

#### Main features

- Adjustable operating point
- Bounce-free output signals
- Two static outputs, 1NO and 1NC
- Reduced actuating force
- Signal LEDs for power supply and switching
- Minimum differential travel

#### Quality marks:



EAC approval: RU C-IT.AQ35.B.00454

#### Compliance with the requirements of:

Low Voltage Directive 2014/35/EU,  
EMC Directive 2014/30/EU.

#### Description

E1 is an electronic contact block, designed to replace the traditional mechanical contact block installed inside Pizzato Elettrica's position switches. The combination provided by the union of the mechanical body and sensor head of the position switches and this electronic contact block forms a mechatronics device that increases the application range of position switches.

#### General data

Ambient temperature:	-25°C ... +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Adjustable operating distance:	0.2 ... 2 mm or 2° ... 30°
Differential travel:	< 0.1 mm or < 1°
Tightening torques for installation:	see page 211-222

#### Electrical data

Rated operating voltage (U <sub>e</sub> ):	10 ... 30 Vdc
Rated operating current (I <sub>e</sub> ):	200 mA
Utilization category:	DC13, 24V 0,2A
Rated insulation voltage (U <sub>i</sub> ):	30 V
Pollution degree:	3
Conditional short circuit current:	100 A
Voltage drop (U <sub>d</sub> ):	2 V
Minimum operating current (I <sub>m</sub> ):	0 mA
Current in locked state (I <sub>r</sub> ):	0.05 mA
Maximum residual ripple:	10%
Current consumption w/o load (I <sub>o</sub> ):	< 10 mA
Short-circuit protection:	yes
Reverse-polarity protection:	yes
Output type:	PNP
LED, power supply:	yes
LED, switching:	yes
Protection fuse:	315 mA, fast

#### Cable cross section (flexible copper strands)

Contact block E1:	min. 1 x 0.5 mm <sup>2</sup>	(1 x AWG 20)
	max. 1 x 2.5 mm <sup>2</sup>	(1 x AWG 14)

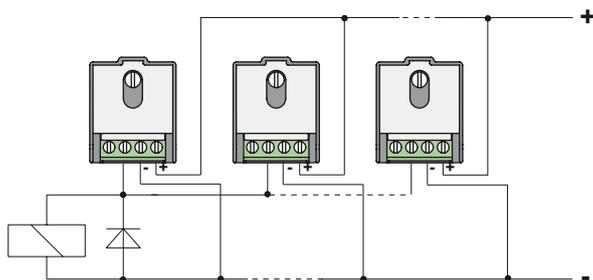
#### In compliance with standards:

IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529.

**⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

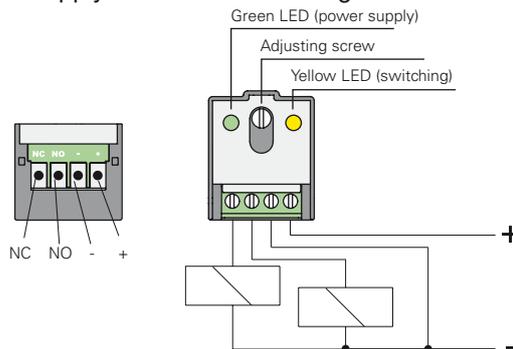
#### Parallel connection of several units E1 (OR)

For connecting the switches in parallel (OR) no particular protective measures are required. We recommend the installation of a commercially available diode for use with inductive loads (relays).



#### Wiring diagram

The wires are connected via a terminal strip where the function of the individual poles is marked by silk screen printing. Furthermore there are two signal LEDs, one for power supply and one for switching state.



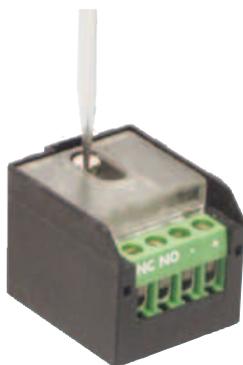
## Main features

The E1 contact block consists of an optical detection system for the position of the mechanical actuator with the following features:

- 1) Possibility of adjusting the switching point by means of a screw, directly on the contact block. The regulation screw is located on the contact unit cover so that the switching point can be set with the switch installed in its final position with open lid and without having to remove the contact block.
- 2) Differential travel below 0.1 mm, guaranteed over the entire operating temperature range.
- 3) Reduced actuating force.
- 4) Two static outputs, 1NO + 1NC, simultaneous, PNP, short circuit protected.
- 5) Bounce-free output signal.
- 6) Wide operating temperature range.
- 7) Signal LEDs for power supply and switching.

These features allow to resolve e.g. following issues:

- 1) Problems due to contact bounces or very low voltages when connecting position switches to PLCs.
- 2) Detection of light objects that require a contact block with high sensibility and reduced actuating forces.
- 3) When it is necessary to detect very small objects that require low differential travels.
- 4) When it is required to adjust the operating point. The internal LED precisely shows the switching point directly at the switch when you turn the adjusting screw.
- 5) In cases where the perfectly simultaneous switching of the two outputs is required.
- 6) Detection of transparent objects or in any case where there are difficulties with normal sensors, taking into account that specialised sensors typically cost much more than this mechatronics device.



## Recommended installation

These switches are protected against electric interference of industrial environment. When used under extreme conditions, as for example installed close to high surge voltages (electric motors, welding machines, etc.), it is advisable to adopt the following precautions:

- Eliminate disturbances at the source;
- Filter the DC power supply with adequate capacitor;
- Separate the power cables from the switch cables;
- Limit the cable length to max. 200 m.

It is equally important to take into account the voltage drops along the supply lines;

Reconnect and shield outgoing signal cables or use a shielded twisted-pair cable with suitable cross sections.

## Series connection of several E1 units (AND)

When connecting the switches in series (AND), following conditions must be fulfilled:

The output current of the first switch is the sum of the load current and the maximum currents absorbed by the other switches. Considering then the connection of the  $n$  switches, the nominal operating current " $I_e$ " becomes:

$$I_e = (200 - 20 \times n) \text{ mA}$$

Provided that  $I_e$ : rated operating current  
 $n$ : number of switches connected in series

Example: with 3 switches it is possible to switch up to 140 mA.

Each switch causes a voltage drop in the connected-through state. The load must be suitable to operate at a voltage of:

$$U_c = U_a - 2 \times n$$

Provided that  $U_c$ : rated operating voltage of the load  
 $U_a$ : used supply voltage  
 $n$ : number of switches connected in series

Example: with 3 switches powered at 24 Vdc, the load must be able to work at 18 Vdc.

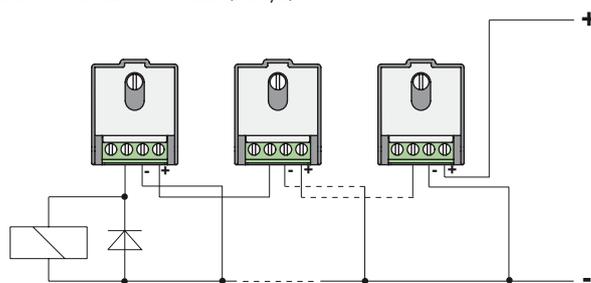
The maximum number of switches that can be connected in series depends on the supply voltage used. In any case, the number should be lower than:

$$n_{o_{\max}} \leq \frac{V_a - 10}{2} + 1$$

Provided that  $n_{o_{\max}}$ : max. number of switches for series connection  
 $V_a$ : supply voltage used

Example: at 24 Vdc it is possible to connect up to 7 switches. At 30 Vdc it is possible to connect up to 11 switches

We recommend the installation of a commercially available diode for use with inductive loads (relays).



## Special loads

The switch is protected against overload and short-circuit, hence, it is required to limit possible load inrush currents. Typical examples are capacitors that require high current pulses during their charging and incandescent lamps whose resistance in cold state can be the tenth of the resistance in hot state. For capacitive loads, whenever necessary, connect a limiting resistance in series, while for lamps, whenever necessary, use a special preheating resistance.

## Limits of use

- **Not suitable for installations for safety applications.**
- Suitable for FD, FP, FL, FR, FM, FX and FZ series position switches only.