1.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX .....15 VDC
Insulation Resistance–Megohm .....> 5000

MECHANICAL
Calibration .....Tension
Safe Overload–% CAP .....±150
Cable length–ft 5
Natural Frequency/Deflection:

lbf	N	Deflection (inches)	Nat. Freq. (Hertz)
10	50	.003	600
25	100	.003	1000
50	200	.003	1550
100	500	.004	1850
250	1000	.006	2350
500	2000	.006	2150
1000	5000	.005	3350

DIMENSIONS

See Drawing	CAPACITY			
	U.S. (lbf)	Metric (N)	U.S. (lbf)	Metric (N)
	10, 25, 50, 100, 150, 250	50, 100, 200 500, 1000	500 1000	2000 5000
	inch	mm	inch	mm
①	0.50	12.7	1.00	25.4
②	2.00	50.8	2.00	50.8
③	2.50	63.5	3.00	76.2
④	0.25	6.40	0.50	12.7
⑤	1.00	25.4	1.00	25.4
⑥	1/4-28 UNF-2B	M6 x 1-6H	1/2-20 UNF-2B	M12 x 1.75-6H
⑦	1.75	44.5	2.00	50.8
⑧	1.38	35.1	1.94	49.3
⑨	0.75	19.1	1.25	31.8

Model SSM Sealed S-Type Load Cell (U.S. & Metric)

Why the Interface model SSM Sealed S-Type Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Environmentally sealed**
- **.02% nonrepeatability**
- **.0008%/°F (.0015%/°C) temp. effect on output**
- **.025% creep**
- **Tension and compression**

STANDARD CONFIGURATION

10 ft Integral Cable (SSM-AJ-nn)
<or> PC04E-10-6P Standard Connector (SSM-AF-nn)
(Connector available only in 500-5K lbf capacities)

OPTIONS*

PC04E-10-6P Connector (SSM-500 and above)
LEMO Connector
Standardized Output
High Temperature
Extra Cable Length

ACCESSORIES*

Load Button
Instrumentation
Mounting Hardware

**See appendix for more technical information*

SPECIFICATIONS

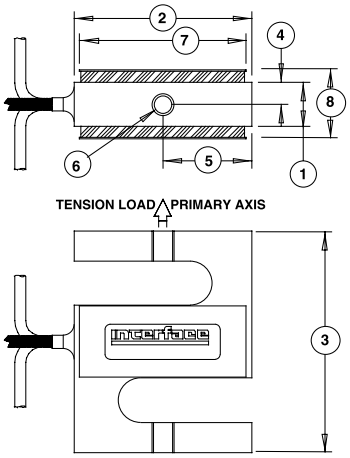
ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.05
Hysteresis–% FS .....±0.03
Nonrepeatability–% RO .....±0.02
Creep, in 20 min–% .....±0.025

TEMPERATURE
Compensated Range–˚F .....0 to 150
Compensated Range–˚C .....-15 to 65
Operating Range–˚F .....-65 to 200
Operating Range–˚C .....-55 to 90
Effect on Output–%/˚F – MAX .....±0.0008
Effect on Output–%/˚C – MAX .....±0.0015
Effect on Zero–% RO/˚F – MAX .....±0.0015
Effect on Zero–% RO/˚C – MAX .....±0.0027

ELECTRICAL
Rated Output–mV/V (Nominal) 3
Zero Balance–% RO .....±1
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX.....15 VDC
Insulation Resistance–Megohm .....> 5000

MECHANICAL
Calibration .....Tension
Safe Overload–% CAP 150
Cable length–ft 10
Natural Frequency/Deflection:

lbf	N	Deflection (inches)	Nat. Freq. (Hertz)
50	200	.003	1500
100	500	.004	1850
150	500	.004	1850
250	1000	.006	2350
500	2kN	.005	2150
750	n/a	.005	2350
1000	5kN	.005	3350
2000	10kN	.005	2400
3000	n/a	.005	3000
5000	20kN	.005	2520



DIMENSIONS

See Drawing	CAPACITY							
	U.S. (lbf)	Metric (N)	U.S. (lbf)	Metric (N)	U.S. (lbf)	Metric (kN)	U.S. (lbf)	Metric (kN)
	50	200	100, 150, 250	500, 700, 1000	500, 750 1K, 2K, 3K	2, 5, 10	5K	20
	inch	mm	inch	mm	inch	mm	inch	mm
①	0.50	12.7	0.50	12.7	1.00	25.4	1.50	38.1
②	2.00	50.8	2.00	50.8	2.00	50.8	2.50	63.5
③	2.50	63.5	2.50	63.5	3.00	76.2	3.50	88.9
④	0.25	6.40	0.25	6.40	0.50	12.7	0.75	19.1
⑤	1.00	25.4	1.00	25.4	1.00	25.4	1.25	31.8
⑥	1/4-28 UNF-2B	M6 x 1-6H	1/4-28 UNF-2B	M6 x 1-6H	1/2-20 UNF-2B	M12 x 1.75-6H	5/8-18 UNF-2B	M16 x 2-6H
⑦	1.88	47.8	1.88	47.8	1.88	47.8	2.38	60.5
⑧	0.82	20.8	0.72	18.3	1.22	31.0	1.75	44.5

Model SMT S-Type Overload Protected Load Cell (U.S. & Metric)

Why the Interface model SMT S-Type Overload Protected Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Overload protected in both tension and compression**
- **Safe overload to 10X capacity**
- **High performance**
- **Low creep**
- **1 to 450 lbf**

STANDARD CONFIGURATION

5 ft Integral Cable

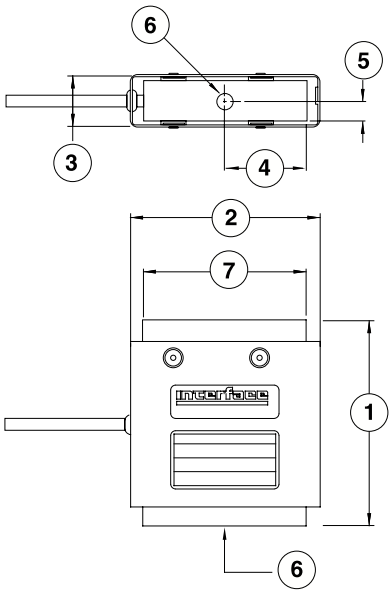
OPTIONS*

Alternate Cable Length
Standardized Output

ACCESSORIES*

Instrumentation
Mounting Hardware

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS ..... ±0.05
Hysteresis–% FS ..... ±0.03
Nonrepeatability–% RO ..... ±0.02
Creep, in 20 min–% ..... ±0.025

TEMPERATURE
Compensated Range–°F ..... 0 to 125
Compensated Range–°C ..... -15 to 50
Operating Range–°F ..... -10 to 175
Operating Range–°C ..... -25 to 80
Effect on Output–%/°F – MAX ..... ±0.0010
Effect on Output–%/°C – MAX ..... ±0.0018
Effect on Zero–% RO/°F – MAX ..... ±0.0015
Effect on Zero–% RO/°C – MAX ..... ±0.0027

ELECTRICAL
Rated Output–mV/V (Nominal) 2.0
Zero Balance–% RO ..... ±3.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX ..... 15 VDC
Insulation Resistance–Megohm ..... > 5000

MECHANICAL
Calibration ..... T & C
Safe Overload–% CAP (1.1, 2.2, 5.6, 11, 22, 56) ..1000
(112, 225, 450) 500
Cable length–ft 5

Natural Frequency/Deflection:

lbf	N	Deflection (inches)	Nat. Freq. (Hertz)
1.1	5	.014	100
2.2	10	.012	160
5.6	25	.011	260
11	50	.009	380
22	100	.007	600
56	250	.006	900
112	500	.007	600
225	1000	.007	1200
450	2000	.007	1500

DIMENSIONS

See Drawing	CAPACITY			
	SMT1		SMT2	
	U.S. (lbf)	Metric (N)	U.S. (lbf)	Metric (N)
	1.1, 2.2, 5.6, 11, 22, 56	5, 10, 25, 50, 100, 250	112, 225, 450	500, 1000, 2000
	inch	mm	inch	mm
①	2.48	63.0	2.98	75.7
②	2.33	59.2	2.33	59.2
③	0.65	16.5	1.15	29.2
④	0.98	24.9	0.98	24.9
⑤	0.24	6.1	0.49	12.4
⑥	1/4-28 UNF-3B	M6 x 1-6H	1/2-20 UNF-3B	M12 x 1.75-6H
	0.31 deep	8.0 deep	0.57 deep	14.5 deep
⑦	1.96	49.8	1.96	49.8

Model SMA Series Miniature S-Type Load Cell (U.S. and Metric)

Why the Interface model SMA Miniature S-Type Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .05%**
- **Small compact design**
- **Tension and compression**

STANDARD CONFIGURATION

5 ft Integral Cable (SMA-nn)

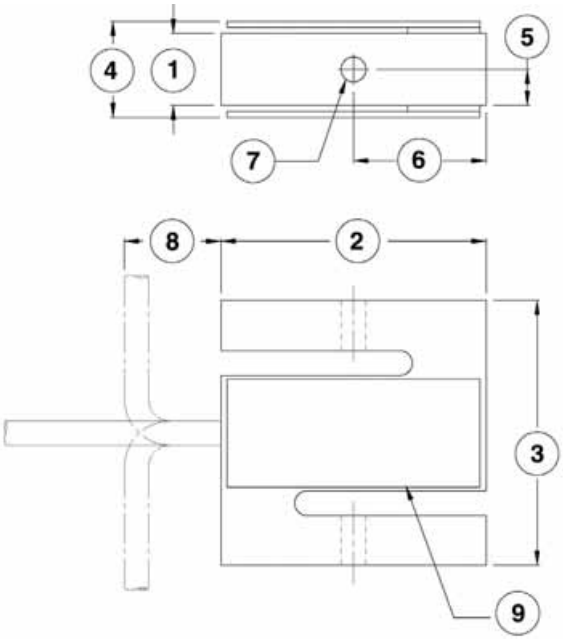
OPTIONS*

Extra Cable Length
Standardized Output

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – MAX
Nonlinearity - % FS……..+/- 0.05
Hysteresis - % FS……+/- 0.05
Nonrepeatability - % RO……..+/- 0.02
Creep, in 20 min - %……..+/- 0.05
TEMPERATURE
Compensated Range - °F……15 to 115
Compensated Range - °C……-10 to 45
Operating Range - °F……..-65 to 200
Operating Range - °C……..-55 to 90
Effect on Output - %/°F – MAX……...+/- 0.0008
Effect on Output - %/°C – MAX……..……+/- 0.0014
Effect on Zero - % RO/°F – MAX……....+/- 0.005
Effect on Zero - % RO/°C – MAX……...…+/- 0.009
ELECTRICAL
Rated Output- mV/V (nominal)……..…2.5
Zero Balance - %RO……..…..-0.6 to 0.0
Bridge Resistance – Ohm (nominal)……..…..350
Excitation Voltage – MAX……....…15 VDC
Insulation Resistance – Megohm……> 5000
MECHANICAL
Calibration……..……..Tension
Safe Overload - % CAP……...150
Cable length – ft……..5

DIMENSIONS

See Drawing	CAPACITY	
	US (LBF)	Metric (N)
	15, 100, 150, 200	60, 500, 600, 900
	inch	mm
①	0.38	9.53
②	1.38	35
③	1.38	35
④	0.56	14.2
⑤	0.19	4.8
⑥	0.69	17.5
⑦	#8-36 UNF - 2B	M4 X .7 - 6
⑧	0.5	12.7
⑨	Identification Label	

Model ULC Ultra Low Capacity Load Cell

Why the Interface model ULC Ultra Low Capacity Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Highest performance gram cell in the world**
- **Overload protected**
- **Safe side load overload to 5X capacity**
- **Low extraneous load sensitivity**
- **Low temperature effect on zero (0.002%/°F)**
- **Capacity down to 50 grams**
- **Tension and compression**

STANDARD CONFIGURATION

5 ft Cable (ULC-nnN)

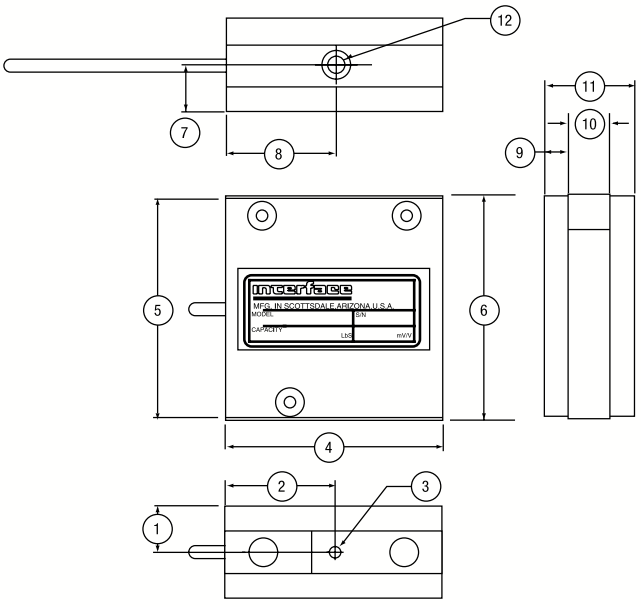
OPTIONS*

Extra Cable Length

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.05
Hysteresis–% FS .....±0.05
Nonrepeatability–% RO .....±0.05
Creep, in 20 min–% (0.5N) .....±0.1
(All Others) .....±0.05

TEMPERATURE
Compensated Range–°F .....15 to 115
Compensated Range–°C .....-10 to 45
Operating Range–°F .....-65 to 200
Operating Range–°C .....-55 to 90
Effect on Output–%/°F – MAX .....±0.001
Effect on Output–%/°C – MAX .....±0.002
Effect on Zero–% RO/°F – MAX .....±0.002
Effect on Zero–% RO/°C – MAX .....±0.004

ELECTRICAL
Rated Output–mV/V (Nominal)(0.5N) .....±1.5
(All Others) .....±2.0
Zero Balance–% RO (horiz.).....±2.0
Input Resistance–Ohms .....350+35/-3.5
Output Resistance–Ohms.....350±3.5
Excitation Voltage – MAX.....12 VDC
Insulation Resistance – Megohms .....> 5000

MECHANICAL
Calibration .....Tension
Safe Axial Overload–% CAP .....±1000
Safe Side Load Overload–% CAP .....±500
Safe Load Axis Moment–% CAP x 1 in ....±500
Cable length–ft 5
Natural Frequency/Deflection:

N	Deflection (inches)	Nat. Freq. (Hertz)
0.5	0.011	120
1	0.011	125
2	0.008	200

DIMENSIONS

See Drawing	CAPACITY (N)* 0.5, 1, 2	
	inch	mm
①	0.42	10.6
②	0.99	25.1
③	4-40 UNC x 0.19 (4.8) Deep	
④	1.98	50.3
⑤	1.96	49.8
⑥	2.00	50.8
⑦	0.42	10.6
⑧	0.99	25.1
⑨	0.23	5.8
⑩	0.38	9.5
⑪	0.84	21.2
⑫	1/4-28 UNF x 0.32 (8.1) Deep	

*1 Newton = 102 gram force

Note: Other sizes are available – contact factory

Model SML Low Height Load Cell

Why the Interface model SML Low Height Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **From 3/4" high**
- **Performance to .05%**
- **Low extraneous load sensitivity**
- **Tension and compression**
- **.0008%/°F temperature effect on output**
- **Overload protection (SML-5 and SML-10)**

STANDARD CONFIGURATION

5 ft Integral Cable (SML-nn)

OPTIONS*

Extra Cable Length
Studs Instead of Threaded Holes

ACCESSORIES*

Instrumentation

**See appendix for more technical information*

SPECIFICATIONS

ACCURACY - (MAX ERROR)	5-300	500, 1000
Nonlinearity–% FS	±0.05	±0.10
Hysteresis–% FS	±0.05	±0.10
Nonrepeatability–% RO	±0.03	
Creep, in 20 min–%	±0.05	

TEMPERATURE

Compensated Range–°F	0 to 150
Compensated Range–°C	-15 to 65
Operating Range–°F	-65 to 200
Operating Range–°C	-55 to 90
Effect on Output–%/°F – MAX	±0.0008
Effect on Zero–% RO/°F – MAX	±0.005

ELECTRICAL

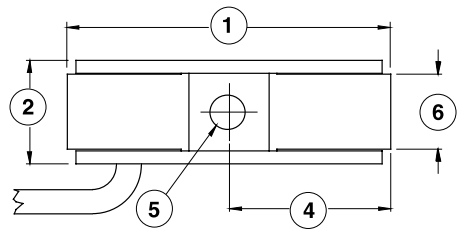
Rated Output–mV/V (Nominal)	2.0
Zero Balance–% RO	±1.0
Bridge Resistance–Ohm (Nominal)	350
Excitation Voltage – MAX	15 VDC
Insulation Resistance – Megohm	> 5000

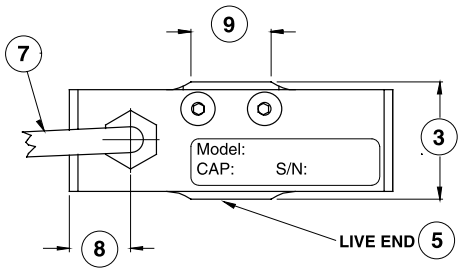
MECHANICAL

Calibration	Tension
Safe Overload–% CAP:	
5, 10 lbf	800
25-1000 lbf	150
Cable length–ft	5

Natural Frequency/Deflection:

lbf	Deflection (inches)	Nat. Freq. (Hertz)
5,10	.005	3000
25	.004	2500
50	.003	3300
100	.003	5000
200,300	.003	4500
500,1000	.003	1800





DIMENSIONS

See Drawing	CAPACITY (lbf) 5, 10		25, 50, 100		200, 300 500,1000	
	inch	mm	inch	mm	inch	mm
①	1.80	45.7	2.00	50.8	2.12	53.8
②	0.52	13.2	0.64	16.4	0.90	22.9
③	0.73	18.6	0.73	18.6	0.98	24.9
④	0.90	22.9	1.00	25.4	1.06	26.9
⑤	10-32 UNF-2B .20 deep		1/4-28 UNF-2B .25 deep		3/8-24 UNF-2B .38 deep	
⑥	0.34	8.6	0.46	11.8	0.72	18.3
⑦	0.13	3.3	0.13	3.3	0.13	3.3
⑧	0.29	7.4	0.38	9.7	.46	11.7
⑨	0.50	12.7	0.50	12.7	0.57	14.5

Model WMC Miniature Sealed Stainless Steel Load Cell

Capacities 5-500 lbf

Why the Interface model WMC Miniature Sealed Stainless Steel Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Tension and compression**
- **Small size**
- **Environmentally sealed**

SPECIFICATIONS

ACCURACY - (MAX ERROR)
Nonlinearity–% FS .....±0.15
Hysteresis–% FS .....±0.15
Nonrepeatability–% RO .....±0.05
Creep, in 20 min–% .....±0.05

TEMPERATURE
Compensated Range–°F .....15 to 115
Compensated Range–°C.....-10 to 45
Operating Range–°F .....-65 to 250
Operating Range–°C .....-54 to 121
Effect on Output–%/°F – MAX .....±0.002
Effect on Zero–% RO/°F – MAX .....±0.005

ELECTRICAL
Rated Output–mV/V (Nominal) 2.0
Zero Balance–% RO.....±2.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX.....12.0 VDC
Insulation Resistance – Megohm.....> 5000

MECHANICAL
Calibration .....Tension
Safe Overload–% CAP:
5,10 lbf 150
25-500 lbf.....150
Cable length–ft.....5

STANDARD CONFIGURATION

5 ft Integral Cable

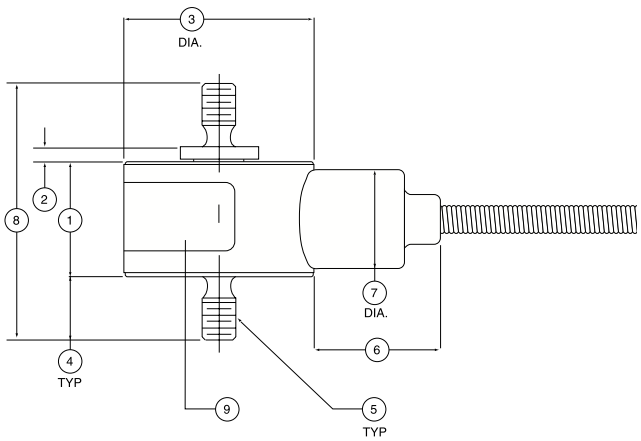
OPTIONS*

Extra Cable Length

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



DIMENSIONS

See Drawing	CAPACITY (lbf)					
	5, 10		25, 50, 100		250, 500	
	inch	mm	inch	mm	inch	mm
①	0.45	11.4	0.52	13.21	0.52	13.21
②	0.06	1.5	0.12	3.05	0.03	0.76
③	0.75	19.1	1.00	25.4	1.00	25.4
④	0.25	6.4	0.25	6.4	0.38	9.7
⑤	6-32 UNF		10-32 UNF		1/4-28 UNF	
⑥	0.50	12.7	0.50	12.7	0.50	12.7
⑦	0.39	9.9	0.39	6.4	0.39	6.4
⑧	1.01	25.6	1.14	29.0	1.31	33.3
⑨	label		label		label	

Model WMC Miniature Sealed Stainless Steel Load Cell

Capacities 1K-10Klbf

Why the Interface model WMC Miniature Sealed Stainless Steel Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Tension and compression**
- **Small size**
- **Environmentally sealed**

STANDARD CONFIGURATION

5 ft Integral Cable

OPTIONS*

Extra Cable Length

ACCESSORIES*

Instrumentation

**See appendix for more technical information*

SPECIFICATIONS

ACCURACY - (MAX ERROR)

Nonlinearity–% FS .....±0.20
Hysteresis–% FS .....±0.20
Nonrepeatability–% RO .....±0.05
Creep, in 20 min–% .....±0.05

TEMPERATURE

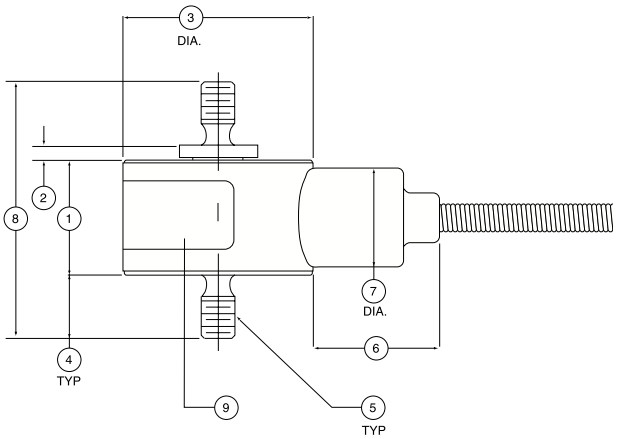
Compensated Range–˚F .....15 to 115
Compensated Range–˚C.....-10 to 45
Operating Range–˚F .....-65 to 250
Operating Range–˚C .....-54 to 121
Effect on Output–%/˚F – MAX .....±0.002
Effect on Zero–% RO/˚F – MAX .....±0.005

ELECTRICAL

Rated Output–mV/V (Nominal) 2.0
Zero Balance–% RO.....±2.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX.....15 VDC
Insulation Resistance – Megohm.....> 5000

MECHANICAL

Calibration .....Tension
Safe Overload–% CAP:.....150
Cable length–ft.....5



DIMENSIONS

See Drawing	CAPACITY (lbf)							
	1K		2K, 3K		5K		7.5K, 10K	
	inch	mm	inch	mm	inch	mm	inch	mm
①	0.53	13.4	0.72	18.3	0.94	23.9	1.09	27.7
②	0.03	0.8	0.03	0.08	0.03	0.08	0.03	0.08
③	1.00	25.4	1.00	25.4	1.25	31.8	1.38	34.9
④	0.38	9.7	0.50	12.7	0.63	16.0	0.88	22.4
⑤	0.250-28 UNF		0.375-24 UNF		0.500-20 UNF		0.750-16 UNF	
⑥	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7
⑦	0.39	9.9	0.39	9.9	0.39	9.9	0.39	9.9
⑧	1.32	33.5	1.75	44.5	2.23	56.6	2.88	73.2
⑨	label		label		label		label	

Model LBM Compression Load Button

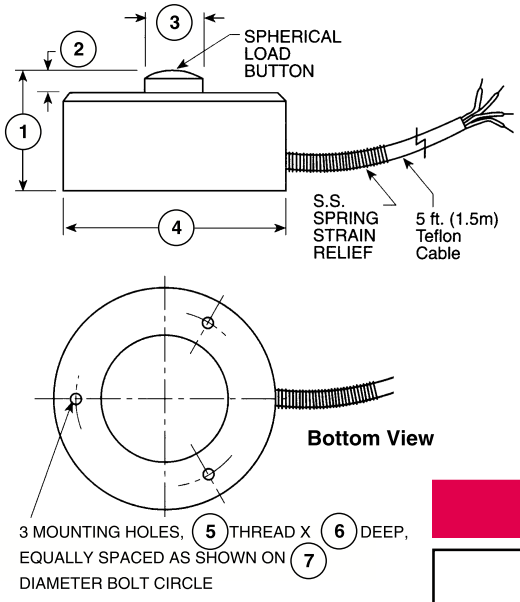
Why the Interface model LBM Compression Load Button is the best in class:

- **Temperature compensated**
- **Integral load button**
- **Small diameter**
- **Environmentally sealed**

ACCESSORIES*

Instrumentation

**Please call for additional information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.25
Hysteresis–% FS .....±0.25
Nonrepeatability–% RO .....±0.10

TEMPERATURE
Compensated Range–˚F .....60 to 160
Compensated Range–˚C.....16 to 71
Operating Range–˚F .....-65 to 250
Operating Range–˚C .....-54 to 121
Effect on Zero–% RO/˚F – MAX .....±0.005
Effect on Output–%/˚F – MAX .....±0.01
Zero Balance % FS.....±2

ELECTRICAL
Rated Output–mV/V (Nominal) 2.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage.....10 VDC

MECHANICAL
Calibration .....Comp.
Deflection 0.004
Safe Overload–% CAP 150
Ultimate Overload % of CAP 300
Cable length–ft 5
4-conductor Teflon insulated cable

DIMENSIONS

See Drawing	CAPACITY (lbf) LBM Series									
	25, 50, 100		250,500,1K, 2K		5K, 10K		20K		50K	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	0.62	15.7	0.39	9.90	0.63	16.0	1.0	25.4	1.50	38.1
②	0.05	1.30	0.07	1.80	0.08	2.00	0.12	3.00	0.18	4.60
③	0.21	5.30	0.32	8.10	0.43	10.9	0.60	15.0	0.78	19.8
④	1.00	25.4	1.25	31.8	1.50	38.1	2.00	50.8	3.00	76.2
⑤	4-40 UNC		6-32 UNC		6-32 UNC		6-32 UNC		6-32 UNC	
⑥	0.19	4.83	0.25	6.35	0.25	6.35	0.25	6.35	0.25	6.35
⑦	0.75	19.00	1.00	25.4	1.25	31.8	1.63	41.3	2.38	60.3

Model LBS Miniature Compression Load Button

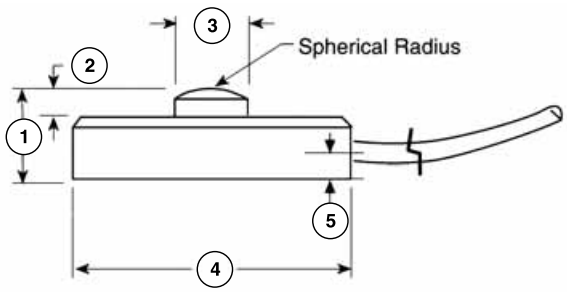
Why the Interface model LBS Miniature Compression Load Button is the best in class:

- **Temperature compensated**
- **Integral load button**
- **Small diameter**
- **From .12" height**

ACCESSORIES*

Instrumentation

**Please call for additional information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.25
Hysteresis–% FS .....±0.25
Nonrepeatability–% RO .....±0.10

TEMPERATURE
Compensated Range–˚F .....60 to 160
Compensated Range–˚C.....15 to 71
Operating Range–˚F .....-65 to 225
Operating Range–˚C .....-54 to 107
Effect on Zero–% RO/˚F – MAX .....±0.005
Zero Balance % FS.....±2

ELECTRICAL
Rated Output–mV/V (Nominal) 2.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage.....5 VDC
Excitation Voltage – MAX.....7 VDC

MECHANICAL
Calibration .....Compression
Deflection .....0.001 - 0.003
Safe Overload–% CAP 150
Ultimate Overload % of CAP 300
Cable length–ft.....5
4-conductor Teflon insulated cable with temperature compensation board

DIMENSIONS

See Drawing	CAPACITY (lbf)					
	LBS Series					
	5, 10, 25, 50		100, 250		500, 1K	
	inch	mm	inch	mm	inch	mm
①	0.12	3.00	0.15	3.80	0.25	6.4
②	0.03	0.80	0.02	0.50	0.03	0.80
③	0.09	2.20	0.12	3.00	0.24	6.10
④	0.38	9.60	0.50	13.0	0.75	19.0
⑤	.04	1.0	.06	1.5	.10	2.5

Model MSC Small Diameter High Capacity Load Button

Why the Interface model MSC Small Diameter High Capacity Load Button is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Small compact design**
- **Environmentally sealed**
- **Stainless steel construction**
- **Low deflection**

STANDARD CONFIGURATION

5 ft Integral Cable

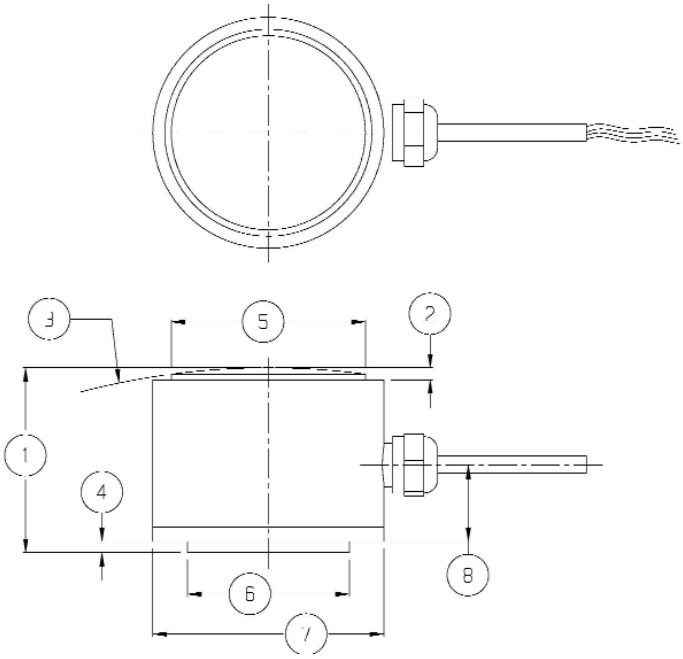
OPTIONS*

Extra Cable Length

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – MAX
Nonlinearity - % FS……..±0.05
Hysteresis - % FS……..±0.05
Nonrepeatability - % RO……..±0.10
Creep, in 20 min - %……..±0.15
TEMPERATURE
Compensated Range - °F……70 to 170
Compensated Range - °C……21 to 77
Operating Range - °F……..-40 to 175
Operating Range - °C……..-40 to 80
Effect on Output - %/°F – MAX……...±0.009
Effect on Output - %/°C – MAX……..……±0.005
Effect on Zero - % RO/°F – MAX……....±0.0036
Effect on Zero - % RO/°C – MAX……...…±0.002
ELECTRICAL
Rated Output- mV/V (nominal)……..…2 +40%/-20%
Zero Balance - %RO……..…±2
Bridge Resistance – Ohm (nominal)……..…350 +50/-3.5
Excitation Voltage – MAX……....…15 VDC
Insulation Resistance – Megohm……5000
MECHANICAL
Calibration……..……..Compression
Safe Overload - % CAP……...150
Cable length – ft……..5

DIMENSIONS

See Drawing	CAPACITY	
	U.S. (lbf)	Metric (N)
	15K, 20K, 30K, 65K, 90K, 130K	
	inch	mm
①	1.00	25.4
②	0.06	1.52
③	R 4.0 ±.5	101.6 ±13
④	0.06	1.52
⑤	1.05	26.67
⑥	0.875	22.23
⑦	1.25	31.75
⑧	.5 ±0.1	12.32

Can’t find the load cell you need?

Call us at 1-800-947-5598
to discuss your application
with one of our application engineers.

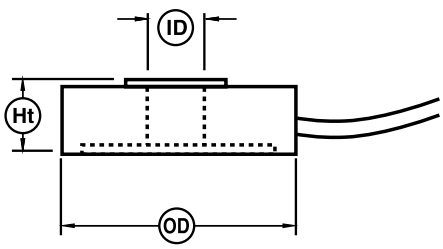
Model LW Load Washer

Why the Interface model LW Load Washer is the best in class:

- **Capacities from 5 lbf to 100Klbf**
- **Wide selection of OD, ID, and height (as low as .25 in) combinations**
- **Stainless steel construction**

SPECIFICATIONS

PARAMETERS	MODEL	
	LW10xx LW12xx	LW15xx LW20xx LW25xx LW30xx LW31xx LW45xx
ACCURACY – (MAX ERROR) Combined Error–% FS	±1.0	±0.5
TEMPERATURE Compensated Range–˚F	60 to 160	
Compensated Range–˚C	16 to 71	
Operating Range–˚F	-65 to 250	
Operating Range–˚C	-54 to 121	
Effect on Zero–%RO/˚F – MAX	±0.005	
Effect on Zero–%RO/˚C – MAX	±0.009	
ELECTRICAL Rated Output–mV/V (Nominal)	2.00	
Bridge Resistance–Ohm (Nominal)	350	
Excitation Voltage – MAX	15 VDC	
MECHANICAL Safe Overload–% of RO	150	
Cable Length – ft	5	
Deflection @ R.O. – inch	.003	



(See dimensions on adjacent page)

OPTIONS*

Special Cable Length

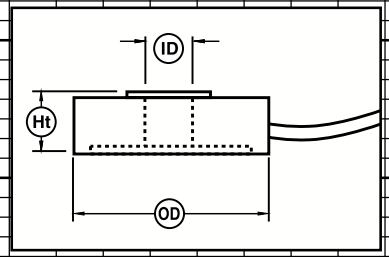
ACCESSORIES*

Instrumentation

**Please call for additional information*

INTERFACE LOAD WASHER SELECTION CHART

OD (IN.)	ID (IN.)	HEIGHT (IN.)	MODEL LW	CAPACITY (lbf)																				
				5	10	25	50	100	200	250	500	1K	2K	3K	5K	7.5K	10K	15K	20K	25K	30K	40K	50K	75K	100K
1.00	0.100	0.28	1010	●	●	●	●	●	●																
	0.125	0.28	1012	●	●	●	●	●	●																
	0.188	0.28	1019	●	●	●	●	●	●																
	0.200	0.28	1020	●	●	●	●	●	●																
	0.250	0.28	1025	●	●	●	●	●	●																
1.25	0.100	0.25	1210			●	●	●		●	●														
	0.125	0.25	1212			●	●	●		●	●														
	0.188	0.25	1219			●	●	●		●	●														
	0.200	0.25	1220			●	●	●		●	●														
	0.250	0.25	1225			●	●	●		●	●														
	0.312	0.25	1231			●	●	●		●	●														
	0.375	0.25	1238			●	●	●		●	●														
1.50	0.100	0.50	1510					●		●	●	●	●	●	●										
	0.125	0.50	1513					●		●	●	●	●	●	●										
	0.200	0.50	1520					●		●	●	●	●	●	●										
	0.250	0.50	1525					●		●	●	●	●	●	●										
	0.312	0.50	1531					●		●	●	●	●	●	●										
	0.375	0.50	1538					●		●	●	●	●	●	●										
	0.500	0.50	1550					●		●	●	●	●	●	●										
2.00	0.125	*	2013	●	●	●	●	●		●	●	●													
	0.188	*	2019	●	●	●	●	●		●	●	●	●												
	0.250	*	2025	●	●	●	●	●		●	●	●	●	●	●										
	0.375	*	2038	●	●	●	●	●		●	●	●	●	●	●	●	●								
	0.500	*	2050	●	●	●	●	●		●	●	●	●	●	●	●	●								
	0.625	*	2063	●	●	●	●	●		●	●	●	●	●	●										
	0.750	*	2075							●	●	●	●	●	●										
	0.875	*	2088							●	●	●	●	●											
	1.000	*	20100								●	●	●												
2.50	0.250	1.00	2525									●	●	●											
	0.375	1.00	2538									●	●	●	●	●	●								
	0.500	1.00	2550									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.625	1.00	2563									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.750	1.00	2575									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.875	1.00	2588									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.938	1.00	2594									●	●	●	●	●	●	●	●		●	●	●	●	●
	1.000	1.00	25100									●	●	●	●	●	●	●	●		●	●	●	●	●
	1.130	1.00	25113									●	●	●	●	●	●								
	1.250	1.00	25125									●	●	●	●	●	●								
	1.380	1.00	25138									●	●	●	●	●	●								
	1.500	1.00	25150									●	●	●	●	●	●								
3.00	0.250	1.00	3025									●	●	●											
	0.375	1.00	3038									●	●	●	●	●	●								
	0.500	1.00	3050									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.625	1.00	3063									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.750	1.00	3075									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.875	1.00	3088									●	●	●	●	●	●	●	●		●	●	●	●	●
	0.938	1.00	3094									●	●	●	●	●	●	●	●		●	●	●	●	●
	1.000	1.00	30100									●	●	●	●	●	●	●	●		●	●	●	●	●
	1.130	1.00	30113									●	●	●	●	●	●								
	1.250	1.00	30125									●	●	●	●	●	●								
	1.380	1.00	30138									●	●	●	●	●	●								
	1.500	1.00	30150									●	●	●	●	●	●								
3.13	2.000	0.50	31200									●		●	●										
	2.130	0.50	31213									●		●	●										
4.00	2.000	**	40200									●		●	●		●			●			●		●
	2.130	**	40213									●		●	●		●			●			●		●
4.50	3.000	1.25	45300									●		●	●		●								
	3.130	1.25	45313									●		●	●		●								



*Height is 0.37" for 5 lb. thru 100 lb. height is 0.63" for 250 lb. thru 10k lb.

**Height is 1.00" for 1k thru 50k lb. height is 2.00" for 100k lb.

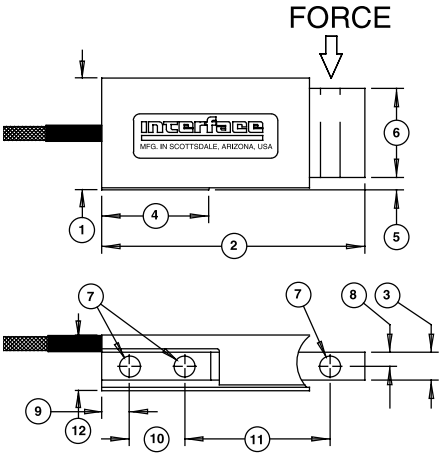
Model MB Miniature Beam Load Cell

Why the Interface model MB Miniature Beam Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Performance to .03%**
- **Low height – 1 in**
- **.0008%/°F temp. effect on output**
- **Low cost**

STANDARD CONFIGURATION

5 ft Integral Cable (MB-nn)



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.03
Hysteresis–% FS .....±0.02
Nonrepeatability–% RO .....±0.01
Creep, in 20 min–% .....±0.025
TEMPERATURE
Compensated Range–°F .....0 to 150
Operating Range–°F .....-65 to 200
Effect on Output–%/°F – MAX .....±0.0008
Effect on Zero–% RO/°F – MAX .....±0.0015
ELECTRICAL
Rated Output–mV/V (Nominal) 3.0
Zero Balance–% RO .....±1.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX .....15 VDC
Insulation Resistance–Megohm 5000
MECHANICAL
Calibration .....Compression
Safe Overload–% CAP .....±150
Cable length–ft 5
Natural Frequency/Deflection:

lbf	Deflection (inches)	Nat. Freq. (hertz)
5	.005	950
10	.005	1300
25	.005	2250
50	.004	3300
75	.004	3900
100	.005	4000
150	.005	4750
250	.005	4400

DIMENSIONS

See Drawing	CAPACITY (lbf)													
	5, 10		25		50		75		100		150		250	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	1.01	25.7	1.01	25.7	1.01	25.7	1.01	25.7	1.01	25.7	1.01	25.7	1.02	25.9
②	2.38	60.5	2.38	60.5	2.38	60.5	2.38	60.5	2.38	60.5	2.38	60.5	2.38	60.5
③	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4	0.5	12.8
④	0.97	24.6	0.97	24.6	0.97	24.6	0.97	24.6	0.97	24.6	0.97	24.6	0.97	24.6
⑤	0.14	3.6	0.11	2.8	0.15	3.8	0.14	3.6	0.13	3.3	0.1	2.5	0.12	3
⑥	0.75	19.1	0.81	20.6	0.72	18.3	0.75	19.1	0.78	19.8	0.82	20.8	0.79	20.1
⑦	0.17	4.3	0.17	4.3	0.17	4.3	0.17	4.3	0.17	4.3	0.17	4.3	0.17	4.3
⑧	0.13	3.3	0.13	3.3	0.13	3.3	0.13	3.3	0.13	3.3	0.13	3.3	0.25	6.4
⑨	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4	0.25	6.4
⑩	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7
⑪	1.31	33.3	1.31	33.3	1.31	33.3	1.31	33.3	1.31	33.3	1.31	33.3	1.31	33.3
⑫	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7	0.50	12.7	0.75	19.1

Model MBP Miniature Beam Overload Protected Load Cell

Why the Interface model MBP Miniature Beam Overload Protected Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **10X overload protection**
- **Low height – 1 in**
- **.0008%F temp. effect on output**
- **Low height – 1 in**

STANDARD CONFIGURATION

5 ft Integral Cable (MBP)

OPTIONS*

Cable Length
Standardized Output

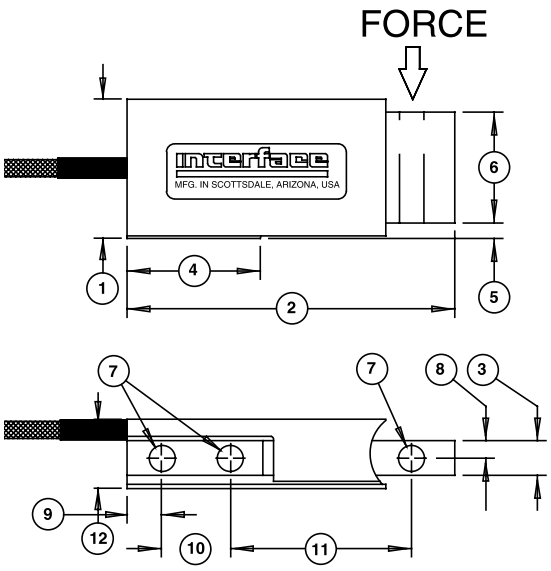
ACCESSORIES*

Instrumentation

SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.03
Hysteresis–% FS.....±0.02
Nonrepeatability–% RO.....±0.01
Creep, in 20 min–% .....±0.025
TEMPERATURE
Compensated Range–˚F .....0 to 150
Operating Range–˚F .....-65 to 200
Effect on Output–%/˚F – MAX.....±0.0008
Effect on Zero–% RO/˚F – MAX .....±0.0015
ELECTRICAL
Rated Output–mV/V (Nominal) 3.0
Zero Balance–% RO .....±1.0
Bridge Resistance–Ohm (Nominal).....350
Excitation Voltage – MAX .....15 VDC
Insulation Resistance–Megohm 5000
MECHANICAL
Calibration.....Compression
Safe Overload–% CAP.....±1000
Cable length–ft 5
Deflection @RO-inch 0.005 (0.13mm)

**See appendix for more technical information*



DIMENSIONS

See Drawing	CAPACITY	
	U.S. (lbf)	Metric (N)
	2.5, 5, 10	10, 20, 50
	inch	mm
①	1.01	25.7
②	2.38	60.5
③	0.25	6.4
④	0.97	24.6
⑤	0.14	3.6
⑥	0.75	19.1
⑦	0.17	4.3
⑧	0.13	3.3
⑨	0.25	6.4
⑩	0.50	12.7
⑪	1.31	33.3
⑫	0.50	12.7

Model MBI Fatigue Rated Mini Beam Overload Protected Load Cell

Why the Interface model MBI Fatigue Rated Mini Beam Overload Protected Load Cell is the best in class:

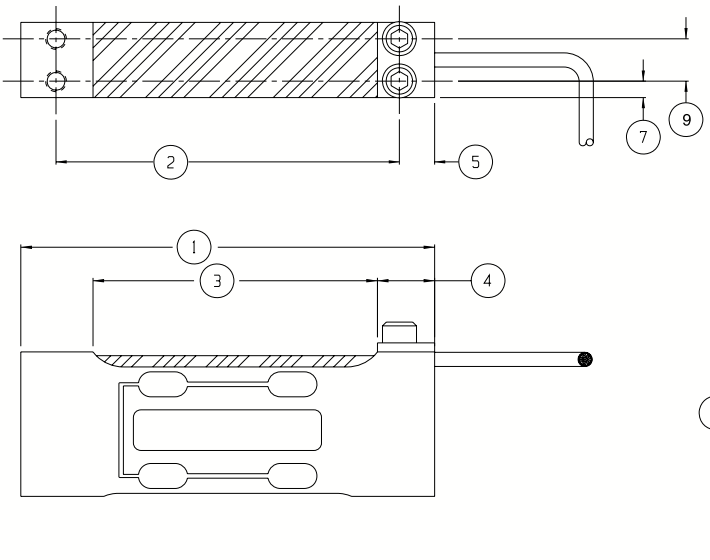
- **Proprietary Interface temperature compensated strain gages**
- **Performance to .03%**
- **Low height – 1 in**
- **.0008%/°F temp. effect on output**
- **10X overload protection**

SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS ±0.02
Hysteresis–% FS ....±0.02
Nonrepeatability–% RO ....±0.01
Creep, in 20 min–% ....±0.025
TEMPERATURE
Compensated Range - F ....70 to 170
Operating Range– F ....-40 to 175
Effect on Output–%/F – MAX....±0.0008
Effect on Zero–% RO/F – MAX....±0.002
ELECTRICAL
Rated Output–mV/V (Nominal) 2
Zero Balance–% RO....±1.0%
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX....15 VDC
Insulation Resistance–Megohm 5000
MECHANICAL
Calibration ....Compression
Safe Overload–% CAP 1000
Cable length–ft....5

STANDARD CONFIGURATION

5 ft Integral Cable (MBI-nn)



DIMENSIONS

See Drawing	CAPACITY	
	U.S. (lbf)	Metric (N)
	2, 5, 10	10,20,50
①	2.750	69.90
②	2.281	57.94
③	1.890	48.00
④	0.380	9.70
⑤	0.234	5.94
⑥	1.160	29.50
⑦	0.110	2.79
⑧	0.510	13.00
⑨	0.281	7.14
⑩	0.500	12.70

Model SSB Sealed Beam Load Cell

Why the Interface model SSB Sealed Beam Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **.01% nonrepeatability**
- **Environmentally sealed**
- **.0008%/°F temp. effect on output**
- **Compact size**

STANDARD CONFIGURATION

10 ft Integral Cable (SSB-AJ-nn)
<or> 10 ft Integral Cable & Standardized Ouptut (SSB-AP-nn)

OPTIONS*

Extra Cable Length
Standardized Output

ACCESSORIES*

Instrumentation
Load Button

**See appendix for more technical information*

SPECIFICATIONS

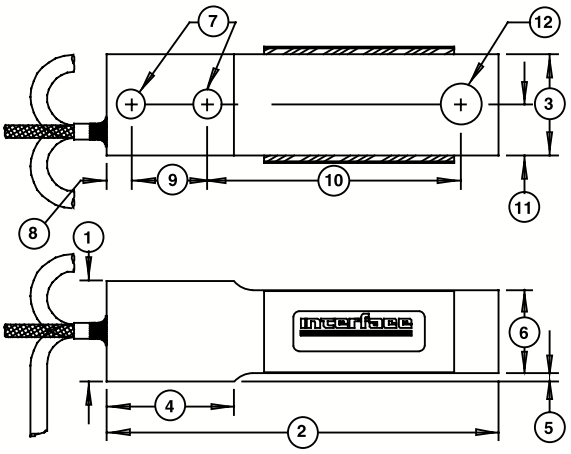
ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.03
Hysteresis–% FS .....±0.02
Nonrepeatability–% RO .....±0.01
Creep, in 20 min–% .....±0.025

TEMPERATURE
Compensated Range–˚F .....0 to 150
Compensated Range–˚C.....-15 to 65
Operating Range–˚F .....-65 to 200
Operating Range–˚C .....-55 to 90
Effect on Output–%/˚F – MAX .....±0.0008
Effect on Zero–% RO/˚F – MAX .....±0.0015

ELECTRICAL
Rated Output–mV/V (Nominal) 3.0
Zero Balance–% RO.....±1.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX.....15 VDC
Insulation Resistance–Megohm.....5000

MECHANICAL
Calibration .....Compression
Safe Overload–% CAP .....±150
Cable length–ft.....10
Natural Frequency/Deflection:

lbf	Deflection (inches)	Nat. Freq. (Hertz)
50	.004	2130
100	.004	2400
250	.005	3000
500	.010	2220
1000	.013	1970



DIMENSIONS

See Drawing	CAPACITY (lbf)									
	50		100		250		500		1000	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	0.98	24.9	0.98	24.9	0.98	24.9	1.00	25.4	1.50	38.1
②	2.38	60.5	2.38	60.5	2.38	60.5	3.88	98.6	5.00	127.0
③	0.50	12.7	0.50	12.7	0.50	12.7	1.00	25.4	1.00	25.4
④	0.97	24.6	0.97	24.6	0.97	24.6	1.25	31.8	1.75	44.5
⑤	0.11	2.80	0.11	2.80	0.11	2.80	0.09	2.30	0.10	2.50
⑥	0.82	20.8	0.82	20.8	0.82	20.8	0.82	20.8	1.36	34.5
⑦	0.17	4.30	0.17	4.30	0.17	4.30	0.28	7.10	0.41	10.3
⑧	0.25	6.40	0.25	6.40	0.25	6.40	0.25	6.40	0.38	9.70
⑨	0.50	12.7	0.50	12.7	0.50	12.7	0.75	19.1	1.00	25.4
⑩	1.31	33.3	1.31	33.3	1.31	33.3	2.50	63.5	3.25	82.6
⑪	0.25	6.40	0.25	6.40	0.25	6.40	0.50	12.7	0.50	12.7
⑫	0.17	4.30	0.17	4.30	0.17	4.30	0.40	10.2	0.40	10.2

Model WMC
Rod End Load Cell

Why the Interface model WMC Rod End Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Environmentally sealed**
- **Stainless steel construction**
- **Low deflection**
- **Tension and compression**

STANDARD CONFIGURATION

PTO2E-10-6P Connector

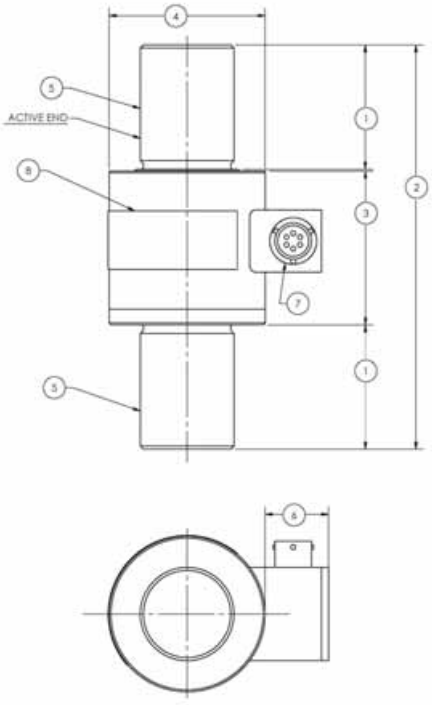
OPTIONS*

Integral Cable
Standardized Output

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – MAX
Nonlinearity - % FS……..…±0.10
Hysteresis - % FS……±0.10
Nonrepeatability - % RO……..…±0.05
Creep, in 20 min - %……..±0.05
TEMPERATURE
Compensated Range - °F……15 to 115
Compensated Range - °C……-10 to 45
Operating Range - °F……..-65 to 250
Operating Range - °C……..-54 to 121
Effect on Output - %/°F – MAX……...±0.004
Effect on Output - %/°C – MAX……..……±0.0072
Effect on Zero - % RO/°F – MAX……....±0.0025
Effect on Zero - % RO/°C – MAX……...…±0.0045
ELECTRICAL
Rated Output- mV/V (nominal)……...…2
Zero Balance - %RO……..…..±1
Bridge Resistance – Ohm (nominal)……..…..350 ±3.5
Excitation Voltage – MAX……..…15 VDC
Insulation Resistance – Megohm……> 5000
MECHANICAL
Calibration……..……..Tension
Safe Overload - % CAP……...150

DIMENSIONS

See Drawing	CAPACITY (lbf) 20K, 30K, 50K	
	inch	mm
①	2.00	50.8
②	6.5	165.1
③	2.47	62.7
④	2.5	63.5
⑤	1.5 - 12 UNF	
⑥	1.01	25.7
⑦	PT02E-10-6P	
⑧	Label	

Model 2100 High Capacity Column Load Cell (U.S. & Metric)

Why the Interface model 2100 High Capacity Column Load Cell is the best in class:

- **Capacities to 1000Klbf or 4450 kN**
- **Performance to ±0.15% FS**
- **Compact size**
- **Metric and English models**

OPTIONS*

Compression-Only available. Ask factory for specifications and dimensions.

Multiple Bridge
Standardized Output
ASTM E74 Calibration
Special Thread Size
Handles

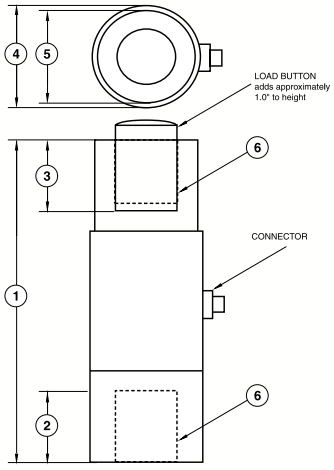
ACCESSORIES*

Mating Connector
Cable Assembly

**Please call for additional information*

SPECIFICATIONS

PARAMETERS	Cal Grade
ACCURACY	
Nonlinearity - %FS	±0.15
Hysteresis - %FS	±0.05
Nonrepeatability - %RO	±0.03
Creep in 20 min - %	±0.05
TEMPERATURE	
Compensated Range–°F	32 to 132
Operating Range–°F	-30 to 200
Effect on Zero–%RO/°F	0.003
Effect on Output–%/°F	0.003
ELECTRICAL	
Rated Output - mV/V (Nominal)	2.0
Excitation - V AC/DC - Nominal	10
Excitation - V AC/DC - Maximum	15
Bridge Resistance–Ohm (Nominal)	350
Zero Balance - %RO	±1.0
Insulation Resistance - Megohm	> 5000
MECHANICAL	
Safe Overload–%CAP	150
Connector	MS3102A-14S-5P



DIMENSIONS

See Drawing	MODEL 2160											
	CAPACITY (lbf/kN)											
	300K	1335 kN	400K	1780 kN	500K	2225 kN	600K	2670 kN	700K	3115 kN	1000K	4450 kN
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
①	16.50	419.1	19.00	482.6	21.26	540.0	23.25	590.6	25.50	647.7	27.80	706.1
②	3.75	95.3	4.00	101.6	4.50	114.3	5.00	127.0	5.50	139.7	6.50	165.1
③	3.75	95.5	4.00	101.6	4.50	114.3	5.00	127.0	5.50	139.7	6.50	165.1
④	5.50	139.7	5.50	139.7	6.00	152.4	7.00	177.8	7.50	190.5	9.50	241.3
⑤	5.00	127.0	5.00	127.0	5.50	139.7	6.50	165.1	7.00	177.8	9.00	228.6
⑥	3 ½-12	M76x2	3 ½-12	M90x2	4-12	M100x2	4 ½-8	M100x2	5-8	M125x4	6-8	M125x4

Model 1216 Axial Torsion Load Cell

Why the Interface model 1216 Axial Torsion Load Cell is the best in class:

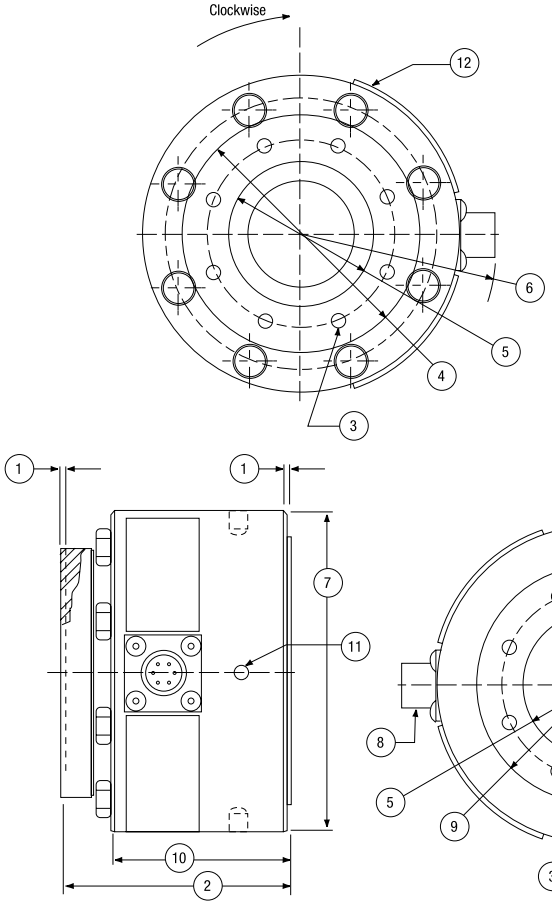
- **Measures load and torque**
- **Minimal crosstalk**
- **Extraneous load resistance**
- **Fatigue rated**

OPTIONS*

Integral Cable
Compression Overload Protection
Connector Protector

SPECIFICATIONS

ACCURACY – (MAX ERROR)	Axial Bridge A	Torsion Bridge B
Nonlinearity–% FS	±0.04	±0.07
Hysteresis–% FS	±0.04	±0.05
Nonrepeatability–% RO	±0.02	±0.05
Creep, in 20 min–%	±0.025	±0.025
TEMPERATURE		
Compensated Range–˚F	15 to 115	15 to 115
Compensated Range–˚C	-10 to 45	-10 to 45
Operating Range–˚F	-65 to 200	-65 to 200
Operating Range–˚C	-55 to 90	-55 to 90
Effect on Output–%/100˚F – MAX	±0.08	±0.08
Effect on Zero–% RO/100˚F – MAX	±0.08	±0.08
ELECTRICAL		
Rated Output–mV/V (Nominal)	1.50	1.80
Zero Balance–% RO	±2.0	±2.0
Input Resistance–Ohms	700±7	700±7
Output Resistance–Ohms	700±7	700±7
Excitation Voltage – MAX	20 VDC	20 VDC
MECHANICAL		
Calibration	T&C	CW & CCW
Safe Overload–% CAP	±200	±200
Ultimate Overload–% CAP	±400	±400



DIMENSIONS

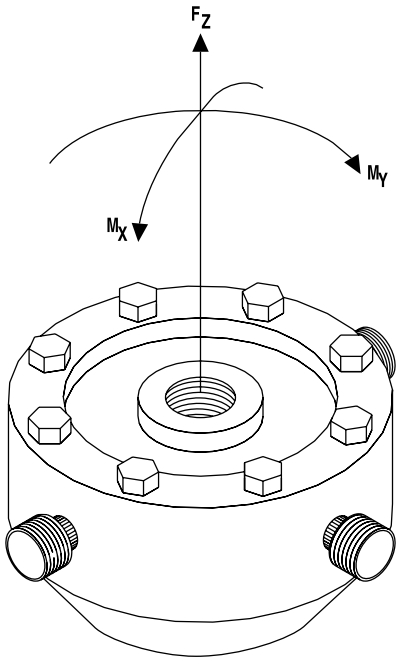
See Drawing	MODEL 1216 CAPACITY (lbf)/(inch-lb) 250/125, 500/250, 1K/500, 2K/1000	
	inch	mm
①	0.070	1.78
②	3.00	76.2
③	0.250-28 x 0.43 deep on a 2.600 B.C.	
④	3.20	81.3
⑤	2.000 + 0.002 / -0.000	
⑥	2.77	70.3
⑦	4.13	104.3
⑧	PT02E-12-8P	
⑨	3.200	81.28
⑩	2.33	59.2
⑪	0.25 0.25 deep	6.4 6.4 deep
⑫	Label	

Model 5200 Multi-Axis Load Cell

Why the Interface model 5200 Multi-Axis Load Cell is the best in class:

- **Simultaneously measure thrust and moment perpendicular to the thrust axis**
- **Thrust axis functions to the same specifications as a Model 1200**
- **Thrust stiffness and moment stiffness are both very high because of the low profile construction**

Base included



SPECIFICATIONS

Static Error Band–Thrust, 1K-10K .....±0.04
25K & 50K .....±0.05
Deflection–Thrust, FS .....0.001 to 0.002 inches (depending on range)
Calibration–Thrust .....Same as 1200 Series Universal†
Deflection–Moment, FS .....from 20 seconds (depending on range)
Output–Moment, mV/V.....Approx. 1/2 of rated thrust output
Cross-Talk–Moment .....1% or less
Calibration Accuracy–Moment .....±1%

DIMENSIONS

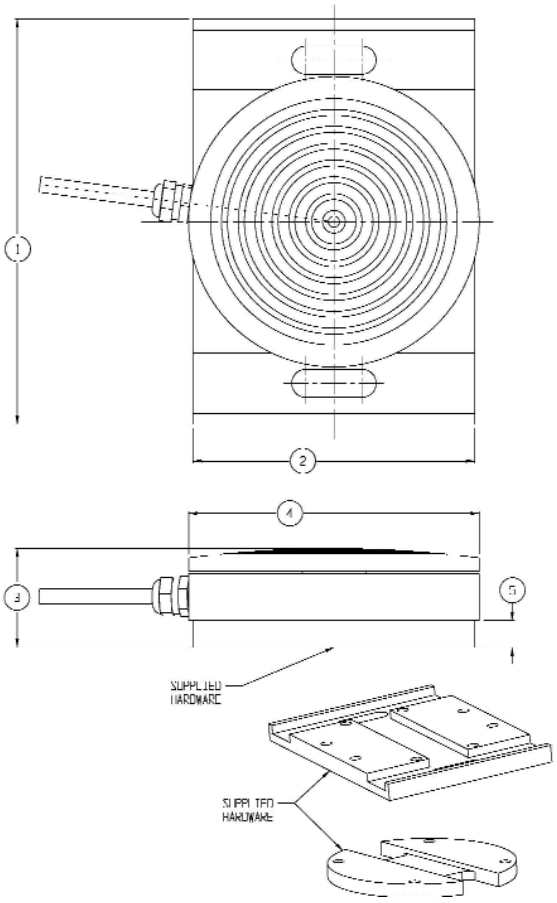
	MODEL			
	5210		5220	
	CAPACITY (lbf)			
	1K, 2K, 5K, 10K		25K, 50K	
	inch	mm	inch	mm
	Same as 1200 Series Universal (See Page 16)			

5200 Model	Rated Thrust (lbf)	Rated Moment (in-lbf)
5210XYZ-1K	1,000	400
5210XYZ-2K	2,000	800
5210XYZ-5K	5,000	1,000
5210XYZ-10K	10,000	2,000
5220XYZ-25K	25,000	10,000
5220XYZ-50K	50,000	20,000

Model BPL Pedal Load Cell
Capacities 50-500 lbf

Why the Interface model BPL Pedal Load Cell is the best in class:

- **Lowest nonlinearity and hysteresis of any brake pedal load cell – < 0.05%**
- **Ultra low height**
- **Low sensitivity to off-center loads - <1.0%/in**
- **Mounts directly to pedal with included strap(s)**
- **Interchangeable mounting plates**
- **For use with gas, brake or clutch pedal**



SPECIFICATIONS

ACCURACY – (MAX ERROR)

Static Error Band	±0.05
Nonlinearity–% FS	±0.05
Hysteresis–% FS	±0.05
Nonrepeatability–% RO	±0.02
Creep, in 20 min–%	±0.05
Eccentric Load Sensitivity–%/in	±1

TEMPERATURE

Compensated Range–°F	15 to 115
Compensated Range–°C	-10 to 45
Operating Range–°F	-65 to 200
Operating Range–°C	-55 to 90
Effect on Output–%/°F–MAX	±0.001
Effect on Zero–% RO/°F–MAX	±0.002

ELECTRICAL

Rated Output–mV/V (Nominal)	2.0
Zero Balance–% RO	±1.0
Bridge Resistance–Ohm (Nominal)	700
Excitation Voltage–MAX	15 VDC
Excitation Voltage–Nominal	10 VDC
Insulation Resistance–Megohm	> 5000
Deflection at Capacity (inch)	0.002

MECHANICAL

Calibration	Compression
Safe Overload–% CAP	150
Safe Overload–Side–% CAP:	40, any direction
Cable	10 ft

DIMENSIONS

See Drawing	CAPACITY (lbf) 50, 100, 200, 300, 500	
	inch	mm
①	3.60	91.4
②	2.50	63.5
③	0.88	22.3
④	2.58	65.5
⑤	0.24	6.1

Model SPI Platform Scale Load Cell

Capacities 3-15 lbf

Why the Interface model SPI Platform Scale Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **.01% nonrepeatability**
- **400% compression overload protection**
- **.0008%/°F temp. effect on output**
- **Eccentric load compensated**

STANDARD CONFIGURATION

5 ft Integral Cable (SPI-nn)

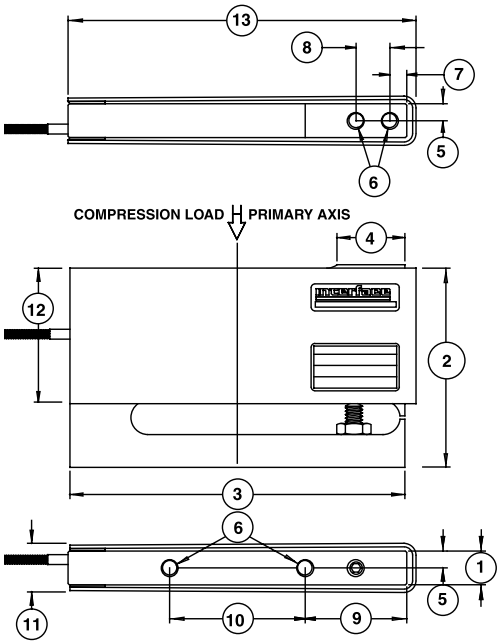
OPTIONS*

Tension & Compression
Overload Protection
Extra Cable Length
Standardized Output

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.02
Hysteresis–% FS .....±0.02
Nonrepeatability–% RO .....±0.01
Creep, in 20 min–% .....±0.025
Eccentric load sensitivity–%/in 0.012

TEMPERATURE
Compensated Range–°F .....15 to 115
Compensated Range–°C .....-10 to 45
Operating Range–°F .....-65 to 200
Operating Range–°C .....-55 to 90
Effect on Output–%/°F – MAX .....±0.0008
Effect on Zero–% RO/°F – MAX .....±0.0015

ELECTRICAL
Rated Output–mV/V (Nominal) 3.0
Zero Balance–% RO .....±5.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX .....15 VDC
Insulation Resistance–Megohm 5000

MECHANICAL
Calibration .....Comp.
Safe Overload–% CAP 400
Cable length–ft 5
Deflection @ RO–inch .....to .015
Natural Frequency/Deflection:

lbf	Deflection (inches)	Nat. Freq. (hertz)
3	.015	130
7.5	.009	220
15	.009	220

DIMENSIONS

See Drawing	CAPACITY (lbf)					
	3		7.5		15	
	inch	mm	inch	mm	inch	mm
①	0.38	9.60	0.50	12.7	1.00	25.4
②	2.99	75.9	2.99	75.9	2.99	75.9
③	5.00	127	5.00	127	5.00	127
④	1.00	25.4	1.00	25.4	1.00	25.4
⑤	0.19	4.80	0.25	6.40	0.5	12.7
⑥	10-32 UNF-2B		1/4-28 UNF-2B		1/4-28 UNF-2B	
⑥	0.50 in deep		0.56 in deep		0.56 in deep	
⑦	0.25	6.40	0.25	6.40	0.25	6.40
⑧	0.50	12.7	0.50	12.7	0.50	12.7
⑨	1.50	38.1	1.50	38.1	1.50	38.1
⑩	2.00	50.8	2.00	50.8	2.00	50.8
⑪	0.62	15.7	0.75	19.0	1.25	31.8
⑫	2.00	50.8	2.00	50.8	2.00	50.8
⑬	5.13	130.3	5.13	130.3	5.13	130.3

Model SPI Platform Scale Load Cell

Capacities 25-150 lbf

Why the Interface model SPI Platform Scale Load Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **.01% nonrepeatability**
- **Safe overload to 200%**
- **.0008%/°F temp. effect on output**
- **Eccentric load compensated**

STANDARD CONFIGURATION

5 ft Integral Cable (SPI-nn)

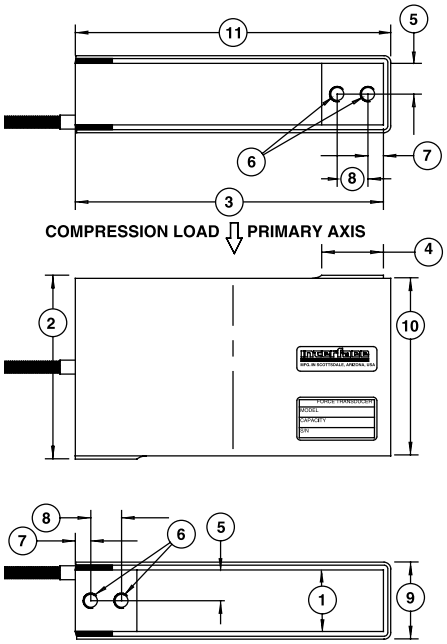
OPTIONS*

Extra Cable Length
Standardized Output

ACCESSORIES*

Instrumentation

**See appendix for more technical information*



SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.02
Hysteresis–% FS .....±0.02
Nonrepeatability–% RO .....±0.01
Creep, in 20 min–% .....±0.025
Eccentric load sensitivity–%/inch.....0.002

TEMPERATURE
Compensated Range–°F .....15 to 115
Compensated Range–°C.....-10 to 45
Operating Range–°F .....-65 to 200
Operating Range–°C .....-55 to 90
Effect on Output–%/°F – MAX .....±0.0008
Effect on Zero–% RO/°F – MAX .....±0.0015

ELECTRICAL
Rated Output–mV/V (Nominal) 3.0
Zero Balance–% RO .....±5.0
Bridge Resistance–Ohm (Nominal) 350
Excitation Voltage – MAX.....15 VDC
Insulation Resistance–Megohm 5000

MECHANICAL
Calibration .....Compression
Safe Overload–% CAP 200
Cable length–ft.....5
Deflection @ RO–inch .....to .008
Natural Frequency/Deflection:

lbf	Deflection (inches)	Nat. Freq. (hertz)
25	.008	240
50	.008	310
100	.007	470
150	.005	580

DIMENSIONS

See Drawing	CAPACITY (lbf)			
	25, 50		100, 150	
	inch	mm	inch	mm
①	1.00	25.4	1.00	25.4
②	3.00	76.2	3.00	76.2
③	5.00	127	6.00	152.4
④	1.00	25.4	1.50	38.1
⑤	0.50	12.7	0.50	12.7
⑥	1/4-28 UNF-2B		1/4-28 UNF-2B	
⑥	0.56 in deep		0.56 in deep	
⑦	0.25	6.40	0.25	6.40
⑧	0.50	12.7	1.00	25.4
⑨	1.25	31.8	1.25	31.8
⑩	2.88	73.0	2.88	73.0
⑪	5.12	130	6.12	155.4

Model A4200 and A4600 Weighcheck Load Cell

Why the Interface model A4200 and A4600 Weighcheck Load Cells are the best in class:

- **Capacity ranges from 2.5 to 50Klbf**
- **High output – 4 mV/V**
- **Self-centering in all directions**
- **High safe side load – to 400%**
- **Standardized output - ±0.1%**
- **Zinc plated (A4200) or stainless steel (A4600)**
- **Factory assembled for easy field installation**
- **Static/dynamic/in-motion capabilities**
- **Low height—4.0" for 2.5K, 5K & 10K; 5.0" for 25K & 50K**

SPECIFICATIONS

ACCURACY – (MAX ERROR)

Static Error Band–% FS .....±0.05
Nonlinearity–% FS .....±0.05
Hysteresis–% FS .....±0.03
Nonrepeatability–% RO .....±0.02
Creep, in 20 min–% .....±0.025

TEMPERATURE

Compensated Range–˚F .....15 to 115
Compensated Range–˚C.....-10 to 45
Operating Range–˚F .....-65 to 200
Operating Range–˚C .....-55 to 90
Effect on Output–%/˚F – MAX .....±0.0008
Effect on Zero–% RO/˚F – MAX .....±0.0008

ELECTRICAL

Rated Output–mV/V .....4.000 ±0.1%
(2.5K..... 2.000 mV/V ±0.1%)
Zero Balance–% RO .....±1.0
Bridge Resistance–Ohms 350
Excitation Voltage – MAX.....20 VDC
Insulation Resistance – Megohm.....5000

MECHANICAL

Calibration .....Compression
Safe Overload–% CAP 150
Cable length–ft.....30

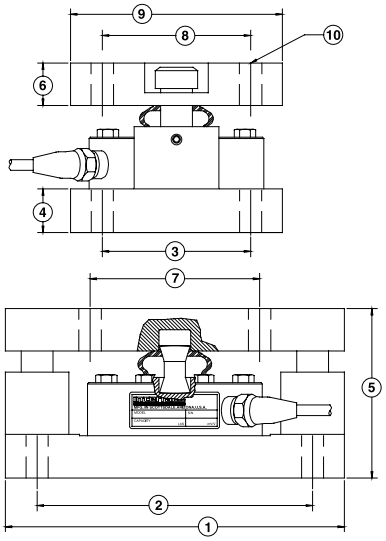
OPTIONS*

Zinc Plated (A4200)
Stainless Steel (A4600)
Special Cable Length

ACCESSORIES

9300
9390
UMC600
SGA
Junction Box

**See appendix for more technical info.*



DIMENSIONS

See Drawing	MODEL A4211 or A4611 CAPACITY (lbf) 2.5K, 5K, 10K inch	mm	MODEL A4221, A4621 CAPACITY (lbf) 25K, 50K inch	mm
①	8.00	203.2	10.00	254.0
②	6.50	165.1	7.75	196.9
③	3.50	88.9	4.50	114.3
④	1.00	25.4	1.25	31.8
⑤	4.00	101.6	5.00	127.0
⑥	1.00	25.4	1.25	31.8
⑦	4.00	101.6	5.00	127.0
⑧	3.50	88.9	4.50	114.3
⑨	5.00	127.0	6.00	152.4
⑩	0.52	13.2	0.78	19.8

Model 2101 Dual Range Standard Load Cell Compression-Only (U.S. & Metric)

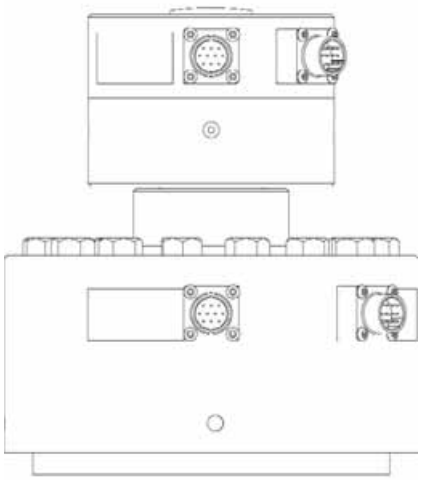
Why the Interface model 2101 Dual Range Standard Load Cell Compression-Only is the best in class:

- **Dual range allows for accurate measurements throughout test range**
- **4X to 5X overload protection on lower capacity load cell**
- **Proprietary Interface temperature compensated gages**
- **High output for both ranges-to 4 mV/V**
- **Eccentric load compensated**
- **Shunt calibration**
- **Low deflection**

SPECIFICATIONS

Lower Capacity Same as
1200 Compression-Only Low Profile (See Page 20)

Higher Capacity Same as
1200 Universal Low Profile (See Page 16)



DIMENSIONS

MODEL							
2111		2121		2131		2141	
CAPACITY							
U.S.(lbf)	Metric (N)	U.S.(lbf)	Metric (N)	U.S.(lbf)	Metric (N)	U.S.(lbf)	Metric (N)
1K/5K	5kN/25kN	5K/25K	25kN/100kN	25K/100K	125kN/450kN	50K/150K	250kN/900kN
2K/10K	10kN/50Kn	10K/50K	50kN/250kN			100K/270K	450kN/1200kN
Lower capacity load cell same as 1200 Compression only (See Page 20) Higher capacity load cell same as 1200 Universal (See Page 16)							
** Contact factory for further details							

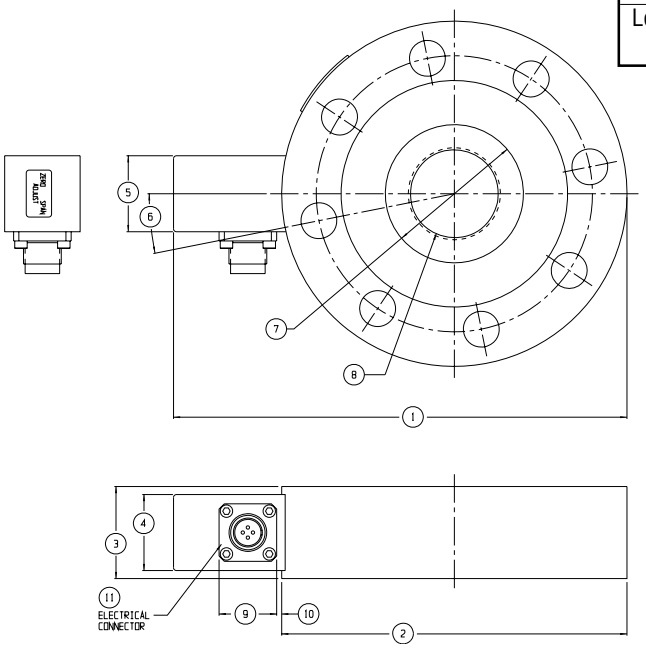
Model 3420 & 3430 Coil Tubing Load Cell

Why the Interface model 3400 Coil Tubing Load Cell is the best in class:

- **Hermetically sealed cell**
- **Performance to .05%**
- **4-20 m/A**
- **ATEX approved**

SPECIFICATIONS

PARAMETERS	MODEL 3400
ACCURACY – (MAX ERROR)	
Nonlinearity–% FS	±0.05
Hysteresis–% FS	±0.05
Nonrepeatability–% RO	±0.02
TEMPERATURE	
Compensated Range–˚F	0 to 150
Compensated Range–˚C	-18 to 65
Operating Range–˚F	-60 to 200
Operating Range–˚C	-50 to 93
Effect on Zero–%RO/˚F – MAX	±.002
Effect on Output–%/˚F – MAX	±.002
ELECTRICAL	
Output signal mA	8.000 +/-0.008
Zero Balance–% RO	±1.0
Excitation Nominal	+15 VDC
Excitation Range	+9 to +28 VDC
Loop Resistance	0 Ω @ 9 VDC excitation 950 Ω @ 28 VDC excitation

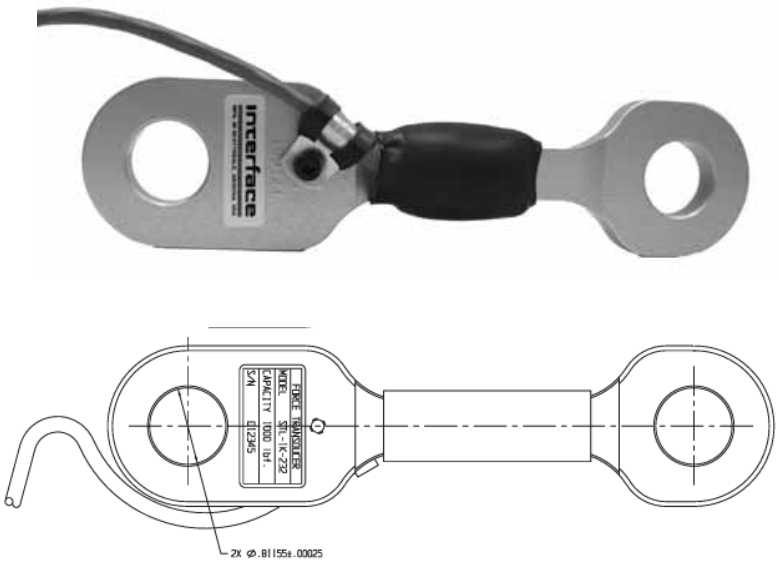


DIMENSIONS

See Drawing	MODEL 3420 CAPACITY (lbf) 30K, 40K, 50K inch	mm	MODEL 3430 CAPACITY (lbf) 25K, 50K inch	mm
①	9.85	250.1	10.35	262.9
②	7.5	190.5	8.00	203.2
③	2	50.8	2.50	63.5
④	1.65	41.9	1.65	41.9
⑤	1.65	41.9	1.65	41.9
⑥	11.25˚	11.25˚	11.25˚	11.25˚
⑦	3	76.2	3.37	85.6
⑧	2-12 UN-2B thru		2-12 UN-2B thru	
⑨	1.26	32	.94	23.9
⑩	0.11	2.7	.27	6.19
⑪	Jupiter REC-M-10TPN-04-16		PTWIH-10-6P	

INTERFACE CUSTOM DESIGNS

Interface Model STLN–Torque Arm

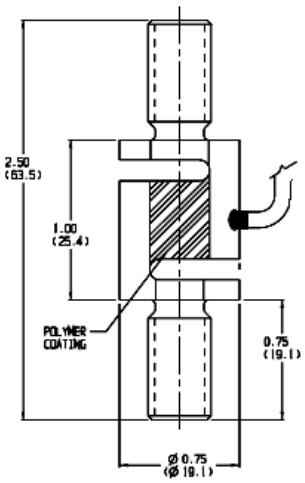


- Automotive application
- Custom designed to fit existing machine
- Used for force measurement on engine dynamometer
- Design is economical yet accurate
- Capacity 1Klbf

SPECIFICATIONS

Rated Output	2.2 mV/V
Nonlinearity %FS	±0.25
Hysteresis %FS	±0.25
Nonrepeatability %FS	±0.05

Interface Model TCN–Micro S-Type



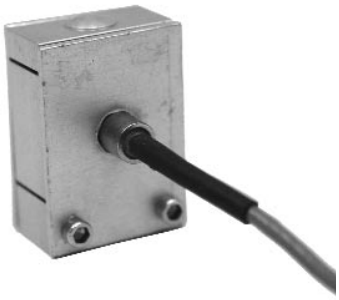
- Medical application
- Miniature S-Type load cell with male threads
- Aluminum construction, RTV sealed
- Capacities of 50 & 75 lbf

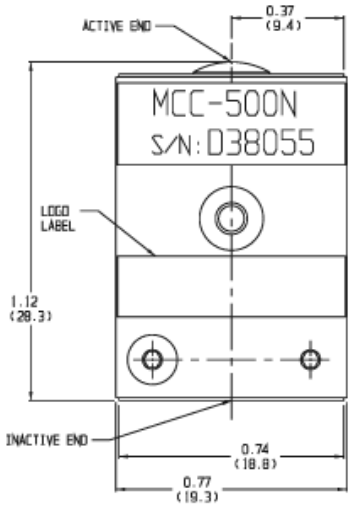
SPECIFICATIONS

Rated Output	3.0 mV/V
Nonlinearity %FS	±0.10
Hysteresis %FS	±0.10
Nonrepeatability %FS	±0.05

INTERFACE CUSTOM DESIGNS

Interface Model MCC–Mini Compression-Only



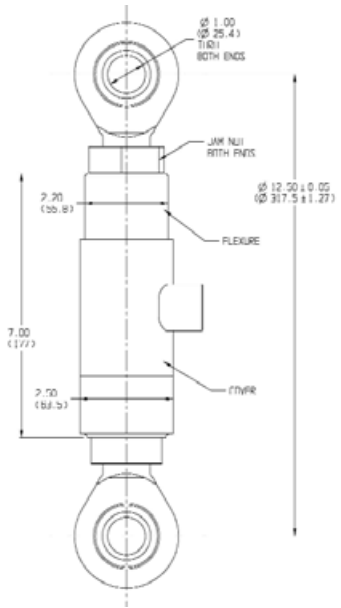


- Calibration application
- Test machine application
- Designed to fit in a machine that has tight space restrictions
- Capacity 500N

SPECIFICATIONS

Rated Output	2.2 mV/V
Nonlinearity %FS	±0.10
Hysteresis %FS	±0.10
Nonrepeatability %FS	±0.05

Interface Model 2120–Rod End



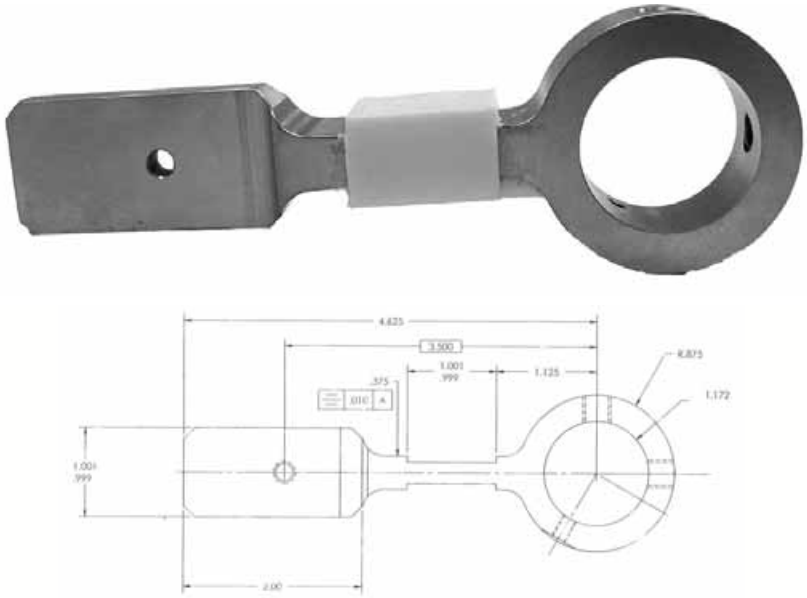
- Automotive application
- Used to measure forces in a shaker table
- Custom column style design with rod end bearings
- Capacity 200kN

SPECIFICATIONS

Rated Output	2 mV/V
Nonlinearity %FS	±0.25
Hysteresis %FS	±0.25
Nonrepeatability %FS	±0.05

INTERFACE CUSTOM DESIGNS

Interface Model RTA–Torque Arm

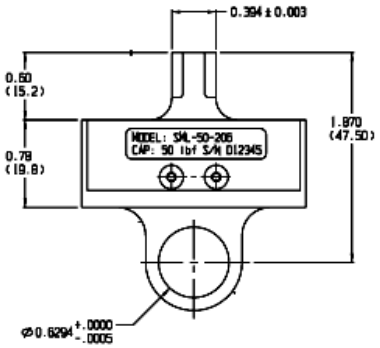


- Test machine application
- Semi-conductor strain gages
- High output of 270 mV
- Used to measure the torque applied on test specimens
- Capacity 60 lb-in

SPECIFICATIONS

Rated Output	270 mV at 10mA DC Constant Current
Nonlinearity %FS	±0.25
Hysteresis %FS	±0.25
Nonrepeatability %FS	±0.05

Interface Model SML–Custom



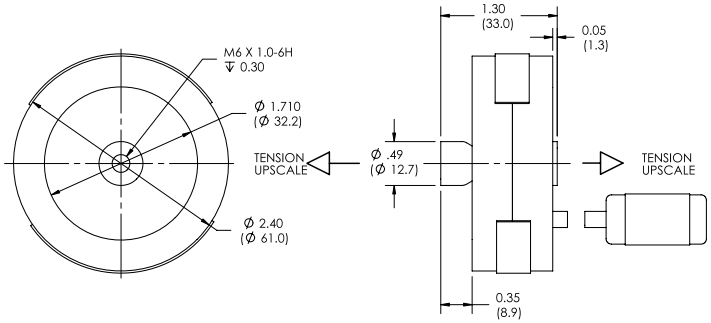
- Industrial automation application
- Custom SML series load cell
- Used for force measurement on robotic positioning and welding assembly
- Modified for ease of installation and connectivity to fixturing
- Small package size
- Capacity 50 lbf

SPECIFICATIONS

Rated Output	1.9 mV/V
Nonlinearity %FS	±0.10
Hysteresis %FS	±0.10
Nonrepeatability %FS	±0.05

INTERFACE CUSTOM DESIGNS

Interface Model 1550–Low Profile

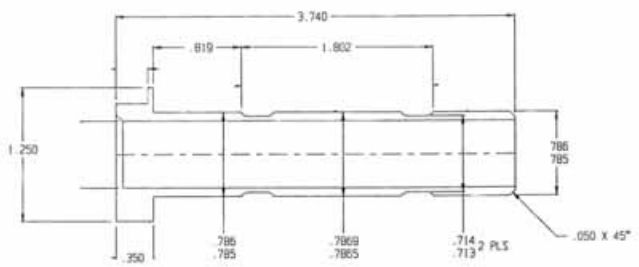


- Test machine application
- Compact size
- Good for high accuracy measurement where space is limited
- Capacities 25, 50, 100, 200 lbf

SPECIFICATIONS

Rated Output	2.0 mV/V
Nonlinearity %FS	±0.30
Hysteresis %FS	±0.05
Nonrepeatability %FS	±0.02

Interface Model LP–Loadpin



- Designed to replace pins or bolts that carry a load
- Stainless Steel construction
- Capable of 100% humidity, 30G mechanical shock and 5G vibration
- Used with Clevises, or pulley shafts to monitor loads
- Capacity 1740 lbf

SPECIFICATIONS

Rated Output	1.6 mV/V
Nonlinearity %FS	±0.50
Hysteresis %FS	±0.50
Nonrepeatability %FS	±0.25

Model RT10E Rotary Transformer Torque Cell

Why the Interface model RT10E Rotary Transformer Torque Cell is the best in class:

- **4X overload rating**
- **Infinite fatigue life**
- **Hardened to EMI from adjustable speed drives**
- **Performance to 0.07%**
- **Bidirectional operation including stall**
- **Ferrite-free rotary transformer coupling**
- **Calibration & balance free of cable effects**
- **Unexcelled immunity to machinery magnetic fields**
- **15-5 PH stainless shaft, splashproof & corrosion resistant**
- **mV/V output compatible with carrier amplifiers**

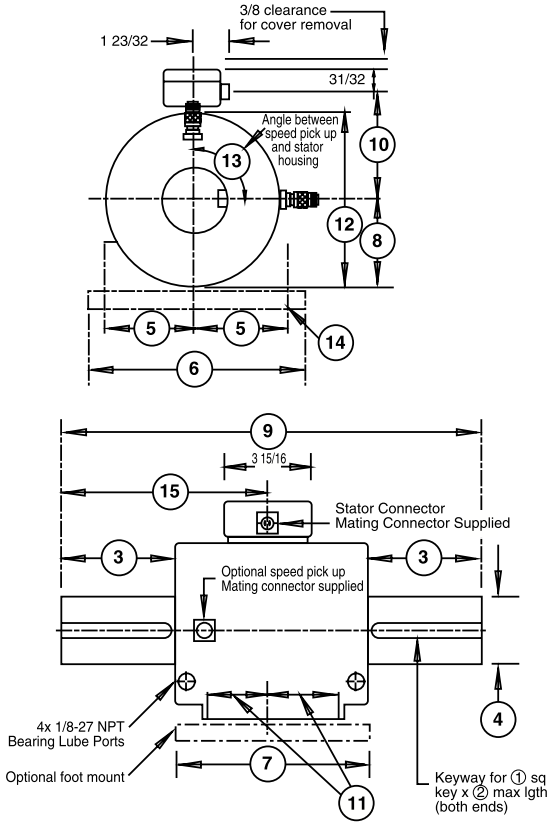
OPTIONS*

On-board Signal Conditioning**
Digital Output-RS232**
Enhanced Performance
Foot Mount (shown in photo)
Standard & Zero Velocity Speed Pickups
Flange Style Mount

ACCESSORIES*

Interconnect Cables
Digital Readout (9850) Page 101

**Please call for additional information*
***Please consult factory for specifications*



DIMENSIONS (inch)

See Drawing	CAPACITY (lb-in) 25 to 100	250 to 500	500 to 1K	2K to 5K	10K to 20K	25K to 50K	100K to 250K	500K to 1M	1.5M to 2M
①	0.187	0.187	0.250	0.375	0.625	0.750	1.000	Note 3	Note 4
②	1.125	1.625	1.750	2.750	3.500	4.500	6.500	8.000	12
③	1.50	2.00	2.00	3.38	4.13	5.13	7.56	9.00	13.50
④	0.625	0.750	1.000	1.500	2.500	3.000	4.500	7.750	9.375
⑤	2.25	2.25	2.625	2.625	4.25	4.25	4.25	7.00	8 50
⑥	5.50	5.50	6.25	6.25	10.00	10.00	10.00	15.50	18.50
⑦	5.50	5.50	7.00	7.00	8.75	8.75	7.75	18.00	20 00
⑧	2.250	2.250	2.500	2.500	5.000	5.000	5.000	8.000	9.750
⑨	8.50	9.50	10.00	12.75	17.00	19.00	23.00	36.00	47.00
⑩	4.219	4.219	2.969	2.969	4.875	4.875	5.125	7.875	9.500
⑪	1.500	1.500	1.500	1.500	2.813	2.813	2.813	7.875	8.875
⑫	3.469	3.469	2.563	2.563	7.938	7.938	8.500	13.875	17
⑬	90°	90°	90°	90°	0°	0°	0°	0°	0°
⑭	.254	.304	.406	.609	Note 2	Note 2	Note 2	Note 2	Note 2
⑮	4.250	4.750	5	6.375	9.500	9.500	12.844	18	23.500

1. Tolerance on ④ diameter is +0.0000/-0.0005 for diameters ≤ 2.500 inch and +0.000/-0.001 for diameter ≥ 2.500 inch.
2. Slotted 0.531 inch wide by 1.125 inch long.
3. Dual rectangular keyways at each end are 2.000 inch wide by 1.500 inch high.
4. Dual rectangular keyways at each end are 2.500 inch wide by 1.750 inch high.

SPECIFICATIONS

PARAMETERS	MODEL STANDARD	MODEL ENHANCED
ACCURACY – (MAX ERROR)		
Combined Error–%FS	±0.1	±0.07
Nonlinearity–%FS	±0.1	±0.05
Hysteresis–%FS	±0.1	±0.05
Nonrepeatability–%FS	±0.05	±0.02
Stability, 6 Months–%FS	±0.15	±0.10
Rotational Effect on Zero–%FS	±0.05	±0.02
TEMPERATURE		
Effect on Zero–%FS/°F	±0.002	±0.001
Span–%/°F	±0.002	±0.001
Compensated Range–°F	+75 to +175	
Usable Range–°F	-25 to +185	
Storage Range–°F	-65 to +225	
ELECTRICAL		
Fully bi-directional, dual output with common characteristics, as follows		
Clockwise (CW) Torque	+1.5 mV/V	
Counterclockwise (CCW) Torque	-1.5 mV/V	
Zero Balance	±1% of FS, nominal	
Excitation (MAX)	3-6 V rms, 3 khz ±10% sine wave only	
Readout	Strain gage carrier amplifier	

*Specifications apply to mV/V models only. When selecting the **ON-BOARD SIGNAL CONDITIONING** or **DIGITAL OUTPUT** options please contact factory for specification details.

TORQUE RANGE [lb-in]	TORQUE RANGE [Nm]	SPEED RATING [rpm]	SHAFT* STIFFNESS [lb-in/radian]	ROTATING INERTIA [oz-in sec^2]	MAX. WT. [lbs]
25	2.82	0 to ±15,000	5,590	0.035	11
50	5.65	0 to ±15,000	11,700	0.035	11
100	11.3	0 to ±15,000	21,400	0.035	11
250	28.2	0 to ±15,000	50,200	0.036	12
500	56.5	0 to ±15,000	56,000	0.036	12
500	56.5	0 to ±10,000	154,000	0.11	23
1K	113	0 to ±10,000	214,000	0.11	23
2K	226	0 to ±10,000	421,000	0.16	26
5K	565	0 to ±10,000	593,000	0.16	26
10K	1,130	0 to ±8,000	1,800,000	2.3	105
20K	2,260	0 to ±8,000	2,700,000	2.4	105
25K	2,820	0 to ±6,000	5,700,000	2.8	115
50K	5,650	0 to ±6,000	7,100,000	3.0	115
100K	11,300	0 to ±3,600	29,000,000	11.0	150
250K	28,200	0 to ±3,600	36,000,000	11.7	150
500K	56,500	0 to ±1,800	125,000,000	207	780
1M	113,000	0 to ±1,800	142,000,000	218	800
1.5M	170,000	0 to ±1,200	221,000,000	567	1455
2M	226,000	0 to ±1,200	227,000,000	582	1475

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

Model RT12E Rotary Transformer Torque Cell

Why the Interface model RT12E Rotary Transformer Torque Cell is the best in class:

- **2X overload rating**
- **Performance to 0.07%**
- **Bidirectional operation including stall**
- **Ferrite-free rotary transformer coupling**
- **Calibration & balance free of cable effects**
- **Unexcelled immunity to machinery magnetic fields**
- **15-5 PH stainless shaft, splashproof & corrosion resistant**
- **mV/V output compatible with carrier amplifiers**

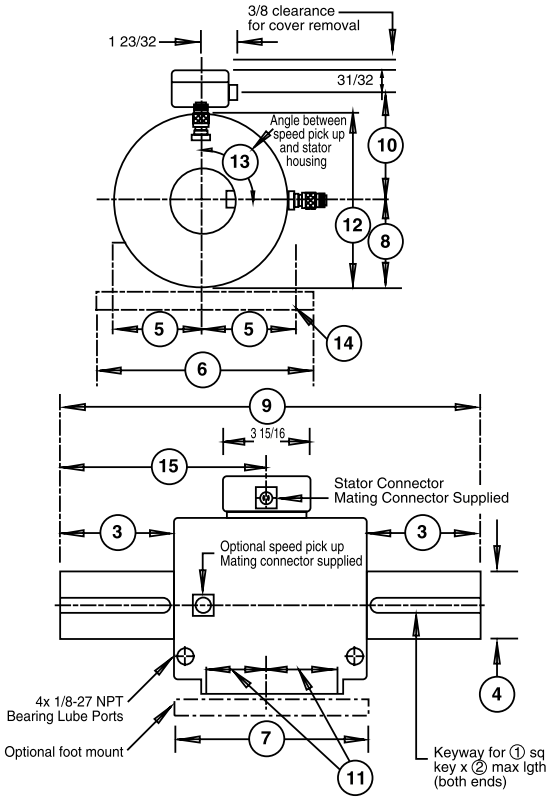
OPTIONS*

On-board Signal Conditioning**
Digital Output-RS232**
Noise Hardening
Enhanced Performance
Foot Mount (shown in photo)
Standard & Zero Velocity Speed Pickups
Flange Style Mount

ACCESSORIES*

Interconnect Cables
Digital Readout (9850) Page 101

**Please call for additional information*
***Please consult factory for specifications*



DIMENSIONS (inch)

See Drawing	CAPACITY (lb-in) 25 to 100	500 to 1K	1K to 2K	5K to 10K	20K to 40K	50K to 100K	200K to 375K	750K to 1.5M	3M to 4M
①	0.187	0.187	0.250	0.375	0.625	0.750	1.000	Note 3	Note 4
②	1.125	1.625	1.750	2.750	3.500	4.500	6.500	8.000	12
③	1.50	2.00	2.31	3.69	4.13	5.13	7.56	9.00	13.50
④	0.625	0.750	1.000	1.500	2.500	3.000	4.500	7.750	9.375
⑤	2.25	2.25	2.625	2.625	4.25	4.25	4.25	7.00	8 50
⑥	5.50	5.50	6.25	6.25	10.00	10.00	10.00	15.50	18.50
⑦	5.50	5.50	5.50	5.50	8.75	8.75	7.75	18.00	20 00
⑧	2.250	2.250	2.500	2.500	5.000	5.000	5.000	8.000	9.750
⑨	8.50	9.50	10.00	12.75	17.00	19.00	23.00	36.00	47.00
⑩	2.688	2.688	2.969	2.969	4.875	4.875	5.125	7.875	9.500
⑪	1.500	1.500	1.500	1.500	2.813	2.813	2.813	7.875	8.875
⑫	3.469	3.469	3.969	3.969	7.938	7.938	8.500	13.875	17
⑬	90°	90°	90°	90°	0°	0°	0°	0°	0°
⑭	.254	.304	.406	.609	Note 2	Note 2	Note 2	Note 2	Note 2
⑮	4.250	4.750	5	6.375	8.500	9.500	12.844	18	23.500

1. Tolerance on ④ diameter is +0.0000/-0.0005 for diameters ≤ 2.500 inch and +0.000/-0.001 for diameter ≥ 2.500 inch.
2. Slotted 0.531 inch wide by 1.125 inch long.
3. Dual rectangular keyways at each end are 2.000 inch wide by 1.500 inch high.
4. Dual rectangular keyways at each end are 2.500 inch wide by 1.750 inch high.

SPECIFICATIONS

PARAMETERS	MODEL STANDARD	ENHANCED
ACCURACY – (MAX ERROR)		
Combined Error–%FS	±0.1	±0.07
Nonlinearity–%FS	±0.1	≤±0.05
Hysteresis–%FS	±0.1	±0.05
Nonrepeatability–%FS	±0.05	±0.02
Stability, 6 Months–%FS	±0.15	±0.10
Rotational Effect on Zero–%FS	±0.05	±0.02
TEMPERATURE		
Effect on Zero–%FS/°F	±0.002	0.001
Span–%/°F	±0.002	±0.001
Compensated Range–°F	+75 to +175	
Minimum Usable Range–°F	-25 to +185	
Storage Range–°F	-65 to +225	
ELECTRICAL		
Fully bi-directional, dual output with common characteristics, as follows		
Clockwise (CW) Torque	+1.5 mV/V	
Counterclockwise (CCW) Torque	-1.5 mV/V	
Zero Balance	±1% of FS, nominal	
Excitation (MAX)	3-6 V rms, 3 kHz ±10% sine wave only	
Readout	Strain gage carrier amplifier	

*Specifications apply to mV/V models only. When selecting the **ON-BOARD SIGNAL CONDITIONING** or **DIGITAL OUTPUT** options please contact factory for specification details.

TORQUE RANGE		SPEED RATING	SHAFT* STIFFNESS	ROTATING INERTIA	MAX. WT.
[lb-in]	[Nm]	[rpm]	[lb-in/radian]	[oz.-in sec^2]	[lbs]
25	2.82	0 to ±15,000	2,150	0.034	6
50	5.65	0 to ±15,000	6,030	0.034	6
100	11.3	0 to ±15,000	14,700	0.034	6
200	22.6	0 to ±15,000	18,900	0.034	6
500	56 5	0 to ±15,000	57,900	0.035	7
1K	113	0 to ±15,000	70,100	0.035	7
1K	113	0 to ±8,500	197,100	0.15	11
2K	226	0 to ±8,500	260,000	0.15	11
5K	565	0 to ±8,500	580,000	0.19	14
10K	1,130	0 to ±8,500	605,000	0.19	14
20K	2,260	0 to ±8,000	1,800,000	2.3	105
40K	4,520	0 to ±8,000	2,700,000	2.4	105
50K	5,650	0 to ±6,000	5,700,000	2.8	115
100K	11,300	0 to ±6,000	7,100,000	3	115
200K	22,600	0 to ±3,600	29,000,000	11	150
375K	42,400	0 to ±3,600	38,000,000	11.7	150
750K	84,700	0 to ±1,800	115,000,000	205	775
1.5M	169,000	0 to ±1,800	136,000,000	212	790
3M	339,000	0 to ±1,200	221,000,000	567	1455
4M	452,000	0 to ±1,200	227,000,000	582	1475

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

Model RT8 Low Cost Rotary Torque Cell

Why the Interface model RT8 Low Cost Rotary Torque Cell is the best in class:

- **200% overload rating**
- **±10 volt or ±5 volt analog output with 0.02% resolution and low noise & ripple**
- **14 bit engineering unit output via com port; interface software and cable included**
- **Automatic zero and span, no manual adjustments**
- **NIST Traceable bidirectional calibration with 10 units of measure supported**
- **Operates with unregulated single supply**
- **Speed option available on all ranges**

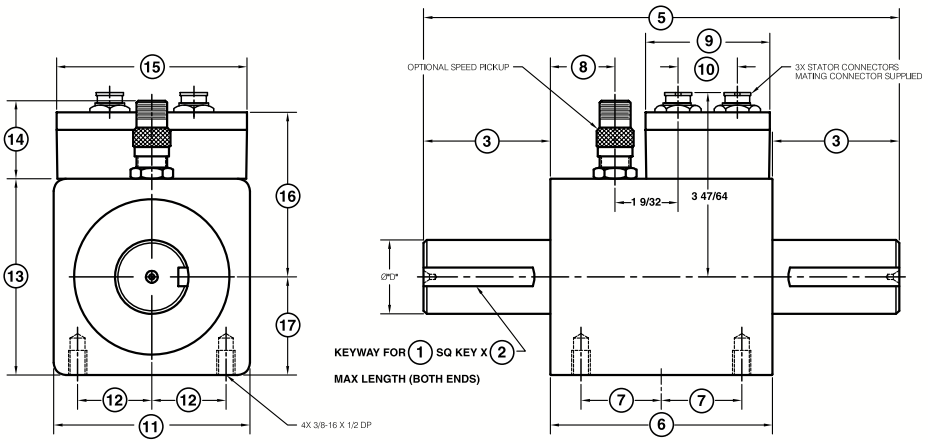
OPTIONS

Enhanced Performance

Standard & Zero Velocity Speed Pickups (60ppr)

DIMENSIONS (inch)

See Drawing	CAPACITY (lb-in)			
	25, 50, 100, 200	500, 1K	1K, 2K	5K, 10K
①	0.187	0.187	0.250	0.375
②	0.625	0.750	1.063	1.625
③	1.063	1.188	1.563	2.563
④	0.625	0.750	1.000	1.500
⑤	6.625	6.875	7.625	9.625
⑥	4.500	4.500	4.500	4.500
⑦	1.625	1.625	1.625	1.625
⑧	1.313	1.313	1.313	1.313
⑨	2.516	2.516	2.516	2.516
⑩	1.203	1.203	1.203	1.203
⑪	3.969	3.969	3.969	3.969
⑫	1.500	1.500	1.500	1.500
⑬	3.969	3.969	3.969	3.969
⑭	1.578	1.578	1.578	1.578
⑮	3.859	3.859	3.859	3.859
⑯	3.328	3.328	3.328	3.328
⑰	1.985	1.985	1.985	1.985



SPECIFICATIONS

PARAMETERS	MODEL	
	STANDARD	ENHANCED
ACCURACY – (MAX ERROR)		
Combined Error–%FS	±0.3	±0.15
Stability, 6 Months–%FS	±0.3	±0.15
Remote Calibration Accuracy*	±0.01	±0.05
TEMPERATURE		
Effect on Zero–%FS/°F	±0.006	±0.003
Span–%/°F	±0.006	±0.003
Compensated Range–°F	+75 to +150	
Useable Range–°F	+32 to +175	
ELECTRICAL		
Analog Output: CW/CCW Full Scale**	+10V/-10V & 5V/-5V user selectable	
Bandwidth (Hertz)	DC to 200	
Noise & Ripple (rms, % FS)	0.1	0.05
MAX. Allowable Resistive & Capacitive Loads	10K Ω MIN. & 0.05uF MAX.	
Supply Voltage	10 to 15 VDC @ 125mA, nominal	

*% of full scale @ 75°F, traceable to NIST

**Overrange 50%, source impedence: <1Ω

RS232C Com port: Outputs Torque in Engineering Units. Inputs units of measure, scaling, zero, span, cal data and commands. Baud Rate 38,400

TORQUE RANGE		SPEED RATING	SHAFT STIFFNESS	ROTATING INERTIA	MAX. WT.
[lb-in]	[Nm]	[rpm]	[lb-in/radian]	[oz.-in sec^2]	[lbs]
25	2.82	0 to ±8,000	1,800	0.031	10
50	5.65	0 to ±8,000	5,000	0.031	10
100	11.3	0 to ±8,000	12,000	0.031	10
200	22.6	0 to ±8,000	26,000	0.031	10
500	56 5	0 to ±7,000	66,000	0.032	10
1000	113	0 to ±7,000	85,000	0.032	10
1000	113	0 to ±6,500	197,000	0.08	10
2000	226	0 to ±6,500	288,000	0.08	10
5000	565	0 to ±6,000	545,000	0.1	11
10,000	1,130	0 to ±6,000	684,000	0.1	12

Model RT13L & RT14L
Low Capacity Rotary Transformer Torque Cell

Why the Interface model RT13L & RT14L Low Capacity Rotary Transformer Torque Cells are the best in class:

- **2X overload rating RT14L**
- **4X overload rating RT13L**
- **Performance to 0.1%**
- **NIST Traceable dead weight calibration**
- **Bidirectional operation including stall**
- **Ferrite-free rotary transformer coupling**
- **Calibration & balance free of cable effects**
- **Unexcelled immunity to machinery magnetic fields**
- **mV/V output compatible with carrier amplifiers**
- **Titanium shaft**

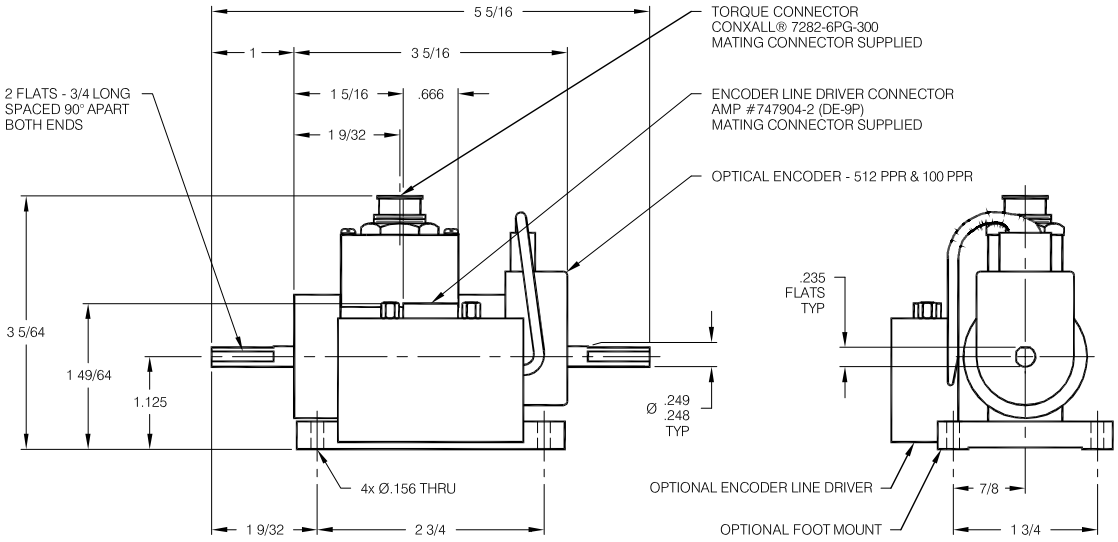
OPTIONS*

Foot Mount (shown in photo)
Speed Encoder with Line Driver
Noise Hardening
On-board Signal Conditioning**

ACCESSORIES*

Interconnect Cables
Digital Readout (9850) Page 101

**Please call for additional information*
***Please consult factory for specifications*



SPECIFICATIONS

PARAMETERS	MODEL STANDARD
ACCURACY – (MAX ERROR)	
Combined Error–%FS	±0.1
Nonlinearity–%FS	±0.1
Hysteresis–%FS	±0.1
Nonrepeatability–%FS	±0.05
Stability, 6 Months–%FS	±0.15
Rotational Effect on Zero–%FS	±0.05
TEMPERATURE	
Effect on Zero–%FS	±0.002
Span–%FS	±0.002
Compensated Range–˚F	+75 to +175
Minimum Usable Range–˚F	-25 to +185
Storage Range–˚F	-65 to +225
ELECTRICAL	
Fully bi-directional, dual output with common characteristics, as follows	
Clockwise (CW) Torque	+1.5 mV/V
Counterclockwise (CCW) Torque	-1.5 mV/V
Zero Balance	±1% of FS, nominal
Excitation (MAX.)	3 - 6 V rms, 3 kHz ±10% sine wave capable of driving a 90 ohm bridge
Readout	Strain gage carrier amplifier

Specifications apply to mV/V models only. When selecting the **ON-BOARD SIGNAL CONDITIONING** option please contact factory for specification details.

Standard Ratings RT14L Series Low Capacity Non-Contact Torquemeters

TORQUE RANGE		TORQUE OVERLOAD		SPEED RATING	SHAFT STIFFNESS*		ROTATING INERTIA*		MAX. WT.
[oz-in]	[Nm]	[oz-in]	[Nm]	[rpm]	[oz-in/rad]	[Nm/rad]	[oz-in sec^2]	[Nm sec^2]	[lbs]
10	0.071	20	0.141	0 to ±25,000	336	2.37	1.82X10^{-4}	1.29X10^{-6}	1.5
20	0.141	40	0.2823	0 to ±25,000	528	3.73	1.83X10^{-4}	1.30X10^{-6}	1.5
50	0.353	100	0.706	0 to ±25,000	1,840	13.00	1.87X10^{-4}	1.33X10^{-6}	1.5
100	0.706	200	1.412	0 to ±25,000	4,224	29.82	1.93X10^{-4}	1.37X10^{-6}	1.5
200	1.412	400	2.825	0 to ±25,000	8,080	57.05	2.01X10^{-4}	1.43X10^{-6}	1.5

Standard Ratings RT13L HIGH OVERLOAD Series Low Capacity Non-Contact Torquemeters

TORQUE RANGE		TORQUE OVERLOAD		SPEED RATING	SHAFT STIFFNESS*		ROTATING INERTIA*		MAX. WT.
[oz-in]	[Nm]	[oz-in]	[Nm]	[rpm]	[oz-in/rad]	[Nm/rad]	[oz-in sec^2]	[Nm sec^2]	[lbs]
10	0.071	40	0.283	0 to ±25,000	608	4.29	3.01X10^{-4}	2.14X10^{-6}	1.5
20	0.141	80	0.565	0 to ±25,000	1,616	11.41	3.07X10^{-4}	2.18X10^{-6}	1.5
50	0.353	200	1.412	0 to ±25,000	5,072	35.81	3.20X10^{-4}	2.27X10^{-6}	1.5
100	0.706	400	2.825	0 to ±25,000	8,864	62.59	3.32X10^{-4}	2.36X10^{-6}	1.5
200	1.412	800	5.649	0 to ±25,000	12,048	85.07	3.53X10^{-4}	2.51X10^{-6}	1.5

*Stiffness and inertia are conservatively rated from shaft end to end.

Model RT15S & RT16S
Spline Drive Rotary Transformer Torque Cell

Why the Interface model RT15S & RT16S Rotary Transformer Torque Cells are the best in class:

- **Hardened to EMI from adjustable speed drives**
- **Ferrite-free rotary transformer coupling**
- **2X overload rating**
- **Corrosion resistance**
- **mV/V output compatible with carrier amplifiers**
- **Bidirectional operation including stall**
- **Spline drive per AND 10262 & AND 20002**

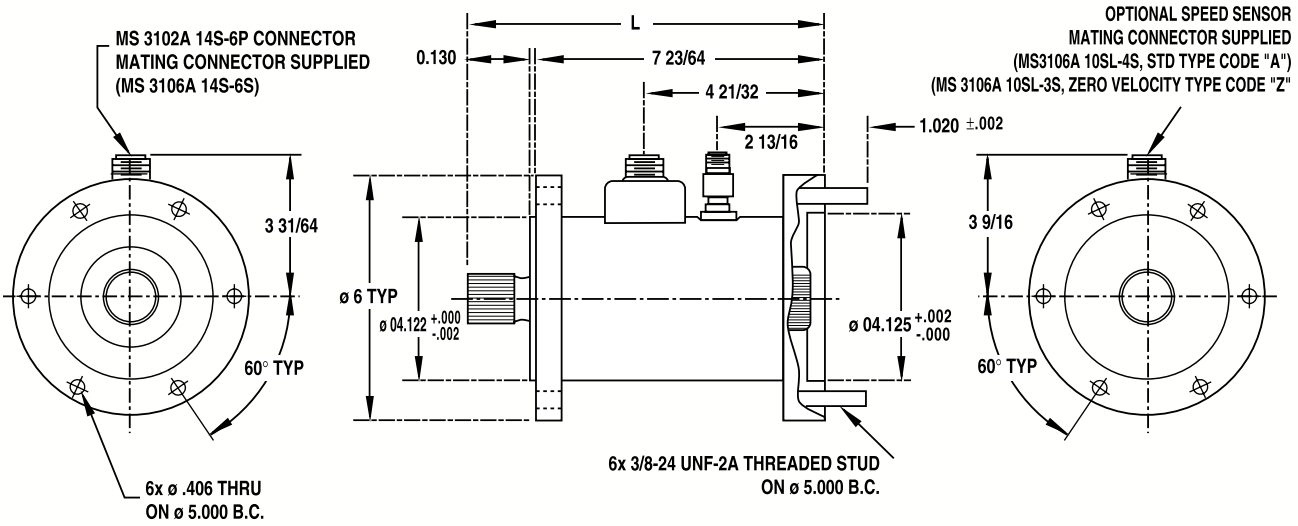
OPTIONS*

Standard & Zero Velocity Speed Pickups
On-board Signal Conditioning**

ACCESSORIES*

Interconnect Cables
Digital Readout (9850) Page 101

**Please call for additional information*
***Please consult factory for specifications*



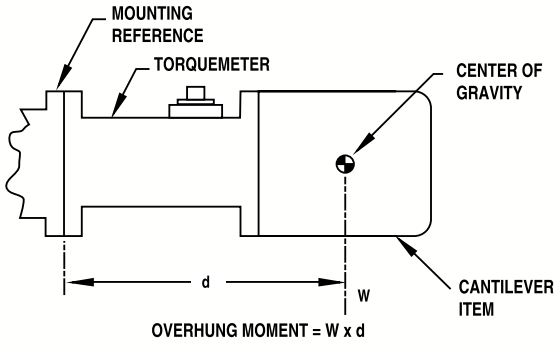
SPECIFICATIONS

PARAMETERS	MODEL STANDARD
ACCURACY – (MAX ERROR)	
Combined Error–%FS	±0.1
Nonlinearity–%FS	±0.0
Hysteresis–%FS	±0.1
Nonrepeatability–%FS	±0.05
Stability, 6 Months–%FS	±0.15
Rotational Effect on Zero–%FS	±0.05
TEMPERATURE	
Effect on Zero–%FS/°F	±0.002
Span–%/°F	±0.002
Compensated Range–°F	+75 to +175
Usable Range–°F	-25 to +185
Storage Range–°F	-65 to +225
ELECTRICAL	
Fully bi-directional, dual output with common characteristics, as follows	
Clockwise (CW) Torque	+1.5 mV/V
Counterclockwise (CCW) Torque	-1.5 mV/V
Zero Balance	±1% of FS, nominal
Excitation	3 - 6 V rms, 3 kHz ±10% sine wave capable of driving a 90 ohm bridge
Readout	Strain gage carrier amplifier

*Specifications apply to mV/V models only. When selecting the **ON-BOARD SIGNAL CONDITIONING** option please contact factory for specification details.

MODEL	TORQUE RANGE (lb-in)	TORQUE OVERLOAD (lb-in)	MAX. SPEED (rpm)	STIFFNESS* (lb-in/radian)	INERTIA* (oz-in/sec.)	MAX. WT. (lb)
RT15S	50	100	0 to ±15,000	5,570	0.15	13
RT15S	100	200	0 to ±15,000	15,000	0.15	13
RT15S	200	400	0 to ±15,000	54,500	0.15	13
RT15S	500	1,000	0 to ±15,000	94,500	0.15	13
RT15S	1,000	2,000	0 to ±15,000	145,000	0.15	13
RT16S	1,000	2,000	0 to ±10,000	247,000	0.16	14
RT16S	2,000	4,000	0 to ±10,000	428,000	0.16	14
RT16S	5,000	10,000	0 to ±10,000	486,000	0.16	14
RT16S	10,000	20,000	0 to ±10,000	613,000	0.17	14

MODEL	TORQUE RANGE	MAXIMUM OVERHUNG MOMENT (WXD)	SPLINE DATA	DIMENSION L (inch)
RT15S	All	2,000 lb-in	16 teeth, 20/30 D.P.	8 17/32
RT16S	All	2,000 lb-in	24 teeth, 20/30 D.P.	9 3/32



*Stiffness and inertia are conservatively rated from shaft end to end.

Model 5300
Reaction Torque Cell

Why the Interface model 5300 Reaction Torque Cell is the best in class:

- **High torsional stiffness**
- **Extraneous load resistance**
- **Compact size**
- **Amplified output available on 5350 & 5355 solid flange models**

STYLES	Available Styles & CAPACITIES (lb-in)	(oz-in)
5305 Mini Shaft		10,25,50,100,160
5310 Shaft	20K, 50K, 100K, 200K, 300K	
5320 Flange	200K, 300K	
5330 Hollow Flanged	60, 120, 240, 600, 1200, 3000, 6000, 10K, 20K, 50K, 100K	
5340 Flat	50, 100, 200, 500	
5350 Solid Flange		10,20,50,100,200
5355 Solid Flange	10,20,50,100,200,500 1K,2K,5K,10K,20K,50K,100K	

SPECIFICATIONS

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.1
Hysteresis–% FS .....±0.1
(5330 & 5305-10 .....±0.25)
Nonrepeatability–% .....±0.05

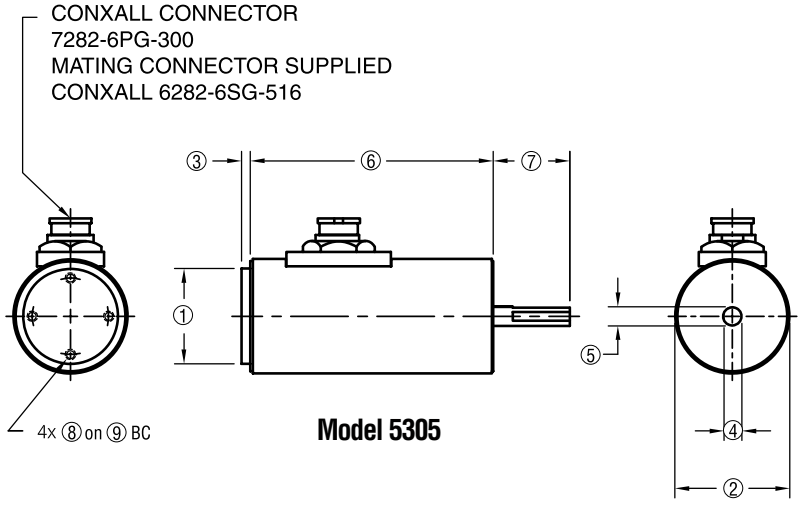
TEMPERATURE
Compensated Range–°F .....±75 to ±175
Compensated Range–°C .....+24 to +80
Operating Range–°F.....-65 to +225
Operating Range–°C .....-54 to +107
Effect on Output–%/°F-MAX .....±0.002
Effect on Zero–% RO/°F-MAX .....±0.002

ELECTRICAL
Rated Output–mV/V (Nominal) 2.0
5305-10 .....1.0
5330-60 thru 6K 1.0
5340.....1.0
5350-10.....1.3
Bridge Resistance–Ohm (Nominal) 350
(5330-3K thru 100K.....700)
Excitation Voltage-MAX .....10 VDC
(5305 .....8)

MECHANICAL
Calibration .....CW & CCW
Safe Overload-% CAP 200

DIMENSIONS

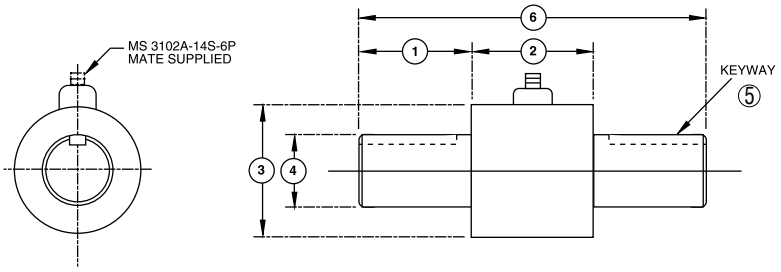
See Drawing	MODEL 5305 MINI SHAFT STYLE CAPACITY 10, 25, 50, 100, 160 oz-in
①	1.249 +0/-0.001
②	1.500
③	0.125
④	0.249 +0/-0.001
⑤	2 FLATS @ 90°
⑥	3.188
⑦	1.000
⑧	6-32 x 0.250 deep, 4 places
⑨	1.000



Model 5305

DIMENSIONS

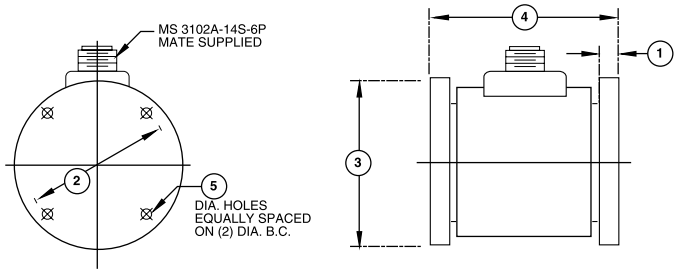
See Drawing	MODEL 5310 SHAFT STYLE	
	CAPACITY (lb-in) 20K, 50K, 100K	200K, 300K
	inch	inch
①	5.125	7.125
②	8.75	7.75
③	5.50	7.50
④	3.000 +0/-0.001	4.50
⑤	0.75 square	1.00 square
⑥	19.0	22.0



Model 5310

DIMENSIONS

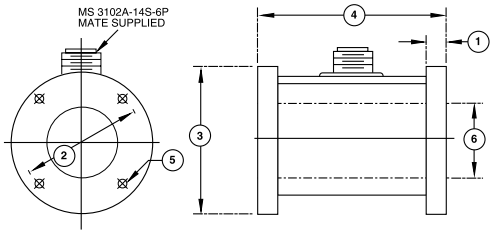
See Drawing	MODEL 5320 FLANGE STYLE
	CAPACITY (lb-in) 200K, 300K
	inch
①	0.75
②	10.375
③	12.0
④	13.0
⑤	0.630 thru 16 places



Model 5320

DIMENSIONS

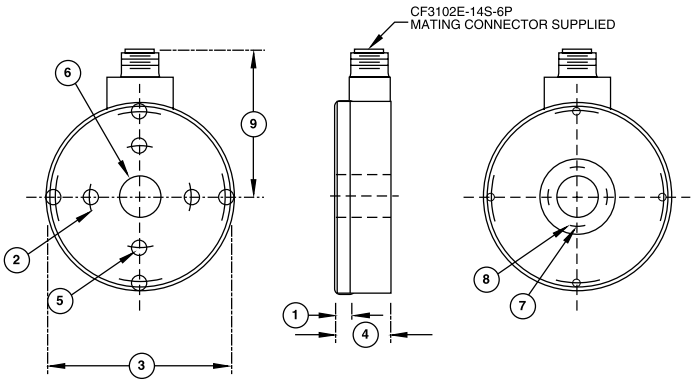
See Drawing	MODEL 5330 HOLLOW FLANGE TYPE				
	CAPACITY (lb-in) 60, 120, 240	600, 1200	3K, 6K	10K, 20K	50K, 100K
	inch	inch	inch	inch	inch
①	0.3125	0.3125	0.3125	0.625	0.625
②	2	2.5	3.375	4.375	7.00
③	2.5	3.25	4	5	8.5
④	2.125	2.125	2.125	3.5	3.5
⑤	0.203 thru 2 places	0.39 thru 2 places	0.406 thru 4 places	3/8-24 UNF 6 places	0.63 thru 8 places
⑥	.875 thru	1.375 thru	2.375 thru	3.375 thru	3.375 thru



Model 5330

DIMENSIONS

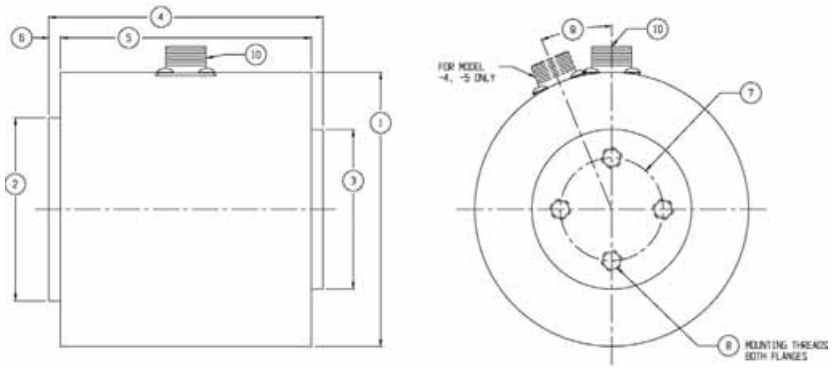
See Drawing	MODEL 5340 FLAT TYPE
	CAPACITY (LB-IN) 50, 100, 200, 500
	inch
①	.375
②	2.500
③	4.50
④	1.34
⑤	3/8-24 UNF-2B x 0.312 deep, 4 places
⑥	1.000 +0.001/-0 thru
⑦	10-32 UNF-2B x 0.50 deep, 4 places
⑧	1.380
⑨	3.50



Model 5340

DIMENSIONS

See Drawing	SOLID FLANGE TYPE					
	5350 oz-in	5355 lb-in				
	10,20,50,100,200	10,20,50	100,200,500	1K,2K,5K	10K,20K	50K,100K
	inch					
①	1.50	2.00	2.75	4.50	6.00	8.00
②	1.00	1.375	2.000	3.875	5.375	7.375
③	0.875	1.250	1.875	3.750	5.25	7.250
④	1.50	1.875	2.75	3.50	4.50	5.50
⑤	1.375	3.750	2.375	3.00	3.75	4.75
⑥	0.0625	0.125	0.188	0.25	0.375	0.375
⑦	0.563	0.750	1.250	2.750	4.000	5.750
⑧	#4-40 UNL-2B 2 places	#10-32 UNL-2B 2 places	1/4-20 UNL-2B 4 places	3/8-24 UNF-2B 4 places	7/16-20 UNF-2B 8 places	5/8-18 UNF-2B
⑨	0	0	0	0	22.5	15
⑩	Conxall 7282-GPG-300	CF3102E-14S-6P	CF3102E-14S-6P	CF3102E-14S-6P	CF3102E-14S-6P	CF3102E-14S-6P



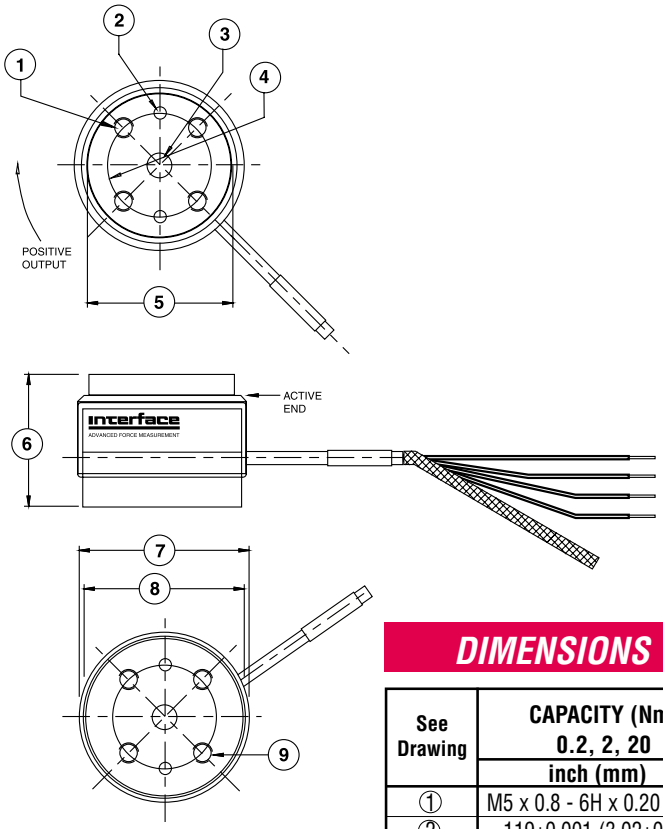
***Model 5350 & 5355**

***Amplified Output Available. Please consult factory for details.**

Model MRT Miniature Reaction Torque Cell

Why the Interface model MRT Miniature Reaction Torque Cell is the best in class:

- **Proprietary Interface temperature compensated strain gages**
- **Low capacity - as low as 1.77 in-lb (0.2Nm)**
- **Small size - 1.6 in OD x 1.25 in**
- **Excellent linearity & repeatability**
- **Low deflection**
- **Other capacities available**
- **Call factory for details**



DIMENSIONS

See Drawing	CAPACITY (Nm) 0.2, 2, 20 inch (mm)
①	M5 x 0.8 - 6H x 0.20 Deep
②	.119±0.001 (3.02±0.03)
③	.237 thru (6.02)
④	.984 (24.99)
⑤	1.375 (34.95)
⑥	1.25 (31.8)
⑦	1.60 (40.6)
⑧	1.50 (38.1)
⑨	M5 x 0.8 - 6H x 0.20 Deep

SPECIFICATIONS

Standard Capacities (Nm) 0.2, 2, 20
Equivalent (in-lb) 1.77, 17.7, 177

ACCURACY – (MAX ERROR)
Nonlinearity–% FS .....±0.10
Hysteresis–% FS .....±0.10
Nonrepeatability–% RO .....±0.05
Creep, in 20 min–% .....±0.10

TEMPERATURE
Compensated Range–˚F .....15 to 115
Compensated Range–˚C .....-10 to 45
Operating Range–˚F .....-65 to 200
Operating Range–˚C .....-55 to 90
Effect on Zero–% RO/100F˚ .....±0.20
Effect on Output–%/100F˚ .....±0.10

ELECTRICAL
Rated Output–mV/V (Nominal) .....2.00 ±0.30
Zero Balance–% RO .....±1.0
Input Resistance–Ohms .....700 + 100/-7
Output Resistance–Ohms.....700 ±7
Insulation Resistance–Megohm .....> 5000
Excitation, Nominal .....10 VDC
Excitation, Maximum .....20 VDC

MECHANICAL
Overload:
–safe torsion–% cap .....±150
–ultimate torsion–% cap .....±400
–safe side load–N 13, 110, 400
–lbf 3, 25, 90
–safe overhang moment–% cap 100
–safe mounting torque–Nm.....0.3, 3, 9
–in-lb.....2.7, 27, 80
Deflection at capacity–radian 0.007, 0.003, 0.003
Cable length–feet 5

INSTRUMENT SELECTION GUIDE

Digital Indicators

TYPE	MODEL	TYPICAL APPLICATIONS	KEY FEATURES	COMMON FEATURES
Test	9840 	Calibration Labs Field Calibration High Accuracy Test	25 Calibration Memory 6-Digit, 24 Bit 2-Channel	Bipolar Display Shunt Calibration Front Panel Zero/Tare Button Peak & Valley RS232 Setpoints Analog Output Plug-In Power Cord Metal Enclosure Transformer Power Supply
	9830 	Test & Measurement Breaking or Insertion Force	120 Samples/Second Scalable Analog Output ±10 VDC 2000 Hz Bandwidth Analog Output	
	9820 	General Purpose Test	Aluminum Enclosure Plug-In Power Cord Analog Output	
	9850 	Torque HP	2000 Samples/Second 2-Channel 3rd Channel for Calculation-	
	9320 TEDS enabled 	Field Test	Hand Held Battery Powered Dual Range 6-Digit TEDS	
Weight	9300 	Weighing Harsh Environment	Analog Output	Stainless Steel NEMA 4X Enclosure Unipolar Display - No Negative Values Zero & Net/Gross Buttons RS232
	9390 	Remote Weighing	Battery Powered	
	UMC600 	Batching Truck Scales	Weighing Functions Setpoints Analog Output	

INSTRUMENT SELECTION GUIDE

Amplifiers

TYPE	MODEL	TYPICAL APPLICATIONS	KEY FEATURES	COMMON FEATURES
External	SGA 	General Purpose Test Weighing	AC Power 18-28 VDC Power Selectable Filters- 1 Hz to 6000 HZ High Gain NEMA 4X Enclosure w/Cable Glands	5 or 10 VDC Excitation to Load Cell (SGA 10 VDC Only) Hi Level Output VDC & mA Output User Configurable Gain - (except 500) Zero & Span Adjustment
	DCA 	OEM & General Purpose Automotive	Smaller Than SGA 100 Hz Bandwidth 10-28 VDC Power NEMA 4X Enclosure w/Cable Glands Screw Terminal Connections	
	DMA 	Automation Process Control	DIN Rail Mount 10-28 VDC Power 1000 Hz Bandwidth Screw Terminal Connections	
	500 	OEM & General Purpose	Small Size 9-Pin Connectors 12-24 VDC Power Lowest Cost	
Internal	2-Wire 	Process Control	4-20 mA or 12 ±8 mA Loop Powered	Internal to Load Cell Zero & Span Adjustment Factory Configured
	3-Wire 	Process Control	±10 VDC, ±5 VDC 4-20 mA, 12 ±8 mA	

Model 500 In-Line Signal Conditioner

- **DC powered**
- **±5 VDC or 4-20 mA**
- **Small size**
- **Ultra-stable electronics**

	500 Analog Output Signal Conditioner
POWER	12-24 VDC
EXCITATION Voltage	5 or 10 VDC
Current	30 mA
OUTPUT	±5 VDC Bipolar and 4-20 mA Unipolar
PERFORMANCE Input Range, Nominal	10,20,30,or 40 mV
Dynamic Response	1000 Hz
Span Adjustment Range	±10%
Zero Adjustment Range	±1.4 mV
Operating Temperature	-32°F to 158°F -0°C to 70°C
ENVIRONMENTAL Size	2.6 in X 1.7 in X 0.85 in

ACCESSORIES

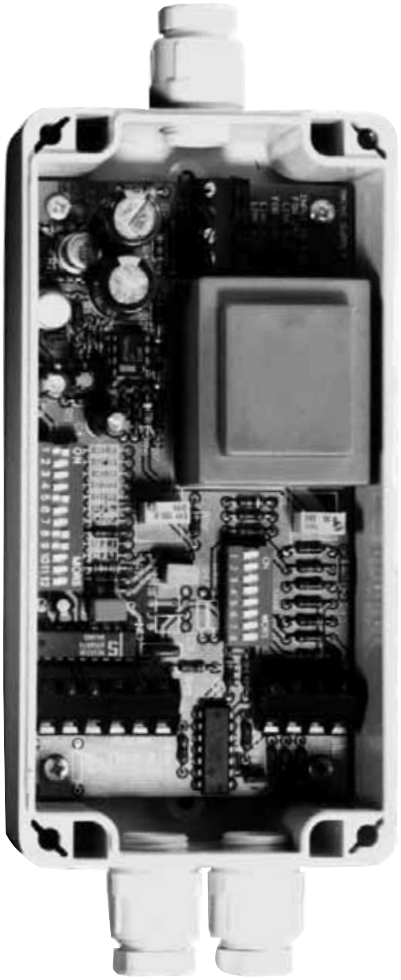
Terminal strip adaptors (to fan out connector wiring to a screw terminal strip)

TSA-101 (to load cell)

TSA-102 (to system wiring)

Model SGA AC/DC Powered Signal Conditioner

- **User selectable analog output ±10V, ±5V, 0-10V, 0-5V, 0-20 mA, 4-20 mA**
- **110 VAC, 220 VAC OR 18-24 VDC power**
- **Switch selectable filtering 1 Hz to 5 kHz**
- **Single channel powers up to 4 transducers**
- **Selectable full scale input range 0.06 to 30 mV/V**
- **Switch selectable offset ±70% FS**
- **Sealed ABS enclosure**



SPECIFICATIONS

POWER

AC	110 VAC 60 Hz or 220 VAC 50 Hz
DC	18-24 VDC

EXCITATION

Voltage	10 VDC ±5%
Current	118 mA

PERFORMANCE

Output	±10V, ±5V Bipolar 0-5V, 0-10V Unipolar 0-20 mA, 4-20 mA
Unipolar Input Range	±0.06 to ±30 mV/V Switch selectable
Max Bandwidth	6 kHz
Filter	1 Hz to 5 kHz Switch selectable
Offset	±70% FS Course and fine adjust
Nonlinearity	0.03% FS
Span Temp. Coefficient	0.004%/°F Max
Zero Temp. Coefficient	0.5 µV/°F Max

ENVIRONMENTAL

Operating Temp.	+32°F to +122°F
Dimensions	6.3 in X 3.1 in X 2.2 in
Enclosure	Sealed ABS case, Compression cable seals

ACCESSORIES

AC Power Cord (PWRCRD-SGA-110)

Model DMA DIN Rail Mount Signal Conditioner

- **User selectable analog output ±10V, ±5V, 4-20 mA**
- **10-28 VDC power**
- **Selectable full scale input range 5 to 50 mV**
- **DIN Rail Mountable**

Model DMA
DIN Rail Mount Amplifier
for strain gage transducer input

Terminal

1	Ground
2	Vsupply (10-28 VDC)
3	- Excitation
4	+ Excitation
5	Iout (4-20 mA)
6	Vout (±5 or ±10 V)
7	- Signal
8	+ Signal

interface
ADVANCED FORCE MEASUREMENT
Scottsdale, AZ 85260 USA
480-948-5555 FAX 480-948-1924
www.interfaceforce.com

SPECIFICATIONS

POWER
DC .....10-28 VDC
EXCITATION
Voltage .....5 or 10 VDC
Current .....30 mA Max
PERFORMANCE
Output 1 .....±5V or ±10V Full Scale
Bipolar, jumper selectable
Output 2 .....4-20 mA Full Scale
Unipolar
Input Range.....5 to 50 mV FS
coarse and fine adjust
Dynamic Response .....DC to 1000 Hz
Zero Offset Range .....±50% FS Output
Course and fine adjust
Nonlinearity .....0.01% FS
Span Temp. Coefficient .....0.004%/°F Max
Zero Temp. Coefficient.....0.5 µV/°F Max
ENVIRONMENTAL
Operating Temp. .....-32°F to +158°F
Dimensions .....0.70 in X 3.90 in X 2.30 in
Mounting.....35mm DIN Rail

Model DCA Vehicle Compatible Signal Conditioner

- **10-28 VDC power**
- **User selectable analog output ±10V, ±5V or 4-20 mA**
- **Small size**
- **NEMA 4X enclosure**
- **DC to 100 Hz**
- **Ideal for battery powered applications**

SPECIFICATIONS

EXCITATION

Voltage	5 or 10 VDC
Current	30 mA Max

PERFORMANCE

Output 1	±5V or ±10V Full Scale
Output 2	4-20 mA Full Scale Unipolar
Input Range	5 to 50 mV FS
Dynamic Response	DC to 100 Hz
Zero Offset Range	±50% FS Output Coarse and fine adjust
Nonlinearity	0.01% FS

ENVIRONMENTAL

Operating Temp.	-32°F to +158°F
Dimensions	2.56 in X 3.70 in X 2.24 in

POWER

DC	10-28 VDC

Model 9820
General Purpose Indicator

- **Bipolar**
- **5 digit bipolar LED display**
- **Nonlinearity < ±0.01%**
- **Analog output – ±10 VDC, with 2 kHz bandwidth**
- **Front panel shunt calibration, tension or compression, internal or external resistor**
- **Peak and valley monitoring**
- **Remote and front panel tare**
- **Transformer minimizes noise**

SPECIFICATIONS

EXCITATION

Excitation Voltage.....5, 10, VDC (jumper selectable)
Current.....60, 120 mA respectively

PERFORMANCE

Maximum Display Range.....±99,999
Internal Resolution.....±19,999 counts
Signal Input Range.....±50 mV
Sensitivity.....1.2 µV/count
Readings Per Second.....2.5
Maximum Error.....0.01% FS ±1 count
CMR.....120dB

ENVIRONMENTAL

Operating Temperature.....14 to 122°F -10 to 50°C
Relative Humidity – MAX.....90% at 104°F, non-condensing

POWER

AC.....115 OR 230 VAC 50–60 Hz
Power Consumption.....6 watt

MECHANICAL

Size.....3.78" W, 1.89" H, 5.5" D (96mm x 48mm x 140mm)
Weight.....1.3 lb (575g)
Display.....LED 14 segment, .4" H
Panel Cutout.....3.62" W X 1.77" H (92mm X 45mm)

FAST ANALOG OUTPUT.....2 kHz

STANDARD CONFIGURATION

9820-000-1 110 V with ±10V analog output

OPTIONS

RS232 serial output
4–20 mA analog output
Four relay setpoint outputs
Bench top enclosure

Model 9830 High Speed Digital Indicator

- **Sample rate 120 readings per second**
- **4 limit setpoints with solid s/h relays**
- **Programmable analog output, ±10 VDC and 4-20 MA, 2000 Hz bandwidth**
- **5 digit bipolar LED display**
- **Nonlinearity < ±0.01%**
- **Front panel shunt calibration**
- **Peak and valley monitoring**
- **Remote and front panel tare**
- **Powers four 350 load cells**
- **Designed for CE compliance**
- **Bidirectional RS232**

STANDARD CONFIGURATION

9830-110-1 110V with ±10V analog output

OPTIONS

Bench top enclosure
External Relay Board

SPECIFICATIONS

EXCITATION

Excitation Voltage.....5, 10, VDC (jumper selectable)
Current.....60, 120 mA respectively

PERFORMANCE

Maximum Display Range.....±99,999
Display Update.....5/sec
Internal Resolution.....±32,768 counts
Signal Input Range.....±50 mV
Sensitivity.....0.8 µV/count
Readings Per Second.....120
Maximum Error.....0.01% of reading ±1 count
CMR.....120dB
Scalable Analog Output.....±10 VDC and 4-20 mA
RS232 Output

ENVIRONMENTAL

Operating Temperature.....14 to 122°F -10 to 50°C
Relative Humidity – MAX.....90% at 104°F, non-condensing

POWER

AC.....115 OR 230 VAC 50–60 Hz
Power Consumption.....6 watt

MECHANICAL

Size.....3.78" W, 1.89" H, 5.5" D (96mm x 48mm x 140mm)
Weight.....1.3 lb (575g)
Display.....LED 14 segment,.4" H
Panel Cutout.....3.62" W X 1.77" H (92mm X 45mm)

Model 9840 Intelligent Indicator

- 1 or 2 Channel
- Remote sense excitation
- 5 & 6 point linearization
- Bipolar
- ±999,999 display counts
- Nonlinearity < ±0.005%
- Auto setup for multiple load cells
- Fast, direct analog output
- ±10 VDC scalable analog output - 16 bit
- Full duplex RS232C communication
- Peak/valley hold with front panel reset
- Front panel and remote tare
- 8 selectable digital filters
- Auto zero
- Front panel shunt calibration with two selectable resistors
- Display units conversion: Lb, Kg, N, Psi, Mpa, Klb, KN, t, mV/V
- Two-line vacuum fluorescent display
- Quadature encoder channel available
- mV/V Calibration

SPECIFICATIONS

EXCITATION

Voltage	5 or 10 VDC
Current – MAX	180 mA

OUTPUTS

Serial Interface	RS232 duplex
Output – Analog, 16 bit	Scalable, ±10 VDC
Output – Analog, Direct	1.5 khz BW
Output – Analog	4–20 mA (optional)
Limits	Quad-programmable

PERFORMANCE

Maximum Display Counts	±999,999
Display Update	4 / sec.
Internal Resolution	24 bits
Signal Input Range	±4.5 mV/V
Programmable Count - by	1, 2, 5, 10, and 20
Conversion Rate	60 / sec
Maximum Error	0.01% FS ±1 count
CMRR	115 dB

ENVIRONMENTAL

Operating Temperature	32 to 122°F 0 to 50°C
Storage Temperature	14 to 140°F -10 to 60°C
Relative Humidity – MAX	95% at 104°F non-condensing

POWER

AC Power	115 OR 230 VAC 50–60 Hz
DC Power (option)	Available as a special
Power Consumption	12 watts

MECHANICAL

Size	7.5" W, 2.5" H, 9.5" D
Weight	5 lb
Display	Vacuum Fluorescent
Unit Annunciator	Lb, Kg, Klb, KN, N, mV/V

STANDARD CONFIGURATION

9840-100-1 110V single channel

OPTIONS

Second channel
Quad limits
RS485 output
4-20 mA analog output
Panel mount bracket
Multi-drop RS232/485

Model 9850 Rotary Torque Indicator

- **AC carrier excitation**
- **2000 samples/sec/channel**
- **7-pole 200 Hz anti-alias filter plus 4-pole digital filters**
- **Auto-scaled ±5V and/or ±10V analog outputs**
- **RS232, RS422, RS485 serial communication**
- **Torque, speed, and HP display**
- **Max/min capture**
- **Two-line backlit LCD display**
- **3rd channel for calculated values**

STANDARD CONFIGURATION

AC power/AC excitation transducer channel

OPTIONS

Second transducer channel
Input type - LVDT/Frequency/Strain/DC
DC power
Panel mount kit

SPECIFICATIONS

EXCITATION
Voltage ..... 3 Vrms, 3030 Hz ±0.01% sine wave

OUTPUTS
Serial Interface RS232/RS422/RS485
Output – Analog, 12 bit ..... 2 Scalable, ±5 VDC, or ±10 VDC
Limits ..... HI/LO, per channel

PERFORMANCE
Maximum Display Counts 10,000
Display Update ..... 4 / sec
Internal Resolution ..... ±14 bits
Signal Input Range ..... ±5 mV/V
Conversion Rate ..... 2000 / sec
Maximum Error ..... 0.02% FS

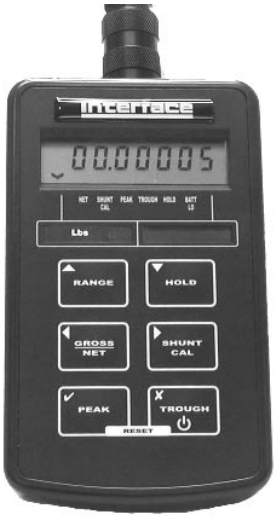
ENVIRONMENTAL
Operating Temperature ..... +41°F to 122°F
Relative Humidity - MAX ..... 95% at 104°F, non-condensing

POWER
AC Power ..... 90 VAC to 250 VAC
50/60 Hz @ 25VA max
DC Power ..... 10-15 VDC at 15 watts max

MECHANICAL
Size ..... 6.5" W, 2.5" H, 8.7" D
Weight ..... 3 lb
Display ..... Backlit LCD

Model 9320 Hand Held Battery Powered Indicator

- **TEDS enabled (see Page 118)**
- **7 1/2 digit bipolar LCD display**
- **Dual range with unit labels**
- **Environmentally sealed**
- **Peak/valley hold**
- **Display hold**
- **Gross/net**
- **25 Hz update rate**
- **Shunt cal**
- **Power save mode**
- **mV/V Calibration**



TEDS enabled

OPTIONS

Serial RS232 Port provides streaming ASCII for print, remote display and logging.

Carry case

SPECIFICATIONS

ELECTRICAL

Excitation Voltage	5 VDC
Current	59 mA

PERFORMANCE

Maximum Display Counts	±9999999
Internal Resolution	24 bit
Signal Input Range	5 mV/V
Readings Per Second	to 25 mV, selectable
Nonlinearity	0.005% FS

ENVIRONMENTAL

Operating Temperature	14 to 122°F -10 to 50°C
Enclosure	Sealed IP65/NEMA 4X (when mating plug fitted)

POWER

Power	2 x AA alkaline batteries
Battery Life	45 hrs (450 hrs in low power mode)

MECHANICAL

Size	3.5" W x 6.0" H x 1.3" D 90 mm x 152 mm x 34 mm
Weight	0.5 lb (250 g)
Display	7 1/2 digit LCD display, 8.8 mm digits

Model 9300 Weight Indicator

- **6-digit display**
- **60,000 display graduations**
- **Powers up to 8 load cells**
- **15 Updates/second typical**
- **NEMA 4 stainless steel washdown enclosure**
- **Selectable primary/secondary units lb, kg, ounces, short tons, metric tons, grams or none.**
- **2 Independent serial communications ports: (1) full duplex, (1) unidirectional or active 20 mA current loop**
- **Full front-panel digital calibration & configuration**
- **Three-stage digital filtering**
- **CE Marked**

SPECIFICATIONS

ELECTRICAL

Excitation Voltage.....10 ±0.5 VDC, 8 x 350Ω load cells or 16 x 700Ω load cells

PERFORMANCE

Maximum Display Counts 100,000
Analog Signal Input Range.....0.6 mV/V - 4.5 mV/V
Sensitivity.....0.3µV/graduation min.
Measurement Rate .....15 measurements/second

ENVIRONMENTAL

Operating Temperature.....14 to 122°F -10 to 50°C

POWER

AC Power .....115 OR 230 VAC 50–60 HZ

MECHANICAL

Weight .....6.4 lb (2.9 kg)
Enclosure .....NEMA 4X/IP66 stainless steel
Enclosure Size .....9.5 in x 6 in x 2.75 in
Display .....6 digit LED

OPTIONS

Analog output: selectable 0-10V, 4-20 mA
Panel mount kit
Please specify if CE mark is required

Model 9390 Battery Powered Weight Indicator

- **Large 1" high contrast LCD display**
- **6-digits**
- **100,000 graduations**
- **Powers up to 4 load cells**
- **Battery powered**
- **15 updates/second typical**
- **Configurable standby mode for extended battery life**
- **Full front-panel digital calibration & configuration**
- **Three-stage digital filtering**
- **Full Duplex RS-232**

SPECIFICATIONS

ELECTRICAL

Excitation Voltage.....5 ±0.5VDC,
4 x 350Ω load cells or
8 x 700Ω load cells

PERFORMANCE

Maximum Display Counts 100,000
Analog Signal Input Range.....4.5 mV/V
Sensitivity.....0.3 µV/graduation min.
Measurement Rate 30, 15, 7.5, 3.75/second

ENVIRONMENTAL

Operating Temperature.....14 to 104°F
-10 to 40°C

POWER

Power.....9 VDC provided by 6 "C" cells or included AC adaptor

MECHANICAL

Weight .....4.6 lb with batteries
Enclosure .....NEMA 4X/IP66 stainless steel
Enclosure Size .....9.0 in x 3 in x 5.52 in
Display .....6 digit LCD, 1" high

OPTIONS

Carrying case for portable use
Please specify if CE mark is required

Model UMC600 Weight Indicator/Controller

- **Powers up to 8 load cells**
- **80,000 display graduations**
- **Nonlinearity <±0.01%**
- **Nema 4 stainless steel enclosure**
- **Serial output (RS232)**
- **Adjustable digital filter**
- **Dual setpoint outputs**
- **Tilt stand base**
- **"Zero," "Tare," "Net/Gross," "lb/kg Conv.," and "Print" keys**
- **10 updates/second with adjustable digital averaging**
- **Active 5 Hz analog filter**
- **5-point linearization**
- **Batching and weighing functions**

SPECIFICATIONS

ELECTRICAL
Excitation Voltage (Nominal) .....10 VDC
Current .....240 mA

PERFORMANCE
Maximum Display Counts 80,000
Maximum Error .....0.01% of reading ±1 count
Signal Input Range.....9 to 44 mV FS
Sensitivity.....0.3 µV/count
Conversion Rate.....10 per second
Integration Time.....20 msec typical
Display Increments 1, 2, 5, 10, 20, 50, 100

ENVIRONMENTAL
Operating Temperature.....14 to 104°F
-10 to 40°C

POWER
AC .....115/60 or 230/50 VAC/Hz
(Internal rechargeable battery or 12 VDC optional)

MECHANICAL
Panel Cutout.....9.12 X 6.62" (232x168 mm)
DIMENSIONS .....L 9.12" x H 6.62" x W 4.18"
Weight .....9.4 lb (4300g)
Display .....6 digit, LED or LCD, 6 in high

OPTIONS

UMC600 ___ – ___ – ___

- RS = Remote Sense
- A = LED
- B = LCD
- 1 = 115/60 VAC/Hz
- 2 = 220/50 VAC/Hz
- 3 = 115/60 + internal battery
- 4 = 220/50 + internal battery
- 5 = External 12 VDC source
- 6 = 115/60, 0-10V + 4-20 mA output
- 7 = 220/50, 0-10V + 4-20 mA output

ACCESSORIES

Panel mount kit
CN-208 mating connector (included)

Interface Gold Standard™ Calibration Systems

A fully integrated PC-based solution for calibration of load cells and force test machines

Why the Interface model Gold Standard™ Calibration System is the best in class:

- **Controlled calibration process reduces calibration times by 50% to 90% and produces consistent calibration results**
- **Easy-to-use software reduces operator training time**
- **Fully integrated reporting functions**
- **Automatic archiving of calibration results**
- **Supports ASTM E74, ASTM E4 and ISO 7500/1, EN10002**
- **Industry Accepted terms and calculations**
- **0.1µV display resolution**
- **Used in over 150 calabration labs world-wide**

Gold Standard™ Load Cell Calibration System

The Interface load cell calibration system combines highly accurate load cell signal conditioning, calibration standard load cells and state of the art calibration software. In this system a Gold Standard™ or Platinum Standard™ load cell is placed in line with the load cell to be calibrated in a hydraulic or mechanical force test machine. The system steps through a sequence of test points, either manually or automatically and then calculates performance specifications such as Linearity and Hysteresis, stores the data and creates test reports.

Gold Standard™ E4 Machine Calibration System

The Interface E4 verification system integrates the ultra-accurate 9840 Intelligent Indicator with any laptop computer. This creates a portable system for in-field verfication of force test machines. The verification involves insertion of a reference load cell (such as the Interface Gold Standard™ Load Cell) into the equipment under test. Each data point in the test frame controller is compared against the reading from the reference load cell.

Gold Standard™ Load Cell Calibration System

SYSTEM INCLUDES

- One SCB1 2 Channel Signal Conditioning Board
- One ICS-202 Force Calibration Software
- One SIS-103 One-Day Training at Interface
- One CT-139-10 SCB1 to GS Load Cell Cable
- One CT-142-10 SCB1 to Standard Load Cell Cable
- One CX-0440 mV/V Transfer Standard
- One SIS-104 System Setup

OPTIONS

- HRBSC Boards
- 9840-200-1 Dual Channel
- DA-101 For Test Machine Automation
- HL-4I0 For High Level Outputs
- CX-0610 or Other Multi-Step mV/V Transfer Standard
- USB Chassis for Signal Conditioning Board(s)

Gold Standard™ E4 Machine Calibration System

SYSTEM INCLUDES

- 9840-100-1 Intelligent Indicator
- One ICS-205 E4 Machine Calibration Software
- One CT-177-10 Gold Standard™ Interconnect Cable Assemby
- Serial Cable, Laptop to 9840
- One CX-0440 ±4mV/V Transfer Standard
- One SIS-104 System Setup
- Training at Interface

OPTIONS

- Dual Channel 9840
- CX-0610 or Other Multi-Step mV/V Transfer Standard

Gold Standard™ Calibration System Options

- **GS-USB:** Provides USB interface for HRBSC, SCB1, DA-101 and HL4IO instrument boards includes internal power supply, cooling fan and USB cable.
- **SCB1:** 20 bit instrument board provides signal conditioning for the Gold Standard™ System. Available in single or dual channel versions. (See Page 110 for specifications)
- **HRBSC:** High-resolution 22 bit instrument board increases accuracy over the SCB1. (See Page 111 for specifications)
- **DA-101:** Digital to analog board for generating command signal for system control. Provides setpoint signal for servo controlled hydraulic force testing.
- **HL4IO:** High level 4-channel input board allows calibration of ±5 and ±10 VDC output transducers and includes all features of the DA-101.
- **Load Cell Simulator:** mV/V transfer standards are used to calibrate the Gold Standard™ system, and for setting up and testing load cell readout devices. (See Page 109 for more information)
  CX-0404 - specifically designed for instrument substitution testing as per ASTM E74.
- **Desktop, laptop or portable PC:** Contact factory for currently available configurations.
- **Gold Standard™ or Platinum Standard™ load cells as required:** See Page's 40-44.

GS-USB

1611 Gold Standard™ Compression Only

1810 Platinum Standard™ Universal Style

Precision mV/V Load Cell Simulator

- **Most accurate load cell simulator**
- **Special low thermal emf construction**
- **Each unit individually calibrated, aged and recalibrated**
- **Strong, rugged design**
- **Instrument substitution testing**

CX-0610

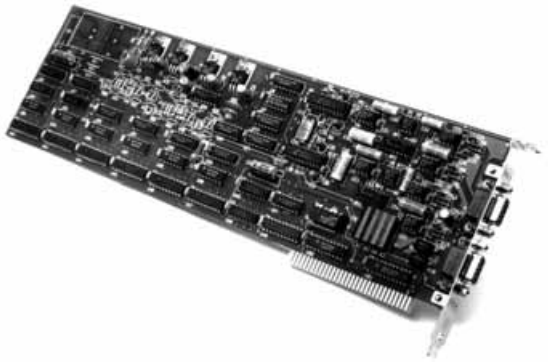
CX-0440

Models CX-0202, CX-0610, CX-0440, CS-0330, and CX-0220 are used for setting up and checking the Gold Standard™ System Hardware. CX-0440, CX-0330, and CX-0220 are single-step mV/V transfer standards providing precision outputs of ±4, ±3, and ±2 mV/V respectively. CX-0610 is a multi-step unit that allows the user to go from -6 mV/V to +6 mV/V in 1 mV/V steps.

Model CX-0404 is specifically designed for instrument substitution testing as per ASTM E74.

Specification	CX-0404 Multi-Step Model	CX-0610 Multi-Step Model	CX-0440 Single-Step Model	CX-0330 Single-Step Model	CX-0220 Single-Step Model
Output at zero setting	< 0.5 µV	< 0.5 µV	< 1.0 µV	< 1.0 µV	< 1.0 µV
Output settings–mV/V	0, ±0.04, ±0.08, ±0.2, ±0.4, ±0.8, ±1.2, ±1.6, ±2.0, ±2.4, ±3.2, ±4.0, ±4.4	-6, -5, -4, -3, -2, -1, +1, +2, +3, +4, +5, +6	-4, +4	-3, +3	-2, +2
Output accuracy at any non-zero setting, normalized to actual zero setting output:					
Relative to nominal value	0.01% to 0.05% of setting	0.01% of setting	0.01% of setting	0.01% of setting	0.01% of setting
Relative to value provided in unit-specific calibration chart	0.0015% of setting for one year	0.0015% of setting for one year	0.0025% of setting for one year	0.0025% of setting for one year	0.0025% of setting for one year
Temperature coefficient of normalized output	< 5 ppm/°C of setting	< 5 ppm/°C of setting	< 5 ppm/°C of setting	< 5 ppm/°C of setting	< 5 ppm/°C of setting
Input and output resistance:					
At zero setting	350 ohms ±0.005%	350 ohms ±0.005%	350 ohms ±0.005%	350 ohms ±0.005%	350 ohms ±0.005%
At output setting (value decreases with increasing setting, either polarity)	> 347.5 ohms	> 347.5 ohms	> 348.5 ohms	> 348.5 ohms	> 348.5 ohms

Model SCB1 Signal Conditioning Board 1 or 2 Channel



- **Nonlinearity <0.003% full scale**
- **20-bit resolution**
- **High thermal stability**
- **Shunt calibration, software selectable**
- **Single or dual channel versions**
- **Bipolar**
- **Isolated output**

The SCB1 signal conditioning board comes in a one or two-channel configuration. The single-channel unit is used with a dead weight system and/or for test machine verification, while the two-channel unit is used for calibrations where a reference (Standard) load cell is being used. One channel is connected to the reference standard and one channel is connected to the cell being calibrated.

ACCESSORIES*

CT-139-10 Interconnect cable (1600 type)

CT-142-10 Interconnect cable (1000 type)

CT-154-10 Interconnect cable (pigtails)

DA-101 Digital-Analog board, used with automated systems (consult factory)

GS-USB Chassis to house Signal Conditioning Board(s)

**See appendix for more technical information*

SPECIFICATIONS

EXCITATION

Excitation Voltage	10 V DC
Current	120 mA max

PERFORMANCE

Resolution	20 bits
Signal Input Range	±2.5, ±5.0, or ±7.5 mV/V
Conversion Rate	8 readings/second
Nonlinearity	<.003% full scale
Span Temperature Coefficient	<10ppm/°C
Zero Temperature Coefficient	<0.2 microvolt/°C
Span Stability–after warm up	±.003% per 24 hrs., ±.01% per year
Zero Stability–after warm up	±10 microvolt/per year
Settling Time	<0.25 sec to within .01%
Frequency Response	5Hz (-3 dB points)
Input Resistance	>100 megohm
Common mode rejection	>90 dB
Common mode voltage re: signal	±8 volts without damage
Common mode voltage re: ground	±500 V peak without damage (isolated version only)
Isolation Resistance	>100 megohms to ground
Noise	<0.3 µvolt typical, 0.6 µvolt max (digital filter ON) <0.7 µvolt typical, 1.5 µvolt max (digital filter OFF)

ENVIRONMENTAL

Operating Temperature	35 to 105°F
Relative Humidity – MAX	80%

Power

DC	PC BUS +5 V supply
Power Consumption	10 watts max

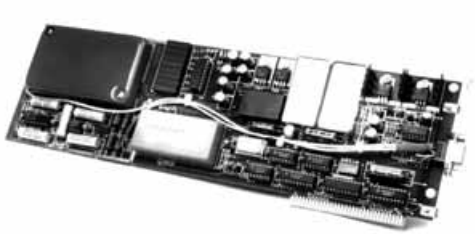
Mechanical

Outline	3.75 x 14 x .75 in (95 x 356 x 19 mm) Full Size Card
Connector	DE-9 Socket (1 per channel)

Model HRBSC High Resolution Signal Conditioning Board

- **Nonlinearity <0.001% full scale**
- **22-bit resolution**
- **High thermal stability**
- **Shunt calibration, software selectable**
- **Auto ID with Gold Standard load cells**
- **ISA slot plug-in board**
- **Bipolar**

The model HRBSC is a single-channel high resolution signal conditioning board. This board offers many additional features over the SCB1 for users requiring the highest levels of accuracy and precision.



SPECIFICATIONS

EXCITATION

Excitation voltage	10VDC ±1%, mV ripple max 80-5000 ohm load

PERFORMANCE

Internal Resolution	22 bits
Signal Input Range	-4.5 to +4.5 mV/V
Integration Time	Software selectable from 1, 10, 16.7, 20, 100, 166.7 and 300 msec
Nonlinearity	<0.001% full scale
Span Temperature Coefficient	<5ppm/°C
Zero Temperature Coefficient	<0.1microvolt/°C
Span Stability–after 60 min warmup	±0.001%, 24 hrs. ±0.003%, 1 yr.
Zero Stability– after 60 min warmup	±5 microvolts, one year
Response	<0.5 sec to within 0.01% basic analog response. Response rate equals 3 seconds for 100 msec conversion time and standard digital filter
Input Resistance	>100 megohm
Common Mode Rejection	>120dB @ 60Hz, >110 dB @ DC
Common Mode Voltage	±8 V without damage ±5 V for specified common mode reject
Noise	<0.25 µvolt typical, 0.6 µvolt max peak with 350 ohm load, @ 100 msec integration time and 10 sample average

ENVIRONMENTAL

Operating Temperature	35 to 105 °F
Relative Humidity-MAX	80%

Power

DC	PC BUS +5 V supply
Power Consumption	10 watts max

Mechanical

Outline	3.75 x 14 x .75 in (95 x 356 x 19 mm) Full size card
Connector	DE-9 socket

OPTIONS*

5 VDC excitation
Special shunt calibration resistors

ACCESSORIES*

CT-134-10 Interconnect cable (1600 type)
CT-141-10 Interconnect cable (1000 type)
DA-101 Digital-Analog board, used with automated systems (consult factory)
GS-USB Chassis to house Signal Conditioning Board(s)

**See appendix for more technical information*

NIST Traceable Load Cell Calibration Service

INTERFACE has the most consistent and meticulous calibration service in the industry

- 1,000,000 lbf capacity (kN, kg, etc. also available)
- Commercial, Mil STD, ASTM E74, Z540, EN10002-3, ISO-376, & System calibrations
- Calibrations for most manufacturer's load cells & instruments
- 1 week turnaround (2 days on special order)

CALL 1-800-947-5598 Ext. 133 FOR QUOTATION

Typical Interface Load Cell Calibration Certification

interface
ADVANCED FORCE MEASUREMENT

LOAD CELL CALIBRATION CERTIFICATION

CONDITION: FINAL PROCEDURE: C-1257
MODEL: 1020BJ-25K-B SERIAL: 99886 BRIDGE: A CAPACITY: 25 Klbf

INPUT RESISTANCE: 351.2 OHM
OUTPUT RESISTANCE: 351.2 OHM
ZERO BALANCE : -0.433 %RO

TEST CONDITIONS

TEMPERATURE: 77 °F HUMIDITY: 47 % EXCITATION: 10 VDC

TRACEABILITY

FORCE STANDARD : STD-9 NIST #: 822.07/258672 DUE: 15-JUN-99
STANDARD INDICATOR: BRD1 NIST #: 811/249920-92
TEST INDICATOR : BRD4 NIST #: 811/249920-92

SHUNT CALIBRATION

60 Kohm ± 0.01%	TENSION	COMPRESSION
OUTPUT	1.4604 mV/V	-1.4588 mV/V
STRAIGHT LINE conversion	17.579 Klbf	17.569 Klbf

Shunt calibration resistor connections for tension and compression respectively are (-EXC to -OUT) and (+EXC to -OUT) for connector models: (-SENSE to -OUT SHUNTCAL) and (+SENSE to -OUT SHUNTCAL) for 7 wire cable models.

PERFORMANCE

	RATED OUTPUT	SEB OUTPUT	NONLINEARITY	HYSTERESIS	SEB
TENSION	2.0767 mV/V	2.0769 mV/V	.006 %FS	.013 %FS	± .008 %FS
COMPRESSION	-2.0758 mV/V	-2.0757 mV/V	-.003 %FS	.001 %FS	± .002 %FS

STATIC ERROR BAND (SEB) - The band of maximum deviations of the ascending and descending calibration points from a best fit straight line through zero OUTPUT. It includes the effects of NONLINEARITY, HYSTERESIS, and nonreturn to MINIMUM LOAD.

TEST LOAD APPLIED (Klbf)	RECORDED READINGS (mV/V) Tension	Compression
0	.0000	.0000
5	.4155	-.4151
10	.8307	-.8303
15	1.2460	-1.2454
20	1.6614	-1.6606
25	2.0767	-2.0758
10	.8309	-.8303
0	-.0001	.0001

Interface, Inc. certifies that all calibration measurements are traceable to NIST.
Estimated uncertainty of measurements is 0.05%
Do not reproduce this report except in full or with Interface written approval.

TECHNICIAN :_____ DATE :17-AUG-98

INTERFACE INC.
7401 EAST BUTHERUS DRIVE · SCOTTSDALE, ARIZONA 85260, U.S.A.
TELEPHONE (602)948-5555 · FAX (602)948-1924

F16-3

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ASTM E74 Calibration

INTRODUCTION

The E74 procedure has been developed by the ASTM E-28 committee on Mechanical Testing as a standard for instruments used for verifying force indication of materials testing machines. The standard is being adopted for use with load cells in other applications also, as it presents a uniform and rigorous approach to calibration.

INTERFACE CAPABILITY

Interface, Inc. provides calibration on load cells up to 1,000,000 lbf capacity. The lower capacity calibrations are performed with deadweights and the higher capacities use secondary standard load cells in a comparison procedure. Interface secondary standards are calibrated by primary standards at NIST annually. The secondary standards are useful over their Class AA (most restrictive) range as determined by the NIST calibration per E74; the load cells being calibrated at Interface are then useful over their Class A range which is stated on the calibration certificate. With the secondary standard load cells, Interface can provide calibrations at virtually any load values within the capacity range, ascending or descending, and in any force units: lbf, kN, kg, etc.

FEATURES OF E74

The key elements of the E74 procedure include the application of at least 10 different forces approximately equally spaced, each of which must be applied at least 2 times, and the total of all force applications must be at least 30. Typically, 10 forces are applied in 3 sequences. The load cell is rotated in position in the test frame between sequences to randomize errors caused by loading conditions.

Upon completion of the tests, a polynomial equation is fitted to the 30 readings using regression analysis. The degree of the equation, degree 2 through degree 5 being possible, is determined per E74 test criteria and the highest degree allowed is used. A standard deviation is calculated from the errors of the readings relative to the fitted equation per the E74 procedure. From this calculation, the uncertainty and lower load limit of the Class A range are in turn calculated.

CERTIFICATION

A test report is provided with each calibration stating the forces applied, the corresponding readings, the coefficients of the polynomial equation, the fitted output at each load, the standard deviation, uncertainty, lower load limit, error plots, NIST traceability information, and environmental conditions at the time of test. The following pages show an example of a test report for a tension and compression calibration.

MULTIPLE CALIBRATIONS WITH CURVE FIT.

Three calibrations are performed rotating the load cell in the load frame by 120° between each test. All test data is presented in a tabular form. A curve is fitted to the data and the standard deviation of all test points about the fitted curve is calculated. The calibration record states that all measurements are traceable to NIST and provides the force standard test reference number.

Low Profile Options

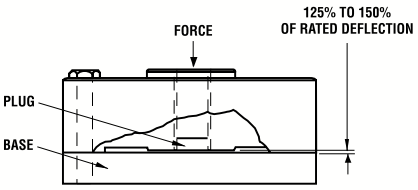
Positive Compression Overload Protection for Low Profile Load Cells

The positive overload option is useful when high overloads occur in applications such as: impact loads on weighing platforms; engine malfunctions during rocket or jet engine testing; transient overloads on engine dynamometers.

The unique design of INTERFACE load cells allows incorporation of a simple positive overload stop to protect against overload in compression. This stop engages at approximately 125% of cell capacity.

Compression-only cells with the overload option may be operated to 5 times rated capacity without damage in capacities through 25,000 pounds. 50,000 pound capacities and larger may be operated to 3 times rated capacities.

Load cells with positive overload protection must be ordered with an INTERFACE installed base.

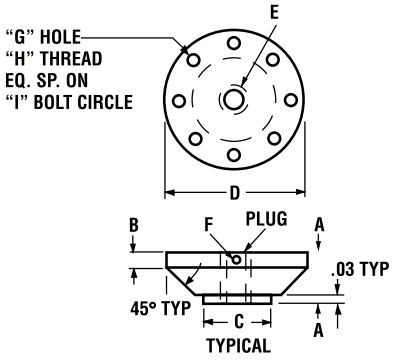


Center hub deflects under the load until it contacts the base which provides positive overload protection. The center tapped hole is sealed to keep overload surfaces clean.

Bases for Low Profile Load Cells

These heat treated, high strength bases are available in standard sizes. When the base and load cell are ordered together, a plug is supplied in both the cell and the base to prevent damage or errors caused by over engagement of mating parts. Standard thread size is the same as the mating load cell.

BASES OR FLAT MOUNTING SURFACES ARE REQUIRED FOR ALL LOW PROFILE LOAD CELL INSTALLATIONS. A mounting surface that is flat to 0.0002" T.I.R. (total indicator reading) is required, unless a base is installed.



P/N	A	B	C	D	E	F	G	H	I	WT., lb	Mat'l
B-101	1.12	0.50	1.25	4.12	5/8-18	.25	8	1/4-28	3.500	1.75	Aluminum
B-102	1.12	0.50	1.25	4.12	5/8-18	.25	8	1/4-28	3.500	4	Steel
B-103	1.75	0.81	2.25	6.06	1 1/4-12	.31	12	3/8-24	5.125	12	Steel
B-104	2.00	1.97	3.00	7.50	1 3/4-15	.31	12	7/16-20	6.250	24	Steel
B-105	3.00	2.97	4.50	11.00	2 3/4-8	.31	16	5/8-18	9.000	78	Steel
B-106	1.25	1.22	2.00	4.75	1/2-20	.31	4	5/16-24	4.000	6	Steel
B-108	2.50	2.47	3.00	8.25	3/4-16	.31	12	5/8-18	6.750	38	Steel
B-112	2.00	1.97	3.00	8.00	1 3/4-12	.31	16	1/2-20	6.500	26	Steel
B-116	4.00	3.97	4.50	11.00	2 3/4-8	.31	16	3/4-16	9.000	100	Steel
B-121	4.50	4.47	6.00	12.00	3 1/2-8	1/2-13	20	3/4-16	9.500	132	Steel
B-122	5.00	4.97	7.75	15.50	4 1/4-8	1/2-13	24	7/8-14	12.684	248	Steel
B-123	7.00	6.97	10.55	20.50	6.0-8	5/8-18	28	1.00-12	16.500	610	Steel

Note: Stainless Steel & Metric Bases are also available.

Options

Standardized Output

The output of INTERFACE load cells stated in the catalog is the nominal output. In reality, the load cells come from production with a tolerance band of approximately ±10% (example: 4mV/V could be 3.6 to 4.4 mV/V). In multiple load cell applications such as batch systems and electronic truck scales, it is desirable for a customer to receive cells with a tighter band spread. With this option, outputs are standardized within ±0.1% of the nominal outputs shown in the catalog. (Example: 4 mV/V would be 3.996 mV/V to 4.004 mV/V).

As a result of the trimming operation, the input resistance of the load cell may be increased. A maximum input resistance on a 350 Ohm bridge would not exceed 385 ohms. Compression cells are standardized in compression and universal cells are usually standardized in tension, although they can be standardized in compression on request. An INTERFACE base is required on Low Profile units with standardized outputs.

Shunt Calibration

A precision fixed resistor (R_{CAL}) placed across one leg of a load cell bridge causes an electrical unbalance which may be considered equivalent to a particular value of mechanical load. This “equivalent mechanical input” may be used for setting and checking an instrument or a system calibration without the necessity of applying a known mechanical load.

An R_{CAL} value approximating 73% of full scale is recorded and supplied for each low profile load cell. The user may duplicate this output by placing a like value resistor across the indicated terminals of the load cell.

The approximate value of shunt resistor which will simulate a particular mechanical load may be calculated, knowing the approximate output corresponding to the load, as follows:

$$R_{CAL} = \frac{25\ R_B}{K \cdot X}$$

Where R_{CAL} = Shunt resistor in Kohms
R_B = Bridge resistance in ohms
K = Rated output of cell in mV/V
X = Load to be simulated, in % of Rated Capacity

Connector Options

Connector Protection for Low Profile Load Cells

The Connector Protection Option provides a rugged, anodized aluminum Protector for Low Profile load cells fitted with the INTERFACE standard PC04E-10-6P connector or other common connectors. This option can be included on new load cell or can be factory installed on existing INTERFACE load cells.

Recognizing that the majority of load cell repairs involve damaged connectors, Interface encourages the use of this option.

Contact the factory for additional information on the specific Protector Model for your load cell.

Connector Protector

PT02E-10-6P Bayonet Connector

This option provides a bayonet style connector in place of the PC04E-10-6P threaded type connector which is standard on most Interface Low Profile Load Cells. Other connectors are available on request as special options.

PC04E-10-6P
Standard Connector

MC-001
Mating Connector

Interconnecting Cables

Interconnecting cables are available for use with INTERFACE load cells. Cables include a load cell mating connector on one end and pigtailed leads on the other. Standard length is 10 ft, but any length is available, in increments of 5 ft

SYSTEM INTERCONNECT CABLE PART NUMBERS
CT-101-xx* tension upscale (emulates integral cable)
CC-101-xx* compression upscale (for use with Junction Box in multi-cell weighing systems).
*xx indicates length in feet

PT02E-10-6P
Optional Bayonet Connector

CN-207
Mating Connector

Mating Connectors

Load Cell Connector	Mating Connector	Interface P/N
PC04E-10-6P	PC06W-10-6S	MC-001
PT02E-10-6P	PT06A-10-6S (SR)	CN-207

Transducer Electronic Data Sheet (TEDS) SELF-ID Load Cell

- **Load cell with electronic identification inside**
- **Meets IEEE 1451.4 standard for smart transducer interface**
- **Available on new or existing load cells**
- **Plug and play**
- **Cuts instrument setup time**
- **Eliminates data entry error**
- **Sensor information and calibration data**

Actual size compared to standard load cell

Interface has offered sensors with various types of SELF-ID for many years. The SELF-ID features eliminates the need to enter data via a keyboard or key panel from a paper calibration sheet into the instrument used with the load cell. This feature offers the following benefits:

- Eliminates potential for data entry error
- Cuts time in half to set up instrument
- Makes swapping of load cells easy
- Increases safety by making certain that system has the correct capacity of the load cell
- Can be used to identify location of load cell
- No need to store calibration sheets, no more paper, no more concern about lost sheets
- Makes inventory control of your load cells easy
- Load cells can be changed out without jeopardizing integrity of system

Now TEDS provides additional advantages over proprietary SELF-ID because it is an industry standard (IEEE 1451.4) which has the potential to permit mix and matching of load cells and instruments from different manufacturers.

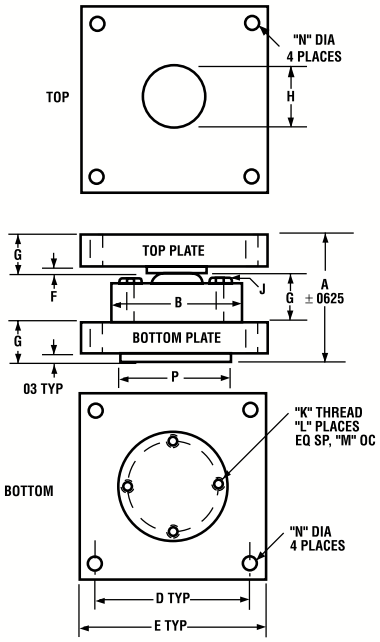
IEEE1451.4 specifies a table of identifying parameters that are stored in the load cell in the form of a TEDS (Transducer Electronic Data Sheet). TEDS is a table of parameters that identify the transducer and is held in the transducer on a EEprom for interrogation by external electronics.

Accessories

Mounting Plates for Low Profile™ Load Cells

The installation of a compression load cell under a weigh bridge, tank, or other structure normally requires that mounting plates be used. The bottom plate, ground flat to 0.0002 T.I.R. to mate with the load cell and fabricated of mild steel, distributes the load over the foundation or supporting structure and provides a prepared surface for the load cell.

The top plate distributes the load to the weighing structure and provides a hard (R_c45) surface for the load button. The top plate will move on the button due to thermal expansion, load shifting, wind loading, and other side loads. The high side load capacity of the INTERFACE load cell eliminates the requirement for expansion assemblies in most installations. Mounting plates are suitable for compression loads only; they will not properly support a universal load cell used in tension.



P/N	L/C RANGE	A	B	C	D	E	F	G	H	J	K	L	M	N	P
TP-101, BP-101	1K, 2K	3.62	4.12	1.37	5.0	6	.25	1.12	2.00	1/4-20 X 1-1/2	1/4-20	8	3.50	.56	3.00
TP-101, BP-108	5K, 10K	3.62	4.12	1.37	5.0	6	.25	1.12	2.00	1/4-20 X 1-1/2	1/4-20	8	3.50	.56	3.00
TP-102, BP-102	25K, 50K	4.25	4.75	4.75	5.5	7	.25	1.25	2.25	5/16-18 X 2	5/16-18	4	4.00	.69	3.50
TP-103, BP-103	100K	5.25	7.50	2.25	6.5	8	.25	1.50	2.75	7/16-20 X 2 -1/2	7/16-20	12	6.25	.69	4.00
TP-104, BP-104	200K	8.25	8.25	3.25	8.0	10	.37	2.50	4.00	5/8-11 X 3 3/4	5/8-11	12	6.75	.69	8.25
*TP-301, BP-308	5K, 10K	3.49	4.12	1.37	5.0	6	.12	1.12	1.9	1/4-20 X 1-1/2	1/4-20	8	3.50	.56	3.00
*TP-302, BP-302	25K, 50K	4.25	4.75	1.75	5.5	7	.25	1.25	1.9	5/16-18 X 2	5/16-18	4	4.00	.69	3.50
*TP-303, BP-303	100K	5.25	7.50	2.25	6.5	8	.25	1.50	1.9	7/16-20 X 2-1/2	7/16-20	12	6.25	.69	4.0

*STAINLESS STEEL

Add dash number after the basic part number of bottom plate to specify exact configuration of the plate and type of mounting screws supplied in the kit.

DASH #	DESCRIPTION	PAD	USAGE
-3	Single threaded stud in center	No	Load cell with base installed
-11	Tapped holes and hex head cap screws	Yes	Uncounterbored load cell
-12	Tapped holes and socket head cap screws	Yes	Counterbored load cell
-21	Tapped holes and hex head cap screws	No	Uncounterbored load cell
-22	Tapped holes and socket head cap screws	No	Counterbored load cell

Load Buttons

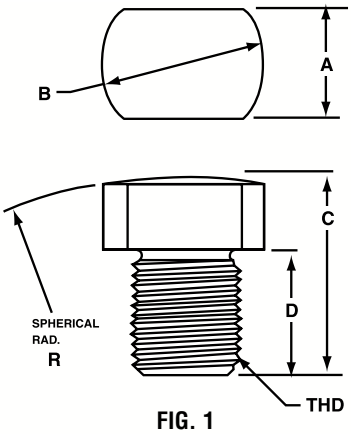


FIG. 1

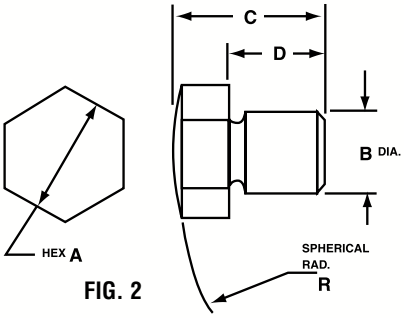


FIG. 2

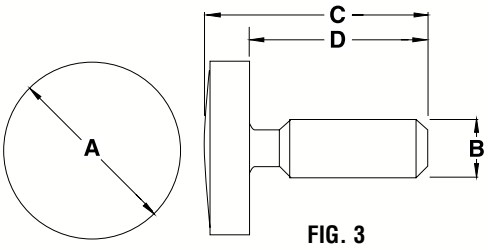
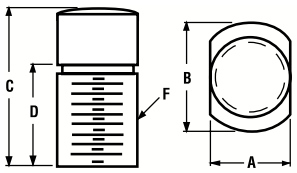


FIG. 3

LOAD BUTTONS									
MODEL	MATERIAL	THD/DIA	APPLICATION	DIMENSIONS IN INCHES					
				A	B	C	D	R	FIG
LB-106	H.T. STEEL	1/4-28	SM-10 THRU 250, SSM-50 THRU 250	7/16	1/2	5/8	1/2	2	1
LB-109	H.T. STEEL	1/2-20	SM-500, 1000 SSM-500 THRU 3000	15/16	1 1/16	1 5/16	1	4	1
LB-110	H.T. STEEL	5/8-18	SSM-5000	15/16	1 1/16	1 5/16	1	4	1
LB-101	H.T. STEEL	5/8-18	1110 & 1210-300 THRU 10K	15/16	1 1/16	1 9/32	1	4	1
LB-102	H.T. STEEL	1 1/4-12	1120 & 1220-25K, 50K	1 1/2	1 3/4	1 9/16	11/16	6	1
LB-103	H.T. STEEL	1 3/4-12	1132 & 1232-100K	2 1/8	2 1/2	3 3/4	2 1/8	12	1
LB-104	H.T. STEEL	2 3/4-8	1140 & 1240-200K	3 1/2	4	5	3 1/8	12	1
LB-111	H.T. STEEL	.395	SSB-500, 1000	3/4	.395	3/4	1/2	4	2
LB-114	H.T. STEEL	0.169	MB-All, SSB-50 thru 250	0.50	0.169	0.63	0.50	2	3
METRIC SIZES									
LB-101M	H.T. STEEL	M16x2	1110 & 1210-5kN TO 50kN	15/16	1 1/16	1 9/32	1	4	1
LB-102M	H.T. STEEL	M33x2	1120 & 1220-100kN, 250kN	1 1/2	1 3/4	1 9/16	11/16	6	1
LB-103M	H.T. STEEL	M42x2	1132 & 1232-450kN	2 1/8	2 1/2	3 3/4	2 1/8	12	1
LB-104M	H.T. STEEL	M72x2	1140 & 1240-900kN	3 1/2	4	5	3 1/8	12	1

A load button may be installed in an INTERFACE universal load cell if it is used as a compression cell with the load applied by a plate or other flat surface.

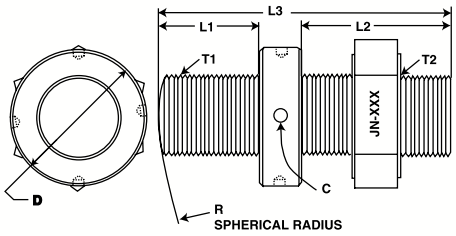
For compression applications only, an INTERFACE compression load cell should usually be specified. Compression load cells are usually smaller, less expensive and have an integral load button.



P/N	A	B	C	D	F
LB-101 (M)	0.94	1.06	1.25	1.00	5/8-18 UNF-3A (M16x2)
LB-102 (M)	1.25	1.75	1.56	0.69	1 1/4-12 UNF-3A (M32x2)
LB-103 (M)	1.75	2.50	3.75	2.12	1 3/4-12 UNF-3A (M42x2)
LB-104 (M)	2.75	4.00	5.00	3.12	2 3/4-8 UNF-3A (M72x2)

(M) suffix for metric threads

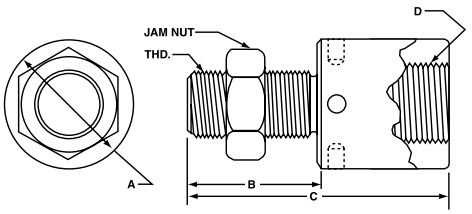
Calibration Adaptors



CALIBRATION ADAPTORS									
MODEL	JAM NUT INCLUDED	SIZE T1 TO T2	APPLICATION	DIMENSIONS IN INCHES					
				C	D	L1	L2	L3	R
CA-101	JN-103	5/8-18 to 5/8-18	1X10 to 10K	1/4	1 1/4	3/4	1 9/16	2 13/16	6
CA-102	JN-105	1 1/4-12 to 1 1/4-12	1X20 to 50K	1/4	2	1 1/2	2 3/16	4 3/16	6
CA-103	JN-106	1 3/4-12 to 1 3/4-12	1X32 to 100K	1/4	3	2	3 1/8	6	12
CA-105	JN-106	1 3/4-12 to 2 3/4-8	1X32 to 100K	1/4	3 1/2	2	4 7/8	7 3/8	12
CA-104	JN-107	2 3/4-8 to 2 3/4-8	1X40 to 200K	5/16	3 1/2	2 1/2	4 7/8	8 1/8	12
METRICS									
CA-201	JN-203	M16X2 to M16X2	1X10 to 50KN	1/4	1 1/4	3/4	1 9/16	2 13/16	6
CA-202	JN-205	M33X2 to M33X2	1X20 to 250KN	1/4	2	1 1/2	2 3/16	4 3/16	6
CA-203	JN-206	M42X2 to M42X2	1X32 to 450KN	5/16	2 15/16	1 13/16	3 3/16	5 3/4	12
CA-204	JN-207	M72X2 to M72X2	1X40 to 900KN	5/16	4 1/4	2 3/4	4 3/4	8 1/4	12

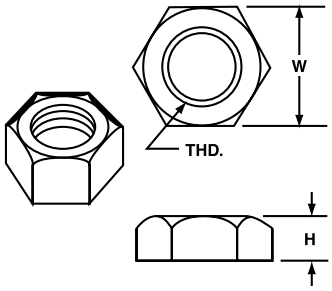
Material: Heat treated steel.
Note: X refers to Low Profile Load Cell model numbers. For example, 1X10 could be 1010, 1110, or 1210.

Thread Adaptors



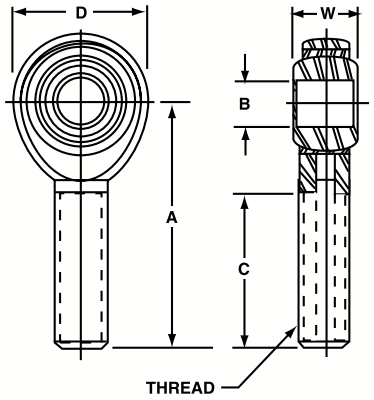
THREAD ADAPTORS							
MODEL	JAM NUT INCLUDED	SIZE MALE to FEMALE	APPLICATION	DIMENSIONS IN INCHES			
				A	B	C	D
TA-102	N/A	1/4-28 to 1/2-20	SM & SSM TO 250	0.75	0.38	1.50	1/2-20x.63
TA-103	N/A	1/4-28 to 3/8-24	SM & SSM TO 250	0.75	0.38	1.50	3/8-24x.50
TA-106	N/A	1/4-28 to 5/8-18	SM & SSM TO 250	1.19	0.44	1.56	5/8-18x.63
THD-101	JN-103	5/8-18 to 1/2-20	LOW PROFILES TO 10K	1.25	1.75	3.19	1/2-20x.50
THD-112	JN-103	5/8-18 to 1-14	LOW PROFILES TO 10K	1.62	1.75	4.56	1-14x1.25
THD-153	JN-105	1 1/4-12 to 1-14	LOW PROFILES 25K TO 50K	2.00	2.50	4.50	1-14x1.0
THD-103	JN-105	1 1/4-12 to 1 1/2-12	LOW PROFILES 25K TO 50K	2.50	2.34	4.42	1 1/2-12x1.40
THD-163	N/A	1 1/4-12 to 1 1/2-12	LOW PROFILES 25K TO 50K	2.50	1.50	3.58	1 1/2-12x1.40
THD-143	JN-105	1 1/4-12 to 2-12	LOW PROFILES 25K TO 50K	3.38	2.34	5.89	2-12x2.62
THD-144	N/A	1 1/4-12 to 2-12	LOW PROFILES 25K TO 50K	3.38	1.50	5.05	2-12x2.62
THD-114	JN-106	1 3/4-12 to 3-8	LOW PROFILES TO 100K	4.00	3.75	9.62	3-8x4.50
THD-115	N/A	1 3/4-12 to 3-8	LOW PROFILES TO 100K	4.00	1.75	7.62	3-8x4.50
THD-105	JN-107	2 3/4-8 to 4-8	LOW PROFILES TO 200K	5.50	5.25	13.0	4-8x6.00
THD-106	N/A	2 3/4-8 to 4-8	LOW PROFILES TO 200K	5.50	2.75	10.5	4-8x6.00

Jam Nuts



JAM NUTS (Heat treated Steel Grade 8)			
MODEL	THD	DIMENSIONS IN INCHES	
		H	W
JN-101	1/4-28	5/32	7/16
JN-102	1/2-20	5/16	3/4
JN-103	5/8-18	3/8	15/16
JN-104	3/4-16	27/64	1 1/8
JN-105	1 1/4-12	23/32	1 7/8
JN-106	1 3/4-12	1	2 3/4
JN-107	2 3/4-8	1 1/2	4 1/4
DIMENSIONS IN MILLIMETERS			
JN-201	M6X1	3	10
JN-202	M12X1.75	6	19
JN-203	M16X2	8	24
JN-204	M27x2	14	48
JN-205	M33X2	16	48
JN-206	M42X2	20	70
JN-207	M72X2	35	110

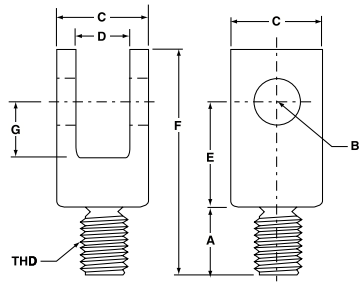
Rod End Bearings



ROD END BEARINGS								
MODEL	THD	APPLICATION	JAM NUT INCLUDED	DIMENSIONS IN INCHES				
				B	W	C	D	A
REB-104	1/4-28	SM-10 THRU 250, SSM-5O THRU 250	JN-101	1/4	3/8	1	3/4	1 9/16
REB-106	1/2-20	SM-500, 1000, SSM-500, 1000 SSM-2000,& 3000	JN-102	1/2	5/8	1 1/2	1 5/16	2 7/16
REB-101	5/8-18	1110 & 1210-300 THRU 10K, SSM-5K	JN-103	5/8	3/4	1 5/8	1 1/2	2 5/8
REB-102	1 1/4-12	1120 & 1220-25K, 50K	*	1	1 3/8	2 11/32	2 3/4	4 1/8

NOTE: When connecting a ROD END BEARING directly to a LOAD CELL, use of the JAM NUT is recommended.
*The JAM NUT for REB-102 is sold separately. See JN-105.

Clevises



CLEVISES										
MODEL	MATERIAL	THD	APPLICATION	DIMENSIONS IN INCHES						
				A	B	C	D	E	F	G
CLV-104	ALUMINUM	1/4-28	SM-10 THRU 250 SSM-50 THRU 250	5/16	.251 ±.001	3/4	377 ±.001	3/4	1 7/16	7/16
CLV-105	ALUMINUM	1/2-20	SM-500,1000 SSM-500 THRU 1000	1/2	.501 ±.001	1 1/2	.627 ±.001	1 1/2	2 3/4	3/4
CLV-106	H.T. STEEL	1/2-20	SSM-2000,3000	9/16	.501 ±.001	1	.627 ±.001	1 1/2	2 7/16	3/4
CLV-101	H.T. STEEL	5/8-18	1110 & 1210-300 THRU 10K,SSM-5K	7/8	.626 ±.001	1 1/4	.752 ±.002	1 1/2	3 1/8	7/8
CLV-102	H.T. STEEL	1 1/4-12	1120 & 1220-25K, 50K	1 3/8	1.001 ±.001	2 1/2	1.380 ±.002	2 7/8	5 3/4	1 5/8

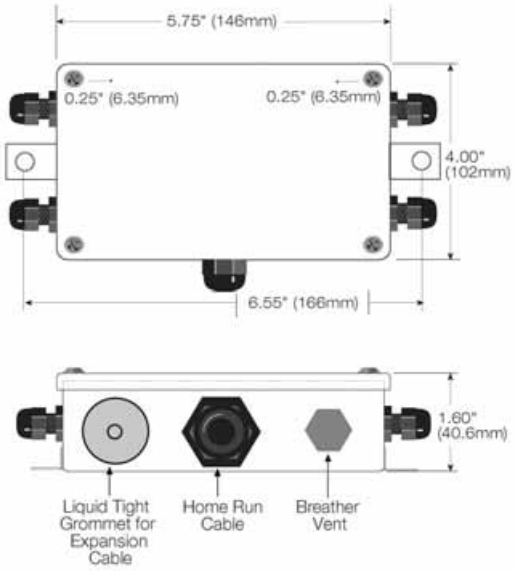
Junction Boxes

In its most basic form a junction box provides a convenient method for wiring multiple load cells to a single indicator. Junction boxes are commonly used in weighing applications where a tank or scale is supported by more than one load cell. The individual load cell cables are wired into the junction box and then a single cable connects the junction box to the instrumentation. Interface offers 4 different models of junction box in two different size enclosures.

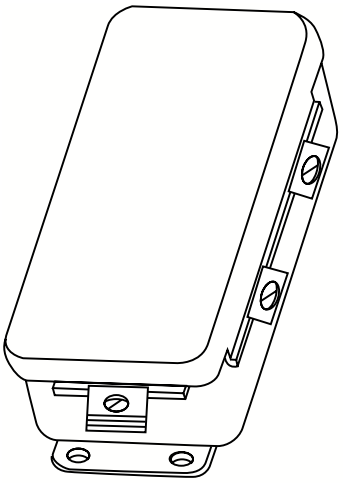
The JB102, JB103 and JB103SS are large 8x10x4 inch boxes providing plenty of working room and the ability to coil excess cable inside the box. These boxes can accommodate up to 8 load cells. The JB102 is the most basic configuration using solder connections and a NEMA 12 rating. The JB103 is NEMA 4 rated and adds screw terminals and trim pots for corner adjustment. The JB103SS is a stainless steel version of the JB103.

The JB104SS is a small 4x6.5x1.75 inch stainless steel NEMA 4 rated box suitable for installations where space is limited. Standard configuration is for up to 4 load cells and provides three trim ranges; no trim, 10% and 30%. Spring clips are used for the load cell connections.

DIMENSIONS



JB104SS

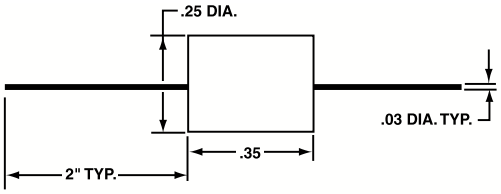


JB102& JB103

JUNCTION BOXES			
Number Of Load Cells	**Painted Steel NEMA 12 Rating (No Trim Pots)**	**Painted Steel NEMA 4 Rating (with Trim Pots, 20 Ohms)**	**Stainless Steel NEMA 4 Rating (with Trim Pots, 20 Ohms)**
2	JB102-2	JB103-2	JB103SS-2
3	JB102-3	JB103-3	JB103SS-3
4	JB102-4	JB103-4	JB103SS-4
5	JB102-5	JB103-5	JB103SS-5
6	JB102-6	JB103-6	JB103SS-6
7	JB102-7	JB103-7	JB103SS-7
8	JB102-8	JB103-8	JB103SS-8

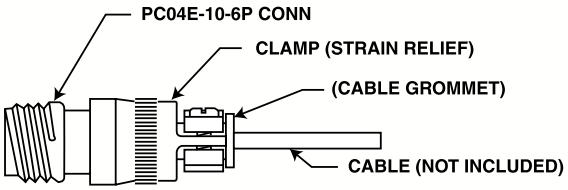
Note: Interface summing junction boxes are designed to sum the output of two to eight load cells. Enclosures are heavy duty steel 8 x 10 x 4 inches. Weather-tight feed-through fittings are sized for Interface 0.25 inch diameter cable.

RCAL Resistors



RCAL RESISTORS		
MODEL	**RESISTANCE (Kohm)**	**APPLICATION**
RS-100-30K	30 ±0.01%	4mV/V Load Cells
RS-100-40K	40 ±0.01%	3mV/V Load Cells
RS-100-60K	60 ±0.01%	2mV/V Load Cells
RS-100-120K	120 ±0.01%	1mV/V Load Cells

Mating Connector Assemblies



CN-204

Mating Connector

TRANSDUCER		MATING CONNECTOR	
Model	**Receptacle Type**	**Plug Type**	**Order Number**
1000, 1100, 1200 Standard	PC04E-10-6P	PC06W-10-6S	MC-001
1000, 1100, 1200 Bayonet	PT02E-10-6P	PT06A-10-6S (SR)	CN-207
1216	PT02E-12-8P	PT06A-12-8S (SR)	MC-002
1500	PT02E-10-6P	PT06A-10-6S (SR)	CN-207
1600, 1800	PT02E-12-8P	PT06A-12-8S (SR)	MC-002
2420, 2430	PTW1H-10-6P	PT06A-10-6S (SR)	CN-207
2440, 2450	MS3102E-14S-6P	MS3106A-14S-6S	CN-208
2160, 2161	MS3102A-14S-5P	MS3106A-14S-5S	CN-214
5200	PC04E-10-6P	PC06W-10-6S	MC-001
WMC-20K, 30K, 50K	PT02E-10-6P	PT06A-10-6S (SR)	CN-207
SSM	PC04E-10-6P	PC06W-10-6S	MC-001

Transducer Interconnect Cable Assemblies

For connecting transducers with receptacles to instrumentation

INTERCONNECT CABLE ASSEMBLY

		INSTRUMENT END				
TRANSDUCER	TRANSDUCER END	UNIVERSAL	9820,9300, SGA, DCA, DMA	9830, 9840	9850	9320
Model	Plug Type	Pigtail	Screw Term	DE-9P	DE-9P	Binder
1000, 1100, 1200 Standard	PC06A-10-6S(SR)	CT-101-10	CT-101-10	CT-173-10	CT-516-10	CT-236-10
1000, 1100, 1200 Bayonet	PT06A-10-6S(SR)	CT-152-10	CT-152-10	CT-175-10	CT-249-10	CT-239-10
1216	PT06A-12-8S(SR)	CT-222-10	CT-222-10	CT-246-10	*	*
1500	PT06A-10-6S(SR)	CT-152-10	CT-152-10	CT-175-10	CT-249-10	CT-239-10
1600, 1800	PT06A-12-8S(SR)	CT-153-10	CT-153-10	CT-177-10	*	CT-237-10
2420, 2430	PT06A-10-6S(SR)	CT-179-10	CT-179-10	CT-254-10	CT-251-10	CT-253-10
2440, 2450	MS3106A-14S-6S	CT-204-10	CT-204-10	CT-260-10	*	CT-252-10
2160, 2161	MS3106A-14S-5S	CT-259-10	CT-259-10	CT-191-10	*	CT-255-10
5200	PC06A-10-6S(SR)	CT-101-10	CT-101-10	CT-173-10	*	CT-236-10
WMC-20K, 30K, 50K	PC06A-10-6S(SR)	CT-179-10	CT-179-10	CT-254-10	*	CT-253-10
SSM	PC06A-10-6S(SR)	CT-101-10	CT-101-10	CT-173-10	*	CT-236-10

CABLE SPECIFICATION FOR ABOVE ASSEMBLIES

NOTE: "CT" prefix on cable assembly order numbers is for the most common polarity which is tension upscale. For compression upscale substitue "CC".
"-10" suffix on cable assembly part number is the most common cable length of 10 ft Other lengths may be ordered by substituting the desired length in feet.

EXAMPLE: For a 20 ft cable to connect to a model 1221HL-50K transducer and have the convention of the green pigtail as + signal for a compression load, order CC-101-20.

*Call factory for more information.

INSTRUMENT CONNECTION SELECTION GUIDE

INSTRUMENT		EXTRA MATING PLUG		Order number for extra plug plus installation on end of tranducer integral cable	
Model	Receptacle	Type	Order Number	Tension Upscale	Compression Upscale
9320	Binder	Binder	CN-219	MIC-9320-T	MIC-9320-C
9830	DE-9S	DE-9P	CN-212	MIC-9830-T	MIC-9830-C
9840	DE-9S	DE-9P	CN-212	MIC-9840-T	MIC-9840-C
9850	DE-9S	DE-9P	CN-212	MIC-9850-T	MIC-9850-C
500	DE-9S	DE-9P	CN-212	MIC-500-T	MIC-500-C

Instruments not listed use screw terminal connections.

Electrical Information

Load Cell Series	Cell Type	Upscale (4) Mode	Integral Cable Wiring	Std. Cable Type	Cable Length, Feet (5)	Connector Wiring	Mating Connector (2)
1000	Univ.	Tension	Fig. W1	A	10	Fig. C1	PC06W-10-6S(SR)
1100	Univ.	Tension	Fig. W1	A	10	Fig. C1	PC06W-10-6S(SR)
1100	Comp.	Tension	Fig. W1	A	10	Fig. C1	PC06W-10-6S(SR)
1200	Univ.	Tension	Fig. W1	A	10	Fig. C1	PC06W-10-6S(SR)
1200	Comp.	Tension	Fig. W1	A	10	Fig. C1	PC06W-10-6S(SR)
1500	Univ.	Tension	—	—	—	Fig. C1	PT06W-10-6S(SR)
1600	Univ.	Tension	—	—	—	Fig. C2	PT06W-12-8S(SR)
1600	Comp.	Tension	—	—	—	Fig. C2	PT06W-12-8S(SR)
1800	Univ.	Tension	—	—	—	Fig. C2	PT06W-12-8S(SR)
3200	Univ.	Tension	Fig. W2	B	20	—	—
3200	Comp.	Tension	Fig. W2	B	20	—	—
4200	Comp.	Tension	Fig. W2	B	20	—	—
4600	Comp.	Tension	Fig. W2	B	20	—	—
5200	Univ.	Tension (1)	Fig. W1	A	10	Fig. C1	PC06W-10-6S(SR)
SSB	Comp.	Comp.	Fig. W2	C	5	—	—
MB, MBP	Comp.	Comp.	Fig. W2	C	5	—	—
SM	Univ.	Tension	Fig. W2	C	5	—	—
SSM	Univ.	Tension	Fig. W2	A	10	Fig. C1	PC06W-10-6S(SR)
SMT	Univ.	Tension	Fig. W2	D	5	—	—
SPI	Univ.	Comp.	Fig. W2	C	5	—	—
SML	Univ.	Tension	Fig. W2	D	5	—	—
LBM	Comp.	—	Fig. W2	G	5	—	—
LBS	Comp.	—	Fig. W2	G	5	—	—
LoadCheck	Comp.	Tension	Fig. W1	A	10	—	—
LoadTrol	Comp.	Comp.	—	Note (3)	Note (3)	Note (3)	Note (3)
LW	Comp.	Comp.	Fig. W2	—	5	—	—
WeighCheck	Comp.	Tension	Fig. W2	B	30	—	—
WMC	Univ.	Tension	Fig. W3	G	—	—	—
2410-2430	Univ.	Tension	—	—	—	Fig. C3	PT06W-10-6S(SR)
2440-2450	Univ.	Tension	—	—	—	Fig. C3	MS3106A-145-6S
2100	Univ.	Tension	—	—	—	Fig. C4	MS3106A-145-5S
2100	Comp.	Tension	—	—	—	Fig. C4	MS3106A-145-5S
MRT	Torque	CW	W2	D	5	—	—
ULC	Univ.	Tension	W2	D	5	—	—
MCC	Comp.	Comp.	W2	E	5	—	—
CX	—	—	—	—	—	Fig. C5	PT06W-12-8S(SR)

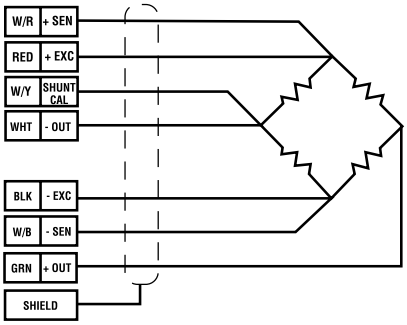
Notes: (1) Thrust axis only.
(2) Mating connector for the stock version of cell. Consult factory for alternate connectors and specials.
(3) Consult factory. Several connectors and mating cable types are available.
(4) Indicates the loading direction which causes a positive output.
(5) Stock length; other lengths available on special order.

LOAD CELL INTEGRAL CABLES

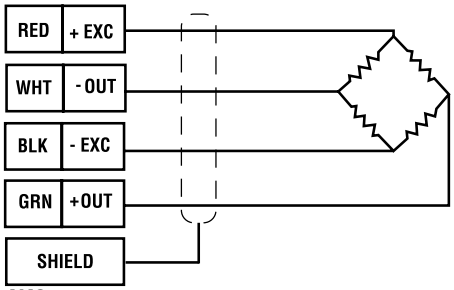
Cable Type	Wire Size	No. of Wires	Shield	Description
A	22 AWG	7	Braid	Heavy-duty, PVC jacket
B	22 AWG	4	Braid	Heavy-duty, polyurethane jacket
C	28 AWG	4	Braid	Tough, clear PVC jacket
D	28 AWG	4	Spiral	Ultra-flexible, black PVC jacket
E	30 AWG	4	Braid	Ultra-flexible, gray PVC jacket
F	20 AWG	4	Braid	Teflon jacket
G	30 AWG	4	Braid	Teflon jacket

Wiring Diagrams

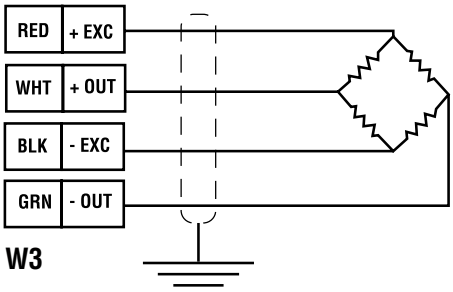
LOAD CELL CABLE WIRING



W1

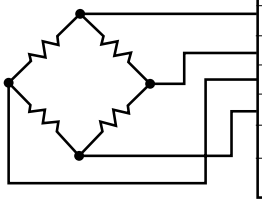


W2



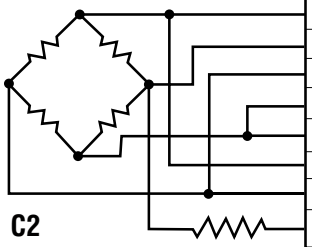
W3

LOAD CELL CONNECTOR WIRING



PIN	FUNCTION
A	+ EXCITATION
B	+ OUTPUT
C	- OUTPUT
D	- EXCITATION
E	NO CONNECTION
F	NO CONNECTION

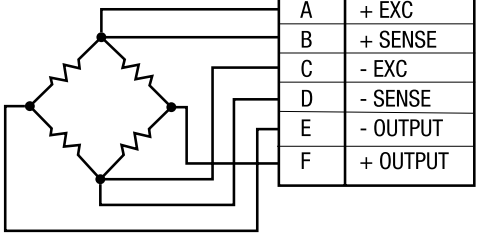
C1



PIN	FUNCTION
A	+ EXCITATION
B	+ OUTPUT
C	- OUTPUT
D	- EXCITATION
E	- SENSE
F	+ SENSE
G	- SHUNTCAL
H	IDENT R

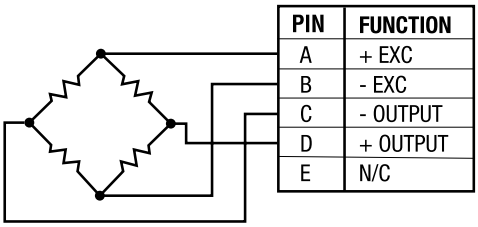
C2

IDENT RESISTOR



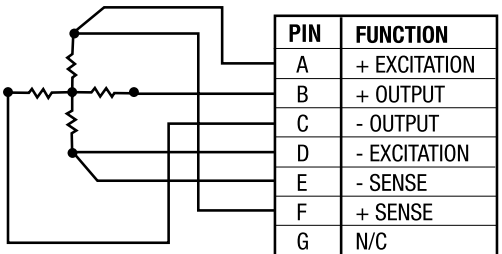
PIN	FUNCTION
A	+ EXC
B	+ SENSE
C	- EXC
D	- SENSE
E	- OUTPUT
F	+ OUTPUT

C3



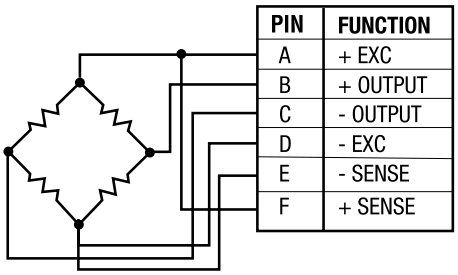
PIN	FUNCTION
A	+ EXC
B	- EXC
C	- OUTPUT
D	+ OUTPUT
E	N/C

C4



PIN	FUNCTION
A	+ EXCITATION
B	+ OUTPUT
C	- OUTPUT
D	- EXCITATION
E	- SENSE
F	+ SENSE
G	N/C
H	N/C

C5



PIN	FUNCTION
A	+ EXC
B	+ OUTPUT
C	- OUTPUT
D	- EXC
E	- SENSE
F	+ SENSE

C6

Load Cell Terms & Definitions

This document defines the terminology and performance parameters pertaining to engineering specifications of load cell products. The objective of this terminology standard is to promote effective communication of specifications and to constitute a reference for uniformity. The definitions herein are generally compatible with common understanding in the load cell community and are an expansion of those found in "Load Cell Terminology and Test Procedure Recommendations," Third Edition, 1985, Scale Manufacturers Association, and in OIML International Recommendation R60, 1991 Edition. This document includes modifications to the definitions in the above referenced standards to correct some of their inconsistencies and inadequacies.

For convenience, terms which are defined in this standard are printed in upper case when used in the definition of another term.

AMBIENT TEMPERATURE

The temperature of the medium surrounding the LOAD CELL.

AXIAL LOAD

A load applied along the PRIMARY AXIS.

BAROMETRIC SENSITIVITY

The change in ZERO BALANCE due to a change in ambient barometric pressure. Normally expressed in units of %RO/atm.

CALIBRATION

The comparison of LOAD CELL OUTPUT against standard test loads.

CAPACITY

The maximum AXIAL LOAD a LOAD CELL is designed to measure within its specifications.

COMBINED ERROR

The maximum deviation of the CALIBRATION curve from the straight line drawn between MINIMUM LOAD OUTPUT and MAXIMUM LOAD OUTPUT, normally expressed in units of %FS. Both ascending and descending curves are considered.

CREEP

The change in LOAD CELL SIGNAL occurring with time while under load and with all environmental conditions and other variables remaining constant. Normally expressed in units of % of applied load over a specified time interval. It is common for characterization to be measured with a constant load at or near CAPACITY.

CREEP RECOVERY

The change in LOAD CELL SIGNAL occurring with time immediately after removal of a load which had been applied for a specified time interval, environmental conditions and other variables remaining constant during the loaded and unloaded intervals. Normally expressed in units of % of applied load over a specified time interval. Normally the applied interval and the recovery interval are equal. It is common for characterization to be measured with a constant load at or near CAPACITY.

CREEP RETURN

The difference between LOAD CELL SIGNAL immediately after removal of a load which had been applied for a specified time interval, environmental conditions and other variables remaining constant during the loaded interval, and the SIGNAL before application of the load. Normally expressed in units of % of applied load over a specified time interval. It is common for characterization to be measured with a constant load at or near CAPACITY.

DEFLECTION ☑

The displacement of the point of AXIAL LOAD application in the PRIMARY AXIS between the MDL and MDL+CAPACITY load conditions.

ECCENTRIC LOAD

Any load applied parallel to but not concentric with the PRIMARY AXIS.

FULL SCALE or FS

The OUTPUT corresponding to MAXIMUM LOAD in any specific test or application.

HYSTERESIS

The algebraic difference between OUTPUT at a given load descending from MAXIMUM LOAD and OUTPUT at the same load ascending from MINIMUM LOAD. Normally expressed in units of %FS. It is common for characterization to be measured at 40-60% FS.

☑ See APPENDIX articles for more detailed information

INPUT RESISTANCE
The resistance of the LOAD CELL circuit measured at the excitation terminals with no load applied and with the output terminals open-circuited.

INSULATION RESISTANCE
The DC resistance measured between the bridge circuit and the case. Normally measured at 50 VDC.

LOAD CELL
A device which produces an OUTPUT proportional to an applied force load.

MAXIMUM AXIAL LOAD, SAFE
The maximum AXIAL LOAD which can be applied without producing a permanent shift in performance characteristics beyond those specified. Normally expressed in units of % CAPACITY.

MAXIMUM LOAD
The highest load in a specific test or application, which may be any load up to and including CAPACITY + MINIMUM LOAD, but may not exceed CAPACITY significantly.

MAXIMUM AXIAL LOAD, ULTIMATE
The maximum AXIAL LOAD which can be applied without producing a structural failure. Normally expressed in units of % CAPACITY.

MAXIMUM LOAD AXIS MOMENT, SAFE
The maximum moment with respect to the PRIMARY AXIS which can be applied without producing a permanent shift in performance characteristics beyond those specified.

MAXIMUM MOUNTING TORQUE, SAFE
The maximum torque which can be applied concentric with the primary axis without producing a permanent shift in performance characteristics beyond those specified.

MAXIMUM SIDE LOAD, SAFE
The maximum SIDE LOAD which can be applied without producing a permanent shift in performance characteristics beyond those specified.

MEASURING RANGE
The difference between MAXIMUM LOAD and MINIMUM LOAD in a specific test or application. It may not exceed CAPACITY.

MINIMUM DEAD LOAD or MDL
The smallest load for which specified performance will be met. It is normally equal to or near NO LOAD in single mode applications and is of necessity equal to NO LOAD in double mode applications.

MINIMUM LOAD
The lowest load in a specific test or application, differing from NO LOAD by the weight of fixtures and load receptors which are attached plus any intentional pre-load which is applied.

MODE
The direction of load. Tension and Compression are each one mode.

NATURAL FREQUENCY ☑
The frequency of free oscillations under conditions of NO LOAD.

NO LOAD
The condition of the LOAD CELL when in its normal physical orientation, with no force input applied, and with no fixtures or load receptors attached.

NONLINEARITY
The algebraic difference between OUTPUT at a specific load and the corresponding point on the straight line drawn between MINIMUM LOAD and MAXIMUM LOAD. Normally expressed in units of %FS. It is common for characterization to be measured at 40-60 %FS.

NONREPEATABILITY
The maximum difference between OUTPUT readings for repeated loadings under identical loading and environmental conditions. Normally expressed in units of %RO.

OUTPUT
The algebraic difference between the SIGNAL at applied load and the SIGNAL at MINIMUM LOAD.

OUTPUT RESISTANCE
The resistance of the LOAD CELL circuit measured at the SIGNAL terminals with no load applied and with the excitation terminals open-circuited.

PRIMARY AXIS
The axis along which the LOAD CELL is designed to be loaded.

☑ See APPENDIX articles for more detailed information

Load Cell Terms & Definitions, continued

RATED OUTPUT or RO

The OUTPUT corresponding to CAPACITY, equal to the algebraic difference between the SIGNAL at (MINIMUM LOAD + CAPACITY) and the SIGNAL at MINIMUM LOAD.

RESOLUTION ☑

The smallest change in load which produces a detectable change in the SIGNAL.

SHUNT CALIBRATION ☑

Electrical simulation of OUTPUT by connection of shunt resistors of known values at appropriate points in the circuitry.

SIDE LOAD

Any load at the point of AXIAL LOAD application acting at 90° to the PRIMARY AXIS.

SIGNAL

The absolute level of the measurable quantity into which a force input is converted.

SPAN

Another name for RATED OUTPUT.

STATIC ERROR BAND or SEB

The band of maximum deviations of the ascending and descending calibration points from a best fit line through zero OUTPUT. It includes the effects of NONLINEARITY, HYSTERESIS, and non-return to MINIMUM LOAD. Normally expressed in units of %FS.

SEB OUTPUT

A computed value for OUTPUT at CAPACITY derived from a line best fit to the actual ascending and descending calibration points and through zero OUTPUT.

SYMMETRY ERROR

The algebraic difference between the RATED OUTPUT in tension and the average of the absolute values of RATED OUTPUT in tension and RATED OUTPUT in compression. Normally expressed in units of %RO.

TEMPERATURE EFFECT ON OUTPUT

The change in OUTPUT due to a change in AMBIENT TEMPERATURE. Normally expressed as the slope of a chord spanning the COMPENSATED TEMPERATURE RANGE and in units of %/°F or %/100°F.

TEMPERATURE EFFECT ON ZERO

The change in ZERO BALANCE due to a change in AMBIENT TEMPERATURE. Normally expressed as the slope of a chord spanning the COMPENSATED TEMPERATURE RANGE and in units of %RO/°F or %RO/100°F.

TEMPERATURE RANGE, COMPENSATED ☑

The range of temperature over which the LOAD CELL is compensated to maintain OUTPUT and ZERO BALANCE within specified limits.

TEMPERATURE RANGE, OPERATING

The extremes of AMBIENT TEMPERATURE within which the LOAD CELL will operate without permanent adverse change to any of its performance characteristics.

TOGGLE

Another name for ZERO FLOAT.

ZERO BALANCE

The SIGNAL of the LOAD CELL in the NO LOAD condition.

ZERO DEAD BAND

Another name for ZERO FLOAT.

ZERO FLOAT

The shift in ZERO BALANCE resulting from a complete cycle of equal tension and compression loads. Normally expressed in units of %FS and usually characterized at FS = CAPACITY.

ZERO STABILITY

The degree to which ZERO BALANCE is maintained over a specified period of time with all environmental conditions, loading history, and other variables remaining constant.

☑ See APPENDIX articles for more detailed information

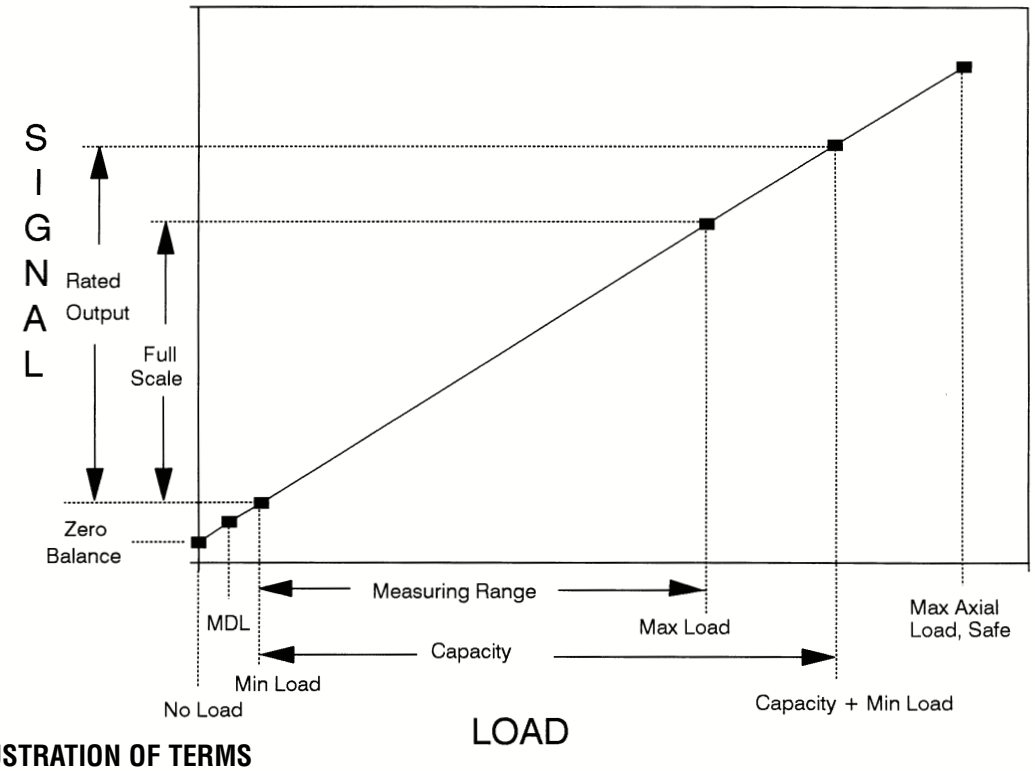


FIGURE 1. ILLUSTRATION OF TERMS

ABBREVIATIONS

(All abbreviations are case-specific, are not to be pluralized, and do not use trailing periods.)

ampere	A	kilogram	kg	newton	N
combined error	CE	kilogram force	kgf	newton-meter	Nm
degree Celsius	°C	kilonewton	kN	pound	lb
degree Fahrenheit	°F	kilopound (kip)	K	pound force	lbf
degree Kelvin	°K	kilopound force	Klbf	pound per square inch	psi
foot	ft	meganewton	MN	rated output	RO
foot-pound	ft-lb	meter	m	static error band	SEB
full scale	FS	milliampere	mA	ton, metric	t
gram	g	millimeter	mm	volt	V
hertz	Hz	millivolt	mV	volt direct current	VDC
inch	in	millivolt/volt	mV/V	volt alternating current	VAC
inch-pound	in-lb	minimum dead load	MDL	watt	W

Troubleshooting Guide for Interface Load Cells

1. INTRODUCTION

Performance of a load cell force (or weigh) measurement system is dependent upon the integrity of the physical installation, correct interconnection of the components, proper performance of the basic components which make up the system, and calibration of the system. Presuming that the installation was originally operating and was calibrated, troubleshooting can begin by checking the components individually to determine if they have been damaged or have failed. The basic components are:

- Load cells
- Mechanical supports and load connections
- Interconnecting cables
- Junction boxes
- Signal conditioning electronics

1.1 Mechanical Installation

Load Cells which are not mounted in accordance with the manufacturer's recommendations may not perform to manufacturer's specifications. It is always worthwhile to check:

- Mounting surfaces for cleanliness, flatness, and alignment
- Torque of all mounting hardware
- Load cell orientation: "Dead" end on mechanical reference or load forcing source, "live" end connected to the load to be measured. (Dead end is the end closest mechanically to the cable exit or connector.)
- Proper hardware (thread sizes, jam nuts, swivels, etc) as required to connect the load to the load cell.

A fundamental requirement is that there be one, and only one load path! This load path must be through the load axis of the load cell. This may sound elementary, however it is a commonly overlooked problem.

1.2 Electrical Installation:

Proper load cell performance is also dependent upon the electrical "system." The following items are common problem areas:

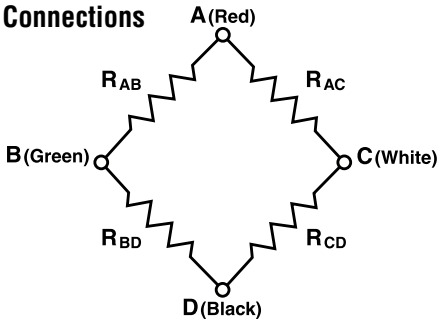
- Loose or dirty electrical connections, or incorrect connection of color coded wires.
- Failure to make use of remote sensing of excitation voltage on long cables.
- Incorrect setting of excitation voltage. (The best setting is 10 VDC, because that voltage is used to calibrate the load cell in the factory. The maximum voltage allowed is 15 or 20 volts, depending on the model. Some battery-operated signal conditioners use smaller voltages, down to 1.25 volts, to conserve battery power.)
- Loading of the bridge circuit. (Highly accurate load cell systems require highly accurate read-out instruments. Such instruments typically have very high input impedances to avoid circuit loading errors.)

2. LOAD CELL EVALUATIONS

It is quite easy to make a quick diagnostic check of a load cell. The procedure is quite simple and a minimum of equipment is required. Should it be determined that the load cell is at fault, the unit should be returned to the factory for further evaluation and repair as may be required. Many of the checks may be performed with an ohmmeter.

2.1 Check Bridge Circuitry and Zero Balance. (Numbers apply to standard 350 ohm bridges.)

Typical Connections



- Instrument required: Ohmmeter with 0.1 ohms resolution in the range of 250-400 ohms.
- Bridge Input Resistance: R_{AD} should be 350 ±3.5 ohms (unless the cell has "standardized output," in which case the resistance should be less than 390 ohms)
- Bridge Output Resistance: R_{BC} should be 350 ±3.5 ohms
- Bridge Leg Resistances: Comparing the leg resistances at no load permits evaluation of the cause of any permanent damage in the load cell flexure. The "computed unbalance" of the bridge shows the general condition of the cell.
- The computed unbalance, in units of "mV/V," is determined as follows:
  Unbalance = 1.4 • (R_{AC} - R_{AB} + R_{BD} - R_{CD})
- The Zero Offset, in units of "% of Rated Output", is determined as follows:
  Zero Offset = 100 • Unbalance ÷ Rated Output

If the ohmmeter resolution is 0.1 ohm or better, then a computed Zero Offset of greater than 20 percent is a clear indication of overload. A computed zero balance of 10-20% is an indication of probable overload.

If the load cell has been overloaded, mechanical damage has been done that is not repairable, because overloading results in permanent deformation within the flexural element and gages, destroying the carefully balanced processing that results in performance to Interface specifications. While it is possible to electrically re-zero a load cell following overload, it is not recommended because this does nothing to restore the affected performance parameters or the degradation to structural integrity.

If the degree of overload is not severe the cell may in some cases be used at the user's discretion, although some performance parameters may violate specifications and the cyclic life of the load cell may be reduced.

2.2 Insulation Resistance Tests

- Insulation resistance, shield to conductors: Connect all the conductors together, and measure the resistance between all those wires and the shield in the cable.
- Insulation resistance, load cell flexure to conductors: Connect all the conductors together, and measure the resistance between all those wires and the metal body of the load cell.

The tests described above can be performed using a standard ohm meter, although best results are obtained with a megohm meter. If resistance is beyond the standard ohmmeter range, about 10 megohms, the cell is probably OK. However, some kinds of electrical shorts show up only when using a megohm meter or with voltages higher than most ohmmeters can supply.

CAUTION

Never use a voltage higher than 50 VDC or 35 VRMS AC to measure insulation resistance, or breakdown of the insulation between the gages and the flexure may result.

Low resistance (below 5000 megohms) is often caused by moisture or pinched wires. The cause and extent of damage must be established at the factory to determine if the load cell may be salvaged.

3. FACTORY EVALUATION

If the load cell is defective for reasons other than overload, return to factory for detailed evaluation. Factory evaluation may show that the cell is repairable or non-repairable and if repair or replacement will be under warranty. If non-warranty, the customer will be contacted with the cost of repairs and recalibration, and a delivery date after receipt of authorization to proceed.

Load Cell Fatigue Theory

BACKGROUND

Interface has specialized in fatigue-rated load cells and their applications since its founding in 1968. Fatigue rating is a distinct specification which guarantees the customer a load cell which has a service life of 100 million fully reversed loading cycles at full rated capacity.

The very first products at Interface were fatigue-rated load cells, and over the years a history has been built up by thousands of cells in use all over the world. Many have been supplied to major manufacturers of materials test machines and to major aerospace manufacturers, for use in long term structural fatigue test programs on aircraft, space, and automotive equipment. **No fatigue failure of any fatigue-rated Interface load cell, used within its ratings, has ever been reported.**

FATIGUE FAILURE THEORY

It is well known that metals will fail in a statically loaded situation if the yield strength is exceeded. Inasmuch as load cells are structural members which are stressed in the course of their normal use, they are commonly given "ultimate overload" ratings in an effort to characterize the magnitude of static load they will withstand without failing structurally.

However, all metal structures, including load cells, are also subject to failure as a result of repetitive loadings which are much lower than the ultimate overload rating. This phenomenon is known as a fatigue failure, and it is due to the fact that the stress which a metal can withstand under cyclic loading usually becomes less and less as the number of cyclic loadings is increased.

The cause of this apparent anomaly can be explained by noting that metals are typically not perfectly homogeneous solids. They are composed of crystals, and at locations called grain boundaries, along slip planes or in a region of a microscopic defect there can be minute strains under load which do not completely reverse during unload, leaving the material with a slight plastic deformation at the end of each complete cycle. This effect is highly dependent on the magnitude of the load and the number of cycles.

ANATOMY OF A FATIGUE FAILURE

It is generally acknowledged that a structural fatigue failure develops in three stages:

1. Repeated cycling builds up local plastic deformation, and a microscopic crack is initiated.
2. The crack propagates and a larger section becomes weakened.
3. Stress concentration in the section of cracking increases rapidly, and continued cycling enlarges the crack until sudden fracture occurs.

FATIGUE LIFE PREDICTION

Accurate prediction of fatigue life of any structure is not a reality. Well controlled tests on the most simple configurations of test specimens result in a wide scatter band of results. With complex structures typical of a load cell, analysis is even more complex. Theoretical analysis can produce approximations, however, which can be useful in estimating the margin of safety at which a particular load cell design is operating.

In materials science, the S-N curve is a well known tool. It is a graphical representation of the number of load cycles required to break a specimen, at a range of peak cyclic stress levels. S-N curves for the high quality materials used in Interface load cells have been experimentally determined, and are shown in Figure 1 for stainless steel and alloy steel, and in Figure 2 for aluminum alloy.

Thus, if the stress level is known, the fatigue life can be approximately known. However, there are factors which make fatigue life difficult to characterize.

Such factors include the shape of the loading curve, the frequency of the load cycling, residual stresses, stress concentrations due to material shape, state of stress, material condition, size, fabrication method, surface finish, corrosion, operating temperature, and operating atmosphere.

LOAD CELL FATIGUE FAILURE MODES

COMPONENTS SUBJECT TO FAILURE

There are two metal components in a load cell that must be considered in fatigue analysis, the flexure (spring element) and the strain gage (sensor).

1. The flexure bears the load; therefore failure of the flexure is structural.
2. Since the gages' function is electrical measurement of minute deflections, failure of the strain gages, on the other hand, is typically not structural; failure is noted by a shift in resistance or gage factor.

The relative propensity to first encounter flexure or strain gage fatigue failure depends upon the design of the transducer.

FLEXURES

There are several metals used for flexures in Interface load cells including aircraft quality alloy steel, stainless steel, and high strength fatigue-resistant aluminum alloy. S-N curves for these three materials are presented in Figure 1 and Figure 2.

Stress is normally expressed in units of psi (pounds per square inch), but for convenience we use units of KSI which are equal to 1000 psi. Shear stress is on the vertical axis, corresponding to the state of stress in Low Profile load cells. Readers with some materials science familiarity will recognize that classical fatigue strength for these materials is higher than indicated in the figures. This is because classical data is for bending or direct stress, whereas Interface fatigue-rated cells operate in shear mode. This analysis therefore appropriately uses the required factor for shear, avoiding a falsely optimistic result.

Note that the shear S-N curve for steel becomes essentially flat at about 55 KSI. This is a characteristic of steel. The stress level at the flat portion of the curve is called the ***endurance limit.*** If operated below this limit, theoretically the material will endure an infinite number of load cycles. Nonferrous metals do not generally exhibit an endurance limit, their curves continuing on with a small slope.

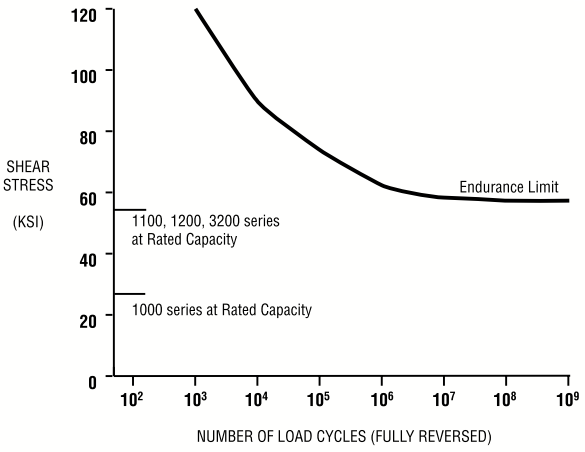


FIG. 1 S-N CURVE, INTERFACE ALLOY STEEL AND STAINLESS STEEL

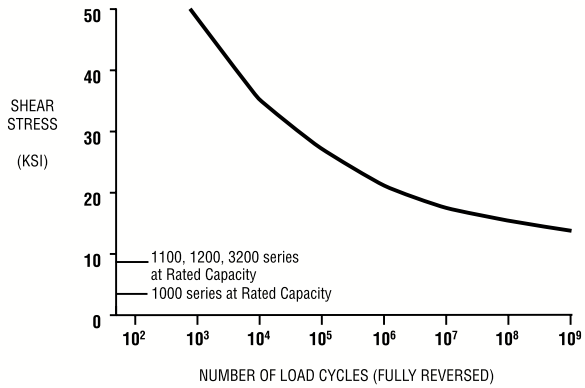


FIG. 2 S-N CURVE, INTERFACE ALUMINUM

Load Cell Fatigue, continued

GAGES

Interface strain gages are specially made of fatigue-resistant nickel-chromium alloy. Strain gage fatigue characteristics are most conveniently viewed in terms of strain rather than stress. Figure 3 shows a Strain-N curve for Interface strain gage material. Strain is a dimensionless quantity of normally very small magnitude. The microstrain unit is simply 106 strain units and is used for convenience. Stress and strain for any particular material are related by a constant which is the modulus of elasticity (30X106 for steel and 10X106 for aluminum), allowing convenient comparison of S-N curves and Strain-N curves.

NOTE

The curves in Figures 1, 2 and 3 are for fully reversed load cycles, meaning that for 2000 microstrain as an example, a cycle starts at zero load and consists of one load to (+2000), one load to (-2000), with a return to zero.

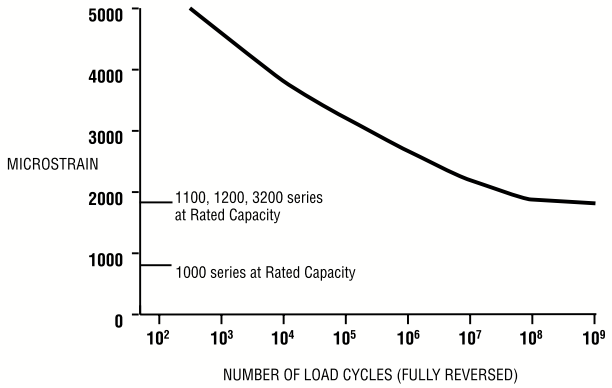


FIG. 3 STRAIN-N CURVE, INTERFACE STRAIN GAGES

COMPARISON OF LOADING LEVELS

Superimposed on the curves are operating levels of Interface Low Profile load cells by model series. This provides a convenient visualization of the fact that all of these load cells are designed to have very long, if not infinite, theoretical fatigue lives. Remember that in actual practice things are not necessarily so ideal. Therefore, in order to establish the correlation between theoretical and realizable fatigue life, actual test results are desirable.

DESIGN VERIFICATION TESTS

TEST PROTOCOL

Interface conducted Design Verification Tests to substantiate the theoretical life predictions by means of actual load tests of the product. Obviously, building up millions of load cycles on a high capacity load cell is not a trivial task. Many hours of costly machine time are required. Tests were conducted on three representative Interface Low Profile load cells: (1) an aluminum cell of 5,500 lbf capacity, (2) a steel cell of 11,000 lbf capacity, and (3) a steel cell of 22,000 lbf capacity.

Loading to 130% of rating was selected as an acceleration factor, to bring down the test time to a realizable length, since 100 million cycles at 1 hertz and 100% loading would consume 3 years and 2 months of testing, 24 hours per day. Based on the slopes of the S-N curves, a cycle acceleration factor of at least 10 can be achieved with 130% loading, thus ensuring that the more stringent test at 10^7 cycles will prove a fatigue life of 10^8 cycles at 100% loading.

TEST RESULTS

Analysis of the test data showed that there were no indications of fatigue failure nor degradation of load cell performance outside specified limits, for the critical load cell parameters of output, zero balance, nonlinearity, hysteresis, and creep, during or after completion of the Verification Test program.

BENEFITS OF REDUCED STRESS LEVELS

LOWER STRESS BY DESIGN

Interface load cells are designed for optimum fatigue life. Other load cells are not necessarily equivalent. Table 1 is a comparison of actual strain levels in Low Profile™ and typical competitive load cells. The safety factors are a means of visualizing the design merit of the various designs. The value of fatigue rated load cells for fatigue applications is evident from the safety factor data. It is also apparent that Interface load cells with 4 mV/V output have lower stress levels and, therefore, more fatigue resistance than competitors' cells, even though their output is only 3 mV/V or less.

LOWER STRESS, BY USER LIMITS

Note that the tests and S-N curves are based on fully reversed load cycles. This type of loading cycle is considerably more stringent than unidirectional loading, which is the more common application of load cells. If a fatigue load cell is repeatedly loaded in only one direction, the Goodman Law predicts that it can be loaded to about 133% of the bidirectional fatigue-rated capacity with no degradation of its fatigue rating. Conversely, unidirectional loading to a fatigue cell's rated capacity is much less stressful on the cell than bidirectional loading and can be expected to yield a fatigue life well beyond the number of cycles which could be reasonably and economically applied in a verification test program.

TABLE 1. Low Profile Load Cell Strain and Safety Factor Comparison

Design Characteristic	Interface 1000 Series (Fatigue) Aluminum	Interface 1000 Series (Fatigue) Steel	Interface 1100 Series 1200 Series Aluminum	Interface 1100 Series 1200 Series 3200 Series 4200 Series 4600 Series Steel	Competition Generic Load Cell Steel
Output, mV/V	1	2	2	4	3
Fatigue Life Rating (Cycles)	10^8	10^8			?
Microstrain at Rated Capacity	450	900	900	1800	1790 (1)
Max Microstrain on Flexure allowed for 10^8 Cycle Life	1400	1850	1400	1850	1850
Max Microstrain on Gages allowed for 10^8 Cycle Life	2000	2000	2000	2000	1400 (2)
Safety Factor, Flexure (Ratio allowed/actual strain)	3.1	2.1	1.6	1.0	1.0
Safety Factor, Gages (Ratio allowed/actual strain)	4.4	2.2	2.2	1.1	0.8

NOTES: (1) In typical competitors' load cells, the copper-nickel alloy gages have approximately 20% lower Gage Factor than interface gages and lose approximately 10% of their natural output to temperature compensation circuitry, a loss which is not present with Interface self-compensated gages. The result is that generic 3 mV/V load cells are stressed about equally with Interface 4 mV/V load cells.

(2) Typical copper-nickel alloy gages have approximately 70% of the fatigue resistance of Interface nickel-chromium alloy gages.

Load Cell Resolution

INTERFACE Load Cells are constructed using electric resistance metal foil strain gages bonded to an elastic flexure element. The load cell is a passive analog device with continuous resolution limited ultimately by noise, due to electron motion on the order of 10^{-9} volts (1 nanovolt). Therefore, practically speaking, resolution is limited by the type and quality of the electronic instrumentation used, rather than by the load cell itself. Many reasonably priced instruments can resolve 0.8 to 1.0 microvolt/count as a minimum signal level.

For example, consider a load cell with Rated Output of 3mV/V. Assume that 10VDC excitation is used. At Rated Output, the signal level produced would be:

3 mV/V x 10 V = 30 mV

If the indicating instrument can resolve 1 microvolt in the rightmost digit of the display, then:

$$\text{Resolution} = \frac{1\ \mu\text{volt}}{30\ \text{mV}}$$

$$= \frac{1\ \mu\text{volt}}{30{,}000\ \mu\text{volt}}$$

= 0.000033, fraction of Rated Output

= 0.0033 % of Rated Output

If, for example, an MB-5 (5 lbf Rated Capacity) load cell were being used, the resolution in pounds could be calculated as:

Resolution = 5 lbf x 0.000033

= 0.00017 lbf

If an instrument capable of 0.5 microvolt resolution were used, the resolution would be approximately 1 part in 60,000 or 0.000083 pounds for the 5 pound capacity cell. Maximum resolution may be limited by the instrument to the total number of counts that can be displayed.

Another typical example would be the case where only a portion of the range of the load cell is to be used. If the maximum load on the MB-5 were to be 3 pounds, then the output would be:

3 mV/V x 3 lbf / 5 lbf =
1.8 mV/V

Using 10V excitation provides a signal of 18 mV output for 3 pounds input. If the instrument displays is to display 30,000 counts a signal strength of

18 mV / 30,000 counts =
0.6 microvolt/count

results in a display of 0.00015 pound/count resolution. Of course, the instrument must have a sensitivity of at least 0.6 µvolt/count for this example.

It can be seen from the above examples that the sensitivity and stability of the electronic instrumentation is critical, when high resolution is required. High electronic gain alone will not achieve good results if the zero stability or gain stability is poor because the readings will drift with time or temperature changes.

Also, keep in mind that excessive resolution can be detrimental in situations where the stability of the applied force is low, as in some hydraulic systems.

Generally, it is desired to read physical units instead of counts. Most instruments provide a count-by feature of 1, 2, 5 or 10 to facilitate this. For the above example, an instrument could be set up to read 30,000 counts by 2 for the 3 pound load, providing resolution of 0.0002 lbf Premium instruments are available that offer as good as 0.001 µvolt/count.

Grounding and Shielding in Load Cell Installations

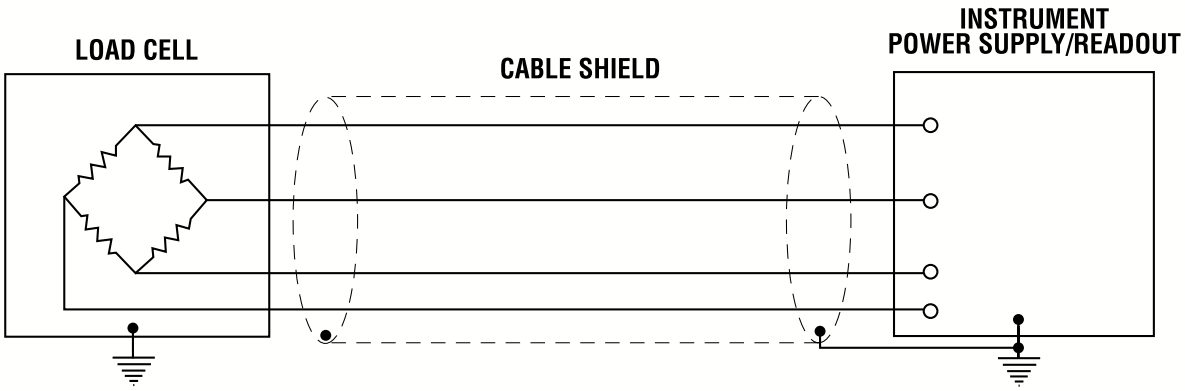
Proper grounding and shielding can be critical to the successful application of load cells generating low level signals. There is no “best way” to set up all systems and the specifics of the installation and associated instrumentation must be considered in arriving at a system configuration that is satisfactory.

The basic rule that should not be violated is that continuous ground loops should be avoided, i.e., a system should not be grounded at multiple points. This could occur, for example, if the shield of the load cell cable were grounded at both ends.

Interface load cell cables are supplied with a braided shield which provides protection from electrostatic interference when properly grounded. This shield is floating (not connected) at the load cell end so that a “ground loop” will not be inadvertently created.

A basic system layout that is easily achieved and usually is satisfactory is as follows:

The load cell case is grounded by mechanical attachment to the structure to which it is mounted. This structure should be properly grounded to the electrical circuits which drive the excitation for the load cell. The braided shield enclosing the load cell leads is grounded at the instrument and the instrument is grounded through the power cord.



Excitation Voltage

INTRODUCTION

Unless otherwise specified, all Interface load cells are calibrated with an excitation voltage of 10 VDC. Although Low Profile™ cells may be operated with excitation as high as 20 VDC, and Mini Series cells can be excited with up to 15 VDC, it is always best to operate a load cell at the same voltage used for the calibration, because certain parameters of the cell are affected by the applied voltage.

The basic construction of a load cell consists of strain gages bonded to a flexure inside the load cell with a very thin layer of an electrically insulating epoxy. Typically, four gages are connected together in a bridge circuit. When voltage is applied to the bridge, the current through the each gage generates heat, which is conducted through the epoxy into the larger mass of the flexure. Thus, the temperature of the bridge is always slightly higher than the flexure during normal operation.

GAGE HEATING

Each 350 ohm leg of a bridge will dissipate over 71 milliwatts at 10 VDC excitation. Since power is proportional to the square of the voltage, the leg would be dissipating over a quarter of a watt at 20 VDC, but only 18 milliwatts at 5 VDC.

ZERO BALANCE

Slight differences in the temperature coefficient of resistance in each leg of a bridge will cause the zero balance to shift slightly as the gage temperature changes. The effect is usually small. For example, a change of excitation from 10.00 VDC to 10.25 VDC will cause a zero shift of less than 0.0014% of rated output.

SENSITIVITY

The gage factor of each gage is adjusted so as to compensate for the temperature coefficient of the modulus of the flexure. This matching is exactly valid only at an excitation of 10 VDC. An increase of excitation voltage to 10.25 VDC would lower the bridge sensitivity by only 0.001%, but use of 20 VDC would cause the sensitivity of a Low Profile cell to decrease by 0.07%, which could be significant. 20 VDC applied to Mini Series cell would cause a more serious effect due to gage heating, and could possibly even shorten the life of the cell.

CREEP

Creep is influenced by temperature, but the magnitude and direction of the effect of large changes in applied voltage is not predictable.

At room temperature, changing the applied voltage from 10.00 VDC to 10.25 VDC causes a negligible effect. However, increasing the voltage on a Low Profile cell to 20 VDC could cause the creep to increase (or decrease) by less than 10% of the creep specification.

CONCLUSION

Because of the inherent temperature stability of the design of Interface load cells, reasonable shifts in excitation voltage will result in parametric shifts which would not be detectable in most normal applications.

However, in applications where the load cell is to be used as a transfer standard, or where the stability of the cell's characteristics is necessary, precautions should be used to assure the stability of the excitation voltage.

Moment Compensation

Do you know if you have an accurate force reading? In most applications it is difficult, if not impossible, to calculate or even estimate the effect of misalignments on the precision of a force measurement system. Moment sensitivity introduces errors into force measurements whenever forces cannot be applied precisely on-axis.

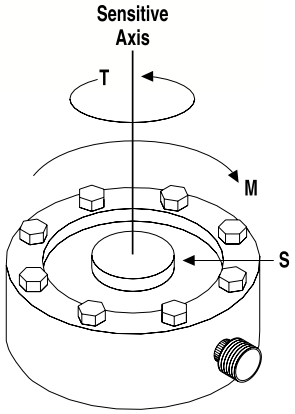
The Low Profile™ design by Interface has the intrinsic capability of canceling moment loads because of its radial design.

- The radial flexure beams are precision machined to balance the on-axis loading.
- The gages are precisely placed so that strains due to on-axis loads are additive and strains due to moment loads tend to cancel under actual moment loading.
- Interface uses eight gages, as opposed to the four used by many manufacturers, which helps to further minimize error from the loads not being perfectly aligned.
- Slight discrepancies between gage outputs are carefully measured and each load cell is adjusted to further reduce extraneous load sensitivity, to meet the specifications in the table below.

RESISTANCE TO EXTRANEOUS LOADS

The INTERFACE Low Profile design provides optimum resistance to extraneous loads to insure maximum operation life and minimize reading errors. The above chart tabulates maximum allowable extraneous loads that may be applied singularly without electrical or mechanical damage to the cell and the maximum error that can be expected from side forces or bending moments. Several loads can be tolerated simultaneously if the total combined load is not more than 100% of the allowable maximum extraneous load.

Only Interface guarantees maximum extraneous load error and physically adjusts every load cell. The Interface 1200 Series cells have eccentric load sensitivity less than ±0.25% of reading per inch, and the 1000, 1100, and 1600 Series are further adjusted to come in at less than ±0.1% of reading per inch. Most competing load cells will have extraneous load error ten, or more, times higher than with a superior Interface load cell.



SERIES	S Max Side Force (% Rated Range)	M Max Moment (% Rated Range x 1 inch)	T Max Torque (% Rated Range x 1 inch)	Max Error Due To S or M (% Rated Range)
1000	100%	100%	100%	0.10%
1100	40%	40%	40%	0.04%
1200	40%	40%	40%	0.10%
1500	40%	40%	60 in-lb	0.10%
1600	40%	40%	40%	0.04%
1800	100%	100%	100%	0.05%

Temperature Compensation of Zero

THE ADVANTAGES OF FULL TEMPERATURE RANGE COMPENSATION

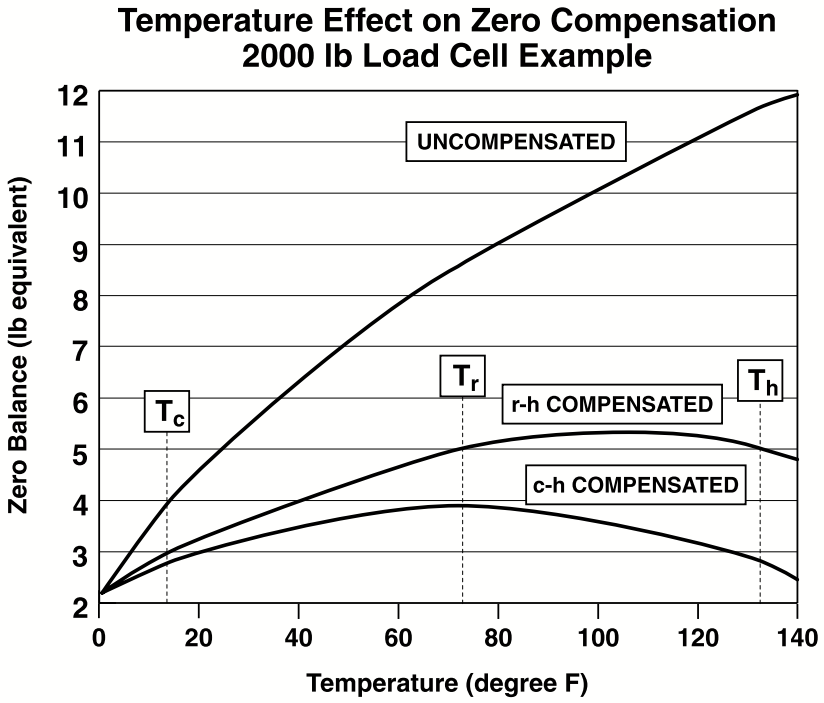
Temperature compensation of zero balance of load cells is conventionally performed using the chord-slope method. A partial-range implementation of this method, acting on a chord between room temperature and one extreme temperature is often used. A better implementation is full-range using three test temperatures and acts on a chord between the cold and hot extremes.

The top curve on the plot represents the zero temperature characteristics of an uncompensated load cell. This curve would ideally be a straight line but often has some nonlinearity such as shown here. The objective of the compensation process is to rotate the curve to a more level position. The middle curve represents a compensation based on room temperature (T_r) and hot temperature (T_h) and is consequently labeled "r-h compensated." The process equalizes the zero balance values at T_r and T_h.

The lower curve represents a compensation based on cold temperature (T_c) and hot temperature (T_h) and is labeled "c-h compensated." This process equalizes the zero balance values at T_c and T_h, producing a relatively full-range solution.

It is now apparent why the full range procedure (lower curve) is superior:

1. The slope of the characteristic near room temperature, the temperature at which most applications are of most interest, is near zero.
2. The total range of zero balance over the temperature range of the plot is minimal, approximately one-half that of the partial-range compensated curve in this example.



Instrument Calibration Using a Shunt Calibration Resistor

INTRODUCTION

Since a strain gage load cell is a passive electrical device, there exists a simple, yet effective, method for checking the calibration of a load cell system in the field or when a means of applying actual forces is unavailable. Inducing an electrical imbalance in the cell's bridge circuit will simulate the bridge imbalance caused by the application of actual forces to the load cell. Then the system gain may be adjusted so that the system output signal or display indicates a known force on the load cell.

NOTE

Be careful not to use Shunt Calibration as a substitute for actual force calibration of a system. Shunt Calibration merely supplies a known signal to the signal conditioning unit, in order to check its gain or span adjustment.

EQUIVALENT FORCE

On the Calibration Certificate for each Low Profile load cell, Interface routinely supplies the value of the equivalent force resulting from connecting a specified shunt calibration resistor across one leg of the bridge. For other types of cells, Interface will supply shunt calibration values on special request.

SHUNT CALIBRATION CONNECTIONS

The standard connections used by Interface for tension and compression shunt calibration are specified on the Calibration Certification for each load cell.

It is important that the standard connection be used, although a similar (but not equal) output would result from connecting to the opposite leg of the bridge. Shunt calibration is relatively insensitive to small changes in temperature, although the calibration is precisely correct only at the "Lab Standard" conditions noted on the load cell's Calibration Certificate.

RESISTOR VALUES

The following values of shunt resistors will cause an output of approximately 73% of Rated Output for the load cell types indicated when connected across the specified load cell terminals.

For 4 mV/V cells:

RS-100-30K (30,000 ohms, ±0.01%)

For 3 mV/V cells:

RS-100-40K (40,000 ohms, ±0.01%)

For 2 mV/V cells:

RS-100-60K (60,000 ohms, ±0.01%)

For 1 mV/V cells:

RS-100-120K (120,000 ohms, ±0.01%)

PROCEDURE

To perform a shunt calibration, use the following procedure:

1. Remove or stabilize all forces on the load cell.
2. Adjust the display or indicator ZERO to read exactly zero.
3. Connect the shunt calibration resistor to the terminals specified on the Calibration Certificate, and adjust the SPAN or GAIN until the display reads the force value stated on the Certificate.
4. Repeat the procedure to insure a valid calibration.

Load Cell Performance as Affected by Cable Length

INTRODUCTION

For high accuracy force measurement the effects of the cable on the measurement must be considered. For constant voltage excitation there are two effects of significance. These are:

1. An effect on the sensitivity due to voltage drops over the cable length.
2. An effect on the thermal span characteristics of the load cell due to the change of cable resistance with temperature.

CABLE LENGTH EFFECTS

If the load cell is sold with a cable of any length, the sensitivity is determined with the installed cable in calibration and this is not a problem. For load cells with connectors, or if the customer adds cable himself, there will be a loss of sensitivity of approximately 0.37% per 10 feet of 28 gage cable and .09% per 10 feet of 22 gage cable. This error can be eliminated if a six wire cable is run to the end of the load cell cable or connector and used in conjunction with an indicator that has sense lead capability.

TEMPERATURE EFFECTS

Since cable resistance is a function of temperature, the cable response to temperature change affects the thermal span characteristics of the load cell/cable system. For 6-wire systems this effect is eliminated. For 4-wire cables the effect is compensated for in the standard cable lengths offered with the load cells if the load cell and cable are at the same temperature at the same time. For non-standard cable lengths, there will be an effect on thermal span performance. The effect of adding 10 feet of 28 gage cable is to cause a decrease in sensitivity with temperature equal to 0.0008%/°F (an amount equal to the standard Interface specification). For an added 10 feet of 22 gage cable the effect is to decrease sensitivity by .0002%/°F (one-fourth Interface spec). In many cases a customer can tolerate the degraded performance since our standard specification is extremely tight. However, for long cable runs or high accuracy applications, this can be a significant factor. In such cases, the best approach to the problem is to run six wires to the end of the standard cable length and sense the excitation voltage at that point. This eliminates the problem.

Proprietary Interface Strain Gages

UNIQUE FORMULATION, MADE IN-HOUSE

Interface load cells are constructed with strain gages manufactured by Interface from a unique proprietary alloy which provides inherently temperature compensated output. They are manufactured in our facility, in order to provide the necessary strict control of the formulation and the forming process.

MATCHED TEMPERATURE CHARACTERISTICS

The temperature characteristic of the strain gages is adjusted by special processes to exactly match and counteract the temperature characteristic of the modulus of the load cell structural material, thereby providing output which is relatively temperature insensitive. The bridge circuit is simple, reliability is high, and changes in output sensitivity caused by temperature variations are automatically compensated.

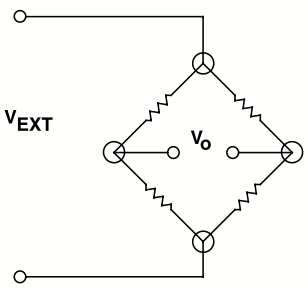
By contrast, competitive load cells use strain gage alloys which require the addition of temperature-sensitive resistors in the bridge circuit for compensation, thus reducing reliability. Since the resistors aren't in intimate thermal contact with the cell's flexure, the dynamic thermal performance, resistance to thermal gradients, and thermal response times are also severely affected.

LONGER FATIGUE LIFE

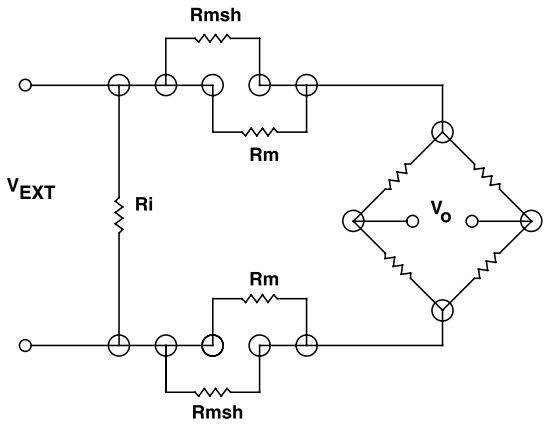
The Interface strain gage alloy provides significantly greater fatigue life than the widely-used constantan gages used by the competition.

HIGHER OUTPUT

A third advantage of the Interface strain gage is higher output, providing higher signal-to-noise ratio and opportunity for higher resolution in precision measurement applications.



INTERFACE LOAD CELL



TYPICAL COMPETITOR'S LOAD CELL

Rm = Modulus compensating resistor
Rmsh = Fine trim for Rm
Ri = Bridge input resistance trim

Warranty & Repair Policy

WARRANTY

1. Interface warrants that its products shall be free from defects in material and workmanship for the full warranty period under normal and proper use when correctly installed. The warranty period for most load cells is two years and for other products is one year, from date of shipment by Interface.

2. Any Interface product, which proves defective in material or in workmanship within the warranty period, will be repaired or replaced free of charge provided that the buyer; (1) provides Interface with satisfactory proof of the defect and that the product was properly installed, maintained and operated within the limits of rated and normal usage; (2) buyer obtains from Interface authorization to return the product; and (3) products claimed to be defective must be returned with transportation charges prepaid, and will be returned to Buyer with transportation charges collect unless the item is found to be defective, in which case, Interface will pay the return transportation charges.

3. The remedy set forth herein does not apply to damage to or defects in any product caused by the Buyer's misuse or neglect, nor does it apply to any product which has been repaired or disassembled which in the sole judgement of Interface affects the performance of the product.

4. Interface makes no warranty concerning components not manufactured by it. However, in the event of the failure of any component or accessory not manufactured by Interface, reasonable assistance will be given to Buyer in obtaining from the respective manufacturer whatever adjustment is reasonable based on the manufacturer's own warranty.

5. Interface expressly disclaims any liability to its customers, dealers, and representatives, and to users of its products, and to any other person for special or consequential damages of any kind and from any cause whatsoever arising out of or in any way connected with the manufacture, sale, handling, repair, maintenance, or replacement arising out of or in any way connected with the use of Interface products.

6. Representations and warranties made by any person, including dealers and representatives of Interface, which are inconsistent or in conflict with the terms of this warranty (including but not limited to the limitations of the liability of Interface, as set forth above), shall not be binding upon Interface unless reduce to writing and approve by an officer of Interface, Inc.

THIS EXPRESS WARRANTY SUPERCEDES ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

OBTAINING SERVICE UNDER WARRANTY

Advance authorization is required before any product is returned to Interface. Prior to the return of any product, write or call the Repair Department at Interface advising them of; (1) a part number; (2) a serial number of the defective product; (3) a technical description of the defect including specific test data, written observations on the failure and specific corrective action required; (4) a no-charge purchase order number (so the product can be returned to sender correctly); and (5) ship and bill addresses. Non-verified problems or defects may be subject to an evaluation charge. Please return the original calibration data with the unit.

REPAIR WARRANTY

All repairs of Interface products are warranted for a period of 90 days from date of shipment. This warranty applies only to those items which were found defective and repaired; it does not apply to products in which no defect was found and returned as is or merely recalibrated. Out of warranty products may not be capable of being returned to the exact original specifications.

Terms & Conditions

The following Terms and Conditions shall apply to any order between Interface Inc., (Seller) and Buyer, unless overridden by written agreement.

1. ACCEPTANCE

All orders and sales contracts are subject to acceptance or rejection by Interface and are not binding on Interface unless and until so accepted. Acceptance of an order by Interface constitutes a complete and binding contract governed by the terms and conditions of sale expressed herein and by the laws of the State of Arizona. Acceptance is at all time subject to availability for delivery of the goods covered by each order, and prices in effect at the time of shipment, unless otherwise agreed in a separate agreement signed by Buyer and Interface.

2. CANCELLATION

In the event of cancellation, Buyer will pay promptly upon receipt of invoice from Interface:

(a) The full contract price for all products which have been completed prior to receipt of notice of cancellation.

(b) All costs incurred by Interface in connection with the uncompleted portion of the order.

(c) Cancellation charges incurred by Interface on account of its purchasing commitments made to its Suppliers under the order.

3. PATENTS

No license or other rights under any patents, copyrights' or trademarks owned or controlled by Interface or under which Interface is licensed are granted to Buyer or implied by the sale of products or services hereunder. Buyer shall not identify as genuine products of Interface products purchased hereunder which Buyer has modified, or altered in any way nor shall Buyer use Interface's trademarks to identify such products; provided, however, that Buyer may identify such products as utilizing, containing, or having been manufactured from genuine products of Interface as modified or altered by Buyer or Buyer's representative. If products or services sold hereunder are manufactured or performed according to Buyer's specifications, Buyer shall indemnify Interface against any liability for patent, copyright or trademark infringement on account of such manufacture or performance.

4. PRICES

Unless otherwise stated, prices are subject to change without notice. No cash discounts or other discounts for prompt payment are offered unless specifically stated on the face thereof. The prices quoted are based upon the manufacture of the quantity and type ordered and are subject to revision when interruptions, engineering changes, or changes in quantity are caused or required by Buyer. Clerical errors made by Interface are subject to correction.

5. TAXES & OTHER CHARGES

To the extent legally permissible, all present and future excise levies, taxes, or any similar charges imposed by any federal, state, foreign or local authority which Interface may be required to pay or collect, upon or with reference to the sale, purchase, transportation, use or consumption of products or services, including taxes measured by the receipts therefrom (except net income and franchise taxes), shall be for the account of Buyer.

6. DELIVERY

All sales are F.O.B. Interface's Plant. Delivery dates are approximate and estimated, and are based on prompt receipt of all necessary information from Buyer. Interface may make partial shipments of any one or more items covered by the quotation or acknowledgment. Interface assumes no liability for loss, damage, or consequential damages due to delays.

7. TERMS OF PAYMENT

All invoices are payable only in U.S. funds. Payment terms are net 30 days. Credit and delivery of products shall be subject to the approval of Interface to whom all bills are payable and who reserves the right to alter the terms and set a limit of credit. Each shipment shall be treated as a separate and independent contract; but if the Buyer fails to fulfill the terms of payment under this or any other contract, Interface at its option may defer further shipments, until payment have been made. Invoices that are not paid by the due date are subject to a late charge of 1.5% per month on the unpaid balance.

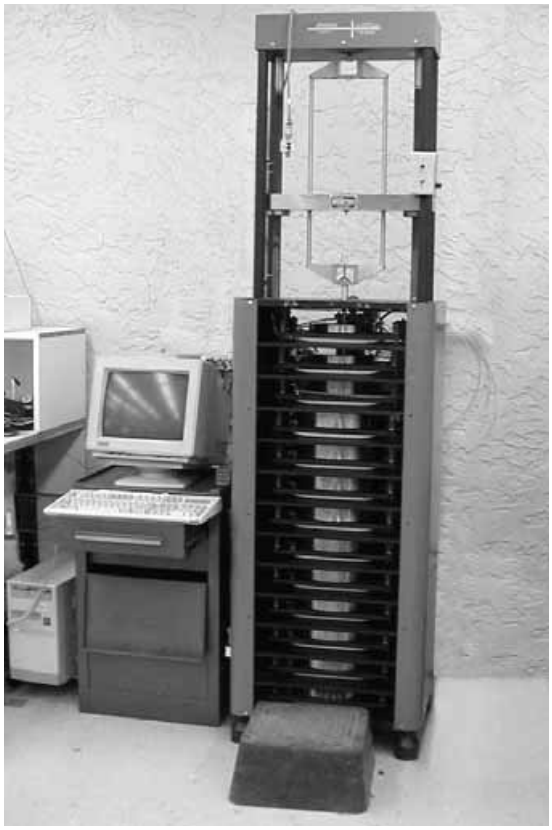
8. CONFIDENTIAL INFORMATION

Selected software and hardware, drawings, diagrams, manuals, specifications, and other materials furnished by Interface relating to the use and service of products furnished hereunder, including any information which may be identified as proprietary to Interface. Such software and hardware, diagrams, manuals, drawings, specifications and other materials, have been developed at great expense and are considered to be trade secrets to Interface and Buyer may not reproduce them in any way without the express written permission of Interface except as needed to operate and maintain the equipment supplied by Interface.

9. DISPUTE RESOLUTION

This Agreement and all transactions hereunder are governed by the laws of the State of Arizona.

We Can Recalibrate Any of Your Load Cells, Regardless of Manufacturer



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CH-8142 Uitikon
Telefon: +41 (0)44 404 34 34
Telefax: +41 (0)44 493 50 32
sales@nbn-elektronik.ch