# FT5000 Integrated Keypad and Display Application / Engineering Manual.

## Overview.

Developed for use in a new generation of financial transaction terminals, this integrated **keypad and display** is suitable for use in exposed or hostile environments. The keypad's front panel can be easily customised to complement the colour scheme and design of the host equipment.

- **Weather and vandal resistant for outdoor and unsupervised public environments.**
  (also available in a lighter robust construction for less aggressive environments).

- **20 Character X 4 Line, illuminated LCD display** (optional).

- **Rapid, responsive and reliable data entry.**

- **Stainless steel or polymer front plate.**

- **Easily and securely installed in vending machines, automated teller machines, public telephones, ticketing machines, car-parking control equipment etc.**

## Section 1. Options

The Storm Integrated keypad and display is a versatile device that can be configured to suit most applications. A number of cosmetic and functional options can be selected to achieve the optimum environmental or operational performance.

The options marked with a ● should be considered as "required to achieve a vandal resistant specification".

The following table shows the range and availability of optional features. Check the boxes θ to indicate your selected options.

| Option<br>● = Required for Vandal Resistance<br>θ = Optional 4if required<br>- = Not available | Vandal Resistant Spec | Robust Spec |
|---|---|---|
| Resistance to water and dust. | IP65<br>Low pressure water jet | IP54<br>Wet wipe-down, splashes and light rain |
| Switch Contact Resistance | 100 ohms (max) | 100 ohms (max) |
| Silver Chromed metal keys. (See section 8. Keytop details). | ●θ | - |
| Moulded polymer keys with laser engraved keytop graphics. (See section 8. Keytop details). | - | θ |
| GFX Keytops with a transparent snap on cap, enabling tiles with custom keytop characters to be encapsulated within the keytop | - | θ |
| Factory fitted illuminated display module. (See section 3. Compatible display modules). | θ | θ |
| Polycarbonate display window with anti-reflective scratch resistant surface coating. | ●θ | θ |
| High energy impact protection plate located behind the keypad's switch contact pcb (See section 9. Dimensional Details). | ●θ | θ |

## Section 2. Ratings and performance.

**The following table shows the designed operational and performance data. Achieved performance may depend on environmental or operational conditions and mode of use.**

| Key to symbols<br>● = Required for Vandal Resistance<br>- = Not applicable | Vandal Resistant Spec | Robust Spec |
|---|---|---|
| Resistance to water and dust. | IP65<br>Low pressure water jet<br>● | IP54<br>Wet wipe-down, splashes and light rain |
| Operational Temperature | -20°C to +60°C | -20°C to +60°C |
| Impact Resistance | 20 Joules via 50mm dia steel striker<br>● | Light impacts only |
| Switch Contact Resistance (keypad) | 100 ohms (max) | 100 ohms (max) |
| Switch Contact Bounce (keypad) | 5ms (max) | 5ms (max) |
| Insulation Resistance (keypad) | 50 Mohms (min) | 50 Mohms (min) |
| Breakdown Voltage (keypad) | 500V AC (max 60 secs) | 500V AC (max 60 secs) |
| Operating Voltage (keypad) | 24V DC (max) | 24V DC (max) |
| Operating Current (keypad) | 50mA (max) | 50mA (max) |
| Operational Life (keypad) | 4 million cycles per key (min) | 2 million cycles per key (min) |
| Keytop travel (keypad) | 1.4mm nominal | 1.4mm nominal |
| Key actuation force (keypad) | 160gms nominal | 160gms nominal |
| Connector (keypad) | 0.1" pitch, gold plated square pin, male connector. | 0.1" pitch, gold plated square pin, male connector. |

## Section 3.  Display devices.

Many types and brands of displays can be used with the Storm Integrated keypad and display. As a general statement displays can be installed in two ways:-

1. **The display module can be secured ( using thread forming M1.8 x 8mm pan head screws ) directly to female bosses moulded into the underside of the** Storm Integrated keypad and display **casing. This method of installation can be achieved, at the factory, as part of the final assembly process. The female bosses on the underside of the casing are positioned to accept displays with either 93.0mm x 55.0mm or 89.9mm x 48.8mm fixing hole centres, and with a maximum depth (module thickness) of 10.0mm when measured from the mounting face.**

2. **Alternatively, if an auxiliary circuit board is to be installed (by the customer) into the underside of the** Storm Integrated keypad and display **casing, a suitable display can be fixed and connected directly to the auxiliary circuit board. This allows the auxiliary circuit and display to be manufactured and tested as a sub-assembly before final assembly into the** Storm Integrated keypad and display**.**

LCD Displays that are dimensionally compatible with the Storm Integrated keypad and display are available from most leading display manufacturers including:-

**POWERTIP TECHNOLOGY CORP.**
**Models: PG 12232-C and PC 2004-A**

**HYUNDAI**
**Model: HC 20401**

**VARITRONIX**
**Model: MGL(S)-12032B**

**When specifying a display for installation in the** Storm Integrated keypad and display **consideration should be given to rated operational temperature ranges quoted by the chosen manufacturer,**

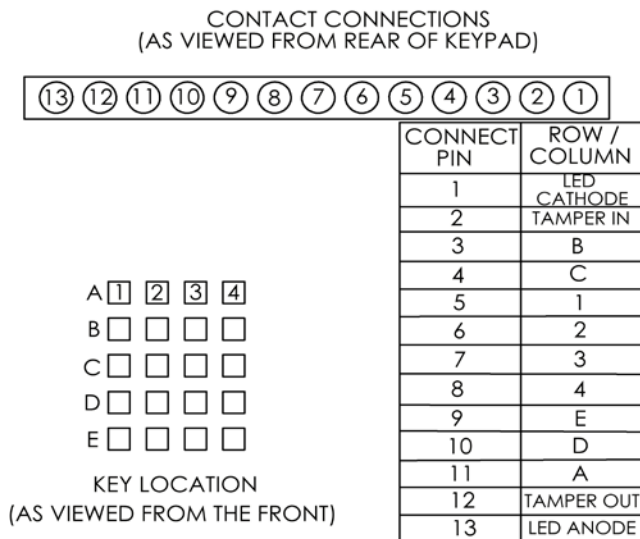## Section 4.  Connectors and connections. (keypad and soft keys only).

The 16 key pad and the 4 adjacent soft keys (positioned beneath the display window) are configured on a 5 x 4 circuit matrix. This circuit matrix is terminated via a 13 way, 0.1" pitch, gold plated, square pin, male connector with locking ramps

If you require RS232 output then order a Storm Interface RS232 Encoder – this fits directly onto the pins.
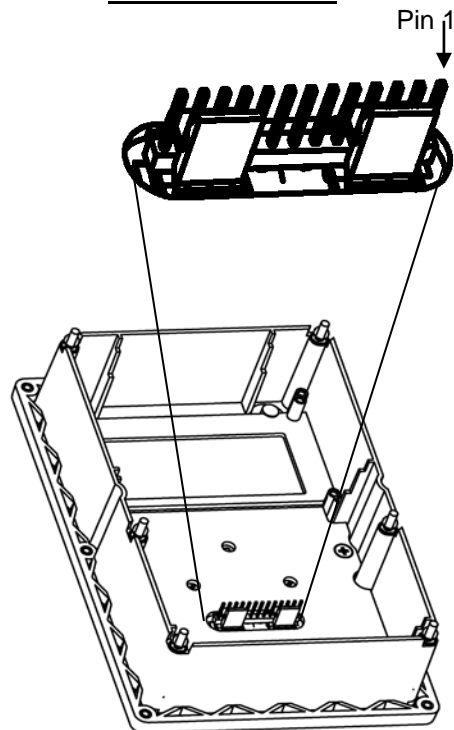See Ordering Details – Section 8.

The anti tamper facility is supplied to detect any seperation of the pcb from the unit.  If this occurs then this will break the connection (open circuit) and may be used to activate an alarm system. Connect to PIN 2 and PIN 12 to use this facility)   Rating  24 Volts dc Max

The Pinout Connection Details below shows the connector pin designation for each switch position.  Switches provide a momentary contact between designated connector pins. The Connector Details below shows the orientation and position of the connector.

**Pinout Connection Details**                          **Connector Details**

Pin 1

CONTACT CONNECTIONS
(AS VIEWED FROM REAR OF KEYPAD)

⑬ ⑫ ⑪ ⑩ ⑨ ⑧ ⑦ ⑥ ⑤ ④ ③ ② ①

| CONNECT PIN | ROW / COLUMN |
|---|---|
| 1 | LED CATHODE |
| 2 | TAMPER IN |
| 3 | B |
| 4 | C |
| 5 | 1 |
| 6 | 2 |
| 7 | 3 |
| 8 | 4 |
| 9 | E |
| 10 | D |
| 11 | A |
| 12 | TAMPER OUT |
| 13 | LED ANODE |

A ☐1 ☐2 ☐3 ☐4
B ☐ ☐ ☐ ☐
C ☐ ☐ ☐ ☐
D ☐ ☐ ☐ ☐
E ☐ ☐ ☐ ☐

KEY LOCATION
(AS VIEWED FROM THE FRONT)

## Section 5. Installation in host equipment.

The Storm Integrated keypad and display can be secured into a fascia panel (or equipment casing) in two ways.

1. (Recommended for maximum tamper and vandal resistance). The Storm Integrated keypad and display can be installed from the underside of a panel, with the operational face of the unit accessible through a rectangular aperture in the panel. The Storm Integrated keypad and display is secured into place by six M3 locknuts and a retaining plate (supplied in the Mounting Kit – see Section 8. Ordering Details). Recommended dimensions and profile for the panel aperture and positions of the fixing studs are detailed in Section 7. Dimensional Details. A sealing gasket is compressed between the Storm Integrated keypad and display sealing flange and the rear surface of the fascia panel. This is necessary to achieve rated resistance to water and dust ingress.

2. The Storm Integrated keypad and display can be fixed to the outer surface of a fascia panel (or equipment casing). This is achieved by locating the unit over suitably positioned fixing holes and aperture in the panel, as shown in Section 9. The unit is then secured using six M3 screws through the panel into the threaded inserts in the case moulding. The sealing gasket is compressed between the Storm Integrated keypad and display peripheral edge and the surface of the fascia panel. This is necessary to achieve rated resistance to water and dust ingress. To calculate the length of screw required allow 4.5mm length of thread for housing plus sealing gasket.

It is recommended that the sealing gasket is replaced each time the Storm Integrated keypad and display is re-fitted to the fascia panel or host equipment.

## Section 6. Keytop Options

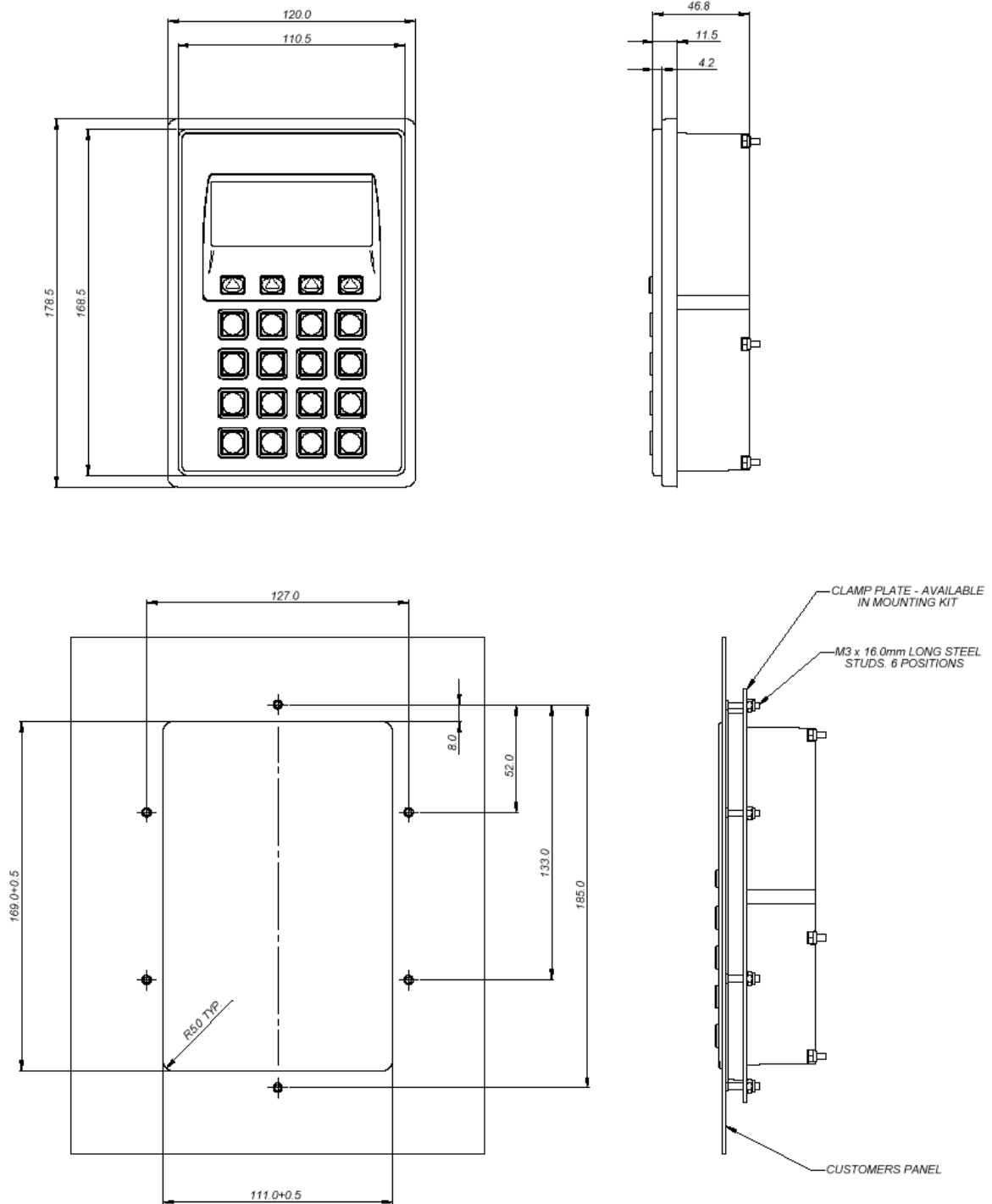| Style | Construction |
|---|---|
| Engraved metal | (Chrome plated cast ) |
| Polymer | (Laser marked UV stable impact resistant) |
| Graphic | (Insertable – customisable legend tiles) |

**Legends**

The standard legend set is shown below.  Other key legends and styles are available on request
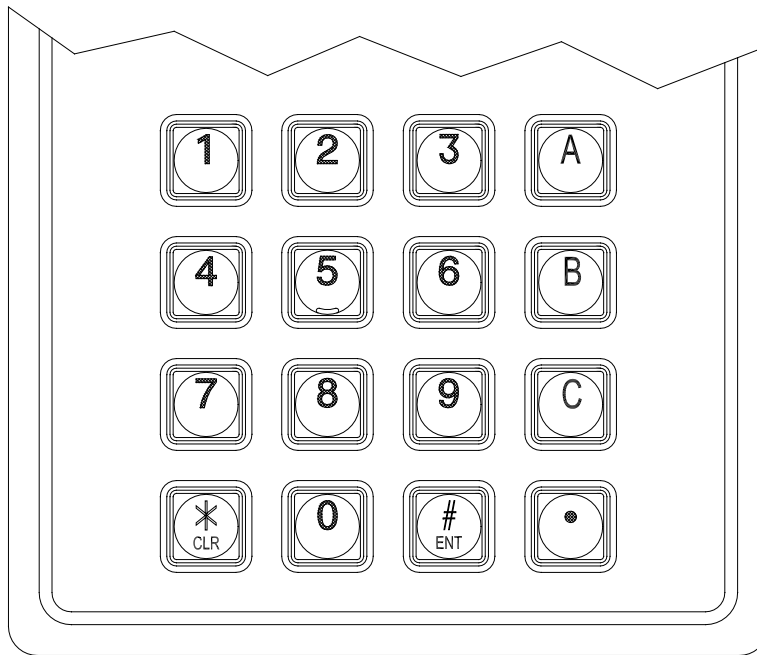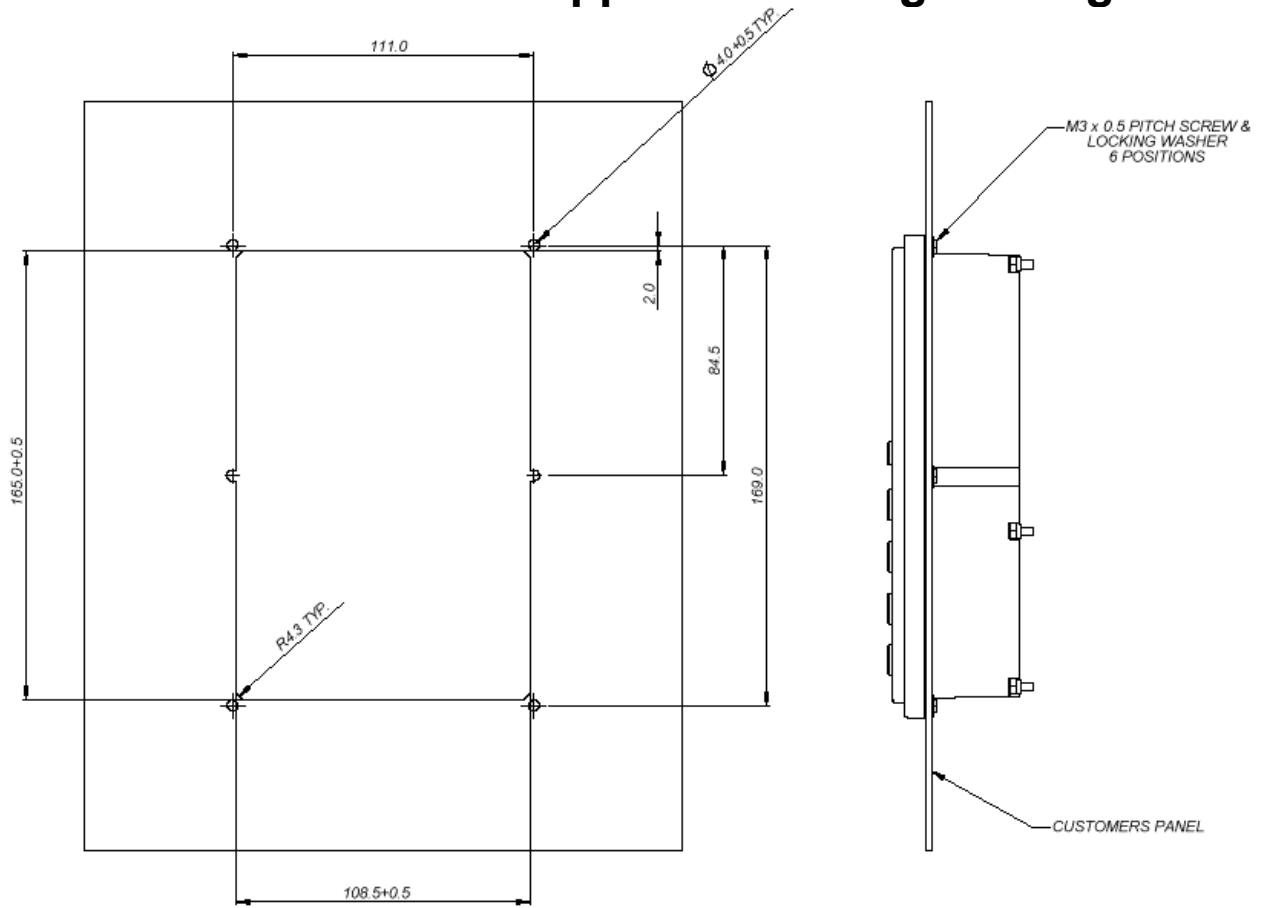
## Section 7. Dimensional Details. (All dimensions in millimetres)



**Panel Cutout (Underpanel).**

**Panel Cutout (Top Mount).**

## Section 8. Ordering Details

| Part No | Construction - Vandal Resist or Robust | Display | Keytops |
|---------|----------------------------------------|---------|---------|
| FT1K 050 | Vandal Resist | None | Chromed Metal Infill |
| FT1K 080 | Vandal Resist | Character | Chromed Metal Infill |
| FT2K 050 | Vandal Resist | None | Laser Marked Polymer |
| FT2K 080 | Vandal Resist | Character | Laser Marked Polymer |
| FT4K 090 | Robust | Character | GFX |
| FT4K 100 | Robust | None | GFX |

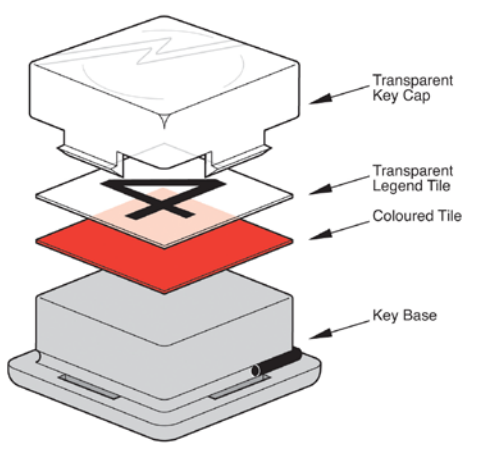## Accessories

| | |
|---|---|
| FTMK010 | Mounting Kit . |
| 4200-001 | RS232 Encoder |
| 4200-101 | Ribbon Cable between RS232 Encoder and Powertip Display Module |
| 5001-000201 | Powertip Display Module |

If using the encoder you will need a connection cable to host - RS232 Encoder to 9 pin Serial Connector as per diagram below
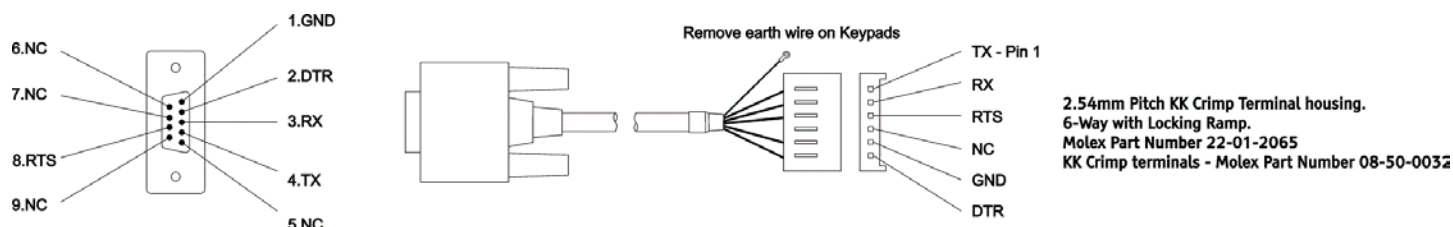


## Legends for GFX Keytops



For GFX Product the keytop legends are user configurable.

If you do not wish to produce your own tiles then Storm offer a range of legend tiles and coloured background tiles.

Contact your distributor for details

## Section 8. Manufacturers Data for Displays.

## Displays

Refer to **Powertip** website: **www.powertip.com.tw** , **FAQ's are at** www.powertip.com.tw/technical/Q&A.asp

Standard fitment character display is :-
20 Char x 4 Line Display      PC 2004LRU-AWA-H    or   PC 2004LRU-ASO-H      -20° C to +70 °C

Alternative normal temp range fitment is :-
20 Char x 4 Line Display      PC 2004LRU-AEA-B      0 to 50 °C

**Operating Voltages ($V_{op}$) for each type of display are as follows :-**

| LCD Type | Vop for N.T. | Vop for W.T. |
|----------|--------------|--------------|
| Character | 4.2 ~ 4.8V | 5 ~ 9V |
| Graphic | 5.5 ~ 26V | 6 ~ 28V |

Note: N.T. = normal temperature     W.T.= wide temperature

**What is temperature compensation and why is required?**

     A LCD operating voltage varies at different temperatures. The operating voltage must rise as temperature lowers or the contrast will degrade. Conversely, the operating voltage must fall as the temperature rises or the contrast will degrade. For this reason it is often a requirement, with graphics modules, to control the input voltage accordingly. The temperature compensation circuit is the circuit that controls the input voltage as the temperature changes. This temperature compensation circuit can be located on the LCD module or on the customer's motherboard.