

DST200 Depth/Speed/Temperature Sensor UserManual

**also covers models
DT200, DT200S, D200, D200ST, and ST200**

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1. Introduction

This document provides a detailed description of the communications protocol for the following Airmar products:

- DST200 Depth/Speed/Temperature TRIDUCER[®] multisensor
- DT200 Depth/Temperature sensor
- DT200S Depth/Temperature sensor with optional external Speed sensor
- D200 Depth sensor
- D200ST Depth sensor with optional external Speed/Temperature sensor
- ST200 Speed/Temperature sensor

These products are all expected to be certified to the NMEA 2000[®]¹ standard.

In this document, the term *DST* (as distinct from the individual product names DST200, DT200, DT200S, D200, D200ST, and ST200) refers generically to all of the products embodied herein.

For further information about the NMEA 2000[®] protocol, refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices, version 1.200*. This document is available from the National Marine Electronics Association (www.nmea.org).

2. NMEA 2000[®] Interface

Each of these products has a single NMEA 2000[®]-compliant network interface, and is expected to be certified as a Class 1 Level B device. The sensor transmits and receives standard and proprietary NMEA 2000[®] Parameter Groups via this interface. Transmitted PGNs (Parameter Group Numbers) are described in section 2.3. Received PGNs are described in section 2.4.

2.1. Terminology

The following terms related to the NMEA 2000[®] protocol appear on the detailed PGN pages to follow.

PGN: Parameter Group Number. NMEA 2000[®] messages are organized into logical collections of data called Parameter Groups. The NMEA assigns each Parameter Group a unique Parameter Group Number, or PGN.

¹ NMEA 2000[®] is a Registered Trademark of the National Marine Electronics Association, Inc.

Single Frame: Yes = the Parameter Group has been designed to fit within the 8 bytes of a single CAN frame. No = the Parameter Group is larger than 8 bytes, so must be transmitted in multiple CAN frames using either NMEA 2000[®] Fast Packets, or (TBD) ISO 11783 multi-packets, using the Data Transfer Transport Protocol (PGNs 60160 and 60416).

Priority: NMEA 2000[®] parameter groups are each assigned a priority value between 0 and 7, which is used to arbitrate between two devices attempting to transmit simultaneously. 0 is the highest priority, and 7 is the lowest. The Priority field at the top of each of the detailed specification pages shows three values separated by slashes (e.g. 6/Y/Y). The first value is the default priority, between 0 and 7, of the parameter group as defined in the NMEA 2000[®] Standard. The second value is "Y" if the priority for this parameter group may be changed using the Command Group Function PGN 126208, or "N" if the priority may not be changed. The third value is "Y" if the priority is saved in nonvolatile EEPROM memory within the device and maintained upon cycling power, or "N" if the priority reverts to the default value upon cycling power.

Update Rate: Some NMEA 2000[®] parameter groups are transmitted periodically by the DST. The Update Rate field at the top of each of the detailed specification pages shows three values separated by slashes (e.g. 100 ms/Y/Y). The first value is the default update rate for the parameter group, as defined in the NMEA 2000[®] Standard. If the default behavior for the parameter group is not to transmit periodically, then this first value will be 0 (zero). The second value is "Y" if the update rate for this parameter group may be changed using the Transmission Interval field in the Request Group Function PGN 126208, or "N" if the update rate may not be changed. The third value is "Y" if the update rate is saved in nonvolatile EEPROM memory within the DST and maintained upon cycling power, or "N" if the update rate reverts to the default value upon cycling power.

Destination: Global or Address. A Global Destination means that the parameter group was designed to be broadcast for use by all receiving devices on the bus. If Destination = Address, this means the parameter group was designed to be transmitted to a specific device on the bus. In this case, the address of the destination device must be provided within the PGN.

Query Support: If the parameter group supports queries, then the DST will transmit the parameter group if requested by another device on the bus. The request must be made using either the ISO Request PGN 59904, or the Complex Request Group PGN 126208.

Access Level: The DST contains a security mechanism whereby certain PGNs require an access sequence to be performed in order to enable the functionality in the PGN. If the indicated Access Level is 0, then the PGN is fully functional without requiring an access sequence to be performed. If the indicated Access Level is nonzero, then it is necessary to perform an access sequence using the proprietary transmitted PGN 065287, Access Level, before the functionality of the PGN will be enabled.

Request Parameter: A "Yes" value specifies that the given field may be used by the Request Group Function PGN 126208 as a qualifier to request specific data according to the contents of the field.

DD: Data Dictionary. The Data Dictionary number defines the contents of the parameter group field. The designators in this column are described in detail in the NMEA 2000[®] Standard, Appendix B.2.

DF: Data Format. The Data Format number defines the format of the data in the parameter group field. The designators in this column are described in detail in the NMEA 2000[®] Standard, Appendix B.3.

Type: The Type designators are described in detail in the NMEA 2000[®] Standard, Appendix B.4.

Resolution: The resolution indicates the smallest increment of the value in the given field, in the units specified by the data format.

Value: This indicates the range of allowable values the field may contain.

2.2. Sequence ID (SID)

Some transmitted Parameter Groups contain a SID (Sequence Identification Number) field. This field contains an 8-bit upward counting number that is used to tie related information together between different Parameter Groups. The SID provides a method to indicate that the data in a given set of Parameter Groups are synchronized to the same sample interval.

In the DST products, the following groups of PGNs will contain identical SID values, indicating that the data from each PGN in the group was taken at the same time, even though the PGNs may be transmitted at different times:

SID Group 1:

PGN 128267 Water Depth

Proprietary PGN 65408 Depth Quality Factor

SID Group 2:

PGN 128259 Speed

Proprietary PGN 65409 Speed Pulse Count

2.3. Transmitted NMEA 2000® PGNs

The NMEA 2000® PGNs transmitted by the different models are summarized in Table 1. Each of the transmitted PGNs in Table 1 is described in detail on the subsequent pages.

Table 1: NMEA 2000® Transmitted PGNs

<u>PGN</u>	<u>Description</u>	DST200	DT200	DT200S	D200	D200ST	ST200
59392	ISO Acknowledgment	✓	✓	✓	✓	✓	✓
60928	ISO Address Claim	✓	✓	✓	✓	✓	✓
65285	Proprietary: Boot State Acknowledgment	✓	✓	✓	✓	✓	✓
65287	Proprietary: Access Level	✓	✓	✓	✓	✓	✓
65408	Proprietary: Depth Quality Factor	✓	✓	✓	✓	✓	
65409	Proprietary: Speed Pulse Count	✓		✓		✓	✓
65410	Proprietary: Internal Device Temperature and Supply Voltage	✓	✓	✓	✓	✓	✓
126208	Acknowledge Group Function	✓	✓	✓	✓	✓	✓
126464	PGN List – Transmit and Received PGNs Group Function	✓	✓	✓	✓	✓	✓
126720	Proprietary: -35: Simulate Mode -40: Calibrate Depth -41: Calibrate Speed -42: Calibrate Temperature -43: Speed Filter -44: Temperature Filter -46: NMEA 2000® Options	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓
126996	Product Information	✓	✓	✓	✓	✓	✓
126998	Configuration Information	✓	✓	✓	✓	✓	✓
128259	Speed (water referenced)	✓		✓		✓	✓
128267	Water depth	✓	✓	✓	✓	✓	
128275	Distance log	✓		✓		✓	✓
130310	Environmental Parameters (water temperature)	✓	✓	✓		✓	✓
130311	Environmental Parameters (water temperature)	✓	✓	✓		✓	✓
130944	Proprietary: POST	✓	✓	✓	✓	✓	✓

PGN **059392** (0x0E800)

ISO Acknowledgment

Single Frame: Yes

Priority: 6/N/N

Update Rate: 0/N/N

Destination: Address

Query Support: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

This PGN is transmitted as a handshake mechanism in response to an ISO Request PGN 59904.

PGN **060928** (0x0EE00)

ISO Address Claim

Single Frame: Yes

Priority: 6/N/N

Update Rate: 0/N/N

Destination: Address

Query Support: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 60928 is a network management message used to claim a network address, reply to devices requesting the claimed address, and to respond to requests for device information (NAME). The 64 bits comprised by the ten fields in this parameter group constitute the ISO 11783-5 NAME entity.

The contents of fields 3, 4, and 8 are stored in EEPROM memory and may be changed using PGN 126208, Command Group Function.

PGN 065285 (0x0FF05)

Proprietary: Boot State Acknowledgment

Single Frame: Yes	Priority: 7/N/N	Update Rate: 0/N/N	Destination: Global	Query Support: No	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	No	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	No	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Boot State	No	N/A	DF52	3 bits	1	000 = in Startup Monitor 001 = running Bootloader 010 = running Application 011 to 110 = reserved 111 = Data Not Available	
5	Reserved bits	No	DD001	DF52	45 bits	1	0x1FFFFFFFFFFFF	All bits set to logic "1"

Notes

The Boot State Acknowledgment proprietary PGN is transmitted in response to the received proprietary PGN 65286, Global Boot State Request. This PGN is transmitted from any of the following contexts: Startup Monitor, CAN Bootloader, or Application.

This PGN is also transmitted in response to a PGN 126208 Request Group Function message. Fields 1 and 3 must both be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

PGN 065287 (0x0FF07)

Proprietary: Access Level

Single Frame: Yes	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Global	Query Support: Yes	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Format Code	Yes	DD005	DF53	uint8	1 bit	1	1 = Format Code 1
5	Access Level	No	N/A	DF52	3 bits	1	0x0 = locked 0x1 = unlocked, level 1 0x2 = unlocked, level 2 0x3 to 0x7 = reserved	When this PGN is transmitted, this field indicates the current Access Level of the DST. This field may be changed using the Command Group Function PGN 126208 (see text below).
6	Reserved bits	No	DD001	DF52	5 bits	1	0x1F	All bits set to logic "1"
7	Access Seed/Key	No	N/A	DF55	uint32	1 bit	0 to 4,294,967,292	When this PGN is transmitted, this field provides a Seed that may be used in a subsequent Unlock operation. This field is also used to provide a Key to the DST when performing an Unlock operation, using the Command Group Function PGN 126208 (see text below).

Notes

The Access Level proprietary PGN is a security mechanism that provides the DST with a method to limit access to certain functions to devices that understand the proper unlock sequence. Certain operations will not be possible unless the Access Level is first increased to the required value. A nonzero Access Level remains in effect until the unit powers down, or 15 minutes has elapsed, whichever comes first, after which the Access Level returns to zero. The Access Level is not stored in EEPROM.

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1 and 3 must both be fully specified in the request in order for this PGN to be transmitted.

Note that the value in field 4 (Format Code) may correspond to a specific set of algorithms for calculating the key from a given seed.

If field 4 is specified in a Request Group PGN 126208, but does not agree with the format code known by the device, then the request will be NAK'ed. If field 4 is *not* specified in a request, then the PGN will be transmitted with the format code known to the device.

This PGN does not respond to ISO Requests (PGN 59904).

When this PGN is transmitted, field 5 provides the current Access Level of the DST, and field 7 provides a randomly-generated Seed that may be used in a subsequent Unlock operation.

To change the Access Level, use the Command Group Function PGN 126208, specifying the individual fields in PGN 65287 as follows:

To change the Access Level to 0 (i.e. to lock the device after having been previously unlocked):

Use the Command Group Function PGN 126208, specifying the individual fields in PGN 65287 as follows. (Note that it is not required to specify field 7.)

PGN 65287	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	1
5	0

The DST will respond with the Acknowledge Group Function PGN 126208, indicating success or failure according to the error codes provided in the parameter fields.

To change the Access Level to 1:

Use the Command Group Function PGN 126208, specifying the individual fields in PGN 65287 as follows.

Field 7 serves as a simple password to allow setting the Access Level to 1. For this Access Level, it is not necessary to obtain a Seed or calculate a Key.

PGN 65287	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	1
5	1
7	0x12345678

The DST will respond with the Acknowledge Group Function PGN 126208, indicating success or failure according to the error codes provided in the parameter fields.

To change the Access Level to 2 or higher:

1. Use the Request Group Function PGN 126208, specifying PGN 65287, to obtain a Seed.
2. The DST will respond with PGN 65287, with the current Access Level in field 5, and with a random Seed in field 7.
3. Using the Seed provided in step 2, calculate a Key according to the algorithm corresponding to the desired Access Level.

(Continued on following page)

4. Use the Command Group Function PGN 126208, specifying the individual fields in PGN 65287 as follows:

PGN 65287	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	1
5	The desired Access Level
7	The calculated Key

5. The DST will respond with the Acknowledge Group Function PGN 126208, indicating success or failure according to the error codes provided in the parameter fields.

After executing the above sequence to change the Access Level, you may optionally request this PGN using the Request Group Function PGN 126208 to confirm that the Access Level was in fact changed.

Note that increasing the Access Level does not in and of itself allow global access to the secure functions of the DST. The Access Level is changed only for subsequent commands and requests originating from the device with the source address originally used to specify the Access Level.

PGN 065408 (0x0FF80)

Proprietary: Depth Quality Factor

Single Frame: Yes	Priority: 7/Y/Y	Update Rate: 0/Y/Y	Destination: Global	Query Support: Yes	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	SID (Sequence ID)	No	DD056	DF53	uint8	1 bit	0 to 252	Unit-less number. Refer to section 2.2. for an explanation of this field.
5	Depth Quality Factor	No	N/A	DF52	4 bits	1	0x0 = depth unlocked 0x1 to 0xA = depth quality (0xA=best) 0xB to 0xE = reserved 0xF = data not available	
6	Reserved bits	No	DD001	DF52	36 bits	1	0xFFFFFFFF	All bits set to logic "1"

Notes

PGN 65408 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	✓
	D200ST	✓
	ST200	No

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1 and 3 must both be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

The following transmitted PGNs are linked by their SID fields: PGN 128267 and Proprietary PGN 65408. When this PGN is used, it is recommended that it be enabled for transmission at the same rate as the Water Depth PGN 128267.

PGN 065409 (0x0FF81)

Proprietary: Speed Pulse Count

Single Frame: Yes	Priority: 7/Y/Y	Update Rate: 0/Y/Y	Destination: Global	Query Support: Yes	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	SID (Sequence ID)	No	DD056	DF53	uint8	1 bit	0 to 252	Unit-less number. Refer to section 2.2. for an explanation of this field.
5	Duration of interval	No	N/A	DF66	uint16	0.001 s	0 to 65.532 s	Duration of the most recent measurement interval.
6	Number of pulses received	No	DD008	DF54	uint16	1	0 to 65532	Number of pulses received from the paddlewheel sensor during the most recent measurement interval.
7	Reserved bits	No	DD001	DF52	8 bits	1	0xFF	All bits set to logic "1"

Notes

PGN 65409 supported in:	DST200	✓
	DT200	No
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1 and 3 must both be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

This PGN may be used along with an alternative speed sensor (e.g. GPS) to create a frequency versus speed profile for use in calibrating the paddlewheel speed sensor within the device.

Field 5, duration of interval, will nominally be the same as the update rate, but reflects the *actual* duration, whereas the update rate setting reflects the *desired* duration.

Each time this PGN is transmitted, the interval timer (used for field 5) is reset to 0.

The pulse frequency for a given interval can be calculated by dividing field 6 (number of pulses) by field 5 (duration of interval in seconds). Assuming a steady-state speed, the error in this calculation will be:

$$\pm \frac{1}{field5} Hz$$

Therefore, at very low speeds, it will be necessary to use long intervals in order to collect enough pulses to achieve the required accuracy. Alternatively, the data from fields 5 and 6 may be accumulated over several successive transmissions of this PGN (assuming a steady-state speed over the entire measurement span).

The following transmitted PGNs are linked by their SID fields: PGN 128259 and Proprietary PGN 65409.

See also the proprietary transmitted Calibrate Speed PGN 126720-41.

PGN 065410 (0xFF82)

Proprietary: Device Temp. and Supply Voltage

Single Frame: Yes	Priority: 7/Y/Y	Update Rate: 0/Y/Y	Destination: Global	Query Support: Yes	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	SID (Sequence ID)	No	DD056	DF53	uint8	1 bit	0 to 252	Unit-less number. Refer to section 2.2. for an explanation of this field.
5	Internal Device Temperature	No	DD043	DF39	uint16	0.01 deg K	0 to 655.32 deg K	Measured temperature of the DST internal circuit board.
6	Supply Voltage	No	DD136	DF42	int16	0.01 V	+/-327.64 V	Supply voltage, as measured by the DST
7	Reserved bits	No	DD001	DF52	8 bits	1	0xFF	All bits set to logic "1"

Notes

PGN TBD supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	✓
	D200ST	✓
	ST200	✓

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1 and 3 must both be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

NMEA 2000[®] TRANSMITTED PARAMETER GROUP

PGN 126208 (0x1ED00)

Acknowledge Group Function

Single Frame: No

Priority: 6/N/N

Update Rate: 0/N/N

Destination: Address

Query Support: Yes

Access Level: 0

Notes

The Acknowledgment Reply is transmitted in response to a PGN 126208 Request or Command Group Function message. In response to the Request message, the Acknowledge is only transmitted for a request that cannot be complied with.

See also related PGNs:

- the received Request Group Function PGN 126208
- the received Command Group Function PGN 126208

PGN 126464 (0x1EE00)

PGN List - Transmit/Received PGNs Group

Single Frame: No	Priority: 6/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 0
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For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

This message provides a list of the transmitted or received PGNs that are supported by the DST. It is transmitted only upon request. If it is requested using the ISO Request PGN 59904, or with the Request Group Function PGN 126208 without specifying the Group Function Code in field 1, then this PGN will be transmitted twice, once each for the transmitted and received lists.

Note that proprietary PGNs are excluded from these lists.

(continued on next page)

The list of Transmitted PGNs, broken down by model, is as follows:

<u>PGN</u>	<u>Description</u>	DST200	DT200	DT200S	D200	D200ST	ST200
59392	ISO Acknowledgment	✓	✓	✓	✓	✓	✓
60928	ISO Address Claim	✓	✓	✓	✓	✓	✓
126208	Acknowledge Group Function	✓	✓	✓	✓	✓	✓
126464	PGN List – Transmit and Received PGNs Group Function	✓	✓	✓	✓	✓	✓
126996	Product Information	✓	✓	✓	✓	✓	✓
126998	Configuration Information	✓	✓	✓	✓	✓	✓
128259	Speed	✓		Note 1		Note 1	✓
128267	Water depth	✓	✓	✓	✓	✓	
128275	Distance log	✓		Note 1		Note 1	✓
130310	Environmental Parameters	✓	✓	Note 1		Note 1	✓
130311	Environmental Parameters	✓	✓	Note 1		Note 1	✓

Note 1: For models DT200S and D200ST: On power-up, these units will automatically detect the presence or absence of an optional external speed/temperature sensor. If no external sensor is detected, then the following transmitted PGNs will not be provided, and the Transmitted PGNs Group List PGN 126464 will exclude them from its list:

Model DT200S: PGNs 128259 and 128275.

Model D200ST: PGNs 128259, 128275, 130310 and 130311.

The list of Received PGNs is as follows. These are supported by all models.

<u>PGN</u>	<u>Description</u>
59904	ISO Request
60928	ISO Address Claim
126208	Request Group Function
126208	Command Group Function

PGN 126720 (0x1EF00)

Addressable Multi-Frame Proprietary

Single Frame: No **Priority:** 7/Y/N **Update Rate:** 0/N/N **Destination:** Address **Query Support:** Yes **Access Level:** See PID variants

Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	0 to 252	Identifier specifying how to interpret the remaining fields in this parameter group.
5+	(PID-dependent)	No	DD000	DF00	undef.	undefined	undefined	The use of the remaining bytes and the number of CAN frames required varies according to the PID (field 4).

Notes

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

The use of this PGN with the following Proprietary ID's (field 4) is described on the subsequent pages:

- 35: Simulate Mode
- 40: Calibrate Depth
- 41: Calibrate Speed
- 42: Calibrate Temperature
- 43: Speed Filter
- 44: Temperature Filter
- 46: NMEA 2000® Options

PGN 126720-35 (0x1EF00)

Proprietary: Simulate Mode

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 1
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	35 (decimal)	35 = Simulate Mode
5	Simulate Mode	No	DD003	DF52	2 bits	1	MSB/LSB: 00 = Simulate Mode Off 01 = Simulate Mode On 10 = Reserved 11 = No action/Data Not Available	This field defines whether the DST is in Simulate Mode. This field may be changed with the Command Group Function PGN 126208. It is <i>not</i> saved in EEPROM. The default value on power up is 00 (Simulate Mode Off).
6	Reserved bits	No	DD001	DF52	22 bits	1	0x3FFFFFF	All bits set to logic "1"

Notes

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

Although this is a fast-packet message, the version with this PID fits into a single CAN frame.

To change the state of the Simulate Mode option (field 5), use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-35 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	35 (decimal)
5	One of the following: MSB/LSB: 00 = Turn Simulate Mode Off 01 = Turn Simulate Mode On

PGN 126720-40 (0x1EF00)

Proprietary: Calibrate Depth

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 1
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	40 (decimal)	40 = Calibrate Depth
5	Speed of Sound	No	N/A	N/A	uint16	0.1 m/s	0 to 65532 = 0 to 6553.2 m/s. The actual range of allowable values is 1350.0 to 1650.0 m/s. 0xFFFE (65534) = restore default 0xFFFF (65535) = data not available / do not change	This field establishes the Speed of Sound used for the Water Depth calculation. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value is 1500.0 m/s.
6	Reserved	No	DD001	DF52	8 bits	1	0xFF	All bits set to logic "1"

Notes

PGN 126720-40 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	✓
	D200ST	✓
	ST200	No

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

Although this is a fast-packet message, the version with this PID fits into a single CAN frame.

To change the Speed of Sound used for depth calculations (field 5), use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-40 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	40 (decimal)
5	Desired Speed of Sound value.

If a Command Group Function PGN 126208 is received to change field 5 to a value outside the range of allowable values, the response will be an Acknowledge Group Function PGN 126208 with a parameter error code indicating 'Request or command group parameter out-of-range.'

PGN 126720-41 (0x1EF00)

Proprietary: Calibrate Speed

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 1
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	41 (decimal)	41 = Calibrate Speed
5	Number of pairs of data points to follow	No	DD006	DF53	uint8	1 bit	0 to 252 The allowable range of values is 0 to 25. 0xFE (254) = restore default speed calibration curve 0xFF (255) = data not available / do not change	This value is stored in EEPROM memory. See text below regarding restoring the calibration to the factory default curve.
6	Input frequency of first data point	No	N/A	N/A	uint16	0.1 Hz	0 to 6553.2 Hz	This value is stored in EEPROM memory.
7	Output speed of first data point	No	DD044	DF35	uint16	0.01 m/s	0 to 655.32 m/s	This value is stored in EEPROM memory.
8	Variable number of fields, field 6 repeated	No	N/A	N/A	uint16	0.1 Hz	0 to 6553.2 Hz	This value is stored in EEPROM memory.
9	Variable number of fields, field 7 repeated	No	DD044	DF35	uint16	0.01 m/s	0 to 655.32 m/s	This value is stored in EEPROM memory.

Notes

PGN 126720-41 supported in:	DST200	✓
	DT200	No
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

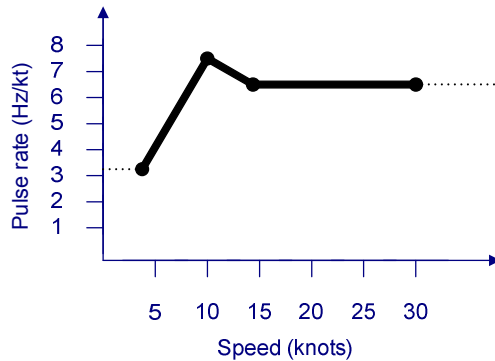
The Speed Calibration PGN is intended to correct first-order nonlinearities in the paddlewheel speed sensor for a given installation. Speed Calibration is a piecewise linear transfer function that maps the raw pulse frequency coming from the paddlewheel sensor (measured in pulses per second, or Hertz) to an output speed curve (measured in meters per second). Each data point in the piecewise linear function is the endpoint of a line segment. The input, or domain of the function, is the raw paddlewheel rotational speed in Hertz, and the output, or range of the function, is the calibrated speed in meters per second.

The data points in this PGN must be ordered with input frequencies monotonically increasing.

To change the Speed Calibration curve, use the Command Group Function PGN 126208. The following example will serve to illustrate the process.

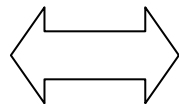
The pulse rate (in Hertz per knot) of a given paddlewheel speed sensor can be plotted against the actual vessel speed in knots. Figure 1, below, shows an example of a simple 4-point calibration curve for a typical transom-mount paddlewheel sensor.

Figure 1: Pulse Rate versus Speed



The table on the left (below) corresponds to the above graph. This relationship can also be understood as Pulse Frequency (in Hertz) versus actual vessel speed (in meters per second). The table on the right (below) shows the same data recast to these units.

<u>Speed (knots)</u>	<u>Pulse Rate (Hz/kt)</u>
3.75	3.25
10	7.5
15	6.5
30	6.5



<u>Frequency (Hz)</u>	<u>Speed (m/s)</u>
12.2	1.93
75.0	5.14
97.5	7.72
195.0	15.43

To determine the pulse frequency produced by the paddlewheel sensor at different speeds, use the transmitted proprietary PGN 65409, along with a separate speed measuring device (such as a GPS). Collect Pulse Frequency versus Speed data for various speeds to generate a table like the one on the right, above.

(Continued on following page)

Then, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-41 according to the below example.

PGN 126720	
Field	Value (decimal)
1	135 (manufacturer code)
3	4 (industry group)
4	41 (PID)
5	4 (number of data points)
6	122 (frequency #1 = 12.2)
7	193 (speed #1 = 1.93)
8	750 (frequency #2 = 75.0)
9	514 (speed #2 = 5.14)
10	975 (frequency #3 = 97.5)
11	772 (speed #3 = 7.72)
12	1950 (frequency #4 = 195.0)
13	1543 (speed #4 = 15.43)

When changing the speed calibration, it is required that *all* data points in the function be specified. It is not permitted to change only one data point, or a subset of data points.

Note: for speeds below the first point in the curve, and speeds above the last point in the curve, the unit will assume the same Hz/knot value corresponding to the first and last points in the curve, respectively. This is illustrated by the dotted lines in Figure 1.

To restore the speed calibration to the factory default curve, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-41 as follows:

PGN 126720	
Field	Value (decimal)
1	135 (manufacturer code)
3	4 (industry group)
4	41 (PID)
5	254 (0xFE, restore default calibration)

Note that specifying 0xFE in field 5 will cause all of the subsequent data fields to be restored to their factory default values.

PGN 126720-42 (0x1EF00)

Proprietary: Calibrate Temperature

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 1
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	42 (decimal)	42 = Calibrate Temperature
5	Temperature instance	Yes			2 bits	1	0=DeviceSensor, 1=Onboard Water Sensor, 2=Optional Water Sensor, 3=Data Not Available	Select sensor to be calibrated or reported on
6	Reserved	No	DD001	DF52	6	1	0x3F	All bits set to logic "1"
7	Temperature offset	No	N/A	N/A	int16	0.001 °K	+/-32.764 °K The actual range of allowable values is -9.999 to +9.999 °K.	This field establishes a Temperature Offset that is added to the measured raw temperature value to produce the reported Water Temperature. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value is 0.000 °K.

Notes

PGN 126720-42 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

Although this is a fast-packet message, the version with this PID fits into a single CAN frame.

To change the Temperature Offset, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-42 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	42 (decimal)
5	Desired temperature instance
7	Desired temperature offset

If a Command Group Function PGN 126208 is received to change field 7 to a value outside the range of allowable values, the response will be an Acknowledge Group Function PGN 126208 with a parameter error code indicating 'Request or command group parameter out-of-range.'

PGN 126720-43 (0x1EF00)

Proprietary: Speed Filter

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 1
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	43 (decimal)	43 = Speed Filter
5	Filter type	Yes	N/A	DF52	4 bits	1	0 = no filter 1 = basic IIR filter 2 through 14 = reserved 15 = data not available / do not change	This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value is 1 (basic IIR filter). The format and number of remaining fields in this parameter group (starting with field 7) depends on the contents of this field.
6	Reserved	No	DD001	DF52	4 bits	1	0xF	All bits set to logic "1"
7+	(Dependent upon filter type)	No	DD000	DF00	undef.	undefined	undefined	The use of the remaining bytes and the number of CAN frames required varies according to the filter type (field 5).

Notes

PGN 126720-43 supported in:	DST200	✓
	DT200	No
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted. If field 5 (filter type) is specified in the request, then the PGN will be transmitted once with the data for the specified filter type. If field 5 (filter type) is *not* specified in the request, then this PGN will be transmitted multiple times, once for each supported filter type.

This PGN does not respond to ISO Requests (PGN 59904).

This PGN is used to establish the sample interval, type of filter, and filter coefficients used when measuring the paddlewheel pulse frequency used in calculating the Speed Water Referenced value reported in PGN 128259.

The purpose of the filter is to remove unwanted frequency components present in the raw data provided by the paddlewheel sensor. The filter settings represent a trade-off between smoothness of readings and responsiveness to changes in the speed.

This PGN is intended to eventually accommodate different types of filters. At this time only two filter options are supported: Filter Type 0 (No Filter), and Filter Type 1 (Basic IIR Filter).

To change to a different filter without changing any of the filter parameters or coefficients, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-43 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	43 (decimal)
5	Desired filter type

The different filter types are described on the following pages.

Speed Filter Type 0 (No Filter)

For Speed Filter Type 0, the fields in PGN 126720-43 starting with field 5 are described below.

Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
5	Filter type	Yes	N/A	DF52	4 bits	1	0 = no filter	See remark for field 5 on page 28.
6	Reserved	No	DD001	DF52	4 bits	1	0xF	All bits set to logic "1"
7	Sample interval	No	N/A	DF66	uint16	0.01 s	0 to 655.32 seconds 0 = reserved 0xFFFE = restore default 0xFFFF = data not available / do not change	Interval of time between successive samples of the paddlewheel pulse accumulator. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value for filter type 0 is 1.00 seconds.

Speed Filter Type 0 causes the Speed Water Referenced value in PGN 128259 to be calculated using only the number of paddlewheel pulses accumulated in the most recent sample interval. No filtering of the data is performed.

To select speed filter type 0 and specify the sample interval, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-43 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	43 (decimal)
5	0 (filter type)
7	Desired sample interval

Speed Filter Type 1 (Basic IIR Filter)

For Speed Filter Type 1, the fields in PGN 126720-43 starting with field 5 are described below.

Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
5	Filter type	Yes	N/A	DF52	4 bits	1	1 = basic IIR filter	See remark for field 5 on page 28.
6	Reserved	No	DD001	DF52	4 bits	1	0xF	All bits set to logic "1"
7	Sample interval	No	N/A	DF66	uint16	0.01 s	0 to 655.32 seconds 0 = reserved 0xFFFE = restore default 0xFFFF = data not available / do not change	Interval of time between successive samples of the paddlewheel pulse accumulator. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value for filter type 1 is 0.25 seconds.
8	Filter duration	No	N/A	DF66	uint16	0.01 s	0 to 655.32 seconds 0 = reserved 0xFFFE = restore default 0xFFFF = data not available / do not change	Duration of filter. This value must be \geq the sample interval value in field 7. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value is 2.0 seconds.

The filter equation is:

$$New_filtered_value = \frac{Old_filtered_value \times (K - 1) + New_reading}{K}$$

where the filter time constant $K = \frac{Filter_duration}{Sample_interval}$

and $K \geq 1$. Note that if $K=1$, this is equivalent to no filtering at all.

To select speed filter type 1 and change its settings, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-43 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	43 (decimal)
5	1 (filter type)
7	Desired sample interval
8	Desired filter duration

When changing either of the filter parameters (fields 7 and 8), both parameters must be specified in the Command Group Function PGN 126208.

PGN 126720-44 (0x1EF00)

Proprietary: Temperature Filter

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 1
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	44 (decimal)	44 = Temperature Filter
5	Filter type	Yes	N/A	DF52	4 bits	1	0 = no filter 1 = basic IIR filter 2 through 14 = reserved 15 = data not available / do not change	This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value is 1 (basic IIR filter). The format and number of remaining fields in this parameter group (starting with field 7) depends on the contents of this field.
6	Reserved	No	DD001	DF52	4 bits	1	0xF	All bits set to logic "1"
7+	(Dependent upon filter type)	No	DD000	DF00	undef.	undefined	undefined	The use of the remaining bytes and the number of CAN frames required varies according to the filter type (field 5).

Notes

PGN 126720-44 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted. If field 5 (filter type) is specified in the request, then the PGN will be transmitted once with the data for the specified filter type. If field 5 (filter type) is *not* specified in the request, then this PGN will be transmitted multiple times, once for each supported filter type.

This PGN does not respond to ISO Requests (PGN 59904).

This PGN is used to establish the sample interval, type of filter, and filter coefficients used when measuring the Water Temperature value reported in PGNs 130310 and 130311.

The purpose of the filter is to remove unwanted frequency components present in the raw temperature data provided by the thermistor. The filter settings represent a trade-off between smoothness of readings and responsiveness to changes in the temperature.

This PGN is intended to eventually accommodate different types of filters. At this time only two filter options are supported: Filter Type 0 (No Filter), and Filter Type 1 (Basic IIR Filter).

To change to a different filter without changing any of the filter parameters or coefficients, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-44 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	44 (decimal)
5	Desired filter type

The different filter types are described on the following pages.

Temperature Filter Type 0 (No Filter)

For Temperature Filter Type 0, the fields in PGN 126720-44 starting with field 5 are described below.

Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
5	Filter type	Yes	N/A	DF52	4 bits	1	0 = no filter	See remark for field 5 on page 33.
6	Reserved	No	DD001	DF52	4 bits	1	0xF	All bits set to logic "1"
7	Sample interval	No	N/A	DF66	uint16	0.01 s	0 to 655.32 seconds 0 = reserved 0xFFFE = restore default 0xFFFF = data not available / do not change	Interval of time between successive samples of the water temperature thermistor. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value for filter type 0 is 1.00 seconds.

Temperature Filter Type 0 causes the Water Temperature value reported in PGNs 130310 and 130311 to be calculated using only the thermistor reading(s) taken in the most recent sample interval. No filtering of the data is performed.

To select temperature filter type 0 and specify the sample interval, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-44 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	44 (decimal)
5	0 (filter type)
7	Desired sample interval

Temperature Filter Type 1 (Basic IIR Filter)

For Temperature Filter Type 1, the fields in PGN 126720-44 starting with field 5 are described below.

Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
5	Filter type	Yes	N/A	DF52	4 bits	1	1 = basic IIR filter	See remark for field 5 on page 33.
6	Reserved	No	DD001	DF52	4 bits	1	0xF	All bits set to logic "1"
7	Sample interval	No	N/A	DF66	uint16	0.01 s	0 to 655.32 seconds 0 = reserved 0xFFFE = restore default 0xFFFF = data not available / do not change	Interval of time between successive samples of the water temperature thermistor. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value for filter type 1 is 0.50 seconds.
8	Filter duration	No	N/A	DF66	uint16	0.01 s	0 to 655.32 seconds 0 = reserved 0xFFFE = restore default 0xFFFF = data not available / do not change	Duration of filter. This value must be \geq the sample interval value in field 7. This field is stored in EEPROM and may be changed with the Command Group Function PGN 126208. The default value is 4.0 seconds.

The filter equation is:

$$New_filtered_value = \frac{Old_filtered_value \times (K - 1) + New_reading}{K}$$

where the filter time constant $K = \frac{Filter_duration}{Sample_interval}$

and $K \geq 1$. Note that if $K=1$, this is equivalent to no filtering at all.

To select temperature filter type 1 and change its settings, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-44 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	44 (decimal)
5	1 (filter type)
7	Desired sample interval
8	Desired filter duration

When changing either of the filter parameters (fields 7 and 8), both parameters must be specified in the Command Group Function PGN 126208.

PGN 126720-46 (0x1EF00)

Proprietary: NMEA 2000® Options

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/N/N	Destination: Address	Query Support: Yes	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	Yes	DD005	DF53	uint8	1 bit	46 (decimal)	46 = NMEA 2000® Options
5	Transmission Interval Supersedes Measurement Interval	No	DD003	DF52	2 bits	1	MSB/LSB: 00 = Feature Disabled 01 = Feature Enabled 10 = Reserved 11 = No action/Data Not Available	See the text below for a description of this feature. This field may be changed with the Command Group Function PGN 126208. It is saved in EEPROM. The default value is 00 (Feature Disabled).
6	Reserved bits	No	DD001	DF52	22 bits	1	0x3FFFFFF	All bits set to logic "1"

Notes

The various types of data provided by the DST200 are sampled, or measured, at different rates, depending on the nature of the data being measured. For example, the rate at which the digital depth is transmitted may depend on how long it takes for a sonar echo to return from the sea bottom. The rate at which a given source of data is measured is unrelated to the rate at which its corresponding PGN is transmitted. It is possible, using the Request Group Function PGN 126208, to specify a PGN transmission interval that is faster than the corresponding measurement interval for data within the PGN.

Field 5 of this PGN allows the user to specify the behavior of the unit when PGNs are requested to be transmitted faster than the measurement intervals for data within the PGNs. If the feature is disabled (the default case), then the measurement interval supersedes the requested transmission interval. If the feature is enabled, then the requested transmission interval supersedes the measurement interval.

Some examples are shown below:

<u>Measurement Interval</u>	<u>Transmission Interval</u>	<u>Field 5</u>	<u>Actual Rate of Transmission</u>	<u>Comment</u>
500 mS	100 mS	00 = disabled	500 mS	In the default case, the device will not transmit data any faster than it is sampled, or measured, even if requested to do so.
500 ms	100 mS	01 = enabled	100 mS	If the feature is enabled, then PGNs will be transmitted at the rate specified by the transmission interval, regardless of the measurement interval. If the transmission interval is shorter than the measurement interval, then data will be repeated on successive PGNs until it is measured again.
500 mS	1000 mS	00 = disabled	1000 mS	If the transmission interval is greater than the measurement interval, then it will supersede regardless of the setting in field 5.
500 mS	1000 mS	01 = enabled	1000 mS	If the transmission interval is greater than the measurement interval, then it will supersede regardless of the setting in field 5.

This PGN is transmitted in response to a PGN 126208 Request Group Function message. Fields 1, 3, and 4 must each be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

Although this is a fast-packet message, the version with this PID fits into a single CAN frame.

To change the state of field 5, use the Command Group Function PGN 126208, specifying the individual fields in PGN 126720-46 as follows.

PGN 126720	
Field	Value
1	135 (decimal)
3	4 (decimal)
4	46 (decimal)
5	One of the following: MSB/LSB: 00 = Disable Feature 01 = Enable Feature

PGN 126996 (0x1F014)

Product Information

Single Frame: No	Priority: 6/Y/N	Update Rate: 0/N/N	Destination: Global	Query Support: Yes	Access Level: 0
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Notes

This PGN is transmitted in response to an ISO Request PGN 59904, or to a PGN 126208 Request Group Function message.

PGN 126998 (0x1F016)

Configuration Information

Single Frame: No	Priority: 6/Y/N	Update Rate: 0/N/N	Destination: Global	Query Support: Yes	Access Level: 0
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For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

This PGN is transmitted in response to an ISO Request PGN 59904, or to a PGN 126208 Request Group Function message.

The contents of fields 1 and 2 are stored in nonvolatile memory, and may be programmed using the NMEA Command Group Function, PGN 126208.

To change the state of the Installation Description (fields 1 and 2), use the Command Group Function PGN 126208, specifying the individual fields in PGN 126998 as follows.

PGN 126998	
Field	Value
1	Desired variable length ASCII string, up to 70 characters
2	Desired variable length ASCII string, up to 70 characters

PGN 128259 (0x1F503)

Speed

Single Frame: Yes **Priority:** 2/Y/Y **Update Rate:** 1000 mS/Y/Y **Destination:** Global **Query Support:** Yes **Access Level:** 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 128259 supported in:	DST200	✓
	DT200	No
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

The following transmitted PGNs are linked by their SID fields: PGN 128259 and Proprietary PGN 65409.

Special note for models DT200S and D200ST: On power-up, these units will automatically detect the presence or absence of an optional external speed/temperature sensor. If no external sensor is detected, then PGNs 128259 and 128275 will not be provided. In this case, the Transmitted PGNs Group List PGN 126464 will exclude those PGNs from its list.

See also the following transmitted PGNs:

- 65409 Proprietary: Speed Pulse Count
- 126720-41 Proprietary: Calibrate Speed
- 126720-43 Proprietary: Speed Filter
- 128275 Distance Log

PGN 128267 (0x1F50B)

Water Depth

Single Frame: Yes	Priority: 3/Y/Y	Update Rate: 1000 mS/Y/Y	Destination: Global	Query Support: Yes	Access Level: 0
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For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 128267 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	✓
	D200ST	✓
	ST200	No

The following transmitted PGNs are linked by their SID fields: PGN 128267 and Proprietary PGN 65408.

See also the following transmitted PGNs:

65408	Proprietary: Depth Quality Factor
126720-40	Proprietary: Calibrate Depth

To change the Offset, use the Command Group Function PGN 126208, specifying the individual fields in PGN 128267 as follows.

PGN 128267	
Field	Value
3	Desired offset

PGN 128275 (0x1F513)

Distance Log

Single Frame: No

Priority: 6/Y/Y

Update Rate: 1000 mS/Y/Y

Destination: Global

Query Support: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 128275 supported in:	DST200	✓
	DT200	No
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

Special note for models DT200S and D200ST: On power-up, these units will automatically detect the presence or absence of an optional external speed/temperature sensor. If no external sensor is detected, then PGNs 128259 and 128275 will not be provided. In this case, the Transmitted PGNs Group List PGN 126464 will exclude those PGNs from its list.

To change the Distance Since Last Reset, use the Command Group Function PGN 126208, specifying the individual fields in PGN 128275 as follows.

PGN 128275	
Field	Value
4	Desired value (usually 0 to reset log)

See also the following transmitted PGNs:

65409	Proprietary: Speed Pulse Count
126720-41	Proprietary: Calibrate Speed
126720-43	Proprietary: Speed Filter
128259	Speed

PGN 130310 (0x1FD06)

Environmental Parameters

Single Frame: Yes

Priority: 5/Y/Y

Update Rate: 0/Y/Y

Destination: Global

Query Support: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 130310 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

This PGN has been superseded by PGN 130311, but is included for backward compatibility.

Special note for model D200ST: On power-up, this unit will automatically detect the presence or absence of an optional external speed/temperature sensor. If no external sensor is detected, then PGNs 130310 and 130311 will not be provided. In this case, the Transmitted PGNs Group List PGN 126464 will exclude those PGNs from its list.

See also the following transmitted PGNs:

126720-42	Proprietary: Calibrate Temperature
126720-44	Proprietary: Temperature Filter
130311	Environmental Parameters

PGN 130311 (0x1FD07)

Environmental Parameters

Single Frame: Yes

Priority: 5/Y/Y

Update Rate: 500mS/Y/Y

Destination: Global

Query Support: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 130311 supported in:	DST200	✓
	DT200	✓
	DT200S	✓
	D200	No
	D200ST	✓
	ST200	✓

Special note for model D200ST: On power-up, this unit will automatically detect the presence or absence of an optional external speed/temperature sensor. If no external sensor is detected, then PGNs 130310 and 130311 will not be provided. In this case, the Transmitted PGNs Group List PGN 126464 will exclude those PGNs from its list.

See also the following transmitted PGNs:

126720-42	Proprietary: Calibrate Temperature
126720-44	Proprietary: Temperature Filter
130310	Environmental Parameters

PGN 130944 (0x1FF80)

Proprietary: POST

Single Frame: No	Priority: 7/Y/N	Update Rate: 0/Y/N	Destination: Global	Query Support: Yes	Access Level: 0
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Field #	Name	Request Param.	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	Yes	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	No	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	Yes	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Control	Yes	N/A	DF52	1 bit	1	0 = report previous values 1 = generate new values	Default value = 0 This field only applies when this PGN is transmitted in response to a query. Periodic transmissions of this PGN will always generate new values.
5	Reserved bits	No	DD001	DF52	7 bits	1	0x7F	All bits set to logic "1"
6	Number of ID/test result pairs to follow	No	DD006	DF53	uint8	1 bit	0 to 252 This field contains 4 for this product.	
7	Test ID #1	No	DD005	DF53	uint8	1 bit	0 to 252	Refer to the Table of IDs and Failure Codes.
8	Test result #1	No	N/A	DF53	uint8	1 bit	0x00 = Pass 0x01-0xEF = Fail 0xF0-0xFE = reserved 0xFF = Data Not Available	Refer to the Table of IDs and Failure Codes.
9	Variable number of fields, field 7 repeated	No	DD005	DF53	uint8	1 bit	0 to 252	Refer to the Table of IDs and Failure Codes.
10	Variable number of fields, field 8 repeated	No	N/A	DF53	uint8	1 bit	0x00 = Pass 0x01-0xEF = Fail 0xF0-0xFE = reserved 0xFF = Data Not Available	Refer to the Table of IDs and Failure Codes.

Notes

This PGN is transmitted once automatically upon power up of the DST. Thereafter, it may be transmitted in response to a PGN 126208 Request Group Function message. Fields 1 and 3 must both be fully specified in the request in order for this PGN to be transmitted.

This PGN does not respond to ISO Requests (PGN 59904).

This PGN provides a method of reporting the results of the Power On Self Test performed by the DST200. The various tests performed by the POST are simple tests to determine if the hardware is minimally responding to software stimuli. The POST function should not be regarded as a comprehensive indicator that a given unit is healthy. In other words, it is possible that a defective unit might still pass the POST operation. However, the POST can be useful to identify certain types of problems with the DST200.

Field 4, Control, specifies whether this PGN will report the results of the last test, or whether the DST will conduct a new self test prior to reporting the results. This field should be specified when requesting a single transmission of this PGN.

This PGN may be configured to transmit periodically by specifying an Update Rate using the Request Group Function PGN 126208. By default, this PGN is not transmitted periodically.

If Field 4, Control, is not specified, then Field 4 will be regarded as 0 (report previous values) for single requests, and 1 (generate new values) for periodic transmissions.

The Power-On Self Test is performed automatically a few seconds after applying power to the unit.

Table of IDs and Failure Codes:

<u>ID</u>	<u>Description</u>	<u>Failure Codes</u>
1	Format Code	0x01 = Format Code mismatch 0x02-0xEF = reserved
2	Factory EEPROM	0x01-0xEE = count of checksum errors 0xEF = one or more illegal values detected
3	User EEPROM	0x01-0xEE = count of checksum errors 0xEF = one or more illegal values detected
4	Water temperature sensor	Models DST200, DT200, and ST200: 0x01 = Thermistor shorted 0x02 = Thermistor open 0x03-0xEF = reserved Models DT200S and D200ST: 0x01-0xEE = reserved 0xEF = Sensor not present
5	Sonar transceiver (depth)	0x01 = Sonar not functional 0x02-0xEF = reserved

ID	Description	Failure Codes
6	Speed sensor	Models DST200 and ST200: 0x01-0xEF = reserved (Test Result will indicate 0xFF, Data Not Available, for these models.) Models DT200S and D200ST: 0x01-0xEE = reserved 0xEF = Sensor not present
7	Internal temperature sensor	0x01 = Thermistor shorted 0x02 = Thermistor open 0x03-0xEF = reserved
8	Battery voltage sensor	0x01 = Sensor not functional 0x02-0xEF = reserved

The test for ID 4, Water temperature sensor, is only provided on models DST200, DT200, DT200S, D200ST, and ST200 (and not on model D200).

The test for ID 5, Sonar transceiver, is only provided on models DST200, DT200, DT200S, D200, and D200ST (and not on model ST200).

The test for ID 6, Speed sensor, is only provided on models DST200, DT200S, D200ST, and ST200 (and not on models DT200 and D200).

2.4. Received NMEA 2000® PGNs

The NMEA 2000® PGNs recognized by the various models are summarized in Table 2. Each of the PGNs in Table 2 is described in detail on the subsequent pages.

Table 2: NMEA 2000® Received PGNs

<u>PGN</u>	<u>Description</u>	DST200	DT200	DT200S	D200	D200ST	ST200
59904	ISO Request	✓	✓	✓	✓	✓	✓
60928	ISO Address Claim	✓	✓	✓	✓	✓	✓
65286	Proprietary: Boot State Request	✓	✓	✓	✓	✓	✓
126208	Request Group Function	✓	✓	✓	✓	✓	✓
126208	Command Group Function	✓	✓	✓	✓	✓	✓
126720	Proprietary						
	-1: Master Reset	✓	✓	✓	✓	✓	✓
	-130: Restore EEPROM	✓	✓	✓	✓	✓	✓

PGN **059904** (0x0EA00)

ISO Request

Single Frame: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

When this PGN is received by the DST, the unit will respond by transmitting either the PGN being requested, or the ISO Acknowledge PGN 59392.

See also the received Request Group Function PGN 126208.

PGN **060928** (0x0EE00)

ISO Address Claim

Single Frame: Yes

Access Level: 0

For further information about the NMEA 2000[®] protocol, including field descriptions refer to the document, *NMEA 2000[®] Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

PGN 60928 is a network management message used to claim a network address, reply to devices requesting the claimed address, and to respond to requests for device information (NAME). The 64 bits comprised by the ten fields in this parameter group constitute the ISO 11783-5 NAME entity.

PGN **065286** (0x0FF06)

Proprietary: Boot State Request

Single Frame: Yes Access Level: 0

Field #	Name	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Reserved bits	DD001	DF52	48 bits	1	0xFFFFFFFFFFFF	All bits set to logic "1"

Notes

When this destination global PGN is received by the DST, the unit will respond by transmitting PGN 65285 (see). It is intended that all Airmar devices connected to the NMEA 2000® bus will likewise also reply accordingly when receiving this PGN.

PGN 126208 (0x1ED00)

Request Group Function

Single Frame: No Access Level: 0

For further information about the NMEA 2000® protocol, including field descriptions refer to the document, *NMEA 2000® Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

When this PGN is received by the DST, the unit will compare the specified Request Parameters in fields 6, 7 (and any following fields) against the contents of the actual fields in the requested PGN. The only fields that may be used as Request Parameters are those which indicate a "Yes" in the "Request Param." column in the detailed description for the specific transmitted PGN. If all specified parameters match the values in the corresponding fields, then the requested PGN will be transmitted. If any of the parameters do not match, then the unit will respond by transmitting the Acknowledge Group Function PGN 126208 with the appropriate error code(s) provided.

This PGN may also be used to specify the Transmission Interval (Update Rate) between successive transmissions of a periodically transmitted PGN. (Note: certain PGNs do not permit changing the transmission interval.) For all single-frame PGNs that permit changing the transmission interval, the allowable range of interval values is 50 ms to 60 seconds. For all fast packet PGNs that permit changing the transmission interval, the allowable range of interval values is 100 ms to 60 seconds. Note that it may be possible to specify an update rate that is faster than the unit's ability to generate new data. In this case, the PGN will be transmitted only as new data becomes available.

Use the proprietary received PGN 126720-130 to reset all Transmission Intervals for all PGNs to their factory defaults.

Refer to the detailed descriptions of the specific transmitted PGNs in this document for any exceptions or special cases with regard to using the Request Group Function PGN 126208 with each PGN.

All parameter value fields must be padded (with 1's) if necessary to ensure byte boundaries are adhered to.

When the Requested PGN field 2 (of PGN 126208) refers to a proprietary PGN, fields 1 and 3 (manufacturer code and industry group) of the proprietary PGN must be specified *first* in the list of field number and parameter value pairs in PGN 126208. All other field number and parameter value pairs may appear in any order in this message.

For proprietary PGNs described in this document, fields 1, 2, and 3 (manufacturer code, reserved bits, and industry group) of the proprietary PGN may optionally be combined into a single 16-bit field when specifying fields in PGN 126208. For Airmar proprietary PGNs, the 16-bit field is constructed as follows:

- bits 15-13 = binary 100 = decimal 4 (industry group for "Marine Industry")
- bits 12-11 = binary 11 = reserved bits
- bits 10-0 = binary 000 1000 0111 = decimal 135 (manufacturer code for Airmar Technology)

The concatenation of these 16 bits produces the binary value 1001 1000 1000 0111 = hexadecimal 0x9887. Therefore, instead of specifying the two fields, 11-bit field 1 and 3-bit field 3 for a proprietary PGN, it is permissible to specify a single 16 bit field 1, containing the value 0x9887, for the proprietary PGNs described in this document.

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When doing so, field 3 may *not* also be specified, or the PGN will not be accepted. The 16-bit field 1 must be specified first in the list of field number and parameter value pairs in PGN 126208.

See also related PGNs:

- the received ISO Request PGN 59904
- the received Command Group Function PGN 126208
- the transmitted Acknowledge Group Function PGN 126208

NMEA 2000® RECEIVED PARAMETER GROUP
Command Group Function

PGN 126208 (0x1ED00)

Single Frame: No Access Level: 0

For further information about the NMEA 2000® protocol, including field descriptions refer to the document, *NMEA 2000® Standard for Serial-Data Networking of Marine Electronic Devices* available from NMEA.

Notes

This received PGN is used by the DST to set the value of one or more parameters in a Parameter Group. The individual parameters of the Commanded PGN are specified in the Field Number/Value pairs (fields 6 and 7 of this PGN). Refer to the detailed description for each transmitted PGN for specific instructions regarding which fields to specify when using the Command Group Function PGN 126208. (Note that some required fields are not changeable, but are used as qualifiers when changing other fields.)

This PGN may also be used to specify the Priority field of a given transmitted PGN. (Note: certain PGNs do not permit changing the Priority field.)

Upon receiving this PGN, the DST will respond by transmitting the Acknowledge Group Function PGN 126208.

Use the proprietary received PGN 126720-130 to reset all Priority fields for all PGNs to their factory defaults.

All parameter value fields must be padded (with 1's) if necessary to ensure byte boundaries are adhered to.

When the Commanded PGN field 2 (of PGN 126208) refers to a proprietary PGN, fields 1 and 3 (manufacturer code and industry group) of the proprietary PGN must be specified *first* in the list of field number and parameter value pairs in PGN 126208. All other field number and parameter value pairs may appear in any order in this message.

For proprietary PGNs described in this document, fields 1, 2, and 3 (manufacturer code, reserved bits, and industry group) of the proprietary PGN may optionally be combined into a single 16-bit field when specifying fields in PGN 126208. For Airmar proprietary PGNs, the 16-bit field is constructed as follows:

- bits 15-13 = binary 100 = decimal 4 (industry group for "Marine Industry")
- bits 12-11 = binary 11 = reserved bits
- bits 10-0 = binary 000 1000 0111 = decimal 135 (manufacturer code for Airmar Technology)

The concatenation of these 16 bits produces the binary value 1001 1000 1000 0111 = hexadecimal 0x9887. Therefore, instead of specifying the two fields, 11-bit field 1 and 3-bit field 3 for a proprietary PGN, it is permissible to specify a single 16 bit field 1, containing the value 0x9887, for the proprietary PGNs described in this document.

When doing so, field 3 may *not* also be specified, or the PGN will not be accepted. The 16-bit field 1 must be specified first in the list of field number and parameter value pairs in PGN 126208.

See also related PGNs:

- the received Request Group Function PGN 126208
- the transmitted Acknowledge Group Function PGN 126208

NMEA 2000® RECEIVED PARAMETER GROUP

PGN 126720 (0x1EF00)

Addressable Multi-Frame Proprietary

Single Frame: No Access Level: See PID variants

Field #	Name	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	DD005	DF53	uint8	1 bit	0 to 252	Identifier specifying how to interpret the remaining fields in this parameter group.
5+	(PID-dependent)	DD000	DF00	undef.	undefined	undefined	The use of the remaining bytes and the number of CAN frames required varies according to the PID (field 4).

Notes

In order for this received PGN to be recognized by the DST, the Manufacturer Code and Industry Group (fields 1 and 3) must match the values shown.

The use of this PGN with the following Proprietary ID's (field 4) is described on the subsequent pages:

- 1: Master Reset
- 130: Restore user EEPROM memory to factory defaults

PGN 126720-1 (0x1EF00)

Single Frame: No Access Level: 1

Field #	Name	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	DD005	DF53	uint8	1 bit	1 = Master Reset	Identifier specifying how to interpret this PGN.
5	Reserved bits	DD001	DF52	24 bits	1	0xFFFFFFFF	All bits set to logic "1"

Notes

Upon receiving this PGN, the DST will perform a master CPU reset, as though the power had been turned off and back on again.

In order for this received PGN to be recognized by the DST, the Manufacturer Code, Industry Group, and Proprietary ID (fields 1, 3, and 4) must match the values shown.

Although this is a fast-packet message, the version with this PID fits into a single CAN frame.

PGN 126720-130 (0x1EF00)

Proprietary: Reset EEPROM

Single Frame: No Access Level: 1

Field #	Name	DD	DF	Type	Resolution	Value	Remark
1	Manufacturer Code	DD172	DF52	11 bits	1	135 (decimal)	Manufacturer Code for Airmar Technology.
2	Reserved bits	DD001	DF52	2 bits	1	0x3	All bits set to logic "1"
3	Industry Group	DD168	DF52	3 bits	1	4 (decimal)	Industry Group for "Marine Industry".
4	Proprietary ID (PID)	DD005	DF53	uint8	1 bit	130 (decimal) = Reset EEPROM	Identifier specifying how to interpret this PGN.
5	Options	N/A	DF52	4 bits	1	0x0 = Restore entire user EEPROM except Unique Number 0x1 = Restore all message Priorities 0x2 = Restore all message Update Rates 0x3 = Restore all message Priorities <i>and</i> Update Rates 0x4 = Restore user Unique Number 0x4 to 0xE = reserved 0xF = reserved	
6	Reserved bits	DD001	DF52	20 bits	1	0xFFFFF	All bits set to logic "1"

Notes

Upon receiving this PGN, the DST will restore part of user EEPROM memory to its factory default state.

The Options field (field 5) specifies whether all of user EEPROM memory (except the user Unique Number) is to be restored (value 0x0), or only a subset of EEPROM memory is to be restored.

Note that this PGN requires Access Level 1, even when resetting the Unique Number to its factory default value (option 0x4). The proprietary PGN to change the Unique Number to a value other than the factory default value, which is described in another document, requires Access Level 2.

In order for this received PGN to be recognized by the DST, the Manufacturer Code, Industry Group, and Proprietary ID (fields 1, 3, and 4) must match the values shown.

Although this is a fast-packet message, the version with this PID fits into a single CAN frame.

3. Revision History

Revision 1.000

Date: 04/22/2010

Description: Initial Release of DST200 User Manual. Derived from DST200 Technical Manual.