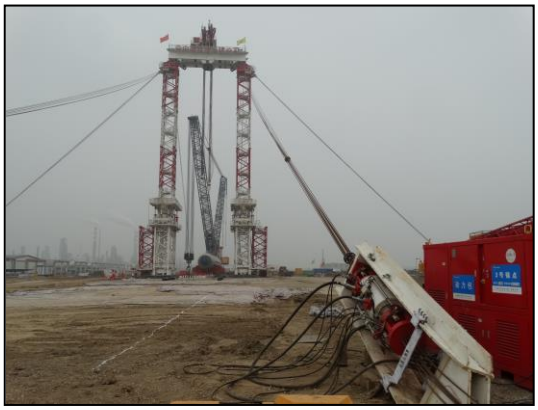
DLT Engineering

Strand Jack Systems

Strand Jacks, Hydraulic Power Units and Control Systems



Introduction

Strand jacks offer an economic, compact and highly controllable method for carrying out heavy lifting and skidding operations. This is particularly true when heavy loads need to be moved through long distances or have a large number of lifting points. We offer complete systems comprising strand jacks, hydraulic power units and control systems, together with on-site supervision and training, and offsite engineering.

For our range of Strand Jacks from 15 to 1,672 tonnes, please see pages 4 to 20.

For our range of Hydraulic Power Units, please see pages 21 to 22.

For our range of Control Systems, please see pages 23 to 26.

We have been designing, manufacturing and using hydraulic strand jack systems since 1992 for use in the construction of bridges, refineries, offshore structures, large roof structures, power stations and other projects where these systems can be used to best advantage. The heavy lifting and skidding operations performed using this equipment are usually critical to the success of a project and it is therefore essential that the equipment is robust, reliable and easily serviced. All DLT jacking systems are 100% designed and developed in-house to international standards, and designed and manufactured in accordance with our accredited ISO 9001 quality management procedures. Our products are designed for safety, durability, robust performance and ease of maintenance. To date, we have manufactured over 800 strand jacks for clients all over the world, with a combined lifting capacity of over 170,000 tonnes.

All DLT systems are supplied with a comprehensive manual for the operation and maintenance of the equipment, including a full set of test certificates and a section giving guidance on method statements, risk assessments and health & safety with examples from previous heavy lifting projects. We offer on-site support, advice and training given by our own heavy lifting Site Supervisors to ensure that the equipment is used safely and properly maintained. We are also able to offer in-house expert engineering advice to our clients on how to use the equipment to best advantage, including detailed design of temporary works.

All DLT jacks and hydraulic power units can be monitored and controlled by a single operator using either our DL-M manual control system or our DL-P40 computer controlled system.

2No. DL-S836 strand jacks during 125% load testing in factory (with transport frames)

Standard Strand Jacks

General Description

DLT standard strand jacks range from the single strand DL-S15 through to the 108 strand DL-S1672 as summarised below. All are designed to be suitable for use with either 18mm diameter 7-wire compacted strand or 15.7mm diameter 7-wire strand to BS 5896:2012. General arrangement drawings for the full range of DLT standard strand jacks and fixed anchors are given on the following pages. The following table summarises our range:

	DL-S015	DL-S046	DL-S062	DL-S108	DL-S185	DL-S294	DL-S418
Safe working load, tonnes (Φ18mm, R_m 1700 N/mm^2)	15	46	62	108	185	294	418
Safe working load, tonnes (Φ15.7mm, R_m 1860 N/mm^2)	11.4	34	45	79	136	216	307
Safe working load, tonnes (Φ15.7mm, R_m 1770 N/mm^2)	10.8	32	43	75	129	205	291
Number of strands	1	3	4	7	12	19	27

	DL-S588	DL-S697	DL-S836	DL-S1022	DL-S1394	DL-S1672
Safe working load, tonnes (Φ18mm, R_m 1700 N/mm^2)	588	697	836	1022	1394	1672
Safe working load, tonnes (Φ15.7mm, R_m 1860 N/mm^2)	432	512	614	750	1024	1229
Safe working load, tonnes (Φ15.7mm, R_m 1770 N/mm^2)	410	486	583	713	976	1171
Number of strands	38	45	54	66	90	108

The safe working loads given above are for 18mm and 15.7mm diameter 7-wire strand complying with BS 5896:2012. Please note that different grip sets must be used for each size of strand.

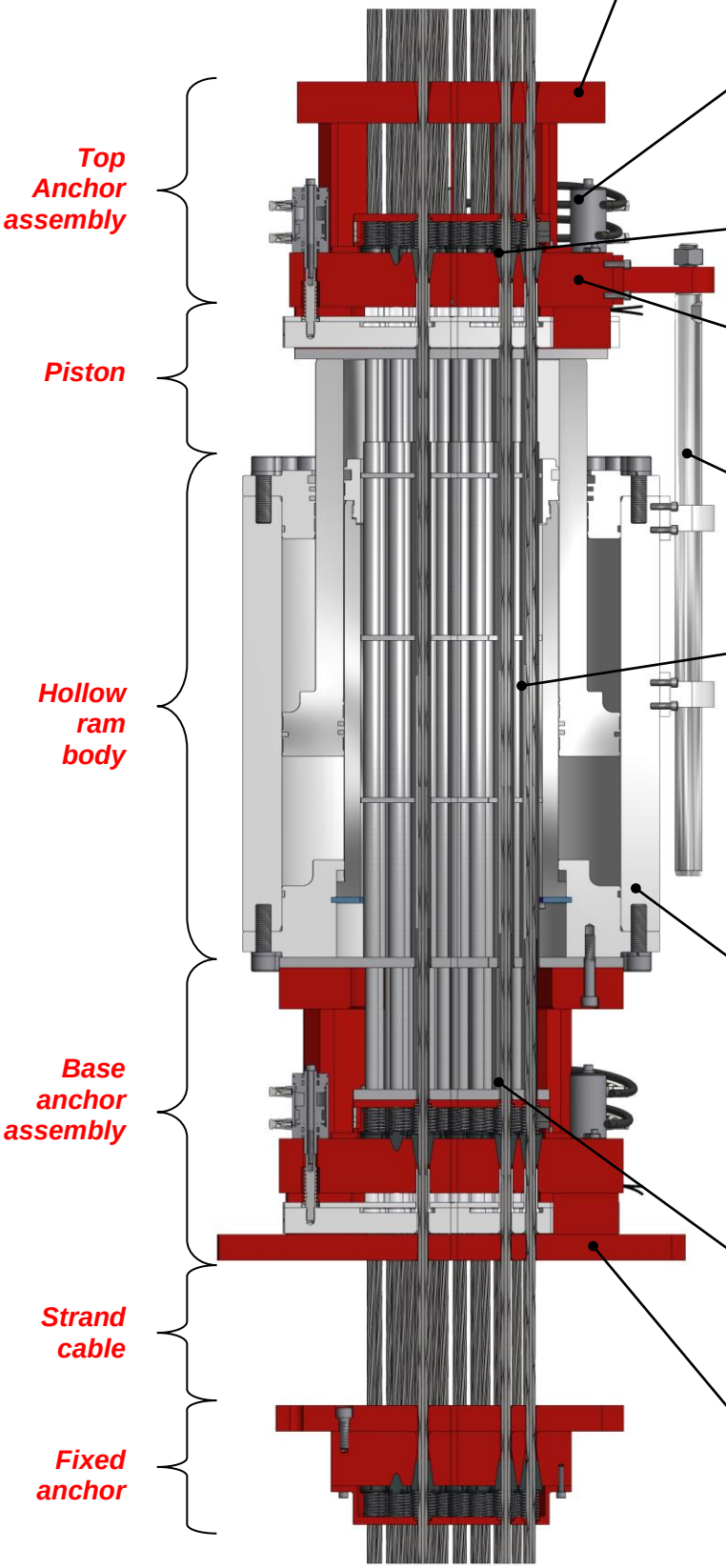
Safe working loads for DL-S15 through to DL-S1672 strand jacks

The main features of all DLT strand jacks are as follows, and illustrated on the next page:

- Safe working load of the jacks has been set at 40% of the minimum breaking load of the strand (i.e. factor of safety = 2.5).
- Designed for use with both 18mm and 15.7mm diameter strands.
- Telescopic strand guide tubes through the full height of the strand jack to prevent buckling and 'birds nesting' of the strands inside of the jack. Made from 100% stainless steel for long life.
- Strand patterns used and the arrangement of top and base anchors have been designed for ease of access to service the grips. All grips can be fully serviced during a lift with the jack fully stranded.
- Main cylinder is pressure-tested and certified to 150% of working pressure.
- Complete strand jack is load-tested and certified to 125% of safe working load.
- Double acting mini-jacks used for opening/closing the grips in the top and base anchors, which can be fully replaced during a lift if necessary without dismantling the strand anchors or cutting the strand.
- Pilot-operated over centre valve fitted to the extension port block for controlled and synchronised load lowering.
- Load-holding valve fitted to the extension port block for safe holding of the load in the event of a hose burst.
- Pressure-compensated bleed valve fitted to the extension port block for very slow final lowering for precise alignment of the load and smooth transfer of load to supports.
- During a lifting operation the strand jack can be fully dismantled for repair with the load held in the base anchor, providing that the strand is cut off for lifting.
- Hose connections are fitted with quick release couplings.
- Corrosion protection to all exposed and running surfaces for long life and suitable for use in a marine environment.
- Single strand tensioning plate fitted to the top of the jack.

Project specific steel fabrications are required to support the strand jack and to connect the fixed anchor to the lifted load. Please see the project photographs on our web site for many examples of the options available. We are able to offer a full design and supply service for these items.

Main Features of DLT Strand Jacks:



Strong guide plate above the top anchor to align the strands before entering the top grips. Machined recesses around each strand take grip sets for single strand tensioning operations.

The grip open/close hydraulic system on the top and base anchor assemblies is located outside the strand cable arrangement and can be fully dismantled and replaced during an operation without the need to dismantle the anchor assembly or cut the strand.

Grips are designed for long life and reliable performance. Grips are available for both 18mm and 15.7mm diameter 7-wire strand.

Large diameter, rigid anchor blocks used for reliable performance and long grip life. Material grade 42CrMo, quenched and tempered for high strength and through-thickness hardness.

Robust anti-rotation bar used to prevent rotation of the top anchor relative to the base anchor.

100% stainless steel strand guide tubes run through the full height of the jack to support the strand and prevent compression failure of individual strands between the top and base anchors when the piston is retracted. Comprising a top section that moves with the top anchor assembly and telescopes into the middle section, a fixed middle section, and a base section that can be lifted up into the middle section to provide access to the grips in the base anchor assembly.

Hollow ram pressure tested and certified to 150% of working pressure. Extend port block is fitted with a combined load-lowering and load-holding valve, and a bleed lowering valve for accurate final levelling of the load. Retract port block is fitted with a relief valve to prevent accidental damage to the cylinder if extended at full pressure with no retract hose fitted (common cause of damage to cylinders).

Strand pattern in 1, 2 or 3 concentric rings, (dependent on size of the jack) for easy hand access, allowing grips to be cleaned and lubricated even with the jack fully stranded.

Jack base plate with bolted connection to supporting steelwork, for both vertical and horizontal mounting of the strand jack.

Cut-through diagram showing the primary features of DLT strand jacks

On-Site Handling of Strand Coils

The strand is delivered to order in coils of up to 3.2 tonnes (1,800m) and is placed in a strand dispenser on site for pulling and cutting to length as shown below:

Photos showing DLT strand dispenser and strand pulling/cutting process

For ease of handling and cleanliness of the strand we recommend that, wherever possible, the jack and fixed anchor are stranded at ground level and lifted in a single jack carriage assembly, as shown below. We are able to provide a full design and supply service for this type of jack carriage to suit the jack size, strand length and support conditions.

Photos showing a jack carriage assembly lifted into place

Fixed Anchor Housing Units and Jack Frames

DLT strand jacks are accompanied by fixed anchor housing units where necessary (see picture below). The strand will then be inserted up through the underside of the fixed anchor housing unit and locked into place with the provided fixed anchors. The housing unit can then be suspended using the accompanying pin assembly.

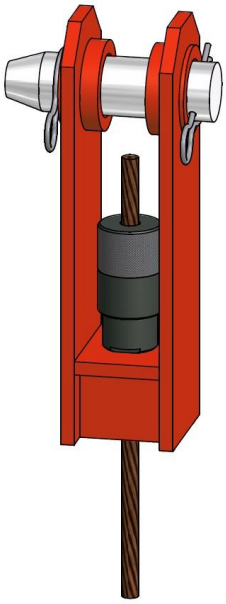
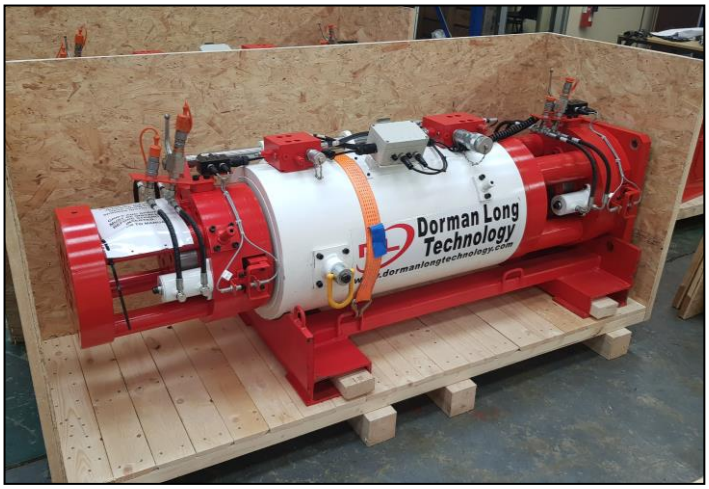
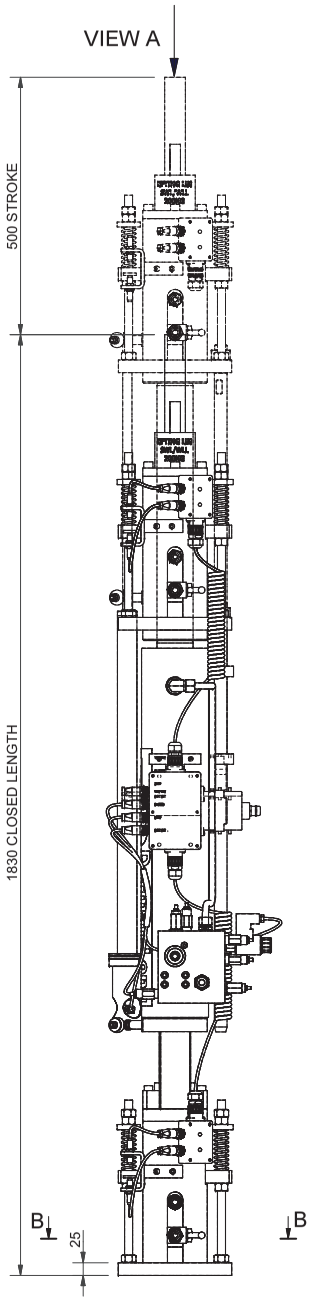


Photo and 3D Model showing Fixed Anchor Housings

Strand Jacks are also supplied with a jack frame for ease of transportation. These frames allow the strand jacks to be easily moved using the handles and fork lift points. The jacks can then be lifted into position using the strand jack lifting brackets, and the jack frame detached.



Photos showing Strand Jacks mounted on Jack Frames



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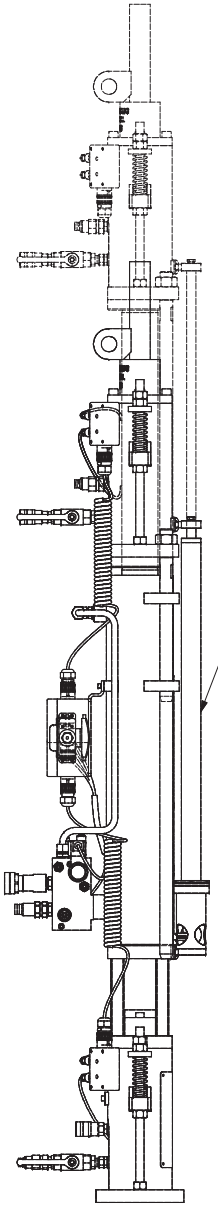
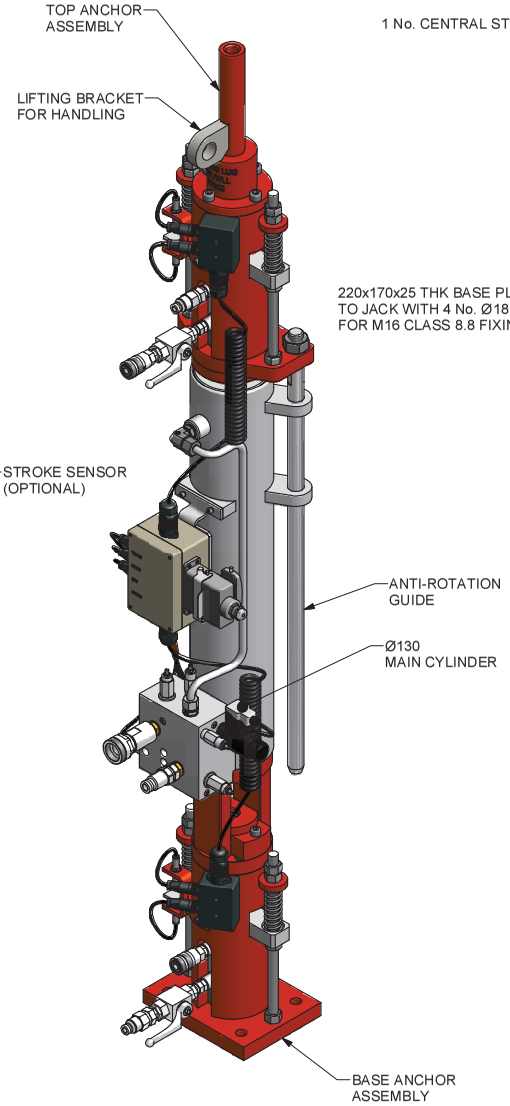
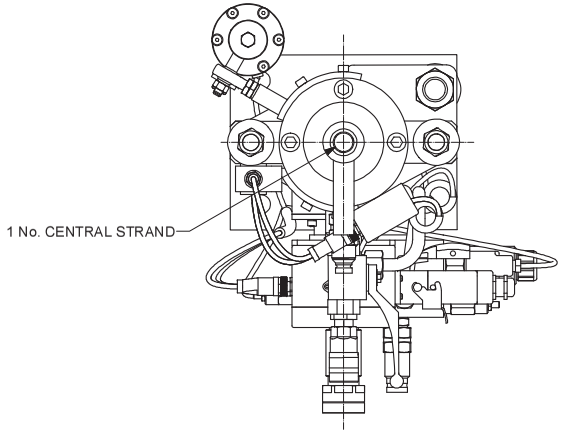
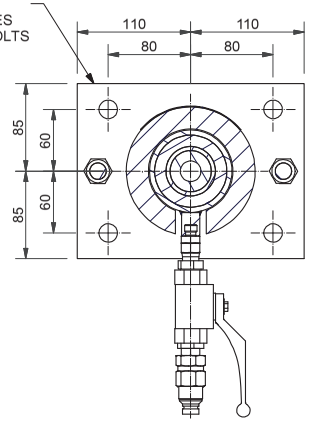




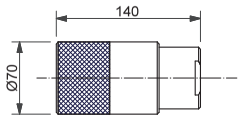
DL-S15B STRAND JACK

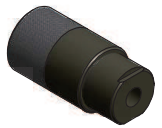


VIEW A (1 : 5)



B-B (1 : 5)





DL-S15B FIXED ANCHOR
(1:5)

DO NOT SCALE

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	15.4 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	191/150 BAR
JACK TEST LOAD (1.25xSWL)	19.3 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	287/225 BAR
CLOSED LENGTH	1830 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	145 kg
FIXED ANCHOR WEIGHT	3 kg
No. OF 18mm STRANDS	1
STRAND CABLE O.D.	18 mm

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Project
DL-S15B STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3) AS SHOWN
Drawing Status INFORMATION
Original Drawing size: A3

Drawing No. DL-S015B-010
Rev. N3

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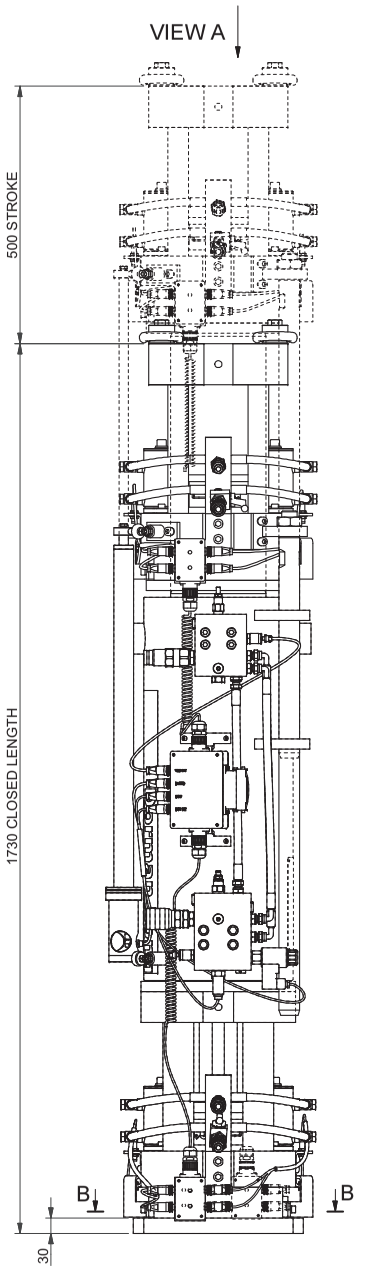

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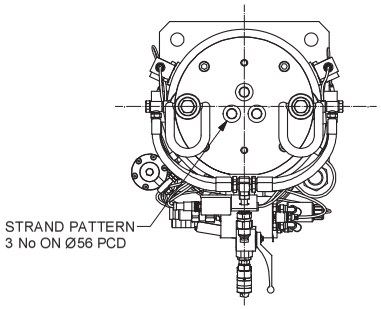
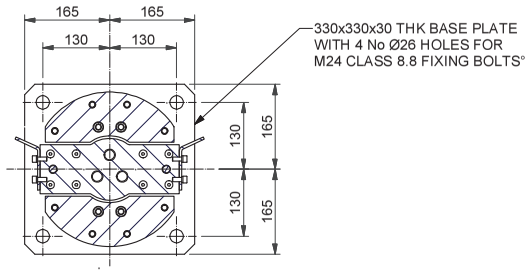
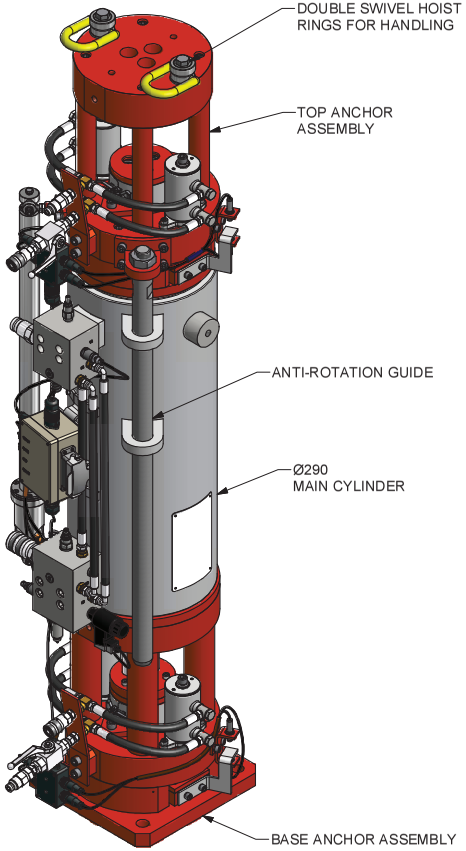


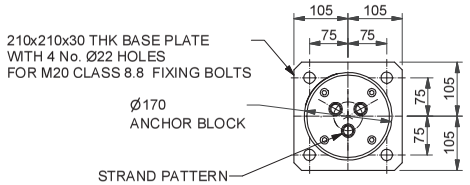
VIEW A (1 : 10)



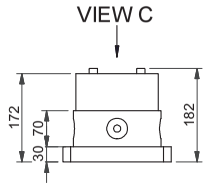
SECTION B-B (1 : 10)



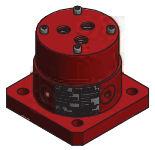
DL-S46 STRAND JACK



VIEW C (1 : 10)



FRONT ELEVATION (1 : 10)



DL-S46 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	46 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	146 BAR
JACK TEST LOAD (1.25xSWL)	58 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	219 BAR
CLOSED LENGTH	1730 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	560 kg
FIXED ANCHOR WEIGHT	29 kg
No. OF 18mm STRANDS	3
STRAND CABLE O.D.	74 mm

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Project
DL-S46 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3) AS SHOWN
Drawing Status INFORMATION
Original Drawing size: A3

Drawing No. DL-S046-010
Rev. N3

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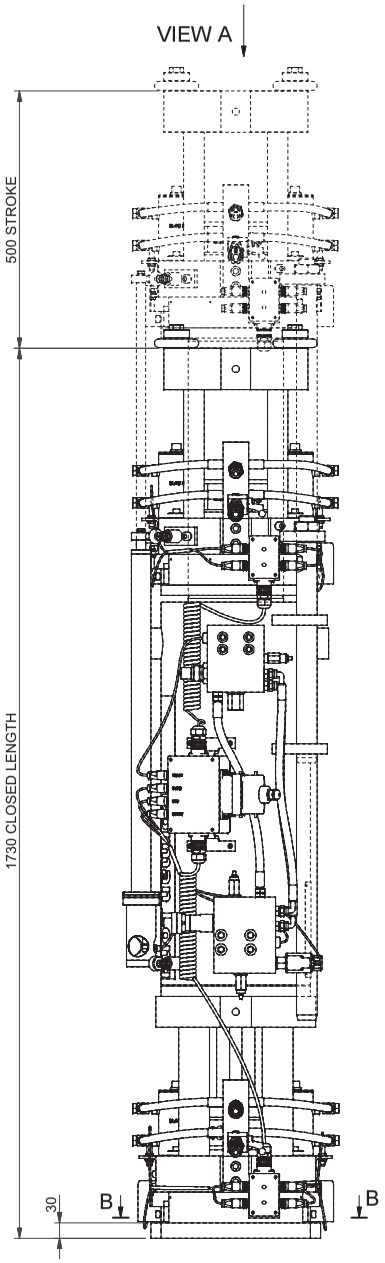

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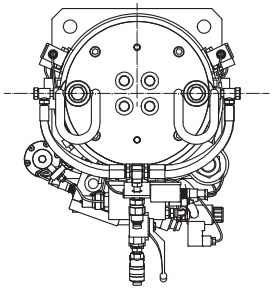
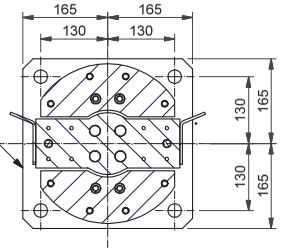
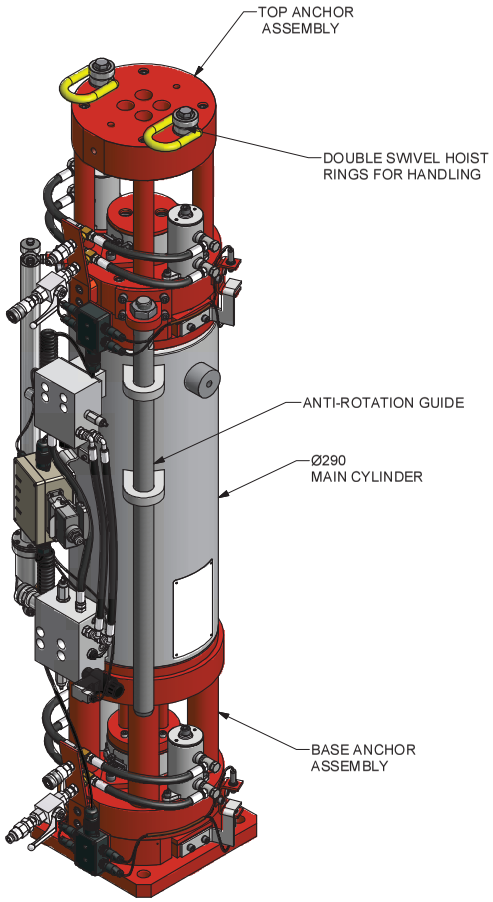


VIEW A (1:10)

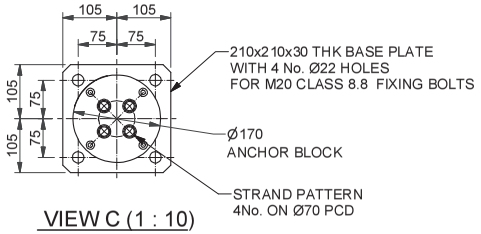
330x330x30 THK BASE PLATE
WITH 4 No Ø26 HOLES
FOR M24 CLASS 8.8 FIXING BOLTS



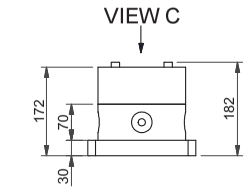
SECTION B-B (1:10)



DL-S62 STRAND JACK



VIEW C (1 : 10)



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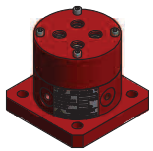

DL-S62 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WWL)	62 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	197/150 BAR
JACK TEST LOAD (1.25xSWL)	78 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	296/225 BAR
CLOSED LENGTH	1730 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	575kg
FIXED ANCHOR WEIGHT	29 kg
No. OF 18mm STRANDS	4
STRAND CABLE O.D.	88 mm

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Project
DL-S62 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3) AS SHOWN
Drawing Status INFORMATION
Original Drawing size: A3

Drawing No. DL-S062-010
Rev. N2

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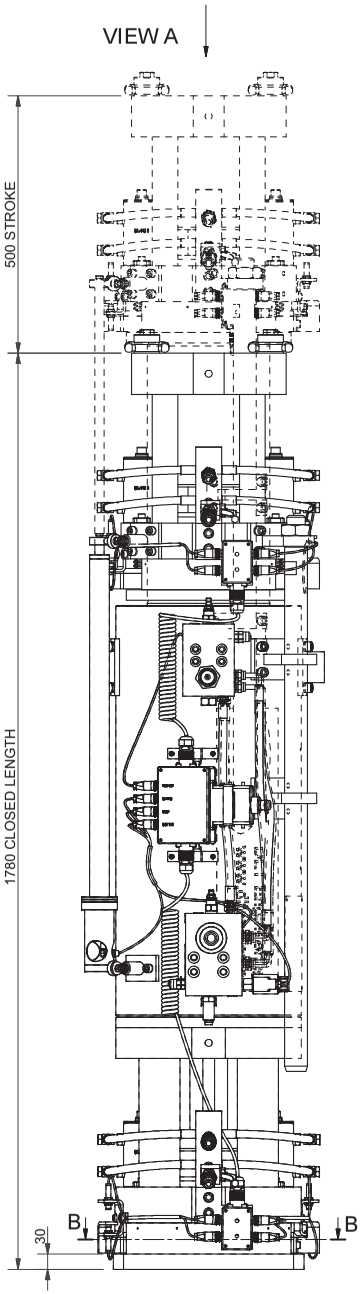

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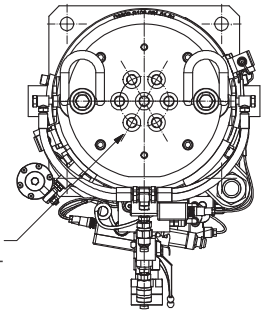
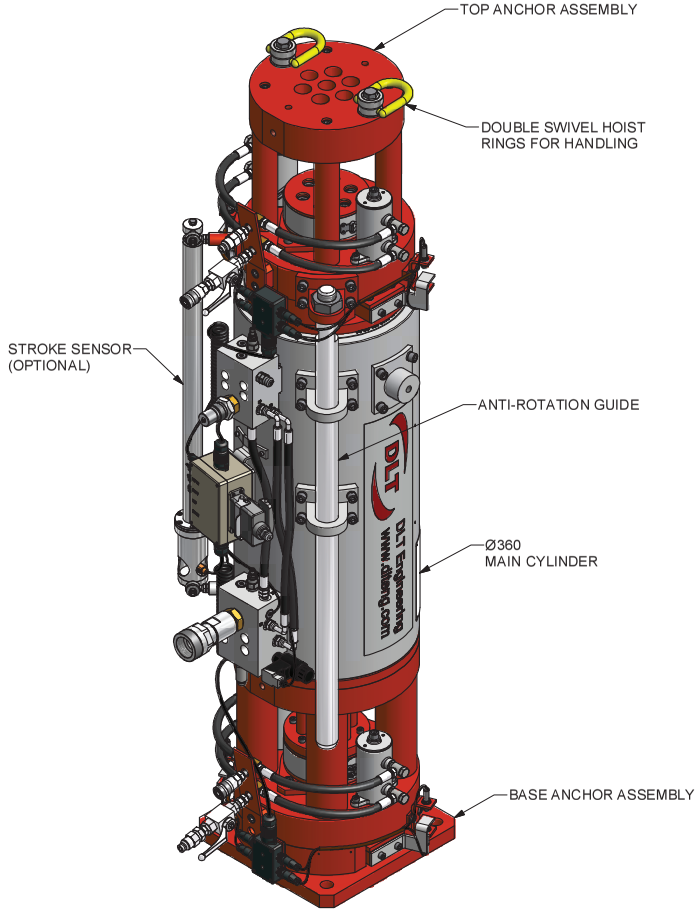
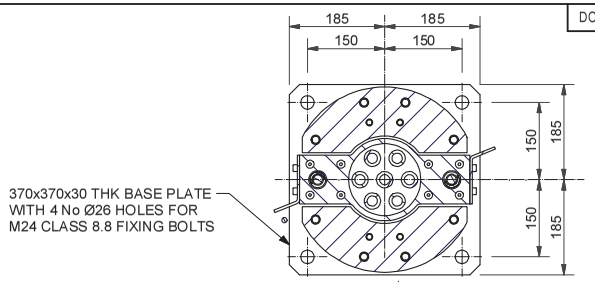


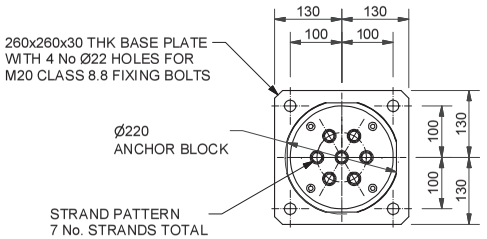
VIEW A (1:10)



DL-S108 STRAND JACK

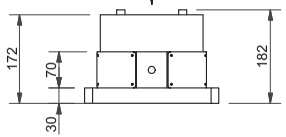


B-B (1:10)



VIEW C (1 : 10)

VIEW C



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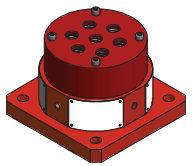

DL-S108 FIXED ANCHOR

This drawing has been produced by DLT Engineering in accordance with the instructions of the client for their sole and specific use.

DLT Engineering shall not be liable for the use of any information contained on this drawing for any purpose other than that for which it was specifically prepared and provided.

Should there be any doubt regarding the interpretation of any information given on this drawing, enquiries should be directed to DLT Engineering at the address given below before executing such part of the works.

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	108 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	281/150 BAR
JACK TEST LOAD (1.25xSWL)	135 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	422/225 BAR
CLOSED LENGTH	1780 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	885 kg
FIXED ANCHOR WEIGHT	45 kg
No. OF 18mm STRANDS	7
STRAND CABLE O.D.	114 mm

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Project
DL-S108 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3) AS SHOWN
Drawing Status INFORMATION
Original Drawing size: A3

Drawing No. DL-S108-010
Rev. N2

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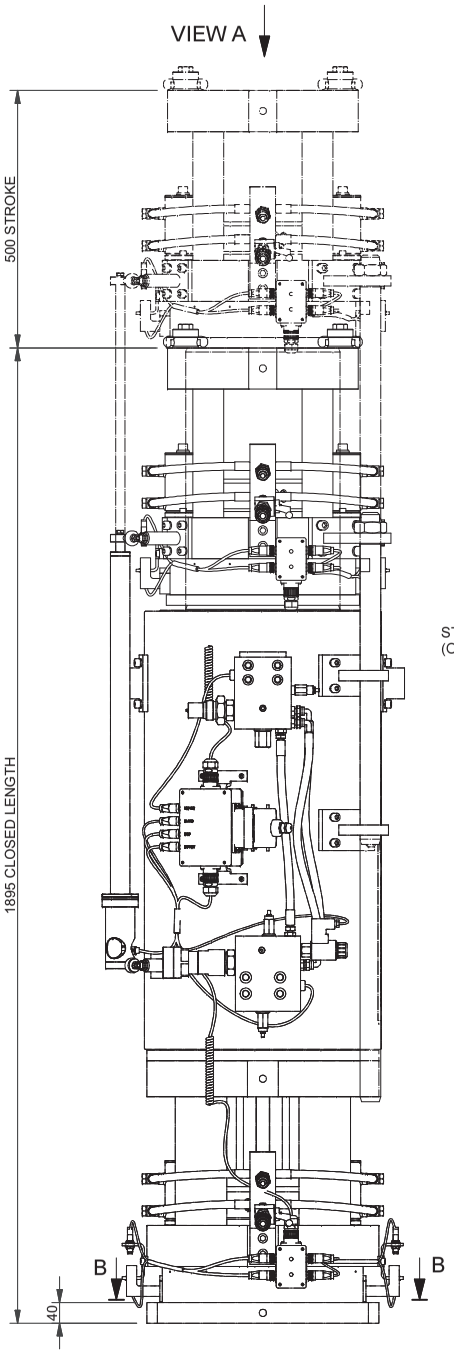
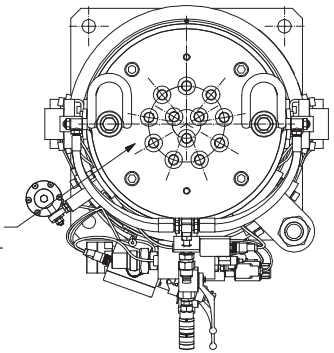
DO NOT SCALE



FRONT ELEVATION (1:10)



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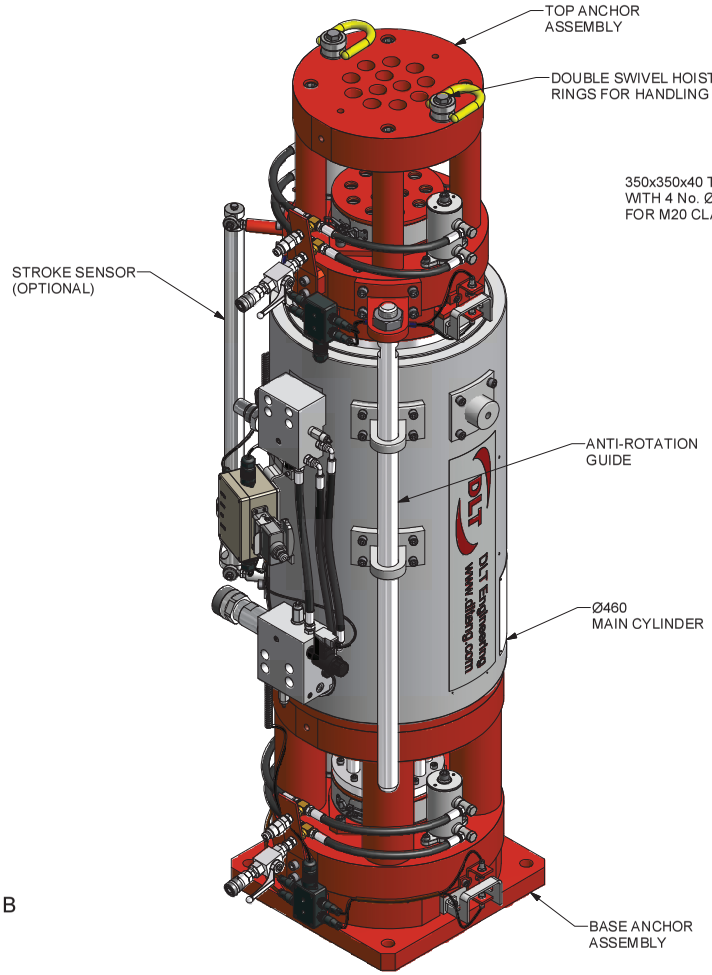
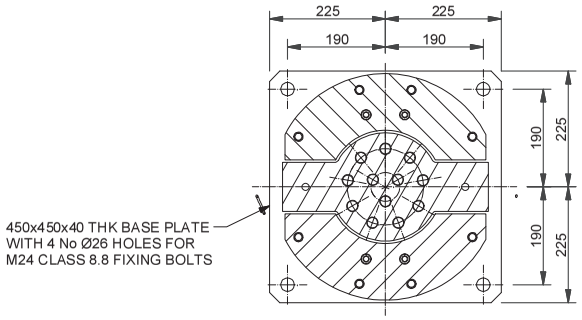
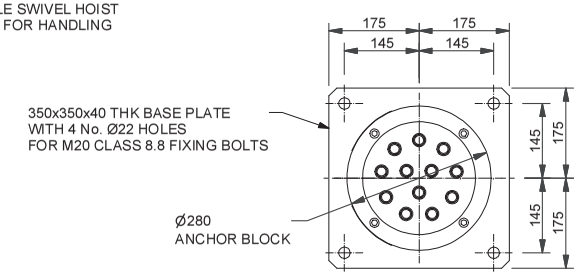


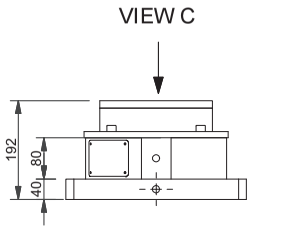
DL-S185 STRAND JACK



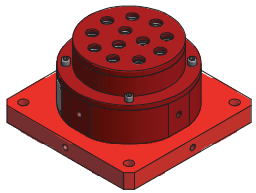
SECTION B-B (1:10)



VIEW C (1 : 10)



FRONT ELEVATION (1 : 10)



DL-S185 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	185 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	292/150 BAR
JACK TEST LOAD (1.25xSWL)	231 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	438/225 BAR
CLOSED LENGTH	1895 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	1450 kg
FIXED ANCHOR WEIGHT	82 kg
No. OF 18mm STRANDS	12
STRAND CABLE O.D.	166 mm

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Project
DL-S185 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S185-010
Rev.: N3

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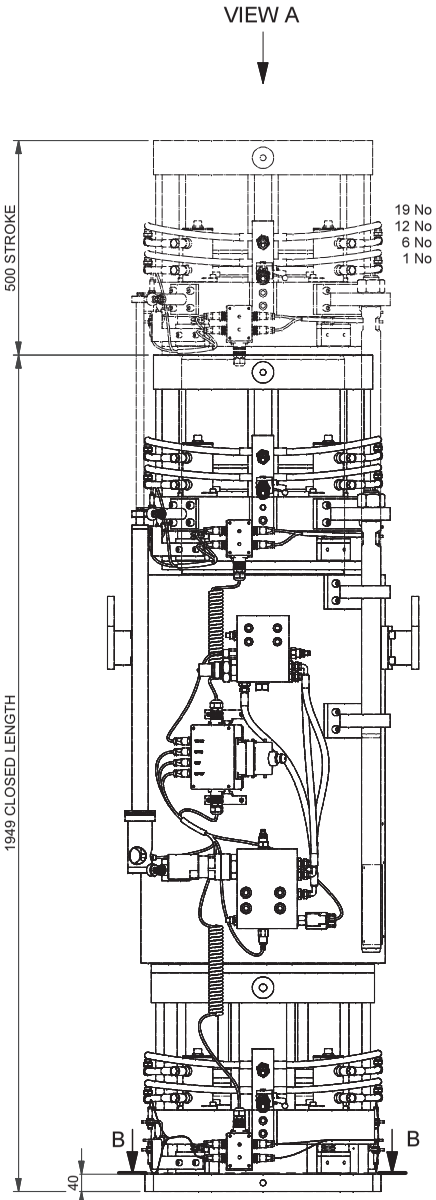
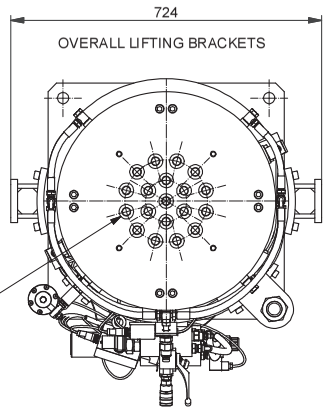
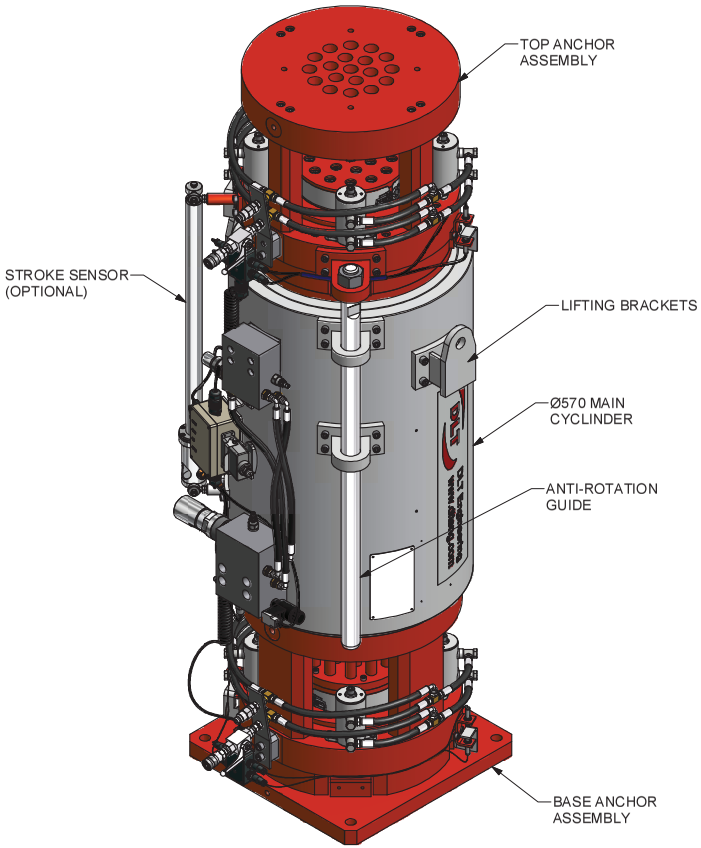
DO NOT SCALE



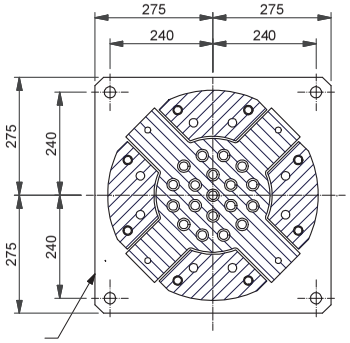
FRONT ELEVATION (1 : 12)



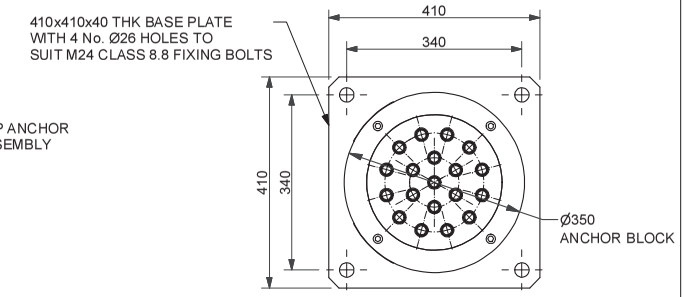
VIEW A (1 : 12)



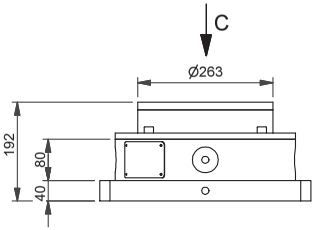
DL-S294 STRAND JACK



B-B (1 : 12)



VIEW C



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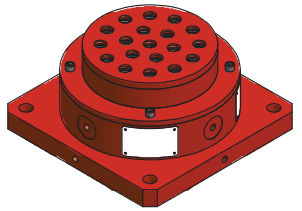

DL-S294 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	294 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	281/150 BAR
JACK TEST LOAD (1.25xSWL)	368 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	422/225 BAR
CLOSED HEIGHT	1949 mm
STROKE	500 mm
TOTAL JACK WEIGHT	2195 kg
TOTAL FIXED ANCHOR WT	121 kg
No. OF 18mm STRANDS	19
STRAND CABLE O.D.	210 mm

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Project
DL-S294 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S294-010
Rev.: N3

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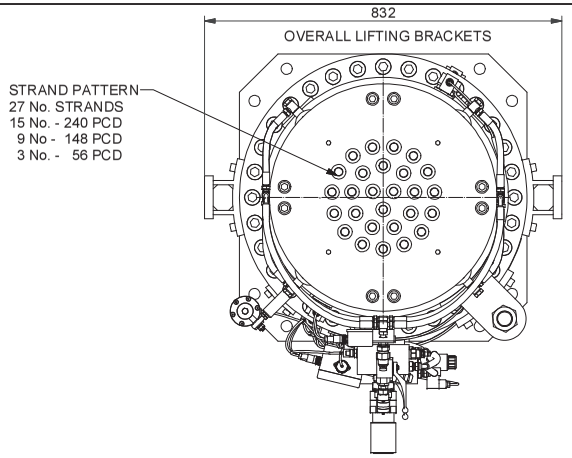

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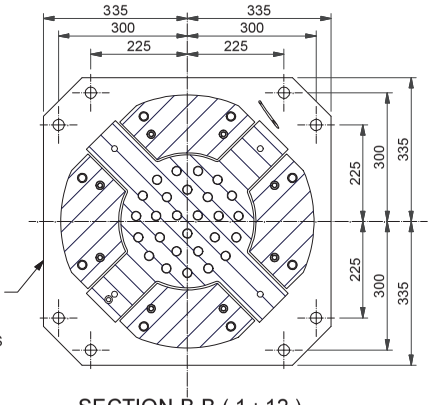
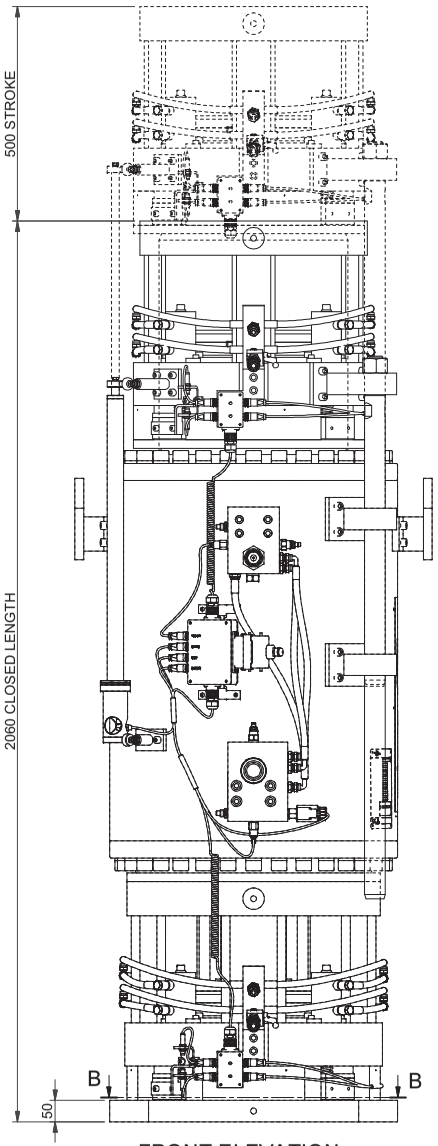


SECTION B-B (1 : 12)



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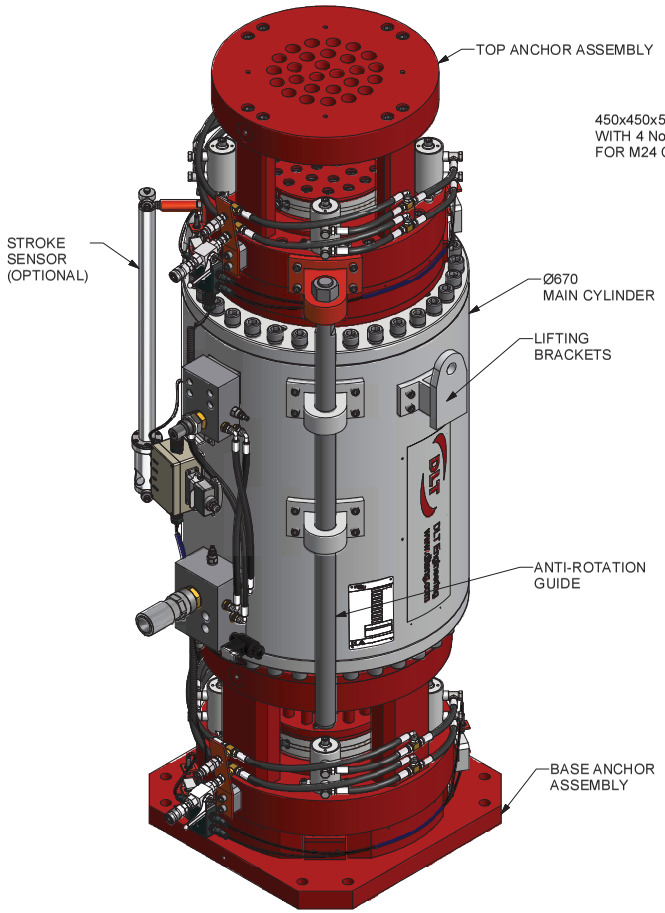
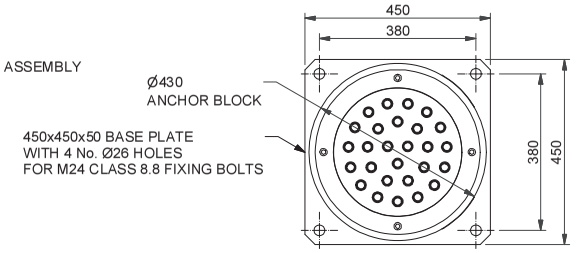
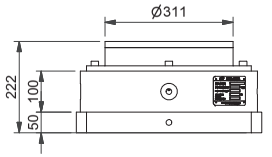


DL-S418 STRAND JACK



VIEW C (1:12.5)

VIEW C



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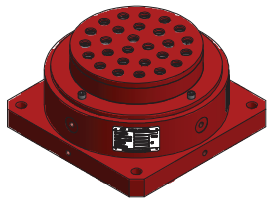

DL-S418 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	418 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	279/150 BAR
JACK TEST LOAD (1.25xSWL)	523 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	419/225 BAR
CLOSED LENGTH	2060 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	3140 kg
FIXED ANCHOR WEIGHT	201 kg
No. OF 18mm STRANDS	27
STRAND CABLE O.D.	258 mm

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Project
DL-S418 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S418-010
Rev.: N3

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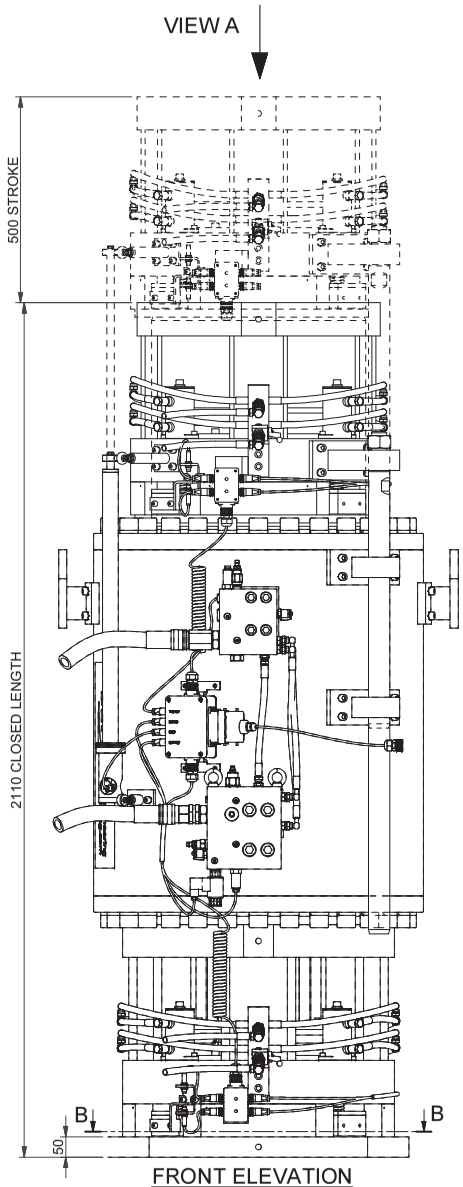
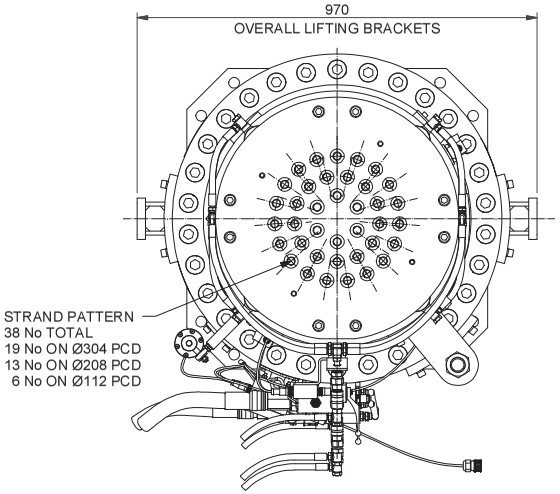
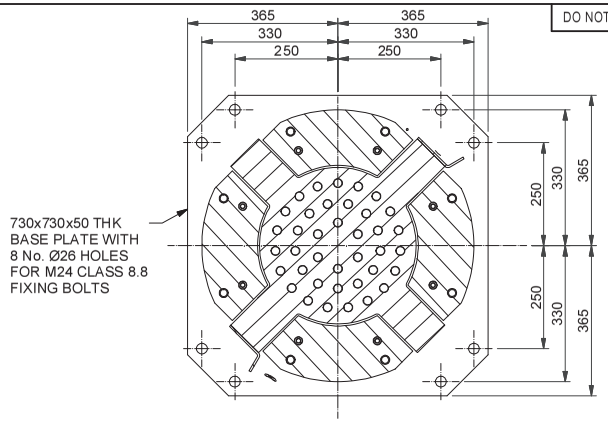


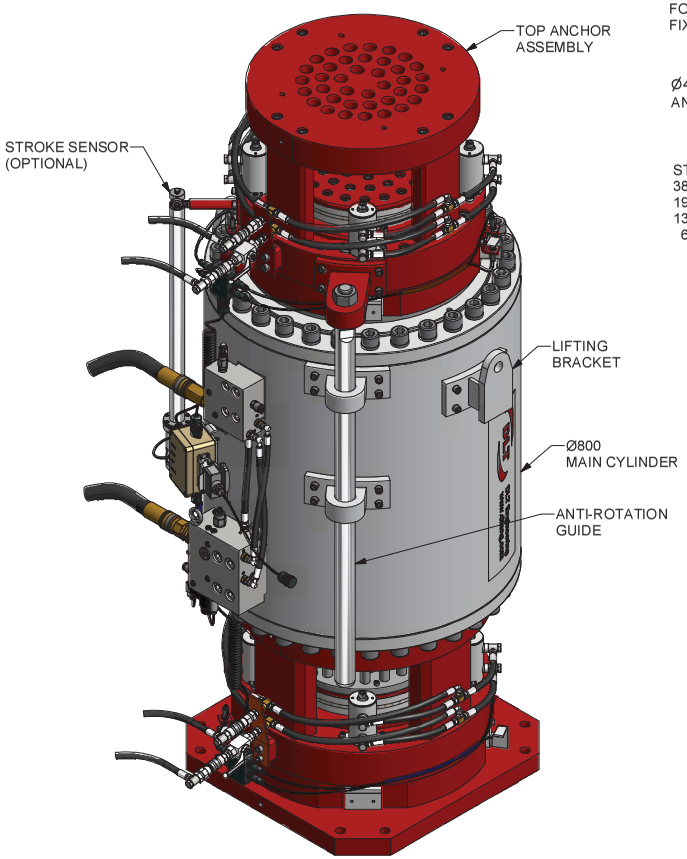
FRONT ELEVATION



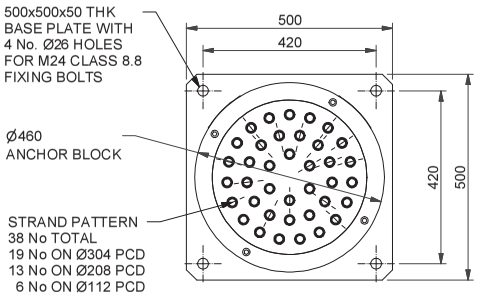
VIEW A (1 : 12.5)



SECTION B-B (1 : 12.5)



DL-S588 STRAND JACK



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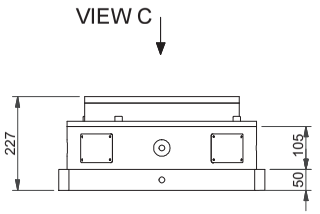

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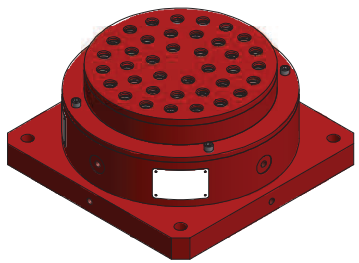

DL-S588 FIXED ANCHOR

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Should there be any doubt regarding the interpretation of any information given on this drawing, enquiries should be directed to DLT Engineering at the address given below before executing such part of the works.

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	588 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	290/150 BAR
JACK TEST LOAD (1.25xSWL)	735 METRIC TONNES
MAIN CYLINDER PRESSURE TEST(1.5xWP) EXTEND/RETRACT	435/225 BAR
CLOSED LENGTH	2110 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	4330 kg
FIXED ANCHOR WEIGHT	245 kg
No. OF 18mm STRANDS	38
STRAND CABLE O.D.	322 mm

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Project
DL-S588 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB
Scales (At A3)	AS SHOWN	Drawing Status	INFORMATION
Original Drawing size: A3			

Drawing No. DL-S588-010 Rev. N3

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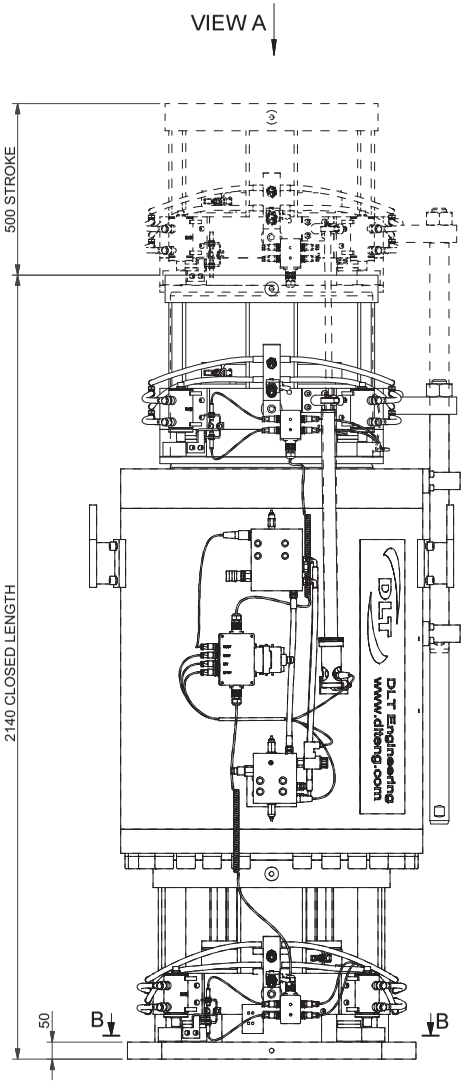

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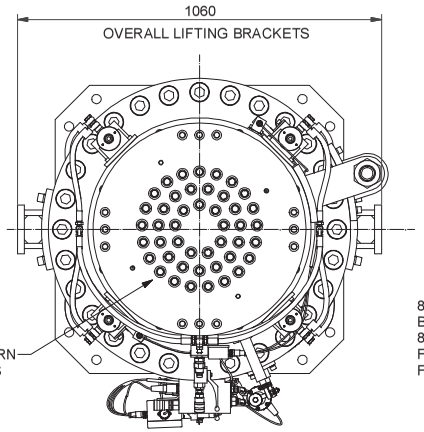
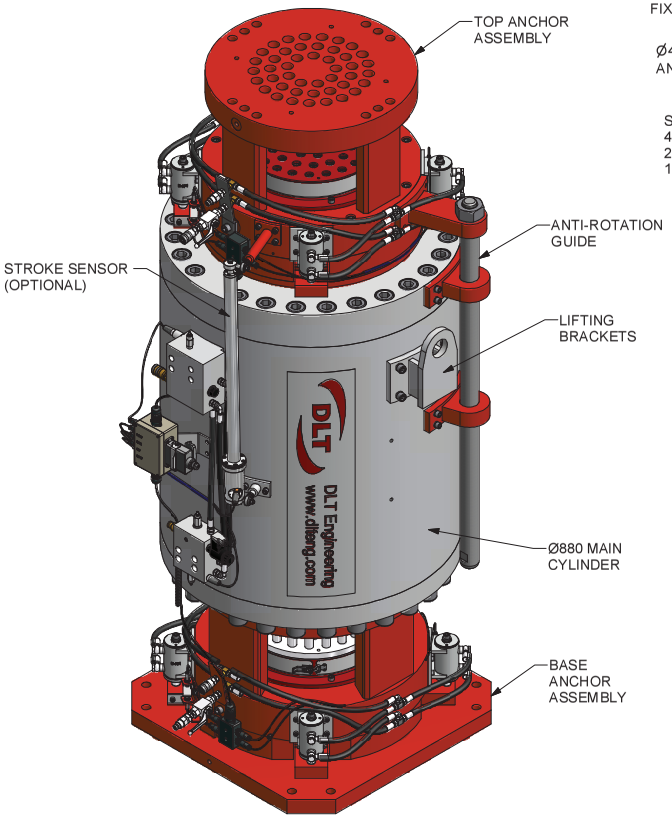
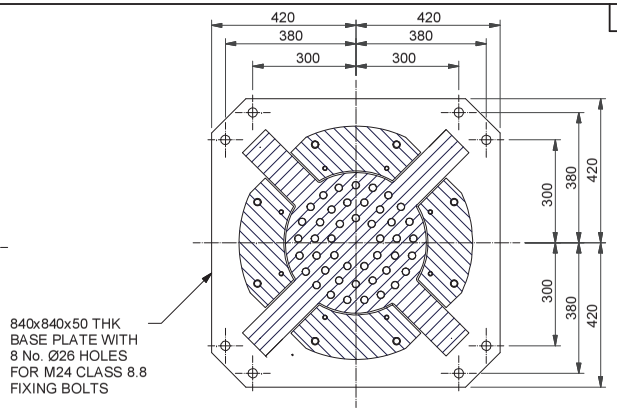


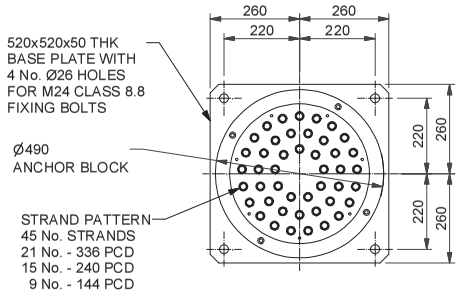
VIEW A (1:15)



DL-S697 STRAND JACK

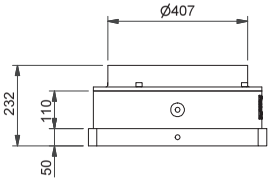


SECTION B-B (1:15)



VIEW C (1:15)

VIEW C



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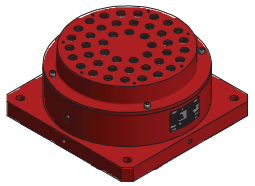

DL-S697 FIXED ANCHOR

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Should there be any doubt regarding the interpretation of any information given on this drawing, enquiries should be directed to DLT Engineering at the address given below before executing such part of the works.

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	697 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	276/150 BAR
JACK TEST LOAD (1.25xSWL)	872 METRIC TONNES
MAIN CYLINDER PRESSURE TEST(1.5xWP) EXTEND/RETRACT	414/225 BAR
CLOSED LENGTH	2140 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	5400 kg
FIXED ANCHOR WEIGHT	280 kg
No. OF 18mm STRANDS	45
STRAND CABLE O.D.	354 mm

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International House
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Project
DL-S697 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S697-010
Rev.: N2

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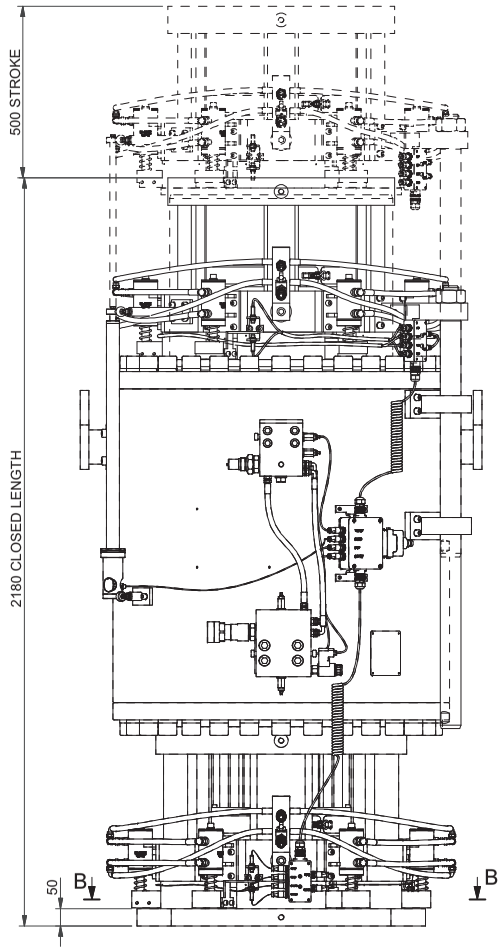
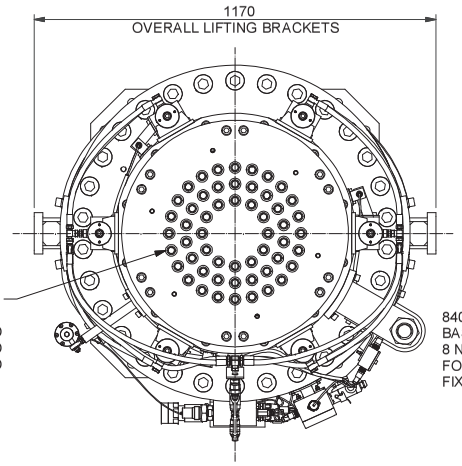


FRONT ELEVATION (1:15)



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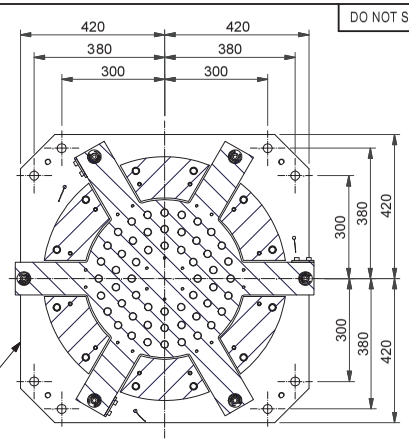

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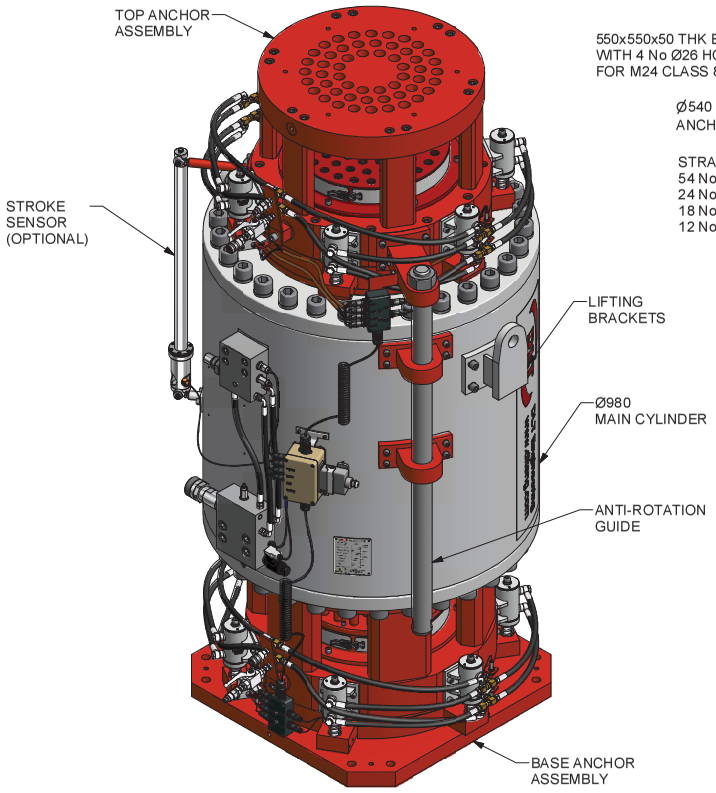
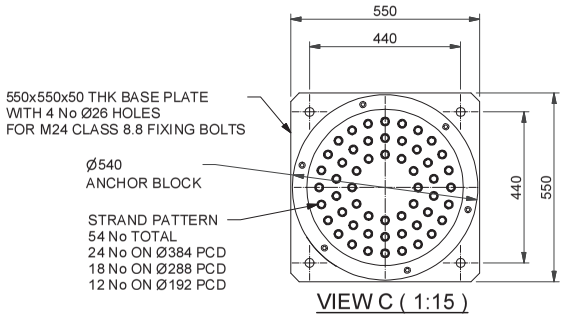
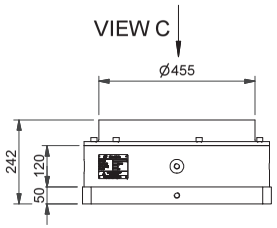


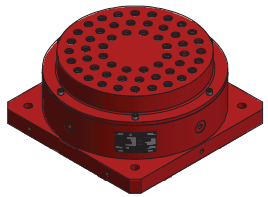
DL-S836 STRAND JACK



VIEW C (1:15)



FRONT ELEVATION (1:15)



DL-S836 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	836 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	275/150 BAR
JACK TEST LOAD (1.25xSWL)	1045 METRIC TONNES
MAIN CYLINDER PRESSURE TEST(1.5xWP) EXTEND/RETRACT	413/225 BAR
CLOSED LENGTH	2180 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	6480 kg
FIXED ANCHOR WEIGHT	345 kg
No. OF 18mm STRANDS	54
STRAND CABLE O.D.	402 mm

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www.dlteng.com

Project
DL-S836 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S836-010
Rev.: N2

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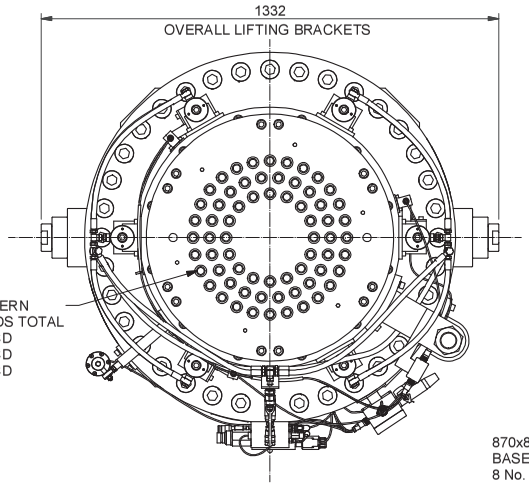
DO NOT SCALE



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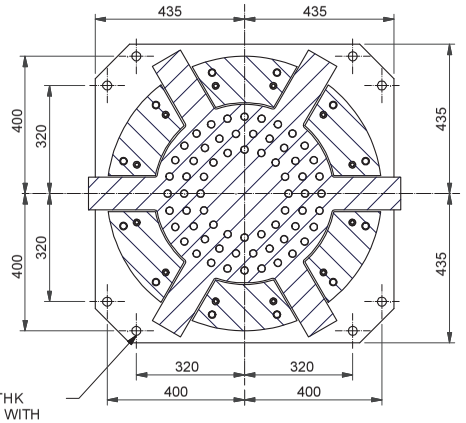
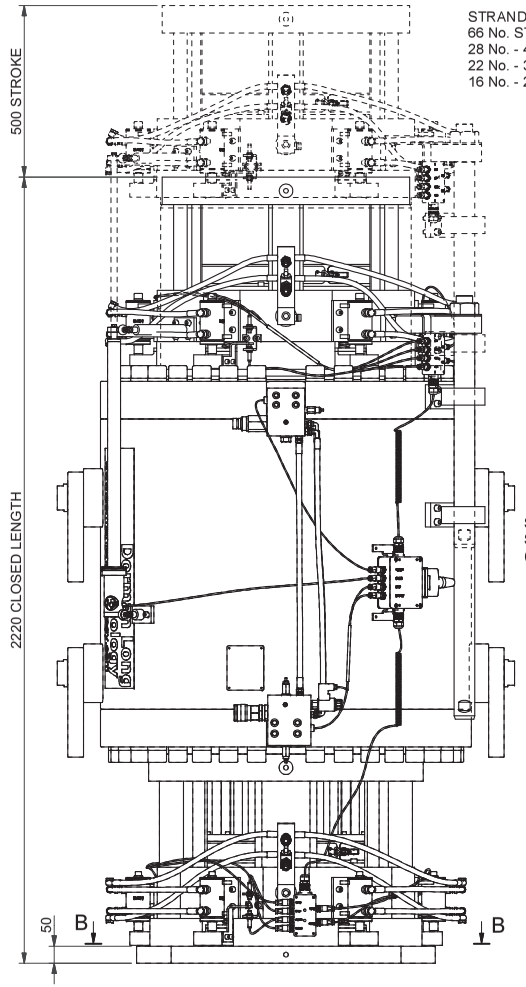
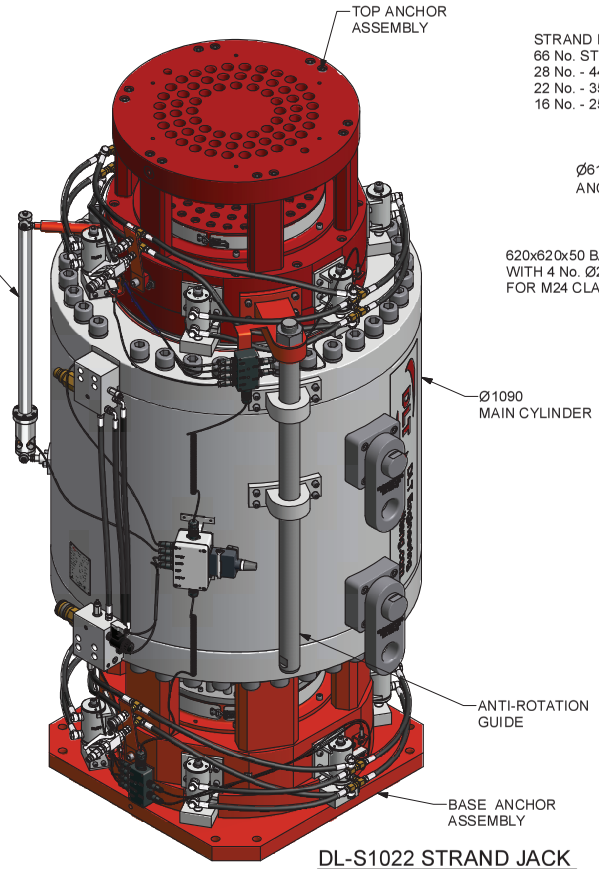


SECTION B-B (1 : 15)

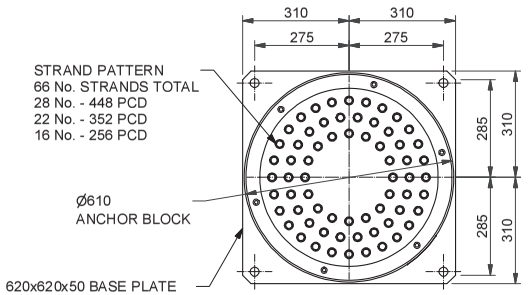
VIEW A



FRONT ELEVATION (1 : 15)

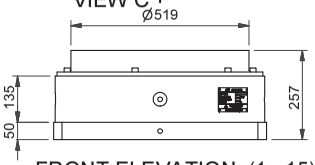


DL-S1022 STRAND JACK



VIEW C (1 : 15)

VIEW C



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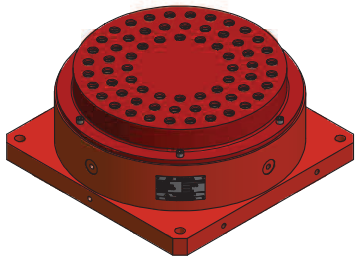

DL-S1022 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	1022 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	276/150 BAR
JACK TEST LOAD (1.25xSWL)	1278 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	414/225 BAR
CLOSED LENGTH	2220 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	7950 kg
FIXED ANCHOR WEIGHT	470 kg
No. OF 18mm STRANDS	66
STRAND CABLE O.D.	466 mm

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Project
DL-S1022 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S1022-010
Rev.: N2

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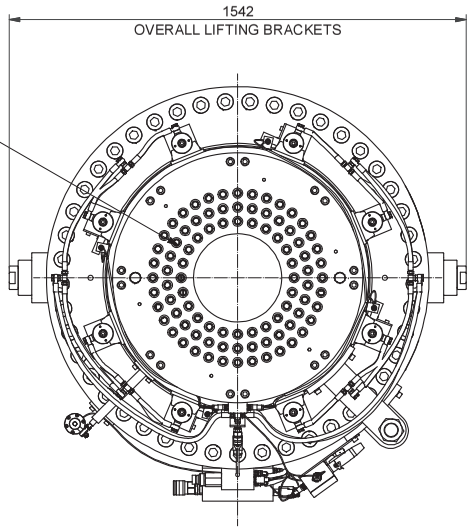
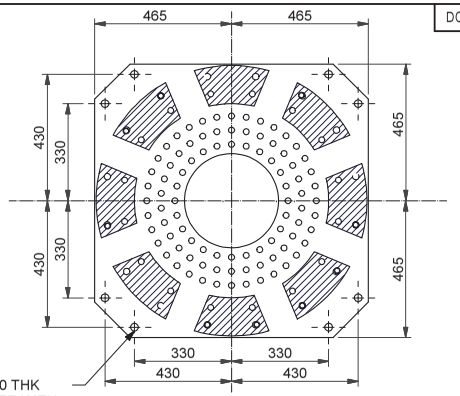
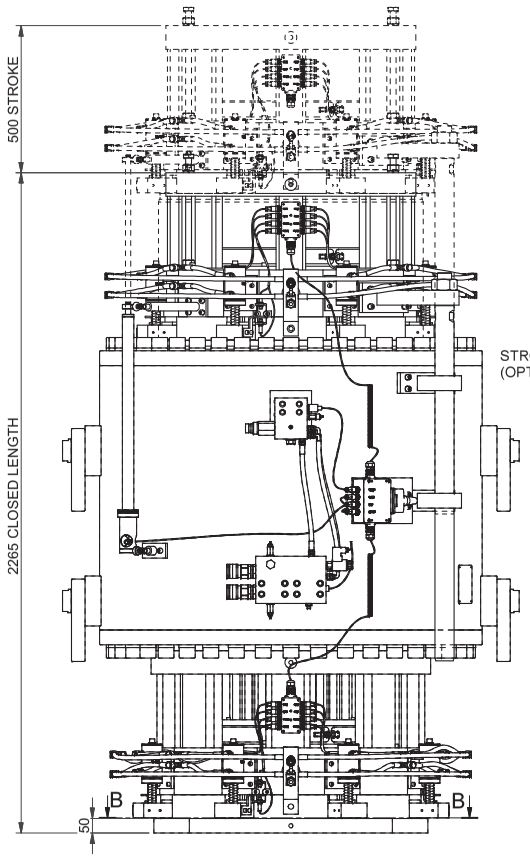


VIEW A (1 : 17.5)



SECTION B-B (1 : 17.5)



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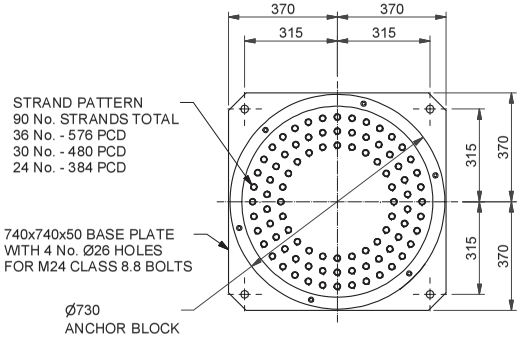
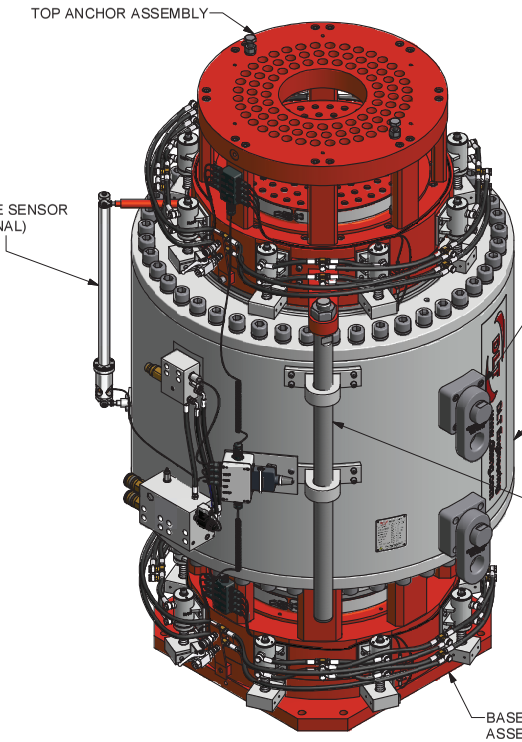
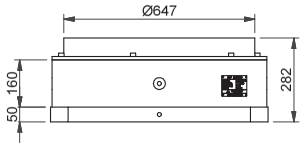


VIEW C (1 : 17.5)

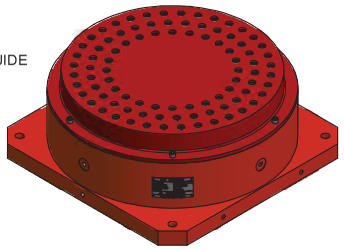


DL-S1394 STRAND JACK

VIEW C



FRONT ELEVATION (1 : 17.5)



DL-S1394 FIXED ANCHOR

DO NOT SCALE

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	1394 METRIC TONNES
WORKING PRESSURE (WP) EXTEND/RETRACT	281/150 BAR
JACK TEST LOAD (1.25xSWL)	1743 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) EXTEND/RETRACT	422/225 BAR
CLOSED LENGTH	2265 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	10700 kg
FIXED ANCHOR WEIGHT	750 kg
No. OF 18mm STRANDS	90
STRAND CABLE O.D.	594 mm

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Project
DL-S1394 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	TJB	Project Eng:	SAB

Scales (At A3) AS SHOWN
Drawing Status INFORMATION
Original Drawing size: A3

Drawing No. DL-S1394-010
Rev. N2

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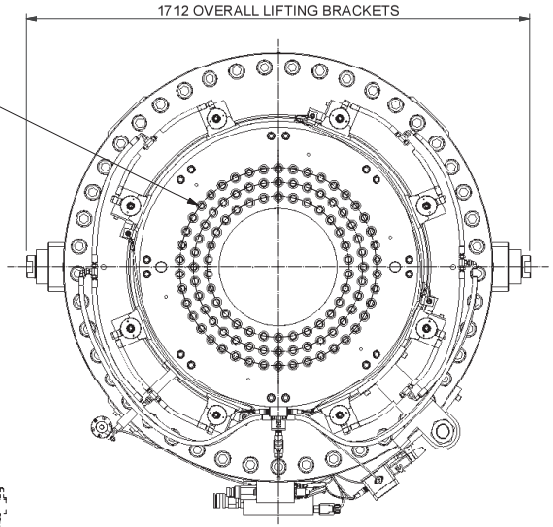
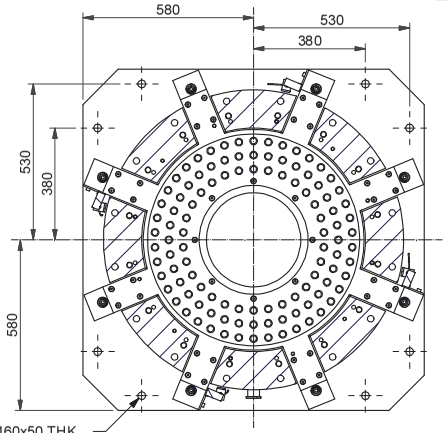
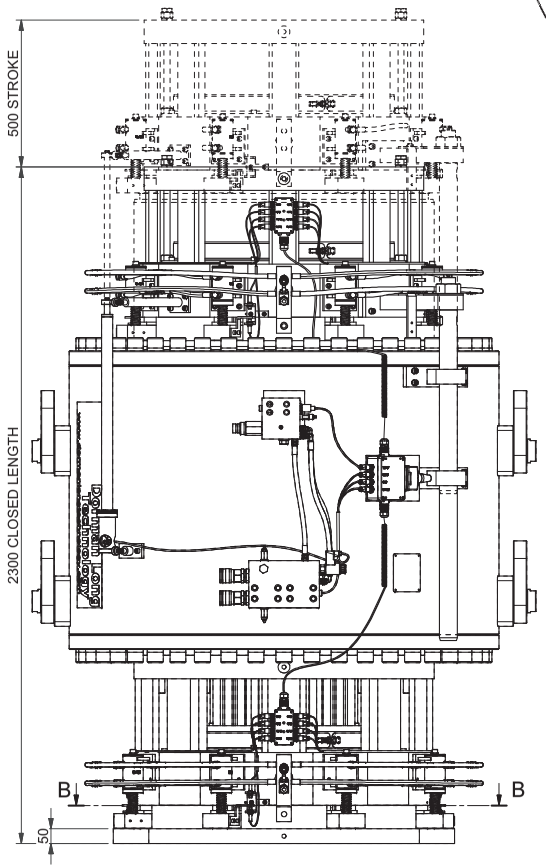
DO NOT SCALE



VIEW A (1 : 17.5)



B-B (1 : 17.5)



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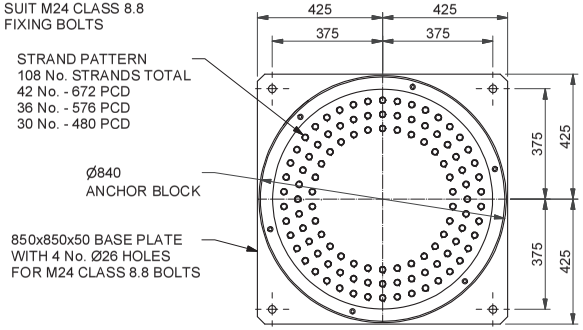
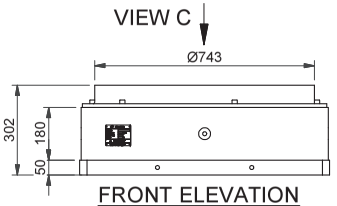


VIEW C



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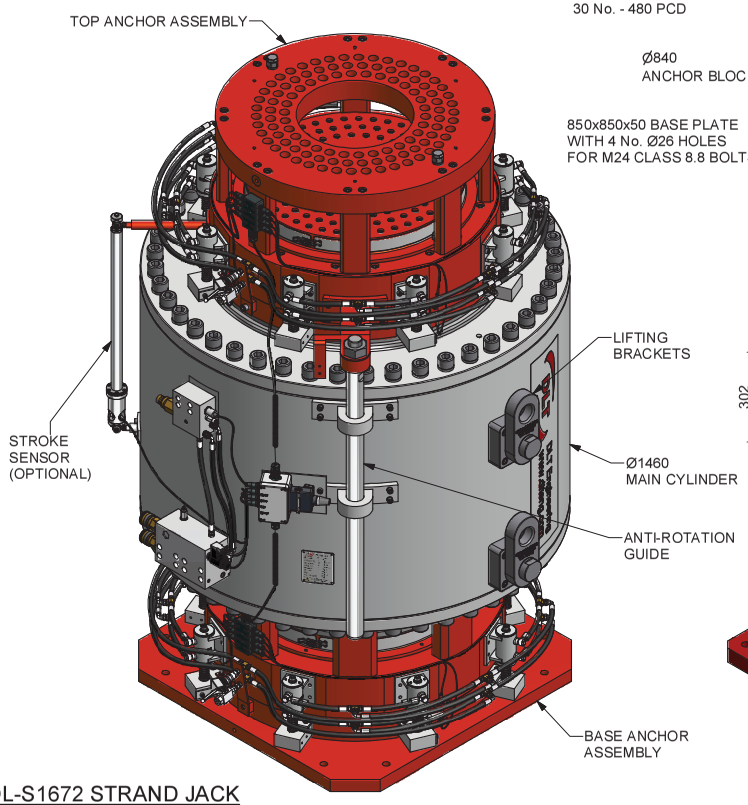
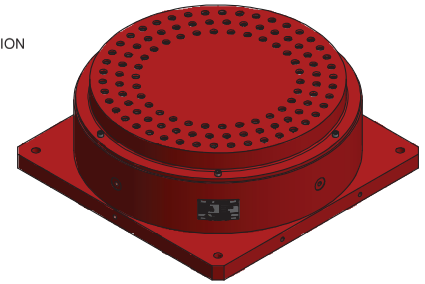


DL-S1672 STRAND JACK



DL-S1672 FIXED ANCHOR

NOTES

SPECIFICATION

SAFE WORKING LOAD (SWL) WORKING LOAD LIMIT (WLL)	1672 METRIC TONNES
WORKING PRESSURE (WP) RETRACT/EXTEND	282/150 BAR
JACK TEST LOAD (1.25xSWL)	2090 METRIC TONNES
MAIN CYLINDER PRESSURE TEST (1.5xWP) RETRACT/EXTEND	423/225 BAR
CLOSED LENGTH	2300 mm
STROKE	500 mm
MAX FULLY EQUIPPED JACK WEIGHT	12900 kg
FIXED ANCHOR WEIGHT	1040 kg
No. OF 18mm STRANDS	108
STRAND CABLE O.D.	690 mm

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Project
DL-S1672 STRAND JACK

Drawing Title
STRAND JACK AND FIXED ANCHOR
GENERAL ARRANGEMENT

Design Eng:	SAB	Checking Eng:	PB
Drawn by:	SG	Project Eng:	SAB

Scales (At A3): AS SHOWN
Drawing Status: INFORMATION
Original Drawing size: A3

Drawing No.: DL-S1672-010
Rev.: N2

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General Description

We produce a wide range of diesel and electric powered hydraulic power units which are compatible with either our DL-M manual control system or our DL-P40 computer control system. In addition, all DLT hydraulic power units come with their own fixed control panel for local operation of the connected jacks. Our hydraulic power units are designed for reliability in harsh environments, ease of service and long life. A single hydraulic power unit can be designed to power 1, 2, 4, 6, 8, 10 or 12 jacks.

The operating speed of the strand jacks is related to the flow of oil to the main cylinder. The approximate maximum movement speed of the load in metres per hour is given below for various combinations of oil flow and jack size:

L / minute	DL-S15	DL-S46	DL-S62	DL-S108	DL-S185	DL-S294	DL-S418	DL-S588	DL-S697	DL-S836	DL-S1022	DL-S1394	DL-S1672
3	12.8	3.5	3.5	2.9	1.8	1.1	-	-	-	-	-	-	-
6	24.4	7.0	7.0	5.8	3.5	2.2	1.5	1.1	-	-	-	-	-
8	31.6	9.2	9.2	7.7	4.7	2.9	2.0	1.5	1.2	-	-	-	-
10	38.5	11.4	11.4	9.6	5.8	3.6	2.5	1.9	1.5	1.2	-	-	-
15	54.0	16.8	16.8	14.1	8.6	5.3	3.7	2.8	2.2	1.9	1.5	1.1	-
20	-	22.0	22.0	18.5	11.4	7.0	5.0	3.7	3.0	2.5	2.0	1.5	1.3
30	-	31.7	31.7	26.9	16.8	10.4	7.4	5.5	4.5	3.7	3.0	2.3	1.9
40	-	40.8	40.8	34.8	21.9	13.8	9.8	7.3	5.9	4.9	4.0	3.0	2.6
50	-	49.2	49.2	42.2	26.9	17.0	12.1	9.1	7.4	6.1	5.0	3.8	3.2
60	-	57.1	57.1	49.2	31.7	20.1	14.4	10.8	8.8	7.3	5.9	4.5	3.8
70	-	-	-	55.7	36.3	23.2	16.7	12.5	10.2	8.5	6.9	5.3	4.4
80	-	-	-	62.0	40.7	26.2	18.9	14.2	11.6	9.7	7.9	6.0	5.1
90	-	-	-	-	45.0	29.2	21.1	15.9	13.0	10.9	8.8	6.7	5.7
100	-	-	-	-	49.1	32.0	23.2	17.6	14.3	12.0	9.8	7.5	6.3
120	-	-	-	-	56.9	37.6	27.4	20.8	17.0	14.3	11.6	8.9	7.5
140	-	-	-	-	64.3	42.9	31.5	24.0	19.7	16.5	13.5	10.3	8.7
160	-	-	-	-	-	48.0	35.4	27.1	22.3	18.7	15.3	11.8	9.9
180	-	-	-	-	-	52.9	39.2	30.1	24.8	20.9	17.1	13.2	11.1
200	-	-	-	-	-	57.5	42.9	33.1	27.3	23.0	18.9	14.6	12.3
220	-	-	-	-	-	62.0	46.5	36.0	29.7	25.1	20.6	15.9	13.5
240	-	-	-	-	-	-	50.0	38.8	32.1	27.2	22.4	17.3	14.6
260	-	-	-	-	-	-	53.3	41.5	34.5	29.2	24.1	18.6	15.8
280	-	-	-	-	-	-	56.6	44.2	36.8	31.2	25.8	20.0	16.9
300	-	-	-	-	-	-	59.8	46.9	39.0	33.2	27.4	21.3	18.1
	MAXIMUM MOVEMENT SPEED OF THE LOAD IN METRES / HOUR												

Maximum movement speed of strand jacks related to oil flow

For example, a 30 l/min flow to a DL-S185 strand jack would have an approximate operating speed of 16.8 m/hour i.e. it would take about 2 hours to lift a distance of 33.6 metres.

The main features of DLT standard hydraulic power units are as follows:

- Pressure tested and certified to 125% of working pressure.
- Jack extended/retract circuits use high quality piston pumps for maximum reliability and minimum variation in flow with changing jack loads.
- An important safety feature is the secondary hydraulic circuit. This is designed to allow the grips to close under the action of the grip springs in the event that there is a loss of hydraulic oil pressure.
- All electrical components weatherproof to IP 55 or better.
- Suitable for use with both mineral or biodegradable hydraulic oils.
- Visual oil level & temperature indicator and automatic shut down system in the event of low oil level.
- Pressure gauges to main extend/retract p-line and mini-jack p-line.
- Separate pressure relief valves for cylinder extend, cylinder retract and mini-jack open/close.
- All DLT hydraulic power units come with a fixed control panel for manual operation of the connected jacks during set up, and a local/remote switch for selecting between this control panel and the DL-P40 and DL-M central control systems.
- All DLT hydraulic power units are compatible with both our DL-M and DL-P control systems for central monitoring and control of all jacks from a single point.
- Hydraulic power unit mounted in steel crash frame with fork lift points and lifting eyes.
- Components arranged for easy access for inspection and servicing.
- Overall size to suit transport in standard shipping containers.
- Fitted with quick release hose couplings.
- All exposed surfaces are corrosion protected for long life and are suitable for use in a marine environment.

Typical electrically powered hydraulic power units

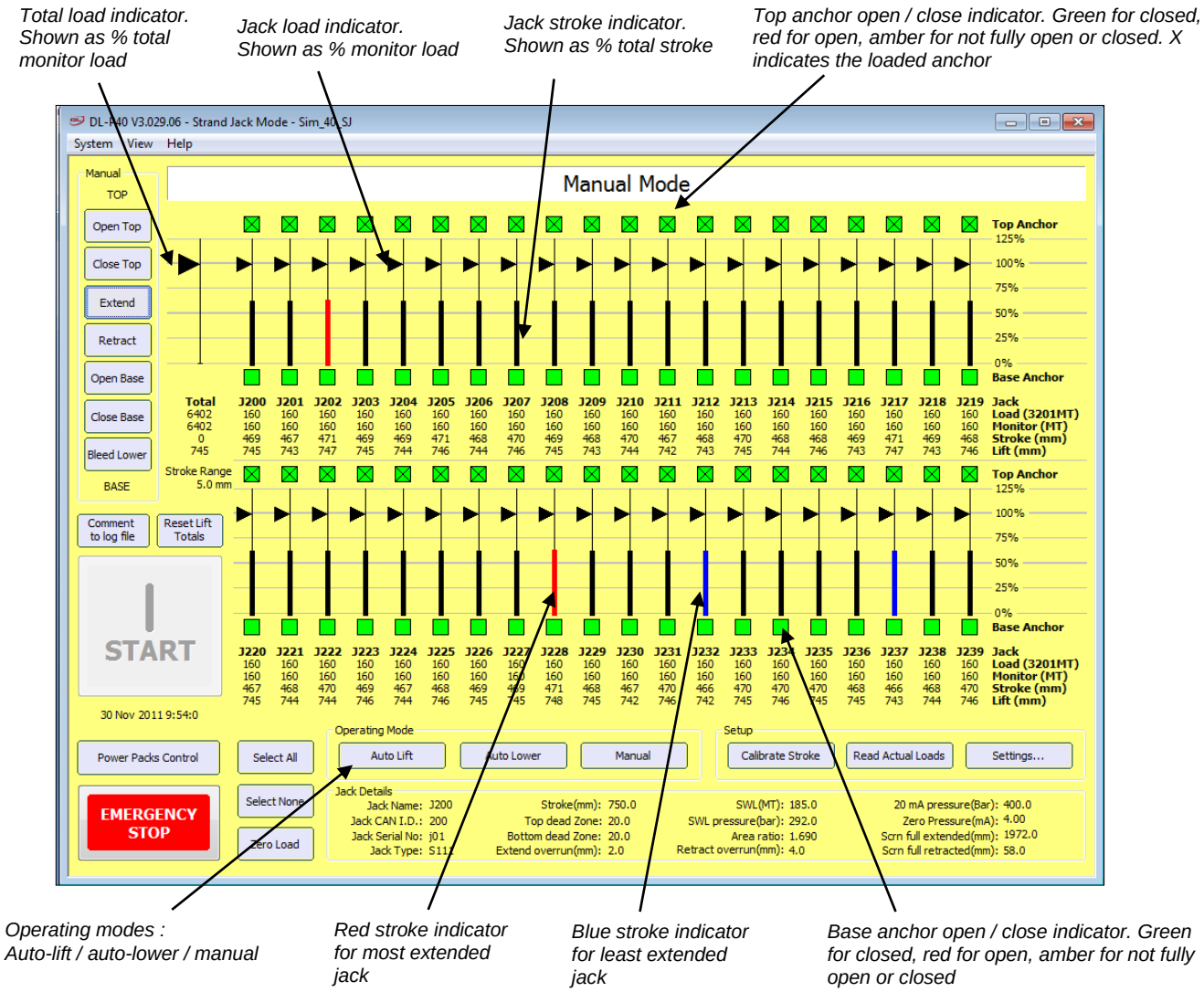
Typical diesel powered hydraulic power units and DL-S588 strand jacks

DL-P40 Computer Control System

The DL-P40 computer control system is written and developed in-house by DLT using our own software and hardware engineers, working in consultation with experienced DLT operators. It can be used to control all types of hydraulic jacking systems, including strand jacks, climbing jacks, gripper jacks and synchronous solid ram jacking systems. The system offers the simplest possible operating screen for increased safety, communicating between the control computer and CAN (Controller Area Network) Controllers located in the hydraulic power units using the latest CANbus networking system. The complete system has been tested and certified to all relevant European Electro-Magnetic Conformance (EMC) standards, an important consideration when used in a site environment.

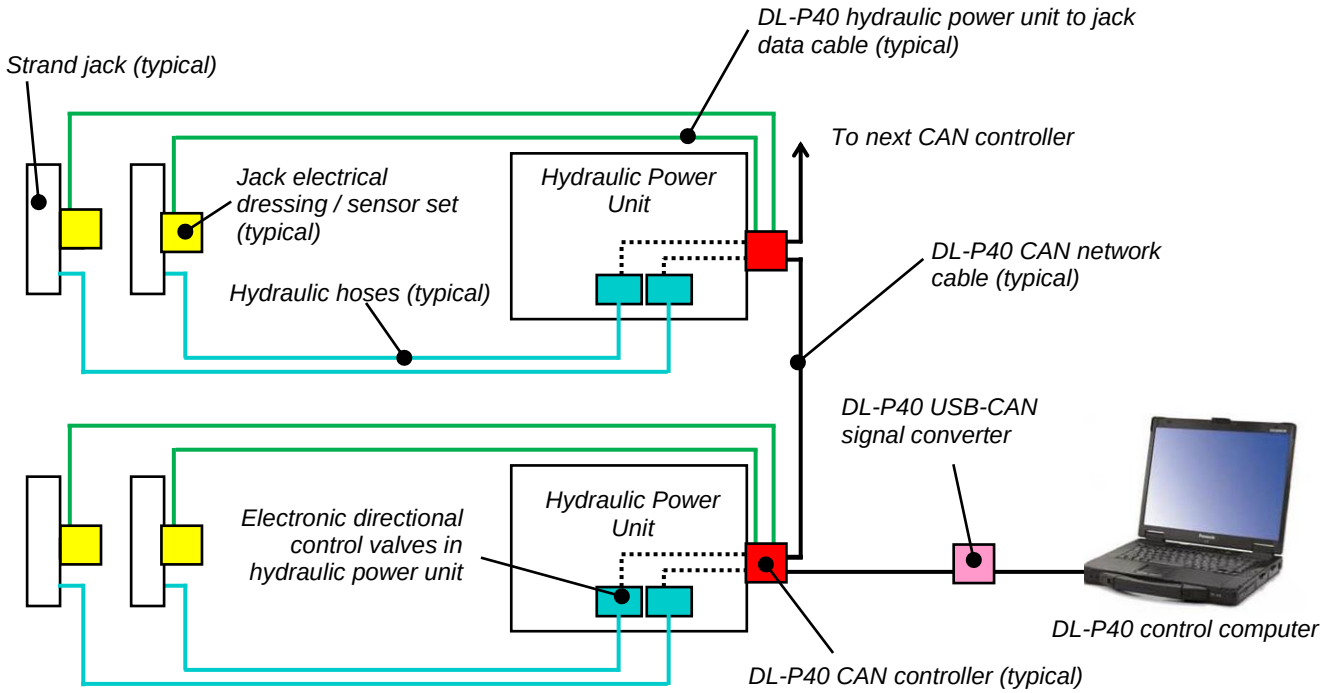
The DL-P40 uses programmable CAN Controllers located in the hydraulic power units for intelligent sensing and control functions, and a central control computer to manage all the tasks. The system can monitor and control any number of jacks, although the current interface is configured for up to 120 strand jacks. The full version of the computer software is free to load on any computer and has an inbuilt simulation mode that allows the operator to set up any combination of strand jacks and hydraulic power units and simulate a full lift taking place.

The screen that the operator will see for a 40-jack lift is as shown below. An auxiliary screen can be utilised to show any additional jacks, allowing for up to 120 jacks in one network.



DL-P40 Software Interface

The operator can select any combination of jacks to be operated and has a choice of three operating modes – manual, auto-lift and auto-lower. In all 3 modes, the computer can be set to automatically synchronise the strokes of the jacks to within a user defined range to maintain an even load distribution between the jacks during a lift. The operator can also set an expected load for each individual jack and can set a maximum percentage of this load as the overload limit for the operation. The system will automatically stop all jacks if any single jack reaches its overload limit. The display graphics allow the operator to easily see if a jack is not taking its expected load.



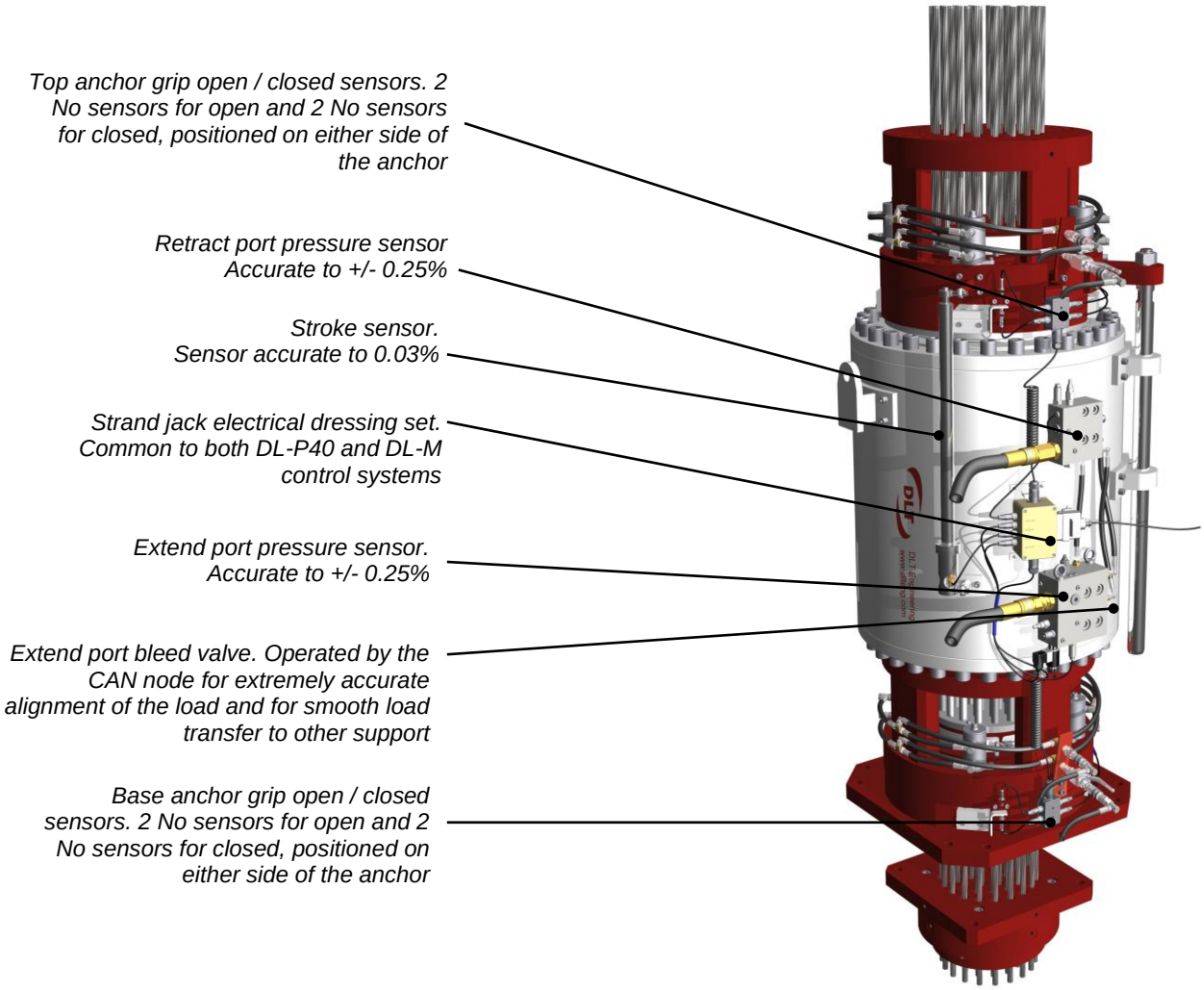
Schematic layout of the DL-P40 system hardware

In summary, the main features of the DL-P40 computer control system are as follows:

- Control of up to 120 No. jacks from a single control computer, with up to 40 jacks shown on the main screen and a further 80 jacks shown on the optional auxiliary screen.
- Control any type of hydraulic ram, either with or without a gripping system fitted e.g. strand jacks, climbing jacks, gripper jacks, compression rams, tension rams.
- Control all types of hydraulic power units, using electric motors or diesel engines, and having fixed flow or variable flow.
- Controller Area Network (CAN) for reliable communication between the control computer, the hydraulic power units and the jacks.
- Plug and play system using intelligent CAN nodes on all hydraulic power units. The Control Computer will automatically detect and understand all the equipment being used. This greatly reduces set-up time.
- User friendly interface, designed in consultation with DLT operators, to give a clear presentation of all essential data during a jacking operation.
- Project specific set-up information can be saved in project files and reloaded at any time, so that this data only needs to be entered once.
- Can accept a wide range of sensors fitted to the jacks and hydraulic power units for continuous display and monitoring of jack load, jack stroke, gripping system open/closed state, oil temperature, oil level and motor state.
- Automatic stroke synchronisation in automatic lift/lower modes and manual mode.
- Simple and accurate method for quickly calibrating all stroke sensors.

- Comprehensive log file of all jack loads, operator commands, messages and events is stored on the control computer for later analysis. The operator may comment to the log file at any time to explain what is happening.
- Remote start and stop of all hydraulic power unit motors from the control computer.
- Control computer can be running Windows 7 or Windows 10 and communicates with the CAN nodes via a USB-to-CAN link.
- Many inbuilt safety features to prevent unsafe operation of the jacking system.
- Tested and certified to European Electro Magnetic Conformance standards for reliable operation in all site conditions.
- Simulation mode for training and demonstration purposes, which can be set up by the user to run any combination of jacks and hydraulic power units.

Each strand jack has a number of sensors fitted to detect pressure, piston extension and grip open or closed states. All sensors, wiring and CAN nodes are weatherproof to IP 55 or better. The arrangement of the DL-P40 sensor system on a strand jack is shown below:



Example of the sensor arrangements on a typical strand jack

The DL-P40 computer calculates the load in the strand jack by multiplying the extend port pressure by the extend side area to get the extend side load, and then deducts the retract port pressure multiplied by the retract side area to remove inaccuracies due to any back pressure in the system on the retract side of the circuit.

DL-M Control System

DL-M pendant control systems can be used by a single operator to monitor and control up to 12 jacks and are operated from a control box as shown below (DL-M4 shown). The DL-M system has none of the automation of the DL-P40 computer control system. However, it offers a practical low cost alternative to the DL-P40. The DL-M control box is weatherproof to IP 55, suitable for external use in all weather, and in temperatures ranging from –10 to +50 degrees Celsius.

Top and base grip open / closed lights. Green for closed, red for open

Analogue display of jack extend port pressure

Jack selector on/off

Digital display of jack load or pressure (measured at the jack extend port)

Joystick for opening the top or base grips with spring-return to centre position (All grips are closed when the joy stick is in the central position)

Emergency stop button

Bleed lowering button for fine alignment of the load or smooth load transfer to supports

Joystick for extending or retracting the main cylinder with spring return to the centre position

Example of a DL-M Control Box

The wiring and junction boxes on the jacks and hydraulic power units are the same for both the DL-P40 and DL-M systems, allowing the DL-M system to be used as a back up to the DL-P40 computer control system with a very quick changeover from one system to the other.

Site Support Services

Site Support for our equipment is provided by our Site Technicians, who have many years of experience in carrying out heavy lifting and moving operations. They are usually seconded into a client's team to assist with the first few operations until the client's own staff feel confident to safely operate the equipment themselves. As part of this service we provide a formal training and certification programme to approve client's staff as competent to operate and maintain the equipment. Our Site Technicians become a valued member of the site team and are often requested to return to assist with future operations.

Our Site Technicians are also available to carry out periodic inspection, maintenance and load testing of the equipment with manufacturer's certification of the work carried out.

Contacts

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