



SYNCHRO TO DIGITAL INTERFACE KW910-M

INTRODUCTION

The interface converts synchro transmission to NMEA 0183 or IEC 61162 data. Applications include

- **Gyro compass** for radar, ECDIS and heading displays.
- **Rudder Sensor Angle** used with a VDR.
- **Telegraph, pitch, rudder demand**
- The "XDR" sentence can be used for many synchro systems.
- **Wind speed and direction**
- **Log speed**

The interface is a precision device, and does not require alignment in the 1:1 mode. The interface can convert gyro ratios such as 90:1. A DIP switch selects reference voltages over the range of 40 to 220 and signals from 40 to 90. The function and choice of data output is set by a second DIP switch.

The KW910M replaces all previous models of the 910 range which has been made since 1988. It is the same size and pin compatible as regards inputs and data output.



SPECIFICATION

INPUT 1: Synchro 40 to 550 Hz. Reference 40 to 220v. Phases 40 to 90 volts. DIP switch selectable. Loading resistors 91K to 270K ohm per phase. 22K reference. The phases have a common connection at centre of the three phase scaling resistors to the power input 0v. Reference input is isolated by transformer. We can supply KW910's for voltages outside the range mentioned and for extreme precision.

Conversion 12 bits, 0.1 degrees.+/- 0.5 degrees. Conversion rate 40 per second.

INPUT 2: NMEA 0183 port. 4800 baud.

Gyro option: Programmed for all NMEA heading sentences input.

Rudder Sensor Angle option: Input a 2nd rudder angle (or rudder demand)

Wind option: Use a 2nd interface to input speed.

XDR option: A second KW910 transducer value can be input.

OUTPUT: 5v CMOS 5 mA via 47 ohms. NMEA 0183, RS422, RS232 compatible. Data is 4800 baud NMEA 0183 format, plus an Anschutz Coursebus option. Generally 1 per second. Refer to option list.

Gyro options: \$HEHDT, \$HEROT, \$HCHCC, \$HCHDM.

Rudder sensor angle: RSA does not necessarily = actual rudder angle. Outputs a \$ERRSA synchro transducer angle sentence with two values, first the interface's own angle, the second field taken from the first field entered via the NMEA input port

Wind option: \$WIMWV. The interface outputs wind speed OR direction. The speed field can be filled by input from the NMEA input port.

XDR option: More than 8 XDR identities, switch selectable. Outputs a \$ERXDR synchro transducer angle sentence with two values, first the interface's own angle, the second field taken from XDR via the NMEA input port

POWER: 9 to 32 v DC at 0.2 amps.

ENCLOSURE: **Black texture finish**
diecast box 222 x 155 x 55 mm for indoor bulkhead mounting.

CABLE ENTRY: Glands for 7 mm diameter cables.

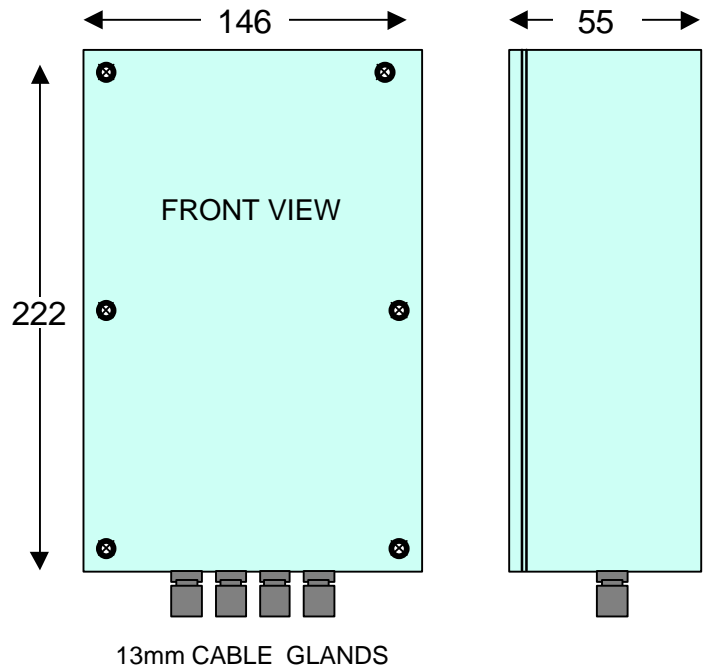
FEATURES: LEDs on data in and out plus bicolour status led. Connections are lift-off terminal blocks.

RATIOS, SCALE OFFSET AND ALIGNMENT:

Synchro is generally assumed 1:1 with a synchro natural zero = 0 degrees, midships etc. The KW910 may be adjusted for an offset angle by inserting a correction in the EPROM. The ratio, or calibration scale, can be changed by various means such as keying a table of 360 values into the EPROM or changing the mathematics of a multiplication. This allows synchro angle to be translated into the actual rudder angle, for instance.

More details are given in the option table and manual but this work can only be done by engineers familiar with binary, BCD, hexadecimal and EPROM programming.

ALIGNMENT: For ratios other than 1:1 an optional extra 4 button keypad is required and may be fitted in the factory at the time of order for a small extra charge.



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KW910 – M option table for program MP5 and later. 06/10/2004

Option	Switch	Ratio	Data out	Data	
00	00 0000	1:1	HEHDT + HEROT	Head & ROT	1 per second
01	00 0001	1:1	HEHDT + HEROT	Head & ROT	1 per sec + when heading changes
02	00 0010	36:1	HEHDT + HEROT	Head & ROT	1 per sec + when heading changes
03	00 0011	90:1	HEHDT + HEROT	Head & ROT	1 per sec + when heading changes
04	00 0100	360:1	HEHDT + HEROT	Head & ROT	1 per sec + when heading changes
05	00 0101	1:1	HEHDT	Heading	10 per second
06	00 0110	1:1	HCHDM	Heading	10 per second
07	00 0111	1:1	HCHCC	Heading	10 per second
08	00 1000	1:1	Anschutz Coursebus	Heading	10 per second
09	00 1001	90:1	Anschutz Coursebus	Heading	10 per second
0A	00 1010	1:1			
0B	00 1011	1:1	ERRSA	Rudder sensor angle	1:1 ratio
0C	00 1100	1:1	ERRSA	Rudder angle	For 4:1 rudder sensor Translate table 0
0D	00 1101	1:1	ERRSA	Rudder angle	For 3:1 rudder sensor Translate table 1
0E	00 1110	1:1	ERRSA	Rudder angle	For 2:1 rudder sensor Translate table 2
0F	00 1111	1:1	ERRSA	Rudder angle	Translate table 3 As yet unused
10	01 0000	1:1	ERXDR	Transducer angle	Identity is as set on the switch
11	01 0001	1:1	ERXDR	Transducer angle	"
12	01 0010	1:1	ERXDR	Transducer angle	"
13	01 0011	1:1	ERXDR	Transducer angle	"
14	01 0100	1:1	ERXDR	Transducer angle	"
15	01 0101	1:1	ERXDR	Transducer angle	"
16	01 0110	1:1	ERXDR	Transducer angle	"
17	01 0111	1:1	ERXDR	Transducer angle	"
18	01 1000	1:1	ERXDR	Transducer angle	"
19	01 1001	1:1	ERXDR	Transducer angle	"
1A	01 1010	1:1	ERXDR	Transducer angle	Identity = 20
1B	01 1011	1:1	ERXDR	Transducer angle	Identity = 21. Not corrected by offset angle.
1C	01 1100	1:1	WIMWV	Wind speed	100 knots for 1 rev
1D	01 1101	1:1	WIMWV	Wind direction	Wind Direction. Accepts external wind speed by NMEA 0183 input.
1E	01 1110	1:1	VMVBW	Longitudinal Water speed	100 knots = 1 synchro rev 3 rd quadrant is astern
1F	01 1111	1:1	VMVBW	Longitudinal Water speed	48 knots = 1 synchro rev Volts input to NMEA port = astern

- NOTES:
- An offset angle may be applied to all options using location 5B 5C packed BCD in 10ths of a degree. Option 1B does not correct for offset angle so you can always check the uncorrected synchro angle.
- 01. The fastest update is whenever heading changes.
- 0B. Rudder **sensor** angle does not always equal actual rudder angle.
- 0C. You can use an offset angle to correct for synchro angle, then use the translate table. Translate table is 360 values described in detail in the technical manual.
- 0B – 0F is dual rudder sensor angle. Input the second angle via NMEA input port.
- 10 – 1B. A second XDR sentence from a KW910M may be input, to be output added to the end of the \$ERXDR output. The format is restricted so it can not combine all XDR messages.
- 1E, 1F. Unused fields are sent as null fields.
- 1E. The speed may be considered as percentage of max rotation. The 3rd quadrant is astern. Speed goes from zero knots to 50 at the 180 degree synchro position, rising to 74.9. Astern speed is -25 to -0.1.
- 1D. Accepts wind speed via the NMEA 0183 input, to be combined in the WIMWV sentence.
- Location 64 is packed BCD base for XDR ID.
- Location 65 66 is the talker ID in ASCII.
- 1C. Translated by look up table. Scale 0 to 100 for one revolution but made zero for speeds greater than 94 knots to allow for synchro going "below" zero.
- 1E. Loc 5F = low binary scaling for multiplier. 250 dec= 100 for a full revolution.
- 0F. Change pointer to translate table at hi-lo 5D 5E