Limited Liability Company
“NPK MORSVYAZAVTOMATICA”

MULTIPURPOSE DATA CONVERTER DFR-118

Technical description

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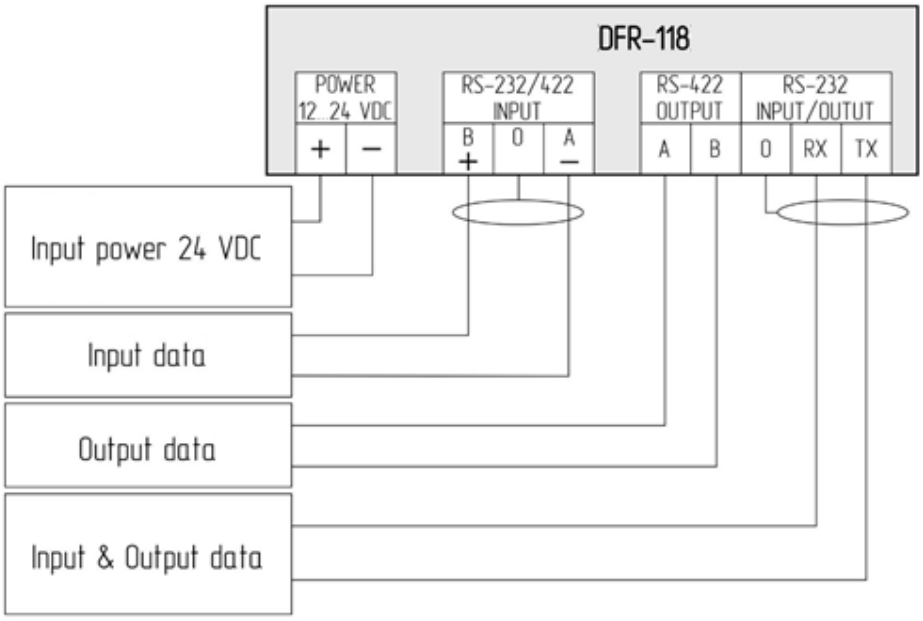
Multipurpose data converter DFR-118 is designed to match two devices with incompatible interfaces, characteristics, types and formats of data, repetition rate, etc.

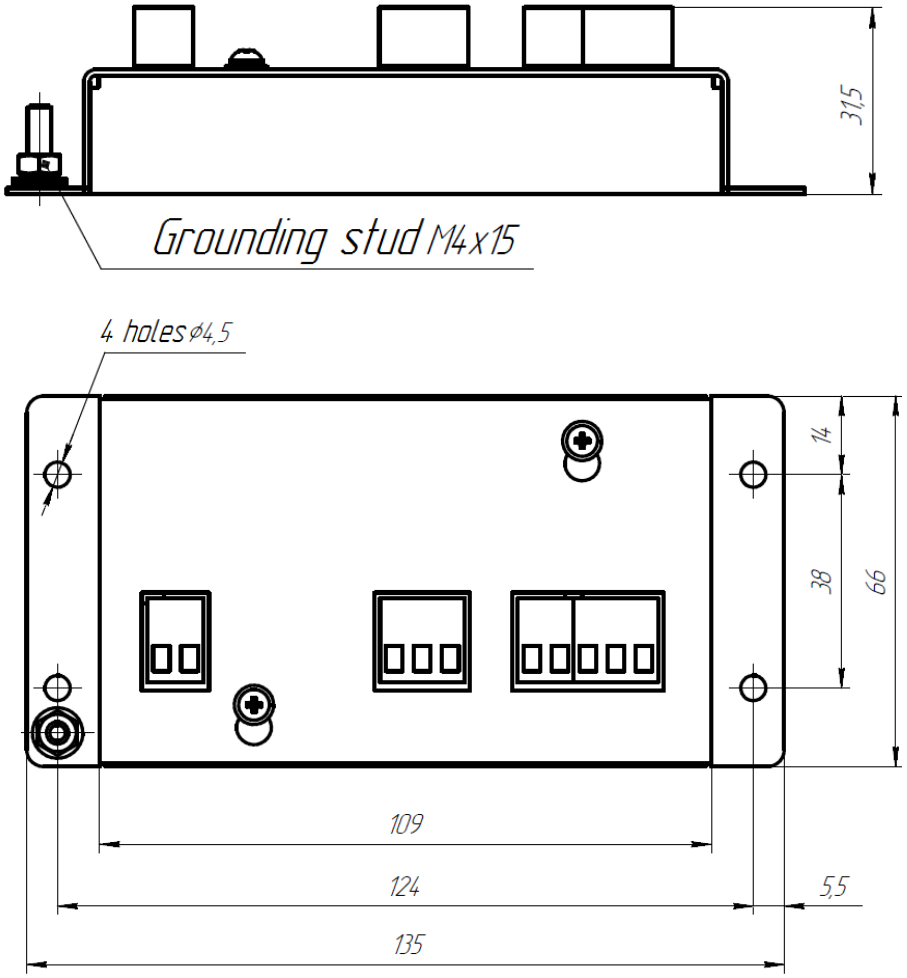
TECHNICAL SPECIFICATIONS

Parameter	Value
Input voltage, V DC	10 to 36
Max. consumption current, mA	100
Protection degree	IP22
Operating temperature, °C	–20 to +55
Limiting temperature, °C	–50 to +75
Weight, kg	0.26

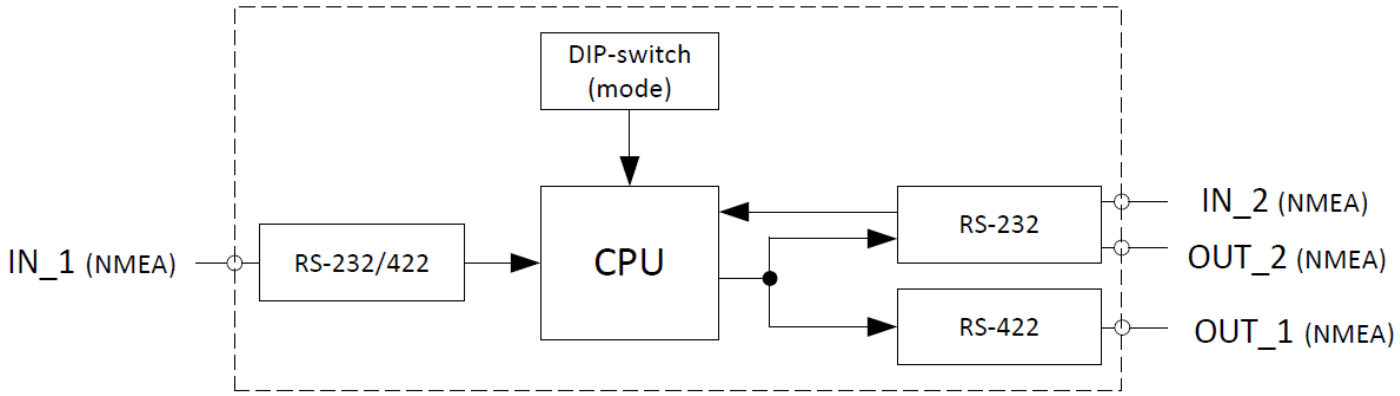
CONNECTION DIAGRAM



DIMENSIONAL AND INSTALLATION SPECIFICATIONS



FUNCTIONAL DIAGRAM



Software options

ID	Soft	Parameters of input (output) signals		Functionality and documentation
1	**GPHDT&HEHDT → HEHDT**	**RS-422 input** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232 input/output** Baud rate: 9,600 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data with GPHDT headline via RS-422, changes to HEHDT headline and sends via RS-232. If there is no data with headline GPHDT via RS-422 for more than 3 sec, it switches to receive HEHDT sentences via RS-232
2	**GPHDT → HEHDT**	**RS-422 input** Baud rate: 9,600 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232 output** Baud rate: 9,600 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data with GPHDT headline via RS-422, changes to HEHDT headline and sends via RS-232
3	**VBW → VHW**	**RS-422 input** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232 output** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data with VMVBW headline via RS-422, changes to VMVHW headline and sends via RS-232
4	**xxHDT → AGHDT (Santalov)**	**RS-422 input** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232 output** Baud rate: 38,400 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data with **HDT headline via RS-422, changes headline to AGHDT and sends them via RS-232
5	**Soft (add CRC)**	**RS-422 input** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232 output** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data via RS-422, calculates checksum, adds it to the received data and sends via RS-232
6	**RS-422 to RS-232 converter + rate matching**	**RS-422 input** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232 output** Baud rate: 19,200 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data via RS-422 and sends them via RS-232
7	**Soft**	**RS-422 input** Baud rate: 9,600 bit/s Stop bits: 2 Bits: 5 Parity: no	**RS-232 output** Baud rate: 38,400 bit/s Stop bits: 2 Bits: 5 Parity: no	Receives data via RS-422. Interpolates the received data. Sends four messages via RS-232 for each message received via RS-422. First message sent via RS-232 corresponds with the message received via RS-422. Other three messages contain interpolated values

ID	Soft	Parameters of input (output) signals		Functionality and documentation
8	**(FURUNO-AutoPilot Navis Soft.6.0) 02.07.10.doc (1 Hz → 10 Hz, interpolation)**	**RS-422 input** Baud rate: 4.8 to 230.4 kbit/s (configurable) Stop bits: select Bits: configurable Parity: configurable Reception frequency: 1 Hz	**RS-232 output** Baud rate: 9,600 bit/s Stop bits: 1 Bits: 8 Parity: no Transmission frequency: 10 Hz	Receives data via RS-422. Sends ten messages via RS-232 for each message received via RS-422. First message sent via RS-232 corresponds with the message received via RS-422. Depending on the made settings (see OM for this soft) OS allows for interpolation of the received values; on/off switching of appending a checksum to the end of passed message; emulation mode on/off. OS enables to select sentences transmitted to the output by means of a switch
9	**EU_PROG_VEG_TeCH (VTG → HDT)**	**RS-232 input** VTG (w/o CRC analysis) Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-422 output** HDT (w/correct CRC) Baud rate: 4,800 bit/s Stop bits:1 Bits: 8 Parity: no	Receives VTG data via RS-232, converts into HDT via RS-422
10	**EU_HDM_→_HDT (HDM → HDT)**	**RS-232/RS-422** HDM (w/o CRC analysis) Baud rate: 4,800 b i t /s Stop bits: 1 Bits: 8 Parity: no	**RS-422** HDT (w/correct CRC) Baud rate: 4,800 bit/s Stop bits:1 Bits: 8 Parity: no	$HCHDM,abc.d,M*hh<cr><lf> ↓ $HEHDT,xx,T,x*hh<cr><lf>
11	**HCHDM → HCHDT (HDM → HDT)**	**RS-232/RS-422** HDM (w/o CRC analysis) Baud rate: 4,800 b i t /s Stop bits: 1 Bits: 8 Parity: no 10Hz $HCHDM,abc.d,M*<cs>..	**RS-422** HDT (w/correct CRC) Baud rate: 4,800 bit/s Stop bits:1 Bits: 8 Parity: no 10Hz $HCHDT,xx,T,x*hh<cr><lf>	$HCHDM,abc.d,M*hh<cr><lf> ↓ $HCHDT,xx,T,x*hh<cr><lf>
12	**GPHDT → HEHDT_4800**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no	Receives data with GPHDT headline via RS-422, changes to HEHDT headline and sends via RS-232. Position of Dip-switch SW2.1 defines format of output heading (zero suppression before integer value). ON – xxx,x OFF – x,x
13	**Delete Pause**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	**RS-232/RS-422** Baud rate: 4.8 to 57.6 kbit/s Stop bits: 1 Parity: no	Receives any input traffic, buffers it and sends to the output when the pause on the input is more than 0.5 to 0.6 sec. BYPASS available – all received data are sent to the output

ID	Soft	Parameters of input (output) signals		Functionality and documentation
14	**MODBUS → NMEA**	**RS-485 input-output** Baud rate: 9,600 bit/s Stop bits: 1 Parity: no	**RS-232 output** Baud rate: 9,600 bit/s Stop bits: 1 Parity: no	Readout register via MODBUS (addresses 0xA1…0xAA). Conversion into NMEA message in format: $WPDOP(CL),y0,y1,y2,…*hh, where y-value 0/1 MODBUS 1…31 address select is available Output NMEA message select OP(CL)
15	**HDT_10 → HDT_50**	**RS-422 input-output** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	**RS-422 output** Baud rate: 19,200 bit/s Stop bits: 1 Parity: no	Conversion of input HDT traffic with rate 10 Hz into output HDT with rate 50 Hz. Provides an option to: Analyze or not input CRC Interpolate output traffic Stop output traffic or send only the last correct value
16	**$pTEL → $--TEL**	**RS-422 input-output** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	**RS-422 output** Baud rate: 9,600 bit/s Stop bits: 1 Parity: no	Replaces the first character ahead of $ with two characters '-' + NMEA checksum calculation
17	**NMEA_xHz → NMEA_15Hz**	**RS-422 input** Baud rate: 4,800 bit/s or 9,600 bit/s (JMP0-SW1) Stop bits: 1 Parity: no	**RS-422 output** Baud rate: 9,600 bit/s Stop bits: 1 Parity: no	Conversion of any NMEA traffic with arbitrary sentence frequency into traffic sentence frequency 15 Hz
18	**VHW → VBW**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Number of bits: 8 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Number of bits: 8 Parity: no	Changes data headlines from VMVHW to VMVBW. Empty fields (between commas) are replaced with digital '0.0' or status 'A', respectively
19	**HDT or ROT → +CRC**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Number of bits: 8 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Number of bits: 8 Parity: no	Recalculates checksum in these sentences and replaces it with the correct one
20	**HDT → HDT**	**RS-232/RS-422** Variable baud rate: 9.6 to 115.2 kbit/s Stop bits: 1 Number of bits: 8 Parity: no	**RS-422** Variable baud rate: 9.6 to 115.2 kbit/s Stop bits: 1 Number of bits: 8 Parity: no	Converts HDT sentences rate
21	**xxVHW → VMVBW**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 9,600 bit/s Stop bits: 1 Parity: no	Changes NMEA 0183 sentences with xxVHW headline. Converter works in mode w/o interpolation
22	**xxxxx → GPxxx**	**RS-232/RS-422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Parity: no	Changes any headlines of NMEA 0183 sentences to GPxxx.

ID	Soft	Parameters of input (output) signals		Functionality and documentation
23	**xxHDT,x.x,T*hh → xxHDT,(x+180).x,T*hh**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	Changes NMEA 0183 sentences with xxHDT headlines by adding 180° to the received value
25	**xxGGA → GPGGA, GPGLL**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	Changes headline of xxGGA sentences into GPGGA format, converts data from xxGGA to GPGLL, filters input sentences – only xxGGA, xxDTM, xxRMC, xxVTG, xxZDA are received, others are disregarded
26	**xxHDT 1 Hz → xxHDT 50 Hz**	**RS-422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Parity: no	Changes traffic rate and converts NMEA 0183 sentence with xxHDT headline. All NMEA sentences except xxHDT are disregarded
27	**HCHDG → HEHDT**	**RS-422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Parity: no	Changes traffic and conversion rate of NMEA 0183 sentence with headline HCHDG into HCHDT with checksum recalculation. All NMEA sentences except HCHDG are disregarded. Sentence body is recalculated trueHeading = Magnetic (+-) Deviation (+-) Variation W = + ; E = -
28	**HDT → HDT + ROT → ROT**	**RS-422** Baud rate: 34,800 bit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	Changes rate of input NMEA 0183 sentences, converts it into standard values for further distribution to consumers. Every 50th sentence of every two types is selected from high speed input stream and sent to standard speed output
29	**Any sentence**	**RS-422** Baud rate: 34,800 bit/s Stop bits: 1 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Parity: no	Changes rate of input NMEA 0183 sentences, converts it into standard values for further distribution to consumers. Every 50th sentence of every two types is selected from high speed input stream and sent to standard speed output
30	***HDG → *HDT**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no	Converter is intended to change a NMEA sentence type
31	****HDT 1 Hz → HEHDT 10 Hz**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no	Converter is intended to filter all sentences except HDT and change transmission frequency (depending on the customer needs), and headline **HDT to HEHDT
32	**Filtering of all sentences except xxGGA, xxDTM, xxRMC, xxVTG, xxZDA**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no	Converter DFR-118 is intended to filter input sentences – only xxGGA, xxDTM, xxRMC, xxVTG, xxZDA are received, others are disregarded

<table>
<tr><th>ID</th><th>Soft</th><th colspan="2">Parameters of input (output) signals</th><th>Functionality and documentation</th></tr>
<tr><td rowspan="2">33</td><td rowspan="2">Data format conversion from gyro compass Simrad GC-80
K242.9,P00.0,R-000.02 →
K242.9,P,R or
K242.9,L,R (DIP SW2.2)</td><td>RS-232/422</td><td>RS-232/422</td><td rowspan="2">Changes message format from gyro compass Simrad GC-80 in order to interface with autopilot PR-6000. Filtering of all NMEA sentences is available:
SW2.1 ON – NMEA received
SW2.1 OFF – NMEA are not received.
SW2.3 ON:
K242.9,P00.0,R-000.02 → K242.9,P00.0,R-000.0
(digital values are saved)</td></tr>
<tr><td>Baud rate:
2.4 to 57.6 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td><td>Baud rate:
4.8 to 115.2 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td></tr>
<tr><td rowspan="2">34</td><td rowspan="2">VMVHW → VMVBW</td><td>RS-232/422</td><td>RS-232/422</td><td rowspan="2">Converts lines according to the following algorithm:
$VMVHW,,,,,321.57,N,,*XX →
$VMVBW,321.57,00.0,A,321.57,00.0,A*XX</td></tr>
<tr><td>Baud rate:
2.4 to 57.6 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td><td>Baud rate:
4.8 to 115.2 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td></tr>
<tr><td rowspan="2">35</td><td rowspan="2">**VBW → VDVBW</td><td>RS-232/422</td><td>RS-232/422</td><td rowspan="2">Converts sentences from acoustic and satellite logs:
$VDVBW,yy.yy,,A,,,V,,V,,V*XX →
$VDVBW,-yy.yy,,A,,,V,,V,,V*XX

$**VBW,,,V,aa.aa,b.bb,A,,V,c.cc,A*XX →
$VDVBW,,,V,-aa.aa,-c.cc,A,,V,-b.bb,A*XX
Any headline except $VDVBW

For log SAL R1a and repeater Consilium</td></tr>
<tr><td>Baud rate:
2.4 to 57.6 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td><td>Baud rate:
4.8 to 115.2 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td></tr>
<tr><td rowspan="2">36</td><td rowspan="2">HEROT+HEHDT → HEHRC</td><td>RS-232/422</td><td>RS-232/422</td><td rowspan="2">Combines HEROT and HEHDT sentences into HEHRC:
$HEROT,xxx.xx,A*XX
$HEHDT,yyy.yy,T*XX (deg/min) →
$HEHRCaaaaa,bbb*XX
aaaaa – yyy.yy, bbb – x.xx (deg/s)
Positive sign ahead bbb: SW2.1 SW2.2
<table><tr><td colspan="3">Sign</td></tr><tr><td>0</td><td>0</td><td>“ ”</td></tr><tr><td>1</td><td>0</td><td>“+”</td></tr><tr><td>0</td><td>1</td><td>“ –”</td></tr><tr><td>1</td><td>1</td><td>“ ”</td></tr></table>SW2.3ON – on output deg/min
SW2.3OFF – on output deg/s
SW2.4ON – on output $HEHRC,aaaaa,bbb*XX
SW2.4OFF – on output $HEHRCaaaaa,bbb*XX Difference in comma
SW2.5ON – checksum is normal
SW2.5OFF –XOR 0x24 is additionally applied to checksum</td></tr>
<tr><td>Baud rate:
2.4 to 57.6 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td><td>Baud rate:
4.8 to 115.2 kbit/s
Stop bits: 1
Bits: 8
Parity: no</td></tr>
</table>

ID	Soft	Parameters of input (output) signals		Functionality and documentation
37	**Rate conversion**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no	Sends all sentences, received on the input, to the output without changes
38	****VTG → HEHDT**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 1 Hz	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 10 Hz	$**VTG,aaa.aa,T,bbb.bb,M,ccc.cc,N,ddd.dd,K*hh → $HEHDT,aaa.aa,T*hh. If there is no input signal for 2 sec, output sentence is not sent. Starting from this version, checksum test of input sentence is introduced (SW1.9 ON/OFF). If checksum is incorrect, sentence is disregarded
39	**$**HDT → $HEHDT** **$**ROT → $HEROT**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no	Converts NMEA0183 $**HDT sentence into $HEHDT, and $**ROT sentence into $HEROT. Sentences with headlines $**HDT and $**ROT are sent to the output without changes
41	**$WIXDR,H,** **$WIXDR,P,** **$IIMWV** ↓ **$IIMDA and** **$IIMWV**	**RS-232/422** Baud rate: 2.4 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no	Converts input NMEA sentences $WIXDR,H, $WIXDR,P and $IIMWV into output sentences $IIMDA and $IIMWV; all other sentences are sent to the output without changes. Checksum test of input sentence is also available (DIPswitch SW1.9 in ON position). If checksum is incorrect, sentence is disregarded
42	**$VDVBW,0.0,,,A,,,V*68** ↓ **$VDVBW,0.0,,,A,,,V*68** **+** **$--VHW, x.x, T, x.x, M, 0.0, N, x.x, K*hh<CR><LF>**	**RS-232/422** Baud rate: 4800 bit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 1 time per 3 sec	**RS-232/422** Baud rate: 4800 bit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 1 time per 1 sec	Adds duplicate data on vessel speed in km/h to the output data on vessel speed in knots
43	**$HEHDT,* * *.*,T** ↓ **$HEHDT,* * *.*,T,CRC**	**RS-232/422** Baud rate: 4.8 to 57.6 kbit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 1 time per 1 sec	**RS-232/422** Baud rate: 4.8 to 115.2 kbit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 1 time per 1 sec	Converts sentences $HEHDT,* * *.*,T into $HEHDT,* * *.*,T,CRC with checksum test

ID	Soft	Parameters of input (output) signals		Functionality and documentation
44	**HDT and ROT, 1 Hz ↓ HDT and ROT, 25 Hz**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 1 Hz	**RS-422** Baud rate: 38,400 bit/s Stop bits: 1 Bits: 8 Parity: no Frequency: 25 Hz	Converts input HDT and ROT sentences with frequency 1 Hz and rate 4,800 bit/s into output sentences HDT and ROT with frequency 25 Hz and rate 38,400 bit/s
45	**$GPRMC ↓ $VWVHW**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: no Bits: 8 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: нет Bits: 8 Parity: no	Converts sentence $GPRMC (GPS Speed Over Ground) into $VWVHW (Speed Through Water) with rate 4,800 bit/s
46	**$PANZRSI ↓ $SGROR**	**RS-232/RS-422** Baud rate: 4,800 bit/s Stop bits: no Bits: 8 Parity: no	**RS-422** Baud rate: 4,800 bit/s Stop bits: no Bits: 8 Parity: no	Converts sentence $PANZRSI into $SGROR (Speed Through Water) with rate 4,800 bit/s
48	**$HEHDT<CRC><CR><LF>, $TIROT<CRC><CR><LF>, $HCHDM<CRC><CR><LF> ↓ $HEHDT<CRC><CR><LF>, $TIROT<CRC><CR><LF>, $HCHDM<CRC><CR><LF>**	**RS-422** Baud rate: 2.4 to 115.2 kbit/s Stop bits: 1 or 2 Bits: 5,6,7,8 Parity: no; even; odd Transmission frequency: 1 to 50 Hz	**RS-422** Baud rate: 2.4 to 115.2 kbit/s Stop bits: 1 or 2 Bits: 5,6,7,8 Parity: no; even; odd Transmission frequency: 1 to 50 Hz	Matches devices with different data sentences, transmitter/receiver data interfaces, and (or) different transmitter/receiver data frequencies. The module allows for changing repetition rate of sentences with value interpolation of the passed data, converting one type of sentences into another; it is also used to organize interaction between transmitter (sentence frequency lower or higher than value required by receiver), and receiver