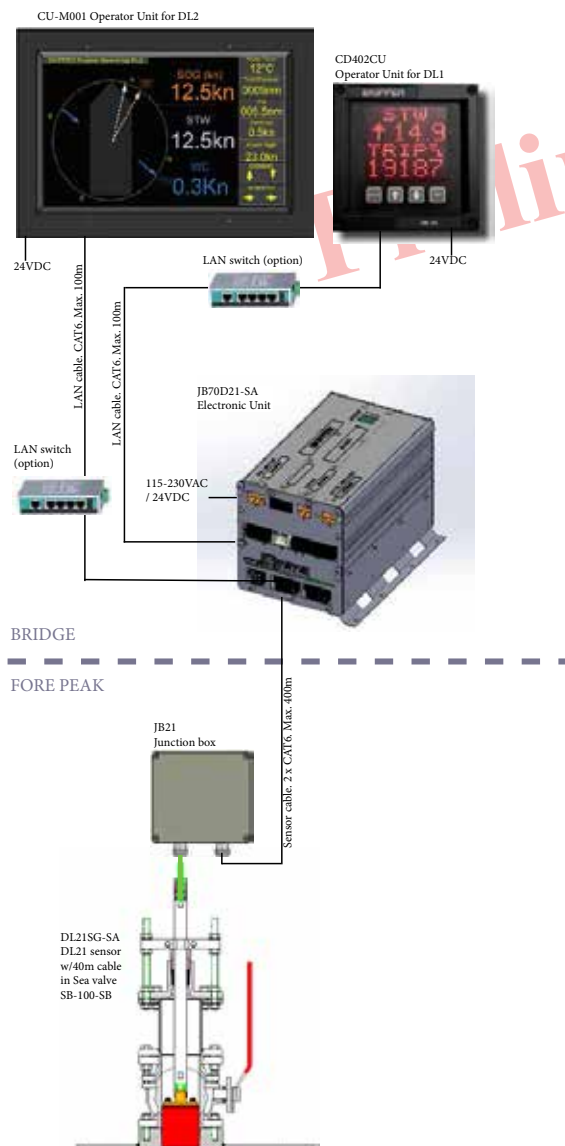


# SKIPPER

## DL21

### Doppler Speed Log System for vessels >50.000GT.

### Installation Manual



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**DL21****DUAL AXIS DOPPLER SPEED LOG SYSTEM**

# INSTALLATION MANUAL

Preliminary

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**TERMS USED IN THIS MANUAL****UNITS**

Unless otherwise stated, all values shown on the display are as follows:

|             |         |
|-------------|---------|
| Dimensions  | mm      |
| Temperature | °C      |
| Tilt        | Degrees |
|             |         |

**ABBREVIATIONS**

In addition, the following symbols are used

|       |  |
|-------|--|
| WT    | Water Track                                  |
| BT    | Bottom Track                                 |
| CAT5e | Category 5e cable as defined in the standard |
| INS   | Integrated Navigational System               |
| MED   | Marine Equipment Directive                   |
| VBW   | Dual ground/Water speed                      |
| VHW   | Heading & Water speed                        |
| NMEA  | National Marine Electronics Association      |
|       |  |

# CHAPTER 1: GETTING STARTED

## OVERVIEW DL21

The DL21 is 2 separate speed logs, DL1 ( single axis STW) + DL2 (Dual axis STW+SOG), built into 1 sensor housing, 1 electronic unit and 2 Display units.

The new DL21 Speed Log is designed for ships over 50.000 GT with simultaneous and independent measurement of speed through water and speed over ground. The system requires no external inputs, however adding inputs from other navigational systems enhances the functionality and allows comprehensive quality control of the data.

The system fulfills all class and type regulations based on MED B (wheelmark) and is manufactured in Norway under stringent production controls.

CU-M001 Operator Unit for DL2



The DL21 system consist of:

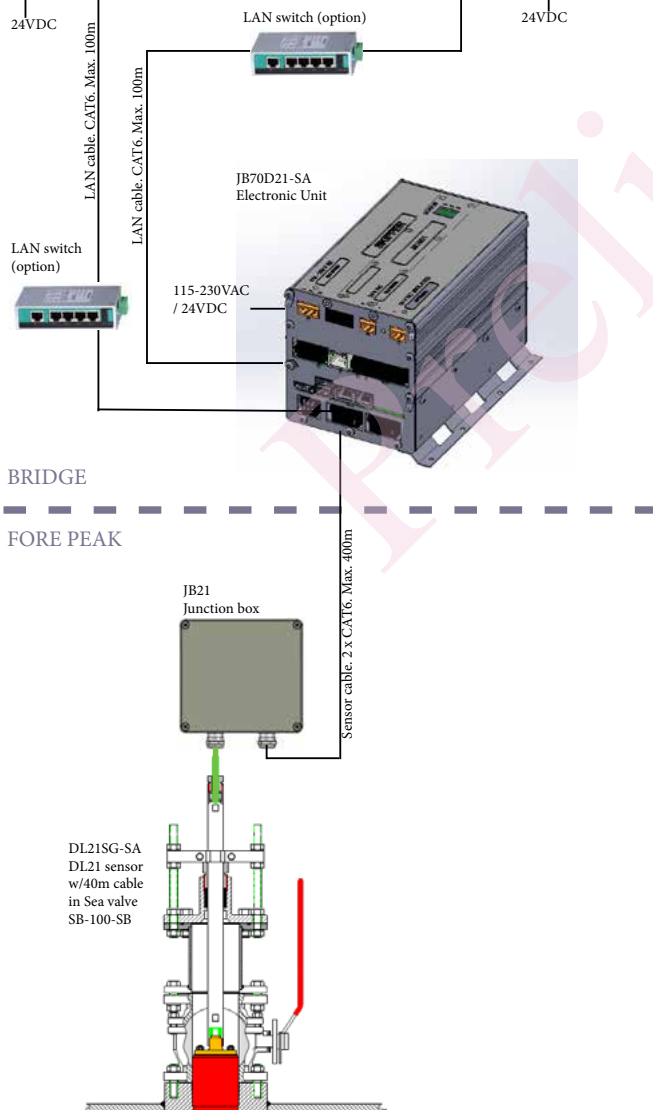
- 2 Display units.
  - CU-M001 for DL2
  - CD402CU for DL1

- 1 Dual Electronic Unit
  - Dual Power PCB
  - Multi Ext. PCB for DL1
  - Multi Processor PCB for DL2

Junction box JB21 (Optional)

Sensor DL21SG-SA

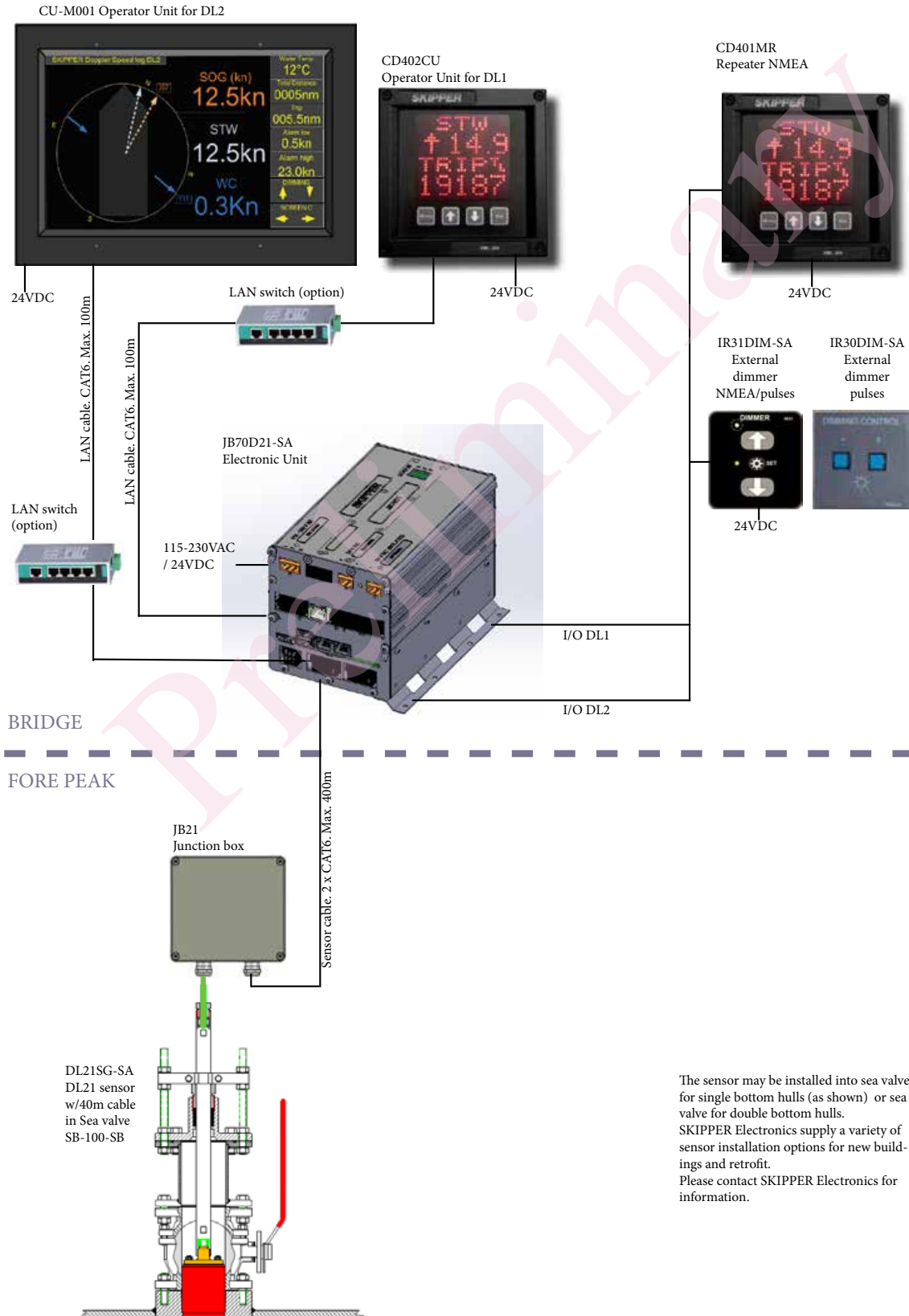
- STW Single axis + (STW+SOG) Dual axis sensor in one housing.
- Fits into same SB-100/DB-100 sea valve as the DL2 sensor.



## OPTIONAL ITEMS DL21

The following items are optional SKIPPER supplied items.

- Speed Repeater
- External dimmer
- LAN switch



The sensor may be installed into sea valve for single bottom hulls (as shown) or sea valve for double bottom hulls. SKIPPER Electronics supply a variety of sensor installation options for new buildings and retrofit. Please contact SKIPPER Electronics for information.

## ITEMS NOT SUPPLIED BY SKIPPER

The following items are not SKIPPER supplied items.

- LAN cable (minimum CAT6) from Operator units to Electronic unit.
- The sensor is manufactured with a 40m cable. The cable may be cut or extended. Extension cable is 6 pairs with individual screens, minimum CAT6 type.

## POWER SUPPLY REQUIREMENTS

The following power supplies are required

- CU-M001. Operator Unit. 24VDC
- CD402CU
- JB70D21-SA. Electronic unit:
  - DL2: 24VDC and/or 115/230VAC Max 60W
  - DL1: Separate 24V DC Max 20W.

Optional items power supply requirement:

- CD401MR repeater. 24VDC
- IR31DIM-SA. External dimmer: 24VDC
- IR30DIM-SA. External dimmer: 5-30VDC
- LAN switch: 24VDC



# CHAPTER 2: HARDWARE MOUNTING

The DL21 is a DL1 ( single axis STW) + DL2 (Dual axis STW+SOG), built into 1 sensor housing, 1 electronic unit and 2 Display units.

For mounting of DL1 Operator unit (CD402) please see “Installation manual DL1” DM-M002.  
 For mounting of DL2 Operator unit (CU-M001) please see “Installation manual DL2” DM-M004.



**PLACEMENT OF THE ELECTRONIC UNIT**

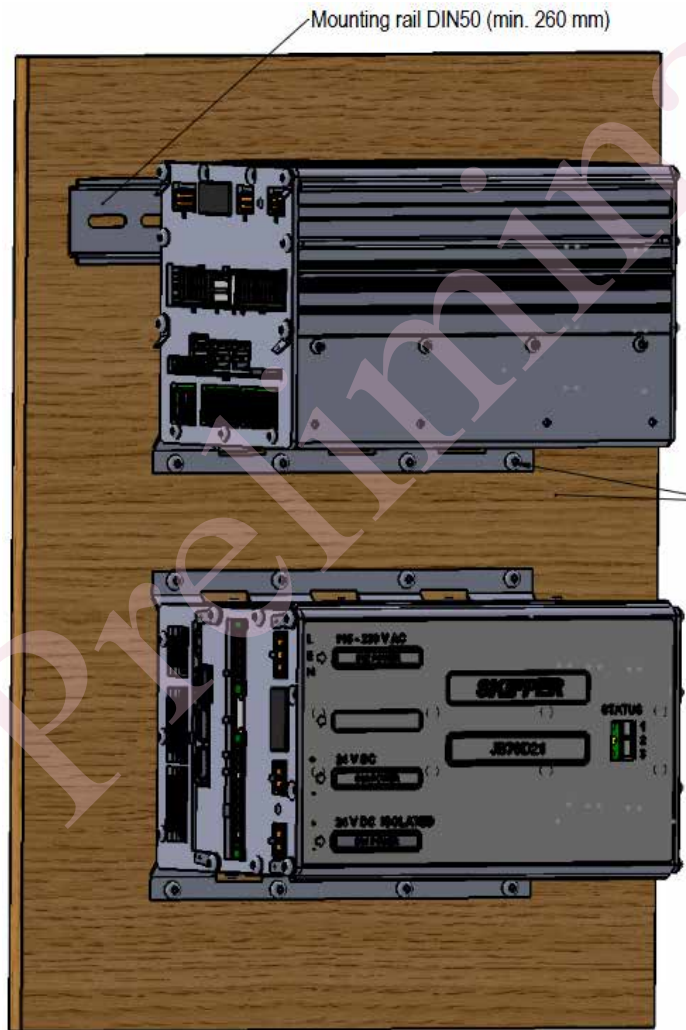
The Electronic unit can be installed on a DIN rail or directly screwed onto the wall.

All parts of the system are connected to the electronic unit.

There are no buttons (like ON/OFF) in the electronic unit. Access to electronic unit is only required for service purpose.

Placement is typically in or near the bridge where the interfaced systems are available, but no nearer than 0.5 m to the GYRO heading sensor.

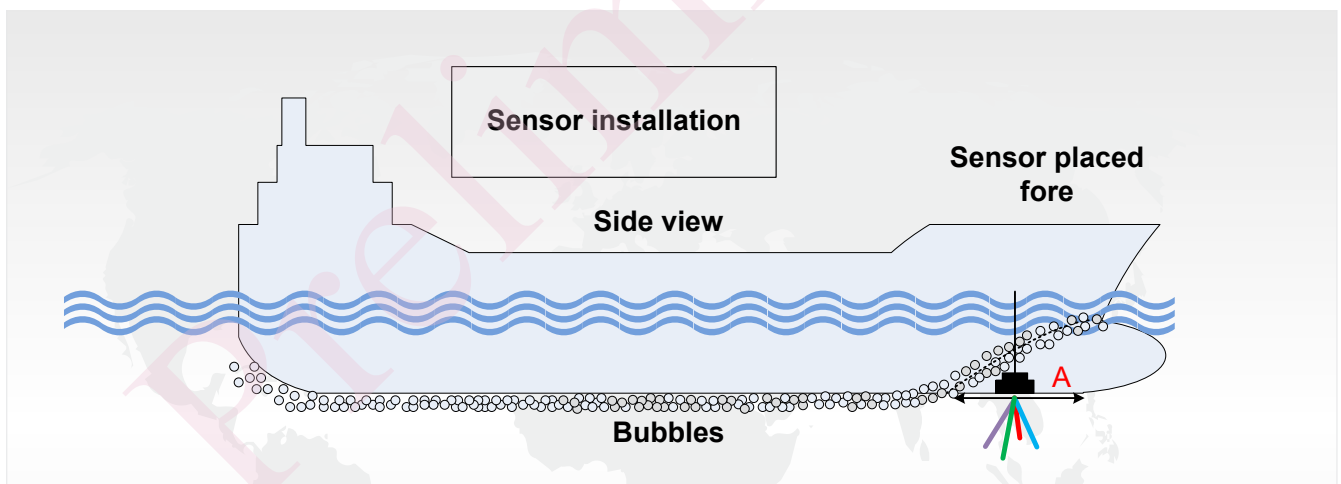
Dimensional drawings are found in appendix 1



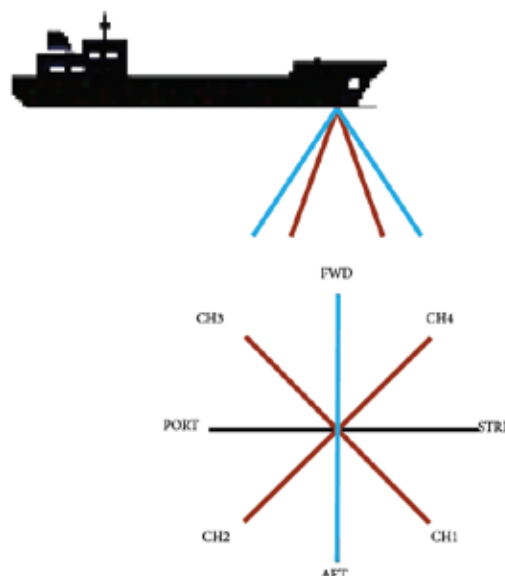
## PLACEMENT OF THE SENSOR IN SEA VALVE

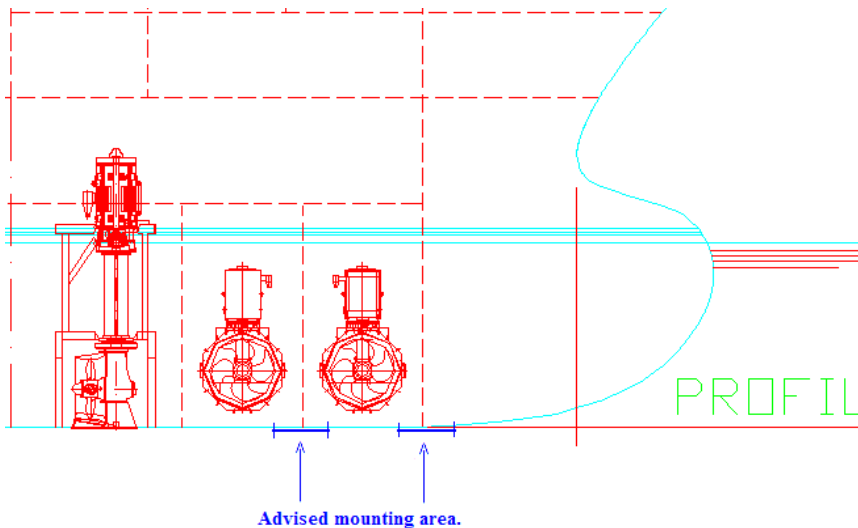
Mounting instructions for the sea valve is available from the SKIPPER web site in separate manual depending on the chosen type. When placing the speed log sensor, consider the following moments:

- Free sight to the bottom (it should be possible to draw a cone of  $\pm 45$  degrees from the sensor to the bottom).
- The active face of speed sensor must be in parallel to the horizontal line, max offset  $\pm 1^\circ$ .
- Do not mount transducers aft of bow thruster, propeller outlets or aft of other hull installations (such as outlets, vents or other protruding details) that may create aeration or turbulence.
- It is necessary to select a part of the hull that is submerged and free from turbulence and aeration under all load and speed conditions, and to avoid positions where air is trapped in heavy weather.
- If a flat, horizontal section is not available for transducer fitting, the shipyard must construct a suitable bed. Welding seams in this area should be smoothed and rounded off in order not to create turbulence or aeration and maintain a laminar waterflow at all speed ranges of the vessel.
- Select an area that is acoustically quiet. The system operates at frequencies between 500 kHz and 750 kHz.



There are 6 acoustic channels in DL21  
 DL1 has 2 channels (Blue)  
 DL2 has 4 channels (Brown).  
 The acoustic signal is sent in  
 a 30deg angle in 6 directions.





The generally best placement on larger vessels is in the front region of the vessel just behind the bulbous bow (see area A on fig above). This area is generally designed such that the bubbles are pushed to either side of the bulb, leaving a clear area under the bulb and just behind. The sensor is installed in a sea valve as it is possible to service the sensor (clean or replace) without docking the vessel.

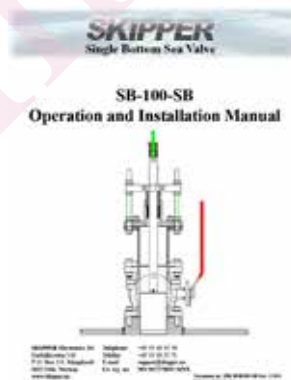
It is recommended, but not required, to install the sea valve in a dry area, like a bow thruster room. This will enable easy cable access to junction box and additionally increase the lifetime of the sea valve.

The sensor DL21 is installed into sea valve 100mm for single bottom SB-100-SB or double bottom DB-100-SB.

Please see Sea valve manual for installation procedure.

Manuals available as downloads from [www.skipper.no](http://www.skipper.no)

The sensor includes 40m moulded in cable. The cable is 11 mm in outer diameter with a bending radius of 25 mm. The cable can be cut or extended if required



**PLACEMENT OF JB21 JUNCTION BOX**

The junction box JB21 is an option for connecting sensor cable to a yard supplied extension cable (2 x CAT6).

It is placed in a dry place within reach of the 40m sensor cable.



**PLACEMENT OF REPEATERS**

Repeaters are typically installed on the overhead console and/or the bridge wings. These can be routed using NMEA signals. These require a local +24 V DC supply.

# CHAPTER 3: WIRING

## OPERATOR UNITS WIRING

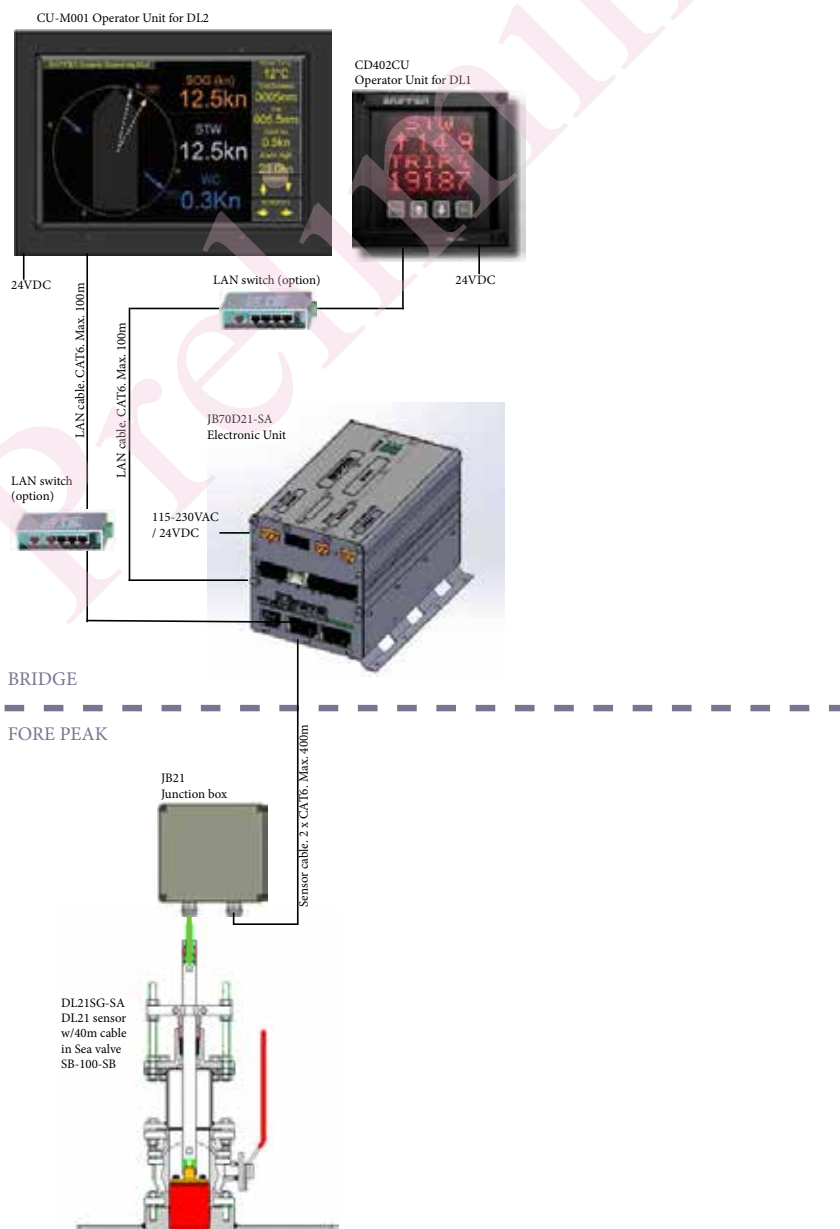
For wiring of DL1 Operator unit (CD402) please see “Installation manual DL1” DM-M002.  
 For wiring of DL2 Operator unit (CU-M001) please see “Installation manual DL2” DM-M004.

The Operator units will communicate with JB70D21 over LAN.

Option 1: Direct.

There are 2 LAN ports on JB70D21. Any PC or LAN network may be connected to second LAN port.

Option2: Via LAN network. (as shown in picture)



## JB70D21-SA ELECTRONIC UNIT WIRING

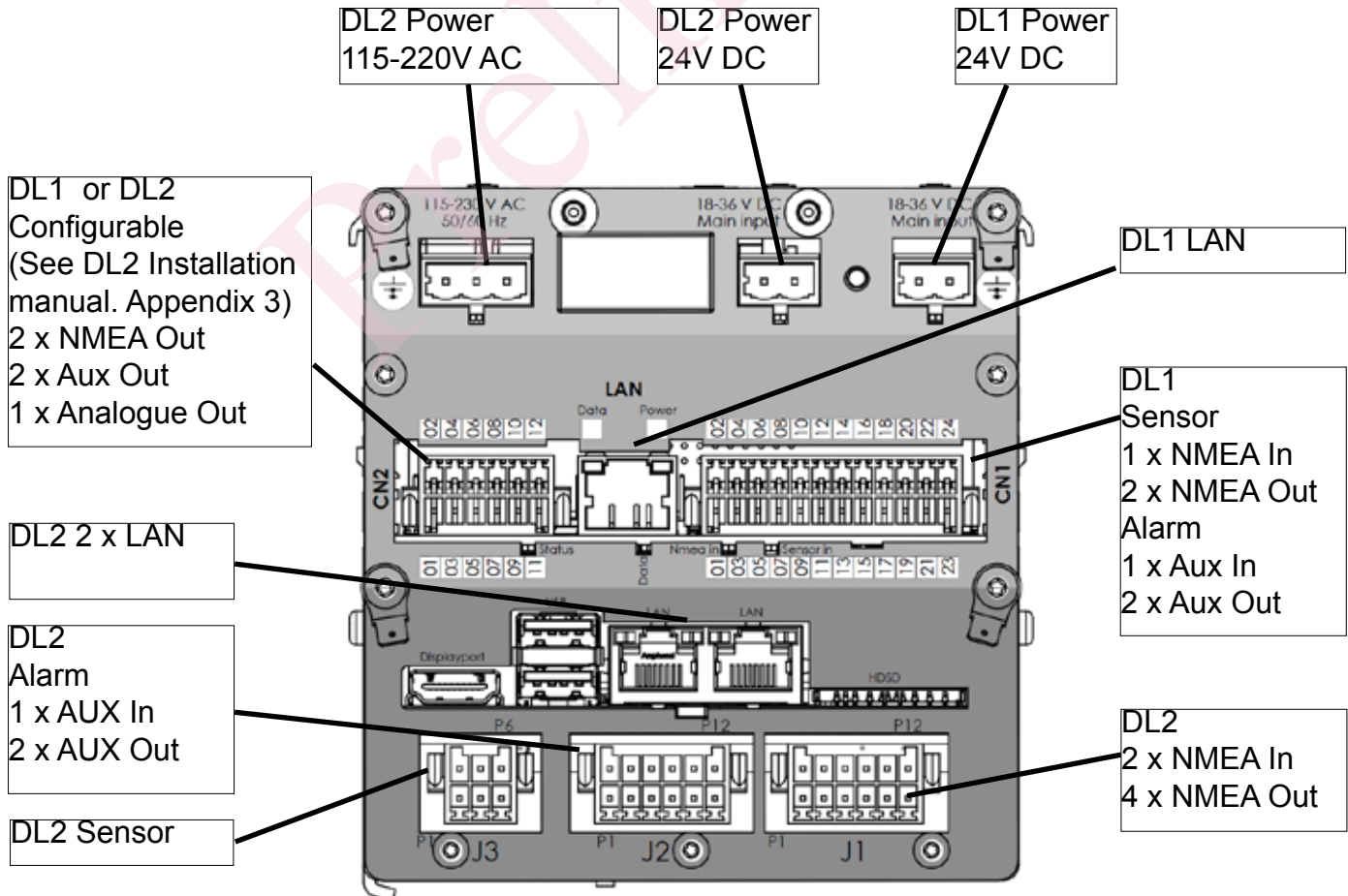
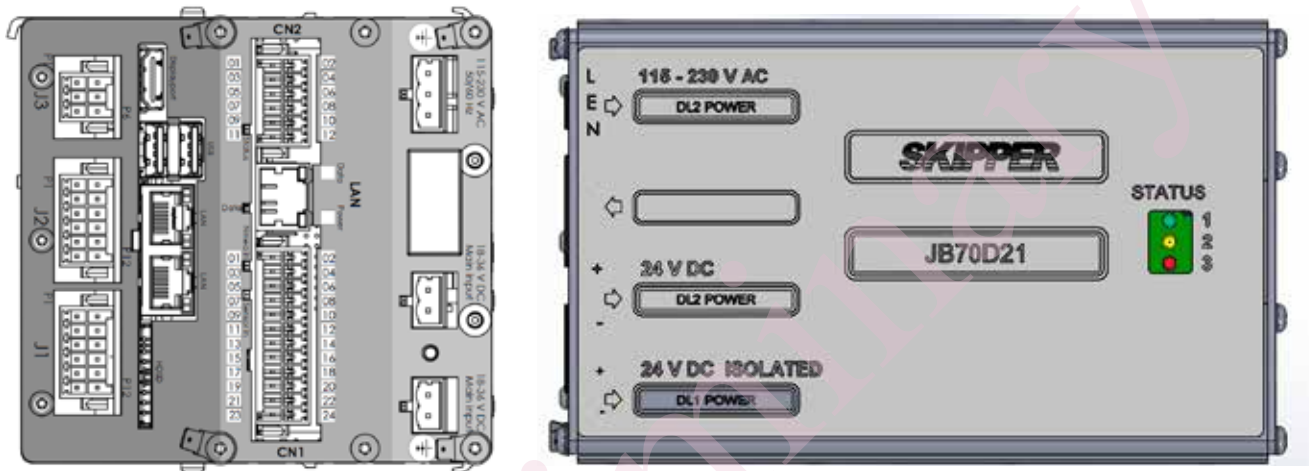
The JB70D21-XX does not contain a physical switch (only software) and should be connected to a circuit breaker for removal of power.

The DL2 is powered from 24VDC and/or 115-220VAC.

The DL1 is powered from 24VDC Isolated input.

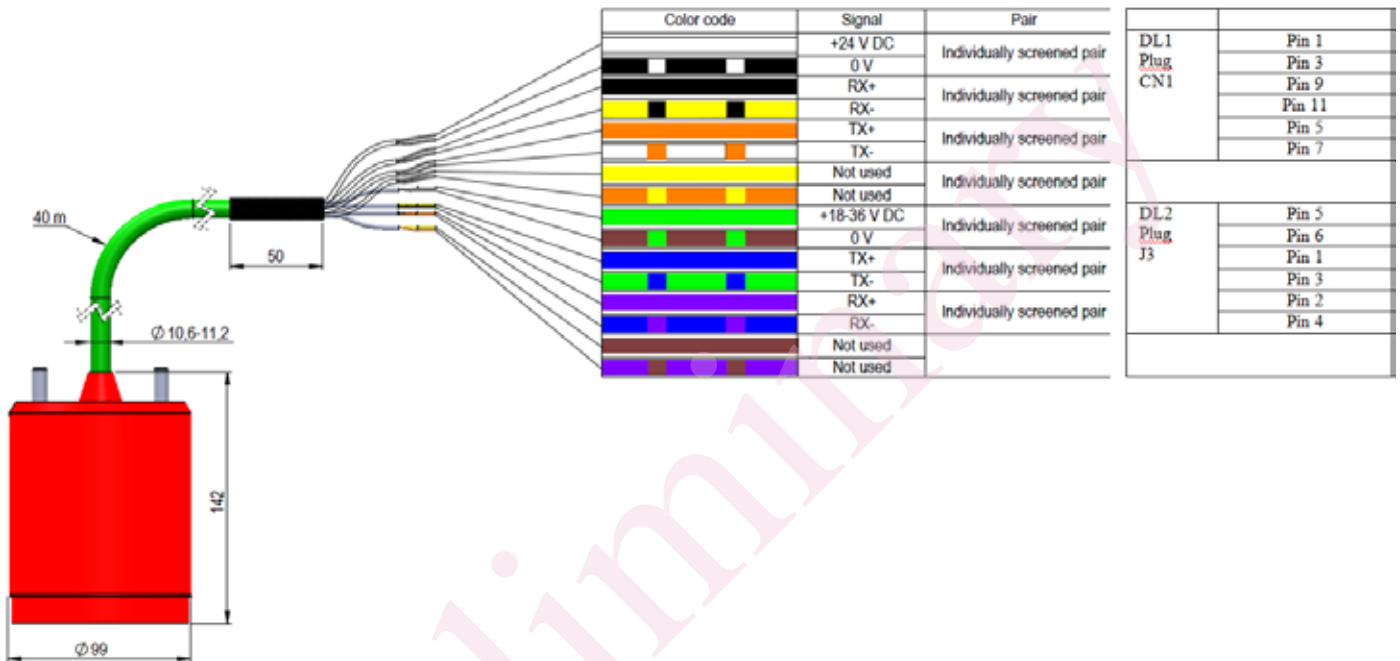
For wiring of DL1 Operator unit (CD402) please see "Installation manual DL1" DM-M002.

For wiring of DL2 Operator unit (CU-M001) please see "Installation manual DL2" DM-M004.



## SENSOR CONNECTION J3 (DL2) AND CN1 (DL1)

The sensor is connected to JB70D21 Connector J3 and CN1 (See below diagram).  
 The cable screen is connected to screen on sensor side and should not be grounded at JB70 side



---

## **CHAPTER 3: STARTUP PROCEDURE**

For setup of DL1 Operator unit (CD402) Electronic unit please see “Installation manual DL1” DM-M002.

For setup of DL2 Operator unit (CU-M001) please see “Installation manual DL2” DM-M004.

## **CHAPTER 4: OPTIONS**

For options of DL1 please see “Installation manual DL1” DM-M002.

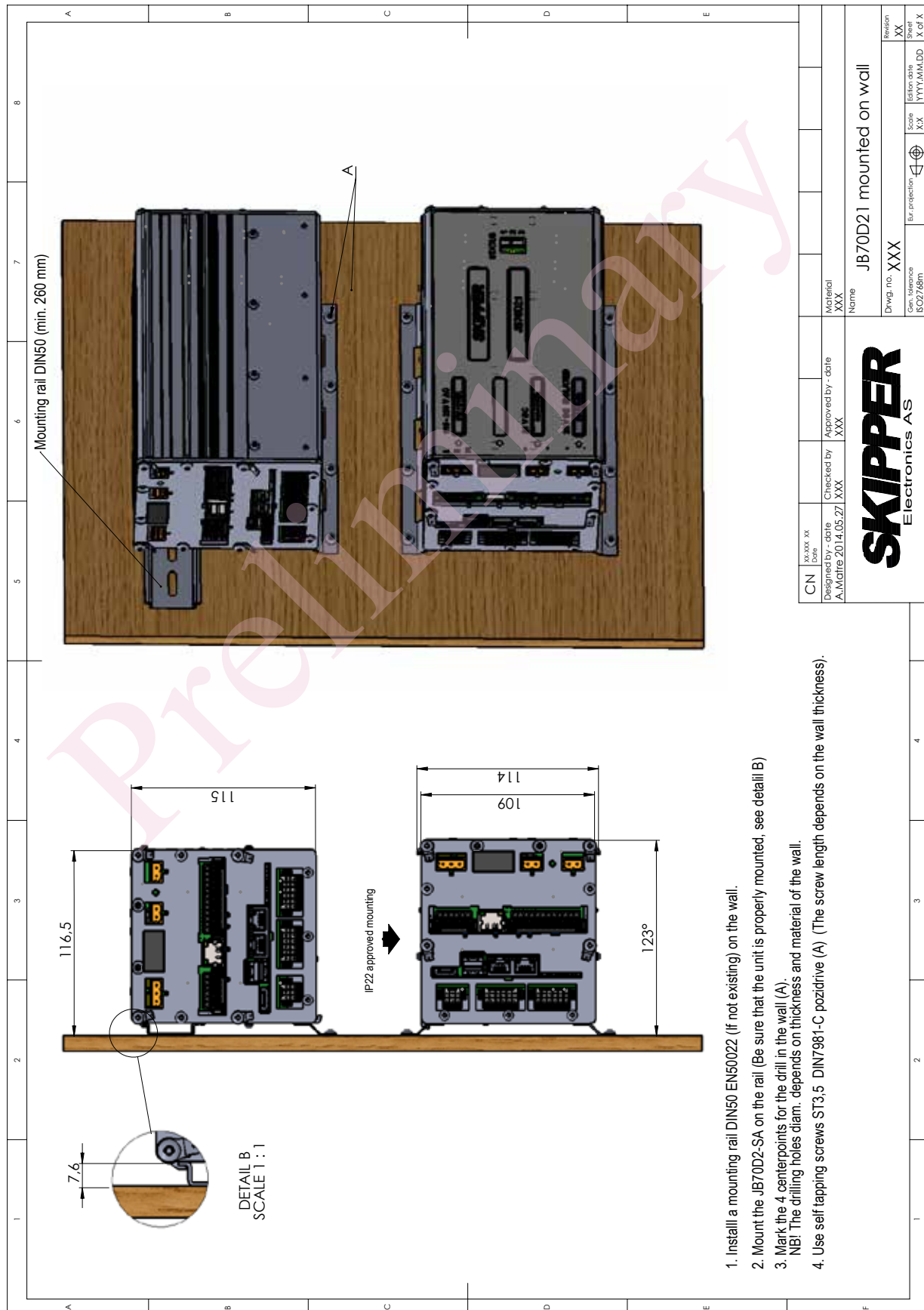
For options of DL2 please see “Installation manual DL2” DM-M004.

Please note that some options available on DL2 will not be available on DL21.

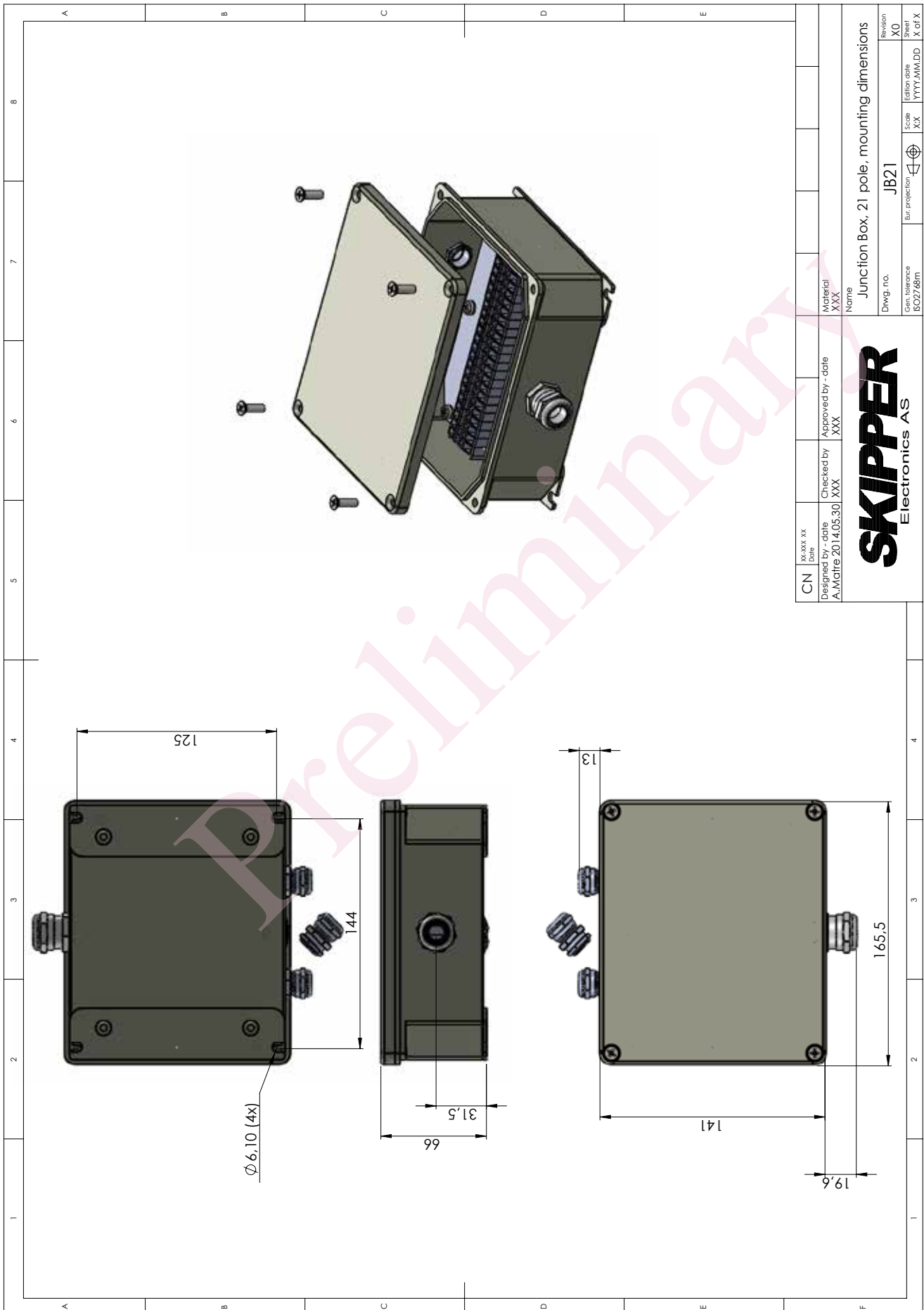
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# APPENDIX 1: INSTALLATION DRAWINGS

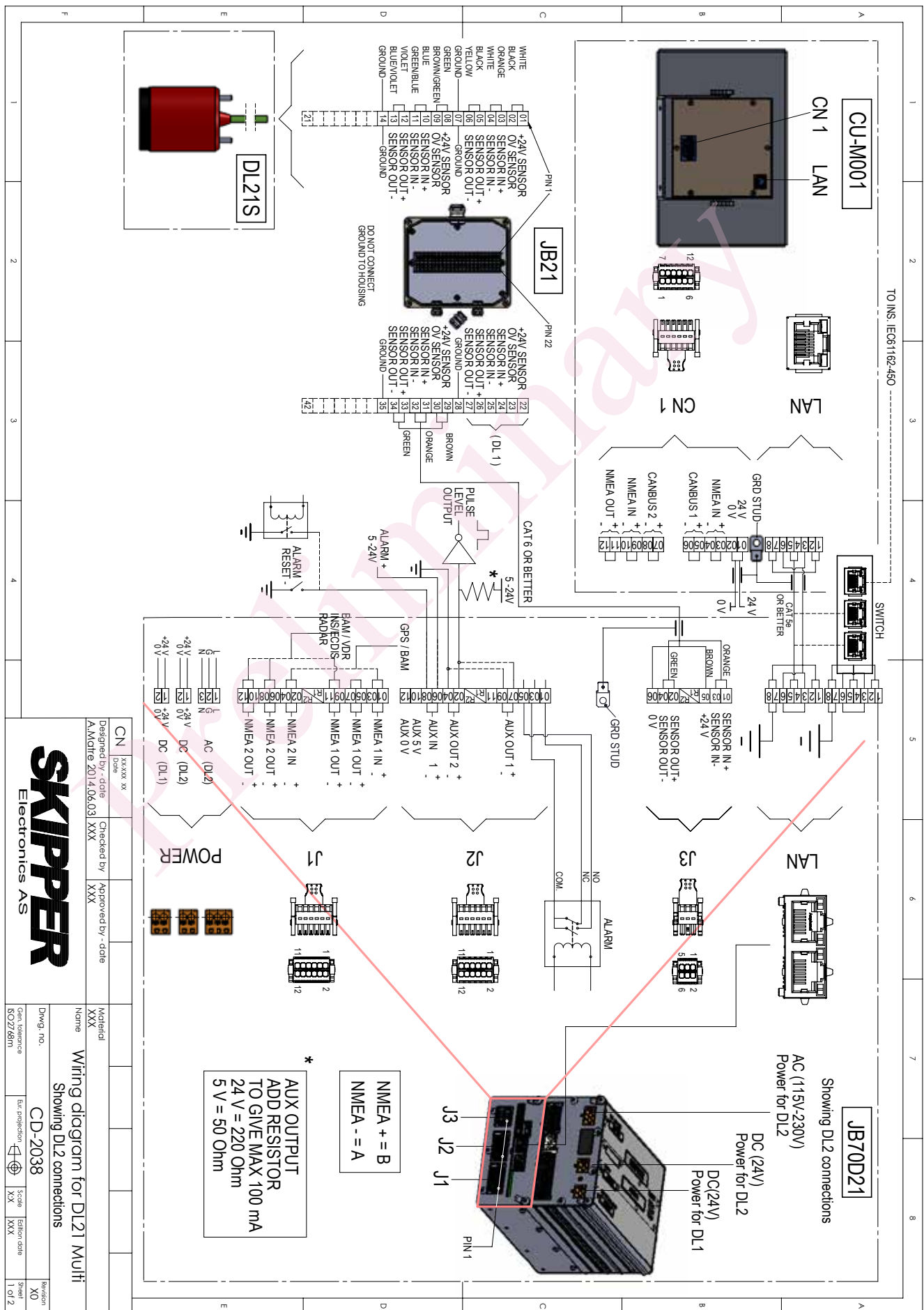


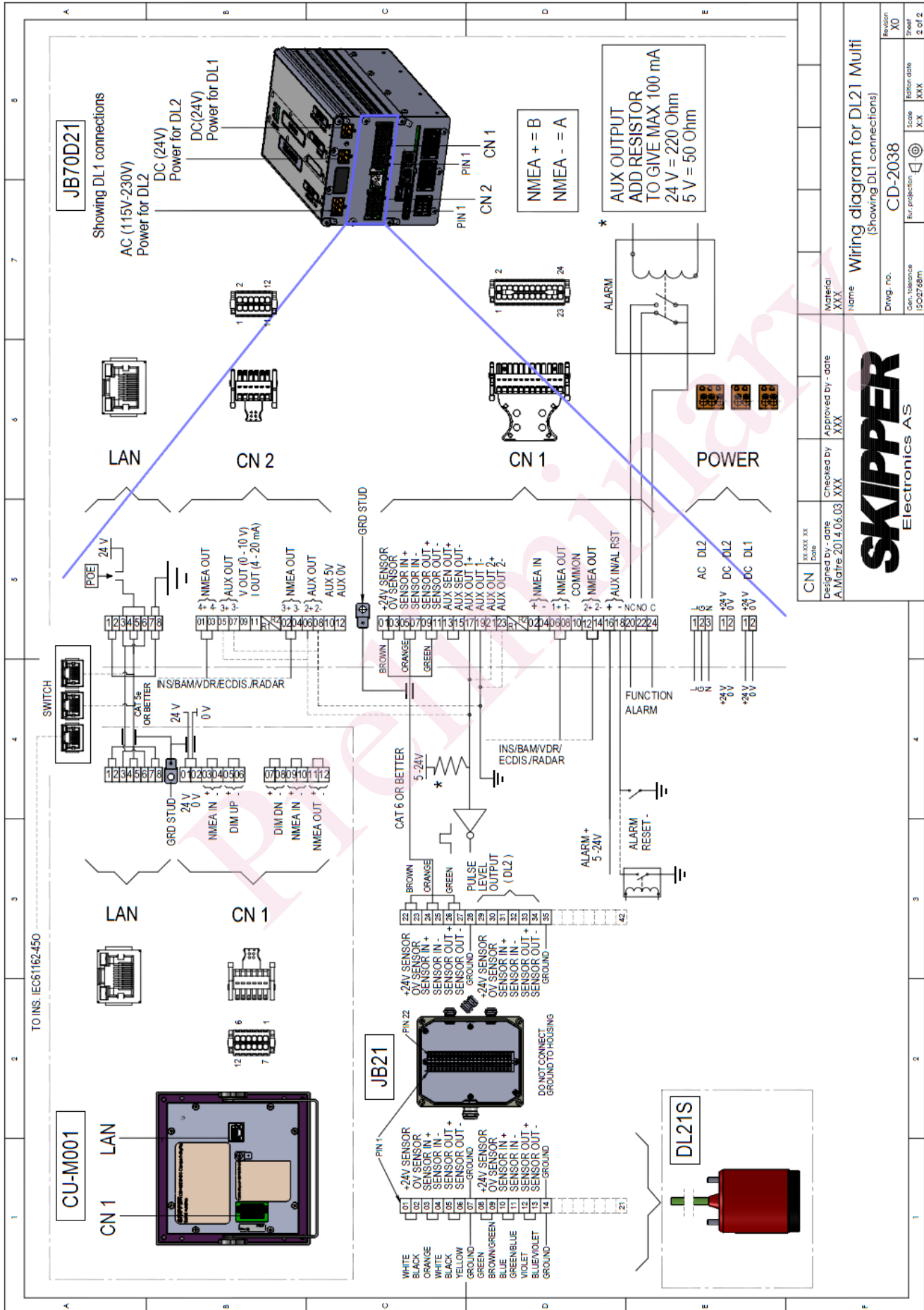
1. Install a mounting rail DIN50 EN50022 (if not existing) on the wall.
2. Mount the JB70D21-SA on the rail (Be sure that the unit is properly mounted, see detail B)
3. Mark the 4 centerpoints for the drill in the wall (A).  
NB! The drilling holes diam. depends on thickness and material of the wall.
4. Use self tapping screws ST3.5 DIN7981-C pozidrive (A) (The screw length depends on the wall thickness).



|    |                   |  |                   |                            |                         |  |                |
|----|-------------------|--|-------------------|----------------------------|-------------------------|--|----------------|
| CN | xx-xxx-xx<br>Date | Designed by - date<br>A.Matre 2014.05.30 | Checked by<br>XXX | Approved by - date<br>XXX  | Material<br>XXX         | Name<br>Junction Box, 21 pole, mounting dimensions | Revision<br>X0 |
|    |                   |  |                   | Scale<br>XX                | File name<br>YYYY.MM.DD | Sheet<br>X of X                                    |                |
|    |                   |  |                   | Bar projection             | Drwg. no.<br>JB21       |  |                |
|    |                   |  |                   | Gen. reference<br>SC02786m |                         |  |                |

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|                    |                     |                   |   |
|--------------------|---------------------|-------------------|---|
| CN                 | XX.XXX.XX           | Material          | XXX   |
| Designed by - date | A.Maffre 2014.06.03 | Checked by - date | XXX   |
| Approved by - date | XXX                 | Material          | XXX   |
| XXX                | XXX                 | Name              | Wiring diagram for DL21 Multi (Showing DL1 connections) |
| XXX                | XXX                 | Drwg. no.         | CD-2038   |
| XXX                | XXX                 | Gen. tolerance    | Scale   |
| XXX                | XXX                 | EUR collection    | XXX   |
| XXX                | XXX                 | EUR date          | XXX   |
| XXX                | XXX                 | Revision          | X0  |
| XXX                | XXX                 | Sheet             | 2 of 2  |



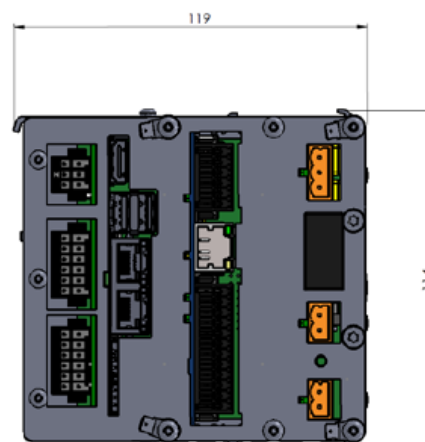
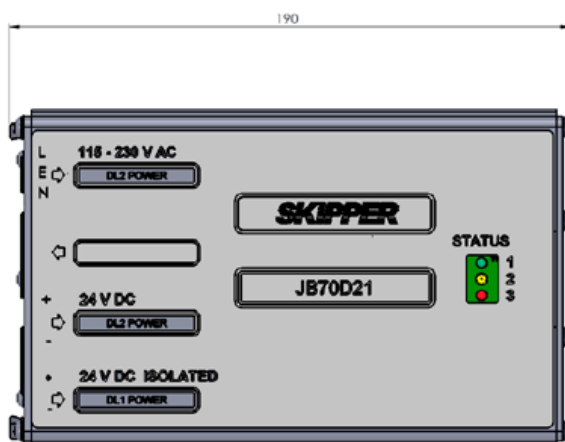
# APPENDIX 2: DATA SHEETS

## DATA SHEET CU-M001



### Specifications

|                                      | Part number  | Description  |
|--------------------------------------|--|--|
| <b>Part number</b>                   | JB70D21-SA   | Electronic Unit for DL21   |
| <b>Control units</b>                 | CD402CU-XX<br>CU-M001-XX   | Control Unit Compact with LAN<br>Control Unit 9" Touch display   |
| <b>Sensors</b>                       | DL21SXX<br>or<br>DL2SXX +DL1SXX  | Dual 1 axis STW and 2-axis STW+SOG<br>or<br>2-axis (STW+SOG) + 1-axis STW  |
| <b>Package consist of</b>            | JB70D21-SA<br>M-KIT-JB70XX   | Electronic Unit for DL21<br>Mounting Kit for JB70  |
| <b>PCBs inside Electronic unit</b>   | PP-M001<br>PI-M001<br>PC-M001  | Multi Power, PCBM<br>I/O Multi extension, PCBM<br>Multi Main Processor, PCBM   |
| <b>PP-M001 Power</b>                 | 115-230 VAC /24VDC Max 60W (For DL2)<br>24VDC Max 20W (For DL1)  | Dual Isolated power supply.  |
| <b>PI-M001 Interfaces for DL1</b>    | NMEA 0183, IEC61162-1, 2 output, 1 input<br>Auxiliary x 2 output, 1 input<br>alarm relay x 1<br>IEC 61162-450 fully implemented<br>web page setup                  | NMEA outputs can be used for IEC61162-2<br>Auxiliary can be designated to alarm, pulse, spd warning<br>relay designated to function and/or powerfailure alarm<br><br>configurable web pages for setup and runtime functions  |
| <b>PI-M001 Switchable interfaces</b> | NMEA out 0183, IEC 61162-1, 2 output<br>analogue 1 x 0-10V, 1x 4-20mA<br>Auxiliary: 1 x output , 1 x input   | Programmable outputs for DL2 or DL1 by switch CN1  |
| <b>PC-M001 Interfaces for DL2</b>    | NMEA 0183, IEC61162-1, 2 output, 1 input<br>Auxiliary x 2 output, 1 input<br>Alarm relay x 1<br>Analog output<br>IEC 61162-450 fully implemented<br>web page setup | NMEA outputs can be used for IEC61162-2<br>Auxiliary can be designated to alarm, pulse, spd warning<br>relay designated to function and/or powerfailure alarm<br>0-10V, 4-20mA (DL21 configurable, DL2 option)<br><br>configurable web pages for setup and runtime functions |
| <b>IP rating</b>                     |  | IP 22 (when mounted with PCBs vertical)  |
| <b>Weight</b>                        |  | 1.5 kg   |
| <b>Packaging dimensions / weight</b> |  | 30.5x21.5x21cm / 2 kg  |
| <b>Manufacturer</b>                  |  | SKIPPER Electronics AS, Norway   |



**DATA SHEET DL2SG-SA**

**Product Datasheet**  
**DL21SG-SA Log sensor DL21 for Sea Valve**  
**SKIPPER Multi Serie**

**Specifications**

|                                     | Part number            | Description  |
|-------------------------------------|------------------------|--|
| <b>Part number</b>                  | DL21SG-SA              | Log sensor DL21for Sea Valve<br>1 Doppler sensor 1-axis STW<br>1 Doppler sensor 2-axis STW+SOG<br>The 2 sensors mounted in one bottom mounting works independantly and are electrically isolated.<br>Designed for ships over 50.000 GT with simultaneous and independent measurement of speed through water and speed over ground. |
| <b>To be installed into</b>         | SB-100-XX<br>DB-100-XX | Sea valve 100mm for single bottom hull<br>Sea valve 100mm for double bottom hull   |
| <b>To be used with</b>              | JB70D21-XX             | Electronic unit  |
| <b>Bottom detection (SOG)</b>       |                        | < 120m   |
| <b>Cable length</b>                 |                        | 40m (may be extended or shortened. Recommended 2 x CAT6 cable)   |
| <b>Cable diameter</b>               |                        | 11 mm +/-0.5   |
| <b>Cable minimum bending radius</b> |                        | 25mm   |
| <b>Accuracy</b>                     |                        | <b>0.2 kn or 2 % whichever is greater</b>  |
| <b>Speed Resolution</b>             |                        | <b>0.1 kn</b>  |
| <b>Max speed</b>                    |                        | <b>+/- 50 kn</b>   |
| <b>Temperature accuracy</b>         |                        | <b>1 deg</b>   |
| <b>Temperature resolution</b>       |                        | <b>0.1 deg</b>   |
| <b>IP rating</b>                    |                        | <b>IP 68</b>   |
| <b>Depth rating</b>                 |                        | <b>6 bar</b>   |
| <b>Operating temperature</b>        |                        | <b>-15 to +55 deg</b>  |
| <b>Outputs</b>                      |                        | <b>2 x NMEA (Proprietry formats)</b>   |
| <b>Input</b>                        |                        | <b>2 x NMEA (Proprietry formats)</b>   |
| <b>Power input</b>                  |                        | <b>2 x Nom. 24 V (15 V to 32 V) 16 W</b>   |
| <b>Weight</b>                       |                        | <b>10.2 kg</b>   |
| <b>Manufacturer</b>                 |                        | SKIPPER Electronics AS, Norway   |



45cm \* 44cm \* 32 cm  
10.2kg



# NOTES

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Preliminary

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