

ZNC-401

Universal NMEA Converter

User's Manual
(Edition 4.3a)

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1. Overview

This ZNC-401 Universal NMEA Converter converts various signals into NMEA-0183 (IEC61162-1) data format. This is very useful for interfacing most kinds of Gyrocompass, Anemometer, Rudder or Speed Log to VDR, AIS and ECDIS.

This ZNC-401 Universal NMEA Converter can accept all 1/36/90/180/360 synchro signal, 90/180/360:1 stepper signal, DC $\pm 5/10V$, DC4~20mA and Pulse/dry-contact signal format.

2. General Specification

1) Display : 8 characters x 2 lines large LCD with Backlight

2) Input signal

- Sync or Step : Gyrocompass, Wind angle, Rudder angle...
- $\pm 5/10V$ or 4~20mA : Wind speed, RPM, Rudder...
- Pulse or dry-contact : Wind speed, Speed log...

3) NMEA Out

- 3 NMEA Ports (Port 3 can be changed to RS-232)

4) Input Power

- Voltage : DC 18~32V, AC 15~23V AC
- Dissipation : Appr 5W

5) Operating Environments

- Temperature : -15 to +55°C
- Humidity : 95%

6) Dimension : 176 x 63 x 210 mm

			Rotor: 100V, Stator: 90V
	SR-120, ES-16, MK-10/20/30/37	180x	DC step35V
Yokogawa Navtec (Plath type)	C-1/1A/2/3, A-55, B-55	360x	AC synch, 50/60hz Rotor: 50/60V, Stator: 22V
	CMZ-250X/300X/500	360x	DC synch (option, contact us)
		180x	DC step35V, COM(+), 3-wire
	CMZ-100/200/300, C-1Jr, D-1Z/1/3, IPS-2/3	360x	AC synch, 50/60hz Rotor: 100V, Stator: 90V
	CMZ-50	180x	Step35V, COM(+), 3-wire

Appendix-4. Common Speedlog Types

Maker	Model	Type	Specification
Tokimec Sperry	SRD-301, TD201/501	200P	Pulse
Yokogawa Navitec	EML-12/13/15/112/201	200P	Pulse
	EML-16x	160P	Pulse
	Pressure Log-3x	30x	Synchro
Furuno	CI-20, DS-20, ML-20/21/200/220	200P	Pulse
IHI	DSL-3500	200P	Pulse
C. Plath	NAVKNOT-1/II	200P	Pulse
Ametek	MRQ-4014/4015	200P	Pulse
Simrad	NL	200P	Pulse
Sagem	LHS-EA-C No.2	200P	Pulse
SAL	SAL-24E/EM/ACCOR	200P	Pulse
Raytheon	DSL-200/250/350/450	200P	Pulse
JRC	JEN-100, JLN-201B/202/203	200P	Pulse

	(See right Specification)		available, it can be used for connecting with SATNAV output, 35V low power DC, COM(+), 3-wire)
	Standard 20	180x	DC step 35V, COM(-), 3-wire
Arma-brown	MK-1/7/10/20, MKL-1, SERIES 1351, MOD-4	180x	DC step 50V COM(+), 3-wire
Furuno	GY-700	180x	DC step100V 5-wire, open collector
JRC	NJZ-501	36x	AC synch, 50/60Hz
Kawasaki	GX-81	90x	AC synch, 50/60Hz Rotor: 100/110, Stator: 90V
Plath	NAV GAT-II/III	360x	AC synch, 50/60Hz Rotor: 50/60V, Stator: 68V
Robertson	SKR-80	180x	DC step 35V, COM(-), 3-wire
Sperry	All 180x	180x	DC step 35/70V, COM(+), 3-wire
	All 1x	1x	AC synch, 400Hz Rotor: 115, Stator: 90V AC synch, 50/60Hz Rotor: 115, Stator: 90V
Tokimec (Sperry Type)	CR-2A, ES-1/2/10/11, GLT-101/102/103/106x/107	36x	AC synch, 50/60Hz Rotor:100/110V, Stator:90V
	ES-11A/110, TG-200, PR222R/2000, PR237L/H, GM-21	90x	AC synch, 50/60Hz Rotor:100/110V, Stator:90V
	MK-14, MOD-1/2/T, NK-EN, NK-EI	180x	DC step, 70v, COM(-), 3-wire
	SR-130/140	180x	DC step, 70V, 5-wire, open collector
	TG-100/5000, PR-357/130/140, ES-17, GLT-201/202/203	180x	DC step70V, COM(+), 3-wire
	TG-6000, MK-5	180x	DC step, 24V
	GM-10x/11x	90x	AC synch, 50/60hz

7) Weight : Appr 1.5kg

3. Applications and Input signals

1) Gyrocompass

- Synch : 1/36/90/180/360x Synch signal
AC 26/11.8V to 115/90V, 50/60Hz or 400/500Hz
- Step : 90/180/360x Step signal, DC 25~75V

2) Anemometer

- Angle : 1X Synch signal
AC 26/11.8V to 115/90V, 50/60Hz or 400/500Hz
- Speed : 0~5(10)V DC or 4~20mA or
0~1,710Hz Pulse at 60 m/s (116 Knots)

3) Rudder

- Angle : Ratio 1X Synch signal –
AC 26/11.8V to 115/90V or 50~500Hz
4:1, 2:1 or 1:1
Analog Signal -
DC +/- 5V(10V), default : +5V(+10V) = 35 deg

4) Speed log

- Speed : 200 or 400 pulse at 1 nautical mile.
5~32V DC or Dry contact signal.

5) Rate of Turn : Use gyrocompass signal

- Damping Value : 1, 3, 6 or 12 sec. (default=6sec)

6) Engine RPM : 500 rpm at $\pm 5V$ (or $\pm 10V$)

4. Output signal

1) Data format (NMEA-0183, IEC61162-1)

- Gyrocompass : \$HEHDT,359.9,T*hh<CR><LF>
- Anemometer: \$WIMWV,359.9,R,60,M,A*hh<CR><LF>
- Rudder : \$AGRSA,90.0,A,,V*hh<CR><LF> : Starboard
\$AGRSA,,V,90.0,A*hh<CR><LF> : Port
\$AGRSA,90.0,A,90.0,A*hh<CR><LF> : Both
- Speed Log : \$VMVBW,49.9,,A,,,V*hh<CR><LF>
\$VMVHW,359.9,T,,,49.9,N,,*hh<CR><LF>
- Rate of Turn : \$TIROT,999.9,A*hh<CR><LF>
- Engine RPM : \$ERRPM,E,0,500,,A*hh<CR><LF>
- * For any other formats, please contact us.

2) Baud rate & Output rate

- 4,800 bps or 38,400 bps
- 1 or 10 times/sec, 1/sec and whenever heading change.

3) NMEA Output ports

- 3 Ports (Port 3 can be configured as RS-232)

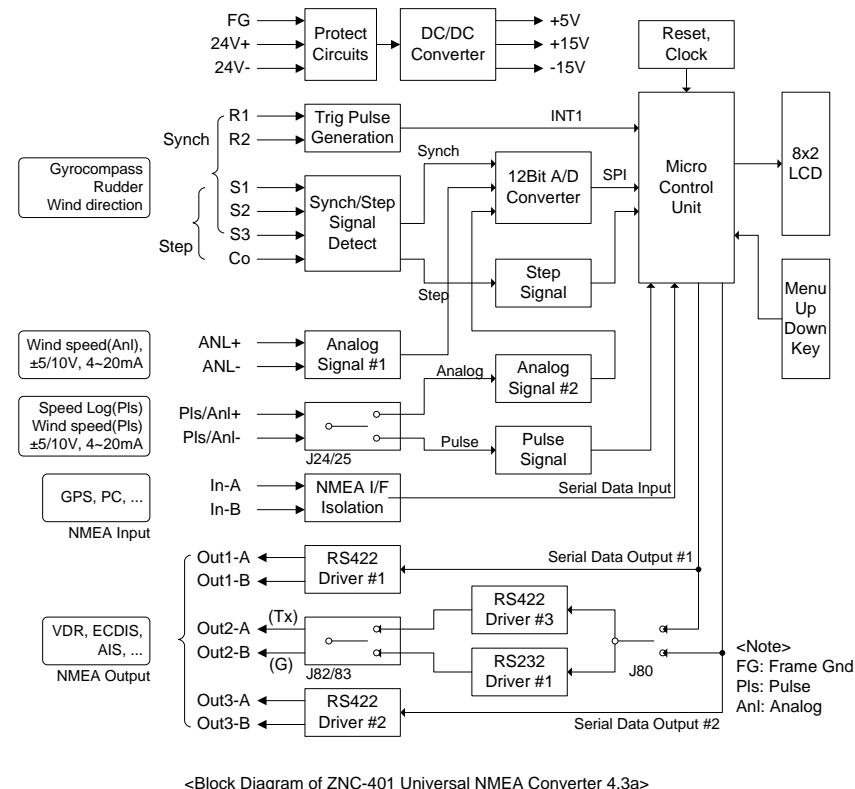
5. Operations

There are one LCD and 3 buttons on front panel, Power switch on back panel.

1) Switch and Button

- ① Power Switch : Used for turn power on and off.
- ② **MENU** Button: Used for entering into menu mode from normal operation. In the menu mode, this is used for set (accept & save

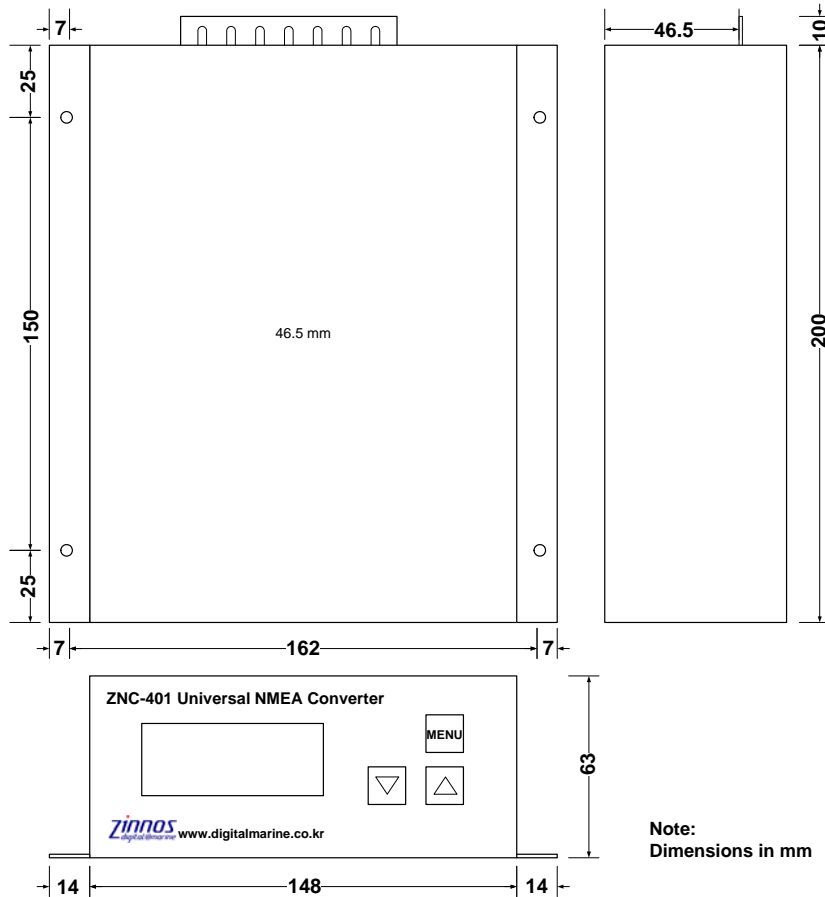
Appendix-2. Block Diagram



Appendix-3. Common Gyrocompass Types

Maker	Model	Ratio	Specification
Anschutz	Standard 2/3	360x	AC synch, 50/60Hz Rotor: 50/60V, Stator: 22V
	Standard 4/6	360x	AC synch, 50/60Hz Rotor: 50/60V, Stator: 90V
	Standard 14x	180x	Proprietary step. (If SATNAV is

Appendix-1. Dimension



Note:
Dimensions in mm

into non volatile memory) current value selected by & button and progress next menu, or exit from menu mode when last menu.

- ③ (Up) Button: Used for LCD dimmer gets light on normal operation, and for increase or alternate value within menu mode.
- ④ (Down) Button: Used for LCD dimmer gets dark on normal operation, and for decrease or alternate value within menu mode.

2) Set Dimmer

- ① If press the button the LCD gets light, and if press the button the LCD gets dark on normal operation mode.

3) Set Contrast

- ① if press the button at normal operation, entered into menu mode. It displays "Cont? Level=n". Set proper level using and buttons. If press the button, it accept current value and go ahead next.

4) The normal display and menu of each application.

Application	Normal disp.	1st Menu	2nd Menu	3rd Menu
Gyro	HEADING 359.9°	Cont? Level=n (n=0~7, Default=4)	HEADING? 000.0	-
Anemo- meter	WA S189°(or 359°) WS 60M(or 116N)		ANG DSP? 0-359° or P/S180°	SPD UNT? M=m/s or N=Knot
Rudder	RUDDER S45°		RUDDER? S S45.6°	RUDDER? P S45.6°**
Speed Log	SPD LOG 49.9N		-	-
Speed Log + Gyro	S 49.9N H 359.9°		HEADING? 000.0	-
ROT	ROT 999.9°		DAMPING? 6 SEC	-

** Only dual mode(Analog input)

6. Installation

1) Terminal Blocks

[illegible]

- ① FG : Frame Ground
- ② 24V : DC18~32V or AC17~22V
- ③ R1-R2 : Sync reference (AC35/25~115/90V, 50~500Hz)
- ④ S1~S3 : Sync or Step S1, S2, S3
- ⑤ CO : Step common (Auto detect the plus/minus co.)
- ⑥ ANL-IN1 : Analog-1 input ($\pm 5/10V$ or 4~20mA selectable)
- ⑦ PLS/ANL2 : Pulse/Analog-2 input (Changeable to Analog-2 input by jumper)
- ⑧ NMEA-IN : Reserved
- ⑨ OUT-1~3 : NMEA Out. (Out-2 supports both RS-422/232)

2) Jumper

① Analog input-1

Jump	1-2	2-3	Note
J10	Single ended	Differential	
J11	Variable	Fixed	Reserved

8. Trouble-shooting

1) LCD Display

Status	Description	Action
No display	No input power	Check input power, and cable
“DIP-SW Set Err” blink on LCD	DIP SW was set as undefined position	Set DIP SW correctly. See “6 - 4)”
1 or 2 line blink (by each signal)	No synchro or stepper signal on R1-2 and/or S1-2-3.	Check synch or step signal and cable
Only heading value blink (except 1:1)	The signal was recovered, but heading may be still wrong	Check heading and set correctly again

2) LED (on PCB)

- When no display any data on LCD, then check LEDs status.
- D120 (R1-R2) : Indicate synchro signal R1/2
- D130 (+C) : Indicate stepper signal (when +common)
- D131 (-C) : Indicate stepper signal (when -common)
- D83 (NMEA-IN) : Indicate NMEA input status
- D87 (NMEA-Out) : Indicate NMEA output status
- D51 (LED1) : If input power on and CPU run correctly, LED1 blink as one second periodically
- D52 (LED2) : Indicate PB-1 SW is on when setting offset

⑤ Speed Log + Gyrocompass (VHW or VBW+HDT)

Description	1	2	3	4	5	6	7	8	Terminal
Refer to “④ Speed Log” & “① Gyrocompass”	X	O	O	Refer to “④” (4,5)		Refer to “①” (6,7,8)			PLS/ANL2 + SYNCH

* NMEA Sentence :

- DIP SW1-7/8 X/X(off/off): Out1=VHW, Out3=VHW
- DIP SW1-7/8 X/O(off/on): Out1=VBW+HDT, Out3=VBW+HDT
- DIP SW1-7/8 O/X(on/off): Out1=HDT, Out3=VBW (ver 4.3a or above)

⑥ Rate of Turn (\$TIROT)

Description	1	2	3	4	5	6	7	8	Terminal
0~999 deg/min	O	X	X	X	X	Refer to “①”			SYNCH or STEP

* NMEA Sentence – DIP SW1-7/8 X/X(off/off): ROT, X/O(off/on): ROT+HDT

⑦ Engine RPM (\$ERRPM)

Description	1	2	3	4	5	6	7	8	Terminal
±500 rpm	O	X	X	O	X	X	X	X	ANL-IN1

3) Set angle offset to 0° (System mode)

- This is very useful to correct angle offset without reinstall the equipment if angle 0° is different with ship heading. This is applied to 1:1 synch signal only such Anemometer or Rudder
- For entering system mode, turn power off and set DIP SW-1:1 to “On” and then turn power on.
- Set and hold the equipment to become 0° and then press PB-1 SW and release. Current direction is set to 0°.

J12	Voltage(5/10V)	Current(4~20mA)	
J13	±5V(4~20mA)	±10V	

② Pulse/Analog input-2.

Jump	1-2	2-3	Note
J24 & J25	Pulse	Analog (±5/10V, 4~20mA)	

- The followings are effect if J24/25 is set to Analog (2-3)

Jump	1-2	2-3	Note
J20	Single ended	Differential	
J21	Variable	Fixed	Reserved
J22	Voltage(5/10V)	Current(4~20mA)	
J23	±5V(4~20mA)	±10V	

* The **Bold** characters mean default factory sets.

③ NMEA Out-2

Jump	1-2	2-3	Note
J80	Same as Out-1	Same as Out-3	NMEA Sentence
J82/83	RS-422	RS-232	Signal type

7. DIP SW Setting (X: off, O: on)

1) DIP SW 1:1~6 (System & Communication)

Description	1	2	3	4	5	6	Note
Mode: Normal Operation	X						
System mode	O						

Direction: Normal		X					Synch/Step signal
Reverse		O					

Data Speed: 4,800bps			X				NMEA Out
38,400bps			O				

Data Rate: 1/sec				X	X		“
1/sec & change*1				X	O		
10/sec				O	X		
(Reserved)				O	O		

Frequency : 50/60Hz						X	Synch signal
400/500Hz						O	

*1 Whenever heading change.

- DS1:7~8 are used for changing output NMEA sentence. (see each application of DIP SW-2)

2) DIP SW 2 (Applications) - For firmware ver 4.0 or above.

Description	1	2	3	4	Note
(Reserved)	X	X	X	X	
Gyrocompass	X	X	X	O	
Anemometer	X	X	O	X	
Rudder	X	X	O	O	
Speed Log	X	O	X	-	
Speed Log + Gyrocompass	X	O	O	-	
Rate of Turn	O	X	X	X	
Engine RPM	O	X	X	O	
(Reserved)	X	O	X	X	
	:	:	:	:	
	O	O	O	O	

① Gyrocompass (\$HEHDT)

Description	1	2	3	4	5	6	7	8	Terminal
360:1 Sync	X	X	X	O	X	X	X	X	SYNCH

180:1 Sync						X	X	O	(R1 R2 S1 S2 S3)
90:1 Sync						X	O	X	
36:1 Sync						X	O	O	
1:1 Sync						O	X	X	
360:1 Step						O	X	O	STEP (R1 R2 R3 Co)
180:1 Step						O	O	X	
90:1 Step						O	O	O	

② Anemometer (\$WIMWV)

Description	1	2	3	4	5	6	7	8	Terminal
0~5(10)V							X	X	ANL-IN1
4~20mA	X	X	O	X	X	X	X	O	
1710Hz							O	X	PLS/ANL2

③ Rudder (\$RARSA)

Description	1	2	3	4	5	6	7	8	Terminal
Synch (Single)	4:1				X	*1	X	X	SYNCH (R1 R2 S1 S2 S3)
							X	O	
							O	X	
Analog (Single)	±5(10)V 4~20mA	X	X	O	O	O	X	X	ANL-IN1
							X	O	
Analog (Dual)	±5(10)V 4~20mA					O	O	X	ANL-IN1, PLS/ANL2
							O	O	

*1 Single rudder : X(off) – Starboard, O(on) - Port

④ Speed Log (\$VMVBW)

Description	1	2	3	4	5	6	7	8	Terminal
200P / nm	X	O	X	X	X	-	-	-	PLS/ANL2
400P / nm				X	O				PLS/ANL2