DDEN Submersible Miniature In-Line Load Cell

Key Features:

- Capacities 0-50N up to 0-50kN
- Fully Submersible: IP68 to 10m
- Tension and Compression
- Output: 0.5mV/V to 2mV/V
- Accuracy: <±0.15%/RC (0.05% typical)
- Optional Amplified Outputs: 4-20mA, 0.1-10Vdc, 0.1-5Vdc, ±10Vdc, ±5Vdc
- Optional RS485 Digital Output: ASCII, Modbus, CAN, CANopen
- Low Profile and Very Compact
- Integral Male Threads for In-Line Mounting
- High Natural Frequency
- Low Deflection
- Robust Construction
- 3 Year Warranty

Low Profile Fully Submersible Load Cell for use in Tension and Compression

The DDEN series of submersible in-line load cells are designed for use in both tension and compression. It is sealed to IP68 environmental protection rating with 'O' rings to provide integrity at depths of up to 10 metres as standard. Greater depths and customised version can be provided, please contact our sales team.

The DDEN fully submersible load cell is designed to be used underwater or in areas subject to high humidity or the risk of flooding. Current applications include wave tank measurement systems and mooring buoy cable tension monitoring.   The DDEN's low profile and compact design, enables its use in applications with restricted mounting space, where other in-line load cells such as the s-beam load cells are too large.

The DDEN's low deflection and high natural frequency results lends it to material testing applications and cable tension monitoring applications.

If a conditioned analogue output or digital output is needed we offer a DDENA variant. The DDENA can incorporate any of the ICA series amplifiers to provide a high-level analogue output signal such as 0.1-10Vdc or 4-20mA, or it can be fitted with a DCELL to provide an RS485 output in ASCII, Modbus, CAN or CANopen protocols.

Options:

- Non-Standard Dimensions
- Higher Capacities to 1000kN/100te+
- Spherical Seating Rod End Bearings
- Female Adaptor Available on Request
- Compression Fittings Available
- Integral ICA Series Amplifiers
- Integral DCell RS485 Signal Digitiser
- USB Versions (via DSC-USB)
- TEDS (Transducer Electronic Data Sheet)
- TEDS Allows Plug & Play with TEDS Enabled Instrumentation
- Single or Multi-Channel PC-Based Monitoring & Data Logging System
- Wireless Version (via T24 instrumentation)
- Fatigue Rated Versions
- Marine & Seawater Compatible Versions

Applications:

- Materials Testing
- Cable Tension Monitoring
- Submersible Applications
- Locations with High Humidity
- Locations Susceptible to Flooding
- Marine Testing
- Hydrodynamic Testing

Wiring Diagram:

Wire		mV/V Output	3-Wire Voltage or Current Otput	4-Wire Voltage Output	2-Wire Current	RS485 Digital
🟥	Red	+ve excitation	+ve supply	+ve supply	+ve supply	+5.4 to +18Vdc supply
🟦	Blue	-ve excitation	0V common	-ve supply	-ve supply / signal	-ve supply
	White	+ve signal (tension)*	+ve signal	+ve signal	N/C	RS485 (B) Data -ve
	Yellow	-ve signal	N/C	-ve signal	N/C	RS485 (A) Data +ve
	Screen	To ground - not connected to load cell body				

* +ve signal in tension is standard, +ve signal in compression can also be offered.

Specification:

Rated Capacity (RC)	N	0-50, 0-100, 0-250, 0-500, 0-1000, 0-2000, 0-5000, 0-10,000, 0-20,000, 0-50,000
Operating Modes	Tension/Compression / Tension & Compression	
Sensitivity (RO)	mV/V (nominal)	50N = 0.5 / 100N=1.0 / 250N = 0.75 / 500N = 1.5 / 1000N up = 2.0
Zero Balance/Offset	±%/Rated Output	<1.0
Output Symmetry (tension vs. compression)	±%/Rated Output	<0.25 typical
Non-Linearity	±%/Rated Output	<0.15 (0.05 typical)
Hysteresis	%/Rated Output	<0.15 (0.05 typical)
Repeatability	±%/Rated Output	<0.1
Temperature Effect on Zero	±%/Rated Output/ ˚C	<0.005
Temperature Effect on Sensitivity	±%/Applied Load/ ˚C	<0.005
Input Resistance	Ohms	700
Output Resistance	Ohms	700
Insulation Resistance	Megohms	>5000 @ 50Vdc
Excitation Voltage	Volts AC or DC	10 recommended (2-15 acceptable) - Note mV/V only, see page 5 for details of conditioned output versions.
Operating Temperature Range	˚C	-20 to +80
Compensated Temperature Range	˚C	0 to +70
Storage Temperature Range	˚C	-20 to +80
Safe Overload	% of Rated Capacity	150
Ultimate Overload	% of Rated Capacity	200
Deflection @ Rated Capacity	mm	50N=0.08; 100N=0.12; 250N=0.09; 500N=0.06; 1000N=0.04; 2000N=0.03; 5000N=0.02; 10,000N=0.015; 20,000N=0.01; 50,000N=0.03
Fundamental Resonant Frequency*	kHz	50N=1.7; 100N=1.3; 250N=0.72; 500N=1.18; 1000N=2; 2000N=3.1; 5000N=6.1; 10,000N=9.9; 20,000N=18.2; 50,000N=13.3
IP Rating (Environmental Protection)		IP68 to 10m depth (please consult sales for greater depths)
Weight (excluding cable)	kg	50N to 20kN: 0.3kg / 50kN: 0.45kg,
Fatigue Life		10^8 cycles typical (10^9 cycles on fatigue-rated version)
Cable Length (as standard)	metres	2
Cable Type		4-core screened submersible, PUR (weight: 82g/m) sheath, Ø7.5
Construction Materials / Wetted Parts		17-4PH Stainless Steel, 303 Stainless Steel, PUR, TPE, Silicone
Resolution		1 part in 250,000 (with appropriate instrumentation)
Pressure Effect on Output		9N/mH²O nominal

*The resonant frequency is calculated with the body of the load cell attached to a large plate, ensuring that only the sensing element oscillates: This is vital to achieve the highest natural frequency and subsequent frequency response.

Dimensions (mm):

MODEL	CAPACITY (N)	A	B	C	ØD	E
DDEN	0-50, 0-100, 0-250, 0-500, 0-1000, 0-2000, 0-5000, 0-10,000, 0-20,000	67	15	35	44	M12 x 1.75
DDEN	0-50,000	71	18	35	44	M16 x 2.0
DDENA	0-50, 0-100, 0-250, 0-500, 0-1000, 0-2000, 0-5000, 0-10,000, 0-20,000	67	15	35	44	M12 x 1.75
DDENA	0-50,000	71	17	37	50	M16 x 2.0

IP68 cable gland fitted with submersible PUR cable

Thread E

62 nom.

Ø15 nom.
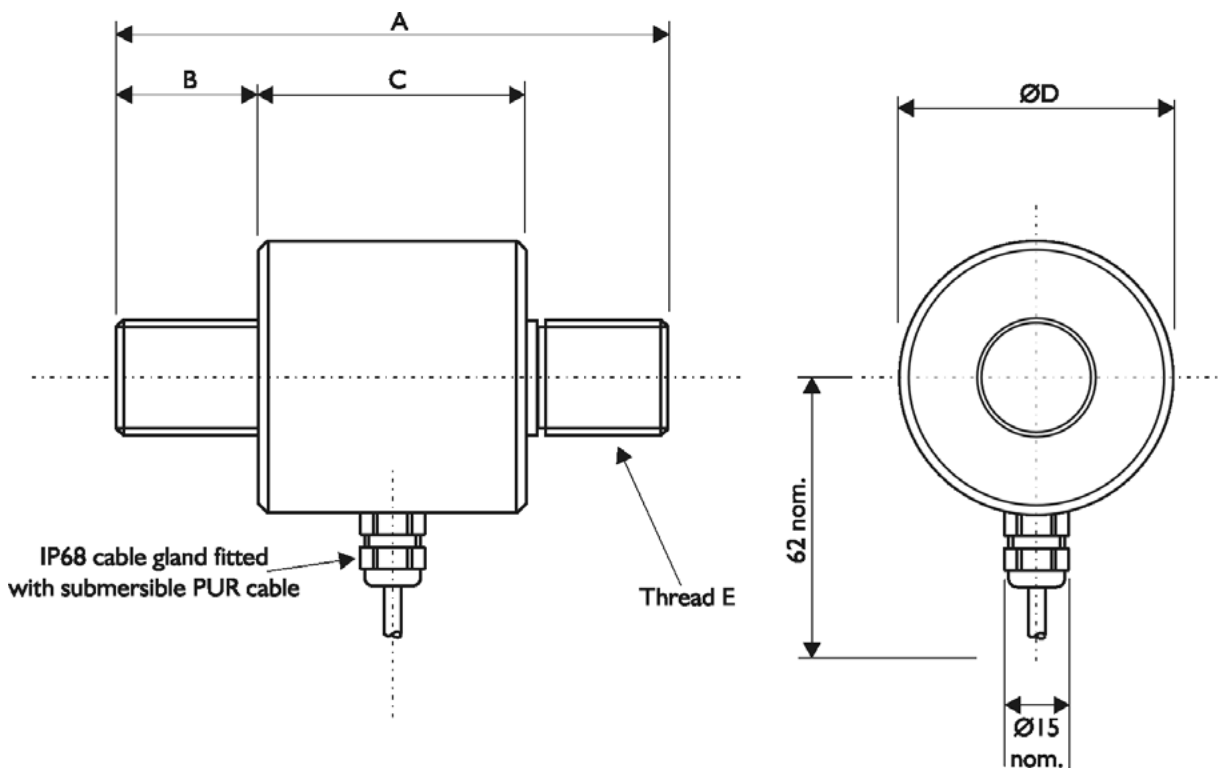
Ordering Codes:

Core Product	Capacity (inc Engineering Units)	Cable Length (m)	Specials Code	Example Result
DDEN	50N	002	000	DDEN-50N-002-000
DDEN	100N	002	000	DDEN-100N-002-000
DDEN	250N	002	000	DDEN-250N-002-000
DDEN	500N	002	000	DDEN-500N-002-000
DDEN	1000N	002	000	DDEN-1000N-002-000
DDEN	2000N	002	000	DDEN-2000N-002-000
DDEN	5000N	002	000	DDEN-5000N-002-000
DDEN	10kN	002	000	DDEN-10kN-002-000
DDEN	20kN	002	000	DDEN-20kN-002-000
DDEN	50kN	002	000	DDEN-50kN-002-000

Core Product	Capacity (inc Engineering Units)	Cable Length (m)	Specials Code	Example Result
DDENAXX	50N	002	000	DDENAXX-50N-002-000
DDENAXX	100N	002	000	DDENAXX-100N-002-000
DDENAXX	250N	002	000	DDENAXX-250N-002-000
DDENAXX	500N	002	000	DDENAXX-500N-002-000
DDENAXX	1000N	002	000	DDENAXX-100N-002-000
DDENAXX	2000N	002	000	DDENAXX-2000N-002-000
DDENAXX	5000N	002	000	DDENAXX-5000N-002-000
DDENAXX	10kN	002	000	DDENAXX-10kN-002-000
DDENAXX	20kN	002	000	DDENAXX-20kN-002-000
DDENAXX	50kN	002	000	DDENAXX-50kN-002-000
Note: XX is replaced by ICA amplifier code, i.e. 2H = ICA2H amplifier.				
Available ICA amplifiers:	**Output**	**Wiring Format + Supply Voltage**		**Amplifier Code**
ICA1H	0.1 - 10Vdc	3 - wire / 13 - 30Vdc		1H
ICA2H	0.1 - 5Vdc	3 - wire / 8.5 - 28Vdc		2H
ICA3H	±10Vdc	3 - wire, bi-polar supply / ±13 to ±15Vdc		3H
ICA4H	4 - 20mA	3 - wire / 10 - 30Vdc		4H
ICA5S	4 - 20mA	2 - wire, loop-powered / 7.5 - 30Vdc		5S
ICA6H	±10Vdc	3 - wire, uni-polar supply / +14 to +18Vdc		6H
Available RS485 DCELL Digitisers:	**Protocol**	**Wiring Format + Supply Voltage**		**Digitiser Code**
DLCHASC	ASCII	2 power + 2 data / 5.4 - 18Vdc		ASC
DLCHMOD	Modbus	2 power + 2 data / 5.4 - 18Vdc		MOD
DLCHMCAN	CAN (MantraCAN)	2 power + 2 data / 5.4 - 18Vdc		CAN
DLCHCOP	CANopen	2 power + 2 data / 5.4 - 18Vdc		COP

Associated Products:

TR150 Handheld Indicator

T24 Wireless Telemetry Range

Intuitive4-L Panel-Mount Indicator

DSC-USB USB Signal Digitiser

ICA Miniature Strain Gauge Amplifier

SGA Signal Conditioner/Amplifier

Mounting and Installation Accessories:

Helping You Get The Best Possible Performance From Your Load Cell.

Rod End Bearings for Tension Use
Designed to align forces through the principle axis of the load cell thus reducing the effects of extraneous forces, hence offering improved performance from the cell.

Rod End Bearings are used where tensile forces are being applied.

Maintenance-free rod ends are a complete units made up of a housing with both an integral shank (with an internal or external thread) and a maintenance-free spherical plain bearing, located within the housing.

Key Features:
* Supports radial loads in a tensile or compressive direction.
* Suitable for unilateral loads - can support alternating loads and alternating loads in combination with bearing GE.. UK-2RS, consult sales.
* Stainless Steel for corrosion resistance.
* Are maintenance-free.
* Fitted with radial spherical plain bearings.
* PTFE composite sliding contact surfaces.
* Enables compact adjacent construction thanks to its thin walled design of the eye housing.

Dimensions in mm:
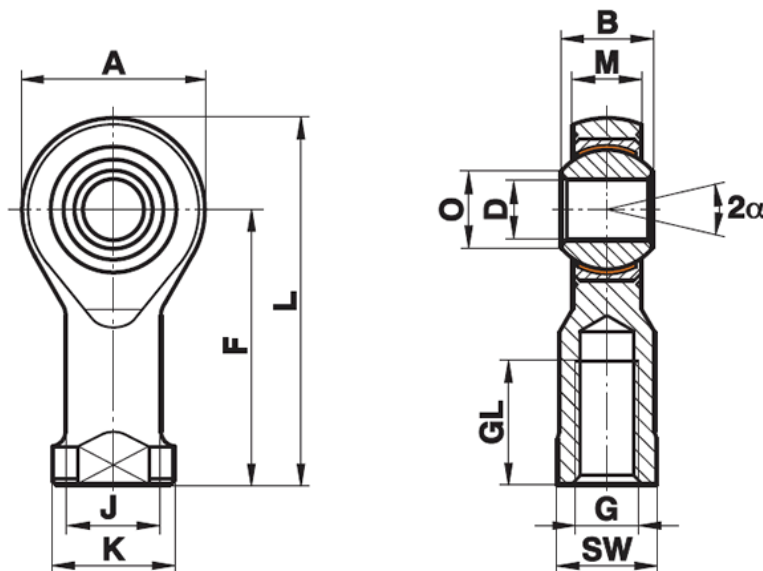
LOAD CELL	ORDERING CODES	Size (D)	B	M	A	F	L	K	J	O	SW	G	GL	Static load C_0 kN	Dynamic load C kN	Limiting Speed rev/min	Weight g
DDEN + DDENA-50N to 20kN	GIRSW-12RR-316	12	16	12.00	32	50	66	22.0	17.5	15.4	19	M12	22	34.5	32.0	300	115
DDEN-50kN	GIRSW-16RR-316	16	21	15.00	42	64	85	27.0	22.0	19.3	22	M16	28	60.5	52.5	230	230