

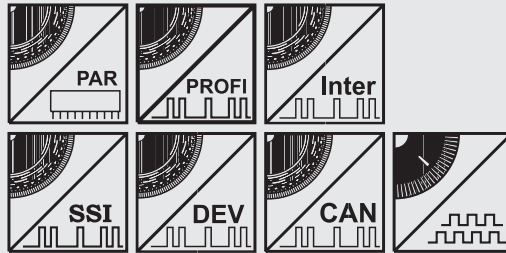
# Model WS60

## with absolute or incremental encoder output



### Industrial position sensor for very long measurement ranges

- Protection class IP52
- Measurement ranges:  
0 ... 15000 mm, 30000 mm, 60000 mm
- With absolute or incremental encoder output



| Specifications | Outputs                                                  | Incremental encoder with TTL or HTL output |          |          |
|----------------|----------------------------------------------------------|--------------------------------------------|----------|----------|
|                |                                                          | Absolute encoder (see order code)          |          |          |
| Resolution     |                                                          | 15000 mm                                   | 30000 mm | 60000 mm |
|                | Pulses resp. steps per mm                                | 16                                         | 10       | 8        |
| Material       | Aluminium and stainless steel.<br>Cable: stainless steel |                                            |          |          |
| Sensing device | Incremental encoder or absolute encoder                  |                                            |          |          |
| Connector      | Depending on the encoder type                            |                                            |          |          |
| Linearity      | ±0.1 % full scale, optional ±0.025 % full scale          |                                            |          |          |
| Weight         | 15 kg max.                                               |                                            |          |          |
| Environmental  |                                                          |                                            |          |          |
| EMC            | Refer to output specification                            |                                            |          |          |
| Temperature    | Refer to output specification                            |                                            |          |          |

### Order Code WS60

absolute/incremental

Model Name

WS60 - [ ] - [ ] - [ ] - [ ]

#### Measurement Range (in mm)

15000 / 30000 / 60000

#### Outputs (see pages 61 ff.)

LD5VC = Incremental encoder TTL compatible inverted

PP24VC = Incremental encoder HTL compatible inverted

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)

L025 = ±0.025 %

#### Cable fixing

M4 = M4 cable fixing

SB0 = Cable clip

Order Code Mating Connector (see accessories page 82)

Incremental, SSI: CONN-CONIN-12F-G

Order Example: WS60 - 60000 - HSSI - M4

Model WS60

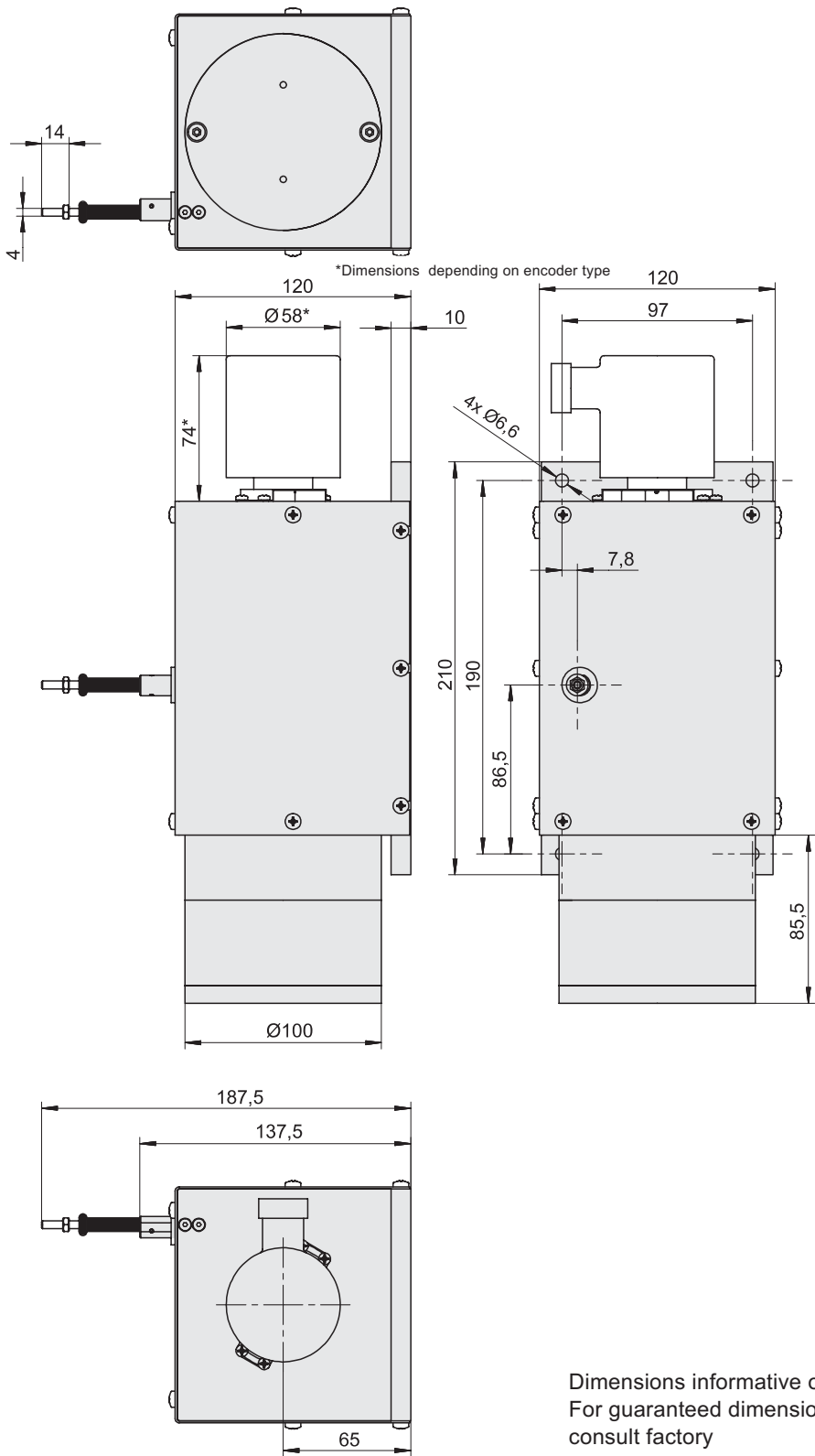
with absolute or incremental encoder output



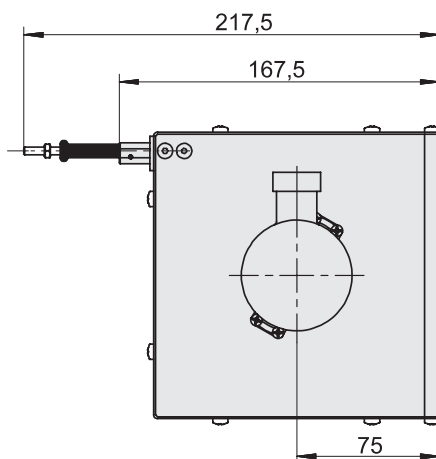
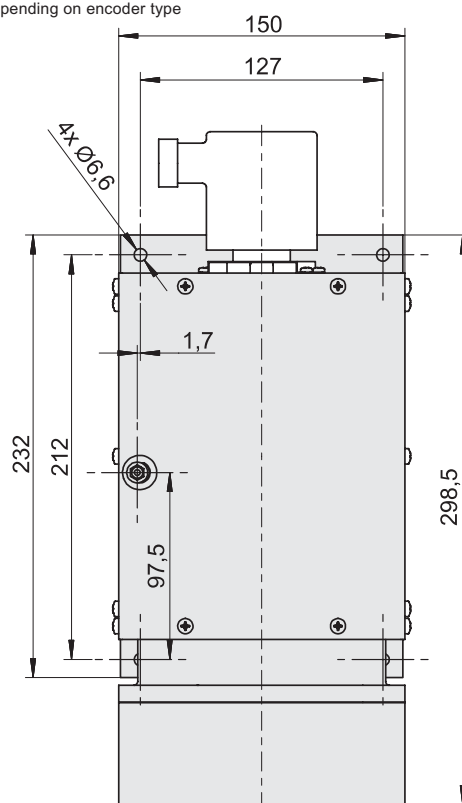
| Cable Forces<br>typical at 20 °C | Range | Maximum Pull-out Force | Minimum Pull-in Force |
|----------------------------------|-------|------------------------|-----------------------|
|                                  | [mm]  | [N]                    | [N]                   |
|                                  | 15000 | 10.5                   | 5.0                   |
|                                  | 30000 | 14.5                   | 6.2                   |
|                                  | 60000 | 17.0                   | 6.5                   |

Outline drawing

(WS60-15000)



Dimensions informative only.  
For guaranteed dimensions  
consult factory

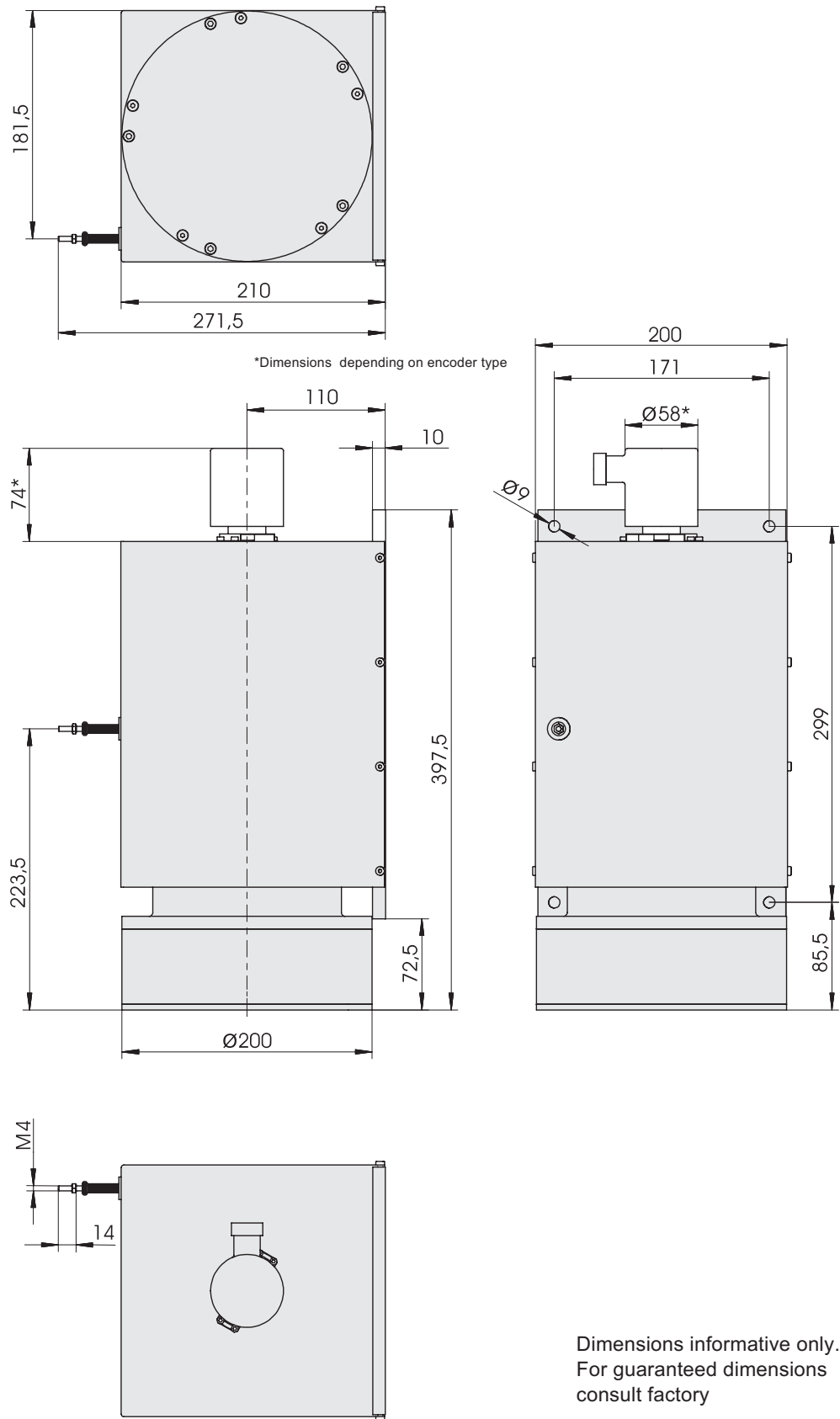


ASM

Model WS60  
with absolute or incremental encoder output



Outline drawing  
(WS60-60000)



Dimensions informative only.  
For guaranteed dimensions  
consult factory

# Output Specifications

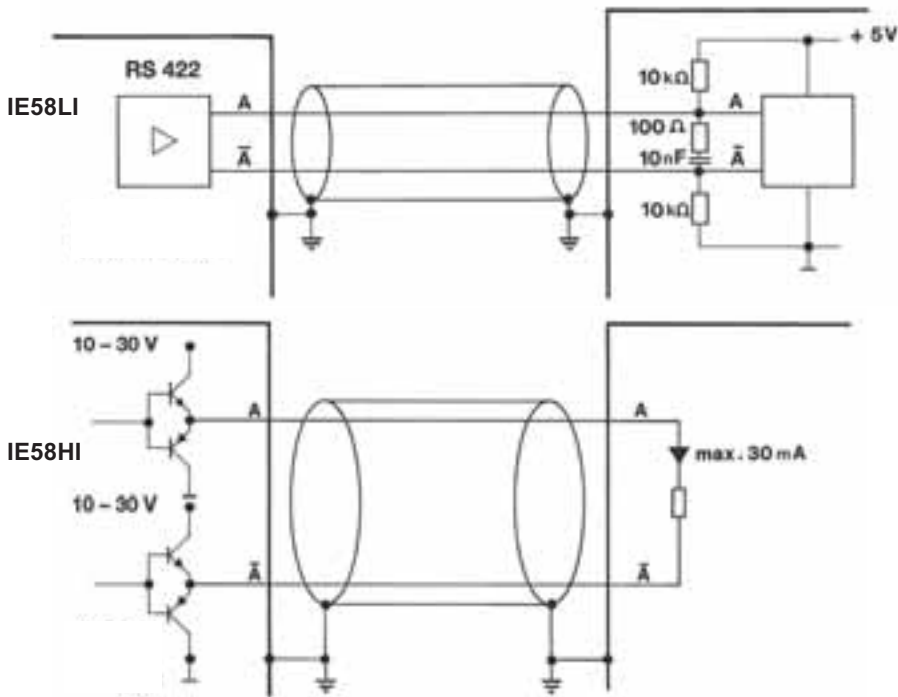
## IE58LI and IE58HI (IE41LI and IE41HI)

### for WS position sensors

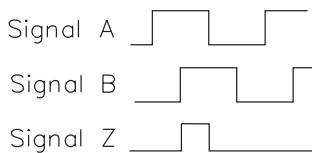


| IE58LI and IE58HI<br>incremental | IE58LI / IE41LI                  |                                                      | IE58HI / IE41HI      |
|----------------------------------|----------------------------------|------------------------------------------------------|----------------------|
|                                  | Excitation voltage               | 5 V DC $\pm 10\%$                                    | 10 ... 30 V DC       |
|                                  | Excitation current               | 120 mA max.                                          |                      |
|                                  | Max. frequency                   | 300 kHz                                              | 200 kHz              |
|                                  | Output                           | RS422                                                | Push-pull antivalent |
|                                  | Output current                   | $\pm 30$ mA                                          | 30 mA                |
|                                  | Output voltage                   | Depending on the excitation voltage                  |                      |
|                                  | Stability (temperature)          | $\pm 20 \times 10^{-6}$ / °C f.s. (sensor mechanism) |                      |
|                                  | Operation temperature            | -10 ... +70 °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



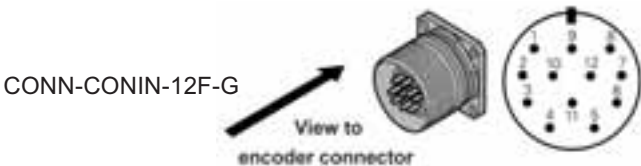
#### Output signals



| Signal wiring | Output signals             | Connector CONN-CONIN-12F |
|---------------|----------------------------|--------------------------|
|               | Excitation +               | 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 $\bar{Z}$           | 4                        |

#### Connection

##### Mating connector



# Output Specification for absolute encoders with SSI interface



|                                                                                                                                                                         |                       |                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------|
| <b>Signal Conditioner</b><br><b>HSSI</b><br>Absolute Encoder<br>synchronous serial<br> | 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         |

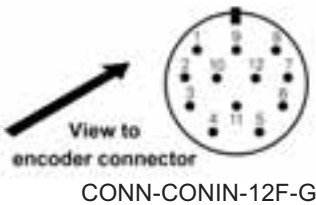
| Data format                                | Resolution | Clock     |     |    |     |     |     |     |     |     |     |     |     |     |  |
|--------------------------------------------|------------|-----------|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|                                            |            | 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 |            |           |     |    |     |     |     |     |     |     |     |     |     |     |  |

|                          |                     |                  |                                                                                                                                                                                                                          |
|--------------------------|---------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transmission rate</b> | <b>Cable length</b> | <b>Baud rate</b> | <b>Note:</b><br>Extension of the cable length will reduce the maximum transmission rate.<br>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        |                                                                                                                                                                                                                          |

|                                   |                     |              |                          |
|-----------------------------------|---------------------|--------------|--------------------------|
| <b>Signal Wiring / Connection</b> | <b>Signal names</b> | <b>Color</b> | <b>Connector pin no.</b> |
|                                   | 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



|                                                                                                                                                                            |                                  |                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------|
| <b>Programmable Signal Conditioner HSSI</b><br>Absolute Encoder<br>synchronous serial<br> | 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                                  |

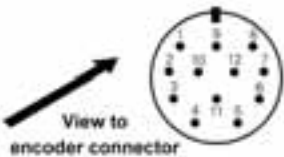
| Transmission rate | Cable length | Baud rate | <b>Note:</b><br>Extension of the cable length will reduce the maximum transmission rate.<br>The signals CLOCK/CLOCK and DATA/DATA must be connected in a twisted pair cable, shielded per pair and common. |
|-------------------|--------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | < 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 mm<sup>2</sup>

## Connection

Mating Connector



CONN-CONIN-12F-G

# Output Specification for absolute encoders with Profibus interface



|                                                                                                                                                                                         |                              |                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------|
| <div> <b>Interface HPROF</b><br/>           Absolute Encoder<br/>           Profibus            </div> | 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                                     |
| <div> <b>Signal Wiring /<br/>Connection</b> </div>                                                                                                                                      | <b>Signal name</b>           | <b>Cable terminal no. (bus cover)</b>                 |
|                                                                                                                                                                                         | 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



|                                                                                                                                            |                    |                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------|
| <b>Interface HPAR</b><br>Absolute Encoder<br>Parallel<br> | 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 |

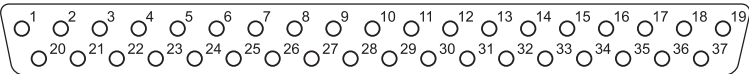
| Control inputs | Input name | Level (physical)                 | Function                                                     |
|----------------|------------|----------------------------------|--------------------------------------------------------------|
|                | Direction  | 1 (+UB or open input)<br>0 (0 V) | CW increasing code values<br>CW decreasing code values       |
|                | Latch      | 1 (+UB or open input)<br>0 (0 V) | Encoder data free running<br>Encoder data stored (data hold) |
|                | Tristate   | 1 (+UB)<br>0 (0 V or open input) | Outputs in tristate condition<br>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 |
|----------------------------------------|--------------|-----------------|------------------------|
| <div> <div>↑</div> <div>↓</div> </div> | S0           | brown           | 2                      |
|                                        | S1           | green           | 21                     |
|                                        | S2           | yellow          | 3                      |
|                                        | S3           | grey            | 22                     |
|                                        | S4           | pink            | 4                      |
|                                        | S5           | violet          | 23                     |
|                                        | S6           | grey/pink       | 5                      |
|                                        | S7           | red/blue        | 24                     |
|                                        | S8           | white/green     | 6                      |
|                                        | S9           | brown/green     | 25                     |
|                                        | S10          | white/yellow    | 7                      |
| <div> <div>↑</div> <div>↓</div> </div> | S11          | yellow/brown    | 26                     |
|                                        | M0           | 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                     |
| <div> <div>↑</div> <div>↓</div> </div> | 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



|                                                                                                                                                                        |                    |                                               |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------|--|--|--|
| <div>Interface HINT</div> <div>Absolute Encoder</div> <div>Interbus</div> <div></div> | 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                           |  |  |  |

|                                               |                                    |                                                                                      |   |   |   |   |
|-----------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------|---|---|---|---|
| <div>Data format</div> <div>Interbus K2</div> |                                    | Differential signals (RS485)<br>ENCOM profile K3, K2, 32 bit,<br>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.)                                                                     |   |   |   |   |

|                                       |              |                                |  |  |  |  |
|---------------------------------------|--------------|--------------------------------|--|--|--|--|
| <div>Signal wiring / connection</div> | Signal names | Cable terminal no. (bus cover) |  |  |  |  |
|                                       | UB +         | 1                              |  |  |  |  |
|                                       | 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



|                                                                                                                                             |                          |                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------|
| <b>Interface HDEV</b><br>Absolute Encoder<br>DeviceNet<br> | Excitation voltage       | 10 ... 30 V DC                                                                       |
|                                                                                                                                             | Excitation Current       | 250 mA                                                                               |
|                                                                                                                                             | Interface                | CAN highspeed according ISO/DIS 11898<br>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                                                                  |

|                                 |                          |                            |
|---------------------------------|--------------------------|----------------------------|
| <b>Recommended transmission</b> | 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 <sup>2</sup>     |

|                          |                       |               |
|--------------------------|-----------------------|---------------|
| <b>Transmission rate</b> | <b>Segment length</b> | <b>Kbit/s</b> |
|                          | 500 m                 | 125           |
|                          | 250 m                 | 250           |
|                          | 100 m                 | 500           |

|                                   |                    |                                       |
|-----------------------------------|--------------------|---------------------------------------|
| <b>Signal Wiring / Connection</b> | <b>Signal name</b> | <b>Cable terminal no. (bus cover)</b> |
|                                   | 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



|                                                                                                                                                                        |                              |                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Interface</b><br><b>HCAN/HCANOP</b><br>Absolute Encoder<br>CANopen/CAN Layer 2<br> | 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;<br>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<br>CAN L2: direction, limit values                      |
|                                                                                                                                                                        | Connection                   | Bus cover with T-manifold                                                                          |
|                                                                                                                                                                        | EMC                          | EN 50081-2, EN50082-2                                                                              |

| <b>Signal wiring /<br/>connection</b> | <b>Signal names</b>    | <b>Cable terminal no. (bus cover)</b> |
|---------------------------------------|------------------------|---------------------------------------|
|                                       | 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                                    |