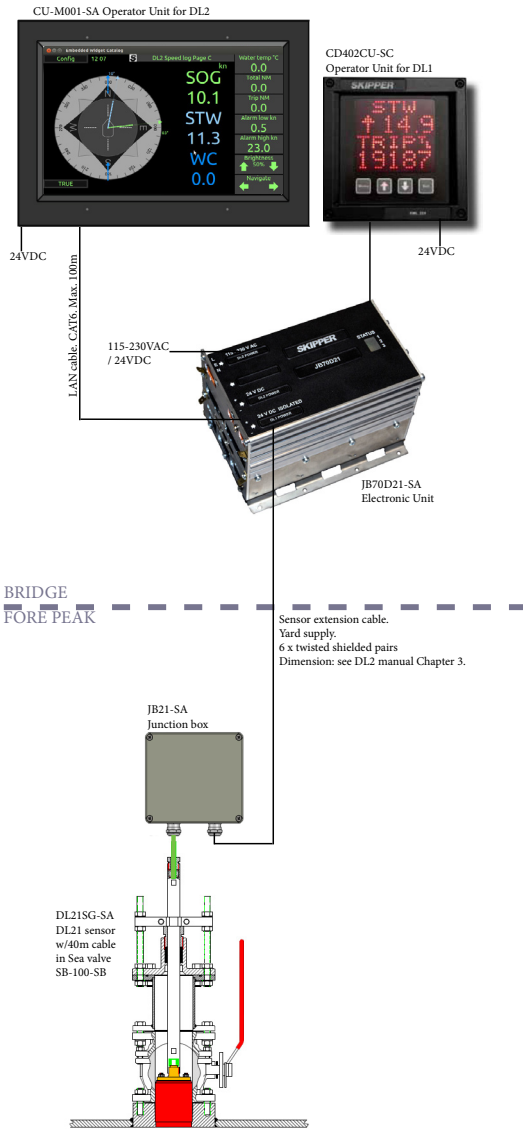
DL21

Installation Manual

Dual axis Doppler Speed Log System (SOG+STW) for vessels >50.000GT.



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Rev: 1622
Date: 2016-07-03

DL21	*DUAL AXIS DOPPLER SPEED LOG SYSTEM*

INSTALLATION MANUAL

COMMUNICATING WITH US

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CONTENTS

INTRODUCTION

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 installation of DL1 please see “Installation manual DL1” DM-M004.

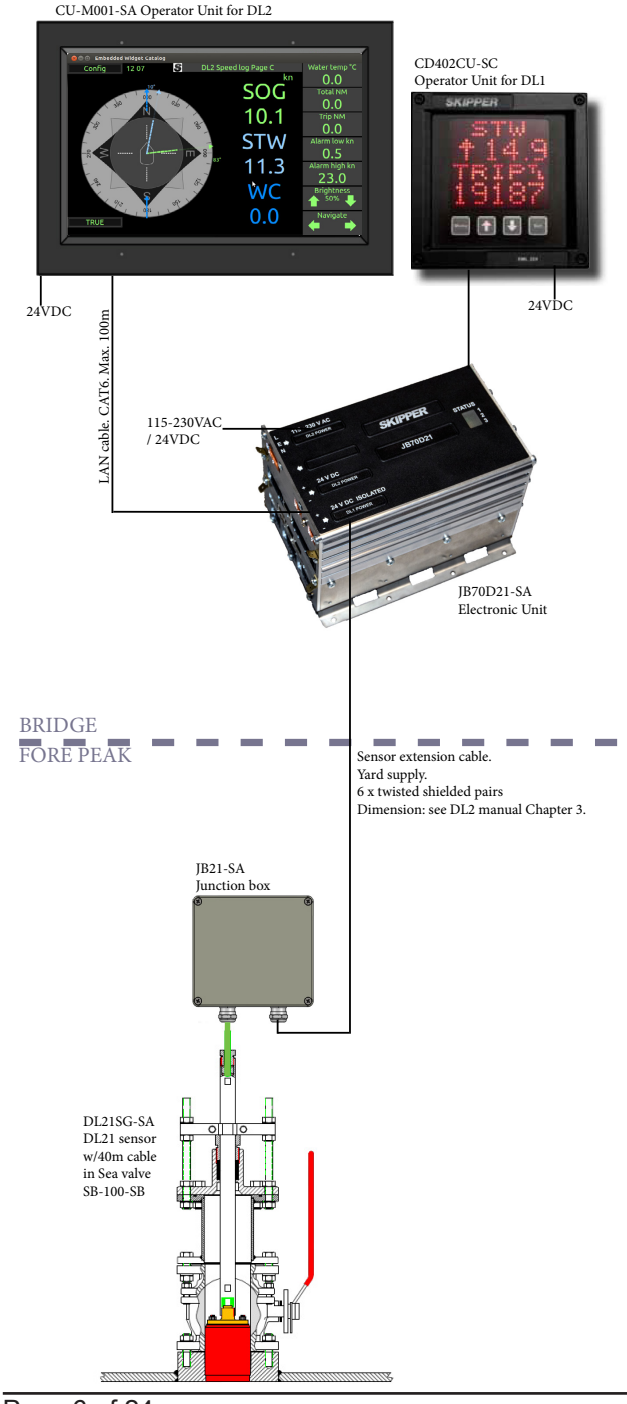
For installation of DL2 please see “Installation manual DL2” DM-M002.

This manual covers the DL21 specific items not included in the DL1 and DL2 Installation manuals.

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 Operator 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.



The DL21 system consist of:

2 x Operator units.
- CU-M001-SA for DL2
- CD402CU-SC for DL1

1 x Dual Electronic Unit
JB70D21-SA Electronic unit

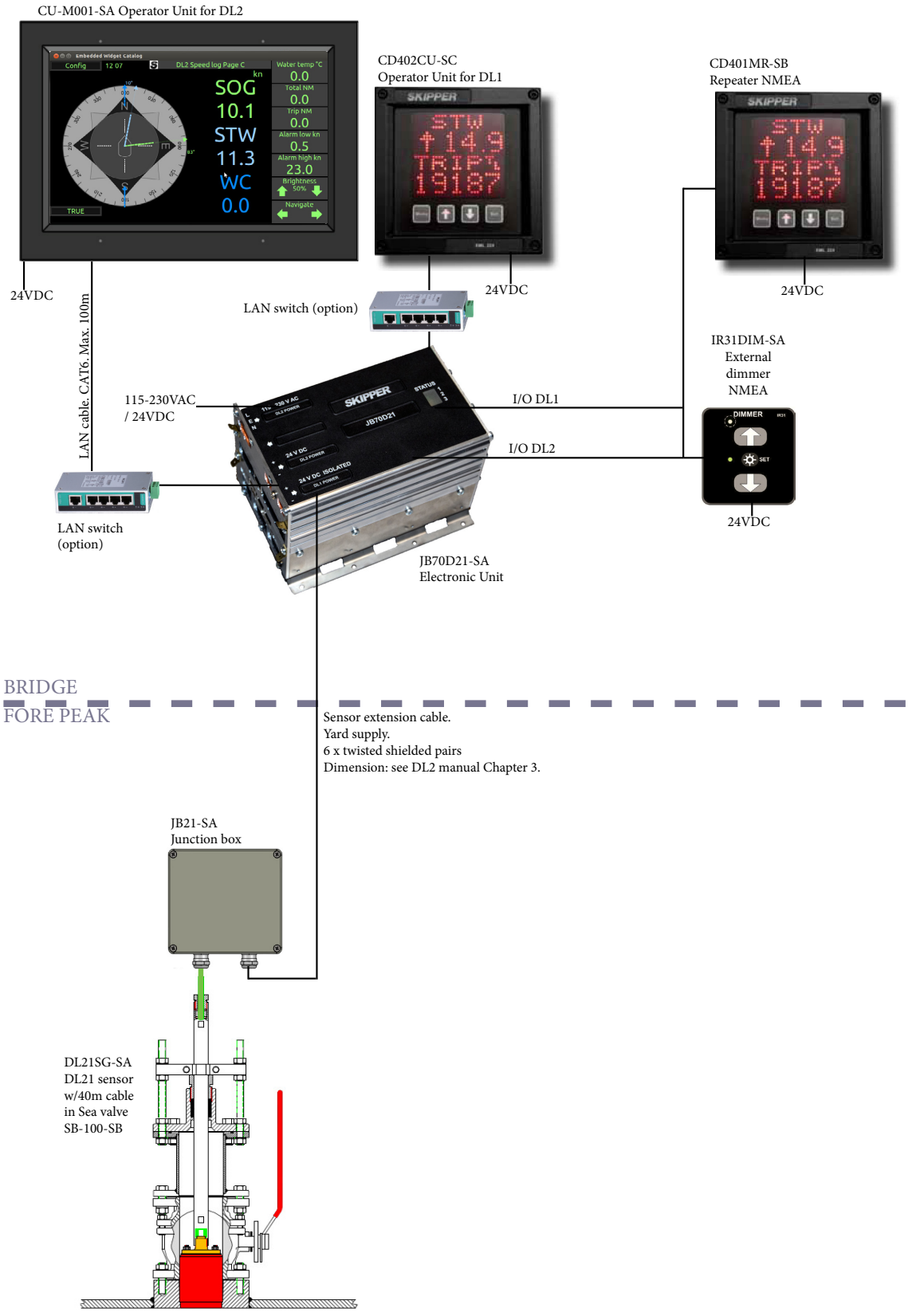
1 x Junction box
JB21-SA
(Optional for extension of 40 m sensor cable)

1 x Sensor DL21SG-SA
- 1 x (STW) Single axis + 1 x (STW + SOG) Dual axis sensor in one housing.
- Fits into SB-100-XX/DB-100-XX sea valves
- Same size as the DL2 and DL850 270 kHz sensors.

Optional items DL21

The following items are optional SKIPPER supplied items.

- Speed Repeater
- External dimmer
- LAN switch



Required items NOT supplied by SKIPPER

The following items are not SKIPPER supplied items.
- LAN cable (minimum CAT7) 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. See DL2 Installation manual Chapter 3 for cable dimension.

Power supply requirements

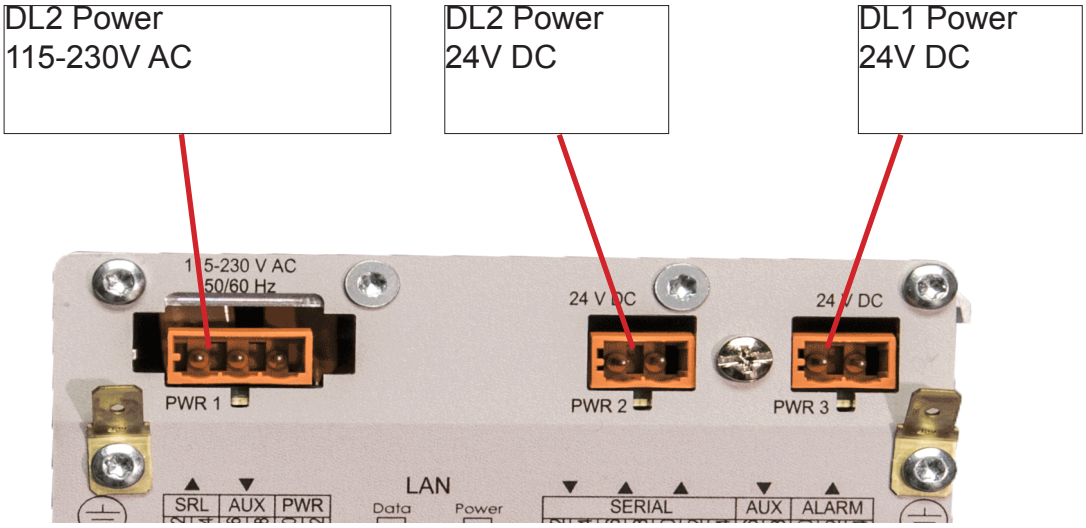
The JB70D21-SA power supply includes separate power for DL1 and DL2

DL2:
- CU-M001-SA. Operator Unit. 24V DC. Max 10 W, Typical 6 W.
- JB70D21-SA. Electronic unit (DL2 Power): 24V DC and/or 115/230V AC. Max 60 W typical 15 W.

DL1:
- CD402CU-SA. Operator Unit. 24V DC. Max 10 W, Typical 6 W.
- JB70D21-SA. Electronic unit (DL1 Power): 24V DC. Max 20 W.

There are no power switches on the CD402CU-SA, CU-M001 orJB70D21-SA.
The separate power inputs should be including a manual circuit breaker.
There are no input fuse on the CD402CU-SA, CU-M001-SA or JB70D2-SA.
The power input should be including a fuse rated for 100 % - 200 % of max power installed components.
Example:
Two separate 24V supplies for DL1 and DL2.
Each 24V supply should have a 3A slow blow fuse.

Optional items power supply requirement:
- CD401MR-SB repeater. 24V DC. Max 10 W, Typical 6 W.
- IR31DIM-SA. External dimmer: 24V DC
- LAN switch: 24VDC

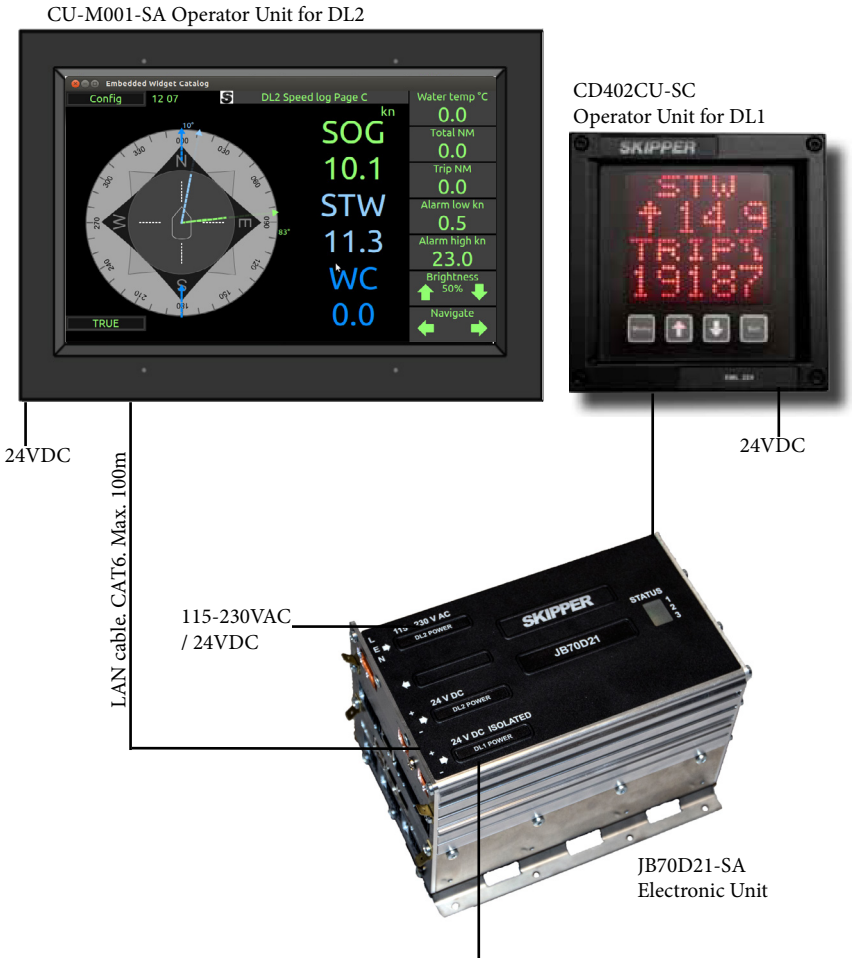


CHAPTER 2: HARDWARE MOUNTING

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

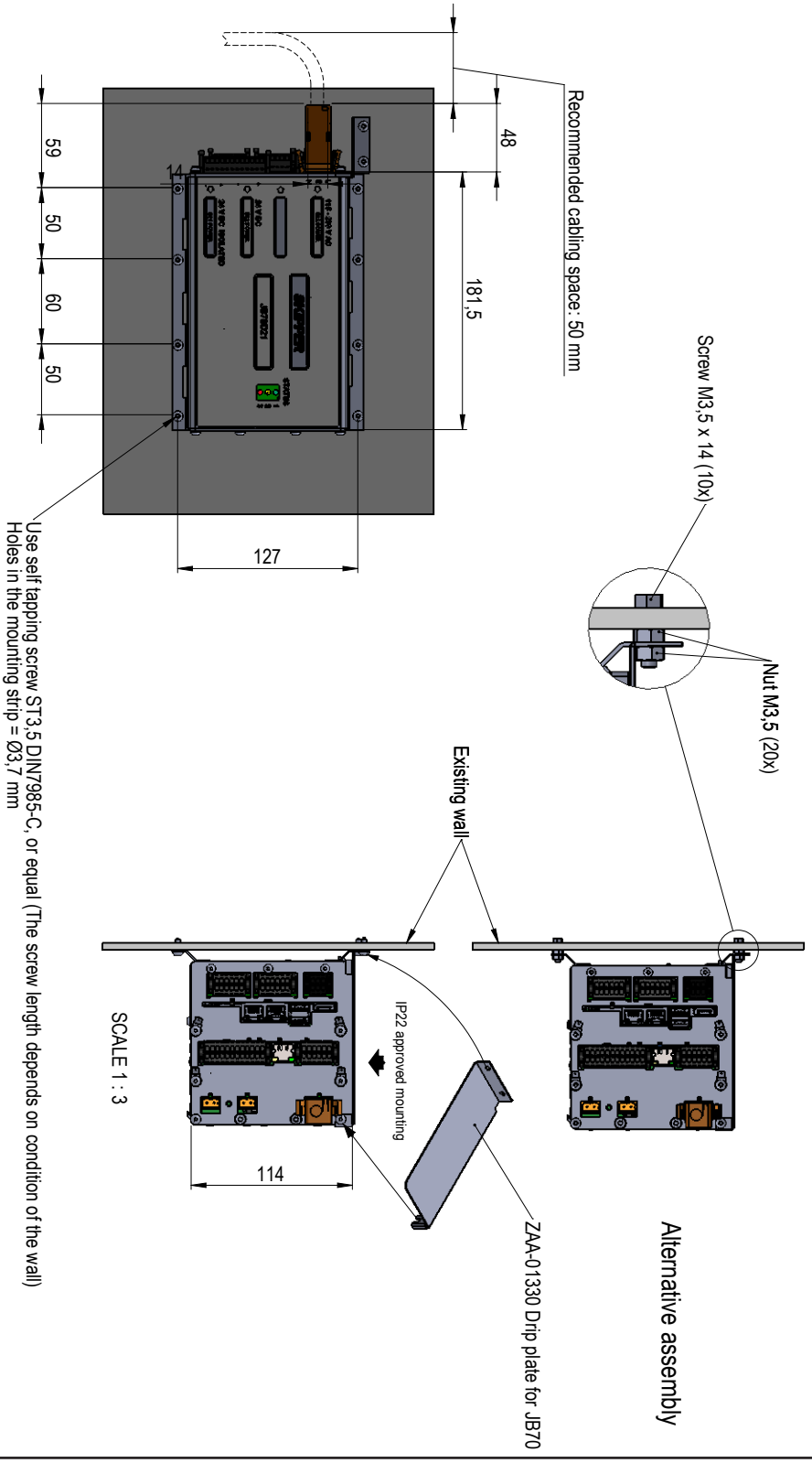
For mounting of DL1 Operator unit (CD402CU-SC)
Please see “Installation manual DL1” DM-M004.

For mounting of DL2 Operator unit (CU-M001-SA)
Please see “Installation manual DL2” DM-M002.



PLACEMENT OF THE ELECTRONIC UNIT

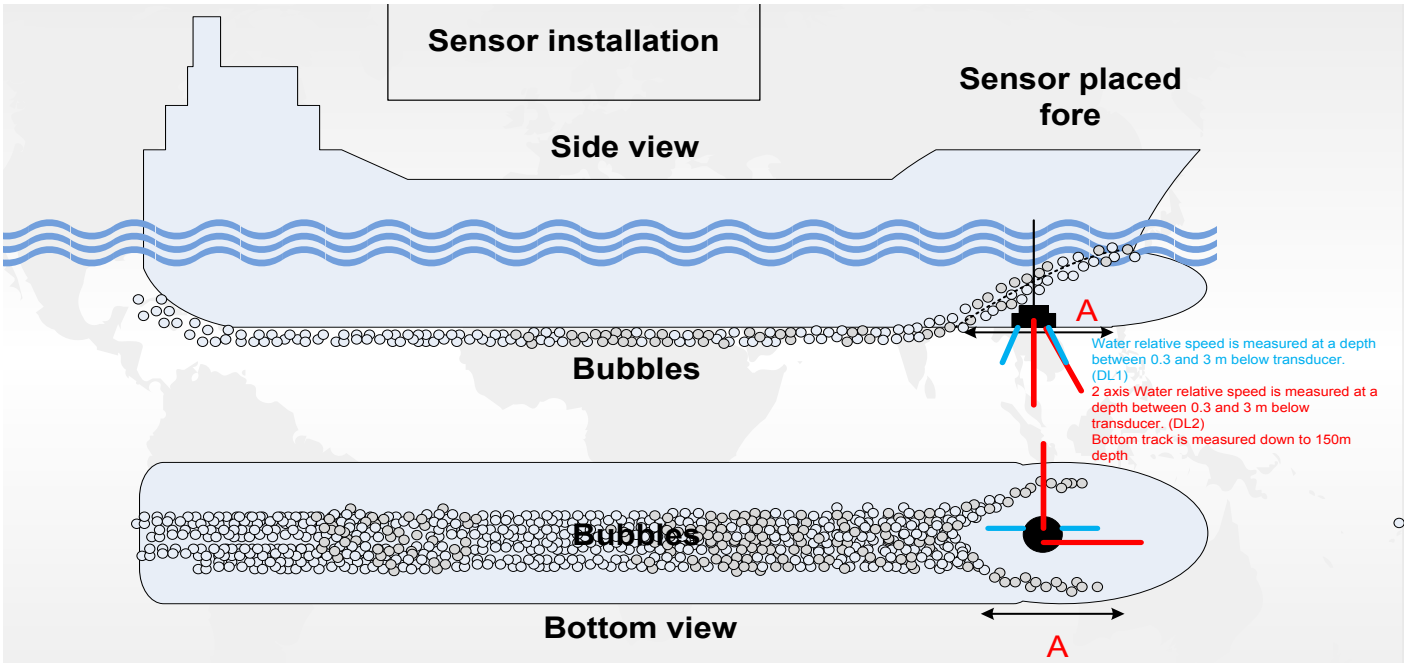
For placement of JB70D21-SA Electronic unit please see “Installation manual DL2” DM-M002.
Same as JB70D2-SA



Placement of the Sensor in sea valve

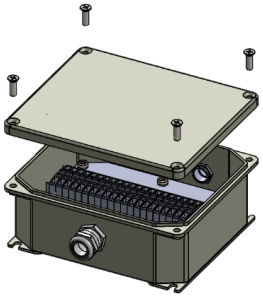
For placement of DL21SG-SA sensor please see “Installation manual DL2” DM-M002.
Same as DL2SG-SA

The sensor dimensions are the same for DL21 and DL2
There are 6 acoustic channels in DL21
DL1 has 2 channels(Blue)
DL2 has 2 channels (Red).
The acoustic signal is sent in a 30deg angle from vertical



Placement of JB21 Junction box

The junction box JB21 is an option for connecting sensor cable to a yard supplied extension cable (6 x twisted shielded pairs).
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

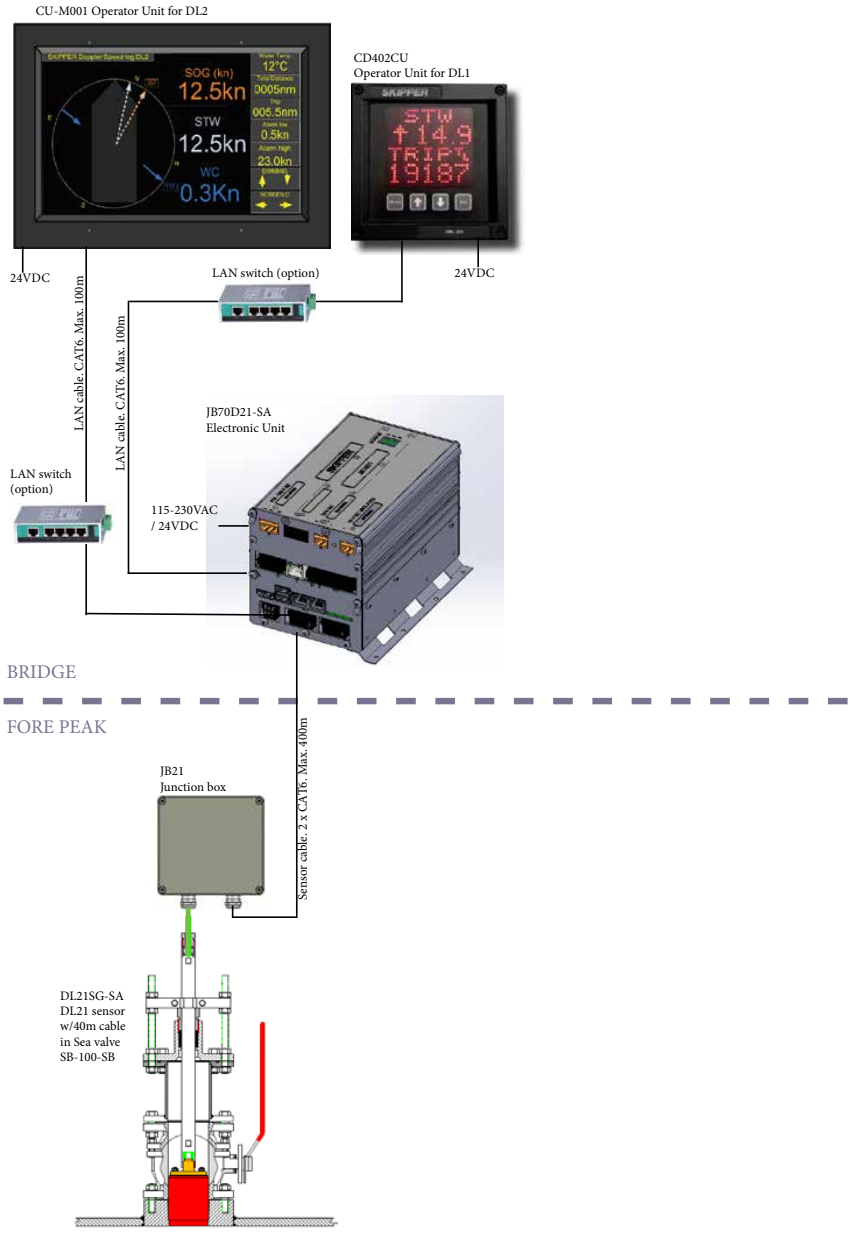
OPERATOR UNITS WIRING

For wiring of DL1 Operator unit (CD402CU-SA) please see “Installation manual DL1” DM-M004.
For wiring of DL2 Operator unit (CU-M001-SA) please see “Installation manual DL2” DM-M002.

The Operator units will communicate with JB70D21 over LAN.

Option 1: Direct.
There are 2 LAN ports on JB70D2. A PC or LAN network may be connected to second LAN port.

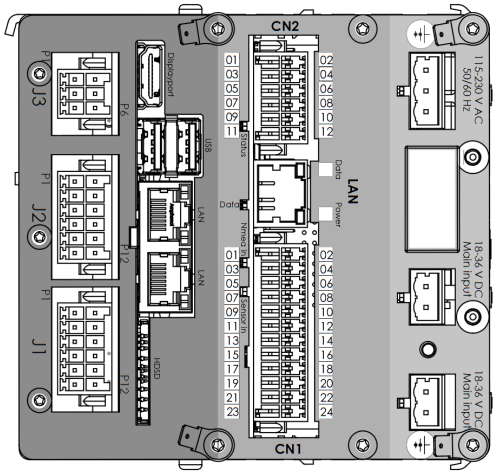
Option2: Via LAN network. (as shown in picture)

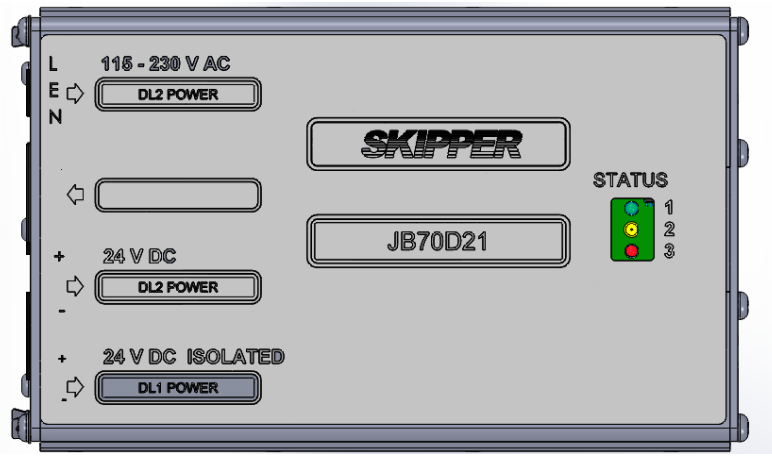


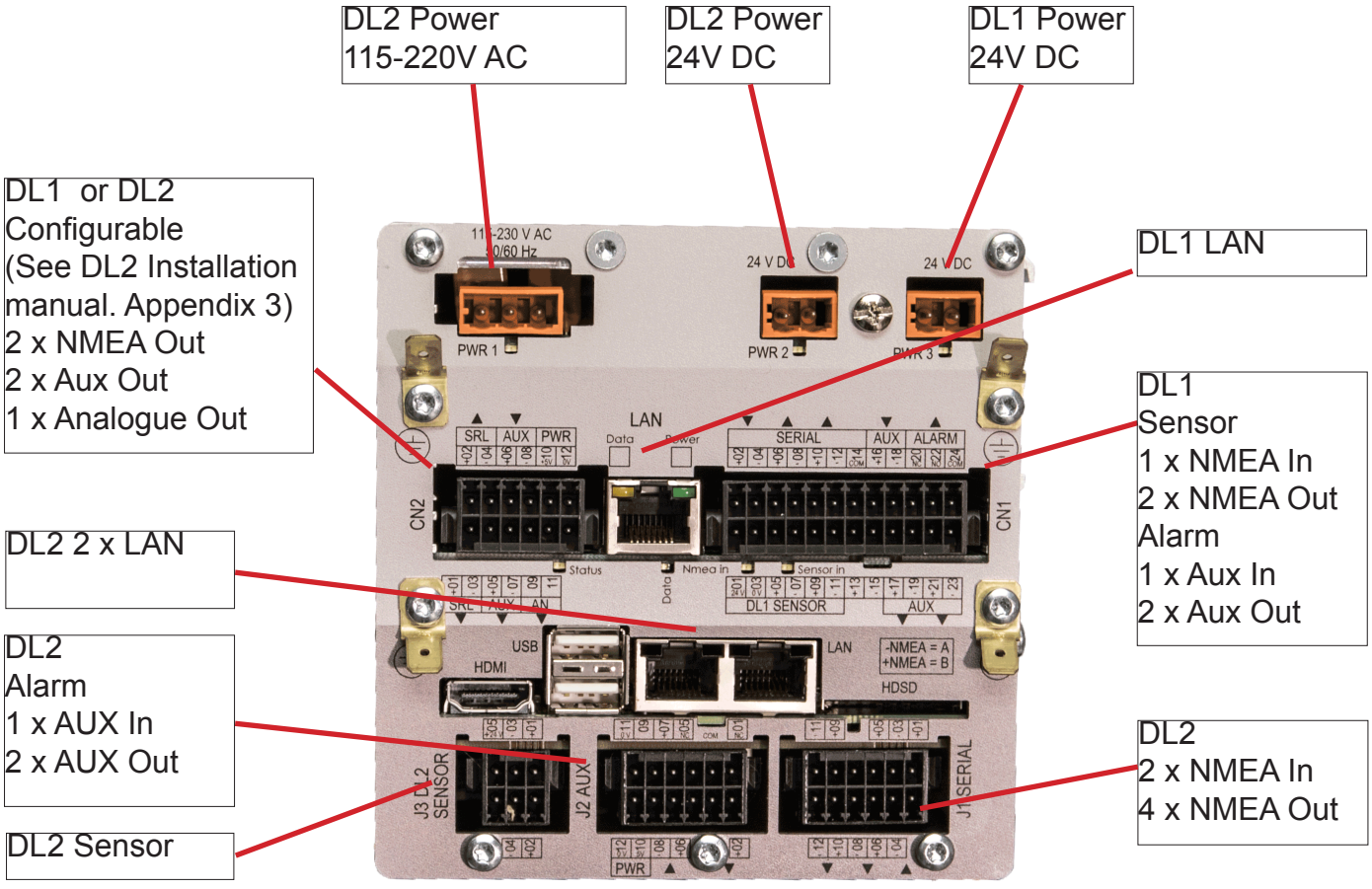
JB70D21-SA Electronic Unit Wiring

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 nominal 24VDC (Max 32VDC) and/or 115-230V AC.
The DL1 is powered from 24V DC Isolated input.

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

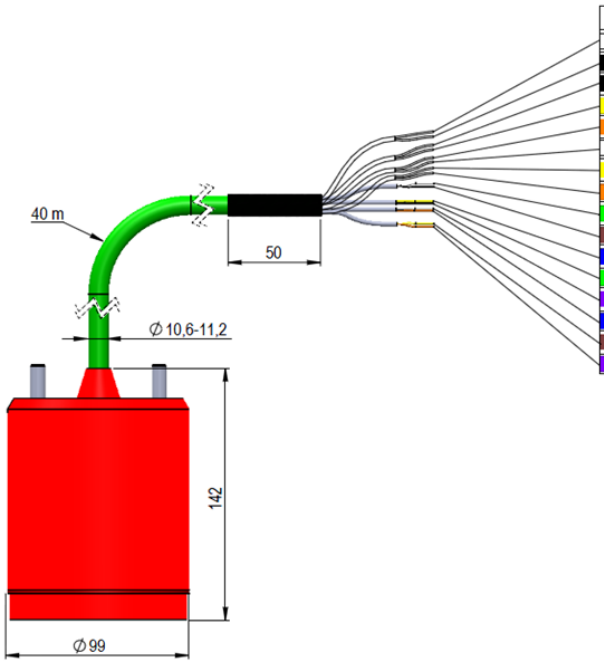






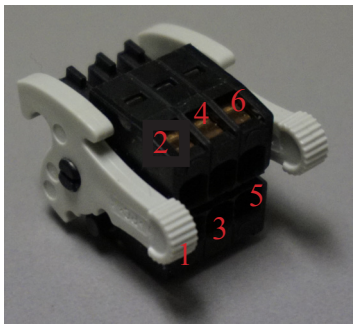
Sensor connection J3 (DL2) and CN1 (DL1)

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

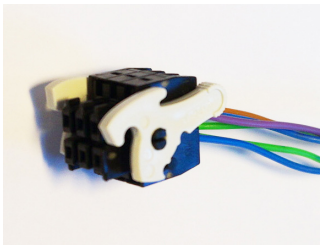


Color code	Signal	Pair
	+24 V DC	Individually screened pair
	0 V	
	RX+	Individually screened pair
	RX-	
	TX+	Individually screened pair
	TX-	
	Not used	Individually screened pair
	Not used	
	+18-36 V DC	Individually screened pair
	0 V	
	TX+	Individually screened pair
	TX-	
	RX+	Individually screened pair
	RX-	
	Not used	
	Not used	

DL1 Plug CN1	Pin 1
	Pin 3
	Pin 9
	Pin 11
	Pin 5
	Pin 7
DL2 Plug J3	Pin 5
	Pin 6
	Pin 1
	Pin 3
	Pin 2
	Pin 4



DL2 plug J3



CHAPTER 3: STARTUP PROCEDURE

General system startup

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

Special DL21 functions

DL21 is a combination of 2 systems. The DL1 part provides 1 Axis Speed Through Water (STW). The DL2 part provides 2 Axis Speed Over Ground (SOG), and also 2 axis Speed Through Water. The longitudinal STW value is therefor produced by both system. And at times can be slightly different . This is because the sensors measure at slightly different depths and frequencies.

To prevent confusion it is possible to turn off the STW from the DL2 system. This is done by changing the ‘Output Parameters buttun in the DL2 setup configuration. This has two settings:

STW + SOG : The DL2 behaves as normal with all IO refering to the DL2.

SOG Only: THe DL2 provides only SOG parameters and internally transfers the information of STW from the DL1. This means the VBW sentence from DL2 will also contain the Longitudinal STW information from the DL1 (but no Transversal information).
In addition the Trip information will be transferred from the DL1, as this comes from STW information and not SOG (SOG can be unavailable for periods when the water depth is too deep). This trip informamtion will also be transmitted from both DL1 and DL2 IO. and if external trip reset is used, this will be transferred to the DL1 system.

Synchronisation

The DL21 has internal isolated communication between the DL2 part and DL1 part. This allows the systems to display some information from the other system. It also allows the two systems to synchronise. By doing this the system will minimise the acoustic interference between the systems (The two sensors are within the same sensor housing). Interference effects can only be seen in very poor sensor conditions (Deeper water with few particles in the water to provide reflction), and may be seen as a constant wrong speed on the DL2. This effect is removed by synchronisation. This function can be activated / deactivated on the DL2 setup page.

CHAPTER 4: OPTIONS

For options of DL1 please see “Installation manual DL1” DM-M004.

For options of DL2 please see “Installation manual DL2” DM-M002.
Please note that some options available on DL2 will not be available on DL21.

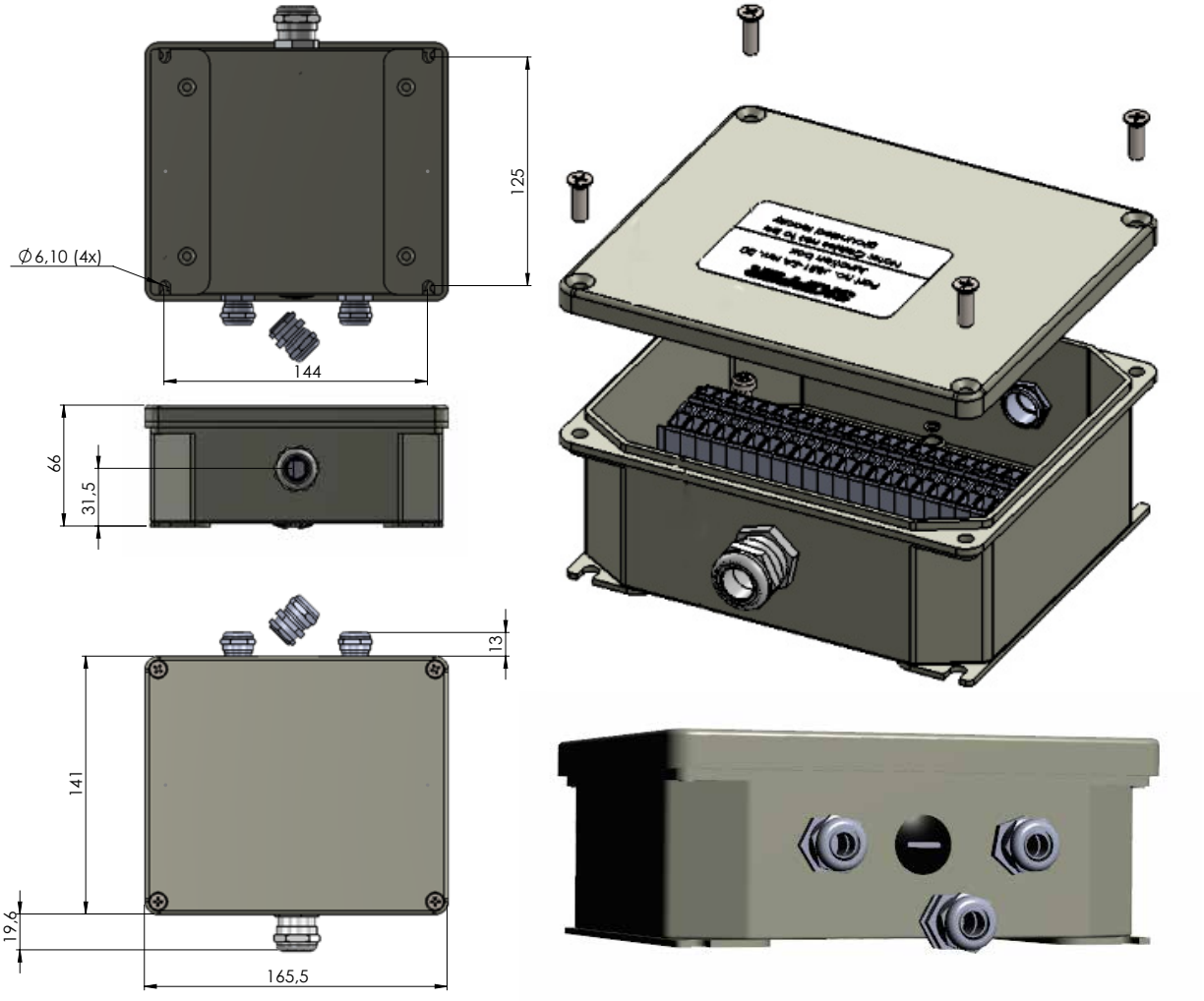
APPENDIX 1: INSTALLATION DRAWINGS

Product Datasheet

JB21-SA JUNCTION BOX

Specifications

	Part number	Description
Part number	JB21-SA	Junction box, 21 pole for speed logs
To be used with		SKIPPER speed log sensor cables with digital signals (DL21)
The junction box contains	WAGO 264-112 1 x Cable gland 3 x Cable gland	2-conductor terminal strip with fixing flange for screw or similar mounting types 3.2 mm Ø 21 pole Pg 13.5 (M20) For green DL21 sensor cable 8 pairs + 2 screens Pg 9 (M15) 2 x mounted, 1 x spare
IP rating		IP 56
Weight		0.8 kg
Packaging dimensions / weight		31x22x12 / 0.9 kg



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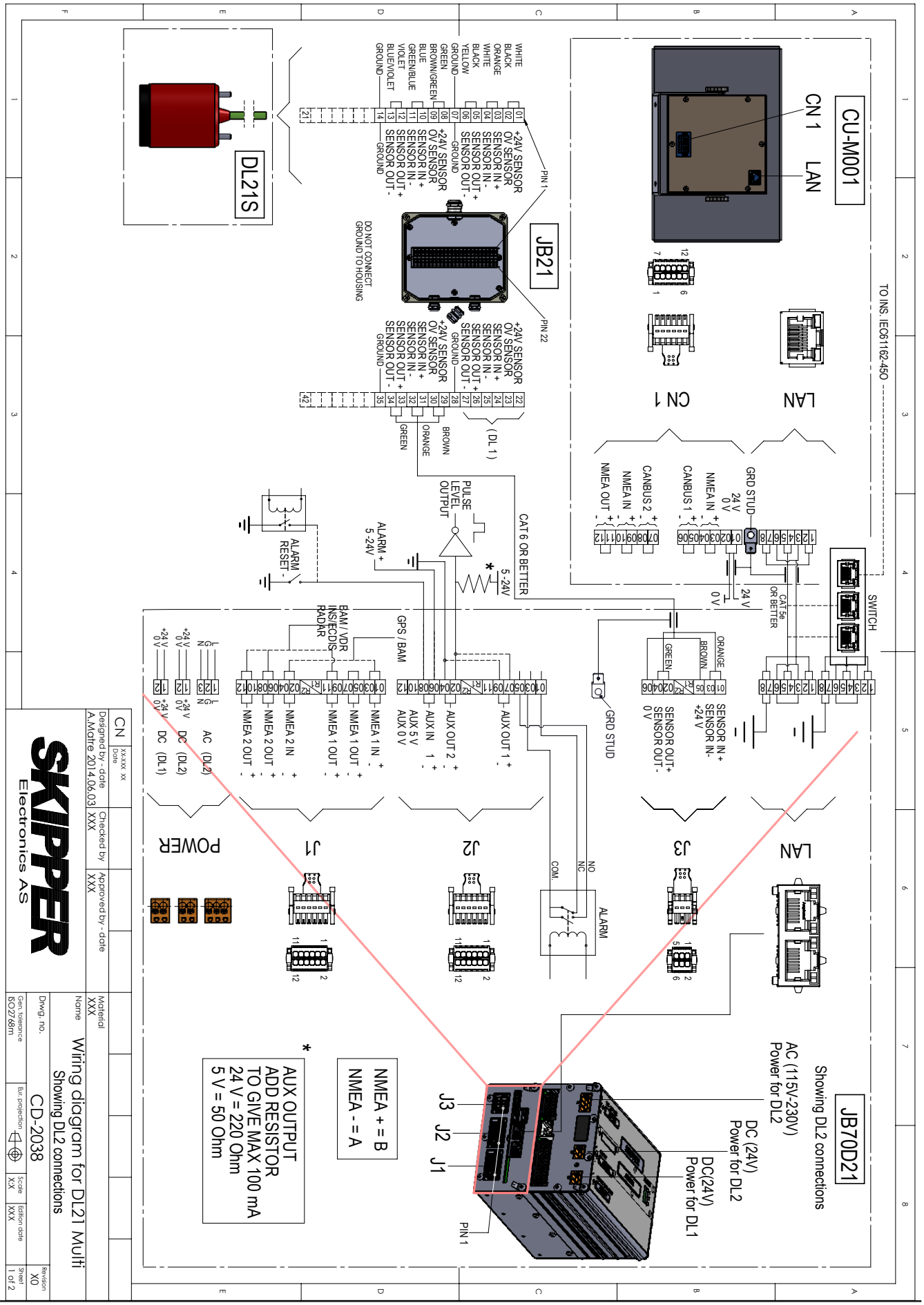
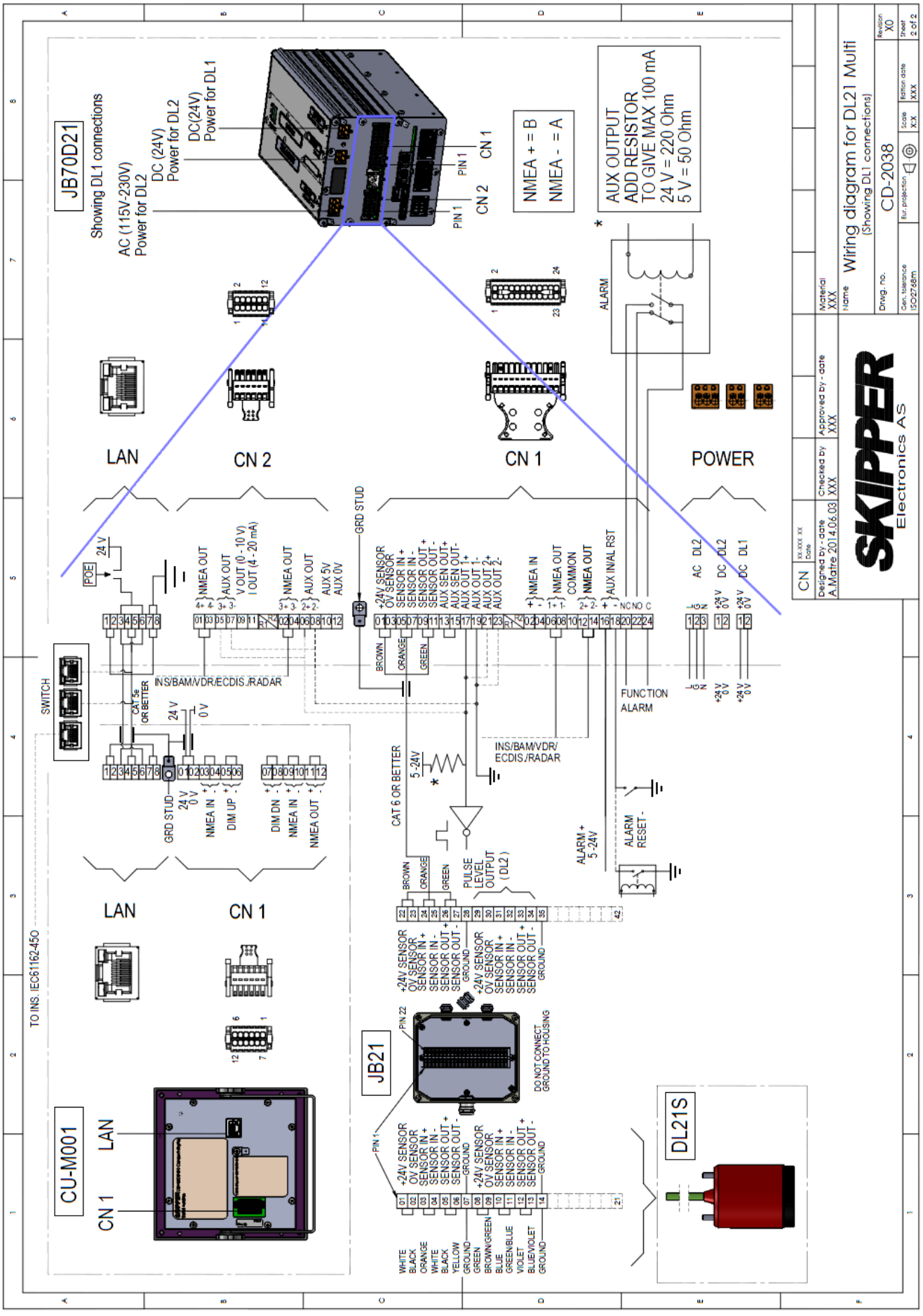
Last update: 2014-12-10


CU-M001
CN 1
LAN
DL21S
JB21
JB70D21
Showing DL2 connections
AC (115V-230V)
Power for DL2
DC (24V)
Power for DL2
DC(24V)
Power for DL1
TO INS: IEC61162-450
CAT 6 OR BETTER
SWITCH
POWER
J1
J2
J3
LAN
ALARM
AUX OUTPUT
ADD RESISTOR
TO GIVE MAX 100 mA
24 V = 220 Ohm
5 V = 50 Ohm
NMEA + = B
NMEA - = A
Wiring diagram for DL21 Multi
Showing DL2 connections
CD-2038
SKIPPER
Electronics AS


JB70D21
Showing DL1 connections
AC (115V-230V)
Power for DL2
DC (24V)
Power for DL2
DC(24V)
Power for DL1
CN 1
CN 2
PIN 1
NMEA + = B
NMEA - = A
AUX OUTPUT
ADD RESISTOR
TO GIVE MAX 100 mA
24 V = 220 Ohm
5 V = 50 Ohm
ALARM
LAN
CN 2
CN 1
POWER
POE
24 V
NMEA OUT
AUX OUT
V OUT (0 - 10 V)
I OUT (4 - 20 mA)
AUX 5V
AUX 0V
GRD STUD
+24V SENSOR
0V SENSOR
SENSOR IN +
SENSOR IN -
SENSOR OUT +
SENSOR OUT -
AUX SEN OUT+
AUX SEN OUT-
AUX OUT 1+
AUX OUT 1-
AUX OUT 2+
AUX OUT 2-
NMEA IN
COMMON
AUX IN/ALRST
NC NO C
AC DL2
DC DL2
DC DL1
BROWN
ORANGE
GREEN
SWITCH
INS/BAM/VDR/ECDIS./RADAR
CAT 5e OR BETTER
FUNCTION ALARM
CAT 6 OR BETTER
5 -24V
PULSE LEVEL OUTPUT (DL2)
ALARM + 5 -24V
ALARM RESET -
DIM DN -
DIM UP -
NMEA IN -
NMEA OUT -
GROUND
TO INS. IEC61162-450
CU-M001
JB21
PIN 22
DO NOT CONNECT GROUND TO HOUSING
DL21S
WHITE
BLACK
ORANGE
WHITE
BLACK
YELLOW
GROUND
GREEN
BROWN/GREEN
BLUE
GREEN/BLUE
VIOLET
BLUE/VIOLET
GROUND
Designed by - date
A.Matre 2014.06.03
Checked by
XXX
Approved by - date
XXX
Material
XXX
Name
Wiring diagram for DL21 Multi
(Showing DL1 connections)
Dwg. no.
CD-2038
Revision
X0
Sheet
2 of 2
Scale
XX
Edition date
XXX
Gen. tolerance
ISO2768m
SKIPPER
Electronics AS

APPENDIX 2: DATA SHEETS

DATA SHEET JB70D21-SA

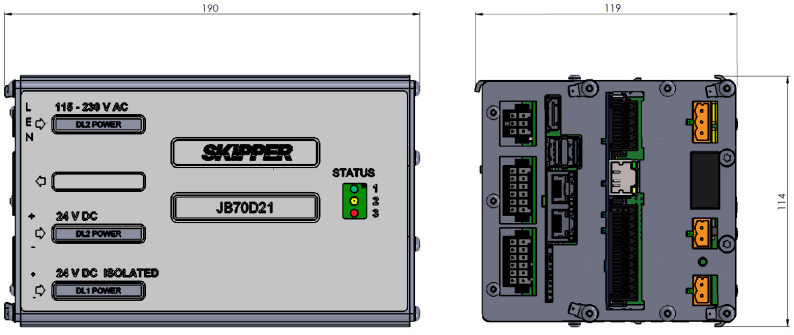
Product Datasheet

JB70D21-SA Electronic Unit
for combined DL2 and DL1 Doppler Speed Logs

Specifications

	Part number	Description
Part number	JB70D21-SA	Electronic unit for DL21
Control units	CD402CU-XX CU-M001-XX	Control unit Compact with LAN Control unit 9" Touch display
Sensor	DL21SXX or DL2SXX +DL1SXX	Dual 1 axis STW and 2-axis STW + SOG or 2-axis (STW + SOG) + 1-axis STW
Package consist of	JB70D21-SA M-KIT-JB70XX	Electronic unit for DL21 Mounting kit for JB70
PCBs inside electronic unit	PP-M001 PI-M001 PC-M001	Multi power, PCBM I/O Multi extension, PCBM Multi main processor, PCBM
PP-M001 power	115 - 230 V AC/24 V DC max 60 W (For DL2) typ. 15 W 24 V DC max 20 W (for DL1) typ. 10 W	Dual isolated power supply.
PI-M001 interfaces for DL1 Multi	• NMEA0183, IEC61162-1, 2 output, 1 input • Auxiliary x 2 output, 1 input • Alarm relay x 1 • IEC 61162-450 fully implemented • Web page setup	• NMEA outputs can be used for IEC61162-2 • Auxiliary can be designated to alarm, pulse, speed warning • Relay designated to function and/or powerfailure alarm • Configurable web pages for setup and runtime functions
PI-M001 switchable interfaces	• NMEA out0183, IEC 61162-1, 2 output • Analogue 1 x 0-10 V, 1 x 4-20 mA • Auxiliary:1 x output , 1 x input	• Programmable outputs for DL2 or DL1 by switch CN1
PC-M001 interfaces for DL2	• NMEA 0183,IEC61162-1, 2 output, 1 input • Auxiliary x 2 output, 1 input • Alarm relay x 1 • Analogue output • IEC 61162-450 fully implemented • Web page setup	• NMEA outputs can be used for IEC61162-2 • Auxiliary can be designated to alarm, pulse, speed warning • Relay designated to function and/or powerfailure alarm • 0-10 V, 4-20 mA (DL21 configurable, DL2 option) • Configurable web pages for setup and runtime functions
IP rating		IP 22 (when mounted with PCBs vertical)
Operating temperature		-15 to 55°C
Storage temperature		-20 to 70°C
Humidity		10 to 90 % relative. No condensation
Weight		1.5 kg
Packaging dimensions / weight		30.5 x 21.5 x 21 cm / 2 kg
Manufacturer		SKIPPER Electronics AS, Norway

Dimensions in mm



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Date: 2015-02-20

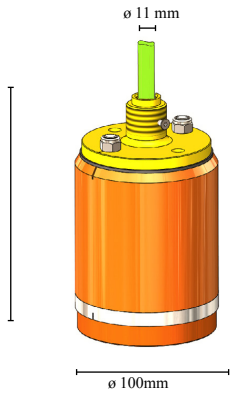
DATA SHEET DL2SG-SA

Product Datasheet
DL21SG-SA Log sensor DL21
For 100mm Sea valve SB-100-XX/DB100-XX

Specifications

	Part number	Description/units
Part number	DL21SG-SA	• Log sensor DL21 SKIPPER for 100mm Sea Valve • 1 Doppler sensor 1-axis STW • 1 Doppler sensor 2-axis STW+SOG • The 2 sensors mounted in one bottom mounting works independantly and are electrically isolated • Designed for ships over 50.000 GRT with simultaneous and independent measurement of speed through water (STW) and speed over ground (SOG)
To be installed into	SB-100-XX DB-100-XX	Sea Valve 100 mm , Single Bottom SST Sea Valve 100 mm, Double Bottom SST
To be used with	JB70D21-XX	Electronic unit
Acoustic frequency range		270-284 kHz (STW+SOG), 710-720kHz (STW)
Bottom detection (SOG)		< 200 m
Cable length		40 m (may be extended or shortened)
Cable diameter		11 mm +/-0.5
Cable minimum bending radius		56 mm
Accuracy		0.2 kn or 2 % whichever is greater
Speed resolution		0.1 kn
Max speed		+45 to - 10 kn Longitudal +/- 25knot Transversal
Temperature accuracy		1 deg
Temperature resolution		0.1 deg
IP rating		IP 68
Operating temperature		-15 to 55°C
Storage temperature		-20 to 70°C
Depth rating		6 bar
Outputs		2 x NMEA (proprietary formats) RS422
Input		2 x NMEA (proprietary formats) RS422
Power input		2 x Nom. 24 V (18 V to 32 V) 16 W
Weight		10.2 kg
Manufacturer		SKIPPER Electronics AS, Norway

45cm * 44cm * 32 cm
10.2kg



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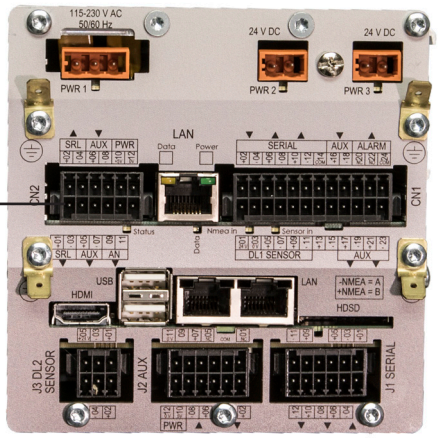
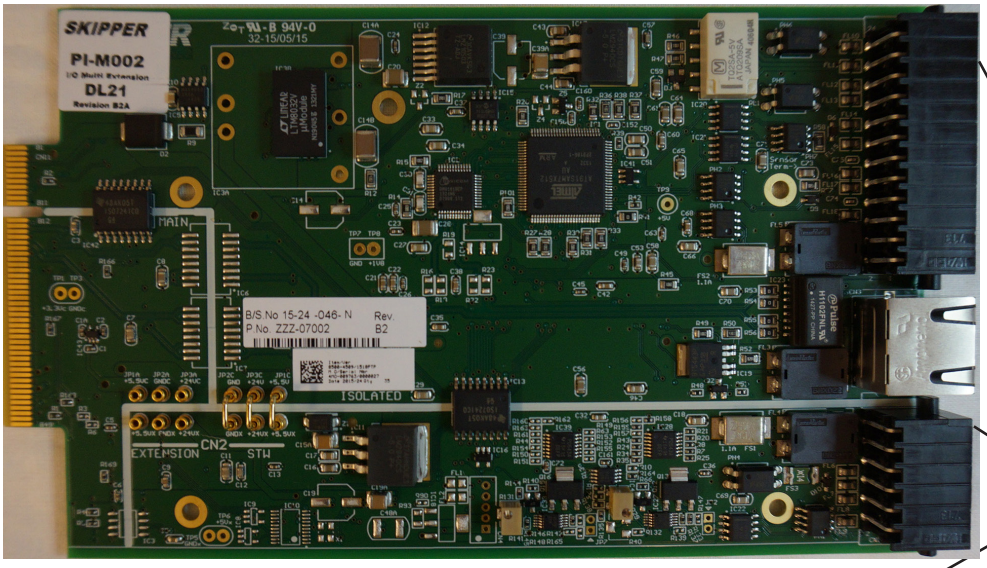
Date: 2015-02-23

APPENDIX 3: I/O MULTI EXTENSION PCB

The multi extension PCB is used in JB70D1 and JB70D21 (+ future option in JB70D2)



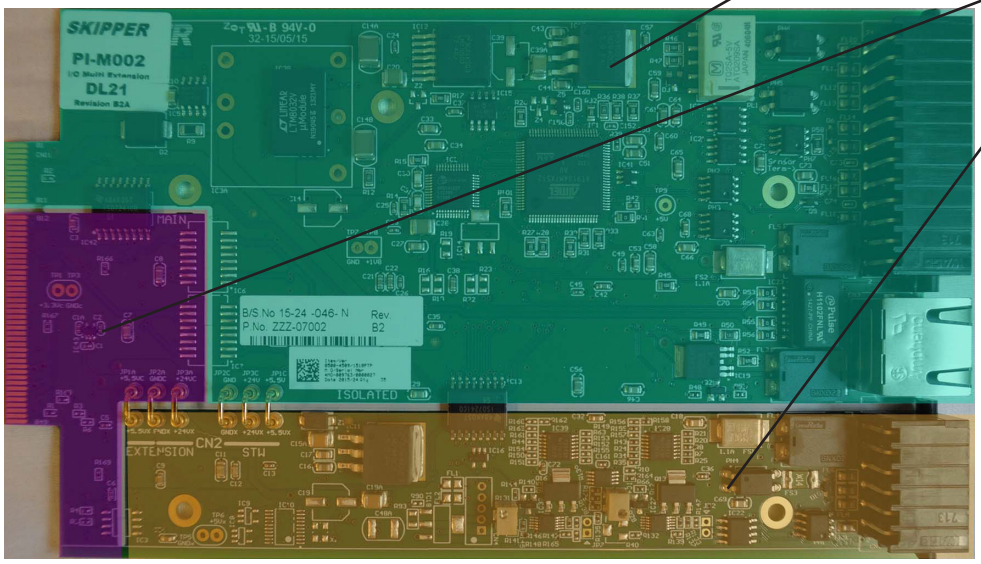
The PCB is designed with 3 electrical isolated areas.



CN1

CN2

Area1:
CN1 and electronics used by DL1

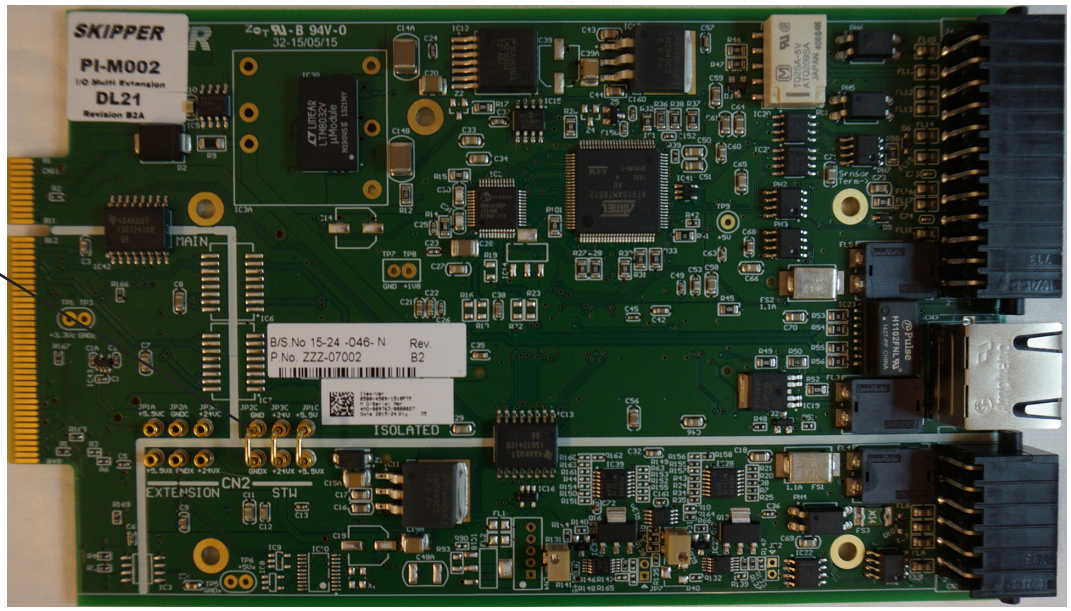


Area2:
Power for DL2

Area3:
Electronics with CN2
2 x NMEA Out
1 x AUX In
1 x AUX Out
1 x Analogue out 4-20 mA
1 x Analogue Out 0-10V
1 x 5V AUX power out
Configurable to be used and powered by DL1, DL2 or both. (The control from DL2 is not yet implemented)

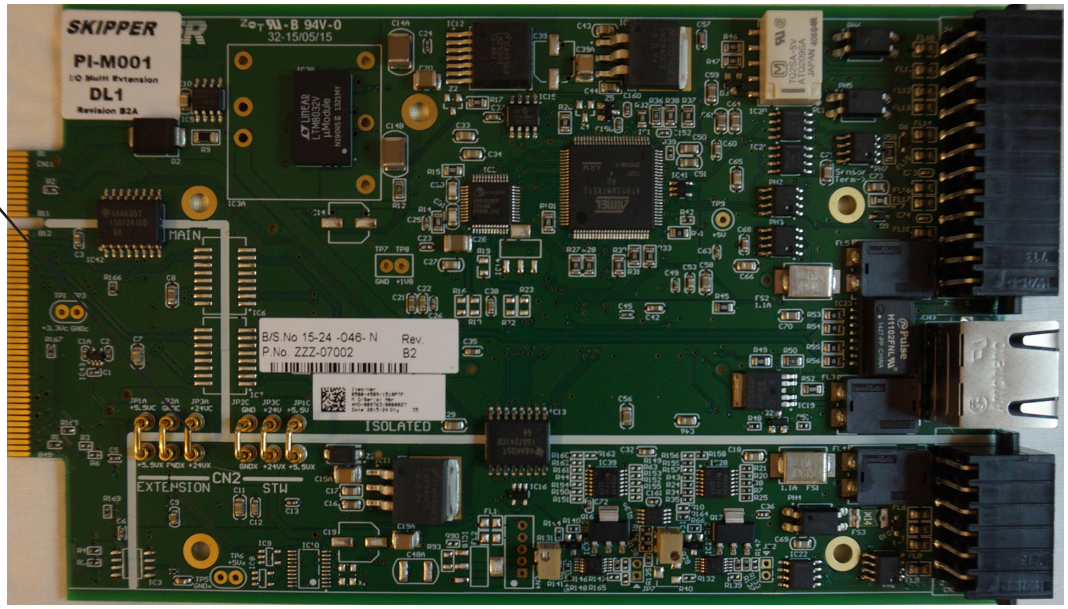
PI-M002. Multi Extension PCB. DL21 Version

3 power jumpers are installed.
CN2 is powered and controlled by DL1.



PI-M001. Multi Extension PCB. DL1 Version

All 6 power jumpers are installed.
CN2 (and rest of DL1) is powered by any of the power inputs 220 / 115V AC (PWR1), 24V DC (PWR2) or optional 24V DC (PWR3)



APPENDIX 4: COMMISIONING CHECKLIST

DL2

Test Nr	Task	Test to be performed	Checklist
DL2 – 1	Wire and check the system	Wire together the JB70 LAN and CU-M001 Graphic display • Display does not show 'NO COMMUNICATION'	
DL2 – 2		Set up the config as per instructions Wire NMEA IN, NMEA OUT • MFD shows VBW,a.a,,V,x.x,y.y,A,,A,z.z,A , MTW, VLW	
DL2 - 3		Wire Relay output J2 to common alarm • Remove power (AC and DC) and check you see alarm	
DL2 – 4	Install and connect sensor for DL2 to the JB70 unit (J3) Connect JB70 to CU-M001 display	Check Using the service software and the self test in Config – Diagnostic – Self test, • Serial Number of sensor (DL2) should be same as on cable	
DL2 – 5	Check Sensor	• Firmware version should be correct (2.14 or greater)	
DL2 – 6		• Live data should show quality factor (QF) 8 or 9 Upgrade firmware to the version on the skipper websites	
DL2 – 9	Install setup in the Bridge Conning system	Check on MFD that you see inputs from DL2 • You can see input VBW, VLW, MTW, occasional VDALR,	
DL2 - 10		Check on MFD that you can see the Outputs to the Log • You can see VTG, DPT, GGA, occasional ACK	
DL2 – 11		Check NMEA 1/2 input Check on display – Config – Communication, that the input is showing GYRO and GPS information. • Can see HDT/THS, ROT, VTG,GGA/GLL	
DL2-12		• Can see aft speed on page D	

DL1

Test Nr	Task	Test to be performed	Checklist
DL1– 1 DL1 – 2	Wire and check the system	Wire together the JB70 CN1 and CD402CU compact display • Compact shows STW on first line Wire NMEA IN NMEA OUT • MFD shows VBW,x.x,,V,,,A,,A,,A , MTW, VLW Wire Relay output CN1 to common alarm	☐ ☐
DL1 – 3 DL1 – 4 DL1 – 5	Install and connect Sensor for DL1 to the JB70 unit (CN1) Connect JB70 LAN plug to CD402 LAN plug Check sensor.	Check Using the service software and t• Check you see STW 0.0 on compact display • Using service software, check on the sensor serial number and firmware should be 1.05 or greater. • Upgrade firmware if required	☐ ☐ ☐
DL2 – 9 DL2 - 10	Install setup in the Bridge Conning system	Check on MFD that you see inputs from DL1 • You can see input VBW, VLW, MTW, occasional VDALR, Check on MFD that you can see the Outputs to the Log • You can see VTG, DPT, GGA, occasional ACK	☐ ☐
DL2 – 11 DL2-12		Set SPEEDHI alarm to 9 kn. Set Menu/set – Diag – DEMO to 1 and wait for alarm. • Check alarm sounds • Check alarm can be acknowledged	☐ ☐
	Check the power failure (Common alarm)	Remove power from the DL1 part of JB70 • The common alarm sounds.	☐

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