DL21
Installation Manual
Dual axis Doppler Speed Log System (SOG+STW) for vessels >50.000GT.

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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-M002.

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

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 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.

The DL21 system consist of:

2 x Display units.
- CU-M001-SA for DL2
- CD402CU-SD for DL1

1 x Dual Electronic Unit
JB70D21-SA Electronic unit

1 x Junction box
JB21-SA
(Optional for extension of 40m 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 270kHz sensors.
**OPTIONAL ITEMS DL21**
The following items are optional SKIPPER supplied items.
- Speed Repeater
- External dimmer
- LAN switch

Sensor extension cable.
Yard supply:
6 x twisted shielded pairs
Dimension: see DL2 manual Chapter 3.
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. 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. 24VDC. Max 10W, Typical 6W.
- JB70D21-SA. Electronic unit (DL2 Power): 24VDC and/or 115/230VAC. Max 60W typical 15W.

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

There are no power switches on the CD402CU-SA, CU-M001 or JB70D21-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. 24VDC. Max 10W, Typical 6W.
- IR31DIM-SA. External dimmer: 24VDC
- 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 (CD402CU-SC)
Please see “Installation manual DL1” DM-M002.

For mounting of DL2 Operator unit (CU-M001-SA)
Please see “Installation manual DL2” DM-M004.
**Placement of the Electronic Unit**

For placement of JB70D21-SA Electronic unit please see “Installation manual DL2” DM-M004. Same as JB70D2-SA.

For placement of DL21SG-SA sensor please see “Installation manual DL2” DM-M004. 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

---


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.

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P L A C E M E N T O F R E P E A T E R S

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-M002. For wiring of DL2 Operator unit (CU-M001-SA) 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 JB70D2. A PC or LAN network may be connected to second LAN port.

Option 2: 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 115-220VAC. 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-M004.
For setup of DL2 Operator unit (CU-M001) please see “Installation manual DL2” DM-M002.

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**

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**Product Datasheet**

**JB21-SA JUNCTION BOX**

<table>
<thead>
<tr>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part number</td>
</tr>
<tr>
<td>To be used with</td>
</tr>
<tr>
<td>The junction box contains</td>
</tr>
<tr>
<td>IP rating</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Packaging dimensions / weight</td>
</tr>
</tbody>
</table>

- **Part number**: JB21-SA
- **Description**: 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 2-conductor terminal strip with fixing flange for screw or similar mounting types 3.2 mm Ø 21 pole
  - 1 x Cable gland
  - 3 x Cable gland
  - 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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*All product specifications are subject to change without notice*

Last update: 2014-12-10
# APPENDIX 2: DATA SHEETS

## Data sheet JB70D21-SA

### Product Datasheet

**JB70D21-SA Electronic Unit**

*for combined DL2 and DL1 Doppler Speed Logs*

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part number</strong></td>
<td>JB70D21-SA</td>
<td>Electronic unit for DL21</td>
</tr>
<tr>
<td><strong>Control units</strong></td>
<td>CD402CU-XX</td>
<td>Control unit Compact with LAN</td>
</tr>
<tr>
<td></td>
<td>CU-M001-XX</td>
<td>Control unit 9” Touch display</td>
</tr>
<tr>
<td><strong>Sensor</strong></td>
<td>DL21SX</td>
<td>Dual 1 axis STW and 2-axis STW + SOG</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td>or 2-axis (STW + SOG) + 1-axis STW</td>
</tr>
<tr>
<td><strong>Package consist of</strong></td>
<td>JB70D21-SA</td>
<td>Electronic unit for DL21</td>
</tr>
<tr>
<td></td>
<td>M-KIT-JB70XX</td>
<td>Mounting kit for JB70</td>
</tr>
<tr>
<td><strong>PCBs inside</strong></td>
<td>PP-M001</td>
<td>Multi power, PCBM</td>
</tr>
<tr>
<td></td>
<td>PI-M001</td>
<td>I/O Multi extension, PCBM</td>
</tr>
<tr>
<td></td>
<td>PC-M001</td>
<td>Multi main processor, PCBM</td>
</tr>
<tr>
<td><strong>PP-M001 power</strong></td>
<td>115 - 230 V AC/24 V DC max 60 W (For DL2) typ. 15 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 V DC max 20 W (for DL1) typ. 10 W</td>
<td>Dual isolated power supply.</td>
</tr>
<tr>
<td><strong>PI-M001 interfaces</strong></td>
<td>NMEA0183, IEC61162-1, 2 output, 1 input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auxiliary x 2 output, 1 input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alarm relay x 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 61162-450 fully implemented</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web page setup</td>
<td></td>
</tr>
<tr>
<td><strong>PI-M001 switchable</strong></td>
<td>NMEA out0183, IEC 61162-1, 2 output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analogue 1 x 0-10 V, 1 x 4-20 mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auxiliary: 1 x output, 1 x input</td>
<td></td>
</tr>
<tr>
<td><strong>PC-M001 interfaces</strong></td>
<td>NMEA 0183, IEC 61162-1, 2 output, 1 input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auxiliary x 2 output, 1 input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alarm relay x 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analogue output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 61162-450 fully implemented</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Web page setup</td>
<td></td>
</tr>
<tr>
<td><strong>IP rating</strong></td>
<td>IP 22 (when mounted with PCBs vertical)</td>
<td></td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>-15 to 55°C</td>
<td></td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-20 to 70°C</td>
<td></td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>10 to 90 % relative. No condensation</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>1.5 kg</td>
<td></td>
</tr>
<tr>
<td><strong>Packaging dimensions / weight</strong></td>
<td>30.5 x 21.5 x 21 cm / 2 kg</td>
<td></td>
</tr>
<tr>
<td><strong>Manufacturer</strong></td>
<td>SKIPPER Electronics AS, Norway</td>
<td></td>
</tr>
</tbody>
</table>

### Dimensions in mm

[Diagram of the electronic unit]

All product specifications are subject to change without notice.
### Specifications

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description/units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL21SG-SA</td>
<td>- Log sensor DL21 SKIPPER for 100mm Sea Valve</td>
</tr>
<tr>
<td></td>
<td>- 1 Doppler sensor 1-axis STW</td>
</tr>
<tr>
<td></td>
<td>- 1 Doppler sensor 2-axis STW+SOG</td>
</tr>
<tr>
<td></td>
<td>- The 2 sensors mounted in one bottom mounting works independantly and are electrically isolated</td>
</tr>
<tr>
<td></td>
<td>- Designed for ships over 50,000 GRT with simultaneous and independent measurement of speed through water (STW) and speed over ground (SOG)</td>
</tr>
<tr>
<td></td>
<td>To be installed into SB-100-XX Sea Valve 100 mm, Single Bottom SST</td>
</tr>
<tr>
<td></td>
<td>To be installed into DB-100-XX Sea Valve 100 mm, Double Bottom SST</td>
</tr>
<tr>
<td></td>
<td>To be used with JB710D21-XX Electronic unit</td>
</tr>
<tr>
<td>Acoustic frequency range</td>
<td>270-284 kHz (STW+SOG), 710-720kHz (STW)</td>
</tr>
<tr>
<td>Bottom detection (SOG)</td>
<td>&lt; 200 m</td>
</tr>
<tr>
<td>Cable length</td>
<td>40 m (may be extended or shortened)</td>
</tr>
<tr>
<td>Cable diameter</td>
<td>11 mm +/- 0.5</td>
</tr>
<tr>
<td>Cable minimum bending radius</td>
<td>56 mm</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.2 km or 2 % whichever is greater</td>
</tr>
<tr>
<td>Speed resolution</td>
<td>0.1 km</td>
</tr>
<tr>
<td>Max speed</td>
<td>+/- 25 knot Transversal</td>
</tr>
<tr>
<td>Temperature accuracy</td>
<td>1 deg</td>
</tr>
<tr>
<td>Temperature resolution</td>
<td>0.1 deg</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP 68</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-15 to 55°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 70°C</td>
</tr>
<tr>
<td>Depth rating</td>
<td>6 bar</td>
</tr>
<tr>
<td>Outputs</td>
<td>2 x NMEA (proprietary formats) RS422</td>
</tr>
<tr>
<td>Input</td>
<td>2 x NMEA (proprietary formats) RS422</td>
</tr>
<tr>
<td>Power input</td>
<td>2 x Nom. 24 V (18 V to 32 V) 16 W</td>
</tr>
<tr>
<td>Weight</td>
<td>10.2 kg</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>SKIPPER Electronics AS, Norway</td>
</tr>
</tbody>
</table>

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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.

Area 1: CN1 and electronics used by DL1

Area 2: Power for DL2

Area 3: Electronics with CN2
2 x NMEA Out
1 x AUX In
1 x AUX Out
1 x Analogue out 4-20mA
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-M001. Multi Extension PCB. DL1 Version

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

PI-M002. Multi Extension PCB. DL21 Version

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