stacosystems
One Step Ahead

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Part of the M7 Family of Data Entry Products

M777XX

PC-COMPATIBLE KEYBOARD

88-Key with Enclosure
EL Backlighting
Built-in Cursor Control
NEMA 4 Sealing

Revision Log					
Rev.	E. R. No.	Revised By	Checked By	Approved By	Rel. Date
A	40344	Trung Nguyen	Trung Nguyen	/s/ J.Y.	4-03-07
B	40345	Trung	Trung Nguyen	/s/ J.Y.	4-4-07
C	40534	Trung	Trung Nguyen	/s/ J.Y.	2-25-08
1.0	41870	James Yeh	/s/ D. Wang	/s/ J. Yeh	5-10-10
1.1	42569	James Yeh	/s/ F. TU	/s/ D. WANG	4-26-11
1.2	44070	J. YEH	Franklin Tu Digitally signed by Franklin Tu DN: cn=Franklin Tu, o=Staco Systems, ou=DES, email=ftu@stacosystems.com, c=US Date: 2013.02.21 14:53:40 -08'00'	James Yeh Digitally signed by James Yeh DN: cn=James Yeh, o=STACO SYSTEMS, ou=D.E.S., email=jyeh@stacosystems.com, c=US Date: 2013.02.21 14:49:29 -08'00'	02/25/13

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1. SCOPE

This Specification Control Document (SCD) describes detailed characteristics of one of the M7 Family of data entry products. The product emanating from this SCD is designated as the product series M777XX. The electrical, mechanical, environmental, and other specifications are described for the customer's application.

2. PRODUCT FEATURES

- PC compatible, rugged and durable, 88-key QWERTY keyboard with ABS plastic enclosure.
- 24 Function Keys (12 physical function keys plus 12 via the Fn key).
- Special function key labeled as "EMERGENCY" on upper left corner.
- Integrated Force Sensitive Resistor (FSR) cursor control with two mouse buttons.
- Hot pluggable standard USB 2.0 connector interface.
- Touch-Type (~90 grams) actuation Force
- -30 to 85 ºC operating and -40 to 90 ºC storage temperature.
- ElectroLuminescent (EL) backlighting with 5 levels of brightness adjustment.
- LED status indicators for NumLk, ScrLk, and Caps Lock keys.
- NEMA 4X (IP 66) sealing based on Molded Elastomer Technology (MET).
- Microsoft Certification for keyboard and mouse input compatibility.
- UL or CSA, CE, and FCC class B Certification.
- RoHS compliant (Specific Models).
- Option available with blank keypad and no legends (see Fig. 6.1)

Fig. 2.1: M777XX Keyboard

3. ELECTRICAL SPECIFICATIONS

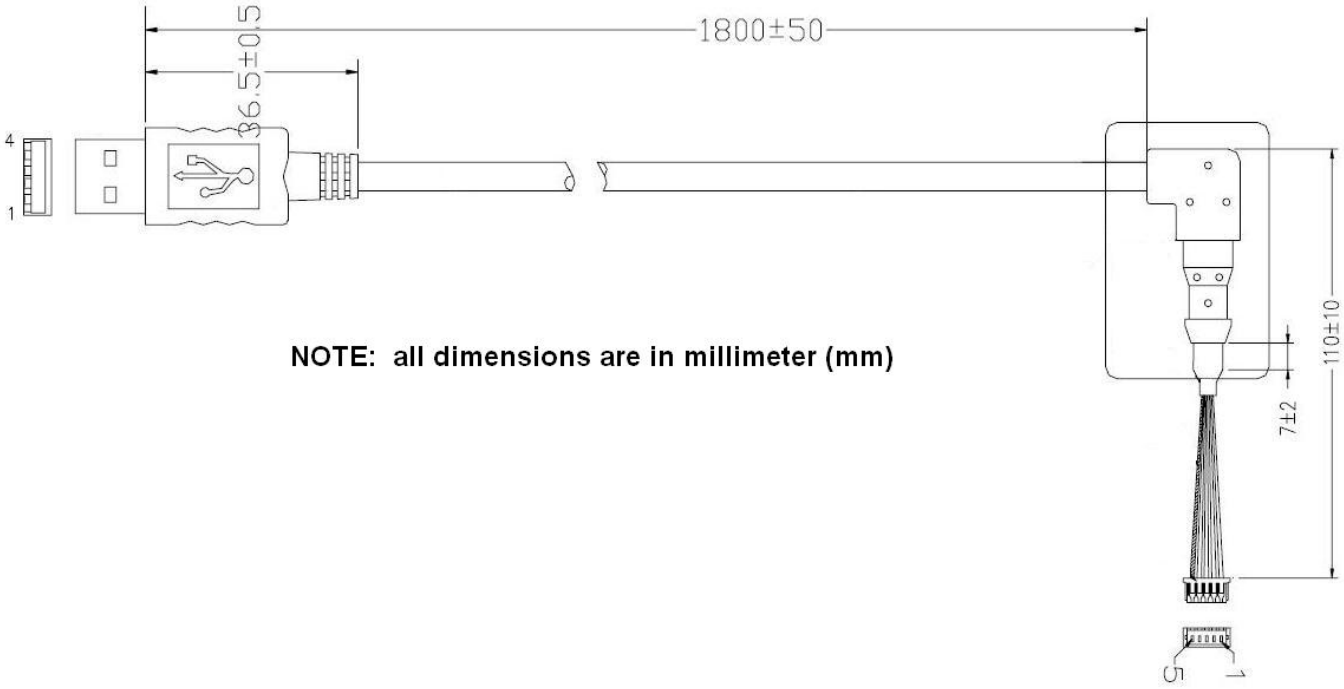
3.1 General Characteristics

- Total power consumption:
  Typical 1.25W, or 5V @ 250 mA (Max. 5V @500 mA).
  Power is supplied to the keyboard through the PS/2 or USB cable.
- DC operating voltage range:... 4.40V ~ 5.50V (USB version)
- USB speed = 1.5 Mbps (low speed) (applied to USB keyboard version)
- Contact resistance:…….....2K ohm or less.
- Insulation Resistance:….....more than 100M ohm @ 250VDC.
- Electrical life:…….....1,000,000 actuations minimum

3.2 Connecting Cables

The keyboard is available with USB interface cable. Cable length is 1,800mm (6 ft) approximately for both types. The keyboard is compliant with the USB 2 standard specifications, which include “plug and play” and “hot swappable.” The USB keyboard pin layout and schematic is illustrated in Table 3.1. Cable drawing and dimension is shown in Figure 3.1.

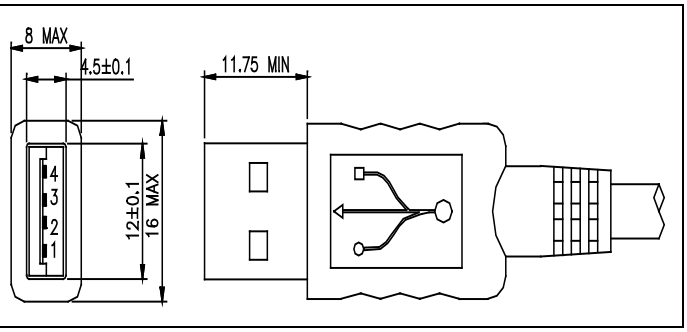
Figure 3.1: USB cable and connectors



NOTE: all dimensions are in millimeter (mm)

Table 3.1: USB Keyboard Pin Layout

Pin #	Pin Description
1	VBUS
2	D-
3	D+
4	GND
Shell	Shield



3.3 Keyboard Backlight

The keyboard offers aquamarine blue EL as the backlight which operates at AC voltage of 150Vrms and 1000 Hz Sine Wave frequency. When turned ON, all of the 88 keys and the mouse buttons are illuminated. Its brightness can be adjusted, through 5 levels of dimming plus the “off” position, by a ”starburst” key located near the upper right corner of the keypad (Fig. 2.1). The start-up mode is preset at the lowest lighting level and it cycles up from there.

LED backlight is offered as an option for keyboard features. Please contact Staco Systems Sales for more information.

3.4 Status Indicator

The keyboard is equipped with green LED indicators for Caps Lock, Number Lock (NumLk) and Scroll Lock (ScrLk) keys.

3.5 Special Function Key “EMERGENCY”

The keyboard has a ring-protected special function key labeled as “EMERGENCY” at the upper left corner (Fig. 2.1). It outputs a “Shift+F1” scan code from the encoder and, in turn, can be used to perform special task associated with the external interface device or computer.

4. MECHANICAL SPECIFICATIONS

4.1 Color

The keypad is colored in black with key legend laser-printed in white color on all keys except for F13 to F24, Fn, Ctrl-R, Alt-R, “NumLk”, and number keys via Fn, which are in blue (Pantone 297 C).

4.2 Material and Coating

The keypad is made from translucent silicone that allows light transmission from the EL backlight. The enclosure is made from ABS or an equivalent material.
A polyurethane or equivalent overcoat is applied to the keypad to provide protection from standard cleaning agents used in hospitals and the military, including Super Tropical Bleach (STB), alcohol, Lysol, hand soap, laundry detergent, vinegar, and hand lotion.

4.3 Key Switch Operation

- Non-lock rubber tactile feeling keystroke
- Nominal Key Travel = 1.70 ± 0.5 mm (or 0.067 ± 0.020 in)
- Nominal Actuation Force:
    - Touch-Type = 90 ± 30 grams (or 3.15 ± 1.05 ounces)

No definite stickiness or other abnormality is exhibited when force is applied with a finger to key-top center at the rate of 3 times per second.
End stroke withstands a static load of 500g applied on the tip of the key stem in the vertical direction for one minute.

4.4 Keyboard Dimension

The keyboard outline dimension is shown in Fig. 4.1 on next page.

4.5 Keyboard Weight

Keyboard weighs 1,125g (2.25 lb) approximately with enclosure and cable attached.
Adding packing box, it will be around 1,500g (3 lb)

4.6 Keyboard Pressure Relief:

The keyboard's enclosure is equipped with a pressure relief feature (Fig. 4.2) required to equalize the air pressure inside the enclosure to atmosphere outside the enclosure. This is especially necessary when operating keyboard at the high altitude atmosphere.

Fig. 4.2: Pressure relief vent in the back of the keyboard

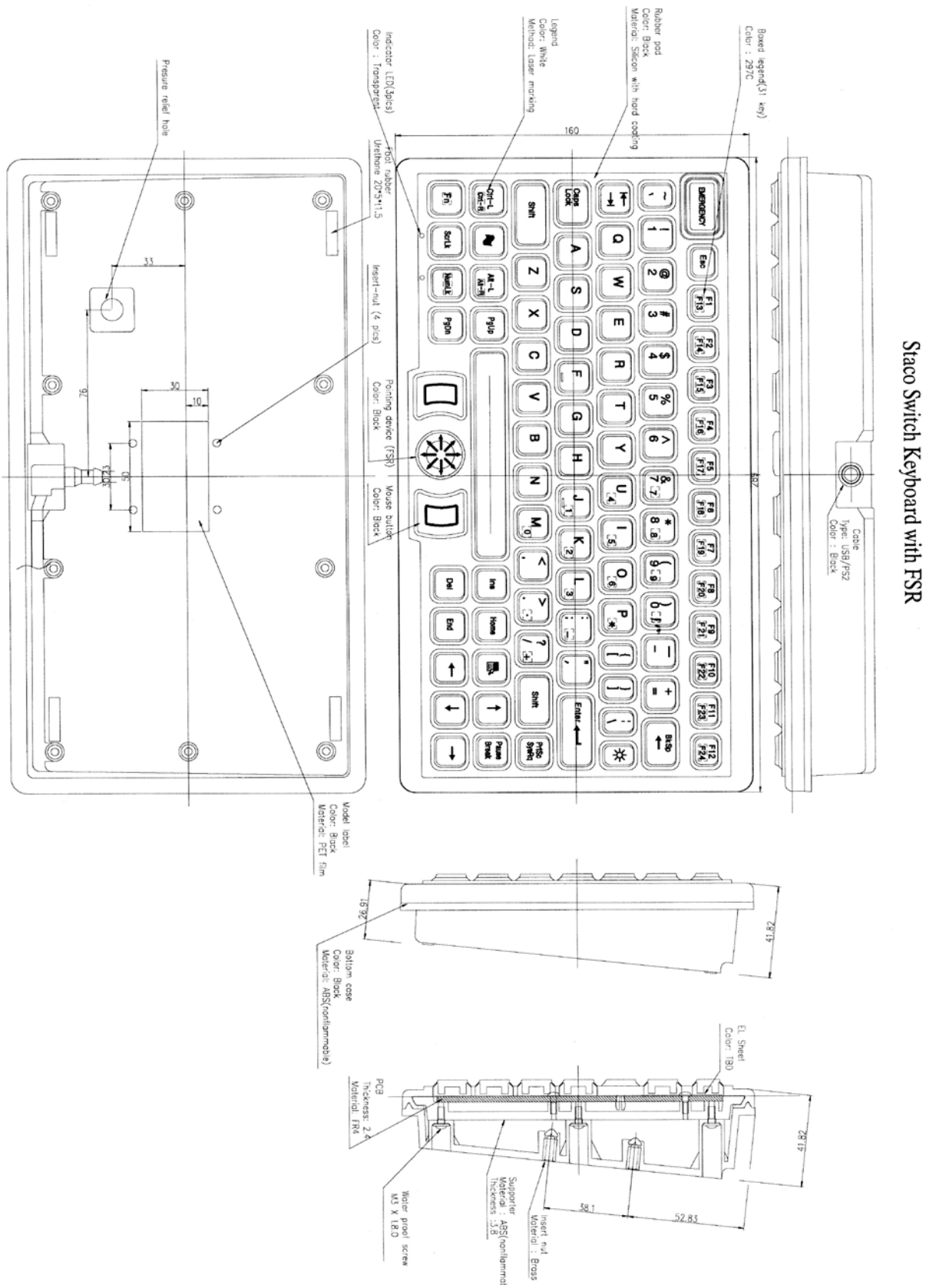


Fig. 4.1: Keyboard Outline Dimension (in millimeters)

CAGE CODE	PART NO.	REV.	SHT.
12522	M777XX SCD	1.2	9

5. ENVIRONMENTAL SPECIFICATIONS

5.1 Operating Temperature and Humidity

Condition	Temperature	Relative Humidity (R.H.)
Operating	-30 to 85 °C (-22 to 176 °F)	85%
Storage	-40 to 90 °C (-40 to 194 °F)	95%

5.2 Flammability

Printed Circuit Board…= 94 VO
Silicone Overlay…….. = 94 HB
Interface Cable…… = 94 VO
Enclosure……. = 94 VO

5.3 Key Legend Durability Test

Visible legend wear does not occur before 200 strokes (2/3) after the following test was performed:

- Testing Equipment: Printing Wear Testing Equipment
- Testing Methods: Load is 450g
  Rate is 1 cycle/sec
  Number of Strokes is over 300
  Type of Eraser (Rubber) is #74, #512, #605

5.4 Key Life Test

The keys are rated at a minimum of 1,000,000 cycles of operation at 25 °C ambient temperature. The cycling rate is between 10 to 100 cycles of operation per minute. Testing conditions are as follow:

1) Test equipment = Plunger Type.
2) Actuation speed = 4 times/sec
3) Press pressure:
   - Touch-Type = 150 ± 50g (5.29 ± 1.76 ounces)

5.5 High Temperature And High Humidity Test

Check Method: Leave for 240 hours as following conditions.

1) Temperature: 65 ^{o}C and 25 ^{o}C, for 10 cycles and for 10 days cycling period
2) Humidity: 90~98 %RH.
3) Checking time: 240 hours.
4) Standard: The keyboard should operate normally after the test.

Use MIL-STD-202, method 106 as a guideline to perform the moisture resistance test by setting the relative humidity between 90 and 98% temperature cycling between 65 ^{o}C and 25 ^{o}C, for 10 cycles (240 hours) and for 10 days cycling period providing that the keyboard is installed and sealed in a moisture resistance enclosure. Note: In the case of the panel mount keyboard, the user is to provide installation provisions to prevent the exposure of the rear of the keyboard to moisture. In the case of the military version the most stringent spec will hold precedence.

5.6 Sealing

The keyboard is rated to NEMA 4, or 4X. There is a breather vent on the bottom of the enclosure used to equalize air pressure inside the sealed unit to that of the surrounding atmosphere. All versions of the keyboard are subjected to a stream of water from a hose that has a 25.4 mm nozzle and delivers at least 246 liters of water per minute.

5.7 Shock

The packaged keyboard is designed to withstand 10G of impacting force. Testing method is in accordance with 213B of MIL-STD-202E.

5.8 Drop Test (none-operating)

The purpose of the test is to verify the ability of keyboard to endure being dropped from lap and desk heights. The test was performed at 25°C and 50% R.H. with the following conditions shown in Table 5.1. The keyboard is recoverable (able to be re-assembly) after the test and still operational.

Table 5.1: Drop test conditions

Packing Condition	Drop surface	Height	Test Description
None-packing	Hard wood	70Cm	2 drops for each corner
	Carpet	70Cm	1drop for 6 surfaces
Inner box	Concrete	90Cm	1drop for 6 surfaces and 4 corners. (Total 10 drops)
Out box	Concrete	60Cm	1drop for 6 surfaces and 4 corners. (Total 10 drops)

5.9 Altitude

The keyboard is designed to meet the following parameters:

Operating Altitude = 12,500 feet
Non-operating Altitude = 30,000 feet

5.10 Pressure Relief

Keyboard is designed to have pressure of 2.6 psi (minimum) at sea level with pressure relief vent. The vent is required to equalize the air pressure inside the enclosure to the surrounding atmosphere.

5.11 Vibration

The packaged keyboard is designed to be operational in the following testing condition (testing method is in accordance with 201A of MIL-STD-202E):

- Vibrating Frequency = 10~55Hz
- Vibrating Amplitude = 0.5 mm
- Vibrating Direction = X, Y, and Z individually
- Vibrating Time = 2 hours

5.12 Radiated Emissions

The keyboard Radiated Emissions meets EML/EMC requirements of the U.S. Title 47, Code of Federal Regulations, Federal Communications Commission, Part *15*, Subpart J, Class B.

6. OTHER SPECIFICATIONS

6.1 Ordering Information

Order Part Number	Part Description
M77760	MILITARY, EMERGENCY KEY, USB, EL LIGHTED, 2-BUTTON MOUSE, COILED CORD, NEMA 4, ROHS, TOUCH-TYPE
M77762	MILITARY, EMERGENCY KEY, USB, EL LIGHTED, 2-BUTTON MOUSE, COILED CORD, NEMA 4, ROHS, TOUCH-TYPE, WITH BLANK KEYPAD AND NO LEGENDS

The above two are offered as standard products. Refer to Appendix for other parts offered in the past. Please contact Staco Systems Sales for other keyboard configurations.

For part number M77762, please refer to Fig. 6.1. This model is for customers interested in making their own legends, especially with foreign languages. Note that the areas with blue legends in standard keyboards (F13-F24, 0-9, /, *,-,+ in Fig. 2.1) will have the same blue color after laser engraving process.

Fig. 6.1: M777X2 Keyboard with blank keypad and no legends

6.2 Keyboard Marking

Data entry product package is legibly marked as follows:

a) Staco Systems name and logo (optional).
b) Staco Systems Manufacturer's Cage Code Identification No. 12522.
c) Staco Systems Part Number.
d) Manufacturing Date Code.

6.3 Keyboard Workmanship

Products is manufactured in such a manner as to be uniform in quality and free from cracked or displaced parts, sharp edges, burrs and other defects that would be detrimental to their serviceability or performance. The manufacturing of electronic assemblies in this product follows the industry standards IPC-A-610 and IPC-J-STD-001.

6.4 Regulatory Certifications

This product series have the following agency certifications: UL or CSA, CE, FCC class B and Microsoft Compatibility Certification.

6.5 Keyboard Quality

The keyboard is inspected and tested as necessary to substantiate product conformance to its drawings and specifications. Inspection and test records are documented available for review.

6.6 Packing

Dimension of individual packing box is shown in Fig. 6.2, and dimension of the case for 10 boxes is depicted in Fig. 6.3.

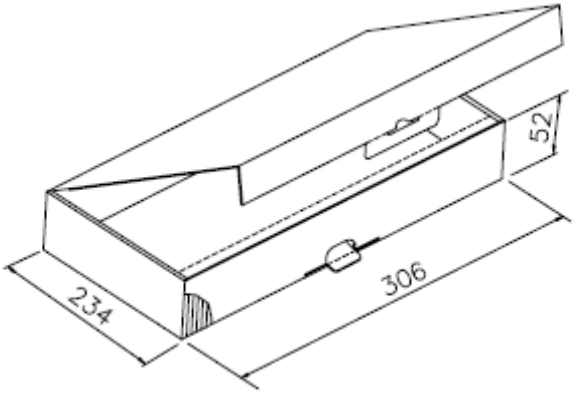


Fig. 6.2: Individual Packing Box (dimension in millimeter)

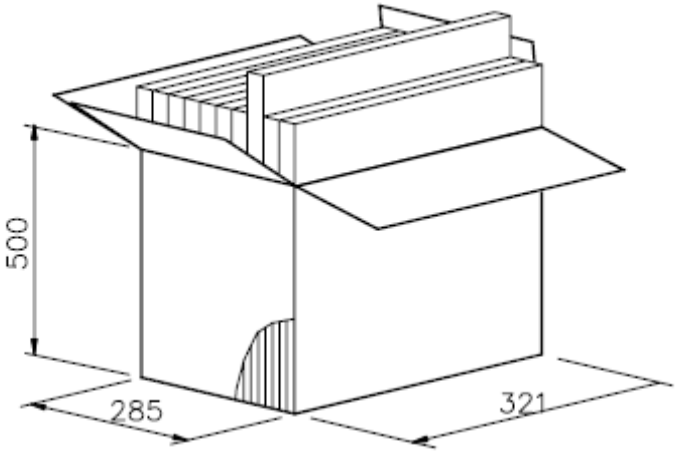


Fig. 6.3: The Packing Case with 10 Boxes (dimension in millimeter)

APPENDIX

Non-RoHS Keyboards (limited quantity in stock)

Part Number	Part Description
M77700/001	MILITARY, w/o legend on Emergency Key, USB, EL Lighted, Coiled Cord, NEMA 4, TOUCH-TYPE
M77705	COMMERCIAL, Emergency Key, PS/2, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, GLOVE-TYPE
M77706-1	COMMERCIAL, USB, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, GLOVE-TYPE
M77713	COMMERCIAL, PS/2, EL Lighted, 2-Button Mouse, Coil Cord, NEMA 4, TOUCH-TYPE

Obsoleted Keyboards

Part Number	Part Description
M77751	No Emergency Key, PS/2, EL, 2-Button Mouse, Coiled Cord, NEMA 4, RoHS
M77761	No Emergency Key, USB, EL, 2-Button Mouse, Coiled Cord, NEMA 4, RoHS
M77701	Military, PS/2, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77702	Military, USB, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77703	Military, PS/2, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4 Plus, Touch-type
M77704	Military, USB, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4 Plus, Touch-type
M77705	Commercial, PS/2, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Glove-type
M77706	Commercial, USB, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Glove-type
M77707	Military, PS/2, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Glove-type
M77708	Military, USB, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Glove-type
M77709	Military, PS/2, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Touch-type
M77710	Military, USB, EL Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Touch-type
M77711	Military, PS/2, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Glove-type

M77712	Military, USB, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Glove-type
M77713	Commercial, PS/2, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77714	Commercial, USB, EL Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77715	Commercial, USB, Green LED Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Touch-type
M77716	Commercial, PS/2, Green LED Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Touch-type
M77717	Military, USB, Green LED Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77718	Military, PS/2, Green LED Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77719	Military, USB, Red LED Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Touch-type
M77720	Military, PS/2, Red LED Lighted, 2-Button Mouse, Straight Cord, NEMA 4, Touch-type
M77721	Military, USB, Red LED Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77722	Military, PS/2, Red LED Lighted, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77723	No Emergency Key, PS/2, EL, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type
M77724	No Emergency Key, USB, EL, 2-Button Mouse, Coiled Cord, NEMA 4, Touch-type

Note:

The specifications of the parts with “Military” description are described in this SCD. The parts with “Commercial” description have the same specifications with the “Military”, except for the temperature ranges shown in the table below.

Condition	**Temperature**				**Relative Humidity (R.H.)**
	Commercial Version		**Military Version**		
	PS/2	**USB**	**PS/2**	**USB**	
Operating	0 to 50 ^{o}C	0 to 50^{o}C	-30 to 85^{o}C	-30 to 85^{o}C	85%
	32 to 122 ^{o}F	32 to 122 ^{o}F	-22 to 176^{o}F	-22 to 176^{o}F	
Storage	-20 to 60^{o}C	-20 to 60^{o}C	-40 to 90^{o}C	-40 to 90^{o}C	95%
	-4 to 140 ^{o}F	-4 to 140 ^{o}F	-40 to 194^{o}F	-40 to 194^{o}F	