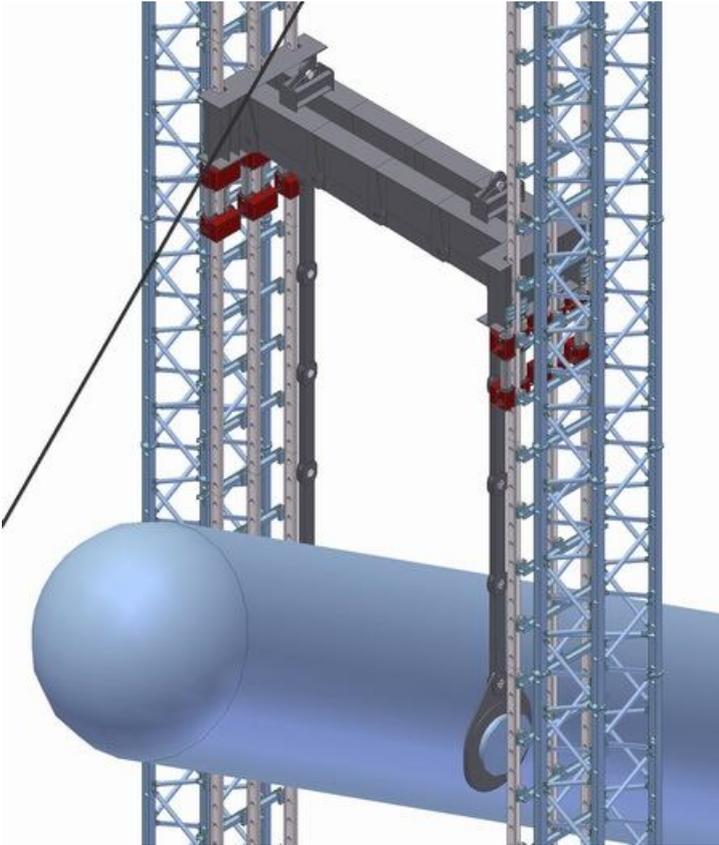




Dorman Long Technology

Pinned climbing jack system

Pinned climbing jacks, power packs and control systems





Introduction

DLT Pinned climbing jack systems are very similar in principle to our strand jacks systems, and can be used with our standard hydraulic power packs and control systems. DLT pinned climbing jacks have top and bottom anchor blocks separated by a pair of hydraulic rams and climb a modular pin plate that transfers the load in compression down to a foundation plate. The top and bottom anchors have secure pinned connections to the pin plate. The pin plate is secured by lateral restrain clips to any suitable structure such as a temporary tower, a building column of a bridge pier.

Our DL-CP pinned climbing jacks vary from 60 - 1000 tonnes safe working load per jack. Lifting speeds vary from 5 - 40 metres per hour depending on the size of power pack used, for details on our power packs please see pages 4 and 5. Our DL-CP pinned climbing jacks can be used vertically to lift and lower heavy loads and can also be used horizontally to push heavy loads along a skid track. For detail on our control systems please see pages 6 to 11.

We have been designing, manufacturing and using hydraulic jacking 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 these 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 our 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 systems. Our systems are designed for safety, long life, robust performance and ease of maintenance.

All our 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 assessment and health & safety with examples from our own 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 expert in-house engineering advice to our clients on how to use the equipment to best advantage, including detailed design of temporary works.

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



DL-CP600 pinned climbing jack load testing



Pinned Climbing Jacks.

Dorman Long pinned climbing jacks range from 60 to 1000 tonne safe working load per jack. Please contact our offices to get the details of a particular capacity.

The main features of all our pinned climbing jacks are as follows:

- Pinned climbing jacks are robust & maintenance free and provide a very good solution for regular lifting requirements due to the absence of any wearable component such as wire ropes, strands, grips etc.
- They are fool proof as compared to the traditional climbing jacks due to the presence of pins getting locked in the slotted holes of climbing bars.
- Dorman Long pinned climbing jack system is equipped with hydraulic and electrical interlocks, this prevents the opening of both the top and bottom anchors together unless bypassed for installation purpose.
- The double acting mini jacks are operated by weak hydraulic circuit (50 bar pressure), therefore the operator cannot open the loaded anchors even by mistake.
- Pinned climbing jacks are monitored, controlled and synchronised by a single operator using our proven DL-P40 computer control system.
- Main cylinder pressure tested and certified to 150% of working pressure
- Complete jack load tested and certified to 125% of safe working load
- Double acting mini-jacks used for opening/closing the grips in the top and bottom anchors, which can be fully replaced in the middle of a lift if necessary without dismantling the anchors.
- 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.
- Fitted with quick release hose couplings
- Corrosion protection to all exposed and running surfaces for long life and suitable for use in a marine environment

Project specific steel fabrications are required to support the jacks. We are able to offer a full design and supply service for these items.

- 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 our power packs 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 our power packs are compatible with both our DL-M and DL-P control systems for central monitoring and control of all jacks from a single point.
- Power pack mounted in steel crash frame with fork lift truck 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.



DL-L120/2/300/D Diesel powered hydraulic power packs



Electrically operated hydraulic power packs



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 our own 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, and uses the latest CANbus networking system for robust communication between the control computer and CAN Controllers located in the power packs. 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 power packs 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 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 jacks and power packs and simulate a full lift taking place.

The screen that the operator will see for a 40 pinned climbing jack lift is as shown below. An auxiliary screen is used to show jacks from 41 to 120.

Total load indicator
Shown as % total
monitor load

Red stroke indicator
for most extended
jack

Jack load indicator
Shown as % monitor load

Top anchor open / close indicator. Green for closed, red for open, amber for not fully open or closed, red border indicates the pins are not aligned with the holes so anchor cannot be closed

Operating modes :
Auto-lift / auto-lower / manual

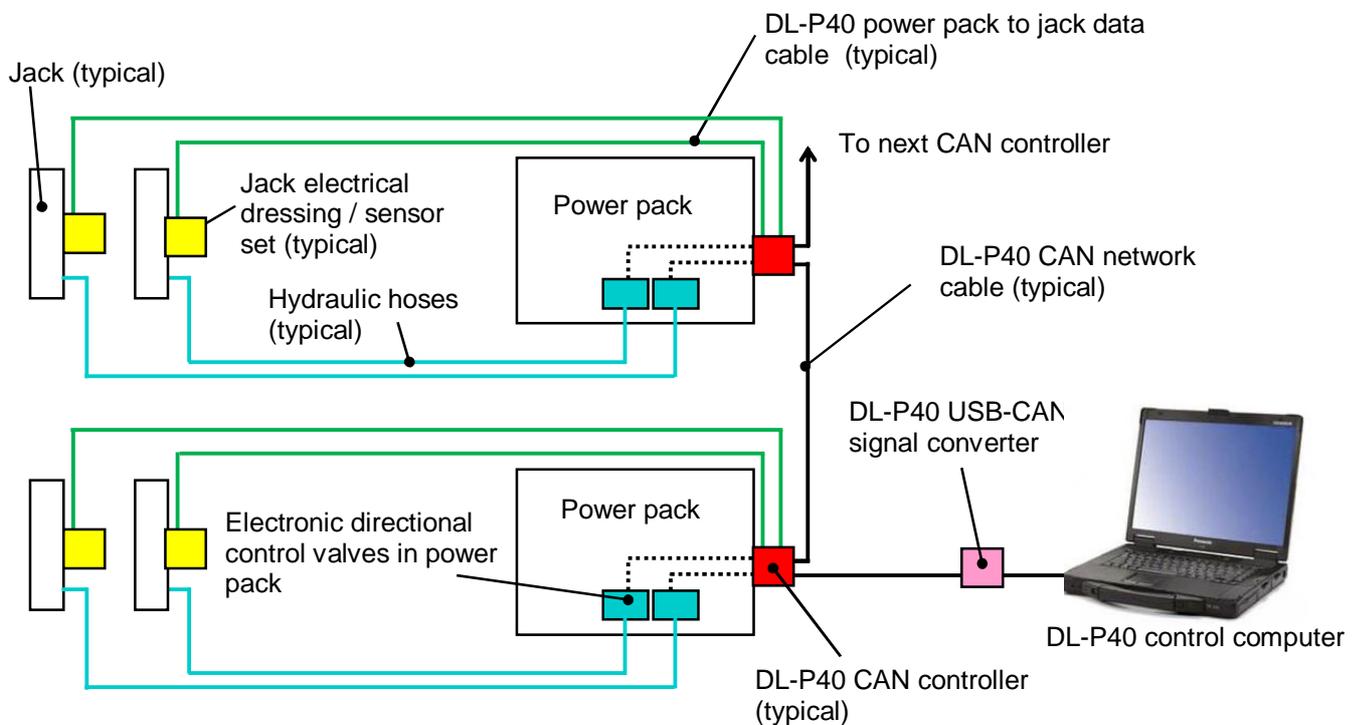
Jack stroke indicator
Shown as % total stroke

blue stroke indicator
for least extended
jack

Bottom anchor open / close indicator.
Green for closed, red for open
amber for not fully open or closed, X
indicates the loaded anchor

The operator can select any combination of jacks to be operated and has 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. Synchronising strokes in this way helps to maintain an even load distribution between the jacks during a lift. The operator can also set an expected load for each jack, which can be different for each jack, and can set a maximum % of this load as the overload limit for the operation. The system will automatically stop all jacks if any of the jacks reaches its overload limit. The screen displays all jack loads graphically as % of pre-set load (expected load), so if all the jacks are seeing their expected load then the operator will see all the jack load indicators on the 100% line. This method of graphically displaying the loads makes it very easy for the operator to see if a jack is not taking its expected load. After the jacks have lifted the load a small distance and the actual loads in each jack are shown on the screen, the operator can press the ‘Set Load’ button to read all these loads into the computer, and he can then ask the computer to graphically show the jack loads as a % of these Set loads instead of the expected loads.

The schematic layout of the DL-P40 system hardware is as follows :



Within each power pack is a DL-P40 power pack CAN controller (shown in red above) which is connected to the DL-P40 control computer and the other power pack CAN controllers by a robust CANbus network. The DL-P40 power pack CAN controller receives all sensor data from the jacks and power pack and sends control voltages to the hydraulic valves in the power pack and the bleed valve in on the jack. The CAN controllers are programmed with the characteristics of the power packs and jacks that are connected, creating an easy to use plug-and-play system that allows the DL-P40 control computer to automatically recognise all the power packs and jacks in the system at start up. The operator can view and amend the operating parameters of the system at any time using the settings screen of the DL-P40 control software in the computer. The layout of the system and the operator defined settings can all be saved in a project file on the control computer, which can be re-loaded at any time to avoid the need to re-input this information.



Each climbing 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 pinned climbing jack is shown below :

Top anchor grip open / closed sensors. 2 No sensors for open and 2 No sensors for closed, positioned inside the anchor.

Stroke sensor
Sensor accurate to 0.03%.

Pressure sensor for both extend and retract port. Accurate to +/- 0.25%

Jack electrical dressing set.
Common to both DL-P40 and DL-M control systems

Bottom anchor grip open / closed sensors. 2 No sensors for open and 2 No sensors for closed, positioned inside the anchor



The DL-P40 computer calculates the load in the 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.

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 Jacks 41-120 Screen.
- Control any type of hydraulic ram, either with or without a gripping system fitted. Eg strand jacks, climbing jacks, gripper jacks, compression rams, tension rams.
- Control all types of hydraulic power packs, using electric motors or diesel engines, and having fixed flow or variable flow.
- CAN network for reliable communication between the control computer and the power packs and the jacks.
- Plug and play system using intelligent CAN nodes on all the power packs. 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 our own 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 power packs 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 both automatic lift/lower modes and manual mode
- Simple and accurate method for quickly calibrating all stroke encoders
- 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 power pack motors from the control computer
- Control Computer can be running Windows XP, Vista or Windows 7 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 power packs.

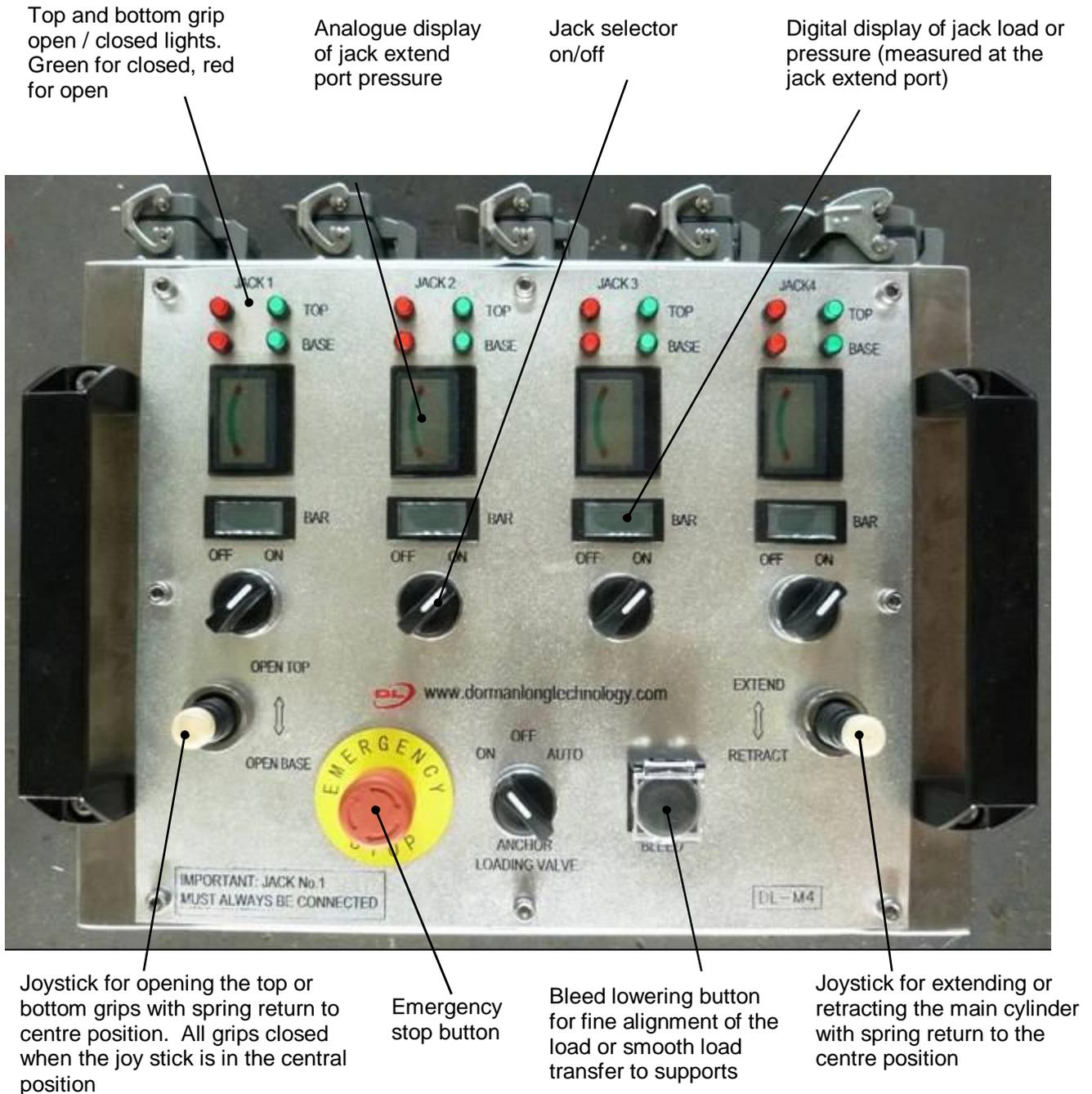


Radiated Emission Test Set-up Back View



DL-M control system

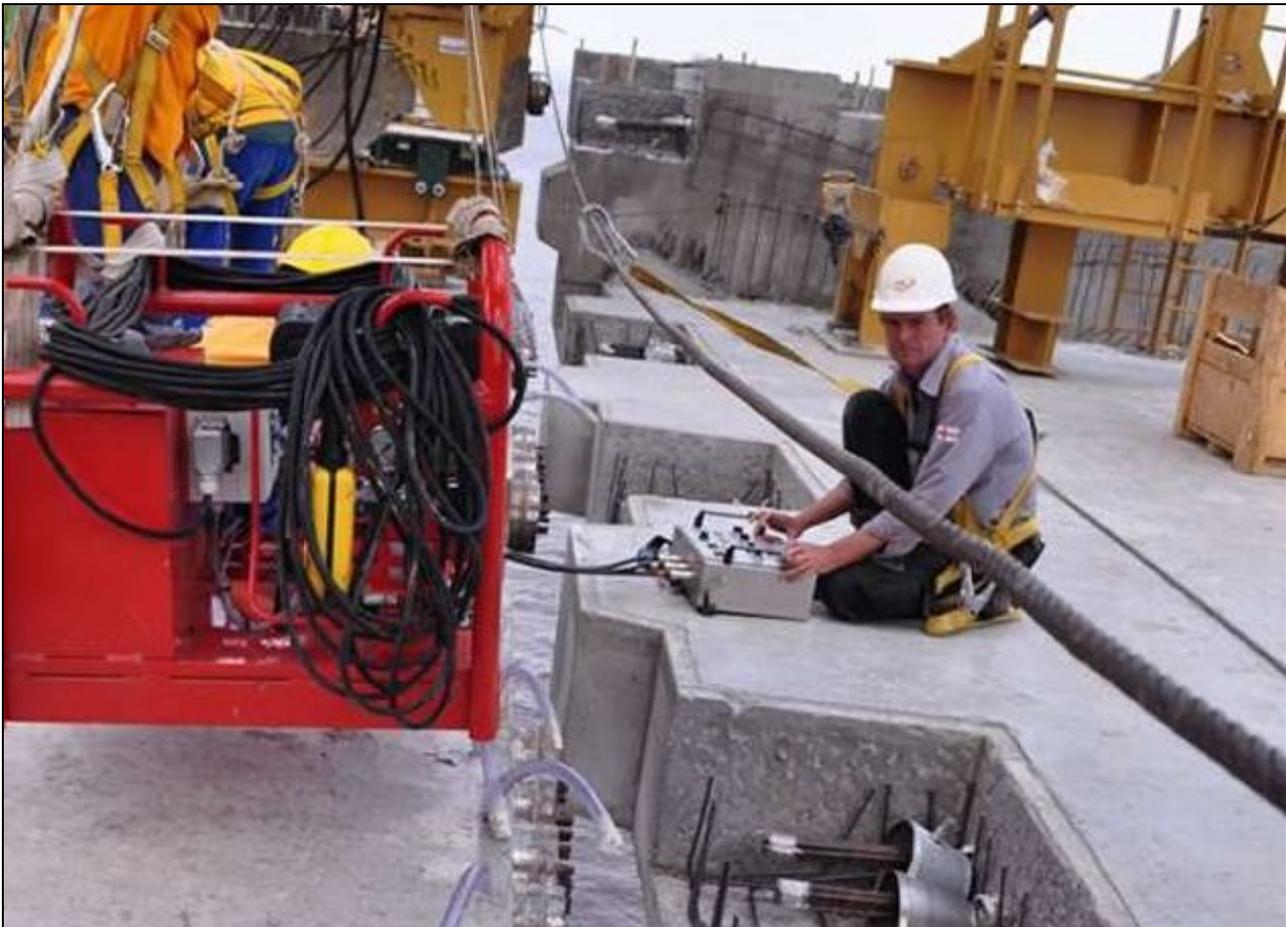
DL-M pendant control systems can be used by a single operator to monitor and control up to 12 jacks and are operated from a control box as shown below (DL-M4 shown). The DL-M system has none of the automation of the DL-P40 computer control system. However, it offers a practical low cost alternative to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



The wiring and junction boxes on the jacks and power packs 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.



DL-M8 control box



DL-M control system being used for final alignment of bridge deck sections



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Our jacking systems are under continuous development in response to feedback from our customers and our own experience in using this equipment. The information contained in the brochure is subject to change without notice.