

PUSHBUTTON K3000 SERIES

SUNLIGHT READABLE MILITARY SWITCHES AND INDICATORS

GENERAL DESCRIPTION

K3000 Series pushbuttons was designed specifically for use either in military and civil aircraft cockpits or in military and professional equipment. Our goal was to produce a new generation illuminated switch, pushbutton type, with higher performances than what the market can offer today.



A New Type of Illumination

The display illumination was realized by using particular solid-state devices. It is possible to generate light of every colour, white included. This technology allows to reach an unlimited pushbutton operative lifetime. Moreover, the need to use the “check lamp” function and the consequent activities for replacing lamps was eliminated. The display is cold to the touch also under maximum lighting emission; there isn't heat generation. The light intensity is greater than that obtainable using traditional lamps.

It is possible to divide the display in zones, up to four, and those can be illuminated independently either with every colour and with every brightness. Colours can be dynamically changed according to operative conditions. The light colour changing in dynamic way permits to meet all of the standard operative prescriptions. It is than possible to illuminate each zone of the display with white light, to make the label readable, and to modify the colour in accordance with the operative rules as soon as the status changes.

A New Type Of Switch

A special switch has been employed in the basic version. It is able to support a very high number of pushing off, maintaining a correct operation even in sever shock and vibration conditions. The pushbutton can be equipped with four different switching devices:

- conductive rubber switch, for digital signal switching;
- optical solid-state switch, for digital signal switching;
- electromechanical switches, for signal or AC/DC power switching, galvanic isolated;
- solid-state switch, for AC/DC power switching.

The alternate action is realized through a special electronic circuit.

A New Way of Assembling

It was developed a new system of assembling that allows the pushbutton to be mounted stand-alone or in matrix without using special housing. Particular holing on the carrier panel are required. This solution reduces costs and makes easier assembling and maintenance operations. Moreover, it allows the pushbuttons to be placed in any position, without restrictions, and so the placing can respect any ergonomic and operational requirements.

The pushbutton is fixed from rear-panel.

A New Way of Connection

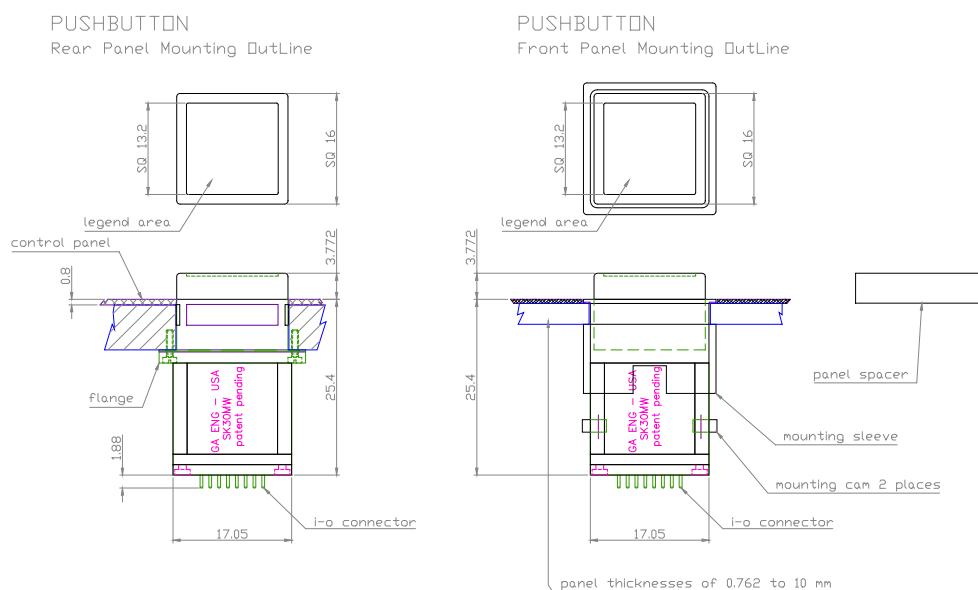
Electrical connections have been realized through indirect insertion microconnectors. The interconnection can be done by using flexible wires or mother-boards.

The crimp type microconnector, indirect insertion, is equipped with removable pins.

For rigid (FR4 or similar) or flexible (kapton) substrate applications, the pushbutton is provided with an indirect insertion microconnector in surface mounting technology.

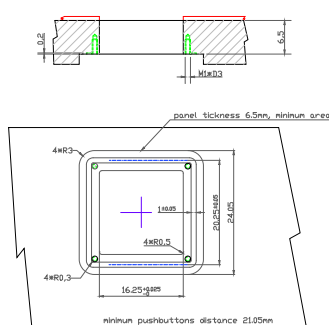
PUSHBUTTON CONFIGURATION

The pushbutton can be supplied for front panel or rear panel assembly. Both versions have different outline.

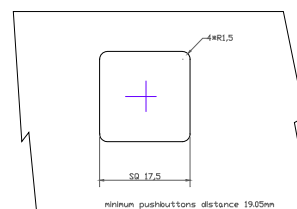


The panel thicknesses is different for the two version; specific panel cutout are required.

Recommended Panel Cutout rear panel mounting



Recommended Panel Cutout front panel mounting



The front panel version is fastened on the panel by means of a mounting sleeve tight by two screws located on the rear side of the pushbutton. The height of the pushbutton active part can be increased by employing a proper panel spacer. The rear panel version is fastened on the panel through four screws located on the rear pushbutton flange.

The water seal of the fastening points is reached, when necessary, by using special gasket. The pushbutton can be equipped with different switch and display types with or without internal electronic management. A particular version, named “electronic”, includes a custom microcontroller and a serial Usart, I2C or SPI interface. In that case the functionality of the pushbutton are completely and dynamically user programmable through configuration messages.

About the display, it is possible to define the following parameters. Number of different zones, on/off status, on/off colours for each zone, brightness for each zone; automatic control of chrominance and automatic control of brightness ambient depending are performed. The switch status is transmitted as programmed: on/off, momentary, status sequence; automatic reset is performed at power on or on command.

DISPLAY CONFIGURATION

The display of the pushbutton can be divided into different zones, up to four, the possible configurations are eight as showed in figure. It is possible to illuminate each zone independently from the others which colour can be dynamically varied on commands. Standard colours are: white, red, green, blue, yellow, amber.

Upon request it is possible the programming of several colours corresponding to each wavelength chosen within the visible spectrum.

Some versions include the possibilities to modify the coloured emission on line, in operative way from external, by properly changing the chromatic base emissions.

The following pushbutton types can be supplied:

- predefined wavelength emission, on/off and variable brightness controllable;
- variable wavelength emission, on/off and variable brightness controllable.

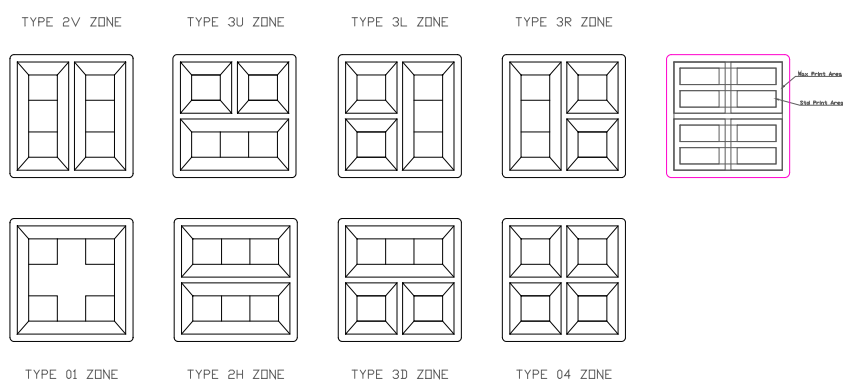
Standard labels have been designed for maximizing readability of different types of representations. Custom labels are realized on demand.

Labels can be assembled at factory or by the customer itself except for the sealed version that requires special processing.

Labels can be displayed in different manners:

- lighted letters: engraved letters appear white on a black background, when illuminated letters appear in colour and background remains black.
- lighted background: engraved letters appear black on a white background, when illuminated background appears in colours and letters remain black.
- hidden message lighted letters: engraved letters are not legible, when illuminated letters appear in colour background remains black.
- hidden message lighted background: engraved letters are not legible, when illuminated background appears in colour letters remain black.

Display Configuration



Other version are under development.



SWITCH CONFIGURATIONS

The pushbutton can be equipped with several types of switches or as indicator.

Actually the available versions are:

- **A Type, momentary action, for signals**
Momentary contacts SPST, for signal switching are used. The contact is realized through a special conductive rubber device assuring unlimited lifetime and low and stable contact resistance.
- **B Type, momentary or alternate action, TTL compatible**
A TTL compatible signal, bounces free, is generated by a CMOS electronic circuit included in the pushbutton. The circuit is driven by a conductive rubber switch. The switch signal can be momentary (status is on until pushbutton is active) or alternate action (status toggle on and off when pushbutton is activated, off status is reached at power on or when rest is active).
- **C Type, momentary or alternate action, for signals**
A CMOS electronic circuit, included in the pushbutton and connected with an optoisolator, carries out a bounces free switch signal. The switch signal can be momentary (status is on until pushbutton is active) or alternate action (status toggle on and off when pushbutton is activated, off status is reached at power on or when rest is active).
The output switch signal is galvanic isolated from power supply.
- **D Type, momentary action, electromechanical**
This pushbutton includes an electromechanical switch device performing momentary action and very high MTBF. This model is compatible with the traditional electromechanical pushbuttons. It can be supplied in SPDT or DPDT versions.
- **E Type, electronic**
The pushbutton status is transmitted through serial line. The user can program the working functionalities by means of messages during start up. Communication can use Usart/I2C/SPI standard.

ACCIDENTAL SIMULTANEOUS ACTION PREVENTION

The pushbutton can be protected to prevent accidental simultaneous action of adjacent switches. Are available horizontal or vertical barriers or slip guard or transparent slip guard with automating shutting function.

SPECIFICATION SHEET

Absolute Maximum Ratings

(Ta = 25°C unless otherwise noted)

DC Supply Voltage

$$-0.3V \leq V_{DD} \leq +7V$$

DC Voltage on any command pin

$$V_{SS} - 0.3V \leq V_{IN} \leq V_{DD} + 0.3V$$

ESD Voltage at any Input Pin

$$1000V$$

Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. Exposure to absolute maximum rating condition for extended periods may affect device reliability.

Recommended Operative Conditions

DC Supply Voltage, V_{DD} (when applicable)

$$4,75 \text{ to } 5,25 \text{ V}$$

Operating Temperature

$$-55 \text{ }^\circ\text{C} \leq T_A \leq +85 \text{ }^\circ\text{C}$$

electronic version $-40 \text{ }^\circ\text{C} \leq T_A \leq +85 \text{ }^\circ\text{C}$

Storage Temperature

$$-55 \text{ }^\circ\text{C} \leq T_A \leq +85 \text{ }^\circ\text{C}$$

Thermal Shock

MIL-STD-202 method 107

Shock

75 G's - MIL-STD-202, method 213 condition B

Vibration

15 G's from 10 to 2.000Hz - MIL-STD-202, method 204

condition B

Dielectric Withstanding Voltage

MIL-STD-202, metodo 301

Low pressure

MIL-STD-202, method 105 condition C



Salt Spray	MIL-STD-202, method 101 condition B
Insulation Resistance	MIL-STD-202, method 302 condition B
Humidity	MIL-STD-202, method 106
Sand and Dust	MIL-STD-202 method 110 condition B
Seal	Drip proof, MIL-STD-108 watertight on request, MIL-STD-108
EMI/RFI	MIL-PRF-22885 para 4.7.33
Mechanical Endurance	1.000.000 cycle, MIL-S-24317 para 4.8.17
Electrical Endurance	elettromechanical 50.000 cycle, rubber 1.000.000 cycle elettronic 1.000.000 cycle MIL-S-24317 para 4.8.21
Contacts Rating	rubber 30mA @30VDC elettromechanical 8A(R) 5A(L) @ 28VDC-115VAC elettronic, TTL compatible MIL-S-24317 para 4.6.20
Overload	1,8 mm
Actuation Travel	ZZ-R-765
Rubber	MIL-A-8625
External Finish	MIL-C-5541
Internal Finish	
Preservation and Packaging	MIL-S-24317 para 5

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