Storm
6000 Series Keypads
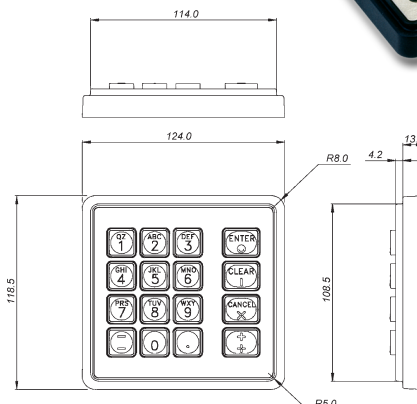
Numeric data entry
in exposed public environments

- Rugged, reliable and responsive data entry

- Vandal resistant (20J BS EN 60068-2-75: 1997)

- Weather resistant (IP65)

- Large buttons for clarity and ease of use

- Permanent, high contrast, laser engraved keytop graphics

- Raised tactile symbols on coloured function keys

- Raised "home pip" on the "5" key

- 4 row x 4 column matrix circuit format

- Optional USB or PS2 encoded interface circuit (enclosed in water resistant pod)

- Optional PS2 or USB connection cable (supplied separately)

- Suitable for use by those with mobility or sensory impairment

- Overall dimensions: 124.0 mm x 118.5 mm x 17.5 mm (excluding interface pod on back face)

www.storm-interface.com

Storm

6000 Series keypad for public environments

UK Keypad Layout   USA Keypad Layout   Alternative Layout

Function Key Colours

CANCEL	**Red**	?	**Blue**
CLEAR	**Yellow**	ENTER	**Green**

15mm Sq (nominal)   15 x 20 mm (nominal)

Matrix Keypad Connections

Row 1 Column 1	Row 1 Column 2	Row 1 Column 3	Row 1 Column 4
Row 2 Column 1	Row 2 Column 2	Row 2 Column 3	Row 2 Column 4
Row 3 Column 1	Row 3 Column 2	Row 3 Column 3	Row 3 Column 4
Row 4 Column 1	Row 4 Column 2	Row 4 Column 3	Row 4 Column 4

Contact Connections *(viewed from rear of keypad)*

PINS	• • • • • • • • • • • • •
PIN NO.	13 12 11 10 9 8 7 6 5 4 3 2 1

Contact Matrix

PINS	ROW / COLUMN
1	Not used
2	Tamper
3	R1
4	R2
5	C1
6	C2
7	C3
8	C4
9	R4
10	R3
11	NC
12	Tamper
13	Not used

CONTACT CIRCUIT SPECIFICATION

Contact	
Operating Voltage	**24V dc (max)**
Operating Current	**50 mA (max)**
Circuit Resistance	**<500 Ohms**
(when contact closed)	

PS2 / USB Keypad Code Tables

Row / Column	UK Layout		USA layout	
	PC / AT Code (Code Set 2)	USB Key Code	PC / AT Code (Code Set 2)	USB Key Code
R1C1	69	59	69	59
R1C2	72	5A	72	5A
R1C3	7A	5B	7A	5B
R1C4	76	29	5A	28
R2C1	6B	5C	6B	5C
R2C2	73	5D	73	5D
R2C3	74	5E	74	5E
R2C4	66	2A	66	2A
R3C1	6C	5F	6C	5F
R3C2	75	60	75	60
R3C3	7D	61	7D	61
R3C4	05	3A	05	3A
R4C1	7C	55	7C	55
R4C2	70	62	70	62
R4C3	5D	31	12, 26	E1, 20
R4C4	5A	28	76	29
Anti-Tamper Open Circuit	Not used			

Specifications

Vandal Resistant	**20J BS EN 60068-2-75:1997**
Weather Resistant	**IP65**
Large Buttons for clarity and ease of use	**15mm square**
Function Key Buttons	**15mm x 20mm**
Responsive key action	**travel 1.5mm, actuation force 130gm**
High contrast laser engraved graphics	**designed to meet with current ADA and DDA recommendations**
Raised tactile symbols on function keys	**designed to meet with current ADA and DDA recommendations.**
Panel Cutout	**109.5 x 115.0 x R 5mm corners (tols – 0.2mm)**
Operating Temp	**-20°C to +60°C**
Matrix Output or user selectable PS2/USB	**(Order cables separately)**

Meets CE and UL requirements for Product Safety

Meets CE and FCC requirements for EMC

Plug compatible with 420 Series RS232 Encoder

Panel Mount Gasket included

Accessories [x] denotes packaging variant

Stock No.	Item
6000-MK00[x]	Mounting Clips Underpanel for 6000 Series
1200-00100[x]	Cable, 2.5m, PS/2 to 5 way Molex
1200-00200[x]	Cable, 2.5m, USB to 5 way Molex
4200-00[x]	Encoder 420 Series, RS232, No Cable, Plug-in

6000 Series Application/Engineering Manual — free download from www.keymat.com

Whilst every effort is made to ensure details are correct at time of print, specifications are subject to change without notice.

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Brochure designed & produced by NIK Design: +44 (0)7810 551046

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Storm
data entry technology

6000 Series keypad for public environments
Application / Engineering Manual

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Section 1. Table of Contents

Section 2. Product Overview

Key Features / Specifications

- *Rugged, reliable and responsive data entry*
- *Vandal Resistant (20J BS EN 60068-2-75: 1997)*
- *Weather Resistant (IP65)*
- *Large buttons for clarity and ease of use*
- *Permanent, high contrast, laser engraved keytop graphics*
- *Raised tactile symbols on coloured function keys*
- *Raised "home pip" on the "5" key*
- *4 Row x 4 Column matrix circuit format*
- *Optional USB or PS2 encoded interface circuit (enclosed in water resistant pod)*
- *Optional PS2 or USB connection cable (supplied separately)*
- *Optional RS232 plug in module (supplied separately)*
- *Suitable for use by those with mobility or sensory impairment*
- *Overall dimensions: 124.0 mm x 118.5 mm x 17.5 mm (excluding interface pod on back face)*
- *UL approved*

Section 2. Options

	Matrix Output	*PS2 / USB Output*	*"Encryption Ready"*
Build Style			
Vandal Resistant (stainless steel top plate)	☑	☑	☑
Keytops			
Black Keytops laser marked white	☑	☑	☑
Coloured Function Keys laser marked with black text	☑	☑	☑
Keypad Circuit			
Matrix Output	☑		
PS2 / USB Selectable Encoder		☑	
Non-Encoded Keypad suplied with empty circuit pod (pod lid not fitted)			☑
Layout			
UK Layout	☑	☑	☐
USA Layout	☑	☑	☐
Customer Specified			☑
Accessories			
Cable with PS2 terminator	■	☑	
Cable with USB terminator	■	☑	
Underpanel Mounting Clips	☑	☑	

Key :   *Available as standard* ☑   *Available as an option* ☐   *Not Available* ■

Section 3. Ratings and Performance

The 6000 Series keypad range is designed to meet the following requirements. Validation is by in-house test and additional third party assessment by an accredited test house, where appropriate. Storm 6000 Series keypads are a UL Recognized Component.

	Matrix Keypad	PS2/USB Keypad	REFERENCE	RELATED BASIC STANDARD OR TEST METHOD
Electrical				
EMC Emissions	N/A		EN55022 : 1998 Class B Limit	*
			FCC CFR 47 Part 15 Class B	*
EMC Immunity to ESD	N/A		EN55024 : 1998	EN 61000-4-2 :1995 * ± 8kV Air ± 4kV Contact
EMC Immunity to Radiated Fields	N/A		EN55024 : 1998	EN61000-4-3 :1996 *
Electrical Safety			EN60950, UL60950 UL Recognized Component E230121	
Communication		Industry Standard PS2 or USB Interface		
Supply requirements – Voltage		+ 5V nominal (5.5 V to 4.75 V)		
Supply requirements – Current		20mA		
Key Switch Rating	+24V dc MAX 50mA MAX			
Anti Tamper Circuit Rating	+24V dc MAX 10mA MAX <500 Ohms (NORMALLY CLOSED)			
Environmental				
Sealing – Water / Particulates			EN60529 (sealing to IP65)	
Temperature			-20 °C to + 60 °C operating (dry)	
Mechanical				
Impact resistance			20 Joules via 50mm dia steel striker	
Key pitch			20 mm General	
Size			15 mm square	
Travel			1.5mm nominal	
Actuation force			130g nominal	
Flammability of Major Plastic Parts			Keytops UL94 HB Moulding UL94 V-0 PCB UL94 V-0 Actuators UL94 HB	

The 6000 Series keypad range is designed to meet the requirements of existing and forthcoming Disability Access Requirements.

As international standards requirements are many and varied (although with some common themes for ATM Keypads), we have chosen the ADAAG requirements to illustrate compliance in the table below

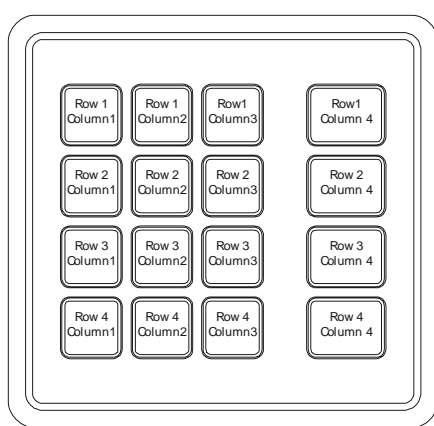|	*ADAAG Pt 707.4* *Requirements for ATM Keypads*	*6000 Series Keypad USA Layout*
Key Characteristics	Key surfaces shall be raised above the surrounding surface by 1/25 inch (1 mm) minimum.	Key surfaces are raised above the surrounding surface by 3mm
	The outer edge of key surfaces shall have a radius of 1/50 inch (0.5 mm) maximum.	Corner radii are 0.5mm
Keypad Layout General	707.4.4.1 Arrangement. Numeric keys shall be arranged in a 12-key telephone keypad layout with the number one key in the upper left hand corner.	Telephone Layout is used
	707.4.4.2 Marking. The number five key shall have a single raised dot.	Number 5 key has a single raised feature.
Key Separation	Any key surface shall be separated from other key surfaces by 1/8 inch (3.2 mm) minimum.	Minimum separation is 5mm
Separation from Function Keys	Function keys shall be separated from numeric keys by a distance that is not less than three times greater the distance between the numeric keys.	Separation to function keys is 15mm
Function Keys General	707.4.5.1 Arrangement. Function keys shall be arranged in the order of enter, clear, cancel, add value and decrease value horizontally from left to right or vertically from top to bottom. Where provided, add value and decrease value function keys shall be grouped with other function keys.	Order of function keys is Enter Clear Cancel
Function Keys Tactile Markings	707.4.5.2 Marking. Function keys shall be marked with tactile characters as follows: Enter or proceed key: raised circle; Clear or correct key: raised vertical line or bar; Cancel key: raised x; Add value key: raised plus sign; Decrease value key: raised minus sign.	Markings are Compliant (NB Add Value / Decrease Value not part of this layout)
Function Keys Colours	707.4.5.3 Colour Coding. Where function keys are colour coded, they shall be coloured as follows Cancel key: red;: Clear or correct key: black; Enter or proceed key: green; Add value key: blue; Decrease value key: yellow.	All these colours are available. This layout has:- Cancel : Red Clear : Yellow Enter : Green (NB Canadian / European stds require Yellow for the Clear key, however layouts including Black key with raised Vertical bar is available to special order)

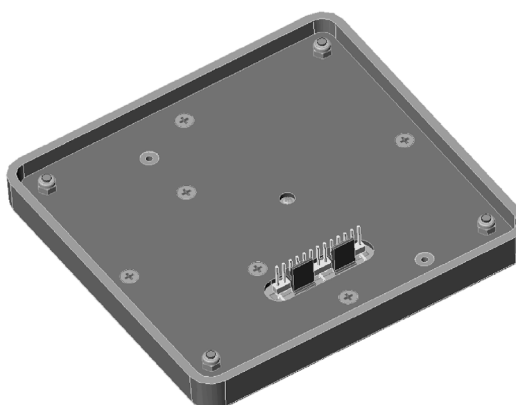# Section 4. Connectors and Connections - Matrix Output

The 6000 Series matrix keypad is supplied without a cable so that the user can select the correct cable length. Switches provide a momentary contact between designated connector pins. Pins are to suit Molex KK Type 0.1" Pitch Headers. The Connector Details below shows the orientation and position of the connector.

If RS232 output is required then the Storm 420 Series Encoder may be purchased separately - this plugs in directly to the rear of the keypad.

KEYPAD FRONT VIEW

Row 1 Column1	Row 1 Column2	Row1 Column3	Row1 Column 4
Row 2 Column1	Row 2 Column2	Row 2 Column3	Row 2 Column 4
Row 3 Column1	Row 3 Column2	Row 3 Column3	Row 3 Column 4
Row 4 Column1	Row 4 Column2	Row 4 Column3	Row 4 Column 4

KEYPAD REAR VIEW

CONTACT CONNECTIONS (REAR VIEW)

PINS	• • • • • • • • • • • • •
PIN NUMBER	13 12 11 10 9 8 7 6 5 4 3 2 1

CONTACT MATRIX

PIN	ROW / COLUMN
1	NOT USED
2	TAMPER
3	R1
4	R2
5	C1
6	C2
7	C3
8	C4
9	R4
10	R3
11	NC
12	TAMPER
13	NOT USED

ANTI-TAMPER CIRCUIT
CONTACT

OPERATING VOLTAGE	24V dc	(max)
OPERATING CURRENT	10mA	(max)
CIRCUIT RESISTANCE	<500	Ohms

(normally closed)

REAR VIEW with Storm 420 Series Encoder fitted

Installation Checklist - Keypad plus RS232

✓Keypad
✓Encoder , configuration switch set
✓Panel Fixing prepared
✓+5V regulated supply
✓RS 232 cable with 6 way Molex KK socket
✓13 way ribbon cable keypad to encoder if encoder is to be remote from keypad
✓Polarising pins fitted to encoder

Section 4. Connectors and Connections - PS2/USB Output

The 6000 Series encoded keypad is supplied without a cable so that the user can select the correct cable length and connector type to suit their application. Cables are offered as separately purchased options, or alternatively the user can source their own cable to suit the application. The pinout details for the connectors are shown on the following page.

Option 1 PS2 Minidin connector, straight cable, 2.5 metres long
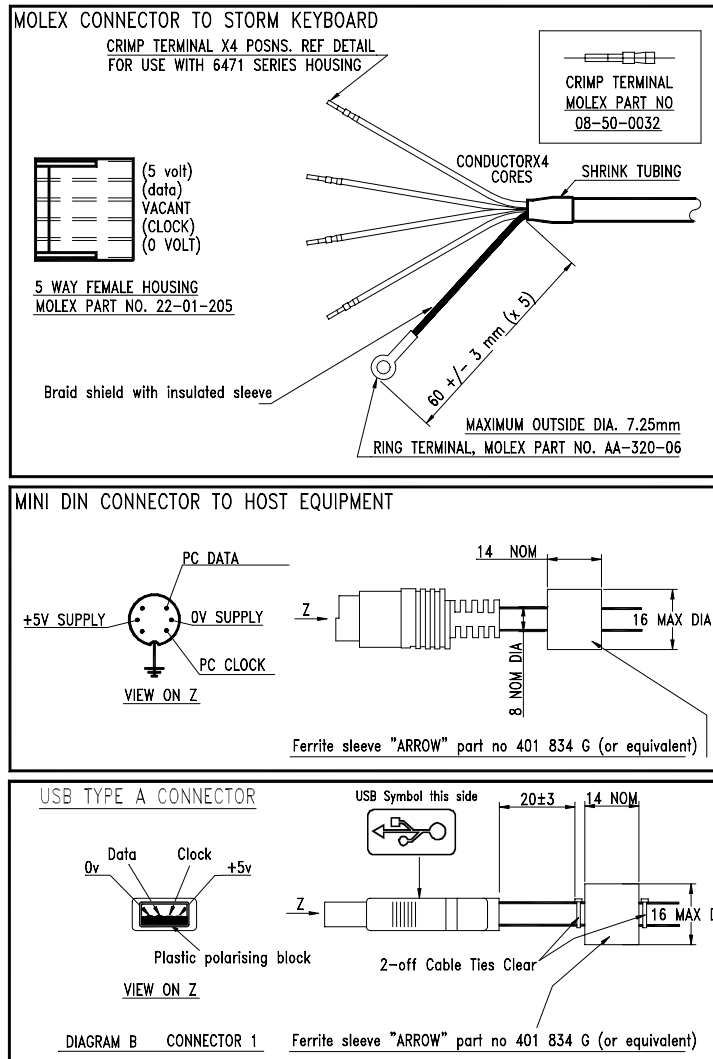*Option 2 USB connector, straight cable, 2.5 metres long*

Fitting Cables

WARNING : THE FOLLOWING MUST BE DONE IN AN ESSD SAFE HANDLING AREA
In order to fit the cable, the pod cover on the back of the keypad must be removed. Plug the molex connector into the connector designated JP1 on the encoder pcb. Connect the earth tag to the securing nut and tighten. Set the positions of the USB / PS2 selector switches (see table below). Note that SW2 toggles the function key output codes between USA layout and UK layout. Ensure the grommet is correctly located into the slot in the pod; this provides strain relief and sealing. Close the pod cover.
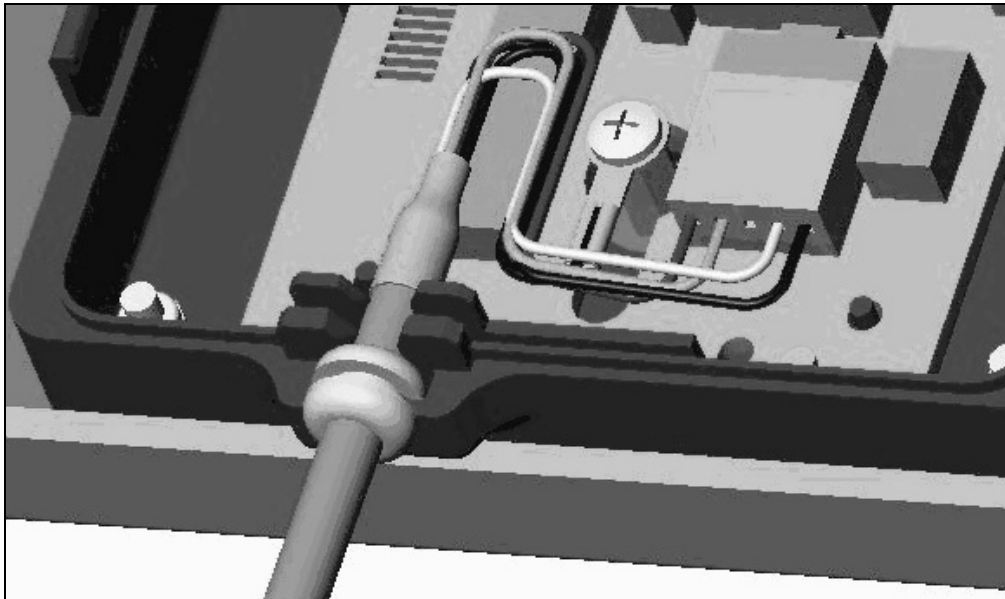
SWITCH SETTINGS	SW1	SW2	SW3
ON	USB	FUNCTION KEYS UK	USB
OFF	PS/2	FUNCTION KEYS USA	PS/2

Section 4. Connectors and Connections -PS2/USB Cable

MOLEX CONNECTOR TO STORM KEYBOARD

CRIMP TERMINAL X4 POSNS. REF DETAIL
FOR USE WITH 6471 SERIES HOUSING

CRIMP TERMINAL
MOLEX PART NO
08-50-0032

(5 volt)
(data)
VACANT
(CLOCK)
(0 VOLT)

CONDUCTORX4
CORES

SHRINK TUBING

5 WAY FEMALE HOUSING
MOLEX PART NO. 22-01-205

Braid shield with insulated sleeve

60 +/- 3 mm (x 5)

MAXIMUM OUTSIDE DIA. 7.25mm
RING TERMINAL, MOLEX PART NO. AA-320-06

MINI DIN CONNECTOR TO HOST EQUIPMENT

PC DATA

+5V SUPPLY   0V SUPPLY

PC CLOCK

VIEW ON Z

14 NOM

16 MAX DIA

8 NOM DIA

Z

Ferrite sleeve "ARROW" part no 401 834 G (or equivalent)

USB TYPE A CONNECTOR

USB Symbol this side   20±3   14 NOM

Data   Clock
0v   +5v

Plastic polarising block

VIEW ON Z

16 MAX DIA

2-off Cable Ties Clear

Z

DIAGRAM B   CONNECTOR 1   Ferrite sleeve "ARROW" part no 401 834 G (or equivalent)

# Section 5. Fitting Encryption Device (PCB) to "Encption Ready" Keypad

"Encryption Ready" Keypads are supplied with a separate kit comprising a pod housing (base and lid), fixings, and the elastomeric connector. The customer supplies the encryption device(pcb) and cable. Assembly stages are as follows :-

1. *Fit pod base assembly over the studs and secure with 2-off M3 nyloc nuts -Torque setting 70Ncm then fit 4-off M3 x 10mm plastite screws - Torque setting: 70 Ncm.*
2. *Place Zebra Strip into pod base.*

1.1
Secure nuts first
(2 positions)

1.2
Then fit screws
(4 positions)

PCB Retaining
Clips
(3 positions)
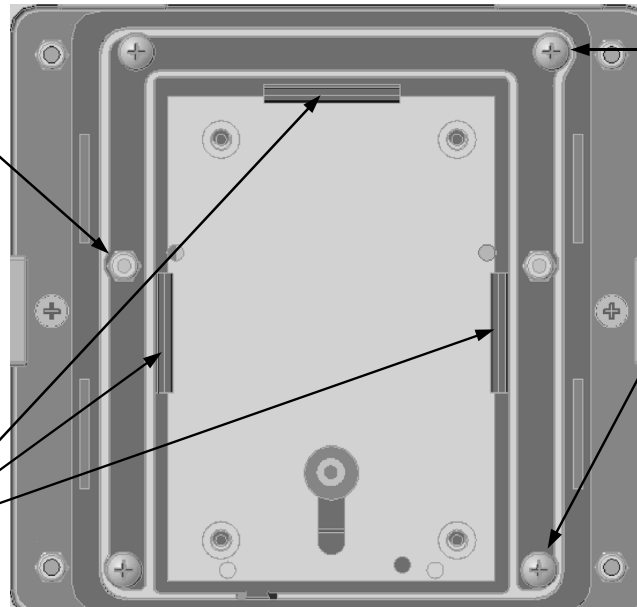
3. *Fit (customer supplied) encoder assembly to pod base using the Jig to snap it into place. Take care not to bend the pcb retaining clips.*
4. *Fit (customer supplied) cable and test.*
5. *If specified, fit 4 off anti-tamper boot to the pod lid.*
6. *Clip pod lid onto the base.*

Section 5. Installation

The 6000 Series keypad is designed to be secured with 6 panel mount clips and locknuts. The gasket is to be positioned between keypad and fixing panel prior to installation. Ensure that a suitable panel material is used to support the keypad. This must provide sufficient rigidity where sealing is required. (e.g. 1.6mm to 2.0mm steel). To optimise sealing the under side of the panel should be flat, clean & free of debris .

1)) Prepare a panel with 2mm weld studs and the appropriate cutout (see below)
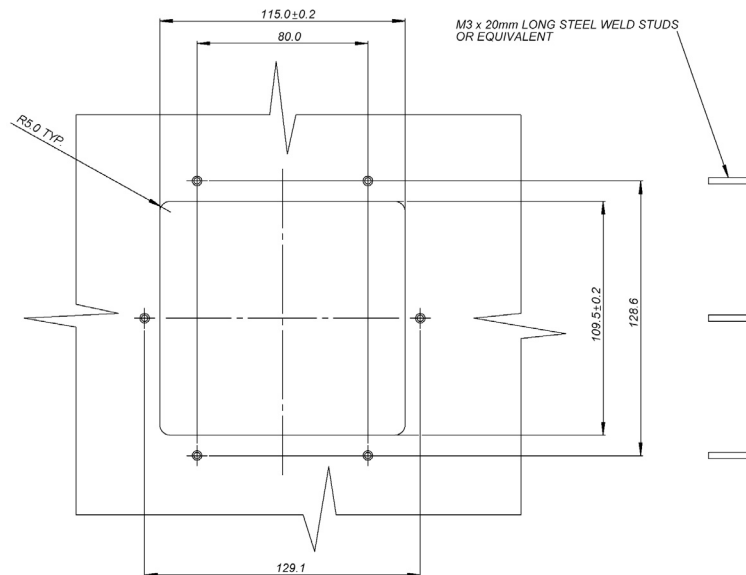
2) Fit the sealing gasket over the weld studs.

3) Offer up the keypad to the rear of the panel, and fit a mounting clip over each stud. Secure in place with locknuts. The torque applied to the locknuts should not exceed 25cN.m
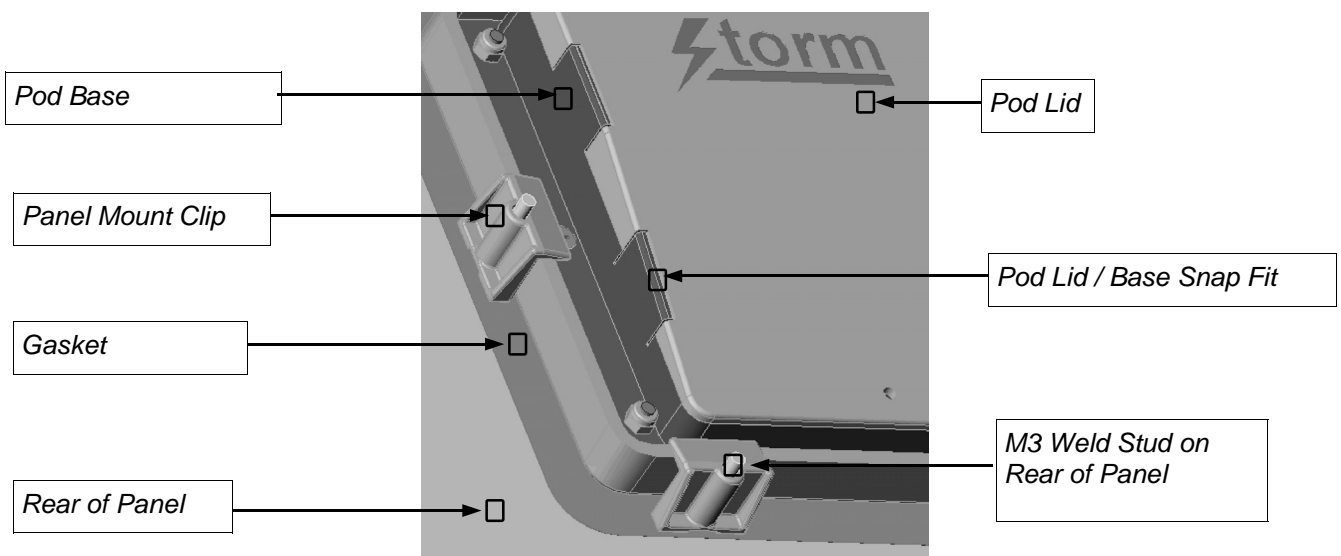
Part Numbering Scheme

DIGIT 123	DIGIT 4	DIGIT 5	DIGIT 6	DIGIT 7	DIGIT 8	DIGIT 9	DIGIT 10
Range	*Moulding/Top Plate*	*Keys*	*Encoder / Pod*	*Cable*	*Not Used*	*Layout*	*Distributor*
600	0 St Steel top plate -	2 Black	0 Zebra strip connection - customer fits own encoder	0 None	0	1 Storm Recommended ie UK	1 KT
			1 Matrix output to 0.1" pins	1 2.5m PS2		2 ADA Compliant ie USA	2 RS
			2 Encoder fitted with user selectable PS2/USB	2 2.5m USB		3 Custom layout	3 USA
			3 PS2 and Clear Cover	3 1 m PS2			
			4 RS232 Encoder	4 2.5m RS232			
			5 Zebra strip connection - INCL ANTI TAMPER CIRCUIT customer fits own encoder				
			N				
			S				

Note - Customer Specific products are designated NS (non-standard) in digits 5 and 6.

EXAMPLES	
6000-210011	6000 SERIES 16 WAY MATRIX KEYPAD, UK LAYOUT
6000-220011	6000 SERIES 16 WAY PS2/USB KEYPAD, NO CABLE, UK LAYOUT
6000-25NS01-0389	6000 SERIES 16 WAY ENCRYPTION READY KEYPAD, INP389 LAYOUT, INCL ENCODER POD HOUSING KIT

Ordering Details

Stock No	Item
KEYPADS	
6000-21001[x]	*Keypad 6000 Series 16 way Matrix Output UK Layout*
6000-21002[x]	*Keypad 6000 Series 16 way Matrix Output USA Layout*
6000-22001[x]	*Keypad 6000 Series 16 way PS2 / USB, UK Layout*
6000-22002[x]	*Keypad 6000 Series 16 way PS2 / USB, USA Layout*
ACCESSORIES	
6000-MK00[x]	*Mounting Clips Underpanel for 6000 Series*
1200-00100[x]	*Cable, 2.5m, PS/2 to 5 way Molex*
1200-00200[x]	*Cable, 2.5m, USB to 5 way Molex*
RELATED PRODUCTS	
4200-00[x]	*Encoder 420 Series, RS232, No Cable, Plug-in (See Storm Application / Engineering Guide: 420 Series Encoder , for fixing and connection details)*

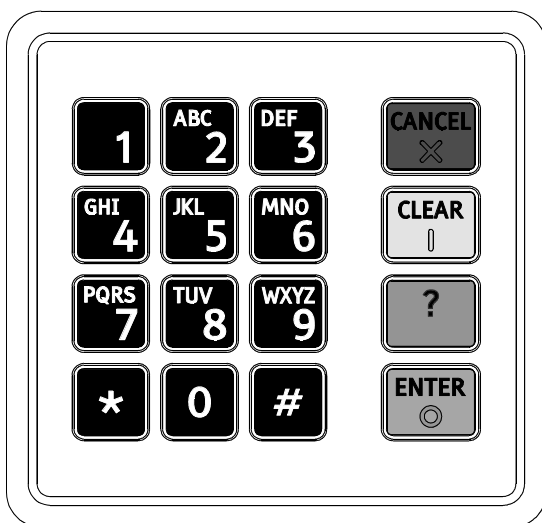*6000 Series Application/Engineering Manual - free download from www.keymat.com*

[x] denotes packaging variant

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data entry technology

Appendix 1: Layouts

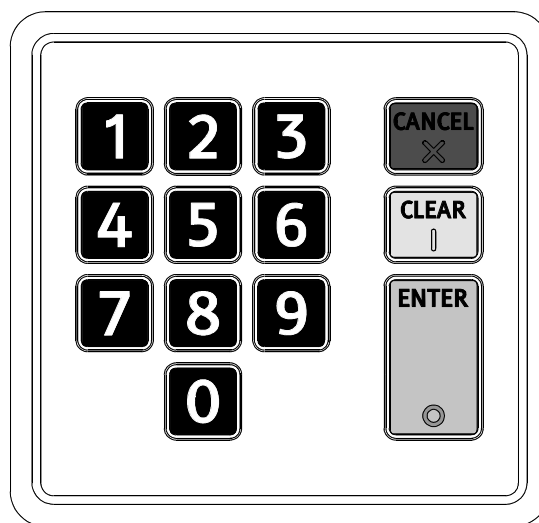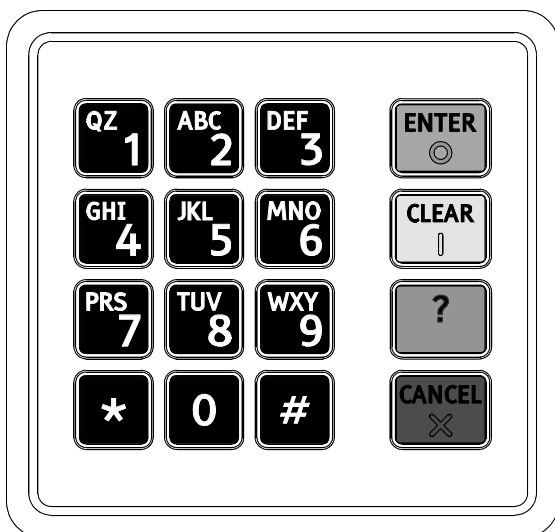| FUNCTION KEY COLOURS	
CANCEL	RED
CLEAR	YELLOW
?	BLUE
ENTER	GREEN

Other layouts are possible –see below.

Contact your Storm distributor for availability.

UK Layout

Alternative Layout - 13 Key

USA Layout

Alternative Layout - 15 Key

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Appendix 2. Dimensions and Mounting Details

124.0

R8.0

13.3

4.2

118.5

108.5

QZ 1	ABC 2	DEF 3	ENTER ○
GHI 4	JKL 5	MNO 6	CLEAR I
PRS 7	TUV 8	WXY 9	CANCEL ✕
—	0	○	+/-

R5.0

114.0
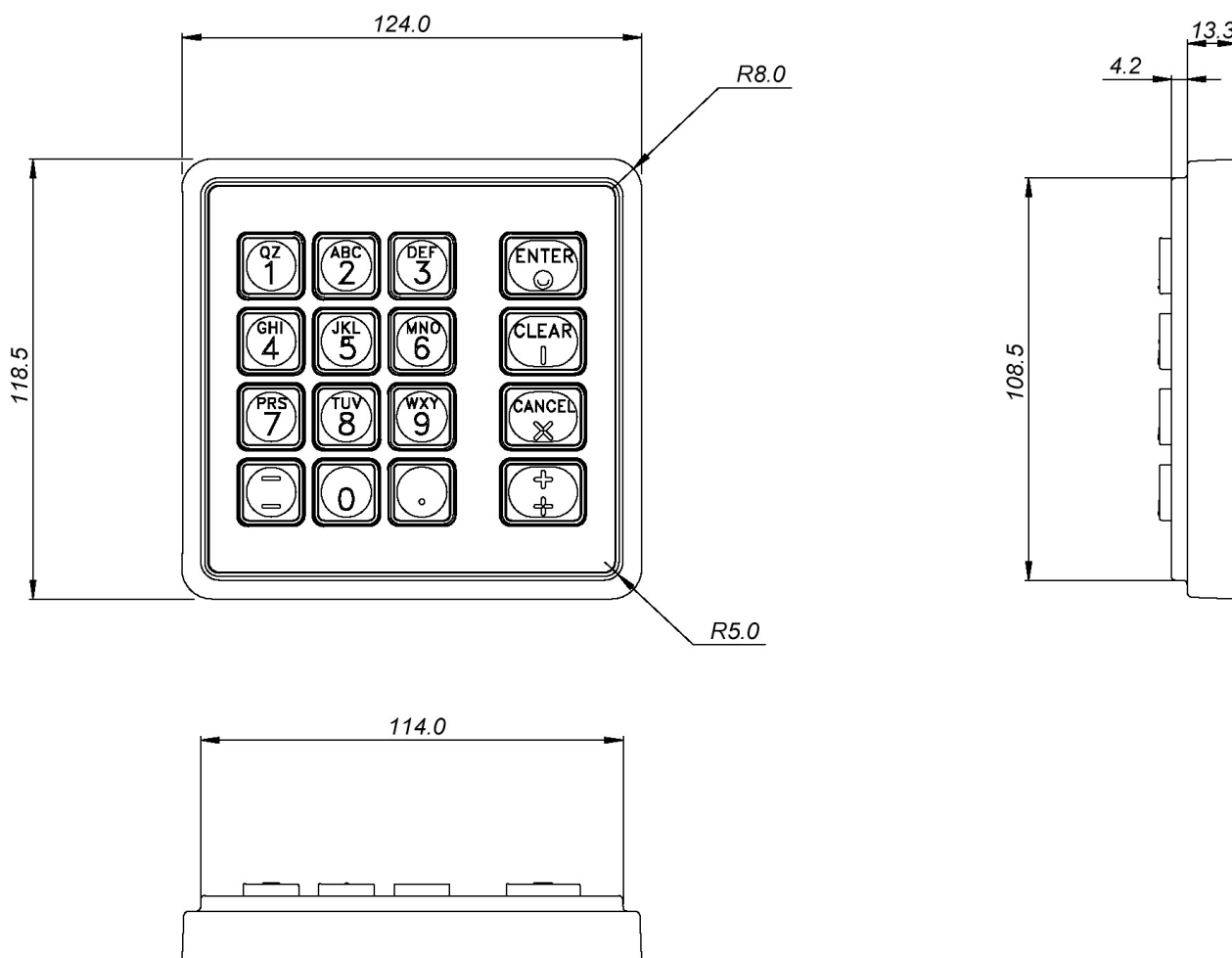
ASSEMBLY SHOWING BASIC SIZES.
CUT OUT SIZE FOR UNDER PANEL MOUNT :-
VERTICAL 109.5±0.2 x HORIZONTAL 115.0±0.2 x RADIUS 5.0mm

Appendix 3. Code Tables.

(NB : ASCII CODES ACHIEVED WITH 420 SERIES RS232 ENCODER FITTED)

Row / Column	UK Layout					USA Layout				
	Marking	*Base Key*	*ASCII Code*	*PC/AT Code (Code Set 2)*	*USB Code*	*Marking*	*Base Key*	*ASCII Code*	*PC/AT Code (Code Set 2)*	*USB Code*
R1C1	1	Black	31	69	59	1 QZ	Black	31	69	59
R1C2	2 ABC	Black	32	72	5A	2 ABC	Black	32	72	5A
R1C3	3 DEF	Black	33	7A	5B	3 DEF	Black	33	7A	5B
R1C4	CANCEL	Red with raised Cross	0D	76	29	ENTER	Green with raised circle	1B	5A	28
R2C1	4 GHI	Black	34	6B	5C	4 GHI	Black	34	6B	5C
R2C2	5 JKL	Black with Homepip	35	73	5D	5 JKL	Black with Homepip	35	73	5D
R2C3	6 MNO	Black	36	74	5E	6 MNO	Black	36	74	5E
R2C4	CLEAR	Yellow with raised vertical line	7F	66	2A	CLEAR	Yellow with raised vertical line	7F	66	2A
R3C1	7 PQRS	Black	37	6C	5F	7 PRS	Black	37	6C	5F
R3C2	8 TUV	Black	38	75	60	8 TUV	Black	38	75	60
R3C3	9 WXYZ	Black	39	7D	61	9 WXY	Black	39	7D	61
R3C4	?	Blue	05	05	3A	?	Blue	05	05	3A
R4C1	*	Black	2A	7C	55	*	Black	2A	7C	55
R4C2	0	Black	30	70	62	0	Black	30	70	62
R4C3	#	Black	23	5D	31	#	Black	23	12,26	E1,20
R4C4	ENTER	Green with raised circle	1B	5A	28	CANCEL	Red with raised Cross	0D	76	29
ANTI-TAMPER OPEN CIRCUIT			07*	NOT USED				07*	NOT USED	

* = CODE REPEATS EVERY 10 SECONDS WHILST CONDITION REMAINS ACTIVE.
TO RESET—DISCONNECT POWER FOR 30 SECONDS.