The main activity of the company "ESA Control" is production and development of electronic products for automatization and control. The company has a tradition in the area of automation since 1999 and has a good technical base. The Main aim and motto of the company is the production of high quality and flawless produce. Our products have a guarantee period 36 month.

Products:

Sensors:
- Inductive proximity sensors
- Magnetic sensors
- Capacitive sensors
- Photoelectric sensors:
  - Thru-beam type
  - Diffuse type
  - Retro-reflective type
  - Mark type
  - Fork type
- Incremental rotary encoders
- Safety light curtain

Devices:
- Analogue timers
- Digital timers
- Digital counters
- Digital length-meters
- Digital rev counters
- Digital frequency-meters
- Digital speedometers
- Others

The usage of our products offers high quality at good prices!

ESA CONTROL Team

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- **Photoelectric sensors**
  - Introduction
  - Thru-beam type
  - Diffuse type /DC/
  - Diffuse type /AC/
  - Retro-reflective type /Reflectors/
  - Mark type
  - Fork type
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- **Incremental rotary encoders**
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Inductive proximity sensors

Application and operating principle
Inductive proximity sensors serve to commutate electric circuit. They act on the basis of induction - if a metal piece is brought to the active surface, the output switches over - the electric circuit opens or shuts. When there is metal in front of the active part of the sensors, the output indicator is on.
Lack of physical contact between object and inductive proximity sensors ensures their high reliability and long-lasting exploitation. They are used for automatic transfer lines, metalworking machines, textile, wood working, packaging and other machines. They find place in solving automation problems, especially in conditions of: high quantity of dust, moisture, lubricants and oils, under vibrations and prolonged regime of working.

Hysteresis
Hysteresis denotes the distance between the triggering line with target approaching the sensing surface and the resetting line with target withdrawing from the sensing surface of the sensor. The value is expressed as a percentage of the nominal switching distance (Sn).

Nominal switching distance / Sn /
Sn - nominal switching distance, measured by the help of target, made from steel 37, 1 mm thick, in a form of square with a side equal in length to the diameter of the active surface of the sensor.

Coefficient of correction / k /Switching distance S of the inductive proximity sensors varies according to the material of the target.

\[ S = k \cdot Sn \]

<table>
<thead>
<tr>
<th>Material</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel 37</td>
<td>1.00</td>
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<tr>
<td>Cast iron</td>
<td>1.10</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>0.70</td>
</tr>
<tr>
<td>Alluminum folio 0.05mm</td>
<td>0.90</td>
</tr>
<tr>
<td>Alluminum</td>
<td>0.40</td>
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<tr>
<td>Brass</td>
<td>0.40</td>
</tr>
<tr>
<td>Copper</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Maximal switching frequency / f max /
Maximal switching frequency denotes the maximum possible number of switching operations, the sensor can perform per second. The measurement is shown in figure:
Inductive proximity sensors

Technical characteristics

Stability to vibrations: 10...80Hz / 0,15mm
Stability blow: 9.8g
Stability electromagnetic influences: 400A/m (50Hz)
Insulation resistance: 50MW (1000V)

Technical materials

Housing-metallic
Housing-metallic
Housing-plastic
Sensing surface
Cable shoe
Nut-metallic
Nut-plastic
Cable

CuZn (brass - chromium plated)
Al (aluminum)
PVC (polyvinyl-chloride)
PA (polyamide)
ABS (acrylonitrile butadiene styrene)
CuZn (brass - chromium plated)
PA (polyamide)
PVC (polyvinyl-chloride)

Type designation

M - metal housing /shielded/
P - plastic housing /unshielded/
1 - cylindrical housing with thread
2 - cylindrical housing without thread
3 - rectangular housing
4 - rectangular housing with slot
9 - others

Diameter of the cylindrical housing or the biggest side of the rectangular housing

Scheme of connection

output

3-wire and 4-wire
1 - DC /transistor PNP/
2 - DC /transistor NPN/
3 - AC /thyristor, triac/
4 - relay
5 - photocoupler

2-wire
6 - DC /transistor/
7 - AC /thyristor, triac/

output function

0 - NO + NC
1 - NO
2 - NC
4 - dephased outputs
5 - analogue “I”, “U”
6 - analogue “I”
7 - analogue “U”

K - protection against short-circuit and overload
C - connector
Inductive proximity sensors

Rules for mounting sensors

A) Unshielded switch (plastic housing)

B) Shielded switch (metal housing)

Overall sizes

Sn - nominal switching distance

D - diameter of sensor

Metal
**Inductive proximity sensors**

**for direct current /3-wire and 4-wire/**

**Application**

The presented inductive proximity sensors serve to commutate direct current 3-wire and 4-wire electric circuits.

**Electrical connection circuit of sensors of the direct current /DC/**

![Diagram of electrical connection circuit of sensors of the direct current](image)

**Output characteristic /residual voltage/**

![Output characteristic graph](image)

**Working with capacitive load**

When working with sensors that have protection against overloading and short-circuit in their outputs, it is necessary to add a resistor $R_x$, that limits the current when charging the load capacitor $C$ for first time (Resistor $R_x$ add if capacitor $C$ more 100nF).

$$R_x = \frac{U_s}{0.5} \quad (R_x = 20\,\Omega \div 60\,\Omega)$$
Inductive proximity sensors for direct current /3-wire/

Technical parameters

Supply voltage, $U_s$
Output voltage(max), $U_{out}$
Residual voltage, $U_{res}$
Load current (max), $I_{out}$
Current consumption, $I_s$
Fall time, $t_f$
Rise time, $t_r$
Operating temperature range, $T_{amb}$
Hysteresis, $h$
Degree of protection of the sensors
Light output indicator
Joining - cable “LIYY” (grey)

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $S_n$ /mm/</th>
<th>Output function</th>
<th>Output /transistor/</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2-6,5.11</td>
<td>1,3</td>
<td>NO</td>
<td>PNP</td>
<td>$\phi 6,5$</td>
<td>36</td>
<td>11</td>
</tr>
<tr>
<td>M2-6,5.12</td>
<td>1,3</td>
<td>NC</td>
<td>PNP</td>
<td>$\phi 6,5$</td>
<td>36</td>
<td>12</td>
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<tr>
<td>M2-6,5.21</td>
<td>1,3</td>
<td>NO</td>
<td>NPN</td>
<td>$\phi 6,5$</td>
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<td>21</td>
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<tr>
<td>M2-6,5.22</td>
<td>1,3</td>
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<td>NPN</td>
<td>$\phi 6,5$</td>
<td>36</td>
<td>22</td>
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</table>

Schemes of connection

Scheme 11

Scheme 12

Scheme 21

Scheme 22
Inductive proximity sensors for direct current /3-wire/

**Technical parameters**

- Supply voltage, $U_s$
- Output voltage (max), $U_{out}$
- Residual voltage, $U_{res}$
- Load current (max), $I_{out}$
- Current consumption, $I_s$
- Fall time, $t_f$
- Rise time, $t_r$
- Operating temperature range, $T_{amb}$
- Hysteresis, $h$
- Degree of protection of the sensors
- Light output indicator
- Joining - cable “LIYY” (grey)

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output function /transistor/</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1-08.11</td>
<td>1,3</td>
<td>NO</td>
<td>PNP</td>
<td>M8x1 36</td>
<td>3000</td>
<td>11</td>
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<tr>
<td>M1-08.12</td>
<td>1,3</td>
<td>NC</td>
<td>PNP</td>
<td>M8x1 36</td>
<td>3000</td>
<td>12</td>
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<tr>
<td>M1-08.21</td>
<td>1,3</td>
<td>NO</td>
<td>NPN</td>
<td>M8x1 36</td>
<td>3000</td>
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<tr>
<td>M1-08.22</td>
<td>1,3</td>
<td>NC</td>
<td>NPN</td>
<td>M8x1 36</td>
<td>3000</td>
<td>22</td>
</tr>
</tbody>
</table>

**Metallic housing /cylindrical/ - fig.1**

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output function /transistor/</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
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<tbody>
<tr>
<td>P1-08.11</td>
<td>1,5</td>
<td>NO</td>
<td>PNP</td>
<td>M8x1 36</td>
<td>3000</td>
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<tr>
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<td>PNP</td>
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<td>P1-08.21</td>
<td>1,5</td>
<td>NO</td>
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<td>M8x1 36</td>
<td>3000</td>
<td>21</td>
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<tr>
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<td>NC</td>
<td>NPN</td>
<td>M8x1 36</td>
<td>3000</td>
<td>22</td>
</tr>
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</table>

**Plastic housing /cylindrical/ - fig.2**

**Schemes of connection**

- Scheme 11
- Scheme 12
- Scheme 21
- Scheme 22
Inductive proximity sensors
for direct current /3-wire and 4-wire/

Type parameters

Supply voltage, $U_s$  
Output voltage (max), $U_{out}$  
Residual voltage, $U_{res}$  
Load current (max), $I_{out}$  
Protection of output (scanning), $I_{prot}$  
Current consumption, $I_s$  
Fall time, $t_f$  
Rise time, $t_r$  
Operating temperature range, $T_{amb}$  
Hysteresis, $h$  
Degree of protection of the sensors

Joining - cable “LIYY” (grey)

- 10...30VDC (Ripple ±10 %)
- 35VDC
- 0,8V (I = 250mA)
- 250mA
- 350mA (25°C)
- 9mA
- 0,2µs (NPN); 0,6µs (PNP)
- 0,6µs (NPN); 0,2µs (PNP)
- -25...+70°C
- 15%
- IP67 (IEC144)
- LED

3x0,25mm²; L=2m
4x0,25mm²; L=2m

### Technical parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1-12.10 /short/</td>
<td>3,5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M12x1</td>
<td>39</td>
<td>1000</td>
</tr>
<tr>
<td>M1-12.10.K</td>
<td>3,5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M12x1</td>
<td>45</td>
<td>1000</td>
</tr>
<tr>
<td>M1-12.11.K</td>
<td>3,5</td>
<td>NO</td>
<td>PNP</td>
<td>M12x1</td>
<td>45</td>
<td>1000</td>
</tr>
<tr>
<td>M1-12.12.K</td>
<td>3,5</td>
<td>NC</td>
<td>PNP</td>
<td>M12x1</td>
<td>45</td>
<td>1000</td>
</tr>
<tr>
<td>M1-12.20 /short/</td>
<td>3,5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M12x1</td>
<td>39</td>
<td>1000</td>
</tr>
<tr>
<td>M1-12.20.K</td>
<td>3,5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M12x1</td>
<td>45</td>
<td>1000</td>
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<tr>
<td>M1-12.21.K</td>
<td>3,5</td>
<td>NO</td>
<td>NPN</td>
<td>M12x1</td>
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<td>NPN</td>
<td>M12x1</td>
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### Metallic housing /cylindrical/ - fig.1

### Plastic housing /cylindrical/ - fig.2

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1-12.10 /short/</td>
<td>5,0</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M12x1</td>
<td>39</td>
<td>800</td>
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<td>P1-12.10.K</td>
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</tbody>
</table>

### Schemes of connection

- Scheme 10
- Scheme 11
- Scheme 12
- Scheme 20
- Scheme 21
- Scheme 22
Inductive proximity sensors for direct current /3-wire and 4-wire/

Technical parameters

Supply voltage, $U_s$
Output voltage (max), $U_{out}$
Residual voltage, $U_{res}$
Load current (max), $I_{out}$
Protection of output (scanning), $I_{prot}$
Current consumption, $I_s$
Fall time, $t_f$
Rise time, $t_r$
Operating temperature range, $T_{amb}$
Hysteresis, $h$
Degree of protection of the sensors
Light output indicator

Joining - cable “LIYY” (grey)

10...30VDC (Ripple ±10 %)
35VDC
0,8V (I = 250mA)
250mA
350mA (25°C)
9mA
0,2μs (NPN); 0,6μs (PNP)
0,6μs (NPN); 0,2μs (PNP)
-25…+70°C
15%
IP67 (IEC144)
LED
3x0,25mm²; L=2m
4x0,25mm²; L=2m

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $S_n$ /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
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</tr>
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Metallic housing /cylindrical/ - fig.1

Plastic housing /cylindrical/ - fig.2

Schemes of connection

Scheme 10
Scheme 11
Scheme 12
Scheme 20
Scheme 21
Scheme 22
Inductive proximity sensors for direct current /3-wire and 4-wire/

Technical parameters

Supply voltage, $U_s$
Output voltage (max), $U_{out}$
Residual voltage, $U_{res}$
Load current (max), $I_{out}$
Protection of output (scanning), $I_{prot}$
Current consumption, $I_s$
Fall time, $t_f$
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-25…+70°C
15%
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LED

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4x0,25mm²; L=2m

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<tr>
<th>Type</th>
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<th>Output function</th>
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<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
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Schemes of connection

Scheme 10

Scheme 11

Scheme 12

Scheme 20

Scheme 21

Scheme 22
Inductive proximity sensors for direct current /3-wire and 4-wire/

**Technical parameters**

Supply voltage, $U_s$
Output voltage (max), $U_{out}$
Residual voltage, $U_{res}$
Load current (max), $I_{out}$
Protection of output (scanning), $I_{prot}$
Current consumption, $I_s$
Fall time, $t_f$
Rise time, $t_r$
Operating temperature range, $T_{amb}$
Hysteresis, $h$
Degree of protection of the sensors
Light output indicator
Joining - cable “LIYY” (grey)

Supply voltage: 10...30VDC (Ripple ±10 %)
Output voltage: 35VDC
Residual voltage: 0,8V ($I = 250mA$)
Load current: 250mA
Protection of output: 350mA (25°C)
Current consumption: 9mA
Fall time: 0,2µs (NPN); 0,6µs (PNP)
Rise time: 0,6µs (NPN); 0,2µs (PNP)
Operating temperature range: -25…+70°C
Hysteresis: 15%
Degree of protection: IP67 (IEC144)
Light output indicator: LED
Joining: 3x0,25mm²; L=2m
Light output indicator: 4x0,25mm²; L=2m

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $S_n$ /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
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<tbody>
<tr>
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<td>NO + NC</td>
<td>PNP</td>
<td>M22x1 51</td>
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<td>M1-22.11.K</td>
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<td>NO</td>
<td>PNP</td>
<td>M22x1 51</td>
<td>300</td>
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<td>300</td>
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</tbody>
</table>

**Schemes of connection**

- **Scheme 10**
- **Scheme 11**
- **Scheme 12**
- **Scheme 20**
- **Scheme 21**
- **Scheme 22**
### Technical parameters

- **Supply voltage,** $U_{s}$
- **Output voltage (max),** $U_{out}$
- **Residual voltage,** $U_{res}$
- **Load current (max),** $I_{out}$
- **Protection of output (scanning),** $I_{prot}$
- **Current consumption,** $I_{s}$
- **Fall time,** $t_{f}$
- **Rise time,** $t_{r}$
- **Operating temperature range,** $T_{amb}$
- **Hysteresis,** $h$
- **Degree of protection of the sensors**
- **Light output indicator**

#### Joining - cable “LIYY” (grey)
- 10...30VDC (Ripple ±10%)
- 35VDC
- 0,8V ($I = 250mA$)
- 250mA
- 350mA (25°C)
- 9mA
- 0,2µs (NPN); 0,6µs (PNP)
- 0,6µs (NPN); 0,2µs (PNP)
- -25...+70°C
- 15%
- IP67 (IEC144)
- LED
- 3x0,25mm²; L=2m
- 4x0,25mm²; L=2m

### Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $S_n$ /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
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<td>NO + NC</td>
<td>PNP</td>
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<td>PNP</td>
<td>M30x1,5</td>
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<td>NO + NC</td>
<td>NPN</td>
<td>M30x1,5</td>
<td>53</td>
<td>200</td>
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<td>NPN</td>
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<td>NPN</td>
<td>M30x1,5</td>
<td>53</td>
<td>200</td>
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**Metallic housing /cylindrical/ - fig.1**

| P1-30.10.K | 14                           | NO + NC         | PNP                               | M30x1,5    | 53                            | 100                 |
| P1-30.11.K | 14                           | NO              | PNP                               | M30x1,5    | 53                            | 100                 |
| P1-30.12.K | 14                           | NC              | PNP                               | M30x1,5    | 53                            | 100                 |
| P1-30.20.K | 14                           | NO + NC         | NPN                               | M30x1,5    | 53                            | 100                 |
| P1-30.21.K | 14                           | NO              | NPN                               | M30x1,5    | 53                            | 100                 |
| P1-30.22.K | 14                           | NC              | NPN                               | M30x1,5    | 53                            | 100                 |

**Plastic housing /cylindrical/ - fig.2**

### Schemes of connection

- **Scheme 10**
- **Scheme 11**
- **Scheme 12**
- **Scheme 20**
- **Scheme 21**
- **Scheme 22**
Inductive proximity sensors
for direct current /3-wire and 4-wire/

Technical parameters
Supply voltage, \( U_s \)
Output voltage(max), \( U_{out} \)
Residual voltage, \( U_{res} \)
Load current (max), \( I_{out} \)
Protection of output (scanning), \( I_{prot} \)
Current consumption, \( I_s \)
Fall time, \( t_f \)
Rise time, \( t_r \)
Operating temperature range, \( T_{amb} \)
Hysteresis, \( h \)
Degree of protection of the sensors
Light output indicator
Joining - cable “LIYY” (grey)

10...30VDC (Ripple ±10 %)
35VDC
0,8V (I = 250mA)
250mA
350mA (25°C)
9mA
0,2µs (NPN); 0,6µs (PNP)
0,6µs (NPN); 0,2µs (PNP)
-25...+70°C
15%
IP67 (IEC144)
LED
3x0,25mm²; L=2m
4x0,25mm²; L=2m

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
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<td>90</td>
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<td>55</td>
<td>90</td>
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<td>NPN</td>
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<td>55</td>
<td>90</td>
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Plastic housing /cylindrical - fig.2

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<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
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Schemes of connection

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<td><img src="image" alt="Diagram Scheme 11" /></td>
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<tr>
<td>22</td>
<td><img src="image" alt="Diagram Scheme 22" /></td>
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</table>
Inductive proximity sensors for direct current /3-wire and 4-wire/

Technical parameters

- Supply voltage, $U_s$
- Output voltage (max), $U_{out}$
- Residual voltage, $U_{res}$
- Load current (max), $I_{out}$
- Protection of output (scanning), $I_{prot}$
- Current consumption, $I_s$
- Fall time, $t_f$
- Rise time, $t_r$
- Operating temperature range, $T_{amb}$
- Hysteresis, $h$
- Degree of protection of the sensors
- Light output indicator
- Joining - cable “LIYY” (grey)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $S_n$ /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
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<td>PNP</td>
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<td>100</td>
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<tr>
<td>P3-60.11.K</td>
<td>12,5</td>
<td>NO</td>
<td>PNP</td>
<td>30 15 60</td>
<td>100</td>
<td>11</td>
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<td>P3-60.12.K</td>
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<td>NC</td>
<td>PNP</td>
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<td>30 15 60</td>
<td>100</td>
<td>20</td>
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<td>NO</td>
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<td>30 15 60</td>
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<td>NC</td>
<td>NPN</td>
<td>30 15 60</td>
<td>100</td>
<td>22</td>
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</tbody>
</table>

Schemes of connection

1. PNP NO+NC
   - brown
   - white
   - black
   - blue

2. NPN NO+NC
   - brown
   - black
   - white
   - blue

3. PNP NO
   - brown
   - black
   - blue

4. NPN NO
   - brown
   - black
   - white
   - blue

5. Plastic housing /rectangular/ - fig.1
# Inductive proximity sensors for direct current with connector /3-wire/

**Technical parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
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<td>Supply voltage, $U_s$</td>
<td>10...30VDC (Ripple ±10 %)</td>
</tr>
<tr>
<td>Output voltage (max), $U_{out}$</td>
<td>35VDC</td>
</tr>
<tr>
<td>Residual voltage, $U_{res}$</td>
<td>0,8V ($I = 250mA$)</td>
</tr>
<tr>
<td>Load current (max), $I_{out}$</td>
<td>250mA</td>
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<tr>
<td>Current consumption, $I_s$</td>
<td>12mA</td>
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<tr>
<td>Fall time, $t_f$</td>
<td>0,2µs (NPN); 0,6µs (PNP)</td>
</tr>
<tr>
<td>Rise time, $t_r$</td>
<td>0,6µs (NPN); 0,2µs (PNP)</td>
</tr>
<tr>
<td>Operating temperature range, $T_{amb}$</td>
<td>-25...+70°C</td>
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<tr>
<td>Hysteresis, $h$</td>
<td>15%</td>
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<tr>
<td>Degree of protection of the sensors</td>
<td>IP67 (IEC144)</td>
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<tr>
<td>Light output indicator</td>
<td>LED</td>
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<tr>
<td>Joining: (page 29)</td>
<td>C-M8-3FS; C-M8-3FA</td>
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<td>C-M12-4FS; C-M12-4FA</td>
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**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output /transistor/</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
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<td>PNP</td>
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<td>1,3</td>
<td>NC</td>
<td>PNP</td>
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<td>NO</td>
<td>PNP</td>
<td>M8x1</td>
<td>60</td>
<td>3000</td>
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<tr>
<td>M1-08.12.CA</td>
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<td>NC</td>
<td>PNP</td>
<td>M8x1</td>
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<td>3000</td>
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<td>NO</td>
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<td>NC</td>
<td>NPN</td>
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<td>3000</td>
</tr>
</tbody>
</table>

**Schemes of connection**

- **Scheme 11C**
- **Scheme 12C**
- **Scheme 21C**
- **Scheme 22C**
Inductive proximity sensors for direct current with connector /3-wire 4-wire/

Technical parameters

- Supply voltage, $U_s$ 10...30VDC (Ripple ±10 %)
- Output voltage(max), $U_{out}$ 35VDC
- Residual voltage, $U_{res}$ 0,8V (I = 250mA)
- Load current (max), $I_{out}$ 250mA
- Protection of output (scanning), $I_{prot}$ 350mA (25°C)
- Current consumption, $I_s$ 9mA
- Fall time, $t_f$ 0,2µs (NPN); 0,6µs (PNP)
- Rise time, $t_r$ 0,6µs (NPN); 0,2µs (PNP)
- Operating temperature range, $T_{amb}$ -25...+70°C
- Hysteresis, $h$ 15%
- Degree of protection of the sensors IP67 (IEC144)
- Light output indicator LED
- Joining: Cable connector - female (page 6)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1-12.10.KC</td>
<td>2,5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M12x1</td>
<td>60</td>
<td>10C</td>
</tr>
<tr>
<td>M1-12.20.KC</td>
<td>2,5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M12x1</td>
<td>60</td>
<td>20C</td>
</tr>
<tr>
<td>M1-18.10.KC</td>
<td>5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1</td>
<td>60</td>
<td>10C</td>
</tr>
<tr>
<td>M1-18.20.KC</td>
<td>5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1</td>
<td>60</td>
<td>20C</td>
</tr>
<tr>
<td>M1-30.10.KC</td>
<td>9,5</td>
<td>NO + NC</td>
<td>PNP</td>
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<td>NO + NC</td>
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<td>20C</td>
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<td>NO + NC</td>
<td>PNP</td>
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<td>10C</td>
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<td>NO + NC</td>
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<td>P1-30.10.KC</td>
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<td>PNP</td>
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<td>P1-30.20.KC</td>
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<tr>
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<td>12,5</td>
<td>NO + NC</td>
<td>PNP</td>
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<td>12,5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>30 x 15 x 72</td>
<td>100</td>
<td>20C</td>
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</table>

Schemes of connection

- Scheme 10C
- Scheme 20C
Inductive proximity sensors for direct current /2-wire/

Application and operating principle

The presented inductive proximity sensors serve to commutate direct current 2-wire electric circuits. They act on the basis of induction - if a metal piece is brought to the active surface, the output switches over - the electric circuit opens or shuts. Lack of physical contact between object and inductive proximity sensors ensures their high reliability and long-lasting exploitation. They are used for automatic transfer lines, metalworking machines, textile, wood working, packaging and other machines. They find place in solving automation problems, especially in conditions of: high quantity of dust, moisture, lubricants and oils, under vibrations and prolonged regime of working.

Technical parameters

Supply voltage, $U_s$
Residual voltage, $U_{res}$
Load current, $I_{out}$
Current consumption, $I_s$
Protection of output (scanning), $I_{prot}$
Fall time, $t_f$
Rise time, $t_r$
Operating temperature range, $T_{amb}$
Hysteresis, $h$
Degree of protection of the sensors
Light output indicator
Joining - cable “LIYY” (grey)

Supply voltage, $U_s$ 8...30VDC (Ripple ±10%)
Residual voltage, $U_{res}$ 3,6V
Load current, $I_{out}$ 1...80mA
Current consumption, $I_s$ 0,2mA
Protection of output (scanning), $I_{prot}$ 125mA (25°C)
Fall time, $t_f$ 400µs
Rise time, $t_r$ 20µs
Operating temperature range, $T_{amb}$ -25…+70°C
Hysteresis, $h$ 15%
Degree of protection of the sensors IP67 (IEC144)
Light output indicator LED
Joining - cable “LIYY” (grey) 2x0,25mm²; L=2m

Schemes of connection

Scheme 61  (NO)
Scheme 62  (NC)

Output characteristic /residual voltage/

![Output characteristic graph](image)
Inductive proximity sensors for direct current /2-wire/

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
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</thead>
<tbody>
<tr>
<td>M1-12.61.K</td>
<td>2,5</td>
<td>NO</td>
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<td>2,5</td>
<td>NC</td>
<td>M12x1</td>
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<td>1000</td>
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<tr>
<td>M1-18.61.K</td>
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<td>NO</td>
<td>M18x1</td>
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<tr>
<td>M1-18.62.K</td>
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<td>NO</td>
<td>M18x1</td>
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<td>600</td>
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<tr>
<td>M1-30.61.K</td>
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<td>NO</td>
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<td>NO</td>
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<td>NC</td>
<td>M40x1,5</td>
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Metallic housing /cylindrical/ - fig.1; fig.2

<table>
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<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
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<td>NC</td>
<td>M12x1</td>
<td>45</td>
<td>800</td>
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<td>P1-18.61.K</td>
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<tr>
<td>P1-18.62.K</td>
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<td>NC</td>
<td>M18x1</td>
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<td>400</td>
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<tr>
<td>P1-30.61.K</td>
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<td>NO</td>
<td>M30x1,5</td>
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<td>100</td>
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<tr>
<td>P1-40.62.K</td>
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</table>

Plastic housing /cylindrical/ - fig.3; fig.4

<table>
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<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
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</thead>
<tbody>
<tr>
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<td>12,5</td>
<td>NO</td>
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<td>61</td>
</tr>
<tr>
<td>P3-60.62.K</td>
<td>12,5</td>
<td>NC</td>
<td>30 x 15 x 60</td>
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</table>

Plastic housing /rectangular/ - fig.5

Schemes of connection

Scheme 61

Scheme 62
Inductive proximity sensors for direct current with connector /2-wire/

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2,5</td>
<td>NO</td>
<td>M12x1</td>
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<td>1000</td>
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<tr>
<td>M1-12.62.KC</td>
<td>2,5</td>
<td>NC</td>
<td>M12x1</td>
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<td>1000</td>
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<tr>
<td>M1-18.61.KC</td>
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<td>NO</td>
<td>M18x1</td>
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<td>M1-18.62.KC</td>
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<td>NC</td>
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<td>M1-30.61.KC</td>
<td>9,5</td>
<td>NO</td>
<td>M30x1,5</td>
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<td>M30x1,5</td>
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<td>200</td>
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</table>

**Metallic housing /cylindrical/ - fig.1; fig.2; fig.3**

| P1-18.61.KC | 8                          | NO              | M18x1      | 60                            | 400                  |
| P1-18.62.KC | 8                          | NC              | M18x1      | 60                            | 400                  |
| P1-30.61.KC | 14                         | NO              | M30x1,5    | 64                            | 100                  |
| P1-30.62.KC | 14                         | NC              | M30x1,5    | 64                            | 100                  |

**Plastic housing /cylindrical/ - fig.5; fig.6**

**Plastic housing /rectangular/ - fig.4**

Joining

Cable connector - female (page 6)

- C-M12-4FS (straight)
- C-M12-4FA (angled)

Schemes of connection

Scheme 61C

Scheme 62C
Inductive proximity sensors for alternating current, 2-wire

Application and operating principle

The presented inductive proximity sensors serve to commutate alternating current 2-wire electric circuits. They act on the basis of induction - if a metal piece is brought to the active surface, the output switches over - the electric circuit opens or shuts. Lack of physical contact between object and inductive proximity sensors ensures their high reliability and long-lasting exploitation. They are used for automatic transfer lines, metalworking machines, textile, wood working, packaging and other machines. They find place in solving automation problems, especially in conditions of: high quantity of dust, moisture, lubricants and oils, under vibrations and prolonged regime of working.

Technical parameters

Supply voltage, $U_s$

Residual voltage, $U_{res}$

Load current, $I_{out}$

Current consumption, $I_s$

Operating temperature range, $T_{amb}$

Hysteresis, $h$

Output

Degree of protection of the sensors

Joining - cable “LIYY” (grey)

Schemes of connection

Output characteristic /residual voltage/

![Diagram showing schemes of connection and output characteristic](image-url)
# Inductive proximity sensors for alternating current /2-wire/

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
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<td>M1-12.71</td>
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<td>NO</td>
<td>M12x1</td>
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</tr>
<tr>
<td>M1-12.72</td>
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<td>M12x1</td>
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<tr>
<td>M1-14.72</td>
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<td>NC</td>
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<td>72</td>
</tr>
<tr>
<td>M1-18.71</td>
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<td>71</td>
</tr>
<tr>
<td>M1-18.72</td>
<td>5</td>
<td>NC</td>
<td>M18x1</td>
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<td>72</td>
</tr>
<tr>
<td>M1-22.71</td>
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<td>NO</td>
<td>M22x1</td>
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<td>71</td>
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<tr>
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<td>NC</td>
<td>M22x1</td>
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<td>72</td>
</tr>
<tr>
<td>M1-30.71</td>
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<tr>
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<td>NC</td>
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<td>20</td>
<td>72</td>
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</table>

## Scheme of connection

- **Scheme 71**
  - Brown
  - White
  - NO
  - Load

- **Scheme 72**
  - Brown
  - White
  - NC
Inductive proximity sensors for alternating current with connector /2-wire/

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
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<td>M18x1</td>
<td>60</td>
<td>71C</td>
</tr>
<tr>
<td>P1-18.72.C</td>
<td>8</td>
<td>NC</td>
<td>M18x1</td>
<td>60</td>
<td>72C</td>
</tr>
<tr>
<td>P1-30.71.C</td>
<td>14</td>
<td>NO</td>
<td>M30x1,5</td>
<td>64</td>
<td>71C</td>
</tr>
<tr>
<td>P1-30.72.C</td>
<td>14</td>
<td>NC</td>
<td>M30x1,5</td>
<td>64</td>
<td>72C</td>
</tr>
<tr>
<td>P3-60.71.C</td>
<td>12,5</td>
<td>NO</td>
<td>30 x 15 x 72</td>
<td>20</td>
<td>71C</td>
</tr>
<tr>
<td>P3-60.72.C</td>
<td>12,5</td>
<td>NC</td>
<td>30 x 15 x 72</td>
<td>20</td>
<td>72C</td>
</tr>
</tbody>
</table>

Joining

Cable connector - female (page 6)

C-M12-4FS (straight)  
C-M12-4FA (angled)

Schemes of connection

Scheme 71C  
Scheme 72C
Inductive proximity sensors for direct current, scheme “Namur” /2-wire/

Type: M1-12.62.N

Application and operating principle

The presented inductive proximity sensors serve to direct current 2-wire electric circuits, where act as a variable resistance. They act on the basis of induction - if a metal piece is brought to the active surface, their output resistance increases. Logical function of their output is normally closed contact “NC”, i.e. when there is no metal piece in front of their active surface their output resistance is lowest and then runs the highest current. Their standard inclusion in to the electric circuit is known under the name “NAMUR” (Scheme 62), where the load resistance is 1kΩ, and the supply voltage is 8,2V. The sensors are used for monitoring the turnovers of gears and others.

Technical parameters

- Switching distance, $S_n$: 2,6mm
- Range of supply voltage, $U_s$: 5...30VDC (Ripple ±10%)
- Nominal supply voltage, $U_n$: 8,2V
- Residual voltage, $U_{res}$ ($U_{res}=U_{out,NC}$): 2,9V ($U_s=8,2V$)
- Load “normal open”, $I_{NO}$: <1,2mA ($U_s=8,2V$)
- Load “normal closed”, $I_{NC}$: >2,1mA ($U_s=8,2V$)
- Maximum switching frequency, $f_{max}$: 2KHz
- Operating temperature range, $T_{amb}$: -25…+70°C
- Degree of protection of the sensors: IP67 (IEC144)
- Housing (plastic, cylindrical), D / L: M12x1 / 39mm
- Joining - cable “LIYY” (grey):

  - $2x0,25mm^2$; L=2m

Scheme of connection

![Scheme 62 (NC)](image)

Output characteristics /residual voltage/

- $U_{out}(V)$
- $U_{res}(V)$

$T=25°C$ $R=1kΩ$
Inductive proximity sensors for speed control, for direct current /3-wire/

Application and operating principle
The sensors serve to monitor the minimum turnovers of conveyor belts, elevators, lifts, shafts and other rotating parts. They are used in direct current electrical circuits.

After applying the supply voltage the outputs of the sensors remain included for 7 seconds - the necessary time for acceleration of the slow-moving mechanisms. If turnovers of the rotating mechanism exceed the given ones, the outputs of the sensors remain on. But if turnovers the rotating mechanism are lesser than the given, the outputs of the sensors turn off. The minimum turnovers are set by trimmer potentiometer located at the back of sensors. They have two LED’s: a red one - indicating the output signal and green one – indicating the length of incoming pulses.

Note: The sensors marked with letter "Z" after turning off the outputs, restore their operation by switching off and on the supply voltage (produced only on request).

Technical parameters
- Range of regulation, $n$: 6...400 rpm
- Supply voltage, $U_s$: 10...30VDC (Ripple ±10 %)
- Output voltage (max), $U_{out}$: 35VDC
- Residual voltage, $U_{res}$: 0,8V ($I = 250mA$)
- Load current (max), $I_{out}$: 250mA
- Protection of output (scanning), $I_{prot}$: 350mA (25°C)
- Current consumption, $I_s$: 9mA
- Fall time, $t_f$: 0,6µs
- Rise time, $t_r$: 0,2µs
- Operating temperature range, $T_{amb}$: -25...+70°C
- Hysteresis, $h$: 10%
- Degree of protection of the sensors: IP65
- Light output indicator: 2 x LED
- Joining - cable “LIYY” (grey)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output /transistor/</th>
<th>Sizes /mm/</th>
<th>Maximum permissible revolutions /rpm/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISM1-18.11.K(Z)</td>
<td>5</td>
<td>HO</td>
<td>PNP</td>
<td>M18x1 59</td>
<td>36000</td>
<td>11</td>
</tr>
<tr>
<td>ISM1-30.11.K(Z)</td>
<td>9,5</td>
<td>HO</td>
<td>PNP</td>
<td>M30x1,5 61</td>
<td>12000</td>
<td>11</td>
</tr>
<tr>
<td>ISM1-40.11.K(Z)</td>
<td>14</td>
<td>HO</td>
<td>PNP</td>
<td>M40x1,5 55</td>
<td>5400</td>
<td>11</td>
</tr>
<tr>
<td>ISP1-18.11.K(Z)</td>
<td>8</td>
<td>HO</td>
<td>PNP</td>
<td>M18x1 59</td>
<td>24000</td>
<td>11</td>
</tr>
<tr>
<td>ISP1-30.11.K(Z)</td>
<td>14</td>
<td>HO</td>
<td>PNP</td>
<td>M30x1,5 61</td>
<td>6000</td>
<td>11</td>
</tr>
<tr>
<td>ISP1-40.11.K(Z)</td>
<td>24</td>
<td>HO</td>
<td>PNP</td>
<td>M40x1,5 55</td>
<td>4800</td>
<td>11</td>
</tr>
<tr>
<td>ISP3-60.11.K(Z)</td>
<td>12,5</td>
<td>HO</td>
<td>PNP</td>
<td>30 x 15 x 60</td>
<td>6000</td>
<td>11</td>
</tr>
</tbody>
</table>

* If the maximum permissible revolutions is exceeded, the output of the sensor turns off.

Electrical circuit of connection

Overall sizes of sensors

![Diagram of electrical circuit](image-url)
Inductive proximity sensors
for speed control, for alternating current /2-wire/

Application and operating principle
The sensors serve to monitor the minimum turnovers of conveyor belts, elevators, lifts, shafts and other rotating parts. They are used in alternating current electrical circuits.

After applying the supply voltage the outputs of the sensors remain included for 7 seconds - the necessary time for acceleration of the slow-moving mechanisms. If turnovers of the rotating mechanism exceed the given ones, the outputs of the sensors remain on. But if turnovers the rotating mechanism are lesser than the given, the outputs of the sensors turn off. The minimum turnovers are set by trimmer potentiometer located at the back of sensors. They have two LED's: a red one - indicating the output signal and green one – indicating the length of incoming pulses.

Note: The sensors marked with letter “Z” after turning off the outputs, restore their operation by switching off and on the supply voltage (produced only on request).

Technical parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of regulation, ( n )</td>
<td>6 ... 400 rpm</td>
</tr>
<tr>
<td>Supply voltage, ( U_s )</td>
<td>90...240VAC (c)</td>
</tr>
<tr>
<td></td>
<td>40...100VAC (b)</td>
</tr>
<tr>
<td></td>
<td>20...50VAC (a)</td>
</tr>
<tr>
<td>Residual voltage, ( U_{res} )</td>
<td>4V</td>
</tr>
<tr>
<td>Load current (max), ( I_{out} )</td>
<td>10...250mA</td>
</tr>
<tr>
<td>Current consumption, ( I_s )</td>
<td>1,5mA</td>
</tr>
<tr>
<td>Operating temperature range, ( T_{amb} )</td>
<td>-25...+70°C</td>
</tr>
<tr>
<td>Hysteresis, ( h )</td>
<td>10%</td>
</tr>
<tr>
<td>Output</td>
<td>Thyristor</td>
</tr>
<tr>
<td>Degree of protection of the sensors</td>
<td>IP65</td>
</tr>
<tr>
<td>Light output indicator</td>
<td>2 x LED</td>
</tr>
<tr>
<td>Joining - cable “LIYY” (grey)</td>
<td>2x0,5mm²; L=2m</td>
</tr>
</tbody>
</table>

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Sizes /mm/</th>
<th>Maximum permissible revolutions /rpm/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td><strong>Metallic housing /cylindrical/ - fig.1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISM1-18.71(Z)</td>
<td>5</td>
<td>HO</td>
<td>M18x1</td>
<td>59</td>
<td>1200</td>
</tr>
<tr>
<td>ISM1-30.71(Z)</td>
<td>9,5</td>
<td>HO</td>
<td>M30x1,5</td>
<td>61</td>
<td>1200</td>
</tr>
<tr>
<td><strong>Plastic housing /cylindrical/ - fig.2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISP1-18.71(Z)</td>
<td>8</td>
<td>HO</td>
<td>M18x1</td>
<td>59</td>
<td>1200</td>
</tr>
<tr>
<td>ISP1-30.71(Z)</td>
<td>14</td>
<td>HO</td>
<td>M30x1,5</td>
<td>61</td>
<td>1200</td>
</tr>
<tr>
<td><strong>Plastic housing /rectangular/ - fig.3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISP3-60.71(Z)</td>
<td>12,5</td>
<td>HO</td>
<td>30 x 15 x 60</td>
<td>1200</td>
<td>1200</td>
</tr>
</tbody>
</table>

* If the maximum permissible revolutions is exceeded, the output of the sensor turns off.

Electrical circuit of connection

Overall sizes of sensors

![Electrical circuit of connection](image1)

![Overall sizes of sensors](image2)
Inductive proximity sensors for textile industry

![Fig. 1](image)

**Technical parameters**

Supply voltage, $U_s$
Output voltage (max), $U_{out}$
Residual voltage, $U_{res}$
Load current (max), $I_{out}$
Protection of output (scanning), $I_{prot}$
Current consumption, $I_s$
Fall time, $t_f$
Rise time, $t_r$
Operating temperature range, $T_{amb}$
Hysteresis, $h$
Degree of protection of the sensors
Light output indicator
Joining - cable “LIYY” (grey)

**Supply Voltage**

10...30VDC (Ripple ±10 %)
35VDC
0,8V (I = 250mA)
250mA
350mA (25°C)
9mA
0,2μs (NPN); 0,6μs (PNP)
0,6μs (NPN); 0,2μs (PNP)
-25…+70°C
15%
IP67 (IEC144)
LED

Light output indicator

10...30VDC (Ripple ±10 %)
35VDC
0,8V (I = 250mA)
250mA
350mA (25°C)
9mA
0,2μs (NPN); 0,6μs (PNP)
0,6μs (NPN); 0,2μs (PNP)
-25…+70°C
15%
IP67 (IEC144)
LED

Degree of protection of the sensors

-25…+70°C
15%
IP67 (IEC144)
LED

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output (transistor-open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>P9-86.10.K</td>
<td>5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>49 18 86</td>
<td>400</td>
<td>10</td>
</tr>
<tr>
<td>P9-86.11.K</td>
<td>5</td>
<td>NO</td>
<td>PNP</td>
<td>49 18 86</td>
<td>400</td>
<td>11</td>
</tr>
<tr>
<td>P9-86.12.K</td>
<td>5</td>
<td>NC</td>
<td>PNP</td>
<td>49 18 86</td>
<td>400</td>
<td>12</td>
</tr>
<tr>
<td>P9-86.20.K</td>
<td>5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>49 18 86</td>
<td>400</td>
<td>20</td>
</tr>
<tr>
<td>P9-86.21.K</td>
<td>5</td>
<td>NO</td>
<td>NPN</td>
<td>49 18 86</td>
<td>400</td>
<td>21</td>
</tr>
<tr>
<td>P9-86.22.K</td>
<td>5</td>
<td>NC</td>
<td>NPN</td>
<td>49 18 86</td>
<td>400</td>
<td>22</td>
</tr>
</tbody>
</table>

**Schemes of connection**

- ![Scheme 10](image)
- ![Scheme 11](image)
- ![Scheme 12](image)
- ![Scheme 20](image)
- ![Scheme 21](image)
- ![Scheme 22](image)
Inductive proximity sensors for textile industry

Technical parameters

Supply voltage, \( U_s \)
Residual voltage, \( U_{res} \)
Load current (max), \( I_{out} \)
Current consumption, \( I_s \)
Fall time, \( t_f \)
Rise time, \( t_r \)
Operating temperature range, \( T_{amb} \)
Hysteresis, \( h \)
Degree of protection of the sensors
Joining - cable “LIYY” (grey)

8...30VDC (Ripple ±10 %)
3,6V (I = 7mA)
20mA
0,85mA
200µs
200µs
-25...+70°C
20%
IP67 (IEC144)
4x0,25mm²; L=0,6m

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance ( Sn )/mm/</th>
<th>Output function</th>
<th>Output</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>P9-95.62S</td>
<td>5,5</td>
<td>3 x NC</td>
<td>3 x PNP</td>
<td>26 14 95</td>
<td>2 000</td>
<td>62S</td>
</tr>
</tbody>
</table>

Scheme of connection

[Diagram showing connection scheme 62S]

Joining - cable “LIYY” (grey)
Cable connectors /IP67/

Cable connectors M12 /4-pins, female/

4-wire, DC
“NO + NC”
Pin 1 - Us (+)
Pin 2 - NC
Pin 3 - Us (-)
Pin 4 - NO

3-wire, DC
“NO”
Pin 1 - Us (+)
Pin 3 - Us (-)
Pin 4 - NO

3-wire, DC
“NC”
Pin 1 - Us (+)
Pin 2 - NC
Pin 3 - Us (-)

2-wire, DC
“NO”
Pin 1 - Us (+)
Pin 4 - NO

2-wire, AC
“NO”
Pin 3 - Us (~)
Pin 4 - NO (~)

2-wire, AC
“NC”
Pin 1 - Us (~)
Pin 2 - NC (~)

Cable connectors M8 /3-pins, female/

3-wire, DC
“NO / NC”
Pin 1 - Us (+)
Pin 3 - Us (-)
Pin 4 - NO/NC
Magnetic sensors /2-wire/

MD-2

Application and operating principle

The magnetic proximity sensor MD-2 is made on the base of reed-contact and serves to commutate direct current and alternating current electric circuits. It is specialized for groove montage on pneumatic aluminum cylinder, but it could be used for other installations. The principle of action is based on the approaching of constant magnet to the surface of the sensor. Then the electric circuit in the sensor shuts and the electricity penetrates. When there is magnet in front of their active part, the output indicator is on.

Technical parameters

Supply voltage, $U_s$  
Residual voltage, $U_{res}$  
Load current (max), $I_{out}$  
Output function  
Fall time and Rise time, $t_f / t_r$  
Switching frequency, $f_o$ (max)  
Operating temperature range, $T_{amb}$  
Degree of protection  
Light output indicator  
Joining - cable “LIYY” (grey)

- $8...110V$ AC/DC
- $2,6V$ ($I = 120mA$)
- $100mA$
- NO
- $0,8ms$
- $600Hz$
- $-20...+70^\circ C$
- IP67 (IEC144)
- LED
- $2x0,25mm^2$; $L=2m$

Scheme of connection

Overall sizes

M3x5 (DIN913)
Magnetic sensors /3-wire/

Application and operating principle

The magnetic proximity sensors series MP4-30 are made on the base of reed-contact and serves to commutate direct current and alternating current electric circuits. They are specialized for groove montage on pneumatic aluminum cylinder, but they could be used for other installations. The principle of action is based on the approaching of constant magnet to the surface of the sensors. Then the electric circuit in the sensors shuts and the electricity penetrates. When there is magnet in front of their active part, the output indicator is on.

Technical parameters

Supply voltage, $U_s$ 8...30V DC
Residual voltage, $U_{res}$ 0V
Load current (max), $I_{out}$ 100mA
Output function NO
Fall time and Rise time, $t_f / t_r$ 0.8ms
Switching frequency, $f_o$ (max) 600Hz
Operating temperature range, $T_{amb}$ -20...+70°C
Degree of protection IP67 (IEC144)
Light output indicator LED
Joining - cable “LIYY” (grey) 3x0.25mm²; L=2m

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Output function</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP4-30.11.R</td>
<td>PNP / NO</td>
<td>11</td>
</tr>
<tr>
<td>MP4-30.21.R</td>
<td>NPN / NO</td>
<td>21</td>
</tr>
</tbody>
</table>

Scheme of connection

Overall sizes

Joining - cable “LIYY” (grey)
Capacitive proximity sensors

Application and operating principle

Capacitive sensors serve to commutate direct current electric circuits. They act on the basis of capacitive principle—when changing the dialectical permeability in front of the active part the output switches over—the electric circuit opens up or shuts up. They react to metal or non-metal objects. They have a potentiometer for regulation of sensitivity. When there is object in front of their active part, the output indicator is on. Basically they are used as level regulator of material in bulk. They are used in automation of production processes in different areas of industry: food processing industry, paper industry, textile industry etc.

Rules for mounting sensors

![Diagram of sensor mounting rules](image)

Sn - nominal switching distance
D - diameter of sensor

Connection circuits of sensors

![Connection circuit diagrams](image)

Scheme 10 (PNP / NO+NC)
Scheme 20 (NPN / NO+NC)

Overall sizes

![Overall size diagrams](image)
Capacitive proximity sensors

Technical parameters
- Supply voltage, \( U_s \)
- Output voltage(max), \( U_{out} \)
- Residual voltage, \( U_{res} \)
- Load current (max), \( I_{out} \)
- Protection of output (scanning), \( I_{prot} \)
- Current consumption, \( I_s \)
- Fall time, \( t_f \)
- Rise time, \( t_r \)
- Operating temperature range, \( T_{amb} \)
- Hysteresis, \( h \)
- Regulation the sensitivity in the range
- Degree of protection of the sensors
- Light output indicator
- Joining - cable “LIYY” (grey)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP1-18.10.K</td>
<td>8</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>CP1-18.20.K</td>
<td>8</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>CP1-30.10.K</td>
<td>15</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M30x1,5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>CP1-30.20.K</td>
<td>15</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M30x1,5</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>CP2-34.10.K</td>
<td>15</td>
<td>NO + NC</td>
<td>PNP</td>
<td>Ø34</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>CP2-34.20.K</td>
<td>15</td>
<td>NO + NC</td>
<td>NPN</td>
<td>Ø34</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

Plastic housing /cylindrical/ - fig.1; fig.2; fig.3

Output characteristic /residual voltage/

Schemes of connection

Scheme 10

Scheme 20
Types photoelectric sensors

Thru-beam sensor
It is a system of two housings (transmitter and receiver) situated one against the other and connected by a modulated infrared ray of light. When an object passes between the transmitter and the receiver, the ray of light becomes disconnected and the output of the receiver changes state.

Mark sensor
It consists of one housing, in which transmitter and receiver are situated. They serve to register coloured mark stripes inflicted on an object, that is passing in a strictly fixed zone (of 10÷20mm) in front of the active surface of the sensor. The width of mark stripes can not be less than 3 mm.

Diffuse sensor
It consists of one housing, in which transmitter and receiver are situated. The sensor emits modulated ray of light, which is reflected by the passing (coming near) object and returns back to the sensor. In such case the output of the switch changes state. It is intended for detection on different objects of the automatics.

Fork sensor
It acts on the principle of emitting and receiving non-modulated ray of light in infrared area of the spectrum. They are used for measuring cycles of shafts etc. They have good sharing ability (0,5mm).

Retro-reflective sensor
It consists of one housing, in which transmitter and receiver are situated. The sensor emits infrared modulated ray of light which reflects on a reflector and returns back to the sensor. When an object passes between the sensor and the reflector, the ray of light becomes disconnected and the output of the sensor changes state.

Safety light curtain
The specialized product is used to protect the machines and other moving elements from accidental interventions and to protect the machine operator from injuries.
Photoelectric sensors

Application and operating principle

The presented photoelectric sensors serve to commutate direct current and alternating current electric circuits. They act on the principle of emitting and receiving ray of light in infrared or visible area of the spectrum. The sensors become active when the ray of light becomes disconnected or reflected by the passing object. They are used for automatic transfer lines, textile, packaging, bottling and other machines.

Conditions of exploitation

Photoelectric switches are not to be used in places where high level of water-vapour, aggressive gases, splashes of oil, strong vibration could occur and also in dusty environment. The receiving part must not be influenced directly by the sun rays or other powerful light transmitters. The joining cable has not to be close to powerful electric circuits.

Type designation

<table>
<thead>
<tr>
<th>O - photoelectric</th>
<th>O D M 1 - 18 . 10 . F K T</th>
</tr>
</thead>
<tbody>
<tr>
<td>B - thru-beam type</td>
<td></td>
</tr>
<tr>
<td>R - retro-reflective type</td>
<td></td>
</tr>
<tr>
<td>D - diffuse type</td>
<td></td>
</tr>
<tr>
<td>M - mark type</td>
<td></td>
</tr>
<tr>
<td>V - fork type</td>
<td></td>
</tr>
<tr>
<td>M - metal housing; P - plastic housing</td>
<td></td>
</tr>
<tr>
<td>1 - cylindrical housing with thread</td>
<td></td>
</tr>
<tr>
<td>2 - cylindrical housing without thread</td>
<td></td>
</tr>
<tr>
<td>3 - rectangular housing</td>
<td></td>
</tr>
<tr>
<td>4 - rectangular housing with slot</td>
<td></td>
</tr>
<tr>
<td>9 - others</td>
<td></td>
</tr>
</tbody>
</table>

Diameter of the cylindrical housing or the biggest side of the rectangular housing

output

3-wire and 4-wire

- 1 - DC /transistor PNP/
- 2 - DC /transistor NPN/
- 3 - AC /thyristor, triac/
- 4 - relay
- 5 - optocoupler
- 2-wire
- 6 - DC /transistor/
- 7 - AC /thyristor, triac/

output function

- 0 - NO + NC
- 1 - NO
- 2 - NC
- 3 - emitter /transmitter/
- 4 - dephased outputs
- 5 - analogue “I”, “U”
- 6 - analogue “I”
- 7 - analogue “U”

spectrum area of operating

- F - infrared
- R - red
- G - green
- W - white
- K - protection against short-circuit and overload
- T - regulator to sensitivity
Electrical connection circuit of sensors of the direct current (3-wire, 4-wire) /DC/

Output characteristic /residual voltage/
Sensors of the direct current (3-wire, 4-wire) “DC”

Working with capacitive load

When working with sensors that have protection against overloading and short-circuit in their outputs, it is necessary to add a resistor $R_x$, that limits the current when charging the load capacitor $C$ for first time (Resistor $R_x$ add if capacitor $C$ more 100nF).

$$R_x = \frac{U_s}{0.5} \quad (R_x = 20 \Omega \div 60 \Omega)$$
Application and operating principle

The photoelectric thru-beam type sensor is a system of two housings (transmitter and receiver) situated one against the other and connected by a modulated infrared ray of light. When an object passes between the transmitter and the receiver, the ray of light becomes disconnected and the output of the receiver changes state. The output indicator of receiver is on, when the transmitter is directed against it.

Technical parameters

- Supply voltage, $U_s$: 10...30VDC (Ripple ±10%)
- Residual voltage, $U_{res}$: 0,8V (I = 250mA)
- Load current (max), $I_{out}$: 250mA
- Protection of output (scanning), $I_{prot}$: 350mA (25°C)
- Operating temperature range, $T_{amb}$: -25...+70°C
- Spectrum area of operating: 850...950nm
- Usable ambient light intensity (max): 3000Lx
- Degree of protection of the sensors: IP65
- Light output indicator: LED
- Joining - cable “LIYY” (grey)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /m/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz</th>
<th>Current consumption /mA/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB1-18.63.F</td>
<td>0...8</td>
<td>Transmitter</td>
<td>-</td>
<td>M18x1</td>
<td>65</td>
<td>16</td>
<td>63</td>
</tr>
<tr>
<td>OB1-18.10.F</td>
<td>0...8</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1</td>
<td>65</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>OB1-18.20.F</td>
<td>0...8</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1</td>
<td>65</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>OB1-30.63.F</td>
<td>0...50</td>
<td>Transmitter</td>
<td>-</td>
<td>M30x1,5</td>
<td>77</td>
<td>16</td>
<td>63</td>
</tr>
<tr>
<td>OB1-30.10.F</td>
<td>0...50</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M30x1,5</td>
<td>77</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>OB1-30.20.F</td>
<td>0...50</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M30x1,5</td>
<td>77</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>OB3-60.63.F</td>
<td>0...8</td>
<td>Transmitter</td>
<td>-</td>
<td>36 x 15 x 60</td>
<td>-</td>
<td>16</td>
<td>63</td>
</tr>
<tr>
<td>OB3-60.10.F</td>
<td>0...8</td>
<td>NO + NC</td>
<td>PNP</td>
<td>36 x 15 x 60</td>
<td>250</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>OB3-60.20.F</td>
<td>0...8</td>
<td>NO + NC</td>
<td>NPN</td>
<td>36 x 15 x 60</td>
<td>250</td>
<td>12</td>
<td>20</td>
</tr>
</tbody>
</table>

Schemes of connection

- Scheme 10
- Scheme 20
- Scheme 63
Application and operating principle

The photoelectric diffuse type sensor consists of one housing, in which transmitter and receiver are situated. The sensor emits modulated ray of light, which is reflected by the passing (coming near) object and returns back to the sensor. In such case the output of the switch change state. Nominal switching distance of the presented sensor is measured by the help of white cardboard with size 100x100 mm. When there is object in front of the sensor, the output indicator is on.

Technical parameters

Supply voltage, \( U_s \) 10...30VDC (Ripple ±10 %)
Residual voltage, \( U_{res} \) 0,8V (I = 250mA)
Load current (max), \( I_{out} \) 250mA
Protection of output (scanning), \( I_{prot} \) 350mA (25°C)
Current consumption, \( I_s \) 27mA
Operating temperature range, \( T_{amb} \) -25…+70°C
Spectrum area of operating \( 850…950nm \)
Usable ambient light intensity (max) \( 3000Lx \)
Degree of protection of the sensors IP65
Light output indicator LED
Joining - cable “LIYY” (grey)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance ( S_n )/mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes ( /mm/ )</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD1-18.10.F</td>
<td>0...200</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1 65</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OD1-18.20.F</td>
<td>0...200</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1 65</td>
<td>250</td>
<td>20</td>
</tr>
<tr>
<td>OD1-18.10.FF*</td>
<td>0...100</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1 65</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OD1-18.20.FF*</td>
<td>0...100</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1 65</td>
<td>250</td>
<td>20</td>
</tr>
<tr>
<td>OD1-30.10.F</td>
<td>0...700</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M30x1,5 69</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OD1-30.20.F</td>
<td>0...700</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M30x1,5 69</td>
<td>250</td>
<td>20</td>
</tr>
<tr>
<td>OD3-60.10.F</td>
<td>0...700</td>
<td>NO + NC</td>
<td>PNP</td>
<td>39 x 15 x 60</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OD3-60.20.F</td>
<td>0...700</td>
<td>NO + NC</td>
<td>NPN</td>
<td>39 x 15 x 60</td>
<td>250</td>
<td>20</td>
</tr>
</tbody>
</table>

* diffuse type - convergent

Schemes of connection

![Diagram](image1)

**Scheme 10**

![Diagram](image2)

**Scheme 20**
Photoelectric sensors
/ Diffuse type for alternating current / “AC”

Application and operating principle
The present photoelectric sensors of diffuse type, serves to commutate alternating current 2-wire electric circuits. It acts on the principle of emitting and receiving modulated ray of light in infrared area of the spectrum. When an object passes in front of the sensor active surface they activate and switch output circuit. The output indicator is on, when there is object in front of the sensor. They are intended for control of circuit-breakers, magneto-valves, relays and other executing mechanisms.

Technical parameters
Supply voltage, $U_s$
90...220VAC (c)
40...110VAC (b)
24...50VAC (a)

Residual voltage, $U_{res}$
4VAC

Load current (max), $I_{out}$
10...300mA
2,5mA

Current consumption, $I_s$

Operating temperature range, $T_{amb}$
-25...+70°C

Spectrum area of operating
850...950nm

Usable ambient light intensity (max)
1000Lx

Degree of protection of the sensors
IP65

Light output indicator
LED

Joining - cable “LIYY” (grey)
2x0,50mm²; L=2m

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $Sn$ /mm/</th>
<th>Output function</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD1-18.71.F</td>
<td>10...200</td>
<td>NO</td>
<td>M18x1</td>
<td>65</td>
<td>10</td>
</tr>
<tr>
<td>OD1-18.72.F</td>
<td>10...200</td>
<td>NC</td>
<td>M18x1</td>
<td>65</td>
<td>10</td>
</tr>
<tr>
<td>OD3-64.71.F2</td>
<td>10...200</td>
<td>NO</td>
<td>30 x 15 x 64</td>
<td>10</td>
<td>71</td>
</tr>
<tr>
<td>OD3-64.72.F2</td>
<td>10...200</td>
<td>NC</td>
<td>30 x 15 x 64</td>
<td>10</td>
<td>72</td>
</tr>
</tbody>
</table>

Output characteristic /residual voltage/, output - thyristor

Schemes of connection

---

Plastic housing /cylindrical/ - fig.1
Plastic housing /rectangular/ - fig.2

---

ESA Control ltd
Photoelectric sensors / Retro-reflective type /

Application and operating principle

The photoelectric retro-reflective type sensor consists of one housing, in which transmitter and receiver are situated. The sensor emits infrared modulated ray of light which reflects on a reflector and returns back to the sensor. When an object passes between the sensor and the reflector, the ray of light becomes disconnected and the output of the sensor change state. When there is reflector in front of the sensor, the output indicator is on. Nominal switching distance of the presented sensors is measured by the help of round reflector Ø80.

Technical parameters

- **Supply voltage, \( U_s \)**: 10...30VDC (Ripple ±10 %)
- **Residual voltage, \( U_{res} \)**: 0,8 V (\( I = 250mA \))
- **Load current (max), \( I_{out} \)**: 250mA
- **Protection of output (scanning), \( I_{prot} \)**: 20mA
- **Current consumption, \( I_s \)**: 350mA (25°C)
- **Operating temperature range, \( T_{amb} \)**: -25...+70°C
- **Spectrum area of operating**
- **Usable ambient light intensity (max)**: 850...950nm
- **3000Lx**
- **Degree of protection of the sensors**
- **Light output indicator**
- **Joining - cable “LIYY” (grey)**

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /m/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR1-18.10.F</td>
<td>0,04...0,8</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OR1-18.20.F</td>
<td>0,04...0,8</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1</td>
<td>250</td>
<td>20</td>
</tr>
<tr>
<td>OR1-30.10.F</td>
<td>0,08...3,5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M30x1</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OR1-30.20.F</td>
<td>0,08...3,5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M30x1</td>
<td>250</td>
<td>20</td>
</tr>
</tbody>
</table>

Plastic housing /cylindrical/ - fig.1; fig.2

Plastic housing /rectangular/ - fig.3

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance Sn /m/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR3-60.10.F</td>
<td>0,08...3,5</td>
<td>NO + NC</td>
<td>PNP</td>
<td>39 x 15 x 60</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>OR3-60.20.F</td>
<td>0,08...3,5</td>
<td>NO + NC</td>
<td>NPN</td>
<td>39 x 15 x 60</td>
<td>250</td>
<td>20</td>
</tr>
</tbody>
</table>

Schemes of connection

- **Scheme 10**
- **Scheme 20**
# Photoelectric sensors / Reflectors /

<table>
<thead>
<tr>
<th>Type / Sizes</th>
<th>Material</th>
<th>Operating temperature (max.)</th>
<th>Reflectivity factor</th>
<th>fig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRT84</td>
<td>Acrylic</td>
<td>65°C</td>
<td>1,0</td>
<td>1</td>
</tr>
<tr>
<td>BRT-48X32A</td>
<td>Acrylic</td>
<td>65°C</td>
<td>1,0</td>
<td>2</td>
</tr>
<tr>
<td>BRT25</td>
<td>Acrylic</td>
<td>65°C</td>
<td>1,0</td>
<td>3</td>
</tr>
<tr>
<td>BRF50H</td>
<td>Synthetic resin</td>
<td>60°C</td>
<td>0,7</td>
<td>4</td>
</tr>
</tbody>
</table>
Photoelectric sensors / Mark type /

Application and operating principle

The photoelectric mark type sensor consists of one housing, in which transmitter and receiver are situated. They serve to register coloured mark stripes inflicted on object, that is passing in a strictly fixed zone (of 10÷20mm) in front of the active surface of the sensor. The width of mark stripes can not be less than 3mm. Depending on the colour of the emitted light from the sensor there are two types:

1. Operating with red light - sensors can distinguish well green, black, grey, blue, violet or brown mark stripes, inflicted on white, yellow or red background and the opposite (whites, yellow or reds mark stripes, inflicted on green, black, grey, blue, violet or brown background).

2. Operating with green light - sensors can distinguish well red, black, grey, blue, violet or brown mark stripes, inflicted on white or yellow background and the opposite.

Technical parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage, $U_s$</td>
<td>0,8V (I = 250mA)</td>
</tr>
<tr>
<td>Residual voltage, $U_{res}$</td>
<td>250mA</td>
</tr>
<tr>
<td>Load current (max), $I_{out}$</td>
<td>350mA (25°C)</td>
</tr>
<tr>
<td>Protection of output (scanning), $I_{prot}$</td>
<td>20mA</td>
</tr>
<tr>
<td>Current consumption, $I_s$</td>
<td>-25…+70°C</td>
</tr>
<tr>
<td>Operating temperature range, $T_{amb}$</td>
<td>620…650nm</td>
</tr>
<tr>
<td>Spectrum area of operating</td>
<td>550…570nm</td>
</tr>
<tr>
<td>- red light (R)</td>
<td>3000Lx</td>
</tr>
<tr>
<td>- green light (G)</td>
<td>LED</td>
</tr>
<tr>
<td>Usable ambient light intensity (max)</td>
<td>4x0,25mm²; L=2m</td>
</tr>
<tr>
<td>Degree of protection of the sensors</td>
<td></td>
</tr>
<tr>
<td>Light output indicator</td>
<td></td>
</tr>
<tr>
<td>Joining - cable “LIYY” (grey)</td>
<td></td>
</tr>
</tbody>
</table>

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Switching distance $S_n$ /mm/</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency (max) /Hz/</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM1-18.10.RT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1 65</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>OM1-18.20.RT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1 65</td>
<td>200</td>
<td>20</td>
</tr>
<tr>
<td>OM1-18.10.GT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1 65</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>OM1-18.20.GT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1 65</td>
<td>200</td>
<td>20</td>
</tr>
<tr>
<td>OM3-60.10.RT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>PNP</td>
<td>36 x 15 x 60</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>OM3-60.20.RT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>PNP</td>
<td>36 x 15 x 60</td>
<td>200</td>
<td>20</td>
</tr>
<tr>
<td>OM3-60.10.GT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>NPN</td>
<td>36 x 15 x 60</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>OM3-60.20.GT</td>
<td>10...20</td>
<td>NO + NC</td>
<td>NPN</td>
<td>36 x 15 x 60</td>
<td>200</td>
<td>20</td>
</tr>
</tbody>
</table>

Schemes of connection

[Scheme 10]

[Scheme 20]
Mounting of mark sensor for registration stripes of the mark, spread on non-transparent band.

Mounting of mark sensor for registration stripes of the mark, spread on transparent (colourless) band.

Mounting of mark sensor for registration:
- mark stripes, spread on shining band
- mark stripes, spread on vibrating band
- mark stripes with light contrast on the background of the band

Notes:
When mark stripes are 5 mm wide and the distance between them is not less than 5 mm, the permissible maximal speed \(V\) of movement of band is 6 m/s.
Application and operating principle

The photoelectric fork type sensor consists of one housing, in which transmitter and receiver are situated. It acts on the principle of emitting and receiving non-modulated ray of light in infrared area of the spectrum. They are used for measuring cycles of shafts etc. They have good sharing ability (0.5mm). The frequency characteristic of type OV1-18.10.F (OV1-18.20.F) is made with raster of gear 1 mm and ambient illumination not more than 1000 Lx. Sensors are made with two outputs - right and inverse (NO+NC) and have protection (scanning) against overloading and short-circuit. When the object is out of the operating range, the output indicator is on.

Technical parameters

- Supply voltage, \( U_s \)
- Output voltage(max), \( U_{out} \)
- Residual voltage, \( U_{res} \)
- Load current (max), \( I_{out} \)
- Protection of output (scanning), \( I_{prot} \)
- Operating temperature range, \( T_{amb} \)
- Spectrum area of operating
- Usable ambient light intensity (max)
- Degree of protection
- Light output indicator
- Joining - cable “LIYY” (grey)

![fig.1](image1)

![fig.2](image2)

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Operating distance ( S_n /\text{mm/} )</th>
<th>Output function</th>
<th>Output (transistor - open collector)</th>
<th>Sizes /mm/</th>
<th>Switching frequency(max) /Hz/</th>
<th>Current consumption ( I_s /\text{mA/} )</th>
<th>Scheme of connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>OV1-18.10.F</td>
<td>4</td>
<td>NO + NC</td>
<td>PNP</td>
<td>M18x1</td>
<td>60</td>
<td>10 000</td>
<td>10 10</td>
</tr>
<tr>
<td>OV1-18.20.F</td>
<td>4</td>
<td>NO + NC</td>
<td>NPN</td>
<td>M18x1</td>
<td>60</td>
<td>10 000</td>
<td>10 20</td>
</tr>
<tr>
<td>OV4-75.10.F</td>
<td>30</td>
<td>NO + NC</td>
<td>PNP</td>
<td>75 x 18 x 52</td>
<td>200</td>
<td>18</td>
<td>10 10</td>
</tr>
<tr>
<td>OV4-75.20.F</td>
<td>30</td>
<td>NO + NC</td>
<td>NPN</td>
<td>75 x 18 x 52</td>
<td>200</td>
<td>18</td>
<td>10 20</td>
</tr>
</tbody>
</table>

Overall sizes

<table>
<thead>
<tr>
<th>Scheme 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>brown</td>
</tr>
<tr>
<td>white</td>
</tr>
<tr>
<td>black</td>
</tr>
<tr>
<td>blue</td>
</tr>
<tr>
<td>PNP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scheme 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>brown</td>
</tr>
<tr>
<td>black</td>
</tr>
<tr>
<td>white</td>
</tr>
<tr>
<td>blue</td>
</tr>
</tbody>
</table>

Schemes of connection
**Photoelectric sensors**

*Fork type with two outputs shifted on phases*

**OV1-18.24.F**

**Application and operating principle**

The photoelectric fork type sensor OV1-18.24.F has two output signals A and B which are shifted on phase of 90° (at raster of the observed object 0,5mm). It is used as a sensor for measurement the angular and linear displacements, and for determining the direction of rotation of the shafts or linear moving objects. It acts on the principle of emitting and receiving non-modulated ray of light in infrared area of the spectrum. It have good sharing ability (0,5mm). When the object is out of the operating range, the output indicators of signals A and B are on. The sensor is used widely in practice as a device for automatization of technological lines and processes.

**Technical parameters**

- Operating distance, $S_n$
- Outputs
- Outputs A and B shifted on phases
- Supply voltage, $U_s$
- Residual voltage, $U_{res}$
- Load current (max), $I_{out}$
- Current consumption, $I_s$
- Fall time, $t_f$
- Rise time, $t_r$
- Operating frequency (max), $f_o$
- Operating temperature range, $T_{amb}$
- Spectrum area of operating
- Usable ambient light intensity (max)
- Degree of protection
- Light indicator of outputs A and B
- Joining - cable “LIYY” (grey)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating distance, $S_n$</td>
<td>4mm</td>
</tr>
<tr>
<td>Outputs</td>
<td>A and B (res. 5.6K to $U_s$)</td>
</tr>
<tr>
<td>Outputs A and B shifted on phases</td>
<td>90°electr. (at raster 0,5mm)</td>
</tr>
<tr>
<td>Supply voltage, $U_s$</td>
<td>8...30VDC (Ripple ±10 %)</td>
</tr>
<tr>
<td>Residual voltage, $U_{res}$</td>
<td>0,45V ($I = 20mA$)</td>
</tr>
<tr>
<td>Load current (max), $I_{out}$</td>
<td>100mA</td>
</tr>
<tr>
<td>Current consumption, $I_s$</td>
<td>25mA</td>
</tr>
<tr>
<td>Fall time, $t_f$</td>
<td>0.1µs</td>
</tr>
<tr>
<td>Rise time, $t_r$</td>
<td>1.0µs</td>
</tr>
<tr>
<td>Operating frequency (max), $f_o$</td>
<td>10000Hz</td>
</tr>
<tr>
<td>Operating temperature range, $T_{amb}$</td>
<td>-10…+50°C</td>
</tr>
<tr>
<td>Spectrum area of operating</td>
<td>850…950nm</td>
</tr>
<tr>
<td>Usable ambient light intensity (max)</td>
<td>1000Lx</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Light indicator of outputs A and B</td>
<td>2 x LED</td>
</tr>
<tr>
<td>Joining - cable “LIYY” (grey)</td>
<td>4x0,25mm² + shield; L=2m</td>
</tr>
</tbody>
</table>

**Overall dimensions and application**

![Fig. 1](image1.png)

![Fig. 2](image2.png)

**Scheme of connection**

![Diagram](image3.png)
Photoelectric sensors
/ Fork type with two outputs shifted on phases /

Time diagram of output signals

Output characteristics (Residual voltage)

Connection with controller

Photoelectric fork type sensor
OV1-18.24.F

Controller

L < 10m

Photoelectric fork type sensor
OV1-18.24.F

Controller

With cores twisted to pairs

L < 30m
L > 30m (RS485)
Incremental Rotary Encoder

Application and operating principle

The incremental rotary encoder series E50-02 (fig.1) serves to convert the angular displacements into electrical impulses. There is three output signals: A, B and C. The output electrical signals A and B are dephased and allow determination the direction of turning round of axles. The output electrical signal C is short single electrical impulse for one complete turning of axle of the device of 360º. The encoder is used widely into practice as a device for automatization of different production processes.

Technical parameters

<table>
<thead>
<tr>
<th>Outputs</th>
<th>A, B, C (5KΩ to +V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual voltage, $U_{res}$</td>
<td>30°...90°electrical</td>
</tr>
<tr>
<td>Load current (max), $I_{out}$</td>
<td>0,45V (I=20mA)</td>
</tr>
<tr>
<td>Current consumption, $I_s$</td>
<td>100mA</td>
</tr>
<tr>
<td>Fall time, $t_f$</td>
<td>25mA</td>
</tr>
<tr>
<td>Rise time, $t_r$</td>
<td>0,1μs</td>
</tr>
<tr>
<td>Operating frequency(max), $f_0$</td>
<td>0,2μs</td>
</tr>
<tr>
<td>Operating temperature range, $T_{amb}$</td>
<td>10KHz</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>-10...+50°C</td>
</tr>
<tr>
<td>Permissible level of moisture</td>
<td>IP41</td>
</tr>
<tr>
<td>Maximum load of shaft</td>
<td>85% (at 25°C)</td>
</tr>
<tr>
<td>- the radial direction</td>
<td></td>
</tr>
<tr>
<td>- the thrust direction</td>
<td>10N</td>
</tr>
<tr>
<td>Joining connector</td>
<td>5N</td>
</tr>
<tr>
<td>Joining cable</td>
<td>Canon &quot;DB9PM&quot; (male)</td>
</tr>
<tr>
<td>Overall size</td>
<td>4x0,25mm² + shield; L=1m</td>
</tr>
<tr>
<td></td>
<td>ø50x45</td>
</tr>
</tbody>
</table>

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Resolution pulse/rotation n</th>
<th>Supply voltage Us</th>
</tr>
</thead>
<tbody>
<tr>
<td>E50-02A-30</td>
<td>30</td>
<td>5VDC ±10%</td>
</tr>
<tr>
<td>E50-02A-60</td>
<td>60</td>
<td>5VDC ±10%</td>
</tr>
<tr>
<td>E50-02A-90</td>
<td>90</td>
<td>5VDC ±10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Resolution pulse/rotation n</th>
<th>Supply voltage Us</th>
</tr>
</thead>
<tbody>
<tr>
<td>E50-02B-30</td>
<td>30</td>
<td>8...30VDC</td>
</tr>
<tr>
<td>E50-02B-60</td>
<td>60</td>
<td>8...30VDC</td>
</tr>
<tr>
<td>E50-02B-90</td>
<td>90</td>
<td>8...30VDC</td>
</tr>
</tbody>
</table>

Output characteristic (log."0")

Schemes of connection
Time diagram of output signals

Connection with controller

Overall sizes

Connection - Canon “DB9PM” (male)
Safety Light Curtain

Application and operating principle

The safety light curtain SLC3 is a specialized product used to protect the machines and other moving elements from accidental interventions and to protect the machine operator from injuries. It consists of three elements: Emitter (SLC3-E), Receiver (SLC3-R) and Controller (SLC3-C).

The emitter and the receiver are situated one against the other and are connected by infrared light rays (optical axes). The maximum number of light rays for the series SLC3 is 12. In a normal working process the output relay of the controller is turned on and passes current in the output circuit to which the controller is connected (LED “Relay”- lights). If only one of the rays is interrupted, the output relay of the controller switches off and breaks off the output circuit (LED “Relay”- does not light). The restoring of the working process of the light curtain and turning on of the output relay starts by pushing once the “Reset” button situated on the face panel of the controller. Additional external button ”Reset” can be used set between terminals 1 and 5 of the controller. The light curtain operates in automatic mode if terminals 1 and 5 are shorted.

Technical parameters

- Operating distance, $S_n$: 0... 5m (0...8m option)
- Supply voltage, $U_s$: 24V AC/DC ±10%
- Current consumption, $I_s$: 120mA
- Output (Relay, 1 x NC): 1A / 220VAC (2A, Fuse)
- Reaction time (ON to OFF): 100ms
- Startup waiting time (OFF to ON): 400ms
- Operating temperature range, $T_{amb}$: -20...+50°C
- Degree of protection: IP40
- Indicator of the supply voltage: LED (green)
- Indicator for the state of the output relay: LED (red)
- Joining: connector
- Controller size (for M36 DIN-rail): 86 x 35 x 58mm

Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of optical axes n/pcs/</th>
<th>Optical axes pitch a/mm/</th>
<th>Detection height of light curtain h/mm/</th>
<th>Height of housing H/mm/</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLC3-06-030</td>
<td>6</td>
<td>30</td>
<td>150</td>
<td>210</td>
</tr>
<tr>
<td>SLC3-06-060</td>
<td>6</td>
<td>60</td>
<td>300</td>
<td>360</td>
</tr>
<tr>
<td>SLC3-12-030</td>
<td>12</td>
<td>30</td>
<td>330</td>
<td>390</td>
</tr>
<tr>
<td>SLC3-12-060</td>
<td>12</td>
<td>60</td>
<td>660</td>
<td>720</td>
</tr>
</tbody>
</table>
**Safety Light Curtain**

**Overall and joining sizes**

![Diagram of Emitter and Receiver with dimensions](image)

**Joining cable (emitter-controller; receiver-controller)**

![Diagram of Cable Connections](image)

**Joining**

![Diagram of Emitter, Receiver, and Controller](image)
Specialized analogue timer

Features

The TAS2-30S specialized analogue timer is meant for montage of M36 DIN-rail and combines functionally two structures:

1. **Standard analogue timer (Timer)**
   It serves to commutate electric circuits at certain interval of time "T", which is set by the help of potentiometer. It starts by turning on the supply voltage or by negative impulse at the input of the device - pin 7 (fig.3,4,5). By the key switch-over (fig.1) could be chosen one of the four regimes of work (fig.2).

2. **Speed control device (Speed controller)**
   The device is meant to control the movement speed of transport lines. Electric impulses are sent from the rotating wheel of the transport line to the device by the help of switch. If the time "t" - between two consequent impulses exceeds the time set by the device "T", then the output timer turns off.

![fig.1](image1)

**fig.1**

**fig.2**

<table>
<thead>
<tr>
<th>Technical parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
</tr>
<tr>
<td>Output (Relay / NO+NC)</td>
</tr>
<tr>
<td>Time-range</td>
</tr>
<tr>
<td>Error in time measuring</td>
</tr>
<tr>
<td>Operating temperature range</td>
</tr>
<tr>
<td>Degree of protection</td>
</tr>
<tr>
<td>Joining</td>
</tr>
<tr>
<td>Sizes</td>
</tr>
</tbody>
</table>

**Schemes of connection of the sensor to the device**

![fig.3](image3)

**fig.3**
Starting by 3-wire NPN type sensor

![fig.4](image4)

**fig.4**
Starting by 2-wire sensor

![fig.5](image5)

**fig.5**
Starting by switch K /dry contact/
**Digital Timer**

**Features**

The TDE4-3 digital simple timer is a small compact device on the basis of microprocessor. It serves to commutate direct current and alternating current electric circuits for a fixed time interval "T", which is set in digital form. It is used widely in automation of production, technological and other processes. The time relay has two operating modes LOG1 (▁▁▁) and LOG2 (▁▁▁▁), which enable it to be used in many different automation processes. The digital timer is designed for installation in a dashboard (panel montage).

**Technical parameters**

- Four-digital indicator, LED-red
- Supply voltage: 220VAC ±10%
- Output (Relay / NO+NC): 4A / 220VAC
- Error in time measuring: 0,05%
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 95x49x113mm
- Energy-independent memory for programmable parameters.
- Input for outer nullity "reset" - switch K3 (fig.1, fig.2).
- Input for outer starting "start" - operates with sensor type NPN (fig.1) or switch K2 (fig.2).
- It is provided direct voltage 12VDC (40mA) for sensor's supply.

**ATTENTION:** In "LOG1" mode, when the K2 key permanently closed, the timer operates in cyclic mode.

**Programmable parameters**

- Parameter "T"  
  0.1~999.9 (1~9999)  
- Time-range of parameter "T":  
  0.1 + 999.9sec  
  1 + 9999sec  
  1 + 9999min  
- Operating regime (increment / decrement): Inc / dEc  
  Cont  
  Full  
  Ucc  
  Goto  
- Breakup in the supply voltage "Us":  
  - after breakup, automatically continues counting from the current state  
  - after breakup, automatically starts counting from the beginning  
  - after breakup, establishes stop-regime of the current data  
  - after breakup, returns to starting position  
- Automatic starting, at first switching on of the supply: no / Auto  
- Mode of operation (▁▁▁ / ▁▁▁▁): LOG1 / LOG2

**Schemes of connection**

- **fig.1**  
  Starting by NPN type sensor

- **fig.2**  
  Starting by K2 switch

---

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDE4-3 / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>TDE4-3 / 12÷24V</td>
<td>12÷24V ac/dc ±10%</td>
<td>85mA (2W)</td>
</tr>
</tbody>
</table>
Features
The TDE4-3L digital simple timer is meant for montage of M36 DIN-rail. It is a compact microprocessor device. It serves to commutate direct current and alternating current electric circuits for a fixed time interval "T", which is set in digital form. It is used widely in automation of production, technological and other processes. The time relay has two operating modes LOG1 ( ) and LOG2 ( ), which enable it to be used in many different automation processes.

![Timer Image]

Technical parameters
- 4-digital indicator, LED-red
- Supply voltage
  - 220VAC / 12÷24V ac/dc ±10%
- Output (Relay / NO+NC)
  - 4A / 220VAC
- Error in time measuring
  - 0.05%
- Operating temperature range
  - -20...+50°C
- Degree of protection
  - IP40
- Joining
  - Terminal
- Sizes
  - 86x70x58mm

Energy-independent memory for programmable parameters.
- Input for outer nullity "reset" - switch K3 (fig.1, fig.2).
- Input for outer starting “start” - operates with sensor type NPN (fig.1) or switch K2 (fig.2).
It is provided direct voltage 12VDC (40mA) for sensor’s supply.
ATTENTION: In “LOG1” mode, when the K2 key permanently closed, the timer operates in cyclic mode.

Programmable parameters
- Parameter "T"
  - Time-range of parameter "T":
    - 0.1÷999.9sec
    - 1÷9999sec
    - 1÷9999min
  - Operating regime (increment / decrement)
  - Breakup in the supply voltage “Us”:
    - after breakup, automatically continues counting from the current state
    - after breakup, automatically starts counting from the beginning
    - after breakup, establishes stop-regime of the current data
    - after breakup, returns to starting position
  - Automatic starting, at first switching on of the supply
  - Mode of operation ( )

Schemes of connection
- Starting by NPN type sensor
- Starting by K2 switch

| Type parameters |
|-----------------|-----------------|-----------------|
| Type            | Supply voltage  | Consumption     |
| TDE4-3L / 220VAC| 220VAC ±10%     | 16mA (4W)       |
| TDE4-3L / 12÷24V| 12÷24V ac/dc ±10% | 85mA (2W)     |
The TDT4-2 digital cyclic timer is a small compact device on the basis of microprocessor. It serves to commutate direct current and alternating current electric circuits. Programmable in digital expression is set the duration of switched on state "Ton" and the duration of switched off state "Toff" of the output relay. One cycle is equal to the sum of the times "Ton" and "Toff". It is possible to set arbitrary number of cycles "C", after counting of which the timer turns off and goes into starting position. It is used widely in automation of production, technological and other processes.

### Technical parameters

- 4-digital indicator, LED-red
- Supply voltage: 220VAC / 12÷24V ac/dc
- Output (Relay / NO+NC)
- Number of cycles "C" (000 - infinity)
- Error in time measuring: 0,05%
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 95x49x113mm
- Energy-independent memory for programmable parameters.

### Programmable parameters

- Time-range of parameter "Ton":
  - 0,1÷999.9sec
  - 1 + 9999sec
  - 1 + 9999min
- Parameter "Ton" (time of switched on state the output relay): 0.1÷999.9sec
- Time-range of parameter "Toff":
  - 0,1÷999.9sec
  - 1 + 9999sec
  - 1 + 9999min
- Parameter "Toff" (time of out-of-work state the output relay): 0.1÷999.9sec
- Number of cycles "C" (000 - infinity): 000÷999
- Breakup in the supply voltage “Us”:
  - Cont
  - Full
  - Ucc
  - Goto
- Automatic starting, at first switching on of the supply: no / Auto
- Initial starting of the timer "St" (Ton / Toff):

### Schemes of connection

- **fig.1**: Starting by NPN type sensor
- **fig.2**: Starting by K2 switch
Technical parameters

- 4-digit indicator, LED-red
- Supply voltage: 220VAC / 12÷24V ac/dc
- Output (Relay / NO+NC)
- Number of cycles "C"
- Error in time measuring: 0,05%
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 86x70x58mm

Energy-independent memory for programmable parameters.

- Input for outer nullity "reset" - switch K3 (fig.1, fig.2).
- Input for outer starting "start" - operates with sensor type NPN (fig.1) or switch K2 (fig.2).

It is provided direct voltage 12VDC (40mA) for sensor's supply.

Programmable parameters

- Time-range of parameter "Ton" :
  - 0,1÷999,9sec
  - 1 + 9999sec
  - 1 + 9999min
- Parameter "Ton" (time of switched on state the output relay) :
  - 0,1÷999,9 sec
  - 1 + 9999sec
  - 1 + 9999min
- Time-range of parameter “Toff” :
  - 0,1÷999,9sec
  - 1 + 9999sec
  - 1 + 9999min
- Parameter "Toff" (time of out-of-work state the output relay) :
  - 0,1÷999,9sec
  - 1 + 9999sec
  - 1 + 9999min
- Number of cycles "C" (000 - infinity)
- Breakup in the supply voltage “Us” :
  - after breakup, automatically continues counting from the current state
  - after breakup, automatically starts counting from the beginning
  - after breakup, establishes stop-regime of the current data
  - after breakup, returns to starting position
- Automatic starting, at first switching on of the supply
- Initial starting of the timer "St" (Ton / Toff )

Schemes of connection

- fig.1: Starting by NPN type sensor
- fig.2: Starting by K2 switch
Features

The digital timer-watch TWD6-2S serves to commutate electric circuits in real time. Beforehand within the framework of 24 hours can be assigned 10 independent a fixed time for switching an electric circuits. When the real time coincides with one of the assigned periods of time, the output relay switches-on for the period from 0 to 999 seconds (it is assigned for every fixed time). The timer-watch controlled via six buttons located on the face panel. It can be used for alarms or for other automation processes.

Option (on request): Remote control of four-digit display DD4-1 - size 420x165x80mm. The connection is made through a 2-wire telephone line with standard connector "6P4C". With the help of cable couplers (couplings) can be coupled up to eight digital displays, which are located at a distance up to 100 m from the timer-watch.

Technical parameters TWD6-2S

Supply voltage 220Vac/24V/12V/ ±10%
Consumption power 4W
Supply battery (CR2032) 3V (180mA/h)
Output (relay) 4A / 220VAC (NO)
Error in time measuring ±0,02%
Operating temperature range -20...+50°C
Degree of protection IP40
Joining Terminal
Sizes 95x49x113mm

Programmable parameters /1/

<table>
<thead>
<tr>
<th>Programmable parameter</th>
<th>Indication to the display /example/</th>
<th>Value (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed time t1</td>
<td>t1. 07. 00</td>
<td>0,00 ÷ 23,59 h.min</td>
</tr>
<tr>
<td>Period P1</td>
<td>P1  100</td>
<td>0 ÷ 999 sec</td>
</tr>
<tr>
<td>Fixed time t2</td>
<td>t2. 08. 00</td>
<td>0,00 ÷ 23,59 h.min</td>
</tr>
<tr>
<td>Period P2</td>
<td>P2  100</td>
<td>0 ÷ 999 sec</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Fixed time t9</td>
<td>t9. 15. 00</td>
<td>0,00 ÷ 23,59 h.min</td>
</tr>
<tr>
<td>Period P9</td>
<td>P9  100</td>
<td>0 ÷ 999 sec</td>
</tr>
<tr>
<td>Fixed time t0</td>
<td>t0. 16. 00</td>
<td>0,00 ÷ 23,59 h.min</td>
</tr>
<tr>
<td>Period P0</td>
<td>P0  100</td>
<td>0 ÷ 999 sec</td>
</tr>
</tbody>
</table>

Programmable parameters /2/

| The current sentry time | t 12. 00                 | 0,00 ÷ 23,59 h.min |
| Date / Month           | d 31. 03                 | 01.01 ÷ 31.12 d.m |
| Year                   | Y 20 09                  | 2000 ÷ 2099 year |

Scheme of connection

![Scheme of connection diagram]
The digital counter of impulses CD4-2 is a compact microprocessor device, that serves for counting electric impulses. The impulses received at the him input are visualized on a four-digital display. Except counting the impulses, its basic function is to commutate electric circuit, in which it is turned on when a fixed value "N" is reached. The counter is used widely in automation of production, technological and other processes. The device is designed for installation in a dashboard (panel montage).

### Technical parameters

- Four-digital indicator, LED-red
- Supply voltage: 220VAC / 24V / 12V
- Output (relay): 4A / 220VAC (NO+NC)
- Counting range: 1...9999 (impulses)
- Inner divisor: 1...99
- Maximum counting frequency: 500Hz (option 5KHz)
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 95x49x113mm

Energy-independent memory for programmable parameters.

Input counting - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).

It is provided direct voltage 12VDC (40mA) for sensor’s supply.

Input for outer nullity “reset” - switch K3 (fig.1, fig.2).

Input for outer starting “start” - switch K2 (fig.1, fig.2).

**ATTENTION:** When the switch K2 is constantly included, the counter is running in cyclic regime.

### Programmable parameters

- Number impulses "N"
- Inner divisor "d"
- Maximum time between two impulses (00=infinity) "t"(sec)
- Active input frontier (low / high)
- Operating regime (increment / decrement)
- Breakup in the supply voltage “Us”:
  - after breakup, automatically continues counting from the current data
  - after breakup, automatically starts counting from the beginning
  - after breakup, establishes stop-regime of the current data
  - after breakup, returns to starting position
- Automatic starting, at first switching on of the supply
- Initial stated of output relay when starting (Status) "St"

### Schemes of connection

- **Connecting NPN type sensor**
- **Connecting a mechanical key "K1"**
Digital Counter of Impulses

**Features**

The digital counter of impulses CD4-2L is a compact microprocessor device, that serves for counting electric impulses. The impulses received at the him input are visualized on a four-digital display. Except counting the impulses, its basic function is to commutate electric circuit, in which it is turned on when a fixed value "N" is reached. The counter is used widely in automation of production, technological and other processes. The device is designed for installation on the DIN-rail M36.

**Technical parameters**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four-digital indicator, LED-red</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>220VAC / 24V / 12V</td>
</tr>
<tr>
<td>Output (relay)</td>
<td>4A / 220VAC (NO+NC)</td>
</tr>
<tr>
<td>Counting range</td>
<td>1…9999 (impulses)</td>
</tr>
<tr>
<td>Inner divisor</td>
<td>1…99</td>
</tr>
<tr>
<td>Maximum counting frequency</td>
<td>500Hz (option 5KHz)</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20...+50°C</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP40</td>
</tr>
<tr>
<td>Joining</td>
<td></td>
</tr>
<tr>
<td>Sizes</td>
<td>86x70x58mm</td>
</tr>
<tr>
<td>Energy-independent memory for programmable parameters</td>
<td></td>
</tr>
<tr>
<td>Input counting</td>
<td>It is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).</td>
</tr>
<tr>
<td>It is provided direct voltage 12VDC (40mA)</td>
<td>for sensor’s supply.</td>
</tr>
<tr>
<td>Input for outer nullity “reset” - switch K3</td>
<td>(fig.1, fig.2).</td>
</tr>
<tr>
<td>Input for outer starting “start” - switch K2</td>
<td>(fig.1, fig.2).</td>
</tr>
<tr>
<td>ATTENTION: When the switch K2 is constantly included, the counter is running in cyclic regime.</td>
<td></td>
</tr>
<tr>
<td>Connecting NPN type sensor</td>
<td></td>
</tr>
<tr>
<td>Connecting a mechanical key &quot;K1&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**Programmable parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number impulses &quot;N&quot;</td>
<td>1 ÷ 9999</td>
</tr>
<tr>
<td>Inner divisor &quot;d&quot;</td>
<td>01 ÷ 99</td>
</tr>
<tr>
<td>Maximum time between two impulses (00=infinity) &quot;t&quot;(sec)</td>
<td>00 ÷ 99 (99=9,9sec)</td>
</tr>
<tr>
<td>Active input frontier (low / high)</td>
<td>Lo / Hi</td>
</tr>
<tr>
<td>Operating regime (increment / decrement)</td>
<td>Inc / dEc</td>
</tr>
<tr>
<td>Breakup in the supply voltage “Us” :</td>
<td></td>
</tr>
<tr>
<td>- after breakup, automatically continues counting from the current data</td>
<td>Cont</td>
</tr>
<tr>
<td>- after breakup, automatically starts counting from the beginning</td>
<td>Full</td>
</tr>
<tr>
<td>- after breakup, establishes stop-regime of the current data</td>
<td>Ucc</td>
</tr>
<tr>
<td>- after breakup, returns to starting position</td>
<td>Goto</td>
</tr>
<tr>
<td>Automatic starting, at first switching on of the supply</td>
<td>no / Auto</td>
</tr>
<tr>
<td>Initial stated of output relay when starting (Status) &quot;St&quot;</td>
<td>☐ / ☐</td>
</tr>
</tbody>
</table>

**Schemes of connection**

[Diagram of connection with NPN type sensor]

[Diagram of connection with mechanical key "K1"]
Digital Counter of Impulses

**Features**

The digital counter of impulses CD6-2 is a compact microprocessor device, that serves for counting electric impulses. The impulses received at the him input are visualized on a six-digital display. Except counting the impulses, its basic function is to commutate electric circuit, in which it is turned on when a fixed value "N" is reached. The counter is used widely in automation of production, technological and other processes. The device is designed for installation in a dashboard (panel montage).

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD6-2 / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>CD6-2 / 24V</td>
<td>24V ±10% AC/DC</td>
<td>85mA (2W)</td>
</tr>
<tr>
<td>CD6-2 / 12V</td>
<td>12V ±10% AC/DC</td>
<td>85mA (1W)</td>
</tr>
</tbody>
</table>

**Technical parameters**

- Six-digital indicator, LED-green/red
- Supply voltage
  - 220VAC / 24V / 12V
- Output (relay)
  - 4A / 220VAC (NO+NC)
- Counting range
  - 1...999999 (impulses)
- Inner divisor
  - 1...9999
- Maximum counting frequency
  - 1KHz (option 11KHz)
- Operating temperature range
  - -20...+50°C
- Degree of protection
  - IP40
- Joining
  - Terminal
- Sizes
  - 95x49x113mm

Energy-independent memory for programmable parameters.

Input counting - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).

It is provided direct voltage 12VDC (40mA) for sensor's supply.

Input for outer nullity "reset" - switch K3 (fig.1, fig.2).

Input for outer starting "start" - switch K2 (fig.1, fig.2).

**Programmable parameters**

- Number impulses "N"
- Inner divisor "d"
- Maximum time between two impulses (0.0=infinty) "t"(sec)
- Active input frontier (high / low) "In"
  - Hi / Lo
- Operating regime (increment / decrement)
  - Inc / dEc
- Breakup in the supply voltage “Us” :
  - after breakup, automatically continues counting from the current data
  - after breakup, automatically starts counting from the beginning
  - after breakup, establishes stop-regime of the current data
  - after breakup, returns to starting position
  - Cont
  - Full
  - Ucc
  - Goto
- Automatic starting, at first switching on of the supply
- Initial stated of output relay when starting (Status) "St"
  - noAuto / Auto

**Schemes of connection**

**fig.1**

Connecting NPN type sensor

**fig.2**

Connecting a mechanical key "K1"
Features

The digital counter of impulses CD6-3 is a compact microprocessor device, that serves for counting electric impulses. The impulses received at the him input are visualized on a six-digit display. Except counting the impulses, its basic function is to commutate electric circuit, in which it is turned on when a fixed value "N" is reached. The counter has a "Total" memory cell in which all counted impulses are accumulated and stored for a long period of time. The amount of accumulated impulses in a cell "Total" is displayed by pressing the "Total" button.

Technical parameters

- Six-digit indicator, LED-green/red
- Supply voltage: 220VAC / 24V / 12V
- Output (relay): 4A / 220VAC (NO+NC)
- Counting range: 1...999999 (impulses)
- Inner divisor: 1...9999
- Maximum counting frequency: 1KHz (option 11KHz)
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 95x49x113mm

Energy-independent memory for programmable parameters.

Programmable parameters

- Number impulses "N" 1 ÷ 999999
- Inner divisor "d" 1 ÷ 9999
- Maximum time between two impulses (0.0=infinity) "t"(sec) 0.0 ÷ 999.9
- Active input frontier (high / low) "In" Hi / Lo
- Operating regime (increment / decrement) Inc / dEc
- Breakup in the supply voltage “Us”:
  - after breakup, automatically continues counting from the current data Cont
  - after breakup, automatically starts counting from the beginning Full
  - after breakup, establishes stop-regime of the current data Ucc
  - after breakup, returns to starting position Goto
- Automatic starting, at first switching on of the supply noAuto / Auto
- Initial stated of output relay when starting (Status) "St"  □ / □

Schemes of connection

Connecting NPN type sensor

Connecting a mechanical key "K1"

Energy-independent memory for programmable parameters.

ATTENTION: When the switch K2 is constantly included, the counter is running in cyclic regime.

Programmable parameters

- Number impulses "N" 1 ÷ 999999
- Inner divisor "d" 1 ÷ 9999
- Maximum time between two impulses (0.0=infinity) "t"(sec) 0.0 ÷ 999.9
- Active input frontier (high / low) "In" Hi / Lo
- Operating regime (increment / decrement) Inc / dEc
- Breakup in the supply voltage “Us”:
  - after breakup, automatically continues counting from the current data Cont
  - after breakup, automatically starts counting from the beginning Full
  - after breakup, establishes stop-regime of the current data Ucc
  - after breakup, returns to starting position Goto
- Automatic starting, at first switching on of the supply noAuto / Auto
- Initial stated of output relay when starting (Status) "St"  □ / □

Schemes of connection

Connecting NPN type sensor

Connecting a mechanical key "K1"
The digital counter of impulses CD6-4 is a compact microprocessor device, that serves for counting electric impulses. The impulses received at the him input are visualized on a six-digital display. The counter has two output relays. The first relay switches over after counting "N1" impulses, the second relay switches over after counting "N2" impulses, whereby the counter is reset and passes into the initial state. For proper operation of the counter, "N1" must be less than or equal to "N2". The counter is used widely in automation of production, technological and other processes.

### Technical parameters

- Six-digital indicator, LED-green/red
- Supply voltage: 220VAC / 24V / 12V
- Output (relay-1, relay-2): 4A/220VAC, 2x(NO+NC)
- Counting range “N1”: 1…999999 (impulses)
- Counting range “N2”: 1…999999 (impulses)
- Maximum counting frequency: 1KHz (option 11KHz)
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 95x49x113mm

Energy-independent memory for programmable parameters.

Input counting - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).

It is provided direct voltage 12VDC (40mA) for sensor’s supply.

Input for outer starting “start” - switch K2 (fig.1, fig.2).

ATTENTION: When the switch K2 is constantly included, the counter is running in cyclic regime.

### Programmable parameters

| Number impulses “N1” | 1 ÷ 999999 |
| Number impulses “N2” | 1 ÷ 999999 |
| Maximum time between two impulses (0.0=infinity) "t"(sec) | 0.0 ÷ 999.9 |
| Active input frontier (high / low) “In” | Hi / Lo |
| Operating regime (increment / decrement) | Inc / dEc |
| Breakup in the supply voltage “Us” : | Cont / Full / Ucc / Goto |
| - after breakup, automatically continues counting from the current data | |
| - after breakup, automatically starts counting from the beginning | |
| - after breakup, establishes stop-regime of the current data | |
| - after breakup, returns to starting position | |
| Automatic starting, at first switching on of the supply | noAuto / Auto |
| Initial stated of output relay when starting (Status) "St" | □ / □ |

### Schemes of connection

**fig.1**
Connecting NPN type sensor

**fig.2**
Connecting a mechanical key "K1"
The reversible six-digital counter of impulses CD6-5R/A is a compact microprocessor device, that serves for summation and subtraction of electric impulses. It is designed to operate in combination with an encoder or sensor type “NPN” with two outputs shifted on phases. It visualizes only the positively numbers. Except reading the entering impulses, its basic function is to commutate electric circuit, in which it is turned on when a fixed value “N” is reached. It is used widely in automation of production, technological and other processes.

CD6-5R - when reaching "N" the output relay turns off and the counter is nullified.
CD6-5RA - when reaching "N" the output relay turns off and the counting continues.

### Technical parameters

- **Six-digit indicator, LED-green/red**
- **Supply voltage**
- 220VAC / 24V / 12V
- **Output (relay)**
- 4A / 220VAC (NO+NC)
- **Counting range**
- 1...999999 (impulses)
- **Maximum counting frequency**
- 11KHz
- **Operating temperature range**
- -20...+50°C
- **Degree of protection**
- IP40
- **Joining**
- Terminal
- **Sizes**
- 95x49x113mm

Energy-independent memory for programmable parameters.

Inputs counting “A” and “B” - they are meant to operate with sensors type NPN (fig.1, fig.2).

It is provided direct voltage 12VDC (40mA) for sensor’s supply.

Input for outer nullity “reset” - switch K3 (fig.1, fig.2).

Input for outer starting “start” - switch K2 (fig.1, fig.2).

**ATTENTION:** When the switch K2 is constantly included, the counter is running in cyclic regime.

### Programmable parameters

- **Number impulses “N”**
- 1 ÷ 999999
- **Maximum time between two impulses (0.0=infinity) “t”(sec)**
- 0.0 ÷ 999.9
- **Active input frontier (high / low) “In”**
- Hi / Lo
- **Operating regime (increment / decrement)**
- Inc / dEc
- **Breakup in the supply voltage “Us”**:
  - - after breakup, automatically continues counting from the current data
  - - after breakup, automatically starts counting from the beginning
  - - after breakup, establishes stop-regime of the current data
  - - after breakup, returns to starting position
- **Automatic starting, at first switching on of the supply**
- noAuto / Auto
- **Initial stated of output relay when starting (Status) “St”**
- □ / □

### Schemes of connection

**fig.1**
Connecting two NPN type sensors with two dephased outputs

**fig.2**
Connecting two NPN type sensors
Features

The reversible six-digital counter of impulses CD6-6R is a compact microprocessor device, that serves for summation and subtraction of electric impulses. It is designed to operate in combination with an encoder or sensor type "NPN" with two outputs shifted on phases. It visualizes both positive and negative numbers. The display is reset by pressing the "Reset" button. The counter is used widely in automation of production, technological and other processes.

Technical parameters

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six-digital indicator, LED-green/red</td>
<td>h=10mm (height)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>220VAC / 12V...24V</td>
</tr>
<tr>
<td>Counting range</td>
<td>-99999...99999</td>
</tr>
<tr>
<td>Maximum counting frequency</td>
<td>11KHz</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20...+50°C</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP40</td>
</tr>
<tr>
<td>Joining</td>
<td>Terminal</td>
</tr>
<tr>
<td>Sizes</td>
<td>95x49x113mm</td>
</tr>
</tbody>
</table>

Energy-independent memory for current data.
(after breakup in the supply voltage, automatically continues counting from the current data)
Inputs counting “A” and “B” - they are meant to operate with sensors type NPN (fig.1, fig.2).
It is provided direct voltage 12VDC (40mA) for sensor’s supply.
Input for outer nullity “reset” - switch K3 (fig.1, fig.2).

Schemes of connection

Connecting NPN type sensor with two dephased outputs

Connecting two NPN type sensors
Digital Length-meter

Features

The six-digital length-meter LMD6-1 is meant for measuring the lineal length of cloths, pipes and other materials, that in their movement turn over the check-roller, from which by certain sensor electric impulses are sent to the input of the counter. For every impulse the counter adds to total measured length the value of coefficient "C". The coefficient "C" set by the operator beforehand when setting the counter. You can set the position of the decimal point on the display, so that the measure of the length can be made with accuracy in meters (m), decimeters (dm), centimeters (cm) or millimeters (mm). There is option to be given limit-length "L" by the reaching of which the output relay of the counter turns off.

Technical parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMD6-1 / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>LMD6-1 / 24V</td>
<td>24V ±10% AC/DC</td>
<td>85mA (2W)</td>
</tr>
<tr>
<td>LMD6-1 / 12V</td>
<td>12V ±10% AC/DC</td>
<td>85mA (1W)</td>
</tr>
</tbody>
</table>

Programmable parameters

- Limit length "L"(m) 0.001 - 999999
- Value of coefficient "C" 0.001 - 99.999
- Position of the decimal point "dP" 0.000 - 0000.
- Maximum time between two impulses (0.0=Infinity) "t"(sec) 0.0 - 999.9
- Active input frontier (high / low) "In" Hi / Lo
- Operating regime (increment / decrement) Inc / dEc
- Breakup in the supply voltage "Us" :
  - after breakup, automatically continues counting from the current data Cont
  - after breakup, automatically starts counting from the beginning Full
  - after breakup, establishes stop-regime of the current data Ucc
  - after breakup, returns to starting position Goto
- Automatic starting, at first switching on of the supply noAuto / Auto
- Initial stated of output relay when starting (Status) "St" Cont / Full

Schemes of connection

Connecting NPN type sensor

Connecting a mechanical key "K1"
The six-digital length-meter LM6-2R/A has reverse action and operates in combination with the encoder or sensor type "NPN" with two outputs shifted phases. It is meant for measuring the lineal length of cloths, pipes and other materials, that in their movement turn over the check-roller, from which certain sensors electric impulses are sent to the input of the counter. Dependent on the direction of turning of the check-roller, the counter sums or subtracts from the total counted length the value of the coefficient "C". The coefficient "C" set by the operator beforehand when setting the counter. You can set the position of the decimal point on the display, so that the measure of the length can be made with accuracy in meters (m), decimeters (dm), centimeters (cm) or millimeters (mm). There is option to be given limit-length "L" by the reaching of which the output relay of the counter turns off.

LM6-2R - when reaching "L" the output relay turns off and the counter is nullified.
LM6-2RA - when reaching "L" the output relay turns off and the counting continues.

### Technical parameters

- **Six-digit indicator, LED-green/red**: h=10mm (height)
- **Output (Relay, NO+NC)**: 4A / 220VAC
- **Range of measurement**: 0,001…999999m
- **Maximum input frequency**: 1kHz
- **Operating temperature range**: -20...+50°C
- **Degree of protection**: IP40
- **Joining**: Terminal
- **Sizes**: 95x49x113mm

Energy-independent memory for programmable parameters.

Inputs counting "A" and "B" - they are meant to operate with sensors type NPN (fig.1, fig.2).

It is provided direct voltage 12VDC (40mA) for sensor's supply.

Input for outer nullity "reset" - switch K3 (fig.1, fig.2).
Input for outer starting "start" - switch K2 (fig.1, fig.2).

### Programmable parameters

- **Limit length "L"(m)**: 0.001 ÷ 999999
- **Value of coefficient "C"**: 0.001 ÷ 99.999
- **Position of the decimal point "dp"**: 0.000 ÷ 0000.
- **Maximum time between two impulses (0.0=∞) "t"(sec)**: 0.0 ÷ 999.9
- **Active input frontier (high / low) "In"**: Hi / Lo
- **Breakup in the supply voltage “Us”**:
  - after breakup, automatically continues counting from the current data Cont
  - after breakup, automatically starts counting from the beginning Full
  - after breakup, establishes stop-regime of the current data Ucc
  - after breakup, returns to starting position Goto
- **Automatic starting, at first switching on of the supply**
- **Initial stated of output relay when starting (Status) "St"**

### Schemes of connection

#### Connecting NPN type sensor with two dephased outputs

![fig.1](image1.png)

#### Connecting two NPN type sensors

![fig.2](image2.png)
The six-digital length-meter LMD6-3/A is meant for measuring the lineal length of cloths, pipes and other materials, that in their movement turn over the check-roller, from which by certain sensor electric impulses are sent to the input of the counter. The counting is in metre and when pushing the button "0,00" the last three digits are indicated in millimetre. For every received impulse the counter adds to the total counting length the value of the coefficient "C", given beforehand in metre. The coefficient "C" gives the sampling ("step") of measuring the length. There is option to be given limit-length "L" by the reaching of which the output relay of the counter turns off.

**LMD6-3** - when reaching "L" the output relay turns off and the counter is nullified.

**LMD6-3A** - when reaching "L" the output relay turns off and the counting continues.

### Type parameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMD6-3 / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>LMD6-3 / 24V</td>
<td>24V ±10% AC/DC</td>
<td>85mA (2W)</td>
</tr>
<tr>
<td>LMD6-3 / 12V</td>
<td>12V ±10% AC/DC</td>
<td>85mA (1W)</td>
</tr>
</tbody>
</table>

### Technical parameters

- **Six-digital indicator, LED-green/red**
- **Output (Relay, NO+NC)**
- **Range of measurement**: 1…999999m
- **Maximum input frequency**: 1kHz
- **Operating temperature range**: -20...+50°C
- **Degree of protection**: IP40
- **Joining**: Terminal
- **Size**: 95x49x113mm

Energy-independent memory for programmable parameters.

Input counting - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).

It is provided direct voltage 12VDC (40mA) for sensor's supply.

Input for outer nullity "reset" - switch K3 (fig.1, fig.2).

Input for outer starting "start" - switch K2 (fig.1, fig.2).

**ATTENTION**: When the switch K2 is constantly included, the counter is running in cyclic regime.

### Programmable parameters

- **Limit length "L"(m)**: 1 ÷ 999999
- **Value of coefficient "C"(m)**: 0.001 ÷ 9.999
- **Maximum time between two impulses (0.0=Infinity) "t"(sec)**: 0.0 ÷ 999.9
- **Active input frontier (high / low) "In"**: Hi / Lo
- **Operating regime (increment / decrement)**: Inc / dEc
- **Breakup in the supply voltage "Us"**: - after breakup, automatically continues counting from the current data
  - after breakup, automatically starts counting from the beginning
  - after breakup, establishes stop-regime of the current data
  - after breakup, returns to starting position
- **Automatic starting, at first switching on of the supply** noAuto / Auto
- **Initial stated of output relay when starting (Status) "St"**: 为什么不 为什么不

### Schemes of connection

**fig.1**

Connecting NPN type sensor

**fig.2**

Connecting a mechanical key "K1"
Schemes of connection

Technical parameters

- Six-digital length-meter LMD6-4 is meant for measuring the lineal length of cloths, pipes and other materials, that in their movement turn over the check-roller, from which by certain sensor electric impulses are sent to the input of the counter. For every received impulse the counter adds to the total counting length the value of the coefficient "C". The coefficient "C" set by the operator beforehand when setting the counter. You can set the position of the decimal point on the display, so that the measure of the length can be made with accuracy in meters (m), decimeters (dm), centimeters (cm) or millimeters (mm).
- There is option to be given two limit-length "L1" and "L2". When "L1" is reached the output Relay-1 is switched over and when reaching "L2", the output Relay-2 is switched over and the counter is nullified.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit length &quot;L1&quot;(m)</td>
<td>0.001 ÷ 999999</td>
</tr>
<tr>
<td>Limit length &quot;L2&quot;(m)</td>
<td>0.001 ÷ 999999</td>
</tr>
<tr>
<td>Value of coefficient &quot;C&quot;</td>
<td>0.001 ÷ 99.999</td>
</tr>
<tr>
<td>Position of the decimal point &quot;dP&quot;</td>
<td>0.000 ÷ 0000.</td>
</tr>
<tr>
<td>Maximum time between two impulses (0.0=infinity) &quot;t&quot;(sec)</td>
<td>0.0 ÷ 999.9</td>
</tr>
<tr>
<td>Active input frontier (high / low) “In”</td>
<td>Hi / Lo</td>
</tr>
<tr>
<td>Operating regime (increment / decrement)</td>
<td>Inc / dEc</td>
</tr>
<tr>
<td>Breakup in the supply voltage “Us” :</td>
<td>Cont</td>
</tr>
<tr>
<td></td>
<td>- after breakup, automatically continues counting from the current data Full</td>
</tr>
<tr>
<td></td>
<td>- after breakup, automatically starts counting from the beginning Ucc</td>
</tr>
<tr>
<td></td>
<td>- after breakup, establishes stop-regime of the current data Goto</td>
</tr>
<tr>
<td></td>
<td>- after breakup, returns to starting position</td>
</tr>
<tr>
<td>Automatic starting, at first switching on of the supply</td>
<td>noAuto / Auto</td>
</tr>
<tr>
<td>Initial stated of output relay when starting (Status) &quot;St&quot;</td>
<td>□ / □</td>
</tr>
</tbody>
</table>

Programmable parameters

- Connecting NPN type sensor

- Connecting a mechanical key "K1"
Digital Length-meter

**Features**

The six-digit length-meter LMD6-5 is meant for measuring the lineal length of cloths, pipes and other materials, that in their movement turn over the check-roller, from which by certain sensor electric impulses are sent to the input of the counter. For every impulse the counter adds to total measured length the value of coefficient "C". The coefficient "C" set by the operator beforehand when setting the counter. You can set the position of the decimal point on the display, so that the measure of the length can be made with accuracy in meters (m), decimeters (dm), centimeters (cm) or millimeters (mm). There is option to be given limit-length "L" by the reaching of which the output relay of the counter turns off. The length-meter has independent cell of the memory "Total", where every counted meter is accumulated for unlimited length of time. It can be read any time by pressing the button "Total".

### Technical parameters

- Six-digit indicator, LED-green/red
- Output (Relay, NO+NC)
- Range of measurement: 0.001...999999m
- Maximum input frequency: 1kHz
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining
- Sizes: 95x49x113mm

Energy-independent memory for programmable parameters.

Input counting - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).

It is provided direct voltage 12VDC (40mA) for sensor's supply.

Input for outer nullity of the memory "Total" - switch K3 (fig.1, fig.2).

Input for outer starting "start" - switch K2 (fig.1, fig.2).

### Programmable parameters

- Limit length "L"(m): 0.001 + 999999
- Value of coefficient "C": 0.001 + 99.999
- Position of the decimal point "dP": 0.00 + 000.0
- Maximum time between two impulses (0.0=Infinity) "t"(sec): 0.0 + 999.9
- Active input frontier (Hi / Lo) "In": Hi / Lo
- Operating regime (Increment / Decrement): Inc / dEc
- Breakup in the supply voltage "Us":
  - after breakup, automatically continues counting from the current data: Cont
  - after breakup, automatically starts counting from the beginning: Full
  - after breakup, establishes stop-regime of the current data: Ucc
  - after breakup, returns to starting position: Goto
- Automatic starting, at first switching on of the supply: noAuto / Auto
- Initial stated of output relay when starting (Status) "St": \( \bar{\text{no}} / \bar{\text{n}} \)

### Schemes of connection

**fig.1**

Connecting NPN type sensor

**fig.2**

Connecting a mechanical key "K1"

---

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMD6-5 / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>LMD6-5 / 24V</td>
<td>24V ±10% AC/DC</td>
<td>85mA (2W)</td>
</tr>
<tr>
<td>LMD6-5 / 12V</td>
<td>12V ±10% AC/DC</td>
<td>85mA (1W)</td>
</tr>
</tbody>
</table>

**Type parameters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPN</td>
<td>Hi / Lo</td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>Hi / Lo</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>Hi / Lo</td>
<td></td>
</tr>
<tr>
<td>K1</td>
<td>Hi / Lo</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>Hi / Lo</td>
<td></td>
</tr>
<tr>
<td>K3</td>
<td>Hi / Lo</td>
<td></td>
</tr>
</tbody>
</table>

**Connecting NPN type sensor**

**Connecting a mechanical key "K1"**
Technical parameters
Six-digital indicator, LED-green/red
Output (Relay-1, Relay-2)
Range of measurement
Maximum input frequency
Operating temperature range
Degree of protection
Joining
Sizes
Energy-independent memory for programmable parameters.
Inputs counting “A” and “B” - they are meant to operate with sensors type NPN (fig.1, fig.2).
It is provided direct voltage 12VDC (40mA) for sensor’s supply.
Input for outer nullity “reset” - switch K3 (fig.1, fig.2).
Input for outer starting “start” - switch K2 (fig.1, fig.2).

Programmable parameters
Limit length “L1”(m)
Limit length “L2”(m)
Value of coefficient “C”
Position of the decimal point “dP”
Maximum time between two impulses (0.0=infinity) ”t”(sec)
Active input frontier (high / low) “In”
Breakup in the supply voltage “Us”:
- after breakup, automatically continues counting from the current data
- after breakup, automatically starts counting from the beginning
- after breakup, establishes stop-regime of the current data
- after breakup, returns to starting position
Automatic starting, at first switching on of the supply
Initial stated of output relay when starting (Status) “St”

Schemes of connection
fig.1
Connecting NPN type sensor with two dephased outputs
fig.2
Connecting two NPN type sensors
Length measurement controller

**Features**

The LMD6-8R reversible six-digit controller serves to measure linear lengths. It visualizes both positive and negative lengths which are indicated in millimeters. The controller has two counting inputs “A” and “B” and is meant for work in a system consisting of photoelectric sensor type OV1-18.24.F (with two outputs shifted on phases) and a measuring ruler with a raster of 0.5mm (fig.1). The length measurement controller has three operating modes (I, II and III), which determine the length measurement step: 1mm, 0.5mm and 0.25mm. The switch from one mode to another is done by pressing and holding the "Reset" button for six seconds.

Type LMD6-8RC - indicates the length in centimeters.

Option (on order): Analogue output 0...4V

<table>
<thead>
<tr>
<th>Type parameters</th>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMD6-8R / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
<td></td>
</tr>
<tr>
<td>LMD6-8R / 24V</td>
<td>12V+24V AC/DC</td>
<td>85mA (2W)</td>
<td></td>
</tr>
</tbody>
</table>

**Technical parameters**

- Six-digit indicator, LED-green/red
- Range of measurement to mode "I"
- Range of measurement to mode "II"
- Range of measurement to mode "III"
- Maximum input frequency: 11kHz
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Terminal: 95x49x113mm
- External reset input "reset" - switch K3 (fig.2).
- Inputs “A” and “B” - they are meant to operate with sensor type NPN (fig.2).
- It is provided direct voltage 12VDC (40mA) for sensor’s supply.

**Kinematics**

**Scheme of connection**

Connecting NPN type sensor with two dephased outputs
**Features**

The digital length-meter LMD8-2R has a reverse action and operates in combination with incremental rotary encoder or sensor type "NPN" with two outputs shifted phases. It serves for measuring the length of cloth when being tested. On the face panel there are two displays - 8-digital for measuring the total length of the material and 6-digital for measuring the length of the faulty one. The counter has two independent memories - "Summational" and "Total". The "Summational" memory serves to cumulate the total and the faulty length of the measured material for a short period of time (day, week, month). The "Total" memory serves to preserve the lengths for a longer period of time (for annual account). By a program the coefficient "C" is fixed and it serves for coordination of the received impulses at the input with real length of the measured material and it determines the sampling ("step") when measuring the length.

![Digital Length-meter LMD8-2R](image)

**Technical parameters**

- **Digital indicator, LED**
  - 8-digital
  - 6-digital
- **Supply voltage**
  220VAC ±10% (50Hz)
- **Power consumption**
  12W
- **Maximum frequency of the inputs A and B**
  3000Hz
- **Operating temperature range**
  -20...+50°C
- **Degree of protection**
  IP41
- **Joining connector (female)**
  Canon "DB9PF"
- **Sizes**
  190x120x60mm

Energy-independent memory for current data.

**Programmable parameter**

- **Value of coefficient "C"(cm)**
  0.001 ÷ 99.999

**Joining connector**

- pin 2 — input A
- pin 3 — input B
- pin 4 — +12V
- pin 5 — Gnd (-)

Canon "DB9PF" (female)
Using the length-meters

**Overall sizes**

![Diagram showing overall sizes with dimensions](image)

Kinematic scheme of connection to sensor for one-way measuring the length of cloth.

![Diagram showing one-way measuring](image)

Kinematic scheme of connection to two sensors for reversive measuring the length of cloth. (When inductive proximity sensors are used, they must be shielded - with metal housing)

![Diagram showing two-sensor connection](image)
The six-digital rev counter CMD6-1 is compact microprocessor device, that finds place in measuring revolutions of turning axis, rotors of engines and other turning objects. It is meant for combined work with inductive, photoelectric and other sensors, from which come impulses to the input of rev counter. For the correct work of the system "rev counter-sensor" it is necessary to enter one impulse from the sensor to the rev counter for one full rotation of the object.

Features

Six-digital indicator, LED-green/red
Supply voltage
Range of revolutions measurement
Maximum input frequency
Error of the measuring revolutions
Operating temperature range
Degree of protection
Joining
Sizes

Input - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2). It is provided direct voltage 12VDC (40mA) for sensor’s supply.

Technical parameters

<table>
<thead>
<tr>
<th>Type parameters</th>
<th>Type</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMD6-1 / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
<td></td>
</tr>
<tr>
<td>CMD6-1 / 24V</td>
<td>12÷24V AC/DC</td>
<td>85mA (2W)</td>
<td></td>
</tr>
</tbody>
</table>

h=10mm (height)
220VAC / 12V...24V
3...600’000 rpm
11KHz
±0,05%
-20...+50°C
IP40
Terminal
95x49x113mm

Schemes of connection

fig.1
Connecting NPN type sensor

fig.2
Connecting a mechanical key "K1"
Digital Rev Counter

CMD6-2

Features

The six-digit rev counter CMD6-2 is a compact microprocessor device, designed for measuring and controlling revolutions of turning axes, rotors of engines, and other turning objects. It is intended for combined work with inductive, photoelectric, and other sensors, from which it receives impulses to its input. For the correct operation of the system "rev counter - sensor," it is necessary to enter one impulse from the sensor to the rev counter for one full rotation of the object. There can be assigned two limit values of the cycles "W1" and "W2," the reaching of which, actuates the relevant output relays. When pushing the display's buttons "sec" and "Hz" of the rev counter, the period of the object in seconds (sec) and its frequency in hertz (Hz) are indicated on the display.

Technical parameters

- Six-digit indicator, LED-green/red
- Supply voltage
- Output (relay-1, relay-2)
- Range of revolutions measurement
- Maximum input frequency
- Error of the measuring revolutions
- Operating temperature range
- Degree of protection
- Joining
- Sizes

Energy-independent memory for the programmable parameters.
Input - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).
It is provided direct voltage 12VDC (40mA) for sensor's supply.

Programmable parameters

- Limit value "W1," (rpm) 3 \( \div \) 600'000
- Limit value "W2," (rpm) 3 \( \div \) 600'000

Schemes of connection

- Connecting NPN type sensor (fig.1)
- Connecting a mechanical key "K1" (fig.2)
Features

The six-digit rev counter CMD6-3R finds place in measuring revolutions of turning axis and other turning objects, and shows the direction of their rotation. It is meant for combined work with two sensors of type NPN or sensor of type NPN with two outputs shifted on phases (OV1-18.24.F). For the correct work of the system “rev counter - sensor” it is necessary to enter one impulse from the sensor to the rev counter for one full rotation of the object.

Technical parameters

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of indicator</td>
<td>Six-digit</td>
</tr>
<tr>
<td>LED color</td>
<td>Green/red</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>220VAC / 12V...24V</td>
</tr>
<tr>
<td>Range of revolutions measurement</td>
<td>3…600’000 rpm</td>
</tr>
<tr>
<td>Maximum input frequency</td>
<td>11KHz</td>
</tr>
<tr>
<td>Error of the measuring revolutions</td>
<td>±0,05%</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20...+50°C</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP40</td>
</tr>
<tr>
<td>Joining</td>
<td>Terminal</td>
</tr>
<tr>
<td>Sizes</td>
<td>95x49x113mm</td>
</tr>
</tbody>
</table>

Inputs “A” and “B” - they are meant to operate with sensors type NPN (fig.1, fig.2). It is provided direct voltage 12VDC (40mA) for sensor’s supply.

Schemes of connection

Fig. 1: Connecting NPN type sensor with two dephased outputs

Fig. 2: Connecting two NPN type sensors
Digital Rev Counter

Features

The six-digit rev counter CMD6-4 finds place in measuring and controlling revolutions of turning axis, rotors of engines and other turning objects. It is meant for combined work with inductive, photoelectric and other sensors, from which come impulses to the input of rev counter.

There is option given for converting the number of impulses received in one turn and it is made by a factor "n". This makes possible the measuring of the revolutions of turning shaft with the help of a gearboxes.

There can be assign two limit values of the revolutions "W1" and "W2" the reaching of which, actuates the relevant output relays.

Technical parameters

Six-digit indicator, LED-green/red
Supply voltage
Output (relay-1, relay-2)
Range of revolutions measurement
Frequency range of input pulses
Error of the measuring revolutions
Operating temperature range
Degree of protection
Joining
Sizes

Energy-independent memory for the programmable parameters.
Input - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).
It is provided direct voltage 12VDC (40mA) for sensor's supply.

Programmable parameters

Limit value "W1", (rpm)
Limit value "W2", (rpm)
Value of factor "n"

Schemes of connection

fig.1
Connecting NPN type sensor

fig.2
Connecting a mechanical key "K1"
Digital Frequency-meter

Features

The FMD6-1 six-digital frequency-meter finds place in measuring frequency of turning axles and other turning objects in hertz (Hz). It is meant for combined work with sensors type "PNP". The device can be used to measure the generators frequency of positive electrical impulses. The FMD6-1N is used to measure the network frequency 40÷60Hz at supply voltage 220Vac (option 110Vac) and it don't need additional sensor to be switched on (fig.2).

![Image of frequency-meter](image)

<table>
<thead>
<tr>
<th>Type parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>FMD6-1 / 220V</td>
</tr>
<tr>
<td>FMD6-1 / 12÷24V</td>
</tr>
<tr>
<td>FMD6-1N / 220V</td>
</tr>
</tbody>
</table>

Technical parameters

- Six-digital indicator, LED-green/red
- Supply voltage
- Range of measurement
- Error of the measure
- Amplitude of input impulses /$U_{in}$/
- Input impedance /$R_{in}$/
- Operating temperature range
- Degree of protection
- Sizes

For type FMD6-1, it is provided input for connection with sensor type PNP. It is provided direct voltage 11VDC (40mA) for sensor's supply.

Schemes of connection

![Scheme 1](scheme1)

**fig.1** Connecting the FMD6-1 frequency-meter

![Scheme 2](scheme2)

**fig.2** Connecting the FMD6-1N frequency-meter
**Features**

Six-digital frequency-meter FMD6-2 finds place in measuring and controlling frequency of turning axles and other turning objects in hertz (Hz). It is meant for combined work with sensors type "PNP". The device can be used to measure the generators frequency of positive electrical impulses. The frequency meter has two output relays and can be set two limit frequencies "F1" and "F2" in reaching of which the relevant output relay switches on.

The FMD6-2N is used to measure and control the network frequency 40÷60Hz at supply voltage 220Vac (option 110Vac) and it don't need additional sensor to be switched on (fig.2).

**Technical parameters**

- Six-digital indicator, LED-green/red
- Supply voltage: 220VAC / 12÷24V
- Output (Relay-1, Relay-2): 4A/220VAC, 2x(NO+NC)
- Range of measurement: 0,05...9999,99 Hz
- Error of the measure: ±0,05%
- Amplitude of input impulses /U<sub>in</sub>/: 3÷30V ac/dc
- Input impedance /R<sub>in</sub>/: 16kΩ
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining
- Sizes: h=10mm (height)

Energy-independent memory for the programmable parameters.

For type FMD6-2, it is provided input for connection with sensor type PNP. It is provided direct voltage 11VDC (40mA) for sensor's supply.

**Programmable parameters**

- Limit of frequency "F1", (Hz): 0.05...9999.99
- Limit of frequency "F2", (Hz): 0.05...9999.99

**Schemes of connection**

- **fig.1** Connecting the FMD6-2 frequency-meter
- **fig.2** Connecting the FMD6-2N frequency-meter
Features

The digital speedometer SMD6-1M is meant for measuring the linear speed of cloths, pipes and other materials, that in their movement whirl a check-roller, from which by certain sensor electric impulses are sent to the input of the speedometer. For counting the speed, in the memory of the speedometer is given the coefficient "C", which presents the real distance between two impulses in the input of the speedometer. The coefficient “C” is assigned in centimetres.

Technical parameters

<table>
<thead>
<tr>
<th>Type parameters</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Voltage</td>
<td></td>
</tr>
<tr>
<td>SMD6-1M / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>SMD6-1M / 24V</td>
<td>12...24V AC/DC</td>
<td>85mA (2W)</td>
</tr>
</tbody>
</table>

Features

- Six-digital LED indicator (green / red)
- Supply voltage
- Range of measurement
- Frequency range of input impulses
- Error of the measure
- Operating temperature range
- Degree of protection
- Joining
- Sizes

Energy-independent memory for the programmable parameters.
Input - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).
It is provided direct voltage 12VDC (40mA) for sensor's supply.

Programmable parameter

Coefficient "C", (cm) 0.01 ÷ 999.99

Schemes of connection

fig.1
Connecting NPN type sensor

fig.2
Connecting a mechanical key "K1"
Features

The digital speedometer SMD6-2M is meant for measuring and controlling the lineal speed of cloths, pipes and other materials, that in their movement whirl a check-roller, from which by certain sensor electric impulses are sent to the input of the speedometer. For counting the speed, in the memory of the speedometer is given the coefficient "C", which presents the real distance between two impulses in the input of the speedometer. The coefficient “C” is assigned in centimetres. There is option given two limit values of the speed to be fixed - "Down" and "Up" the reaching of which, actuates the relevant output relays.

Technical parameters

- Six-digit LED indicator (green / red)
- Supply voltage: 220VAC / 24V / 12V
- Output (relay “Down”, relay “Up”)
- Range of measurement: 0.01...9999.99 m/min
- Frequency range of input impulses: 0.05Hz...11kHz
- Error of the measure: ±0.05%
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining
- Sizes: 95x49x113mm

Energy-independent memory for the programmable parameters.
Input - it is meant to operate with sensor type NPN (fig.1) or switch K1 (fig.2).
It is provided direct voltage 12VDC (40mA) for sensor’s supply.

Programmable parameters

- Limit of speed "Down", (m/min) 0.01 + 9999.99
- Limit of speed "Up", (m/min) 0.01 + 9999.99
- Coefficient "C", (cm) 0.01 + 999.99

Schemes of connection

- Connecting NPN type sensor
- Connecting a mechanical key "K1"
**Features**

The DAC6-1R angles measuring controller has a reverse action and serves to measure the angular displacement, which is displayed in degrees and minutes. The controller indicates positive and negative angles. It has two counting inputs – A and B – and is designed to work with encoders or sensor (type OV1-18.24.F) with a two dephased outputs (fig.2). For correct operation of the controller in advance in the memory must be established number of pulses "n" of the encoder, which is connected to the inputs of the controller. The accuracy of the reading of the angular movements can be changed, by changing the factor of interpolation “i” of the input pulses A and B, which can have values 1, 2 or 4. The angles measuring controller is designed for installation in a dashboard (panel montage).

**Technical parameters**

<table>
<thead>
<tr>
<th>Type parameters</th>
<th>Supply voltage</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAC6-1R / 220VAC</td>
<td>220VAC ±10%</td>
<td>16mA (4W)</td>
</tr>
<tr>
<td>DAC6-1R / 24V</td>
<td>12÷24V AC/DC</td>
<td>85mA (2W)</td>
</tr>
</tbody>
</table>

- Six-digital LED indicator (green / red)
- Supply voltage: 220VAC / 12V...24V
- Range of measurement “or”: a) ”360”  
  b) ”0”
- Maximum frequency of input pulses: 11kHz
- Error of the measuring angles: 0,5°
- Operating temperature range: -20...+50°C
- Degree of protection: IP40
- Joining: Terminal
- Sizes: 95x49x113mm

Energy-independent memory for the programmable parameters. Inputs “A” and “B” - they are meant to operate with encoder or with sensors with a two dephased outputs NPN type (fig.1, fig.2). It is provided direct voltage 12VDC (40mA) for sensor's supply.

**Programmable parameter**

- Number of pulses per turnover “n” 1 ÷ 99999
- Interpolation factor “i” 1; 2; 4
- Range of measurement “or” 360; 0

**Schemes of connection**

Connecting NPN type sensor (with two dephased outputs)

Photoelectric sensor OV1-18.24.F (with two NPN dephased outputs)
Temperature controller

**Features**

The two-channel digital temperature controller TC42-1 is a compact microprocessor device that serves to measure and regulate temperatures in the range of -99°C to +650°C. In one housing are integrated two independent from each other temperature controllers each of which has one input and one output. The inputs of the temperature controller are designed to work with Pt100 temperature sensors 2-wire, and its outputs are relay contacts. The temperature regulation is carried out by two-position law “on/off”. To prevent flipping through the relay contacts of the outputs when switching, in the process of production is set up a limit to their performance of 0.5 seconds. By the front panel buttons can be set the desired the temperature of regulate (T), hysteresis (h) and the operating mode (Mode) - heating or cooling, and by changing the value of the coefficient (d) can be compensated the error of the measured temperature, which is obtained from the resistance of the connecting cable of the temperature sensors. The temperature controllers are widely used in industrial automation, technological and other processes.

<table>
<thead>
<tr>
<th>Type parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>TC42-1 / 220VAC</td>
</tr>
<tr>
<td>TC42-1 / 24V</td>
</tr>
</tbody>
</table>

**Technical parameters**

Double four-digit LED indicator (red)
Supply voltage 220VAC / 24V
Range of measurement -99°C...+650°C
Hysteresis (h) 0°C...10°C
Temperature measurement error ±0,5°C / Ta (+10°C...+30°C)
Outputs “S1”, “S2” (relays)
Inputs “in-1”, “in-2”, for connection of temperature sensors
Operating temperature range (Ta)
Degree of protection IP40
Joining Terminal
Sizes 95x49x113mm
Non-volatile memory for the programmable parameters.

**Programmable parameters**

Temperature of regulate (T1, T2)
Hysteresis (h) -99°C...+650°C
Operating mode (Mode) - heating / cooling HEAT / CooL
Correction coefficient (d) 0°C...-9,9°C

**Schemes of connection**

Connecting two 2-wire Pt100 temperature sensors

![Diagram of connection](image-url)