ABSOLUTE ENCODERS INSTALLATION INSTRUCTIONS

SAFETY ADVICES

- The transducer must be used in observance of its specifications. Encoder is a precision measuring instrument and it is not a safety device.
- Assembling and installing staff must be qualified and carefully follow installation instructions. It is strongly recommended to avoid any mechanical or electrical modification for safety reasons.
- Don't expose the device to stresses or impacts in order to ensure correct functioning.
- Check that the mechanical coupling between the motor shaft and the encoder shaft is carried out with appropriate elastic couplings, specially in case of accentuated axial or radial movements.
- Check that the operating environment is free from corrosive agents (acids, etc.) or substances that are not compatible with the device.
- Check the connection of the device to the ground. If it is necessary, provide an additional external connection.
- Before switching on, verify the voltage range applicable to the device and save it from overvoltage supplying.
- Place power and signal cables in such a way as to avoid capacitive or inductive interferences that may cause malfunction of the device. Place also encoder cables far from power lines or any other cable with high noise levels.
- Use only network cables compliant with PROFIBUS DP regulations and suitably shielded power supply cables. (For models with PROFIBUS interface)
- Check that there is good electrical contact between the cable shield and the proper rings inside the skintop gland. (For models with PROFIBUS interface)
- Don't join or separate the cap containing the connectors from the rest of the body when power supply is on in order to prevent damages. (For models with PROFIBUS interface)
- Transducer installation and cabling must be carried out only with power supply off and by skilled staff.
- The user who integrates the transducer in his appliance must observe CE regulations and mark it with CE mark.
- Failure to comply with previously listed rules will void the warranty.
- Eltra consider itself exempt from any liability for damages or injuries due to non-observance of these directives.

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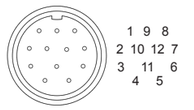
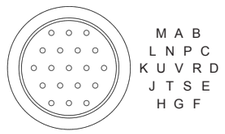
CONNECTORS

MC connector 7-pin
(Amphenol MS 3102 E 16S)
view solder side FV

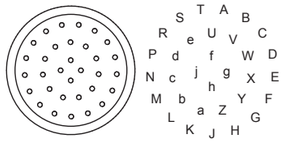
HA connector 12-pin
(Hummel 7.410.000.000 - 7.002.912.603)
view solder side FV



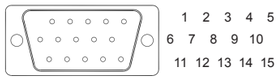
MA connector 19-pin
(Amphenol 62IN 12E 14-19 P)
view solder side FV



ME connector 32-pin
(Glenair IPT 02 A 18-32 P F6)
view solder side FV

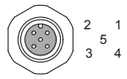


VC connector 15-pin
(Amphenol D-Sub E Shell High Density)
view solder side FV

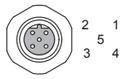


VB connector 15-pin
(Amphenol D-Sub A Shell Standard Density)
view solder side FV

S3 connector 5-pin
power supply
(Lumberg RSFM 5)
view solder side FV



S3 connector 5-pin
line out
(Lumberg 0976 PMC 151)
view solder side FV



S3 connector 5-pin
line in
(Lumberg 0976 PFC 151)
view solder side MV

PROFIBUS INTERFACE

Profibus DP interface is required to join the encoder to a Profibus DP network, in compliance with the IEC 61158 standard and the PNO profile No. 3.062. The encoder is a Class 2 slave device and it can be singleturn (8192 cpr max) or multiturn (8192 cpr e 4096 turns max). For any further information see the Eltra Profibus Installation Guide.

Cable features (A type)	
impedence	135 ... 165 Ω (f = 3 ... 20 MHz)
capacity	< 30 pF/m
resistance	< 110 Ω/km
wire section	≥ 0.34 mm²

Max bit rate	Max cable length
93.75 kbps	1.2 km
187.5 kbps	1 km
500 kbps	400 m
1.5 Mbps	200 m
12 Mbps	100 m

LED on	Encoder state
green	regular operating condition
green - red	encoder is on but it is not connected to the network or it is not configured properly / warning or alarm active

Manual settings

DIP SW A	1	2
Function	Profibus line termination	

DIP SW B	1	2	3	4	5	6	7	8
Function	enabling inversion of counting direction by telegram (see Fig. C)	encoder address						
		MSB	bit 5	bit 4	bit 3	bit 2	bit 1	LSB

GSD file options

counting direction	clockwise or counterclockwise increasing
Class 2 functionality	enabling / disabling (e.g. preset function Fig. C)
scaling function	enabling programmable resolution
singleturn resolution	codes per round (cpr)
total resolution	number of turns · codes per round es. 25 bit = 4096 · 8192 = 33554432 word high = 512, word low = 0 (see Fig. B)
wrong position warning threshold	position error quantity (0 ... 10, disabling = 99)
wrong position alarm threshold	position error quantity (0 ... 10, disabling = 99)

Fig. A

Total resolution: 25 bit (standard)

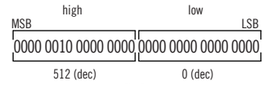


Fig. B

Telegram

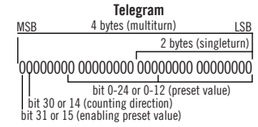


Fig. C

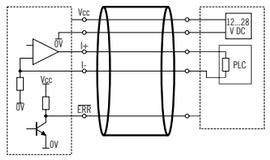
ELECTRICAL CONNECTIONS - PROFIBUS INTERFACE

Function	Connecting terminal (see PCB in Fig. A)	S3 connector 5-pin (power supply)	S3 connector 5-pin (line out)	S3 connector 5-pin (line in)
+ V DC	1	2		
0 V	2	4		
signal A (out)	3		2	
signal B (out)	4		4	
signal A (in)	5			2
signal B (in)	6			4

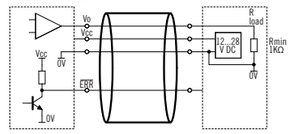
LINEAR INTERFACE

Linear interface provides a linear trasmission of position data in analog form with industrial standard voltage interfaces like 0 ... 5V / 0 ... 10V or current interfaces like 0 ... 20 mA / 4 ... 20 mA.
ADDITIONAL SIGNALS:
ERR (active low)= encoder fault.
CODE SENSE:
- D decrease with clockwise rotation shaft view (standard)
- I increase with clockwise rotation shaft view

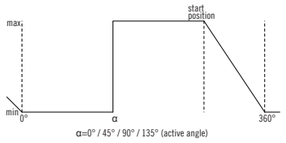
CURRENT OUTPUT



VOLTAGE OUTPUT



SIGNAL PATTERN

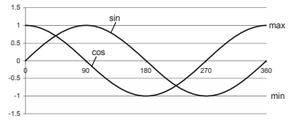


ELECTRICAL CONNECTIONS - LINEAR INTERFACE EML

Function	V output	I output
+ V DC	red	red
0 V	black	black
error	blue	blue
V out	green	/
I out	/	green
I in	/	yellow
⏚	case	case

SINUSOIDAL INTERFACE (1 SIN-COS / TURN)

Sinusoidal interface interface provides a linear trasmission of position data in analog form. Sine and cosine have 1Vpp as differential amplitude with 2,5V DC offset.



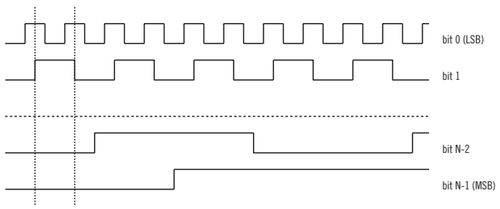
ELECTRICAL CONNECTIONS - SINUSOIDAL INTERFACE EMS

Function	Cable (8-core max)
+ V DC	red
0 V	black
sin +	green
sin -	brown
cos +	yellow
cos -	orange

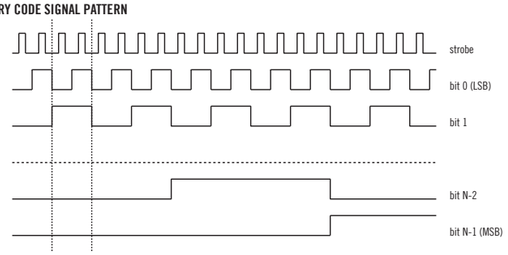
PARALLEL INTERFACE

Parallel interface transmits absolute position data by one bit per channel.
In the following figures:
N = data bit size
2ⁿ = total resolution of the encoder (number of turns · codes per round)

GRAY CODE SIGNAL PATTERN



BINARY CODE SIGNAL PATTERN



ADDITIONAL SIGNALS (active on high state)
UP / DOWN = enables inversion of counting direction (input)
RESET = enables reset of the position of the encoder (input)
STROBE = allows safe binary data acquisition (output)
LATCH = enables data freeze (position doesn't vary even though the shaft of the encoder rotates) (input)

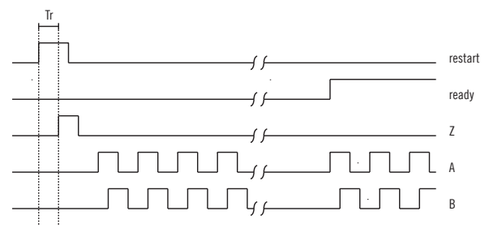
ELECTRICAL CONNECTIONS - PARALLEL INTERFACE

Function	Cable (32-core max)	Cable (for EA 40 T / U only)	MA conn. 19-pin	ME conn. 32-pin	VB conn. 15-pin	VC conn. 15-pin
+ V DC	red	brown	V	h	15	15
0 V	black	blue	T	j	14	14
bit 0 (LSB)	green	white	A	A	1	1
bit 1	yellow	yellow	B	B	2	2
bit 2	blue	green	C	C	3	3
bit 3	brown	purple	D	D	4	4
bit 4	orange or pink		E	E	5	5
bit 5	white		F	F	6	6
bit 6	grey		G	G	7	7
bit 7	purple		H	H	8	8
bit 8	grey-pink		J	J	9	9
bit 9	white-green		K	K	10	10
bit 10	brown-green		L	L	11	11
bit 11	white-yellow		M	M	12	12
bit 12	yellow-brown		N	N		
bit 13	white-grey		P	P		
bit 14	grey-brown		R	R		
bit 15	white-pink		S	S		
bit 16	pink-brown			T		
bit 17	white-blue			U		
bit 18	brown-blue			V		
bit 19	white-red			W		
bit 20	brown-red			X		
bit 21	white-black			Y		
bit 22	brown-black			Z		
bit 23	grey-green			a		
bit 24	yellow-pink			d		
bit 25	yellow-blue			c		
bit 26 (MSB)	green-blue			b		
latch	yellow-grey			e		
reset	pink-green			f		
up / down	red-blue		U	g	13	13
parity		red				
strobe		black				

Default counting direction in Eltra absolute encoders is counterclockwise increasing (viewed from shaft side, with U/D inactive).

ICO INTERFACE

ICO interface combines incremental and absolute concepts. Encoder generates standard incremental signals (A and B in time-quadrature and Z reference index), but at the start-up the device transmits by A and B channels many pulses as the absolute position value. When you power on the encoder, it goes into stand-by state. If you enables RESTART input for at least 50 ms (Tr), start-up sequence begins: a pulse on Z channel reset the counter if necessary and then A and B channels sends the position value by a pulse train. At the end the READY output signal commutates into high logic state and the incremental section of the encoder starts working. READY signal monitors the operating state of the encoder and allows to detect possible failures. During start-up routine the position of the encoder is checked again after being sent and it is continually retransmitted if it doesn't match, until it is identical to the first one.



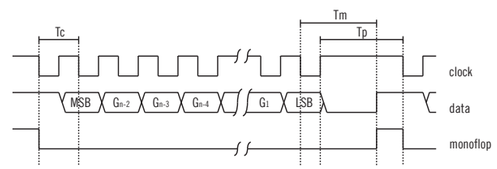
ADDITIONAL SIGNALS
(active on high state)
UP / DOWN = enables inversion of counting direction (input)

ELECTRICAL CONNECTIONS - ICO INTERFACE

Function	Cable (11-core max)	MA connector 19-pin
+ V DC	red	V
0 V	black	T
signal A +	green	U
signal A -	brown	G
signal B +	yellow	H
signal B -	orange	A
signal Z +	blue	D
signal Z -	white	B
up / down	red-blue	E
ready	grey	C
restart	purple	F

SSI INTERFACE

SSI interface transmits absolute position data by differential synchronous serial communication. Data length depends only on the encoder type: 13 bits for singleturn, 25 bits for multiturn. Resolution has no influence. Availables codings are gray (default) and binary.
Tc = clock period
Tm = monoflop time (10...25 µs)
Tp = delay between 2 clock sequences
n = data length (13 bits for singleturn / 25 for multiturn)



ADDITIONAL SIGNALS (active on high state)
UP / DOWN = enables inversion of counting direction (input)
RESET = enables reset of the position of the encoder (input)

ELECTRICAL CONNECTIONS - SSI INTERFACE

Function	Cable (8-core max)	MC connector 7-pin	HA connector 12-pin
+ V DC	red	G	8
0 V	black	F	1
data +	green	C	2
data -	brown	D	10
clock +	yellow	A	3
clock -	orange	B	11
* reset	white	E	4
* up / down	red-blue	-	5

* RESET and UP/DOWN not present for models EMA

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