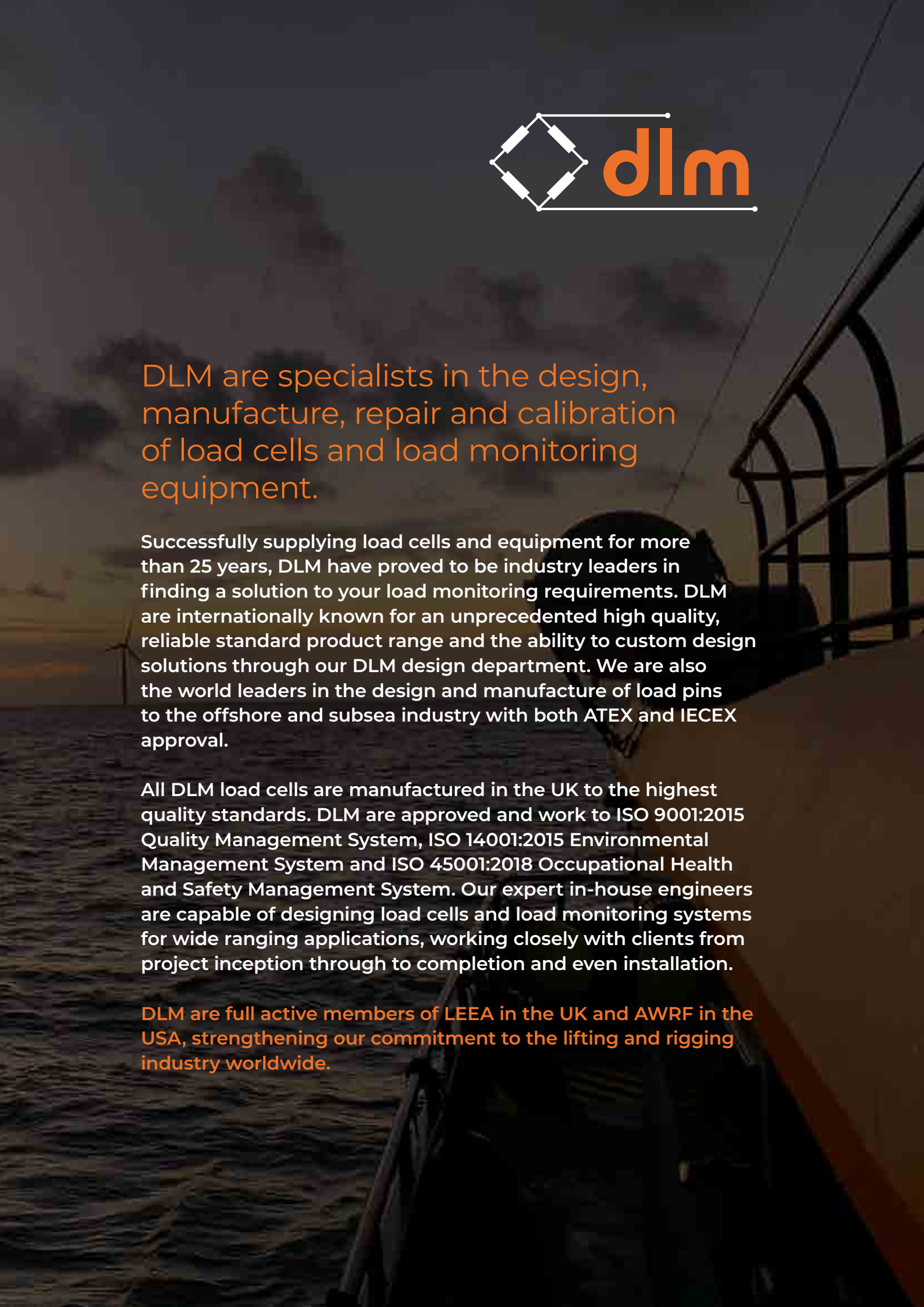
Product and Services Brochure



DLM are specialists in the design, manufacture, repair and calibration of load cells and load monitoring equipment.

Successfully supplying load cells and equipment for more than 25 years, DLM have proved to be industry leaders in finding a solution to your load monitoring requirements. DLM are internationally known for an unprecedented high quality, reliable standard product range and the ability to custom design solutions through our DLM design department. We are also the world leaders in the design and manufacture of load pins to the offshore and subsea industry with both ATEX and IECEX approval.

All DLM load cells are manufactured in the UK to the highest quality standards. DLM are approved and work to ISO 9001:2015 Quality Management System, ISO 14001:2015 Environmental Management System and ISO 45001:2018 Occupational Health and Safety Management System. Our expert in-house engineers are capable of designing load cells and load monitoring systems for wide ranging applications, working closely with clients from project inception through to completion and even installation.

DLM are full active members of LEEA in the UK and AWRF in the USA, strengthening our commitment to the lifting and rigging industry worldwide.

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Standard Products

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Overview:

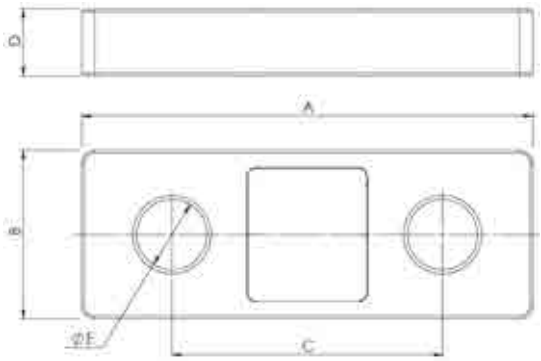
DLM's standard product range is designed by experienced in-house design engineers and manufactured in house at DLM Headquarters in the UK by qualified technicians.

Standard Tensile Link
SL-3.0

The SL-3.0 is a cable connected Tensile Link available with capacities ranging from 1t to 500t. These devices can be used in various tension load monitoring applications for industries worldwide and combine high levels of performance with excellent value.

The link comes complete supplied in a carrying/stowage case by capacity with a standard 10m signal cable and a battery powered TW-3.0-S display.

Dimensional Data



Features:

- Light weight aerospace grade aluminium
- High accuracy
- Rebranding option
- Wide range of capacities

Load Capacity (Tonnes)	Shackles	Part Number	A	B	C	D	ØE	Accuracy (% FRO)	Proof test (% Load Capacity)	Weight (Kg)	Default Resolution (Kg)
1	Crosby G2130	0001 – 1320	214	81	174	16	16.5	0.2	150	1.0	1
2	Crosby G2130	0001 – 1321	214	81	174	16	16.5	0.2	150	1.0	1
5	Crosby G2130	0001 – 1322	260	109	180	25	28	0.2	150	2.0	1
12	Crosby G2130	0001 – 1323	260	109	165	40	38	0.2	150	2.6	5
17	Crosby G2130	0001 – 1324	320	127	204	45	44	0.2	150	4.0	5
25	Crosby G2130	0001 – 1325	340	127	204	50	53	0.2	150	5.0	10
35	Crosby G2130	0001 – 1326	370	149	210	50	60	0.2	150	6.5	10
50	Crosby G2130	0001 – 1327	395	160	220	73	73	0.2	150	11	50
80	GN H9	0001 – 1328	465	180	250	98	86	0.2	150	18	100
100	GN H10	0001 – 1329	535	220	275	100	99	0.3	150	26.5	100
120	GN H10	0001 – 1330	535	220	275	100	99	0.3	150	29.5	100
150	GN H10	0001 – 1331	587	260	295	125	112	0.3	150	43.5	100
200	GN H10	0001 – 1332	658	320	320	125	128	0.5	150	62.0	100
200	Crosby G2140	0001 – 1333	658	320	320	125	125	0.5	150	62.0	100
300	GN H10	0001 – 1334	790	370	380	147	154	0.5	150	100.5	100
300	Crosby G2140	0001 – 1335	790	370	380	147	156	0.5	150	100.5	100
400	GN H10	0001 – 1336	950	500	500	175	180	1.0	150	200.0	100
400	Crosby G2140	0001 – 1337	950	500	500	175	183	1.0	150	200.0	100
500	GN H10	0001 – 1338	950	500	500	200	190	1.0	150	220.5	100
500	Crosby G2140	0001 – 1339	950	500	500	200	196	1.0	150	220.5	100

Specification

Link Material:	Aluminium
Bridge Resistance:	700Ω - 1000Ω
Operating Temperature Range:	-20°C to +60°C
Handheld Display	TW-3.0 cable connected Handheld Display
Cable:	Mil Spec/Tajimi termination. 10m signal cable standard
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Rugged and watertight case for links up to 50 tons. Custom made wooden case for larger capacities
Approvals	UKCA and CE tested and compliant

Standard Handheld Display
TW-3.0-S

The TW-3.0-S Standard Handheld Display is a modern, slimline, multifunctional load monitoring device which is unique to DLM.

This innovative design is built with the user in mind. It has a large, high quality transflective display which is optically bonded removing the need for a back light and improving clarity in bright sunlight. For ease of use each handheld can be given a customisable friendly name made visible on the screen to make instant identification possible.

This multi featured high precision unit ensures reliable load readings while also being simple to operate. It can be used in conjunction with any DLM manufactured load cell, just look for the d+ logo on our products.

Features:

- Connects to a single load cell via cable connection
- Ability to customise load cell name
- Internal audible alarm (90dB @ 0.1m / 75dB @ 1m)
- USB data logging
- RS232 serial or 0-5V analogue output
- Built in pulse measurement to show speed and distance
- Rolling average feature for unsteady loads
- High quality optically bonded transflective display to improve clarity in bright sunlight

Applications:

- Weight indication for any cable load cell fitted with any cabled load cell with a mV/V output
- This handheld is for 1 load cell input only.

Available Models

Type	Part Number	Description	Type	Part Number	Description
TW-3.0-S-S	0001-1269	Standard handheld with audible alarm output	TW-3.0-S-A-AO	0001-1271	Advanced handheld with additional analogue output
TW-3.0-S-A	0001-1270	Advanced handheld with alarm, USB logging and RS232 output			

Specification

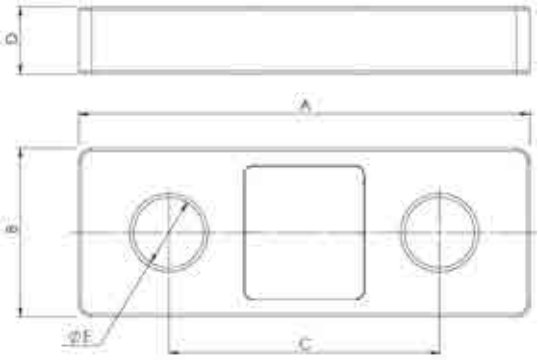
Enclosure	Slimline IP67 plastic enclosure
Keypad	Membrane with tactile dome switches
Display	400x240 Transflective Display
Bridge excitation	2.5VDC
Resolution	5 digits
Keys function	On/off / Tare / Peak hold / Units
Measuring ranges	Kg / Metric Tonnes / US Tons / Kips / kN / lb
Protection	IP67
Battery type	3xAA
Battery life (constant use)	> 150 hours
Operating temperature	-20°C to +60°C
Measurement rate	4 to 0.03Hz (4 times per second to once per 30seconds)
Serial retransmission	RS232 via USB / Serial convertor. Customisable ASCII string
Analogue Output	0-5VDC via splitter cable from handheld connector
Alarm	Internal alarm (90dB @ 0.1m / 75dB @1m)
USB data logging	Sample rates from 4Hz to 0.03Hz. Stored to micro USB key
Approvals	UKCA and CE tested and compliant

Telemetry Tensile Link
TL-3.0

The TL-3.0 is a third generation Telemetry Tensile Link load cell.
A light weight wireless tension measuring unit that combines a high level of performance with a robust design for harsh environments.

With a range up to 800m and a huge battery life of 700 hours the TL-3.0 can be paired with one or a multiple number of TW-3.0-T Telemetry Handheld Displays.

Dimensional Data



Features:

- Light weight aerospace grade aluminium
- 2.4GHz licence free frequency
- High accuracy
- Rebranding option
- 800m signal range
- Remote power on/off feature
- Sleep mode for battery conservation

Load Capacity (Tonnes)	Part Number	Shackles	A	B	C	D	ØE	Accuracy (% FRO)	Proof test % Load Capacity	Weight (kg)	Default Resolution (kg)
1	0001 – 1300	Crosby G2130	214	81	174	16	16.5	0.2	150	1.0	1
2	0001 – 1301	Crosby G2130	214	81	174	16	16.5	0.2	150	1.0	1
5	0001 – 1302	Crosby G2130	260	109	180	25	28	0.2	150	2.0	1
12	0001 – 1303	Crosby G2130	260	109	165	40	38	0.2	150	2.6	5
17	0001 – 1304	Crosby G2130	320	127	204	45	44	0.2	150	4.0	5
25	0001 – 1305	Crosby G2130	340	127	204	50	53	0.2	150	5.0	10
35	0001 – 1306	Crosby G2130	370	149	210	50	60	0.2	150	6.5	10
50	0001 – 1307	Crosby G2130	395	160	220	73	73	0.2	150	11	50
80	0001 – 1308	GN H9	465	180	250	98	86	0.2	150	18	100
100	0001 – 1309	GN H10	535	220	275	100	99	0.3	150	26.5	100
120	0001 – 1310	GN H10	535	240	275	100	99	0.3	150	29.5	100
150	0001 – 1311	GN H10	587	260	295	125	112	0.3	150	43.5	100
200	0001 – 1312	GN H10	658	320	320	125	128	0.5	150	62.0	100
200	0001 – 1313	Crosby G2140	658	320	320	125	125	0.5	150	62.0	100
300	0001 – 1314	GN H10	790	370	380	147	154	0.5	150	100.5	100
300	0001 – 1315	Crosby G2140	790	370	380	147	156	0.5	150	100.5	100
400	0001 – 1316	GN H10	950	500	500	175	180	1.0	150	200.0	100
400	0001 – 1317	Crosby G2140	950	500	500	175	183	1.0	150	200.0	100
500	0001 – 1318	GN H10	950	500	500	200	190	1.0	150	220.5	100
500	0001 – 1319	Crosby G2140	950	500	500	200	196	1.0	150	220.5	100

Specification

Link Material:	Aluminium
Design:	Holes designed to fit fed spec shackles / Pairing switch / Signal LED / Charging socket
Bridge Resistance:	700Ω
Battery:	1 x3.7V Li-Po rechargeable
Battery Life:	700 hours continuous (2 years non-operational)
Charger:	Supplied with USB Charger
Operating Temperature:	-20°C to +60°C
Handheld Display:	One or more TW3.0- T displays
Frequency:	2.4GHz
Range:	Up to 800m range (line of sight)
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Protection:	IP65
Packaging:	Rugged and watertight case for links up to 50T / Custom made wooden case for larger capacities
Approvals:	UKCA, CE, FCC and IC tested and compliant

Telemetry Handheld Display
TW-3.0-T

The TW-3.0-T Telemetry Handheld Display is a modern, slimline, multifunctional load monitoring device which is unique to DLM.

This innovative design is built with the user in mind. It has a large, high quality transflective display which is optically bonded removing the need for a back light and improving clarity in bright sunlight. Each of the 12 devices on the network can be given a customisable friendly name made visible on the screen to make instant identification possible.

This multi featured high precision unit ensures reliable load readings while also being simple to operate. It can be used in conjunction with any DLM manufactured load cell, just look for the d+ logo on our products.

Features:

- Creates networks comprising of up to 12 individual devices from a single handheld display
- Up to 800m wireless range
- Ability to customise load cell name
- Internal audible alarm (90dB @ 0.1m / 75dB @ 1m)
- USB data logging
- RS232 serial or 0-5V analogue output
- Built in pulse measurement to show speed and distance
- Built in signal checker
- Four advanced maths channels for totalising and use of trigonometric functions
- Rolling average feature for unsteady loads
- Specifically designed to work in high noise environments around powerful WiFi networks or port terminals
- High quality optically bonded transflective display to improve clarity in bright sunlight

Applications:

- Weight indication for any load cell fitted with DLM TW3.0 transmitter board
- For use with wireless Running Line Monitors and Saddlebacks

Available Models

Type	Part Number	Description
TW-3.0-T-S	0001-1272	Standard Telemetry Handheld with Alarm output
TW-3.0-T-A	0001-1273	Advanced handheld with alarm, USB logging and RS232 output

Type	Part Number	Description
TW-3.0-T-A-AO	0001-1274	Advanced handheld with additional analogue output

Specification

Enclosure	Slimline IP67 plastic enclosure
Keypad	Membrane with tactile dome switches
Display	400x240 Transflective Display
Resolution	5 digits
Key function	On/off / Tare / Peak hold / Units
Measuring ranges	Kg / Metric Tonnes / US Tons / Kips / kN / lb
Protection	IP67
Battery type	3xAA
Battery life (constant use)	> 150 hours
Operating temperature	-20 to +60C
Range	Up to 800m range (line of sight)
Frequency	2.4GHz
Measurement rate	4 to 0.03Hz (4 times per second to once per 30seconds)
Serial retransmission	RS232 via USB / Serial convertor. Customisable ASCII string
Analogue Output	0-5VDC via additional IP67 connector
Alarm	Internal alarm (90dB @ 0.1m / 75dB @1m)
Software	RS232 data logging
USB Data logging	Sample rates from 4Hz to 0.03Hz. Stored to micro USB key
Approvals	UKCA, CE, FCC and IC tested and compliant

Telemetry Dongle
TD-3.0

The TD-3.0 Telemetry Dongle is a USB multi-functional load monitoring device, designed and developed by Dynamic Load Monitoring.

Designed to be used in conjunction with a handheld or as a stand alone unit, this Telemetry Dongle can be paired with 12 TW-3.0 devices from a PC and is designed to be used with the TW-3.0 toolkit.

This multi-feature, high precision unit ensures reliable load readings, whilst also being simple to operate. It can be used in conjunction with any DLM manufactured load cell, just look out for the d+ logo on our products.

Features:

- Creates networks comprising of up to 12 individual devices from a single handheld display.
- Up to 600m wireless range
- Ability to customise the load cell name
- USB data logging
- Built in pulse measurement to show speed and distance.
- Built in signal checker
- Specially designed to work in high noise environments

Applications:

- Load Testing operations from a PC
- PC-based load monitoring
- For use with wireless RLMs

Available Models

Type	Part Number	Description
TD-3.0	0001-1531	TD-3.0 USB Telemetry Dongle

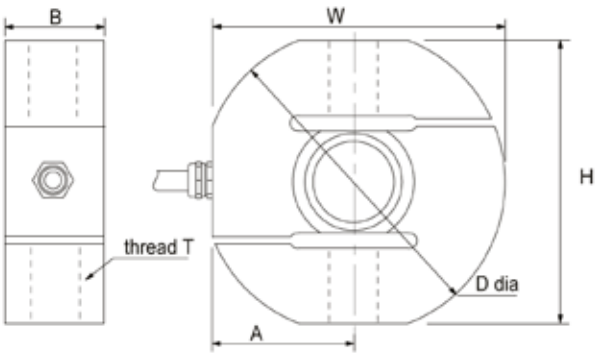
Specification

Enclosure	Slimline plastic enclosure
Connection	USB 2.0 Type A
Antenna connection	SMA
Antenna gain	2 dBi
Resolution	5 digits
Measuring ranges	Kg / Metric Tonnes / US Tons / Kips / kN / lb
Operating Temperature	-20 to +60c
Range	Up to 600m range (line of sight)
Frequency	2.4GHz
Measurement rate	4 to 0.03Hz (4 times per second to once per 30 seconds)
Software	TW-3.0 toolkit
USB data logging	Sample rates from 4Hz to 0.03Hz
Approvals	UKCA and CE tested and compliant

S Cell Load Cell
SC-1.0

S Cell - 250kg - 20,000kg.

Dimensional Data



Features:

- Welded covers
- Stainless steel
- Sealed to IP68
- Tension and compression
- High accuracy

Applications:

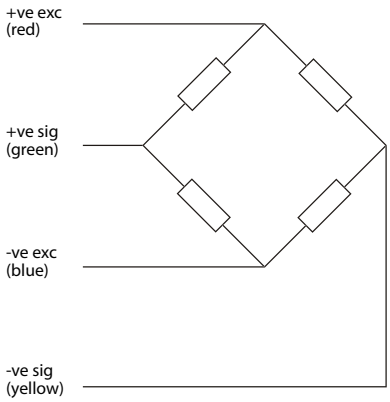
- Test stands
- Certification
- Vessel and tank weighing
- Retro fitting in OEM equipment

Capacity (kg)	Part Number	A	W	H	B	ØD	Thread T
250	0001 – 1052	35	72.5	70	24.5	75	M12x1.75
500	0001 – 1053	35	72.5	70	24.5	75	M12x1.75
1000	0001 – 1054	45	95	95	30	100	M20x1.5
2000	0001 – 1055	45	95	95	30	100	M20x1.5
5000	0001 – 1056	57.5	120	120	40	125	M24x2
10000	0001 – 1057	65	141	145	55	152	M30x2
20000	0001 – 1058	88	188	190	70	200	M45x3

Options: Eye-bolts, compression fittings and instrumentation.
Please enquire for details.

Specification

Capacities	250kg / 500kg / 1000kg / 2000kg / 5000kg / 10000kg / 20000kg
Full Load Output	2.0 (±0.25%) mV/V
Zero Load Output	<±2.0 %
Excitation (Max)	10 (15) V
Accuracy	<0.03 %
Repeatability	<0.01 %
Input Resistance	410 (±30) Ω
Output Resistance	350 (±2) Ω
Compensated Temp. Range	-10 to +40 °C
Operating Temp. Range	-20 to +60 °C
Temp. Coefficient on Zero	<0.0015 % Capacity/°C
Temp Coefficient on Span	<0.002 % Capacity/°C
Safe Overload	150 %
Insulation	500MOhms @ 100Vdc
Environmental Protection	IP68

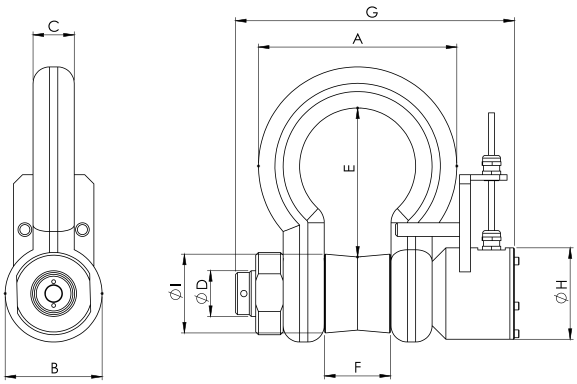


Standard Shackle Load Cell
SS-3.0

The DLM Standard Shackle Load Cell is a high strength marine grade cable connected Load Cell. Manufactured from industry leading Crosby or GN Shackles along with a stainless steel load pin.

The DLM Standard Shackle Load Cell offers a robust and “easy to use” tension monitoring solution for various applications. It is supplied with 10m of tough PUR signal cable as standard and can be combined with either a TW-3.0-S Cable Handheld Display or custom display to show the load.

Dimensional Data



Features:

- Rugged design
- Stainless steel construction
- Low headroom when rigged
- Multiple output options (mV/V, 4-20mA, 0-10V, RS485 ASCII, RS485 MODBUS)
- Supplied with load centering bobbin

Applications:

- Umbilical Load Monitoring
- Under hook crane weighing
- Cable tension monitoring
- Heavy lift
- Bollard pull and certification

Load Capacity (Tonnes)	Part Number	Shackles	A	B	C	D	E	F	G	H	I	Proof Load (Tonnes)	Accuracy (% FRO)	Resolution (kg)
6.5	0001 – 1340	Crosby G2130	102	75	22	22	72	36.6	175	75	53	9.75	<±1	1
12	0001 – 1341	Crosby G2130	146	76	31.8	35	107	51.5	235	100	60	18	<±1	5
25	0001 – 1342	Crosby G2130	225	106	44.5	50	162	73	300	100	86	37.5	<±1	10
55	0001 – 1343	Crosby G2130	327	145	66.5	70	246	105	385	100	114	82.5	<±1	50
85	0001 – 1344	GN H9	365	165	76	82	308	127	444	110	130	127.5	±1	100
120	0001 – 1345	GN H10	416	200	89	95	347	150	493	110	150	180	±1	100
200	0001 – 1346	GN H10	530	260	120	125	450	180	600	140	235	300	±1	100
300	0001 – 1347	GN H10	565	305	130	150	534	200	640	150	287	350	±1	100
400	0001 – 1348	GN H10	655	350	165	175	600	230	720	185	345	600	±1	100
500	0001 – 1349	GN H10	710	370	180	185	610	255	780	200	375	750	±1	100

Specification

Pin Material:	17-4PH H1150+1150 stainless steel
Bridge Resistance:	350Ω
Operating Temperature:	-20°C to +60°C
Display:	TW-3.0-S Cable Handheld Display
Signal Cable:	10m of PUR screened signal cable as standard
Protection:	IP66 with mil spec connector / IP67 with cable gland
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Wooden stowage case

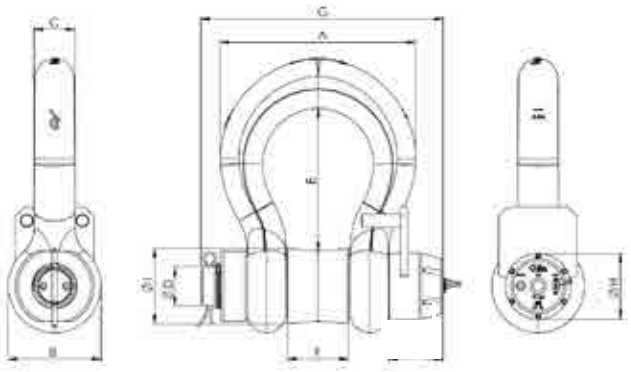
Telemetry Shackle Load Cell
TS-3.0

The DLM Telemetry Shackle is a high strength marine grade wireless Load Cell.

Manufactured from industry leading Crosby and GN shackles along with a stainless steel load pin, the DLM Telemetry Shackle offers reduction in weighing headroom with the flexibility of 2.4GHz licence free wireless load transmission.

The DLM Telemetry Shackle can be used with one or multiple TW-3.0-T Handheld Displays showing the load.

Dimensional Data



Features:

- Rugged design
- Ability to transmit to multiple hand held displays
- 2.4GHz license free frequency
- 800m range (line of sight)
- Stainless steel construction
- Low headroom when rigged
- Supplied with load centering bobbin
- Remote power on/off feature
- Sleep mode for battery conservation

Load Capacity (Tonnes)	Part Number	Shackle	A	ØB	C	ØD	E	F	G	ØH	ØI	Proof Load	Accuracy (%FRO)	Resolution (kg)
6.5	0001-1350	G2130	102	53	22	25	72	35	175	75	53	150%	<±1	1
12	0001-1351	G2130	146	76	33	35	108	49	212	75	60	150%	<±1	2
25	0001-1352	G2130	224	106	47	52	163	70	277	75	86	150%	<±1	5
55	0001-1353	GN H9	324	148	66	70	249	100	362	110	114	150%	<±1	10
85	0001-1354	GN H10	340	165	75	83	311	120	409	110	130	150%	<±1	10
120	0001-1355	GN H10	416	200	89	80	358	150	460	110	150	150%	<±1	50
200	0001-1356	GN H10	530	260	120	90	448	180	562	110	235	150%	<±1	100
300	0001-1357	GN H10	565	305	130	120	541	205	612	110	287	150%	<±1	100
400	0001-1358	GN H10	655	350	165	120	603	230	707	110	345	150%	<±1	100
500	0001-1359	GN H10	710	370	180	160	623	255	740	110	375	150%	<±1	100

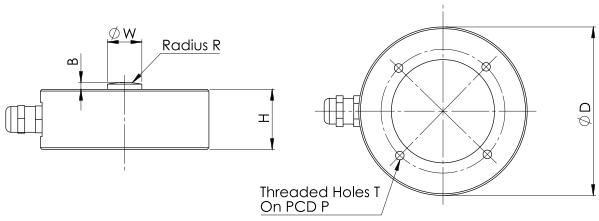
Specification

Pin Material:	17-4PH H1150+1150 Stainless Steel
Bridge Resistance:	700Ω
Operating Temperature:	-20°C to +60°C
Display:	TW3.0-T Telemetry Handheld Display
Transmission Frequency:	2.4GHz
Range:	Up to 800m range (line of sight)
Battery Type:	1 x3.7V Li-Po rechargeable
Battery Life:	350 Hours (2 years non-operational)
Battery Charger:	Supplied with USB Charger
Protection:	IP67
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Wooden Storage Case
Approvals:	UKCA, CE, FCC and IC tested and compliant

Low Profile Compressive Load Cell
CCLP-1.0

Low Profile Compressive Load Cell - 0.5t to 20t

Dimensional Data



Features:

- Low height
- Stainless steel
- Sealed to IP68
- Compression load cell
- Integral load button
- Welded cover

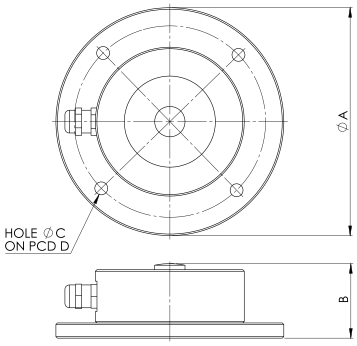
Applications:

- Testing and certification
- Test stands
- Vessel weighing

Capacity (t)	Part Number	H	B	W	R	D	T	P
0.5	0001 – 1077	21	4	10	50	59	M3x7	42
1	0001 – 1078	21	4	10	50	59	M3x7	42
2	0001 – 1079	35	5	20	150	98	M6x18	72
5	0001 – 1080	35	5	20	150	98	M6x18	72
10	0001 – 1081	35	5	20	150	98	M6x18	72
20	0001 – 1082	35	5	20	150	98	M6x18	72

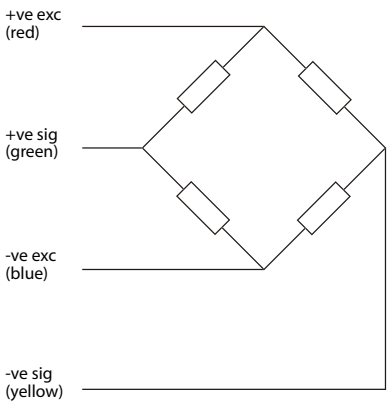
Load cell with optional base

Capacity (t)	Part Numbers	ØA	B	ØC	D
0.5	0001 – 1229	80	30	5.5	66
1	0001 – 1230	80	30	5.5	66
2	0001 – 1231	150	50	9	120
5	0001 – 1232	150	50	9	120
10	0001 – 1240	150	50	9	120
20	0001 – 1233	150	50	9	120



Specification

Capacities	0.5, 1, 2, 5, 10, 20 tonnes
Full load output	2.0 (±0.25%) mV/V
Zero load output	<±2.0 %
Excitation (max)	10 (15) V
Accuracy	<0.25 %
Repeatability	<0.1 %
Input resistance	750 (±20) Ω
Output resistance	700 (±2) Ω
Compensated temp. range	-10 to +40 °C
Operating temp. range	-20 to +60 °C
Temp. coefficient on zero	<0.005 % Capacity/°C
Temp. coefficient on span	<0.005 % Capacity/°C
Safe overload	150 %
Insulation	500MOhms @ 100Vdc
Environmental protection	IP68

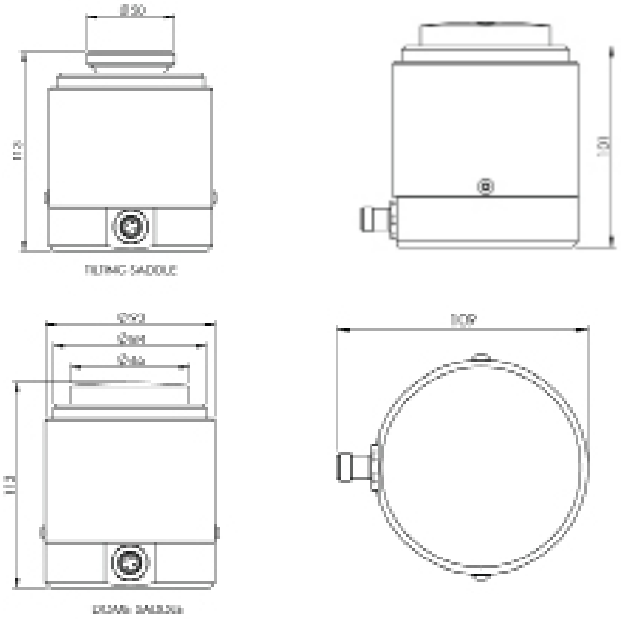


Small Compressive Load Cell
CCSM-3.0

DLM's range of Small Compressive load cells can be used independently or in combination as part of weighing platforms.

These Small Compressive load cells are available from 10t to 50t and manufactured using high grade stainless steel, making these load cells particularly suited to rugged environments and the hire industry amongst others. Other size compressives can be designed upon request.

Dimensional Data



Features:

- Small, compact and portable design
- Optional user replaceable tilting or dome saddle
- Stainless steel construction
- Proven design

Applications:

- Tank weighing
- Hydraulic lifting operations
- Vessel weighing
- Certification

Load Capacity (Tonnes)	Description	Part Number	Accuracy (% FRO)	Proof Load (% Load Capacity)	Weight (kg)	Resolution (kg)
10	No Saddle	0001 – 1360	<±0.5	150	4.5	5
20	No Saddle	0001 – 1361	<±0.5	150	4.5	10
30	No Saddle	0001 – 1362	<±0.5	150	4.5	10
50	No Saddle	0001 – 1363	<±0.5	150	4.5	10

Accessories Table

Part Number	Description
P0020-0727	Tilting Saddle
P0020-0099	Dome Saddle

Specification

Load cell Material:	17-4PH Stainless steel
Bridge Resistance:	1000Ω
Saddle Options:	Dome saddle / Tilting saddle
Operating Temperature range:	-10°C to +60°C
Compatible Display Units:	TW3.0-S Handheld Display / Custom built display
Cable:	M12 10m signal cable standard (increased lengths available on request)./ Tajimi Connector termination to display
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Packaged in rugged storm/Peli watertight case

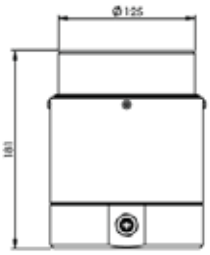
Large Compressive Load Cell
CCLG-3.0

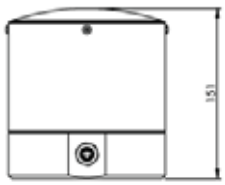
DLM's range of Large Compressive load cells can be used independently or in combination as part of weighing platforms.

The large range is available from 100t to 300t and manufactured using high grade stainless steel, making these load cells particularly suited to rugged environments and the hire industry amongst others. Other size compressives can be designed upon request.

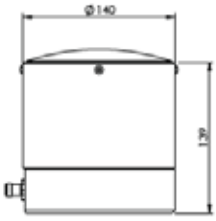
Dimensional Data

Load Cell and Saddle





Load Cell only



Features:

- Small, compact and portable design
- Optional load saddle
- Stainless steel construction
- Light weight

Applications:

- Tank weighing
- Hydraulic lifting operations
- Vessel weighing
- Certification

Load Capacity (Tonnes)	Part Number	Accuracy (% FRO)	Proof Load (% Load Capacity)	Weight (kg)	Resolution (Kg)
100	0001 – 1364	<±0.5	150	14	100
150	0001 – 1365	<±0.5	225	14	100
200	0001 – 1366	<±0.5	300	14	100
300	0001 – 1367	<±0.5	450	14	100

Optional Extra

Part Number	Description
0001-1227	Saddle

Specification

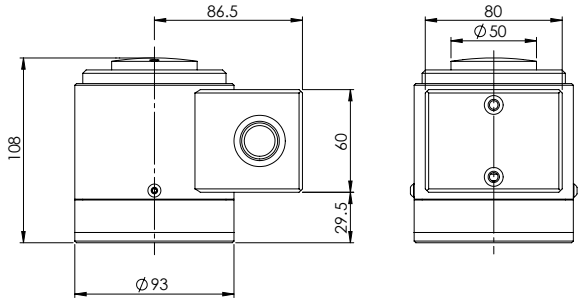
Load cell Material:	17-4PH Stainless steel
Bridge Resistance:	1000Ω
Operating Temperature range:	-10°C to +60°C
Compatible Display Units:	TW3.0-S Handheld Display / Custom built display
Cable:	M12 10m signal cable standard (increased lengths available on request). / Tajimi Connector termination to display
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Packaged in rugged storm/Peli watertight case

Small Telemetry Compressive Load Cell
TC-3.0-SM

DLM's Telemetry Compressive Load Cells can be used independently or in combination as part of weighing platforms.

They range from 10t to 50t and manufactured using high grade stainless steel, making these load cells particulary suited to rugged environments and the hire industry amongst others. Other size compressives can be designed upon request. Some applications include: tank weighing, silo weighing, container weighing and certification.

Dimensional Data



Features:

- 2.4GHz licence free frequency
- Ability to transmit to unlimited handheld displays
- Up to 800m range (line of sight)
- Remote power on/off
- Sleep mode for battery conservation
- Use the TW-3.0 Handheld to totalise load readings from multiple compressive load cells

Load Capacity (Tonnes)	Description	Part Number	Accuracy (% FRO)	Proof Load (% Load Capacity)	Weight (kg)	Resolution (kg)
10	No Saddle	0001 – 1368	<±0.5	150	4.5	10
20	No Saddle	0001 – 1369	<±0.5	150	4.5	10
30	No Saddle	0001 – 1370	<±0.5	150	4.5	10
50	No Saddle	0001 – 1371	<±0.5	150	4.5	10

Accessories Table

Part Number	Description
P0020-0727	Tilting Saddle
P0020-0099	Dome Saddle

Specification

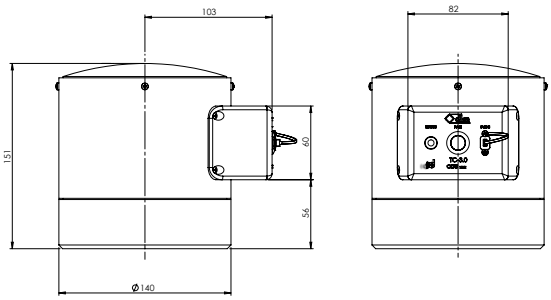
Battery:	3.7V Li-Po rechargeable
Battery Life:	700 hours continuous (2 years non operational)
Charger:	Supplied with USB charger
Operating Temperature:	-20°C to +60°C
Frequency:	2.4GHz
Range:	Up to 800m range (line of sight)
Loadcell Material	Stainless steel
Bridge Resistance:	1000Ω
Saddle Options:	Dome saddle / Tilting saddle
Operating Temperature range:	-10°C to +60°C
Compatible With:	TW-3.0-T handheld display / Custom built display / Centre of gravity display
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Packaged in rugged storm / watertight peli case
Approvals:	UKCA, CE, FCC and IC tested and compliant

Large Telemetry Compressive Load Cell TC-3.0-LG

DLM's Telemetry Compressive Load Cells can be used independently or in combination as part of weighing platforms.

They range from 100t to 300t and manufactured using high grade stainless steel, making these load cells particularly suited to rugged environments and the hire industry. Bespoke size compressive load cells can be designed upon request. Some applications include: tank weighing, hydraulic lifting operations, vessel weighing and certification.

Dimensional Data



Features:

- 2.4GHz licence free frequency
- Ability to transmit to unlimited handheld displays
- Up to 800m range (line of sight)
- Remote power on/off
- Sleep mode for battery conservation
- Use the TW-3.0 Handheld to totalise load readings from multiple compressive load cells

Load Capacity (Tonnes)	Description	Part Number	Accuracy (% FRO)	Proof Load (% Load Capacity)	Weight (kg)	Resolution (kg)
100	Dome Top	0001-1372	<±0.5	150	14	100
150	Dome Top	0001-1373	<±0.5	150	14	100
200	Dome Top	0001-1374	<±0.5	150	14	100
300	Dome Top	0001-1375	<±0.5	150	14	100

Specification

Battery:	1 x 3.7V Li-Po rechargeable
Battery Life:	700 hours continuous (2 years non-operational)
Charger:	Supplied with USB charger
Operating Temperature:	-20°C to +60°C
Handheld Display:	One or more TW-3.0 display
Frequency:	2.4GHz
Range:	Up to 800m range (line of sight)
Loadcell Material:	Stainless steel
Bridge Resistance:	1000Ω
Saddle Options:	Dome saddle
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Packaged in rugged storm/ watertight peli case.
Compatible With:	TW-3.0-T handheld display / Custom built display / Centre of gravity display
Optional extras:	100-300t load saddle. Part number 0001-1227
Approvals:	UKCA, CE, FCC and IC tested and compliant

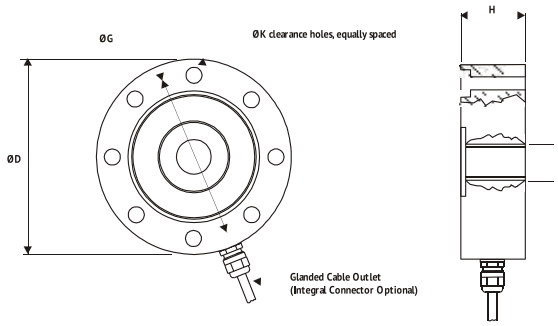
Pancake Load Cell
PC-1.0

Low Profile Tension & Compression Load Cell - 5kN to 1000kN.

Options

- Other ranges available on request
- Full range of mounting options
- Connector version
- Double bridge version
- Atex approved version

Dimensional Data



Features:

- Range 5kN to 1000kN
- Low profile design
- Low deflection
- Atex certification available
- High natural frequency
- Excellent rejection of extraneous forces
- Fatigue rated to 109 full cycles

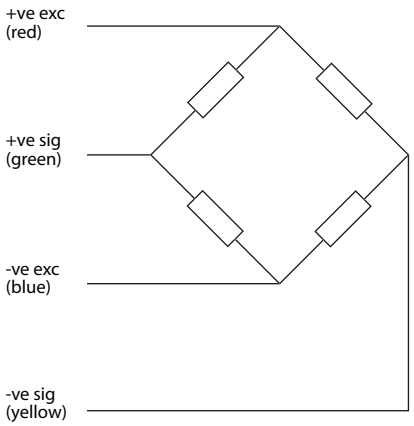
Applications:

- Test machines
- Cable engines and tensioners
- Offshore applications
- Integration in OEM applications

Range (kN)	Part Number	ØD	H	ØG	ØK	T
5	0001 – 1098	107	33	90	8 off Ø8.5	M20x2
10	0001 – 1099	107	33	90	8 off Ø8.5	M20x2
25	0001 – 1100	107	33	90	8 off Ø8.5	M20x2
50	0001 – 1101	107	33	90	8 off Ø8.5	M20x2
100	0001 – 1102	155	45	130	12 off Ø11	M36x2
200	0001 – 1103	155	45	130	12 off Ø11	M36x2
500	0001 – 1104	280	78	230	16 off Ø17	M64x6
1000	0001 – 1105	280	78	230	16 off Ø17	M64x6

Specification

Capacities	±5, ±10, ±25, ±50, ±100, ±200, ±500, ±1000 kN
Full Load Output	2.0 (±0.25%) mV/V
Zero Load Output	<±2.0 %
Excitation (Max)	10 (15) V
Accuracy	<0.1 %
Repeatability	<0.03 %
Input Resistance	375 (±20) Ω
Output Resistance	350 Ω
Compensated Temp. Range	-10 to +40 °C
Operating Temp. Range	-20 to +60 °C
Temp. Coefficient on Zero	<0.005% Capacity/°C
Temp Coefficient on Span	<0.005% Capacity/°C
Safe Overload	150 %
Insulation	500MΩ @100Vdc
Environmental Protection	IP65
Cable Length	4m



Silo Load Cell
SL-1.0

The Silo Load Cell from DLM offers a complete vessel weighing solution incorporating lift off prevention and vessel expansion without compromising accuracy.

It features a fully welded sensor and is manufactured from high tensile stainless steel type 17-4PH for endurance durability and corrosion resistance.

The sensor becomes an integral part of your assembly and eliminates the need for vessel restraints or check rods.

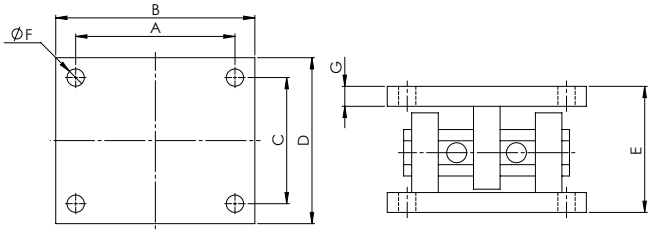
We can also offer customised designs suited to your exact specification; as well as a selection of optional accessories including stainless steel brackets and a range of instrumentation.

Silo Systems: Silo load cells can be supplied with full load monitoring systems including panel meter/ HMI displays, ticket printers, digital and analogue retransmissions. Systems can be designed to meet clients exacting specifications. Please contact us to discuss your full requirements.

Features:

- Range 0.5-100t
- Low profile design
- Low deflection
- Atex certification available
- High natural frequency
- Excellent rejection of extraneous forces
- Fatigue rated to 109 full cycles

Dimensional Data



Type	Part Number	Capacity	A	B	C	D	E	ØF	NO.F	C	Min Expansion
Size1	0001 - 1087	1 – 5t	105	150	94	124	88	13	8	12.7	3mm
Size2	0001 - 1088	2 – 20t	140	200	125	165	117	18	8	18	4mm
Size3	0001 - 1089	10 – 50t	175	280	175	230	162	22	8	25	6mm
Size4	0001 - 1090	75t	240	300	190	250	184	26	12	25	6mm
Size5	0001 - 1091	100t	250	320	230	300	210	26	12	30	8mm

Specification

Capacities:	0.5t, 1t, 2t, 5t, 7.5t, 10t, 20t, 30t, 50t, 75t, 100t
Full Load Output:	2.0 mV/V
Zero Load Output:	10V (15V)
Accuracy (combined error):	<0.05%
Repeatability:	<0.01%
Input Resistance:	750Ω (+/-20)
Output Resistance:	700Ω (+/-2)
Compensated Temp. Range:	-10 to +50°C
Operating Temp. Range	-25 to +70°C
Temp. coefficient on Zero:	<0.005% Capacity/°C
Temp. coefficient of Span:	<0.003 Capacity/°C
Safe Overload:	150% of WLL
Insulation:	>500MΩ@100Vdc
Environmental Protection:	IP68

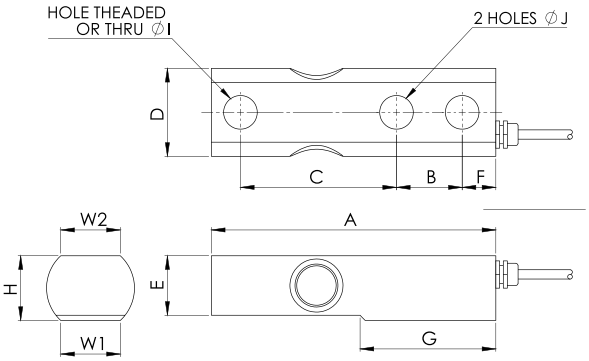
Available in following finishes for the mounting bracket:

- Standard Zinc Phosphate & Black E-Coat with powder coated Yellow.
- Any Ral colour to be powder coated over the standard finish in replace Yellow.

Shear Beam Load Cell
SB-1.0

The Shear Beam Load Cell SB-1.0 is a single point weighing device, suitable for use in multiple applications.

Dimensional Data



Features:

- Welded covers
- Stainless steel body
- Sealed to IP68
- Integral mounting base
- High accuracy
- ATEX certification available

Applications:

- Industrial automation
- Bulk tank weighing
- Manufacturing plants
- Saddleback monitors

Load Capacity (Kg)	Part Number	A	B	C	D	E	F	G	H	ØJ	W1	W1	ØI
250	0001 – 1092	135	25.4	76.2	38.1	26	16	58.5	28	13	22	27	M12x1.75
500	0001 – 1093	135	25.4	76.2	38.1	26	16	58.5	28	13	22	27	M12x1.75
1000	0001 – 1094	135	25.4	76.2	38.1	26	16	58.5	28	13	22	27	M12x1.75
2000	0001 – 1095	135	25.4	76.2	38.1	26	16	58.5	28	13	22	27	M16x2.0
5000	0001 – 1096	170	38.1	95.3	50.8	36	20	76	39	21	28.5	36	Ø21
10000	0001 – 1097	220	50.8	120.7	68	46	26	105	52	26	35.5	50	Ø26

Specification

Link Material:	Stainless steel
Capacities:	250kg, 500kg, 1000kg, 2000kg, 5000kg, 10000kg
Full load output:	2.0mV/V (+/-0.25%)
Zero load output:	<+/-2.0%
Excitation (max):	10V (15V)
Accuracy:	<0.03%
Repeatability:	<0.01%
Input Resistance:	410Ω (+/-30)
Output Resistance:	350Ω (+/-2)
Compensated temp. range:	-10 to +40°C
Operating temp. range:	-20 to +60°C
Temp. coefficient on zero:	<0.0015 % Capacity/°C
Temp. coefficient on span:	<0.002 % Capacity/°C
Safe overload:	150%
Insulation:	>500MΩ @100Vdc
Environmental Protection:	IP68

Specialised Load Monitoring

Saddleback Monitor
RLM/Saddleback Display
15T Standard Running Line Monitor
60T Standard Running Line Monitor
200T Standard Running Line Monitor
15T Telemetry Running Line Monitor
60T Telemetry Running Line Monitor
200T Telemetry Running Line Monitor
Subsea Tensile Link
Subsea Datalogging Tensile Link
Subsea Shackle Load Cell
Acoustic Load Shackle
Subsea Data logger DL.30
PCB Data logger DL.30
3510 PAM Portable

Overview:

DLM have a wide range of specialist monitoring equipment for industry specific applications, ranging from saddleback monitors for PLGR operations to logging subsea loads with our data loggers.

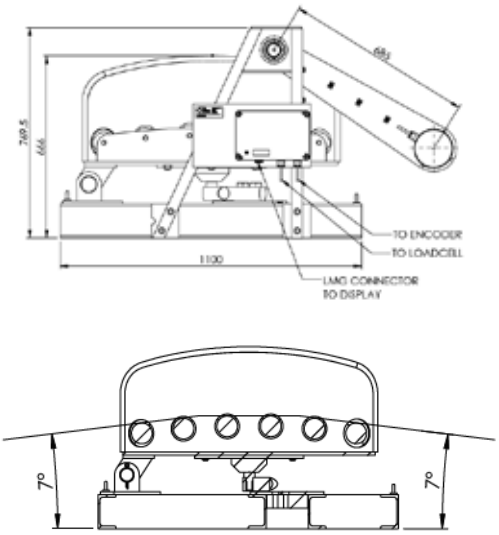
Saddleback Monitor
SBM-1.0

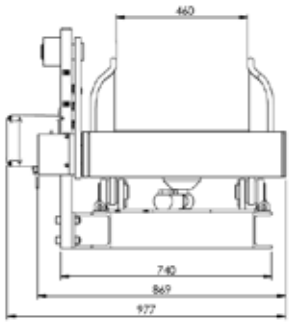
The DLM Saddleback is a line tension monitor suited for more delicate cable, including telecommunication cables or large cable where a Running Line Monitor is unsuitable.

The line tension is measured by the cable passing over the chute and deflecting the Load Cell mounted beneath.

As with the Running Line Monitors, the speed or distance of the cable pay out can be measured by the roller arm incorporated within the Saddleback.

Dimensional Data





Features:

- DLM proprietary design
- Designed exclusively for the rigors of the offshore cable laying industry
- Roller chute
- Integral measuring wheel
- Lifting eyes and securement plates
- Optional frame and goal posts
- Suitable for use with a wide range of cable diameters

Applications:

- Offshore Cable Laying
- PLGR
- Towing operations

Specification

Frame Construction:	• Welded steel fabrication • Integral encoder box located on the side frame • Sealed needle roller bearings used throughout • Robust design for harsh environments • Large or small capacities available
Frame Finish:	Epoxy powder coat 170 µ thickness
Chute Option:	Static / Roller
Load Cell Specification:	Stainless Steel / IP68 sealed / Shear Beam load cell
Saddleback Variants:	*Note: all Saddleback dimensions remain the same, the only difference is the Load Cell capacity which is fitted to the Saddleback.*

Type	Part number	Load cell	Expected line tension min	Expected line tension max
Size 1	0001 - 1106	2.5t	5t	10t
Size 2	0001 - 1107	5t	10t	20t
Size 3	0001 - 1108	10t	20t	40t

All expected line tension ratings are calculated under the assumption that the Saddleback is mounted such that the cable running over the Chute is at 7° (wrap of 166°). Line tensions seen will vary if different mounting arrangements are employed

Amplifier:	3 Wire 4-20mA current source / 18-24VDC powered / Potted for high environmental protection / Mounted in IP66 sealed marshalling box / Signal and power connection through IP67 LMG bulkhead connector shared with encoder output/input
Encoder:	Mounted inside gasket sealed Roller Arm / Push-Pull quadrature output / 18-24VDC Powered / Signal and Power connection through IP67 LMG bulkhead connector shared with amplifier output/input
Saddleback Mounting:	Welded base frame suitable for welding to ships deck
Display:	Optional Master and Slave displays with serial and analogue retransmission
Optional Extras:	Cradles with goal posts / Wear plates / Fleeting gear

RLM/Saddleback Display
MD - 2.0

The RLM/Saddleback display unit is designed for use with DLM modular equipment, specifically the Running Line Monitor's and Saddleback's. The display is built suitable for rugged environments and can be supplied as either a portable unit in a peli case or as fixed installation unit in a stainless steel enclosure.

The display has the ability to display both the tension as well as speed/distance from either the Running Line Monitor or Saddleback and is supplied with digital output options for interfacing to third party equipment or internal data logging/ LAN network access via Ethernet.

Features:

- Rugged design
- Bright red LED displays
- Internal data logging and LAN access options
- RS232/RS485 outputs

Applications:

- Winch line tension and distance monitoring
- PLGR line tension and distance monitoring
- Crane applications
- Cable laying
- Rental equipment

Options

Part Number	Description
0001-1478	Peli case display with RS232/RS485 retransmission
0001-1214	Peli case display with internal data logging / LAN access
0001-1459	Stainless steel display with RS232/RS485 retransmission
0001-1216	Stainless steel display with internal data logging / LAN access

Specification

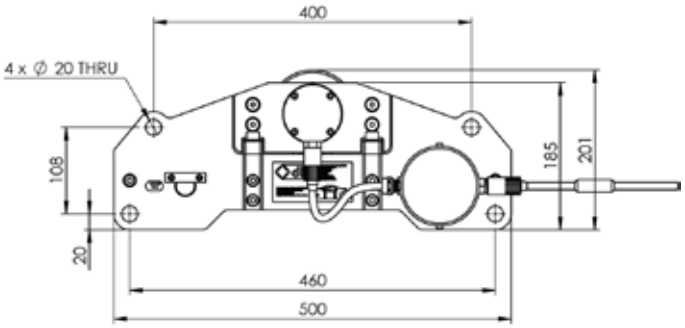
Enclosure	Peli case (for portable applications) / stainless steel (for permanent fixtures)
Display	2 x Bright red LED sunlight readable / panel meters, one for tension and one for speed / distance / 5 digit display
Power requirements	95-240VAC mains
Sensor Inputs	Load Cell (mA) / Encoder (quadrature push pull)
Display units	Load (kg, Tonnes, lbs, kN, Kips etc) / Distance (m, km etc) programmed as required / Speed (km/hr, m/s etc) programmed as required
External switches	1 x tare tension / 1 x zero speed/distance / 1 x on/off switch
Protection	IP67
Retransmission option (0001-1119 & 0001-1215)	• 1 x RS232 port for tension supplied with 5m transmission lead terminated with DB9 connector • 1 x RS232 port for distance supplied with 5m transmission lead terminated with DB9 connector • 1 x RS485 port for tension supplied with 5m transmission lead terminated with DB9 connector • 1 x RS485 port for distance supplied with 5m transmission lead terminated with DB9 connector
Serial String format	Tension <LF><tension><CR><LF>
(RS232 or RS485)	Speed and distance: <LF><speed><CR><LF> <LF><distance><CR><LF>
Data logging option (0001-1214 & 0001-1216)	• Internal data logging of tension and speed/distance values • Internal memory capacity of 2Gb suitable for 52 x 10^6 samples • Logging rate of 1Hz • Remote access to logs through any web browser using dedicated webpage. Can be accessed by ethernet connection or remotely with modem attached • Ability to connect to LAN network via ethernet port on display • Remote access real time graphical display on PC using any web browser.
Additional non-standard extras	• Audible and visual alarms • Winch cut out relays • Network switches • Protocol conversion between many different PLC's

15T Standard Running Line Monitor
RLM15T-3.0-S

The DLM 15T Running Line Monitor measures the tension on a rope passing through its three wheels. Typically used in cable laying and winch operations to measure and record line tension the robust design has become an industry standard.

The monitor can be supplied as a separate item for integration with customers existing PLC's or with a DLM digital display/HMI touch screen display.

Dimensional Data



Features:

- Fully sealed design to IP67
- Robust design suitable for harsh environments
- Integral speed and distance measurement as well as tension
- Easy to rig without the need to remove sheaves from axles
- Lifting and securing points
- Optional mounting fixtures

Available Models

Part Number	Description	Wheel Sizes
0001-1466	Tension, Speed & Distance	8mm to 36mm
0001-1467	Tension Only	8mm to 36mm

Applications:

- Winch load monitoring
- Towing and salvage
- PLGR
- Cable laying
- Crane load monitoring

Accessories Table

Part Number	Description
0001-1452	Tethering Arm

Specification

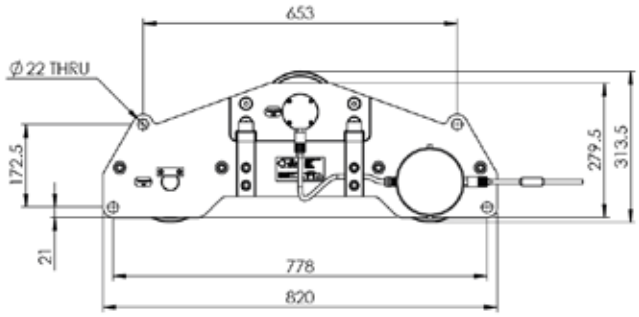
Frame Construction:	CNC machined side plates fixed together using high tensile stainless steel bolts and supporting spacers. No welded joints. Dual frame construction (upper and lower) for easy rigging and rope insertion. O-ring sealed encoder protection casing. Sealed roller bearings used on all wheels.
Frame Finish:	Galvanised prior to painting. Colour to suit customer requirements (orange and black as standard) Painted with marine grade paint.
Wheel Material:	EN24T alloy steel (Hardened to 40 Rockwell upon request)
Axles and Shear Pin Material:	17-4PH H1150 + 1150 stainless steel
Shear Pin Load Cell Axle:	Suitable for line tensions up to 15t / Connection through MCBH-3-FS and MCIL-3-MP subsea connectors and IP67 gland to sealed encoder casing. O- ring sealed.
Amplifier:	3 Wire 4-20mA current source / 18-24VDC Powered / Mounted in load pin head, signal and power connection through MCBH-8-MP bulkhead connector.
Encoder:	Mounted inside O-ring sealed Encoder casing bolted to frame. Push-Pull quadrature output / 18-24VDC powered / Signal and power connection through MCBH-8-MP bulkhead connector
RLM Mounting:	4 machined eyes located on each side plate for easy rigging to spooling gear or for use as lifting points / Machined stainless steel spacers double as lifting or carrying points
Optional Extras:	Fleeting gear / Mounting posts / Mounting brackets
Other Available RLM Sizes:	60t, 200t.

60T Standard Running Line Monitor
RLM60T-3.0-S

The DLM 60t Running Line Monitor measures the tension on a rope passing through its three wheels. Typically used in cable laying and winch operations to measure and record line tension the robust design has become an industry standard.

The monitor can be supplied as a separate item for integration with customers existing PLC's or with a DLM digital display/HMI touch screen display.

Dimensional Data



Features:

- Fully sealed design to IP67
- Robust design suitable for harsh environments
- Integral speed and distance measurement as well as tension
- Easy to rig without the need to remove sheaves from axles
- Lifting and securing points
- Optional mounting fixtures

Available Models

Part Number	Description	Wheel Sizes
0001-1407	Tension, Speed & Distance	26mm to 60mm
0001-1460	Tension Only	26mm to 60mm

Applications:

- Winch load monitoring
- Towing and salvage
- PLGR
- Cable laying
- Crane load monitoring

Accessories Table

Part Number	Description
0001-1451	Tethering Arm

Specification

Frame Construction:	CNC machined side plates fixed together using high tensile stainless steel bolts and supporting spacers. No welded joints. Dual frame construction (upper and lower) for easy rigging and rope insertion. O-ring sealed encoder protection casing. Sealed roller bearings used on all wheels.
Frame Finish:	Galvanised prior to painting. Colour to suit customer requirements (orange and black as standard) Painted with marine grade paint.
Wheel Material:	EN24T alloy steel (Hardened to 40 Rockwell upon request)
Axles and Shear Pin Material:	17-4PH H1150 + 1150 stainless steel
Shear Pin Load Cell Axle:	Suitable for line tensions up to 60t / Connection through MCBH-3-FS and MCIL-3-MP subsea connectors and IP67 gland to sealed encoder casing. O- ring sealed.
Amplifier:	3 Wire 4-20mA current source / 18-24VDC Powered / Mounted in load pin head, signal and power connection through MCBH-8-MP bulkhead connector.
Encoder:	Mounted inside O-ring sealed Encoder casing bolted to frame. Push-Pull quadrature output / 18-24VDC powered / Signal and power connection through MCBH-8-MP bulkhead connector
RLM Mounting:	4 machined eyes located on each side plate for easy rigging to spooling gear or for use as lifting points / Machined stainless steel spacers double as lifting or carrying points
Optional Extras:	Fleeting gear / Mounting posts / Mounting brackets
Other Available RLM Sizes:	15t, 200t.

200T Standard Running Line Monitor
RLM200T-3.0-S

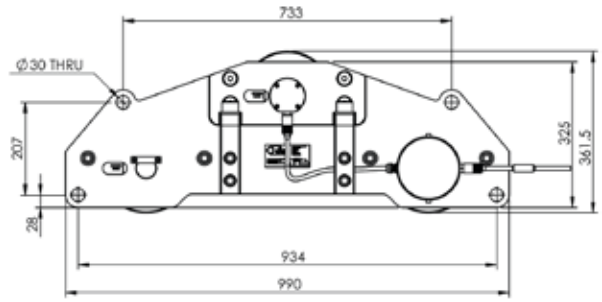
The DLM 200t Running Line Monitor measures the tension on a rope passing through its three wheels. Typically used in cable laying and winch operations to measure and record line tension the robust design has become an industry standard.

- The monitor can be supplied as a separate item for integration with customers existing PLC's or with a DLM digital display/HMI touch screen display.

Features:

- Fully sealed design to IP67
- Robust design suitable for harsh environments
- Integral speed and distance measurement as well as tension
- Easy to rig without the need to remove sheaves from axles
- Lifting and securing points
- Optional mounting fixtures

Dimensional Data



Applications:

- Winch load monitoring
- Towing and salvage
- PLGR
- Cable laying
- Crane load monitoring

Available Models

Part Number	Description	Wheel Sizes
0001-1408	Tension, Speed & Distance	38mm to 76mm
0001-1461	Tension Only	38mm to 76mm

Accessories Table

Part Number	Description
0001-1450	Tethering Arm

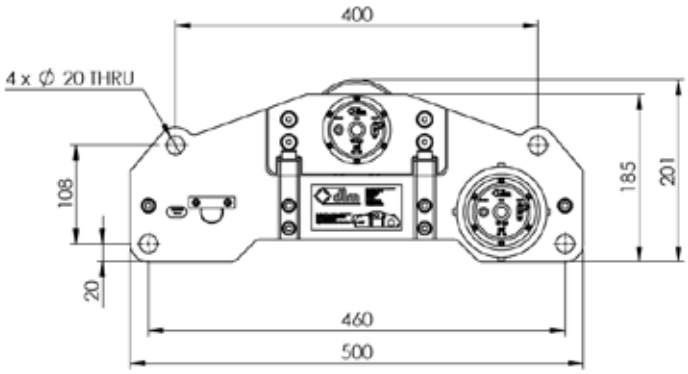
Specification

Frame Construction:	CNC machined side plates fixed together using high tensile stainless steel bolts and supporting spacers. No welded joints. Dual frame construction (upper and lower) for easy rigging and rope insertion. O-ring sealed encoder protection casing. Sealed roller bearings used on all wheels.
Frame Finish:	Galvanised prior to painting. Colour to suit customer requirements (orange and black as standard) Painted with marine grade paint.
Wheel Material:	EN24T alloy steel (Hardened to 40 Rockwell upon request)
Axles and Shear Pin Material:	17-4PH H1150 + 1150 stainless steel
Shear Pin Load Cell Axle:	Suitable for line tensions up to 200t / Connection through MCBH-3-FS and MCIL-3-MP subsea connectors and IP67 gland to sealed encoder casing. O- ring sealed.
Amplifier:	3 Wire 4-20mA current source / 18-24VDC Powered / Mounted in load pin head, signal and power connection through MCBH-8-MP bulkhead connector.
Encoder:	Mounted inside O-ring sealed Encoder casing bolted to frame. Push-Pull quadrature output / 18-24VDC powered / Signal and power connection through MCBH-8-MP bulkhead connector
RLM Mounting:	4 machined eyes located on each side plate for easy rigging to spooling gear or for use as lifting points / Machined stainless steel spacers double as lifting or carrying points
Optional Extras:	Fleeting gear / Mounting posts / Mounting brackets
Other Available RLM Sizes:	15t, 60t.

15T Telemetry Running Line Monitor
RLM15T-3.0-T

The DLM 15T Telemetry Running Line Monitor measures the tension on a rope passing through its three wheels. Typically used in cable laying and winch operations to measure and record line tension. The robust and wireless design has become an industry standard.

Dimensional Data



Features:

- 800m wireless range
- Compatible with TW-3.0 products
- Fully sealed design to IP67
- Robust design suitable for harsh environments
- Integral speed and distance measurement as well as tension
- Easy to rig without the need to remove sheaves from axles
- Lifting and securing points
- Optional mounting fixtures

Available Models

Part Number	Description	Wheel Sizes
0001-1468	Tension, Speed & Distance	8mm to 36mm
0001-1469	Tension Only	8mm to 36mm

Applications:

- Winch load monitoring
- Towing and salvage
- PLGR
- Cable laying

Accessories Table

Part Number	Description
0001-1452	Tethering Arm

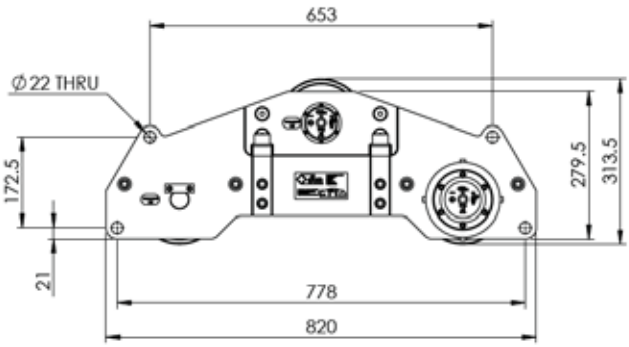
Specification

Frame Construction:	CNC machined side plates fixed together using high tensile stainless steel bolts and supporting spacers. No welded joints. Dual frame construction (upper and lower) for easy rigging and rope insertion. O-ring sealed encoder protection casing. Sealed roller bearings used on all wheels.
Frame Finish:	Galvanised prior to painting. Colour to suit customer requirements (orange and black as standard) Painted with marine grade paint.
Wheel Material:	EN24T alloy steel (Hardened to 40 Rockwell upon request).
Axles and Shear Pin Material:	17-4PH H1150 + 1150 stainless steel.
Shear Pin Load Cell Axle:	Suitable for line tensions up to 15t.
Wireless:	The RLM transmits to one or more TW-3.0 display product using the licence free 2.4GHz frequency.
Load Cell:	The load cell wirelessly transmits the load readings from an internal transmitter to the display. The transmitter is powered by a 3.7VDC rechargable battery.
Encoder:	Mounted inside O-ring sealed Encoder casing bolted to frame. Push-Pull quadrature output powered by an 3.7VDC rechargable battery.
RLM Mounting:	4 machined eyes located on each side plate for easy rigging to spooling gear, or for use as lifting points. Machined stainless steel spacers double as lifting or carrying points.
Optional Extras:	Fleeting gear, Mounting posts, Mounting brackets.
Equipment Needed:	TW-3.0 Handheld Display or TW-3.0 USB Reciever and TW-3.0 RLM Display Software.
Other Available RLM Sizes:	60t, 200t.

60T Telemetry Running Line Monitor
RLM60T-3.0-T

The DLM 60T Telemetry Running Line Monitor measures the tension on a rope passing through it's three wheels. Typically used in cable laying and winch operations to measure and record line tension. The robust and wireless design has become an industry standard.

Dimensional Data



Features:

- 800m wireless range
- Compatible with TW-3.0 products
- Fully sealed design to IP67
- Robust design suitable for harsh environments
- Integral speed and distance measurement as well as tension
- Easy to rig without the need to remove sheaves from axles
- Lifting and securing points
- Optional mounting fixtures

Available Models

Part Number	Description	Wheel Sizes
0001-1404	Tension, Speed & Distance	26mm to 60mm
0001-1462	Tension Only	26mm to 60mm

Applications:

- Winch load monitoring
- Towing and salvage
- PLGR
- Cable laying

Accessories Table

Part Number	Description
0001-1451	Tethering Arm

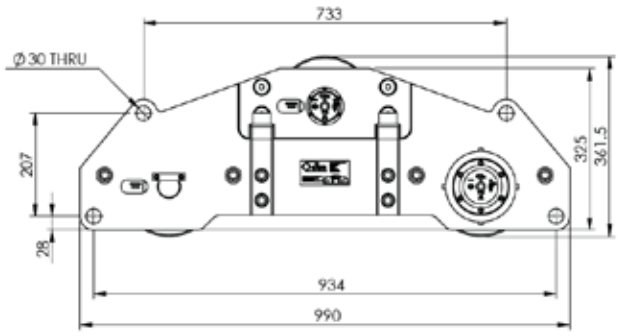
Specification

Frame Construction:	CNC machined side plates fixed together using high tensile stainless steel bolts and supporting spacers. No welded joints. Dual frame construction (upper and lower) for easy rigging and rope insertion. O-ring sealed encoder protection casing. Sealed roller bearings used on all wheels.
Frame Finish:	Galvanised prior to painting. Colour to suit customer requirements (orange and black as standard) Painted with marine grade paint.
Wheel Material:	EN24T alloy steel (Hardened to 40 Rockwell upon request)
Axles and Shear Pin Material:	17-4PH H1150 + 1150 stainless steel
Shear Pin Load Cell Axle:	Suitable for line tensions up to 60t.
Wireless:	The RLM transmits to one or more TW-3.0 display product using the licence free 2.4GHz frequency.
Load Cell:	The load cell wirelessly transmits the load readings from an internal transmitter to the display. The transmitter is powered by a 3.7VDC rechargable battery.
Encoder:	Mounted inside O-ring sealed Encoder casing bolted to frame. Push-Pull quadrature output powered by an 3.7VDC rechargable battery.
RLM Mounting:	4 machined eyes located on each side plate for easy rigging to spooling gear or for use as lifting points / Machined stainless steel spacers double as lifting or carrying points
Optional Extras:	Fleeting gear / Mounting posts / Mounting brackets
Equipment Needed:	TW-3.0 Handheld Display or TW-3.0 USB Reciever and TW-3.0 RLM Display Software
Other Available RLM Sizes:	15t, 200t.

200T Telemetry Running Line Monitor
RLM200T-3.0-T

The DLM 200T Telemetry Running Line Monitor measures the tension on a rope passing through it's three wheels. Typically used in cable laying and winch operations to measure and record line tension. The robust and wireless design has become an industry standard.

Dimensional Data



Features:

- 800m wireless range
- Compatible with TW-3.0 products
- Fully sealed design to IP67
- Robust design suitable for harsh environments
- Integral speed and distance measurement as well as tension
- Easy to rig without the need to remove sheaves from axles
- Lifting and securing points
- Optional mounting fixtures

Available Models

Part Number	Description	Wheel Sizes
0001-1405	Tension, Speed & Distance	38mm to 76mm
0001-1463	Tension Only	38mm to 76mm

Applications:

- Winch load monitoring
- Towing and salvage
- PLGR
- Cable laying

Accessories Table

Part Number	Description
0001-1450	Tethering Arm

Specification

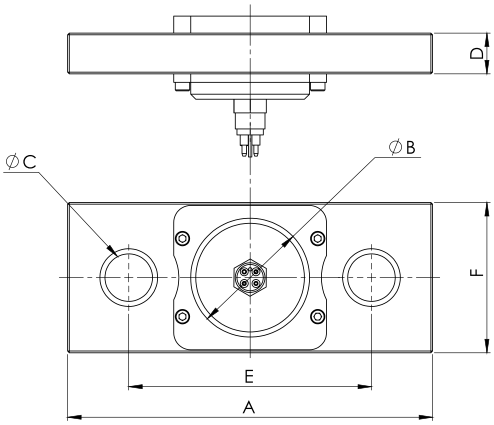
Frame Construction:	CNC machined side plates fixed together using high tensile stainless steel bolts and supporting spacers. No welded joints. Dual frame construction (upper and lower) for easy rigging and rope insertion. O-ring sealed encoder protection casing. Sealed roller bearings used on all wheels.
Frame Finish:	Galvanised prior to painting. Colour to suit customer requirements (orange and black as standard) Painted with marine grade paint.
Wheel Material:	EN24T alloy steel (Hardened to 40 Rockwell upon request)
Axles and Shear Pin Material:	17-4PH H1150 + 1150 stainless steel
Shear Pin Load Cell Axle:	Suitable for line tensions up to 200t.
Wireless:	The RLM transmits to one or more TW-3.0 display product using the licence free 2.4GHz frequency.
Load Cell:	The load cell wirelessly transmits the load readings from an internal transmitter to the display. The transmitter is powered by a 3.7VDC rechargable battery.
Encoder:	Mounted inside O-ring sealed Encoder casing bolted to frame. Push-Pull quadrature output powered by an 3.7VDC rechargable battery.
RLM Mounting:	4 machined eyes located on each side plate for easy rigging to spooling gear or for use as lifting points / Machined stainless steel spacers double as lifting or carrying points
Optional Extras:	Fleeting gear / Mounting posts / Mounting brackets
Equipment Needed:	TW-3.0 Handheld Display or TW-3.0 USB Reciever and TW-3.0 RLM Display Software
Other Available RLM Sizes:	15t, 60t.

Subsea Tensile Link
SUBT-3.0

The Subsea Tensile Link is specially designed for working in subsea conditions and is used for measuring tensile loads. With an optional integral 4-20mA amplifier the load cell is packaged in a wooden case with a subsea rated signal cable to customer specific lengths or alternatively can be supplied with a TW-3.0-S display.

Fully sealed with a subsea connector and pressure tested to over 250Bar the load cell is the ideal instrument for easily and accurately measuring subsea loads.

Dimensional Data



Features:

- Rugged design
- Optional internal 4-20mA or RS485 Amplifier for longer cable lengths
- Subsea connector and cable
- Designed for standard Shackle sizes

Applications:

- Subsea moorings
- Subsea vehicle towing tension monitoring
- Anchoring tension monitoring
- Offshore energy R&D

Load Capacity (Tonnes)	Part Number	A	ØB	ØC	D	E	F	Accuracy (% FRO)	Proof test (% Load Capacity)	Resolution (Kg)
1	0001 - 1194	215	82.5	28	24	145	86.5	±0.2	200	1
2	0001 - 1195	215	82.5	28	24	145	86.5	±0.2	200	1
5	0001 - 1196	215	82.5	28	28	145	86.5	±0.2	200	2
12	0001 - 1197	240	82.5	40	38	150	98	±0.2	200	10
20	0001 - 1198	320	82.5	53	48	190	108	±0.2	200	10
25	0001 - 1199	325	82.5	53	48	195	120	±0.2	200	10
40	0001 - 1200	410	102	74	50	242	150	±0.2	150	50
50	0001 - 1201	410	102	74	58	234	150	±0.2	150	50
100	0001 - 1202	485	107	99	70	275	180	±0.3	150	100

Specification

Link Material:	17-4PH Stainless steel
Internal Amplifier:	3 wire 4-20mA / RS485 ASCII / RS485 MODBUS / 0-10V
Connector:	MCBH-4PMP-SS subsea connector / BH4MP subsea connector / 4 6.5 MBORA subsea connector
Sealing:	Subsea rated with o ring seals - pressure tested to 250Bar
Operating Temperature:	-10°C to +60°C
Display Unit:	Option 1: Peli Case display with viewing window as per display's datasheet / 5 digit bright led display / on/ off switch tare switch / mains (240vac) Option 2: TW-3.0-S display (part number: 0001-1269)
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Packaged in custom built wooden case
Cable:	Subsea moulded cable.

Subsea Data logging Tensile Link
SUBD- 3.0

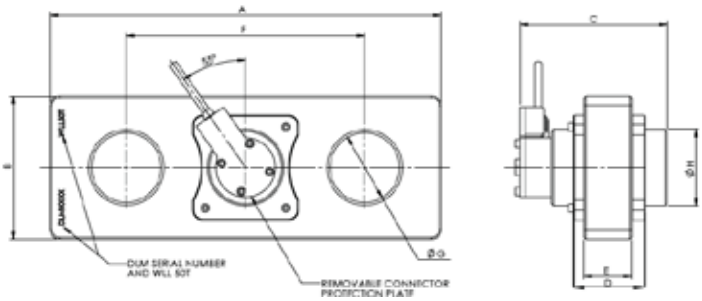
The Subsea Data logging Tensile Link is a robust Tensile Link used for measuring loads on subsea mooring lines, underwater deployments and other similar applications. The instrument measures and records the applied load using an internal data logger which was developed by DLM Design Engineers.

The internal data logger inside the tensile link is self-powered and enables load readings to be recorded at a maximum rate of 800Hz for periods of up to 15 years depending on the sample rate. Data logs can be accessed by using the supplied subsea cable which is connected to the subsea connector mounted to the side of the load cell in a protective shroud. Stored as .CSV file format the logs are easily accessible using already existing PC software like Microsoft Excel, enabling easy data processing after demobbing.

Features:

- Self-powered internal data logger
- Capable of recording up to 2 million load readings
- PC interface to download data in .CSV format

Dimensional Data



Load Capacity (Tonnes)	Part Number	A	B	C	D	E	F	ØG	H	Accuracy (% FRO)	Proof Test (% Load Capacity)	Resolution (Kg)
1	0001-1376	260	110	154	75	25	180	29	80	±0.2	200	1
2	0001-1377	260	110	154	75	25	180	29	80	±0.2	200	1
5	0001-1378	260	110	154	75	25	180	29	80	±0.2	200	2
12	0001-1379	300	110	154	75	40	200	38	80	±0.2	200	5
20	0001-1380	380	130	154	75	50	250	53	80	±0.2	200	10
25	0001-1381	390	140	154	75	50	250	53	80	±0.2	200	10
40	0001-1382	410	140	154	75	50	250	73	80	±0.2	150	50
50	0001-1383	410	150	154	75	50	250	73	80	±0.2	150	50
100	0001-1384	525	180	174	95	70	315	98	80	±0.2	150	100

Specification

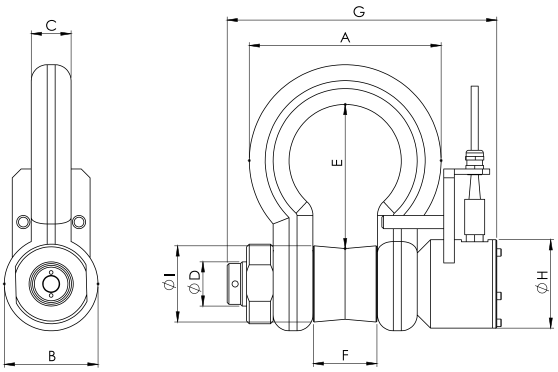
Link Material:	17-4PH Stainless steel
Internal data logger:	mV data logger to convert strain bridge output to SI units
Memory space:	16Gb
Sample rate:	800 readings per second up to 1 reading every 24 hours
Data logs:	Stored internally as CSV files.
Connector:	Subsea MCBH8-MP-SS connector
Sealing:	Piston and face o-ring sealed
Operating Temperature:	-40 to +80C
Display Unit:	Internal data logger which connects to PC to display data after use.
Cable:	Cable not required for operation. Supplied with 4.5m MCBH to USB cable for downloading log data to PC.
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Packaged in custom built wooden case

Subsea Shackle Load Cell
SUBS-3.0

The Subsea Shackle Load Cell has been designed to measure loads in a subsea environment. DLM's subsea shackles are suited to fit leading industry Crosby and GN shackles.

The Subsea Shackle Load Cell can be used with a TW-3.0-S handheld display, a custom enclosure/display unit or integrated with a client's existing systems. As standard, the Subsea Shackle Load Cell comes with 20m of subsea cable but longer cable options are avaliable.

Dimensional Data



Features:

- Rugged design
- Optional internal 4-20mA or RS485 Amplifier for longer cable lengths
- Subsea connector and cable
- Designed for standard Crosby and GN Shackle sizes

Applications:

- Subsea moorings
- Subsea vehicle towing tension monitoring
- Anchoring tension monitoring
- Cable recovery/repair

Load Capacity (Tonnes)	Part Number	Shackle	A	B	C	ØD	E	F	G	H	ØI	Proof Load Tonnes	Accuracy (% FRO)	Resolution (kg)
12	0001 – 1291	Crosby G2130	146	76	31.8	35	107	51.5	235	100	60	18	<±1	5
25	0001 – 1292	Crosby G2130	225	106	44.5	50	162	73	300	100	86	37.5	<±1	10
55	0001 – 1293	Crosby G2130	327	145	66.5	70	246	105	385	100	114	82.5	<±1	50
85	0001 – 1294	GN H9	365	165	76	82	308	127	444	110	130	127.5	±1	100
120	0001 – 1295	GN H10	416	200	89	95	347	150	493	110	150	180	±1	100
200	0001 – 1296	GN H10	530	260	120	125	450	180	600	140	235	300	±1	100
300	0001 – 1297	GN H10	565	305	130	150	534	200	640	150	287	350	±1	100
400	0001 – 1298	GN H10	655	350	165	175	600	230	720	185	345	600	±1	100
500	0001 – 1299	GN H10	710	370	180	185	610	255	780	200	375	750	±1	100

Specification

Pin, Bobbin & nut material:	17-4PH Stainless steel
Bridge resistance:	350Ω - 1000Ω
Operating temperature:	-20°C to +60°C
Display:	TW3.0-S cabled handheld display / Custom display with internal signal conditioner in Load Cell for increased cable lengths
Cable Length:	20m as standard with TW-3.0-S display / 30m+ with internal signal conditioner
Cable Type:	Subsea rated 4 core twisted pair PU2STP cable with over moulded MCIL-4F
Load Cell Connector:	MCBH-4M
Sealing:	Face and barrel O ring sealed. Pressure tested to 250 Bar
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018
Packaging:	Wooden stowage case for larger capacities
Signal Processor types:	4-20mA Amplifier / RS485 MODBUS / RS485 ASCII / 0-10v

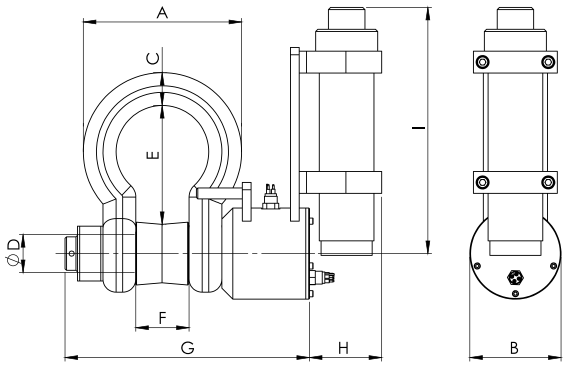
Acoustic Load Shackle
ALS-2.0

The Acoustic Load Shackle is designed for subsea operations where load monitoring is required, either for short term operations lowering an item to the seabed or for longer periods monitoring dynamic loads.

The Acoustic Shackle assembly comprises a Crosby lifting shackle with a modified pin. The standard pin is replaced by a Load Cell machined from stainless steel. On the side of the Load Cell there is a mounting bracket to hold an acoustic beacon, which is clamped in place using stainless steel brackets. The shackle is provided with a bobbin which can be machined to bespoke dimensions.

The load on the shackle is measured by strain gauges connected to a digital amplifier which is housed within the head of the shackle pin and pressure tested to 200bar. The amplifier connects via subsea cable connectors to the acoustic beacon which in turn transmits signals to the surface PAM unit at user selectable sample rates.

Dimensional Data



Features:

- 1500m operating depth
- Spread spectrum acoustic beacon
- Robust design

Applications:

- Subsea Moorings
- Cable laying operations
- Grapnel runs

Load Capacity Tonnes	Part Number	A	B	C	ØD	E	F	G	H	I	Proof Test (% Load Capacity)	Accuracy (%)
25	0001 – 1250	225	125	44.5	50	162	73	335	100	340	150	1.0
55	0001 – 1251	327	125	66.5	70	246	105	420	100	340	150	1.0
85	0001 – 1252	365	125	76	82	308	127	460	100	340	150	1.0
120	0001 – 1253	416	125	89	95	347	150	518	100	340	150	1.0
200	0001 – 1254	530	140	120	125	450	180	605	100	340	150	1.0
300	0001 – 1255	565	150	130	150	534	205	655	100	340	150	1.0

Specification

Loadcell WWL	25t to 250t
Operating Depth	1500m
Beacon Battery:	14.8V Rechargeable 8 Cell 5.4Ah Lithium Ion
Self-Discharge:	<5% per month at 20˚C / <10% per month at 30˚C / <20% per month at 40˚C
Estimated Battery Life:	72,000 samples or 2 months (whichever is sooner)
Operating Temperature:	Charging: 0˚C to +45˚C / Discharging: -20˚C to +60˚C
Storage Temperature:	-20˚C to + 30˚C for 1 year / -20˚C to + 45˚C for 3 months
Loadcell Material:	17-4PH H1150+1150 Stainless Steel
Calibration:	Supplied with calibration, proof load and test certificates to traceable to UKCA BS EN ISO 7500-1 2018

Subsea Data logger
DL-3.0

The Subsea Data logger is proprietary data logger design by DLM for use in the offshore industry. Comprising of multiple on-board sensors and with extra capacity for external mV or mA inputs, the DL-3.0 can sample on-board and external sensors at customisable sample rates of up to 800Hz.

The data logger is housed within a compact stainless steel 316 enclosure with mounting holes for easy integration to existing or new subsea equipment. Ideal for long or short term deployments on offshore and subsea structures, but also ideal for R&D projects where verification data is required to compare against computer models.

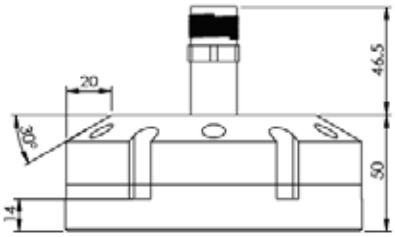
Features:

- Self-powered internal data logger
- Internal 16Gb SD card for storing logged data
- PC interface to download data in .CSV format
- Subsea connecter for mV or mA
- 10.4 Ah litlithium battery

Applications:

- Array cable monitoring
- Monitoring subsea acceleration
- Movement monitoring on Offshore structures

Dimensional Data



Part Number: 0001-1437

Specification Table

Load Cell Input:	mV/ mA
Load Cell Sensor Range:	0.4 – 5.0 mV/V
Load Cell Bridge Resistance:	350 - 2000Ω
Load Cell Logging Frequency:	22 User selected options between 800Hz and once per hour
Accelerometer Input:	Onboard sensor
Accelerometer Sensor Range:	±125dps, ±250dps, ±500dps, ±1000dps or ±2000dps
Accelerometer Logging Frequency:	17 User selected options between 416Hz and once per hour
Gyroscope Input:	Onboard sensor
Gyroscope Sensor Range:	±125dps, ±250dps, ±500dps, ±1000dps or ±2000dps
Gyroscope Logging Frequency:	17 User selected options between 416Hz and once per hour
Status Input:	Onboard
Status Temperature:	° C
Status Battery Status:	Charge level
Logging Frequency:	8 User selected options between once per 10s and once per hour
Protocol:	RS232 ASCII
Baud Rate:	9600 / 19200 / 38400 / 57600 / 115200
Data Bits:	8
String format:	Configurable
Logging initiation:	PC software, external switch, time delay or set-point trigger
Data download:	Primary USB or secondary RS232
Memory Card:	Sandisk 16Gb MicroSD
Pressure Test:	200Bar
Connector:	CRE Connector with supplied cable and USB Connector
Mounting Information:	6 x 6.6mm thru holes on 118mm PCD
Body Material:	17-4PH Stainless Steel
Material Cert:	3.1 (3.2 upon request)

PCB Data logger
DL-3.0

The PCB Data logger is proprietary data logger design by DLM for use in the offshore industry. Comprising of multiple on-board sensors and with extra capacity for external mV or mA inputs, the DL-3.0 can sample on-board and external sensors at customisable sample rates of up to 800Hz.

The PCB data logger is designed for integration into OEM equipment for monitoring movement, tilt or inputs from third party sensors which output mV or mA signals. The PCB can be mounted in multiple orientations and then configured using the PC software to measure movement in the X, Y and Z planes.

Features:

- Load cell input
- On-board accelerometer
- On-board gyroscrope
- GPS antenna
- RS232 ASCII output

Applications:

- Pitch compensation cable engine
- Independant GPS monitoring
- Custom monitoring application

Part Number: 0001-1439

Specification Table

Load Cell Input:	mV / 4-20mA
Load Cell Sensor Range:	0.4 – 5.0 mV/V / 3.00mA – 22.00mA
Load Cell Bridge Resistance:	350 - 2000Ω
Load Cell Logging Frequency:	22 User selected options between 800Hz and once per hour
Accelerometer Input:	Onboard sensor
Accelerometer Sensor Range:	±125dps, ±250dps, ±500dps, ±1000dps or ±2000dps
Accelerometer Logging Frequency:	17 User selected options between 416Hz and once per hour
Gyroscope Input:	Onboard sensor
Gyroscope Sensor Range:	±125dps, ±250dps, ±500dps, ±1000dps or ±2000dps
Gyroscope Logging Frequency:	17 User selected options between 416Hz and once per hour
GPS Input:	Onboard sensor
GPS Logging Frequency:	11 User selected options between 1Hz and once per hour
Status Input:	Onboard
Status Temperature:	° C
Status Battery Status:	Charge level
Logging Frequency:	8 User selected options between once per 10s and once per hour
Protocol:	RS232 ASCII
Baud Rate:	9600 / 19200 / 38400 / 57600 / 115200
Data Bits:	8
String format:	Configurable
Logging initiation:	PC software, external switch, time delay or set-point trigger
Data download:	Primary USB or secondary RS232
Memory Card:	Sandisk 16Gb MicroSD
Mounting Information:	4x3.5mm thru holes

3510 PAM Portable

The 3510 PAM Portable has been developed to meet the harsh operating conditions associated with offshore marine operations. It is housed in a waterproof rugged enclosure with a clear LCD display and splash proof keypad for ondeck operations.

The 3510 has been designed to be a versatile tool for multitransponder configuration and testing, plus on deck release beacon and acoustic telemetry operations.

Transducers

3102 Test transducer (supplied with 3510 PAM Portable)

Handheld for communication with transponder, stored inside PAM 3510 case.

Size:	55mm Ø x 90mm excluding cable relief
Weight:	250g
Cable length:	2m
IP rating:	IP64, not suitable for submersion

3190 Dunking transducer (for use with 3510 PAM Portable)

Robust stainless steel transducer with integral cable and transducer protection cage. Operation subsea with ranging, relocation, acoustic release and telemetry.

Size:	100mm Ø x 276.5mm excluding cable relief
Weight:	8.5kg
Cable length:	30m standard (attached)
Depth rating:	50m

3191 LF Dunking transducer (for use with 3510 PAM Portable)

Robust aluminium transducer with integral cable and transducer protection cage. Operation subsea with ranging, relocation, acoustic release and telemetry.

Size:	181mm Ø x 333mm excluding cable relief
Weight:	7.5kg
Cable length:	30m standard (attached)
Depth rating:	50m

Features:

- Spread spectrum compatible
- Robust construction
- Clear intuitive interface
- Configures 1000 Series beacons
- Low frequency compatibility

Applications:

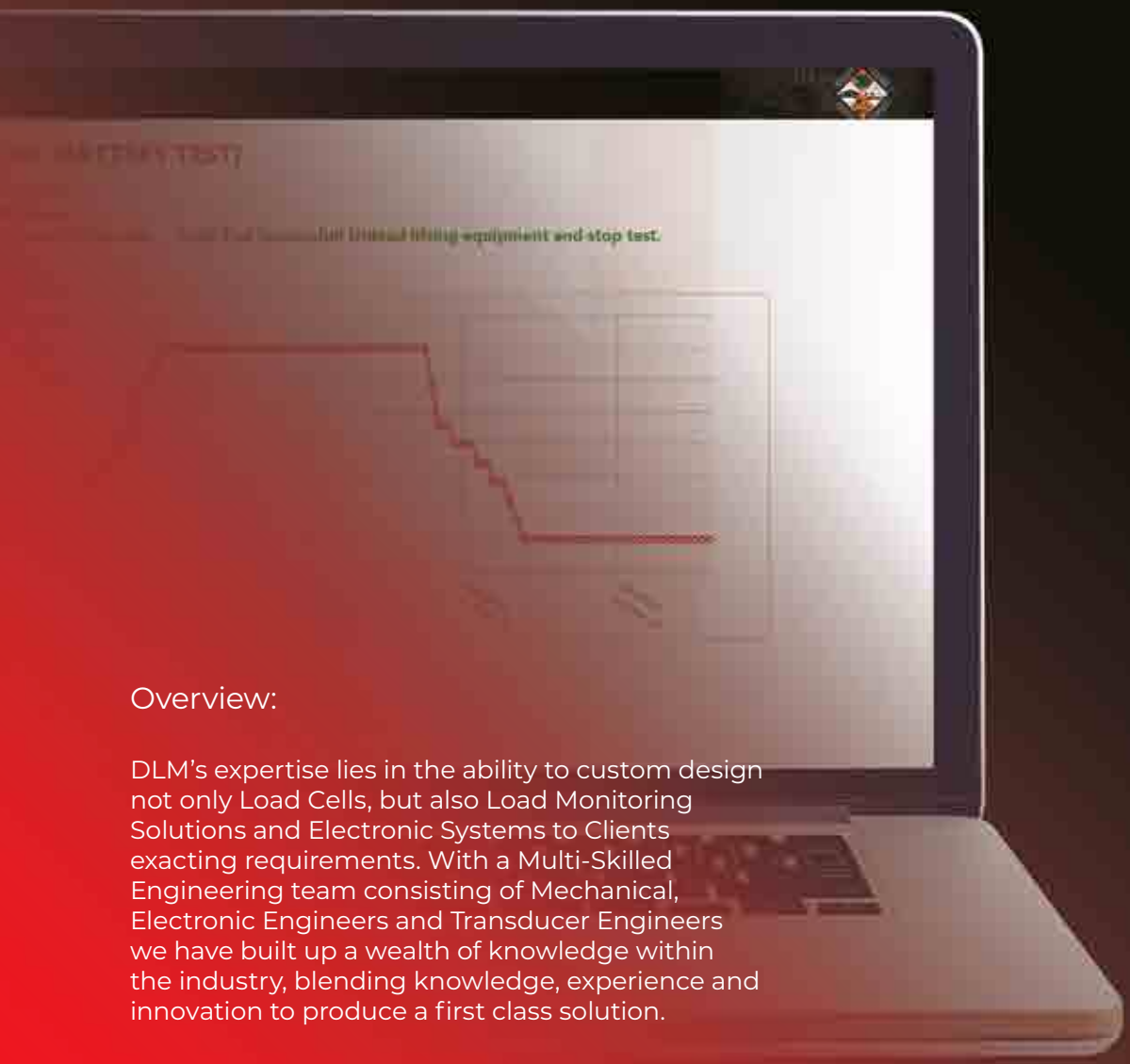
- Testing and configuration of beacons prior to deployment
- Subsea ranging and relocation
- Acoustic release beacon command
- Acoustic telemetry/command applications
- Data gathering

Specification

Case size	390 x 310 x 170mm
Weight:	5kg
Temperature Storage:	-20°C to +60°C
Operation:	0°C to +40°C
External power supply:	Input: 100-240Vac, 50-60Hz / Output: 24Vdc
Battery life:	6 hours
Beacon test compatibility:	Applied Acoustics 200, 300, 600 (LF), 900, 1000, 1400 Series / Applied Acoustics 1500 Series and 529P Release Beacons / Simrad HiPAP (400), Simrad HPR (300) / Trackpoint II
Release compatibility:	1500 Series and 529P / Status or Command or Configure
Transducer compatibility:	3102 Test transducer / 3190 Dunking transducer / 3191 Dunking transducer
Compatible DLM Products:	Acoustic Load Shackle, Acoustic 15t Release Hook

Software

TW-3.0 Centre Of Gravity Software
TW-3.0 Load Test Software
TW-3.0 Data Logging Software
RLM Display Software
Multi Logger Software



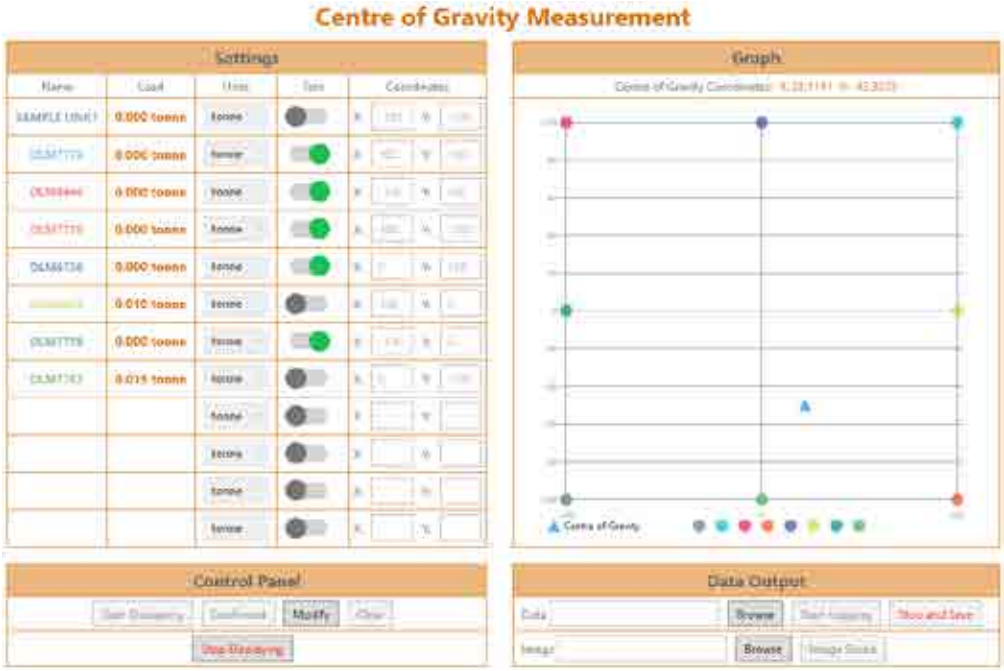
Overview:

DLM's expertise lies in the ability to custom design not only Load Cells, but also Load Monitoring Solutions and Electronic Systems to Clients exacting requirements. With a Multi-Skilled Engineering team consisting of Mechanical, Electronic Engineers and Transducer Engineers we have built up a wealth of knowledge within the industry, blending knowledge, experience and innovation to produce a first class solution.

TW-3.0
Centre of Gravity Software

The TW-3.0 Centre of Gravity Software from DLM is designed to complement DLM's TW-3.0 range of products.

It is used for calculating and visualising the centre of gravity for any objects weighed by TW-3.0 Load Cells. Up to 12 load points can be monitored and analysed dynamically within one PC display. Additionally, the entire dataset during the measurement process can be easily logged to a single CSV file for future reference.



Features:

- Calculate and visualise the centre of gravity dynamically using up to 12 TW-3.0 Load Cells.
- Log load and CoG position values to a CSV file during the weighing process
- Save the position of the centre of gravity as an image for future references.
- Switch between 7 different weight units.
- Switch between tare weight and gross weight.

Applications:

- Container centre of gravity measuring.
- Yacht centre of gravity measuring.

Specification

Part Number:	0001-1281
Equipment Required:	Windows PC, TW-3.0-T Load Cell, TW-3.0-T Handheld, Male USB to Male Micro USB Cable.
Display Units:	Tonne, kN, KgF, Kg, lb, tonne(US), kip.
Minimum System Requirements:	Operating System: Windows 7 SP1 or above RAM: 512MB or above File Size: 11MB. CPU: 1GHz or faster processor Software Framework: Microsoft .NET Framework Version 4.7.2 or above.

TW-3.0
Load Test Software

The TW-3.0 Load Test software from DLM is a software platform designed to complement DLM's TW-3.0 range of products within the lifting industry. Used as a tool for assisting the recording of test results and generation of certificates during a load test, the software is able to be loaded onto a Windows PC and accept the output from a TW-3.0 handheld display.

The Load Test Software allows the user to enter lifting equipment details, test information and client details, it then samples the load output from the TW-3.0 handheld display paired with a DLM Load Cell. At the end of the test a graph showing the applied load is generated and added to a PDF test certificate evidencing that the required load has been attained. The test certificate is able to be branded with company details, all at the simple click of a button.

Features:

- Enter report and equipment details
- Insert company header image for the certificate
- Perform a Live Load Test or upload TW-3.0 handset logging file
- PDF certificate/report generated at the end of the test
- Graph on certificate to prove your lifting equipment has taken the required load
- Option to add LEEA logo to the certificate for LEEA members

Applications:

- Crane and Davit Proof Load Testing
- Bollard testing
- Pad eye testing
- Water bag testing

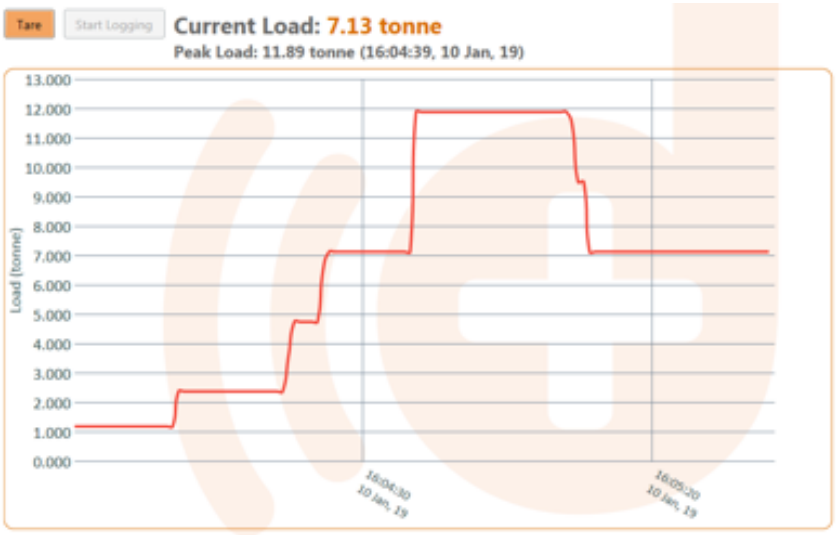
Specification

Part Number:	0001-1279
Equipment Required:	Windows PC, TW-3.0 Load Cell, TW-3.0 Handheld, Male USB to Male Micro USB Cable
Display Units:	Tonne
Minimum System Requirements:	Operating System: Windows 7 SP1 or above RAM: 512MB or above File Size: 5MB CPU: 1GHz or faster processor Microsoft .NET Framework Version: 4.6.2 or above

TW-3.0
Data Logging Software

DLM TW-3.0 Data Logging Software enables PC data logging of load readings displayed on a TW-3.0 display which is connected to a TW-3.0 compatible DLM Load Cell. The applied load on the Load Cell is recorded by the software and shows a live graph against the live time and date.

Load data is recorded in .CSV file format on the PC which can be accessed using Microsoft Excel. The software is able to provide the option to record load readings with various engineering units and is capable of displaying the peak load, whilst also recording the time and date for which this instance occurred.



Features:

- Live animated graph
- Record readings in various display units
- CSV File saved at the end of the logging session
- Current load and peak load display
- Manually set the No. of seconds displayed on the graph (optional)
- Manually set the minimum/maximum load displayed on the graph (optional)
- Fit all plotted points on the graph with the ability to zoom in/out.
- Display previous logging sessions with CSV files created by the logging software

Applications:

- Bollard load tests
- Cable laying line tension recording
- Live load monitoring applications
- Load tests

Specification

Part Number:	0001-1278
Equipment Required:	Windows PC, TW-3.0 Load Cell, TW-3.0 Handheld, male USB to male micro USB cable
Display Unit:	Tonne, lbs, kN, KgF, Kg, USTon, Kips
Minimum System Requirements:	Operating System: Windows 7 SP1 or above
	RAM: 512MB or above
	File Size: 5MB
	CPU: 1GHz or faster processor
	Microsoft .NET Framework Version: 4.6.2 or above

TW-3.0
RLM Display Software

The TW-3.0 RLM Display Software allows users to connect up to 4 of DLM's Running Line Monitors to a PC via TW-3.0 Handheld or USB receiver, to show the tension, speed and distance values being measured by each device.

The RLM software shows real time readings for each connected device, with the option to record these readings to a CSV file for future use. Additionally, the real time values can be re-transmitted via a single COM port to another software package or survey suite.

Features:

- Real time tension, speed and distance monitoring
- Data logging to CSV files for future use
- Optional re-transmission via a COM port

Applications:

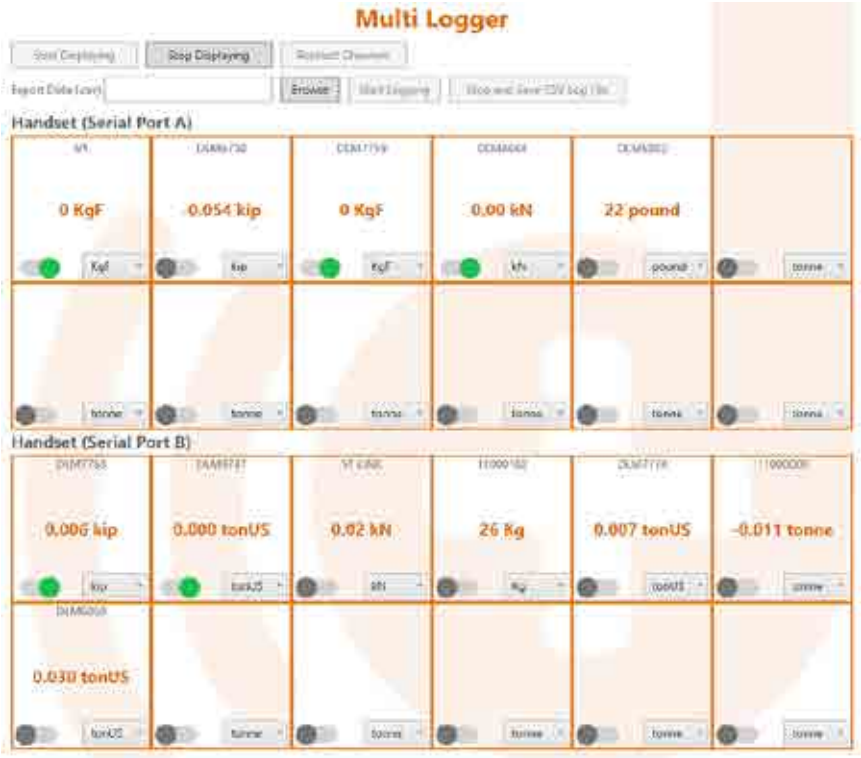
- PLGR projects
- Cable laying
- Crane and winch monitoring

Specification

Part Number:	0001-1280
Equipment Required:	Windows PC, TW-3.0 Load Cell, TW-3.0 Handheld, male USB to male micro USB cable
Display Unit:	Tonne, lbs, kN, KgF, Kg, USTon, Kips
Minimum System Requirements:	Operating System: Windows 7 SP1 or above RAM: 512MB or above File Size: 5MB CPU: 1GHz or faster processor Microsoft .NET Framework Version: 4.6.2 or above

TW-3.0
Multi Logger Software

The TW-3.0 Multi Logger Software from DLM is designed to complement DLM's TW-3.0-T range of products. It is used for monitoring and logging data for up to 24 TW-3.0-T Load Cells including Wireless Compressive Load Cells, Telemetry Tensile Links, and Telemetry Load Shackles.



Features:

- Monitor and log load data for up to 24 TW-3.0 -T • compliant Load Cells.
- Switch between 7 different weight units
- Switch between tare weight and gross weight.

Applications:

- Weighing large structures.
- Train/vehicle weighing.

Specification

Part Number:	0001-1282
Equipment Required:	Windows PC, TW-3.0-T compatible Load Cell, TW-3.0-T Handheld, Male USB to Male Micro USB Cable.
Display Units:	Tonne, kN, KgF, Kg, lb, tonne(US), kip.
Minimum System Requirements:	Operating System: Windows 7 SP1 or above RAM: 512MB or above File Size: 11MB. CPU: 1GHz or faster processor Software Framework: Microsoft .NET Framework Version 4.7.2 or above.

Load Pins

Standard Load Pin
Telemetry Load Pin
Subsea Load Pin
Custom Load Pin design options
Line Tension Load Pin
Force Magnitude Load Pin
ATEX Load Pin

Overview:

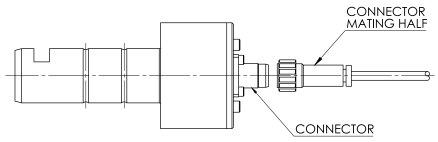
DLM are world renowned for the design and manufacture of custom design load pins for a host of industries, including offshore cable laying, lifting and rigging, renewable energy and offshore moorings.

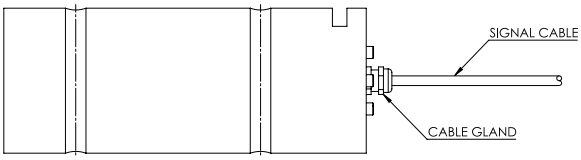
Standard Load Pin
SLP-2.0

The DLM Standard load pin is manufactured from high tensile 17-4PH H1150D stainless steel fully traceable from European mills. Designed for general use with an emphasis on quality and reliability the Standard Load Pin is suitable for a multitude of industries and applications.

Load pins can also be supplied with various electrical outputs for easy interfacing with a host of different instrumentation and displays, along with o-Ring seals and optional encapsulation against vibration and mechanical shock.

Dimensional Data





Features:

- Stainless steel construction
- Minimum of 5:1 safety factor
- Up to IP68 protection
- Wide range of electrical outputs

Applications:

- Cranes
- Winches
- Instrumented sheave / Snatch blocks
- Cable tensioners
- Custom applications
- Offshore moorings

Specification

Pin Material:	17/4PH H1150 + 1150 stainless steel
Bridge Resistance:	350Ω - 1000Ω
Accuracy:	<1.0% FS
Load ratings:	1 tonne up to 2000 tonnes
Operating Temperature:	-20˚C to +60˚C
Signal conditioner options:	mV output / 4-20mA 3 wire amplifier / 4-20mA 2 wire amplifier / RS485 MODBUS signal conditioner / RS485 ASCII signal conditioner / 0-10V Amplifier
Input Voltage:	10V excitation for mV output pin / 12-30VDC for internal amplifiers
Degree of protection:	IP67/IP68 with cable gland connection / IP66 for Mil Spec connector option
Connection options:	Cable gland and signal cable / Mil Spec connector and signal cable
Locking and fixing arrangements:	Keeper slot and lock plate / Anti-rotation bracket / Thread and nut with split pin / Welded bracket
Certification:	Supplied with calibration, proof load and test certificates to BS EN ISO 7500-1:2018 and material certification to 3.1 or 3.2 upon request

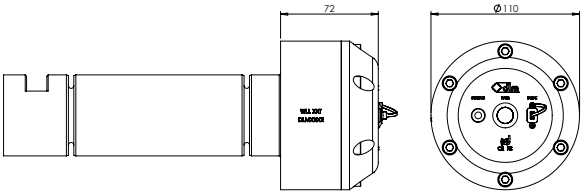
* For design options please see design options sheet

Telemetry Load Pin
TW-3.0

The DLM Telemetry Load Pin utilises DLM's proprietary wireless electronics in order to read and transmit a load wirelessly to a handheld display or system base station. Manufactured from high tensile 17-4PH H1150D stainless steel fully traceable from European mills, the DLM Telemetry Load Pin is particularly suited to environments where cables cannot be easily run and allows for easy and quick installation.

The Telemetry Load Pin can be supplied designed by DLM engineers to meet clients' exacting requirements and each design is proven with a full FEA analysis. The wireless transmission employed makes use of the license free 2.4GHz band and boasts a 800m wireless range.

Dimensional Data



Features:

- Stainless steel construction
- Minimum of 5:1 safety factor
- 800m wireless range
- Connect multiple load pins to one display wirelessly
- Rechargeable internal batteries

Applications:

- Cranes
- Port equipment

Specification

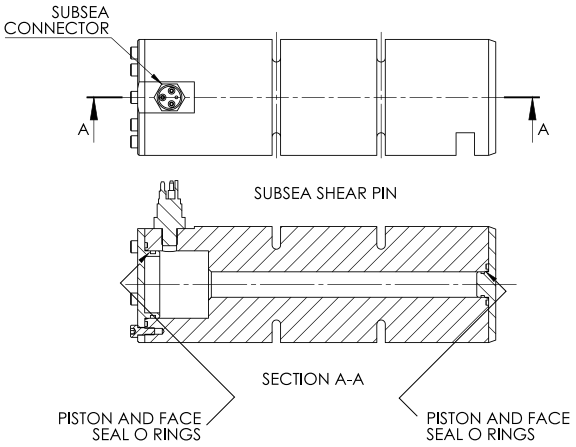
Pin material:	17/4PH H1150 + 1150 stainless steel
Bridge Resistance:	350Ω - 1000Ω
Accuracy:	<1.0% FS
Load ratings:	1-2000t
Operating Temperature:	-20˚C to +60˚C
Internal battery:	3.6V Li-Po Rechargeable battery
Battery life:	700 hours continuous (2 years non operational)
Charger:	Supplied with USB charger
Degree of protection:	IP67 with charging socket cap fitted
Display:	Handheld TW-3.0-T / Custom display with TW-3.0-T receiver embedded / From 1 to 12 TW-3.0-T displays
Frequency:	2.4GHz
Range:	Up to 800m line of sight
Locking and fixing arrangements:	Keeper slot and lock plate / Anti-rotation bracket with thread, nut and split pin
Certification:	Supplied with calibration, proof load and test certificates to BS EN ISO 7500-1:2018 and material certification to 3.1 or 3.2 upon request
Approvals:	UKCA, CE, FCC and IC tested and compliant

Subsea Load Pin
SSLP-2.0

The DLM Subsea Load Pin is manufactured from high tensile 17-4PH H1150D stainless steel fully traceable from European mills and designed for the Subsea industry. The Subsea Load Pin is DLM's flagship product, ideal for use in subsea vehicles, moorings and other marine/offshore applications.

The Subsea Load Pin can also be supplied with various electrical outputs for easy interfacing with a host of different instrumentation and displays. With a minimum double O-Ring sealed construction along with encapsulation against vibration and mechanical shock. The Subsea Load Pin leads the field in rugged and functional Load Cell design. The Subsea Load Pin can be custom designed by DLM engineers to meet clients exacting requirements and each design is proven with a full FEA analysis.

Example design



Load pins are custom designed to meet each client's exacting requirements. Contact us to discuss your design.

Features:

- Stainless steel construction
- Minimum of 5:1 safety factor
- Fully sealed and protected up to 4000m water depth
- Wide range of electrical outputs
- Custom design

Applications:

- Trenching vehicles
- Plough vehicles
- ROV's
- Subsea moorings

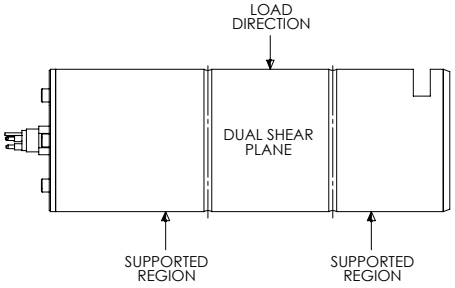
Specification

Pin Material:	17/4PH H1150 + 1150 stainless steel
Bridge Resistance:	350Ω - 1000Ω
Accuracy:	<1.0% FS
Load ratings:	1 - 2000t
Operating Temperature:	-20˚C to +60˚C
Signal conditioner options:	mV output / 4-20mA 3 wire amplifier / 4-20mA 2 wire amplifier / RS485 MODBUS signal conditioner / RS485 ASCII signal conditioner / 0-10V Amplifier
Input Voltage:	10V excitation for mV output / 12-30VDC for internal Amplifiers
Degree of protection:	Subsea varient available with face and barrel O-Ring sealed end caps for subsea rated protection
Connection options:	MCBH3MP or MCBH4MP subsea connector / BH3MP or BH4MP subsea connector / 4 6.5 MBORA subsea connector
Locking and fixing arrangements:	Keeper slot and lock plate / Anti-rotation bracket / Thread and nut with split pin / Welded bracket
Certification:	Supplied with calibration, proof load and test certificates to BS EN ISO 7500-1:2018 and material certification to 3.1 or 3.2 upon request
Hydrostatic Testing:	Up to 600 bar

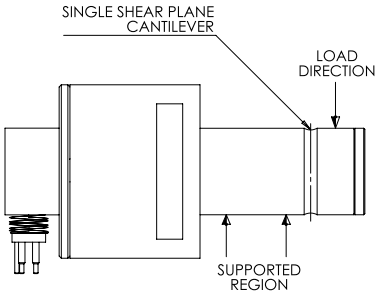
Custom Load Pin Design Options

Custom Load Pin design options

1. Dual shear plane type

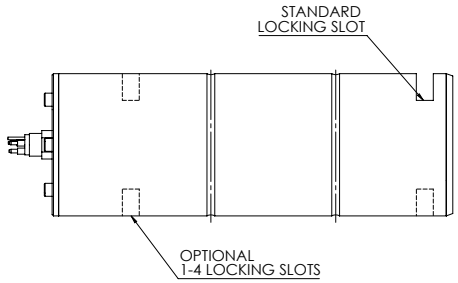


2. Single shear plane cantilever pin

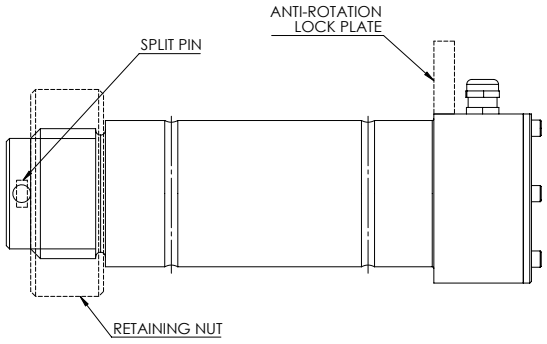


Locking options

1. Lock plate (1 to 4 locking slots)

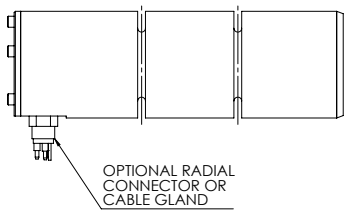


2. Anti-Rotation – thread and nut split pin

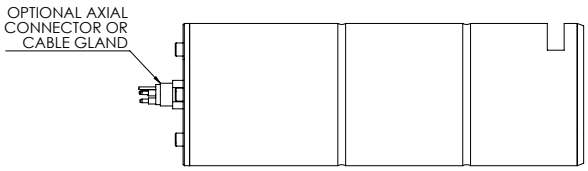


Cable entry options

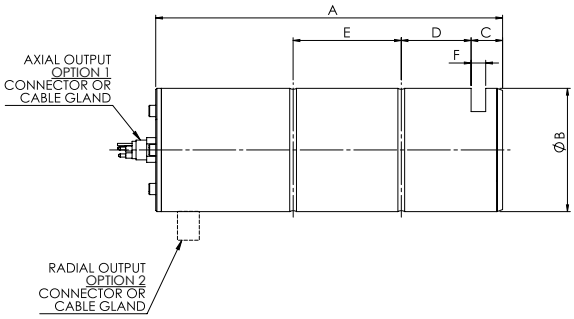
1. Radial – connector or cable gland



2. Axial – connector or cable gland



Dimensional Data



Features:

- Stainless steel construction
- FEA verified designs
- Down hole gauged for high protection
- IP67/IP68 ratings and robust construction
- Removable end caps for easy serviceability and excellent sealing

Line Tension Load Pin
LT-LP

Exclusive technology developed by and exclusive to DLM the Line Tension Load Pin is specifically designed to be mounted as the centre axle of a sheave wheel which then measures the line tension of the cable running over the wheel.

It uses DLM's intelligent Sirius amplifier mounted internally in the pin to process signals from the strain gauges in order to determine both the resultant force and the wrap angle. The amplifier uses this to calculate the line tension and outputs this via a 4-20mA signal.

Normally a standard single direction load pin is required to be fitted so that the load is applied in one plane on the pin, and will not produce accurate load readings if load is applied outside this plane, thus when fitting into a sheave they are only able to measure the resultant force and not the line tension. If the angle of wrap changes the resultant force on the pin will change and therefore would not give a true value for line tension.

However, with the DLM Line Tension Load Pin the change in wrap angle and resultant load is sensed and used to calculate the line tension all within the Load Cell. Therefore giving a 4-20mA signal out relating to line tension.

The Line Tension Load Pin is currently designed to work with wrap angles varying from 40° to 130°, see fig 2. However, larger angle spans can be achieved depending on the design and size of the load pin.

Features:

- DLM proprietary design
- Accurate line tension measurement direct from load pin
- No requirement for additional sensors to determine wrap angles
- 90˚ operational range
- 4-20mA scaled output

Applications:

- Launch and recovery systems (LARS)
- Sheave blocks
- Crane line tension monitoring

The load pin must be placed in a fixed position and it is critical that the wrap angle only varies from one side of the sheave. The load pin requires a fixed datum point from which to measure and therefore requires a fixed cable entry onto the sheave from one side. It is not yet possible to have the wrap angle varying from both sides of the sheave. See fig 3 for a graphical representation.

Dimensional Data

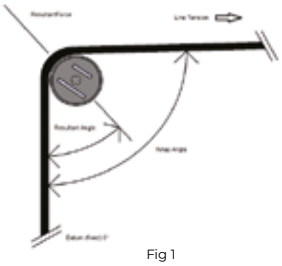


Fig 1

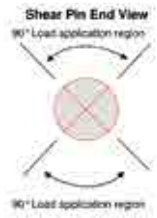


Fig 2

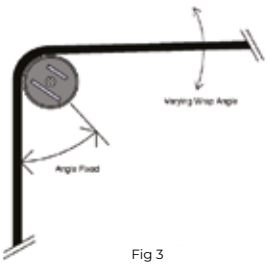


Fig 3

Specification

Pin Material:	17-4PH H1150 + 1150 stainless steel
Accuracy:	<1% FS across combined angles
Load ratings:	Up to 1500t and above
Operating Temperature:	-20 to +60 °C
Internal Amplifier:	DLM designed Sirius 4-20mA 3 wire amplifier or RS485 MODBUS enabled with line tension technology
Input Voltage:	12-30VDC for internal amplifier
Degree of Protection:	Subsea with piston and face O-Ring seals and subsea connector / IP67 with face O-Ring seals and cable gland signal entry
Connection options (client specific):	Subsea connector / IP67 Cable gland and cable / Customer specified connector
Certification:	Supplied with calibration, proof load and test certificates to BS EN ISO 7500-1:2018 and material certification to 3.1 or 3.2 upon request
Pressure test:	Up to 300Bar (subsea version only)
Output Type:	4-20mA scaled to WLL / RS485 MODBUS / RS485 ASCII

Note: Line Tension technology can only work with certain size load pins. Contact DLM to discuss feasibility of load pin design.

Force Magnitude Load Pin
LM-LP

Proven technology developed by and exclusive to DLM; the Force Magnitude technology has been tried and tested in multiple applications and can be applied to various designs of shear pin load cell.

Making use of DLM's intelligent Sirius amplifier mounted internally within a dual bridge load pin, the Force Magnitude technology enables the client to have a load pin which can read load in any direction across a 110 degree range.

Typical load pins are required to be fitted so that the load is applied in one plane on the pin and will not produce accurate load readings if load is applied outside this plane. However, with Force Magnitude technology the load can be applied and accurately read in various locations around the pins central axis, eliminating the need for a load direction and preventing constraints to clients mounting arrangements.

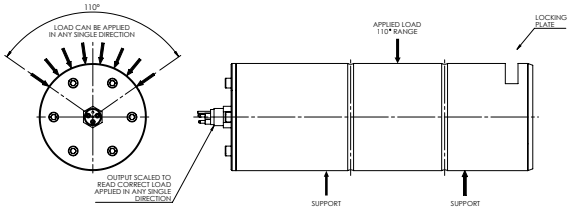
Features:

- Ability to measure magnitude of load in varying directions around the load pin
- Wide application area of 110˚
- Optional signal outputs of a single 4-20mA or RS485
- DLM proprietary design

Applications:

- Subsea vehicles
- Stinger load monitoring
- Moorings
- Applications where the load direction changes

Dimensional Data



For a given load applied in any single direction within the load application region, the Force Magnitude Shear Pin Load Cell will output a consistent calibrated 4-20mA output where 4mA=0t and 20mA = WLL, or R485 MODBUS output. This removes the need to have a load direction on the Shear Pin Load Cell and allows for use in application with a varying load direction.

Specification

Pin Material:	17-4PH H1150 + 1150 stainless steel
Bridge Resistance:	350Ω - 1000Ω
Accuracy:	<1% FS across combined angles
Load ratings:	50t - 2000t
Operating Temperature:	-40 to +60 °C
Internal Amplifier:	Sirius 4-20mA 3 wire amplifier or RS485 MODBUS enabled with Force Magnitude Technology. See Sirius datasheet for further information
Input Voltage:	12-30VDC for internal amplifier
Degree of protection:	• Subsea variant available with face and barrel O-Ring sealed end caps for subsea rated protection • IP67 available with O-Ring sealed end caps and gland cable connection
Connection options (client specific):	46.5MBORA connector / Impulse MCBH-3-MP-SS / IP67 cable gland and cable / customer specified connector
Certification:	Supplied with calibration, proof load and test certificates to BS EN ISO 7500-1:2018 and material certification to 3.1 or 3.2 upon request
Output Type:	4-20mA scaled to WLL / RS485 MODBUS / RS485 ASCII

Note: Force Magnitude load pin can only work with certain size load pins. Contact DLM to discuss feasibility of load pin design.

ATEX / IECEX Load Pin

The ATEX / IECEX load pin cements DLM's place as world leader in the supply of load pins and has been designed specifically for the rugged Oil and Gas industry, along with environments that contain flammable gas.

Suitable for use in Zone 1 and Zone 2 Hazardous areas, the load pin is certified using the Flame Proof Exd concept which allows design flexibility for internal signal conditioners and also negates the need to have additional barriers, taking the signal into the safe area.

Manufactured from high tensile stainless steel, the load pin can have an array of electrical outputs and can be mechanically designed to meet client's requirements.

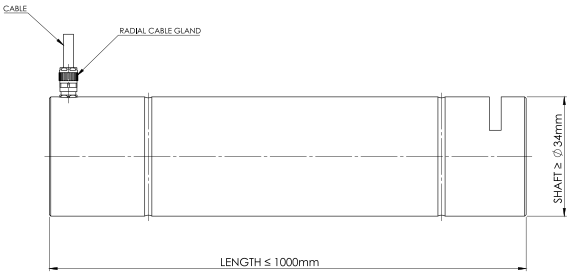
DLM can custom design ATEX load pins for use in a wide variety of applications with sizes to suit clients exacting requirements.

Features:

- Exd design
- Flexibility of outputs through mounting of internal signal conditioners
- Cable gland or connector connection options

Dimensional Data

The ATEX certification of the load pin designates the maximum and minimum allowable sizes of the shaft as detailed below. Adhering to these dimensions the load pin can be custom designed to suit



Applications:

- Supplying as original equipment in offshore equipment
- Quick release mooring hooks
- Mooring and FPSO Load monitoring
- Installations in cranes
- Winches
- Sheave blocks
- Cable tensioners
- Pipe lay applications

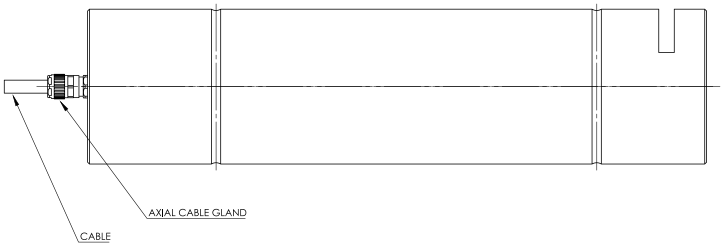
Specification

Load Cell material	17-4PH H1150 + 1150 stainless steel Certs to 3.1 as standard, 3.2 on request
WLL range	Up to 2000 Tonne (higher capacities available upon request)
Proof load:	150% of SWL
Safety factor:	Minimum of 5:1
Bridge resistance:	350 - 1000 ohms
Accuracy:	<1.0% FS
Zero temperature coefficient:	<±0.05% of SWL/°C
Span temperature coefficient:	<±0.05% of SWL/°C
Operating temperature:	-20°C to +60°C
Output options:	mV output / 4-20mA 3 wire amplifier / 4-20mA 2 wire amplifier / RS485 signal conditioner
Input voltage:	10V excitation for mV output pin / 12-24VDC for internal amplifier/signal conditioner
Cable type:	Screened and armoured 1 quad x 0.75mm² IEC60331
Connection options:	Cable Gland / ATEX/IECEX connector
Degree of protection:	IP68. InstrumEx connector IP66/67 if fitted.
Locking and fixing options:	Keeper slot and lock plate / Anti rotation bracket / Thread and nut with split pin
ATEX/IECEX approved to:	Ex II 2G / Ex d IIC Gb T6 Amb -20°C to +60°C
ATEX certificate number:	ITS15ATEX18207X
IECEX certificate number:	IECEx ITS 15.0007X
Documentation provided:	Supplied with calibration, proof load and test certificates to BS EN ISO 7500-1:2018 and material certification to 3.1 or 3.2 upon request. ATEX/IECEX installation Instructions / User manual / ATEX/IECEX certificates

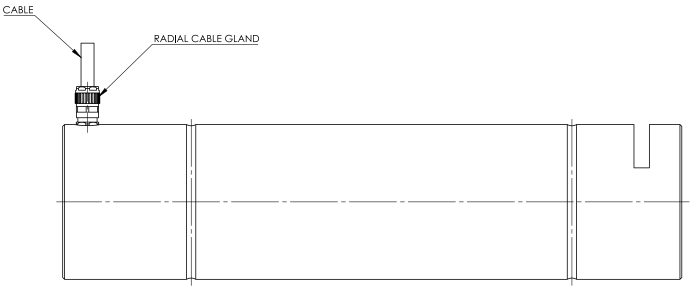
ATEX / IECEX Load Pin

Custom Load Pin design options

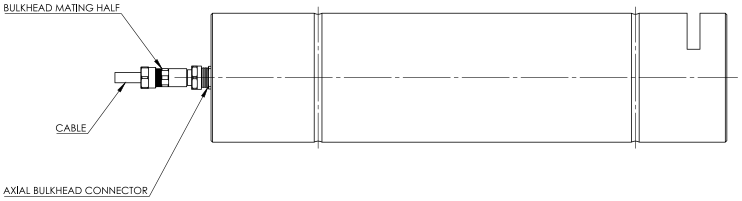
Axial Cable Gland Entry



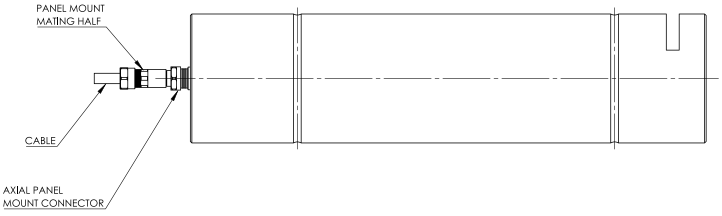
Radial Cable Gland Entry



Axial Bulkhead Mount Connector



Axial Panel Mount Connector



Cable Working Equipment

Wheeled Detrenching Grapnel
Roller Arm Cable Counter
Standard Cable Counter
Flatfish Grapnel
Gifford Grapnel
Rennie Grapnel Small
Rennie Grapnel Large
Sandpoint Grapnel
Spearpoint Grapnel
Detrenching Grapnel
Sliding Prong Grapnel
Jamming Grapnel
Hand Grapnel
Son of Sammy Grapnel
Mushroom Anchor
Pyramid Anchor
5t SG Cutting Hook
Repeater Trolley
BTL Stopper
Cable Sheave
Thimbles and Links
Acoustic 15t Release Hook
Yale Grips
Friction Tape
PolyBuoys

Overview:

DLM's long involvement within the cable laying industry has led to the development of a multitude of products to enable cable operations run smoother.

Wheeled Detrenching Grapnel
1.1m, 1.5m & 1.8m WDTG

The Wheeled Detrenching Grapnel comprises of a prefabricated steel shank with a skid secured by a pin at the front end and a pivoted wheel support and Grapnel crown on the rear end.

The tine is fixed to either side of the Grapnel crown. The rear of the grapnel is supported on wheels. These reduce friction and allow the free flow of soil being pushed up by the tine. They also keep the overall towing force as low as possible and allow steady control of the grapnel working depth. The wheels are mounted on an axle support containing two bushes with a thrust washer at either end of the housing.

Two types of fluke can be mounted on the Grapnel crown depending on the application. They are as follows:

- **For detrenching work (cable recovery) a narrow type fluke**
- **For burial assessment mode a wide replaceable fluke tip similar to a plough share tip**

Acoustics

For ease of cable recognition, the grapnel can be fitted with an acoustic transmitter system. The fluke has a trigger mounted near the grapnel crown. When cable rides up the fluke and forces against the trigger a sound pulse from the pinger mounted on the wheel arm changes, indicating that the cable has been located. The sound pulses can either be picked up by hull mounted transducers or by a hydrophone lowered over the ship's side. The signals are then relayed to a receiver unit.

Grapnel Specifications

Description	Part number - 0001-1241 0.8m	Part number - 0001-1213 1.5m
Weight	1.9t	3t
Length	4.125m	5.2m
Width	2.4m	2.4m
Height	1.25m	2.8m
Max towing tension	25t	13t
Load pin failure	25t Approx	13t Approx
Maximum working depth	1000m	1000m

Detrenching Work

The grapnel can also be fitted with a sensor which indicates when the rear of the grapnel is riding out of the seabed. This may occur if the grapnel encounters a hard underlying layer of rock or if it engages a boulder. A second sensor can be fitted to provide an indication when the front of the grapnel lifts up, due to insufficient tow rope being deployed. The grapnel is fitted with a third sensor (trigger) to indicate when a cable rides up on the fluke. The grapnel is fitted with a fourth sensor which is connected in parallel with the third sensor to indicate when the grapnel is upside-down.

The standard fluke tine / fluke tip penetration is 1.1m, 1.5m & 1.8m. At this setting the grapnel will maintain a full working depth in all uniformly friable seabeds. It will however ride over hard underlying layers that it cannot penetrate. The grapnel is designed to withstand towing forces of 25t and 12t at the tine/fluke tip. To protect the grapnel from permanent damage, forces in excess of these figures cause a shear pin to fail, allowing the fluke to rotate over the obstruction. The grapnel can then be recovered to the ship and a new shear pin fitted.

Acoustics Specification

Command Unit:	Applied Acoustics PAM 3510

Pingers:	Applied Acoustics Transducer
Hydrophone:	Applied Acoustics PAM 3 Dunker 3190

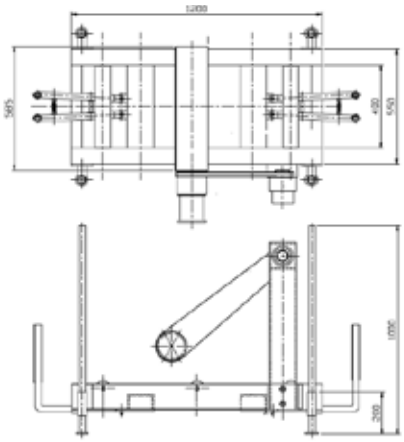
- Tests beacons from many manufacturers
- Splash proof keypad
- Configures 1000 series beacons via serial link
- 6 hour battery life
- Can test all wideband / spread spectrum channels available in the 1000 series beacon
- Supplied with test transducer 3102
- Will test HPR400, HPR30, Sonardyne, Trackpoint / ORE &
- Applied acoustic tone and spread spectrum
- 3000m rated
- Heavy duty dunking transducer with cage.
- Stainless steel body
- Hemispherical coverage
- 30m cable

Roller Arm Cable Counter
RCC - 2.0

The DLM Roller Arm Cable Counter, is as its name suggests, a widely used and highly effective cable measuring device. Frequently used on cable laying vessels it combines durable, robust design with high reliability.

The counter is fitted with a heavy duty roller arm which supplies data via the sealed rotary quadrature shaft encoder. The counter can be supplied with a DLM pelicase display or as a stand alone unit supplying just the quadrature encoder output for integration into clients existing systems.

Dimensional Data



Features:

- Heavy duty roller arm spanning the width of the frame
- Cable guidance arms
- Adjustable frame height
- Sealed rotary enclosure with IP67 connector
- Supplied with signal cable and displays as required

Applications:

- Cable laying operations
- Cable transfer
- Cable loading
- Cable measurement

Counter Frame Specification

Part number: 0001 – 1239

Frame Height Range:	1 metre
Roller Wheel width:	585mm
Track Width:	400mm
Total Length:	1.2metre
Cable Guidance Arms Max Opening:	420mm
Wheel Distance per Revolution:	0.5 metre
Suitable for Cable Diameters:	17mm to 350mm
Encoder Output:	Push Pull Quadrature

Display Specification

Part number: 0001 – 1228

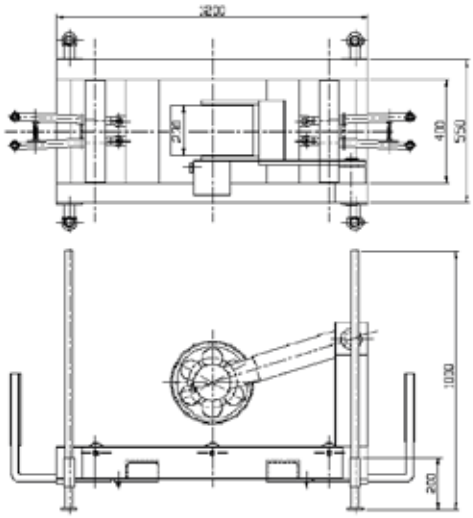
Enclosure:	Rugged pelicase display or wooden case
Speed/Distance Meter:	Bright red digital LED Red Lion PAXI meter
Exterior Switches:	IP67 rated On/Off switch / IP67 rated reset switch
Re-transmission:	RS232 or RS485
Power Supply:	90-250VAC power supply
Counter Cable Connector:	Cable glands
Counter Accuracy:	1% (assuming clean roller and no cable slip)
Signal Cable:	20 metres as standard

Standard Cable Counter
SCC-2.0

The DLM Standard Cable Counter is, as the name suggests, a widely used and highly effective cable measuring device. Frequently used on cable laying vessels it combines durable, robust design with high reliability.

The counter is fitted with a measuring wheel which supplies data via the sealed rotary quadrature shaft encoder. The counter can be supplied with a DLM pelicase display or as a stand alone unit supplying just the quadrature encoder output for integration into clients existing systems.

Dimensional Data



Features:

- Wheel provides excellent traction with 70-80 durometer polyurethane cover
- Adjustable frame height
- Sealed rotary enclosure with IP67 connector
- Supplied with signal cable and displays as required

Applications:

- Cable laying operations
- Industrial cable measurement
- Cable transfer
- Cable loading

Counter Frame Specification

Part number: 0001 – 1212

Frame Height Range:	1 metre
Roller Wheel Width:	230mm
Track Width:	400mm
Total Length:	1.2metre
Cable Guidance Arms Max Opening:	420mm
Wheel Distance per Revolution:	1 metre
Suitable for Cable Diameters:	17mm to 230mm
Encoder Output:	Push pull quadrature

Display Specification

Part number: 0001 – 1228

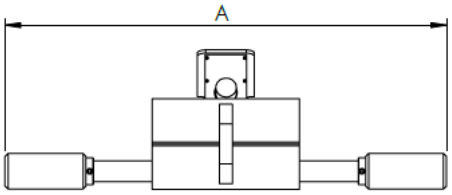
Enclosure:	Rugged pelicase display or wooden crate
Speed/Distance Meter:	Bright red digital LED Red Lion PAXI meter
Exterior Switches:	IP67 rated On/Off switch / IP67 rated reset switch
Re-transmission:	RS232 or RS485
Power Supply:	90-250VAC power supply
Counter Cable Connector:	Cable glands
Counter Accuracy:	1% (assuming clean roller and no cable slip)
Signal Cable:	20 metres as standard

Stingray
Acoustic Tow Line Positioning Grapnel

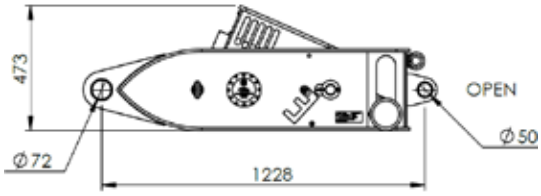
Manufactured from high-strength steel, the Acoustic Tow Line Positioning Grapnel is suitable for use in harsh subsea environments. The design incorporates a pivot point, ensuring that even if the grapnel flips over, the beacon remains oriented towards the surface and maintains communication.

The grapnel is compatible with a range of subsea beacons, including Sonardyne, iXblue, and Applied Acoustics, allowing it to meet client requirements regardless of the preferred system.

Customers looking to measure rotation and inclination can have a data logger fitted.



VERSION	DIM 'A'
LONG	1500
SHORT	900



Features:

- Manufactured from high strength structural steel
- 2 differing sizes of wide stabilisers to improve subsea stability
- Welded plates for increased strength
- Interchanable mounting clamps for use with different subsea USBL beacons such as sonadyne, IX Blue and Applied Acoustics
- 1000m operating depth

Applications:

- PLGR (Pre Lay Grapnel Run)
- De-trenching of buried subsea cables.

Dimensions

Part Number	Description	A	WLL	Proof Load
0001-1480	Acoustic Tow Line Positioning Grapnel (Short)	900mm	13t	26t
0001-1480	Acoustic Tow Line Positioning Grapnel (Long)	1500mm	13t	26t

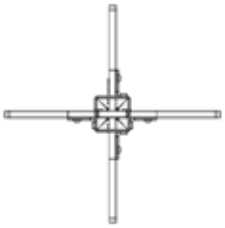
Spares and Accessories Table

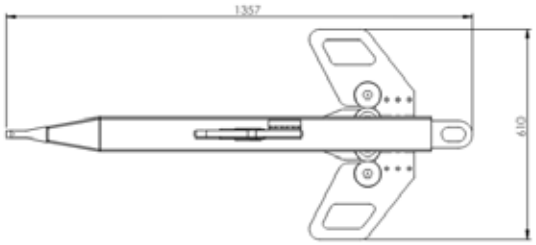
Part Number	Description
0001-1437	DL- 3.0 Subsea Data Logger

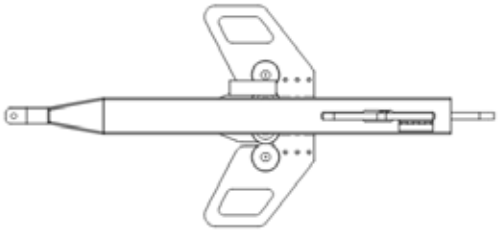
Long Line Cutter Grapnel

Typically used to cut long lines during cable-laying applications, this method prevents the ship from becoming entangled in wires, ensuring uninterrupted operations and the protection of important equipment.

Manufactured from high-strength structural steel and equipped with heat-treated cutting discs, the Long Line Cutter's sharp blades can cut fishing lines instantaneously, with minimal disruption







Features:

- Manufactured from high strength structural steel
- Heat treated hardened cutting discs
- Removable/replaceable discs in the event of damage
- Painted using marine grade paint

Applications:

- PLGR (Pre Lay Grapnel Run)
- Clearing fishing wires to prevent entanglement

Dimensions

Part Number	Description	L	H	WLL	Proof Load
0001-1268	Long Line Cutter Grapnel	1357mm	610mm	13t	19.5t

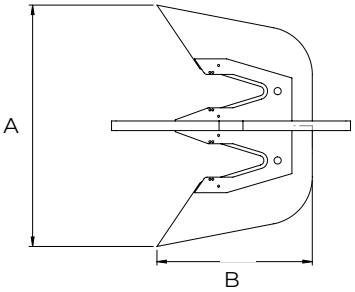
Spares and Accessories Table

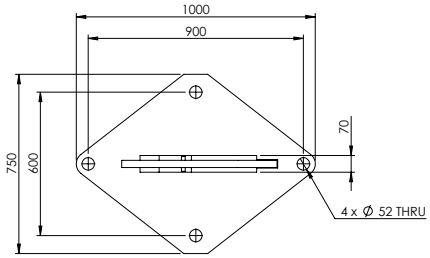
Part Number	Description
0040-1698	LLCG Cutter Wheel
0040-1699	LLCG Blade Guard

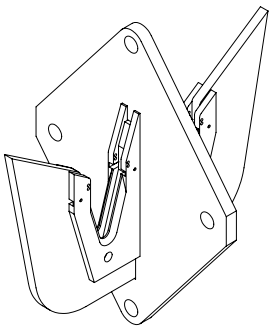
Flatfish Grapnel

The Flatfish Grapnel consists of a large diamond-shaped plate with two prongs. A wide semi-circular seat is set at the base of the prongs.

It is useful in all depths on soft or smooth seabeds especially when the cable is in poor condition, as the large seat minimises damage to the cable. It can be supplied with short or long prongs.







Features:

- Manufactured from high strength structural steel
- Machined blade holders for accurate fitment
- Rounded edge on wings to protect cable sheaves
- Painted using marine grade paint

Applications:

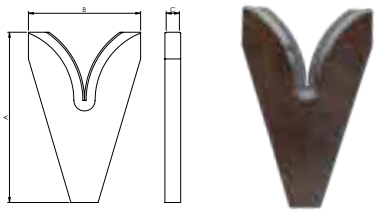
- PLGR (Pre Lay Grapnel Run)
- Designed for use in all water depths on soft or smooth seabeds
- Cutting cable when fitted with blades, curved for lightweight cable, flat for armoured cable
- Recovering cables when fitted with glove
- Maintenance of cable systems

Dimensions

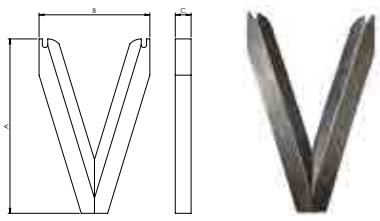
Part Number	Description	A	B	WLL	Proof Load
0001-1160	Flatfish Long Prong	1010mm	650mm	13t	26t
0001-1161	Flatfish Short Prong	750mm	570mm	13t	26t

Spares and Accessories Table

Part Number	Description	A	B	C
0050-0692	12t Shackle	-	-	-
0050-1095	26mm Hammer Lok Coupling	-	-	-
0001-1435	Shear Pin	-	-	-
0001-1163	Glove	400	215	240
0001-1164	Flatfish Armoured Blade Straight (4 per set)	277	178	25
0001-1187	Flatfish Lightweight Blade Curved (4 per set)	270	178	25



0001-1187

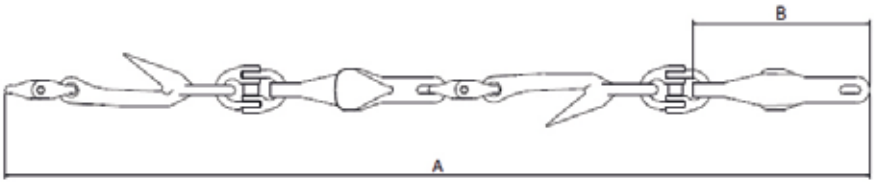


0001-1164

Gifford Grapnel

The Gifford Grapnel is usually used in conjunction with the Rennie. It is made up in units of four hooks at right angles to each other. The hooks resemble a crane hook with a broad hook seat to form a cup to hold the hooked cable. It can be used on any type of bottom but was originally designed for rocky or coral environments.

The standard size can accept cables to approximately 51mm diameter.



Features:

- Cast from high strength alloy
- Casting removes any sharp edges which could damage cables
- Each grapnel is proof tested to ensure strength
- Painted using marine grade paint

Applications:

- PLGR (Pre Lay Grapnel Run)
- Designed for rocky or coral environments
- Recovering and clearing cables up to 90mm diameter (large Gifford) and 51mm diameter (small Gifford)
- Maintenance of cable systems
- Used in conjunction with Rennie

Dimensions

Part Number	Description	A	B	C	WLL	Proof Load
0001-1156	Gifford Grapnel assembly small	2020 mm	464 mm	148 mm	17t	34t
0001-1157	Gifford Grapnel assembly large	2520 mm	614 mm	177 mm	13t	26t

Spares and Accessories Table

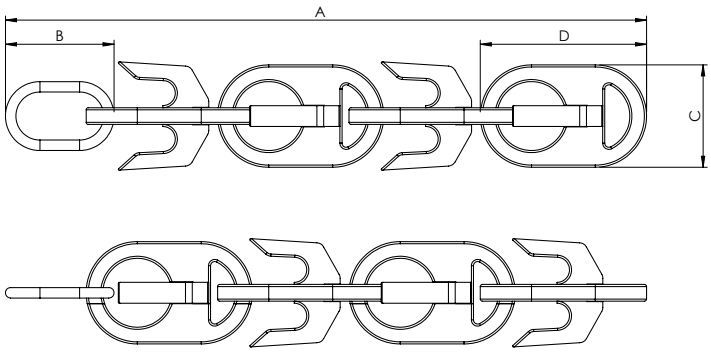
Part Number	Description
0040-1081	Single Gifford Grapnel Large
0040-1082	Single Gifford Grapnel Small
0050-1095	26mm Hammer Lok Coupling
0050-0712	Shackle

*Not supplied with shackles

Small Rennie Grapnel

The Rennie Grapnel is usually used in conjunction with the Gifford. The Rennie Grapnel is built up of flat links, the fluke passes through the body and is then welded onto it. The links are joined together in sets of four in the form of a chain, successive links and flukes being at right angles to each other. Flukes can be detached for renewal when required.

It is often used with two Gifford grapnels to provide weight and hold the grapnels down. The Rennie Grapnel can be used on any type of seabed but originally designed for rocky environments.



Features:

- Manufactured from high strength structural steel
- Painted using marine grade paint
- Proof loaded to 200% of WLL
- Optional Hardox flukes

Applications:

- PLGR (Pre Lay Grapnel Run)
- Originally designed for rocky environments.
- Recovering or clearing cables
- Maintenance of cable systems
- Used in conjunction with Gifford

Dimensions

Part Number	Description	A	B	C	D	WLL	Proof Load
0001-1158	Rennie Grapnel Small	1535mm	260mm	245mm	398mm	9t	18t

Spares and Accessories Table

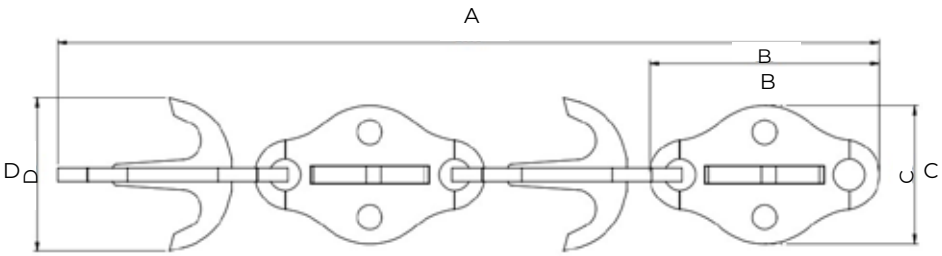
Part Number	Description
0050-0712	12t Shackle
0050-1095	26mm Hammer Lok Coupling

*Not supplied with shackles

Large Rennie Grapnel

The Rennie Grapnel is usually used in conjunction with the Gifford. The Rennie Grapnel is built up of flat links, the fluke passes through the body and is then welded onto it. The links are joined together in sets of four in the form of a chain, successive links and flukes being at right angles to each other. Flukes can be detached for renewal when required.

It is often used with two Gifford grapnels to provide weight and hold the grapnels down. The Rennie Grapnel can be used on any type of seabed but originally designed for rocky environments.



Features:

- Manufactured from high strength structural steel
- Painted using marine grade paint
- Proof loaded to 150% of WLL
- Optional Hardox flukes

Applications:

- PLGR (Pre Lay Grapnel Run)
- Originally designed for Rocky environments.
- Recovering or clearing cables up to 90mm diameter
- Maintenance of cable systems

Dimensions

Part Number	Description	A	B	C	D	WLL	Proof Load
0001-1159	Rennie Large	2358mm	660mm	395mm	438mm	13t	26t

Spares and Accessories Table

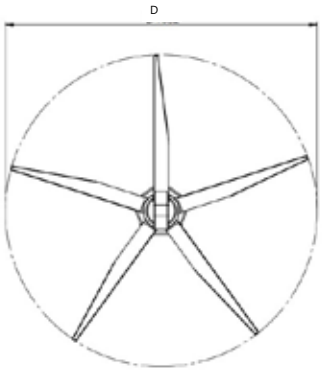
Part Number	Description
0050-1095	26mm Hammer Lok Coupling

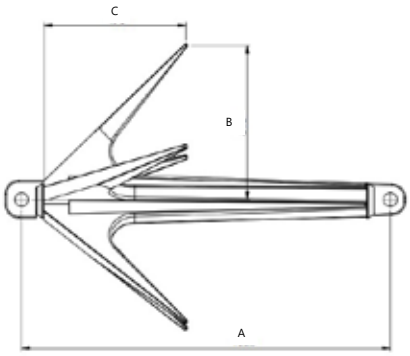
*Not supplied with shackles

Sandpoint Grapnel

The Sandpoint Grapnel is manufactured from high strength structured steel. The sizes normally used are 115kgs, 180kgs and 250kgs and this will depend on penetration requirements.

They are ideal for use on sandy or easily disturbed seabeds where little resistance will be experienced, and are particularly good where the cable has become self-buried to a small degree. They can also be added at the rear of the grapnel train for extra weight and penetration.





Features:

- Manufactured from high strength structural steel
- Integrated single piece prongs for increased strength
- Flux core welded for increased strength
- Integrated tow points
- Painted in marine friendly RAL2000 paint

Applications:

- PLGR (Pre Lay Grapnel Run)
- Designed for sandy seabed environments
- Recovering or clearing self buried cable
- Maintenance of cable systems
- Used in conjunction with Rennie and Gifford

Dimensions

Part Number	Description	A	B	C	D	WLL	Proof Load
0001-1183	115kg	950mm	385mm	330mm	782mm	13t	26t
0001-1184	180kg	1220mm	510mm	470mm	1032mm	13t	26t
0001-1166	250kg	1550mm	560mm	550mm	1132mm	13t	26t

Spares and Accessories Table

Part Number	Description
0050-0692	12t Shackle

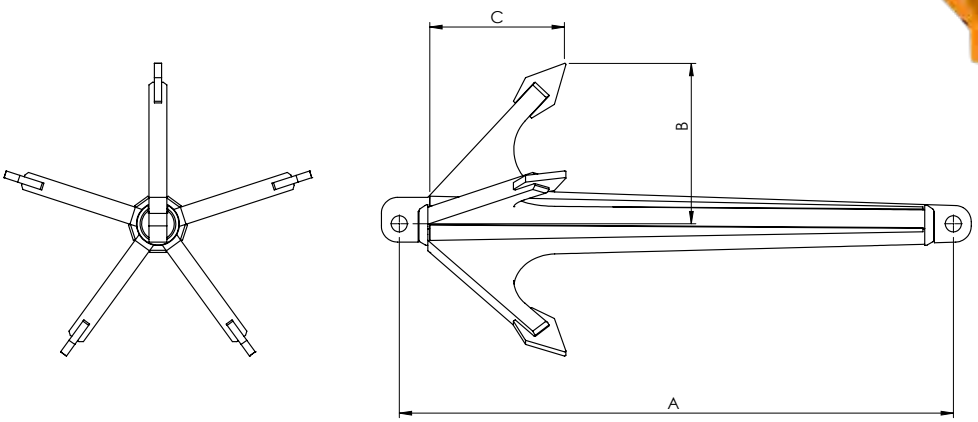
*Not supplied with shackles

Spearpoint Grapnel

The Spearpoint grapnel consists of a shank with five prongs with reinforced tips.

Spearpoints vary in size and hence seabed penetration. The three sizes normally used are the 115kgs, 180kgs and 250kgs depending on the penetration required. They are usually used in sandy or penetrable seabeds where some resistance may be experienced.

Spearpoints are often used at the end of a Rennie and Gifford rig or have a Rennie and Gifford reversed rigged.



Features:

- Manufactured from high strength structured steel
- Integrated single piece prongs for increased strength
- Flux core welded for increased strength
- Integrated tow points
- Painted in marine friendly RAL2000 paint
- Hardox Spearpoint tips

Applications:

- PLGR (Pre Lay Grapnel Run)
- Designed for sandy seabed environments where some resistance can be experienced.
- Recovering or clearing self-buried cable
- Maintenance of cable systems
- Used in conjunction with Rennie and Gifford

Dimensions

Part Number	Description	A	B	C	WLL	Proof Load
0001-1181	115kg	950mm	385mm	300mm	13t	26t
0001-1182	180kg	1220mm	410mm	320mm	13t	26t
0001-1165	250kg	1550mm	450mm	375mm	13t	26t

Spares and Accessories Table

Part Number	Description
0050-0692	12t Shackle

*Not supplied with shackles

Detrenching Grapnel

The Detrenching Grapnel is manufactured from high tensile steel, suitable for withstanding the harsh offshore environments. The structure and material of the grapnel is tested using finite element analysis which is performed during the design phase. This simulates the various stresses and strains acting on the grapnel in a variety of different seabed conditions and allowed for optimisation of the design.

The Grapnel itself is scissor shaped at one end, which is designed to break the surface of the seabed and fitted with stabilising bars at the other end, to assist its dynamics and balance in the water column, while also for use in the seabed. In addition, there is an option to fit two tines if required either side of the grapnel, tines are removable and fitted with wear tips at the end, prolonging tine life.

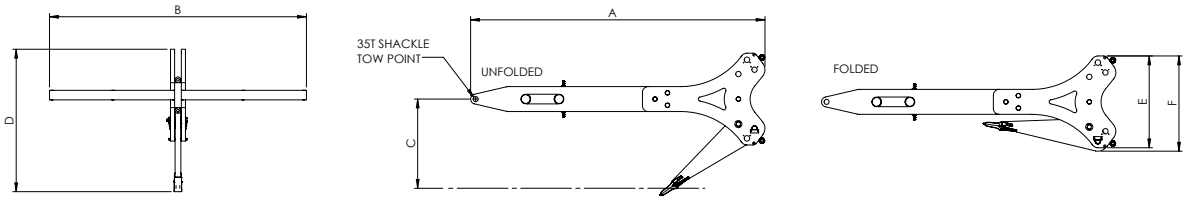
The grapnel, has been designed to withstand tow tensions of up to 15t. It has a built i n shear pin rated to a breaking load of 15t which shears and protects the tow line and the tine if tension is exceeded beyond this point.

Features:

- Manufactured from high strength structural steel
- Removable shear pin to prevent damage in overload conditions
- Replacement wear tip
- Wide stabilisers to improve subsea stability – removable for storage
- Flux core welded for increased strength

Applications:

- Detrenching buried subsea cables (Power or Telecoms)
- Subsea Cable recovery for repair
- Removal of out of service cables
- Route clearance



Dimensions

Part Number	Description	A	B	C	D	E	F	WLL
0001-1426	670mm	3018mm	3080mm	670mm	1362mm	1100mm	1140mm	15t
0001-1427	1070mm	3528mm	3080mm	1070mm	1707mm	1100mm	1140mm	15t
0001-1428	1500mm	4818mm	3080mm	1500mm	2111mm	1100mm	1140mm	15t
0001-1429	1800mm	5718mm	3080mm	1800mm	2543mm	1100mm	1140mm	15t

Spares and Accessories Table

Part Number	Description
P0040-1245	Fluke Tooth
P0040-1246	Tooth Retainer set
P0050-0716	35T Shackle
S0070-0047	670mm Fluke
S0070-0020	1070mm Fluke
S0070-0023	1500mm Fluke
S0070-0045	1800mm Fluke
S0070-0022	Stabiliser & Bolts

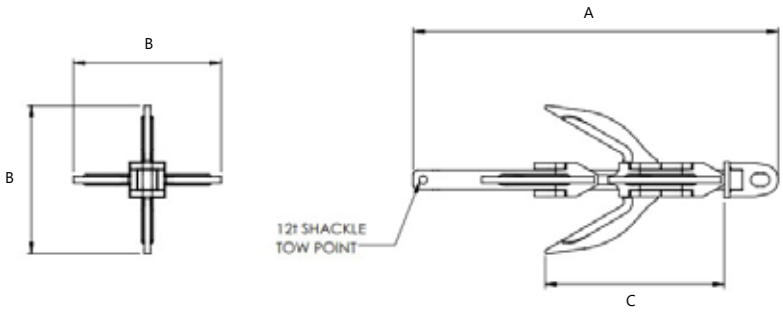
Part Number	Description
P0040-1152	Shear Pin 670mm
P0040-0931	Shear Pin 1070mm
P0040-1025	Shear Pin 1500mm
P0040-1149	Shear Pin 1800mm
P0040-0933	Inner Bush
P0040-0934	Outer Bush
P0040-0932	Pivot Pin

*Not supplied with shackles

Sliding Prong Grapnel

The Sliding Prong Grapnel comprises of a square cross-section shank on which are slid double prongs in alternate orientations. Broken or damaged prongs can be slipped off and renewed. Prongs come in three sizes, known as A, B and C. Type C is the largest prong and is usually used when the cable is believed to be buried.

The Sliding Prong Grapnel is designed for use over sand, clay or mud.



Features:

- Manufactured from high strength structural steel
- Rounded edge on wings to protect cable sheaves
- Removable/replaceable prongs in the event of damage
- Painted using marine grade paint

Applications:

- PLGR (Pre Lay Grapnel Run)
- Designed for use over sand, clay or mud seabeds
- Recovering or clearing cables which are believed to be buried
- Maintenance of cable systems

Dimensions

Part Number	Description	A	B	C	WLL	Proof Load
0001-1170	Sliding Prong Type A (4 Prongs)	1730mm	400mm	350mm	12t	18t
0001-1171	Sliding Prong Type B (3 Prongs)	1730mm	700mm	550mm	12t	18t
0001-1172	Sliding Prong Type C (2 Prongs)	1730mm	1000mm	880mm	12t	18t

Spares and Accessories Table

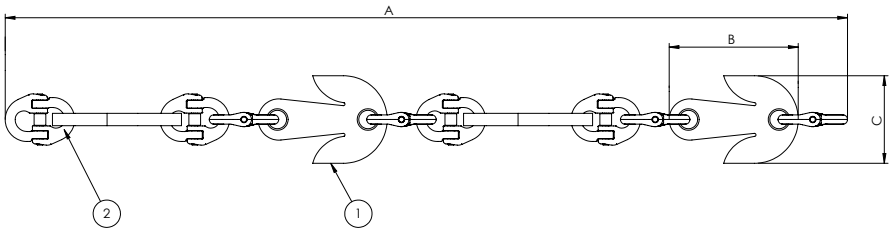
Part Number	Description
0070-0048	Sliding Prong Shaft
0070-0049	Sliding Prong Type A
0070-0050	Sliding Prong Type B
0070-0051	Sliding Prong Type C

*Not supplied with shackles

Jamming Grapnel

The Jamming Grapnel can be used as part of a longer grapnel train for clearing the route prior to laying a cable or recovering a subsea cable.

It typically consists of four jamming hooks connected together using coupling links with the hook's position at 90 degrees to each other. As the name suggests the grapnel relies on the cable which is trying to be recovered, getting jammed in the hook, opening securing it in place before recovering. It can be used with cables of a minimum diameter of 14mm as a guide.



Features:

- Manufactured from high strength structural steel
- Fitted together with coupling links
- Proof loaded to 26t

Applications:

- Route clearance
- PLGR (Pre Lay Grapnel Run)
- Cable recovery

Dimensions

Part Number	Description	A	B	C	WLL	Proof Load
0001-1219	Jamming Grapnel	2741mm	420mm	285mm	13t	26t

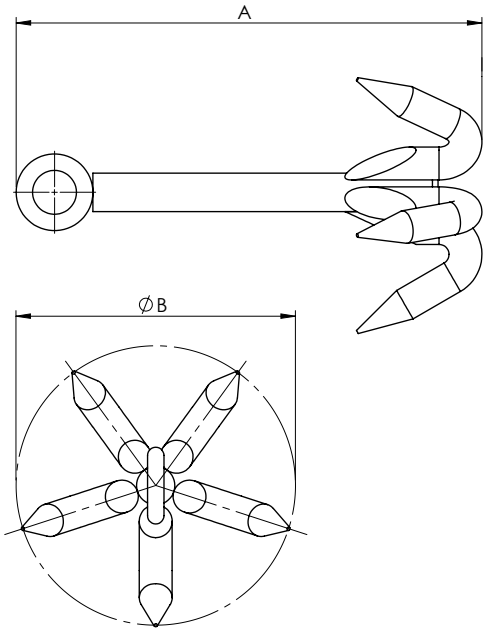
Spares and Accessories Table

Part Number	Description
P0040-1138	Jamming Grapnel Hook
P0050-1095	26mm Hammer Lok Coupling

Hand Grapnel

The Hand Grapnel is a lightweight and portable five prong grapnel, manufactured from high tensile steel and finished in orange marine paint.

Typically used in buoy recovery operations when grappling from the side of a vessel or in lightweight cable recovery.



Features:

- Manufactured from high strength structural steel
- Solid construction to ensure long product life
- Painted using marine grade paint

Applications:

- Buoy recovery
- Cable recovery

Dimensions

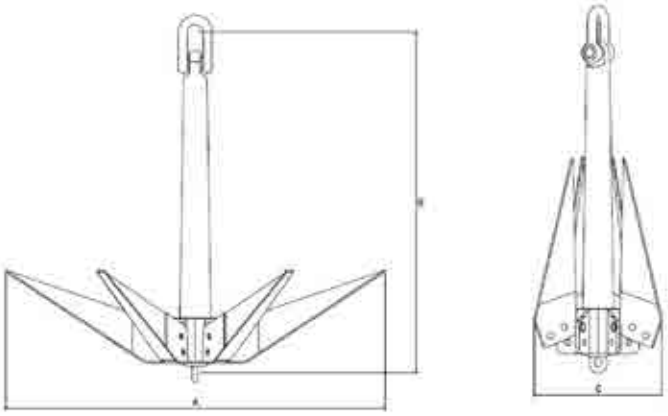
Part Number	Description	A	B	WLL	Proof load
0001-1431	250kg Hand Grapnel	355mm	255mm	250kg	375kg
0001-1434	400kg Hand Grapnel	445mm	255mm	400kg	600kg

*Not supplied with shackles

Son of Sammy

A round bottom grapnel consisting of six hooks positioned centrally around a main shank. Its design being based on the original long prong sand grapnel.

It can be manufactured with fixed hooks where space isn't a problem or folding where the hooks can be stowed during periods of non-use. The square cross section of the hooks provides increased holding capacity during operations in soft seabed conditions.



Features:

- One metre plus penetration available in applicable seabed types.
- Can be used in in clay and sand type seabed
- Multi hook design provides increased cable recovery opportunities
- Good cable holding properties due to hook design
- Two types available, fixed and folding

Applications:

- Recovery of buried cables in a variety of sea-beds

Dimensions

Part Number	Description	A	B	C	WLL	Proof Load
0001-1180	Son of Sammy (Folding)	2300mm	1965mm	792mm	15t	22.5t
0001-1179	Son of Sammy fixed	2500mm	1640mm	N/A	15t	22.5t

Spares and Accessories Table

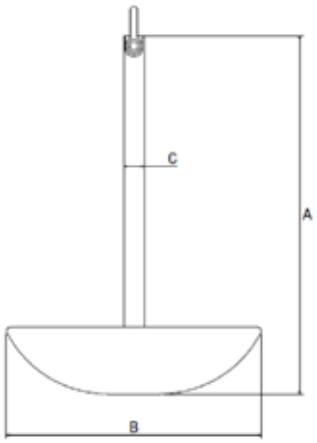
Part Number	Description
0050-0696	35t Shackle

*Not supplied with shackles

Mushroom Anchor

A round bottom weighted anchor at the end of a central shaft. The bowl having either a hole for fitment of a shackle or a welded pad eye to assist recovery.

Supplied in a variety of weights with the intention of controlling the forces arising from buoy moorings or cable operations where additional weight would assist, the design of the mushroom allows it to displace a section of the seabed when in operation equal to its weight.



Features:

- Variety of sizes available
- Proven design
- Hole or pad eye allowing rope of chain to be attached to aid recovery

Applications:

- Buoy moorings
- Additional weight during cable operations

Dimensions

Part Number	Capacity	A	B	C	Suitable Shackle
0001–1185	50kg	1000mm	490mm	38mm	WLL 13.5T Bow with flush head
0001–1186	100kg	1150mm	625mm	45mm	WLL 13.5T Bow with flush head
0001–1173	150kg	1200mm	664mm	50mm	WLL 13.5T Bow with flush head
0001–1174	250kg	1350mm	780mm	50mm	WLL 13.5T Bow with flush head
0001–1175	350kg	1400mm	825mm	65mm	WLL 13.5T Bow with flush head
0001–1176	500kg	1490mm	870mm	65mm	WLL 13.5T Bow with flush head

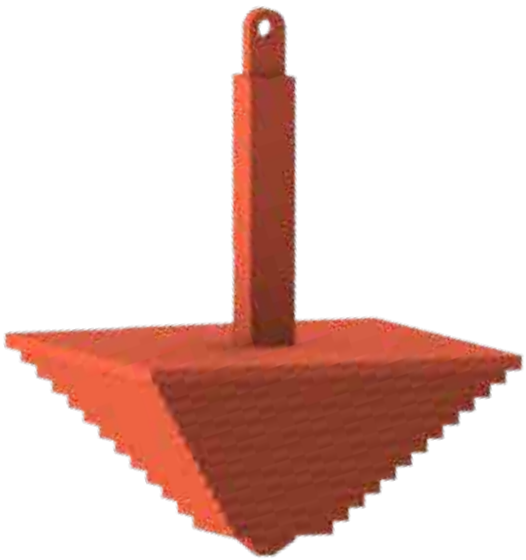
Spares and Accessories Table

Part Number	Description
0050-0709	6.5t Shackle
0050-0710	8.5t Shackle
0050-0711	9.5t Shackle

Part Number	Description
0050-0712	12t Shackle
0050-0713	13.5t Shackle
0050-0714	17t Shackle

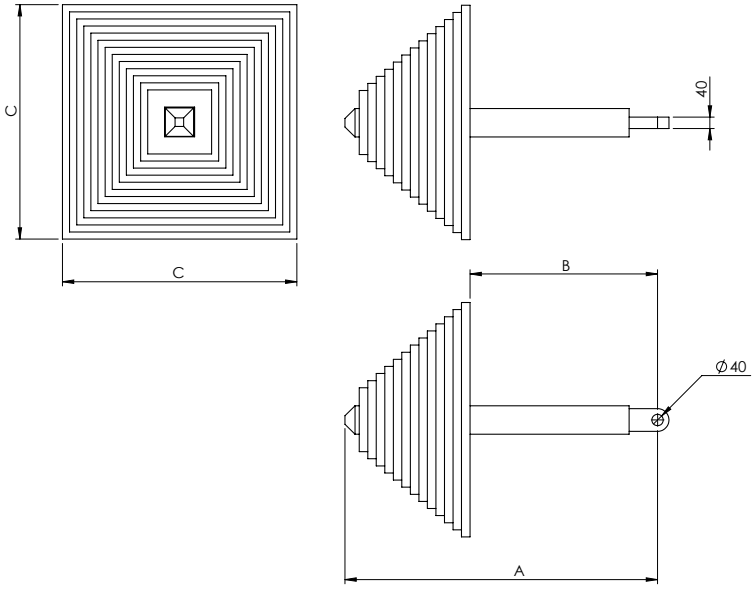
*Not supplied with shackles

Pyramid Anchor



The Pyramid Anchor is able to achieve approximately 10 times its weight in holding power once deployed and embedded in the seabed.

The shape of the anchor induces a high suction effect which allows for the increased holding power over other traditional alternatives. It also allows for easy seabed penetration due to the pyramid shape which concentrates the impact load at the point.



Features:

- Manufactured from high strength structural steel
- Rapid seabed penetration
- Large surface area to increase suction effect
- Painted using marine grade paint

Applications:

- Boat moorings
- Marker buoy moorings
- Dock moorings

Dimensions

Part Number	Description	A	B	C
0001-1420	250kg Pyramid Anchor	545mm	300mm	580mm
0001-1436	1000kg Pyramid Anchor	1100mm	660mm	825mm

Spares and Accessories Table

Part Number	Description
0050-0712	12t Shackle

*Not supplied with shackles

5t SG Cutting Hook

A single steel holder for the second generation Flatfish type cutting blades (Curved or Straight) with a single eye at the front end to secure a holding rope or wire.

Its 5t WLL allows the ship to cut cable where the cable hasn't been cut on the seabed with a flatfish grapnel or other cutting devices.

Features:

- Lightweight
- Uses standard cutting blades from Flatfish Grapnel

Applications:

- Cutting of cable where cable hasn't been cut on seabed

Dimensions

Part Number	Description	A	B
0001-1237	5t SG Cutting Hook	1352mm	398mm

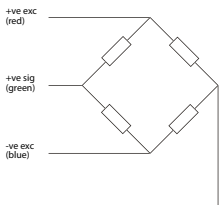
Spares and Accessories Table

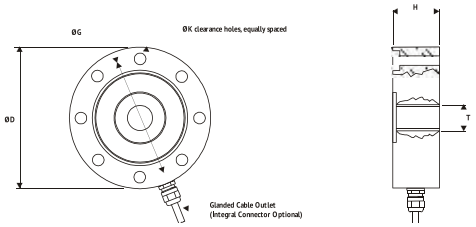
Part Number	Description
0001-1164	Flatfish Blade Straight (4 per set)

Repeater Trolley

A wheeled device with either rubber faced circular or Vee shaped receptacles to safely hold the repeater during cable operations.

The hollow section of the trolley allows the repeater to be secured by slings during loading and unloading.





Features:

- Design allows for different diameter repeaters to be used
- Free moving unit due to the rubber casters positioned in each corner
- Hollow area within trolley allows for the applicable round slings for lifting

Applications:

- Assisting safe movement of the repeater around the ship during deployment or recovery operations
- Storage of repeater

Dimensions

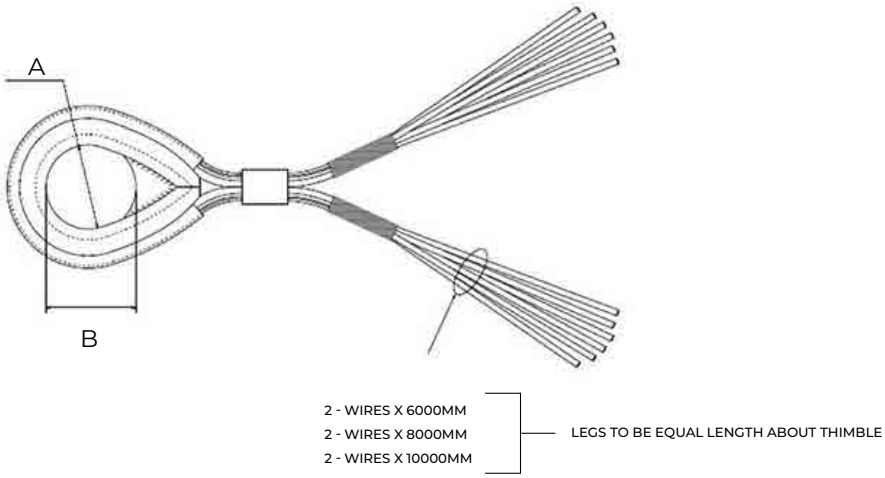
Part Number	Description	A	B	C	D
0001-1188	Repeater Trolley	1000mm	461mm	300mm	295mm

*Not supplied with shackles

BTL Stopper

The BTL Stopper is a 12 leg wire rope stopper with an WLL of 7t. Designed for use with all types of armoured cable but can also be used on polyurethane sheathed cable.

Construction comprises of six lengths of 8mm wire rope (2x6m, 2x8m, 2x10m) wrapped centrally around a with a Steel Ferrule. Ends being fused and tapered or secured with rubber heat shrink.



Wire Rope Ø8mm, 6 X 19 Fc galvanised ends tapered and fused or secured with rubber heat shrink.

Test certificate for Wire Rope to be supplied.

Features:

- Proven Design
- Used over a multitude of cable types
- Ease of application

Applications:

- Securing of cable ends during repairs

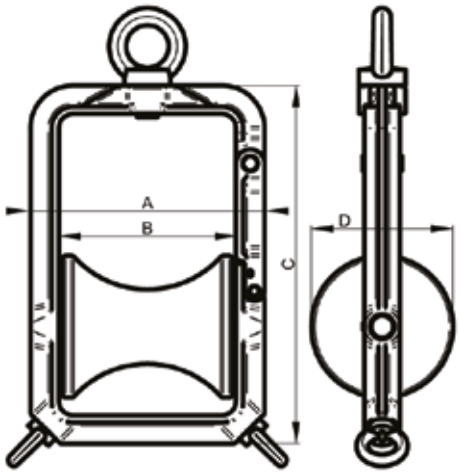
Dimensions

Part Number	Description	A	B	WLL	FOS
0001-1189	BTL Stopper	70mm	75mm	7t	16:1

Cable Sheave

The hanging cable sheave can be supplied in two sizes depending on the weight to be supported when in use.

With its side entry opening and securing points it is idea for transferring product when no fixed installation or trackway is available.



Features:

- Central hanging point to allow quick set up of the cable span.
- Side access entry for cable or rope.
- Securing points to hold sheave in position or secure sheave where span wire not possible
- Wide Sheave

Applications:

- Transferring of product from one location to another where a fixed installation is not available
- Assisting movement of product during on board ship operations. Tank to tank, Bow to Stern transfers

Associated Tools /Equipment:

- Span Wires
- Rigging Equipment to secure

*Not supplied with shackles

Thimbles and Links

Supplied in a number of sizes to match the diameter of the rope or wire they being used on. The link and thimble is a device used to support the eye formed at the end of a rope or wire.

The thimble can be supplied galvanised and with a gusset if additional strength is required. The link inserted into the thimble during manufacture enables a coupling link or shackle to be attached. Its strength and physical size allow it to be passed though machinery.

Features:

- Variety of sizes available
- Low size footprint allows it to be passed though and around machinery
- Certificated Product

Applications:

- Used to re-enforce a rope or wire cable end when additional strength is required.

Associated Tools /Equipment:

- Steel wire or rope

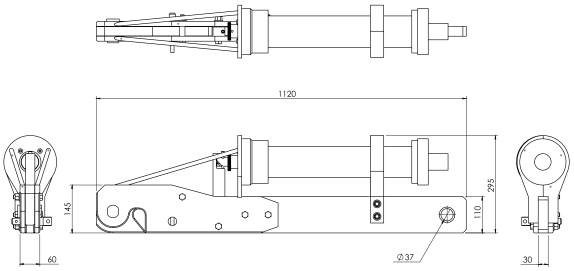
Acoustic 15t Release Hook
ARH - 2.0

The 15t Release Hook offers a new method of wirelessly separating an underwater load from its crane. By using acoustics, rather than divers or ROVs with cutting equipment, this method has the potential to both reduce risk and save time.

The Release Hook consists of a heavy duty strong back and lever system that amplifies the load capability of an Applied Acoustics' 529P Release beacon, and a standard AAE surface control unit, typically a 3510 PAM Portable. Once the load is in position a remote acoustic signal received from the surface unit triggers the hinged hook to open, releasing the load, allowing the frame unit itself to be recovered in its entirety for reuse.

Useful for bight release applications in the cable laying and repair industry, this acoustic Release Hook is also suited for coastal construction operations on wind farm sites, lowering work baskets or other subsea structures, separating lift bags from their loads or as a method of marking subsea infrastructures that are at risk of damage from surface activity.

Dimensional Data



Features:

- 15 tonne release capability
- Commanded by 3510 PAM or 2520 PAM, Easytrak Lite or Nexus USBL
- Positive lever drive off with load assist release
- Upgrade option for existing 529P beacons

Applications:

- Cable work operations
- Crane and winch wire detachment
- Submerged buoy recovery
- Complementary to lift bag operations

Specification

Part number: 0001 - 1117

HOOK SPECIFICATION:

WLL	15t (including 4 x factor of safety)
Operating depth	1000m
Weight in air	60lbs
Weight in water	40lbs
Overall length	1120cms
Maximum height (inc cage)	1200cms
Master link part number	Gunnebo M-1613-10

529P ACOUSTIC RELEASE BEACON

Housing material; hard anodised aluminium.

BATTERY

Type	Alkaline (Set of 3; Rx, Tx, Motor)
Listening life	4 months
Releases	70

TWO-WAY COMMUNICATION

Frequency	MF, 17 to 32kHz
Status telemetry	Acknowledge arm, Acknowledge release, Battery
Commands	Arm, Release, Battery Status, ID Commands, Tilt

COMPATIBILITY AND CONFIGURATION

Internally configured Command/Control 16 identities

TOPSIDE CONTROL 3510 PAM PORTABLE

Case size	390 x 310 x 170mm	
Weight	5lbs	
Temperature	Storage Operation	-20°C to +60°C 0°C to +40°C
External power supply	Input Output	100-240Vac, 50-60Hz 24Vdc
Battery life	6 hours	

3190 DUNKING TRANSDUCER

Robust stainless steel transducer with integral cable and transducer protection cage. Operation subsea with ranging, relocation, acoustic release and telemetry.

Size	100mm Ø x 276.5mm excluding cable relief
Weight	8.5lbs
Cable length (attached)	30m standard
Depth rating	50m

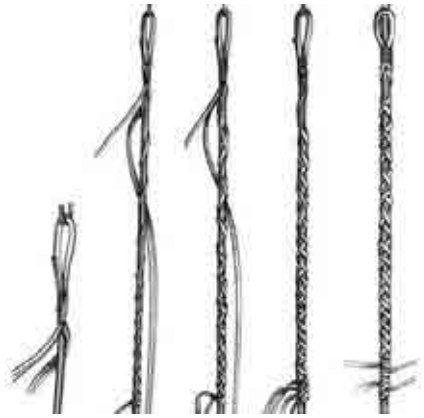
COMPATIBILITY

3510 PAM Portable, 2520 PAM
Easytrak Lite
Easytrak Nexus

YaleGrip™

A four legged grip leading from a central lifting or pulling eye, that is weaved around the product to secure it during use. Manufactured using a Kelvar braid for strength.

Supplied in a variety of sizes covering both product diameter and strengths. Available in standard and extended leg configurations when greater holding capacity required.



Features:

- Lightweight
- Colour coded depicting size and strength
- Ease of application

Applications:

- Holding of product during on board cable operations
- Holding of cable or product during launching or deployment of product to the sea floor

Associated Tools /Equipment:

- Friction Tape
- Stainless Steel Banding Tape

Dimensions

Part Number	Eye Diameter	Minimun Cable Diameter Inches (mm)	Maximum Cable Diameter Inches (mm)	Average Break Strengh 1000's of lbs (kg)	Work Load 1000's of lbs (kg)	Tail Length Ft (m)	Eye Size Inches (cm)	Colour
944504T	7/16" (11)	3/16" (5)	1/2" (12)	6 (2.7)	1.2 (.5)	4.5 (1.4	6 (15)	Red
944505T	9/16" (14)	1/4" (6)	3/4" (18)	12 (5.4)	2.4 (1.1)	5.5 (1.7)	6 (15)	Blue
944506T	11/16" (17)	3/8" (9)	7/8" (22)	18 (8.1)	3.6 (1.6)	6.5 (2.0)	6 (15)	Green
944507T	7/8" (22)	1/2" (12)	1" (25)	30 (13.6)	6.0 (2.7)	8 (2.4)	8 (20)	Orange
944508T	1" (24)	5/8" (16)	1-1/8" (28)	48 (21.7)	9.6 (4.3)	10 (3.0)	8 (20)	Yellow
944509T	1-1/4" (30)	7/8" (22)	1-3/4" (44)	72 (32.6)	14.4 (6.5)	16 (4.9)	12 (30)	Black
944510T	1-1/2" (36)	1-1/8" (27)	3" (76)	120 (54.4)	24 (10.8)	22 (6.7)	16 (41)	Red
944511T	1-3/4" (42)	1-3/8" (33)	3-1/2" (90)	180 (81.6)	36 (16.3)	28 (8.5)	18 (46)	Blue
944512T	2" (48)	2" (48)	4" (102)	290 (131.5)	58 (26.3)	34 (10.3)	18 (46)	Green
944513T	2-1/4" (60)	3-1/4" (78)	5" (127)	365 (165.5)	73 (33.1)	40 (12.2)	20 (51)	Orange
944514T	2-1/2" (64)	4" (102)	6" (152)	450 (204.1)	90 (40.8)	52 (15.8)	24 (61)	Yellow

Friction Tape

100% Cotton Cloth tape that is fractioned on both sides with a solvent free adhesive, consisting of synthetic rubber, in organic fillers and oils. Supplied on reels of 20metre length 50mm width.

Features:

- 100% Cotton Cloth
- Good frictional qualities
- Water resistant properties

Associated Tools /Equipment:

- Steel wire or rope

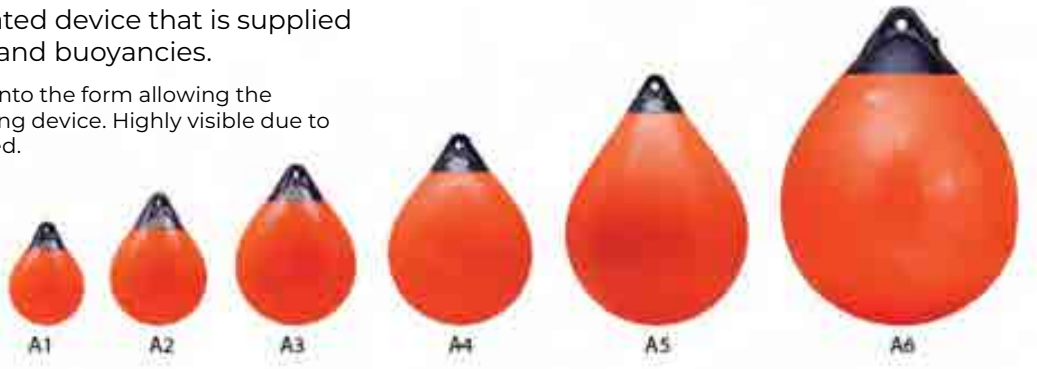
Applications:

- Used to cover and secure ends of stoppers as used during cable operations

Polybuoys

A spherical air inflated device that is supplied in a range of sizes and buoyancies.

A single eye moulded into the form allowing the attachment of a securing device. Highly visible due to the colour range offered.



Features:

- Variety of buoys available to support a range of buoyancies
- Visible in low light
- Fixing for glow light type devices
- Can be deflated for storage
- Lightweight

Applications:

- Used to float product from ship to shore
- Can be used to support product in the water column

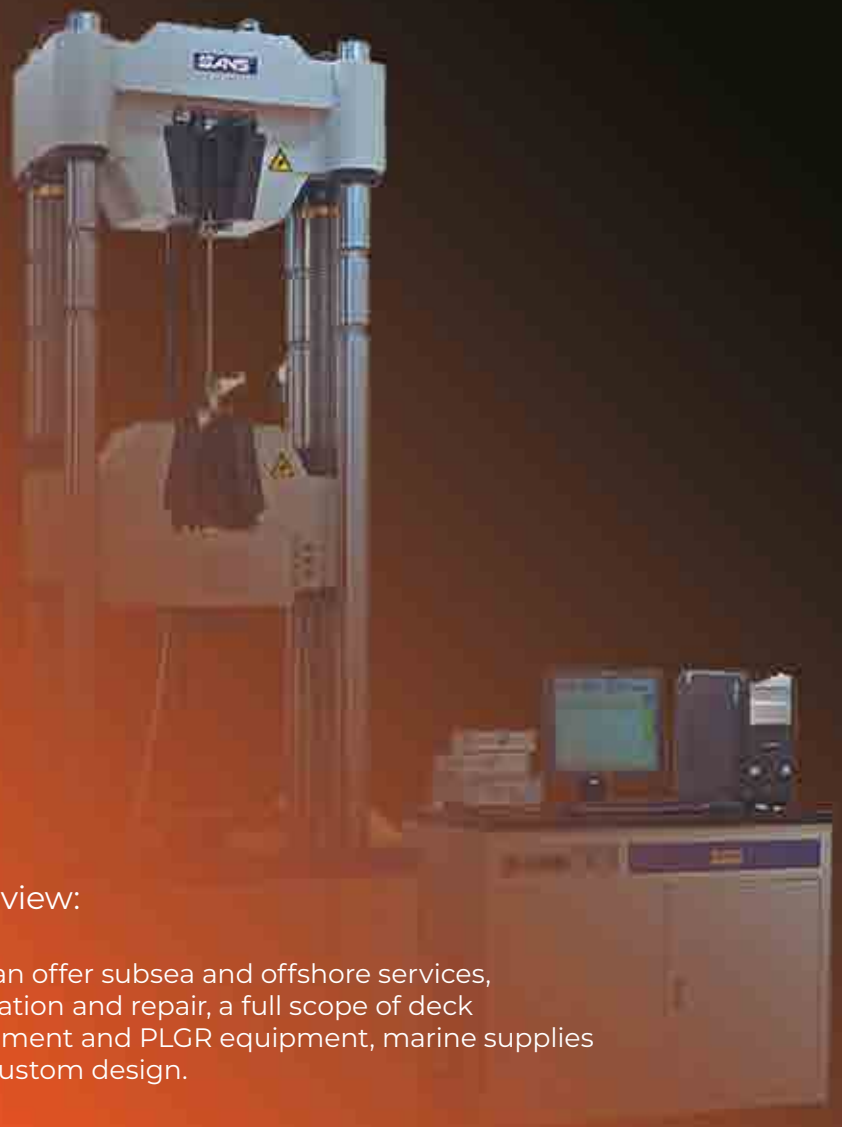
Associated Tools /Equipment:

- Glow Lights
- Karabiner Clips

DLM SERVICES

DLM Services

DLM Design
DLM Hire
DLM Calibration
Onsite Engineering
DLM Marine Sales



Overview:

We can offer subsea and offshore services, calibration and repair, a full scope of deck equipment and PLGR equipment, marine supplies and custom design.

DLM Design

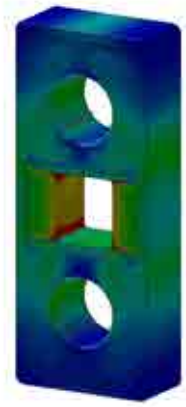
DLM's expertise lies in the ability to custom design, not only Load Cell's but also load monitoring and electronic systems to clients exacting requirements. Our multi skilled engineering team consists of electronic, mechanical and systems engineers with over 40 years of combined design experience in a multitude of industries including Lifting, Offshore, Oil and Gas, Subsea and Industrial.

DLM design blend industry experience, innovation and application knowledge to produce a 1st class solution to your design and system requirements. Our engineers apply this philosophy to all projects allowing for designs which are built to industry standard and durable for all types of use, including EN and BS standard and ATEX/ IECEX directives.

- Engineers are able to carry out complete bespoke designs from conception to production, trained using Solidworks and able to complete complex engineering drawings, FEA analysis and 3D modelling.
- Experience in programming and commissioning Siemens and Red Lion controls systems.
- In-house electronics design for load cell signal conditioners, test equipment and bespoke requirements.
- R&D projects, including revolutionary new product designs.
- ATEX/IECEX system design

Combined Engineering Qualifications

- BEng (Hons) Electronic Engineering
- HNC Electronic Engineering
- HND Instrumentation and Control Systems Engineering
- PRINCE2 project management
- BSc Electronic Engineering
- MSc Electronic Engineering
- HND Mechanical Engineering
- MSc Mechanical Design Engineering



DLM Hire

DLM stock a huge range of load cells, load monitoring and cable working equipment all of which are available for hire immediately and at competitive prices.

All equipment is regularly serviced and maintained by DLM Engineers ensuring high performance and client satisfaction. All load cells are calibrated in advance of dispatch and supplied with traceable calibration certificates ensuring high accuracy. At DLM we pride ourselves on our response times and are dedicated to providing an efficient first class service.

Load cells and Load Monitoring Equipment

DLM have a wide variety of load cell types and specialist equipment available for hire at short notice 24/7. Whether it is weighing a yacht or calculating the total weight and centre of gravity of a large structure we are sure to have a suitable solution.

Equipment available includes the following:

- TL-2.0 Wireless Tensile Links
- TS-2.0 Wireless Shackle load cells
- Large and Small Compressive load cells
- Centre of Gravity displays with data logging
- Subsea Shackle load cells

Cable Working Equipment

We hold stock of a range of equipment designed for use with the offshore Cable Laying and Oil & Gas industries, all of which is able to be mobilised at short notice and supported by our onsite BOSIET trained engineers. Equipment available includes, but is not limited to the following:

- Saddleback Monitors
- Acoustic Releases
- Cable Counters
- Grapnels
- Running Line Monitors
- Winch Line Monitoring Systems
- Data logging displays
- Rigging lofts
- Rigging equipment including Shackles, Hammerlocks, Swivels etc.

Calibration & Repair

DLM offer an unrivalled worldwide Load Cell calibration and repair service based at our Southampton premises. Combining highly competitive prices with quality workmanship, all calibrations are carried out by qualified calibration technicians with time served in the measurement industry.

Load Cell Calibration

Our in-house test facilities include state of the art, brand new computer controlled hydraulic tension and compression machines and allow calibration in tension up to 100 tonnes and in compression up to 300 tonnes. Higher capacities can also be catered for using off site test rigs.

All test machines are fully traceable to either the National Physical Laboratory or UKAS accredited laboratories and are verified in accordance with the national standard ISO 7500-1:2004.

DLM offer repair and servicing facilities not only for its own products but also for many other proprietary brands of Load Cell and instrumentation. Our calibration technicians are trained in electro mechanical repair and are able to offer a professional survey and report of fault conditions of returned load cells.

We have a wide range of tooling suitable for calibrating load pins of varying sizes, allowing us to lead the way with load pin calibration and recertification.

For the offshore and subsea industries DLM have an in-house hydrostatic pressure test facility capable of testing load pins up to 300 bar.

Onsite Engineering

DLM are able to provide qualified BOSIET Engineers for offsite working both within the UK and internationally at short notice. With a wealth of experience in the Load Monitoring and offshore Industry we are able to offer a wide range of services:

Features:

- Installation and commissioning of all DLM systems and equipment.
- Offshore and land based Load Monitoring System installation.
- Onsite calibration of Load Monitoring Equipment and Cable Working Gear.
- Onsite repair of Load Monitoring systems and other instrumentation.
- Rapid Response and technical knowledge.
- Lifting Gear Inspections

DLM Marine Sales

Our Marine Sales division has for many years supported DLM's key clients as an outsourced supply chain solution. We have supplied a range of products & activities for many years. **Our location means we are in the heart of the marine industry in Southampton.**

We are also a distributor of the Dunlop 18" Tyre used on cable tensioners within the cable laying indsutry. We offer a one stop shop service to the cable laying industry. These tyres are suitable for harsh marine environments and feature a high load capacity, UV stable and natural rubber.

DUNLOP AIRCRAFT TYRES

Features:

- You will only have to issue one PO to fulfil requests over a wide range of categories
- Time savings for our customers. Let us look after the items that are time consuming allowing you to focus on other priorities
- Benefit from the experience and relationships that DLM have built with a wide range of manufacturers and vendors over the years
- We understand that each customer is different and our proactive approach will mean that we will tailor our service to meet the specific requirement of each customer
- Ability to source a multitude of products and services across the industry. If we don't know where to buy the items then we will know someone who will
- No minimum order spend

Case Studies

Case Studies

DLM Weighs Turbine Blades at MHI Vestas

MHI Vestas needed an accurate way of measuring the weight of their 80m-long turbine blades (the length of nine London buses back-to-back) at both the root and the tip upon completion of the painting process. The blades are actually made on the Isle of Wight before being transported to Fawley for painting and weighing.

Accuracy is critical as once the blades are weighed they are classified as light, medium and heavy for use on each turbine. Once the total weight of the blade is determined, the manufacturer is able to calculate how much ballast is applied to each blade to create the sets of three to make up a turbine. One rotation of a turbine (three blades) can power a typical home for up to 29 hours.

DLM, a specialist in the design, manufacture, repair and calibration of load cells and load monitoring equipment used throughout the renewable energy supply chain, provided a 25t capacity Telemetry Tensile Link and 20t capacity S-cell Load Cell, both selected from the company's standard range because they are highly accurate and can be added into existing rigging equipment, easily and quickly. The data is read by the operator on two separate wireless handheld displays. The load monitoring equipment is rigged beneath the hooks of the site's overhead lifting equipment.

James Perkins, site manager at the Fawley facility, said: "Accurate data capture allows us to precisely calculate the amount of ballast material needed for each blade, which is critical when blades are mounted and spinning on the offshore wind turbines. Accurate weighing allows us to reduce future O&M [operation and maintenance] costs and ensure the blades are spinning as much as possible."

Perkins added: "DLM's load cells are certainly put through their paces. Their repair and calibration team are very responsive and have a very short lead time on parts and repair works, which helps us out a great deal."

DLM provided a TL-2.0 in this instance. However, it has recently introduced a third generation of its Telemetry Tensile Link Load Cell, a lightweight wireless tension measuring unit that combines a high level of performance with a robust design for harsh environments. It is made from aerospace grade aluminium and offers a range up to 800m (over 2,600 ft.) and a huge battery life of 700 hours. The TL-3.0 can be paired with one or up to a dozen handheld displays. Scrutton also pointed to the product's 2.4GHz license-free frequency and remote power on/off feature.

The S-Cell load cell (SC-1.0), meanwhile, is available from 250kg to 20t capacities and boasts welded covers, stainless steel construction, sealing to IP68, and high accuracy—in tension and compression. It is suitable for use on test stands, to take measurements during certification, and in vessel and tank weighing applications, in addition to retrofit in original equipment manufacturer (OEM) technologies and machinery.

Case Studies

Custom Built Saddleback Holdback Tensioner for Subsea Cable

The product, which combines the established Saddleback product from DLM's catalogue with an additional Hold Back Tension element, is being primarily used by the vessel NKT Victoria. With further devices in the pipeline for a number of customers. When consulted about a solution for measuring line tension and creating a holdback force for a cable lay project, DLM, a specialist in the design, manufacture, repair and calibration of load cells and load monitoring equipment, devised the Saddleback Holdback Tensioner (SB-HBT).

The SB-HBT (it weighs 450kg) works by creating additional line tension on the subsea cable running through it, specifically for bundled cable lays. A Saddleback can measure line tension from 0 to 5,000kg and is suited for more delicate cable, including telecommunication cables or large cable where a Running Line Monitor is unsuitable. Moreover, a twin pair of Dunlop 18 x 7 SMO LCE tyres are connected to a hydraulic cylinder to clamp the two wheels together, and a disc braking system is used to control the rotational speed of the wheels on the SB-HBT. The device can create 750kg of clamping force between the wheels and holdback 500kg of line tension. On the top wheel there is an encoder to measure speed and distance.

Chris Scrutton, technical manager at DLM, said: "This is the first requirement we have had [for the SB-HBT] but we have discussed it with other potential customers; this seems to be a reoccurring problem aboard vessels. It can be used when a cable laying vessel is completing a new lay project, and needs to control the departure speed to small diameter cables being bundled alongside larger cable diameters. The reason for doing this is that the small diameter cable often does not bundle tightly enough with the larger diameter cables and can run free of the bundle when departing off of the vessel."

In this instance, NKT, a provider of turnkey cable solutions that meet the ever-growing demand for power, is using the SB-HBT on a 22mm-diameter fibre optic cable. The 'holdback' (holdback force is essentially a term for adding line tension to a cable) element of the device creates additional tension to control the departure speed of the cable for bundling with DC power cable prior to being laid subsea. An Enerpac cylinder compresses the top and bottom wheel together to create grip pressure onto the cable before the brakes are employed to slowly rotate the wheels. Without clamping the two wheels together, the cable would simply run free. The (orange) HBT element houses all of the components, while the Saddleback is the item bolted to the front of the frame.

Case Studies

Tensionmeters for Jan de Nul Crane Vessel

DLM provided eight bespoke Running Line Monitors (RLMs) for Jan de Nul's 236.8m-long Les Alizés, a next generation, 5,000t capacity floating installation crane vessel, currently being built in China.

DLM, a specialist in the design, manufacture, repair and calibration of load cells and load monitoring equipment, delivered the RLMs to NOV's BLM division, which designs and manufactures ship and offshore equipment products. NOV-BLM presented DLM with a requirement for equipment to monitor the tension on mooring winches aboard the Les Alizés.

The solution is for an eight-point mooring system, that will keep the vessel locked and stable during operations. The original performance criteria was 0-2750 kN, but that was later changed to 3,500kN (approx. 350t). DLM chose a customised solution, based on its standard 200t-rated RLM, adapted to a larger rope diameter and increased safe working load (SWL) and minimum breaking load (MBL) requirements.

Jamie Woodcock, business development manager at DLM, said: "The initially-quoted working range was up-rated by the client. The calibration was also a challenge due to the high working load and proof load requirements. We tested to a safe calibrated load using wire rope, then proof tested the pin in a compression machine to simulate the resultant load the pin would see when in service. This negated the need for risky and potentially unsafe wire rope tests to this very high tension [5,000 kN]."

Woodcock added: "By enlarging the frame we could use larger wheels to suit the 76mm diameter rope. We also needed to up-rate some components for the higher SWL, but still maintained a high safety factor."

Other standout features of the RLMs included maximum design speed of 30m/min up to 200t, 15m/min thereafter; proof load 1.5 x SWL, which equalled 5,625 kN line tension; and high repeatable accuracy up to the full working scale. The calibration process required multiple 76mm slings, as each RLM needed to have multiple runs. The equipment is powder-coated grey to the clients specific RAL reference, suitable for the marine environment with a working life in excess of 20 years. After sales support will also be provided as part of the contract.

DLM's standard range of RLMs (15t, 60t, 200t) are designed specifically for harsh marine-type environments. Typically used in cable laying, towing, mooring and other winch operations to measure and record line tension, pay-out and speed. Their robust design make them the perfect line tension monitor for demanding offshore applications. Available in cabled or wireless configurations, they can be integrated into existing vessel systems, or supplied as stand-alone systems with individual or multi-input HMI displays, with touch screen and data logging capabilities.

Case Studies

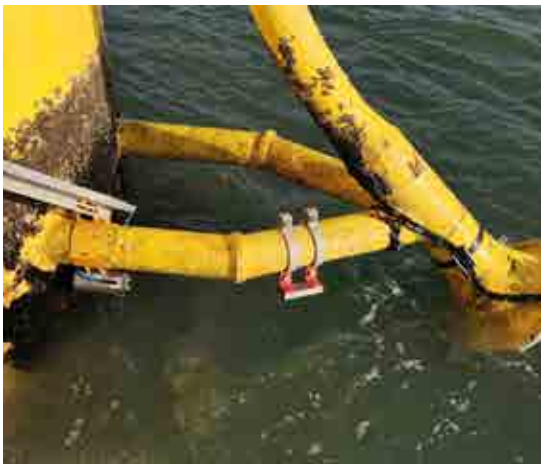
DLM Monitoring, Logging System for Windfarm Array Cables

MHI Vestas needed an accurate way of measuring the weight of their 80m-long turbine Dynamic Load Monitoring (DLM), of Southampton, UK, has manufactured two bespoke monitoring systems that have been installed by dive teams on subsea bend stiffeners at an offshore wind farm. The equipment has been commissioned, with the first round of data due to be collected in March 2021.

The bespoke products were delivered to Darlington, UK-based Subsea Innovation, a manufacturer of subsea equipment, which was challenged by the end user to provide a system to prevent array cables—they connect the site's turbines together—from breaking. Subsea Innovation's Dynamic Bend Stiffener (DBS) is a retrofit assembly that is installed onto turbine cables of an offshore wind farm, which are subject to tidal loads that have been causing the power cables to prematurely fail or reduce in efficiency.

Subsea asked DLM to devise a method to monitor forces on the cables and the movement they experience over time; log the data over the course of a year; and make it periodically accessible. The system comprises three dual axis shear pin load cells, two accelerometers, and a programmable logic controller (PLC). The shear pin load cells are dual axis shear pins that measure forces across two planes in the positive and negative directions. The working load limit (WLL) of each plane is 50kN, in both the positive and negative direction.

Mike Brend, project manager at Subsea Innovation, said: "The DBSs connect directly to the turbine bell mouth and encapsulate the cable at the J-Tube exit, and restrain the cable at the point of failure. The cables are exposed to undesirable bending without a DBS and beyond the expected MBR [minimum bending radius], hence the solution is required to combat such occurrences."



Martin Halford, managing director at DLM, said: "We do regularly put systems together like this for projects, incorporating load cells with other instrumentation and sensors; we probably do two or three projects a year of this kind, but the functionality and use is always different. In this case, we reviewed what off-the-shelf instrumentation and sensors were available, but in the end opted for our recently designed DL-3.0 data-logger, and integrated it into bespoke subsea enclosures."

There are eight DL-3.0 data loggers per system (two for each load pin and two for the accelerometers). The logged data is collated and logged again as a package in a PLC enclosure mounted further up on the turbine platform. From this enclosure, there is an ethernet port on the side that enables a user to plug in a PC to download the data periodically when the platform is accessed. Each system also includes a stainless steel subsea junction box.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