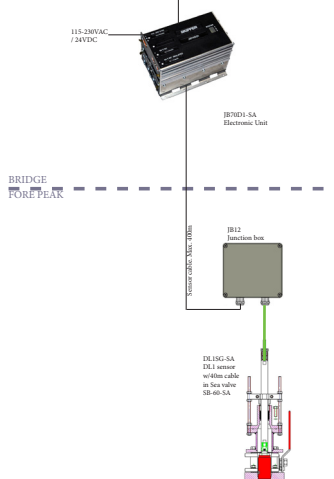


SKIPPER

DL1-Multi

Single Axis Doppler Speed Log System User Manual



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**DL1-
MULTI*****SINGLE AXIS DOPPLER SPEED LOG SYSTEM
COMPACT VERSION***

USER MANUAL (ENGLISH)

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OVERVIEW

CONTENT OF THE MANUAL

TERMINOLOGY

Terms, units and abbreviations used in this manual.

CHAPTER 1 - INTRODUCTION

This part introduces you to the elements of the DL1-Multi Doppler speed log system.

CHAPTER 2 – RUNTIME OPERATION

Once the system is installed and operational, the user can change the screen to show the data of interest at any particular time. This section explains the basic operation of the system.

CHAPTER 3 – CALIBRATION

Each new installation is unique and the system must be matched to the vessel. Calibration is required to avoid influence of mounting errors and that hydrodynamics of the vessel are compensated for. This chapter explains the procedure in a step by step guide.

CHAPTER 4 – SETTING UP THE DL1-MULTI

The CD401CU Compact display is a flexible dot matrix LED display designed to display navigation data. It can also be used as a primary sensor display for speed logs showing the speed values produced by the sensor, or as a simple repeater. The Compact speed log with its electronic unit (JB70D1) meets all the requirements of a primary device, both functionally and electrically. This chapter explains how to set up the unit.

CHAPTER 5 – CHECKING OUT YOUR SYSTEM

It is a good idea to verify your systems performance from time to time. This chapter describes how to check interfaces and other issues. In the event of malfunction, this is a good place to start for trouble shooting.

CHAPTER 6 – MAINTENANCE

To keep your system in order, regular maintenance is important. To take advantages of new features and performance enhancements, you may need to update software. This section shows how.

SYSTEM SPECIFICATION

Here you will find data sheet of DL1-Multi Doppler speed log system.

APPENDIX 1 – BACKGROUND INFORMATION

Here you will find more details of how the system works and which factors are important to know when using it.

APPENDIX 2 – MECHANICAL DRAWINGS

A picture is worth more than 1000 words! In addition to the text describing installation, the mechanical drawings are included to allow correct installation.

APPENDIX 3 - FILTERING

The DL1 two beams Doppler speed log may be programed to operate using one channel only.

APPENDIX 4 - SENDING THE SYSTEM FOR REPAIR

In the unfortunate case of a failure that requires a factory repair, the return sequence described, should be followed.

Please observe the instructions regarding warranty and utilization.

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TERMINOLOGY

TERMS USED IN THIS MANUAL

UNITS

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

Distance	Nautical miles (nm)
Speed	Nautical miles per hour (kn)
Pulse indication	Pulses per nautical mile (p/nm)
Temperature	Degrees Celsius (°C)

ABBREVIATIONS

In addition, the following symbols are used on the runtime screens:

Tp	Daily trip (in nm)
TL	Total measured distance travelled
°	Degrees centigrade
STW	Speed through water
TRIP	Text for trip/total
SOG	Speed over ground
TEMP °	Text for TEMPerature

In menu/setup screens, the following abbreviations are used:

STWWL	Speed through water – water track – longitudinal value
STWWT	Speed through water – water track – transversal value
PULSE	Pulse settings
OFS °	Angular offset in degrees (°)
R	Real resultant speed at a specific point (kn)
M	Measured resultant speed at a specific point (kn)
C _{rs}	Calibrated resultant speed
M _{rs}	Instantaneous uncalibrated measured resultant speed
DIAG	Diagnostics menu

Outgoing NMEA messages follows:

VMVLW	\$VMVLW,..., Trip and total
VMMTW	\$VMMTW,..., Water temperature
VMVHW	\$VMVHW,..., Relative speed through water
VMVBW	\$VMVBW,..., Multiple speed
VMXDR	\$VMXDR,..., Speed direction

Other terms:

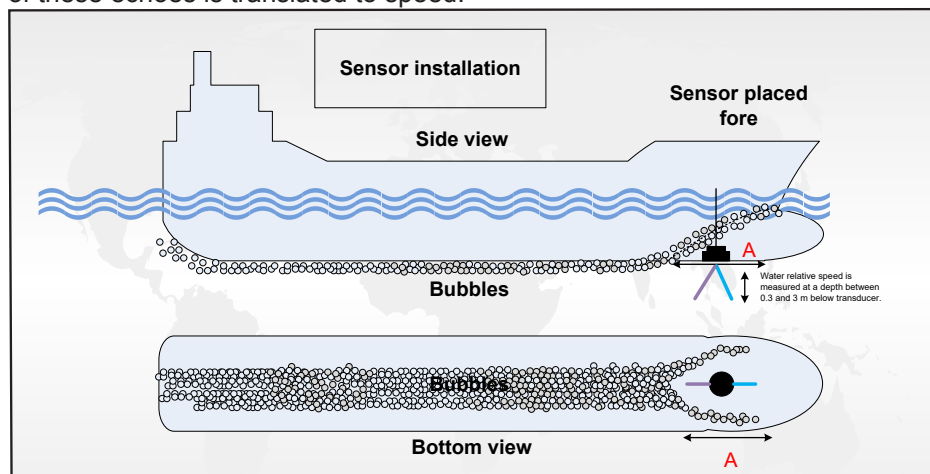
LAN	Local Area Network
PoE	Power over Ethernet
UDP	User Datagram Protocol - A method of transmitting messages on network.

CHAPTER 1

INTRODUCTION OF DL1-MULTI DOPPLER SPEED LOG SYSTEM

The DL1-Multi Doppler speed log system works by the Doppler principle. This principle is that a sound bouncing off a moving object will change in frequency. This principle can be utilized by making a narrow beam of sound and analyzing the frequency of the returning sound. This frequency change is proportional to the relative speed of the sound projector and reflecting object.

On a vessel, a transducer is positioned pointing slightly in one direction and the reflected sound comes from particles in the water or the bottom. The frequency of these echoes is translated to speed.



The DL1-Multi system has two sound beams in directions angled out from the vertical to get good speed definition. These two beams are angled so that the measurement axis (longitudinal) can be detected. It sends from the two beams at the same time but at slightly different frequencies so that the beams do not mix. The transducers are moulded into the same sensor head together with the amplifiers and detection circuitry (transceiver).

The sensor also contains temperature sensors and tilt sensors to **allow** compensation of the data. The transceiver contains a small computer which processes the data and signals and converts them to speeds. This data is sent to the electronic unit (JB70D1-XX) where it is formatted and presented on the control unit and web page, and as data in formats to be integrated into the vessels navigation and presentation systems such as repeaters and conning.

SPEED

The screen presents speed through water (STW) used for the autopilot, radar and logged on the voyage data recorder (VDR). The speed data is also used for setting limits on the rudder and stabilizer wings.

DISTANCE

In addition, the system shows distance travelled through water and has a resettable daily trip counter. This information is used for service intervals and navigation. Extra information is available regarding the sea temperature.

THE CONTROL UNIT

The user can operate the system via a simple to use touch screen or using a web page on the conning unit. The displays are intuitive and have a menu system, but also allows the user to click on the screen to adjust the relevant parameters. Full setup, calibration and diagnostics are available from the screens. Calibration is performed by a simple two leg sailing procedure, and once set, should not need repeating unless the sensor is moved or replaced.

MAINTENANCE

The system is low maintenance. After initial setup and calibration, the system requires no attention except to change alarm parameters if required. The sensor is exposed to the water and over time some growth may appear. This can be carefully removed when possible, and is normally not a problem except if the vessel is still for longer periods of time (weeks) in warm waters. The effect of this growth is usually seen as the range of the bottom track being reduced or jumping of the speed.

DIAGNOSTICS

The system has comprehensive built in test (BIT) that can be used to analyse the performance of the equipment and give a warning if the data is not within specification. It also has inbuilt redundancy in some areas, such that even if a failure occurs, it can still give some data. Due to the systems LAN network point, it is possible to set up the system for remote diagnostics and upgrade using network. In time this will help reduce service visits and increase the probability of first time fix.

CHAPTER 2

RUNTIME OPERATION

RUNTIME SCREENS

The control unit starts up in run mode. By pressing the MENU button, the preset user screens can be selected.

Some of the menu screens are also available in the run mode. The control unit can be dimmed in any of the run screens using the up (↑) and down (↓) buttons. If trip/total are selected as a displayed parameter, they can be reset by pressing and holding the SET button on the trip screen.



RUNTIME DIAGRAM



Operational 1
Main Screen
Not configurable
 ▲ Dimming
 ▼ Dimming



Operational 2
Configurable optional
3 or 4 Lines of values
 ▲ Dimming
 ▼ Dimming
 SET trip/total



Operational 3
Configurable optional
3 or 4 Lines of values
 ▲ Dimming
 ▼ Dimming
 SET trip/total



Trip Reset
Optional
 Shows present trip value
 ▲ Dimming
 ▼ Dimming
 SET resets the value, (press and hold)



Info
Optional
 Shows present system version
 ▲ Dimming
 ▼ Dimming

CHAPTER 3

CALIBRATION

THE PRINCIPLES

Calibration of a speed log involves correction the speed error, at various speeds.

If the vessel has a laminar water flow near the sensor, a single calibration point will be sufficient. If the flow changes with speed, (due to the friction of the hull, or nearby constructions) then extra calibration points will be required.

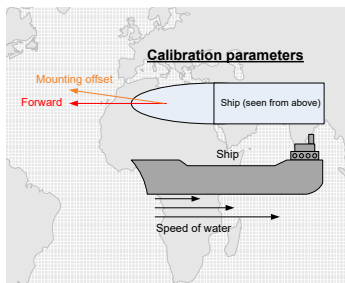
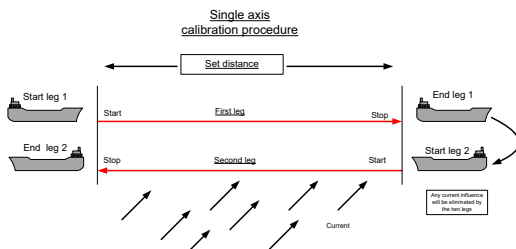


Figure 3.0

2-LEG CALIBRATION

Full calibration is designed to ignore water current effects. The procedure requires the vessel to sail a fixed length track, at a constant speed. To remove the current and wind effects, the same track should then be sailed in the opposite direction. The average of these tracks will be used to calculate the speed difference between the real speed (measured using the actual distance and the time it took), and the measured speed (using distance from the sensor and the time it took). This procedure must be performed at least once, and then other speeds checked with the GPS.

Figure 3.1



If necessary, the procedure should be repeated at different speeds. SKIPPER recommend that calibration is performed at a low speed and a high speed. If the user is not able to turn the vessel and is sure there is no current, the calibration procedure can be stopped after the first leg and saved as a calibration point. This will give values that are correct for that particular condition. (If current is present, the speed through water will contain an error).

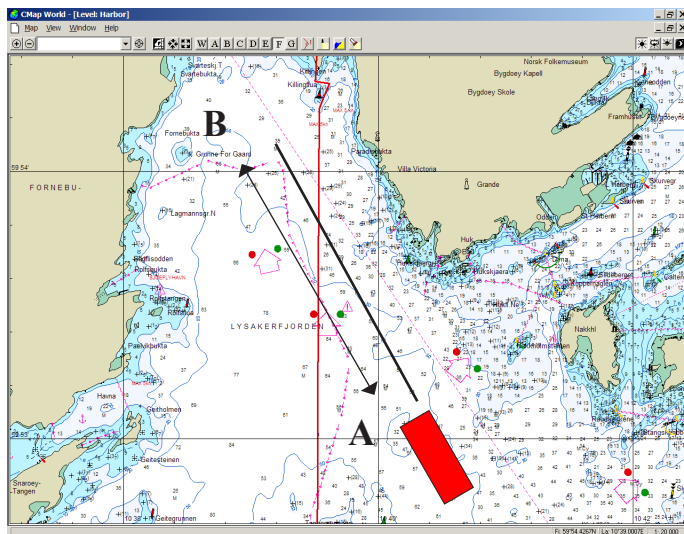


Figure 3.2
Shows plotting a
calibration path on
the chart.

The leg should take at least 5 minutes to sail (distance can be shorter when sailing slowly).

CALIBRATION MODES

The control unit has two modes of calibration:

1. Manual (MANUL).
2. Semi-automatic (AUTO).



Manual mode

The calibration – (MANUL) menu will allow the user to adjust the speed calibrations individually. Up (↑) and down (↓) adjust the highlighted parameter. SET moves to the next parameter. The data showing the result speed of the change will be displayed dimmed on the same screen. On the 3rd press, the lower value will change from measured or raw resultant value (Mrs) to calibrated resultant (Crs) to allow the user to check the result of the change.



Procedure

When entering the manual mode, you will be presented with the first speed calibration point.

Pressing SET moves you to the next speed calibration. Enter the real (R) speed and measured (M) speed, (the measured speed can be seen on the bottom line). The calibrated value can be checked by pressing SET one more time. Repeat this process at as many different speeds as necessary. (Up to 10 points, but one or two are usually sufficient).

Hint: Pressing down (↓) and SET together will change the current selected value to the resultant value, or to zero, saving time when adjusting.


Calibration using the Web page

Connect a LAN cable to the JB70D1, go to the web page as defined on the unit (default 172.16.1.103) and go to the web tab. From there you can select auto calibration, manual calibration or peripheral calibration (temp and tilt). Select manual mode, or GPS mode, then follow the onscreen instructions. Ensure that there is only one column on the calibration table for each speed (+/- ca. 2 knots)

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JB70D1-XX

Electronic unit for DL1



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Calibration menu

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[Auto Speed calibration](#)
[Manual Speed calibration](#)
[Temperature calibration](#)

Manual Speed calibration

Calibration point:	1	2	3	4	5	6	7	8	9	10	<div>ApplyCancel</div>
Real:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Clear all
Measured:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	


Sail in an area with no current in low wind and calm seas, in a straight course with heading and COG the same. When a speed input is stable and trustworthy, sail for at least 1 minute read off the GPS Speed over ground value and enter it in the table with the measured value below.

Current speed:	Real (calibrated) speed:	6.34 knots >>	Real (calibrated) speed is based on Measured (raw) speed using current calibration table
	Measured (raw) speed:	6.34 knots >>	

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Electronic unit for DL1



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Calibration menu

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GPS Speed calibration

Speed inputs:	\$-VTG_...x.x.N.a"hh<CR><LF> (x.x = Relative ground speed in knots)	7.80 knots >>	<div>Use VTG</div>								
	\$-VBW_...x.x.A...hh<CR><LF> (x.x = Longitudinal ground speed in knots)	5.46 knots >>		<div>Use VBW</div>							
Calibration point:	1	2	3	4	5	6	7	8	9	10	Save GPS calibration in position: 1 ▾
Real:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Measured:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Sail in an area with no current in low wind and calm seas, in a straight course with heading and COG the same. When a speed input is stable and trustworthy, sail for at least 1 minute and press the 'Use...' buttons for VTG and VBW.

Current speed:	Real (calibrated) speed:	6.34 knots >>	Real (calibrated) speed is based on Measured (raw) speed using current calibration table
	Measured (raw) speed:	6.34 knots >>	

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2-leg calibration

The calibration – AUTO menu will take the user step by step through the 2-leg calibration menu. The user may follow the steps presented on screen. First drawing a line on the chart system, as shown in figure 3.1 and 3.2.



The line should be sailed at constant stable speed and the line should represent at approx 5 minutes of sailing at the current speed.

- **Leg length setting.** (Adjust the length to match the line drawn on the chart).
- **Start first leg.** (The vessel crosses point A at the calibration speed, towards point B).
- **Stop first leg.** (The vessel reaches point B on the chart and turns to sail the line in the other direction).
- **Save first leg.** (If the presented speeds look correct, save the leg and continue).
- **Second leg** (If the first leg data is of poor quality, you may not be given the option to continue).
- **Start second leg.** (The vessel crosses point B sailing towards point A, sailing at the same speed as leg 1).
- **Stop second leg.** (Press as the vessel passes point B).
- **Calibration result and save option.** (The user can decide to accept or reject this calibration, and in which memory position to save it).



Note: The user should press the start and stop based on position on the chart, and not sailed distance on the unit.

The user may decide which of the 10 calibration points the calibration will be saved in. The screen will display the first available position on the table, or overwrite from zero upwards.

Calibration should occur or be checked whenever the sensor is moved, or a new sensor is mounted. If there is growth on the sensor over time, the speed may be reduced slightly. The sensor should be cleaned and then re-calibrated.


Note: If a new sensor is mounted, the calibration in the control unit may be useable. However, it should be checked.

Calibration using the web page.

Procedure for auto calibration using the web page is the same, however the web gives a better oversight. Enter the leg length and press start, etc. as the vessel sails the required legs

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JB70D1-XX
Electronic unit for DL1



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Calibration menu
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Auto Speed calibration

Actual distance to sail: 01_000 Nautical miles

Type in distance to sail

Set distance

Break

Calibration point:	1	2	3	4	5	6	7	8	9	10	Save leg in position: 1 ▾
Real:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Measured:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Plot a line of known distance on the ships chart in an area with little wind and low, stable current. Enter the length of the plotted line in Actual distance. Sail the line at a stable speed (note: sail along the track, not at a fixed heading). Press start and stop when the vessel crosses the ends of the line. Turn and repeat in the opposite direction at the same speed. This calibration technique is the most accurate.

Measured Sailed distance:

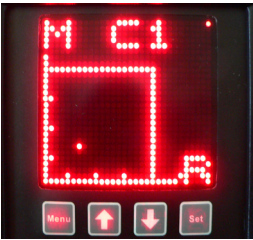
0.00 Nautical miles

Current speed:	Real (calibrated) speed:	6.34 knots >>>	Real (calibrated) speed is based on Measured (raw) speed using current calibration table
	Measured (raw) speed:	6.34 knots >>>	

CHECKING THE CALIBRATION

To check that the calibration points are not too far from the ideal linearity, the Calibration – GRAPH menu will plot the calibration points on the screen. The user may use up (↑) and down (↓) to select a calibration point and then adjust that value by pressing SET on the relevant point. The MENU button will return you to the GRAPH menu again.

If after calibrating the second speed, the first speed is no longer correct, this may indicate that the sensor forward alignment is wrong. See the installation manual to fix this.



CHAPTER 4

SETTING UP THE DL1-MULTI

PRINCIPLES

The control unit is a dot matrix LED display designed to display navigation data. The control unit can be user programmed to show self generated numerical data or from NMEA incoming messages.

The control unit with its electronic unit (JB70D1) meets all the requirements of a primary device, both functionally and electrically.

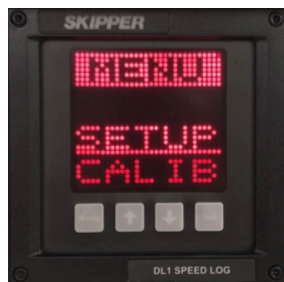
The control unit has three user definable alphanumeric pages, each allowing up to 4 parameters to be displayed. The first page will be fixed. In addition to on screen setup, the DL1-Multi system has a LAN interface, enabling the user to perform all the setup actions using a simple web page.

RUN SCREENS

The unit starts up in run mode. By pressing MENU button, the preset user screens can be selected. Some of the menu screens (i.e alarms) are also available in the run mode. The unit can be dimmed in any of the run screens using the up (↑) and down (↓) buttons. If trip/total are selected as a displayed parameter, they can be toggled using the SET button.

SETUP SCREENS

To change the setup of the control unit, the user must simultaneously press MENU and SET. This will give access to a menu system allowing the user to scroll up and down the sub-menus and functions using up (↑), down (↓) and SET to select. To move to the previous menu, the MENU button must be pressed. The middle underlined line is the selected line, the other lines are dimmed.

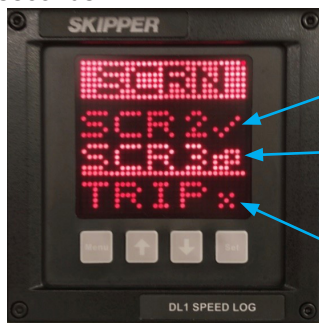


The menu structure is shown in the diagrams on [“Menu diagram” on page 24](#).

ACTIVATING THE RUNTIME SCREENS

The system has three user definable screens. Screen one may be locked in some configurations. In addition, the user can make the most common setup screens available. The screen menu (SCRN) allows the user to configure and choose which runtime screens to be included in normal operation. Up (↑) and down (↓) buttons will scroll to the available screens. By using the SET button, the user can control each individual screen to ON, OFF or SHIFTING.

Screens set to ON are available to be displayed by pressing the MENU button. Screens set to OFF will not be displayed. Screens set to SHIFTING will be shown on the display periodically. Each shifting runtime screen will be displayed for 5 seconds.



On

Shifting the screens automatically every 5 seconds.

Off

CONFIGURING OF DATA SCREENS

The three user programmable screens can be set up using the configuration (CONFG) menu. This submenu allows the user to select one of the three displays. On entering the CONFG screen, the user can change the data type to be displayed in each of the four screen positions. Up (↑) and down (↓) will change the data type, SET will move to the next screen position. The screen layout will depend on the selected data type. Up to four lines of text and data can be displayed on each screen. Placing TXT in the bottom 4th line or 3rd and 4th line will cause the data to spread out showing fewer data points. The system will not allow you to mix speed data from different sources on the same screen. Having two TXT lines after each other will also rearrange the positioning.

Note: The system needs one screen which indicates just the primary data. This screen is fixed and cannot be adjusted.



The non-active parameters will continue showing the dimmed title data, when not selected.

Configuration screen

Runtime screen

Configuration screen

Runtime screen



SETUP OF INPUTS AND OUTPUTS

The system will allow many NMEA formats to be displayed:

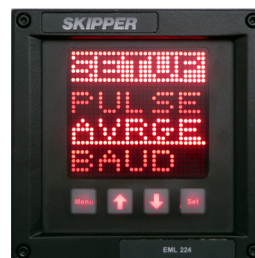
VMVBW	Speed long, trans, forward water speed
VMMTW	Temperature (water)
VMVLW	Trip/total (distance sailed)
VMVHW	Speed through water (resultant)
VMXDR	Vessel (sensor) direction (only when running in backwards mode)

The system will automatically update recognized formats. If the user wishes to output NMEA, the user can select the NMEA sub menu in the SETUP menu and move to the different formats using the up (↑) and down (↓) buttons. Each format can be activated/deactivated using the SET button.



AVERAGING

Each system type has some filters to ensure stable and correct data. The averaging filter takes a number of measurement pulses and makes a rolling average of these values. The longer the averaging, the more stable the data will be, however, the slower the system will respond to changes. The control unit have a minimum value of 10 seconds. If the system seems unstable at times, increasing the average time will reduce the fluctuations. However, the filtering is time based and as it increases, the response time of the system will decrease.



CHANGING THE BAUD RATE

The NMEA 0183 (IEC61162-1) standard is 4800 baud. Some vessels run with higher baud rates. 4800, 9600, 19200, 38400, 57600 and 115200 baud rates can be selected in the baud page of the setup menu. This page contains two sub menus, one for the sensor and one for the NMEA port. It is recommended that the sensor is kept to 4800 baud, as this speed is robust with longer cables. To switch between sub pages, the SET button is used. The baud rates become active when you leave the baud page.

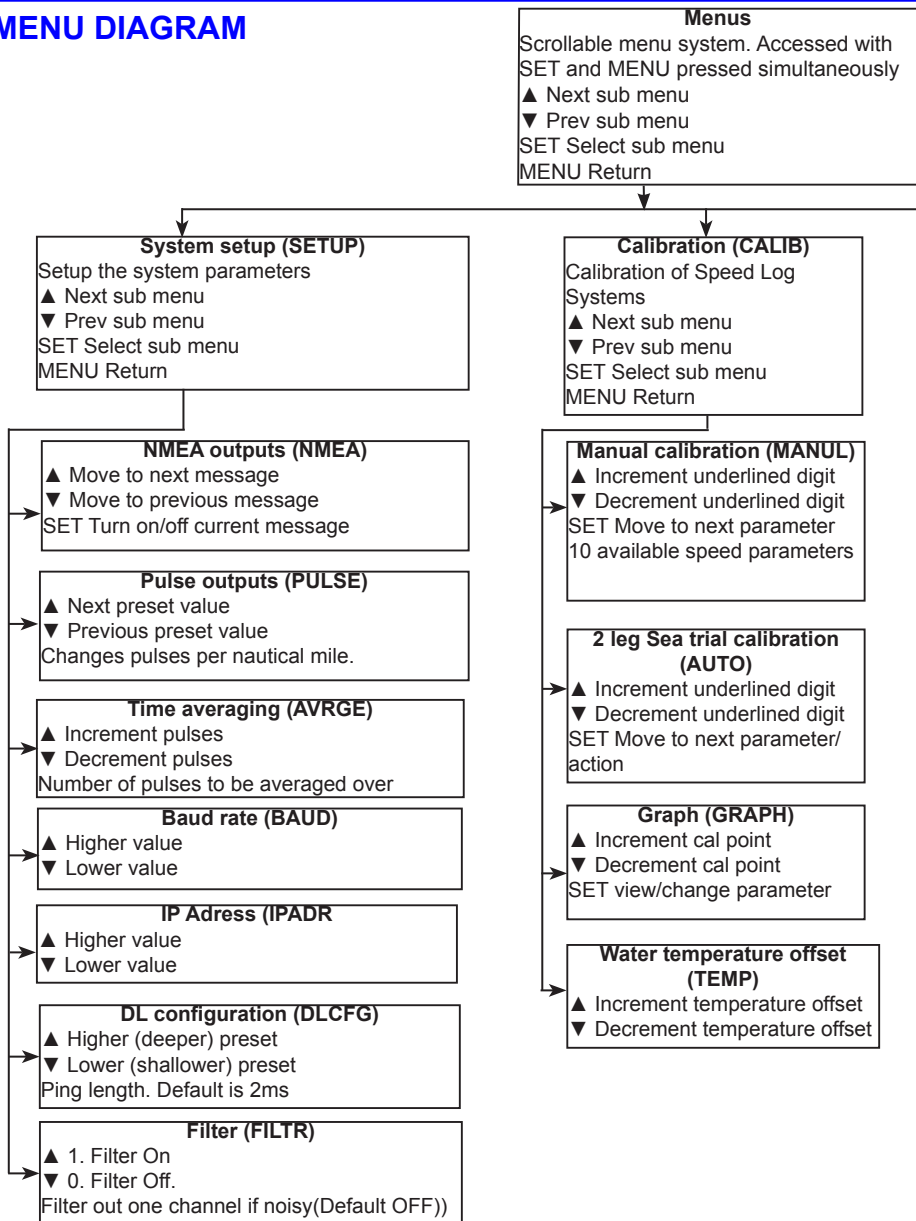
DEMO MODE

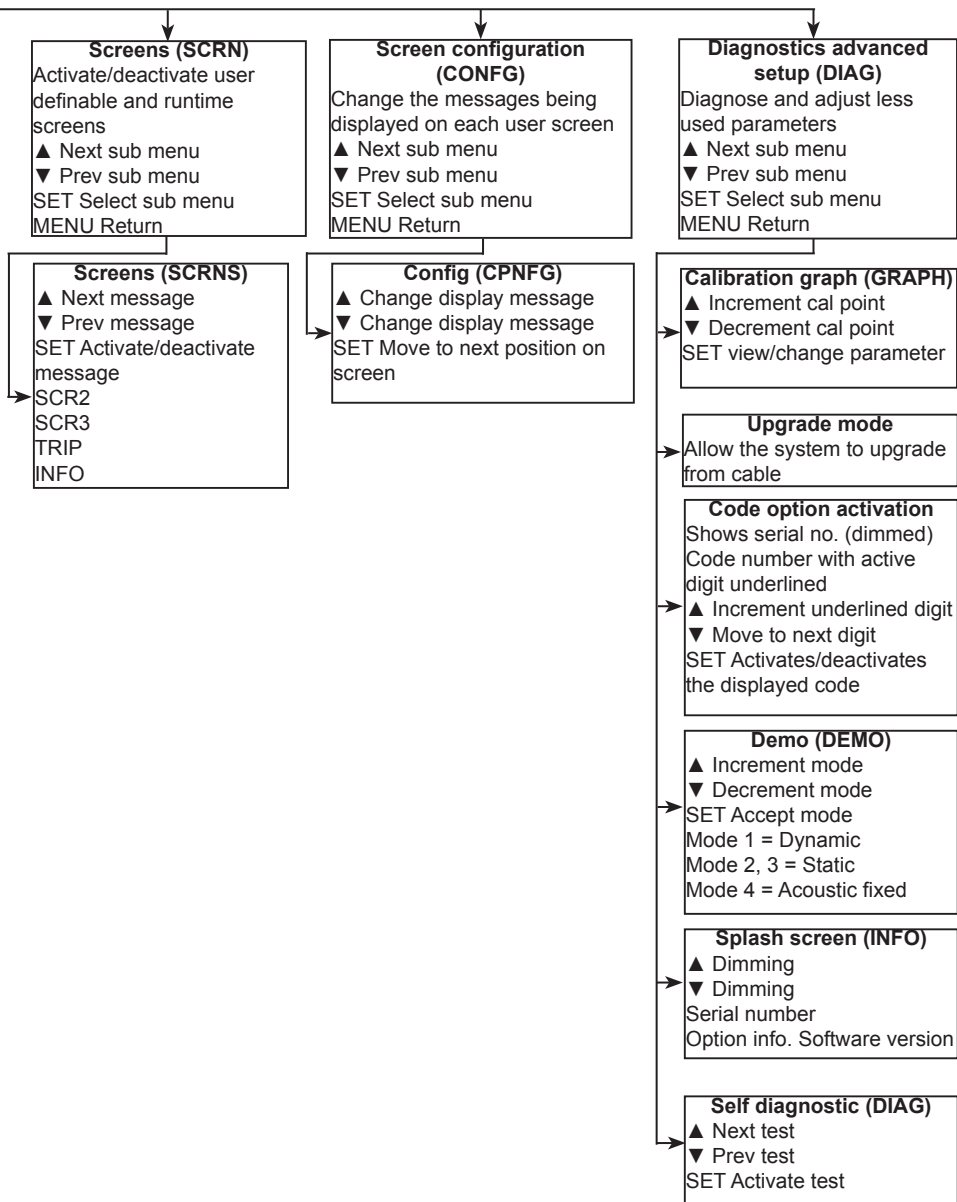
A demo mode is available, and can be activated in the diagnostics advanced setup (DIAG) menu. Four modes are available:

- **Mode 1;** is a **dynamic demo mode** taking the present value as the start point and slowly varying all the available values.
- **Mode 2;** is a **static demo mode** taking the present values and keeping them active.
- **Mode 3;** is a **fixed speed mode** with longitudinal 5 kn.
- **Mode 4;** is a user selectable **acoustic fixed speed mode**. The user selects the required speed and uses SET to activate/deactivate the signal. The system generates an acoustic signal equivalent to the required speed, and then measures it allowing the complete system to be checked.

When the demo modes are active, the sensor signal is ignored, and the screen will indicate the demo state with a blinking S in the upper right corner of the screen. The user can turn off the demo mode from the demo screen by pressing down (↓) button until OFF is shown on the screen, or the demo mode will turn off automatically after 10 hours.

MENU DIAGRAM





SETUP USING THE LAN WEB INTERFACE

Both JB70D1-SA and CD401CU-SC contain web sites for setup. To access these, the user must connect using a LAN cable (RJ45/CAT6) to the LAN port of the item to be set up (alternatively to the network they are connected to) and go to web page

Default 172.16.1.104 for the JB70D1, or 172.16.1.103 for the CD401CU-SC.

Once connected to the correct equipment, it can be set up as follows:


The CD401CU-SC will be operating in a dumb terminal mode, and needs no setup.

The JB70D1-SA web site presents all the options as drop down boxes, and the user can setup all the parameters as desired.

Runtime menus

In this menu each of the three setup screens can be defined. Each line can be defined, however only parameters that fit together should be shown, and only with a relevant title above.

The system has some intelligence in this choice, but the user should be careful that the display shows clearly what information is being shown.

SKIPPER	JB70D1-XX Electronic unit for DL1	
Home System Configuration CD402 CU Configuration Calibration Diagnostics Maintenance Help		

Brightness:

Brightness is controlled by pulse into the CD402CU unit, by NMEA DDC message or through this web function.

Brightness level:	4	Apply Cancel
Brightness levels below 3 are not saved		

Screen configuration:

	Screen 1:	Screen 2:	Screen 3:	Trip:	Info screen:
Operation:	<input checked="" type="radio"/> Enable	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Line 1:	TXT	TXT	TXT	TRIP RESET TRIPW	SKIPPER System type JB D1 FW ver.: 01.59
Line 2:	STWWL	STWWL	SCGBL		Apply Cancel Restore factory default values
Line 3:	TXT	TXT	TXT		
Line 4:	TXT	TOTLW	TOTLW		


Choosing TXT will either present the title of the parameter below or present a blank area.
Only valid configurations are allowed.

System Configuration

SKIPPER

JB70D1-XX

Electronic unit for DL1



Home | System Configuration | CD402 CU Configuration | Calibration | Diagnostics | Maintenance | Help

System Configuration

Serial No:		109034	
Network connection:	--IP address-- <div>172016001104</div>		To change enter password in Maintance page
	Subnet mask <div>255255000000</div>		
	IP address of default router <div>172016001001</div>		
	MAC Address 50-c9-a0-0-0-58		
Multicast:	System ID (SFI)	<div>VD0104</div>	To change enter password in Maintance page
	Group	<div>NAVD239.192.0.4</div>	
	CU ID	<div>II0103</div>	
	Alarm Destination ID	<div></div>	
CD402 CU connection:	Input port: <div><input type="radio"/> None <input type="radio"/> NMEA IN <input checked="" type="radio"/> Ethernet (UDP/IP)</div>	Output port: <div><input type="radio"/> None <input type="radio"/> Sensor OUT <input type="radio"/> NMEA OUT <input checked="" type="radio"/> Ethernet (UDP/IP)</div>	<div>ApplyCancel</div>
Auxiliary:	Aux in 1	<div>Dim Up</div>	<div>ApplyCancel</div>
	Aux in 2	<div>Dim Down</div>	<div>ApplyCancel</div>
	Aux out 1	Function: <div>Pulse out</div>	<div>ApplyCancel</div>
	Aux out 2	Function: <div>Power failure</div>	<div>ApplyCancel</div>
	Aux out 3	Function: <div>Speed warning</div>	<div>ApplyCancel</div>
	<div>Pulses: 200Pulses/Nautical Miles <div>ApplyCancel</div></div> <div>Speed warning: 00High speed warning 00Low speed warning <div>ApplyCancel</div></div>		
Averaging:	<div>20seconds (min 10 sec)</div>		<div>ApplyCancel</div>
DAC analog out [4-20mA]:	<div>5.0Min speed (4mA/0V out) 20.0Max speed (20mA/10V out)</div>		<div>ApplyCancel</div>
Filter:	On/Off: <div><input type="checkbox"/></div>		<div>ApplyCancel</div>

This setup screen allows the user to define the IP address of the unit. The range of allowed addresses is limited by standard IEC 61162-450.

The second section allows the user to activate the digital outputs, define the NMEA output parameters and activate/deactivate NMEA messages and also to define the usage of the auxiliary output.

The user can also adjust the averaging of the sensor.

- Higher average, more stable data, but slower in response (large vessels).
- Lower average, more jumpy data, but fast in response (small vessels).

SKIPPER Service software

SKIPPER has produced a free software (www.skipper.no) allowing a user/service technician to perform diagnostics over the network. This software will help to diagnose and setup the system. More details are available in the installation manual.

CHAPTER 5

CHECKING OUT YOUR SYSTEM

If you suspect something may be wrong with your DL1-Multi system, the system has possibilities to perform self diagnostics. This is available in the diagnostics menu. In addition, an up to date diagnostics guide can be downloaded from the support pages of www.skipper.no. The system is robust to most conditions, however high sea state or bubbles in front of the sensor may temporarily cause lower data quality. The system by default measures the speed through the water from depth 0.5m to 3m. If the water is shallower than 3 m, an element of the bottom speed may influence the results.


SELF DIAGNOSTICS

The Compact Speed Log contains some diagnostic features to enable the user to decide which part of the system is failing. The last 20 errors are stored in the system and can be downloaded using the diagnostics port. If the error is serious, the system will cause a general alarm (if activated), and restart itself. Error numbers can be found in Appendix 5.

Test No.	What it does	What is wrong?
0	All LEDs dimming SET = on/off	Check for LEDs not working. Check normal screens for rows or LEDs sticking
1	Check internal memory.	If fail, the system is not able to communicate with the internal flash memory.
2	Send out a command to sensor and wait for response or same message back.	If fail, either the output or the input to the sensor is not working or the sensor is failing.
3	Write out 80 characters to NMEA, ask user to press if ok, or read back.	Manually check the output. If fail, try to restart.
4	Write out 80 characters to SENSOR, ask user to press if ok, or read back.	Manually check the output. If fail, try to restart.
5 - loop	Manufacture test only	
6 - loop	Manufacture test only	
7 - loop	Manufacture test only	
8 - loop	Manufacture test only	
9 - loop	Manufacture test only	
10	Status of transducers	The screen will show the 2 speed values recieved by the sensor, and a quality value. If the values are similar in + and -, and quality over 2, the test passes. This test may occasionally fail, as objects pass the vessel, but should pass most of the time.

In addition, the system as a whole can be tested using the DEMO mode 4.


Diagnostic screen

SKIPPER	JB70D1-XX Electronic unit for DL1		
Home System Configuration CD401 CU Configuration Calibration Alarms Diagnostics Maintenance Help			
Diagnostics			
Selftests:	0: Turn on all LEDs on remote display Description of Selftests	Press <i>Start Test</i> to run selftest	<input type="button" value="Start test"/>
Demo:	Mode: 0: Off Description of Demo modes Speed to simulate in mode 4: 00 . 0 knots	Demo mode off (Normal operation)	<input type="button" value="Start Demo"/> <input type="button" value="Cancel"/>
NOTE: NMEA1 : Com1: Port 0 : Sensor port NMEA2 : Com2: Port 1 : NMEA port			

If a fault is suspected, diagnostics and in built test (BIT) can be used to check all elements of the system. Tests are selected from a drop down list, and a description of the tests can be viewed by clicking on the hyperlink below the dropdown box. Tests will check hardware, communications and the acoustics of the sensor.

In addition, a demo may be started to give simulated values out of the interfaces and on screen. In this case a 'S' will flash on screen. A special acoustic simulator is available for the DL1 sensor, that sends acoustic signal out and measures the return to check the whole system.

Maintenance

SKIPPER	JB70D1-XX Electronic unit for DL1		
Home System Configuration CD401 CU Configuration Calibration Alarms Diagnostics Maintenance Help			
Maintenance			
System type:	Current System type : CD D1 Serial number: S/N CD999999 Code: 04126	<input type="button" value="Apply"/> <input type="button" value="Cancel"/> All configuration parameters are restored to factory default values	
System unit name:	<input type="text"/> (Maximum 20 characters)	<input type="button" value="Apply"/> <input type="button" value="Cancel"/>	

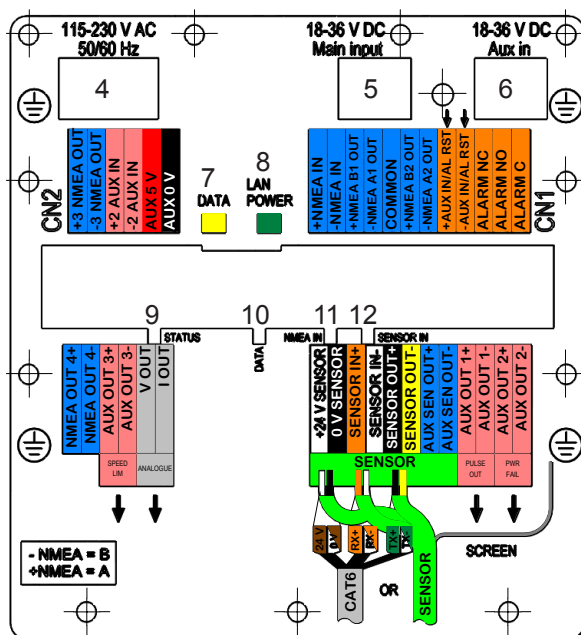
The maintenance page allows you to check the software version of the system. Software upgrade is performed from SKIPPER service software.

STATUS LED'S

It is also possible to see the status of the system by observing the LEDs on the JB70D1-SA electronic unit

Here you can check if the sensor is operational.

LED#	LED name	Colour	Description
11	NMEA in		Flashes each time data is received.
2	NMEA out		Flashes each time data is sent.
3	Pulse out		Flashes each time pulse is sent.
12	Sensor in	Red	Flickers with data being sent from the sensor (not so common).
8	LAN power	Green	+24 V supplied via the LAN cable for direct connection to CD401CU. This will not damage routers or other devices, but does not follow full PoE standard.
7	LAN data	Yellow	Flashes with each NMEA out transmission to navigation system.
1 or 9	STATUS 1 or STAT	Red	Flashing = status ok. Constant = Power but CPU not operating
5,6	24 V		Active.
4	AC		Active.



STATUS LED DIAGRAM



STATUS LED 1(Green) Not in use by DL1

STATUS LED 2(Yellow) Not in use by DL1

STATUS LED 3(Green) Status LED DL1

DL1 software version from 1.58:

Normal operation: LED flash every second.

If no DAT messages from sensor then flash every 5 second.

CHAPTER 6

ROUTINE MAINTENANCE

Very little maintenance is required for the system.

Docking

- Lift the sensor to check valve function (if fitted).
- Grease movable parts.
- Check for damage or corrosion on the connection box.
- Carefully clean and scrape the front face on the sensor, if required.

Do not paint the face of the sensor.

Advised spare parts

There are no necessary spare parts, fuses are automatic and will reset when a problem condition is removed. Parts most likely to fail are sensor (DL1SXX-XX or processor card PI-M001 see ["1\) Exploded view" on page 38](#)).

SOFTWARE UPGRADE

The system is undergoing continuously improvement, and periodically new software will be released. These can be found in the download area of the SKIPPER website (www.skipper.no) and may be downloaded and the system upgraded.

To upgrade the software, /connect a laptop/PC to the LAN port of the item to be upgraded. Open the SKIPPER Service software (downloadable from www.skipper.no). Select the unit to be upgraded and follow the instructions on screen.

MASTER RESET (FACTORY DEFAULT SETTINGS)

The factory default settings can be restored by performing the following operations:

1. Select CODE in diagnostic (DIAG) menu.
2. Press the SET button (**Note:** Do not change code value, just press the SET button.)

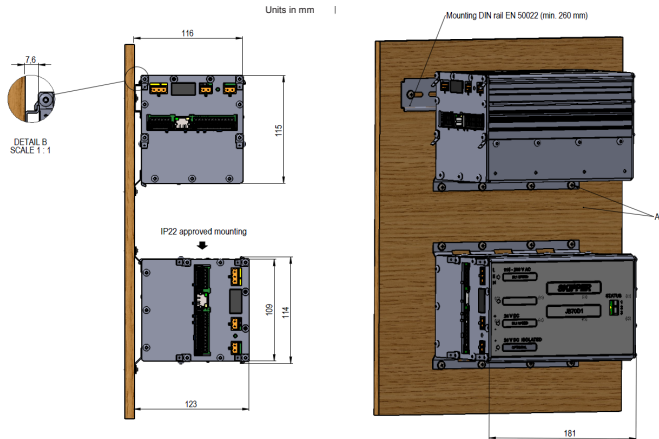
The unit will now restart with factory default settings.

Note. This will also **reset** the stored calibration values.

SYSTEM SPECIFICATION

Product Datasheet
JB70D1-SA Electronic Unit
for DL1-Multi Single Axis Doppler Speed Log
Specifications

	Part number	Description
	JB70D1-SA	Electronic unit for DL1-Multi Single Axis Doppler Speed Log. Provides calibrated single axis Speed Through Water (STW) data to control units and other integrated navigation systems
To be used with	CD402CU-XX DL1SX-XX	Control unit compact with LAN Log sensor for SB/DB-60-SA Doppler, 40 m
The junction box contains	JB70D1-SA M-KIT-JB70XX	Electronic unit for DL1-Multi Mounting Kit for JB70
Power	115 - 230 VAC 24 V DC 24 V DC (backup)	Max 60 W typ. 10 W
Interfaces	<ul style="list-style-type: none">• NMEA 0183, IEC61162-1/2, 4 output, 1 input• Auxiliary x 3 output, 2 input• Relay x 1• Analogue output x 1	<ul style="list-style-type: none">• Supports NMEA 0183 (IEC61162-1) (IEC61162-2 outputs)• Auxiliary can be designated to alarm, pulse, speed warning• Relay designated to function and powerfailure• 0-10 V, 1x 4-20 mA
LAN	IEC 61162-450 fully implemented web page setup	Connection to CD402CU-XX via LAN or NMEA configurable web pages for setup and runtime functions
IP rating		IP 2X
Weight		1.2 kg
Packaging dimensions / weight		30.5 x 21.5 x 21 / 1.7 kg
Manufacturer		SKIPPER Electronics AS, Norway



SKIPPER Electronics AS
Enebakkveien 150
P.O.Box 151, Manglerud
0612 Oslo, Norway

E-mail: sales@skipper.no
Telephone: +47 23 30 22 70
www.skipper.no

Date: 2018-12-06

All product specifications are subject to change without notice

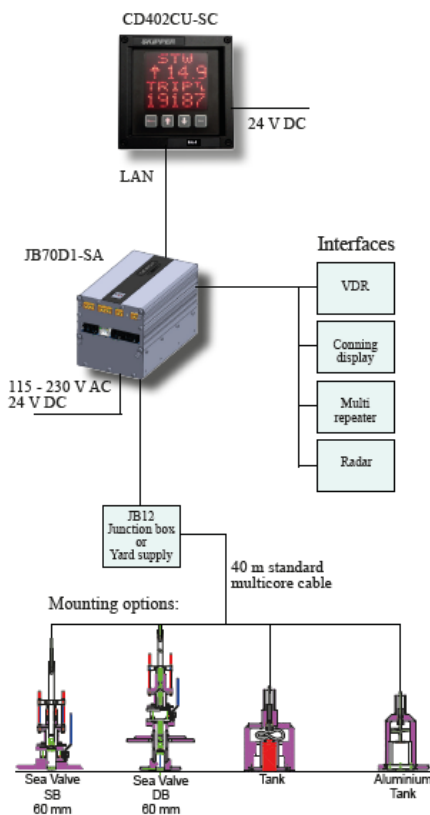
SKIPPER DL1-Multi

Single Axis Doppler Speed Log system

Specifications

	SKIPPER DL1-Multi
Number of Axis	1
Speed range Long	±50 knots
Water track measuring distance from sensor	0.5m - 3m
Minimum water depth below transducer	3m
Accuracy (better than)	0.2 knots or 2 % whichever is greater
Speed resolution	0.1
Temperature accuracy	Better than 1 °C
Temp resolution	0.1
Compact Display	28 x 30 LEDs
Mounting dimensions Compact Display	124mm x 124mm Bracket or panel mounting
Front plate Compact Display	144mm x 144mm to DIN standard
Cabinet mounting depth with cable	90mm
Weight cabinet	2.5kg
Standard cable length for sensor	40m
Bottom mounting options	
Sea Valve:	Single or double bottom
Tank:	Steel or aluminium
Speed alarms	<ul style="list-style-type: none"> High and low speed limits Power failure Sensor failure
Outputs	<ul style="list-style-type: none"> 4 x NMEA 0183 (IEC61162-1/2) 3 x isolated outputs (pulse, power failure etc.). Alarm (relay) LAN (IEC61162-450)
Inputs	<ul style="list-style-type: none"> 1 NMEA 0183 (OPTO isolated) External Dimming (pulse)
Accepted NMEA formats	<ul style="list-style-type: none"> VTG, RMC, GGA, ACK
Outputs	
Speed	<ul style="list-style-type: none"> VBW, VHW
Distance	<ul style="list-style-type: none"> VLW
Others	<ul style="list-style-type: none"> MTW (temp), ALR
Power supply, JB70D1	<ul style="list-style-type: none"> AC: 115 - 230 V 50/60 Hz DC: 24 V
Power consumption	<ul style="list-style-type: none"> Max. 30 W
Certified for MED B (Wheel-mark)	<ul style="list-style-type: none"> IEC61023, IEC60945, IEC61162-1/2/450, IEC62288, ready for IEC61824
Language	<ul style="list-style-type: none"> English

Overview



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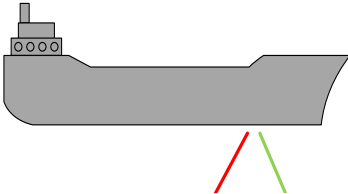


All product specifications are subject to change without notice
Date: 12th. November 2019

APPENDIX 1

BACKGROUND INFORMATION

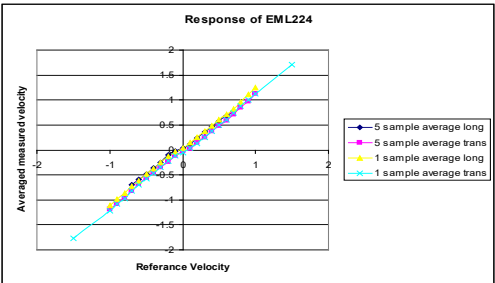
Doppler



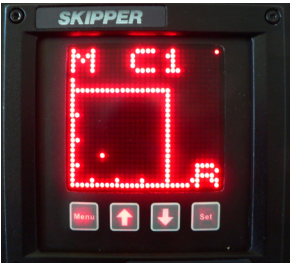
The Doppler system operates by sending a known frequency sound into the water, and listening to the reflected echo from the minute particles in the water. If the particles are moving towards the sensor, the frequency goes up, if away, the frequency goes down. By having two beams at 30 degrees from the vertical we get two frequency values, one plus, one minus, and these can be adjusted to show the speed of the vessel in the horizontal plane. As the amount of particles in the water can vary, the user can ensure the system has optimal signal return, by adjusting the power and length of the sample, depending on depth. The more sample time the better the signal, but the deeper the sampling

Calibration explained

Calibration is piecewise linear, i.e. a linear line is plotted from calibration point to calibration point (sorted by size) and this linearity is applied to the incoming values. This can be seen on the graph screen. The system uses these points as scaling factors for the speed. If the points are too close, a small error will be exaggerated. Points should be chosen at the outer speed limits of the system. and then speeds tried between. If these are not good enough, extra points can be added.



**Calibration graph
with focus on point 1**



APPENDIX 2

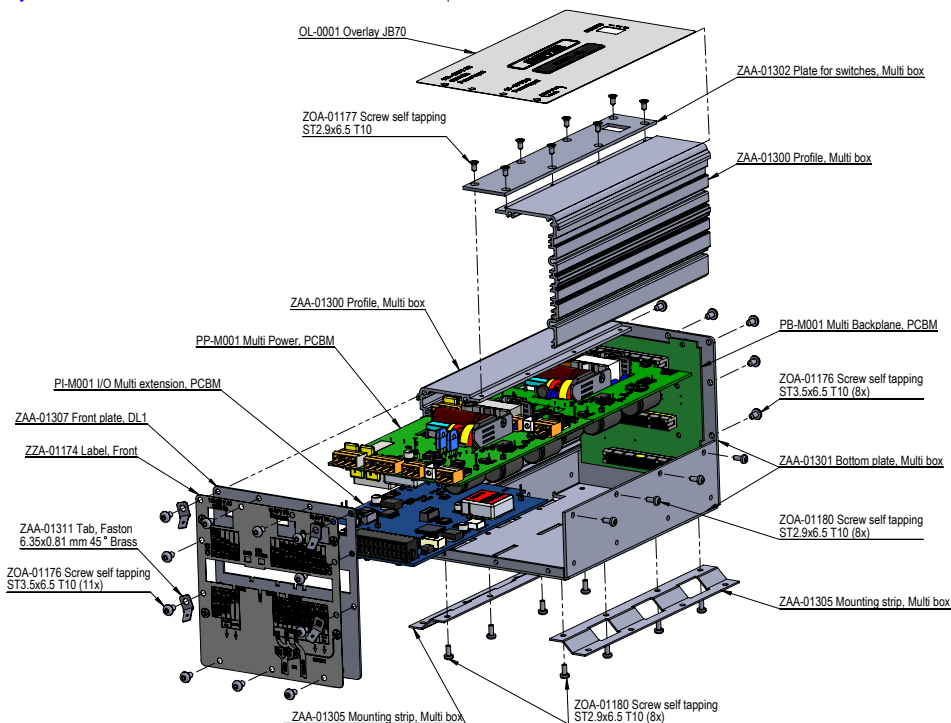
MECHANICAL DRAWINGS

To help planning and installation, the following diagrams are supplied.

1. Exploded view
2. System overview diagram

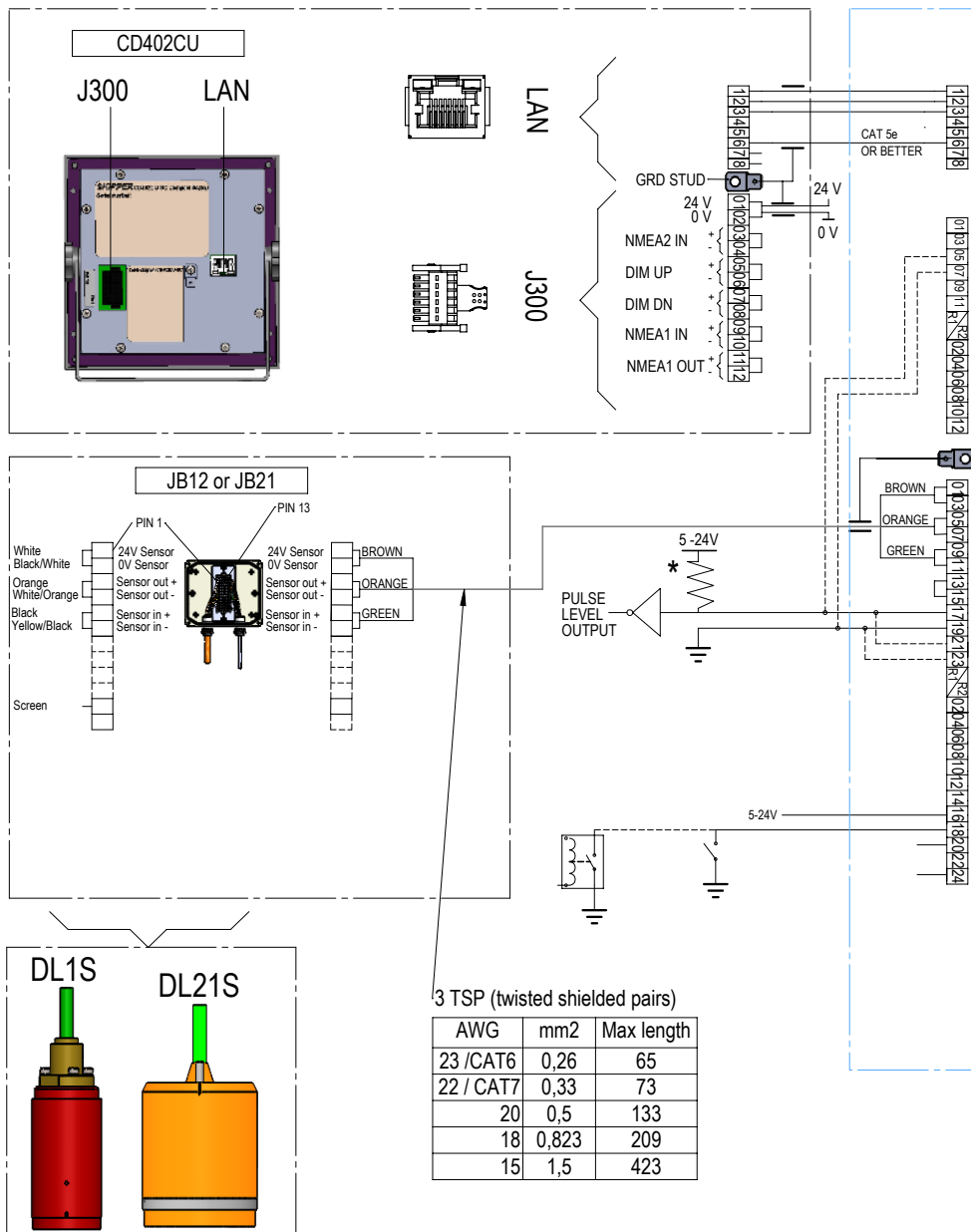
In addition, further guides for mounting of your particular mounting can be found in the separate installation manual, supplied, or available at www.skipper.no

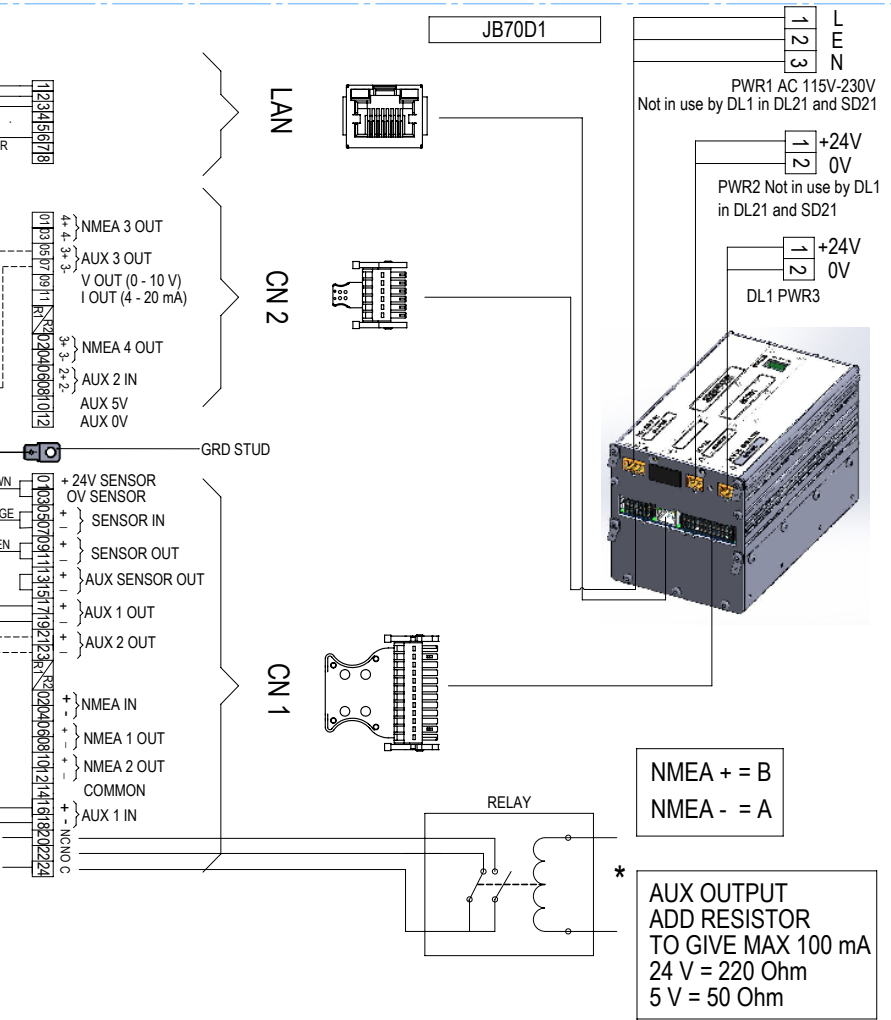
1) EXPLODED VIEW



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2) SYSTEM OVERVIEW DIAGRAM





CN	Changed faults on pin 10, 12 and 14 ST 2017.06.26	Changed faults on cable dimensions ST 2018.11.30	Made one drawing for DL1, DL1 in DL21 and DL1 in SD21 ST 2019.06.11			
Designed by - date ST 2019.06.11	Checked by ST	Approved by - date GT 2019.06.11	Material	Name Wiring diagram for DL1 MULTI and DL1 in DL21 and SD21		
SKIPPER Electronics AS			Drwg. no. CD-2036	Revision 02		
			Gen. tolerance ISO2768m	Eur. projection 	Scale Edition date 2019.06.11	Sheet 1 of 1

APPENDIX 3

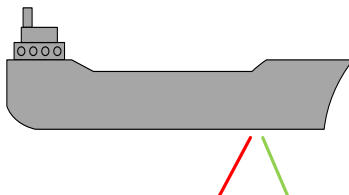
FILTERING OUT ONE CHANNEL

In some cases the DL1 sensor is positioned in a position where one of the two beams (forward:Green, Aft:red) are inhibited or disturbed.

The DL1 can be programmed to work on one channel by enable the filter in "Setup".

Filter 0=OFF (Default)

Filter 1=On.



Access the filter setup in "Menu", "Setup", "FILTR".



The filter status will be indicated by two LEDs on the screen.

One below the CPU live indicator. This indicates Filter is on.

One to the left of CPU live indicator. This will be lit when/if one channel is filtered out.

"Filter On"
Indication of one channel
being filtered out

"CPU Live" Flashing every
second when CPU is live.



"Filter On"
Indication of setting of
filter to "On".

APPENDIX 4

SENDING THE SYSTEM FOR REPAIR

A list of service centres is available on www.skipper.no

In the chance that a system fails, it may be necessary to send a part of the system back for repair. Make contact with your local dealer or SKIPPER for Returns Materials Authorisation number (RMA).

For normal service/support, please contact SKIPPER Electronics AS on e-mail: support@skipper.no, or contact your local dealer

WARRANTY AND UTILIZATION

Warranty

- SKIPPER Electronics AS gives 12 months limited guarantee on all deliveries from SKIPPER Electronics AS, Norway.
- Please note that if the equipment is delivered by a third party, the third party warranty conditions may apply.
- All warranty request should be sent to the local supplier of the equipment.

Utilization

- This equipment is not to be disposed in normal waste, but be handled in accordance with applicable waste disposal regulations in the country where the equipment is used.

SKIPPER

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