TR-Electronic - Your partner in the world of automation

Extract from our product range
TR-Electronic – Your partner in automation

Programmable absolute fieldbus encoders
The standard in automation technology, available for all commercial fieldbusses, such as Profibus, Interbus, CANopen, DeviceNet and Industrial Ethernet.

plus, of course, the standard range of TR mechanical, interface and functional options

Linear absolute displacement sensors
The compact class for linear absolute measurement. Directly bus capable, suitable for harsh environmental conditions and for installation in hydraulic cylinders

Absolute high resolution linear measurement systems
Linear measurement with absolute, sub-micron resolution without referencing

Incremental encoders
from 35 mm external diameter up to 55 mm hollow shaft
- we always have a solution!

LASER-distance measuring systems
Absolute and wear-free measurement of distances up to 200 m via SSI or fieldbus
Intelligent positioning drive
Absolute positioning directly via fieldbus
Integrated - motor, power amplified position control-loop controller, absolute encoder, PLC functions and fieldbus interface.

Heavy-duty industrial PC
Double shock proof mounted housing isolates the electronics from vibration, while front access (MIPC) simplifies configuration and start up.
Choose from our wide selection of housings.

Motor feedback systems
Feedback encoder for modern positioning drives. Optionally integrated or directly mounted on the drive shaft via hollow shaft.

SPC - The PLC for PC
Turns every PC into an efficient PLC under S5/S7 or IEC 1131 protocols. Combines the comfort of PC control with the safety of a separate processor for PLC tasks.

@ctiveO - more than fieldbus modules
Modular, rugged fieldbus node system
I/O-node, small-scale PLC, decentralized axis controller, high performance cam controller, DIN-rail mounted industrial PC... with commercial fieldbusses such as, Profibus-DP, CANopen, DeviceNet, LightBus ... and ETHERNET as an option!
The modular range of encoders

Absolute rotary and linear measurement technology has represented TR-Electronic’s main business for more than twenty years. Right from the beginning we were your partner for custom solutions. In the following, we want to introduce you to our modular system for absolute encoders which, we’re confident, contains a suitable sensor for your automation task.

### Types

<table>
<thead>
<tr>
<th>C</th>
<th>F</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compact encoder</strong></td>
<td><strong>Feedback encoder</strong></td>
<td><strong>“Q-bic” encoder</strong></td>
</tr>
<tr>
<td>The industrial standard for encoders</td>
<td>The compact drive solution</td>
<td>Hollow shaft flexibility</td>
</tr>
<tr>
<td>The traditional type but at the same time extremely flexible. As a solid shaft encoder or also in different versions with hollow, blind shaft or integrated coupling respectively. Sizes: 58 mm and 65 mm also 100 mm for special connections.</td>
<td>Due to its minimal depth, our feedback encoder is especially suitable for installation on drives - a fact that influenced its design as a hollow shaft encoder.</td>
<td>The cubic design offers space for more - whether the 20 mm hollow shaft or the over sized connector panel which can accept two connectors either for redundancy or simultaneous output of commutation, SSI and fieldbus signals.</td>
</tr>
</tbody>
</table>

### Resolution

<table>
<thead>
<tr>
<th>E</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Our standard resolution</strong></td>
<td><strong>Specialist for specialities</strong></td>
</tr>
<tr>
<td>13 bit (programmable) and as a single or multi-turn encoder, “E” resolution meets the requirements of most applications in industrial automation. The choice of interfaces available and numerous other options enable particular and individual solutions.</td>
<td>Probably the only device available on the market with programmable sine/cosine output signal (each resolution up to 32,768 pulses). In combination with the 17 bit absolute signal, unlimited possibilities are created eg. gearless drives, safety applications...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High resolution for industry</strong></td>
<td><strong>Where only limited demands on resolution, accuracy and interface are required, cost effective “M” series encoders are available.</strong></td>
</tr>
<tr>
<td>Up to 17 bit/revolution (programmable) solves almost every industrial measurement problem. Of course, also available as a multi-turn encoder.</td>
<td></td>
</tr>
</tbody>
</table>

Devices shown are a selection from our product range.
### Shaft versions

<table>
<thead>
<tr>
<th>V</th>
<th>Solid shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Solid shaft" /></td>
<td></td>
</tr>
<tr>
<td>Actually, so ordinary that there's nothing much to write about - but we have shafts with flats, with or without keys in both US and metric dimensions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H</th>
<th>Hollow shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2" alt="Hollow shaft" /></td>
<td></td>
</tr>
<tr>
<td>With or without key/slot, up to 20 mm diameter</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S</th>
<th>Blind shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Blind shaft" /></td>
<td></td>
</tr>
<tr>
<td>In contrast to hollow shafts, a blind shaft has the advantage of only one opening. Therefore it is generally more suitable for high rotation speeds.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K</th>
<th>Integrated coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Integrated coupling" /></td>
<td></td>
</tr>
<tr>
<td>Combines torsion resistant mounting of a solid shaft encoder with the compact design of a blind shaft. Vibrations and shaft eccentricity are balanced by a cross coupling element made of plastic.</td>
<td></td>
</tr>
</tbody>
</table>

---

Only the article number exactly identifies a specific encoder with all options and type details. Therefore the article number is essential for availability and compatibility. Options and combinations not shown on the following pages may be possible, on request!

You can find more detailed information in the respective encoder brochures CE, XE... as well as in the corresponding data sheets. The types shown do not state anything about availability and detailed design options. Your local sales representative will give you that information.
# Absolute rotary encoders

<table>
<thead>
<tr>
<th>Compact encoder</th>
<th>Feedback encoder</th>
<th>“Q-bic” encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>F</td>
<td>Q</td>
</tr>
<tr>
<td>13 bit abs., 4096 inc.</td>
<td>17 bit abs., 4096 inc.</td>
<td>9 bit abs., 8192 inc.</td>
</tr>
<tr>
<td>4096 / 32768 revolutions</td>
<td>4096 / 32768 revolutions</td>
<td>32768 revolutions</td>
</tr>
</tbody>
</table>

The industrial standard for absolute rotary and position measurement

<table>
<thead>
<tr>
<th>Absolute resolution / revolution:</th>
<th>13 bit, programmable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of revolutions:</td>
<td>single turn or</td>
</tr>
<tr>
<td>Multi turn 4096, 32768 as an option</td>
<td></td>
</tr>
<tr>
<td>Incremental resolutions available:</td>
<td>512, 1024, 2048, 4096</td>
</tr>
<tr>
<td>Digital or SIN/COS, separate resolution track</td>
<td></td>
</tr>
</tbody>
</table>

## Solid shaft

| CE 58 | CS 58 | CH 58 | CK 58 |

<table>
<thead>
<tr>
<th>Size:</th>
<th>58 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity:</td>
<td>Radial connector, radial gland</td>
</tr>
<tr>
<td>Axial connector, axial gland (not for hollow shaft)</td>
<td></td>
</tr>
<tr>
<td>Radial fieldbus end-cap (for Profibus: illuminated address display, externally viewable)</td>
<td></td>
</tr>
<tr>
<td>Interfaces:</td>
<td>single turn</td>
</tr>
<tr>
<td>Parallel, SSL, ISI, programmable incremental interface (digital) INC</td>
<td></td>
</tr>
<tr>
<td>Option: A, B (hardware incremental signal)</td>
<td></td>
</tr>
<tr>
<td>multi turn</td>
<td>SSL, ISI</td>
</tr>
<tr>
<td>Profibus (PNO class 2), CAN DeviceNet, CANopen, AS-i (not for hollow shaft)</td>
<td></td>
</tr>
<tr>
<td>Option: A, B (digital or SIN/COS) (not for fieldbus devices)</td>
<td></td>
</tr>
<tr>
<td>Programmability:</td>
<td>devices with direct interface (SSL, ISI...); via PC, TR WinProg</td>
</tr>
<tr>
<td>devices with fieldbus: via fieldbus</td>
<td></td>
</tr>
</tbody>
</table>

Devices shown are a selection from our product range.
<table>
<thead>
<tr>
<th></th>
<th>Solid shaft</th>
<th>Integrated coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size:</strong></td>
<td>65 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Connectivity:</strong></td>
<td>Radial connector, radial cable gland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Axial connector, axial cable gland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fieldbus end-cap</td>
<td></td>
</tr>
<tr>
<td><strong>Interfaces:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>single turn</td>
<td>Parallel, camshaft gear, tool changer,</td>
<td>Parallel, CAM controller, tool changer;</td>
</tr>
<tr>
<td></td>
<td>SSI, ISI, SSI+analog (16 bit)</td>
<td>SSI, ISI, SSI+analog (16 bit)</td>
</tr>
<tr>
<td></td>
<td>Profibus, Interbus, CANopen, DeviceNet, CAN, FO</td>
<td>Profibus, Interbus, CANopen, DeviceNet, CAN, FO,</td>
</tr>
<tr>
<td></td>
<td>Option: A, B</td>
<td>Option: A, B</td>
</tr>
<tr>
<td>multi turn</td>
<td>Parallel, CAM controller, tool changer;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SSI, ISI, SSI+analog (16 bit)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Profibus, Interbus, CANopen, DeviceNet, CAN, FO,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FIPiQ, new: EtherCAT, Powerlink</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option: A, B</td>
<td></td>
</tr>
<tr>
<td><strong>Programmability:</strong></td>
<td>via PC or fieldbus</td>
<td></td>
</tr>
</tbody>
</table>
# Absolute rotary encoders

<table>
<thead>
<tr>
<th></th>
<th>Compact encoder</th>
<th>Feedback encoder</th>
<th>“Q-bic” encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>C</td>
<td>F</td>
<td>Q</td>
</tr>
<tr>
<td>Modules</td>
<td>E</td>
<td>O</td>
<td>X</td>
</tr>
<tr>
<td>13 bit abs., 4096 inc.</td>
<td>17 bit abs., 4096 inc.</td>
<td>17 bit abs., 32768 inc.</td>
<td></td>
</tr>
<tr>
<td>4096 / 32768 revolutions</td>
<td>4096 / 32768 revolutions</td>
<td>65536 revolutions</td>
<td></td>
</tr>
</tbody>
</table>

---

### For higher demands on resolution

**Absolute resolution / revolution:** 17 bit, programmable  
**Number of revolutions:** single turn or multi turn 4096, 32768 as an option  
**Incremental resolutions available:** 512, 1024, 2048, 4096  
Digital or SIN/COS, separate resolution track

<table>
<thead>
<tr>
<th>Solid shaft</th>
<th>Blind shaft</th>
<th>Hollow shaft</th>
<th>Integrated coupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>COV 58</td>
<td>COS 58</td>
<td>COH 58</td>
<td>COK 58</td>
</tr>
</tbody>
</table>

---

### Specifications

**Size:** 58 mm  
**Connectivity:** Radial connector, radial cable gland  
Axial connector, axial cable gland (not for hollow shaft)  
Radial fieldbus end-cap (for Profibus: illuminated address display, externally viewable)

**Interfaces:**
- **single turn**  
  Parallel, SSL, ISI, programmable incremental interface (digital) INC  
  Option: A, B (hardware incremental signal)
- **multi turn**  
  SSL, ISI  
  Profibus (PNO class 2), CAN DeviceNet, CANopen,  
  AS-i (not for hollow shaft)  
  Option: A, B (digital or SIN/COS) (not for fieldbus devices)
- **Programmability:**  
  Devices with direct interface (SSL, ISI...): via PC, TR WINProg  
  Devices with fieldbus: via fieldbus

---

### Devices shown

are a selection from our product range
### Compact encoder (C)
- **Size:** 65 mm
- **Connectivity:**
  - Radial connector, radial cable gland
  - Axial connector, axial cable gland
  - Fieldbus end-cap
- **Interfaces:**
  - **Single turn**
    - Parallel, SSI, ISI, SIN/COS (programmable)
    - Option: A, B
  - **Multi turn**
    - SSI, ISI, SIN/COS (programmable)
    - Option: A, B
- **Programmability:** via PC, TR WINProg

### Feedback encoder (F)
- **13 bit abs., 4096 inc.**
- **4096 / 32768 revolutions**

### "Q-bic" encoder (Q)
- **17 bit abs., 4096 inc.**
- **4096 / 32768 revolutions**

### The specialist for particular demands
- **Absolute resolution / revolution:** 17 bit, programmable
- **Number of revolutions:**
  - Single turn or multi turn 65536
- **Programmable SIN/COS:** up to 32768 pulses / revolution

### Solid shaft
- **XE 65**

### Integrated coupling
- **XK 65**

### Blind shaft
- **XS 65**

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Phone: 877-IP-Tech1
Fax: 877-IP-Tech2
www.iptech1.com

Combining Today’s Best Technologies
For Tomorrow’s Break Through Discoveries
**Absolute rotary encoders**

<table>
<thead>
<tr>
<th>Feedback encoder</th>
<th>“Q-bic” encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E</strong> 13 bit abs., 4096 inc.</td>
<td><strong>O</strong> 17 bit abs., 4096 inc.</td>
</tr>
<tr>
<td>4096 / 32768 revolutions</td>
<td>4096 / 32768 revolutions</td>
</tr>
<tr>
<td><strong>X</strong> 17 bit abs., 32768 inc.</td>
<td></td>
</tr>
<tr>
<td>65536 revolutions</td>
<td></td>
</tr>
</tbody>
</table>

Open encoders for drive-feedback applications

Resolution per selected resolution series (*E* = 13 bit, *O* = 15/17 bit with programmable SIN/COS)

Integrated hollow shaft

Please note, the devices featured here are only examples of possible configurations.

Encoders of this type can be customized according to your requirements!

<table>
<thead>
<tr>
<th>Hollow shaft</th>
<th>Hollow shaft</th>
<th>Hollow shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEH 58</td>
<td>FOH 58</td>
<td>FXH 70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size:</th>
<th>58 mm</th>
<th>70 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity:</td>
<td>cable gland</td>
<td>cable gland</td>
</tr>
<tr>
<td>Interfaces:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>single / multi turn</td>
<td>Parallel,SSI,ISI,programmable incremental interface(digital)INC</td>
<td>Parallel,SSI,ISI,programmable SIN/COS</td>
</tr>
<tr>
<td></td>
<td>Profibus,CANopen,DeviceNet</td>
<td>A,B(digitalorSIN/COS)</td>
</tr>
<tr>
<td>Option:</td>
<td>A,B(viaPC,TRWINProg)</td>
<td>A,B(viaPC,TRWINProg)</td>
</tr>
</tbody>
</table>

*Devices shown are a selection from our product range*
H Hardware encoder

E 13 bit abs., not programmable

High resolution, streamlined signal processing
With our basic CE 58 you get the full "E" resolution as a parallel single turn encoder.
Resolution is not user programmable and is factory pre-set.
The direction of rotation, via the signal lines, or switched between pre-set code, can be changed according to the specifications chosen.

Solid shaft
HEV 58

Size: 58 mm
For mechanical specifications you can choose between Z850 flange and 6 mm shaft or Z836 flange and 10 mm shaft

Standard specifications:
Steps / revolution: 4096
Supply: output level 11...27 V DC or 5 V DC
up to 17 bit output (incl. signal bit), push pull
# Absolute rotary encoders

<table>
<thead>
<tr>
<th>C</th>
<th>Compact encoder</th>
<th>F</th>
<th>Feedback encoder</th>
<th>Q</th>
<th>“Q-bic” encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>13 bit abs., 4096 inc.</td>
<td>O</td>
<td>17 bit abs., 4096 inc.</td>
<td>4096 / 32768 revolutions</td>
<td>4096 / 32768 revolutions</td>
</tr>
</tbody>
</table>

For special hollow shaft applications

<table>
<thead>
<tr>
<th>Absolute resolution / revolution:</th>
<th>13 bit, programmable</th>
<th>Absolute resolution / revolution:</th>
<th>15 bit, programmable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of revolutions:</td>
<td>single turn or multi turn 4096, opt. 32768</td>
<td>Number of revolutions:</td>
<td>single turn or multi turn 4096, opt. 32768</td>
</tr>
<tr>
<td>Incremental resolutions available:</td>
<td>512, 1024, 2048, 4096 (A, B additional to the chosen absolute interface)</td>
<td>Incremental resolutions available:</td>
<td>512, 1024, 2048, 4096 (A, B additional to the chosen absolute interface)</td>
</tr>
</tbody>
</table>

## Hollow shaft QEH 65

- **Size:** 65 mm or 80 mm
- **Shaft diameter:** max. 20 mm
- **Connectivity:** Radial connector, radial cable gland
  - Radial fieldbus end-cap
  - QEH 65: (for Profinet: **address display, externally viewable**)
- **Interfaces:**
  - **single turn**
    - Parallel, SSI, ISI, programmable incremental interface (digital) INC
    - Option: A, B (hardware incremental signal)
  - **multi turn**
    - SSI, ISI
    - Profinet (PNO class 2), CAN Devicenet, CANopen
    - Option: A, B (hardware incremental signal)
- **Programmability:**
  - devices with direct interface (SSI, IGI): PC, TR WINProg
  - devices with fieldbus: via fieldbus

## Hollow shaft QEH 80

- **Size:** 65 mm or 80 mm
- **Shaft diameter:** max. 20 mm
- **Connectivity:** Radial connector, radial cable gland
  - Radial fieldbus end-cap
  - QOH 65: (for Profinet: **address display, externally viewable**)
- **Interfaces:**
  - **single turn**
    - Parallel, SSI, ISI, programmable incremental interface (digital) INC
    - Option: A, B (hardware incremental signal)
  - **multi turn**
    - SSI, ISI
    - Profinet (PNO class 2), CAN Devicenet, CANopen
    - Option: A, B (hardware incremental signal)
- **Programmability:**
  - devices with direct interface (SSI, IGI): PC, TR WINProg
  - devices with fieldbus: via fieldbus

## Hollow shaft QOH 65

- **Size:** 65 mm or 80 mm
- **Shaft diameter:** max. 20 mm
- **Connectivity:** Radial connector, radial cable gland
  - Radial fieldbus end-cap
  - QOH 65: (for Profinet: **address display, externally viewable**)
- **Interfaces:**
  - **single turn**
    - Parallel, SSI, ISI, programmable incremental interface (digital) INC
    - Option: A, B (hardware incremental signal)
  - **multi turn**
    - SSI, ISI
    - Profinet (PNO class 2), CAN Devicenet, CANopen
    - Option: A, B (hardware incremental signal)
- **Programmability:**
  - devices with direct interface (SSI, IGI): PC, TR WINProg
  - devices with fieldbus: via fieldbus

## Hollow shaft QOH 80

- **Size:** 65 mm or 80 mm
- **Shaft diameter:** max. 20 mm
- **Connectivity:** Radial connector, radial cable gland
  - Radial fieldbus end-cap
  - QOH 65: (for Profinet: **address display, externally viewable**)
- **Interfaces:**
  - **single turn**
    - Parallel, SSI, ISI, programmable incremental interface (digital) INC
    - Option: A, B (hardware incremental signal)
  - **multi turn**
    - SSI, ISI
    - Profinet (PNO class 2), CAN Devicenet, CANopen
    - Option: A, B (hardware incremental signal)
- **Programmability:**
  - devices with direct interface (SSI, IGI): PC, TR WINProg
  - devices with fieldbus: via fieldbus

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Combining Today’s Best Technologies
For Tomorrow’s Break Through Discoveries
<table>
<thead>
<tr>
<th>Programmable Sinusoidal</th>
<th>Encoder for manual operation</th>
<th>Hollow shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 32768 pulses / revolution</td>
<td>with display</td>
<td>XH 80</td>
</tr>
<tr>
<td>Absolute resolution / revolution</td>
<td>Absolute resolution / revolution</td>
<td>MG 75</td>
</tr>
<tr>
<td>17 bit, programmable</td>
<td>6 bit</td>
<td>ZH 81</td>
</tr>
<tr>
<td>single turn or</td>
<td>multi turn 65536 revolutions</td>
<td></td>
</tr>
</tbody>
</table>

**Encoder for manual operation**

**Hollow shaft**

**XH 80**

- **Size:** 80 mm
- **Connectivity:** connector, cable gland
- **Interfaces:**
  - single turn SSI, ISI,
  - SIN/COS (programmable)
  - Option: A, B
  - multi turn SSI, ISI,
  - SIN/COS (programmable)
  - Option: A, B
- **Programmability:** PC, TR WINProg

**Hollow shaft**

**MG 75**

- **Size:** 75 mm
- **Hollow shaft:** 20 mm
- **Interfaces:**
  - asynchronous serial interface (RS 485) with customized protocol up to 32 encoders on one bus
- **Programmability:** PC, EPROG

**ZH 81**

- **Size:** 80 mm
- **Connectivity:** connector, cable gland
- **Interfaces:**
  - multi turn SSI, ISI,
  - commutation
  - PROFIBUS
  - Interbus-S

The MG 75 was designed as an electronic support for the adjustment of printing, wood working and cardboard processing machines. The machine control system communicates the new destination value, the encoder calculates the difference and the correct direction of rotation.
# Incremental rotary encoders

<table>
<thead>
<tr>
<th></th>
<th>ZI 58</th>
<th>IE 58</th>
<th>IH 58</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable incremental encoder</td>
<td>hardware incremental encoder with solid shaft</td>
<td>hardware incremental encoder with hollow shaft</td>
<td></td>
</tr>
<tr>
<td>Variations</td>
<td>also as hollow shaft device or with integrated coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum resolution</td>
<td>2 - 32768 pulses / revolution</td>
<td>10000 pulses / revolution</td>
<td></td>
</tr>
<tr>
<td>Programmability</td>
<td>via PC EPROM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interfaces available</td>
<td>A, A neg. - B, B neg. - Z, Z neg. (digital signals) line driver or push pull</td>
<td>A, A neg. - B, B neg. - Z, Z neg. (digital or SIN/COS line driver or push pull</td>
<td></td>
</tr>
<tr>
<td>Shaft diameter</td>
<td>solid shaft 6, 10, 12 mm</td>
<td></td>
<td>hollow shaft 8, 10, 12 mm</td>
</tr>
<tr>
<td>Supply</td>
<td>11... 27 V DC</td>
<td>11... 27 V DC</td>
<td>5 V DC</td>
</tr>
<tr>
<td>Maximum rotation</td>
<td>12 000 / min</td>
<td></td>
<td>6 000 / min</td>
</tr>
<tr>
<td>Protection class (DIN 40 050)</td>
<td>IP 65 up to IP 65, accord. to specifications</td>
<td></td>
<td>up to IP 54, accord. to specifications</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20... +70 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General description</td>
<td>Programmable incremental encoder solves the storage problem of multiple fixed disk encoders with different resolutions. You determine the encoder’s resolution via software - even after installation.</td>
<td>The incremental encoder, IE 58, is the standard incremental encoder solution. One size (58 mm) is available with all mechanical variations (hollow shaft, blind shaft, solid shaft, integrated coupling).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IK 58</td>
<td>IS 58</td>
<td>IH 120</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------</td>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Type</td>
<td>hardware incremental encoder with integrated coupling</td>
<td>hardware incremental encoder with blind shaft</td>
<td>hardware incremental encoder with especially large hollow shaft diameter of 55 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPM</td>
<td>10000 pulses / revolution</td>
<td>1024, 2500, 3600, 10000 pulses / revolution, others a.c.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>digital or SIN/COS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>line driver or push pull</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrated coupling with mounting flange as desired</td>
<td>Hollow shaft B, 10, 12 mm</td>
<td>Hollow shaft up to 55 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11...27 V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 000 / min</td>
<td>4 000 / min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP 65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>up to IP 54, accord. to specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-20...+70 °C</td>
<td>-20...+80 °C</td>
<td></td>
</tr>
</tbody>
</table>
### Electric accessories

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programming adapter</strong></td>
<td>Connects the device to the PC. Changes signals from RS 232 to encoder programming interface and is electrically isolated. TR-Nr. 490-00301. We suggest the use in conjunction with our switch cabinet modules. USB to encoder conversion on request.</td>
</tr>
<tr>
<td><strong>SSI - parallel converter PU 10</strong></td>
<td>Converts absolute position and CAM signals from SSI interface to parallel output bits with max. 32 bit. TR-Nr. 491-00002</td>
</tr>
<tr>
<td><strong>SSI-display ADP 200</strong></td>
<td>Displays absolute position information. Available as both single and double channel version. With the double channel version, positions can be shown separately, alternating or the difference/sum of both. Programmable with TR-WINprog via IrDA adapter.</td>
</tr>
<tr>
<td><strong>Switch cabinet module</strong></td>
<td>The perfect aid for transparent encoder cabling. Correct grounding of signal wires and easy connection to our programming adapter. Module 15/2 (SSI + programming wires) TR-Nr: 490-00105 Module 6/1 (only programming wires) TR-Nr: 490-00101</td>
</tr>
<tr>
<td><strong>Pulse divider for incremental encoders</strong></td>
<td>For incremental encoder signal processing (and incremental tracks of our absolute encoders) we offer a wide range of pulse dividers and signal distributors such as the IT 10. It has one incremental input (A, A neg., B, B neg., Z, Z neg.) and one divided, adjustable output. The voltage level of input and output signal can be adjusted to the application (5V or 11 to 27 V). TR-Nr. 490-00009</td>
</tr>
</tbody>
</table>

Devices shown are a selection from our product range.
Mechanical accessories

**Coupling**
If selected and mounted correctly, CPS-couplings protect the encoder shaft from, other than rotation, vibrations and shaft movement.

Other accessories on request

**Additional options (please indicate when ordering):**
In addition to the possibilities shown, we can customize the encoder to your needs, for example with:
- EX housing
- protection housing
- stainless steel encoder
- cable lengths (with cable gland)
- different connectors
  (Contact, Binder etc., M12 with field bus end-cap)
- string pot
- impermeable to oil

Some of these options require larger housings.

Example: protective housing
# Explosion proof encoders

## CE 58 EEx
IE 58 EEx

---

**EEx-Housing** is an option for our CE 58 and IE 58 encoders. With this housing, you have the possibility to use these versatile encoder families in surroundings with zone 1, 21 as well as 2 and 22 character.

There are limitations concerning flange/shaft and connection technology. Please ask for particular case.

### Available explosion-proof certificates

II 2 G/D EEx de IIC T6 für gasförmige bzw. staubhaltige Atmosphären, baumustergeprüft PTB Ex 04-13103

### Protection class

IP 66

### Maximum rotation speed

6000 1/min (with T6)

### Shaft / flange options

- Flange ZB 36, shaft 10 round 20mm long
- Flange ZB 45, shaft 12 with groove, 24 mm long

### Connection

- 10 m cable, 16 pin, open End + PE-clamp at the housing, axial cable gland

---

Respect legal regulations for planning and use of this device!
EEx-housing with flange ZB 36 and shaft 10 GL / 20

EEx-housing with flange ZB 45 and shaft 12 with groove/24

ATEX-Denominator

(Ex) II 2 G/D EEx de IIC T6

- T6 gases with ignition temperature of more than 85 °C
- d protected by pressure proof encapsulation
- EEx certified respecting european standards and regulations
- G ... IIC gases with explosion class IIC (highest class)
- D dusts
- 2 for use in zone 1 and 2
- II device for „over ground“ operation

Please ask for detailed drawings for your machine design!
### Application

Customized production and batch sizes that are getting smaller and smaller keep on making higher demands on the flexibility of progressive automated plants. More and more importance is attached to resetting times. With encoTRive you manage your setup tasks quickly and in an automated way. All processing of positioning information takes place in the drive, the controller only has to send parameter data via the fieldbus. That means easy cabling, whilst the control load is only increased slightly.

### Features

<table>
<thead>
<tr>
<th>Hardware</th>
<th>in one device:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>motor</td>
</tr>
<tr>
<td></td>
<td>sensor</td>
</tr>
<tr>
<td></td>
<td>converter</td>
</tr>
<tr>
<td></td>
<td>position closed-loop controller</td>
</tr>
<tr>
<td></td>
<td>maintenance-free EC 24V motor (48 V in preparation)</td>
</tr>
<tr>
<td></td>
<td>compact configuration with high power and low volume</td>
</tr>
<tr>
<td></td>
<td>absolute multi-turn encoder</td>
</tr>
<tr>
<td></td>
<td>no referencing:</td>
</tr>
<tr>
<td></td>
<td>after power loss</td>
</tr>
<tr>
<td></td>
<td>after emergency stop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication</th>
<th>fieldbus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>serial interface</td>
</tr>
<tr>
<td></td>
<td>fast implementation by existing PLC function blocks</td>
</tr>
<tr>
<td></td>
<td>variable connection options</td>
</tr>
</tbody>
</table>
### Hardware options

<table>
<thead>
<tr>
<th>Motor</th>
<th>maintenance-free EC-Motor, 24 V (48 V in preparation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear / brake</td>
<td>planetary and angular planetary gears with different ratios</td>
</tr>
<tr>
<td></td>
<td>optional brake</td>
</tr>
<tr>
<td></td>
<td>customized mounting flanges</td>
</tr>
</tbody>
</table>

### Mechanical connection

### Connectivity

- different circular and square connectors for fieldbus and power
- (e.g. Harting DESINA...) as desired

### Typical, technical data

- supply: 24 V DC, 48 V DC
- typical power output: 62 W (S1), 290 W

### Software options

#### Measuring system

- absolute encoder
- up to 17 bit / revolution
- 131,072 revolutions (motor shaft, with respect to gear ratio 1)

#### Interfaces

- Profinet (PROFIDrive V2.0, V3.0)
- CANopen (DSP-402)
- In preparation:
  - DeviceNet, LightBus, EtherCAT, Powerlink and others
  - diagnostic interface

#### Operating modes

- absolute point-to-point
- speed control
- intermix operation

#### Optional functions

- memory for positioning data
- special control algorithms
- Micro-PLC with 8 I/Os
- additional measuring system input
- customized control and closed-loop control functions

#### Extras

- digital inputs and outputs
- handheld device as desired
- OEM-specific functions can be integrated
# Linear encoders

## Storage and logistics

<table>
<thead>
<tr>
<th>LE 200</th>
<th>LE 10</th>
<th>ID 200</th>
<th>BE 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser range finder</td>
<td>Laser range finder</td>
<td>cableless fieldbus transmission for storage and logistics</td>
<td>non-contact, barcode based absolute measuring system for storage and logistics</td>
</tr>
<tr>
<td>Measuring range</td>
<td>Measuring range</td>
<td>Transmission range</td>
<td>Measuring range</td>
</tr>
<tr>
<td>0.2... 125 m, 0.2... 170 m absolute, others on request</td>
<td>0.2... 50 m absolute</td>
<td>120 m, 200 m others on request</td>
<td>9.999 m absolute</td>
</tr>
<tr>
<td>Resolution</td>
<td>Resolution</td>
<td>Resolution</td>
<td>Resolution</td>
</tr>
<tr>
<td>0.1 mm</td>
<td>0.2 mm</td>
<td></td>
<td>±1 mm (switchable to ±2 mm)</td>
</tr>
<tr>
<td>Programmability</td>
<td>Programmability</td>
<td>Programmability</td>
<td>Programmability</td>
</tr>
<tr>
<td>via PC, TR WINProg</td>
<td>fieldbus, front panel with display, TR WINProg</td>
<td>via PC, BE-Config fieldbus</td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>Interfaces</td>
<td>Interfaces</td>
<td>Interfaces</td>
</tr>
<tr>
<td>SSI</td>
<td>Profibus (DP, FMS, MPI) up to 1.5 MBit, CANopen, DeviceNet, Interbus 5 500 kBit / s (copper wire), Interbus 5 2 MBit / s (FO), Rockwell (DH+, RIO), RS 422, RS 485 on request</td>
<td>SSI</td>
<td>Profibus-DP</td>
</tr>
<tr>
<td>Supply 18... 27 V DC, &lt; 6 W (typ.)</td>
<td>Supply 18... 27 V DC, &lt; 15 W (typ.)</td>
<td>Supply 18... 30 V DC</td>
<td>Supply 11... 27 V DC</td>
</tr>
<tr>
<td>Protection class IP 65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Absolute position measurement of high-level rack and transportation devices, non-contact and perfect for closed-loop control due to the short cycle time.
- For short measuring distances with minimal installation space.
- The ideal supplement to our non-contact measuring systems.
- The barcode based absolute measuring system BE 90 solves even complicated measuring tasks in storage and logistics, especially suitable for systems that move in curves.
### Linear absolute distance measurement

<table>
<thead>
<tr>
<th>LA 25</th>
<th>LA 41 / LA 42</th>
<th>LA 46</th>
<th>LA 65 H</th>
</tr>
</thead>
<tbody>
<tr>
<td>compact, linear absolute distance measurement system for integration in hydraulic cylinders</td>
<td>linear absolute distance measurement system for integration in hydraulic cylinders or for general applications</td>
<td>The universal standard for installation in cylinders</td>
<td>linear absolute distance measurement system with separate pressure casing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Measuring range</th>
<th>Measuring range</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 2000 mm</td>
<td>up to 4000 mm</td>
<td>up to 2000 mm</td>
<td>up to 4000 mm</td>
</tr>
<tr>
<td>&gt; 2000 mm on request</td>
<td>&gt; 4000 mm on request</td>
<td>&gt; 2000 mm on request</td>
<td>&gt; 4000 mm on request</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Resolution</th>
<th>Resolution</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,005 mm, hysteresis &lt; 0,02 mm</td>
<td>0,01 mm</td>
<td>0,005 mm</td>
<td>0,01 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Programmability</th>
<th>Programmability</th>
<th>Programmability</th>
<th>Programmability</th>
</tr>
</thead>
<tbody>
<tr>
<td>via PC, TR WINProg</td>
<td>via PC, EPROG fieldbus</td>
<td>via PC, TR WINProg fieldbus</td>
<td>via PC, TR EPROG fieldbus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interfaces</th>
<th>Interfaces</th>
<th>Interfaces</th>
<th>Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>synchronous serial</td>
<td>synchronous serial</td>
<td>synchronous serial analog (U1)</td>
<td>synchronous serial analog (U1)</td>
</tr>
<tr>
<td>start stop analog (U1) CAN(open)</td>
<td>Profinbus DP (address display, externally viewable)</td>
<td>CAN(open)</td>
<td>increment serial</td>
</tr>
<tr>
<td>incremental serial</td>
<td></td>
<td>CANOpen, DeviceNet</td>
<td></td>
</tr>
</tbody>
</table>

- Supply 24 V DC ±10%, < 4 W (typ.)
- Supply 24 V DC ±10%, < 5 W (typ.)
- Supply 19-27 V DC ±10%, < 5 W (typ.)

**Protection class** up to IP 65, according to specifications

**Operating temperature** -20... +70 °C

The compact 25 mm diameter sensing head enables integration even when there is only minimal space for installation. The interface electronics are separately housed.

As sensor electronics and interface are placed in the same housing, the LA 41/42 is the perfect all-in-one-device. Two basic types of flanges enable installation in almost any commercial hydraulic cylinders.

The new, universal LA 46 is mechanically compatible to most commercial absolute position measurement systems and therefore perfect for new builds or retrofitting.

Due to the separate housing, the sensing system can be changed without releasing pressure inside the cylinder.
# Linear encoders

<table>
<thead>
<tr>
<th>Linear absolute distance measurement</th>
<th>LA 66</th>
<th>LA 80</th>
<th>LP 38</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Linear absolute measurement system that meets every demand for almost every interface</td>
<td>Linear absolute measurement system for harsh environments with float for level measurement</td>
<td>Linear absolute measurement system in extruded aluminium housing for mechanical engineering applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum operating range</th>
<th>up to 4000 mm</th>
<th>&gt; 4000 mm on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum resolution</td>
<td>0.01 mm</td>
<td></td>
</tr>
<tr>
<td>Programmability</td>
<td>depends on the interface</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interfaces available</th>
<th>synchronous serial, analog (U,I) asynchronous serial, parallel, cams, FiberOptic I/O (FO), FIPFO Profibus (PNO), Interbus-S, EtherCAT, Powerlink</th>
<th>synchronous serial incremental serial analog (U,I)</th>
<th>synchronous serial incremental serial, analog (U,I) CANopen, up to 16 magnets CAN DeviceNet Profibus, up to 12 magnets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply</td>
<td>24 V DC ±10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection class (DIN 40 050)</td>
<td>up to IP 65, according to specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20...+70 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General description</td>
<td>Due to the spacious housing, the LA 66 also supports those interfaces that more compact devices can not use.</td>
<td>Due to the PE (optional PTFE) casing, the LA 80 is perfectly suitable for the food, paper and electroplating industry. Please ask for the chemical resistivity list.</td>
<td>The multi-magnet option (available for CAN and Profibus) enables measurement of up to 16 (Profibus up to 12) positions at the same time.</td>
</tr>
</tbody>
</table>

Devices shown are a selection from our product range.
<table>
<thead>
<tr>
<th>Linear absolute transformation measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LP 46</strong></td>
</tr>
<tr>
<td>Same interfaces as the standard LA 46, but in extruded aluminium housing</td>
</tr>
<tr>
<td>up to 2000 mm</td>
</tr>
<tr>
<td>&gt; 2000 mm on request</td>
</tr>
<tr>
<td>0,005 mm, hysteresis &lt; 0,02 mm</td>
</tr>
<tr>
<td>TR WINProg fieldbus devices via bus</td>
</tr>
<tr>
<td>synchronous serial analog</td>
</tr>
<tr>
<td>24 V DC, &lt; 4 W</td>
</tr>
<tr>
<td>IP 65</td>
</tr>
<tr>
<td>0...+70 °C</td>
</tr>
<tr>
<td>Mechanically compatible with various systems due to adjustable mounting clamps.</td>
</tr>
</tbody>
</table>
### The concept:

You need a position controlled hydraulic axis. Up to now you had to integrate the adjustment of cylinder, valve, sensing device and control card with each other and put them into operation. In addition, you were faced with cabling and space accommodation.

Our system co-partner, or you yourself, provide the power of the system by supplying the cylinder and the valve - the intelligence for absolute positioning is located in hyTRax by TR-Electronic.

---

hyTRax integrates all the signal processing within the sensing device. Besides the pressure and tank line, the desired value set point and the parameter interface are the only connections necessary. You can choose between simple current/voltage inputs or trend-setting field bus interfaces (Profibus, CANopen, DeviceNet and others).
The advantages

- compact, hydraulic drive solution
- self-sufficient, intelligent subsystem as a self-contained component
- minimum cabling
- minimum configuration of process interfaces
- wide range of interfaces for parameterizing and communication
- easy installation and maintenance - just plug-and-run
- minimization of susceptibility to interferences
- modular system, therefore adjustable to individual application requirements
- cost-effective overall solution
- freely programmable positioning commands
- computer-based design configuration of the total axis by TR
  (performance specifications, concept of control, simulation)
# Systems

<table>
<thead>
<tr>
<th>Industrial PC</th>
<th>epc</th>
<th>MIPC</th>
<th>MCC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features</strong></td>
<td>PC power in panel housing with integrated fieldbus and shock proof mounting</td>
<td>The modular ultimate of automation with front panel and shock proof mounting</td>
<td>Processing power for detached mounting - also in stainless steel housing for food industry</td>
</tr>
</tbody>
</table>
| **Display**   | 12” - 15”  
800 x 600... 1024 x 786 | 10,4” - 15”  
640 x 480... 1024 x 786 |  |
| **CPU/ slots** | ISA, PISA, PCI according to specifications | 64 MB |  |
| **RAM**       | optional 128, 256 MB | optional up to 512 MB |  |
| **Drives**    | hard disk 3,5”  
flash disk instead of hard disk  
others on request  
optional FD, CD (slim size) | all commercial 3,5” PC drives can be integrated  
RAID-Module |  |
| **Keyboard**  | only external keyboard possible touchscreen | short stroke keyboard  
ABCD, QWERTZ and others  
F-keys, optional 5-keys  
finger mouse, touchscreen optional |  |
| **Interfaces**| PC standard interfaces |  |
| **Dimensions**| B 350 x H 266... B 451 x H 320  
6 kg... 9 kg, frontal IP 65 | 19”, spec. dim., e.g. B 334 x H 504  
13 kg... 21 kg, frontal IP 65 | B 19” x H 4 units  
19 kg... 20 kg |
| **Supply**    | 24 V DC  
typical 40 W  
UPS as an option | 24 V DC  
150 W, 200 W as an option | 120/240 V AC 50/60 Hz switchable  
typical 150 W... 230 W  
alternatively 24 V DC, 200 VA,  
UPS as an option |
| **General description** | As fieldbus interfaces can be integrated, it is the perfect control PC and operating panel. | The integrated solution for visualization and efficient control platforms. | The traditional PC solution with detached display. Perfect as production server. |

*Devices shown are a selection from our product range*
### Displays

**edsp**

<table>
<thead>
<tr>
<th>Features</th>
<th>Displays for high industrial demands</th>
</tr>
</thead>
</table>
| Display  | 10”... 15”
       | 640 x 480... 1024 x 768
       | TFT display with backlight,
touchscreen as an option |
| Interfaces | VGA
       | optional digital DisplayNet, LVDS
       | or RGB
       | others on request |
| Dimensions | 830 x H 220... B 420 x H 320
       | 5 kg... 6 kg |
| Supply    | 24 V DC |
| General description | Visually, the edsp display’s perfectly match the epc series of panel PC’s.
Due to the various interface options, this display is in high demand for replacement devices and refitting.
Using the innovative DisplayNet technology, several displays can be run over extended distances from a single host. |
Systems

@ctiveIO

Modern plants and machine concepts use decentralized automation systems. TR Systemtechnik consistently supports a broad product range for automation engineering. A prime example is the legendary FOX-series closed-loop controller. It is one of the most universal application devices available, especially in hydraulics and materials handling.

Efficient fieldbusses and Industrial Ethernet expand the possibilities for even more modular plant and machine designs with ever more intelligence going directly into the field. We service these trends and customer requirements with @ctiveIO. We have put all our experience and knowledge of industrial electronics, fieldbus and communication technology into the @ctiveIO system - completely "made by TR Systemtechnik".

In order to meet the different requirements of large scale and special machine production, we offer @ctiveIO in two hardware designs that are compatible with each other. For limited quantities and individual nodes you combine @C controller and @M I/O-modules yourself. For large quantities we deliver completely configured nodes of @C and @X I/O-modules in a common housing. You only order one article and can be sure you always get the node with the same configuration.

Software

As we already mentioned, @ctiveIO has more to offer than mere fieldbus communication. You yourself can create and expand the nodes’ function using our software modules or programs.

@CAM - High-speed applications demand fast control information. @CAM can transfer encoder generated CAM values to several @IO modules via the bus.

@AXIS - The successor of the universal closed-loop controller FOX-AXIS. One @AXIS controls up to eight electrical or hydraulic axes, even with switchable parameter values (e.g. distance/pressure control).

@PLC - Especially for decentralized control engineering to relieve higher level controls and make plants more modular. @PLC integrates itself control-side like a simple fieldbus node (adjustable width in fieldbus), but can itself process local I/O-signals without fieldbus involvement.

@CUST - Here it’s up to you. With our support you can back up your individual control and closed-loop control code in our modules.
The key parts of any system are versatile I/O modules. As they are modular, @M and @X, with an accuracy of 1 byte, can achieve your individual configuration. You can select from standard industrial interfaces, such as digital or analog inputs and outputs, measuring systems and power distribution clamps. That enables flexible and compact solutions. Two types that meet your requirements:

If you use configurations that differ a lot, we deliver the modules in separate housings. When customized and installed on the mounting rail, the @M are electrically and mechanically safely connected.

If you use @ctiveIO-nodes in series production machines or modules, we match the nodes for you according to your individual needs. These @X are placed in a common housing, with the same mechanical characteristics as the single type. Therefore, only one compact assembly for your installation and startup. Additional @M-modules can be coupled to those prefabricated @X-modules.

The core of the decentralized intelligence is the controller module. It connects the communication technology (fieldbusses, partly Ethernet) with the I/O-level. In addition to the mere transmission of information between fieldbus and I/O-modules, the controllers also take on control and closed-loop control tasks independently. As these software modules make different demands on the hardware, we offer three basic types:

@C100 - The fieldbus node. With the fieldbus-node @C100 you bring all your I/O-data to the bus.

@C200 - Industrial Ethernet on board. In addition to the traditional fieldbus interface the @C100's big brother also offers Ethernet and thanks to our modular architecture we can accommodate existing and future standards.

@C500 - PC power in the field. For applications with high demands on power we offer you a full industrial PC for snap-on, mounting rail fitting. In addition to the I/O-module interface, it also has all standard PC interfaces, such as LPT, COM, keyboard, mouse, VGA and Ethernet. Due to the open PC104-based configuration other interfaces, such as fieldbus master, are easy to achieve.
Systems

Bus terminal

The universal basic element for automation

The bus terminal is an open and fieldbus-neutral periphery concept consisting of electronic terminal blocks. The heart of an electronic terminal block is the bus coupler fieldbus interface. Bus couplers are available for Lightbus, Profibus-DP/FMS, Interbus, CANopen, DeviceNet, ControlNet, Modbus, SERCOS interface, RS 232/ RS 485, Ethernet TCP/IP or USB, and new: EtherCAT.

One bus coupler supplies up to 64 electronic terminal blocks for any form of signals. The terminal blocks are clipped onto the bus coupler and connected by simply latching together, without further movement. The I/O-level can be built up uniformly based on the electronic terminal blocks and still remains fieldbus-neutral.

Simple and space-saving

The bus terminal ensures that switch cabinets and terminal boxes are constructed more economically. It is no longer necessary to wire the field devices between the first terminal connection in the control cabinet or in the terminal box and the controller. Therefore terminal boxes and especially switch cabinets get smaller and more reasonable. Installation and wiring of the bus terminal is thus simple and compact like that of a standard terminal block. The bus terminal can be connected to the controller by connecting a bus coupler via the fieldbus as required.

The bus terminal has been highly successful in various industrial sectors using automation systems, such as automotive and manufacturing industry, mechanical engineering, materials handling and environmental technology.

Free mix of signals

The bus terminal components enable users to operate mixed signals without restriction at each station. This means that a single non-central input/output node can map all the necessary signals. Besides digital I/O terminals there are also terminals available for analog signals or current and voltages with standardised signal levels and for the PT100. Intelligent devices can be connected via bus terminals with serial interfaces in accordance with RS 232 C, RS485 or 20 mA TTY.

Devices shown are a selection from our product range.
Slot-PLC

The happy medium
The TR SystemsTechnik slot-PLC combines the stability of a hardware PLC with the easy visualization options of a software PLC.

In the past, industrial PC’s, in combination with conventional PLC’s, were mainly used for visualization tasks. The critical point concerning visualization has always been the serial and/or network connection. The classical PLC becomes redundant when its functions are integrated into an industrial PC. I/O-modules are connected via fieldbuses, such as Profibus-DP, Interbus-S, CANopen, DeviceNet or LightBus. The data for visualization are transmitted quickly via the ISA and/or PCI-bus of the industrial PC, where up to six slot-PLCs can be integrated.

Clear task sharing
Within a plant the host CPU takes on the visualization, whereas the slot-PLC takes on control and closed-loop control tasks. The strict separation of functions increases the transparency of control tasks and contributes significantly to the system’s stability. Slot-PLC and host CPU communicate via a decoupled DP-RAM. The visualization cannot directly influence the PLC program. Even a complete crash of an application on the host PC does not interfere directly with the control on the slot-PLC.

As programming languages, S5/57 and IEC 61131 are available. No matter what fieldbus and host bus have been chosen, the PLC programs can always be used. Only the bus configuration must be adjusted accordingly.

A special feature is the programmability via Ethernet, which enables centralized supply of programs for networked controls.

For plant safety the SPC can be provided with a buffered RAM which permanently retains data even after power failure. In addition, a UPS card can be integrated in order to keep the controller running.

Technical data
According to its instruction set, the SPC is compatible to S7 416 or S5 945. A Siemens-PG with Simatic Manager can be used as a programming unit. Of course other programming systems for S5/57 can also be used. The connection to the programming system is established either by MPI via RS 232 or by MPI via Ethernet. The SPC operates with a Geode 300 MHz as well as other CPUs and does not require a fan.
Examples of possible applications

**Storage and logistics**

Powerful, decentralized measurement and control systems, with simple commissioning and set-up, are crucial for modern, automated storage and logistics equipment, such as aisle stackers, transfer runways and crane installations.

**Packaging industry**

Solutions for control equipment, adapted to customers' needs, are the intelligent base for successful machine design in the packaging industry. High processing speed is required for short lead times and high production runs.

Absolute sensors no longer require time costly referencing as intelligent, highly integrated sensor technology reduces the volume of the machines and removes load from the master control. For applications with high demands on accuracy we especially find a suitable solution. In the past that was only a distant hope.
Metal processing

For a long time, the sheet metal working industry has been a TR-Electronic speciality field. As this industry has very particular requirements, our products are designed for heavy-duty applications even from the initial development stage on. TR-Electronic - that’s years of experience in vibration and shock!

Woodworking

Intelligent, decentralized control technology, powerful sensors with integrated signal processing and components that work reliably despite great variation in temperature and vibration, are the basis for automation solutions for the woodworking industry. Providing automatic transfer facilities on working machines or assembly cells with intelligent systems is our speciality - and especially if you are looking for a platform for your particular machine philosophy or a very particular function.
TR-Electronic - Your partner for absolute measurement and control

Innovative solutions as a standard

Coming up with exciting new ideas takes a combination of intuition, innovation and experience with moving components. Anyone who wants to turn his vision of automation technology into tangible benefits should have a specialist like TR-Electronic at his side.

TR-Electronic is a partner who acts as well as reacts - a partner to whom flexibility means more than just product availability.

For TR-Electronic innovation is, therefore, closely linked to the ability to react flexibly to changing requirements. Moreover, the dynamic innovative spirit which has characterized the company since its foundation is still omnipresent after twenty years of active market exposure: providing automation technology with new, future orientated impulses.

Due to the sophisticated interplay of know-how and up-to-the-minute development and manufacturing equipment, TR-Electronic sets new standards.
In order to fulfil your high expectations, we take the utmost care in the manufacture of our products and subject them to the most stringent criteria. Even the most extreme field conditions can be simulated in our in-house environmental laboratory. The results of this contribution to reliability are consistently applied to the development and design of TR products.
# Worldwide Presence

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Phone Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Germany</strong></td>
<td>TR-Electronic TB Süd GmbH, Roland Meyer, Wickerer Weg 45/719 Hofheim, Tel.: +49 (0) 61 92 / 3 36 47, Fax: +49 (0) 61 92 / 3 36 71, <a href="mailto:Roland.Meyer@tr-gruppe.de">Roland.Meyer@tr-gruppe.de</a></td>
<td>Phone: 877-478-3241, Phone: 877-IP-Tech1, Fax: 877-IP-Tech2, <a href="http://www.iptech1.com">www.iptech1.com</a></td>
</tr>
<tr>
<td><strong>Argentina</strong></td>
<td>AEA Aparatos Eléctricos Automáticos, S.A.C.I.E./ Asunción 2130, RA-1419, Buenos Aires, Tel.: +54 / 11-4574 1155, Fax: +54 / 11-4574 2400, servicio@<a href="mailto:lente@aaa.com.ar">lente@aaa.com.ar</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td>Sensor Measurement Pty Ltd., Unit 8/26 Shields Crescent, P.O. Box 1079, Boongar, Western Australia 6154, Tel.: +61 / 8-93 17 25 52, Fax: +61 / 8-93 17 24 52, <a href="mailto:sales@sensormeasurement.com.au">sales@sensormeasurement.com.au</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Belgium</strong></td>
<td>Martek SPA, Rue du Broux 16, B-1320 Be euxhechain, Tel.: +32 / 10 66 62 80, Fax: +32 / 10 66 63 89, <a href="mailto:info@martek.be">info@martek.be</a>, <a href="http://www.martek.be">www.martek.be</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Brazil</strong></td>
<td>C-Tecnologia, Avenida Pedroso de Marais, 433-13 andar, CEP-05419-000, Pirheiros - São Paulo –SP, Tel.: +55 11 3815 6554, Fax: +55 11 3815 4819, info@c- tecnologia.com.br, <a href="http://www.c-tecnologia.com.br">www.c-tecnologia.com.br</a></td>
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</tr>
<tr>
<td><strong>China</strong></td>
<td>TR-Electronic, Shanghai, Rm 102, #74, Phoenix City, 3356 Nong Yin Du Road, 201108, Shanghai, P.R., China, Tel.: +86 / 21 - 5463 5113, Fax: +86 / 21 - 5831 4820, <a href="mailto:tr-electronic@online.sh.cn">tr-electronic@online.sh.cn</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Denmark</strong></td>
<td>FH Gruppen A/S, Bjerrnevæj, DK 8700 Horsens, Tel.: +45 / 76 25 44 44, Fax: +45 / 76 25 44 45, <a href="mailto:mail@fh-gruppen.dk">mail@fh-gruppen.dk</a>, <a href="http://www.fh-gruppen.dk">www.fh-gruppen.dk</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Finland</strong></td>
<td>Sarlin Oy, E. AB, Kaivokelanle 3-5, SF-00101 Helsinki 10, Tel.: +358 / 9-560 441, Fax: +358 / 9-563 3227, <a href="mailto:mynti.automation@sarlin.com">mynti.automation@sarlin.com</a>, <a href="http://www.sarlin.com">www.sarlin.com</a></td>
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</tr>
<tr>
<td><strong>France</strong></td>
<td>TR-Electronic France SARL, 56 Boulevard du Courrier Bât. 16, 59 Pariest-Marne La Vallée, F-77183 Creissy-Beaumont, Tel.: +33 / 1-64 62 13 13, Fax: +33 / 1-64 62 20 02, <a href="mailto:info@tr-electronic.fr">info@tr-electronic.fr</a>, <a href="http://www.tr-electronic.fr">www.tr-electronic.fr</a></td>
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</tr>
<tr>
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<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>India</strong></td>
<td>Global Tech (India) Pvt Ltd, 404 White House, 1482, Sadakht Pamp, Tilak Road, Pune - 411 030, Tel.: +91 / 20-2447 00 85, Fax: +91 / 20-2447 00 86, <a href="mailto:info@globitechindia.com">info@globitechindia.com</a></td>
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<tr>
<td><strong>Israel</strong></td>
<td>DOR Drive Systems L.T.D., P.O.B. 6, Kibbutz Einat, 49910, Tel.: +972 / 9 9007595, Fax: +972 / 9 9007599, <a href="mailto:sales@lor1.co.il">sales@lor1.co.il</a>, <a href="http://www.dor1.co.il">www.dor1.co.il</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>Telestar S.r.l., Via C. Colombo 13, I-22069, Rovellato (Ca), Tel.: +39 / 02-96 74 02 61, Fax: +39 / 02-96 74 02 73, <a href="mailto:telestar@telestar-automations.it">telestar@telestar-automations.it</a>, <a href="http://www.telestar-automations.it">www.telestar-automations.it</a></td>
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</tr>
<tr>
<td><strong>Japan</strong></td>
<td>SANTECS CO. LTD., 1-60 Tsuchiyu-cho, 1-Chome, Komishikane, Osaka 554-4691, Tel.: +81 / 6-6465 5561, Fax: +81 / 6-6465 5921, <a href="mailto:info@santtecs.co.jp">info@santtecs.co.jp</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
<tr>
<td><strong>Canada, Mexico</strong></td>
<td>TR Electronic, P.O. Box 2543, Station B, London, Ontario Canada N6A 4G9, Tel.: +1 / 519-452 1999, Fax: +1 / 519-452 1177, <a href="mailto:customerscare@telecronic.com">customerscare@telecronic.com</a>, <a href="http://www.telecronic.com">www.telecronic.com</a></td>
<td>Combining Today’s Best Technologies For Tomorrow’s Break Through Discoveries</td>
</tr>
</tbody>
</table>
TR-Electronic - worldwide presence:

Argentina  
Australia  
Austria  
Belgium  
Brazil  
Canada  
China  
Czech Republic  
Denmark  
Finland  
France  
Germany  
Great Britain  
India  
Israel  
Italy  
Japan  
Netherlands  
Poland  
Portugal  
Singapore  
Slovakia  
Slovenia  
South Africa  
South Korea  
Spain  
Sweden  
Switzerland  
Thailand  
Turkey  
USA
To meet the market demand of sending absolute position to an incremental measuring device, TR has developed an incremental A Quad B interface which is integrated into the absolute encoder and linear transducer. This revolutionary interface converts the absolute position value to incremental pulses. After a loss of power the controller requests the encoder to send its absolute position. This is accomplished with the use of the “LOAD INPUT”. Once it has been toggled on and off, the encoder will send a stream of pulses over the A and B channels equal to the absolute position. This makes mechanically homing or zeroing your machine obsolete. (see inside for details).
Absolute Encoder CE-65 - ISI, CE-100 - ISI

Overview:

The TR multturn encoder is an absolute device utilizing a coded optical disk to divide one rotation of its shaft into a maximum of 8192 steps (There are no batteries or capacitors that hold the position while power is off). The shaft also drives satellite disks that track absolute position over 4096 revolutions. Since the encoder utilizes a microprocessor it has the ability to be programmed. Parameters such as the number of steps per revolution, number of revolutions and others can be modified to optimize the system.

In industry, there are many methods for passing absolute position information from the encoder to a controller. Parallel, serial and various fieldbus systems such as DeviceNet are common. TR has developed another interface dubbed the ISI (Incremental Serial Interface). This revolutionary interface converts the absolute position value to incremental pulses. To the controller or counter card this appears to be a normal A quad B incremental encoder signal. With incremental axes, if power is lost, then the system must be mechanically moved to a reference point. With the ISI encoder, however, this is not necessary. After a loss of power the controller only needs to ask the encoder to send its absolute position. To do this there is an input to the encoder call “Load Input”. Once it has been toggled on and off, the encoder will send a stream of pulses over the A and B channels that equals the absolute position of the encoder. As a method of hand shaking and to disable motion, a “Load Output” signal is provided which will remain high while the position value is being loaded to the counter module. Once the load output signal drops low, normal real-time operation resumes. The output frequency is programmable from 2kHz to 124kHz. This enables the encoder to interface with a wide range of controllers and counter modules.

Advantages:

- Any incremental axis can be made absolute with little change in hardware.
- All electronics are contained in the encoder. No additional modules needed.
- Reduced stock requirements.

Absolute - Rotary Encoder

Electrical Specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder Capacity</td>
<td>8192 counts/rev x 4096 revs. (2048 ppr x 4096 revs.)</td>
</tr>
<tr>
<td>Encoder Capacity Optional</td>
<td>8192 counts/rev x 256,000 revs.</td>
</tr>
<tr>
<td>Power Supply</td>
<td>11-27 VDC</td>
</tr>
<tr>
<td>Power Dissipation (No Load)</td>
<td>2 watts</td>
</tr>
<tr>
<td>Programming via RS485</td>
<td>EPROG software, programming terminal PT 100</td>
</tr>
<tr>
<td>Output Code</td>
<td>A QUAD B</td>
</tr>
<tr>
<td>Incremental signals:</td>
<td></td>
</tr>
<tr>
<td>Output, A, B and Inverted Signals</td>
<td>Line driver RS422, max. current 50mA (5V) or push-pull, max. current 15mA</td>
</tr>
<tr>
<td>Load Output</td>
<td>push-pull or RS422 Line Driver Standard</td>
</tr>
<tr>
<td>Control Output Options</td>
<td>4 limit switches, overspeed control, direction output, standstill signal, encoder error signal</td>
</tr>
<tr>
<td>Inputs:</td>
<td></td>
</tr>
<tr>
<td>Load Input</td>
<td>Standard</td>
</tr>
<tr>
<td>Preset 1 + 2</td>
<td>Standard</td>
</tr>
<tr>
<td>Special Inputs</td>
<td>Upon Request</td>
</tr>
<tr>
<td>Life Time of Opto Electronic</td>
<td>100,000 operating hours</td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td></td>
</tr>
<tr>
<td>- Standard</td>
<td>-60°C to 85°C (232°F to 140°F)</td>
</tr>
<tr>
<td>- Extended (Optional)</td>
<td>-40°C to 70°C (-40°F to 158°F) with heater (CE 70 and CE100 only)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>98% (non condensing)</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP65 (DIN40 050)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 20% relative to 1 increment</td>
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</table>
**Mechanical Specifications:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. RPM</td>
<td>6000 RPM</td>
</tr>
<tr>
<td>Max. Load at Shaft</td>
<td>40 N. Axial, 60 N. Radial (end of shaft)</td>
</tr>
<tr>
<td>Guaranteed Lifetime of Bearings</td>
<td>3.9 x 10^6 Rotations at</td>
</tr>
<tr>
<td>- Operational RPM</td>
<td>3000 RPM</td>
</tr>
<tr>
<td>- Load at Shaft</td>
<td>20 N. Axial, 30 N. Radial (at shaft end)</td>
</tr>
<tr>
<td>- Operating Temperature</td>
<td>60°C (140°F)</td>
</tr>
<tr>
<td>Protection Class with 26 Pin Connector</td>
<td>IP65 (DIN 40 050)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to 70°C (-40°F to 158°F)</td>
</tr>
<tr>
<td>Weight</td>
<td>CE-65 0.7 kg (1.5 lbs); CE-100 1.3 kg (2.9 lbs)</td>
</tr>
<tr>
<td>Max. Angular Acceleration</td>
<td>&lt; 10^6 rad / sec.</td>
</tr>
<tr>
<td>Momentum of Inertia</td>
<td>2.5 x 10^4 Kgm²</td>
</tr>
<tr>
<td>Startup Momentum at 20°C (68°F)</td>
<td>2 Ncm</td>
</tr>
<tr>
<td>Vibration (50 - 2000 Hz)</td>
<td>10g (&lt; 100 m / sec.)</td>
</tr>
<tr>
<td>Shock (11 msec) IEC 68/2</td>
<td>100g (&lt; 1000 m / sec.)</td>
</tr>
</tbody>
</table>

**Optional Outputs:**
- Overspeed
- Limit Switches
- Direction
- Encoder Error

**Preset:**
This input enables the encoders absolute position to be adjusted to a predetermined value. This value can be programmed in the EPROM software. On the rising edge of this input the value will be changed. For example, if the preset value is set to 0 in the software, the encoder can be electronically zeroed at the mechanical zero position.

**Mechanical Dimensions CE-65-ISI (dimensions in Millimeters)**

**Inputs:**

**Programming and display interface:**

**Mechanical Dimensions CE-100-ISI (Dimensions in Millimeters)**
Linear - Absolute Displacement Sensor LA-66-ISI, LP-38-ISI

The measurement is based on ultrasonic propagation delay. The signal propagation time is proportional to the distance and is processed in an electronic circuit. A magnetic position sensor reads the distance without mechanical contact. Current pulses are reflected as ultrasonic signals by the magnetic system and are converted into a distance information. The processor calculates this distance information and provides it as an incremental A QUAD B signal at the output.

Advantages:

- Robust Mechanics
- No-contact and no-wear sensor
- Suitable for hydraulic cylinders (600 BAR)
- No restrictions regarding operating speed and mounting orientation
- Resolution 0.01 mm
- Programmable, scalable
- All electronics for ISI interface built into sensor
- Inputs: preset, load
- Control outputs upon request

<table>
<thead>
<tr>
<th>Measuring Method</th>
<th>Magnetostrictive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard measuring range (mm)</td>
<td>150, 300, 500, 700, 750, 1000, 1500, 2000</td>
</tr>
<tr>
<td>Special Size</td>
<td>custom length upon request</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0° to 70° C (32° to 158° F) electronics</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP65 (DIN 40 050)</td>
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<tr>
<td>Operating Voltage</td>
<td>19-27 V DC</td>
</tr>
<tr>
<td>Programming</td>
<td>PT - 100</td>
</tr>
<tr>
<td>Sensor Capacity</td>
<td>depending on length of system</td>
</tr>
<tr>
<td>Output Code</td>
<td>A QUAD B</td>
</tr>
<tr>
<td>Data Output</td>
<td>A, A, B, B</td>
</tr>
</tbody>
</table>

Mechanical Specifications:

| Protection Class | IP 65, DIN 40 050 |
| Operating Temperature Range | 0° to 70° C (32° to 158° F) |
| Storage Temperature | -40° to 100° C (-40° to 212° F) |
| Weight, dependant on type and stroke length | 2.0 - 2.9 lbs |
| Vibration (Max.) (50Hz - 4kHz) | 20g (200 m/sec²) |
| Pressure Resistance (optional) | 8700 PSI static and dynamic (LA-66) |
| Magnetic Field | <3 mT (milli Tesla) |
| Operating Speed and Mounting Position | No restrictions |

Measurement Specifications:

| System Resolution | 0.01 mm |
| Linearity | <0.05% of total measurement length |
| Repeatability | ≤0.01 mm |
| Hysteresis | ≤0.01 mm |
| Temperature Coefficient | 5 μm°C @ 20° to 70°C (68° to 158°F) |
Linear absolute transducer

Mechanical dimensions LA - 66 ISI (dimensions in millimeters)

D = dampened range; signals not guaranteed
L = 5mm additional length for optional pin bearings

<table>
<thead>
<tr>
<th>Measuring Range (M/mm)</th>
<th>Rod Length (S/mm)</th>
<th>Cycle Time (ms)</th>
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</thead>
<tbody>
<tr>
<td>150</td>
<td>256</td>
<td>1.4</td>
</tr>
<tr>
<td>300</td>
<td>406</td>
<td>1.4</td>
</tr>
<tr>
<td>500</td>
<td>606</td>
<td>1.4</td>
</tr>
<tr>
<td>700</td>
<td>806</td>
<td>1.4</td>
</tr>
<tr>
<td>900</td>
<td>1006</td>
<td>1.8</td>
</tr>
<tr>
<td>1100</td>
<td>1206</td>
<td>2.7</td>
</tr>
<tr>
<td>2000</td>
<td>2106</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Special size upon request

Mechanical dimensions LP - 38 - ISI (dimensions in millimeters)

View A without connector

M = measuring range
M = Measuring range M = 2x81 mm

Position sensor in measuring slide

<table>
<thead>
<tr>
<th>Measuring Range (M/mm)</th>
<th>Rod Length (S/mm)</th>
<th>Cycle Time (ms)</th>
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<tbody>
<tr>
<td>150</td>
<td>312</td>
<td>1.4</td>
</tr>
<tr>
<td>300</td>
<td>462</td>
<td>1.4</td>
</tr>
<tr>
<td>500</td>
<td>662</td>
<td>1.4</td>
</tr>
<tr>
<td>700</td>
<td>862</td>
<td>1.4</td>
</tr>
<tr>
<td>900</td>
<td>1162</td>
<td>1.8</td>
</tr>
<tr>
<td>1000</td>
<td>1562</td>
<td>2.7</td>
</tr>
<tr>
<td>1500</td>
<td>1962</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Special size upon request
TR Programmability advantages

The comprehensive line of TR measuring products allows you, the customer, to expand the possibilities for your measuring applications. Specifically, the programmability gives you the following advantages:

- Easy adaptation of the encoder or linear transducer to the controller
- Electronic adjustment
- Easy start up by allowing programming during system design or directly on the shop floor
- Programmability allows for reduced stocking requirements.

Programming with a PC and software

Programmable parameters:

- Counting direction
- Measuring range in increments (CE / LA / LP)
- Measuring range in revolutions (CE)
- Preset values 1 + 2
- Load frequency
- Soft limits
- Overspeed limits
- Active level (H = active, L = active)
- Etc.

TA - MINI as Secondary Display:

- Scalable
- Counting direction (increasing / decreasing)
- Decimals (up to 4)
- Zero
- Special functions upon request

Startup and Noise Considerations:

The use of complex microelectronic circuits in todays machines – especially with AC servo drives – requires a correct application of wiring and electronic noise suppression.

To achieve a perfectly working measuring system, correct wiring is an absolute necessity.

Generally the following guidelines have to be applied:

- Avoid wiring close to high energy cables, avoid parallel wiring with power lines
- Wire size minimum 26 gauge
- Cable size for connection of shielding to the machine or cabinet minimum 10 mm²
- Star wiring for shielding and 0 Volt
- Connect shielding with maximum contact to common earth ground
- Shut off power before wiring of connector or cabinet

Please note:

- Check connectors on both ends of cable before power up
- Power ON/OFF has to be applied to the encoder and host electronics simultaneously
- Disconnect encoder only during power OFF
- Unused but wired inputs have to be connected to 0 or 11 - 27 VDC
Introducing

the next generation of DeviceNet™ absolute position sensors

- rotary multi-turn high resolution encoders
- linear position sensors
- laser distance measurement
- optical data transmission
- barcode position sensors

TR Electronic - positioning for the future
TR Electronic introduces a comprehensive range of position measurement devices to support the rapidly growing success of the DeviceNet™ fieldbus network. The well established and industry proven TR absolute rotary encoders and linear position sensors are now supplemented by the laser distance finder, optical data transmitter and barcode position sensor.

### Absolute Rotary Encoders

**CE-65-M**
- Encoder Capacity: up to 25 bit
- 8192
- 4096
- 11 - 27 VDC
- < 4 Watt
- Binary
- IP65 standard
- DeviceNet™
- max. 500 kBaud
- 64
- Adjustable value (ie. zero set)
- -20 to +60°C (standard)
- on request

**CE-58-M**
- Encoder Capacity: up to 28 bit
- 8192
- max. 32,768
- 11 - 27 VDC
- ≤ 3 Watt
- Binary, Gray, Shifted Gray
- IP65 standard
- DeviceNet™
- max. 500 kBaud
- 64
- Adjustable value (ie. zero set)
- -20 to +60°C (standard)
- on request

### Linear Position Sensors

**LA=41/42**
- Magnetostrictive
- 150 - 3000 mm
- 0.01 mm (max.)
- 11 - 27 VDC
- < 4 Watt
- Binary
- IP65 standard
- DeviceNet™
- max. 500 kBaud
- 64, BCD switch adjustable
- Adjustable value (ie. zero set)
- “0” < +2 VDC, “1” > +8 VDC, max. 30 VDC
- -20 to +60°C (standard)
- on request
- Multi magnet capable

**LP=38**
- Magnetostrictive
- 150 - 3000 mm
- 0.01 mm (max.)
- 11 - 27 VDC
- < 4 Watt
- Binary
- IP65 standard
- DeviceNet™
- max. 500 kBaud
- 64, BCD switch adjustable
- -20 to +60°C (standard)
- on request
- Multi magnet capable

### Hollow shaft (ZH Series) and shaftless (ZK Series) encoders are also available with a DeviceNet™ interface.

The LA and LP series linear position sensors are ideally suited for your DeviceNet™ network. A stroke length of more than 3 meters is available on request. Programming features of all TR Electronic devices are programmable via the bus. Heavy Duty versions of the LA-66 and ZE-115 are available for harsh environment use.
Full details and specifications, including EDS files, can be found on our website at:
www.treletronic.com
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<tr>
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<td></td>
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</table>

**LE-200**
- Phase Shift Measurement
- 0.2 - 125 m. With special reflector up to 170 m
- 0.01 mm
- 1 ms
- 18 - 27 VDC, 24 VDC w/heater
- Laser Diode Class 2
- IP65
- DeviceNet™
- Binary/Gray
- max. 500 kBaud
- 64
- Preset, Laser Diode off switch
- 0 to 50°C (-30 to +50°C with lens heater)
- 1 ppm / °C on request

**ID-200**
- Infra red Laser Beam (Wave Length 880 nm)
- max. 200 m
- 0.2 to 200 m
- Laser Diode
- Class 1
- 18 to 30 VDC
- IP65
- Voltage Supply, Bar Graph Display of Receiving Level, Operating Mode, Data Traffic
- DeviceNet™
- -5°C to +50°C
- -30°C to +50°C (with optics heating)
- Only one person required

**Barcode Position Sensor**

| **BE-90** |
| **Class 2 infra red** |
| **Measurement Principle** | **Infra red Laser Beam** |
| Integration Time | 16 (8) msec. |
| Reproducibility | ± 1 (2) mm |
| Measurement Readout | 1000/s |
| Resolution | 1/100 mm |
| Supply Voltage | 10 - 30 VDC |
| Operating Temperature | 0 to 40°C |
| With Optics Heater | -30 to + 40°C |
| Protection Class | IP65 |
| Interface | DeviceNet™ |
| Sampling Distance | 60 - 140 mm |
| Laser Source | Laser Diode |
| **Class 2** | Class 2 |
| Laser Diode | 10,000 m |
| Barcode Tape Length | -40 to -120°C |
| Temperature Range | Acrylic |
| Adhesive | Scratch & Smear Proof, UV Light, Chemical & Humidity |

**TR Electronic has been an active member of the ODVA since the beginning.**

In addition to normal bus programming capabilities, TR offers extra input and output bytes for changing parameters such as velocity, pre-sets, direction etc., directly via the bus.

**Let us demonstrate the power and speed of DeviceNet™ position sensing. Our experience is only equalled by our applications and service support.**

**Industries:**
- Automotive
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- Packaging
- Food & Beverage
- Shipping
- Mining
- Energy
- Nuclear
- Warehousing
- Military
- Environmental
- Medical

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web: www.treletronic.com

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Service & Technical Support ...

TR recognizes the need for high quality “before and after” sales service.

We offer skilled and intuitive application engineering support for all your positioning requirements.

A “state-of-the-art” technical service department provides unparalleled support either on-site, by phone or via the internet.

TR Electronic continues to develop and extend its interactive web site at: http://www.trelelectronic.com

providing access and download of all relevant documentation such as operating manuals, specification data, cable connections and dimensional drawings.

Custom modification and conventional repair capability is backed by a large inventory of product and components.

Contact these TR Electronic services by emailing us at: service@trelelectronic.com

or calling toll free, 1-800-265-9483 anywhere in North America.

Other TR Electronic products ...

- absolute, rotary, programmable, multi-turn, high resolution encoders
- incremental rotary encoders
- software programmable incremental encoders
- linear magnetostrictive position sensors
- glass scale absolute linear
- absolute encoders and linear transducers with incremental A Quad B output

Leading edge technology with industry proven ruggedness and reliability ...

For worldwide support check “Offices” on our web site at: www.trelelectronic.com

TR Electronic - the standard by which others are measured
Introducing

the next generation of
PROFIBUS absolute position sensors

- rotary multi-turn high resolution encoders
- linear position sensors
- laser distance measurement
- optical data transmission
- barcode position sensors

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### Absolute Rotary Encoders

**CE-65-M**
- Encoder Capacity: up to 25 bit
- Steps / Revolution: 8192
- Number of Revolutions: 4096
- Supply Voltage: 11 - 27 VDC
- Power Dissipation: ≤ 4 Watt
- Output Code: Binary
- Protection Class: IP55 standard
- Data Protocol: PROFIBUS-DP
- Standard Baud Rate: max. 12 Mbaud
- Station Address: 3 - 99

*Inputs*
- *Preset 1*
- *Preset 2*
- Logic Levels

*Adjustable value (ie. zero set)*
- “0” < +2 VDC, “1” > +8 VDC, max. 30 VDC
- Standard -20 to +60º C on request

**ZE-65-M**
- Encoder Capacity: up to 31 bit
- Steps / Revolution: 1 - 131,072
- Number of Revolutions: max. 65,536 revolutions
- Supply Voltage: 11 - 27 VDC
- Power Dissipation: ≤ 3 Watt
- Output Code: Binary
- Protection Class: IP65 standard
- Data Protocol: PROFIBUS-DP
- Standard Baud Rate: max. 12 Mbaud
- Station Address: 3 - 99

*Inputs*
- *Preset 1*
- *Preset 2*
- Logic Levels

*Adjustable value (ie. zero set)*
- “0” < +2 VDC, “1” > +8 VDC, max. 30 VDC
- Standard -20 to +60º C on request

**CE-58-M**
- Encoder Capacity: up to 28 bit
- Steps / Revolution: 8192 steps / revolution
- Number of Revolutions: max. 32,768 revolutions
- Supply Voltage: 11 - 27 VDC
- Power Dissipation: ≤ 3 Watt
- Output Code: Binary, Gray, Shifted Gray
- Protection Class: IP65 standard
- Data Protocol: PROFIBUS-DP
- Standard Baud Rate: max. 12 Mbaud
- Station Address: 3 - 99

*Inputs*
- *Preset 1*
- *Preset 2*
- Logic Levels

Standard -20 to +60º C on request

### Linear Position Sensors

**LA-66-K**
- Measurement Principle: Magnetostrictive
- Stroke Length: 150 - 3000 mm
- Resolution: 0.01 mm (max.)
- Supply Voltage: 11 - 27 VDC
- Power Dissipation: < 4 Watt
- Output Code: Binary
- Protection Class: IP65 standard
- Data Protocol: PROFIBUS-DP
- Standard Baud Rate: max. 12 Mbaud
- Station Address: 3 - 99, BCD switch adjustable

*Inputs*
- *Preset 1*
- *Preset 2*
- Logic Levels

*Adjustable value (ie. zero set)*
- “0” < +2 VDC, “1” > +8 VDC, max. 30 VDC
- -20 to +60º C (standard) on request
- Multi magnet capable

**LP-38**
- Measurement Principle: Magnetostrictive
- Stroke Length: 150 - 3000 mm
- Resolution: 0.01 mm (max.)
- Supply Voltage: 11 - 27 VDC
- Power Dissipation: < 4 Watt
- Output Code: Binary
- Protection Class: IP65 standard
- Data Protocol: PROFIBUS-DP
- Standard Baud Rate: max. 12 Mbaud
- Station Address: 3 - 99, BCD switch adjustable

*Inputs*
- *Preset 1*
- *Preset 2*
- Logic Levels

-20 to +60º C (standard) on request
- Multi magnet capable

The LA and LP series linear position sensors are ideally suited for your PROFIBUS network.

A stroke length of more than 3 meters is available on request.

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### Laser Distance

**Class 2 infra red**

**LE-200**

- **Measurement Principle**: Phase Shift Measurement
- **Range** *(LE-200 to reflector)*: 0.2 - 125 m. With special reflector up to 170 m
- **Resolution**: 0.01 mm
- **Refresh Update Rate**: 1 ms
- **Supply Voltage**: 18 - 27 VDC, 24 VDC w/heater
- **Light Source**: Laser Diode Class 2 IP65
- **Protection Class**: PROFIBUS-DP
- **Interface**: Binary/Gray
- **Station Address**: max. 12 Mbaud
- **Inputs**:
  - *Switching Input*
  - *Operating Temperature*
- **Thermal Drift**
- **Pin Configuration**
- *programmable via bus*
- **Preset, Laser Diode off switch**
- **Operating Temperature**: 0 to 50°C (-30 to +50°C with lens heater)
- **1 ppm /°C on request**

### Optical Data Transmission

**Class 1 infra red**

**ID-200**

- **Data Transmission**
- **Range**
- **Sensing Distance**
- **Source**: Laser Diode
- **Class**: Class 1
- **Supply Voltage**: 18 to 30 VDC
- **Protection Class**: IP65
- **LED Indication**
- **Interface**
- **Operating Temperature**
- **Set Up**

- **Infra red Laser Beam** (Wave Length 880 nm)
- **max. 200 m**
- **0.2 to 200 m**
- **Laser Diode**
- **Class**: IP65
- **Voltage Supply, Bar Graph Display of Receiving Level, Operating Mode, Data Traffic**
- **PROFIBUS-DP**
- **-5°C to + 50°C**
- **-30°C to +50°C (with optics heating)**
- **Only one person required**

### Barcode Position Sensor

**Class 2 infra red**

**BE-90**

- **Measurement Principle**
- **Integration Time**
- **Reproducibility**
- **Measurement Readout**
- **Resolution**
- **Supply Voltage**
- **Operating Temperature**
- **With Optics Heater**
- **Protection Class**
- **Interface**
- **Sampling Distance**
- **Source**
- **Class**
- **Barcode Tape Length**
- **Temperature Range**
- **Adhesive**
- **Environmental**

- **Infra red Laser Beam**
  - 16 (8) msec.
  - ±1 (2) mm
  - 1000/s
- **1/100 mm**
- **10 - 30 VDC**
- **0 to 40°C**
- **-30 to + 40°C**
- **IP65**
- **PROFIBUS-DP**
- **60 - 140 mm**
- **Laser Diode Class 2**
- **10,000 m**
- **-40 to -120°C**
- **Acrylic**
- **Scratch & Smear Proof, UV Light, Chemical & Humidity**

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- absolute encoders and linear transducers with incremental A Quad B output
- laser distance absolute measurement - optical data transmission
- bar code scanning absolute position sensors

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