| Sensor principle | | MH-C | MH-C2 |
|---|---|---|---|
| **Electrical data** | | | |
| Measuring range | ° | 0 ... 360 | 0 ... 360 |
| Indep. linearity | % of meas. range | ±0.3 | ±0.1 |
| Max. hysteresis | ° | 0.1 | 0.1 |
| Resolution | bit | 12 | 14 |
| Max. repeatabilty | ° | 0.1 | 0.1 |
| Sample rate fast mode | kHz | (5) | (2) |
| Sample rate slow mode | kHz | 1.66 | 0.5 |
| System propagation delay fast mode | µs | (800) | (800) |
| System propagation delay slow mode | µs | 4600 | 2500 |
| Max. temperature coefficient of the output signal | ppm/°K | 50 | 50 |
| MTTFd / MTBF | years | 668/668 | 308/308 |
| Power supply voltage | VDC | 5 (±10 %) | 5 (±10 %) |
| Current consumption without load (typ.) fast mode | mA | (14) | (15) |
| Current consumption without load (typ.) slow mode | mA | 9 | 10 |
| Min. ohmic load at output | kOhm | 10 | 10 |
| Max. capacitive load at output | nF | 100 | 100 |
| Reverse polarity protection of power supply | | yes | no |
| Electrical connection | | Cable 3pole | Cable 3pole |
| Cross section of single wires | mm² | 0.56 (AWG20) | 0.56 (AWG20) |
| Redundancy feasible | | yes | no |
| Electrical connection redundant | | Wires (6x) | - |
| Cross section of single wires redundant | mm² | 0.56 (AWG20) | - |
| | | | |
| **Mechanical data** | | | |
| Mechanical range | ° | 360 (continuous) | 360 (continuous) |
| Protection class | | IP54 / IP65 | IP54 / IP65 |
| Max. starting torque at specified protection class | Ncm | 0.5 / 3 | 0.5 / 3 |
| Max. rotating speed | rpm | 120 | 120 |
| Min. life | movements | 50 Mio. | 50 Mio. |
| Max. permitted axial shaft load | N | 20 | 20 |
| Max. permitted radial shaft load | N | 20 | 20 |
| Operating & storage temperature (with cable) | °C | -40 ... +85 | -40 ... +85 |
| Operating & storage temperature (with wires) | °C | -40 ... +125 | -40 ... +125 |
| IEC 68-2-6 Vibration (Amax = 0.75mm, f = 5 … 2000 Hz) | g | 20 | 20 |
| IEC 68-2-27 Shock | g | 50 | 50 |

| Standards | | | |
|---|---|---|---|
| EN 55022 class B, Emission radiated (30... 230 MHz) | dB(µV/m) | max. 30 | max. 30 |
| EN 55022 class B, Emission radiated (230...1000MHz) | dB(µV/m) | max. 37 | max. 37 |
| EN 61000-4-2, ESD (contact discharge / air discharge) | kV | ±4 / ±8 | ±4 / ±8 |
| EN 61000-4-3, Immission HF radiated (80... 1000 MHz) | V/m | 30 | 30 |
| EN 61000-4-4, Burst (on all lines) | kV | ±1 | ±1 |
| EN 61000-4-5, Surge (lines to ground) | kV | ±1 | ±1 |
| EN 61000-4-6, Immission HF conducted (0.15...80MHz) | Vemk | 10 | 10 |
| EN 61000-4-8, Immission magnetic field (50Hz) | A/m | 30 | 30 |
| IEC 60393-1 Insulation resistance (500VDC, 1bar, 2s) | GOhm | 20 | 20 |
| IEC 60393-1 Dielectric strength (VAC, 50Hz, 1min, 1bar) | kV | 1 | 1 |

## Vert-X 28 - 5V / 10...90% Ub

### Applications
- Harvester
- Fork-lift
- Operating table
- Hydraulic pump

### Features general
- Compact dimensions
- Contactless measuring method
- Long life
- High accuracy of measurement
- Simple adjustment with elongated holes
- Full resolution and accuracy at programmed electrical angle

### Features MH-C
- Linearity of ±0.3%
- Resolution of 12bit
- Full redundancy possible
- Lower price than MH-C2

### Features MH-C2
- Linearity of ±0.1%
- Resolution of 14bit
- Index point(s), sense of rotation and angle settable resp. programmable by customer (optional)

Errors and omissions excepted. Subject to change without notice. / State: 27.09.10

Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group

## Vert-X 28 - 5V / 10...90% Ub
## Ordering code

*** Switch outputs**
Please define number (max. 127), position and width of the pulses.

**Output characteristics**

| | | |
|---|---|---|
| Positive gradient CW | Standard | 1 |
| Positive gradient CCW | Optional | 2 |
| Redundant, positive gradient CW | Optional | 3 |
| Redundant, positive gradient CCW | Optional | 4 |
| Redundant, crossed signal curves | Optional | 5 |
| Positive gradient CW with 1 switch output* | Optional | A |
| Positive gradient CCW with 1 switch output* | Optional | B |
| Positive gradient CW with 2 switch outputs* | Optional | C |
| Positive gradient CCW with 2 switch outputs* | Optional | D |
| Sense of rotation settable | Optional | E |
| Zero point & sense of rotation settable | Optional | F |
| Middle point & sense of rotation settable | Optional | G |
| Start + end point & sense of rotation settable | Optional | H |
| Programmable with Vert-X EasyAdapt | Optional | P |

**Output signal**

| | | |
|---|---|---|
| 10% ... 90% Ub | Standard | 2 |
| x% ... y% Ub (within 5 ... 95%) | Optional | 4 |

**Power supply voltage**

| | | |
|---|---|---|
| 5VDC | Standard | 2 |

**Electrical connection**

| | | |
|---|---|---|
| 1 | Standard | Round cable 3pole |
| 2 | Optional | Wires 4pole |
| 3 | Optional | Wires 5pole |
| 4 | Optional | Wires 6pole |
| 9 | Optional | Special cable / wires |

**Length of wires**

| | | |
|---|---|---|
| 01 | Optional | 10cm |
| 03 | Optional | 30cm |
| 05 | Standard | 50cm |
| 99 | Optional | Special length |

**Length of cable**

| | | |
|---|---|---|
| 02 | Standard | 1.0m |
| 06 | Optional | 3.0m |
| 10 | Optional | 5.0m |
| 99 | Optional | Special length |

| Vert-X | 2 | 8 | 0 | 1 | | 7 | 3 | 6 | | 2 | 2 | 1 | | 1 | 0 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Electrical angle**

| | | |
|---|---|---|
| 36 | Standard | Electrical angle 360° |
| xx | Optional | 03 to 35; Declaration in 10° steps |
| 99 | Optional | Special angle |

**Sensor principle**

| | |
|---|---|
| 7 | MH-C |
| 8 | MH-C2 |

**Mechanical version**

| | | |
|---|---|---|
| 2801 | Standard | 6mm shaft D-shape; IP54 |
| 2821 | Optional | Push on coupling; IP54 |
| 2831 | Standard | 6mm shaft D-shape; IP65 |
| 2841 | Optional | Push on coupling; IP65 |
| 2899 | Optional | Special shaft |

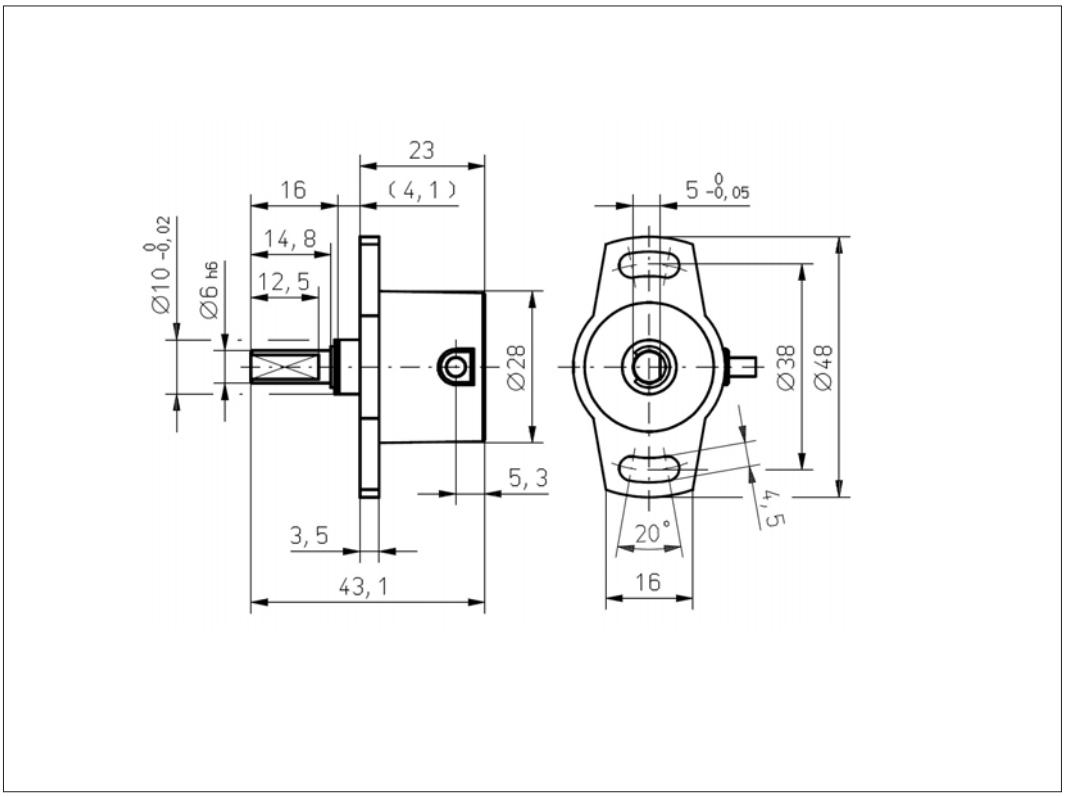
| | MH-C | MH-C2 |
|---|---|---|
| Custom shaft design | X | X |
| Custom cable / wires | X | X |
| Interface x% ... y% Ub (within 5% ... 95% Ub) | X | X |
| Sample rate in fast mode | X | X |
| Switch functions TTL (max. 2) | X | X |
| Special characteristic curve | - | X |
| Special electrical angle within 30° to 360° (ex factory) | X | X |
| Electrical angle programmable (Software) | - | X |
| Start & end point settable (Additional wires) | - | X |
| Sense of rotation CW/CCW settable / programmable (Additional wires or Software) | - | X |
| Index point settable / programmable (Additional wires or Software) | - | X |

**Options** (on request)

Errors and omissions excepted. Subject to change without notice. / State: 27.09.10

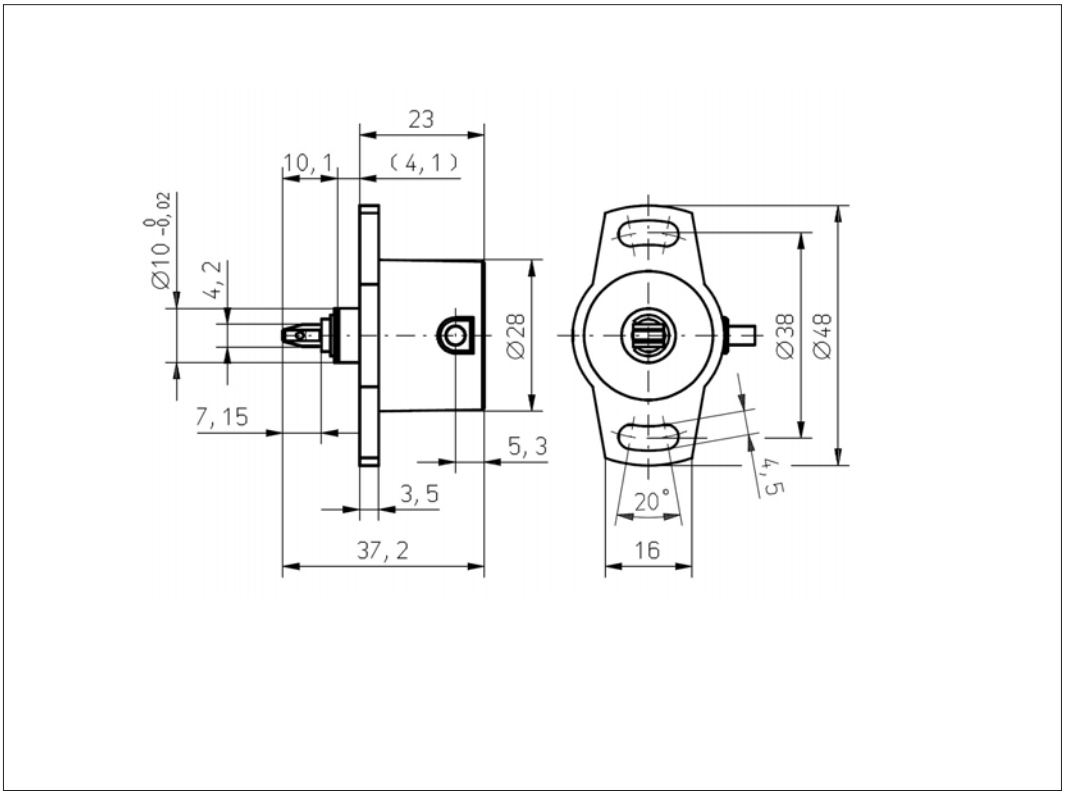
Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group




**Vert-X 2801**
**Vert-X 2831**

**Accessories (incl.)**
- None




**Vert-X 2821**
**Vert-X 2841**

**Accessories (incl.)**
- None

Errors and omissions excepted. Subject to change without notice. / State: 27.09.10

Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group

## Vert-X 28 - 5V / PWM

### Applications

- Harvester
- Fork-lift
- Operating table
- Hydraulic pump

### Features

- Compact dimensions
- Contactless measuring method
- Long life
- High accuracy of measurement
- Simple adjustment with elongated holes
- Full resolution and accuracy at programmed electrical angle

| Sensor principle | | MH-C | MH-C2 |
|---|---|---|---|
| **Electrical data** | | | |
| Measuring range | ° | 0 ... 360 | - |
| Indep. linearity | % of meas. range | ±0.3 | - |
| Max. hysteresis | ° | 0.1 | - |
| Resolution | bit | 12 | - |
| Max. repeatability | ° | 0.1 | - |
| Sample rate fast mode | kHz | (5) | - |
| Sample rate slow mode | kHz | 1.66 | - |
| System propagation delay fast mode | µs | (800) | - |
| System propagation delay slow mode | µs | 4600 | - |
| Max. temperature coefficient of the output signal | ppm/°K | 25 | - |
| MTTFd / MTBF | years | 668 / 668 | - |
| Power supply voltage | VDC | 5 (±10 %) | - |
| Current consumption without load (typ.) fast mode | mA | (14) | - |
| Current consumption without load (typ.) slow mode | mA | 9 | - |
| Min. ohmic load at output | kOhm | 10 | - |
| Max. capacitive load at output | nF | 1 | - |
| PWM frequency | Hz | 855 (±20%) | - |
| Reverse polarity protection of power supply | | yes | - |
| Electrical connection | | Cable 3pole | - |
| Cross section of single wires | mm² | 0.56 (AWG20) | - |
| Redundancy feasible | | yes | - |
| Electrical connection redundant | | Wires (6x) | - |
| Cross section of single wires redundant | mm² | 0.56 (AWG20) | - |
| | | | |
| **Mechanical data** | | | |
| Mechanical range | ° | 360 (continuous) | - |
| Protection class | | IP54 / IP65 | - |
| Max. starting torque at specified protection class | Ncm | 0.5 / 3 | - |
| Max. rotating speed | rpm | 120 | - |
| Min. life | movements | 50 Mio. | - |
| Max. permitted axial shaft load | N | 20 | - |
| Max. permitted radial shaft load | N | 20 | - |
| Operating & storage temperature (with cable) | °C | -40 ... +85 | - |
| Operating & storage temperature (with wires) | °C | -40 ... +125 | - |
| IEC 68-2-6 Vibration (Amax = 0.75mm, f = 5 … 2000 Hz) | g | 20 | - |
| IEC 68-2-27 Shock | g | 50 | - |
| | | | |
| **Standards** | | | |
| EN 55022 class B, Emission radiated (30... 230 MHz) | dB(µV/m) | max. 30 | - |
| EN 55022 class B, Emission radiated (230...1000MHz) | dB(µV/m) | max. 37 | - |
| EN 61000-4-2, ESD (contact discharge / air discharge) | kV | ±4 / ±8 | - |
| EN 61000-4-3, Immission HF radiated (80... 1000 MHz) | V/m | 30 | - |
| EN 61000-4-4, Burst (on all lines) | kV | ±1 | - |
| EN 61000-4-5, Surge (lines to ground) | kV | ±1 | - |
| EN 61000-4-6, Immission HF conducted (0.15...80MHz) | Vemk | 10 | - |
| EN 61000-4-8, Immission magnetic field (50Hz) | A/m | 30 | - |
| IEC 60393-1 Insulation resistance (500VDC, 1bar, 2s) | GOhm | 20 | - |
| IEC 60393-1 Dielectric strength (VAC, 50Hz, 1min, 1bar) | kV | 1 | - |

Errors and omissions excepted. Subject to change without notice. State: 31.10.11

Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group

## Vert-X 28 - 5V / PWM
## Ordering code

**Electrical connection**
1 Standard Round cable 3pole
4 Optional Wires 6pole
9 Optional Special cable / wires

**Length of wires**
01 Optional 10cm
03 Optional 30cm
05 Standard 50cm
99 Optional Special length

**Length of cable**
02 Standard 1.0m
06 Optional 3.0m
10 Optional 5.0m
99 Optional Special length

**Output characteristics**
Positive gradient CW Standard 1
Positive gradient CCW Optional 2
Redundant, positive gradient CW Optional 3
Redundant, positive gradient CCW Optional 4
Redundant, crossed signal curves Optional 5

**Output signal**
PWM Standard 5

**Power supply voltage**
5VDC Standard 2

| Vert-X | 2 | 8 | 0 | 1 | | 7 | 3 | 6 | | 2 | 5 | 1 | | 1 | 0 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Electrical angle**
36 Standard Electrical angle 360°
xx Optional 03 to 35; Declaration in 10° steps
99 Optional Special angle

**Sensor principle**
7 MH-C

**Mechanical version**
2801 Standard 6mm shaft D-shape; IP54
2821 Optional Push on coupling; IP54
2831 Standard 6mm shaft D-shape; IP65
2841 Optional Push on coupling; IP65
2899 Optional Special shaft

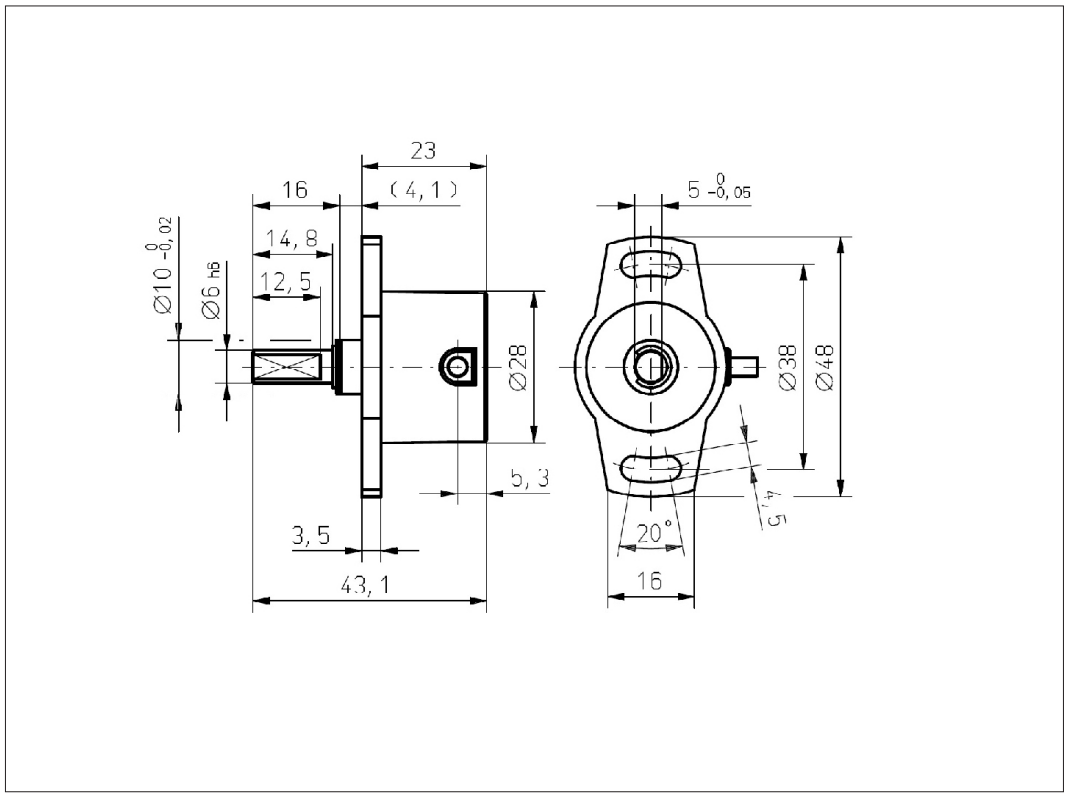
| | MH-C | MH-C2 |
|---|---|---|
| Custom shaft design | X | - |
| Custom cable / wires | X | - |
| Sample rate in fast mode | X | - |
| Switch functions TTL (max. 2) | X | - |
| Special characteristic curve | - | - |
| Special electrical angle within 30° to 360° (ex factory) | X | - |
| Electrical angle programmable (Software) | - | - |
| Start & end point settable (Additional wires) | - | - |
| Sense of rotation CW/CCW settable / programmable (Additional wires or Software) | - | - |
| Index point settable / programmable (Additional wires or Software) | - | - |

**Options** (on request)

Errors and omissions excepted. Subject to change without notice. State: 31.10.11

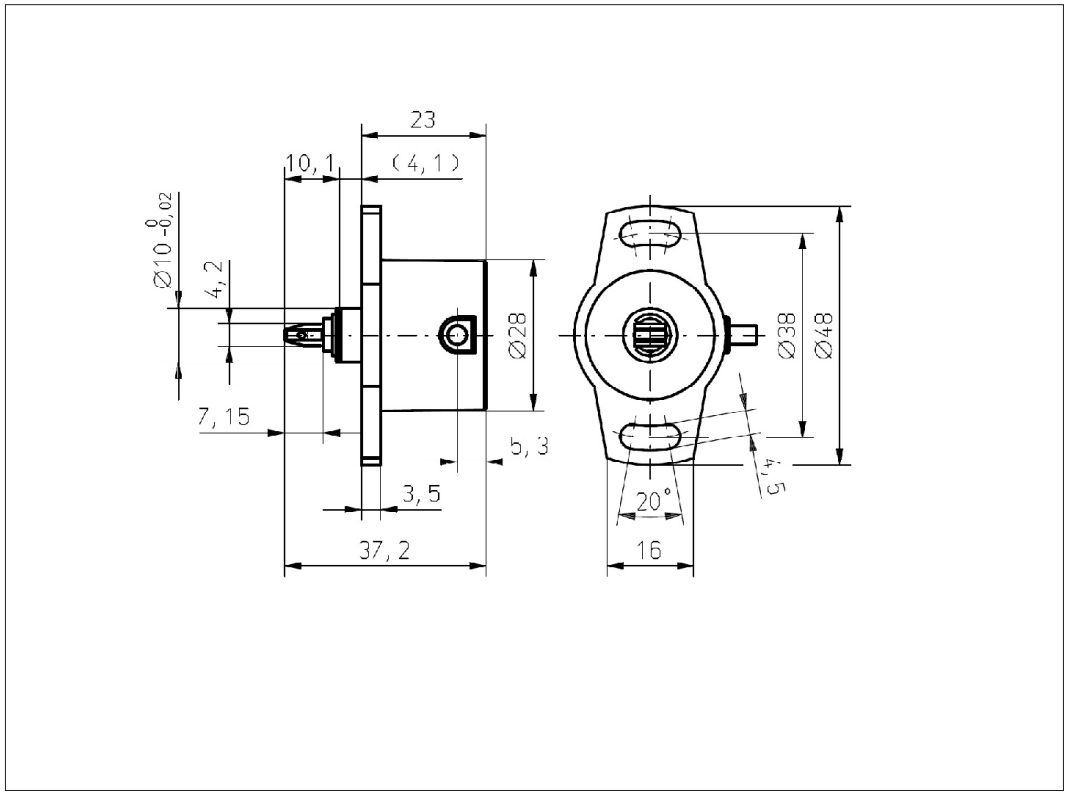
Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group




**Vert-X 2801**
**Vert-X 2831**

**Accessories (incl.)**
- None




**Vert-X 2821**
**Vert-X 2841**

**Accessories (incl.)**
- None

Errors and omissions excepted. Subject to change without notice. State: 31.10.11

Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group

| Sensor principle | | MH-C | MH-C2 |
|---|---|---|---|
| **Electrical data** | | | |
| Measuring range | ° | 0 ... 360 | - |
| Indep. linearity | % of meas. range | ±0.3 | - |
| Max. hysteresis | ° | 0.1 | - |
| Resolution | bit | 14 | - |
| Max. repeatability | ° | 0.1 | - |
| Sample rate fast mode | kHz | 2.2 | - |
| Sample rate slow mode | kHz | (0.55) | - |
| System propagation delay fast mode | µs | 400 | - |
| System propagation delay slow mode | µs | (600) | - |
| Max. temperature coefficient of the output signal | ppm/°K | 25 | - |
| MTTFd / MTBF | years | 668/668 | - |
| Power supply voltage | VDC | 5 (±10 %) | - |
| Current consumption without load (typ.) fast mode | mA | 14 | - |
| Current consumption without load (typ.) slow mode | mA | (9) | - |
| Max. ohmic load at output | kOhm | - | - |
| Max. capacitive load at output | nF | - | - |
| Reverse polarity protection of power supply | | yes | - |
| Electrical connection | | Wires (5x) | - |
| Cross section of single wires | mm² | 0.56 (AWG20) | - |
| Redundancy feasible | | no | - |
| Electrical connection redundant | | - | - |
| Cross section of single wires redundant | mm² | - | - |
| | | | |
| **Mechanical data** | | | |
| Mechanical range | ° | 360 (continuous) | - |
| Protection class | | IP54 / IP65 | - |
| Max. starting torque at specified protection class | Ncm | 0.5 / 3 | - |
| Max. rotating speed | rpm | 120 | - |
| Min. life | movements | 50 Mio. | - |
| Max. permitted axial shaft load | N | 20 | - |
| Max. permitted radial shaft load | N | 20 | - |
| Operating & storage temperature | °C | -40 ... +125 | - |
| IEC 68-2-6 Vibration (Amax = 0.75mm, f = 5 … 2000 Hz) | g | 20 | - |
| IEC 68-2-27 Shock | g | 50 | - |
| | | | |
| **Standards** | | | |
| EN 55022 class B, Emission radiated (30... 230 MHz) | dB(µV/m) | max. 30 | - |
| EN 55022 class B, Emission radiated (230...1000MHz) | dB(µV/m) | max. 37 | - |
| EN 61000-4-2, ESD (contact discharge / air discharge) | kV | ±4 / ±8 | - |
| EN 61000-4-3, Immission HF radiated (80... 1000 MHz) | V/m | 30 | - |
| EN 61000-4-4, Burst (on all lines) | kV | ±1 | - |
| EN 61000-4-5, Surge (lines to ground) | kV | ±1 | - |
| EN 61000-4-6, Immission HF conducted (0.15...80MHz) | Vemk | 10 | - |
| EN 61000-4-8, Immission magnetic field (50Hz) | A/m | 30 | - |
| IEC 60393-1 Insulation resistance (500VDC, 1bar, 2s) | GOhm | 20 | - |
| IEC 60393-1 Dielectric strength (VAC, 50Hz, 1min, 1bar) | kV | 1 | - |

## Vert-X 28 - 5V / SPI

### Applications

- Harvester
- Fork-lift
- Operating table
- Hydraulic pump

### Features

- Compact dimensions
- Contactless measuring method
- Long life
- High accuracy of measurement
- Simple adjustment with elongated holes
- Full resolution and accuracy at programmed electrical angle

Errors and omissions excepted. Subject to change without notice. State: 28.09.10

Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group

## Vert-X 28 - 5V / SPI
## Ordering code

**Output characteristics**

| | | |
|---|---|---|
| Positive gradient CW | Standard | 1 |
| Positive gradient CCW | Optional | 2 |
| Redundant, positive gradient CW | Optional | 3 |
| Redundant, positive gradient CCW | Optional | 4 |
| Redundant, crossed signal curves | Optional | 5 |

**Output signal**

| | | |
|---|---|---|
| SPI | Standard | 8 |

**Power supply voltage**

| | | |
|---|---|---|
| 5VDC | Standard | 2 |

**Electrical connection**

| | | |
|---|---|---|
| 3 | Standard | Wires 5pole |
| 9 | Optional | Special wires |

**Length of wires**

| | | |
|---|---|---|
| 01 | Optional | 10cm |
| 03 | Optional | 30cm |
| 05 | Standard | 50cm |
| 99 | Optional | Special length |

| Vert-X | 2 | 8 | 0 | 1 | | 7 | 3 | 6 | | 2 | 8 | 1 | | 3 | 0 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Electrical angle**

| | | |
|---|---|---|
| 36 | Standard | Electrical angle 360° |
| xx | Optional | 03 to 35; Declaration in 10° steps |
| 99 | Optional | Special angle |

**Sensor principle**

| | |
|---|---|
| 7 | MH-C |

**Mechanical version**

| | | |
|---|---|---|
| 2801 | Standard | 6mm shaft D-shape; IP54 |
| 2821 | Optional | Push on coupling; IP54 |
| 2831 | Standard | 6mm shaft D-shape; IP65 |
| 2841 | Optional | Push on coupling; IP65 |
| 2899 | Optional | Special shaft |

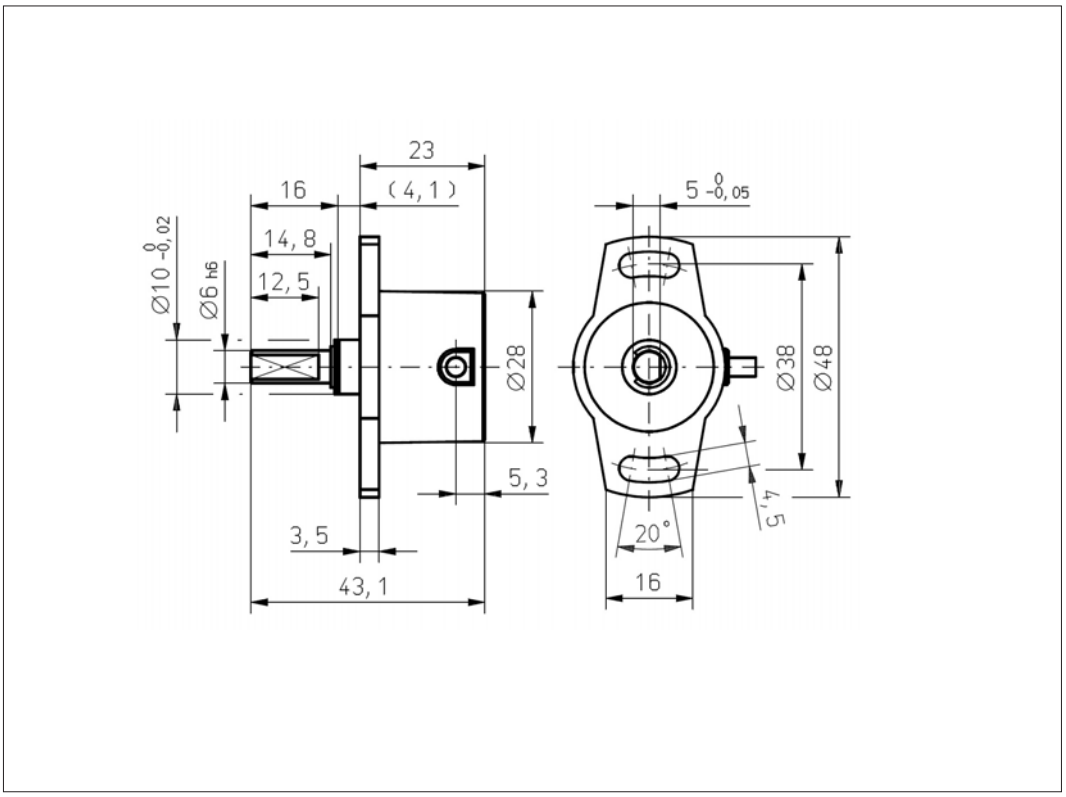
| | MH-C | MH-C2 |
|---|---|---|
| Custom shaft design | X | - |
| Custom wires | X | - |
| Sample rate in slow mode | X | - |
| Switch functions TTL (max. 2) | X | - |
| Special characteristic curve | - | - |
| Special electrical angle within 30° to 360° (ex factory) | X | - |
| Electrical angle programmable (Software) | - | - |
| Start & end point settable (Additional wires) | - | - |
| Sense of rotation CW/CCW settable / programmable (Additional wires or Software) | - | - |
| Index point settable / programmable (Additional wires or Software) | - | - |

**Options** (on request)

Errors and omissions excepted. Subject to change without notice. State: 28.09.10

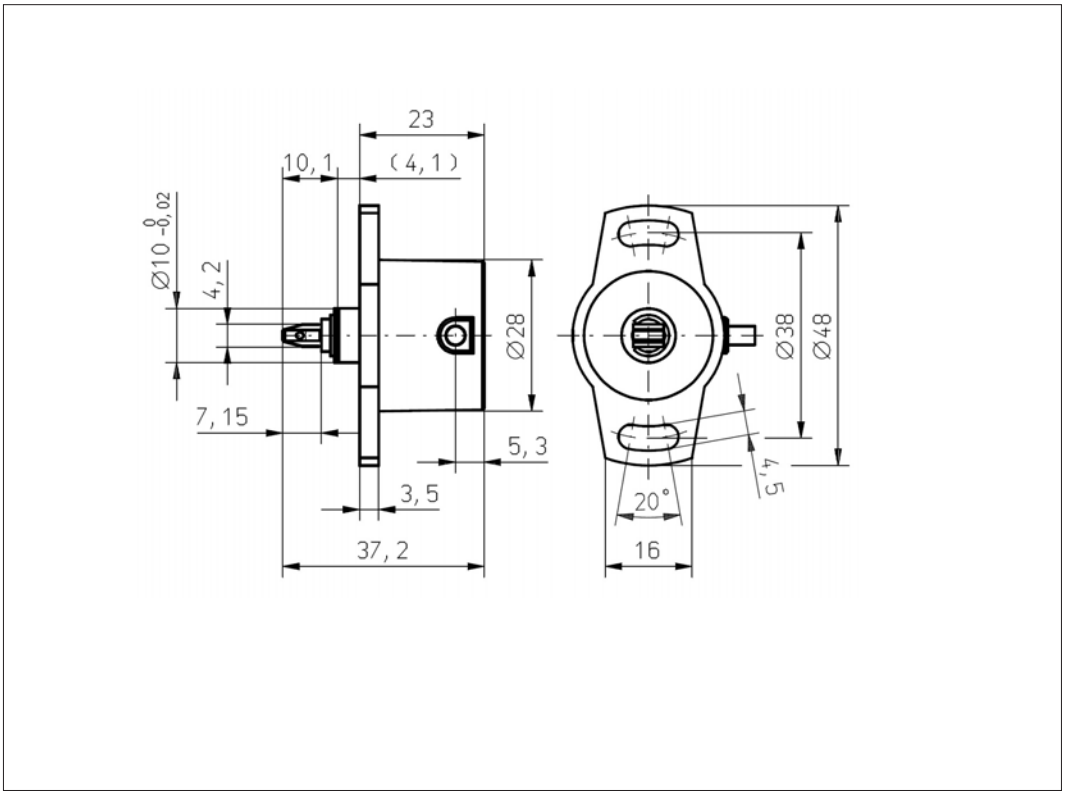
Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group




**Vert-X 2801**
**Vert-X 2831**

**Accessories (incl.)**
- None




**Vert-X 2821**
**Vert-X 2841**

**Accessories (incl.)**
- None

Errors and omissions excepted. Subject to change without notice. State: 28.09.10

Contelec AG
Portstrasse 38
CH-2503 Biel/Bienne
Phone +41 (0)32 3665600
Telefax +41 (0)32 3665604
sales@contelec.ch

CONTELEC
A company of the Siedle-Group