

Model WS19KT with absolute encoder output



Position sensor with heavy-duty encoder

- Protection class IP64
- Measurement ranges:
0 ... 2000 mm up to 0 ... 15000 mm
- With absolute encoder output



Specifications	Outputs	Refer to order code	
	Resolution for 12 bit per revolution (4096 steps/revolution)	Resolution	Distance per rev.
		WS19KT-2000:	0.04 mm 163.84 mm
		WS19KT-3000:	0.063 mm 260.09 mm
		WS19KT-5000:	0.10 mm 409.60 mm
		WS19KT-8000:	0.162 mm 667.90 mm
		WS19KT-15000 mm:	0.146 mm 600.00 mm
	Material	Aluminium, stainless steel. Cable: stainless steel	
	Sensing Device	Absolute multiturn encoder	
	Connector	Depending on the encoder type	
	Linearity	±0.05 % full scale, optional ±0.01 % full scale	
	Protection Class	IP64	
	Weight	See table on the page after next	
	Environmental		
	EMC	Refer to output specification	
	Temperature	Refer to output specification	

Order Code WS19KT Absolute

Model Name WS19KT - [] - [] - [] - []

Measurement Range (in mm)
2000 / 3000 / 5000 / 8000 / 15000

Outputs (see pages 65 ff.)

- HSSI = Absolute encoder with synchronous serial output (SSI)
- HSSIP = Absolute encoder with synchronous serial output (SSI), programmable
- HPROF = Absolute encoder with Profibus interface
- HINT = Absolute encoder with Interbus interface
- HCAN = Absolute encoder with CAN bus interface
- HCANOP = Absolute encoder with CANopen bus interface
- HDEV = Absolute encoder with DeviceNet interface
- HPAR = Absolute encoder with parallel interface

Linearity (option)

- L01 = ±0.01 %

Cable fixing

- M4 = M4 cable fixing
- SB0 = Cable clip

Order Code Mating Connector (see accessories page 82)

SSI: **CONN-CONIN-12F-G**

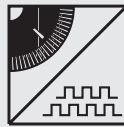
Order Example: WS19KT - 5000 - HSSI - M4

Model WS19KT with incremental encoder output



Position sensor with heavy-duty encoder

- Protection class IP64
- Measurement range:
0 ... 2000 mm up to 0 ... 15000 mm
- With incremental encoder output



Specifications	Outputs	Incremental encoder with HTL or TTL output
	Pulses per mm	WS19KT-2000: 25 pulses WS19KT-3000: 15.75 pulses WS19KT-5000: 10 pulses WS19KT-8000: 6.13 pulses WS19KT-15000 mm: 6.83 pulses
Material	Aluminium, stainless steel. Cable: stainless steel	
Sensing Device	Incremental encoder	
Connector	12 pin socket	
Linearity	±0.05 % full scale, optional ±0.01 % full scale	
Protection Class	IP64	
Weight	See table next page	
Environmental		
EMC	Refer to output specification	
Temperature	Refer to output specification	

Order Code WS19KT Incremental

Model Name WS19KT - [] - [] - [] - []

Measurement Range (in mm)
2000 (smaller measurement ranges included) / 3000 / 5000 / 8000 / 15000

Outputs (see page 61)
IE58LI = incremental encoder TTL compatible inverted
IE58HI = incremental encoder HTL compatible inverted

Linearity (option)
L01 = ±0.01 %

Option
M4 = M4 cable fixing
SB0 = Cable clip

Order Code Mating Connector (see accessories page 82)

CONN-CONIN-12F-G

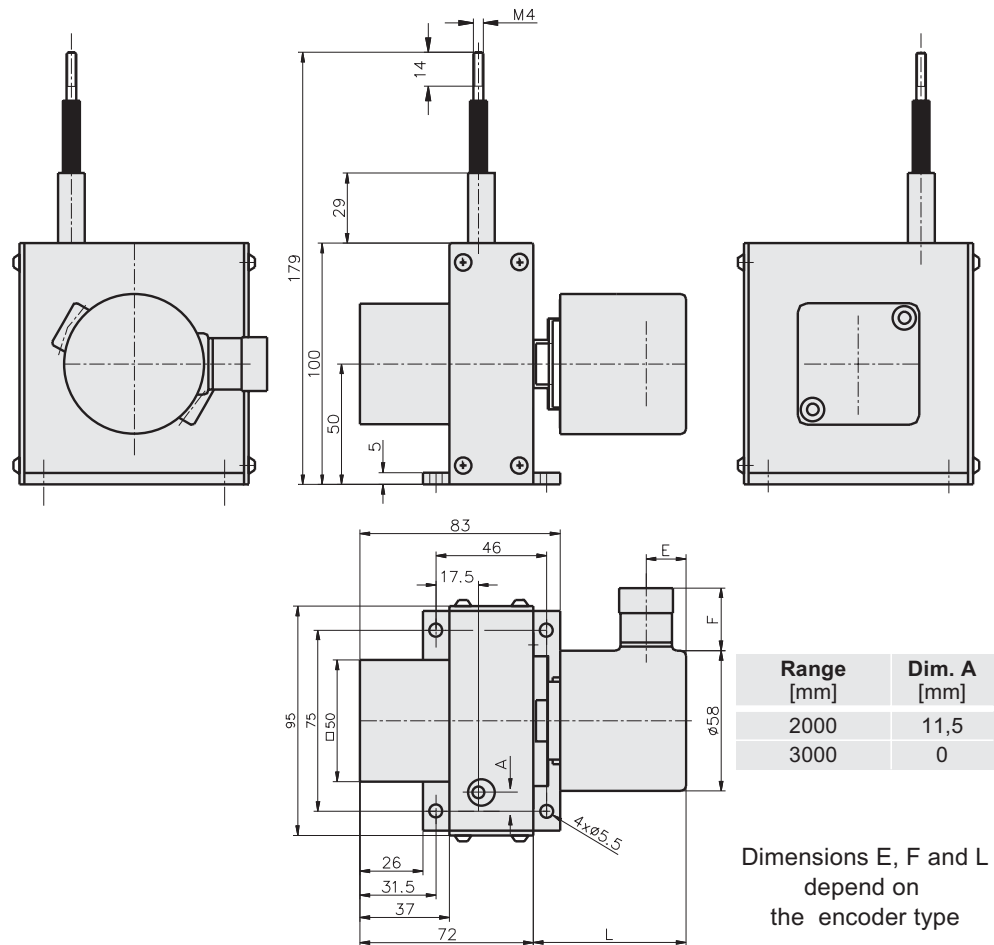
Order Example: WS19KT - 5000 - HTL - M4

Model WS19KT with absolute or incremental encoder output



Cable Forces and Weights typical at 20 °C	Range [mm]	Weight (approx.) [kg]	Maximum pull-out force [N]	Minimum pull-in force [N]
	2000	1.3	11.0	6.0
	3000	1.6	8.1	4.9
	5000	3.0	12.0	9.0
	8000	5.6	10.5	6.8
	15000	6.1	16.5	9.1

Outline drawing WS19KT-2000 / 3000

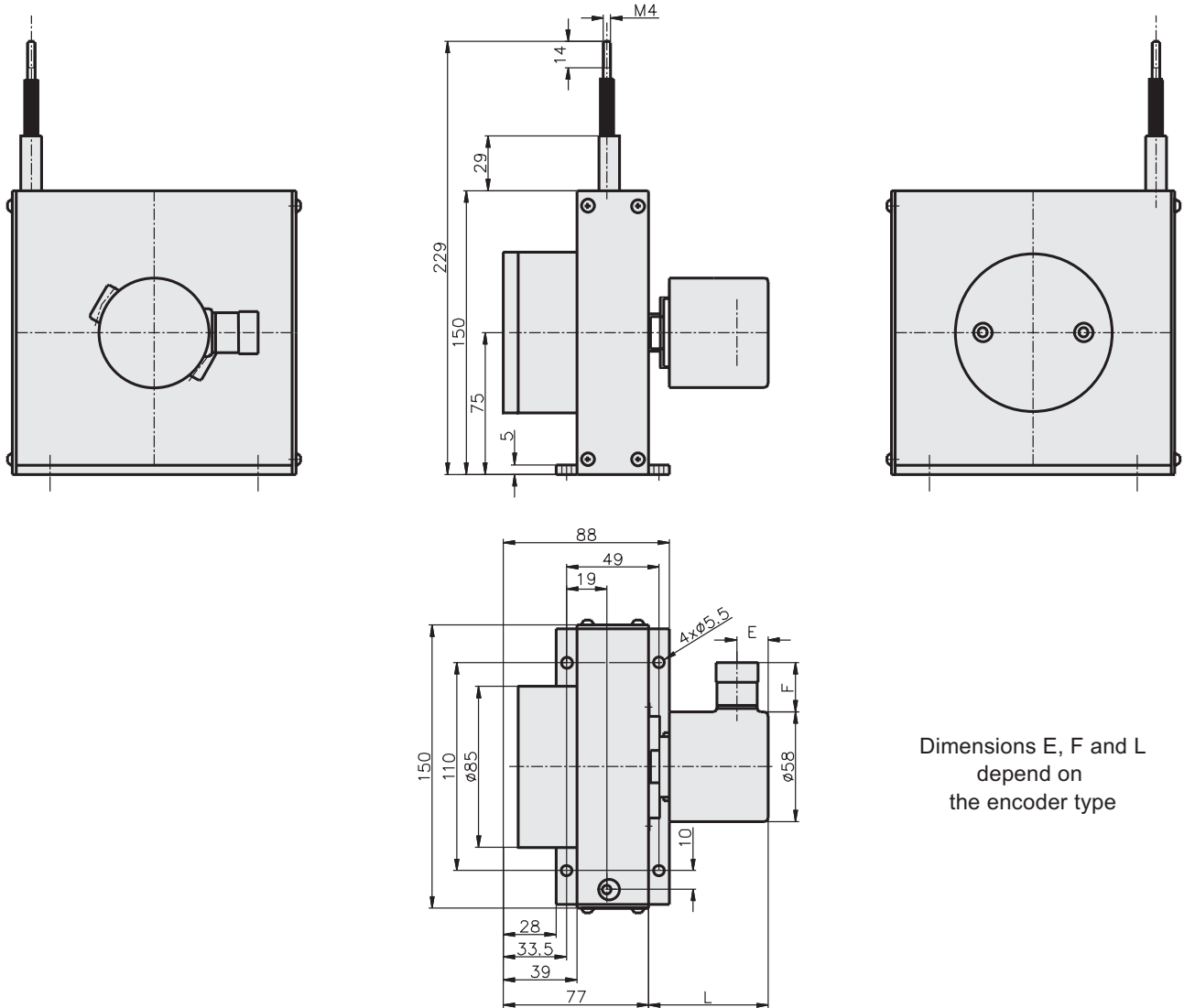


Dimensions informative only.
For guaranteed dimensions consult factory

Model WS19KT with absolute or incremental encoder output



Outline drawing WS19KT-5000



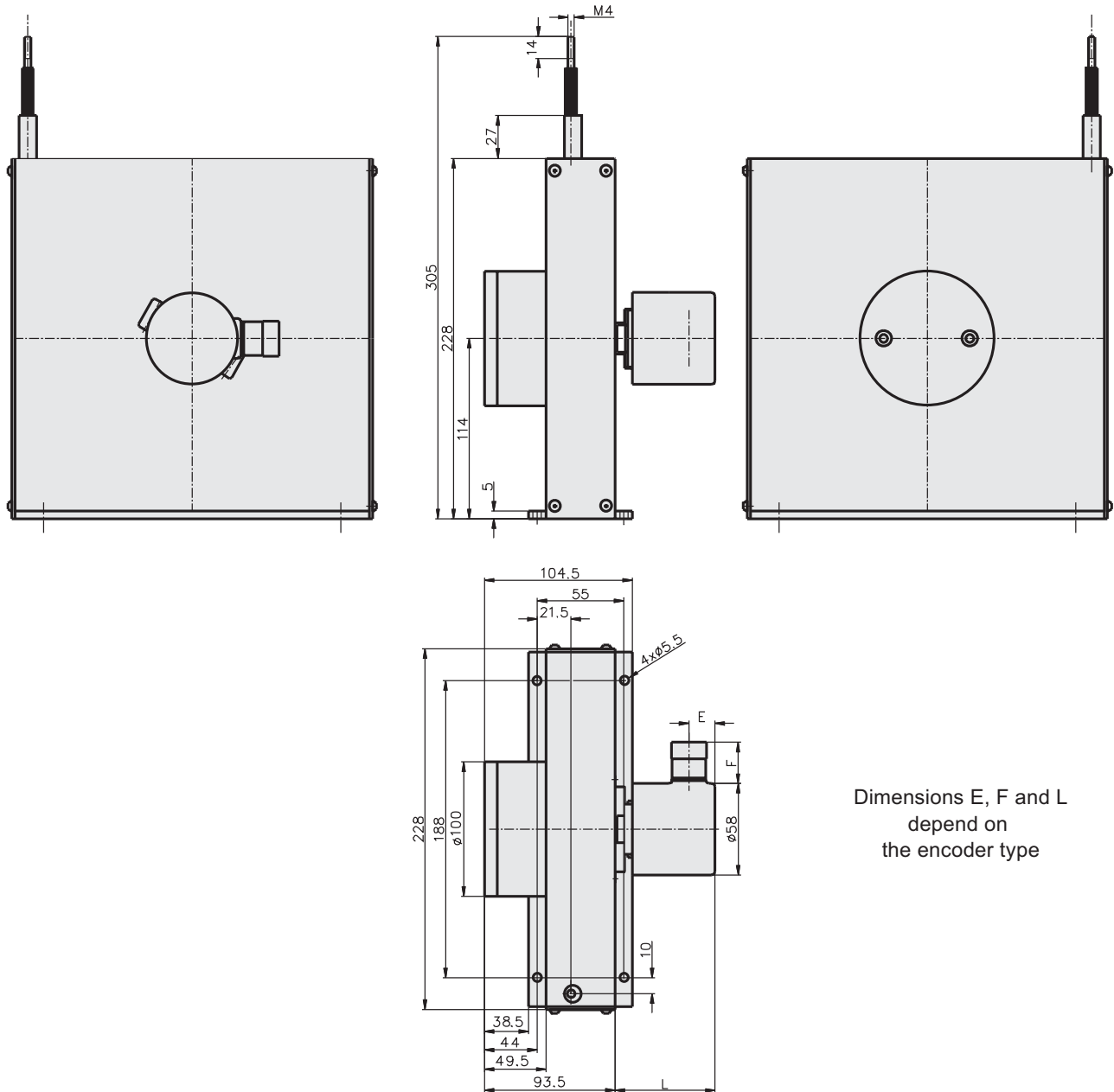
Dimensions E, F and L
depend on
the encoder type

Dimensions informative only.
For guaranteed dimensions consult factory

Model WS19KT with absolute or incremental encoder output



Outline drawing
WS19KT-8000



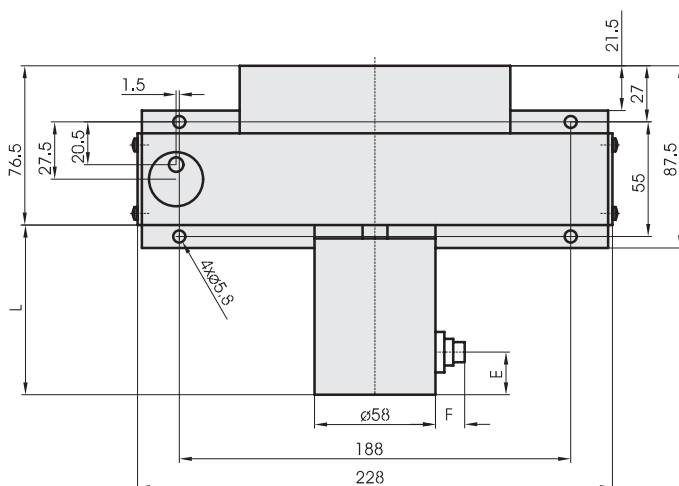
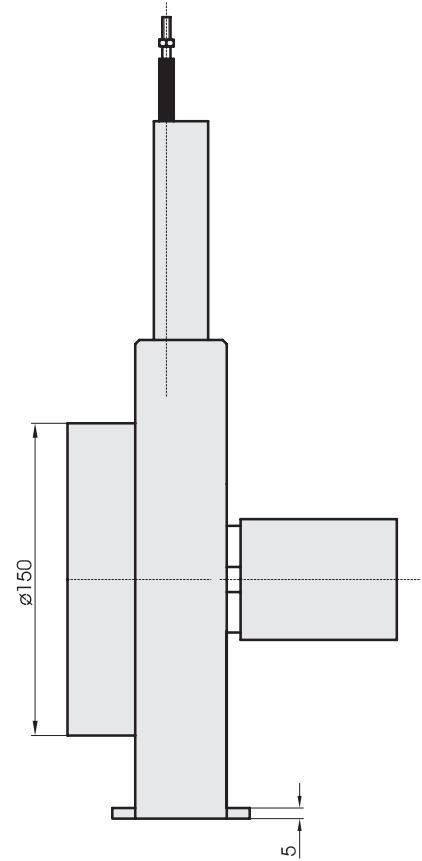
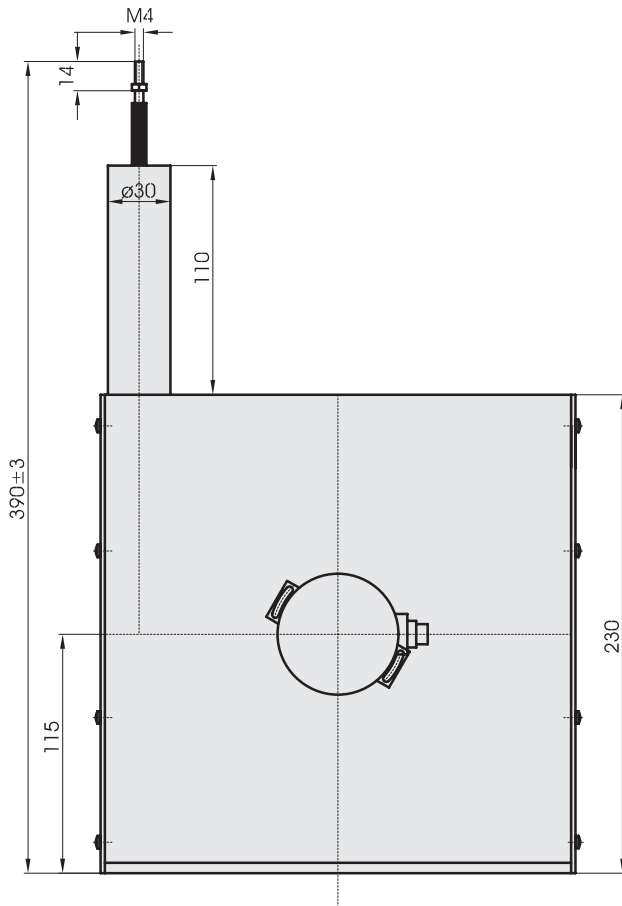
Dimensions E, F and L
depend on
the encoder type

Dimensions informative only.
For guaranteed dimensions consult factory

Model WS19KT with absolute or incremental encoder output



Outline drawing
WS19KT-15000




Dimensions E, F and L
depend on
the encoder type

Dimensions informative only.
For guaranteed dimensions consult factory

Output Specification for absolute encoders with SSI interface



Signal Conditioner HSSI Absolute Encoder synchronous serial 	Excitation voltage	10 ... 30 V DC
	Excitation current	100 mA
	Interface	Standard SSI
	Lines / drivers	Clock and data / RS-422
	Code	Gray
	Resolution multiturn	12 + 12 bit
	3 dB cutoff frequency	500 kHz
	Control input	Direction
	Alarm output	Alarm bit (SSI option), warning bit
	Status LED	Green = OK, red = alarm
	Connection	Cable or male socket 12 pin

Data format	Resolution	Clock													
			T1	T2	T3	...	T12	T13	...	T21	T22	T23	T24	T25	T26
			Data bits												
24 bit		M11	M10	M9	...	M0	S11	...	S3	S2	S1	S0	0		

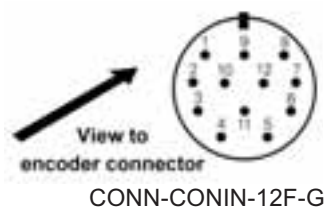
Mx = multiturn bits, Sx = single turn bits

Transmission rate	Cable length	Baud rate	Note: Extension of the cable length will reduce the maximum transmission rate. The signals <u>CLOCK/CLOCK</u> and <u>DATA/DATA</u> must be connected in a twisted pair cable, shielded per pair and common.
	< 50 m	< 400 kHz	
	< 100 m	< 300 kHz	
	< 200 m	< 200 kHz	
	< 400 m	< 100 kHz	

Signal Wiring / Connection	Signal names	Color	Connector pin no.
	Excitation +	white	8
	Excitation GND (0V)	brown	1
	CLOCK	yellow	3
	CLOCK	green	11
	DATA	pink	2
	DATA	grey	10
	Direction *	blue	5
	0 V signal output	black	12

* Excitation + = cw increasing code, 0 V = cw decreasing code

Connection Mating Connector



Output Specification for absolute encoders with programmable SSI interface



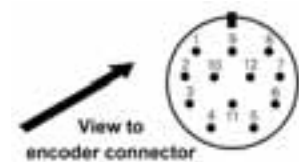
Programmable Signal Conditioner HSSIIP Absolute Encoder synchronous serial 	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Interface	SSI programmable
	Lines/drivers	Clock and data / RS-422
	Code	Binary or Gray, programmable
	Resolution	13 (9 ... 20 bit) + 12 bit
	Format	MSB justified or fir tree
	Programmability	Resolution, code, rotating direction, format, warning, alarm
	Control input	Direction, Preset1, Preset2
	Reset button under housing cover	Lockable by programming
	Alarm output	Alarm bit (SSI option), warning bit
	Status LED	Green = ok, red = alarm
	Connection	Cable or male socket 12 pin

Transmission rate	Cable length	Baud rate	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.
	< 50 m	< 400 kHz	
	< 100 m	< 300 kHz	
	< 200 m	< 200 kHz	
	< 400 m	< 100 kHz	

Signal Wiring / Connection	Signal names	Color	CONN-CONIN-12F
	Excitation +	white *	11
	Excitation GND (0V)	brown *	12
	CLOCK	yellow	2
	CLOCK	green	1
	DATA	pink	3
	DATA	grey	4
	Direction	blue	8
	0 V signal output	black	7
	RS-232 TxD	brown	5
	RS-232 RxD	white	6
	Preset 1	red	9
	Preset 2	violet	10

* = larger width 0,5 mm²


Connection Mating Connector



CONN-CONIN-12F-G

Output Specification for absolute encoders with Profibus interface




Interface HPROF Absolute Encoder Profibus 	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Interface	RS-485
	Protocol	Profibus DP with encoder profile class C2
	Resolution	12 (10 ... 14) + 12 bit
	Output code	Binary
	Baudrate	Automatically selected between 9,6 kBaud and 12 MBaud
	Programmability	Resolution, preset, direction
	Integrated special functions	Velocity, acceleration, operating time
	Bus terminating resistor	Selectable via DIP switch
	Connection	Bus cover with T-manifold
	EMC	EN61326 : class A

Signal name	Cable terminal no. (bus cover)
UB in	1
0V in	2
UB out	3
0V out	4
B in	5
A in	6
B out	7
A out	8

Output Specification for absolute encoders with Parallel interface



Interface HPAR Absolute Encoder Parallel 	Excitation voltage	10 ... 30 V DC
	Excitation current	300 mA
	Interface	Parallel
	Output code	Binary, Gray, Gray Excess
	Resolution	12 bit + 12 bit
	Output current	30 mA per bit short circuit protected
	Alarm output	NPN open collector 5 mA max.
	Control inputs	Latch, Direction, Tristate
	Connection	Cable 0.1 m with SUB-D 37 pin connector

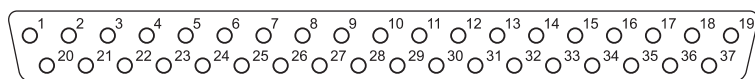
Control inputs	Input name	Level (physical)	Function
	Direction	1 (+UB or open input)	CW increasing code values
		0 (0 V)	CW decreasing code values
	Latch	1 (+UB or open input)	Encoder data free running
	Tristate	0 (0 V)	Encoder data stored (data hold)
		1 (+UB)	Outputs in tristate condition
		0 (0 V or open input)	Outputs active

Switching delay 10 μs typ. for push-pull operation, for open collector signals an external pull-down resistor (1 kΩ) is necessary.

Signal Wiring / Connection	Signal names	Color	Connector SUB-D 37 pin	
	S0	brown	2	
	S1	green	21	
	S2	yellow	3	
	S3	grey	22	
	S4	pink	4	
	S5	violet	23	
	S6	Singleturn bits	grey/pink	5
	S7		red/blue	24
	S8	white/green	6	
	S9	brown/green	25	
	S10	white/yellow	7	
	S11	yellow/brown	26	
	M0	Multiturn bits	white/grey	8
	M1		grey/brown	27
	M2		white/pink	9
	M3		pink/brown	28
	M4		white/blue	14
	M5		brown/blue	33
	M6		white/red	15
	M7		brown/red	34
	M8		white/black	16
	M9		brown/black	35
	M10		grey/green	17
	M11	yellow/grey	36	
	Alarm		pink/green	18
	Direction		yellow/pink	10
Latch		green/blue	30	
Tristate		yellow/blue	12	
10...30 V DC		red (0.5 mm2)	13	
10...30 V DC		white (0.5 mm2)	31	
0 V		blue (0.5 mm2)	1	
0 V		black (0.5 mm2)	20	

Connection Mating Connector


View to encoder connector



CONN-SUBD-37F

Output Specification for absolute encoders with Interbus interface




Interface HINT Absolute Encoder Interbus 	Excitation voltage	10 ... 30 V
	Excitation current	250 mA
	Interface	Interbus, ENCOM Profile K3 (programmable), K2
	Output code	Binary 32 bit
	Baud rate	500 kBaud
	Data refresh	Every 600 µs
	Resolution	12 (10 ... 12) + 12 bit
	Programmability	Direction, preset, offset, resolution
	Connection	Bus cover with T-manifold
	EMC	EN 50081-2, 50082-2

Data format Interbus K2		Differential signals (RS485) ENCOM profile K3, K2, 32 bit, binary process data				
	DT format	Sµpi address	0	1	2	3
	(according to the Phoenix company)	Byte no.	3	2	1	0
	ID code K2		36 H (= 54 dec.)			
	ID code K3		37 H (= 55 dec.)			

Signal wiring / connection	Signal names	Cable terminal no. (bus cover)
		UB +
	GND	2
	DI1	3
	DI1	4
	DO1	5
	DO1	6
	DO2	7
	DO2	8
	DI2	9
	DI2	10
	RBST	11
	GND	12

Output Specification for absolute encoders with DeviceNet interface



Interface HDEV Absolute Encoder DeviceNet 	Excitation voltage	10 ... 30 V DC
	Excitation Current	250 mA
	Interface	CAN highspeed according ISO/DIS 11898 CAN specification 2.0 A (11 bit identifier)
	Protocol	DeviceNet according to Rev. 2.0, programmable encoder
	Resolution	12 (10 ... 14) + 12 bit
	Programmable	Resolution, preset, direction
	Output code	Binary
	MAC ID	Selectable via DIP switch
	Data refresh	Every 5 ms
	Baud rate	Selectable 125, 250, 500 kBaud, DIP switch
	Bus terminating resistor	Selectable via DIP switch
	Connection	Bus cover with T-manifold
	EMC	EN 50081-2, 50082-2


Recommended transmission	Characteristic impedance	135 ... 165 Ω (3...20 MHz)
	Operating capacity	< 30 pF
	Loop resistance	< 110 Ω/km
	Wire diameter	> 0.63 mm
	Wire width	> 0.34 mm ²

Transmission rate	Segment length	Kbit/s
	500 m	125
	250 m	250
	100 m	500

Signal Wiring / Connection	Signal name	Cable terminal no. (bus cover)
	UB in	1
	0V in	2
	CAN-L	3
	CAN-H	4
	Drain	5
	Drain	6
	CAN-H	7
CAN-L	8	

Output Specification for absolute encoders with CAN interface



Interface HCAN/HCANOP Absolute Encoder CANopen/CAN Layer 2 	Excitation voltage	10 ... 30 V DC
	Excitation current	250 mA
	Interface	CAN highspeed according ISO/DIS 11898
	Protocol	CANopen according to DS301 with encoder profile DSP 406, programmable encoder according to class 2
	Resolution	12 (10 ... 14) + 12 bit
	Programmable	CANopen: direction, resolution, preset, offset; CAN L2: direction, limit values
	Output code	Binary
	Data refresh	Every millisecond (adjustable), on request
	Baud rate	Selectable 10 to 1000 kBaud
	Base identifier	Selectable via DIP switches
	Integrated special functions	CANopen: speed, acceleration, limit values CAN L2: direction, limit values
	Connection	Bus cover with T-manifold
	EMC	EN 50081-2, EN50082-2

Signal wiring / connection	Signal names	Cable terminal no. (bus cover)
	UB in	1
	0V in	2
	CAN in – (dominant L)	3
	CAN in + (dominant H)	4
	CAN GND in	5
	CAN GND out	6
	CAN out + (dominant H)	7
	CAN out - (dominant L)	8
	0V out	9
	UB out	10

Output Specifications

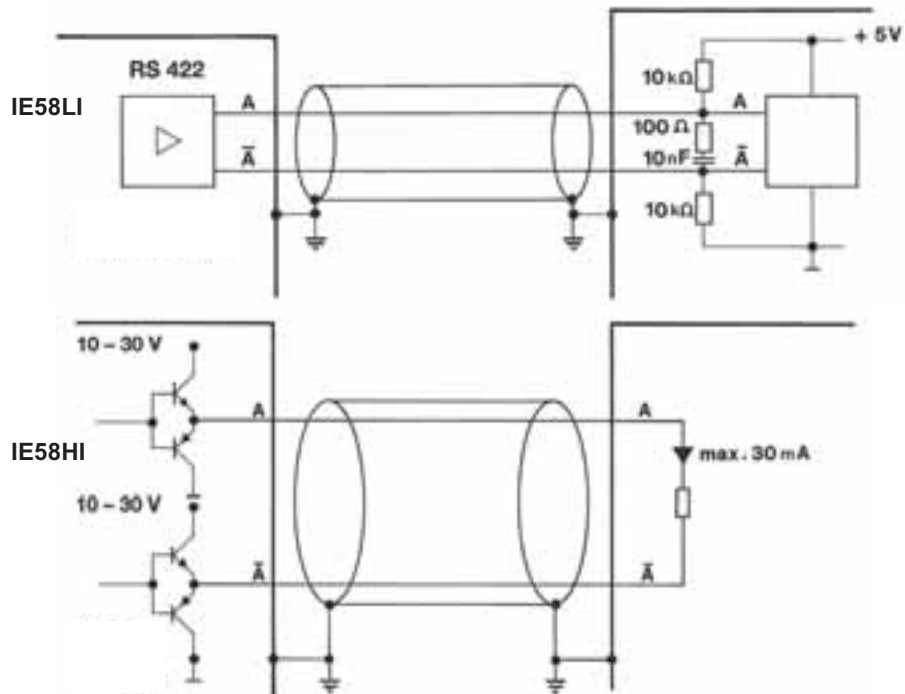
IE58LI and IE58HI (IE41LI and IE41HI)

for WS position sensors

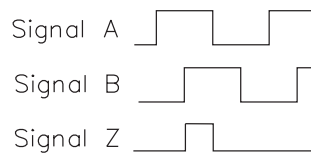


IE58LI and IE58HI incremental		IE58LI / IE41LI	IE58HI / IE41HI
		Excitation voltage	5 V DC $\pm 10\%$
Excitation current		120 mA max.	
Max. frequency		300 kHz	200 kHz
Output		RS422	Push-pull antivalent
Output current		± 30 mA	30 mA
Output voltage		Depending on the excitation voltage	
Stability (temperature)		$\pm 20 \times 10^{-6} / ^\circ\text{C}$ f.s. (sensor mechanism)	
Operation temperature		-10 ... +70 $^\circ\text{C}$	
Protection against short circuit		1 channel for 1 s max.	Yes
EMC		According to EN 61326:2004	

Output circuit and recommended processing input circuit



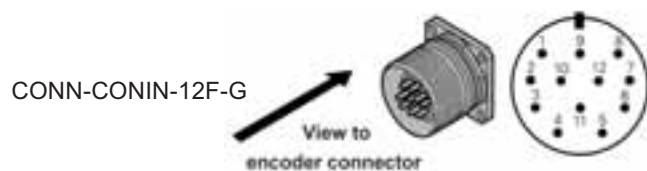
Output signals



Signal wiring	Output signals	Connector CONN-CONIN-12F
	Excitation +	
Excitation GND (0V)		10
Signal A		5
Signal \bar{A}		6
Signal B		8
Signal \bar{B}		1
Signal Z (reference pulse)		3
Signal \bar{Z}		4

Connection

Mating connector



Output Specifications

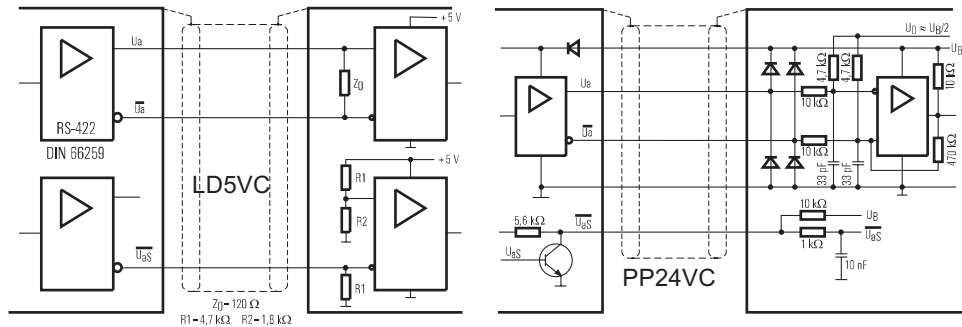
PP24VC and LD5VC for WS position sensors



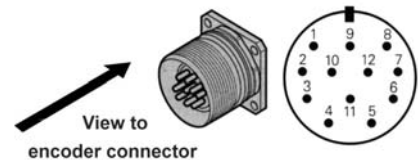
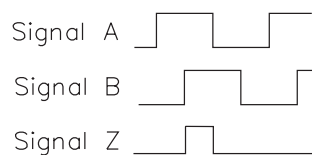
PP24VC Incremental 	Output	Push-pull line driver (24 V - HTL)
	Excitation voltage	10 ... 30 V DC
	Excitation current	150 mA max. w/o load
	Output frequency	300 kHz max.
	Output current	100 mA per channel
	Signal level	
	Ud High at Id=20 mA, Ub=24 V	≥21 V
	Ud Low at Id=20 mA, Ub=24 V	≤2,8 V
	Transition time positive edge	< 200 ns
	Transition time negative edge	< 200 ns
	Stability (Temperature)	±20 x 10 ⁻⁶ / °C full scale (sensor mechanism)
	Operation temperature	-20 ... +85 °C
	Protection	Short circuit (max. 1 min.), overvoltage, reverse pol.
	EMC)	According to EN 61326:2004

LD5VC Incremental 	Output	Line driver according to RS-422
	Excitation voltage	5 V DC ± 10%
	Excitation current	150 mA max. w/o load
	Output frequency	300 kHz max.
	Output current	20 mA per channel
	Signal level	
	Ud High at Id=20 mA	≥2,5 V
	Ud Low at Id=20 mA	≤0,5 V
	Transition time positive edge	< 100 ns
	Transition time negative edge	< 100 ns
	Stability (Temperature)	±20 x 10 ⁻⁶ / °C full scale (sensor mechanism)
	Operation temperature	-20 ... +85 °C
	Protection	Short circuit, overvoltage
	EMC	According to EN 61326:2004

Output circuit and recommended processing input circuit



Output signals and output connectors



Signal wiring and connection	Output signals (Note: Do not connect pins not listed in this table)	CONN-CONIN-12F-G
	Excitation +	12
	Excitation GND (0V)	10
	Signal A	5
	Signal \bar{A}	6
	Signal B	8
	Signal \bar{B}	1
	Signal Z (reference pulse)	3
	Signal Z	4
	Fault detection signal \bar{U}_{as}	7
	Shield	Housing