



**Vert-X 32E**  
**Technical**  
**booklet**

# Applications

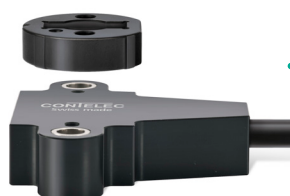
## Possible applications



Control of arm position of walking excavator



Steering wheel position of scrubber drier



Arm position of front loader



Angle position of excavator cabin



Angle position detection of truck trailer

## The key performance characteristics

Measurement range:	0° to 360°
Resolution:	12 – 16 bit
Independent linearity:	±0.3% of the measurement range
Operating temperature range:	-40°C to +125°C
Protection class:	IP68*
Max. repeatability:	0.1°
Possible interfaces:	
- Analog 5V supply voltage:	10% – 90% Ub
- Analog 24V supply voltage:	0.5 – 4.5V / 0.1 – 10V / 4 – 20mA
- Digital 24V supply voltage:	CANopen

\* Submerging in 2M deep water for min. 400 days

## Customer benefit

### Customer benefit

- Very long life
- No mechanical wear
- Very robust design (usable in 2M deep water)
- Fully encapsulated electronics, prevents the ingress of water
- Bigger installation tolerances in radial & axial directions
- Custom magnetic actuator
- Half- and full-redundancy available
- Custom cable and connector
- Special output characteristic curve
- Special electrical angle within 10° to 360° (ex factory)
- Easily adaptable to customer needs
- Easy, individual setting of the sense of rotation (CW, CCW), index points (zero point/middle point) or start and end points
- Extended operating range, axial (without safety flag)
- RoHS conformity

### Benefits for CANopen

- CAN integrated bus termination resistor ( $120\Omega / R_{CAN}$ )
- Custom bitrate (10 ; 20 ; 50 ; 100 ; 125 ; 250 ; 500 ; 800 ; 1'000 kBit/s)
- Setting of custom Node-ID

### Vert-X 32E housing

The Vert-X 32E is available in a single and a redundant housing.

#### Single housing



#### Redundant housing



## Axial operating

### Safety flag mode

In non-contacting magnetic rotary encoders, the sensor unit and magnetic actuator are physically separated. This brings a high level of shock and vibration resistance, and enables accurate measurements to be made – even with considerable axial and radial offsets of the magnetic actuator.

Contelec's non-contacting magnetic rotary encoders are providing as a standard an implemented safety feature which is called "safety flag mode".

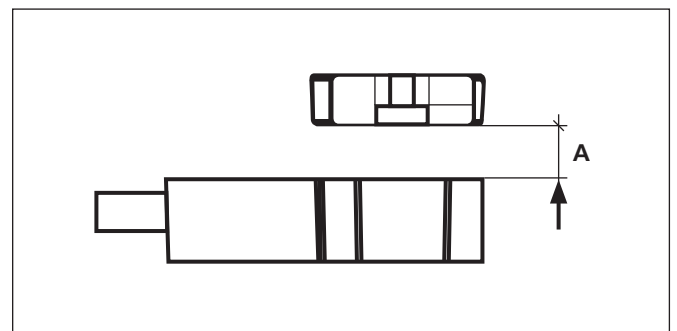
The features of the safety flag mode are as follow:





- Detection of the magnetic loss
- System shut-down (output level  $< 2\% U_b$ ) in case of magnetic actuator out of valid operating range

Within the allowed axial and radial operating range offered by Contelec, all specifications are guaranteed at all time. Moreover, due to the detection of the magnetic loss, the non-contacting magnetic rotary encoders from Contelec are made for safety relevant applications.

### Axial operating distance / Air gap

Notwithstanding this safety flag mode, the Vert-X 32E is still offering a wide axial operating distance which is called "air gap".



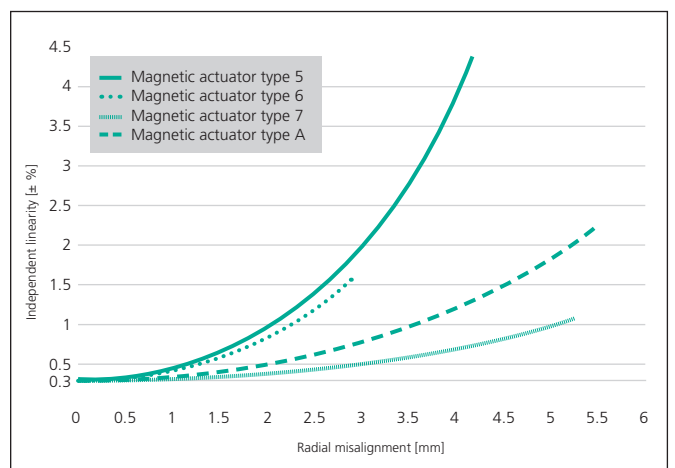
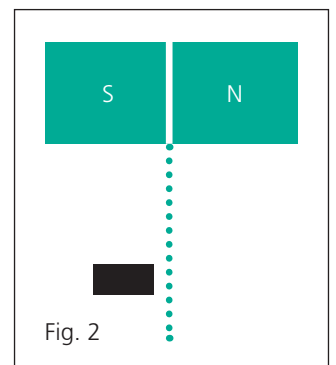
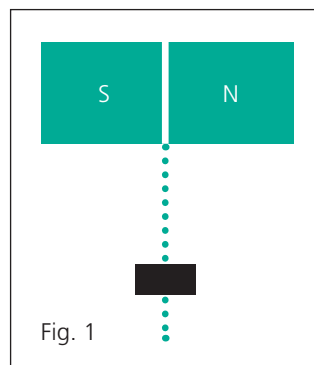
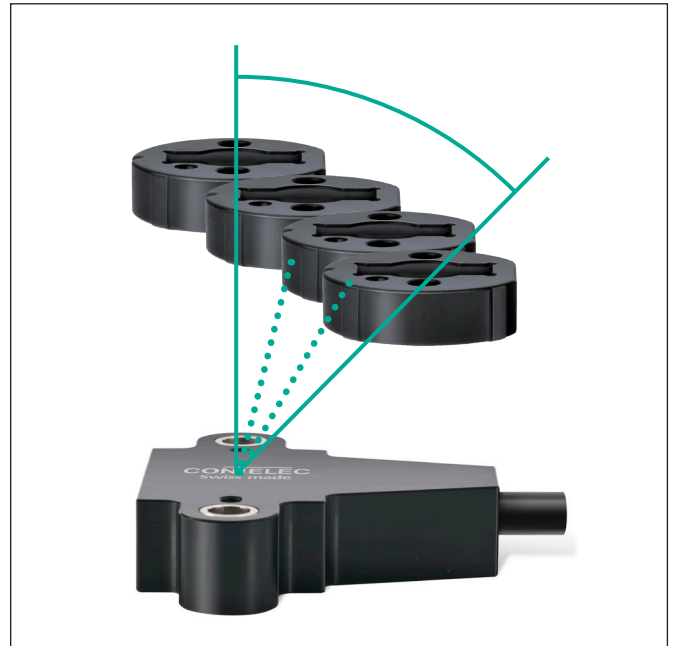
	Magnetic actuator	Signal output	A (air gap)
Type 5		single	0 ... 6.7mm
		redundant	0 ... 6.2mm
Type 6		single	0 ... 5.5mm
		redundant	0 ... 5.0mm
Type 7		single	0 ... 13.7mm
		redundant	0 ... 13.2mm
Type 8		single	0 ... 13.2mm
		redundant	0 ... 12.7mm

## Radial operation

### Radial operating distance

If the magnetic actuator is perfectly centered in the middle of the sensor (Fig. 1) there is no non-linearity influence and the sensor has a max. independent linearity of  $\pm 0.3\%$ .

In the state of a radial offset of the magnetic actuator (Fig. 2), the independent linearity will increase as showed in the graphic. As higher the radial offset is, as higher the influence on the independent linearity will be.



## Setting features

### Why a customer is using Vert-X MH-C2 Feature?

The Vert-X MH-C2 technology is offering many additional features to customers. Precision installation and adjustment of encoders, exact setting of the zero or middle point or the start and end points – these are some of the challenges facing system integrators, production plants and service personnel. Components are frequently installed in such confined spaces that mechanical adjustment of the rotary encoder is impossible or extremely difficult.

### Example: setting start and end point

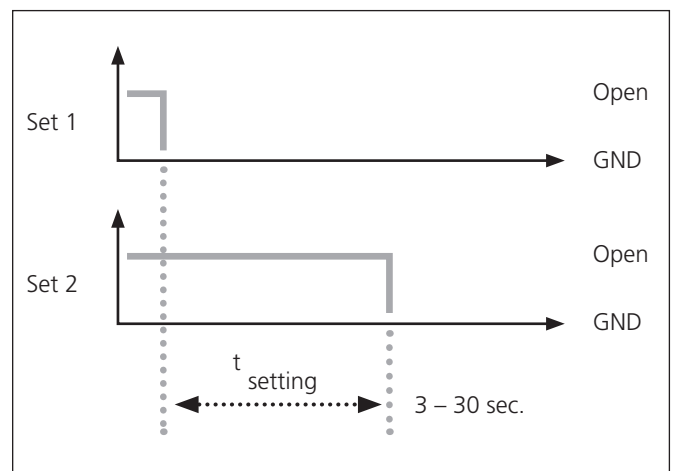
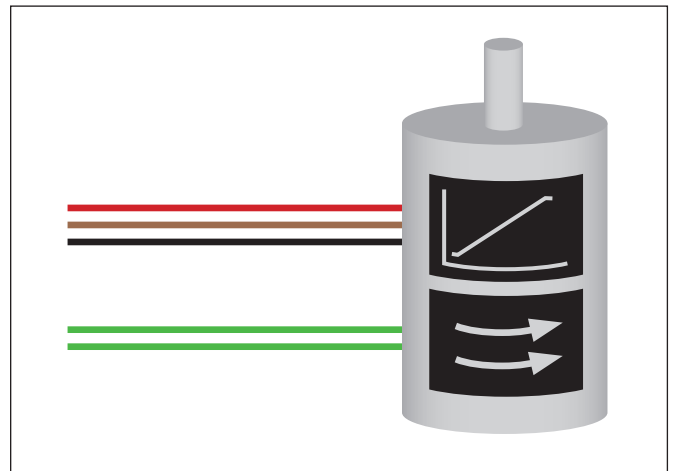
Following sensor with setting features has the following wire definition:

Power supply 24Vdc -> **red**  
Output signal -> **brown**  
GND -> **black**  
Set 1 -> **green**  
Set 2 -> **green**

1. Turn the rotary encoder to the desired starting angle  
-> SET START POSITION
2. Connect the green wire (Set 1) to the black wire (GND)
3. Within the specific time ( $t_{\text{setting}}$ ), turn the rotary encoder to the desired end angle and connect the second green wire (Set 2) to the black wire (GND) as well  
-> SET END POSITION
4. The angle range and sense of rotation (CW) have now been set and stored

### Contelec solution

To meet these challenges and create a high level of flexibility for customers, Contelec has developed a simple, innovative solution with its 'setting features'. The rotary encoders have two additional digital inputs (Set 1 and Set 2), which are used to set the sense of rotation (CW, CCW), index points (zero point or middle point) or start and end points as often as needed. A key factor here is that installation in a machine is not restricted by mechanical tolerances or the angle position of the rotary encoder.



# Output Characteristics

## Contelec standard CANopen output characteristics

Contelec is working with the CANopen communication according to CiA Standard DS-301. CANopen has been established for many years in Europe as a "standard for secure networking of complex equipment and systems" and is becoming increasingly accepted in North America and Asia. As a result, CANopen is now used in a very wide range of applications.

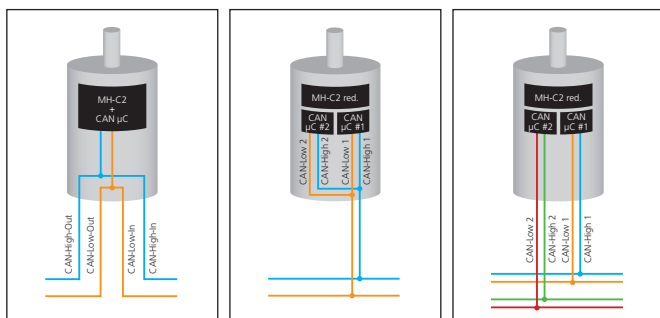
In addition to automation, these include applications like:

- energy production
- shipping industry
- industrial vehicles, such as telehandlers and fork lift trucks
- construction and agricultural machinery

A common feature of all applications of this kind is the demand for a high level of safety, speed and affordable implementation.

The Vert-X 32E non-contacting magnetic rotary encoder from Contelec boasts features that previously were inconceivable in this budget segment and with mechanical specifications, including the metal-reinforced mounting lugs and the rugged cable outlet that withstands even the highest tension, the Vert-X 32E is build to be used even under harsh environmental condition.

Single                      1-bus redundant                      2-bus redundant



Standard CANopen output characteristic:

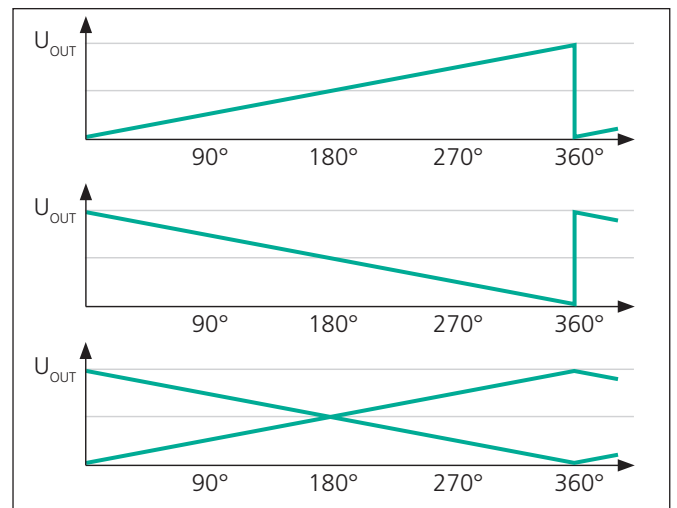
- CAN-High; CAN-Low (4 wires)

Optional CANopen output characteristics:

- CAN-High-In; CAN-High-Out;
- CAN-Low-In; CAN-Low-Out (6 wires)
- CAN-High; CAN-Low;  $R_{CAN}$

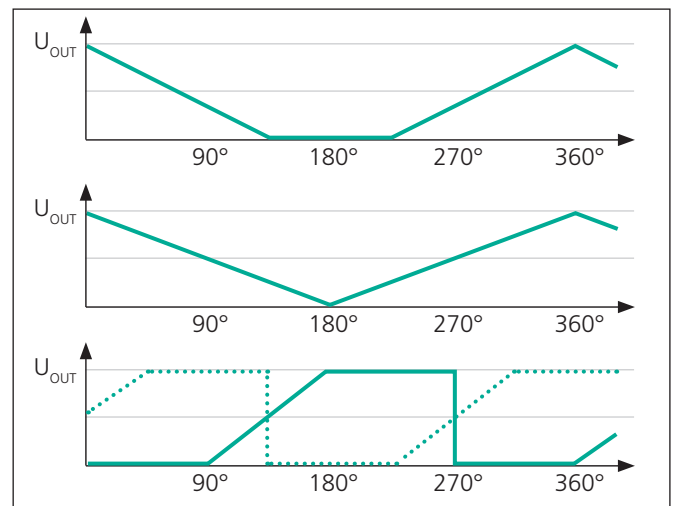
## Contelec standard analog output characteristic curves

For standard solutions, Contelec is offering typical and simple characteristic curves. The individual configuration of the electrical angle (between 10° to 360°) will be implemented before delivery. Next to the single output curve, all characteristic curves are also available as a half- and full-redundant version.



## Contelec custom analog output characteristic curves

Next to standard output characteristic curves, Contelec is especially standing with the Vert-X technology for a wide range of individual and customized solutions. Below charts are showing some possible custom output characteristic curves. Further characteristic curves on request.



## Ask us for customized solutions

Contelec supplies the world market with premium-quality, unparalleled and innovative solutions. In addition to developing and manufacturing industry-leading rotary sensors, Contelec has also gained a strong reputation for the implementation of application-specific solutions.

### Individual solutions:

By individual solutions, Contelec is providing customers with rotary sensors that are tailored to the relevant application and optimized for individual needs based on standard components.

Possible adaptations include:

- Mechanical adaptation (customer-specific housing and shaft) to the installation requirements of the customer's application
- Assembled connection leads like custom wire, cable or connector
- Characteristic curves tailored to customer specifications

### Design-In solutions:

Contelec also specializes in developing design-In solutions by working very closely with the customer. This cooperation leads to the creation of unique products, precisely matched to the customer's needs and cost targets. Such kind of design-In solutions can be realized in-house at Contelec, which allows us to implement extremely complex projects.

To explore the possibilities of a special design-In solution, Contelec will be happy to advise you in a personal, non-committing discussion.







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