



Innovative Solutions in Engineering

BBG-7xxxEx-TARP



True North ARP/ACP Converter

Description

The BBG-7xxxEx-TARP is a stand-alone system, which provides a True North compensated ACP/ARP signal out.

The unit is factory configurable to customer requirements for easy field installation.

Supports live mode and simulated modes.

Applications

- Radar Systems (antenna azimuth)
- Navigation Systems (gyrocompass, speedlog, course, pitch, and roll)
- Industrial Processes (position, velocity)
- Meteorology Instruments (wind speed and direction)
- And Many Others

Features

- ACP/ARP Output
 - True North referenced ARP output
- I/O Options
 - 90V, 60/400Hz Synchro Heading Input
 - RS422 NMEA Heading Input
 - 90V, 60/400Hz Synchro Azimuth Input
 - RS422 ACP/ARP Azimuth Input

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Chart

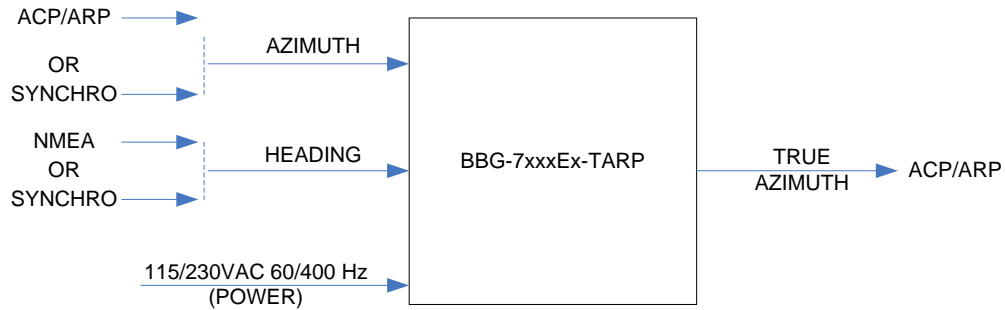


Figure 1 – Example Block Diagram

The BBG-7XXXEX-TARP operates on 115/230 VAC 60/400 Hz power and needs ships heading and radar antenna azimuth as inputs and provides a True ARP signal and ACP signals as outputs. The ARP signal will be at magnetic north if the heading is from a magnetic compass and true north of the heading is from a true north seeking compass.

Technical Specifications

Parameter	Value	Units
Inputs		
Power Supply	115/230	Volts AC
	1	Amps
	60/400	Hertz
Reference	115	Volts
	0.5	Amps
	60/400	Hertz
Synchro Azimuth	90	Volts AC
	60/400	Hertz
	0 – 360	Degrees of Azimuth
Serial Control	RS-232/RS-422	
Outputs		
ARP (North Ref.)	1 pulse/revolution, 16 ACP pulses long	RS-422
ACP	2048 or 4096 pulses/revolution	RS-422
Temperature Range		
Operating	0 to +50	C°
Storage	-65 to +150	C°
Dimensions		
	12(W) x 16(H) x 8(D)	In
	40.64(W) x 30.48(H) x 20.32(D)	Cm



OVERVIEW

The BBG-7XXXEX-TARP is a radar azimuth to ACP/ARP converter. The unit is powered by 115/230 VAC 60/400Hz. The unit receives ships heading and antenna azimuth as inputs and generates ACP/ARP signals compensated for ships heading. The unit is configured to produce 2048 or 4096 (selectable) ACP pulses per 360 degree rotation and one ARP pulse referenced at North crossing. The antenna azimuth input can be ordered as either 115 VAC 60/400Hz Synchro or ACP/ARP. Ship's heading input can be ordered as either Synchro, NMEA, or as a custom serial protocol. The ACP and ARP signals are driven with RS-422 drivers giving a balanced output and are received as balanced inputs.

INPUTS/OUTPUTS

Inputs and outputs are available on standard DIN rail terminal blocks or BNC connectors. Inputs and outputs are listed below:

Ship's Heading Input Options:

- Synchro – 115 VAC 60/400Hz Reference (R1, R2), and 90VAC 60/400Hz Synchro Signal lines (S1, S2, S3)
- Serial (NMEA) – HDT message in accordance with the NMEA-0183 specification

Radar Antenna Azimuth Input Options:

- Synchro – 115 VAC 60/400Hz Reference (R1, R2), and 90VAC 60/400Hz Synchro Signal lines (S1, S2, S3)
- ACP/ARP – RS-422 balanced inputs where ACP is repeated 2048 or 4096 times during one revolution and the ARP signal is sent once corresponding to ship's head.



Serial Interface

Serial Input:

The serial input is configurable as either an RS232 or RS422 interface via a jumper on the internal printed circuit card. Table 1 shows the jumper configurations:

PROTOCOL SELECTION		
Protocol	Jumper Position	
RS-232 Control	JP18 2 – 3	JP11 2 – 3
RS-422 Control	JP18 1 – 2	JP11 1 – 2

Table 1. Protocol Configuration Jumpers

Serial Message Formats:

Heading input:

\$HEHDT,000.0,T*<CK> - <CK> checksum

Baud Rate and Default Values:

Switch SW1 on PCB1 controls the baud rate for the NMEA heading input and the ACP/ARP options. Default data input is 38,400, 2048 pulses/rev, positive logic ACP/ARP.

BAUD RATE (Only)								
BAUD RATE (bits per sec)	Configuration Switch S1							
	1	2	3	4	5	6	7	8
2400	0	0	0	X	X	X	X	X
4800	1	0	0	X	X	X	X	X
9600	0	1	0	X	X	X	X	X
19200	1	1	0	X	X	X	X	X
38400	0	0	1	X	X	X	X	X
57600	1	0	1	X	X	X	X	X
115200	0	1	1	X	X	X	X	X
1 = OFF, 0 = ON, X = Don't Care								

Table 2. Control Baud Rate



ACP/ARP Options								
	Configuration Switch S1							
	1	2	3	4	5	6	7	8
IN ACP INVERT	X	X	X	0	X	X	X	X
IN ARP INVERT	X	X	X	X	0	X	X	X
OUT ACP INVERT	X	X	X	X	X	0	X	X
OUT ARP INVERT	X	X	X	X	X	X	0	X
2048 PULSES/REV	X	X	X	X	X	X	X	1
4096 PULSES/REV	X	X	X	X	X	X	X	0

1 = OFF 0 = ON, X = Don't Care

Table 3. ACP/ARP Options

Synchro Interface

Synchro Azimuth Input:

The Synchro input accepts 90 volt Line to Line, 60 or 400 Hertz Synchro. Default synchro format is single channel 1X input. Custom voltages and frequencies are available upon request. The input is used to develop the ARP and ACP signals for the Live ACP/ARP outputs.

Part Number Reference

Part Number	Azimuth Input	Heading Input	Enclosure
BBG-7140EB-ACP	ACP/ARP	Synchro	Bulkhead
BBG-7140ES-ACP	ACP/ARP	Synchro	Shelf
BBG-7240EB-ACP	Synchro	Synchro	Bulkhead
BBG-7240ES-ACP	Synchro	Synchro	Shelf
BBG-7040EB-ACP	ACP/ARP	NMEA	Bulkhead
BBG-7040ES-ACP	ACP/ARP	NMEA	Shelf

Table 4

Reference Interface

Reference Input:

The reference input is 115 Volt, 60 or 400 Hertz.



CONNECTOR LIST

Inputs and outputs are available on DIN rail terminal blocks provided with the BBG-7XXXEX-TARP. The shelf mount has the terminal blocks located on the front of the unit and the bulkhead unit has the terminal blocks internal to the enclosure. Cable glands entries to the bulkhead mount are preinstalled to allow cables to enter the enclosure for connection to the terminal blocks. The cable glands will provide a water tight seal if unit is installed correctly. Connection information for the terminal block connections are listed below by product number:

Part Number: All part numbers

I/O CONNECTOR TYPE: DIN Terminal Blocks

CONNECTOR MATE: Ferrules

BBG-7140EB-TARP & BBG-7140ES-TARP

Signal	Connector
ACN 115V AC 60/400 Hz NEUTRAL (FUSED INPUT) (3.15 Amp)	TB1 – 1
ACL 115V AC 60/400 Hz LINE (FUSED INPUT) (3.15 Amp)	TB1 – 2
Chassis Ground (E1)	TB1 – 3
Heading R1 115V AC 60/400 Hz (REFERENCE INPUT)	TB1 – 4
Heading R2 115V AC 60/400 Hz (REFERENCE INPUT)	TB1 – 5
Heading S1 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 6
Heading S2 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 7
Heading S3 IN 1X 60/400 Hz (SYNCRHO INPUT)	TB1 – 8
Chassis Ground (E1)	TB1 – 9
ACP + (Input RS422)	TB1 – 10
ACP – (Input RXD422)	TB1 – 11
ARP + (Input RS422)	TB1 – 12
ARP – (Input RXD422)	TB1 – 13
ACP/ARP Input Signal Ground	TB1 – 14
Chassis Ground (E1)	TB1 – 15
True ACP + (Output RS422)	TB1 – 16
True ACP – (Output RXD422)	TB1 – 17
True ARP + (Output RS422)	TB1 – 18
True ARP – (Output RXD422)	TB1 – 19
ACP/ARP Output Signal Ground	TB1 – 20

Table 5



BBG-7240EB-TARP & BBG-7240ES-TARP

Signal	Connector
ACN 115V AC 60/400 Hz NEUTRAL (FUSED INPUT) (3.15 Amp)	TB1 – 1
ACL 115V AC 60/400 Hz LINE (FUSED INPUT) (3.15 Amp)	TB1 – 2
Chassis Ground (E1)	TB1 – 3
Heading R1 115V AC 60/400 Hz INPUT (REFERENCE INPUT)	TB1 – 4
Heading R2 115V AC 60/400 Hz INPUT (REFERENCE INPUT)	TB1 – 5
Heading S1 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 6
Heading S2 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 7
Heading S3 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 8
Chassis Ground (E1)	TB1 – 9
Azimuth R1 115V AC 60/400 Hz INPUT (REFERENCE INPUT)	TB1 – 10
Azimuth R2 115V AC 60/400 Hz INPUT (REFERENCE INPUT)	TB1 – 11
Azimuth S1 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 12
Azimuth S2 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 13
Azimuth S3 IN 1X 60/400 Hz (SYNCHRO INPUT)	TB1 – 14
Chassis Ground (E1)	TB1 – 15
True ACP + (Output RS422)	TB1 – 16
True ACP – (Output RXD422)	TB1 – 17
True ARP + (Output RS422)	TB1 – 18
True ARP – (Output RXD422)	TB1 – 19
ACP/ARP Signal Ground	TB1 – 20

Table 6

BBG-7040EB-TARP & BBG-7040ES-TARP

Signal	Connector
ACN 115V AC 60/400 Hz NEUTRAL (FUSED INPUT) (3.15 Amp)	TB1 – 1
ACL 115V AC 60/400 Hz LINE (FUSED INPUT) (3.15 Amp)	TB1 – 2
Chassis Ground (E1)	TB1 – 3
IN ARP A (SIG if Unbalanced)	TB1 – 4
IN ARP B (GND if Unbalanced)	TB1 – 5
IN ACP A (SIG if Unbalanced)	TB1 – 6
IN ACP B (GND if Unbalanced)	TB1 – 7
Chassis Ground (E1)	TB1 – 8
OUT ARP A (SIG if Unbalanced)	TB1 – 9
OUT ARP B (GND if Unbalanced)	TB1 – 10
OUT ACP A (SIG if Unbalanced)	TB1 – 11
OUT ACP B (GND if Unbalanced)	TB1 – 12
Chassis Ground (E1)	TB1 – 13
NMEA Heading (Input RXD422A)	TB1 – 14
NMEA Heading (Input RXD422B)	TB1 – 15
NMEA Signal Ground (Isolated)	TB1 – 16
Chassis Ground (E1)	TB1 – 17

Table 7

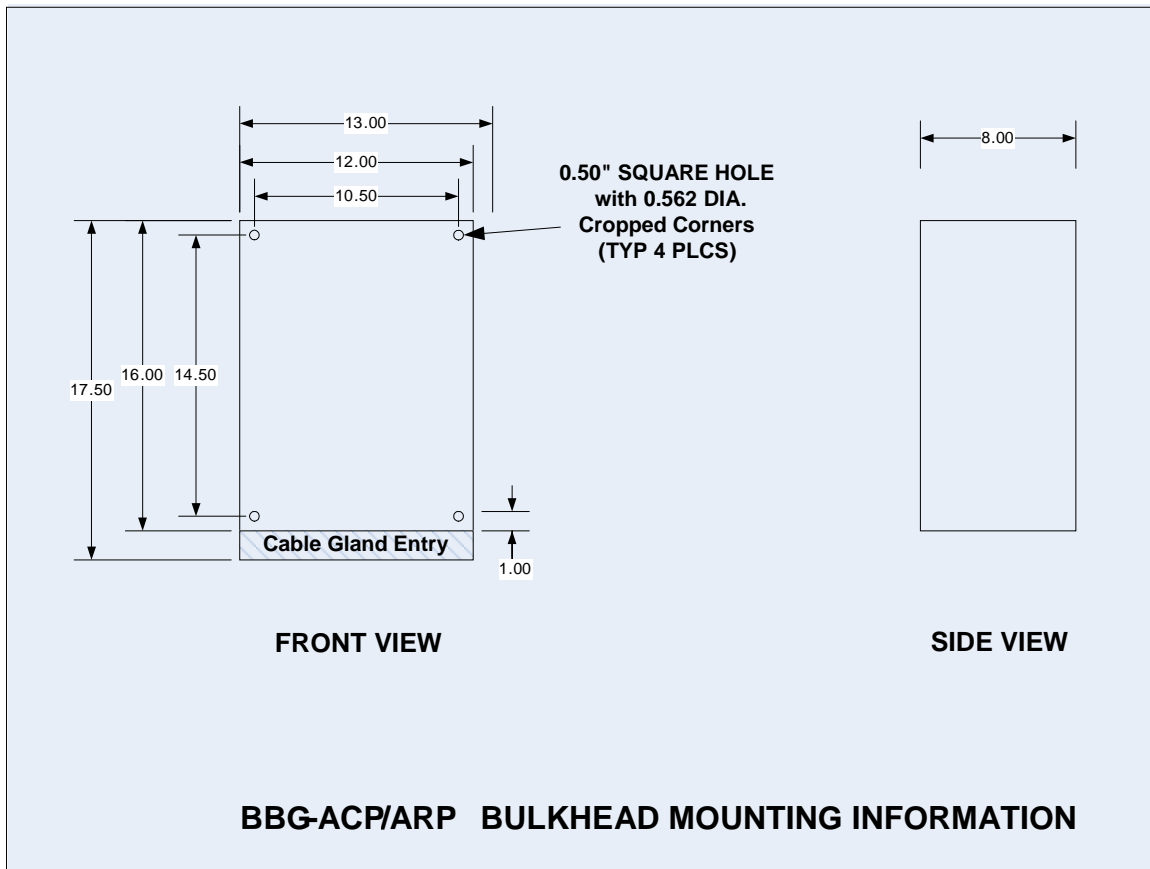


Figure 2 – Bulkhead Mount



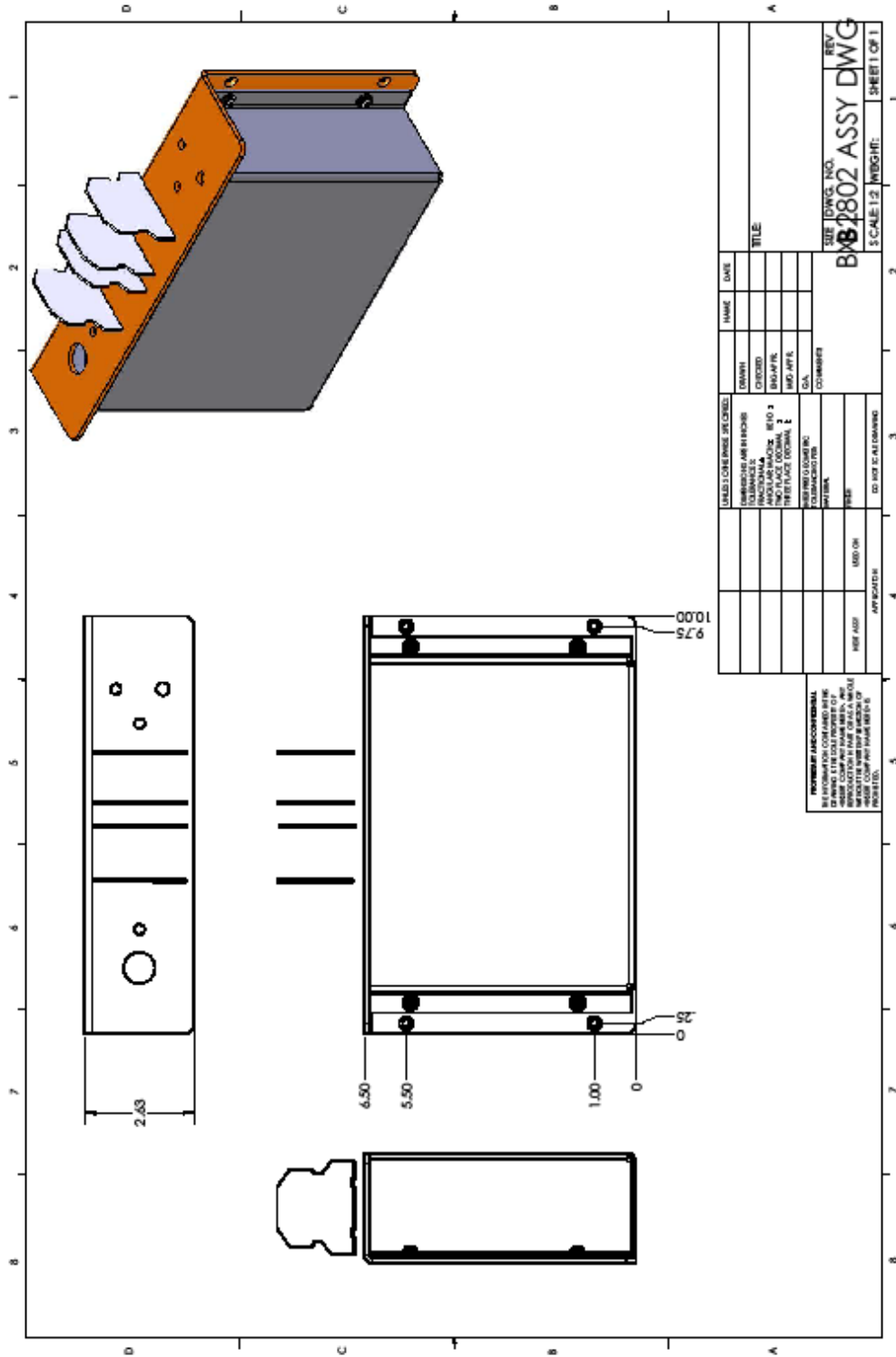


Figure 3 – Shelf Mount



V1.1 25 February 2016

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