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Product Overview

The Storm 420 Series Encoder provides a serial interface between keypad and host system. It can be supplied either as a separate encoder module or pre-assembled into a Storm keypad to suit end user requirements.

Features / Specifications

Input Power + 5V \pm 0.25V dc
RS232 Output via 6 pin Molex 2.54mm (.100") Pitch KK® Series Connector
Drives Powertip 80 Character LCD Display from keypad
Direct connection to underpanel mounted 12 key, 16 key, 20 key Storm Keypads.
Ribbon Cable needed for top panel fixing 4 key, 12 key, 16 key Storm Keypads
Overall Footprint 89mm x 66mm
Mounting Centres at 43.2mm and 73.5mm (3mm holes provided for pcb standoffs)

Electromagnetic Compatibility (EMC)

Storm 420 Series Encoders are classified as a component with regard to the European Community EMC regulations. It is the equipment manufacturers responsibility to ensure that systems using the Storm 420 Series Encoder are compliant with the appropriate EMC standards.

If the electronic system requires input protection against high voltage transients (to meet CE requirements) it is recommended that an external interface board is located at the point where the external wiring enters the electronic system enclosure.

Using the 420 Series Encoder with Storm 5000 Series Integrated Keypads

As a combination the Storm Integrated Keypad/ Display Module with Encoder forms a complete serial communications device. Alphanumeric output from the unit is communicated via the familiar RS232 physical link layer.

The keypad has 20 keys including ten numeric keys and a further ten special function keys. The LCD module displays 80 characters across 4 lines. Both the keypad and LCD module may be backlit from the controller board.

The module has been designed in such a way that it can be used as part of an embedded application, possibly using a separate host microcontroller or PC to communicate with the module. Alternatively it may be used as an input interface since the keypad and LCD functions have been designed to be familiar to most users.

The keypad is arranged as a 5-row, 4 column matrix and is scanned and debounced by the module's built-in microprocessor. The debounce filter is set at 64ms. No typematic key rollover function is implemented. Multi-key lockout is, however, implemented in the firmware.

Use of 420 Series Encoder to provide RS232 output from Storm K Range Keypads

When used with any Storm Interface matrix keypad, the encoder can either be fitted directly to the rear of the keypad, or connected via a ribbon cable. Please note that the cables required to connect a keypad to the encoder are custom cables and are not provided by Storm.

The encoder can either be fitted directly to the rear of a standard Storm K Range Keypad, or remotely by a ribbon cable.

Where Storm K Range Keypads are underpanel mounted the 420 Encoder can be directly connected, requiring no additional mounting hardware.

The overall depth required to house the 420 Encoder is 32mm (1.25in) when measured from back of keypad. Where Storm K Range Keypads are fixed to a panel surface, a ribbon cable and mounting hardware are required (these items not included with encoder)

Communications Protocol

Physical Link Layer

The module transmits and receives data using RS232 signalling with a voltage swing of approximately $\pm 9V$. DIP Configuration Switch 8 selects between 9600 baud (DIP switch off) and 1200 baud (DIP Switch on). In both conditions, 8-bit data is used with no parity and one stop bit. This may be summarised as follows....

| | |
|----------|------------|
| DIP8 OFF | 9600,8,N,1 |
| DIP8 ON | 1200,8,N,1 |

No software or hardware handshaking is used since the data rate is low relative to the bandwidth of the communications protocol.

Only the TX, RX and Ground signals are employed. The chosen nomenclature is that TX means transmission out of the module.

Data buffering

Both data transmission and reception are controlled by the module's built in microprocessor using a pair of stacks- one for transmitted characters and one for received characters. These allow the application to send data to and from the unit largely without consideration of the timing constraints of the RS232 physical link layer.

Provided the stacks are not filled, data can be freely sent to and received from the module and the module will buffer the characters until such times as it is able to process them.

The buffer sizes are as follows...

| | |
|---|----------|
| Data transmission (keypad data out of module) | 16 bytes |
| Data reception (LCD data into module) | 48 bytes |

Should the buffers be filled, further characters will not be pushed onto the stacks, but instead are discarded.

Character echoing

Characters received from the host terminal/microprocessor may be echoed back to the host by setting DIP Configuration Switch 2 to ON. With DIP Switch 2 OFF the characters are not echoed.

Characters resulting from key strokes are never echoed to the LCD display, but are simply sent via the RS232 TX pin to the host application.

LCD Display

The LCD display comprises 80 characters in all, arranged as 20 characters on each of 4-lines. The full range of standard ASCII characters are available, including lower case letters. Some, but not all, of the extended ASCII characters are available. Appendix 3 lists the available characters.

Power-up message

At power-on the LCD display shows hardware and software version numbers and communications information for a period of approximately 5 seconds. After this time the display automatically clears and the cursor is located at the first character on the left of line 1.

LCD operating principles

The LCD interface is designed to be suitable either for keypad data input (for example as a data entry terminal) or for embedded microprocessor applications.

It has been designed to operate in a similar way to a teletype terminal since this is a familiar environment to most users and is consequently intuitive.

The cursor begins on the left of line 1. Entered characters move the cursor progressively further to the right of line 1 until the end of the line is reached. Entering one further character automatically moves the cursor to the beginning of line 2, i.e. automatic text wrapping is implemented. This applies to all lines.

Once the end of line 4 is reached, entering one further character results in all lines moving up one place, resulting in the contents line 1 being discarded, line 2 moves to line 1, line 3 moves to line 2 and line 4 moves to line 3. Line 4 is subsequently cleared and the cursor moves to the beginning of line 4.

Special characters

The Carriage Return key is supported (ASCII character 0x0D) and results in the cursor moving to the beginning of the next line, exactly as described above. The Line Feed key (ASCII character 0x0A , or Ctrl-J in HyperTerminal) is also supported and gives the same functionality as carriage return.

The backspace key (ASCII character 0x7F) and Del key (ASCII character 0x08) may be used to delete the last entered character and move the cursor back one place. This can be repeated until the cursor is at the beginning of the current line, but no further (exactly as a teletype terminal).

The Tab key (ASCII character 0x09) is supported, and enters four spaces, even if this involves a line-wrap.

The Form Feed key (ASCII character 0x0C, Ctrl-L in HyperTerminal) is implemented as a 'clear screen' function and returns the cursor to the beginning of line 1..



Typical implementations

An embedded application where the LCD is written to by a separate microprocessor or computer would typically send a Form Feed character followed by up to 80 characters, possibly interspersed with carriage returns to reduce the number of characters to be transmitted.

It is unlikely that such an application would make use of the backspace function since there are unlikely to be errors in data entry, although the line-wrap feature may be used to allow the microprocessor to treat the display as a contiguous array of 80 characters with no requirement for carriage returns.

A terminal-like application, however, where the user is permitted to type any characters on the LCD (perhaps using an application such as HyperTerminal) would almost certainly make use of all the features built into the module such as line-wrap and special characters to make the interface more user friendly.

LCD adjustment

A potentiometer is provided on the module interface circuit board to allow the contrast of the LCD display to be adjusted. Wide Temp Range Displays require 0V to -9V ; Std Temp Range Displays require 0V to +5V

Supported Displays

POWERTIP TECHNOLOGY CORP.

20 Char x 4 Line Display PC 2004LRU-AWA-H, PC 2004LRU-ASO-H Wide Temp Range

| Pin | Symbol | Function |
|------------|---------------|------------------------------|
| 1 | Vss | Power supply(GND) |
| 2 | Vdd | Power supply(+) |
| 3 | Vo | Contrast Adjust |
| 4 | RS | Register select signal |
| 5 | R/W | Data read / write |
| 6 | E | Enable signal |
| 7 | DB0 | Data bus line |
| 8 | DB1 | Data bus line |
| 9 | DB2 | Data bus line |
| 10 | DB3 | Data bus line |
| 11 | DB4 | Data bus line |
| 12 | DB5 | Data bus line |
| 13 | DB6 | Data bus line |
| 14 | DB7 | Data bus line |
| 15 | A | Power supply for LED B/L (+) |
| 16 | K | Power supply for LED B/L () |

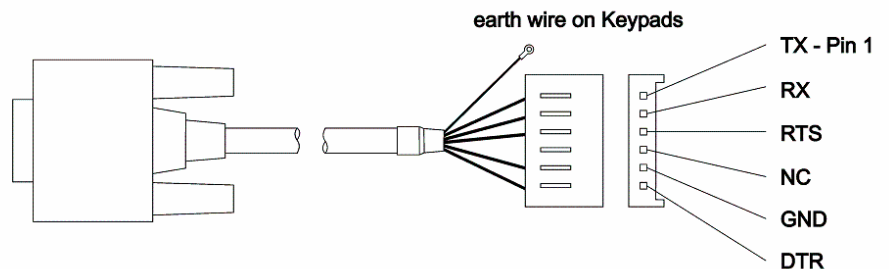
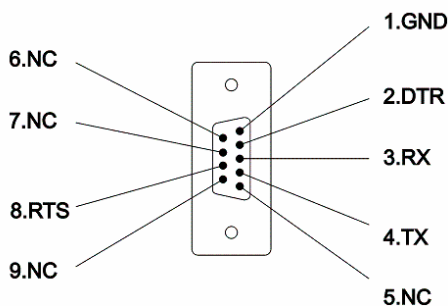
Part Ordering Details - Storm Products

| | |
|-------------|--|
| 4200-00[x] | RS232 Encoder |
| 4200-101 | Ribbon Cable 16 Way, 65mm long for LCD Connection for use with FT5000 Integrated |
| 5001-000201 | LCD 4 x 20 Powertip Display |

Part Details - Other Hardware Required (depending on end application)

Cable for +5V Supply Two wire with tinned ends

Cable for PC Connection Cable 6 Way Molex KK to Serial Port as drawing below



9 Way portable PC cable.
RS part number 758-7541 (cut one cable to make two assemblies)

2.54mm Pitch KK Crimp Terminal housing 6-Way with locking ramp.
RS part number 296-4984 or Molex Part number 22-01-2065.
1 - off required

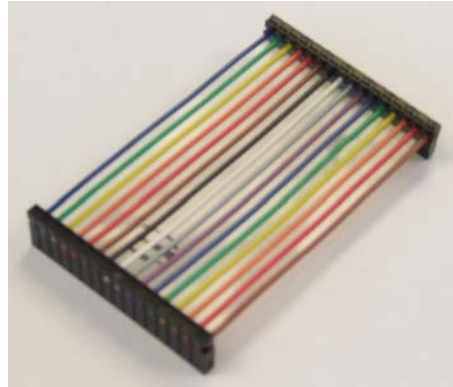
KK Crimp terminals.
RS part number 467-598 or Molex Part number 08-50-0032.
6 - off required.

Yellow M3.5mm crimp ring terminal.
RS part number 534-468.
1 - off required.

Part Details - Other Hardware Required (depending on end application)

Cable for LCD Connection Ribbon Cable 16 Way

Buy direct from Samtec.
Part number IDSS-16-D-X.X (X is the length specified in inches).



Cable for 4 Way Keypad

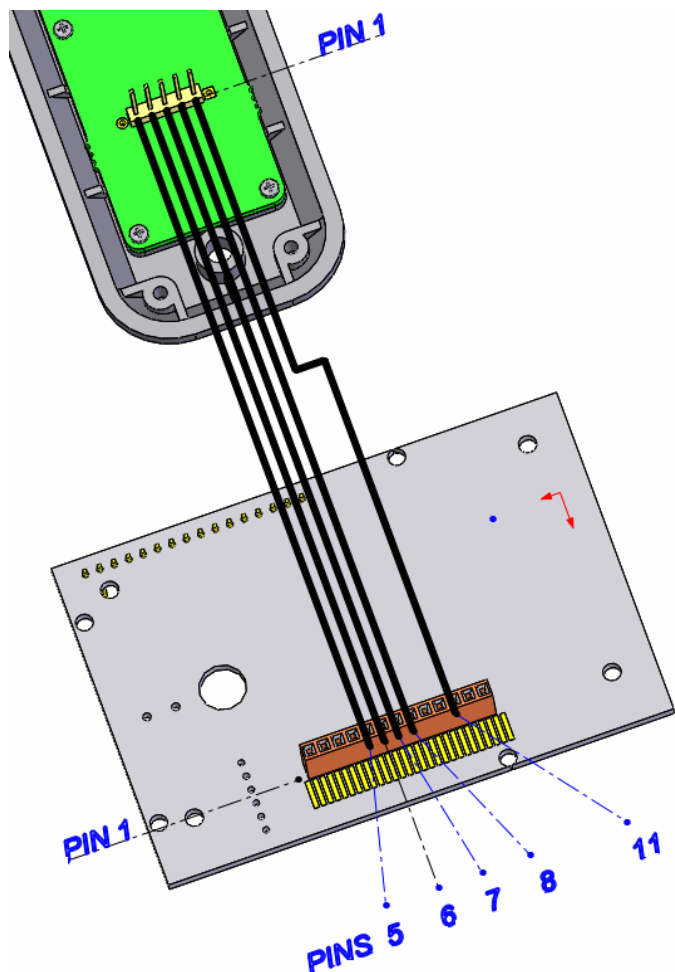
Ribbon Cable 5 Way Molex KK to bare ends

2.54mm Pitch KK Crimp Terminal housing 5-Way with locking ramp, RS part number 679-5385P or Molex Part number 22-01-3057.
1 - off required

KK Crimp terminals. RS part number 467-598.
Molex Part number 08-50-0032.
5 - off required.

2.54mm Ribbon cable length to suit application.
RS part number 214-0661
This is a 10-way cable, tear down to make a 5 way

Bare ends to be soldered to encoder.



Part Details - Other Hardware Required (depending on end application)

Cable for 4 way Backlit Keypad

Ribbon Cable 7 Way Molex KK to bare ends

2.54mm Pitch KK Crimp Terminal housing 7-Way with locking ramp.
RS Components 679-5404P.
Molex Part number 22-01-3077.
1 - off required

KK Crimp terminals. RS part number 467-598.
Molex Part number 08-50-0032.
7 - off required.

2.54mm Ribbon cable length to suit application.
RS part number 214-0661
This is a 10-way cable , three ways should be stripped off before assembly.

Bare ends to be soldered to encoder.

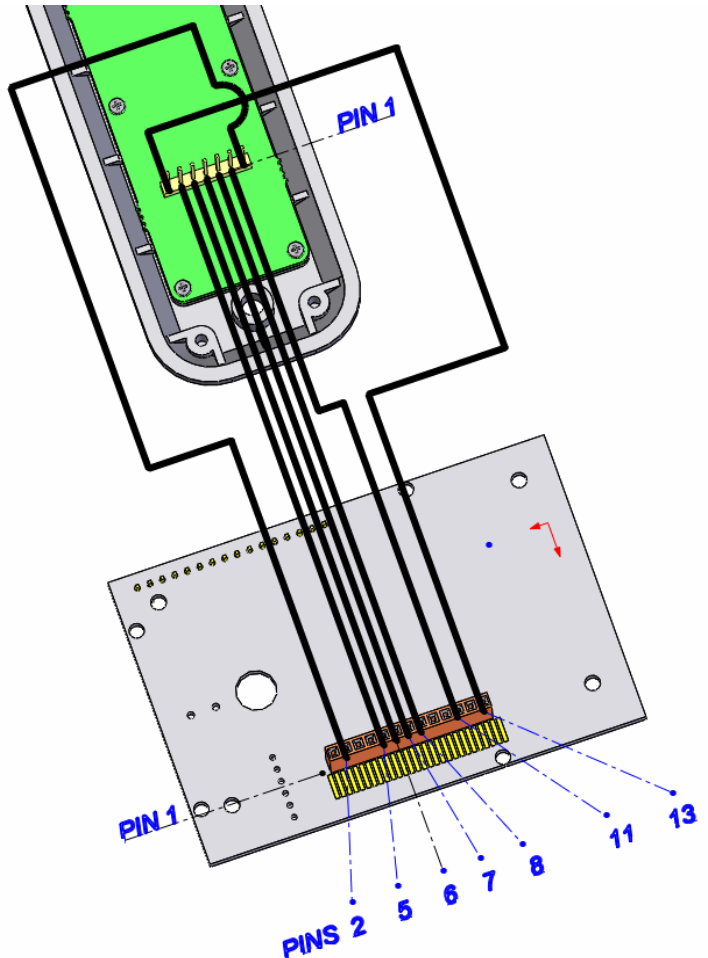


Table of Encoder Connections

| Keypad Connector (on reverse of pcb) | | | | | | | | | | | | ✓ = pin connection made | | Direct connection to rear of keypad ? | |
|--------------------------------------|--------------------|-------------|---------------------|---------------------|----|----|----|----|----|----|----|-------------------------|---|--|--|
| KEYPAD TYPE | | | | | | | | | | | | | | | |
| 6000 Series | Fit polarisin pin | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Fit polarising pin | YES —fit polarising pins to positions 1and 13 | | |
| FT5000 | Fit polarising pin | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Fit polarising pin | YES —fit polarising pins to positions 1and 13 | | |
| 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 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 | |
| To Keypad | | LED CATHODE | TAMPER IN | R1 | R2 | C1 | C2 | C3 | C4 | R4 | R3 | R5 FUNCTION KEYS | TAMPER OUT | LED ANODE | |
| PIN 1 ON REVERSE | | | | | | | | | | | | | | | |
| R = ROW, C = COLUMN | | | | | | | | | | | | | | | |



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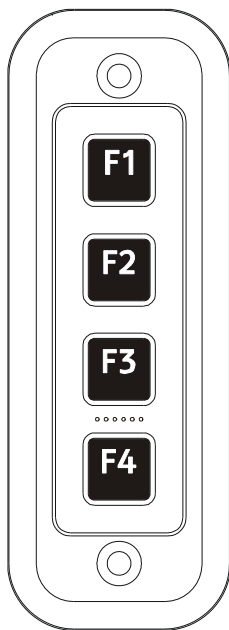
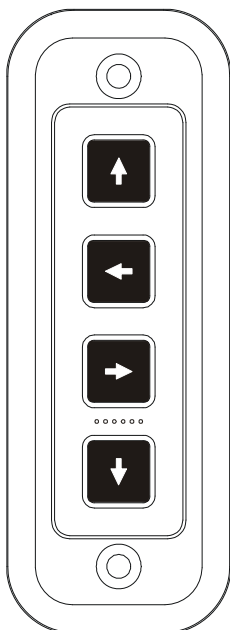
Connecting the Encoder to a 4-Way Keypad

Storm 4-way keypads are the only keypad types that require a cable in order to be connected to the encoder; all other types of keypad can be connected directly to the encoder.

Before you connect the encoder to a 4-way keypad, make sure you have:

- ☐ A 5 way Molex cable to connect the keypad to the encoder
- ☐ An RS232 cable with 6-way Molex connector to connect the encoder to your controller
- ☐ Polarizing pins fitted to the appropriate encoder pins
- ☐ A +5V regulated supply
- ☐ Prepared your panel fixing
- ☐ A 16-way ribbon cable if using the Storm 5000 series bezel with LCD (this cable is not supplied by Storm)

| 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 | <ul style="list-style-type: none"> ✓ 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 ✓ Polarising pins fitted to encoder |



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 |

4 WAY KEYPAD
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 |

Cable Connections for
4 way keypads

| ENCODER PIN | TO | KEYPAD PIN | |
|-------------|----|------------|-----------------|
| | | | Non-illuminated |
| | | | Illuminated |
| 2 | | NC | 1 |
| 11 | | 1 | 2 |
| 5 | | 5 | 6 |
| 6 | | 4 | 5 |
| 7 | | 3 | 4 |
| 8 | | 2 | 3 |
| 13 | | NC | 7 |

ASCII CODES

| COLUMN | Row 5 |
|--------|-------|
| C1 | 11 |
| C2 | 12 |
| C3 | 13 |
| C4 | 14 |

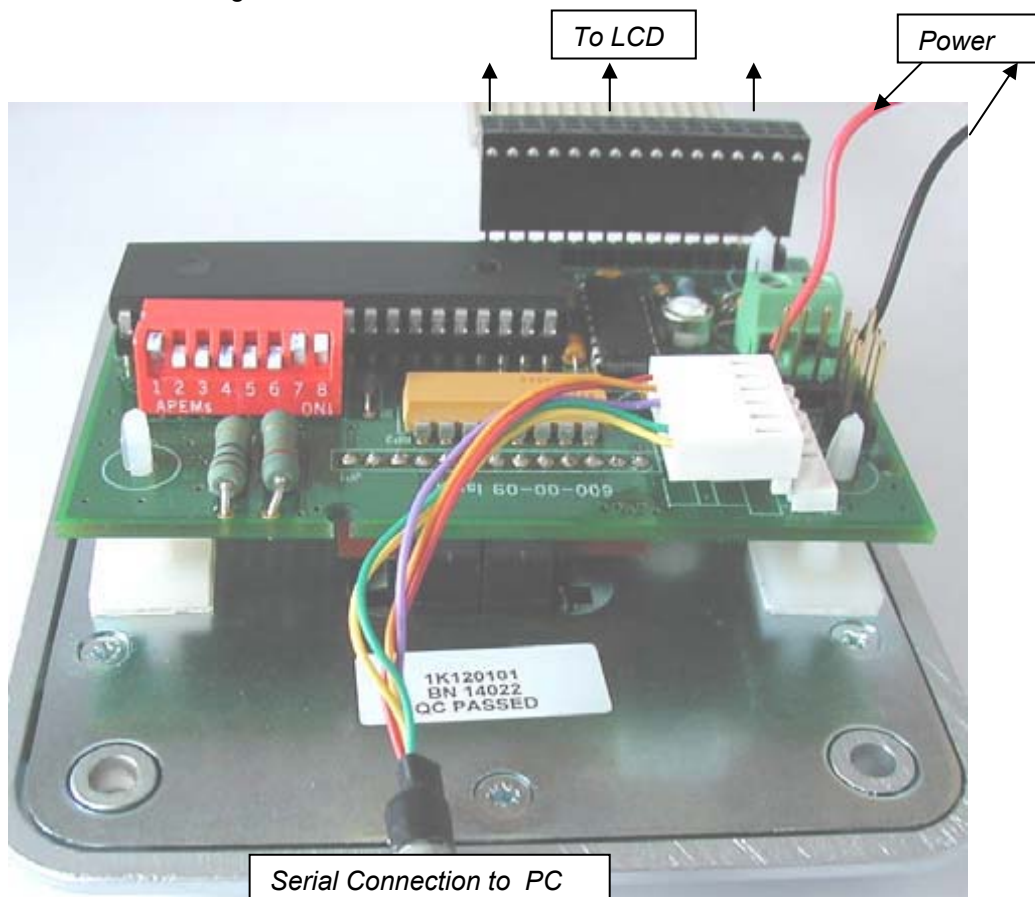
Connecting the Encoder to a 12 or 16 Way Keypad – Telephone Layout

Storm 12 and 16 way keypads can be connected directly to the encoder with no need for any cables. Before you connect the encoder to a 12 or 16 way keypad, make sure you have:

- ☐ An RS232 cable with 6-way Molex connector to connect the encoder to your controller
- ☐ Polarizing pins fitted to the appropriate encoder pins
- ☐ A +5V regulated supply
- ☐ Prepared your panel fixing

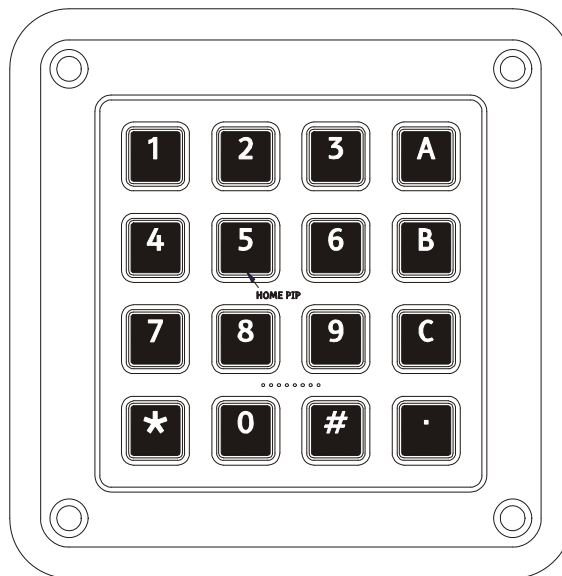
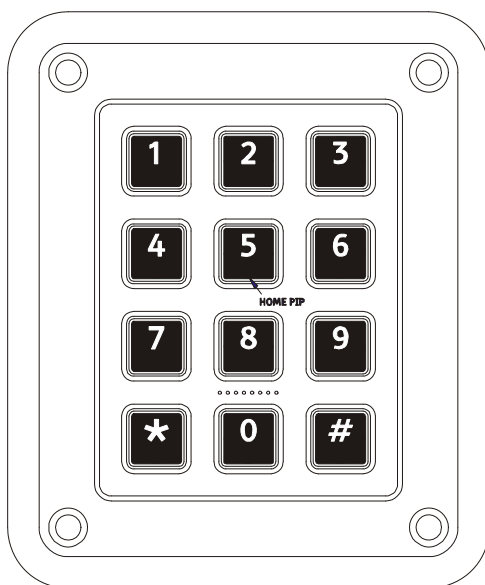
Configuration switch settings for the telephone layout keypad:

- ☐ 1 & 7 should be in the 'ON' position
- ☐ 3, 4, 5 & 6 should be in the 'OFF' position
- ☐ 2 controls the character echoing



Typical picture showing encoder mounted directly to keypad.

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



12 / 16 WAY KEYPAD
CONTACT CONNECTIONS
(REAR VIEW)

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

CONTACT MATRIX

| 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 KEYPAD
CONTACT CONNECTIONS
(REAR VIEW)

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

CONTACT MATRIX

| 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 |

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 |

Connecting the Encoder to a 12 or 16 Way Keypad – Calculator Layout

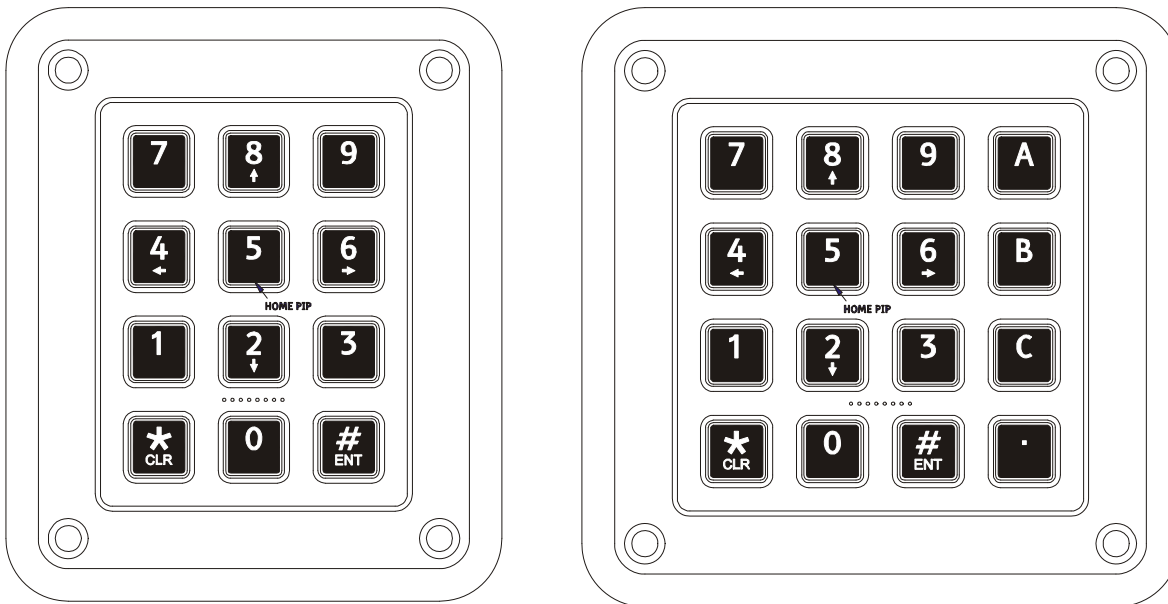
Storm 12 and 16 way keypads can be connected directly to the encoder with no need for any cables. Before you connect the encoder to a 12 or 16 way keypad, make sure you have:

- ☐ An RS232 cable with 6-way Molex connector to connect the encoder to your controller
- ☐ Polarizing pins fitted to the appropriate encoder pins
- ☐ A +5V regulated supply
- ☐ Prepared your panel fixing

Configuration switch settings for the calculator layout keypad:

- ☐ 1, 4 & 7 should be in the 'ON' position.
- ☐ 3, 5 & 6 should be in the 'OFF' position .
- ☐ 2 controls the character echoing.
- ☐ 8 controls the Baud rate selector.

| Configuration Switch Settings | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Installation Checklist |
|---|----|----------------------------|-----|----|-----|-----|----|--------------------|--|
| | | CHARACTER ECHOING SELECTOR | | | | | | BAUD RATE SELECTOR | <ul style="list-style-type: none"> ✓ 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 ✓ Polarising pins fitted to encoder |
| 12 and 16 Key Calculator Layout Keypads | ON | ON = ECHO ON | OFF | ON | OFF | OFF | ON | OFF=9600 BAUD | |
| | | OFF = ECHO OFF | | | | | | ON=1200 BAUD | |



12 / 16 WAY KEYPAD CONTACT CONNECTIONS (REAR VIEW)

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

CONTACT MATRIX

| 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 KEYPAD CONTACT CONNECTIONS (REAR VIEW)

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

CONTACT MATRIX

| 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 |

ASCII Codes

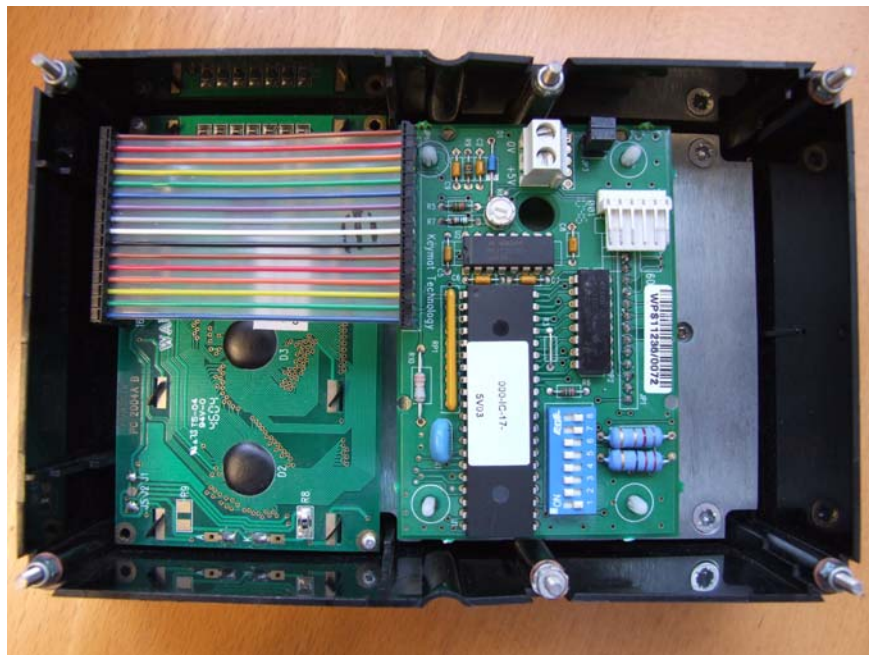
| ROW / COLUMN | C1 | C2 | C3 | C4 |
|--------------|----|----|----|-----|
| R1 | 37 | 38 | 39 | 1B |
| R2 | 34 | 35 | 36 | 0C* |
| R3 | 31 | 35 | 33 | 05 |
| R4 | 7F | 30 | 0D | 2E |

Connecting the Encoder to the Storm 5000 Series Integrated Keypad

The Storm 5000 Series Integrated Keypad with LCD can be connected directly to the Storm encoder without the need for a cable.

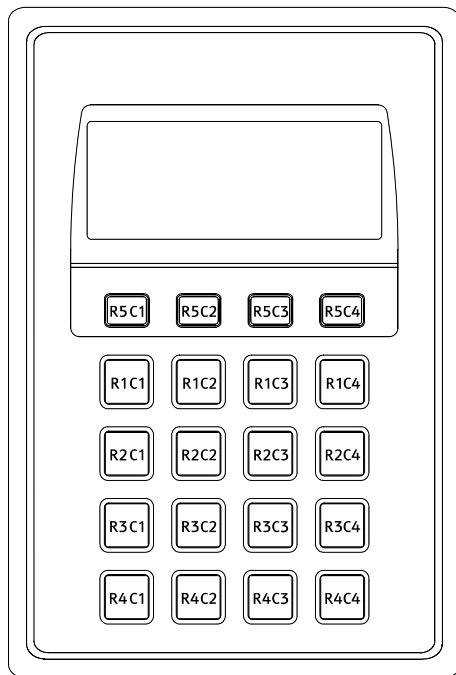
Before you connect the encoder to any of the Storm 5000 Series keypads, make sure you have:

- ☐ An RS232 cable with 6-way Molex connector to connect the encoder to your controller
- ☐ The configuration switches set correctly on the encoder
- ☐ Polarizing pins fitted to the appropriate encoder pins
- ☐ A +5V regulated supply
- ☐ Prepared your panel fixing
- ☐ Encoder is supplied with four off adhesive backed stand offs. to allow it to be mounted on the back plate.
- ☐ 16 way ribbon cable connected between the LCD and encoder. The part number is 4200-101. Not supplied with encoder.



| 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
✓Polarising pins fitted to encoder



20 WAY KEYPAD
CONTACT CONNECTIONS
(REAR VIEW)

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

CONTACT MATRIX

| <i>PIN</i> | <i>ROW / COLUMN</i> |
|------------|-------------------------|
| 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 |

| 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 | | | |

Connecting the Encoder to Storm 6000 Keypads

*Each of the Storm 6000 Series keypads are directly connected to the Storm
Before you connect the encoder to the 6000 Series keypad, make sure you have:*

- ☐ An RS232 cable with 6-way Molex connector to connect the encoder to your controller
- ☐ The configuration switches set correctly on the encoder
- ☐ Polarizing pins fitted to the appropriate encoder pins
- ☐ A +5V regulated supply
- ☐ Prepared your panel fixing

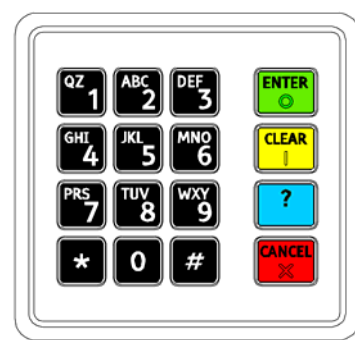
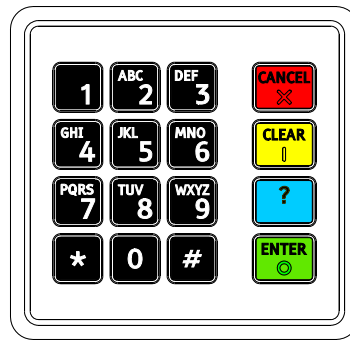
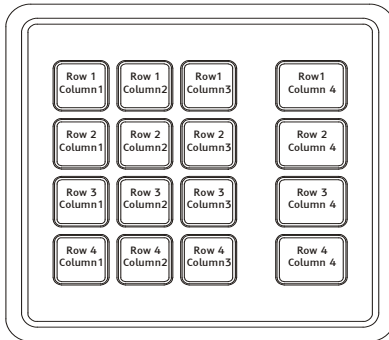
Configuration switch settings for the UK layout keypad:

- ☐ Jumper R3 should be removed before use
- ☐ 1, 4, 6 & 7 should be in the 'OFF' position
- ☐ 3, & 5 should be in the 'ON' position
- ☐ 2 controls the character echoing
- ☐ 8 controls the Baud. 'OFF' provides a Baud of 9600, 'ON' provides a Baud of 1200.

Configuration switch settings for the USA layout keypad:

- ☐ Jumper R3 should be removed before use
- ☐ 1, 6 & 7 should be in the 'OFF' position
- ☐ 3, 4 & 5 should be in the 'ON' position
- ☐ 2 controls the character echoing
- ☐ 8 controls the Baud. 'OFF' provides a Baud of 9600, 'ON' provides a Baud of 1200.

| Configuration Switch Settings | | R3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Installation Checklist |
|---|-------------------|-----|----------------------------|--------------------------------|-----|----|-----|-----|-------------------------------|---|------------------------|
| 6000 Series Pinpad - UK Layout | Remove before use | OFF | CHARACTER ECHOING SELECTOR | ON | OFF | ON | OFF | OFF | BAUD RATE SELECTOR | | |
| 6000 Series Pinpad - USA Layout | Remove before use | OFF | | ON | ON | ON | OFF | OFF | | | |
| | | | | ON = ECHO ON OFF = ECHO OFF | | | | | OFF=9600 BAUD ON=1200 BAUD | | |
| | | | | | | | | | | | |
| <div>✓ Keypad ✓ Encoder , configuration switch set ✓ Panel Fixing prepared ✓ +5V regulated supply ✓ RS 232 cable with 6 way Molex KK socket ✓ Polarising pins fitted to encoder</div> | | | | | | | | | | | |



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) | |

| Row / Column | UK Layout | | | USA Layout | | |
|--|------------|----------------------------------|-------|------------|----------------------------------|-------|
| | Key Legend | Key | ASCII | Key Legend | Key | ASCII |
| R1C1 | 1 | Black | 31 | 1 QZ | Black | 31 |
| R1C2 | 2 ABC | Black | 32 | 2 ABC | Black | 32 |
| R1C3 | 3 DEF | Black | 33 | 3 DEF | Black | 33 |
| R1C4 | CANCEL | Red with raised Cross | 0D | ENTER | Green with raised circle | 1B |
| R2C1 | 4 GHI | Black | 34 | 4 GHI | Black | 34 |
| R2C2 | 5 JKL | Black with Homepip | 35 | 5 JKL | Black with Homepip | 35 |
| R2C3 | 6 MNO | Black | 36 | 6 MNO | Black | 36 |
| R2C4 | CLEAR | Yellow with raised vertical line | 7F | CLEAR | Yellow with raised vertical line | 7F |
| R3C1 | 7 PQRS | Black | 37 | 7 PRS | Black | 37 |
| R3C2 | 8 TUV | Black | 38 | 8 TUV | Black | 38 |
| R3C3 | 9 WXYZ | Black | 39 | 9 WXY | Black | 39 |
| R3C4 | ? | Blue | 05 | ? | Blue | 05 |
| R4C1 | * | Black | 2A | * | Black | 2A |
| R4C2 | 0 | Black | 30 | 0 | Black | 30 |
| R4C3 | # | Black | 23 | # | Black | 23 |
| R4C4 | ENTER | Green with raised circle | 1B | CANCEL | Red with raised Cross | 0D |
| ANTI-TAMPER OPEN CIRCUIT | | | 07* | | | 07* |
| *= CODE REPEATS EVERY 10 SECONDS WHILST CONDITION REMAINS ACTIVE. TO RESET—DISCONNECT POWER FOR 30 SECONDS. | | | | | | |

LCD Character Map PC 2004LRU Display

| Higher Lower 4bit 4bit | 0000 | 0010 | 0011 | 0100 | 0101 | 0110 | 0111 | 1010 | 1011 | 1100 | 1101 | 1110 | 1111 |
|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| xxxx0000 | | 0 | a | P | ` | P | | — | ア | E | o | p | |
| xxxx0001 | | ! | 1 | B | Q | a | q | u | フ | チ | △ | △ | q |
| xxxx0010 | | " | 2 | B | R | b | r | 「 | イ | ウ | × | E | θ |
| xxxx0011 | | # | 3 | C | S | c | s | 」 | ウ | テ | E | e | ∞ |
| xxxx0100 | | \$ | 4 | D | T | d | t | 、 | 工 | ト | ト | μ | Ω |
| xxxx0101 | | % | 5 | E | U | e | u | ・ | オ | ナ | 1 | α | 0 |
| xxxx0110 | | & | 6 | F | V | f | v | ヲ | カ | ニ | ヨ | ρ | Σ |
| xxxx0111 | | ' | 7 | G | W | g | w | フ | キ | ズ | ウ | q | π |
| xxxx1000 | | (| 8 | H | X | h | x | イ | ク | ホ | U | γ | × |
| xxxx1001 | |) | 9 | I | Y | i | y | ウ | ケ | ル | U | ~ | u |
| xxxx1010 | | * | : | J | Z | j | z | エ | コ | ノ | ノ | i | + |
| xxxx1011 | | + | : | K | C | k | c | オ | サ | ロ | ロ | * | π |
| xxxx1100 | | , | < | L | * | 1 | 1 | ホ | シ | フ | ワ | Φ | π |
| xxxx1101 | | — | = | M | I | m |) | ユ | ズ | へ | ン | ± | ÷ |
| xxxx1110 | | u | > | N | ^ | n | ÷ | ヨ | セ | ホ | ° | ん | |
| xxxx1111 | | / | ? | O | _ | o | + | ッ | ッ | マ | " | ö | ■ |