# INTRODUCTION

Description

The GPS speedometer is a master gateway that collects data received from analog sensors and CAN bus network and makes them available on NMEA 2000 bus and OceanLink 52 mm gauges. In addition to indicate the speed (over ground, SOG or through water, STW), it displays real-time engine, environment and navigation values. A built-in GPS module accurately calculates the position and automatically reads the date/time.

SAE J1939
Sensors and GPS module
NMEA 2000
NMEA 2000
EasyLink
(max. 20)
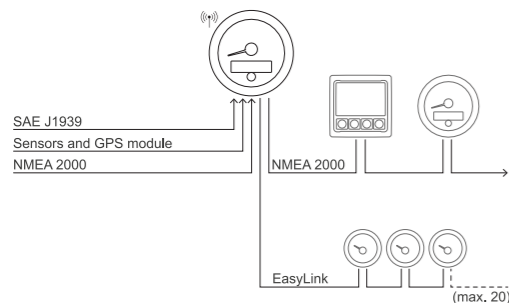
DATA PAGES
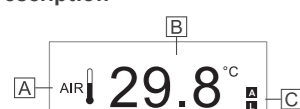
Description

Part	Description
A	Data symbol
B	Current value with relevant unit of measure
C	"AL": indication that at least one alarm was triggered. The current alarm list is available after the last data page, see "Managing alarms".

List of managed data

Icon	Information	Input signal NMEA 2000	SAE J1939	Analog sensor	Output signal NMEA 2000	EasyLink	Unit of measure
	Total engine operating hours	x	x	x	x	-	h
	Engine coolant temperature	x	x	-	x	x	°C/ °F
	Engine coolant pressure	x	x	-	x	-	bar / psi/ kPa
	Transmission oil temperature	x	x	-	x	-	bar / psi/ kPa
	Transmission oil pressure	xh	x	-	x	x	bar / psi/ kPa
	Engine oil temperature	bar	x	-	x	-	°C/ °F
	Engine oil pressure	x	x	-	x	-	bar / psi/ kPa
	Engine oil level	-	x	-	-	-	%
	Boost pressure	x	x	-	x	x	bar / psi/ kPa
	Exhaust gas temperature	x	x	-	x	-	°C/ °F

Icon	Information	Input signal NMEA 2000	SAE J1939	Analog sensor	Output signal NMEA 2000	EasyLink	Unit of measure
	Engine rpm	x	x	x	x	-	rpm
	Fuel consumption	x	-	-	-	-	gal/h or l/h
	Fuel level	x	x	x	x	x	%
	Fresh water level	x	-	x	x	x	%
	Waste water level	x	-	-	x	x	%
VOLT	Battery voltage	x	x	-	x	x	V
AMP	Battery current	x	x	-	x	x	A
STW	Speed through water (STW)	x	-	-	-	-	mph / kn or km/h
SOG	Speed over ground (SOG)	x	-	x *	x	-	mph / kn or km/h
HDG	Magnetic heading	x	-	-	-	-	°M (magnetic North)
COG	Course over ground (COG)	x	-	x *	x	-	°T (true North)
	Depth below transducer **	x	-	-	-	-	m / ft
TRIM	Trim	x	-	x	x	x	%
	Rudder angle	x	-	x	x	x	°S (starboard) / °P (port)
AIR	Room temperature	x	-	-	-	-	°C/ °F
	Sea water temperature	x	-	-	-	-	°C/ °F
	Time	x	-	x *	x	-	12h / 24h
	GPS module information ***	-	-	x *	x	-	-

Note*: data received by the built-in GPS module.
Note**: the displayed value depends on any set offset. It is the depth below transducer by default (offset = 0).
Note***: data only displayed if **GPS source = Int**, see "Settings description".

Received signal priority

If the same data is available from more than one source, the received signal priority is the following:

Sensors and engine
1. Analog sensor
2. NMEA 2000
3. SAE J1939
4. Battery (for power voltage)
5. Self counting (for engine operating hours)

GPS position
1. Built-in GPS module
2. NMEA 2000

Note: the speed source can be manually set.

Transmission via EasyLink

Data transmission to 52 mm gauges is automatic every 20 ms, no settings are required.

On/Off

The on/off mode depends on the power line connection. Typically, it is sufficient to simply turn the engine ignition key or turn on the service switchboard.
The VDO logo and software version are displayed when turned on.

Displaying pages

When turned on the device displays the last page selected before it was turned off. Briefly press the button to scroll the pages.
Note: the page with the total engine operating hours is displayed by default the first time the device is turned on.
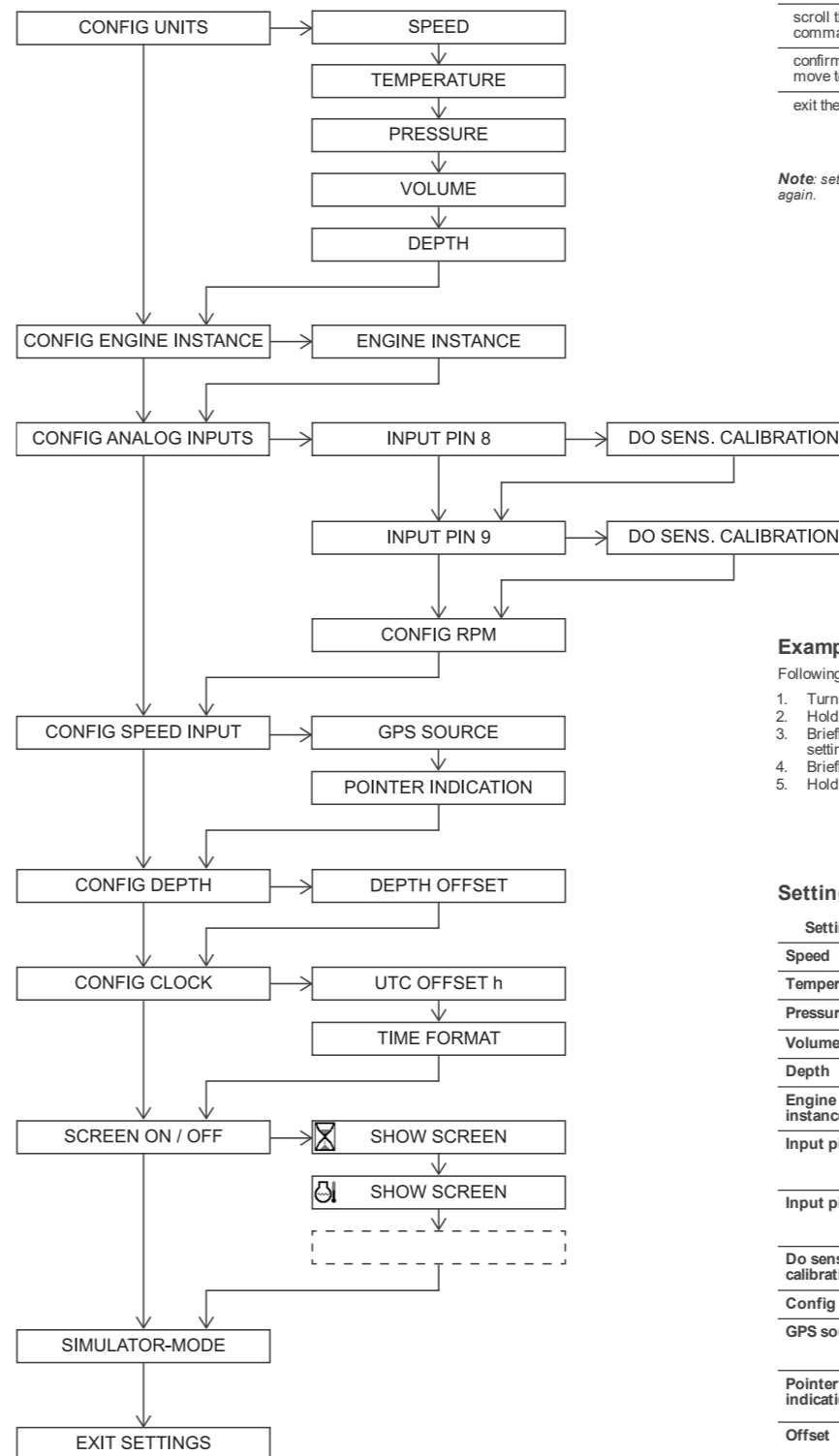
Select the pages to be displayed

All pages are displayed by default. You can select which pages to be displayed/hidden in the settings menu in **Show screen**.

GENERAL SETTINGS

Settings menu description

CONFIG UNITS → SPEED → TEMPERATURE → PRESSURE → VOLUME → DEPTH

CONFIG ENGINE INSTANCE → ENGINE INSTANCE

CONFIG ANALOG INPUTS → INPUT PIN 8 → DO SENS. CALIBRATION

INPUT PIN 9 → DO SENS. CALIBRATION

CONFIG RPM

CONFIG SPEED INPUT → GPS SOURCE → POINTER INDICATION

CONFIG DEPTH → DEPTH OFFSET

CONFIG CLOCK → UTC OFFSET h → TIME FORMAT

SCREEN ON / OFF → SHOW SCREEN → SHOW SCREEN

SIMULATOR-MODE

EXIT SETTINGS

Using the settings menu

To...	Then....
open the settings menu	turn on the device holding down the button until "Settings" appears: the **Config units** setting appears
scroll the possible values or commands **Yes** and **No**	briefly press the button
confirm the value or command and move to the next setting	hold down the button until the value or command blinks once
exit the settings menu	select the setting **Exit settings** and then the command **Yes** or turn the device off and back on: the first data page appears.

Note: settings can only be scrolled forward. To change a previous setting, exit the settings menu and open it again.

Example procedure

Following is the procedure to set **Engine instance** = 3
1. Turn on the device holding down the button until "Settings" appears: the **Config units** setting appears.
2. Hold down the button until **No** blinks once: the **Config engine instance** setting appears.
3. Briefly press the button to view **Yes**, then hold it down until **Yes** blinks once: the **Engine instance** setting appears with the current value.
4. Briefly press the button to scroll values until **3** is displayed.
5. Hold down the button until it blinks once: the **Config analog inputs** setting appears.

Settings description

Setting	Description	Possible values/commands*
Speed	Speed units of measure	**kmh**/ mph/ kts
Temperature	Temperature units of measure	**°C**/ °F
Pressure	Pressure units of measure	**bar**/ PSI/ kPA
Volume	Volume units of measure	**Ltr**/ gal
Depth	Depth units of measure	ft/ **mtr**
Engine instance	Displayed data engine, NMEA 2000 code.	**0**/ 1/ 2/ 3
Input pin 8	Type of sensor data on input 1	• **Off**: no connected analog sensor • **Trim**: trim, propeller tilt • **Fresh**: fresh water level • **Fuel**: fuel level • **Rudder**: rudder angle
Input pin 9	Type of sensor data on input 2	
Do sens. calibration	Start sensor calibration	For information on sensor calibration, see "Sensors calibration".
Config RPM	Impulses per engine revolution	From 0.0 to 999.9 (default = 1.0)
GPS source	Speed source	• **Int**: built-in GPS module • **Ext**: via NMEA 2000
Pointer indication	Speed displayed by the device pointer	• **SOG**: speed over ground • **STW**: speed through water
Offset	Value to be added/subtracted from the depth to compensate for the transducer position compared to the waterline or keel	From -99.9 to + 99.9
UTC offset	Time zone	From -12 to +12 h
TimeFormat	Time format	• 12 h • **24 h**
Show screen	Data to hide/show	For each data: • **Yes** • **No**
Simulator-mode	Simulation mode	• **Yes**: the device displays random values. Data is also transmitted to connected 52 mm gauges. • **No**: turn off simulation mode **NOTICE**: simulation mode remains enabled even after the device is turned off and back on until set to **No**.
Exit settings	Exiting the settings menu	• **Yes** • **No**

Note: the underlined value/command is the default value/command.

SENSORS CALIBRATION

Calibration types

Analog sensors calibration can be:

- **standard**: for VDO sensors only. The type of sensor is set and the device reads the sensor value with good approximation without requiring calibration.
- **manually**: for non VDO sensors or to obtain more accurate indication from a VDO sensor. A three step procedure instructs the system to read the sensor value.

Starting calibration

CONFIG ANALOG INPUTS	→	INPUT PIN 8/9	→	DO SENS. CALIBRATION	→	SET DEFAULT CAL.

To start calibration, select the **Do sens. calibration** setting and then **Yes**: the **Set default cal** setting appears. Running the required calibration procedure.

Running manual calibration

1. In **Set default cal**, select **No**.
2. Run the operation displayed on the first row on the display.
3. Select **No**: the device reads the sensor value and updates the last row on the display with the value read.
4. If the value read is correct, select **Yes**: the cursor moves on to the next calibration point. Otherwise select **No** to take another reading and obtain a correct value.
5. Repeat steps 2-3-4 for the other two calibration points.
6. To confirm changes, in **Save changes**, select **Yes**: a message confirms that calibration settings have changed.

Running standard calibration

1. In **Set default cal**, select **Yes**.
2. Scroll the possible values and select the required one: the selected value blinks once.
3. To confirm changes, in **Save changes**, select **Yes**: a message confirms that calibration settings have changed.

DISPLAY SETTINGS

Introduction

Display brightness and contrast can be adjusted. The display brightness applies to all masters on the NMEA 2000 bus and on connected 52 mm gauges.

Adjusting display brightness and contrast

1. From any data page, hold down the button until "Light" appears.
2. If necessary, adjust the brightness level by briefly pressing the button.

   Note: if "Light off" appears, brightness cannot be changed since the external lighting is off.

3. To confirm the brightness level, hold down the button until the bar blinks once: "Contrast" appears.
4. If necessary, adjust the contrast level by briefly pressing the button.
5. To confirm the contrast level, hold down the button until the bar blinks once: the last page displayed reappears.

ALARMS

Alarm signal

When an alarm is triggered, "New alarm" briefly appears on the display followed by the specific alarm message and buzzer (if connected). The message remains on the screen and the buzzer sounds until the alarm is acknowledged.

Note: alarms are not signaled when setting up the device.

If, after acknowledgment, at least one alarm is still active, "AL" blinks in the data pages.

Managed alarms list

NMEA2000 - Engine Parameters, Dynamic (PGN 127489)

- Check engine
- Hot engine
- Low oil pres
- Low oil level
- Low fuel pres
- Low cool level
- Low voltage
- Water flow
- Water in fuel
- Charge indicat
- Preheat indic
- Boost pressure
- Over rev
- EGR system
- Main throttle
- Emergency stop
- General warn 1
- General warn 2
- Pwr reduction
- Maintenance
- Eng com error
- Sub throttle
- Neutral prot
- Eng shut down

NMEA2000 - Transmission Parameters, Dynamic (PGN 127493)

- Check gear
- Gear oil temp
- Gear oil pres
- Gear oil level
- Sail drive

SAE J1939 - Active Diagnostic Trouble Codes (DM1)

- Water in fuel indication
- Engine speed
- Engine Turbocharger boost pressure
- Exhaust gas temperature
- Engine oil pressure
- Engine Coolant Pressure
- Engine Coolant Temperature
- Engine oil temperature
- Transmission oil temperature
- Transmission oil pressure
- Fuel Level

Managing alarms

1. To acknowledge an alarm, briefly press the button: if other alarms were triggered (new or already acknowledged), the next alarm message appears. For the alarm display order, see "Managed alarms list".
2. To scroll alarms, briefly press the button: "Exit alarms" appears after the last alarm in the list.
3. To scroll the alarm list again, select **No**. To exit the alarm list, select **Yes**: the data page displayed before the new alarm was triggered appears.
4. To scroll the alarm list, scroll all data pages until "Alarm" appears and hold down the button for 3 seconds.

TROUBLESHOOTING

Display problems

Problem	Cause	Solution
The displayed values are not those expected	Incorrect sensor configuration	Check parameter settings in the settings menu, in **Config analog inputs**
	Incorrectly connected sensor	Check the connection, see installation instructions
	The NMEA 2000 network backbone was incorrectly created	Check connections and make sure there is a termination at the beginning and end of the backbone
"--" and not the expected value appears on the display	Data not available on the network	Wait
	Sensor not connected	Connect the sensor, see installation instructions
	The NMEA 2000 network backbone was incorrectly created	Check connections and make sure there is a termination at the beginning and end of the backbone

Problems on connected 52 mm gauges

Problem	Cause	Solution
The gauge is backlit but the pointer does not move	Data not received from master	Check whether the 52 mm gauge is compatible with the master
The pointer does not move and the gauge is not backlit	Master not powered	Check master connections Connect the power supply
	No 52 mm chain gauge is connected to the master	Connect a 52 mm gauge to the master

Problems with GPS (GPS speedometer only)

Problem	Cause	Solution
The displayed speed is "--"	GPS module searching (**GPS search**)	Wait. The search takes about one minute, then the GPS is ready (**GPS valid**).

TECHNICAL SPECIFICATIONS

General features

Material	PBT and plastic lens
Connectors	• Molex MX150 (with EasyLink connector built into the pigtail cable) • NMEA 2000 Micro-C M12
Input data	• via CAN bus (NMEA 2000 and SAE J1939) • 2 resistive analog inputs (0–400 Ω) • 1 frequency input (0-4 kHz) • 1 built-in GPS module
Output data	• via CAN bus (NMEA 2000) • via EasyLink (VDO proprietary protocol) to 52 mm gauges • output alarm (500 mA)
Protection grade	IP65
Available variations	0–14 / 0–35 / 0–70 kn / km/h / mph
Display	Dot matrix LCD 132 x 33 px
GPS antenna	Built-in, 10 Hz

Environmental specifications

Working temperature	From -20 to +70 °C
Storage temperature	From -30 to +85 °C

Electrical specifications

Rated voltage	12 / 24 V
Voltage tolerance	9-32 V
Working current	< 100 mA @ 12 V
Absorption (LEN)	2

Conformity

Conformity	CE NMEA 2000
Directives	2014/30/EU (Electromagnetic compatibility) 2011/65/EU (Electrical-electronic equipment hazardous substances)
Reference standards	IEC 60945: 2002-08 (Environmental class: exposed)

SPARE PARTS, SENSORS AND ACCESSORIES

Available spare parts

Product	Part number
Pigtail cable with MX150 connector	A2C1433330001
White bezel	A2C1352140001
Black bezel	A2C1111380001
Chrome bezel	A2C1141580001
Spin lock	A2C13760900
EasyLink extension cable	A2C1650700001

Available accessories

To view available accessories, visit www.marine.vdo.com.

Available analog sensors

Data type	Sensor type	Part number
Trim (**Trim**)	10–167 Ω	-
Fresh water level (**Fresh**)	3–180 Ω	226-828-001-001K
Fuel level (**Fuel**)	3–180 Ω	226-801-015-001G, 226-801-015-001C, A2C59510162, A2C59510168
	240–33 Ω	A2C59510166, A2C59510172, A2C1364580001
Rudder angle (**Rudder**)	10–180 Ω	A2C1102950001
	5–90 Ω	A2C1102960001

APPENDIX

Supported NMEA 2000 messages

PGN	Description
126992	System time
127250	Vessel heading
127488	Engine Parameters, Rapid Update
127489	Engine Parameters, Dynamic
127493	Transmission Parameters, Dynamic
127505	Fluid level
127508	Battery status
128259	Speed: Water referenced
128267	Water depth
129026	COG and SOG: Rapid update
129033	Local Time Offset
130310	Environmental parameters
130311	Environmental parameters
130312	Temperature
130316	Temperature, Extended Range
127245	Rudder
129025	Position: Rapid update

Supported SAE J1939 messages

PGN	SPN	Description
61444	190	Engine Speed
65253	247	Engine Total Hours of Operation
65262	110	Engine Coolant Temperature
65262	175	Engine Oil Temperature 1
65263	98	Engine Oil Level
65263	100	Engine Oil Pressure
65263	109	Engine Coolant Pressure
65266	183	Engine Fuel Rate
65270	102	Engine Turbocharger Boost Pressure
65270	173	Engine Exhaust Gas Temperature
65271	114	Net Battery Current
65271	115	Alternator Current
65271	158	Battery Potential (Voltage), Switched
65271	167	Charging System Potential (Voltage)
65271	168	Electrical Potential (Voltage)
65272	177	Transmission Oil Temperature
65272	127	Transmission Oil Pressure
65276	96	Fuel Consumption
65279	97	Water In Fuel Indicator