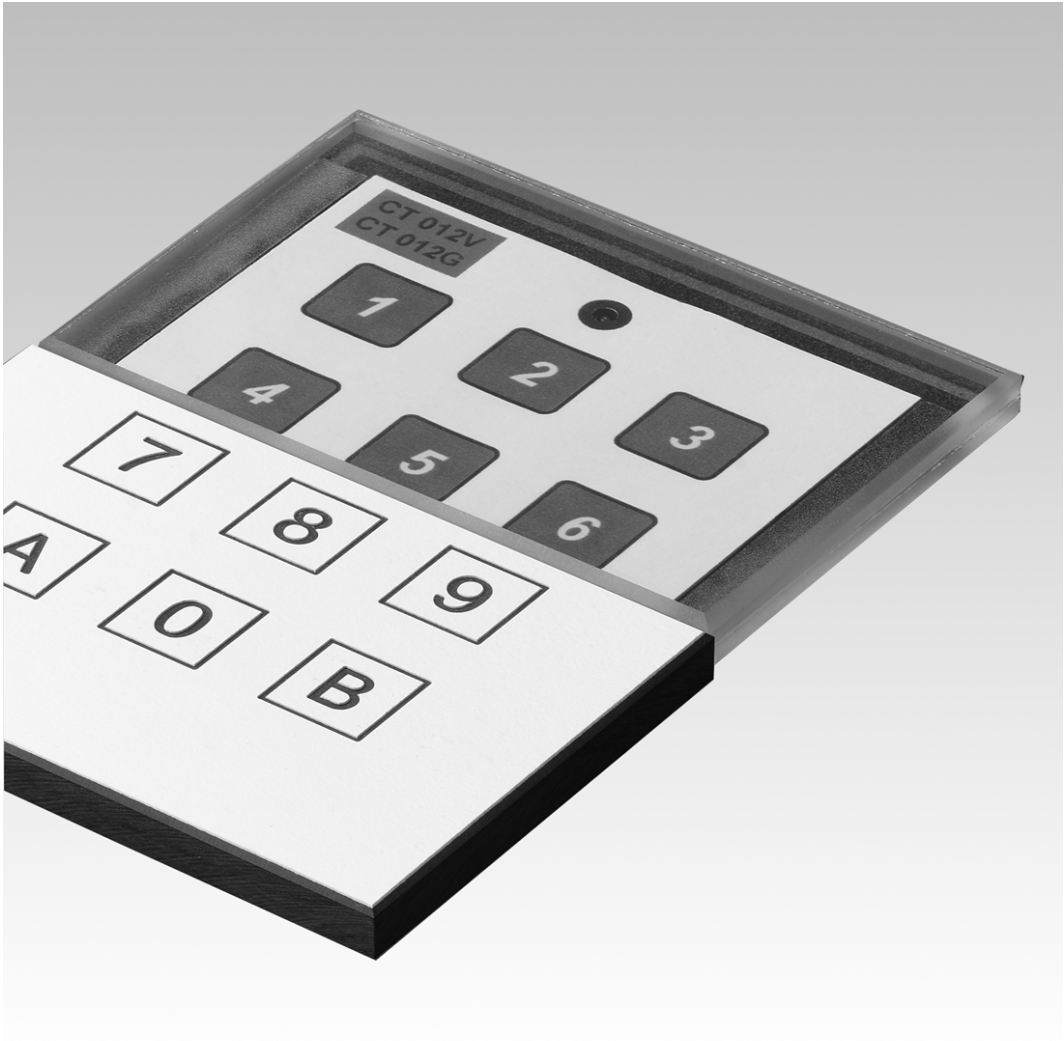




EAO Product Information

Series 75



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Series 75

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Keyboards with touch sensitive technology

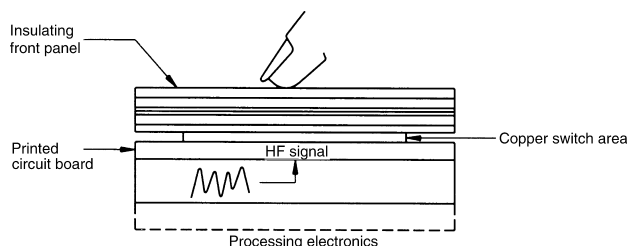
The unique touch sensitive keyboard range has been designed as a reliable and mechanically rugged input device with no moving parts. Each unit is fully sealed and the long service life far exceeds that of other keyboards based on touch screens or electro-mechanical switching-systems.



Consideration of the operating environment of the touch sensitive devices is a key factor in selecting the most appropriate unit. The range includes sealed keyboards and switches that have laminated plastic, metal, or toughened glass switch areas suitable for even the most aggressive environments. The keyboards can be connected via; RS232 or PC keyboard ports whilst the discrete switches have NPN transistor outputs.

The Principle behind the touch sensitive Switches

Principle



Each key on the keyboard or keypad consists of a copper area linked to a HF-emitting detector cell.

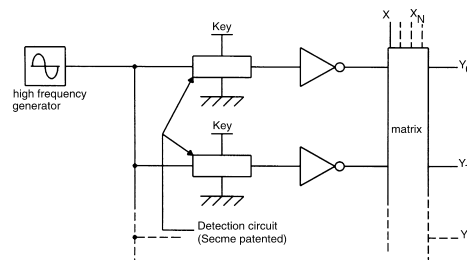
This copper area may be considered as the armature of a capacitor, with the front panel of the keyboard acting as the dielectric (the non-conductive isolating material).

When a human finger touches the area in front of the copper area, it acts as the second armature of the capacitor, earthed through the user's body.

The body's electrical properties then act as a serial RLC (Resistor – Self – Capacitor) network, diverting part of the HF voltage generated on the key towards the earth.

This drop in voltage constitutes a change in the output state and is detected as such by the micro-controller.

The Technology



Touch-sensitive technology involves the use of high-frequency signals whose amplitude is modified when a key is activated, i.e. when it is touched or skimmed by the user's finger.

Touch-sensitive keyboards or keypad consist of three elements:

- a set of keys, laid out on a printed circuit board;
- an interface card;
- a non-conductive front panel (glass, polycarbonate, etc).

Each key circuit features a detector circuit or cell. The detector circuit is protected by an EAO patent. An HF generator sends the HF signal to the keys.

An interface card based around a micro-controller controls all the keys. The keyboard's output signal is transmitted to the PC via a standard PS2 or USB port.

Description of the capacitor effect

The capacitor formed by the key (copper area of the circuit), the dielectric (non-conductive front panel) and the user's finger (in contact with the front panel) must have the highest possible capacitance to ensure that the change in voltage is large enough to be detected as opposed to being drowned out by the background noise generated by the electronic components in the assembly.

At high frequencies, a capacitor's impedance is inversely proportional to its capacitance and the frequency:

$$Z = 1 / C\omega$$

Z : impedance in Ω (Ohms)

C : capacitance in F (Farads)

ω : frequency = $2\pi f$

$\pi = 3.14$

$f = 400 \text{ KHz}$

The capacitance is proportional to the size of the copper area and the consistence of the dielectric and inversely proportional to its thickness.

Selecting an appropriate material for the front panel

Given that the size of the keys (copper area) is fixed, here are some guidelines for achieving optimal results:

- The best results are achieved by the use of glass, plexiglas or composite materials.
- Polycarbonate delivers a poorer performance at like-for-like thickness; with this material, a thinner panel must therefore be used.
- Owing to its structure, tempered glass provides better results than layered glass at like-for-like thickness.
- Anti-glare glass can be used, but only in the case of non-metallic anti-glare coating.
- Given that the recommended thickness is linked to the size of the keys, the appropriate values are set out in the technical specifications of each product.

For instance, for vandal-proof applications, the minimum thickness should be:

- 6 mm in the case of layered glass*. Mechanical resistance: able to withstand the consecutive impact of 3 metal balls with a combined weight of 4.1 kg free-falling from a height of 1.5 metres.
- 8 mm in the case of tempered glass*. Mechanical resistance: able to withstand

the impact of a 500 gram steel ball free-falling from a height of 2 metres.

Source : St Gobain Glass Protect. STADIP® layered glass, SECURIT® tempered glass.

Warnings / Guidelines

Never use a conducting material as a dielectric (i.e. a metallic front panel). This would cause the keys to short-circuit. Similarly, do not use conducting serigraphy (lead-based serigraphy) on a non-conducting front panel, for this would turn the front panel into a conducting surface.

Never use a dielectric with a thickness of 0 (finger in direct contact with the key). Electrostatic discharges may result which could damage the electronics in the key circuits. Assembly and installation instructions relating to each keyboard are provided in the corresponding technical specifications.

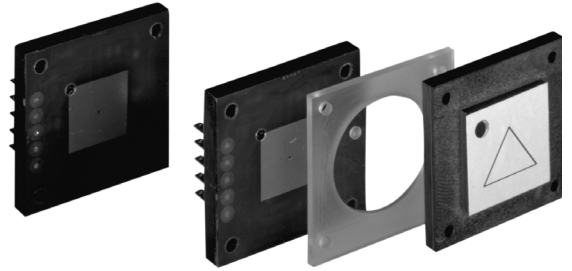
CT1V

Sealed - vandal resistant

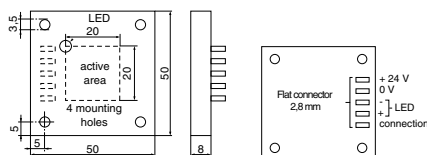
The CT1V is a single key with an active area 20 mm square. The switch is activated by a light touch to the switch area. The device has no moving parts, or electrical switch contacts and is sealed into a resin block. The unit has an LED embedded in the resin which can be externally illuminated to give a visual confirmation that the switch has been actuated or to act as status indicator.

The CT1V switches can be used mounted behind every non-conductive front material, including glass and polycarbonate. These environmentally sealed, vandal resistant switches can even be activated with gloved hands. The CT1V is suitable for a variety of applications that include:

- Passenger lifts
- Vending machines
- Access Control Systems
- Industrial process control systems



Technical Characteristics



General characteristics

- power supply 24 VDC
- current consumption 10 mA (excluding LED)
- transistor output: open collector
- LED control 24 VDC (integrated resistor)
- Operating temperature: - 20°C to + 70°C
- Sealing: to IP65 (when installed)
- Legend: max. thickness 125 µm (non-metallic)
- Service life: almost unlimited
- no activation force / no moving contacts
- max. frontpanel thickness: 10 mm
- I_{max}: 100 mA

CT1B

Sealed – vandal resistant

The CT1B key has a plastic body and a Ø 20 mm active area made of nickel plated brass. The switch is activated by a light touch to the switch area. The device has no moving parts, or electrical switch contacts and is moulded into a sealed cylindrical switch body. The switch is designed for front panel mounting into a standard Ø 22,5 mm hole and is fastened with a 26 mm threaded locking nut.

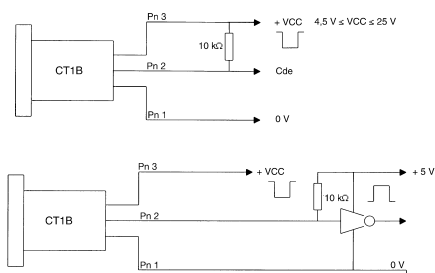
The CT1B is fitted with an HE14, three pin 2,54 mm pitch connector for easy installation. If required the metal switch area can be engraved with text or symbols.

This extremely robust switch with metal front and fully sealed, hard plastic body is vandal resistant and can be used in almost any environment

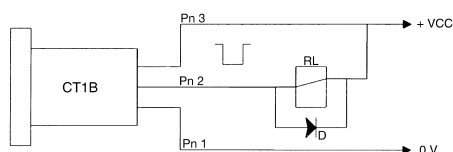
Typical applications include:

- Lifts
- Vending / Ticket machines
- Access control systems
- Cash dispenser
- Public information systems

Connection Variants



Control of a logic component



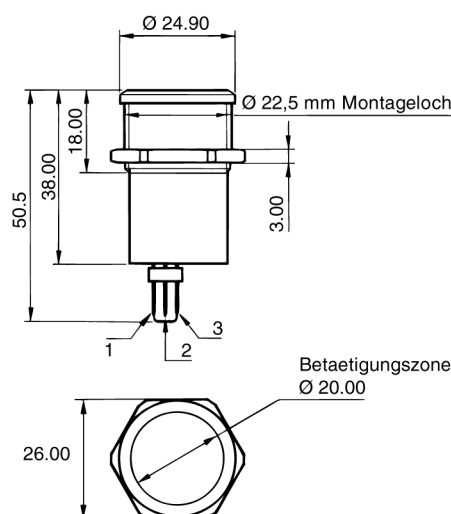
Control of a relay coil

Models

Model	Part Number	Connector
Front Ø25mm	CT1B	Plug HE14 3-Pin



Technical Characteristics



Connections:

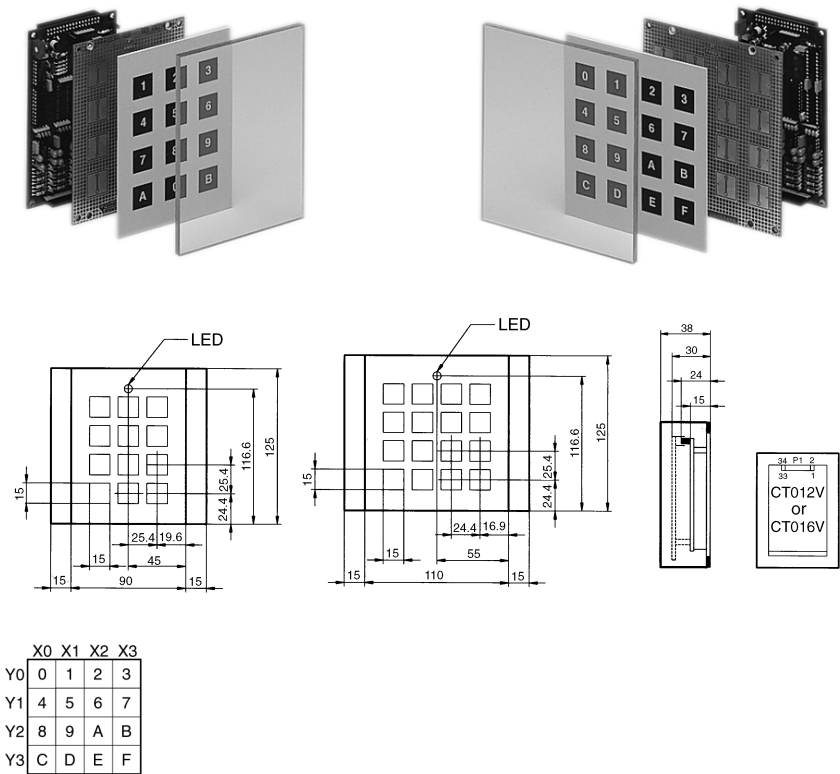
PLUG HE14
Pin1: Ground OV
Pin 2: Transistor output(open collector)
Pin 3 : Power + VDC(4.5 - 25 VDC)

General Characteristics:

- EMC-Protected
- Voltage: 4,5 – 25 VDC
- NPN Open Collector Transistor Output
- I_{max}: 125 mA
- No activation force / no moving contacts
- Protected to IP67
- Service life – almost unlimited
- active area nickel plated brass
- T_(op): -30°C to +80°C
- mounting hole 22,5 mm Ø

CT012V/CT016V

Waterproof – easy to clean
Technical characteristics



The keypads are designed for actuation through a glass, or polycarbonate front plate. A customer defined plastic or paper legend can be inserted between the front panel and the keypad PCB. The output signal is available as an XY matrix co-ordinate on a PC XT/AT compatible signal. The units can be completely sealed behind the user-supplied front panel. The ability to operate the units with gloved hands and to have a unit sealed for pressure washdown makes them suitable for the following applications:

- Pharmaceutical industry
- Public information terminals
- Access control systems
- Industrial control systems
- Pay terminals
- Shop windows

Suitable materials for use in association with these keyboards:

- glass
- plexiglass
- polycarbonate
- marble
- all non-conductive materials

Recommended front panel thickness

	CT-V	CT-VX001	CT-V X002
	MAT,PCS	MAT,HEX,RS2,PCS	MAT, HEX, RS2, PCS
Glas	6-10 mm	11-13 mm	14-15 mm
Polycarbonat	3-4 mm	5-6 mm	7-8 mm

General characteristics of the basic models CT12 and CT16 matrix

- Power supply: 5 V ± 10% -30 mA max.
- operating temperature: -20°C to + 70°C
- storage temperature: -40°C to +85°C
- protection against electrostatic discharge conforming to IEC 801-2
- installation angle: vertical or > 15°C from horizontal
- in mounted state sealing of the key area: IP66(IEC 529)
- service life almost unlimited

Model

Front view	Electrical connection	Part No:																
12 keys <table><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>5</td><td>6</td></tr><tr><td>7</td><td>8</td><td>9</td></tr><tr><td>A</td><td>0</td><td>B</td></tr></table>	1	2	3	4	5	6	7	8	9	A	0	B	matrix PC XT/AT/PS2	CT012V MAT CT012V PCS				
1	2	3																
4	5	6																
7	8	9																
A	0	B																
16 keys <table><tr><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>A</td><td>B</td></tr><tr><td>C</td><td>D</td><td>E</td><td>F</td></tr></table>	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	matrix PC XT/AT/PS2	CT016V MAT CT016V PCS
0	1	2	3															
4	5	6	7															
8	9	A	B															
C	D	E	F															

Connector P1

Pin	Function
1	0 V
2	enable (0 V)
3-4	+ 5 V
9	output Y3
10	output Y2
11	output Y1
12	output Y0
25	input X3
26	input X2
27	input X1
28	input X0
29*	No function
30*	
31*	
32*	
33*	
34	

Available on request:

- customer-specific legend

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