

# SKIPPER

## DL2

### Dual Axis Doppler Speed Log System (SOG+STW) Installation Manual

CU-M001 Operator Unit for DL2



24VDC

LAN cable, CAT6, Max. 100m

LAN switch (option)

JB70D2-SA  
Electronic Unit

115-230VAC

24VDC

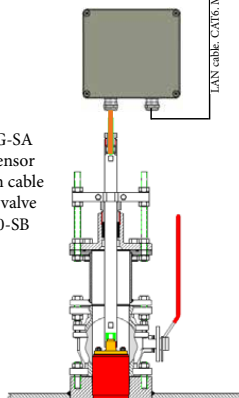
BRIDGE

FORE PEAK

JB12  
Junction box

LAN cable, CAT6, Max. 400m

DL2SG-SA  
DL2 sensor  
w/40m cable  
in Sea valve  
SB-100-SB



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**DL2****DUAL AXIS DOPPLER SPEED LOG SYSTEM**

# INSTALLATION MANUAL

Preliminary

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# CONTENTS

<b>CHAPTER 1: GETTING STARTED .....</b>	<b>6</b>
Overview DL2.....	6
Optional items DL2.....	7
Items Not supplied by SKIPPER .....	8
Power supply requirements.....	8
<b>CHAPTER 2: HARDWARE MOUNTING .....</b>	<b>9</b>
Placement of the Operator unit .....	9
Placement of the electronic unit .....	9
The Electronic unit can be installed on a DIN rail or directly screwed onto the wall. ....	9
All parts of the system are connected to the electronic unit. ....	9
Placement of the Sensor in sea valve .....	10
Placement of JB12 Junction box .....	11
Placement of repeaters .....	11
<b>CHAPTER 3: WIRING.....</b>	<b>12</b>
Operator unit wiring .....	12
JB70D2-SA Electronic Unit Wiring .....	14
The junction box (JB12)/splice .....	17
<b>CHAPTER 3: STARTUP PROCEDURE .....</b>	<b>19</b>
LAN setup.....	19
Alarm setup .....	19
System setup.....	20
Saving and locking .....	20
Setting up communications .....	20
<b>CHAPTER 4: OPTIONS.....</b>	<b>22</b>
Software options.....	22
1. High accuracy.....	22
2. Surface current measurement.....	22
3. Adjustable current cell .....	22
4. Synchronisation* .....	22
5. Docking .....	22
Activating/de-activating software options.....	22
Hardware options .....	23
1. Extension card.....	23
2. Dual system.....	23
<b>APPENDIX 1: INSTALLATION DRAWINGS .....</b>	<b>25</b>
Operator unit deskmount dimensions.....	25
Operator unit Flushmount dimensions .....	26
<b>APPENDIX 2: DATA SHEETS .....</b>	<b>30</b>
Data sheet CU-M001.....	30
Data sheet JB70D2-SA .....	31
Data sheet DL2SG-SA .....	32
<b>APPENDIX 3: MULTI EXTENSION PCB.....</b>	<b>33</b>
Jumper settings.....	33
<b>NOTES .....</b>	<b>35</b>

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

Dimensions	mm
Temperature	°C
Tilt	Degrees

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

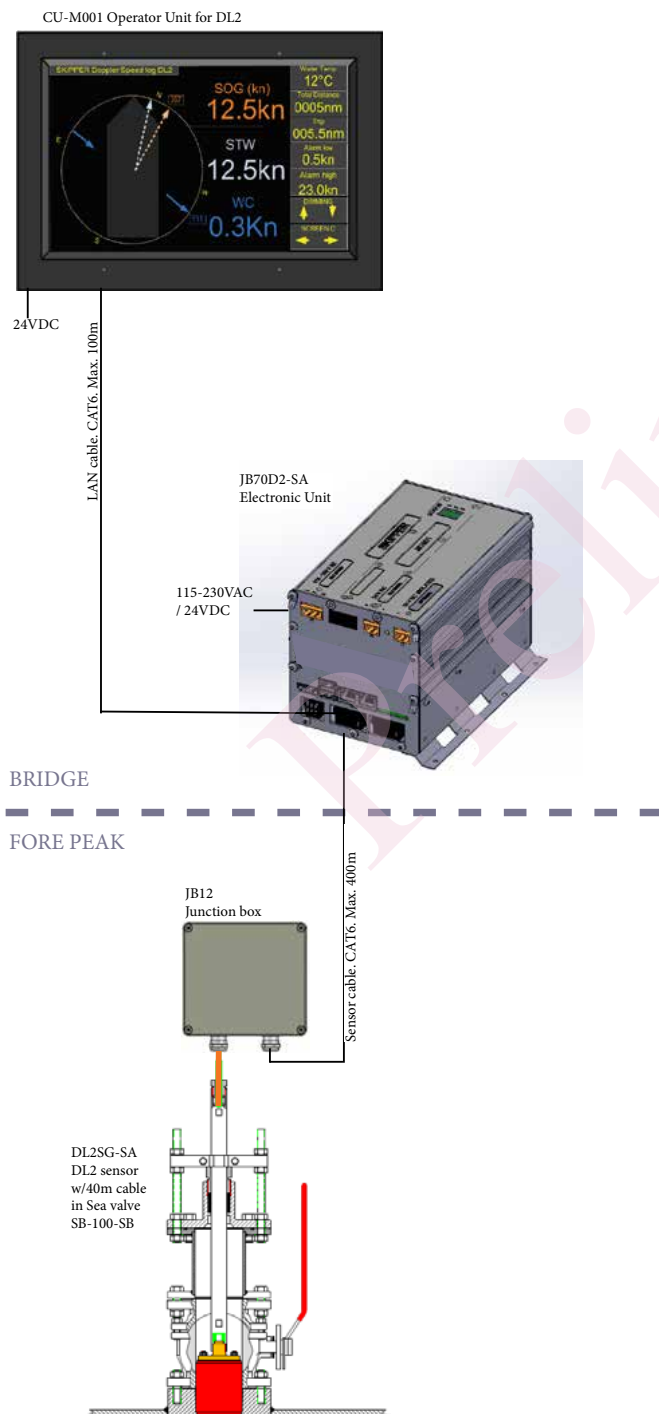
## OVERVIEW DL2

The DL2 dual axis Doppler speed log is a Navigational Doppler Speed log system that measures speed in two axis (longitudinal and transversal) through the water and over the sea bed. 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.

The system comprises of 5 units;

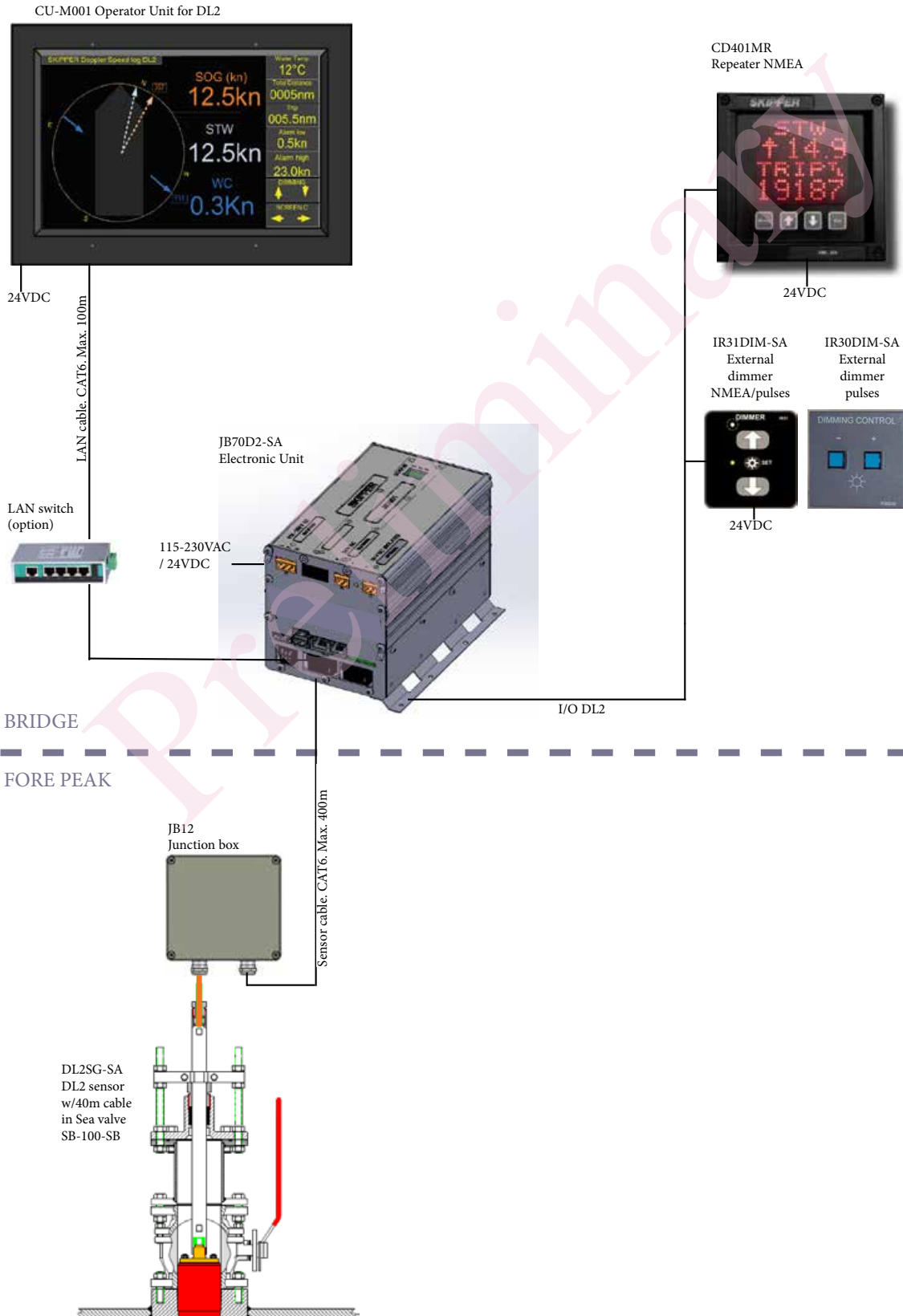
1. **The Operator unit** – (CU-M001-XX) The system is be fitted with a touch display panel where full setup and operation of the system can be performed.
2. **The electronic unit** – This unit (JB70D2-XX) comprises of a processor, IO board and a power supply. It is a compact single euro cabinet. This units electronics enable the user to interface to both modern and older navigation systems with all the expected connectivity. The unit has a built-in web server, allowing the system to be fully integrated into existing navigation systems (extra approvals may apply).
3. **Junction box** JB-12. To connect sensor cable to yard supplied CAT6 extension cable.
4. **The sensor** – The sensor (DL2SXX-XX) contains acoustic elements and a fully programmable transceiver unit, allowing the system to adapt itself to the conditions and requirements. In addition the sensor contains a temperature sensor.
5. **Sea valve**. The sensor may be installed into a sea valve for single bottom hull (SB-100-XX) or sea valve for double bottom hull (DB-100-XX).



## OPTIONAL ITEMS DL2

The following items are optional SKIPPER supplied items.

- Speed Repeater
- External dimmer
- LAN switch



## ITEMS NOT SUPPLIED BY SKIPPER

The following items are not SKIPPER supplied items.

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

## POWER SUPPLY REQUIREMENTS

The following power supplies are required

- CU-M001. Operator Unit. 24VDC
- JB70D2-SA. Electronic unit: 24VDC and/or 115/230VAC

Optional items power supply requirement:

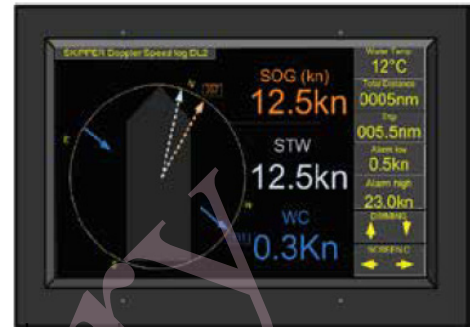
- CD401MR repeater. 24VDC
- IR31DIM-SA. External dimmer: 24VDC
- IR30DIM-SA. External dimmer: 5-30VDC
- LAN switch: 24VDC



# CHAPTER 2: HARDWARE MOUNTING

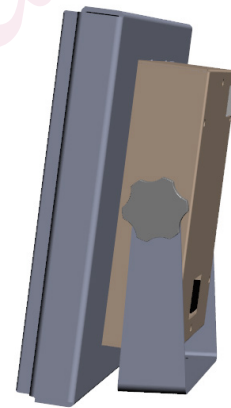
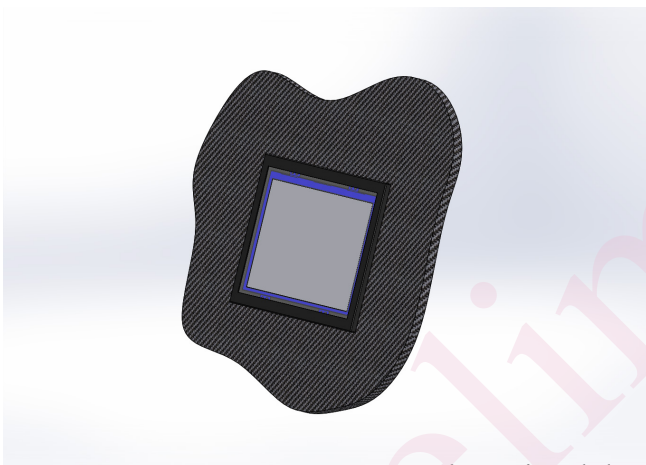
## PLACEMENT OF THE OPERATOR UNIT

The operator unit is placed on the bridge. Some standards require some operations of the unit to be available from 'standing position'. These operations are available from the operator unit and multi-repeaters if both input and output are connected.



Flush mount installation

Desk mount installation



Dimensional drawings are found in appendix1

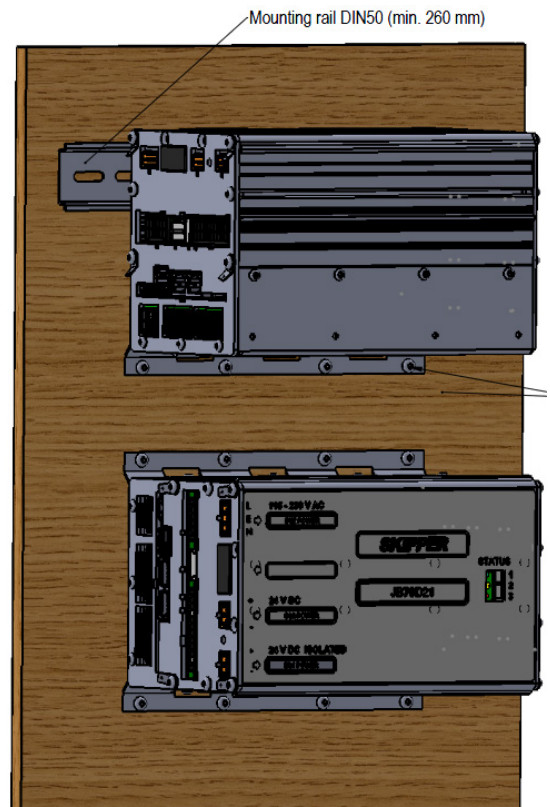
## PLACEMENT OF THE ELECTRONIC UNIT

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.

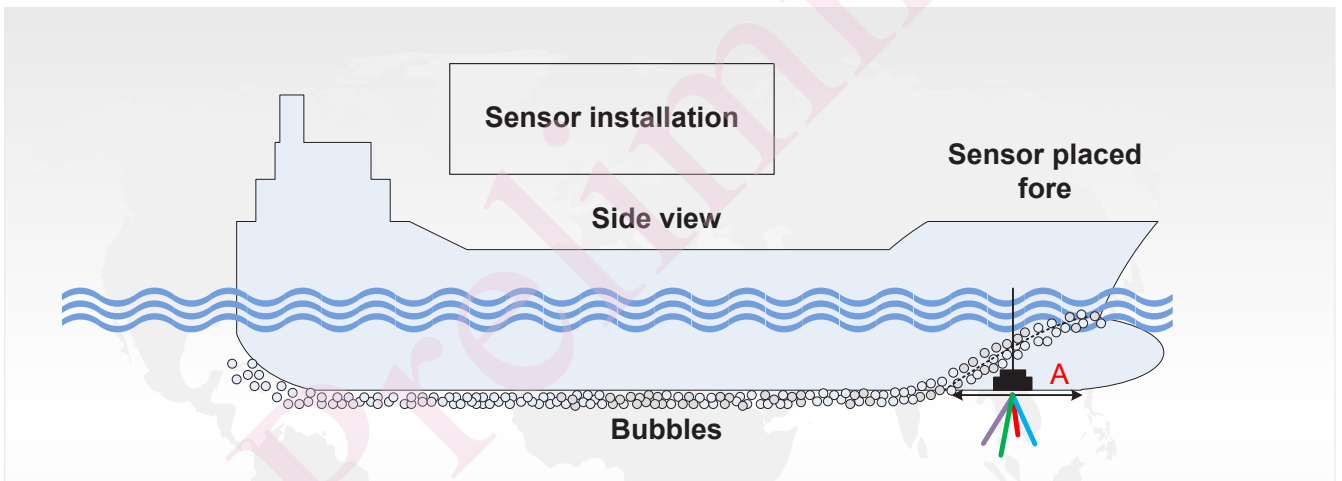
Placement is typically in or near the bridge where the interfaced systems are available, but no nearer than 0.5 m to the GYRO heading sensor.



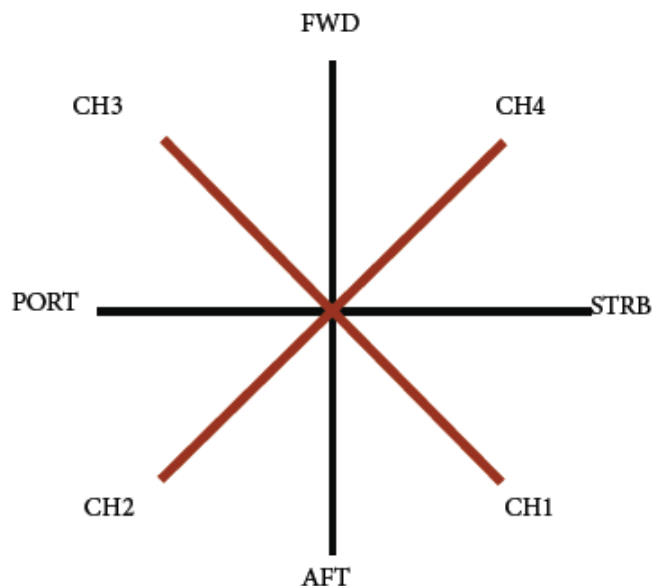
**PLACEMENT OF THE SENSOR IN SEA VALVE**

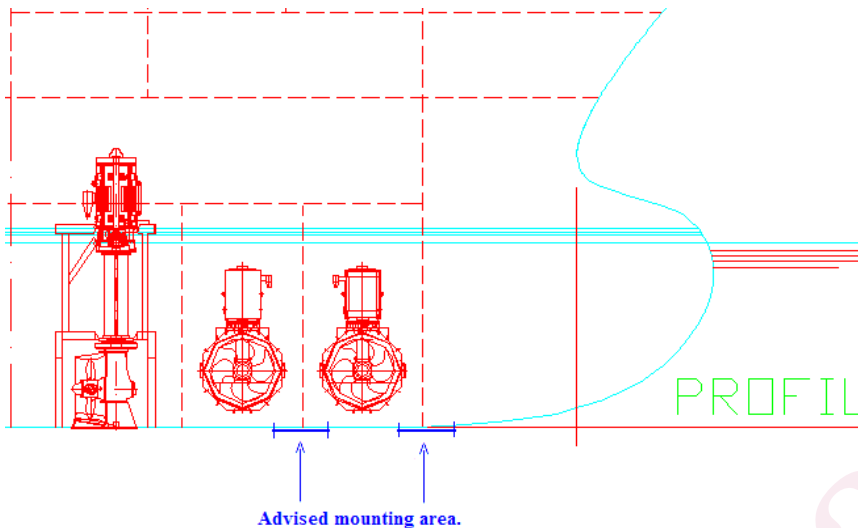
Mounting instructions for the sea valve is available from the SKIPPER web site in separate manual depending on the chosen type. When placing the speed log sensor, consider the following moments:

- Free sight to the bottom (it should be possible to draw a cone of +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 600 kHz.



There are 4 Channels in DL2.  
 The acoustic signal is sent in a 30deg angle in 4 directions.  
 All 4 channels are used to calculate longitudinal and transversal speed.





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 DL2 is installed into sea valve 100mm for single bottom SB-100-SB or double bottom DB-100-SB.

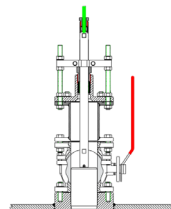
Please see Sea valve manual for installation procedure.

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



**SB-100-SB**  
Operation and Installation Manual



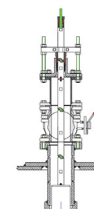
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Document no: SVA-800008-08 Rev. 1/04/05  
Edisno: 003.02.11



**DB-100-SB**  
Operation and Installation Manual



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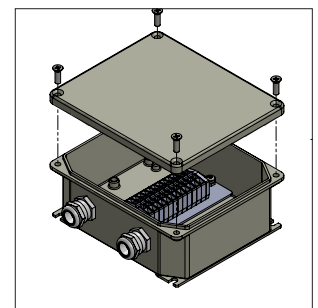
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Faks: +47 23 30 22 71  
E-post: skipper@skipper.no  
Co. reg. no: NO980378845A/EN

Document no: SVA-800008-08 Rev. 1/04/05  
Edisno: 003/02

### PLACEMENT OF JB12 JUNCTION BOX

The junction box JB12 is an option for connecting sensor cable to a yard supplied extension cable (CAT6).

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



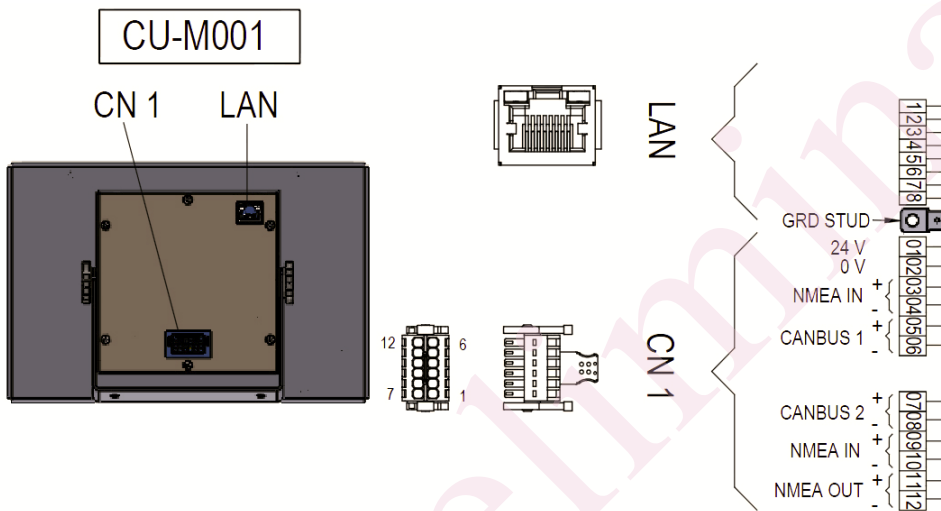
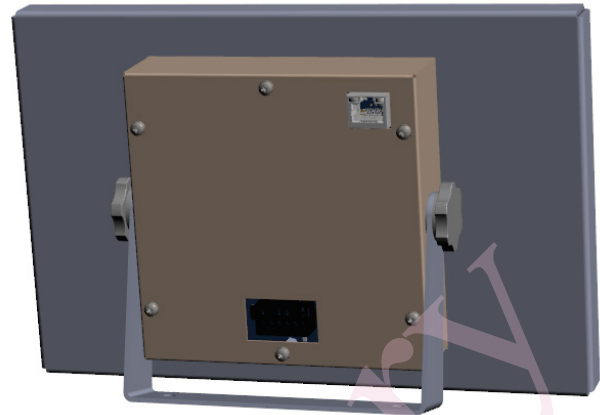
### PLACEMENT OF REPEATERS

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 UNIT WIRING

The operator unit has 2 plugs.  
 1 LAN plug for communication with Electronic unit.  
 2: WAGO plug for 24V power

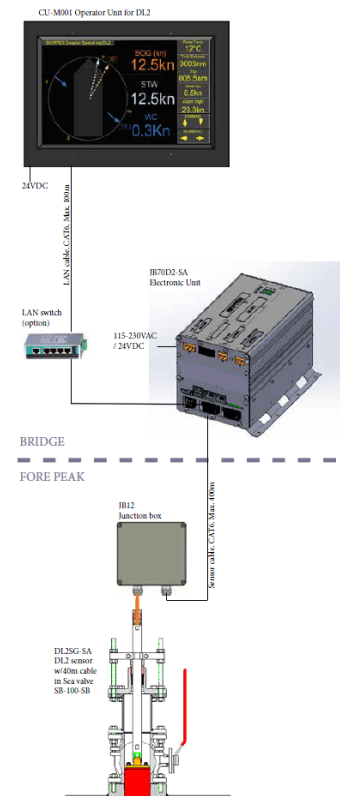


The Operator unit will communicate with JB70D2 over LAN.

Option 1: Direct.

There are 2 LAN ports on JB70D2. Any PC or LAN network may be connected to second LAN port.

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



**Connectors supplied with JB70D2**



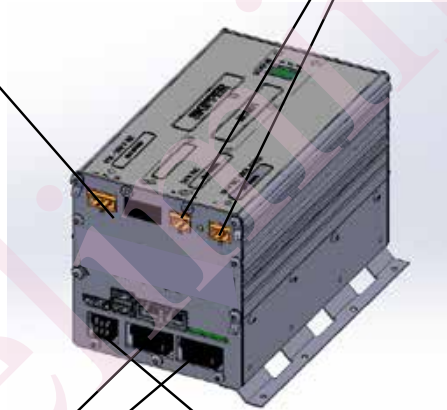
ZZN-01126 Relief Housing,  
3 pole snap-on.  
WAGO: 232-633



ZZN-01124 Plug, Female 2  
pole, 231-302\_032-000



ZZN-01125 Plug, Female 3  
pole, 231-303 026



ZZN-01120 Connector Fe-  
male w ejectors 6x2 pole, black  
WAGO 713-1106/037-000



ZZN-01130 Connector, Fe-  
male w/ejectors 3x2 pole, black  
WAGO 713-1103/037-000



ZZN-01123 Strain relief  
plate, 6x2 pole, width 11 mm  
WAGO 713-126



ZZN-01123 Strain relief  
plate, 6x2 pole, width 11 mm  
WAGO 713-126

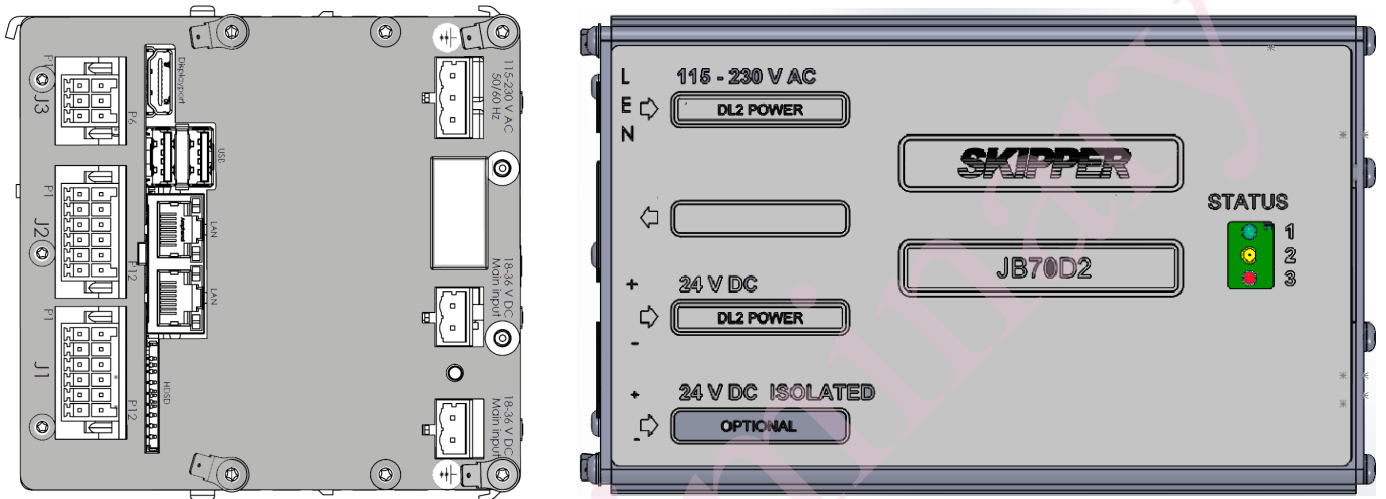
## JB70D2-SA ELECTRONIC UNIT WIRING

**Note:** The JB70D2-XX does not contain a physical switch (only software) and should be connected to a circuit breaker for removal of power.

Power may be 24VDC and/or 115-220VAC.

The optional 24VDC Isolated input is not used in DL2.

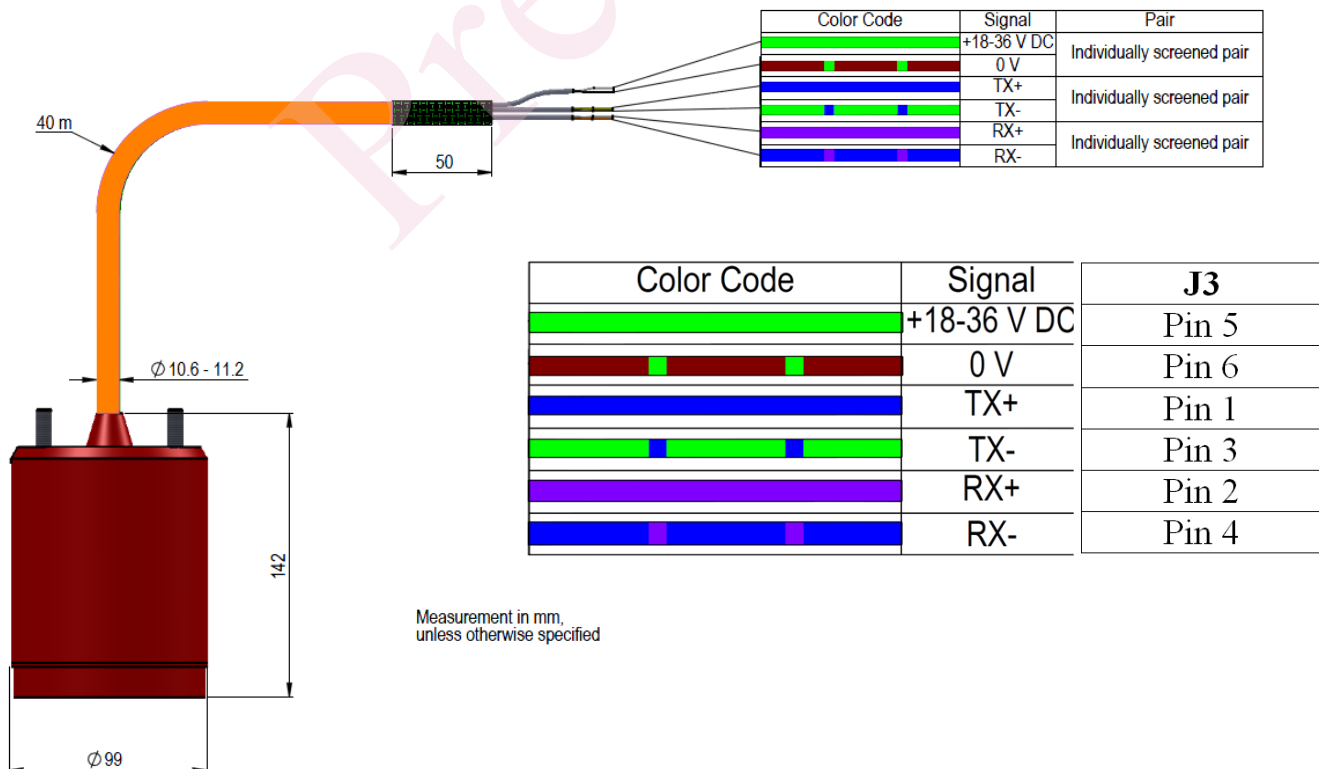
The Operator unit CU-M001 is connected to one of the LAN connectors. The other connector may be used for set up/ service purpose.

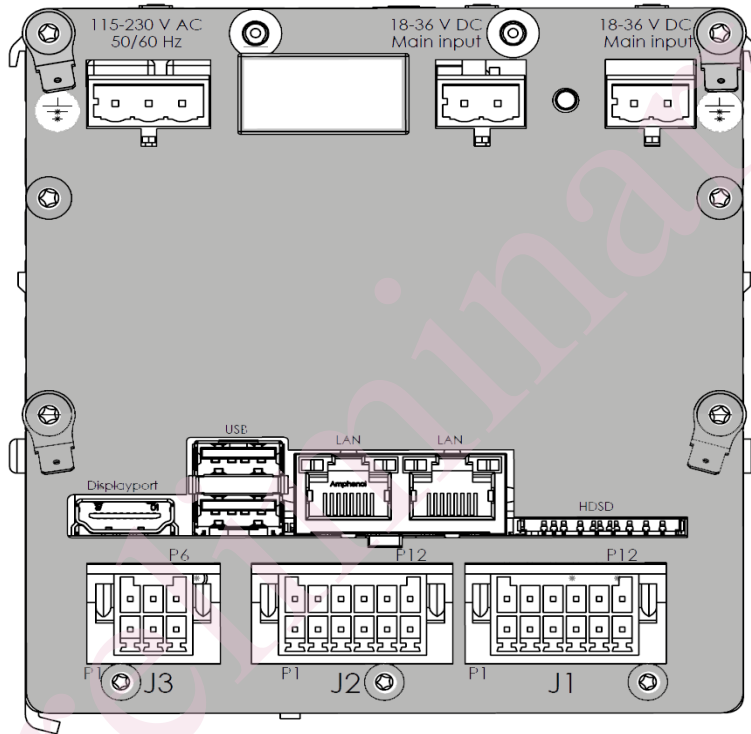
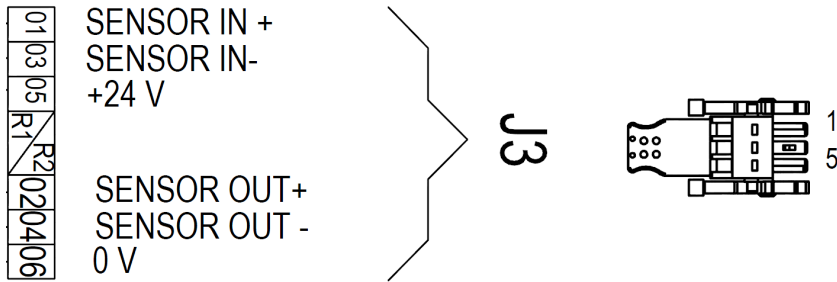


### SENSOR CONNECTION J3

The sensor is connected to JB70D2 Connector J3. 6 pin WAGO connector.

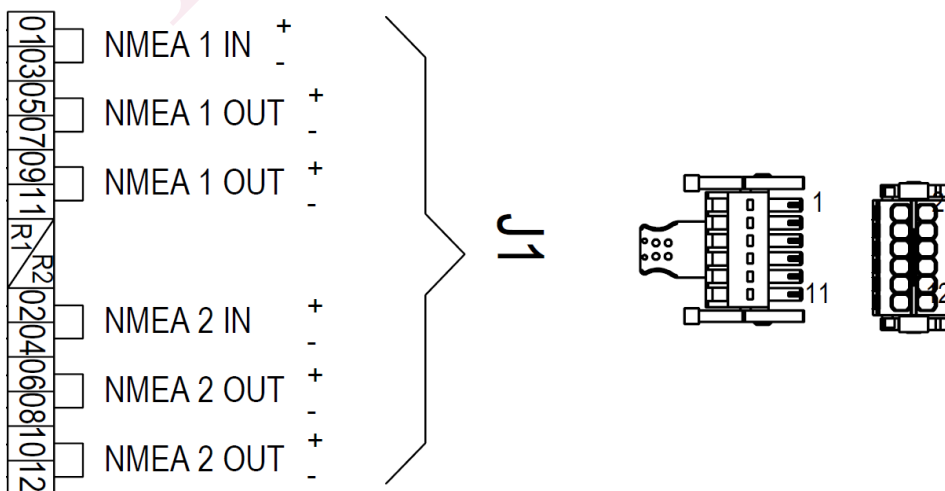
The cable screen is connected to screen on sensor side and should not be grounded at JB70 side.





**NMEA CONNECTION J1**

The DL2 has standard 2 NMEA Inputs and 2 Outputs. Each output is dual and makes total of 4 outputs.



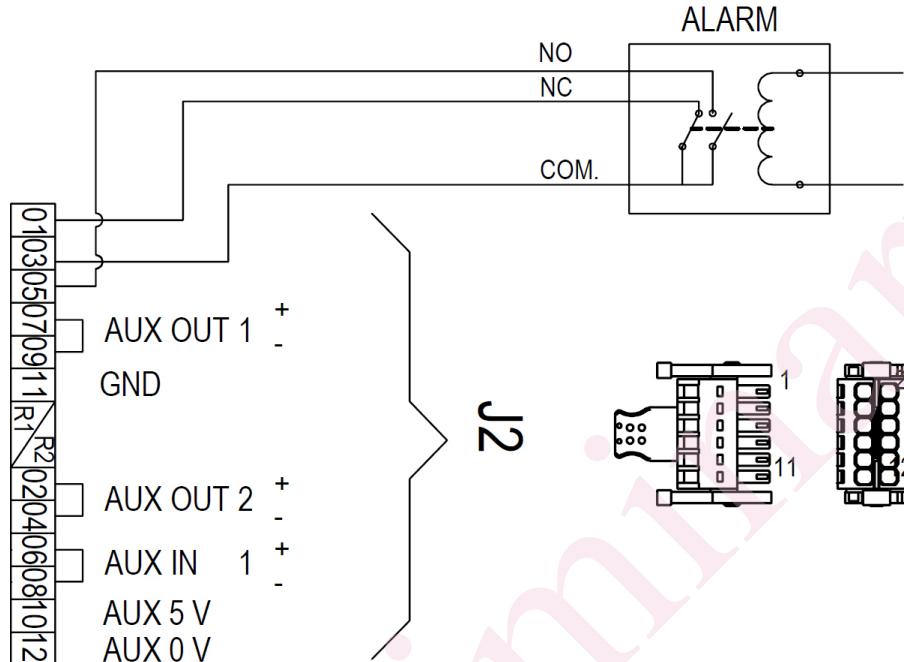
**AUX/Alarm CONNECTION J2**

The DL2 has standard

Alarm relé

1 x Aux In. (default set as “Alarm reset”)

2 x Aux Out.



**Additional NMEA, Aux and analog Out**

An optional Multi Extension PCB is required for additional NMEA, additional Aux or analog output. See Appendix 3.

**CLAMPING THE CABLES**

Cables should be connected to WAGO connector, leaving approximately 3 cm of tail. They should be stripped with 6-7 mm of metal showing and these should be connected as in the diagram above. A small screwdriver with blade size approx 3.5 mm, can be used, although WAGO part no 210-719 is ideal for this use.

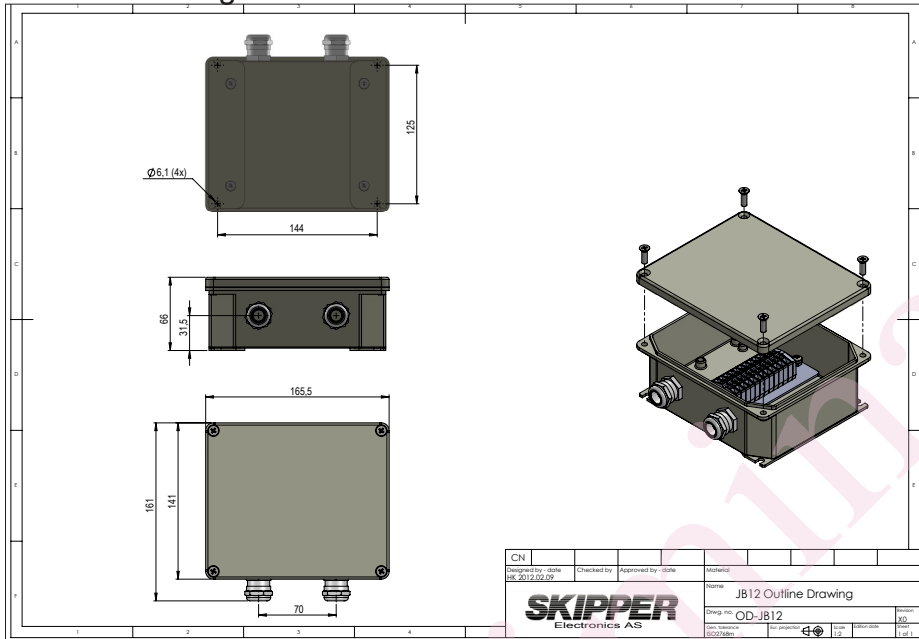
Outer shields should be collected and grounded in a ground stud on the edge of the cabinet. The outer insulation should be cable tied to the plastic handle of the connector, and securely anchored nearby. The plugs when refitted, must be installed such that their clips are fully in the up position.



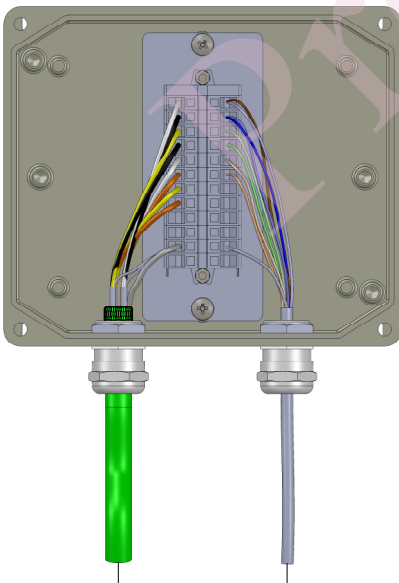


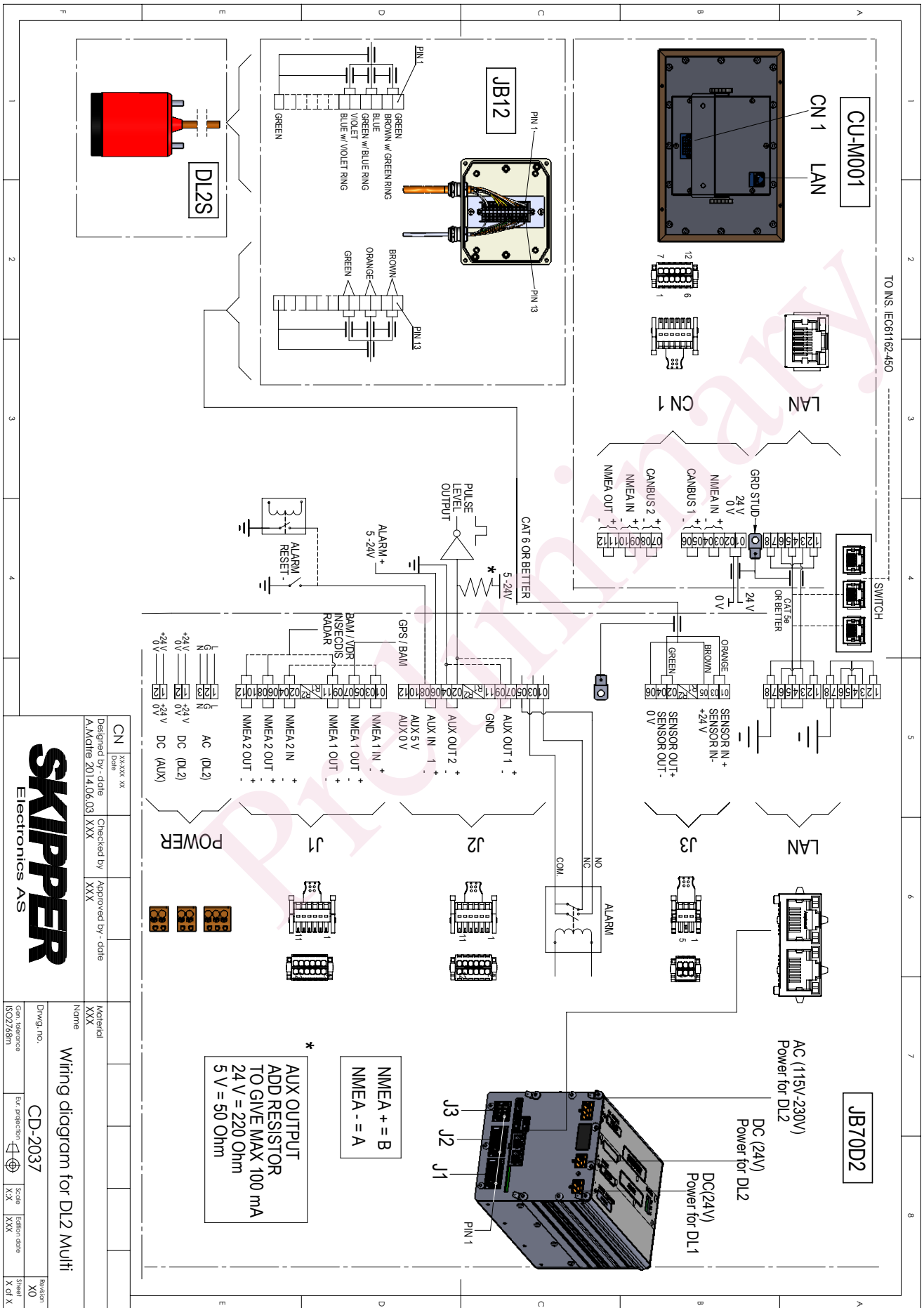
## THE JUNCTION BOX (JB12)/SPLICE

### Mechanical diagram



All individual screens of sensor cable to be connected to the outer screen of the CAT6 extension cable.  
Do not ground screens to JB12 chassi.





CN	XXXX XX	Designed by:- date	Checked by	approved by:- date
		A.Mchre 2014.06.03 XXX	XXX	

**SKIPPER**  
Electronics AS

Name		Material	
XXXX		XXXX	
Wiring diagram for DL2 Multi			
Drwg. no.	Scale	Edtion date	Revision
CD-2037	A.X	XXX	X0
Gen. reference	Ext. projection	Scale	Edtion date
ISO2758m		A.X	XXX
			X of X

# CHAPTER 3: STARTUP PROCEDURE

(Preliminary, note that the Software pictures are preliminary and will change)

Setup can be performed from the control unit or a web page available by connecting a PC to the LAN port using a LAN cable or via a switch.

The following procedure will take you through the setup using the Display.

First, the Display must be connected to the main Electronic Unit JB70D2. To do this enter the setup on the display and go to the Screen setup page.

On this you must select DL2 as system type, and then enter the SFI (ID) of the JB70D2 unit (This is market on the JB70 unit).

## LAN SETUP

On starting the display CU-M001, enter the CU-M001 setup, and select the systems type as DL2 and then set the Paired ID to the ID shown on the JB70D2 units label.

The Unit will then pair with the JB70 unit

**BACK** SYSTEM TYPE: CU-M001  
Serial number 14001, ID CU1234, GROUP NAVD  
IP ADDRESS 31.255.1.1  
CURRENT SYSTEM TYPE DL2  
SECONDARY SYSTEM DL1  
THIRD SYSTEM: NOT CONNECTED  
Available systems:  
JB70D21(2)-SA SN 140123, IP 31.255.1,34 ID:VD1234  
Paired  
JB70D21(1)-SA SN 140123, IP 31.255.1,35 ID:VD1111  
SECOND  
CD-M001CU SN 140234, IP 31.255.1,36 ID:II2222

SCREEN	Vertical	Horizontal
SYSTEM TYPE	DL2	DL1 ES1 Repeater
IP ADDRESS	Change	
LOCAL ID	CU1234	
Paired ID	VD1234	
GROUP	NAVD	
REMOTE DIMMING DDC	Rx	RX/TX OFF

SECONDARY SYSTEM TYPE	DL1	DL2 ES1 NONE
SECONDARY SYSTEM MENU	OFF	ON
THIRD SYSTEM TYPE	NONE	DL2 DL1 ES1
THIRD SYSTEM MENU	OFF	ON
SOFTWARE UPDATE	NOT AVAILABLE	1.2.04 Update

If required you can now enter the JB70D2 units setup and change settings, such as IP and SFI (ID). You can also change group, however changing these settings may make the units loose connection, and you will then need to change the parameter also in the Display.

BACK

**SYSTEM TYPE:JB70D2**  
 Serial number 14001, ID VD0001,  
 GROUP NAVD  
 IP ADDRESS 31.255.1.2  
 CURRENT SYSTEM TYPE DL2

Available systems:

CD-M001CU SN 140234, IP 31.255.1.34 ID:II0034  
Paired  
 CD-M001CU SN 140238, IP 31.255.1.38 ID:II0038

SYSTEM TYPE	DL2	DL1	ES1
IP ADDRESS	Change		
LOCAL ID	CU1234		
Paired ID	VD1234		
GROUP	NAVD		
SOFTWARE UPDATE	NA	1.2.04 Update	

This process can also be performed in a simpler way by using the Communications Application available in the SKIPPER service software (available for download on the SKIPPER website). This App allows you to connect to the same network as the units and then perform a search. The software will show you all the connected units, and you may then edit the ip SFI addresses and pair units from the software. You may then enter the web pages for each individual unit.

### **IEC61162-450 LIGHTWEIGHT ETHERNET STANDARD**

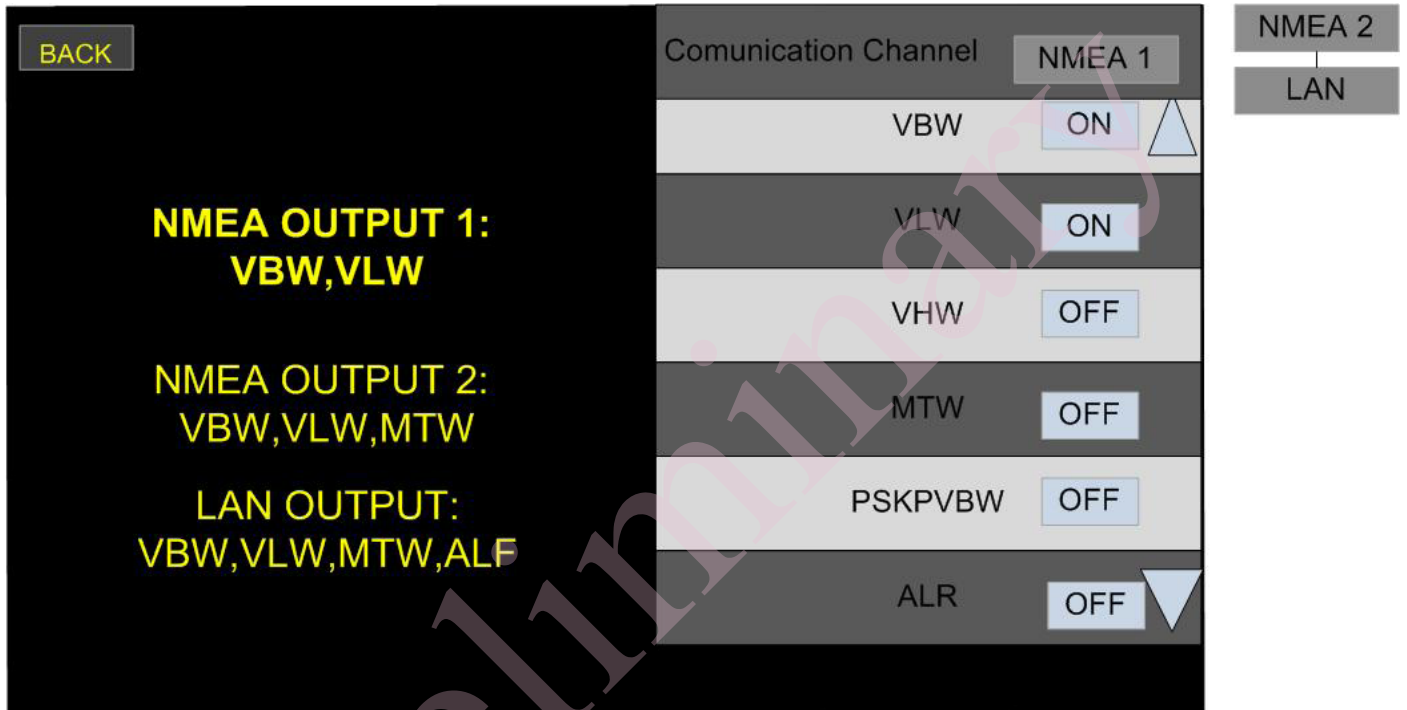
This standard allows the network to be used for the distribution and control of sensor systems such as the DL2. The DL2 is made up of the JB70D2 Electronic unit and the CU-M001 Graphic display. These communicate using propriety NMEA type messages on this multicast (UDP) system. The system will have a maximum load on the network of XXXX MB/S.

An advantage of this method of communicating is that it becomes simple to have more than 1 display unit on the same system. Instead of (or as well as) repeaters, the user can have as many control units as they wish, these are activated by pairing the units to the Electronic unit. In the case of INS bridges, the main bridge conning unit can be used as a control unit as well or instead of the screen (with approval).

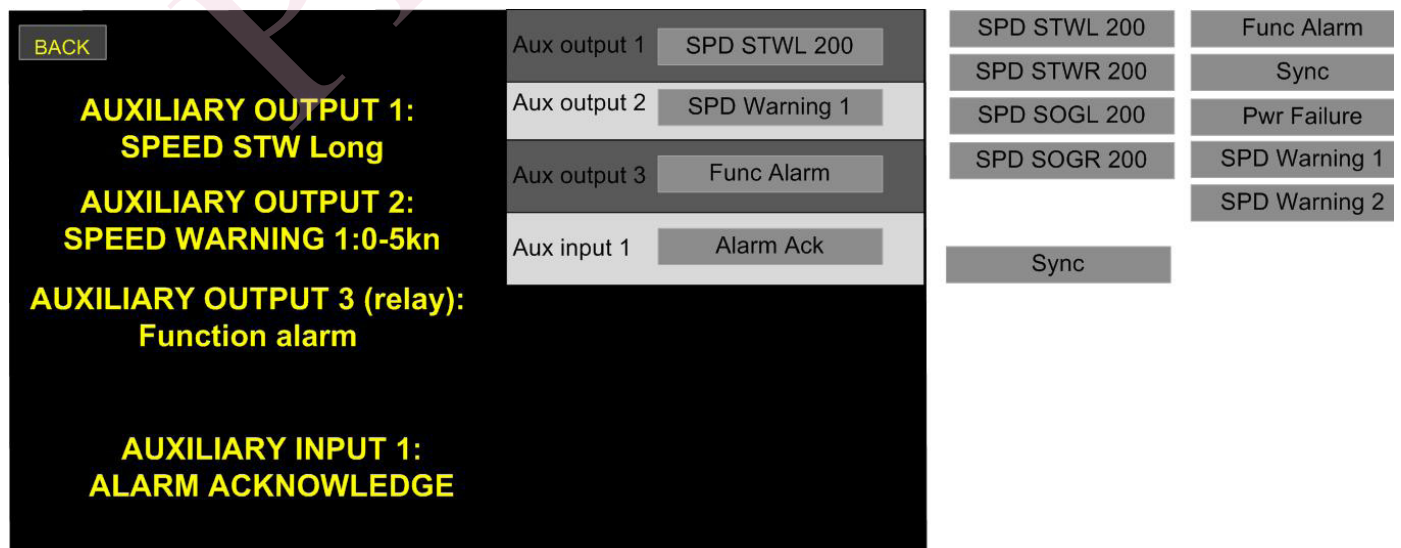
### SETTING UP COMMUNICATIONS

Communications are split into 2 setup screens. 1 for Serial NMEA (IEC61162) communications and 1 for Auxiliary communications.

By entering the Serial communication screen a summary of the current outputs is shown and these can be activated or deactivated on the 2 NMEA output channels (each with 2 separate outputs) or the LAN Lightweight ethernet port(s)



The Auxiliary inputs and outputs can be assigned to different functions in the Aux Setup screen. Some options are only available when the option is activated in the DL2 setup screen.



Speed warning changes the output state as the vessels speed passes a set speed, this can have 2 values low and high. These values are set in the alarms setup page.

**ALARM SETUP**

The system can provide alarms by auxiliary output (Aux output 1 and 2), relay (aux output 3), or NMEA/LAN. Remote acknowledge can be set up by aux input, by ACK NMEA command or by ACN (both from NMEA port and LAN). Alarms are available for low speed (SOG and STW), high speed(SOG and STW) and system failure. They can be activated or deactivated and given a unique alarm ID. Each alarm has its own unique ID and message, and can be deactivated by making the ID zero.

**BACK** Activated alarms and warnings:

NMEA Alarm ALR, ALF,  
Speed high =24.0kn  
SOG: ID 10234 Message 'SOG Speed Hi'  
STW: ID 10236 Message 'STW Speed Hi'

Speed Low =0.5kn  
SOG : ID 10235 Message 'SOG Speed Lo'  
STW : ID 10237 Message 'STW Speed Lo'

Power failure alarm = Not connected  
Function alarm relay = Aux 3

Speed levels

Speed level 1 = Aux 2 :  
Speed hi =5kn; Speed lo = off  
Speed level 2 =OFF :  
Speed hi =10kn; Speed lo = off

Speed Hi value	24.0	0=OFF
Speed Lo value	0.5	0=OFF
Alarm ID STW Speed Hi	10234	0=OFF
Alarm ID SOG Speed Hi	10235	0=OFF
Alarm ID STW Speed Lo	10236	0=OFF
Alarm ID SOG Speed Lo	10237	0=OFF

AUX Speed Level hi 1	5kn	
AUX Speed level lo 1	0kn	0=OFF
AUX Speed level hi 2	10kn	
AUX Speed level lo 2	0kn	0=OFF

The messages in use are as follows:

Alarm type	Default ID	Message Text	Message number
SOG SPEED HI	10234	'SOG Speed Hi'	
SOG SPEED LO	10236	'SOG Speed Lo'	
STW SPEED HI	10235	'STW Speed Hi'	
STW SPEED LO	10237	'STW Speed Lo'	
SYSTEM warning	10238	'SYSTEM WARNING'	

## SYSTEM SETUP

To help the system check itself and filter bad data, also to provide aft transversal speed in the docking screen, a number of parameters should be setup for the vessel. These are entered in the DL2 setup menu.

Draft	12.5m	
Vessel Max speed	22	
Vessel Length	148	
Sensor dist from Bow	4m	
Current correction	Log SOG	GPS SOG
STW on / off	ON	Auto
SOG lost bottom	Auto	ON / OFF
DOCKING option code	12356	
1% option	NA	
Synch/blanking opt code	52136	
Auto-GPS on NMEA code	52136	

System ID Number: JB70D21:14002

In this screen you can also turn on and off parameters such as Speed through water, and current. You may also select if current is to be calculated using an input GPS or the Doppler speed overground. If the Bottom is out of range the system can be made to switch automatically to GPS instead.

## DIAGNOSTICS

The Diagnostics screen allows the user to test the system, activating alarms and outputting set speeds. It is also possible to perform self test of the system, and check the status.

Self test will perform the following actions:

- Check internal voltages and compare them to defaults and installation references.
- Check connectivity and connected items.
- Disconnect NMEA ports and loop back to check circuit function.
- Measure function of the sensor (pinging between channels and analysis of return signals).

To test other systems connected to this system, a data test is available, allowing output parameters

to be entered and given out on all the activated outputs. In addition, an alarm condition can be simulated and acknowledged. For demonstration, a simulator can be activated to show a recorded data set over time. This function will turn off automatically after 6 hours or on power reset.

Speed simulation is a full check of the system. The speed information is set to the sensor and the sensor produces frequencies corresponding to the desired speed. In this way all parts of the system are in use, and this in itself is a good diagnostic check.

## SAVING AND LOCKING

The parameters will be automatically saved and if the the individual units of the system loose communications, they will re-synchronise when they reconnect.

## ERROR MESSAGES

The following error cases are accounted for.

Error description	How you see it	What happens
Data not available or wrong	On the screen the data dissapears and is rplaced by ‘-.-’	The sensor is not responding or the required NMEA input is not available
Loss of communication to display from electronic unit	On screen the following warning will occur ‘Lost communication’ The JB70 unit will send a system alarm.	The pairing between the units has failed. Check your cabling and setup
Poor quality of the data	a warning will appear on screen ‘Poor signal’	The sensor runtime quality control is failing.



Preliminary

# CHAPTER 4: VESSEL PARAMETERS AND SYSTEM OPTIONS

The DL2 system has a number of options available and the list of these will grow as the product matures. The hardware in the product is designed to meet and exceed the requirements of MED and IEC 60945. The product in its standard form is limited to meet the specification required. However, it is designed to allow adjustments and improvements to be implemented so that the product can be used in markets requiring higher specification and functions not normal in a commercial speed log. Most of these options can be added to the product retrospectively, using an activation code, and maybe upgrading the software. Hardware options are normally performed at the time of purchase, but some can also be performed in the field.

## SOFTWARE OPTIONS

### 1. HIGH ACCURACY

The accuracy of the standard DL2S sensor is better than 2 % or 0.2 kn whichever is greater as required in the standard (IEC61023) However the system can be made to measure more accurately. This is done by changing the measurement algorithms. Results are currently better than 1 % or 0.1 kn. This option is activated in software using an option key provided by SKIPPER.

### 2. SURFACE CURRENT MEASUREMENT

With this feature the current of the water cell is calculated to give a direction and strength of the current detected by the sensor. This is fully integrated into the electronic unit and may be sent out as a \$VDVDR NMEA message. By connecting the GPS and heading sensor to the electronic unit, the current can be calculated even when bottom track is lost.

### 4. SYNCHRONISATION\*

Synchronisation allow the user to force the system to be quiet, usually when another system requires the acoustic frequency band. This option allows the user to use auxiliary inputs and outputs to stop the system. The system will inform the user of the accuracy of the data if pinging is slowed. It will allow the user to set up a burst of measurement and to trigger that burst using auxiliary. It also allows the user to send a signal from the DL2 when the unit pings.

### 5. DOCKING

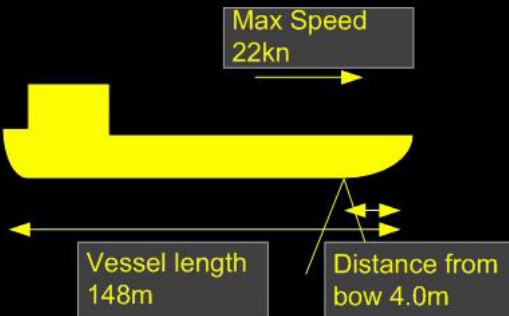
Docking option activates a calculation of the aft transversal speed. This option requires a heading input, the length of the vessel as well as the distance from the sensor to the bow.

**Note:** Items marked \* can not be approved by IEC61023 MED B (Wheelmark) standards, and when installed, will mean that the system is not approved under these standards.

## ACTIVATING/DE-ACTIVATING SOFTWARE OPTIONS.

Software options can be activated and de-activated on the DL2 menu. This page contains a table where the installer can enter codes purchased/supplied from SKIPPER. Codes will only activate if they detect the correct hardware in place. Codes are unique to the serial number of the system and can not be moved from system to system. To remove an extra option, the user must remove the code number.

**BACK**



Max Speed 22kn

Vessel length 148m

Distance from bow 4.0m

System ID Number: JB70D21:14002

Draft	12.5m
Vessel Max speed	22
Vessel Length	148
Sensor dist from Bow	4m
Current correction	Log SOG
STW on / off	ON
SOG lost bottom	Auto
DOCKING option code	12356
1% option	NA
Synch/blanking opt code	52136
Auto-GPS on NMEA code	52136

GPS SOG

Auto

ON / OFF

## **HARDWARE OPTIONS**

In addition to the mechanical options and software options, it is possible to select hardware options. These require an additional PCB and front plate.

### **1. EXTENSION CARD ( AVAILABLE SOON)**

The JB70D2 can be equipped with an additional PCB giving 2 more channels of NMEA out, 2 Aux out and Analog Output. The card gives an analogue output in both current 4 - 20 mA and voltage 0 - 10 V. See appendix 3.

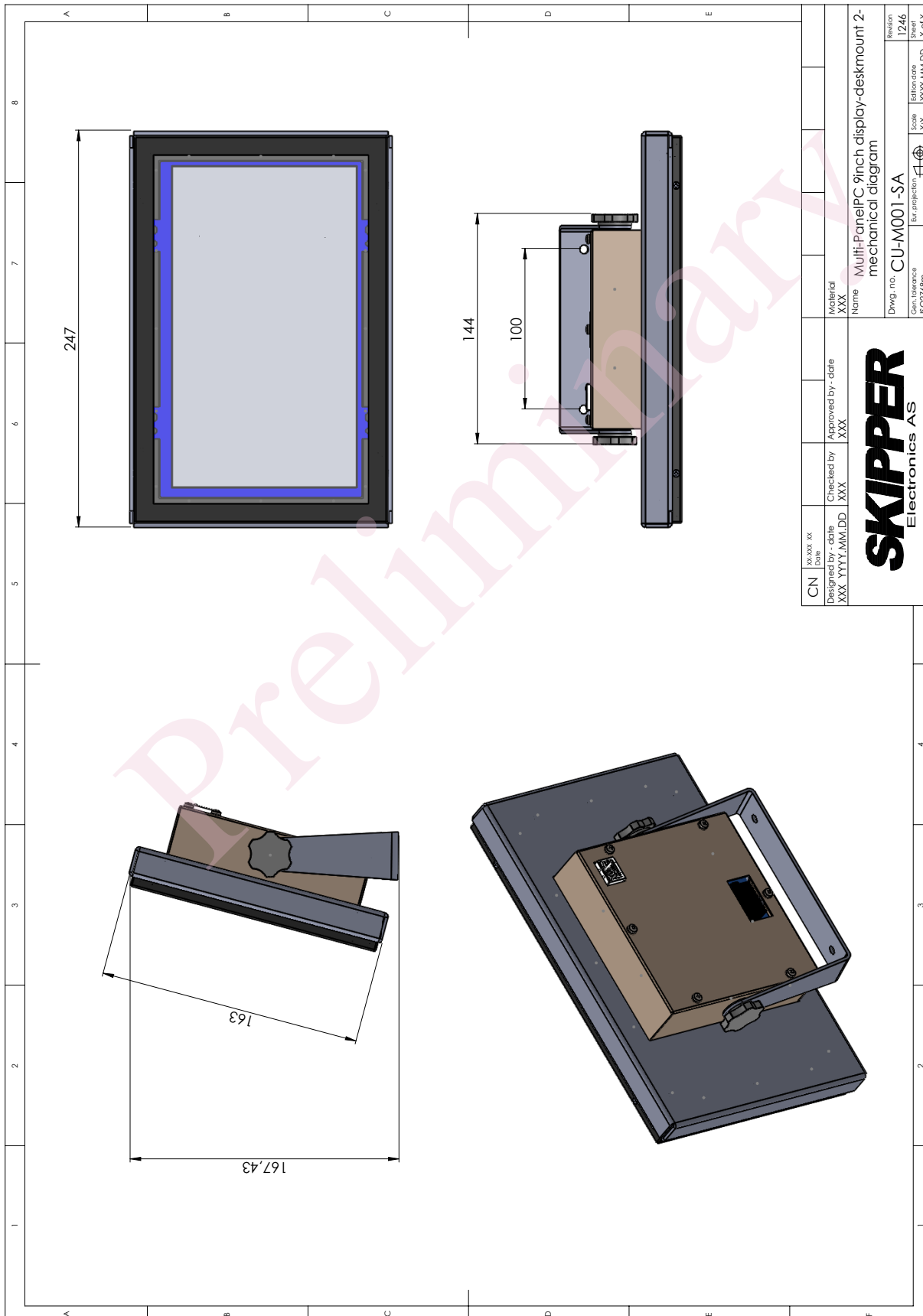
### **2. DUAL SYSTEM**

The DL2 (JB70D2 electronic unit) can also be upgraded with an extension card where the card can be used partly as extension (for analogue and extra NMEA outputs (2 extra)), and also as a separate single axis Doppler speed log. In addition to the PCB, an additional sensor or the sensor of type DL21 is required. This sensor contains both 2 axis (540 kHz) transducers, but also a single axis (700 kHz) speed log within the same housing. New regulations for vessels over 50 K GRT (Gross Register Tonnage) state that the vessel must have separate (electrically isolated) systems for speed over ground and speed through water. This system and the use of auxiliary +24 V DC power on the JB70D2-X electronic unit unit meets this criteria. A CD402CU-XX control unit will also be required for the secondary system.

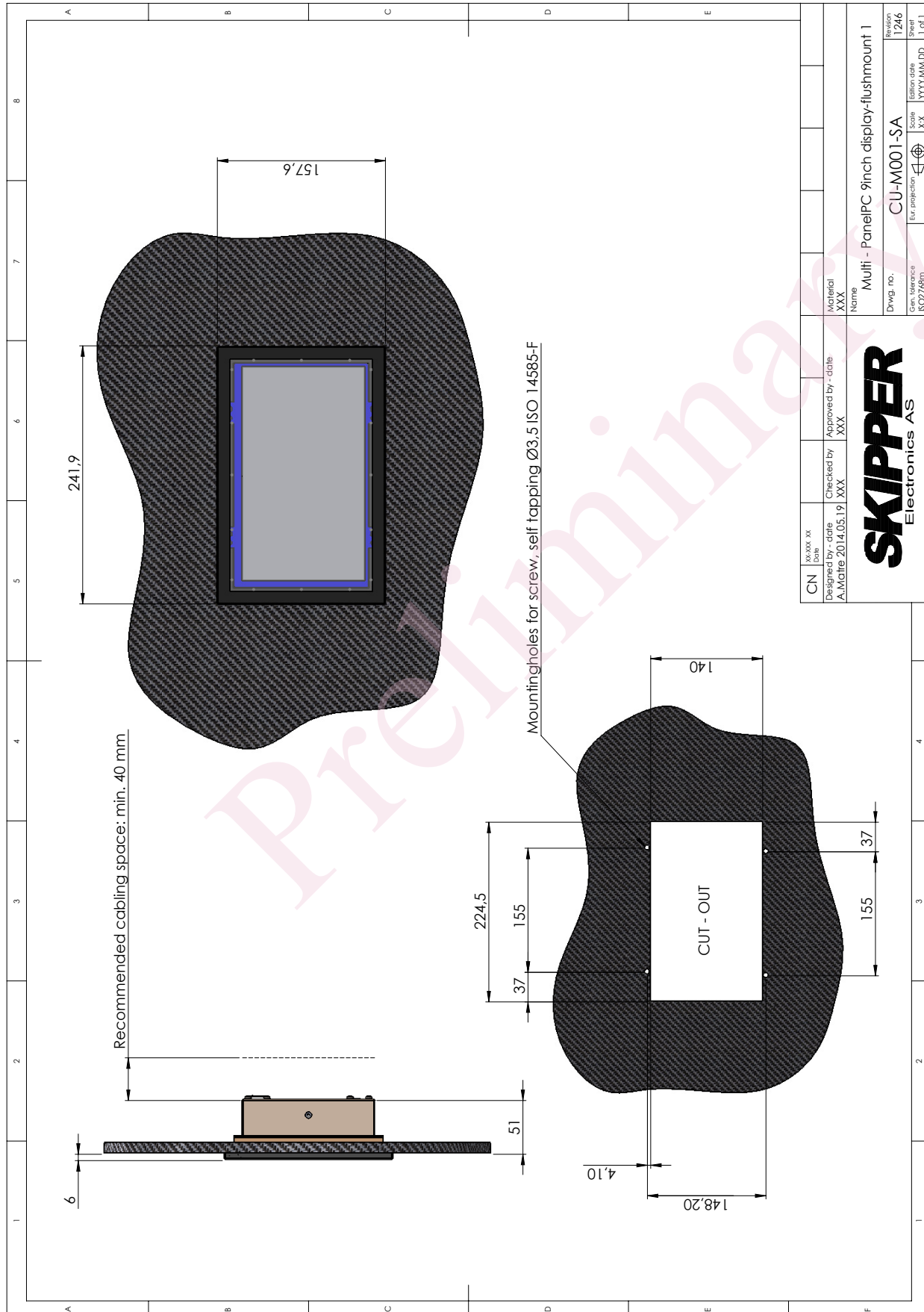
Preliminary

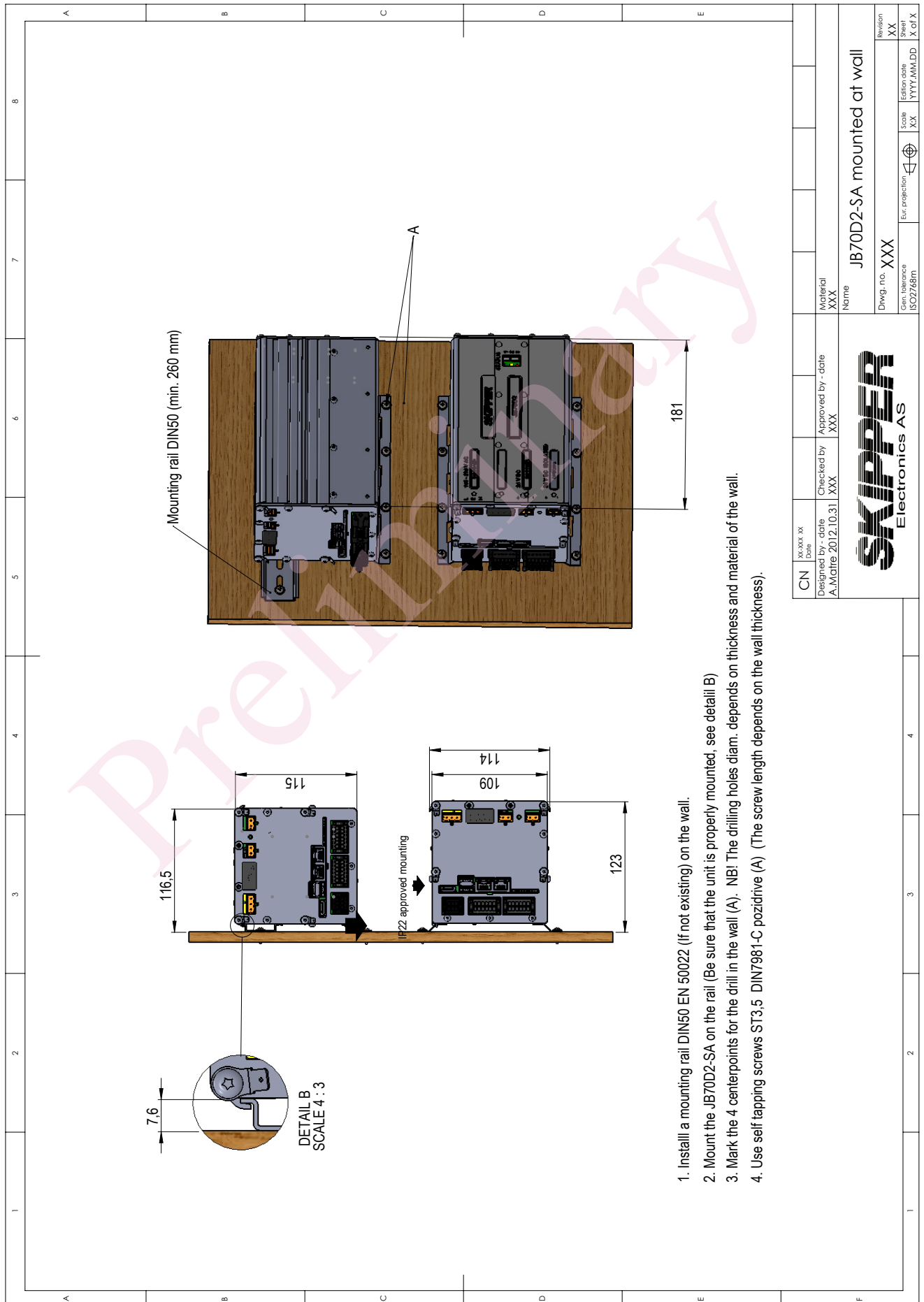
# APPENDIX 1: INSTALLATION DRAWINGS

## OPERATOR UNIT DESKMOUNT DIMENSIONS



**OPERATOR UNIT FLUSHMOUNT DIMENSIONS**

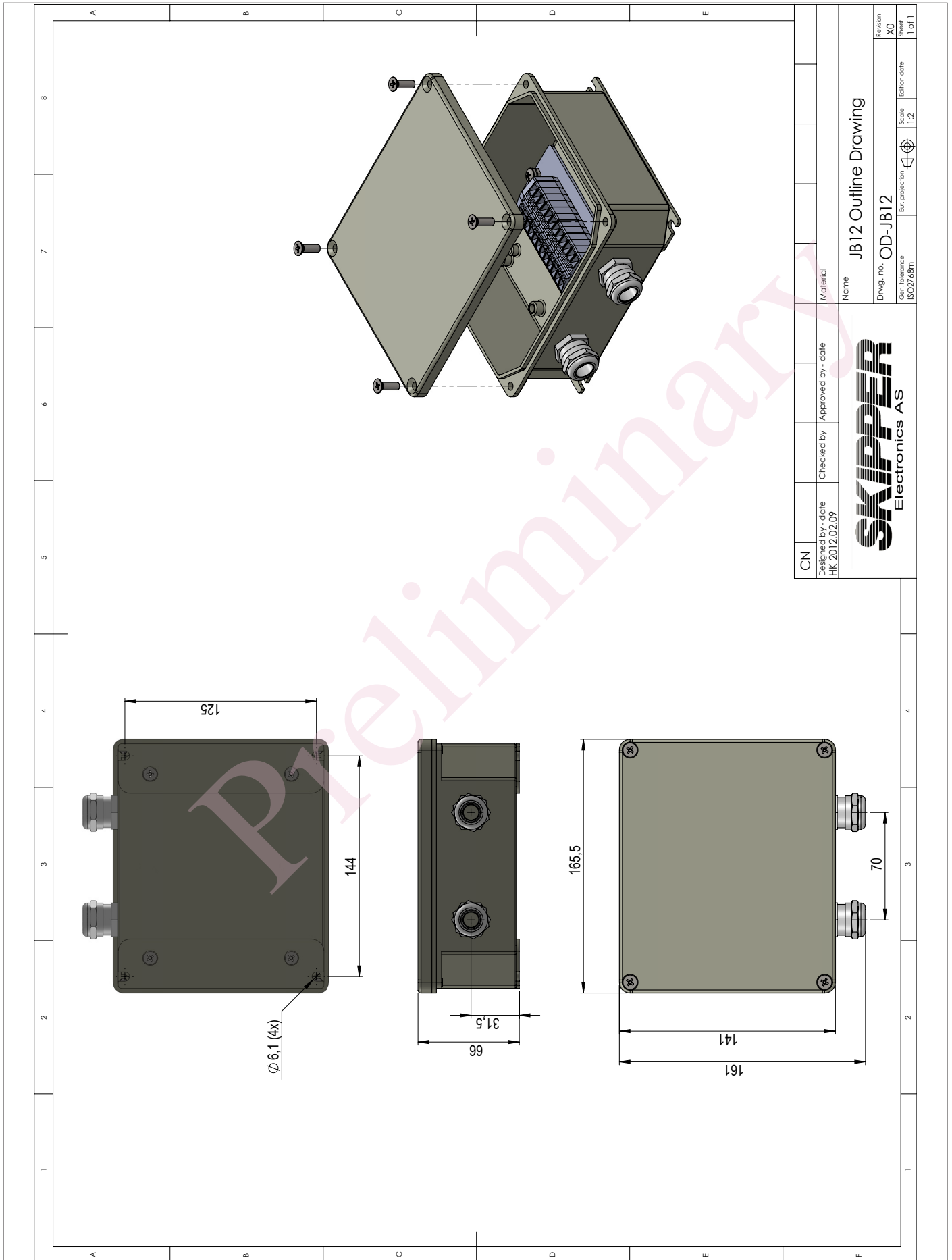




1. Install a mounting rail DIN50 EN 50022 (if not existing) on the wall.
2. Mount the JB70D2-SA on the rail (Be sure that the unit is properly mounted, see detail B)
3. Mark the 4 centerpoints for the drill in the wall (A). NB! The drilling holes diam. depends on thickness and material of the wall.
4. Use self tapping screws ST3,5 DIN7981-C pozidrivne (A) (The screw length depends on the wall thickness).

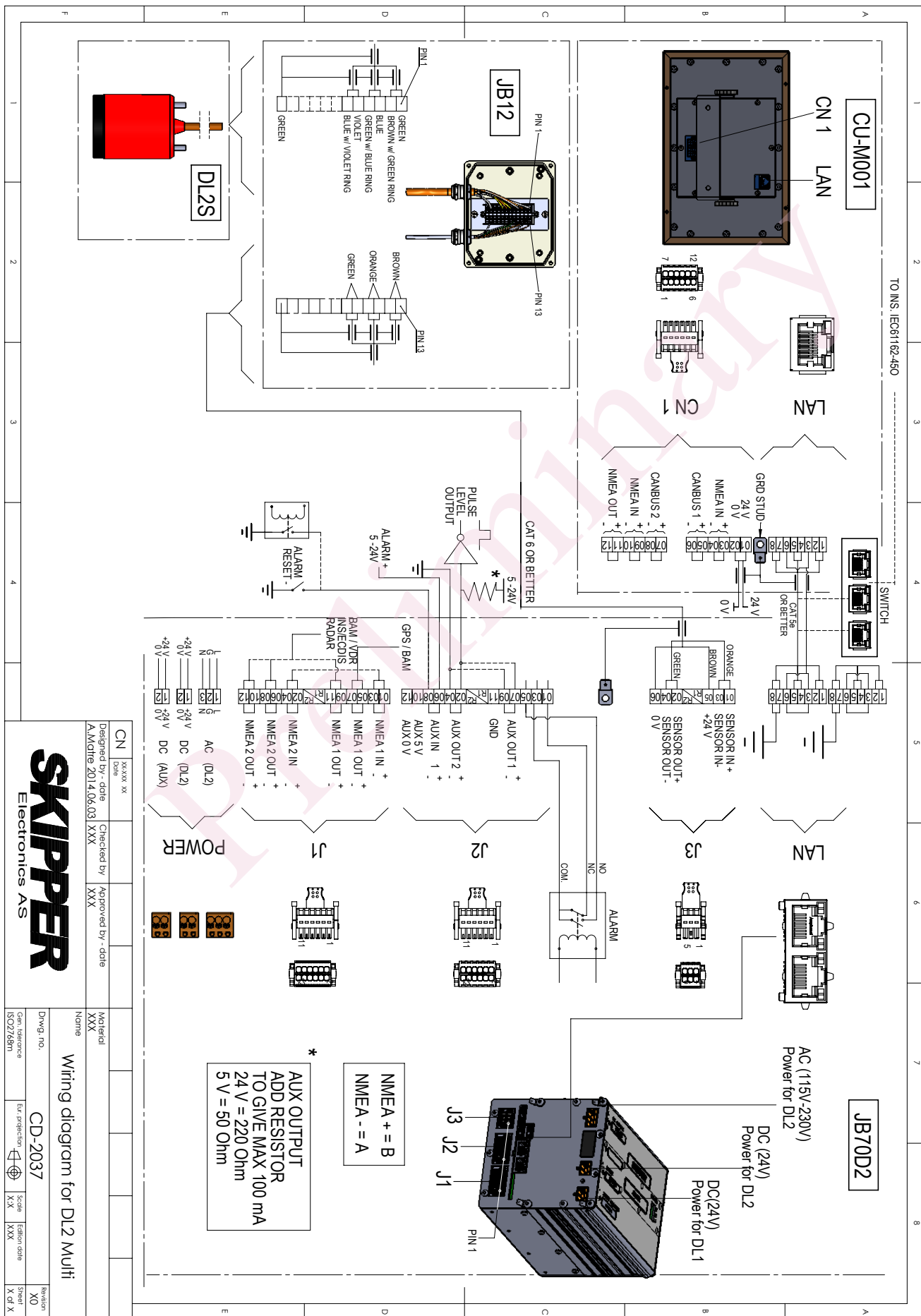
CN	XX-XX-XX Date	Approved by - date XXX	Material XXX	Revision XX
Designed by - date A.Matre 2012.10.31	Checked by XXX	Approved by - date XXX	Name JB70D2-SA mounted at wall	Scale XX
Dwg. no. XXX			Scale XX	Scale XX of X
Con. tabacco ISO2768m			Scale XX	Scale XX of X
Eur. protection			Scale XX	Scale XX of X





CN	Designed by - date HK 2012.02.09	Checked by	Approved by - date	Material
<b>SKIPPER</b> Electronics AS				Name JB12 Outline Drawing
Dwg. no. OD-JB12		Scale 1:2	Revision X0	Sheet 1 of 1
Gen. tolerance ISO2768m		Eur. projection	Scale	Revision date





CN	Rev	xxxx	xxxx	xxxx	xxxx
	Date				
Designed by	date	xxxx	xxxx	xxxx	xxxx
	Machine	2014.06.03	XXX	XXX	XXX
Checked by	date				
	Machine				
Approved by	date				
	Machine				
Name					
Material					
Name					
Drawing no.					
CD-2037					
Gen. tolerance					
ISO2768m					
Ext. production					
Scale					
Edition date					
Sheet					
X of X					

Wiring diagram for DL2 Multi

# APPENDIX 2: DATA SHEETS

## DATA SHEET CU-M001



### Product Datasheet CU-M001-XX Control Unit for SKIPPER Multi Series

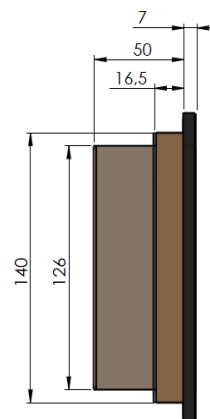
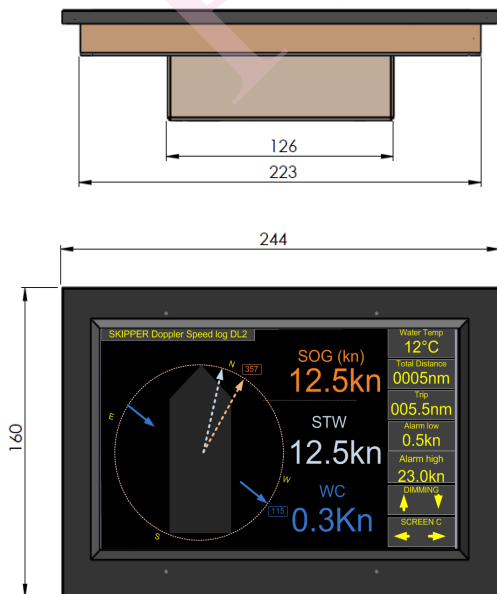
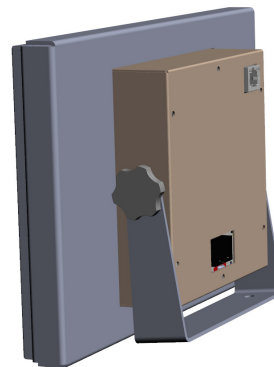
#### Specifications

Part number	Part number	Description
CU-M001-XX	Control Unit 9" Touch display Resistive or Projected capacitive touch, Flush mountable or desktop Resolution 800 * 480. LED Backlight. 400 Nits. Viewing angle 70/70/50/60 Night dimming via touch or NMEA.	
1 LAN. 2 NMEA In. 1 NMEA Out. (2 CAN future option)		IEC 61162-450 NMEA 0183, IEC61162-1
<b>Power consumption</b>	12 - 24VDC, Max 10W, typ 6W	
<b>Used with</b>	JB70XX-XX Electronic unit	SKIPPER Multi series Speed logs and Echo sounders
<b>Package consist of</b>		
<b>IP rating</b>		22
<b>Manufacturer</b>		SKIPPER Electronics AS, Norway



Packaging dimensions:  
325 x 125 x 230  
1,2kg

Dimensions in mm

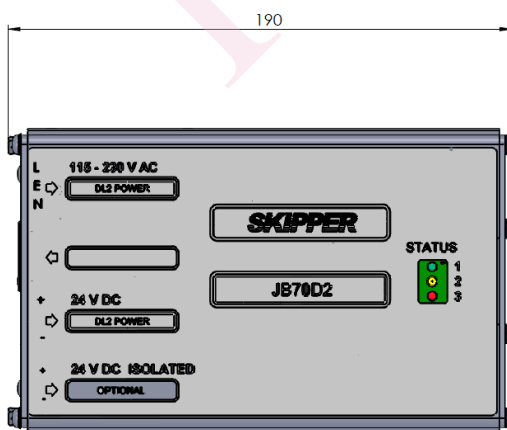


**DATA SHEET JB70D2-SA**

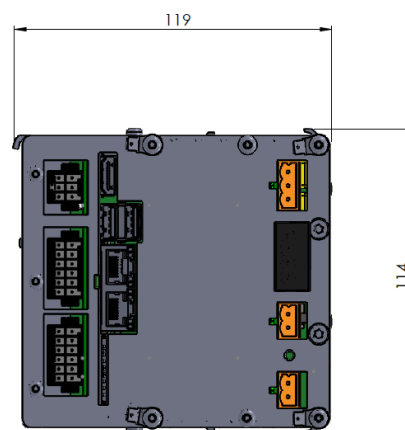
**Product Datasheet**  
**JB70D2-SA Electronic unit for**  
**SKIPPER Doppler Speed Log DL2**

**Specifications**

	Part number	Description
<b>Part number</b>	JB70D2-SA	Electronic Unit for DL2
<b>Control units</b>	CU-M001-XX	Control Unit 9" Touch display
<b>Sensors</b>	DL2SXX	2-axis STW+SOG
<b>Package consist of</b>	JB70D2-SA M-KIT-JB70D2	Electronic Unit for DL2 Mounting Kit for JB70D2
<b>PCBs inside</b>	PP-M001 PC-M001 PI-M001 (Optional)	Multi Power, PCBM Multi Main Processor, PCBM I/O Multi extension, PCBM (Optional for extra NMEA + analog out)
<b>Power Input</b>	115-230 VAC and/or 24VDC Max 60W typ. 15W	
<b>Standard In/out</b>	4 x NMEA 0183, IEC61162-1 output 2 x NMEA 0183, IEC61162-1 input 2 x Auxiliary output 1 x Auxiliary input 1 x Auxiliary (relay) 2 x LAN IEC 61162-450 web page setup	NMEA outputs can be used for IEC61162-2  Auxiliary output can be designated to alarm, pulse, spd warning Auxiliary input can be designated to alarm or dimming control relay designated to function and/or powerfailure alarm  Configurable web pages for setup and runtime functions
<b>Optional In/Out</b>	4 x NMEA out 0183, IEC 61162-1 output 2 x analogue 0-10V, or 4-20mA 4 x Auxiliary output 2 x Auxiliary input	Optional PCB PI-M001 for extra NMEA outputs and Analog outputs.  Auxiliary output can be designated to alarm, pulse, spd warning Auxiliary input can be designated to alarm or dimming control
<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



Dimensions in mm



**DATA SHEET DL2SG-SA**

# Product Datasheet

## DL2SG-SA Log sensor DL2 for Sea Valve

### SKIPPER Multi Serie

#### Specifications

	Part number	Description
<b>Part number</b>	DL2SG-SA	Log sensor DL21for Sea Valve Doppler sensor 2-axis STW+SOG
<b>To be installed into</b>	SB-100-XX DB-100-XX	Sea valve 100mm for single bottom hull Sea valve 100mm for double bottom hull
<b>To be used with</b>	JB70D2-XX	Electronic unit
<b>Bottom Detection (SOG)</b>		<120m
<b>Cable length</b>		40m (may be extended or shortened. Recommended 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>1 x NMEA (Proprietary formats)</b>
<b>Input</b>		<b>1 x NMEA (Proprietary formats)</b>
<b>Power input</b>		<b>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



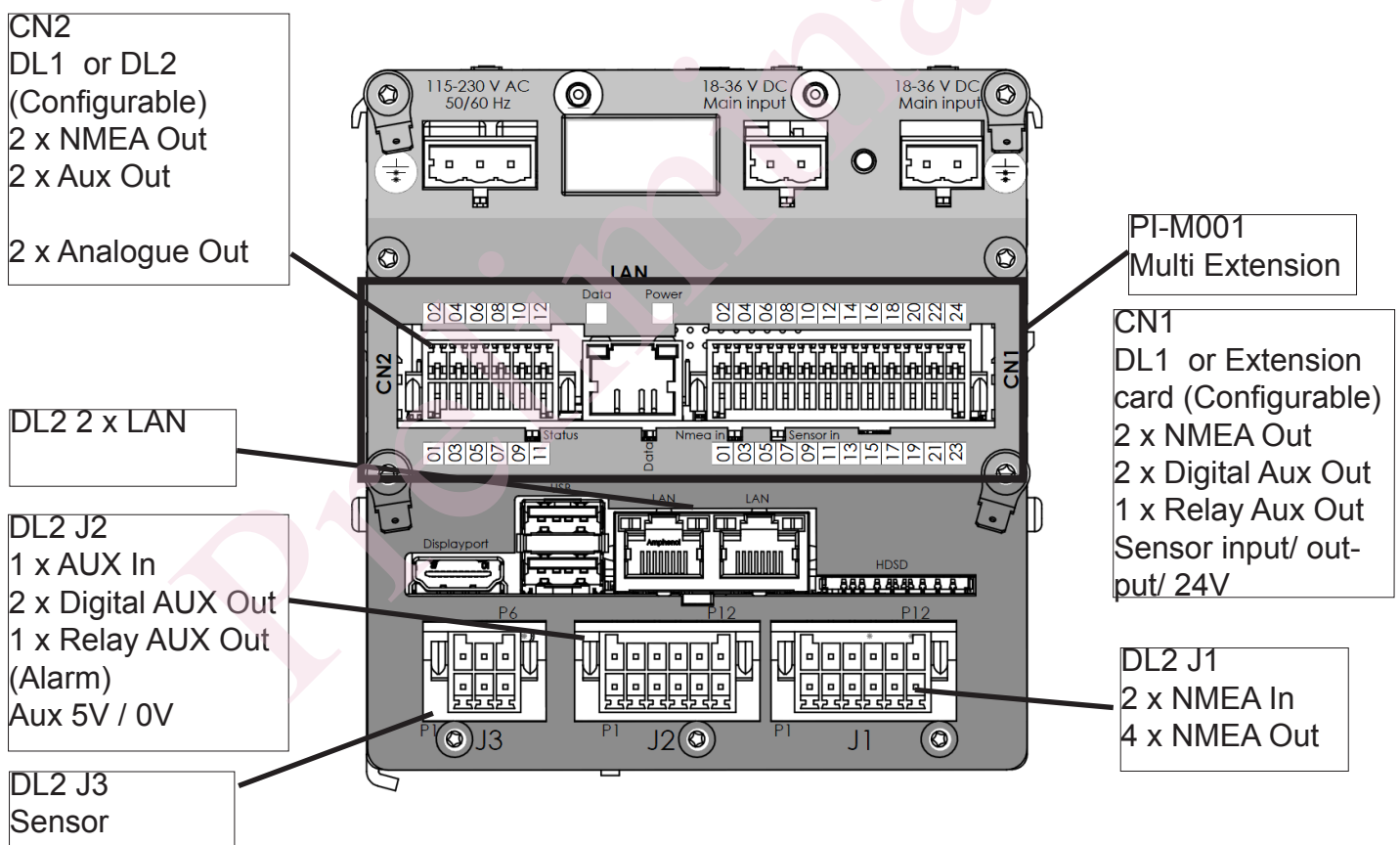
45cm \* 44cm \* 32 cm  
10.2kg



# APPENDIX 3: MULTI EXTENSION PCB

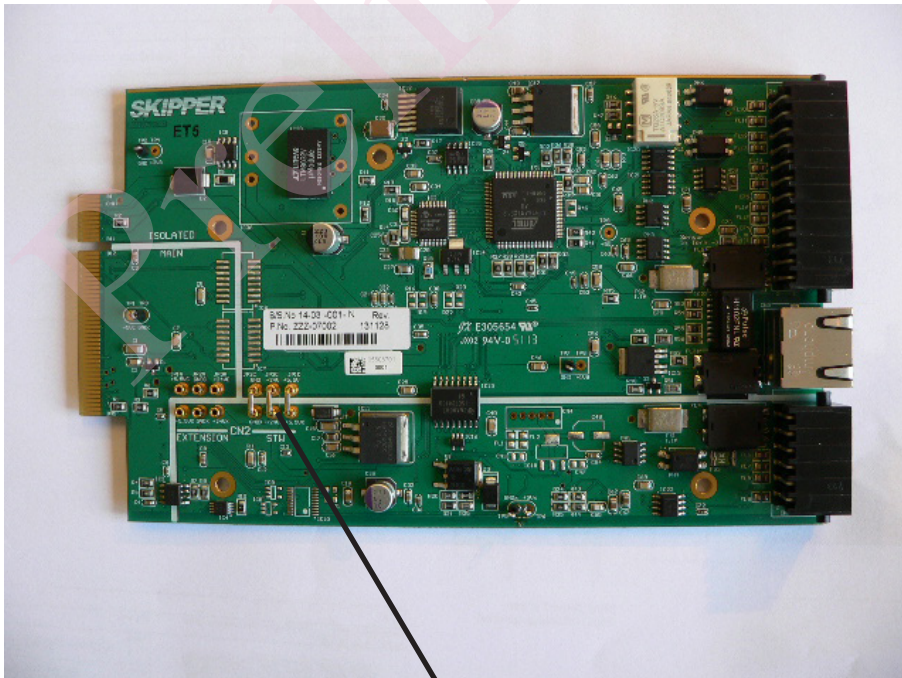
## JUMPER SETTINGS

The DL2 have an option for additional NMEA,AUX and Analog output.  
 Plug CN2 on multi extension PCB (Part number PI-M001) may be configured for DL2.





PI-M001 Jumpers  
CN2 connected to DL2



PI-M001 Jumpers  
CN2 connected to DL1

# NOTES

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Preliminary

# **SKIPPER**

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