Contents

Product Overview

This self-contained device is ready to use. It can be easily attached to the rear surface of most Storm keypads to provide connectivity and communication with USB compatible host systems. Factory configured for standard numeric data entry, this versatile device can also be user programmed to output any supported USB code; making the 450 Series encoder the ideal keypad interface for most applications.

Features

Generic keyboard (HID) device – no additional drivers needed
Factory configured to encode telephone or calculator format numeric keypads
Output code table can be customised using Storm's USB Configuration Utility
Host PC can use the supplied API to control the encoder functions in an application.
Integrated power supply for keypad illumination
450i version provides additional brightness control for keypad illumination
450i version features a piezo sounder for optional key press confirmation or application driven status signal
Simple connection via a USB Mini-B socket
Compact, self contained form factor
Compatible with most Storm 4, 12 and 16 key format keypads
(including Storm 700, 720,1000, 2000, 3000, GFX and PLX product series)
Separate ribbon cable available if you do not wish to plug the encoder directly onto the rear of the keypad.

Product Range and Accessories

Part Number	Description
4500-10	450i Encoder with Buzzer and Illumination Control
4500-00	450 Encoder
4500-01	USB 2.0 Cable MINI-B TO TYPE A, 0.9m
4500-CAB07	Ribbon Cable 0.3 metre for remote connection to 4 way keypad
4500-CAB10	Ribbon Cable 0.3 metre for remote connection to 12/16 way keypad

Note :
These part numbers are for on line ordering directly from Storm Interface.
When bought through broadline distribution they have an additional suffix to allow for distributor specific labelling/marking requirements e.g.

4500-102	450i Encoder with Buzzer

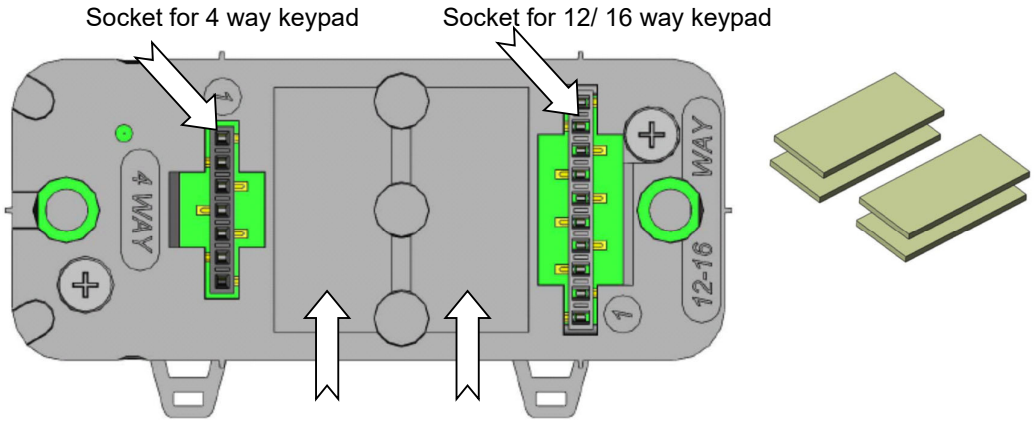
Quickstart Guide

Before starting make sure that you have :

- The encoder
- A compatible Storm keypad.
- A USB mini-B cable between your keypad and the host computer.
- A panel with the correct cutout for your keypad
- A copy of the configuration utility if you want to customise the configuration

Installation

- Ensure your computer is powered up before connecting the encoder.
- Note that there are two different sockets for the keypad connection, depends if a 4 way or 12/16 way keypad is being used. Make sure that the correct socket is used before using the sticky pads to fix the encoder in place.



Sticky pads go here
(one per position, unless using 700 Series underpanel which needs 2 per)

- Push the encoder onto the keypad pins ; make sure the pad sticks down
- Plug in the mini B USB cable on the side of the encoder

One Time Only Initialisation

This initialisation process must be completed the first time you turn it on. The encoder has to recognise the keypad, and you have to select the layout that matches the keypad layout.

a) **PRESS AND HOLD** the bottom right hand key on the keypad – this tells the encoder which keypad is connected

b) Connect the encoder cable to the pc

c) **RELEASE KEY IF** you want function key (4 way) / telephone layout (12/16 way) code table

or

d) **KEEP THE KEY PRESSED FOR 10 SEC IF** you want cursor (4 way) / calculator (12/16 way) code table

Now check that you are getting the correct characters on screen. If you need to reconfigure the encoder you can change the code table (or reset to a pre-loaded code table) with the USB Configuration Utility from www.storm-interface.com

F.A.Q's

Does this encoder need a special driver ?	No – it works with the standard USB keyboard driver.
Does the utility work on any pc ?	At present it does not run on Linux or Mac OS. The utility requires Windows XP or later.
What's the USB connection ?	Mini-B socket
Do I need to use the sticky pads ?	These are included to retain the encoder in service.
What custom USB codes can I assign ?	See the code tables on page 11.
What do I do if I have wrongly initialised the product ?	Download & use the config utility to reset defaults.
Why is the socket longer than the pinstrip on my keypad?	The end pins power the 720 illuminated keypads.
Can I control this from a host application ?	Yes – the commands are listed in the API reference.
Can the host activate the keypad illumination to prompt for user input ?	The Encoder API includes an 'LED Brightness Command' which enables the host software application to control the keypad illumination. For example, the illumination setting can be changed from 0 (keypad illumination off) to a setting of 9 (full brightness) to indicate to the user that keypad input is required.

Ratings & Performance

Operational temperature	-20ºC to +60ºC
Storage temperature	-20ºC to +70ºC
Humidity	10% to 90% non-condensing
Vibration and shock	ETSI 300 019 5M3
Operating voltage	5V +/- 5% (USB)
Operating current	20mA (excluding keypad illumination current)
Safety	EU Low Voltage Directive
EMC:	Emissions and Immunity: FCC part 15 class A
	EN55022, EN55024
	ESD: Up to +/- 15kV air discharge, +/- 7.5kV contact discharge

EU RoHS

WEEE Directive compliant

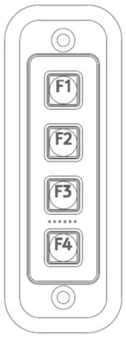
Compatible Products

	4 Key	12 Key	16 Key	Note
700 Series	☑	☑	☑	Use additional sticky pads for underpanel fixing of 700 Series
720 Series	☑	☑	☑	720 and 720 illuminated keypads are supported
1000 Series	☑	☑	☑	
PLX Series	☑	☑	☑	
2000 Series	☑	☑	☑	
GFX	☑	☑	☑	
3000 Series	☑	☑	☑	
SF6000			☑	Use remote connection cable. – see page 18 (NB Illumination circuit is separate)
6000			☑	Use remote connection cable – see page 18
3000 Illuminator				Illumination not supported on this model
GFX Illuminator				Illumination not supported on this model
	Use the 7 way socket for 4 key pad	Use the 10 way socket for 12/16 key pad		

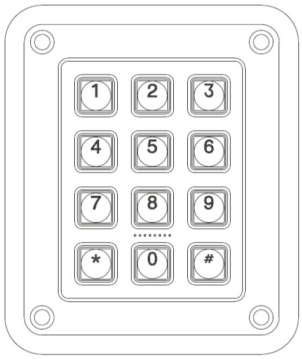
Keypad Layouts

Keypad Layouts

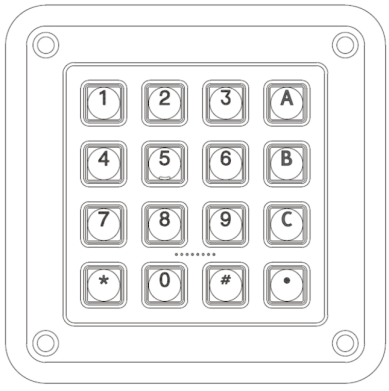
Default Code Table (US English)



4-Way Function



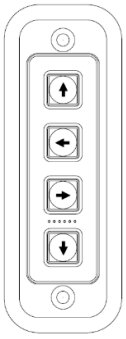
12-Way Telephone



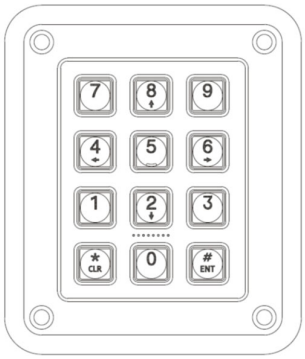
16-Way Telephone

Keypad Layouts

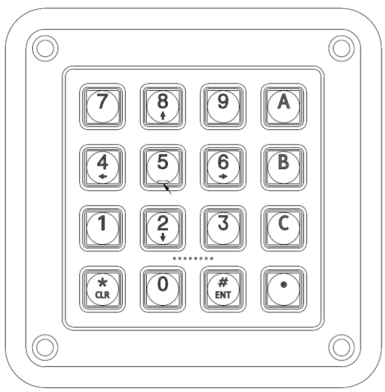
Alternate Code Table (US English)



4-Way Cursor



12-Way Calculator



16-Way Calculator

Default Code Tables (remember host set to UK English gives £ instead of #)

Row	Column	4 way codes Function (hex)	12 way code Telephone(hex)	16 way code Telephone(hex)
A	1	F1 (3A)	1 (1E)	1 (1E)
B	1	F2 (3B)	4 (21)	4 (21)
C	1	F3 (3C)	7 (24)	7 (24)
D	1	F4 (3D)	* (E1, 25)	* (E1, 25)
A	2	-	2 (1F)	2 (1F)
B	2	-	5 (22)	5 (22)
C	2	-	8 (25)	8 (25)
D	2	-	0 (27)	0 (27)
A	3	-	3 (20)	3 (20)
B	3	-	6 (23)	6 (23)
C	3	-	9 (26)	9 (26)
D	3	-	# (E1, 20)	# (E1, 20)
A	4	-	-	A (04)
B	4	-	-	B (05)
C	4	-	-	C (06)
D	4	-	-	. (37)

Alternate Code Table (to get the arrow keys on a 12/16 way keypad then switch NumLock off)

Row	Column	4 way code Cursor (hex)	12 way code Calculator (hex)	16 way code Calculator (hex)	Output for 12/16 way with NumLock off
A	1	↑ (52)	7 (5F)	7 (5F)	HOME
B	1	← (50)	4 (5C)	4 (5C)	←
C	1	→ (4F)	1 (59)	1 (59)	END
D	1	↓ (51)	* (E1, 25)	* (E1, 25)	*
A	2	-	8 (60)	8 (60)	↑
B	2	-	5 (5D)	5 (5D)	
C	2	-	2 (5A)	2 (5A)	↓
D	2	-	0 (62)	0 (62)	
A	3	-	9 (61)	9 (61)	PgUp
B	3	-	6 (5E)	6 (5E)	→
C	3	-	3 (5B)	3 (5B)	PgDn
D	3	-	# (E1, 20)	# (E1, 20)	#
A	4	-	-	A (04)	A
B	4	-	-	B (05)	B
C	4	-	-	C (06)	C
D	4	-	-	. (37)	.

Configuration Utility

To customise the output codes just download and install the Configuration Utility from www.storm-interface.com
This lets you do the following :-

Scan the encoder in order to	Confirm the encoder is connected Show which version of firmware is installed Show which keypad is set (4, 12 or 16 key) Show which code table is selected (default, alternate or customised)
And also	Change the keypad setting Change the selected code table Change the buzzer volume (450i only) Change the brightness on illuminated keypads (450i only) Self test the encoder
For re-legendable keypads	Customise the code table by assigning a USB code to each key Add a modifier in front of each USB code Save this configuration Export or Import configuration files
For maintenance purposes	Update the encoder firmware if a new version is released Restore all settings to original factory defaults.

API

To allow a host application to control the USB encoder the available commands are listed in the API Documentation.

Product Dimensions

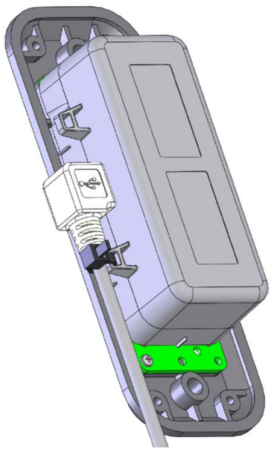
Overall dims	77mm x 39mm x 25mm, 30 grams
Packed dims	124mm x 52mm x 40mm, 50 grams
Included parts	Qty 4 sticky pads, Installation sheet

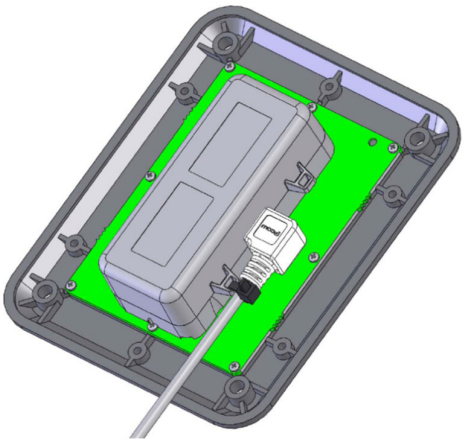
Cables

Depending on your installation you may require either a straight or an angled cable, with latching mini B USB connector. If you use an angled cable then you will be able to secure the cable to the encoder as below.
Note : Angled Mini B cables are available with 2 possible connectors – see picture below.

Encoder on 4 way keypad

Encoder on 12 way keypad
(order pn 4500-01 from Storm)





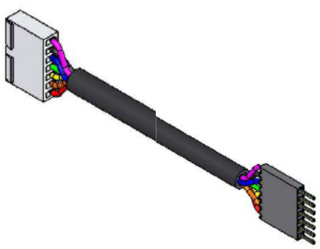
If you wish to install the encoder remote from the keypad then you will need an interconnection cable
Cable details as shown below (or order 7 way cable PN 4500- CAB07 ,10 way cable PN 4500-CAB10)

Encoder 4 W PIN	to	4 w keypad PIN	Illuminated version PIN
1			1
2		1	2
3		2	3
4		3	4
5		4	5
6		5	6
7			7

Molex KK 0.1" Pitch Socket 2695 Series Pitch Socket -connect to keypad

Molex KK 0.1" Pitch PIN Headers

-connect to 450 encoder



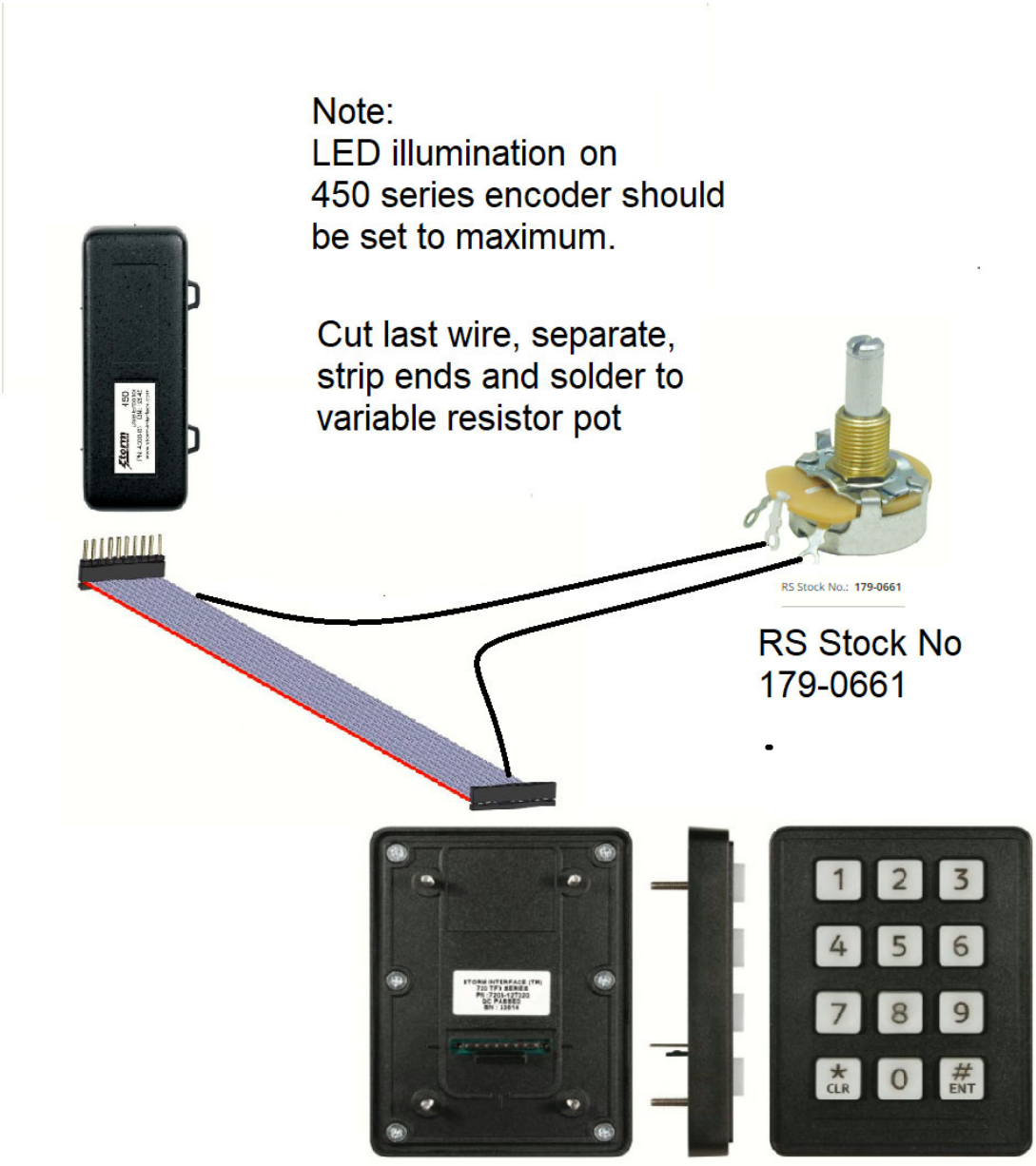
	Encoder 12/16 PIN	to	12/16 keypad PIN	Illuminated version PIN	SF6000 Series Matrix Keypad PIN	6000 Series Matrix Keypad PIN
						1
	1			1		2
R1	2		1	2	1	3
R2	3		2	3	2	4
C1	4		3	4	3	5
C2	5		4	5	4	6
C3	6		5	6	5	7
C4	7		6	7	6	8
R4	8		7	8	7	9
R3	9		8	9	8	10
	10			10		11
						12
						13

Illumination Control

If you need to vary the brightness in service then this can be controlled in two ways .

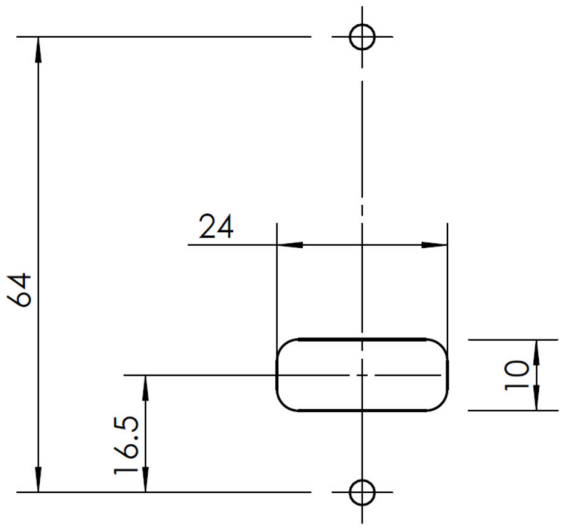
Either use the API (see 450 Encoder API Manual – download from www.storm-interface.com for details)

Or use the remote cable (see below) and fit a pot in line for the pin 10 connection line. Set the brightness to maximum using the Utility software, then you can use the pot to dim it.

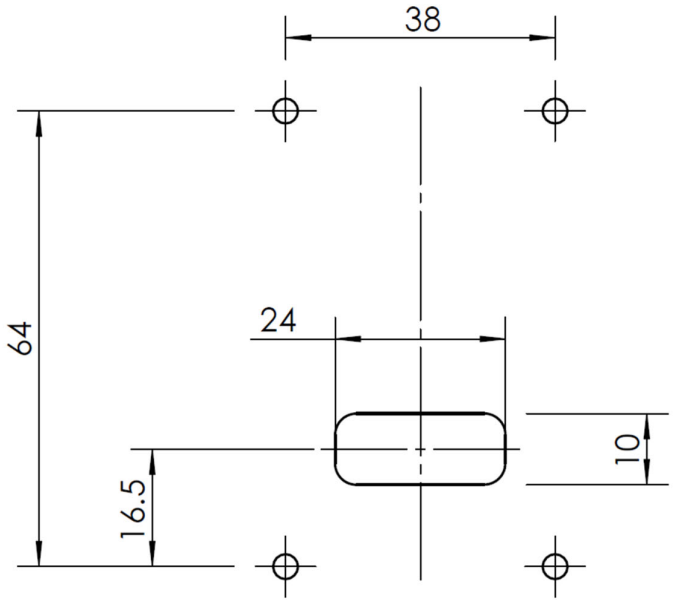


Panel Cutout Drawings

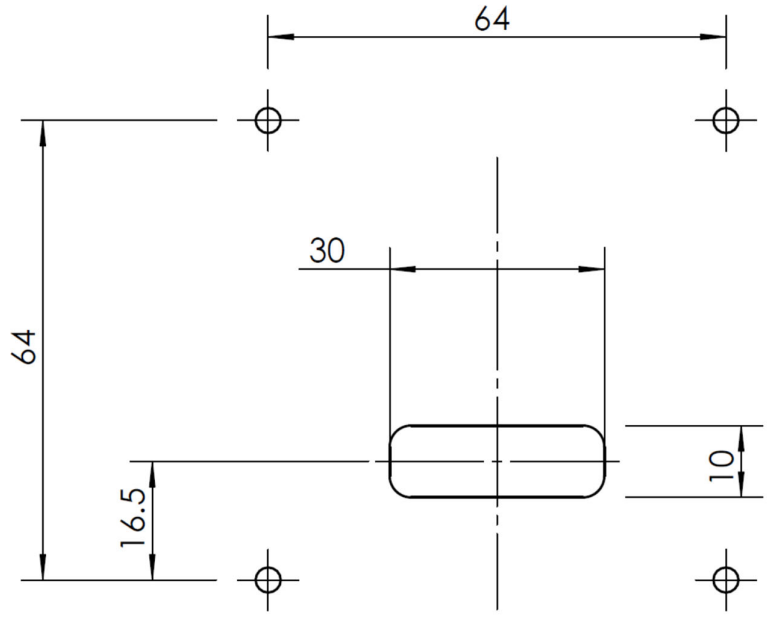
Surface Fixing of Keypads : 700 Series. 720 Series Both products use the same panel cutout detail.



4 WAY PANEL FRONT MOUNTED



12 WAY PANEL FRONT MOUNTED



16 WAY PANEL FRONT MOUNTED

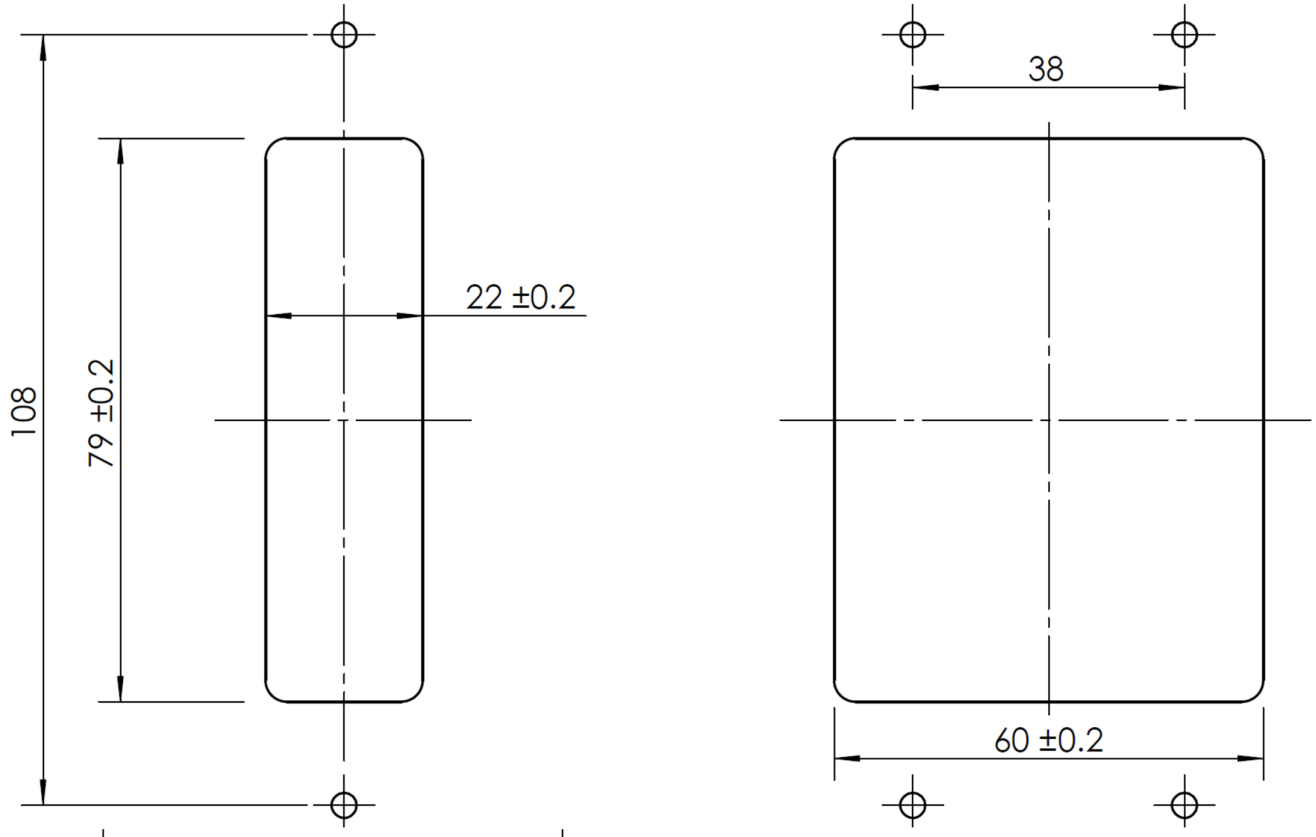
PANEL DETAILS FOR
700 AND 720 SERIES
FRONT FIXING

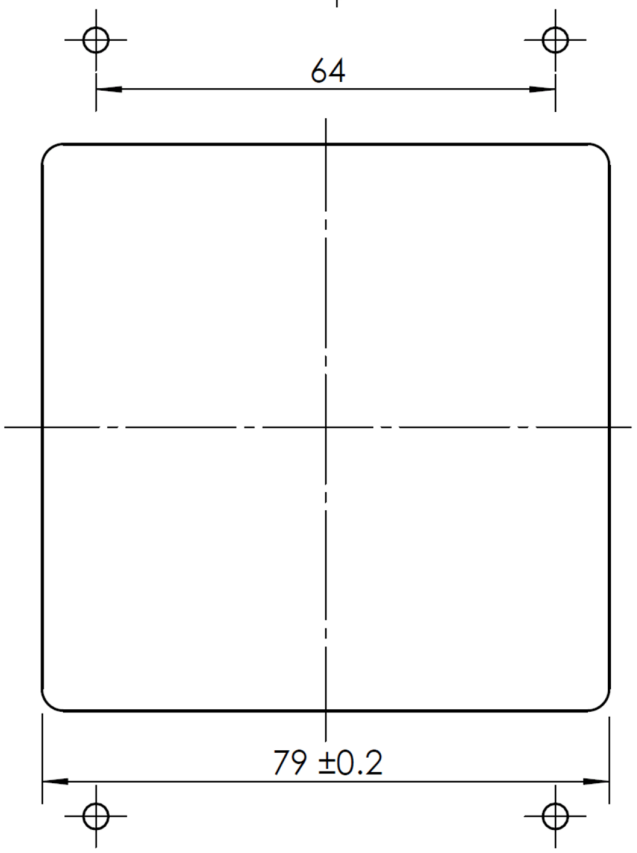
ALL DIMS IN MM
R3 IN CORNERS

CLEARANCE HOLES
DIAMETER 3.5 FOR STUDS

Panel Cutout Drawings

Underpanel Fixing of Keypads : 700 Series. (4 way uses fix kit 7004CL0, 12/16 way uses fix kit 7012CL0)
720 Series (uses fixing kit pn 7204CL0, 12/16 way uses fix kit 7212CL0)





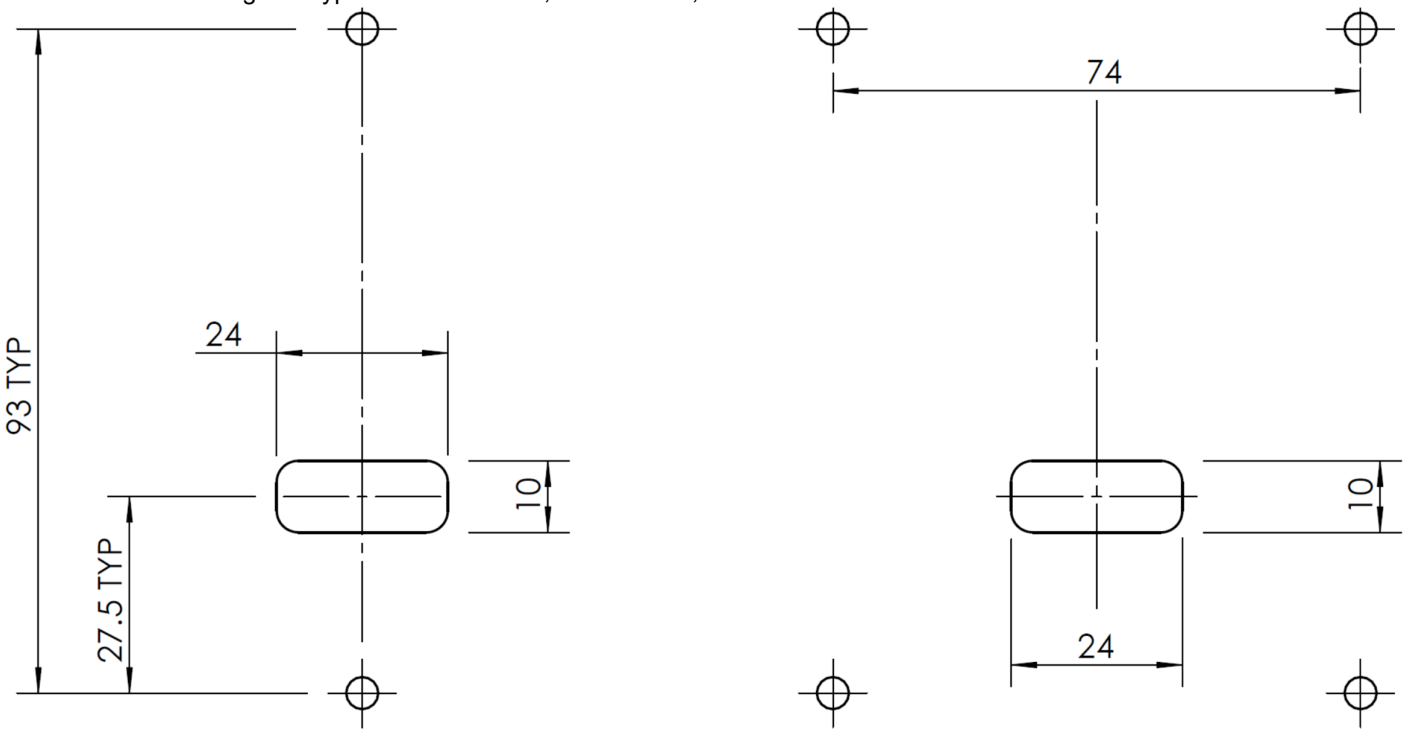
PANEL DETAILS FOR
700 AND 720 SERIES
UNDERPANEL FIXING

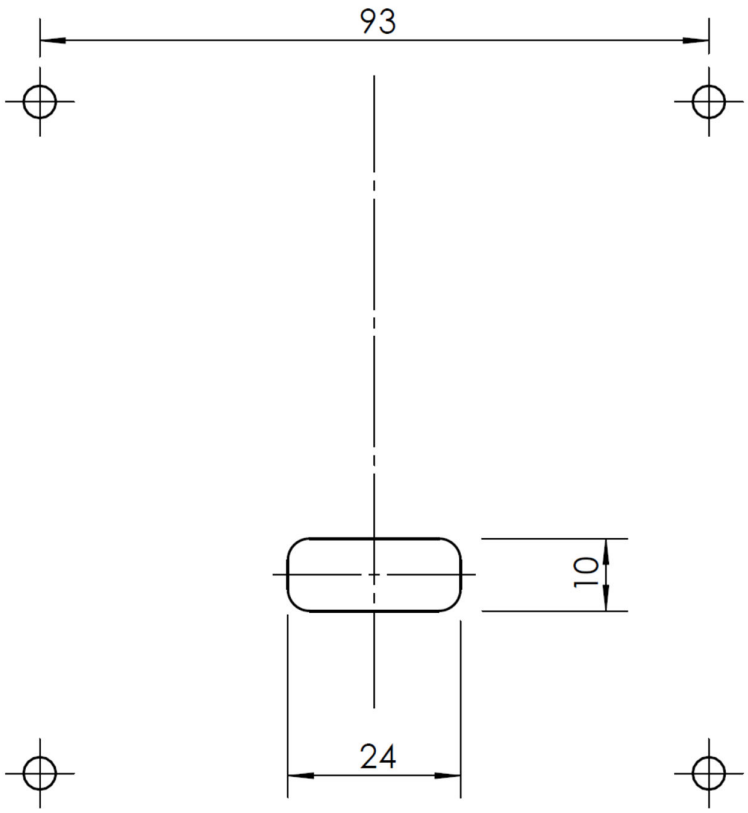
4, 12 AND 16 WAY
KEYPADS
MAKE SURE TO USE THE
CORRECT FIXING CLIPS
FOR PRODUCT

ALL DIMS IN MM
R3 IN CORNERS
M3 STUDS OR SIMILAR

Panel Cutout Drawings

Surface Fixing of Keypads : 1000 Series, 2000 Series, PLX Series





PANEL DETAILS FOR
1000 AND 200 SERIES
FRONT FIXING

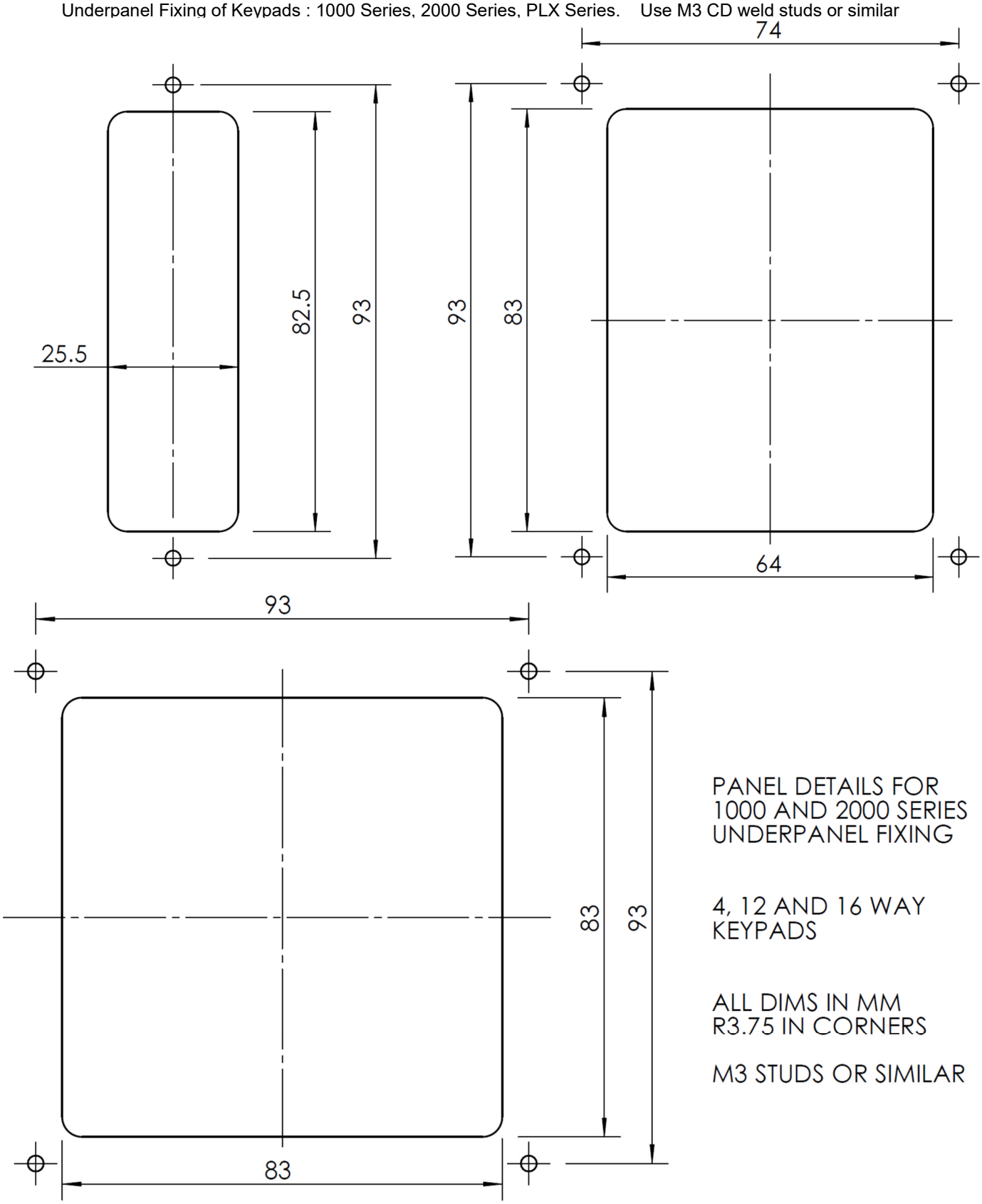
4, 12 AND 16 WAY
KEYPADS

ALL DIMS IN MM
R3 IN CORNERS

CLEARANCE HOLES
DIAMETER 4.5

Panel Cutout Drawings

Underpanel Fixing of Keypads : 1000 Series, 2000 Series, PLX Series. Use M3 CD weld studs or similar



PANEL DETAILS FOR
1000 AND 2000 SERIES
UNDERPANEL FIXING

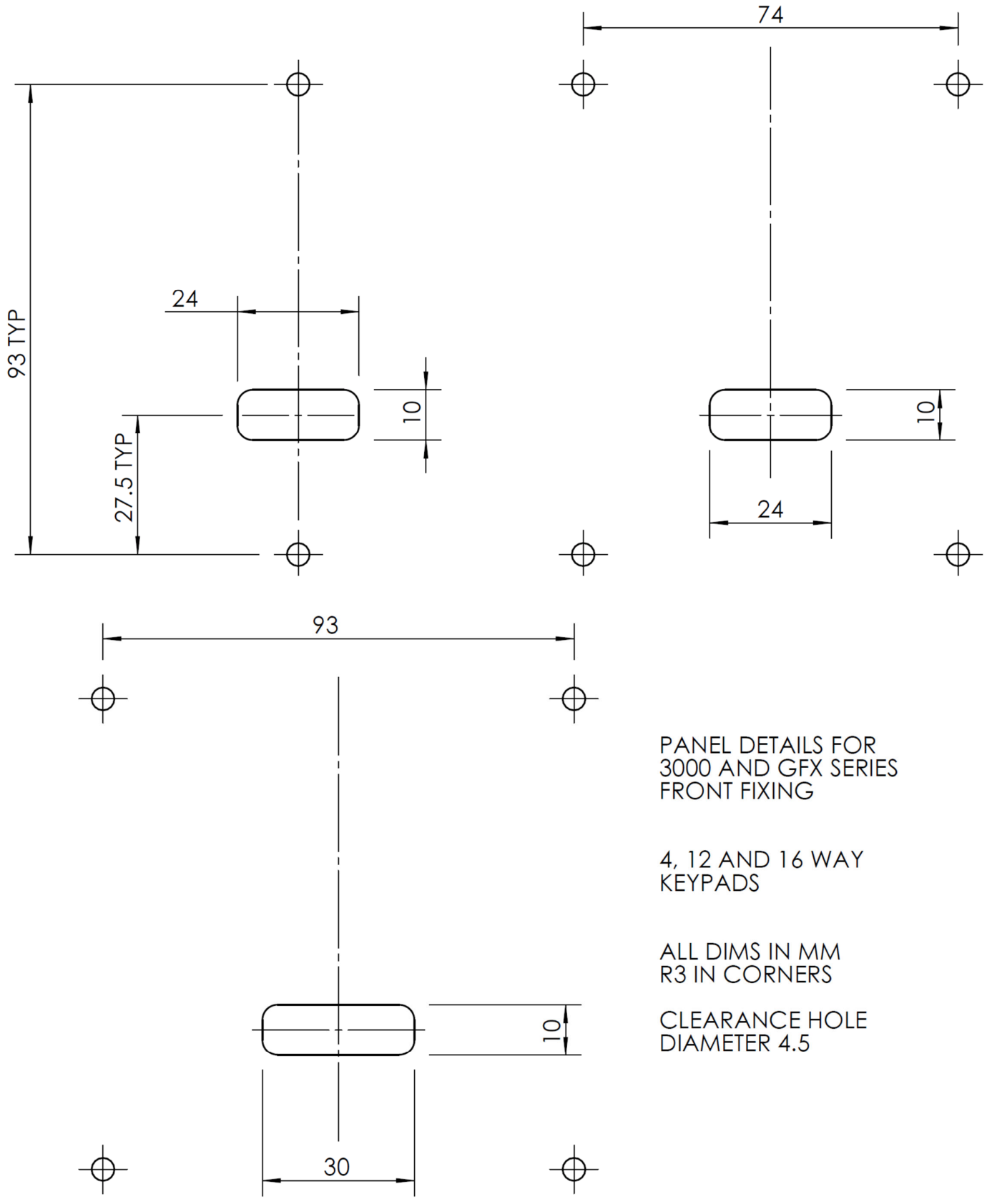
4, 12 AND 16 WAY
KEYPADS

ALL DIMS IN MM
R3.75 IN CORNERS

M3 STUDS OR SIMILAR

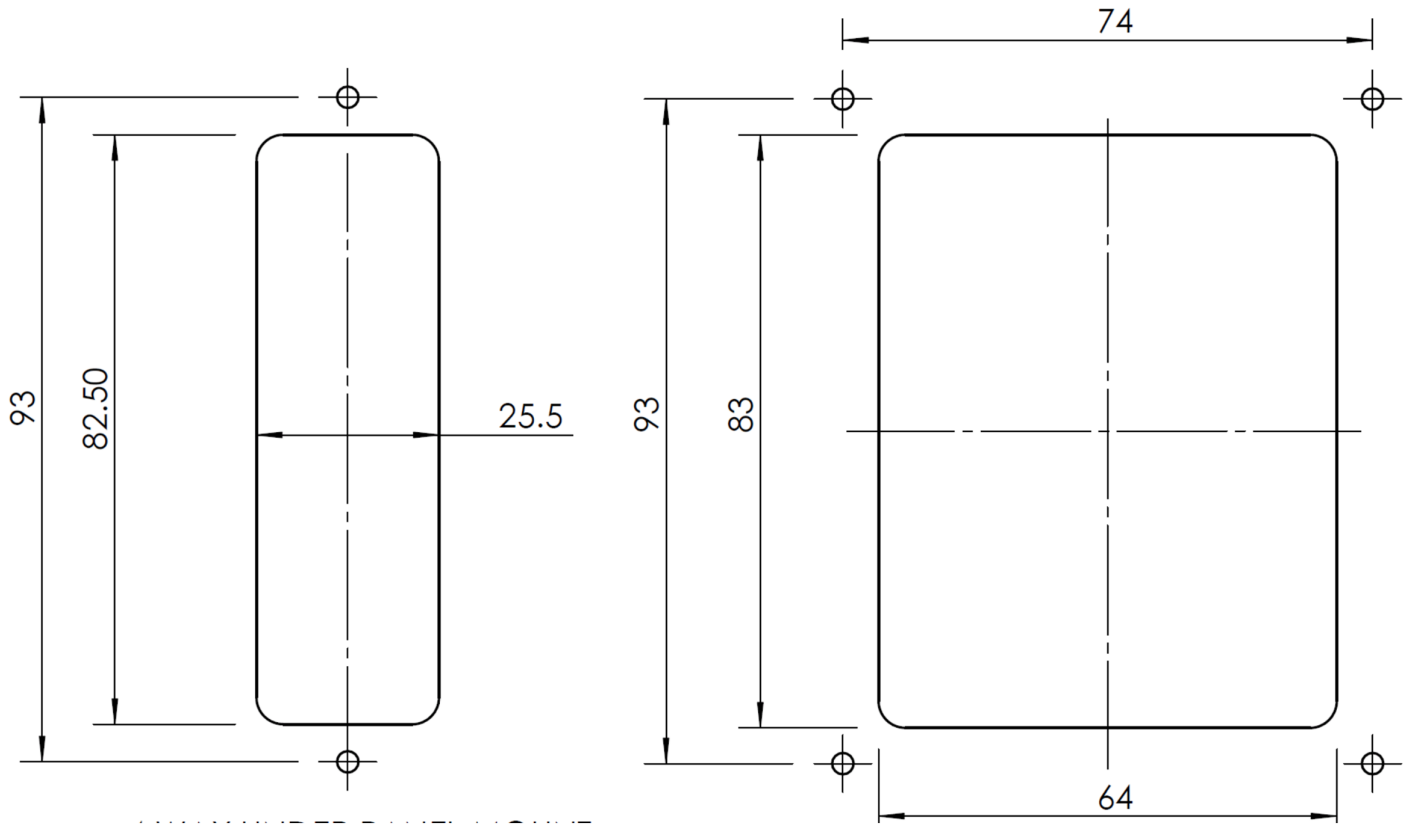
Panel Cutout Drawings

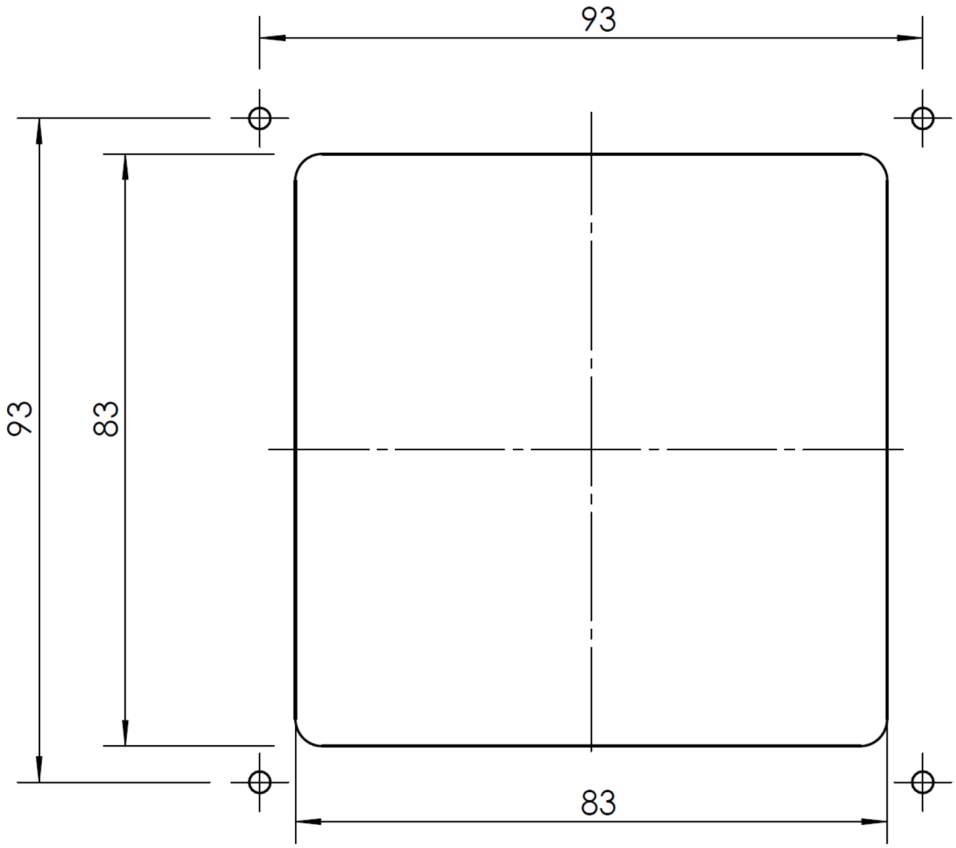
Surface Fixing of Keypads : 3000 Series, GFX Series



Panel Cutout Drawings

Underpanel Fixing of Keypads : 3000 Series, GFX Series,





PANEL DETAILS FOR
3000 AND GFX SERIES
UNDERPANEL FIXING

4, 12 AND 16 WAY
KEYPADS

ALL DIMS IN MM
R3.75 IN CORNERS

M3 STUDS OR SIMILAR

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