Interfaces
SSI Absolute Position Values

The **absolute position value,** beginning with the Most Significant Bit, is transferred over the data lines (DATA) in synchronism with a CLOCK signal from the control. The SSI standard data word length for single-turn absolute encoders is 13 bits, and for multiturn absolute encoders 25 bits. In addition to the absolute position values, sinusoidal **incremental signals** with 1-V_{PP} levels are transmitted. For a description of the signals, see *1 V_{PP} Incremental Signals.*

The following **functions** can be activated via the interface by applying the supply voltage U_P:

- **Direction of rotation**
  Continuous application of the supply voltage U_P to pin 2 reverses the direction of rotation for ascending position values.
  Pin 2 inactive: Ascending position values with clockwise rotation
  Pin 2 active: Ascending position values with counterclockwise rotation
- **Reset**
  Brief application of the supply voltage U_P to pin 5 (t_{min} > 1 ms) sets the current position to zero.

Interface	**SSI** serial
Data transfer	Absolute position values
Data input	Differential line receiver according to EIA standard RS 485 for the CLOCK and $\overline{\text{CLOCK}}$ signals
Data output	Differential line driver according to EIA standard RS 485 for the DATA and $\overline{\text{DATA}}$ signals
Code	Gray code
Ascending position values	With clockwise rotation viewed from flange side (can be switched via interface)
Incremental signals	∿ 1 V_{PP} (see *1 V_{PP} Incremental Signals*)
Programming inputs Inactive Active Switching time	Direction of rotation and reset LOW < 0.25 x U_P or input open HIGH > 0.6 x U_P t_{min} > 1 ms
Connecting cable Cable lengths Propagation time	HEIDENHAIN cable with shielding PUR [(4 x 0.14 mm^2) + 4(2 x 0.14 mm^2) + (4 x 0.5 mm^2)] Max. 150 m distributed capacitance 90 pF/m 6 ns/m

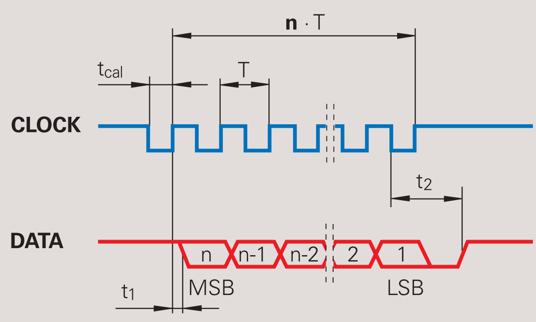
Control cycle for complete data word
When not transmitting, the clock and data lines are on high level. The current position value is stored on the first falling edge of the clock. The stored data is then clocked out on the first rising edge.

After transmission of a complete data word, the data line remains low for a period of time (t_2) until the encoder is ready for interrogation of a new value. If a falling clock edge is received within t_2, the same data will be output once again.

If the data output is interrupted (CLOCK = high for t ≥ t_2), a new position value will be stored on the next falling edge of the clock, and on the subsequent rising edge clocked out to the subsequent electronics.

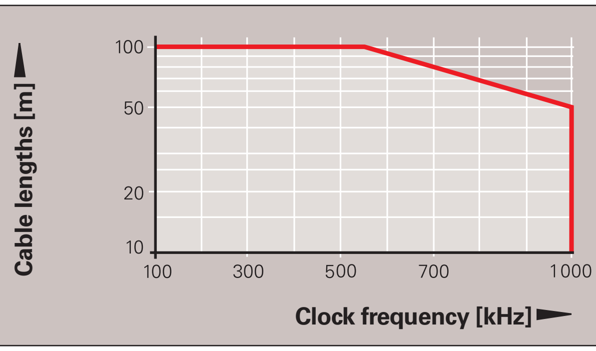
Data transfer

T = 1 to 10 µs
t_{cal} see *Specifications*
t_1 ≤ 0.4 µs (without cable)
t_2 = 14 to 17 µs
n = Data word length
13 bits for ECN/ROC
25 bits for EQN/ROQ



$\overline{\text{CLOCK}}$ and $\overline{\text{DATA}}$ not shown

Permissible clock frequency with respect to cable lengths



Input circuitry of the subsequent electronics

Dimensioning
IC_1 = Differential line receiver and driver
E.g. SN 65 LBC 176
LT 485

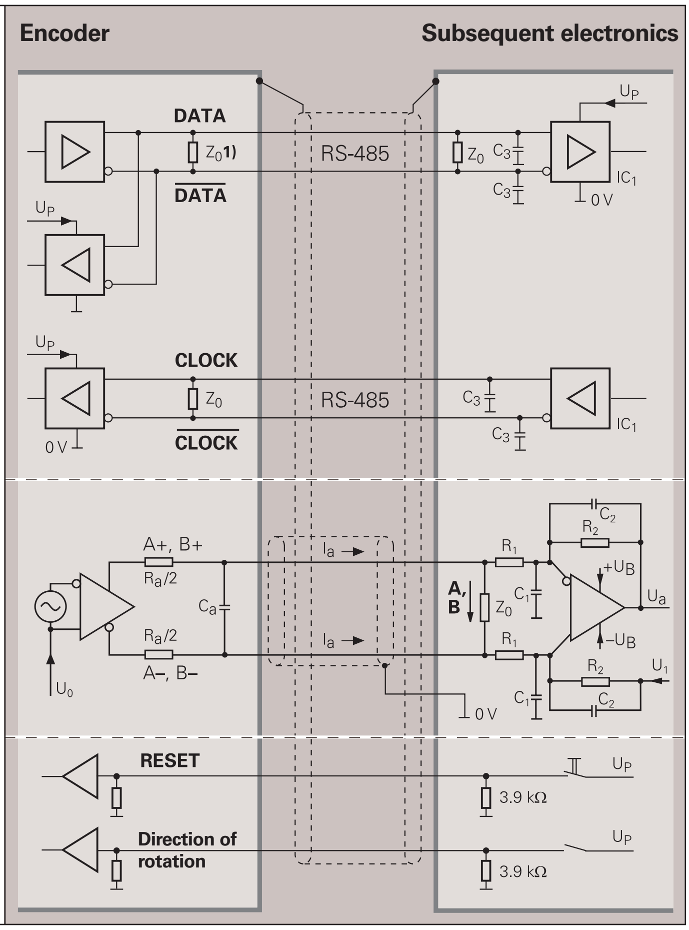
Z_0 = 120 Ω
C_3 = 330 pF (serves to improve noise immunity)

Data transfer

[1] Not present with 10 to 30 V power supply

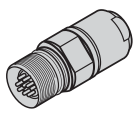
Incremental signals

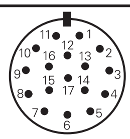
Programming via connector

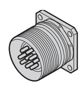


Pin layout

17-pin coupling M23







	Power supply					Incremental signals				Absolute position values				Other signals	
	7	1	10	4	11	15	16	12	13	14	17	8	9	2	5
	U_P	**Sensor** U_P	**0 V**	**Sensor** 0 V	**Inside shield**	**A+**	**A–**	**B+**	**B–**	**DATA**	**$\overline{\text{DATA}}$**	**CLOCK**	**$\overline{\text{CLOCK}}$**	**Direction of rotation**	**Reset**
	Brown/ Green	Blue	White/ Green	White	/	Green/ Black	Yellow/ Black	Blue/ Black	Red/ Black	Gray	Pink	Violet	Yellow	Black	Green

Shield on housing; **U_P** = Power supply voltage
Sensor: With a 5 V supply voltage, the sensor line is connected internally with the corresponding power line.
Vacant pins or wires must not be used!