



# 420 Series RS232 Encoder for Keypad Applications - Installation Instruction

Storm 420 Series Encoders allow interfacing between a Storm keypad and host system using the RS232 communications protocol. This model will also drive a 4 line x 20 character LCD display. For additional information download the 420 Encoder Application / Engineering Manual from [www.keymat.com](http://www.keymat.com)

## SPECIFICATIONS

Input Power ..... 5V dc  $\pm$  0.25 V, regulated supply Overall Size W 89mm x L 66mm x H 32mm  
 RS232 Output ..... (via 6 pin Molex 2.54mm (.100") Pitch KK@) Mounting Centres at 73.5mm x 43.2mm

Drives Powertips 80 Character LCD Display  
 (uses Hitachi HD44780U LCD-II Controller/Driver)

Direct connection for underpanel fixing ..... 12, 16, 20 way Storm Keypads  
 Ribbon Cable needed for top panel fixing 4, 12, 16 way Storm Keypads

## Display Controls :

On host system : Ctrl + L - clears the display, Ctrl + C toggles cursor on and off

Keypad Connector (on reverse of pcb)		✓ = pin connection made										Direct connection to rear of keypad ?		
KEYPAD TYPE														
20 WAY BACKLIT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	YES
20 WAY NOT BACKLIT	Fit polarising pin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Fit polarising pin	YES
12 / 16 WAY BACKLIT	Fit polarising pin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Fit polarising pins	YES—fit polarising pins to positions 1,12 and 13
12 / 16 WAY NOT BACKLIT	Fit polarising pins	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Fit polarising pins	YES
4 WAY BACKLIT	Fit polarising pin	✓	Fit polarising pin	✓	✓	✓	✓	✓	✓	✓	✓	✓	Fit polarising pin	NO—separate cable required - See Note 1 below STD version needs 5 way cable BACKLIT version needs 7 way cable Fit polarising pins as required
4 WAY NOT BACKLIT	Fit polarising pins	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Fit polarising pins	

Encoder Pin	1	2	3	4	5	6	7	8	9	10	11	12	13
R = ROW, C = COLUMN	LED CATHODE	TAMPER IN	R1	R2	C1	C2	C3	C4	R4	R3	R5 FUNCTION KEYS	TAMPER OUT	LED ANODE
	PIN 1 ON REVERSE												

NOTE 1—Connections for 4 way keypads

ENCODER PIN	TO	KEYPAD PIN	STD	BACKLIT
2			NC	1
11			1	2
5			5	6
6			4	5
7			3	4
8			2	3
13			NC	7

**RS232 OUTPUT**  
 DTR  
 GND  
 NC  
 RTS  
 RX  
 TX (Pin 1)

**JUMPER SETTING CONTROLS BACKLIT KEYPAD LED COLOUR**

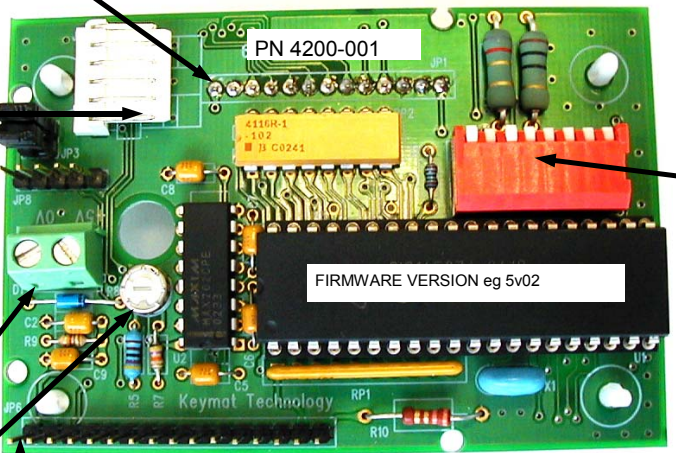
RED

GREEN

JP8 FACTORY USE ONLY

**Input Power Terminals**

**LCD Display Contrast Adjustment**



60 mm

88.9 mm

LCD Display Connector, 16 pins, 0.1" square pins

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Symbol	Vss	Vdd	Vo	RS	RW	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	A	K

**Configuration Switches**



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## ORDERING DETAILS

Stock No Item  
 4200-00[X] RS232 Encoder

[X] denotes packaging variant

free downloads from [www.keymat.com](http://www.keymat.com) :-

420 Encoder Application/Engineering Manual  
 Test Software

Mounting Details Page 1 of 4  
 420-XX-08KT Rev 2 Apr 2006



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



FM39602

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Fitted to 4, 12 or 16 WAY KEYPAD

Configuration Switch Settings	1	2	3	4	5	6	7	8	Installation Checklist
4 Way Keypads	ON	CHARACTER ECHOING SELECTOR ON = ECHO ON OFF = ECHO OFF	OFF	ON	ON	ON	OFF	BAUD RATE SELECTOR OFF=9600 BAUD ON=1200 BAUD	
12 and 16 Way Telephone Layout Keypads	ON		OFF	OFF	OFF	OFF	ON		
12 and 16 Way Calculator Layout Keypads	ON		OFF	ON	OFF	OFF	ON		

Installation Checklist
✓ Keypad
✓ Encoder , configuration switch set
✓ Panel Fixing prepared
✓ +5V regulated supply
✓ RS 232 cable with 6 way Molex socket
✓ Ribbon cable keypad to encoder if needed
✓ LCD and 16 way ribbon cable if needed
✓ Polarisng pins fitted to encoder

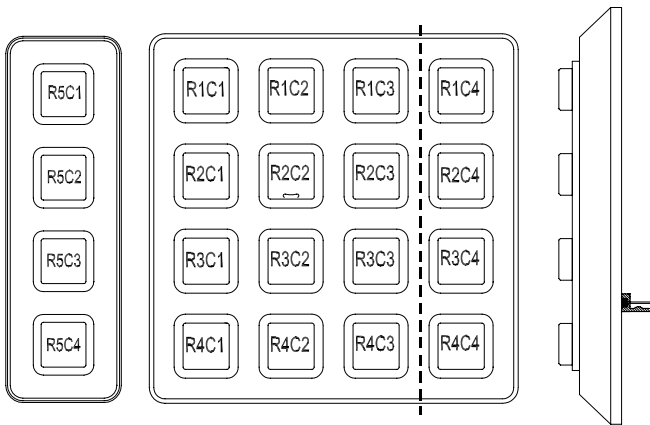
### ROW / COLUMN DESIGNATIONS (KEYPADS FRONT VIEW)

For Example R1C2 = Row 1 Column 2. NB : A 20 way keypad is treated as 4 way + 16 way.

4 Way Front View

12 / 16 Way Front View

Side View



### PIN-OUT FOR 4, 12 and 16 WAY MATRIX KEYPADS

4 WAY KEYPAD (NO BACKLIGHT) CONTACT CONNECTIONS (REAR VIEW)

PINS	• • • • •
PIN NUMBER	5 4 3 2 1

CONTACT MATRIX

PIN	ROW / COLUMN
1	R5
2	C4
3	C3
4	C2
5	C1

4 WAY BACKLIT KEYPAD CONTACT CONNECTIONS (REAR VIEW)

PINS	• • • • • • •
PIN NUMBER	7 6 5 4 3 2 1

CONTACT MATRIX

PIN	ROW / COLUMN
1	LED POWER
2	R5
3	C4
4	C3
5	C2
6	C1
7	LED POWER

12 / 16 WAY KEYPAD (NO BACKLIGHT) CONTACT CONNECTIONS (REAR VIEW)

PINS	• • • • • • • •
PIN NUMBER	8 7 6 5 4 3 2 1

CONTACT MATRIX (NO BACKLIGHT)

PIN	ROW / COLUMN
1	R1
2	R2
3	C1
4	C2
5	C3
6	C4 (16 WAY ONLY)
7	R4
8	R3

12 / 16 WAY BACKLIT KEYPAD CONTACT CONNECTIONS (REAR VIEW)

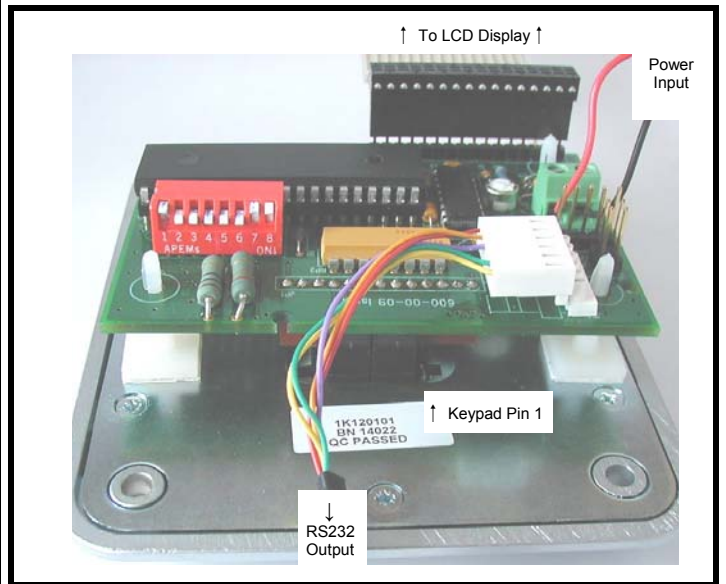
PINS	• • • • • • • • •
PIN NUMBER	10 9 8 7 6 5 4 3 2 1

CONTACT MATRIX (WITH BACKLIGHT)

PIN	ROW / COLUMN
1	LED POWER
2	R1
3	R2
4	C1
5	C2
6	C3
7	C4 (16 WAY ONLY)
8	R4
9	R3
10	LED POWER

### TYPICAL INSTALLATION

(rear view, encoder direct connection to keypad, LCD display used)



### ASCII CODE TABLES

4 WAY KEYPAD ASCII CODES

ROW / COLUMN	R5
C1	11
C2	12
C3	13
C4	14

NOTE 1 : These codes are non-printing ASCII device control codes. The application software will need to assign usage

NOTE 2 : The COMMON pin on a 4 way is termed ROW 5 to be consistent with applications using 4 function keys.

12 / 16 WAY TELEPHONE KEYPAD ASCII CODES

ROW / COLUMN	C1	C2	C3	C4
R1	31	32	33	61
R2	34	35	36	62
R3	37	38	39	63
R4	2A	30	23	2E

12 / 16 WAY CALCULATOR KEYPAD ASCII CODES

ROW / COLUMN	C1	C2	C3	C4
R1	37	38	39	1B
R2	34	35	36	0C*
R3	31	35	33	05
R4	7F	30	0D	2E

\* = Form Feed Code to give CLEAR function

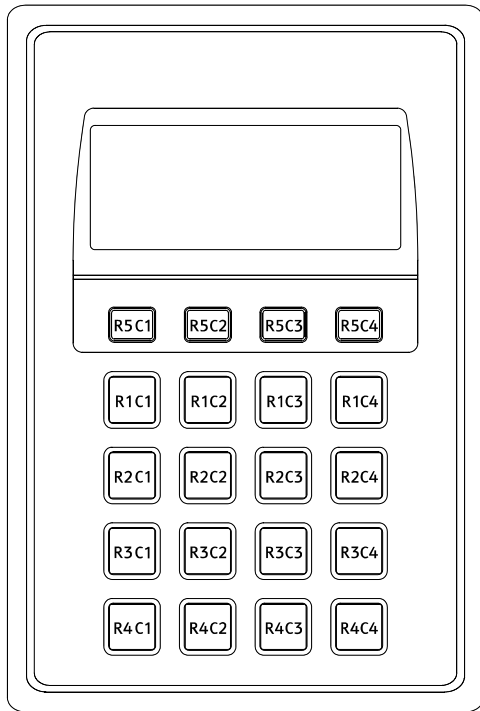
Fitted to INTEGRATED 20 WAY KEYPAD AND DISPLAY

Configuration Switch Settings	1	2	3	4	5	6	7	8	Installation Checklist
Integrated 20 Way Keypad and Display - Telephone Layout	OFF	CHARACTER ECHOING SELECTOR	ON	OFF	OFF	ON	OFF	BAUD RATE SELECTOR OFF=9600 BAUD ON=1200 BAUD	
Integrated 20 Way Keypad and Display - Calculator Layout	OFF		ON	ON	ON	ON	OFF		
Note : Remove Jumpers from JP3 and JP4 in this configuration.		ON = ECHO ON OFF = ECHO OFF							

- ✓ Integrated 20 way Keypad
- ✓ Encoder , configuration switch set
- ✓ LCD and 16 way ribbon cable if needed
- ✓ Panel Fixing prepared
- ✓ +5V regulated supply
- ✓ RS 232 cable with 6 way Molex KK socket
- ✓ 13 way ribbon cable keypad to encoder if needed
- ✓ Polarising pins fitted to encoder

### ROW / COLUMN DESIGNATIONS ( KEYPAD FRONT VIEW)

For Example R1C2 = Row 1 Column 2. NB : A 20 way keypad is treated as 4 way + 16 way.

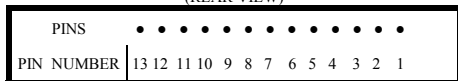


### ASCII CODE TABLES

Row / Column	Telephone Layout		Calculator Layout	
	Character	ASCII	Character	ASCII
R5C1	▲	11	▲	11
R5C2	▲	12	▲	12
R5C3	▲	13	▲	13
R5C4	▲	14	▲	14
R1C1	1	31	1	31
R1C2	2 ABC	32	2	32
R1C3	3 DEF	33	3	33
R1C4	A	41	ENTER	1B
R2C1	4 GHI	34	4	34
R2C2	5 JKL	35	5	35
R2C3	6 MNO	36	6	36
R2C4	B	42	CLEAR	0C
R3C1	7 PQRS	37	7	37
R3C2	8 TUV	38	8	38
R3C3	9 WXYZ	39	9	39
R3C4	C	43	?	05
R4C1	* CLR	2A	*	7F
R4C2	0	30	0	30
R4C3	# ENT	23	#	0D
.	ENTER	2E	CANCEL	2E
ANTI-TAMPER OPEN CIRCUIT		07*		07*
* = CODE REPEATS EVERY 10 SECONDS WHILST CONDITION REMAINS ACTIVE				

### PIN-OUT FOR 20 WAY KEYPAD

20 WAY KEYPAD  
CONTACT CONNECTIONS  
(REAR VIEW)



#### CONTACT MATRIX

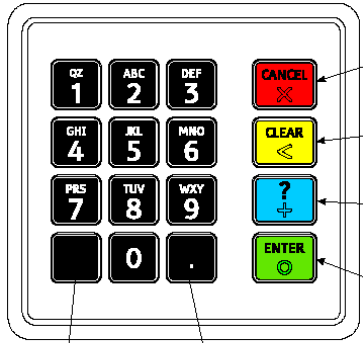
PIN	ROW / COLUMN
1	NOT USED
2	TAMPER IN
3	R1
4	R2
5	C1
6	C2
7	C3
8	C4
9	R4
10	R3
11	R5
12	TAMPER OUT
13	NOT USED

Fitted to 6000 SERIES PINPAD

Configuration Switch Settings	R3	1	2	3	4	5	6	7	8	Installation Checklist
6000 Series Pinpad - Basic Layout	fitted	OFF	CHARACTER ECHOING SELECTOR ON = ECHO ON OFF = ECHO OFF	ON	OFF	ON	OFF	OFF	BAUD RATE SELECTOR	
6000 Series Pinpad - UK Layout	Remove before use	OFF		ON	OFF	ON	OFF	OFF		
6000 Series Pinpad - USA Layout	Remove before use	OFF		ON	ON	ON	OFF	OFF	OFF=9600 BAUD	
Note : R3 may need to be removed depending on the configuration required.										
										ON=1200 BAUD

- Installation Checklist**
- ✓ 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 needed
  - ✓ Polarisng pins fitted to encoder

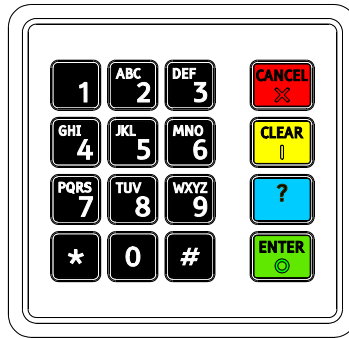
### BASIC LAYOUT



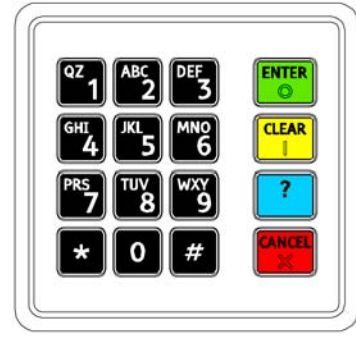
**BLANK KEY**  
No Key Code with Standard Firmware

Key Code = Decimal Point

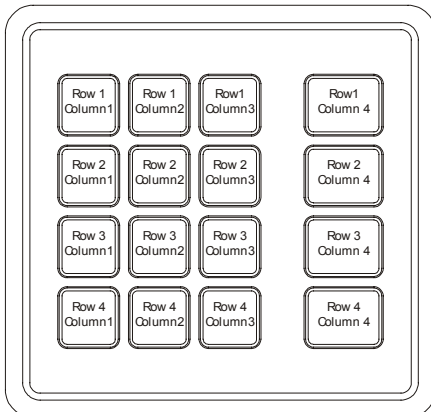
### UK LAYOUT



### USA LAYOUT



### ROW / COLUMN DESIGNATIONS



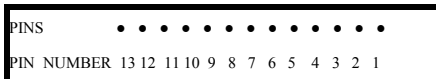
### ASCII CODE TABLES

Row / Column	Basic Layout			UK Layout			USA Layout		
	Marking	Base Key	ASCII	Marking	Base Key	ASCII	Marking	Base Key	ASCII
R1C1	1 QZ	Black	31	1	Black	31	1 QZ	Black	31
R1C2	2 ABC	Black	32	2 ABC	Black	32	2 ABC	Black	32
R1C3	3 DEF	Black	33	3 DEF	Black	33	3 DEF	Black	33
R1C4	CANCEL	Red with raised Cross	0D	CANCEL	Red with raised Cross	0D	ENTER	Green with raised circle	1B
R2C1	4 GHI	Black	34	4 GHI	Black	34	4 GHI	Black	34
R2C2	5 JKL	Black with Homepip	35	5 JKL	Black with Homepip	35	5 JKL	Black with Homepip	35
R2C3	6 MNO	Black	36	6 MNO	Black	36	6 MNO	Black	36
R2C4	CLEAR	Yellow with raised vertical line	7F	CLEAR	Yellow with raised vertical line	7F	CLEAR	Yellow with raised vertical line	7F
R3C1	7 PRS	Black	37	7 PQRS	Black	37	7 PRS	Black	37
R3C2	8 TUV	Black	38	8 TUV	Black	38	8 TUV	Black	38
R3C3	9 WXY	Black	39	9 WXYZ	Black	39	9 WXY	Black	39
R3C4	?	Blue with raised Plus	05	?	Blue	05	?	Blue	05
R4C1		Black	No Code	*	Black	2A	*	Black	2A
R4C2	0	Black	30	0	Black	30	0	Black	30
R4C3	.	Black	2E	#	Black	23	#	Black	23
R4C4	ENTER	Green with raised circle	1B	ENTER	Green with raised circle	1B	CANCEL	Red with raised Cross	0D
ANTI-TAMPER OPEN CIRCUIT			07*			07*			07*

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

### PIN-OUT FOR 16 WAY MATRIX PINPAD

CONTACT CONNECTIONS (REAR VIEW)



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