

HMI

Human Machine Interface (HMI) technology has been developing significantly over the last years to meet the demands of specialized applications across the industries.

Electromechanical devices in all their variety, including switches, keypads and keyboards became critical points for controlling equipment and systems.

Safety regulations, raising standards for hygiene, durability and ergonomics have drawn industrial designers to choose from low-power, interactive, solid metal piece piezo switches and keypads that perfectly meet the demands of industrial, medical, hygienic, anti-vandal and wash-down applications.

Technology's low currents, little or no arching or welding make piezo an explosion-proof, safe choice in designing HMI solutions for oil, gas refineries and other hazardous areas.

Manufacturers like Stern Engineering conduct series of researches and tests to ensure the right quality of their piezo products and strive to comply with the most recent International standards in industry. Constant investments in R&D, product line development and production lines, ensure the strong position of Stern Engineering among the leading manufacturers of HMI solutions.

Worldwide, Stern SMARTSWITCH customers enjoy the benefits of advanced piezo technologies, along with personal customer approach and tailor-made services.



ABOUT THE COMPANY

Stern Engineering Ltd. was founded in 1989 and is a leading manufacturer of electronic faucets, electronic flush valves and Piezo HMI solutions.

The company is a recognized pioneer in designing eco-friendly, innovative and durable products in quality and look.

Stern Engineering group delivers products and services to satisfied customers in over 80 countries.

Our expertise in engineering and project management allows us to design custom made products that meet the requirements of the most selective customers.

Leading by example, Stern Engineering uses piezo products in manufacturing its branded electronic faucets and electronic sanitary valves:

www.sternfaucets.com

Stern Engineering products' perfection is ensured by quality control over all phases of production. Full in-house manufacturing both ATEX and ISO9001 certified and equipped with modern production lines:

- CNC machining center
- SMT assembly lines
- Epoxy coating lines
- Piezoelectric switches & panels full production line
- Electronic tests facilities
- In-house R&D
- Quality assurance and control

PIEZO TECHNOLOGY

Piezo technology is a reliable and proven mechanism used in many high-tech applications and products. It is based on the ability of piezoelectric crystals to generate low-voltage electric potential in response to the applied mechanical stress.

Piezo and reverse piezoelectric effects are used in printing equipment, ultrasonic transducers, fuel injectors, acoustic equipment, laser mirror alignment and piezoelectric devices.

In HMI solutions, low voltage piezo actuators activated by touch generate 300mA or 1.5A pulse, which is then converted to the desired electrical output. For basic momentary action performance, a piezo switch or keypad requires no external power supply.

STANDARDS IN INDUSTRY

Essential components of HMI interfaces, switches, keypads and keyboards have to meet specific requirements imposed on the whole systems, and full consideration must be given to the environment in which HMI will be deployed. Where fine dust, cleaning solutions, fuel or other liquids may come into contact with switches or control panels it is important to select components with an appropriate rating for environments protection and explosion proof. A number of ratings, introduced to the industry, allow to standardize the products according to their behavior in different conditions.

INTERNATIONAL PROTECTION (IP) RATING

Often referred to as “Ingress protection”, this widely popular standard is mainly used in Europe and describes the degree of protection as defined by the IEC standard 60529. The IP code designation consists of the letters IP typically followed by two numerals. The first number indicates the level of protection against the solids. The highest rating in this system is IP6x which stands for ‘dust tight’. The second digit indicates the degree of protection against liquids of various pressures, volumes and directions, where IPx6 stands for powerful water jets, IPx7 for immersion up to 1 m and IPx8 for immersion beyond 1m. An expansion to IP rating is provided with an additional rating IP69K as per DIN 40050-9. Under this rating, devices can undergo high-temperature and high-pressure impacts up to 80°C at 10MPa and a flow rate of 16 liters per minute. IP rating corresponds with NEMA ratings in the USA. For example, IP68 rating is associated with NEMA 6P type. STERN SWITCHES products are IP68 or IP69K rated, and can be used in most applications.





SMARTSWITCH PRODUCT SERIES DESCRIPTION

Piezo switches, keypads and keyboards designed and manufactured by Stern Engineering offer high technology with high finish standards, and are suitable for sleek design equipment or heavy machinery alike.

They provide an unprecedented level of durability, longevity, hygiene, aesthetics and interactivity when compared with non-piezo switches. Having no moving parts, and with all electronic components molded within a one-piece metal housing, SMARTSWITCH products are completely solid and water proof, can be used in aggressively polluted environments and in wash-down applications as well as in vandalism endangered surroundings.

International Protection ratings for SMARTSWITCH products are IP68 and IP69K, according to the results of temporary Immersion test, Low pressure test, High Temperature tests, Shock operational test, and Random vibration test all done by an independent laboratory.

Stern Engineering continuously invests in research. All products apply a unique technology that allows better conductivity between the piezoelectric disk and electronic circuit, eliminating the risks of electrical pulse loss, and prolonging products life.

SMARTSWITCH line includes illuminated and non-illuminated switches, momentary, prolonged or toggle switches, keypads and keyboards that address the needs of any application.

Housing material is typically stainless steel or anodized aluminum, available in variety of colors. Brass in satin or chrome finish is available as well.

KEY FEATURES

- Solid metal housing ensures IP69K sealing protection;
- No external power supply required for Basic Piezo Switches, results in less energy consumption;
- No moving parts, over 10 mln cycles with minimum maintenance;
- Illumination and sound feedback allow smart interactivity;
- NO (normally open), NC (normally closed) or toggle piezo switches available;
- Momentary or prolonged impulse up to 6 sec for a variety of applications;
- Laser engraving and color print for product customization;
- Low operation height and antivandal mounting.

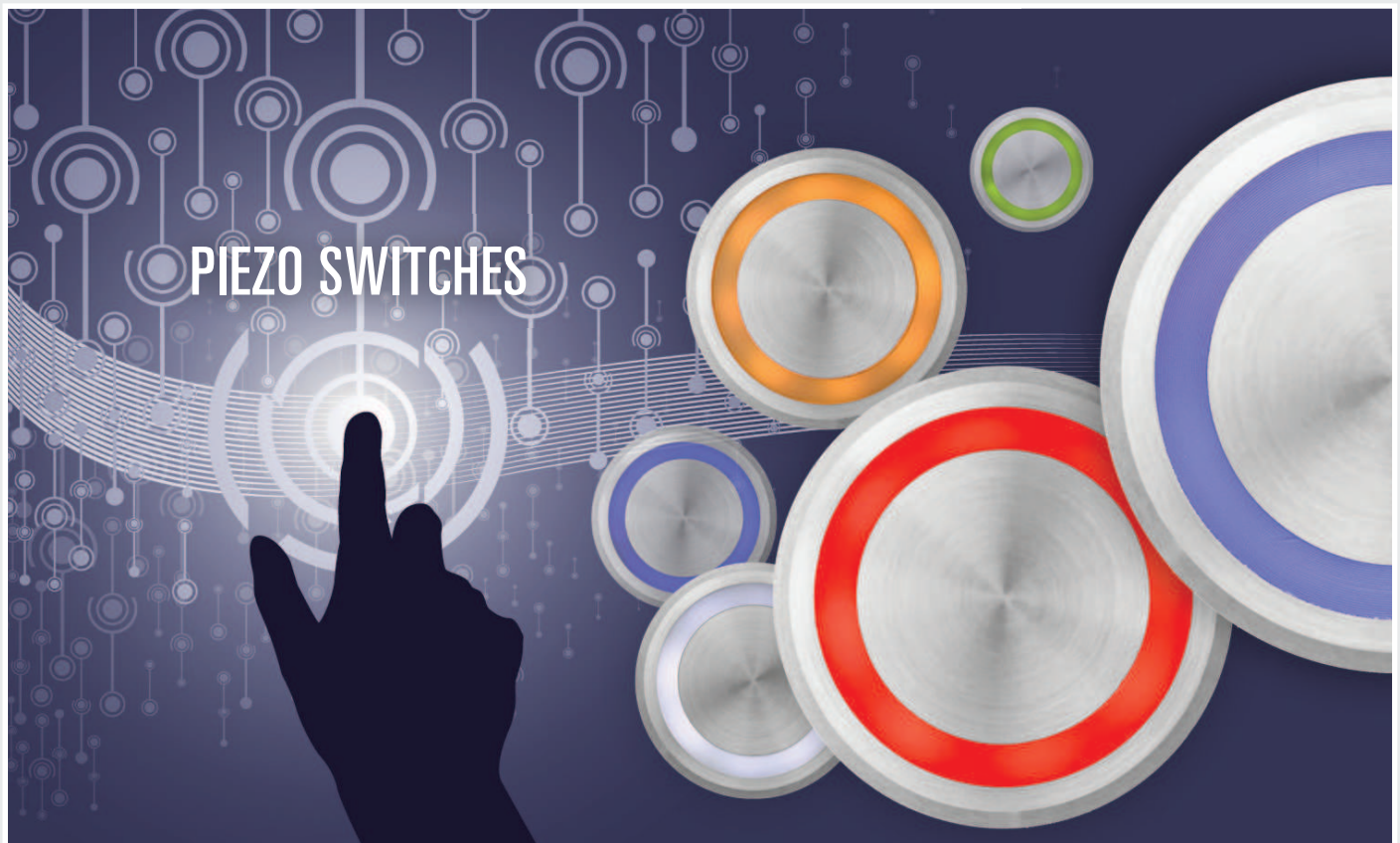
STERN SMARTSWITCH PRODUCTS ARE IMPLEMENTED WITHIN THE FOLLOWING INDUSTRIES:

- Food processing and packaging equipment
- Car wash and pressure washers
- Mining Equipment
- Automatic parking and ticketing machines
- Medical and pharmaceutical equipment
- Oil rigs and off shore equipment
- Access control systems
- Gas & Fuel equipment
- ATMs and Automatic Vending machines
- Industrial controls and HMIs
- Industrial scales and weighing systems

APPLICATIONS MATRIX BY FEATURES AND STANDARDS

FEATURE / STANDARD	IP68	ANTI-VANDAL, IP69K
Illumination	Car wash stations	Parking ticketing machines
Sound indication	Scales and weighing systems	ATMs, Vending machines
Customized finishing	Marine, yachts	Vending machines
Momentary activation	Food processing equipment	Private label equipment
Toggle switch	Machinery	Machinery
Lockout time	Clean rooms	Elevators, escalators





BPS – BASIC PIEZO SWITCHES

Basic piezo switches are suitable for any applications requiring momentary pulse formation and immediate following action. They are easy to install, maintain and operate.

ENVIRONMENTAL SPECIFICATIONS

- IP degree of protection: IP68 per IEC 60529:2001, IP69K per DIN 40050-9
- Operating temperatures: -40°C to +85°C
- Shock resistance: per MIL-STD-810G, 516.6
- Vibration resistance: 10-500 Hz/10g per IEC 60068-2-6

ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating: 300mA to 1.5A, 30VDC/VAC
- Operating force: 2-5N
- Switch resistance On: 10Ω max
- Switch resistance Off: 5MΩ max
- LED consumption: 50mA
- Life expectancy: over 10 million cycles

MATERIALS

- Housing: stainless steel (AISI303), aluminum (natural or anodized), brass
- Cable, pair: 200-500mm




ELECTRICAL FUNCTIONS

BPS switches do not require an external power supply, except for those with LED illumination. In that case, a power supply of 9-24 VDC/VAC is required.

BPS: ORDER CODE DESCRIPTION

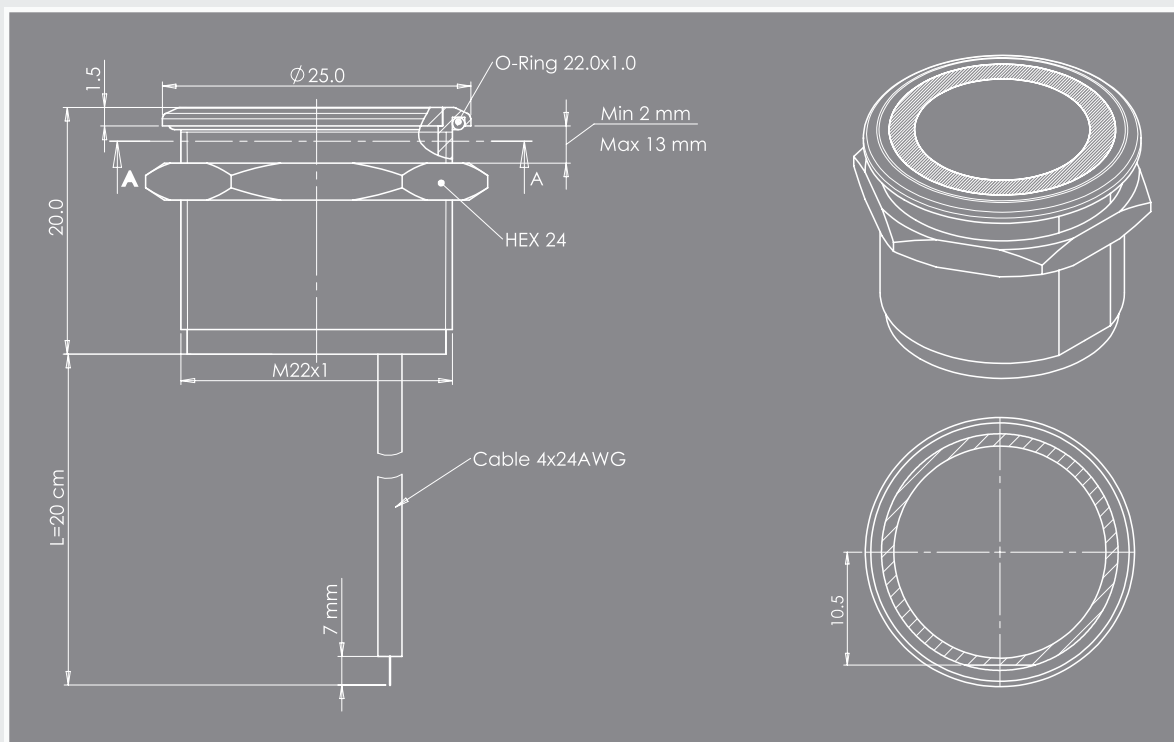
Series	Material	Finish	Mounting Ø	Output	LED Illumination	Surface	Power supply
BPS Basic Piezo Switch	S AISI303 Stainless steel	N Natural	12 Ø12	P Pulse 0.3 sec at 1A	N Non illuminated	F Flat	E0 Voltage 9 VDC / VAC
	A Aluminum	R Red	16 Ø16	S Pulse 6 sec at 0.3 A	R Red	R Recessed	F0 Voltage 12 VDC / VAC
	B Brass	B Blue	18 Ø18	I Pulse 0.3sec for IR	B Blue		G0 Voltage 24 VDC / VAC
FOR ALUMINUM ONLY		G Green	19 Ø19	V 60V 1.5A 0.3sec	G Green		J0 Customized
		Y Yellow	22 Ø22		Y Yellow		
		K Black			W White		
FOR BRASS ONLY		S Satin			O Orange		
		C Chrome			E Green-Red		
					H Blue-Red		
					I Red-Yellow		
					K Blue-White		

EXAMPLE	BPS	S	N	22	P	B	F	E0
	BASIC PIEZO SWITCH	STAINLESS STEEL	NATURAL	22MM	PULSE 0.3 SEC AT 1A	BLUE ILLUMINATION	FLAT	VOLTAGE 12 VDC.
BPSSN22PBFEO								

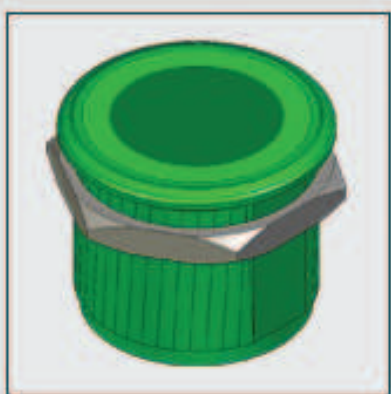
BPS Ø22

Mounting diameter: 22mm

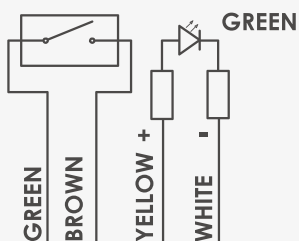
Operating diameter: 25mm



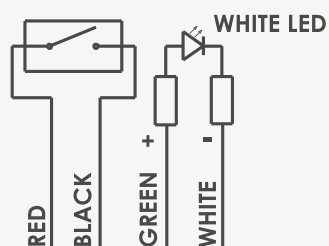
SAMPLE MODELS

**BPSAG22PGFG0**

Manufactured by Stern Engineering
 P/N 07225201
 -Switch voltage 0-24 VAC/DC
 -Switch current 1A
 -Green illuminated 24V AC/DC

**BPSSN22PWFG3**

Manufactured by Stern Engineering
 P/N 07225199
 -Switch voltage 0-24 V AC/DC
 -Switch current 1A
 -White illuminated 24V AC/DC





BPS Ø19

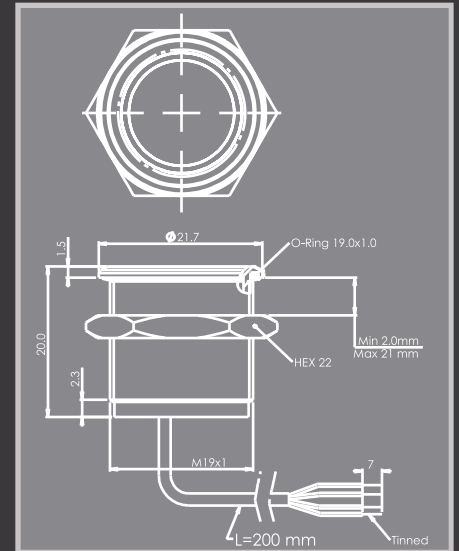
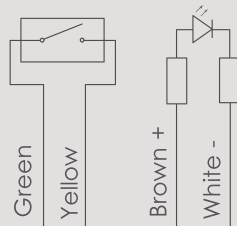
Mounting diameter: 19mm

Operating diameter: 21.7mm



Manufactured by Stern Engineering
P/N 07225226
-Power supply 0-24V AC/DC
-Switch voltage 0-24V AC peak/DC
-Switch current Max 1A
-Red illuminated 24V AC/DC

Red LED



SAMPLE MODEL

BPSSN19POFG0

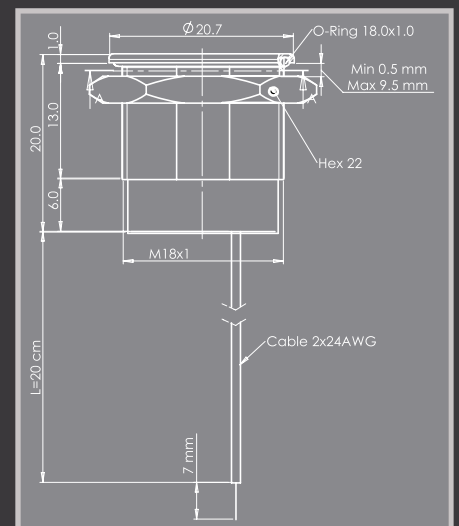
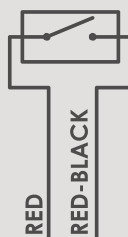
BPS Ø18

Mounting diameter: 18mm

Operating diameter: 21mm



Manufactured by Stern Engineering
P/N 07225213
-Rated voltage 0-24 V AC/DC
-Switch current 1A
-Switch pulse time up to: 300 msec



SAMPLE MODEL

BPSAN18SNFK0



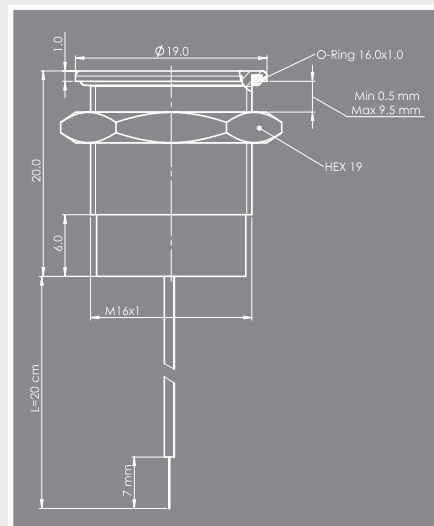
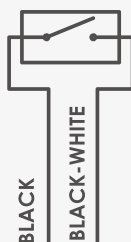
BPS Ø16

Mounting diameter: 16mm

Operating diameter: 19mm



Manufactured by Stern Engineering
P/N 07225204
-Rated voltage 0-24 V AC/DC
-Switch current 1A
-Switch pulse time up to: 300 msec



SAMPLE MODEL

BPSSN16PNFK0

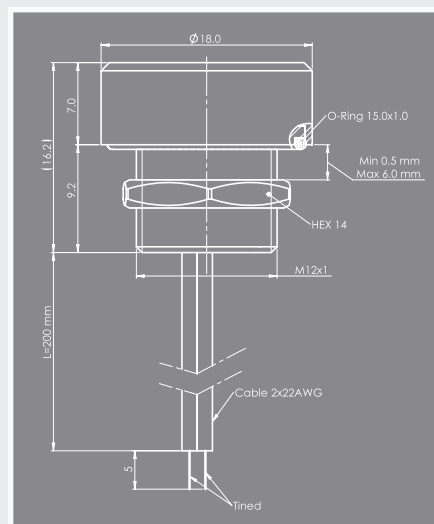
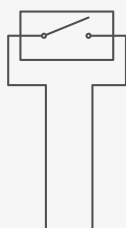
BPS Ø12

Mounting diameter: 12mm

Operating diameter: 18mm



Manufactured by Stern Engineering
P/N 07225235
-Rated voltage 0-24 V AC/DC
-Switch current 1A
-Switch pulse time up to: 300 msec



SAMPLE MODEL

BPSSN12PNFE0


APS - PROGRAMMABLE PIEZO SWITCHES

Programmable piezo switches can be programmed for continued pulse, allow preset operation time, conduct timer based operations, lockout devices or equipment. They allow smart integration into the most sophisticated solutions.

All environmental, materials specifications for APS switches are similar to that of BPS switches. APS switches require power supply of minimum 6VDC for non-illuminated switches and 9, 12, 24VDC for illuminated switches.

ORDER CODE DESCRIPTION

Series	Material	Finish	Mounting Ø	Output	LED Illumination	Surface	Power supply
APS Programmable Piezo Switch	S AISI303 Stainless steel	N Natural	19 Ø19	L Latch 6VDC	N Non illuminated	F Flat	A0 Voltage 12 VDC
	A Aluminum	R Red	22 Ø22	N Non-latch	R Red	R Recessed	B0 Voltage 9 VDC transformer
	B Brass	B Blue		K Latch 9VDC	B Blue		H0 Voltage 9VDC battery
FOR ALUMINUM ONLY		G Green			G Green		C0 Voltage 12 VDC
		Y Yellow			Y Yellow		J0 Customized
		K Black			W White		D0 Voltage 24 VDC / VAC
FOR BRASS ONLY		S Satin			O Orange		
		C Chrome			E Green-Red		
					H Blue-Red		
					I Red-Yellow		
					K Blue-White		


EXAMPLE	APS	S	N	22	L	B	F	C0
	ADVANCED PIEZO SWITCH	STAINLESS STEEL	NATURAL	22MM	LATCH 6VDC	BLUE ILLUMINATION	FLAT	VOLTAGE 12 VDC
APSSN22LBFC0								

TPS - TOGGLE PIEZO SWITCHES

Toggle piezo switches are available with NO and NC functions.

ORDER CODE DESCRIPTION

Series	Material	Finish	Mounting Ø	Output	LED Illumination	Surface	Power supply
TPS Toggle piezo switch	S AISI303 Stainless steel	N Natural	16 Ø16	N Non-latch	N Non illuminated	F Flat	D0 Voltage 24 VDC / VAC
	A Aluminum	R Red	18 Ø18		R Red	R Recessed	B0 Voltage 9 VDC
	B Brass	B Blue	19 Ø19		B Blue		C0 Voltage 12 VDC
FOR ALUMINUM ONLY		G Green	22 Ø22		G Green		J0 Customized
		Y Yellow			Y Yellow		
		K Black			W White		
FOR BRASS ONLY		S Satin			O Orange		
		C Chrome			E Green-Red		
					H Blue-Red		
					I Red-Yellow		
					K Blue-White		

EXAMPLE	TPS	S	N	22	P	B	F	C0
	TOGGLE PIEZO SWITCH	STAINLESS STEEL	NATURAL	22MM	NO LATCH	BLUE ILLUMINATION	FLAT	VOLTAGE 12 VDC
TPSSN22PBFC0								



KEYPADS

KEYPADS

Stainless steel and aluminum, SMARTSWITCH keypads are made of a one piece solid metal, no moving parts. Anti-vandal designed, IP68 and IP69K sealed, they can operate in harsh environments. Keypads are easy to install and operate, and do not require maintenance. Different types of laser engraving, illumination and anodized printing are available.

SIZES

FLAT SURFACE	BEVELED SURFACE
1X3 - 1X4 - 1X5	1X3 - 1X4 - 1X5
2X3 - 2X4 - 2X5	2X3 - 2X4 - 2X5
3X3 - 3X4 - 3X5	3X3 - 3X4 - 3X5
4X4 - 4X5	4X4 - 4X5
5X4 - 5X5	5X4 - 5X5

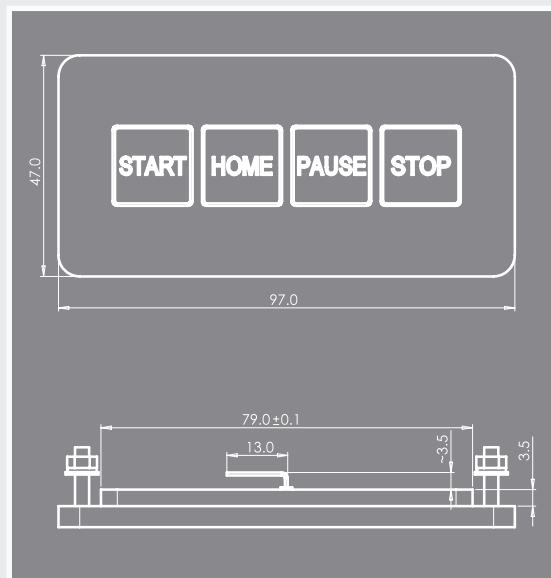
INTERFACES

Matrix

Common bus



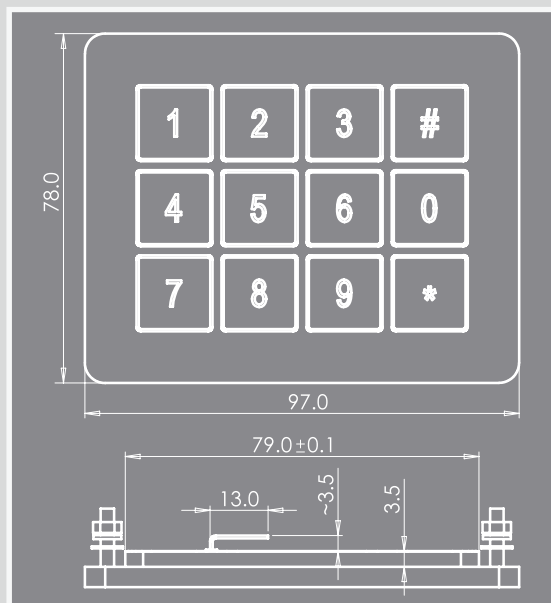
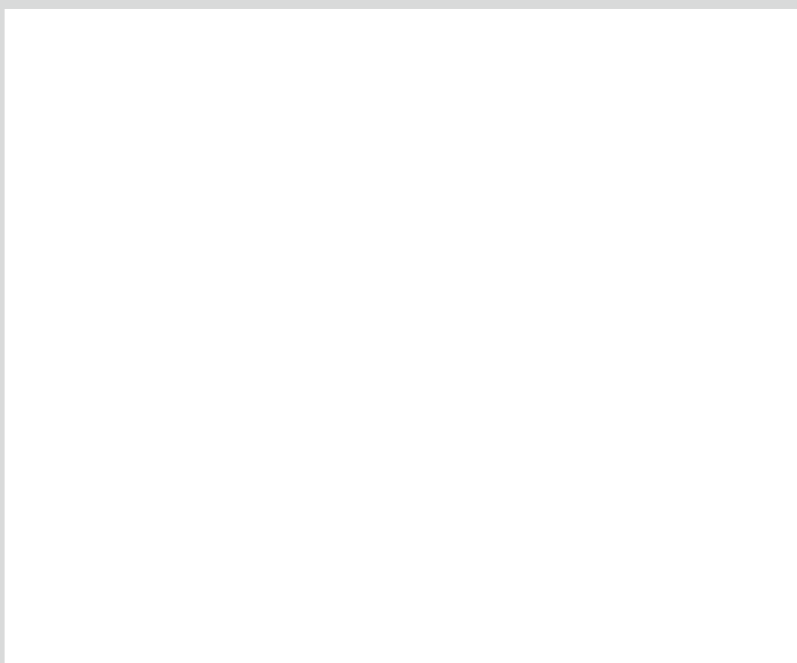
KEYPAD 1X4 ANTIVANDAL



Material	Al 6061
Finishing	Natural anodize, engraving
Switching voltage	0-24V AC/DC
Switching current	1A
Switch capacitance	100pF
Operating temperature	-40C + 85C

GRAPHIC	PIN					
		1	2	3	4	5
	START				X	X
	HOME			X		X
	PAUSE		X			X
	STOP	X				X

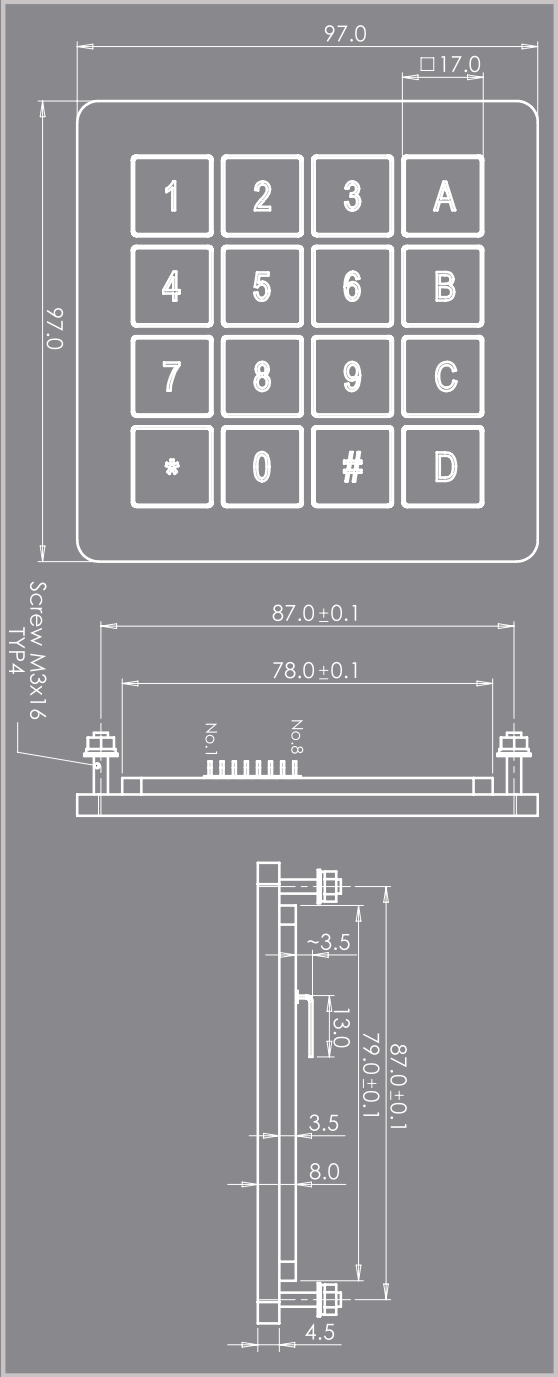
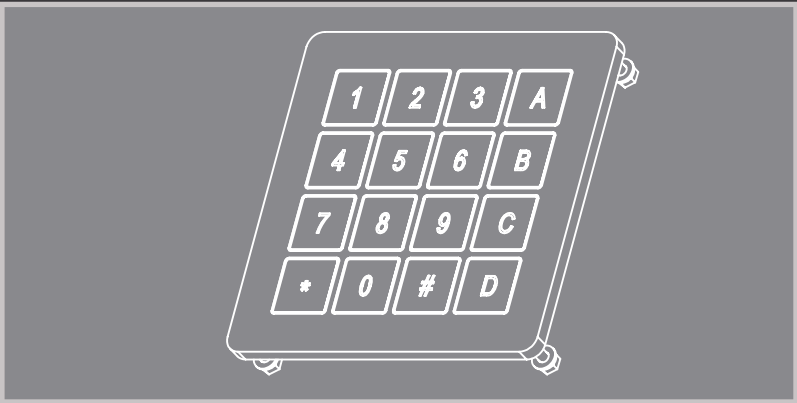
KEYPAD 3X4 ANTIVANDAL



Material	Al 6061
Finishing	Natural anodize, engraving
Switching voltage	0-24V AC/DC
Switching current	1A
Switch capacitance	100pF
Operating temperature	-40C + 85C

		PIN							
		1	2	3	4	5	6	7	8
1	1				X		X		
2	2			X			X		
3	3		X				X		
4	#	X					X		
5	4				X			X	
6	5			X				X	
7	6		X					X	
8	0	X						X	
9	7				X				X
10	8			X					X
11	9		X						X
12	*	X							X

KEYPAD 4X4 ANTIVANDAL



Material	Al 6061
Finishing	Natural anodize, engraving
Switching voltage	0-24V AC/DC
Switching current	1A
Switch capacitance	100pF
Operating temperature	-40C + 85C

	GRAPHIC	1	2	3	4	5	6	7	8
1	A				x	x			
2	B			x		x			
3	C		x			x			
4	D	x				x			
5	3				x		x		
6	6			x			x		
7	9		x				x		
8	#	x					x		
9	2				x			x	
10	5			x				x	
11	8		x					x	
12	0	x						x	
13	1				x				x
14	4			x					x
15	7		x						x
16	*	x							x

KEYBOARDS



KEYBOARDS

IP68 and IP69K sealed piezo keyboards are made of solid piece metal, and used in heavy-duty applications where durability, waterproof sealing and reliability matter the most.

Stern Piezo keypads and keyboards are designed according to the customer's needs.

INTERFACES

PS/2

USB

