



LIFTLOG™ DX CRANE DATA LOGGER

Model LL10x, with SN 162xxx



Installation and User Manual

V1: 31/03/2016

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1 OVERVIEW

Liftlog™DX is a remaining life and load limiting data-logger for cranes that logs all hoisting motions as well as longitudinal and transverse travel. Accompanying software takes the wirelessly downloaded data and applies AS2550.1-2011 to calculate the remaining life of the crane.

Liftlog™DXDX is a drop in replacement for a traditional Liftlog™DX unit and is wired identically.

You can identify Liftlog™DX either by (a) its Liftlog™DX stickers (first batches do not have these) or (b) Liftlog™DX units with serial numbers greater than 16-2xxx (e.g. 16-2001, 16-3024, 17-1001 etc).

It is important to note that Liftlog™DX units require version 17.1 or higher of the FSU software. This was released on 30/03/2016. Earlier versions of the FSU will not be able to communicate with Liftlog™DX units.



2 SPECIFICATIONS

2.1 Operational Specifications

Parameter	Description	Min	Typ	Max	Units
L _{count}	Maximum number of logged events			13,000,000	
F _{log}	Frequency of logged events			4	Hz
T _{log}	Duration of a logged event	1		30000	Sec

2.2 Physical Specifications

Overall length (mm):	115
Overall width (mm):	100
Overall height (mm):	23
Weight (kg):	0.12
Mounting:	30mm DIN Rail

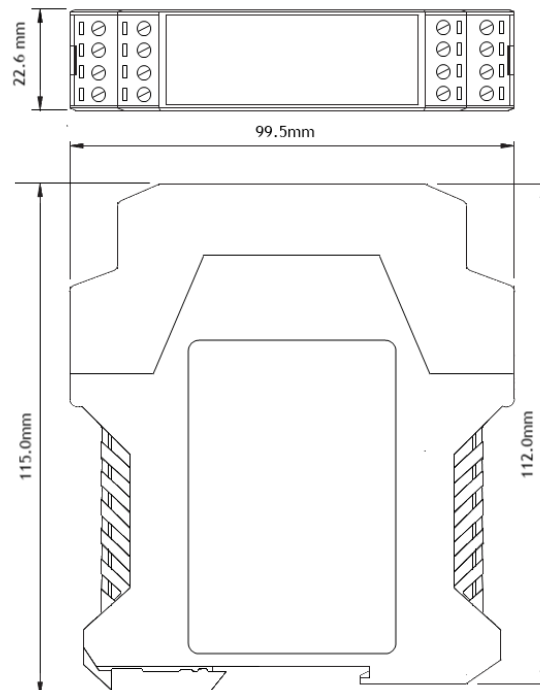


Figure 1: Case Dimensions



2.3 Electrical Specifications

Parameter	Description	Min	Typ	Max	Units
V_{in}	Supply voltage	24		250	VAC/DC
I_{in}	Supply current	10	15	30	mA
V_{batt}	Backup battery voltage	2	3	3.5	V
I_{batt}	Backup battery current		300	500	nA
L_{max}	Maximum voltage on a load sensing pin with respect to device gnd			3.3	V
L_{fs}	Load pin differential input for full scale reading	20	23	25	mV
I_{input}	Input current draw (up, down, north, south, east, west pins)	0.5	1	10	mA
V_{motion}	Max voltage for motion inputs			250	V AC
V_{fault}	Max voltage for fault output			250	V AC
I_{fault}	Max current sink by fault output			4	A
P_{fault}	Max contactor inrush rating at 48V			200	W
	Allowable operating temperature	-40		85 ^{Note1}	°C

Note1: Extended operation at maximum temperature will reduce the life the device

2.4 Communication Specifications

Communications between the device and a host is usually via a Bluetooth radio link. The Bluetooth device name will be set to the Crane ID, the PIN is 0000.

For more details on the communication protocol used to communicate with the Liftlog™DX, see Appendix A.



3 INSTALLATION DETAILS

3.1 Prior to Installation

Before installing your Liftlog™DX device visually inspect the device and check that:

- (a) the type of input marked on the front of the device is appropriate for your application;
- (b) the case is not damaged and fits together securely;
- (c) terminals are secure;
- (d) terminal numbering is as per the following diagram.



Figure 2: Terminal Positions

NB: As each block of 4 terminals can be removed (for installation) it is important that they be reinstalled in the positions shown.

3.2 Wiring Diagrams

3.2.1 Installation with an existing 3rd party load display

The recommended method for connecting a Liftlog™DX to an existing load display is to use a 4-20mA output from the display to a 4-20mA configured Liftlog™DX or to insert a 4-20mA Liftlog™DX into an existing current loop.

Where this is not an option, it may be possible to piggyback the Liftlog™DX onto the strain gauge inputs of the load display.



3.2.2 Installation with a Dedicated Load Cell (e.g. RCxT)

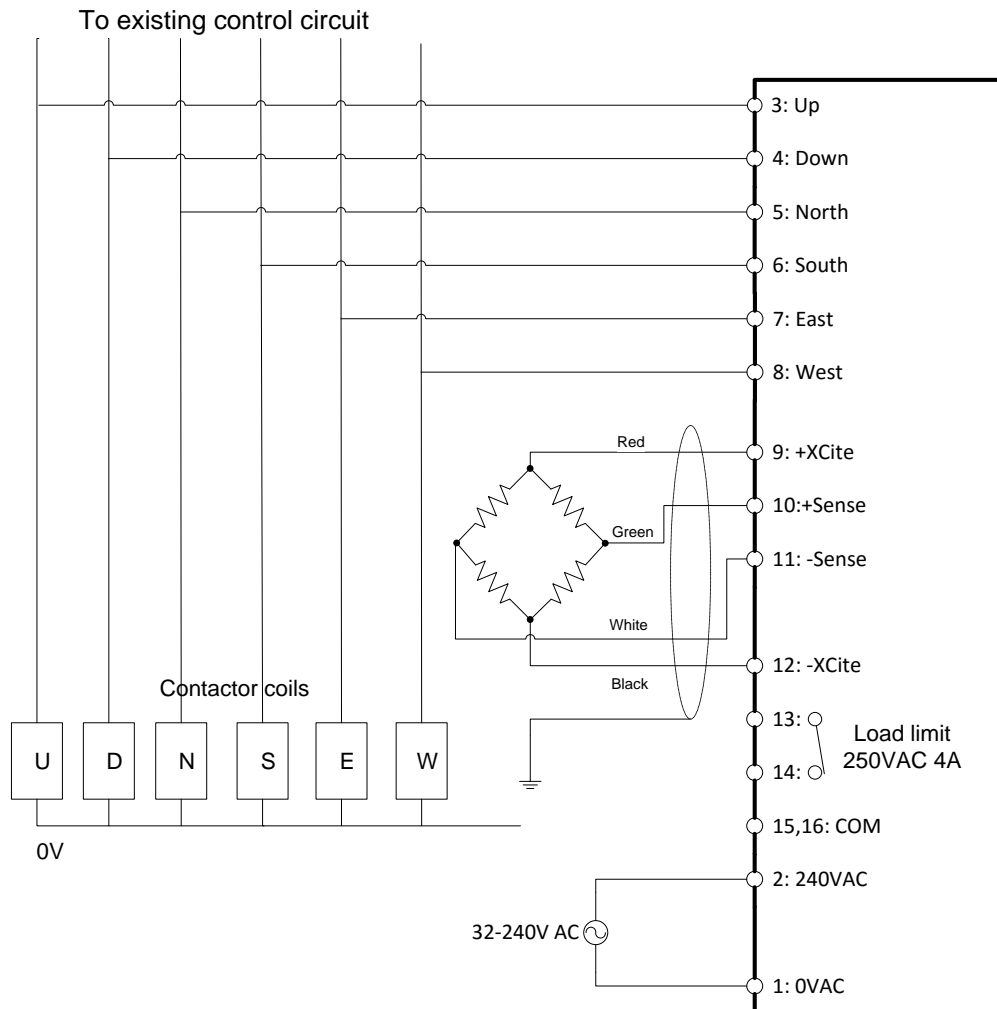


Figure 3: Connecting a dedicated load cell

NB: Output pins (13-14) are Normally Closed and rated for 250V AC 4A. They can be reconfigured to Normally Open using the FSU software.

It is very important not to connect pin 15,16 to the chassis earth!

3.2.2.1 Connecting the negative reference

The Liftlog™DX input circuit is connected to the chassis ground. When installing against an existing load Indicating system, ensure that its inputs are floating. It is important that the voltage on pins 10 and 11 do not exceed 3.3V with respect to pin 12.



3.2.3 Installation with a 4-20mA Load Output

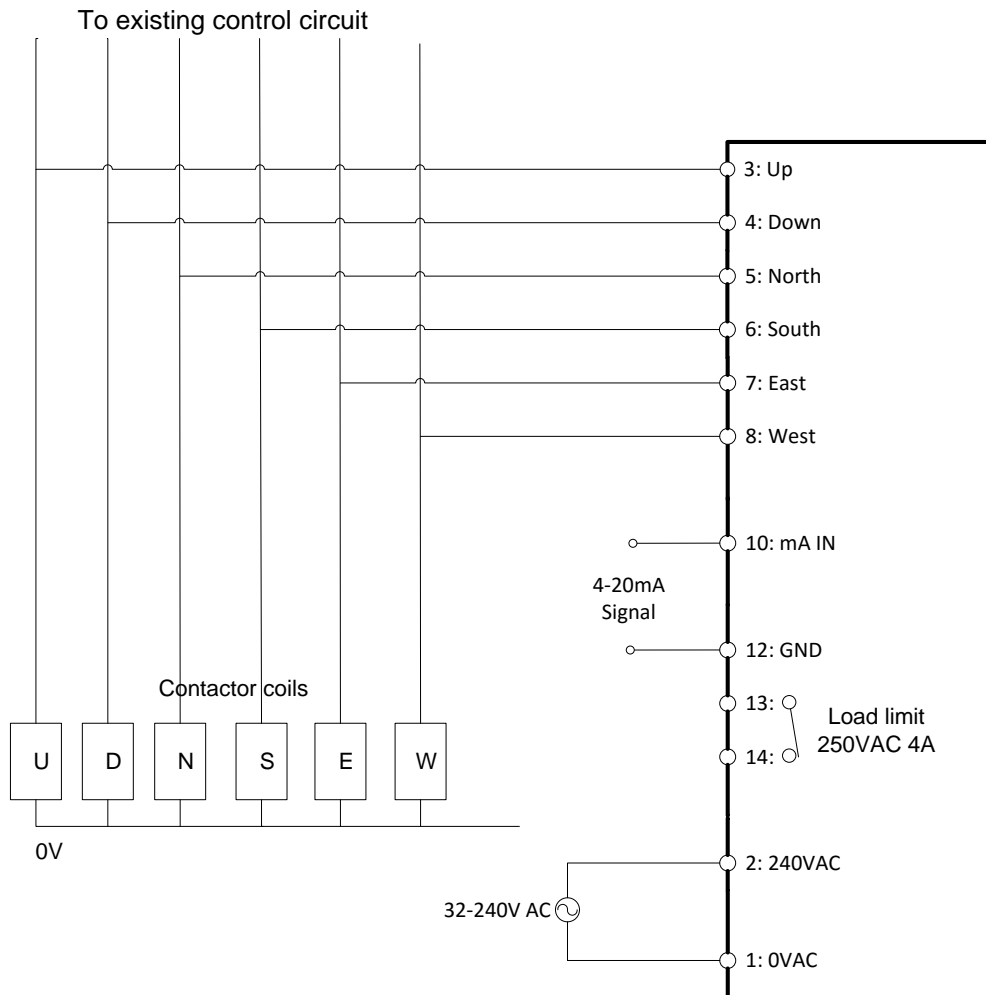


Figure 4: Connecting a 4-20mA load signal

NB: Output pins (13-14) are Normally Closed and rated for 250V AC 4A. They can be reconfigured to Normally Open using the FSU software.



3.2.4 Installation with a 0-10V Load Output

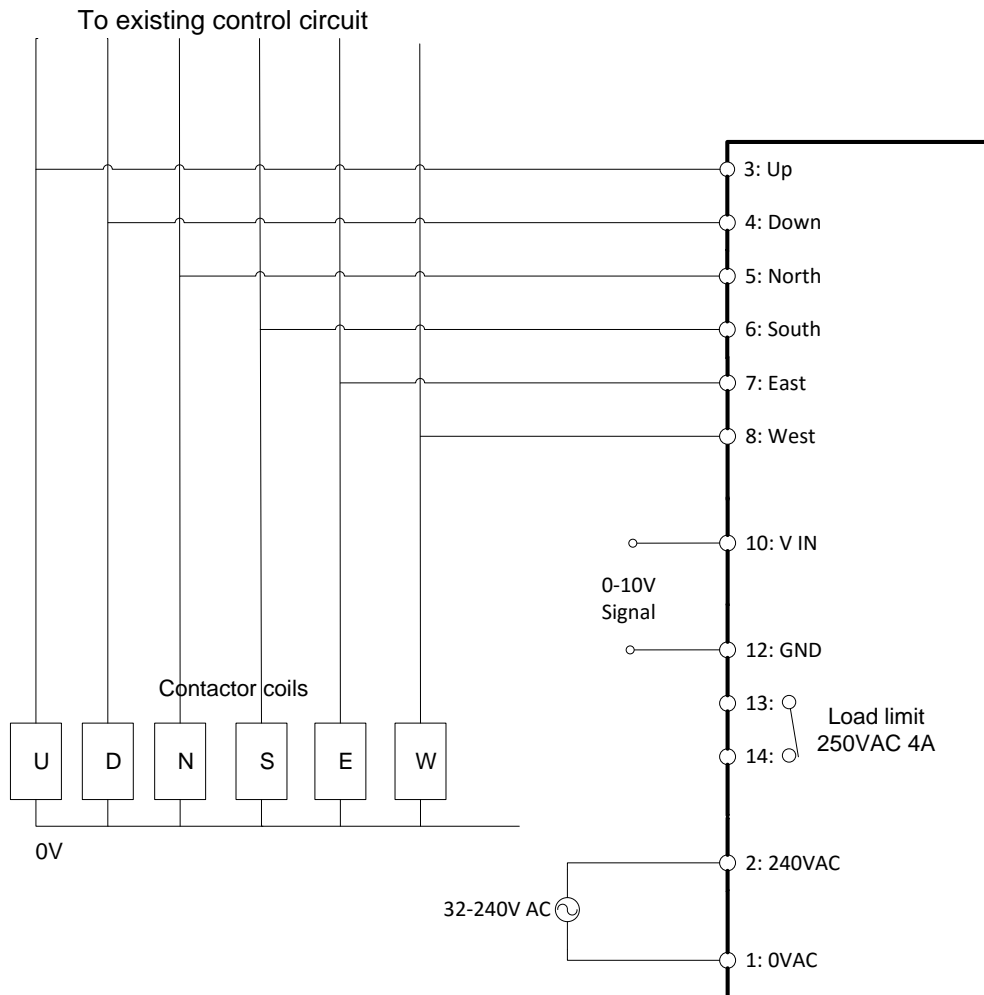


Figure 5: Connecting to a 0-10V Load Signal

NB: Output pins (13-14) are Normally Closed and rated for 250V AC 4A. They can be reconfigured to Normally Open using the FSU software.



3.2.5 Installation with a Q-Link Output (ABUS LIS)

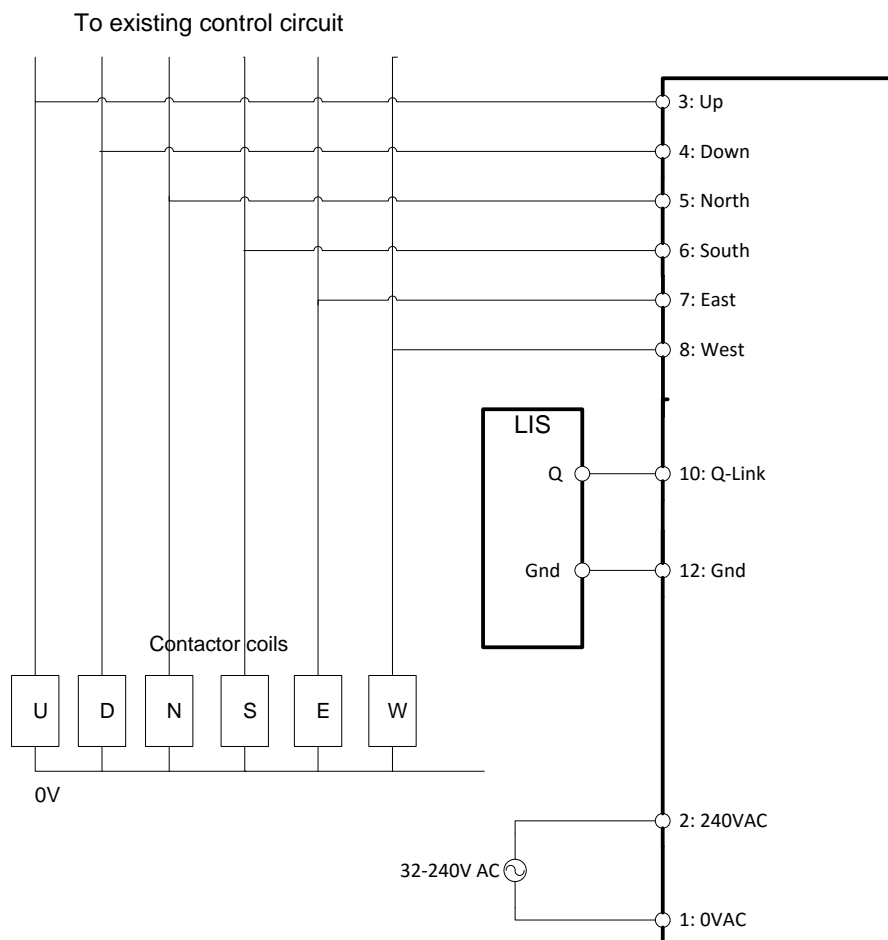


Figure 6: Connection to an ABUS LIS using a Q-Link 'Q' Output

NB: Output pins (13-14) are Normally Closed and rated for 250V AC 4A. They can be reconfigured to Normally Open using the FSU software.



3.2.6 Installation with a F-Link Output (ABUS LIS)

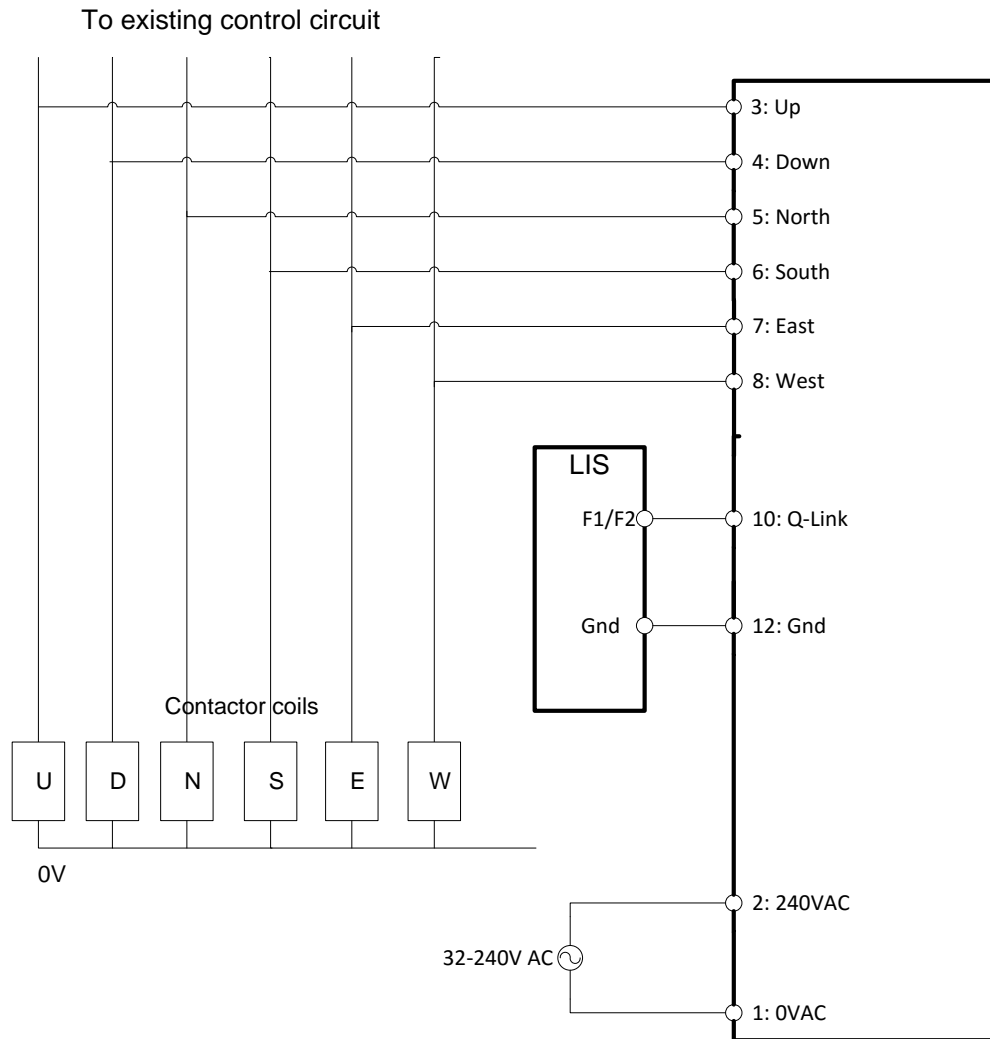


Figure 7: Connecting to an ABUS LIS using the Q-Link Frequency (F1/F2) Output

NB: Output pins (13-14) are Normally Closed and rated for 250V AC 4A. They can be reconfigured to Normally Open using the FSU software.



4 COMMISSIONING DETAILS

Liftlog™DX is designed to be commissioned using a laptop computer. You will need a CASWA LINK-2 Bluetooth Modem and the Field Service Utility (FSU) software application, version 17.1 or higher, loaded on a laptop.

Note: FSU versions prior to 17.1 will not be able to communication with Liftlog™DX units.

4.1 Installing and Launching the FSU Application

4.1.1 FSU Program Installation

Ensure that your computer is switched on, connected to the internet and that the minimum required software versions are installed (see Appendix B for minimum system requirements). Ensure that the LINK-2 modem is installed and that the drivers have loaded.

4.1.2 Installing the FSU application

The latest LINK-2 FSU software (Link-2_FSU) can be downloaded from <http://www.soledigital.com.au/Link2.html>.

You should check this location periodically for updates.

4.1.3 Launching the application

Double click on the FSU program icon:

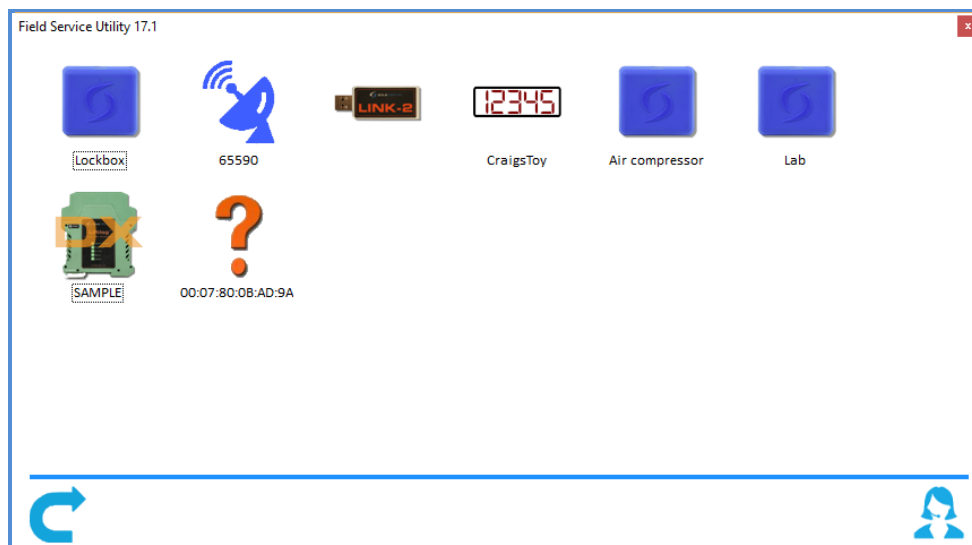





4.2 Connecting to the Device

The FSU will scan for Bluetooth enabled devices. This process takes approximately 10 seconds, when complete a list of all CASWA devices within range will be displayed. Liftlog™DX Units are depicted

by a  icon.



If a particular Liftlog™DX unit is not found, ensure it is powered up and press  to repeat the search.

NB: The Bluetooth link between the Laptop using a Link-2 and a Liftlog™DX has a range of approximately 100m.

To get help on Sole Digital products, go to our website or open a remote support session, press the

 icon.

Otherwise, select the Liftlog™DX you wish to configure by double clicking on the desired icon.

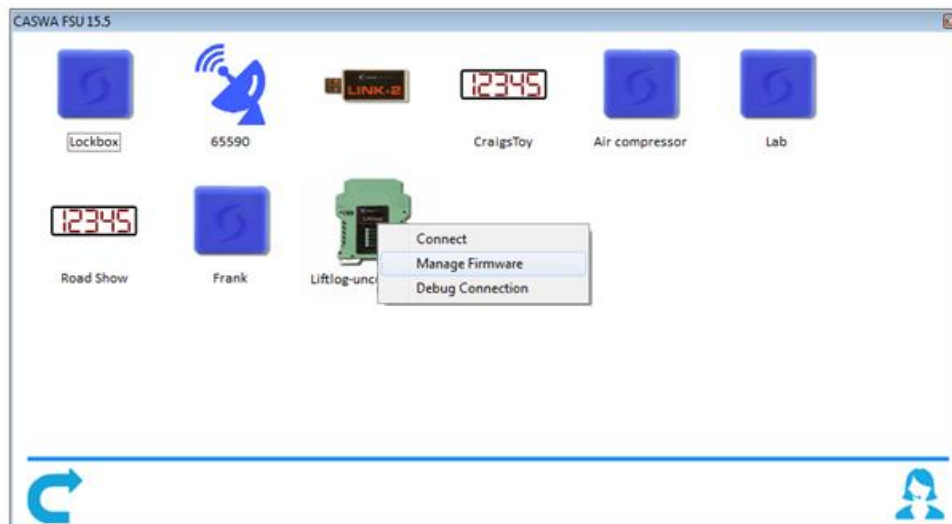


4.3 Managing Firmware

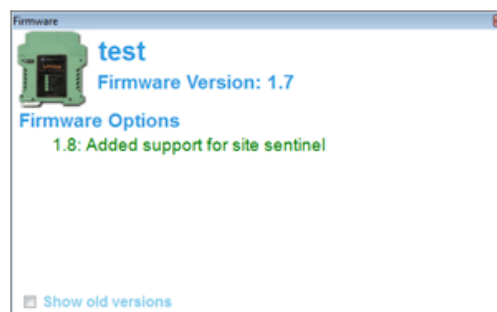
Firmware should only be updated if you:

- a) specifically want a new feature that is only available in later versions;
- b) are experiencing a problem that has been rectified by a later version;
- c) are experiencing a problem and need to roll back to an earlier firmware version that didn't cause the problem you are experiencing; or
- d) have been specifically instructed to do so by your Liftlog™DX supplier.

To check for new firmware versions or to access old firmware versions, return to the Device Display screen and right click the desired equipment icon. Select 'Manage Firmware'.

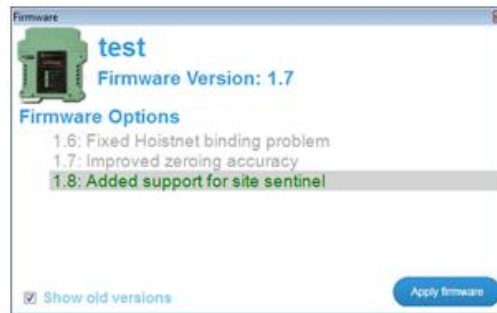


A new window will popup and show the FSU software connecting to the device. When this is complete, the window will show the name of the device, its current firmware version and a list of newer firmware that is available for the device.



If you need to roll back to an earlier version, check the 'Show old versions' box in the lower left corner of the window.


Select a firmware version and then press the <Apply firmware> button that appears in the lower right corner of the window:

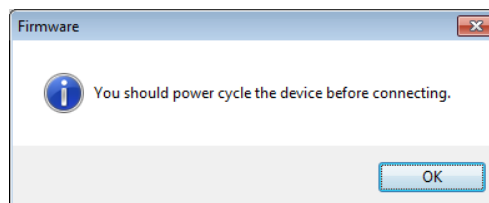


The display will change to the following:



As the message states, **DO NOT switch off the Liftlog™DX or the computer running the FSU software, or remove the Link2 modem** until you are told to do so. If either device loses power then the Liftlog™DX may become unusable and the device will need to be returned to your supplier for repair.

When the firmware has finished updating successfully you will see a  **Success** message in the popup window and also be told to power cycle the device before reconnecting:



Close this window, wait for the manage firmware window to close (this may take 20 seconds) and power cycle the device as instructed. You will be returned to the first FSU screen, Manage Connections.

Wait a few seconds after power cycling the device and then select the device you wish to connect to by double clicking the device.



4.4 Liftlog™DX Configuration

All configuration options are now shown on a single screen.

LiftlogDX

Hoist ID
SAMPLE

Crane Specification
C1 M1 1 t

Logged Data
30 moves
Upload

System time
31/03/16 16:45

PDF fw Ver 20.1

Inputs
N
S
E
W
U
D

Input type HoistNet

0kg
Zero Calibrate

Load Summing

HoistNet
link 1 Unbound disconnected
link 2 Unbound disconnected

Load limits
This Hoist 5000kg Combined 5000kg Contact N/C N/O



4.4.1 Setting the Crane/Hoist Classifications

To facilitate more meaningful reporting and calculation of remaining life, the rated SWL and crane/hoist classifications are required.

To set the classification of the crane/hoist, select the desired rating from the drop down menus and enter the Safe Working Limit (SWL) of the crane in tonnes.

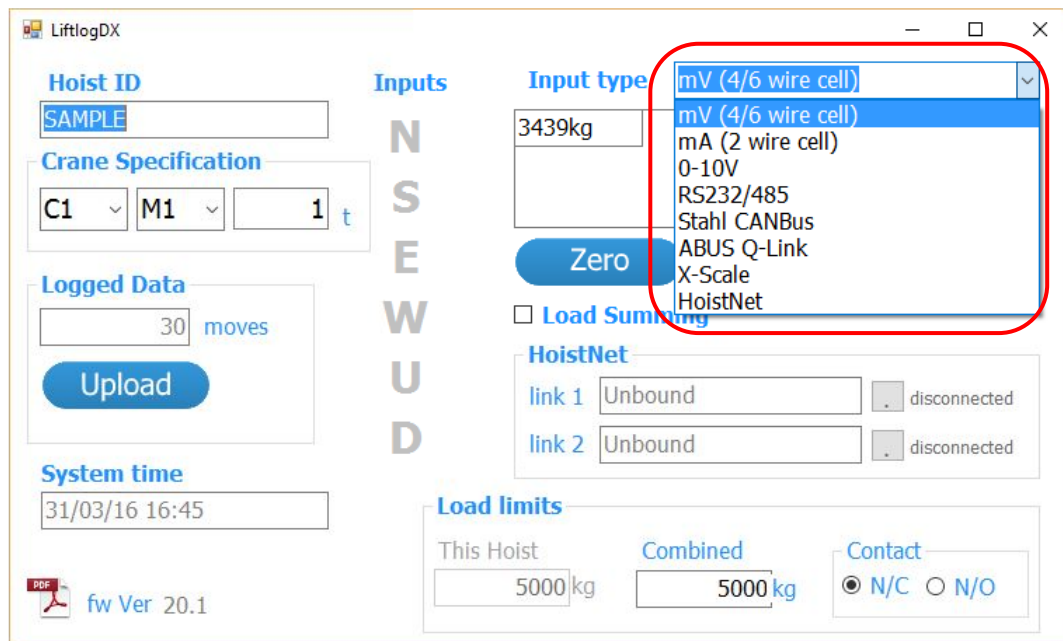
The screenshot shows the LiftlogDX software interface. On the left, there are sections for 'Hoist ID' (containing 'SAMPLE'), 'Crane Specification' (with dropdowns for 'C1', 'M1', and a text input for '1'), 'Logged Data' (showing '30 moves' and an 'Upload' button), and 'System time' (showing '31/03/16 16:45'). A central vertical column contains the letters 'N', 'S', 'E', 'W', 'U', 'D'. On the right, the 'Input type' is set to 'HoistNet', and a large display shows '0kg' with 'Zero' and 'Calibrate' buttons. Below this, there is a 'Load Summing' checkbox and a 'HoistNet' section with 'link 1' and 'link 2' both set to 'Unbound' and 'disconnected'. At the bottom, the 'Load limits' section shows 'This Hoist' at '5000 kg', 'Combined' at '5000 kg', and a 'Contact' section with radio buttons for 'N/C' (selected) and 'N/O'.

Note: The Liftlog™DX will still operate correctly without this information (i.e. all logging and load limiting functions will not be affected). However, this data will be required in order to produce automated or manual reports on remaining design life.



4.4.2 Setting the Input Type

Make sure that the Input is set to the type of Liftlog™DX load input. By default, the mV input will be selected. This is applicable for Liftlog™DX devices that have a strain gauge input.



The following table provides a list of commonly used input types and how they map onto the options in this FSU selection box.


Load input coming from:	Use Input type:
RC3T, RC5T, RC10T rope clamp	mV (4/6 wire cell)
Other load cell with 4-6 connections	mV (4/6 wire cell)
Load cell with 2 connections	mA (2 wire cell)
Kone ControlPRO	0-10V
ABUS LIS Q-Link (With a load cell connected)	ABUS Q-Link
Serial Output from an existing load display or PLC	RS232/485
Stahl Hoist (using our adapter CANBus adapter)	Stahl CANBus
Sole Digital X-Scale	X-Scale
Wirelessly from a Sole Digital device (e.g. MaxOut, HB200, other Liftlog)	HoistNet



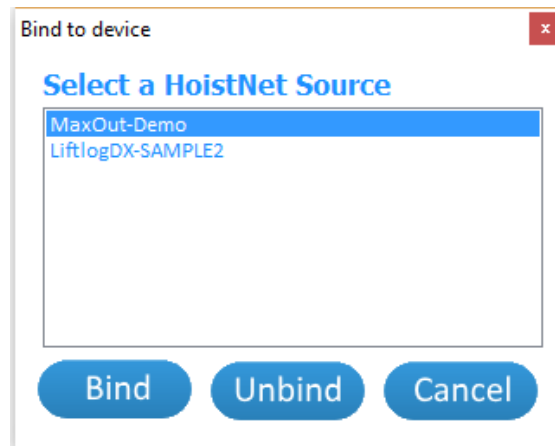
4.4.2.1 Using/Removing a HoistNet Input

Liftlog™DX devices are fully compatible with CASWA HoistNet. This means that they can obtain their load signal wirelessly from any other HoistNet enabled device, eliminating the need for long cable runs between the load cell and data logger.

To receive a load signal via HoistNet, select 'HoistNet' option input. The HoistNet controls on the screen will now be enabled.

To select a HoistNet source press the  button for Link1.

A box will appear asking you which HoistNet enabled device you want to connect to:



Select the device that has the load signal to be used and press <Bind>. The popup box will close.


The name of the bound HoistNet device will be shown on the FSU screen. The connection status will also be shown:



NB: You will need to ensure that the originating HoistNet load signal has been calibrated correctly.

If you connect more than one HoistNet input, the load shown and recorded will be the combined load from both these sources.



To unbind a Liftlog™DX from a HoistNet device, or to change the bound device, press the  button on the Load screen and then select <Unbind> on the popup box.

4.4.2.2 Note on using the Liftlog™DX with a ControlPro or an ABUS LIS

Liftlog™DX connected to a ControlPRO must now be calibrated. (Liftlog units could use the internal calibration of the ControlPRO.) Calibration is now necessary because experience has indicated that the output load being supplied by the ControlPro is often inaccurate.

As the ABUS LIS Q Link output is a digital output, it cannot be calibrated. Therefore, if the load is not showing the expected value, the LIS itself must be recalibrated.

4.4.3 Calibrating the Liftlog™DX

If your Liftlog™DX device has been preconfigured (only available with Q-Link inputs) or you are using a HoistNet load signal (which is calibrated separately) then you will not need to calibrate the Liftlog™DX.

All other types of Liftlog™DX must be calibrated and this process will require test weights.

4.4.3.1 Setting the Zero Value

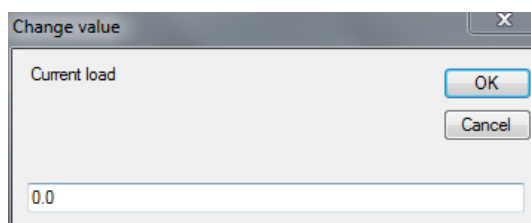
With no load on the hook (or the crane load display reading 0.00t), click on the <Zero> button.

Within a few seconds the display will change to 0.0.

4.4.3.2 Calibrate

Lift a load (minimum 80% of rated capacity) and click the <Calibrate> button.

Enter the mass shown on the load display when prompted and press <OK>.

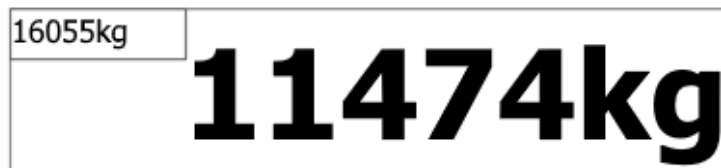




NB: If the fault output of the logger is used as an overload, you may need to go to the Overload screen and set a large overload limit (e.g. 3000) to allow the load to be lifted. See section 4.4.4 for details.

Tap the <OK> button and the screen will now display the load on the hook.

If you have selected the Load Summing option, then you will see two different loads displayed as shown:



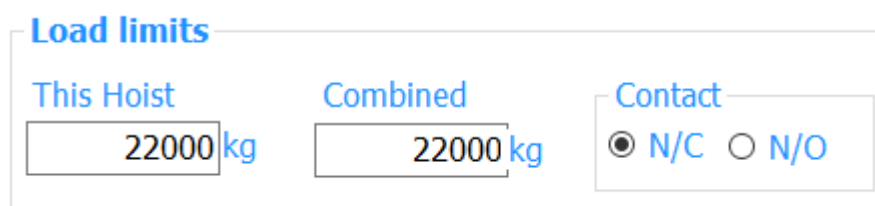
The load in the large box shows the load from the local load source (i.e. this logger), whilst the small box, which disappears after 5 seconds, shows the Total Combined load from the two HoistNet sources. See section 4.4.5 for more information about load summing.

4.4.4 Configuring the Overload

This option is not available for loggers using an ABUS 'Frequency' or 'Q-Link' input (settings will be ignored).

4.4.4.1 Set Overloads

Enter the overload for 'This Hoist'. This can be in 0.1t increments (E.g. 9.4).



The Combined overload is only used in Load Summing mode (see Section 4.5.5).

4.4.4.2 Invert Output

The fault output on the Liftlog™DX is a pair of normally closed contacts. Selecting the < N/O> option will change the normally closed fault output to normally open. You may need to do this:

- If there is an interposing relay between the Liftlog™DX and the up contactor;
- You want the Liftlog™DX to operate in a "fail functional" rather than a "fail safe" mode;
- You are using the Liftlog™DX for slack rope detection



4.4.5 Load Summing - New Feature

Load Summing is a new feature that enables two-way wireless communication between 2 or 3 HoistNet devices for the purposes of activating limits based on individual AND combined loads.

Make sure that limits are wired in for both Sole Digital devices.

To activate Load Summing, check the 'Load Summing' box on ONE of the devices involved in determining the combined load. (Do not select 'Load Summing' on the other device.)

The HoistNet box will be enabled. Connect to the desired HoistNet source (i.e. from the other hoist on the same crane).

HoistNet

link 1	<input type="text" value="MaxOut-Demo"/>	<input checked="" type="checkbox"/> online
link 2	<input type="text" value="Unbound"/>	<input type="checkbox"/> disconnected

Make sure that the Combined Load Limit is set correctly:

Load limits

This Hoist	Combined	Contact
<input type="text" value="22000"/> kg	<input type="text" value="22000"/> kg	<input checked="" type="radio"/> N/C <input type="radio"/> N/O

This Combined limit needs to be set on both devices.

The Liftlog™DX will now send its load to the linked device. Hoisting will now be disabled on both hoists anytime the combined load exceeds hoists will now activate their limits based on individual and combined loads.

The FSU will now display the load from this device in the large box and the combined load in the left hand corner box.

<input type="text" value="16055kg"/>	11474kg
--------------------------------------	----------------



4.4.6 Setting the Crane ID

Setting the crane ID should be the last step in configuring the device. Whilst the craneID is “unconfigured”, the device will display lifts but not log them. This prevents data from lifts prior to calibration affecting later analysis.

Type in the desired logger identification in the ‘Hoist ID’ field. This must be 18 characters or less.

Hoist ID

If the logger will be used with the Liftlog™DX- AccessPack system, set the crane ID as directed by your AccessPack vendor or administrator of the AccessPack manager software at your location.

Tip: Whilst you can set the Crane ID to anything you want, setting it to the crane’s serial number or other external marking will help you distinguish it from other logger equipped cranes. If you also include the crane classification such as C4M5 in the ID then the analysis software will use this in its calculations (if you haven't entered it separately on this screen).

4.5 Verifying Your Installation

4.5.1 Checking the Inputs

Due to improved noise immunity of the Liftlog™DX, you no longer need to define which inputs are being used.

To verify that an input is being detected correctly, activate the input. The colour of the associated input (N,S,E,W,U,D) on the FSU screen should change from grey to blue:

Inputs

N
S
E
W
U
D



4.6 Uploading Data

To upload the logged data from the device to your computer click on the <Upload> button.

Logged Data

moves

Upload

This will bring up a dialog box asking where to save the data. The program defaults to your Documents folder.

Enter the required file name (usually the crane name or serial number).

The resulting data file is a .csv file and the format of its contents is described in Appendix C.



5 ROUTINE MAINTENANCE

It is recommended that the Liftlog™DX unit be inspected annually during which time:

- (a) logged data is downloaded from the device and saved to disk, and
- (b) the internal battery is checked and replaced if necessary.

5.1 Battery Maintenance

The Button cell battery inside of the Liftlog™DX device keeps the internal clock/calendar running when the logger has no external power. It should be checked by removing it from the logger and measuring its open circuit voltage. If this measurement is <2V then the battery should be replaced.



6 TROUBLESHOOTING

Fault	Cause	Fix
LED flashes RED on power up	Unable to initialise memory card	Cycle power. Replace /unit memory card.
Load display indicates a fault	Logger is affecting load pin voltages	Check power to the logger. Disconnect pins 10 and 11 to verify that the logger is causing the fault. Check logger LED is operational (solid red or green). Check that the voltage from pins 11 and 12 is between 4 and 6 volts. If these voltages are out, check the connection between logger GND and load pin GND.
Unable to connect to logger from FSU	Logger or FSU are busy	Power cycle the crane.
	Incorrect wiring	Check that wiring is as per section 3.2. Check that removable terminals have been reinserted into their correct positions as shown in Figure 2.
	Pluggable terminals not seating correctly.	Replace pluggable terminal and rewire the associated terminals.
LED solid red on start-up	Corrupt Memory Card	Replace memory card.
Multiple inputs trigger at the same time	Cross talk on cabling	Separate cables or fit 1W 1kOhm terminating resistors between the input terminal on the Liftlog™DX and a GND terminal.
Input(s) constantly on or flickering	Active and neutral reversed	Check and swap as necessary.
Limit cuts out prematurely on hoisting and adjusting sensitivity has no effect	Magnetic interference causing Liftlog™DX to reset	Check that Liftlog™DX is at least 15mm from any large contactor.
Adding Liftlog™DX to a 4-20mA current loop causes a fault	Liftlog™DX is pulling the loop to GND	Ensure the Liftlog™DX is the lowest potential device in the loop or contact CASWA to order a 4-20mA isolator.



APPENDIX A: COMMUNICATION PROTOCOL

For information about how to communicate with Sole Digital Devices contact [Technical Support](#).

APPENDIX B: FSU SYSTEM REQUIREMENTS

The minimum requirements for operating CASWA's Field Service Utility (FSU) and Link-2 Bluetooth modem are:

- Laptop computer running Windows XP SP3 or later;
- One Spare USB port;
- Microsoft .NET framework 3.5.





APPENDIX C: DATA FILE FORMAT

Data is recorded each time a motion is detected (a contactor closes). Each datum set contains:

1. Date/Time (based on the logger's internal clock – when a user connects to the logger via Bluetooth using the FSU software, the time is compared to the time on the laptop and can be reset)
2. Operator (only used if a logger is bound to an AccessPack)
3. Hook (For Liftlog this will should always be 1.)
4. Load from load cell/other input in tenths of a tonne
5. Duration of motion in tenths of a second
6. Motion code – type of motion as shown in the following table.

Motion Code	Motion
0	No move
1	Move Up
2	Move Down
4	Move Fast
8	Move East
16	Move West
32	Move North
64	Move South
128	Move Up Fast
256	Move Aux1 / Aux
512	Move Aux2 / Magnet
1024	Move Aux3/Override
2048	Move Aux1 Off
4096	Move Aux2/Magnet Off
8192	Move Aux3/Override Off

Note: If a combined motion is detected, then the sum of the individual motions is recorded (e.g. Move Up and Move Fast = 1+4=5).