

Navigational Echo Sounders & Speed Logs



SKIPPER

Version 1.24

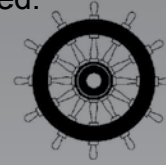
Introduction

SKIPPER was established as a brand in 1973 by SIMRAD. In 1984 SKIPPER became an independent Norwegian owned company, and started to convert from a trading to a production company.

Today more than 90 % of all products are produced by SKIPPER.

SKIPPER is situated in Oslo, Norway, in modern facilities with production, training, warehouse and office at the same location. This makes SKIPPER a flexible and reliable supplier of navigational electronics.

SKIPPER Electronics AS is ISO 9001:2008 certified, and all the navigational electronics is IMO Wheelmarked.



SKIPPER Electronics AS manufactures marine electronics for the merchant fleet as well as for fishing and navy purposes. Our design is based on experience, research and traditions.

Our products are known worldwide for reliability, quality, sophistication and good value for money.



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Navigational Echo Sounders

SKIPPER GDS101



The SKIPPER GDS101 is one of the markets most sold Navigational Echo Sounder. The Echo Sounder graphics are continuously shown on the LCD along with relevant navigational details. External connectors are provided for printer, VGA and NMEA in/output.

Highlighted features as:

- NMEA 0183
- 38, 50 and 200 kHz transducer options
- Colour LCD 10.4" display
- Alarm functions
- Memory functions
- IMO Wheelmark

The SKIPPER GDS101 contains history memory that stores depth, time and other available navigation data continuously for the preceding 24 hours. This and current information can also be printed in hard copy.

The GDS101 has 3 transducer connections as standard with resonant frequencies of 38, 50 and 200 kHz. Only one can be shown on the display at a time, by choosing the corresponding transducer in the menu. A wide range of transducers are available to fit vessel requirements.

All IMO requirements are met or exceeded and most standard interfaces are available.

Specifications for the GDS101 (Part no. EN101C-SA):

Power Supply	AC: 115 V/ 230 V 50/60 Hz. DC: 20-32 V Auto Switch over	Calendar / Clock	Year-month-day / Hours-min. 24 hour system
Power Consumption	50 W at 24 V, 70 W at 115 V or 230 V	Outputs	Trigger and bottom-pulses
Display	Night/Day (10.4") Colour LCD screen with adjustable back-light		Alarm relays/NMEA Alarm
Mounting Dimensions	300 x 320 mm		Analogue 4-20 mA, and 0-10 V for depth
Printer	External printer		Detected video
Memory	24 Hour storage. (More than 1 month available on CF card)		NMEA 0183
Ranges	Selectable from 0-1600 m		External VGA
Measuring Accuracy	Error less than 1 %		Printer
Frequencies	Standard, 38, 50 and 200 kHz, selectable from keyboard.	Inputs	100/200 pulse input for speed
Output power	Up to 1 kW, adjustable		NMEA 0183 for speed, position, heading and time
Depth alarms	Deep and shallow water alarms. Relay and NMEA alarms.	Languages	English, French, German, Spanish, Russian, Norwegian
		Options	Remote depth indicators
			Remote keyboard. Printer
		Classification	Made to IMO performance standard
		Service	Available in most major harbours, world-wide through extensive dealer network

SKIPPER GDS102



The SKIPPER GDS102 is a dual channel Navigation Echo Sounder with a large, colour LCD display. The Echo Sounder graphics are continuously shown on the LCD along with relevant navigational details. External connectors are provided for printer, VGA and NMEA in/output.

Highlighted features as:

- NMEA 0183
- Transducers between 10-49 kHz and 50-265 kHz can be connected.
- Colour LCD 10,4" display
- Two frequencies can be simultaneously shown on the display
- Alarm functions
- Memory functions
- IMO Wheelmark

The SKIPPER GDS102 includes history memory storing depth, time and other available navigation data continuously for the preceding 24 hours. Information can also be printed in hard copy.

GDS102 is prepared for connection of 1 or 2 transducers with a resonant frequency in the range of 10-265 kHz. A wide range of transducers are available to fit the vessels requirements. This includes both high and low frequencies, for depth recordings towards 5000 m!

Specifications for the GDS102 (Part no. EN102C-SA):

Power Supply	AC: 115 V/230 V 50/60 Hz DC: 20-32 V Auto Switch over	Calendar / Clock	Year-month-day / Hours-min. 24 hour system
Power Consumption	50 W at 24 V, 70 W at 115 V or 230 V	Outputs	Analogue 4-20 mA, and 0-10 V for depth
Display	Night/Day (10.4") Colour LCD screen with adjustable backlight		NMEA 0183
Mounting Dimensions	300 x 320 mm		Alarm relays/NMEA Alarm
Printer	External printer		External VGA
Memory	24 Hour storage. (More than 1 month available on CF card)	Inputs	Printer
Ranges	Selectable from 0-5000 m		NMEA 0183 for speed, position, heading and time
Measuring Accuracy	Error less than 1 %.	Languages	English, French, German, Spanish, Russian, Norwegian
Frequencies:			Option
Channel 1	From 50 kHz to 265 kHz, 1 kHz step	Classification	
Channel 2	From 10 kHz to 50 kHz, 1 kHz step		Made to IMO performance standard
Output power	Up to 2 kW, adjustable	Service	Available in most major harbours, world-wide through extensive dealer network
Depth alarms	Deep and shallow water alarms. Relay and NMEA alarms.		

SKIPPER IR 301 Digital Depth Repeater



The SKIPPER IR 301 is a remote depth indicator using NMEA signals. It gives accurate digital depth indication based on signals from the SKIPPER ED165, GDS101 or GDS102 Echo Sounders. SKIPPER IR 301 can also be used with Echo Sounders from other manufacturers, when these have NMEA 0183 output.

Highlighted features are:

- Depth indication
- Alarms
- Shows position of transducer in use
- Bracket or panel mounting

GDS101: The IR 301 will indicate the position of selected transducer

GDS102: The IR 301 will indicate position of primary channel

Brightness is adjusted on the front panel, or from a remote dimmer control.

Specifications for the IR 301 (Part no. ENIR301-SA)*:

Power Supply	DC: 10-40 V
Power Consumption	3 W
Display	7 segment. 20 x 11 mm digital readout.
Mounting Dimensions	124 x 124 mm cut out for panel mounting. Bracket mounting included.
Front plate	144 x 144 mm to DIN standard
Depth	59 mm
Weight cabinet	1 kg
Outputs	1 x NMEA 0183
Inputs	NMEA 0183
	Remote dimmer input (Part no. IR30DIM)
Classification	IP 56
Service	Available in most major harbours, world-wide through extensive dealer network.

* CD401MR-SB will also be an alternative for SKIPPER Echo Sounders - See page 24.

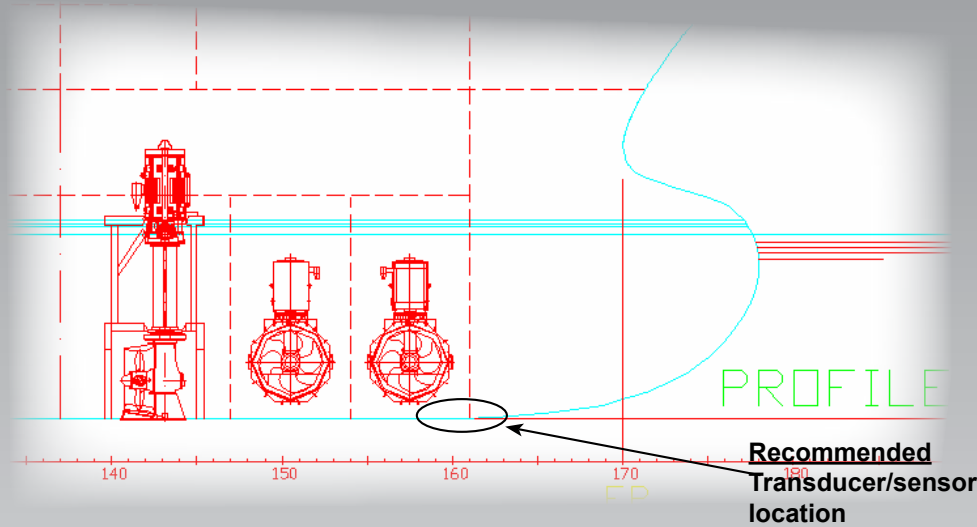
Transducer and sensor location

Echo Sounder transducer location

There is always uncertainty in placing the transducer in the vessel. SKIPPER products have several different mounting options; Tank (Ice protected, aluminium and steel), Sea Valve for single and double bottom. Ice protection for Sea Valve is also available.

Feel free to contact SKIPPER for a recommendation for the transducer placement.

When installing two different transducers, we recommend to install the high frequency transducer (200 kHz) aft in the vessel and the lower frequency transducer (50 kHz) in the forward part of the vessel. The aft transducer will normally work only at low speeds due to aeration.



The mounting position of these different Tanks or Sea Valves are usually the same. The most important parameter is to place the transducer in a position where there is a minimum amount of aeration in the waterflow passing the hull of the ship in the full speed range of the vessel. The transducer should therefore be mounted on a flat, horizontal surface on to the hull, as low as possible, and preferably in the front of the ship, where the forward transom is reaching down to the water level (see figure).

The result of the placement of the transducer can only be recommended, and it is not possible to guarantee the correct position, even on vessels of the same design from the same yard.

It is always recommended to place the transducer in a dry compartment, for easier maintenance of the sensor, especially when mounted in Sea Valve.

In some cases there may be an option to place a special hull fitting for the transducer in order to avoid the air bubbles.

Speed Log sensor location:

The same basic rules are true when mounting the sensor for Doppler Speed Logs. Air bubbles should be avoided.

The sensor placement for the EML is not that critical because this sensor uses the electromagnetic field in order to measure the speed of the vessel. However EML should be placed away from any object that can interfere with a linear water flow.

It is never recommended to place Speed Log sensors aft in any vessels.

When installing both Echo Sounder transducer and Speed Log sensor, place the Speed Log sensor forward of the Echo Sounder transducer when using a Doppler Speed Log. The distance between the Echo Sounder Transducer and the Speed Log Sensor should be minimum 2 m.



Transducers for Echo Sounders

24 kHz Transducers (ETN024T and ETN024G)



The 24 kHz transducer is a ceramic type. It has a beam angle of 20 degrees, and a 40 m cable length.

The fittings for the ETN024T transducer is ETNSTCLF (Steel Tank) or ETNSTCILF (Ice Tank). When using a Sea Valve (SB-200-SA) the correct transducer part no. is ETN024G. The transducer includes a junction box and mounting materials.



38 kHz Transducers (ETN038T and ETN038G)



The 38 kHz ceramic transducer has a beam angle of 16 degrees, and a 40 m cable length.

The ETN038T can be mounted in the ETNSTCLF (Steel Tank) or ETNSTCILF (Ice Tank). The ETN038G transducer can be mounted in the SB-200 (Sea Valve).

The transducer includes a junction box and mounting materials.



50 kHz Transducers



The 50 kHz ceramic transducer has a beam angle of 33 degrees. There is a choice of two different cable length with the 50 kHz transducer, namely 25 and 40 m.



Transducer	Cable length (m)	Beam (degrees)	Frequency (kHz)	Installed in
ETN024T	40	20	24	ETNSTCLF
ETN024G	40	20	24	SB-200-SA
ETN038T	40	16	38	ETNSTCLF
ETN038G	40	16	38	SB-200-SA
ETN050T	25	33	50	ETNST and ETNSTC
ETN050XT	40	33	50	ETNST and ETNSTC
ETN050G	25	33	50	SB-100-SA, SB-100-SB, DB-100-SA and DB-100-SB Sea Valves.
ETN050XG	40	33	50	SB-100-SA, SB-100-SB, DB-100-SA and DB-100-SB Sea Valves
ETN050BEL	25	33	50	ETNSLJB Sea Valve (No junction box included) and ETNSTCI
ETN050BELX	40	33	50	ETNSLJB Sea Valve (No junction box included) and ETNSTCI
ETN050TA	25	33	50	ETNALC Aluminium Tank
ETN050XTA	40	33	50	ETNALC Aluminium Tank

The transducer includes a junction box and mounting materials.

200 kHz Transducers



The 200 kHz ceramic transducer has a beam angle of 6 or 10 degrees depending whether, it is 100 mm (6 degrees) or 50 mm (10 degrees) in diameter.

There is a choice of two different cable lengths (25 and 40 m) and two different diameters (5 cm and 10 cm) with the 200 kHz transducer:

ETN200S(X)T



ETN200S(X)G

Transducer	Cable length (m)	Beam (degrees)	Diameter (cm)	Frequency (kHz)	Installed in
ETN200T	25	6	10	200	ETNST and ETNSTC
ETN200XT	40	6	10	200	ETNST and ETNSTC
ETN200ST	25	10	5	200	ETNST and ETNSTC
ETN200SXT	40	10	5	200	ETNST and ETNSTC
ETN200SG	25	10	5	200	SB-100-SA, SB-100-SB, DB-100-SA and DB-100-SB Sea Valves
ETN200SXG	40	10	5	200	SB-100-SA, SB-100-SB, DB-100-SA and DB-100-SB Sea Valves
ETN200FS	25	10	5	200	ETNSLJB Sea Valve (No junction box included) and ETNSTCI Ice protected Tank
ETN200FSX	40	10	5	200	ETNSLJB Sea Valve (No junction box included) and ETNSTCI Ice protected Tank
ETN200STA	25	10	5	200	ETNALC Aluminium Tank
ETN200SXTA	40	10	5	200	ETNALC Aluminium Tank

The transducer normally includes a junction box and mounting materials.



ETN200(X)T

Sea Valves and Tanks for Echo Sounders

The bottom parts are needed in order to fit the transducers into the hull of the ship. The bottom parts delivered by SKIPPER are approved by Det Norske Veritas (DNV) and Germanischer Lloyds (GL) as standard. It is also possible to get approval by other classification authorities on request.

SKIPPER always recommends to install the transducers into Sea Valves. It is then much easier to change the transducer, and to maintain and clean the transducers regularly without entering any dry-dock or using divers. The installation of a tank will require installation of cable pipes above load water line. This is time consuming, costly, and, when everything is taken into consideration, normally the installation of Sea Valve will often be the cheapest option for installation.



Standard Tank (Part no. ETNST)

Our standard tank is delivered with a special red coating in order to protect the tank during transport and storing. The tank is made of durable approved steel in order to withstand the harsh environment it is exposed for.

There are several transducers that fits into this tank. Please see the section for transducers.



Combo Tank (Part no. ETNSTC)

The Combo Tank is similar to the Standard Tank, the difference being a flange that is installed inside in order to fit various transducers and sensors. The red coating is the same as for standard tank as well as the steel.



Ice protected Tank (Part no. ETNSTCI)



The ice protected tank is, as described by the name, made in order to protect the transducer from ice in arctic sea waters, or ships likely to “beach” the vessel, like landgoing military vessels. The tank is similar to the Combo Tank, the difference being an “acoustic see through” plate placed in front of the transducer. The tank is filled with water and the cable pipe extended above the load water line as well as for the Standard and Combo Tanks.

The ice protected tanks include all the fittings for the transducers and a junction box in order to extend the cable.

This tank is required for the NAUT-OSV class if a Sea Valve is not used.

Aluminium Combo Tank (Part no. ETNALC)

The Aluminium Combo Tank is made in order to fit the 50 and 200 kHz transducer, together with our speed log sensors. This tank is ideal for mounting in aluminium hulls or to be moulded into composite hulls. The aluminium tank is not DNV certified and will need to be approved with the hull after installation.





100 mm Sea Valve for single bottom (Part no. SB-100-SB)

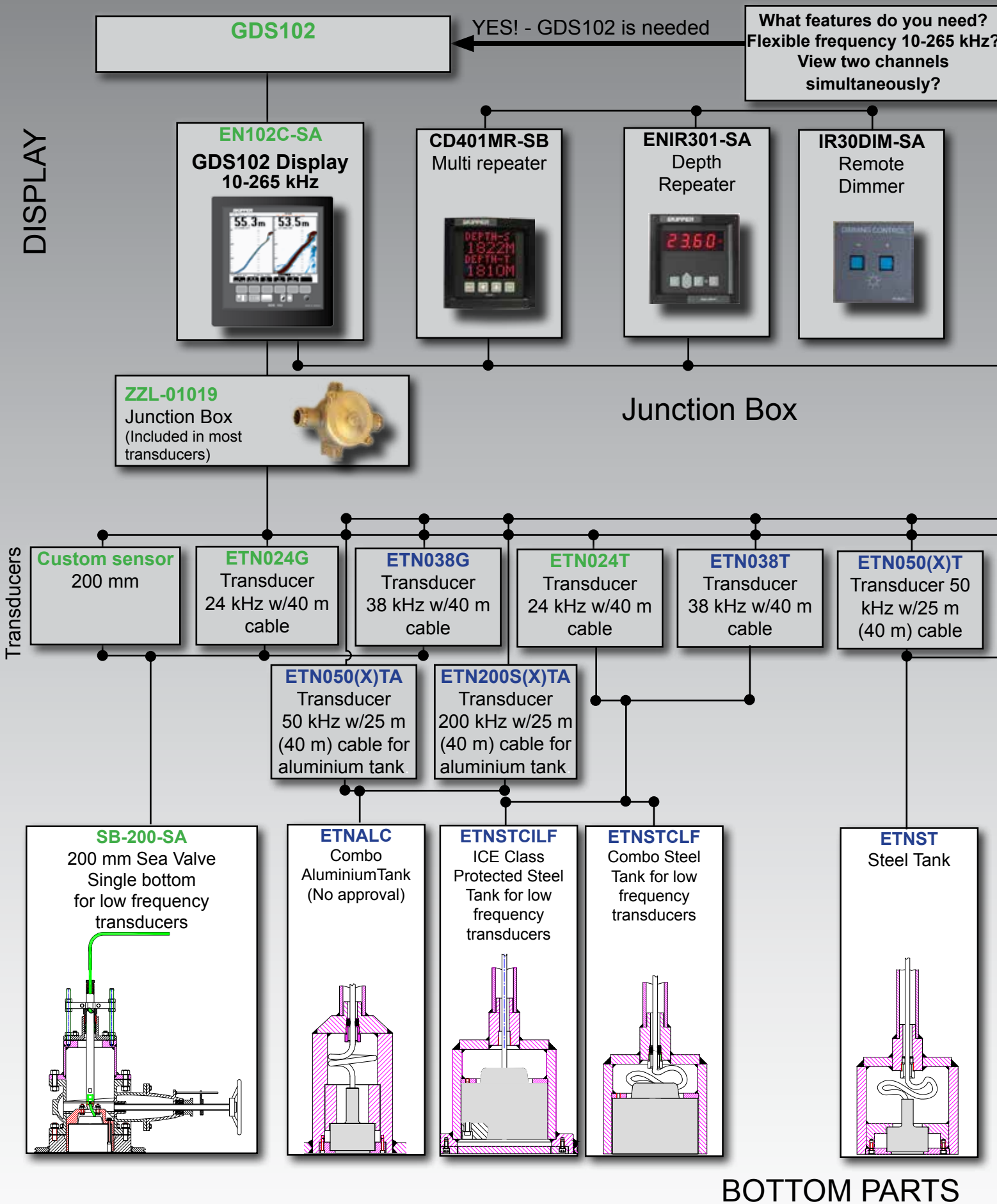
The SB-100-SB is an alternative to the SB-100-SA. The difference being that the SB-100-SB is a Ball Valve with a lever to close the valve. It is also made of stainless steel. Some confined spaces will make SB-100-SA or SB-100-SB version more suitable. Please contact SKIPPER for details in space needed for each separate Sea Valve, or visit www.skipper.no for download of installation manuals.

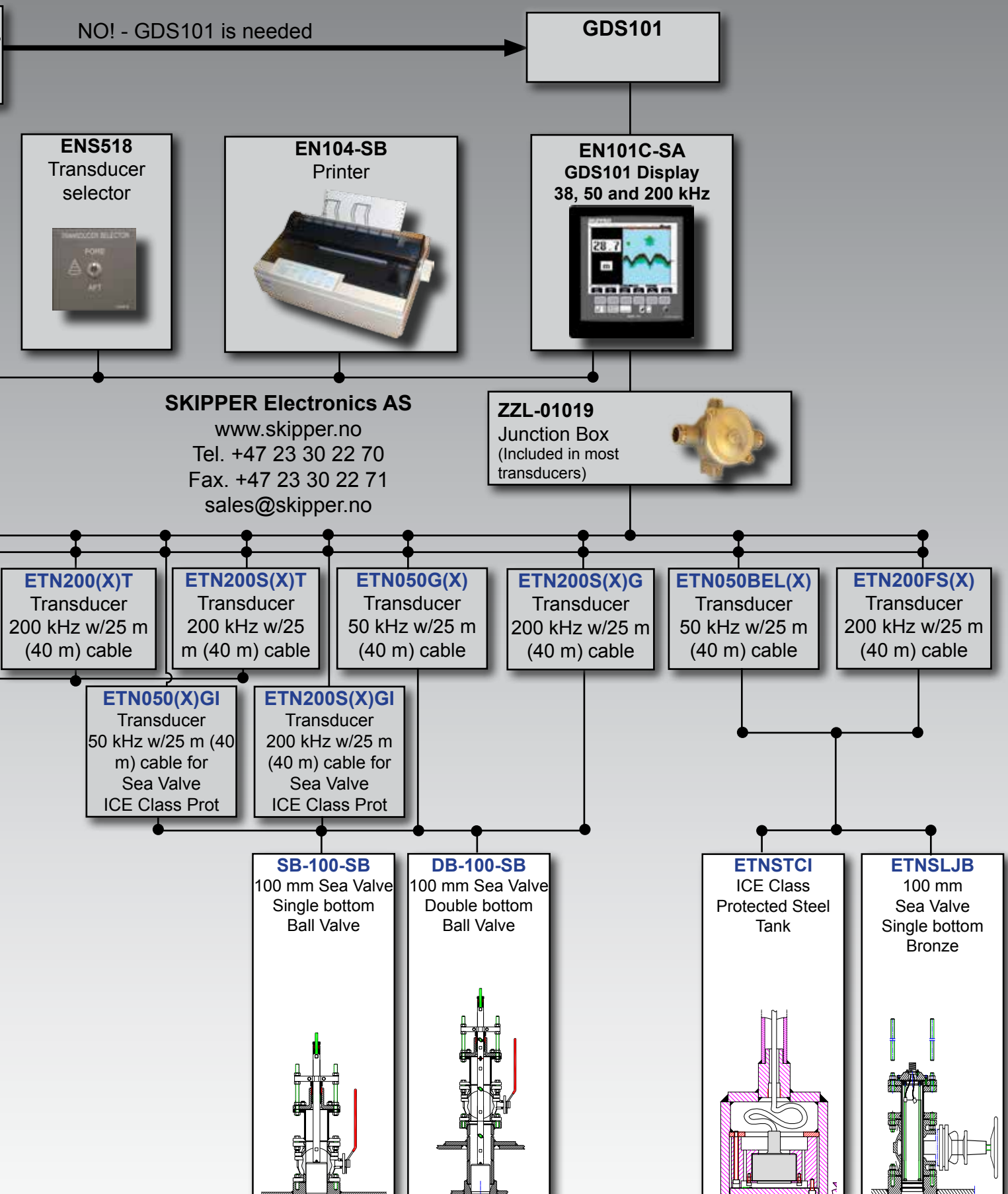
100 mm Sea Valve for double bottom (Part no. DB-100-SB)

The DB-100-SB is the Ball Valve in stainless steel to be installed in a double hull configuration. As standard SKIPPER deliver 2 x 0.5 m and 1 x 1 m extension pipe to lower the transducer into the Ball Valve. Extra extension pipes are available on request.



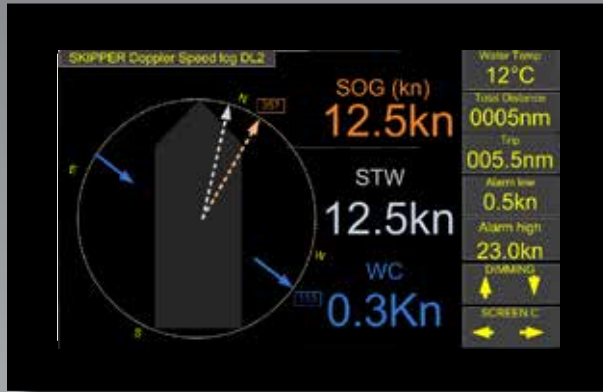
Echo Sounder Systems and Options





Navigational Speed Logs

SKIPPER DL2 Dual axis Doppler Speed Log



The SKIPPER DL2 are our newest range of Doppler Speed Logs. It works with the doppler principle STW in two axis and SOG in two axis. The DL2 can be mounted using several options, such as Sea Valve for double bottom and Sea Valve for single bottom.

It contains features as:

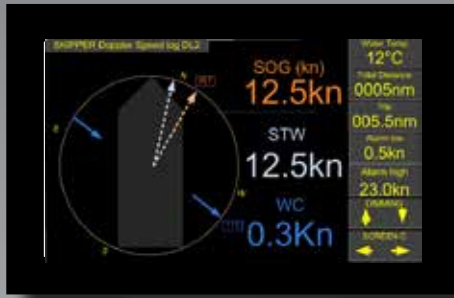
- Water track of speed in two axis (STW)
- Bottom track of speed in two axis (SOG)
- Sea temperature
- Wheelmark
- On screen diagnostics
- Logging functions
- LAN integration
- Touch display



Specifications for the DL2:

	DL2	UNITS		
Primary Frequency	270-284	kHz	Outputs	- 4 x NMEA 0183
Speed range (lon/tra)	+45 to -10 Longitudinal +/- 25 Transversal	knots		2 x LAN
Bottom lock	<150	meters		- 4 x Aux (pulse , alarm etc)
Water track (from)	<3 (2-12)	meters	Inputs	- Alarm (Meets all current requirements for INS/ OSV)
Aft transversal speed	yes (requires ROT)			LAN, NMEA x2, Aux (user selectable)
Pulse output power (rms)	30	Watts	Accepted NMEA formats	
Accuracy (better than)	0.2 or 2% (Opt. 0.1 or 1%) whatever greater	knots	Inputs	
Tilt accuracy	<2	deg	Gyro	ROT, THS and HDT
Temperature accuracy	<1	°C	GPS	GLL, GGA, RMC, VTG and ZDA
Mounting			Trip	PSKPRSTT (Trip reset)
Sea Valves	Single bottom, Double bottom (SB-100-SB), (DB-100-SB)		Others	DDC, ACN and ACK
Housing			Outputs	
JB70D2-SA	DIN mountable Housing NMEA, LAN, Digital IO (Pulse alarms etc.) USB, SD Flash, 2 transducer connections, power connections		Speed	VBW and VHW
Display CU-M001-SA	Flush mount 9.0" Touch panel 240x155mm. Ethernet		Distance	VLW
Sensors	DL2SXX-XX sensor (100mm)		Alarm	ALR, ALF and ALC Speed alarm, power failure alarm and function alarm
Speed alarms	High and low speed limits		Others	MTW (temp), DDC, HBT, DPT and XDR
Clock	- internal or From NMEA		Pulse output	Yes
			Analogue output	Default no Optical 4-20 mA and 0-10V
			Power Supply	AC 115 - 230 V 50/60 Hz, DC, 24 V
			Power Consumption	Max. 60 W
			Classification	IMO
			IP rating	IP 22 Control unit IP 22 Electronic unit IPX7 Sensor unit

SKIPPER DL21 Dual and Single axis Doppler Speed Log



The SKIPPER DL21 are our newest range of Doppler Speed Logs. It works with the doppler principle with STW in one axis and SOG in two axis. The DL21 can be mounted using several options, such as Sea Valve for double bottom and Sea Valve for single bottom. Comply with the requirements of MSC334(90) with one sensor/hull mounting and one electronic unit for vessels above 50 000 GT.

It contains features as:

- Water track of speed in one axis (STW)
- Water track of speed in two axis (STW)
- Bottom track of speed in two axis (SOG)
- Two separate speed logs in one sensor
- Sea temperature
- Wheelmark
- On screen diagnostics
- Logging functions
- LAN integration and touch display



Specifications for the DL21:

	DL2	DL1	UNITS		DL2	DL1
Primary Frequency	270-284	700-730	kHz	Speed alarms	High and low speed limits	High and low speed limits
Speed range (lon/tra)	+45 to -10 Long. +/-25 Trans.	+/-50	knots	Clock	- internal or From NMEA	From NMEA
Bottom lock	1-150	NA	meters	Outputs	- 4 x NMEA 0183	4 x NMEA 0183
Water track (from)	<3 (2-12)	<3 (2-12)	meters		2 x LAN	1 x LAN
Aft transversal speed	Yes (ROT req.)	NA			- 4 x Aux (pulse, alarm etc.)	3 x Aux (pulse, alarm etc)
Pulse output power (rms)	30	8W	Watts		- Alarm (Meets all current requirements for INS/OSV)	- Alarm
Accuracy (better than)	0.2 or 2% whatever greater	0.2 or 2% whatever greater	knots	Inputs	LAN, NMEAx2, Aux (user selectable)	LAN, NMEAx2, Aux (user selectable)
Tilt accuracy	<2	<2	deg	Accepted NMEA formats		
Temperature accuracy	<1	<1	°C	Inputs		
Mounting				Gyro	ROT, THS and HDT	-
Sea Valves	Single bottom, Double bottom (SB-100-SB), (DB-100-SB)			GPS	GLL, GGA, RMC, VTG and ZDA	GLL, GGA, RMC, VTG and ZDA
Housing				Outputs		
JB70D21-SA	DIN mountable Housing NMEA, LAN, Digital IO (Pulse alarms etc.) USB, SD Flash, 2 transducer connections, power connections			Speed	VBW and VHW	
Display				Distance	VLW	
CU-M001-SA	Flush mount 9.0" Touch panel with LAN connection and			Others	MTW (temp), ALR and ALF (alarm), DDC	
CD402CU-SC	144x144 DOT Matrix display for DL1			Power Supply	AC 115 - 230 V 50/60 Hz, DC, 24 V	
Sensors	DL21SG-XX (combined but electrically isolated DL2 -SOG/STW and DL1-STW) (100mm) or separate sensors for DL2 and DL1			Power Consumption	Max. 60 W	
				IP rating	IP 22 Control unit IP 22 Electronic unit IPX7 Sensor unit	
				Classification	IMO MSC.334(90)	

SKIPPER DL1 Multi Single axis Doppler Speed Log



The SKIPPER DL1 Multi is our newest Doppler Speed Log. It works with the doppler principle with STW in one axis. The DL1 Multi can be mounted using several options, such as Sea Valve for double bottom and in tank.

It contains features as:

- Water track of speed
- Sea temperature
- Wheelmark
- On screen diagnostics
- Logging functions
- Single axis
- LAN communication with JB70D1 Electronic unit
- All in/outputs connected to JB70D1 Electronic unit



Specifications for the DL1 Multi:

	DL1	Units	Power Supply	AC: 115/230 V 50/60 Hz DC: 24V
Primary frequency	715	kHz	Power Consumption	Max. 30 W
Speed range (longitudinal/transversal)	+/-50	knots	Display	28X30 led's
Water track (from)	2	meters	Accessories	ENIR300-SA Speed repeater IR31DIM-SA Dimming Control CD401MR-SA Multi repeater
Accuracy	<0.2 or 2%	knots	Classification	MED-B/IMO
Mounting			Weight cabinet	2.5 kg
Sea Valve:			Standard cable length for sensor	40 m
Single bottom	Yes		Mounting dimensions for cabinet	124x124 mm Bracket or panel mounting, (144x144 mm front)
Double bottom	Yes		IP rating	Electronic unit: 22 Display: 22 Sensor: IPX7
Steel tank	Yes			
Aluminium tank	Yes			
Speed alarms	High and low speed limits Power failure Sensor failure			
Clock	- Year-month-day/Hour-min. (taken from GPS if available)			
Outputs	- 4 x NMEA 0183			
	- 3 x Aux (pulse, alarm etc)			
	- Alarm (Relay)			
	- LAN			
Inputs	- 1 NMEA 0183 (OPTO Isolated) - External Dimming			
Accepted NMEA formats				
Outputs:				
	Speed: VBW AND VHW			
	Distance: VLW			
	Others: MTW (temp), ALR and ALF (alarm)			
	Dimming DDC			

SKIPPER DL850 270 kHz Dual axis Doppler Speed Log



The SKIPPER DL850 270 kHz is our Dual axis Doppler Speed Log. It works with the doppler principle with both SOG and STW. The 270 kHz frequency gives the possibility of tracking bottom speed down to at least 150 m. The DL850 270 kHz can be mounted using several options, such as Sea Valve for double bottom and in tank.

It contains features as:

- Bottom track of speed
- Water track of speed
- Depth readout
- Sea temperature
- Wheelmark
- On screen diagnostics
- Logging functions
- Dual axis as standard, three axis (Docking) as option

Specifications for the DL850 270 kHz:

	DL850-270	Units	Outputs		
Primary frequency	270	kHz	<ul style="list-style-type: none"> - 2 x NMEA 0183 - 3 x 0-10 V or 4-20 mA Analogue - 3 x contact closure (pulse) - Alarm (Relay) - VGA additional screen 		
Speed range (longitudinal/transversal)	+/-40	knots			
Bottom lock	1-200	meters		Inputs	- 2 NMEA 0183 (OPTO Isolated)
Water track (from)	2	meters		Accepted NMEA formats	
Aft transversal speed	Optional - in Docking version			Inputs:	
Pulse output power (rms)	100	Watt (Tranceiver unit)		Gyro: ROT, HDT and THS	
Accuracy	<0.2 or 2 %	knots		GPS: GLL, GGA, RMC, VTG	
Echo Sounder function			Outputs:		
Range	200	meters		Speed: VBW, VHW, VTG	
Frequency	270	kHz		Distance: VLW	
Max output power	100	Watt (Tranceiver unit)		Depth: DPT, DBS, DBT, DBK	
Temperature accuracy error	<1	°C		Others: MTW (temp), ALR (alarm)	
Mounting			Power Supply	AC: 115/230 V 50/60 Hz DC: 20 -32 V, Auto switch over	
Sea Valve:			Power Consumption	Max. 100 W	
Single bottom	Yes		Display	Night/Day (10.4") Colour LCD screen with adjustable backlight.	
Double bottom	Yes		Memory	Compact Flash - For retaining operational settings and diagnostic data	
Steel tank	Yes		Language	English	
Aluminium tank	Yes		Accessories	ENIR300-SA Speed repeater IR30DIM-SA Dimming Control CD401MR-SA Multi repeater	
Depth alarms	Deep and shallow limits		Classification	MED-B/IMO	
Speed alarms	High and low speed limits				
Clock	- Year-month-day/Hour-min. (taken from GPS if available)				

SKIPPER DL1 Single axis Doppler Speed Log



The SKIPPER DL1 is a single axis Doppler Speed Log. It works with the doppler principle with STW in one axis. The DL1 can be mounted using several options, such as Sea Valve for double bottom and in tank.

It contains features as:

- Water track of speed
- Sea temperature
- Wheelmark
- On screen diagnostics
- Logging functions
- Single axis

Specifications for the DL1:

	DL1	Units	Power Supply	AC: 115/230 V 50/60 Hz DC: 24V
Primary frequency	715	kHz	Power Consumption	Max. 30 W
Speed range (longitudinal/transversal)	+/-50	knots	Display	28X30 led's
Water track (from)	2	meters	Accessories	ENIR300-SA Speed repeater IR31DIM-SA Dimming Control CD401MR-SA Multi repeater
Accuracy	<0.2 or 2%	knots	Classification	MED-B/IMO
Mounting			Weight cabinet	2.5 kg
Sea Valve:			Standard cable length for display	10 m (Unlimited on DL1 Multi)
Single bottom	Yes		Standard cable length for sensor	40 m
Double bottom	Yes		Mounting dimensions for cabinet	124x124 mm Bracket or panel mounting, (144x144 mm front)
Steel tank	Yes		IP rating	Electronic unit: 22 Display: 56 Sensor: IPX7
Aluminium tank	Yes		Service	Available in most major harbours, world-wide through extensive dealer network.
Speed alarms	High and low speed limits Power failure Sensor failure			
Clock	- Year-month-day/Hour-min. (taken from GPS if available)			
Outputs	- 2 x NMEA 0183 - 2 x contact closure (pulse) - Alarm (Relay)			
Inputs	- 1 NMEA 0183 (OPTO Isolated) - External Dimming			
Accepted NMEA formats				
Outputs:				
	Speed: VBW AND VHW			
	Distance: VLW			
	Others: MTW (temp), ALR and ALF (alarm)			
	Dimming DDC			

SKIPPER EML224 Dual Axis Electromagnetic Speed Log



The SKIPPER EML224 is SKIPPERs most sold Electromagnetic Speed Log. It is a dual axis Speed Log using the electro-magnetic principle, providing longitudinal and transversal ship speed relative to sea water. The EML224 gives accurate navigation parameters, measured as they happen, and the data is presented in a logical, user friendly way.

Highlighted features as:

- Speed through water in dual axis
- Sea temperature
- Fully automated settings
- Easy setup and diagnostics.
- NMEA 0183
- IMO Wheelmarked

Specifications for the EML224:

	EML224	Units	Inputs	- 2 NMEA 0183 (OPTO Isolated)
Number of Axis	2		Accepted NMEA formats	
Speed range Long	±40	knots	Outputs:	
Speed range Trans	±40	knots		Speed: VBW, VHW
Water track (from)	0	meter		Distance: VLW
Accuracy (better than)	0.2 or 2 %	knots		Others: MTW (temp), ALR (alarm)
Temperature Accuracy error	< 1	°C	Power Supply	AC: 115/230 V 50/60 Hz. DC: 24 V, Auto switch over
Mounting Dimensions	300 x 320 mm		Power Consumption	Max. 100 W
Front plate	320 x 340 mm		Display	Night/Day (10.4") Colour LCD screen with adjustable backlight.
Depth	165 mm		Language:	English
Weight cabinet	10 kg		Accessories:	ENIR300-SA Speed repeater IR30DIM-SA Dimming control CD401MR-SA Multi repeater
Mounting			Classification:	MED-B/IMO
Sea Valve:			IP rating	Electronic unit: 22 Display: 22 Sensor: IPX7
Single bottom	Yes		Service:	Available in most major harbours, world-wide through extensive dealer network.
Double bottom	Yes			
Tank:				
Steel	Yes			
Aluminium	Yes			
Alarms	- High and low speed limits - Power failure			
Outputs	- 2 x NMEA 0183 - 3 x contact closure (pulse) - Alarm (Relay) - VGA additional screen - 3 x 0-10 V or 4-20 mA Analogue			

SKIPPER EML224 Compact, Single and Dual axis Electromagnetic Speed Log



The SKIPPER EML224 Compact is the newest electromagnetic Speed Log. The difference from the EML224 is that the operator unit (display) is smaller. The EML224 Compact is available in single or dual axis, making it more flexible depending on customers needs and demands.

Highlighted features as:

- NMEA 0183
- Compact display (144 x 144 mm)
- Alarm functions
- IMO Wheelmarked
- Speed through water in 1 or 2 axis
- Fully automated settings
- Support software for easy setup and diagnostics

Specifications for the EML224 Compact:

Log	EML124 Compact	EML224 Compact	Units	Aluminium	Yes	Yes
Number of Axis	1	2		Speed alarms	- High and low speed limits - Power failure - Sensor failure	
Speed range Longitudinal	±40	±40	knots	Outputs	- 2 x NMEA 0183 - 1 x contact closure (pulse) - Alarm (Relay) - Fitness	
Speed range Transversal		±40	knots			
Water track (from)	0	0	meter	Inputs	- 1 NMEA 0183 - External dimming (pulse) and NMEA dimming	
Accuracy (better than)	0.2 or 2 %	0.2 or 2 %	knots	Accepted NMEA formats		
Temperature Accuracy error	< 1	< 1	°C	Outputs:		
Mounting Dimensions	124 x 124 mm. Cut out panel mounting. Brackets are included			Speed	VBW, VHW	
				Distance	VLW	
				Others	MTW (temp)	
Front plate	144 x 144 mm			Power Supply	AC: 115/230 V 50/60 Hz. (Electronic unit) DC: 20-32 V, Auto switch over.	
Depth	59 mm			Power Consumption	Max. 30 W	
Weight cabinet	1 kg			Display	28 x 30 pixle alphanumeric LEDs (red) with dimming.	
Standard cable length	10 m (max 20 m)			Language	English	
Mounting				IP rating	56	
Sea Valve:				Service	Available in most major harbours, world-wide through extensive dealer network	
Single bottom	Yes	Yes				
Double bottom	Yes	Yes				
Tank:						
Steel	Yes	Yes				

SKIPPER IR300 Digital Speed Repeater



The SKIPPER IR300 is a remote speed indicator for NMEA signals. It is designed for use with SKIPPER DL850 and EML224. It may also be used with Speed Logs from other manufacturers, when these have an NMEA 0183 output.

Highlighted features as:

- Speed indicator
- Alarms - Speed alarm
- Trip counter
- Distance counter
- One, two or three axis indication
- Bracket or panel mounting

Specifications for the IR300:

Power Supply	DC: 10-40 V	Outputs	1 x NMEA 0183
Power Consumption	3 W at 24 V	Inputs	1 x NMEA 0183
Display	2 lines with 7 segments 20 x 11 mm		- VBW for speed
	1 line with 7 segments 13 x 7 mm		- VLW for distance travelled Remote dimmer input
Display outputs	Speed over ground (bottom track)	Classification	Made acc. to IMO performance standard
	- Longitudinal - Transversal fore - Transversal aft (Docking)	Language	English
	Speed through water (water track)	IP rating	56
	- Longitudinal - Transversal fore - Transversal aft (docking)	Service	Available in most major harbours, world-wide through extensive dealer network
	Distance travelled through water		
	- Trip - Total		
Mounting Dimensions	124 x 124 mm. Cut out for panel mounting. Brackets are included		
Front plate	144 x 144 mm to DIN standard		
Depth	59 mm		
Weight cabinet	1 kg		
Protection	IP 56		

CD401MR Multi repeater



The SKIPPER CD401MR is a remote multi repeater for NMEA signals. It is designed for use with SKIPPER products together with products from other manufacturers, when these have an NMEA 0183 output.

Highlighted Features:

- Depth below surface, keel and transducer
- Speed over ground and through water (longitudinal, transverse, aft and relative)
- Distance, total/trip for both ground and water
- Heading, true, magnetic and relative
- Rotation, rate of turn and direction
- Wind speed and direction (true, magnetic and relative)
- Temperature in water and air
- Drive, RPM, propeller pitch and rudder position
- Clock UTC, local time and expected time of arrival (ETA)
- Current, true and relative

The SKIPPER CD401MR multi repeater repeats information about several essential information needed on a vessel. The operator may select between the information needed by use of the display, and could even customize the information shown. Brightness is adjusted on the front panel, or from a remote dimmer control and NMEA.

Power Supply	DC: 24 V DC (19-36)	Weight cabinet	1 kg
Power Consumption	30 W at 24 V	Protection	IP 56
Display	Up to 4 lines with LED	Outputs	1 x NMEA 0183
Display outputs	Depth – below surface, keel and transducer	Inputs	1 x NMEA 0183 protocols
	Speed – over ground and through water (longitudinal, transverse, aft and relative)		Remote dimmer input
	Distance – total/trip for both ground and water		* Depth: DPT, DBK, DBT, DBS
	Heading - true, magnetic and relative		* Speed: VBW, VTG, VHW
	Wind - speed and direction (true, magnetic and relative)		* Distance: VLW
	Temperature – water and air		* Heading: VTG, VHW, THS, HDT, HDM, HDG
	Drive – RPM, propeller pitch and rudder position		* Rotation: ROT
	Clock – UTC, local time and ETA		* Pitch and Roll: XDR
Current - true and relative	* Wind: MWV, VWR, VWT, MWD	Protection	IP 56
Mounting Dimensions	124 x 124 mm. Cut out for panel mounting. Brackets are included.	Classification	Made acc. to IMO performance standard
Front plate	144 x 144 mm to DIN standard	Service	Available in most major harbours, world-wide through extensive dealer network
Depth	59 mm		

SKIPPER manufacture all the Sensors to the SKIPPER Speed Logs. SKIPPER manufacture two different Speed Log families, Doppler Speed Logs and Electromagnetic Speed Logs. The Doppler Speed Log consists of three versions based on the frequencies; 715 kHz, 540 kHz and 270 kHz.

DL2 Doppler Speed Log Sensor

The DL2 sensor consists of 3 ceramic transducers for measuring speed and 1 sensor measuring temperature. This sensor can be installed in a variety of bottom mountings.

There are one option for the cable, 40 m. This Doppler sensor gives speed through water (STW) and speed over ground (SOG) in two axis.

Part no.	Cable length (m)	Installed in
DL2SG-SA	40	SB-100-SA, SB-100-SB, DB-100-SA, DB-100-SB. 100 mm Sea Valve
DL2SE-SA	40	ETNSLB 100 mm Sea Valve (Retrofit)
DL2SW-SA	40	Log Sensor for SPERRY SRD500/421 (Retrofit)



DL21 Doppler Speed Log Sensor

The DL21 sensor consist of a sensor housing with six ceramic transducers angled at 30°. The two systems are electrically isolated (SOG+STW 2-axis and STW 1-axis). Two separate temperature sensors measure water temperature.

Depth is calculated from slanted beams. The sensor is delivered with a 40 m cable as standard. The sensor can be installed in Sea Valve, for double and single bottom configurations.

Part No.	Cable length (m)	Installed in
DL21SG-SA	40	SB-100-SA, SB-100-SB, DB-100-SA, DB-100-SB. 100 mm Sea Valve
DL21SE-SA	40	ETNSLB 100 mm Sea Valve (Retrofit)
DL21SW-SA	40	Log Sensor for SPERRY SRD500/421 (Retrofit)



DL1 Doppler Speed Log Sensor

The DL1 sensor consists of 2 ceramic transducers for measuring speed and 1 sensor measuring temperature. This sensor can be installed in a variety of bottom mountings.

Standard cable length is 40 m, and the cable can be cut or extended with the junction box (JB12). This Doppler sensor gives speed through water.

Part no.	Cable length (m)	Installed in
DL1SG-SA	40	SB-60-SA and DB-60-SA
DL1ST-SA	40	ETNSTCL
DL1STA-SA	40	ETNALC
DL1SN-SA	40	Retrofit to Simrad NL-Log
DL1SS-SA	40	Retrofit to Sagem Log
DL1SX-SD	40	Retrofit to PCSV60
DL1SDB-SA	40	SB-100-SA, SB-100-SB, DB-100-SA and DB-100-SB. 100 mm Sea Valve



DL1S

DL850 270 kHz Doppler Speed Log Sensor

The 270 kHz sensor consist of a moulded sensor housing with three ceramic transducers angled at 30°. The depth is calculated and can not be directly read out. The sensor is delivered with a 40 m cable as standard. The sensor can be installed in tank or Sea Valve, for double and single bottom configurations.



DL850S27G-SB

Sensor	Part No.	Cable length (m)	Installed in
Sensor 270 kHz	DL850S27E-SB	40	ETNSLB 100 mm Sea Valve (Retrofit)
Sensor 270 kHz	DL850S27G-SB	40	SB-100-SA, SB-100-SB, DB-100-SA, DB-100-SB. 100 mm Sea Valve
Sensor 270 kHz	DL850S27TA-SB	40	ETNALC Aluminium Tank
Sensor 270 kHz	DL850S27T-SB	40	ETNSTC Combo Steel Tank
Sensor 270 kHz	DL850S27D-SB	40	Log Sensor for Atlas Dolog

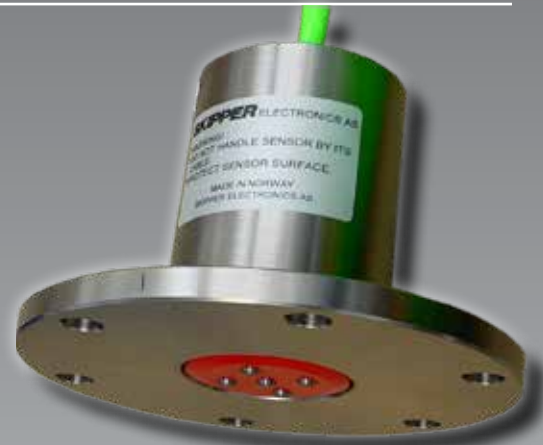
EML224 Electromagnetic Speed Log Sensor

The EML224 sensor is moulded and comes with a 40 m cable as standard. This sensor can be mounted in a Tank or Sea Valve for double and single bottom.

Other retrofit adapters are available on request.



EML224SG-SD



EML224ST-SD

Sensor	Cable length (m)	Installed in
EML224SG-SD	40	SB-60-SA and DB-60-SA. 60 mm Sea Valve
EML224ST-SD	40	ETNSTCL Combo Steel Tank
EML224STA-SD	40	ETNALC Aluminium Tank
EML224SX-SD	40	PCSV60 60 mm Sea Valve (Retrofit)
EML224SN-SD	40	SIMRAD NL Log Sea Valve or Tank installation (Retrofit)
EML224SDB-SD	40	SB-100-SA, SB-100-SB, DB-100-SA and DB-100-SB. 100 mm Sea Valve
EML224SS-SD	40	LOG SENSOR FOR SAGEM Fittings EML, 40mtr ungrounded (Retrofit)



Sea Valves and Tanks for Speed Logs

The hull fittings are needed in order to fit the sensors into the hull of the ship. The bottom parts delivered by SKIPPER are approved by Det Norske Veritas (DNV). Approval by other classification authorities are available on requests.

SKIPPER always recommend to install the sensors into Sea Valves. It is much easier to change the sensor, and to maintain and clean the sensors regularly without entering any drydock or using divers. The installation of a Tank will require installation of cable pipes above load water line. This is time consuming, costly, and, when everything is taken into consideration, the installation of Sea Valve will often be the cheapest option for installation.

Combo Tank (ETNSTCL)



The Combo Tank is specially made for SKIPPER's Speed Logs, DL850 270 kHz and the EML224 Speed Logs. The red coating as well as the steel alloy is the same for standard tank (ETNST). Tanks for Speed Logs have a mounting direction, and need to be installed correctly (please see the installation manual).

Aluminium Combo Tank (ETNALC)

The Aluminium Combo Tank is also specially made for SKIPPER's Speed Logs. Please note that the aluminium tank needs to be certified with the hull of the vessel after installation.



60 mm Sea Valve for single bottom (SB-60-SA)



SKIPPER 60 mm Sea Valve is manufactured for the EML Speed Logs. It is made in stainless steel, and the Ball Valve is operated with a lever. Because of the small size, it is easy to fit into small spaces at the bottom of the vessel.

The SB-60-SA is delivered with a 0.5 m extension tube in order to mount the SKIPPER EML sensor.

60 mm Sea Valve for double bottom (DB-60-SA)

If the vessel is constructed with a double bottom, or the valve needs to be moved away from the hull, the correct solution is the DB-60-SA. As seen on the figure, this Sea Valve is delivered with an extra flange to be installed in the outer hull of the vessel. The interhull distance is different for each hull setup, so the piping between the outer and the inner hull is yard supply and need to be welded between the outer hull flange and the inner hull flange. Please see the installation manual for further information on the installation procedure. For use with SKIPPER EML Speed Logs only.



The DB-60-SA is delivered with 1 m and 0.5 m extension tubes. Extra extension tubes are available on request.



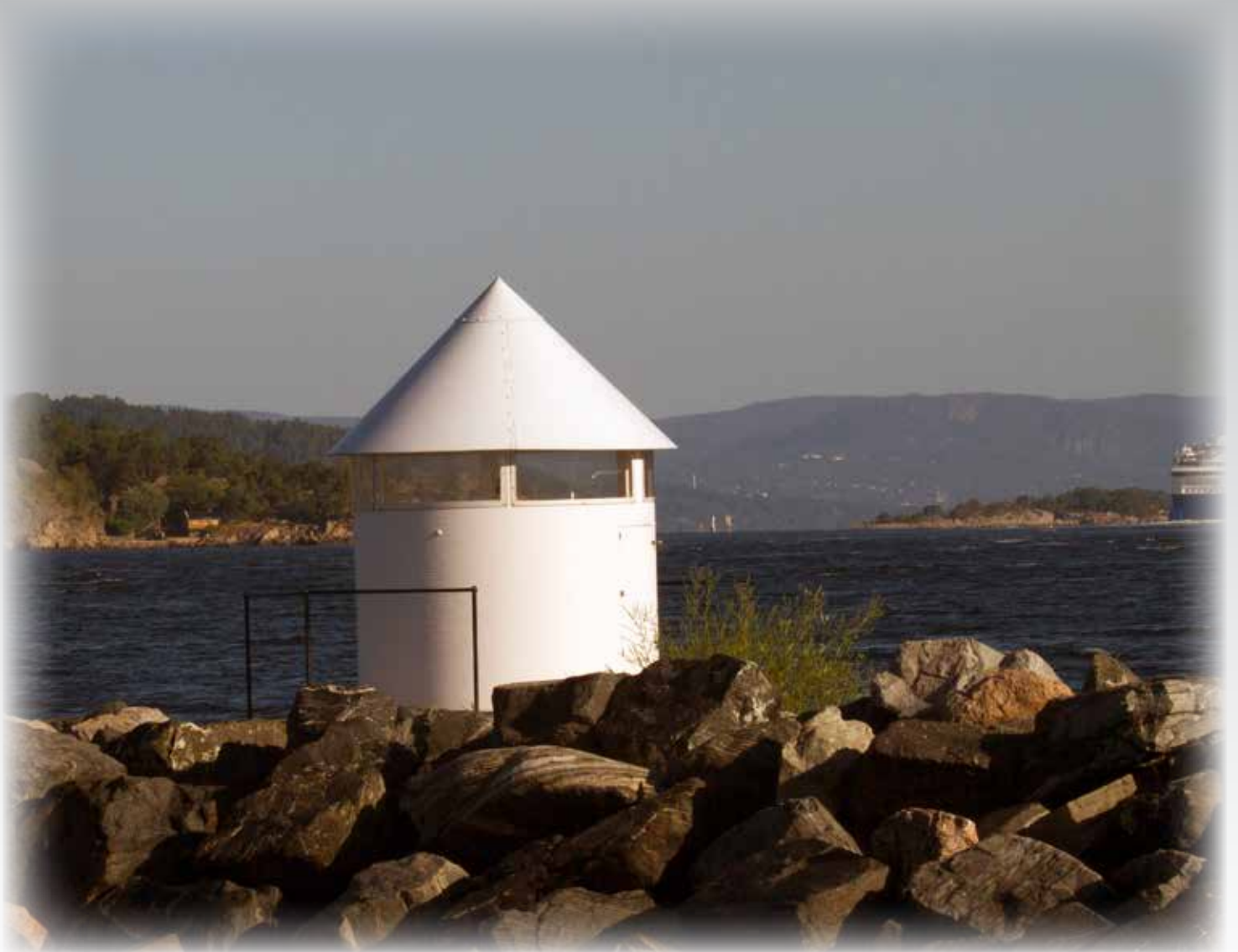
100 mm Sea Valve for single bottom (SB-100-SB) Recommended!

The SB-100-SB is an alternative to the SB-100-SA, the difference is that the SB-100-SB has a Ball Valve with a lever to close the valve instead of the screw operation of the SB-100-SA valve and it is made in stainless steel.

Difference in space in the installation location would require the choice between the SB-100-SA and the SB-100-SB. Please contact SKIPPER for details in space needed or visit www.skipper.no for downloads of installation manuals and installation videos.

100 mm Sea Valve for double bottom (DB-100-SB) Recommended!

The DB-100-SB is our Sea Valve in stainless steel to be installed in a double bottom configuration. 2 x 0.5 m and 1 x 1 m extension pipe to lower the transducer in the Sea Valve are delivered as standard together with the Sea Valve. Extra extension pipe is available on request.



ETT985 Tester



Depth: 6 cm
Weight: 728 g



24 cm



A simple to use, reliable and accurate tester for most Echo Sounders. Preprogrammed with factory tests for Transducers, Echo Sounders and NMEA ports.

This unit can be used in a stand-alone mode, or using a connection to a PC to give accurate results and even print/save a status report, this unit eliminates uncertainty of whether a failure is in the Transducer or in the Echo Sounder. An expensive mistake if you get it wrong!

Features:

Tester for Transducer of frequencies from 10 kHz to 1 MHz

Just the tester:

- Impedance, resistance and phase
- Detection of resonant point and impedance at resonance
- Preprogrammed integrity tests for SKIPPER transducers (and others)

With software:

- Graph of impedance, conductance, phase and susceptance
- Detection of resonance, anti-resonance, bandwidth and factory limit check
- Save to .xls format and/or print out for service reports
- Add your own transducer checks and limits (saved in tester for later use)

Simulator for SKIPPER and other continuous wave Echo Sounders

Just the tester:

- Detect and measure pulses, frequency, strength, Vpp, width and period
- Generate return pulses with fixed or tracking format, at depth up to 999.9 m
- Simulate fish in the water column

With software:

- Check results against factory settings or preset default values
- Add your own Echo Sounder values and checks

NMEA tester

Just the tester:

- Monitor NMEA lines, loop back signals from devices, send standard formats for GPS, gyro, Echo Sounders, Speed Logs etc.
- Use the unit as a NMEA to RS232 converter or to USB with included converter

With software:

- Insert your own NMEA parameters (can be saved)

DGR360 Digital Gyro Repeater



DGR360 is a digital gyro repeater that displays the Heading Angle in the LED 7 segment display and indicates the direction of turn with 30 dual colour surrounding LEDs, changing from green to red depending on the direction of turn.

Highlighted features:

- Digital gyro repeater
- Heading angle
- HDT/THS signals
- Bracket or panel mounting

The DGR360 will display Heading Angle given by the Heading message from a gyro or other equipment (NMEA 0183) and indicate "Direction of Turn" by calculating change in heading based on the HDT/THS input and the time between each message.

The dimming may be controlled by pressing the dimming key or by using an external dimming key.

Specifications:

Power Supply	DC: 20-32 V	Protection	IP 56
Power Consumption	2 W at 24 V	Outputs	NMEA 0183
Display	1 line with 7 segments 30 x 20 mm	Inputs	NMEA 0183 protocols Sentence: \$--HDT, \$--THS Remote dimmer input, pulse.
Display outputs	Heading (HDT, THS) from gyro compass or other HDT/THS devices Analogue indication of turn direction speed (red/green LEDs)	Classification	IEC 60945/2002. Approved up to IMO Standards.
Standard cable length	2 m	Service	Available in most major harbours, world-wide through extensive dealer network.
Compass safe distance	85 cm		
Mounting Dimensions	190 x 158 mm. Cut out for panel mounting. Brackets are included.		
Front plate	220 x 170 mm		
Depth	63 mm		
Weight cabinet	2 kg		

Speed Log Setup and Options

DISPLAY

**Speed through Water (STW)
Speed Log**

NO! - STW only

What features do you need?
Bottom track?
Acoustic sensor?
Vessel over 50 000 GT?

CD401E2-SB
Dual Axis
Compact
Display

CD401E1-SB
Single Axis
Compact
Display

EML224N-SA
Dual Axis
Display

CD401D1-SB
Single Axis
Compact
Display

CD402CU-SC
Single Axis
Compact
Display

**Repeaters/Remote
dimmer**

CD401MR-SB **IR31DIM-SA**

NMEA dimmer

ELECTRONIC
UNIT/
TRANS-
CEIVER

JB60CD-SA
Electronic Unit
Max. 10 m from
Compact display

JB60N2-SA
Electronic Unit

JB70D1-SA
Electronic Unit

MAX 10m

40 m cable to be cut or extended

New installations

SENSOR

**EML224SG-SD/
DL1SG-SA**
Log Sensor for
60 mm
Sea Valve

**EML224ST-SD/
DL1ST-SA**
Log Sensor for
Combo Steel
Tank

**EML224STA-SD/
DL1STA-SA**
Log Sensor for
Combo Aluminium
Tank

BOTTOM
PARTS

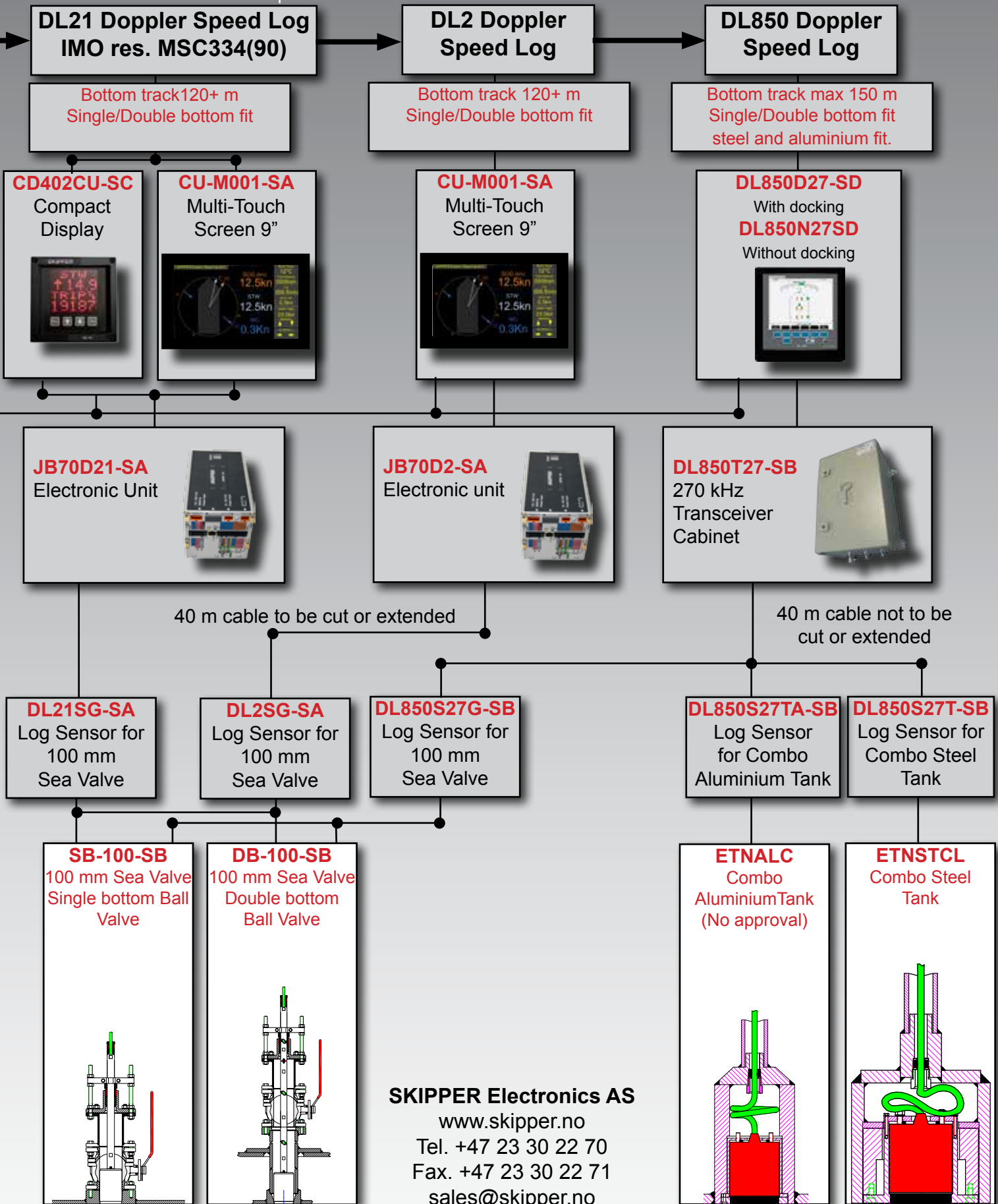
SB-60-SA
60 mm Sea
Valve Single
bottom Ball
Valve

DB-60-SA
60 mm Sea
Valve Double
bottom Ball
Valve

ETNSTCL
Combo Steel
Tank

ETNALC
Combo
Aluminium Tank
(No approval)

YES! - STW+SOG required



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sales@skipper.no

Speed Log Retrofit Solutions

DISPLAY

**Speed through Water (STW)
Speed Log**

NO! - STW only

What features do you need?
Bottom track?
Acoustic sensor?
Vessel over 50 000 GT?

CD401E2-SB
Dual Axis
Compact
Display



CD401E1-SB
Single Axis
Compact
Display



EML224N-SA
Dual Axis
Display



CD401D1-SB
Single Axis
Compact
Display



CD402CU-SC
Single Axis
Compact
Display



**Repeaters/Remote
dimmer**

CD401MR-SB



IR31DIM-SA



NMEA dimmer

MAX 10m

ELECTRONIC
UNIT/
TRANS-
CEIVER

JB60CD-SA
Electronic Unit
Max. 10 m from
Compact display



JB60N2-SA
Electronic Unit



JB70D1-SA
Electronic Unit



Retrofit

40 m cable to be cut or extended

Retrofit

SENSOR

**EML224SN-SD/
DL1SN-SA**
Log Sensor for
Simrad NL-Log
Tank or Valve

**EML224SX-SD/
DL1SX-SD**
Log Sensor for
PCSV60
Sea Valve

**EML224SDB-SD/
DL1SDB-SA**
Log Sensor for
100 mm
Sea Valve

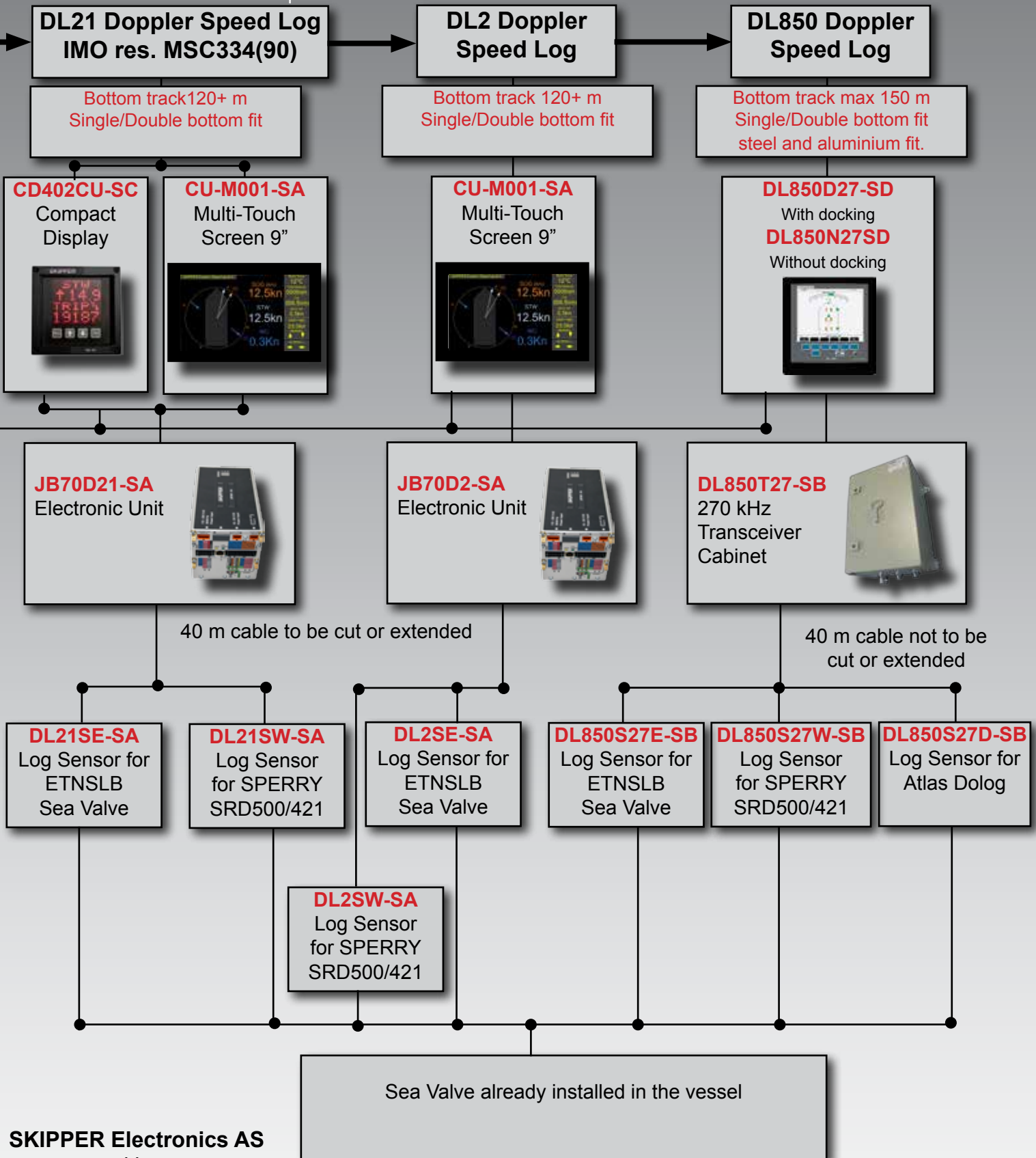
**EML224SS-SD/
DL1SS-SA**
Log Sensor for
SAGEM Speed
Log

**EML224SV-SD/
DL1SV-SA**
Log Sensor for
Naviknot SRD331
Speed Log

Sea Valve or Tank already installed in the vessel

BOTTOM
PARTS

YES! - STW+SOG required



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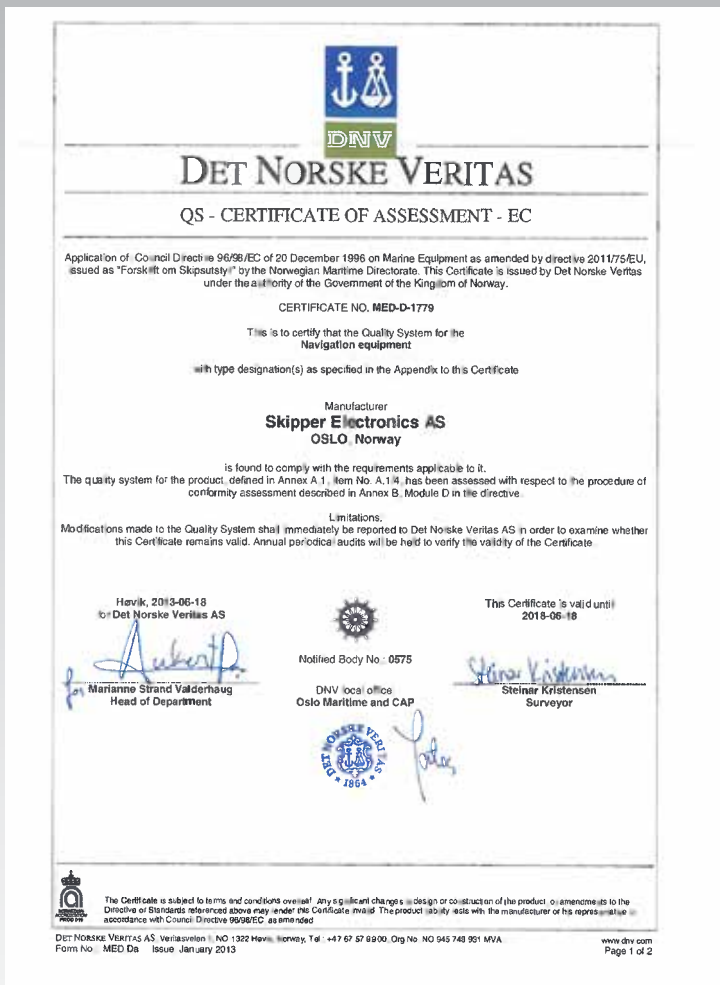
Quality Standards

An excellent quality is important for SKIPPER and will always be our main target. SKIPPER is continuously improving the quality of the existing products and all new products in the pipeline. It is important not only that the products leave SKIPPER in good condition, but also that the quality of the products remain excellent throughout its lifetime.

SKIPPER Electronics AS is approved with the standards as listed below:

- ISO 9001:2008
- IMO wheelmark (Med D)

All our Steel Tanks and Sea Valves are DNV approved. Approvals from other authorities can be provided on request.



Service/Support

Service HUBs and world wide stock:

SKIPPER Electronics lays emphasis on the importance of a world wide service/support coverage. We have therefore established service hubs throughout the world. These service hubs keep all our main spare parts, to reduce the freight time for your service. A full list of all the spare parts they keep can be found on SKIPPER web pages.

The Hubs are currently

Region	Main office	email	Tel
Mid. Europe	Radio Holland, Belgium	info@radioholland.be	+32 33209960
South Europe	Aage Hempel Marine Electronics, Spain	service@aagehempel.com	+34 956573276
Middle east	Elcome international LLC Dubai	service@elcome.ae	+971 48121333
Asia	Seven Seas, Shanghai, China	info@sevenseas.cn	+86 21588552626
Asia	Jason Electronics, Singapore	service@jason.com.sg	+65 68720211
North America	L3 G.A. International, Miami	Service.Florida.GAI@L-3com.com	+1 3053717039

All Hubs have a local network of service stations


Service centers:

There are also several other service/support/dealers throughout the world, capable of service and support on all SKIPPER products. For a full list of all the service/support and dealers please go to www.skipper.no. SKIPPER schedules annual training for all its service/support/dealers, and have recently trained over 400 engineers worldwide. We also hold train a trainer courses in order to keep all up to date on SKIPPER Navigational Echo Sounders and Speed Logs.



SKIPPER have several means of support, including our web portal www.skipper.no with service bulletins, downloadable manuals, catalogues, brochures, drawings and also a forum to get information not covered in the manuals.

The New MULTI Series will include tips and information on screen to support the use of the systems.

Press the SKIPPER logo “” to get help whenever available.

Remote support:

The MULTI series is designed for remote support, by connecting the system to a LAN or connecting an internet connected computer to the system, it is possible for SKIPPER engineers to check your system, run diagnostics and support with issues that arise. In this way it is easier to ensure first time fix.

SKIPPER Service software is available free on www.skipper.no this software gives access to useful tools such as:

- NMEA monitors
- Data logging functions
- Firmware and software upgrade
- Diagnostics of sensors
- Remote control of MULTI systems
- Software for Transducer tester ETT985
- Latest software versions and company news

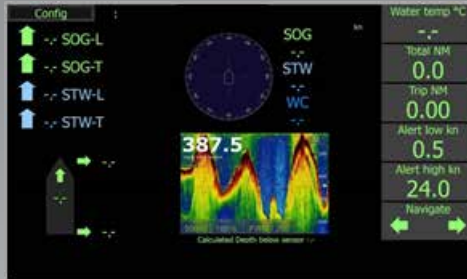


SKIPPER Electronics is also available for support/service on support@skipper.no, and on phone no. +47 23 30 22 70.



Integration of the MULTI system

SKIPPER Electronics is dedicated to making the MULTI system fully integratable to modern bridges. Systems communicate using the new IEC61192-450 standard and Integrators can use a precompiled software application directly into their system.



- If used with a standard display, there should be no need for extra approval. If used without a display, a minimal check is required. In particular, attention should be paid to redundant displays and alarm systems (ALF format as standard).
- TCP-IP (Web pages) are also available, or soon to be available on all system setup parameters (Approval required in the case of echosounders).
- Command line control will also be available giving full freedom in your own GUI design (within regulation limits).
- SKIPPER is dedicated to giving support to any company attempting integrate SKIPPER MULTI systems.



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