

WS7.0 Position Sensor with Absolute or Incremental Encoder



Compact Industrial Sensor for Long Ranges

- **Measurement Range:**
0 ... 3750 mm to 0 ... 40000 mm
0 ... 147.6 in to 0 ... 1574.8 in
- **With Absolute or Incremental Encoder Output**



Specifications	Outputs	Incremental Encoder Absolute Multiturn Encoder with synchronous serial output TSSI / RS-485
	Resolution	Incremental: 1, 5 or 10 pulses per mm; 25.4, 127 or 254 pulses per in TSSI: 0.073 mm up to 30000 mm range 0.088 mm up to 40000 mm range TSSI-P: 0.037 mm up to 30000 mm range 0.044 mm up to 40000 mm range
Material	Aluminium and Stainless Steel Cable: Stainless Steel	
Sensing device	Incremental or Absolute Encoder	
Linearity	Up to ±0.05 % F.S., optional ±0.01 % F.S.	
Weight	Up to 4 kg max.	
Environmental		
Immunity to Interference (EMC)	Refer to Output Specification	
Temperature	Refer to Output Specification	

Order code WS7.0

Absolute/Incremental

Model Name

WS7.0 - [] - [] - [] - [] - []

Measurement Range (in mm)

3750 / 5000 / 7500 / 10000 / 15000 / 20000 / 25000 / 30000 / 40000

Pulses per mm for Incremental Output PP530

10 = 10 Pulses per mm; 254 pulses per in
5 = 5 Pulses per mm; 127 pulses per in
1 = 1 Pulse per mm; 25.4 pulses per in (not in the 40000 mm range)

Outputs

ME = Mechanism only for installation of suitable multiturn encoders
PP530 = Incremental output
TSSI = Multiturn encoder with synchronous serial output
TSSI-P = TSSI programmable, RS232C, incremental signals
Other Outputs on Request (Interbus S, Profibus, CAN-Bus)

Linearity

L01 = ±0.01 %, related to the specified sensitivity on the label (PP530)

Option

M4 = M4 cable fixing

Order Code Mating Conn. (see accessories p. 105)

WS-CONN-D8

TSSI(-P):

WS-CONN-017S-M

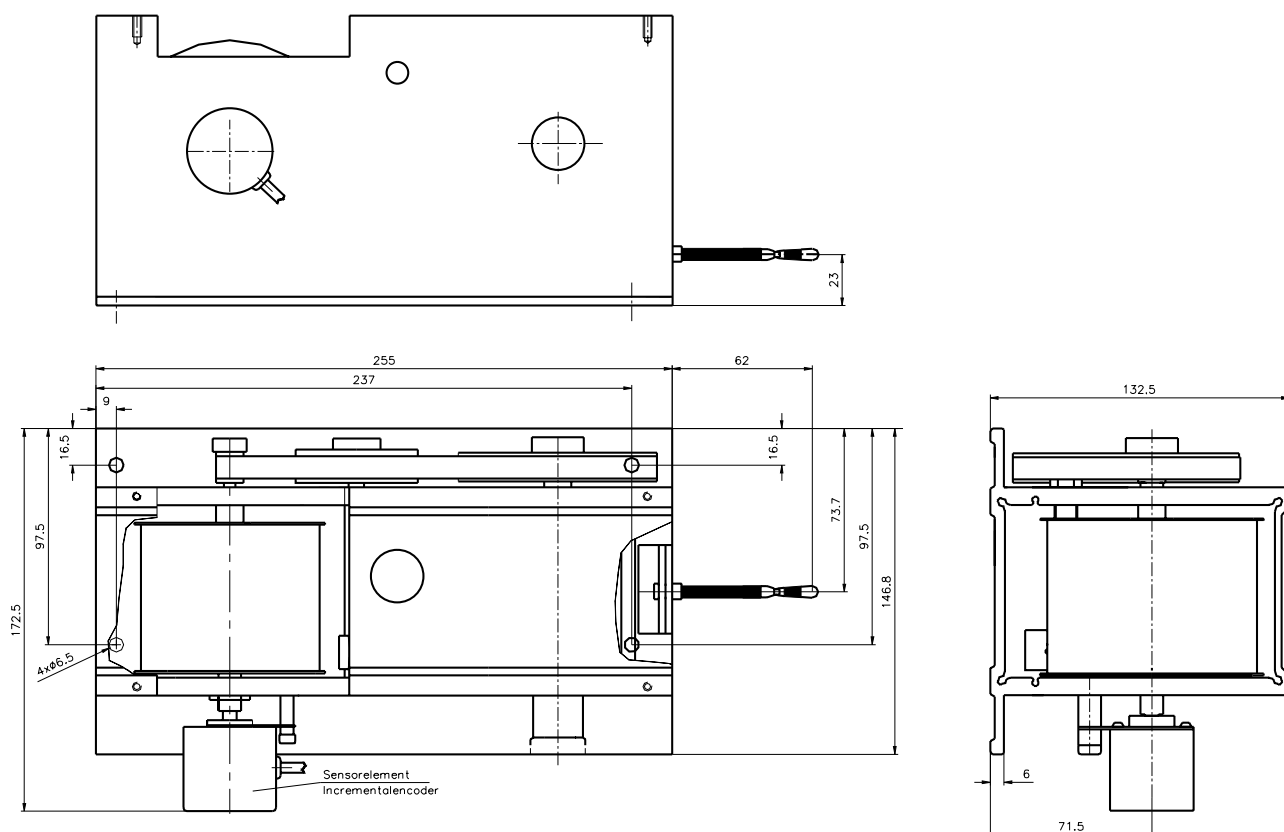
Order Example: WS7.0 - 30000 - 5 - PP530 - M4

WS7.0 Position Sensor with Absolute or Incremental Encoder



Cable Forces typical at 20 °C	Range		Maximum Pull-out Force [N]	Minimum Pull-in Force [N]
	[mm]	[in]		
	3750 - 30000	147.6 - 1181.1	8.0	4.2
	40000	1574.8	7.0	3.4

Outline drawing

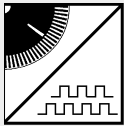


For guaranteed dimensions consult factory

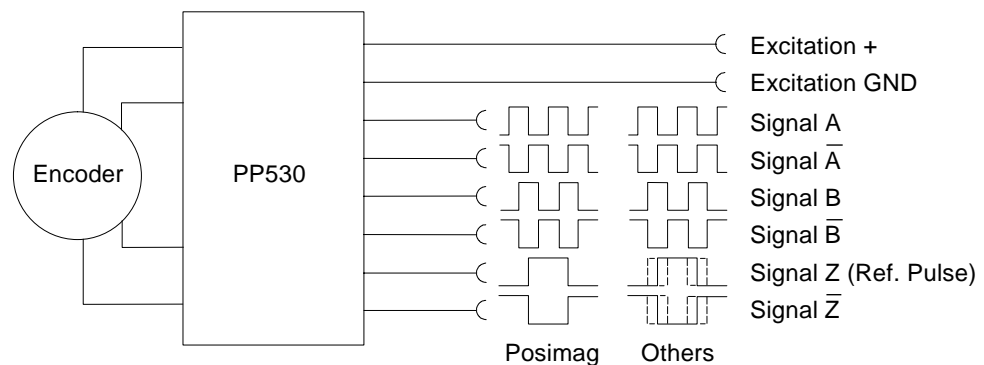
WS Position Sensors

Output Specification PP530

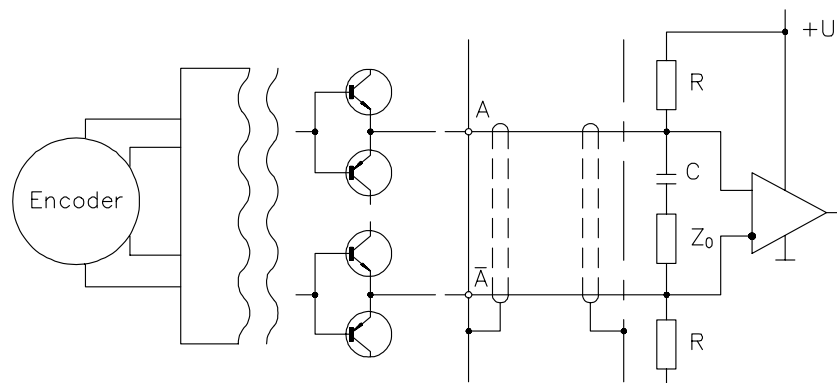


Signal Conditioner PP530 Incremental 	Excitation Voltage	+5 ... +30 VDC
	Excitation Current	200 mA max.
	Output Frequency	200 kHz max.
	Output	Linedriver, Push-Pull, CMOS, TTL and HTL compatible
	Output Current	30 mA max., Short Circuit Protection
	Output Voltage	Depends on the excitation voltage (e.g. to obtain TTL-signals the excitation must be 5 V) Compatible to EIA RS-422/RS-485
	Stability (Temperature)	$\pm 0.002\%$ / K Full Scale (sensor mechanism)
	Operation Temperature	-10 ... +70 °C
	Storage Temperature	-30 ... +80 °C
	Transition Time Positive Edge	250 ns
	Transition Time Negative Edge	250 ns
	Protection	Reverse Polarity, Permanent Short Circuit
	Immunity to Interference (EMC)	According to EN61326: 1998

Signal Diagram



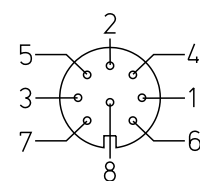
Recommended Processing Circuit



Signal Levels	Excitation	Level	$I_a \leq 5 \text{ mA}$	$I_a \leq 25 \text{ mA}$	$-I_a \leq 5 \text{ mA}$	$-I_a \leq 25 \text{ mA}$
	5 V	U_{aHigh}	$>4.2 \text{ V}$	$>4.2 \text{ V}$	$>4.1 \text{ V}$	$>3.8 \text{ V}$
5 V	U_{aLow}	$<0.5 \text{ V}$	$<1.2 \text{ V}$	$<0.4 \text{ V}$	$<0.4 \text{ V}$	
24 V	U_{aHigh}	$>23.5 \text{ V}$	$>23.5 \text{ V}$	$>23.5 \text{ V}$	$>22.5 \text{ V}$	
24 V	U_{aLow}	$<0.5 \text{ V}$	$<1.2 \text{ V}$	$<0.4 \text{ V}$	$<0.4 \text{ V}$	

Signal Wiring / Connection	Output Signals PP530	Connector WS-CONN-D8
	Excitation +	1
Excitation GND (0V)	2	
Signal B (A + 90°)	3	
Signal A	4	
Signal B-bar	5	
Signal A	6	
Signal Z (Ref. Pulse)	7	
Signal Z-bar	8	

Mating connector
View to solder terminals



WS-CONN-D8

WS Position Sensors

Output Specification TSSI

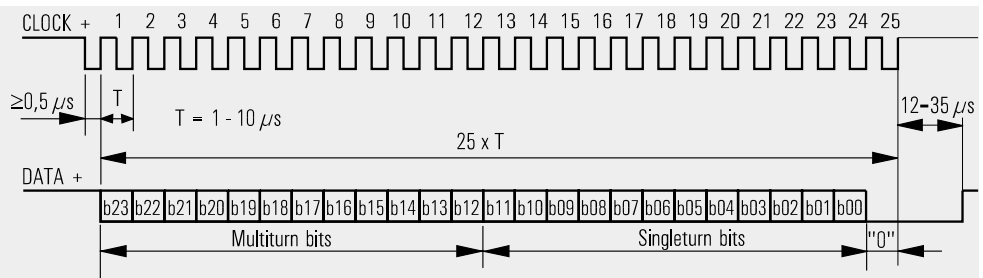


- 4096 counts per revolution (12 bit), 4096 revolutions (12 bit)
- No Loss of Data at Power-down
- Easy to Connect to PLC's with SSI Input Circuit

Description

The sensing device of the SSI is a 24-bit absolute multiturn encoder. The position information is given by an analog/digital converter output serialized as a data word. The processing unit (PLC, Microcomputer) sends pulse sequences which clocks the data transmission at the required transfer rate. With the first falling edge of the pulse sequence the position of the sensor is recorded and stored. The following rising edges control the bit-by-bit transmission of the data word. After a delay time the next new position information

Data Format (Train of 26 pulses)

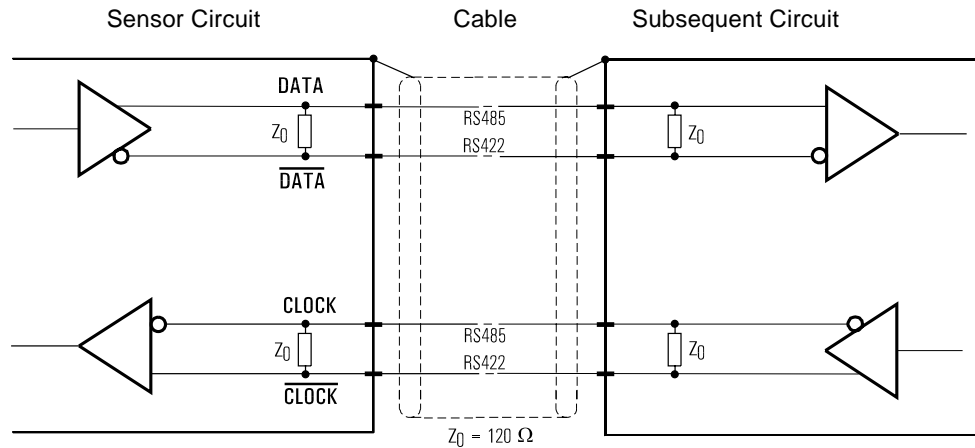


Signal Conditioner TSSI Absolute Encoder synchronous serial



Output	EIA RS-422, RS-485, short-circuit proof
Excitation Voltage	10 ... 30 V DC, reverse polarity protected
Excitation Current	250 mA max. without load
Clock Frequency	100 kHz ... 1 MHz
Code	Gray, continuous progression
Format	Tannenbaum
Delay between Pulse Trains	12 to 35 μs
Stability (Temperature)	±0.002% / K Full Scale (sensor mechanism)
Operation Temperature	-20 ... +85 °C
Immunity to Interference (EMC)	According to EN50082-2, EN50081-1

Recommended Processing Input Circuit



Cable Length	Baud Rate
50 m	100 ... 1000 kHz
100 m	100 ... 300 kHz

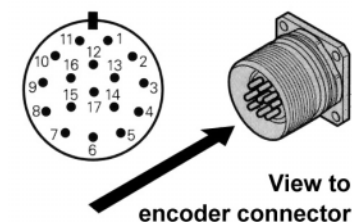
Note:

Extension of the cable length will reduce the maximum transmission rate.
The signals CLOCK/CLOCK and DATA/DATA must be connected in a twisted pair cable, shielded per pair and common.

Signal Wiring / Connection

Signal Name	Cable Output (*)	Connector Pin
Excitation +	white	7
Excitation GND (0V)	brown	10
CLOCK	green	8
CLOCK	yellow	9
DATA	grey	14
DATA	pink	17

(*) WS7.2 only



WS Position Sensors

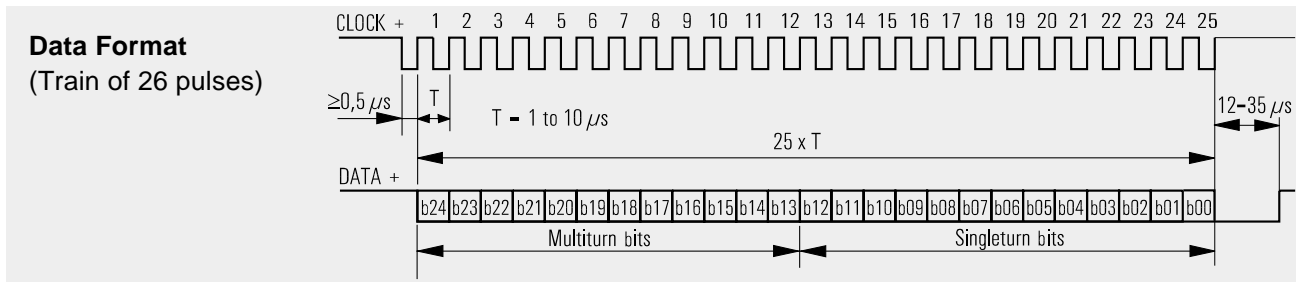
Output Specification TSSI-P



- 8192 counts per revolution (13 bit), 4096 revolutions (12 bit)
- Encoder programming and data transfer via RS-232 interface
- In addition sinusoidal incremental signals

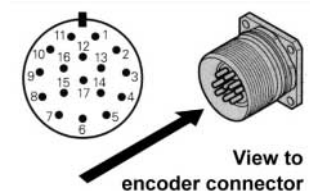
Description

The sensing device of the SSI is a 25-bit absolute multiturn encoder. The position information is given by an analog/digital converter as a serial data word. The processing unit (PLC, Microcomputer) sends pulse sequences which clocks the data transmission at the required transfer rate. With the first falling edge of the pulse sequence the position of the sensor is recorded and stored. The following rising edges control the bit-by-bit transmission of the data word. After a delay time the next new position information will be transmitted.



Signal Conditioner TSSI Absolute Encoder synchronous serial, programmable 	Output	EIA RS-422, RS-485, short-circuit proof
	Excitation Voltage	10 ... 30 V DC, reverse polarity protected
	Excitation Current	250 mA max. without load
	Clock Frequency	100 kHz ... 1 MHz
	Programmable Functions	Resolution, Offset, Preset, Counting Direction, Output Code and Format
	Code	Gray or Binary
	Format	Tannenbaum (SSI) or Serial, right aligned
	Delay between Pulse Trains	12 to 35 μs
	Incremental Signal	Two sinusoidal quadrature signals A and B, each with 512 periods per revolution. Signal amplitude approx. 1 V _{SS} with 120 Ω terminating resistance
	Serial Interface	RS-232C asynchronous (TxD, RxD, GND) for encoder programming and data transmission
	Hardware Programming	Preset1, Preset2, Counting Direction
	Stability (Temperature)	002% / K Full Scale (sensor mechanism)
	Operation Temperature	-20 ... +85 °C
Immunity to Interference (EMC)	According to EN50082-2, EN50081-1	

Signal Name	Connector Pin
Excitation +	7
Excitation GND (0V)	10
CLOCK	8
CLOCK	9
DATA	14
DATA	17
Signal A	15
Signal A	16
Signal B	12
Signal B	13
Internal shield	11
RxD	1
TxD	4
Fault detection signal UaS	3
Preset1	5
Preset2	6
Counting direction	2



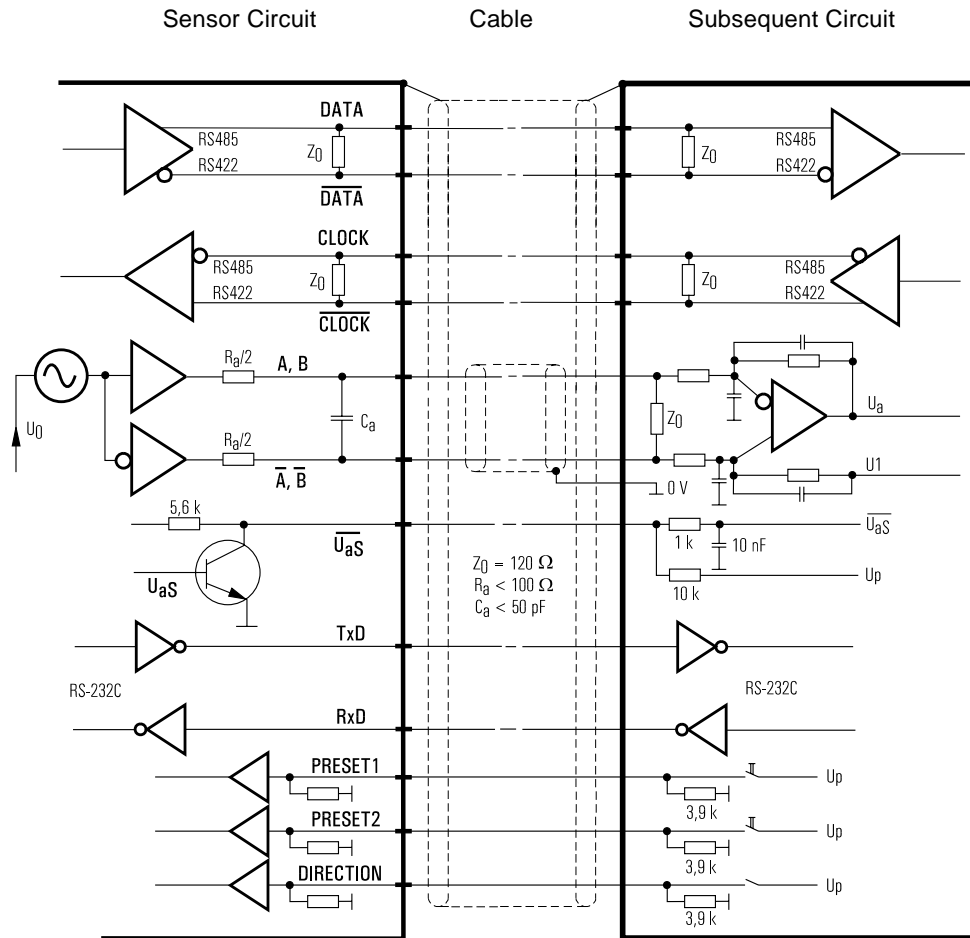
Programming Software and Connector Cable see page 104.

WS Position Sensors

Output Specification TSSI-P



Recommended Processing Input Circuit



Cable Length	Baud Rate
50 m	100 ... 1000 kHz
100 m	100 ... 300 kHz

Note:
 Extension of the cable length will reduce the maximum transmission rate.
 The signals CLOCK/CLOCK and DATA/DATA must be connected in a twisted pair cable, shielded per pair and common.

Incremental Signals

