

USER MANUAL

# VisuNet XT 9700 Series





With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"



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# 1 Safety

## 1.1 Validity

This document contains information that you must read for your own personal safety and to avoid property damage. Depending on the hazard category, the warning signs are displayed in descending order as follows:

## 1.2 Symbols Used

### Safety Symbols

#### ***Danger!***



Danger notices emphasize that hazardous conditions may exist in the equipment, or may be associated with its use. Failure to comply with danger notices may result in serious personal injury or death.

#### ***Warning!***



Warning notices indicate a warning about a possible fault or danger.

Failure to comply with warning may result in personal injury or equipment damage.

#### ***Caution!***



Caution notices indicate a warning about a possible fault.

Ignoring the devices and any connected facilities or systems may cause interruption, or complete failure of components or the entire system.

### Informative Symbols

#### ***Note!***



Notes call attention to information that is especially significant to understanding or operating the diagnostic module.

#### **Action**

This symbol indicates a paragraph with instructions.

## 1.3 Target Group/Personnel

The system operator is responsible for planning, mounting, commissioning, operating, and maintenance.

Assembly, commissioning, operation, maintenance, and disassembly of any device must be performed by trained, qualified personnel only. The instruction manual must be read and understood.

## 1.4 Reference Documentation

Laws, standards, or directives applicable to the intended use must be observed. In relation to hazardous areas, Directive 1999/92/EC must be observed.

The corresponding data sheets, Declarations of Conformity, EC type-examination certificates, certificates and control drawings, if applicable (see data sheet), are an integral part of this document. This information can be found at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

Due to constant revisions, this documentation is subject to continual change. Please refer only to the most up-to-date version at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

## 1.5 Delivery, Transport, and Storage

Check the packaging and contents for damage. Inform the shipper and contact the supplier if any damage is found.

Make sure the item received is the correct item ordered. Contact Pepperl+Fuchs with questions or concerns.

Keep the original packaging. Always store and transport the device in the original packaging.

Always store the device in a clean and dry environment. The permitted storage temperature (see data sheet) must be considered.

## 1.6 Marking

Examine the model number nameplate to identify the appropriate approvals, area classification, and type, as shown in [Figure 1.1](#).

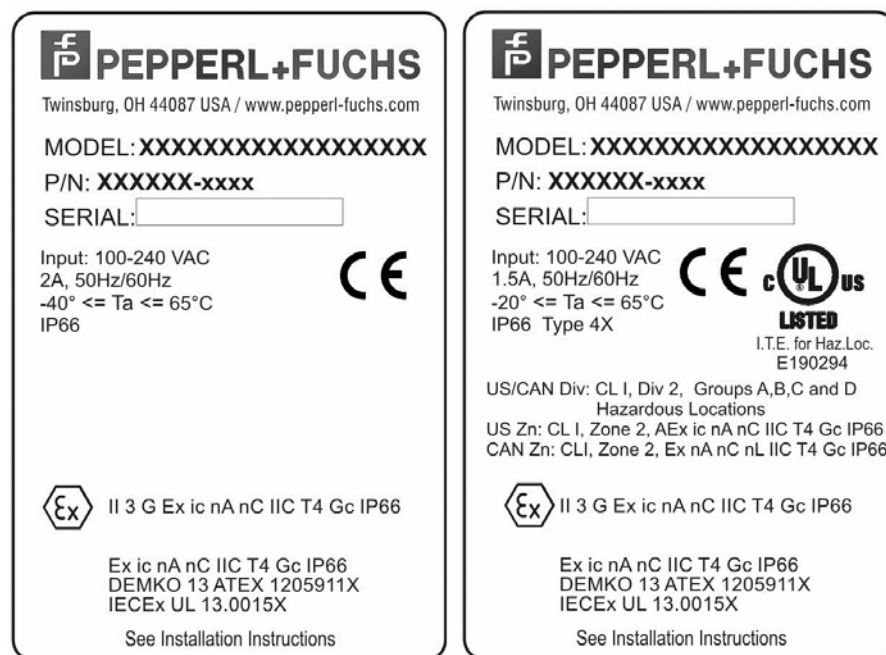


Figure 1.1 XT Identification Labels: Zone 2 only ("L2") and Dual rated Zone 2 & Class I/Div 2 ("W3")

## 1.7 Intended Use

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

The device must only be operated in the ambient temperature range and at the relative humidity (non-condensing) specified.

Connect interfaces using shielded cables ONLY.

The lead data cable and power circuit line must be in separate cable channels.

Check all cables and connectors before commissioning the system.

Wiring methods must be done in accordance with the authority having local jurisdiction.

Protection of the operating personnel and the overall system is not ensured if the product is not being used according to its intended purpose.



For installations in a Restricted Access Location or equivalent, the user must comply with the Restricted Access Location requirements of UL60950-1.

## 1.8 Warnings and Cautions

When so labeled, this equipment is suitable for use in Class I/Div 2, Groups A, B, C and D, Class I/Zone 2, ATEX/IEC-Ex Zone 2 or non-hazardous locations only. Please consult local electrical codes for hazardous location installation guidelines.

Power, input and output (I/O) wiring must be in accordance with Class I/Division 2 wiring methods [Article 501.4(B) of the National Electrical Code, NFPA 70] and in accordance with the authority having jurisdiction. The cabinet for installations in Division 2 must be suitable for Division 2 wiring.



**Warning!**

EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.



**Warning!**

EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I / ZONE 2.



**Warning!**

EXPLOSION HAZARD - DO NOT OPEN OR REPAIR UNIT WHILE POWER IS CONNECTED.



**Warning!**

EXPLOSION HAZARD - ALL UNUSED CABLE GLANDS MUST HAVE A PROTECTIVE BLANKING PLUG IN PLACE. Refer to [Section 5.2.12](#).

The Declaration of Conformity, Certificate of Compliance, and the data sheets are considered an integral part of this user manual. The data sheets contain the electrical data of the Declaration of Conformity and the Certificate of Compliance. Laws and/or regulations governing the use or intended use must be observed.

## 1.9 Disposal

Disposing of devices, packaging material, and possibly contained batteries must be in compliance with the applicable laws and guidelines of the respective country.



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## 2 Introduction

The VisuNet XT-9700 Series is a self-contained, Windows®-based personal computer with a built-in hardened, resistive touch screen and front keypad overlay designed primarily for use in hazardous and harsh environments.

The unit is housed in a rugged, cast aluminum alloy enclosure (Type 4x/IP66) to protect the system against dust, water, and damage.

VisuNet XT computers are available as either 24 V DC units that accept a range of 18 ... 30 V DC, or as 115/230 V AC units that accept a range of 100 ... 240 V AC. VisuNet XT computers provide an enhanced feature set including configurable heaters for extended temperature operation and a front keypad overlay. The unit is supplied completely assembled and requires only mounting and connecting.

### 2.1 Certification

The VisuNet XT-9700 series is ATEX and IECEx certified for Zone 2, as well as UL Class I/Div 2 and AEx Class I/Zone 2 environments. See [Section 3.4](#) for a complete list of agency markings, standards, and certifications.



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## 3 Product Description

### 3.1 General Overview

The VisuNet XT product family is a series of extremely rugged, PC-based operator workstations for the oil and gas industry based on an Type 4X/IP66 rated, impact-resistant cast aluminum housing.

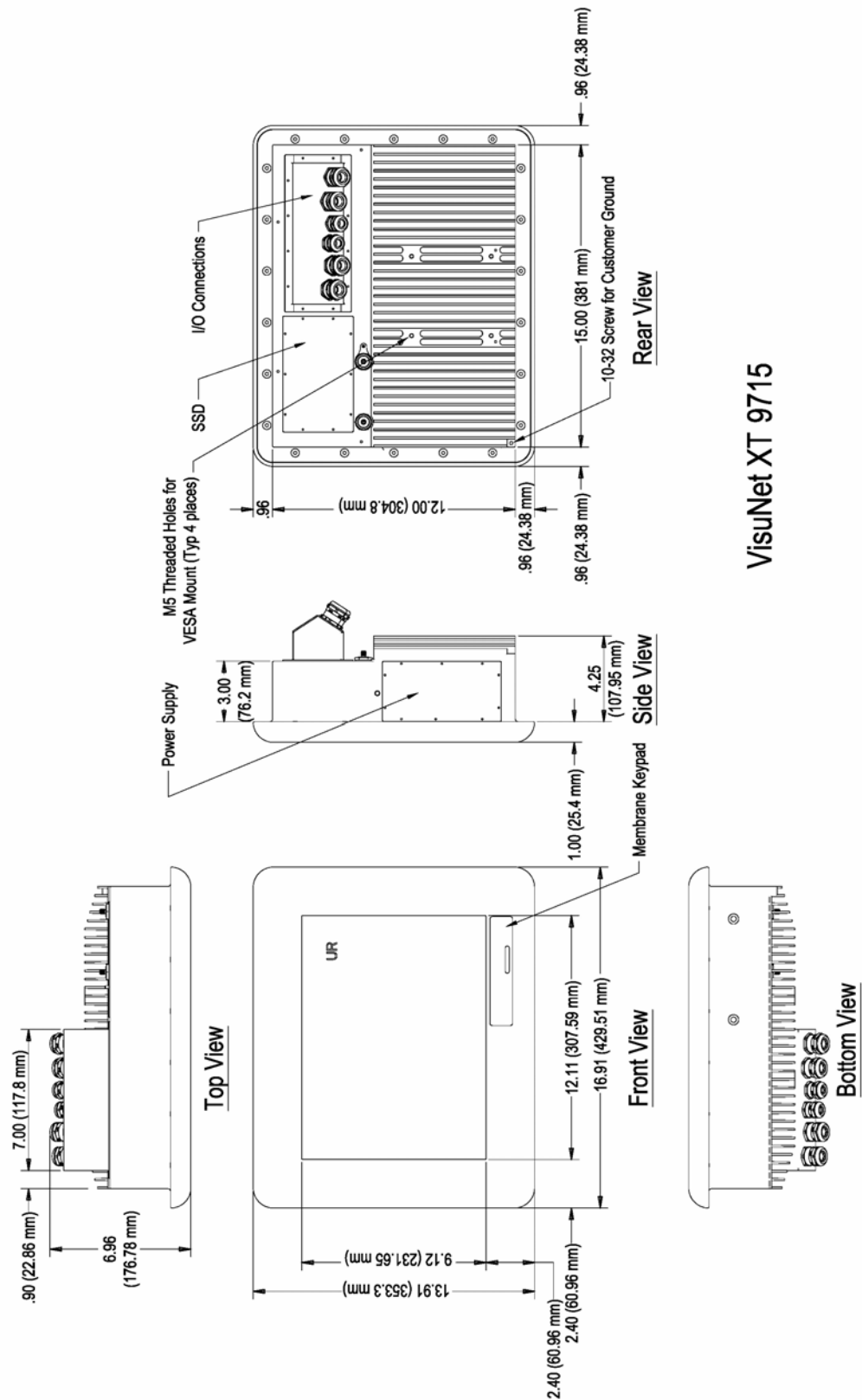
The VisuNet XT PC9700 series features either a high bright 15 inch or 19 inch TFT LED-backlit LCD display. Both models come with a 5-wire hardened resistive, optically bonded touch screen for enhanced sunlight readability. The PC9700 is available as either a Class I/Division 2 or a ATEX/IECEX Zone 2 rated device.

The key component of the PC9700 is the powerful Intel® i7 quad core processor, running the Windows® 7 Ultimate operating system with the option of a 32-bit or 64-bit system.

The following options are available.

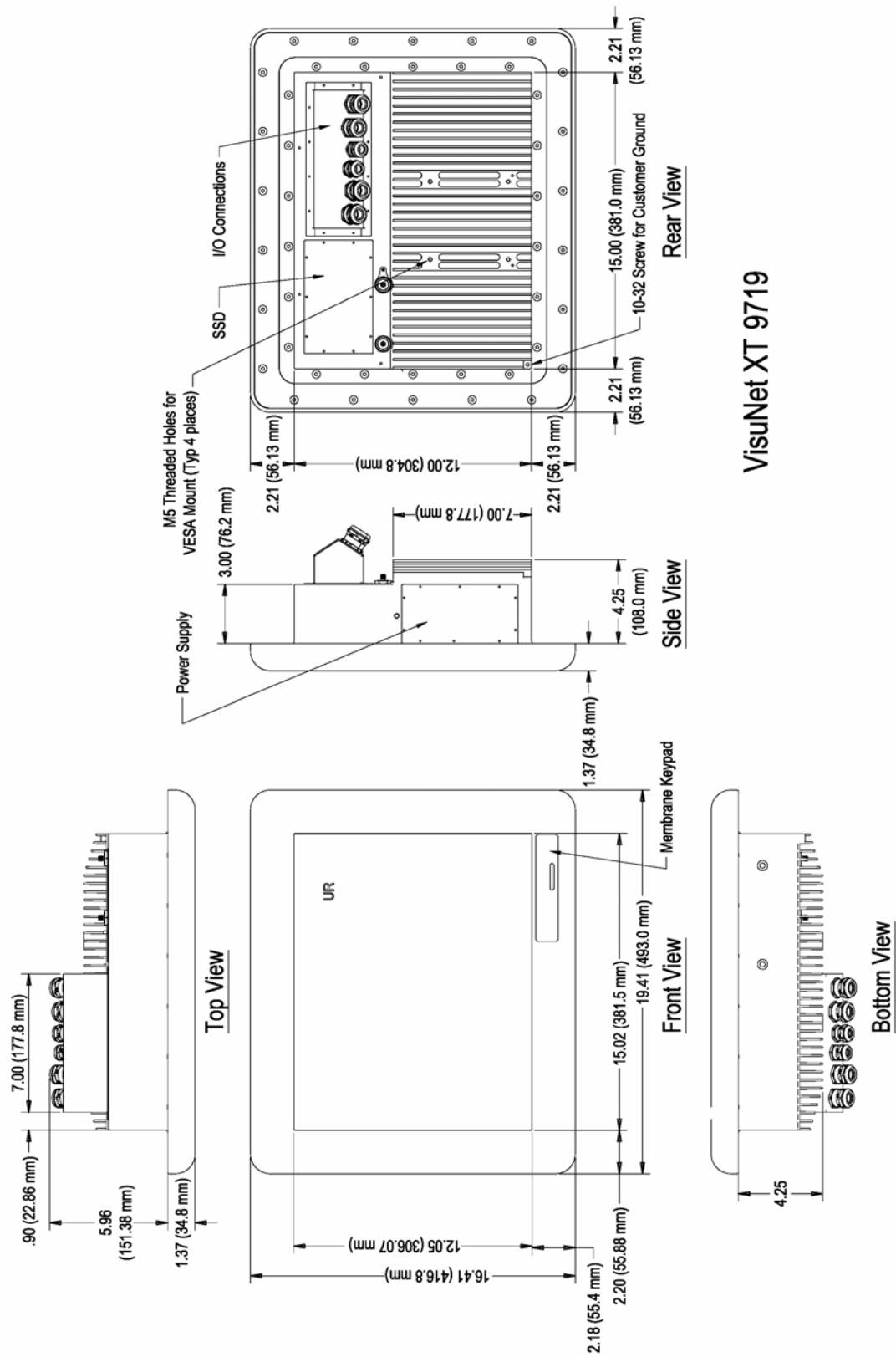
- Multi-mode fiber optic LAN option.
- Intel® i7 Quad Core or Celeron processor options.
- 120 GB SSD (Solid state Drive).
- Windows® 7 Ultimate (32-bit or 64-bit).
- Up to 8 GB RAM.
- Wireless Ethernet IEEE 802.11a/b/g/n.
- Complete fanless design.
- Heater option for -40° C (-40° F) operation.
- 100 ... 240 VAC, 50-60 Hz, 18 ... 30 VDC.
- Three mounting options: VESA mount, yoke mount, or panel mount.
- NEMA 4X and IP66 rated.
- Class I/Division 2, Class I/Zone 2, ATEX Zone 2, IECEX Zone 2

## 3.2 Component Overview



VisuNet XT 9715

Figure 3.1 VisuNet XT 9715



VisuNet XT 9719

Figure 3.2 VisuNet XT 9719

### 3.3 Specifications

Table 3.1 General Specifications

Type	XT 9715	XT 9719
Hardware		
Processor	Intel i7 quad core processor, 2.2 GHz / Celeron 1.6 GHz	Intel i7 quad core processor, 2.2 GHz / Celeron 1.6 GHz
RAM	4 GB/8 GB	4 GB/8 GB
Hard Disk/SSD	120 GB SSD	120 GB SSD
Display		
Type	TFD, LCD	TFD, LCD
Screen Diagonal	15 inches	19 inches
Resolution	768 x 1024 pixels	1280 x 1024 pixels
Contrast	800:1	800:1
Brightness	Sunlight readable	Sunlight readable
I/O		
Interface Type	1 x RS232, 1 x RS485, 2 x USB, 2 x LAN, 1 x VGA, 1 x audio out, 1 x audio in, 2 x ST-fiber (when fiber option is selected), 1 x DI, 1 x DO	
Software		
Operating System	Microsoft Windows® 7 Ultimate, 32-bit or 64-bit	
Electrical Specifications		
Power Supply	AC: 100 ... 240 VAC, 56 ... 60 Hz, 1.5 A Max. AC with Heater: 100 ... 240 VAC, 50 ... 60 Hz, 4 A Max. DC: 18 ... 30 VDC DC with heater: 10 ... 30 VDC, 20 A Max.	
Power Consumption	100 W Max	125 W Max
Electrical Isolation (I/O's)	1.5 Kv	1.5 Kv
Ambient Conditions		
Operating Temperature	-20 °C ... +65 °C (-4 °F... +149 °F) -40 °C ... +65 °C (-40 °F... +149 °F) with heater	
Storage Temperature	-40 °C ... +70 °C (-40 °F... +158 °F)	
Vibration Resistance	MTL-STD-810G Operational: 2.2G RMS, 20-2000 Hz, 1 hr per axis Storage: 3.1G RMS, 20-2000 Hz, 1 hr per axis	
Shock Resistance	MTL-STD-810G Operational: 40G peak, 11ms, 3-axis Storage: 40G peak, 11ms, 3-axis	
Humidity	0 ... 95 % non-condensing	



Mechanical Specification	
Protection Degree	Type 4/4X, IP66
Standards	
EMC	Immunity Standards meet EN 61000 Sections 3-2,3-3,6-2
CE	2004/108/EC (EMC Directive) 2006/95/EC (Low-Voltage Directive) 94/9/EU (Guidance for Ex-Protection)
ATEX	EN 60079-0, EN 60079-11, EN 60079-15
cULus	UL508 (Industrial Control Equipment) UL60950 (IT Equipment) ANSI/ISA-12.12.01-2007 (Hazardous Location) CSA C22.2 142 (Process Control Equipment) CSA 213 (Hazardous Location) Class I / Div 2, Class I / Zone 2
IECEX	60079-0, 60079-11, 60079-15 Zone 2
ATEX	II 3G Ex ic nA nC IIC T4 Gc IP66

### 3.4 Agency Markings, Standards, and Certifications

#### 3.4.1 UL

##### USA

UL 60950-1 (2ND EDITION + AMENDMENT 1) - INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2011/12/19  
UL 60950-22 - INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 22: EQUIPMENT TO BE INSTALLED OUTDOORS - Edition 1 - Revision Date 2011/12/19.

##### Canada

CSA C22.2 NO. 60950-1-07 (2ND EDITION + AMENDMENT 1) - INFORMATION TECHNOLOGY EQUIPMENT SAFETY PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2011/12/19  
CSA C22.2 NO. 60950-22-07 - INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 22: EQUIPMENT TO BE INSTALLED OUTDOORS - Edition 1 - Revision Date 2011/12/01.

Products designated USL have been investigated using requirements contained in:

ANSI/ISA-12.12.01-2012, Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations, dated 2012-07-09. UL 60079-0, 5th Edition, Explosive atmospheres - Part 0: Equipment - General Requirements, dated 2009-10-21. UL 60079-11, 6th Edition, Explosive Atmospheres - Part 11: Equipment Protection by Intrinsic Safety "i", dated 2013-02-15. UL 60079-15, 3rd Ed., Electrical Apparatus for Explosive Gas Atmospheres - Part 15: Construction, Test and Marking of Type of Protection "n" Electrical Apparatus, dated 2009-07-17. UL50, 12th Edition, Enclosures for Electrical Equipment, Non-Environmental Considerations, dated 2007-09-04. UL50E, 1st Edition, Enclosures for Electrical Equipment, Environmental Considerations, dated 2007-09-04.

Products designated CNL have been investigated using requirements contained in:

C22.2 No. 213-M1987, Non-incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations CAN/CSA C22.2 No. 60079-0:11, 2nd Edition, Explosive atmospheres - Part 0: Equipment - General Requirements, dated December 2011. CAN/CSA-C22.2 No. 60079-11:11, Explosive Atmospheres - Part 11: Equipment Protection by Intrinsic Safety "i", dated 2011-12-01. CAN/CSA-C22.2 No. 60079-15:12, 1st Edition, Electrical Apparatus for Explosive Gas Atmospheres - Part 15: Construction, test and marking of type of protection "n"

electrical apparatus, dated January 2012 Enclosures for Electrical Equipment, Non-Environmental Considerations, dated 2007-09-04. CSA C22.2 No. 94.1-07, 1st Edition, Enclosures for Electrical Equipment, Non-Environmental Considerations - First Edition CSA C22.2 No. 94.2-07, 1st Edition, Enclosures for Electrical Equipment, Environmental Considerations, dated 2007-09-01.

**US Divisions:** Class I, Division 2, Groups A, B, C and D Standards ANSI/ISA-12.12.01-2012, dated 2012-07-09.

**Canadian Divisions:** Class I, Division 2, Groups A, B, C and D Standards C22.2 No. 213-M1987.

**US Zones:** Class I, Zone 2, AEx ic nA nC IIC T4 Gc IP66 Standards UL 60079-0, 5th Edition, dated 2009-10-21. UL 60079-11, 6th Edition, dated 2013-02-15 UL 60079-15, 3rd Ed., dated 2009-07-17.

**Canadian Zones:** Class I, Zone 2, Ex nA nC nL IIC T4 Gc IP66 Standards CAN/CSA C22.2 No. 60079-0:11, 2nd Edition, dated December 2011. CAN/CSA-C22.2 No. 60079-11, 1st edition, 2011-12-01 CAN/CSA-C22.2 No. 60079-15:12, 1st Edition, dated January 2012.

### 3.4.2 ATEX

EN60950-22:2006 + A11:2008 INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 22: EQUIPMENT INSTALLED OUTDOORS - Edition N/A - Revision Date 2008/01/01.

**ATEX Cert:** DEMKO 13 ATEX 1205911X

#### Markings



II 3G Ex ic nA nC IIC T4 Gc IP66



II 3G Ex ic nA nc [ic] IIC T4 Gc IP66

#### Standards

EN 60079-0:2009  
EN 60079-11:2012  
EN 60079-15:2010

### 3.4.3 IEC and IECEX

IEC 60950-1 (2ND EDITION + AMENDMENT 1) INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2011/12/19.

IEC 60950-22 INFORMATION TECHNOLOGY EQUIPMENT SAFETY PART 22: EQUIPMENT TO BE INSTALLED OUTDOORS - Edition 1 - Issue Date 2005/10/01.

IECEX UL 13.0015X

#### Markings

Ex ic nA nC IIC T4 Gc IP66

Ex ic nA nc [ic] IIC T4 Gc IP66

#### Standards

IECEX 60079-0 (5th Edition)  
IECEX 60079-11 (6th Edition)  
IECEX 60079-15 (4th Edition)

#### 3.4.4 FCC

Federal Register CFR 47, Part 15, subpart B: 2007

- Radiated Emissions, Part 15.109(b), Class A
- Conducted Emissions, Part 15.107(b), Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operations.



## 4 Hardware Installation

Become familiar with the device and carefully read the instruction manual prior to the mounting, installation, and commissioning of the device.

The Statement of Conformity and Certificate of Compliance of the VisuNet XT-9700 must be observed. It is especially important to pay attention to any special conditions for safe use that are indicated.

Avoid electrostatic discharges while operating the installed device.

Connection or disconnection of energized non-intrinsically safe circuits is only permitted in the absence of a hazardous atmosphere.

### 4.1 General Warnings

- Input and output wiring methods and cable types must be in accordance with ordinary location wiring methods and in accordance with the authority having jurisdiction.
- Power must be removed from the unit before performing any service procedures.
- Dangerous power levels may be present in the computer or on power input terminals while power is connected, even if the power has been turned off. The proper method for removing power from the unit is to switch off power at the circuit breaker.
- (DC version) Connect the power supply to an isolated secondary voltage that is separated from the primary circuit by reinforced or double insulation. The power supply shall be properly bonded to the main grounding terminal in the end product. Make sure there is a proper connection between protective earth and negative somewhere in the DC Power Net. The power supply shall be connected to a circuit that does not exceed 30 A.
- (AC version) The power supply shall be connected to branch circuit that does not exceed 20 A.

The touch screen, control buttons and function keys are intended for use with hands or gloved hands. Do not use tools that have metal parts, such as screwdrivers, as these may damage the touch screen and controls.



#### **Caution!**

**DO NOT attempt to remove the LCD monitor from the computer housing. Removal of the monitor by unauthorized persons may void all warranties. This procedure must only be performed by a qualified Pepperl+Fuchs Service Technician.**

### 4.2 Mounting the VisuNet XT

#### 4.2.1 Selecting a Mounting Location

- The VisuNet XT-9700 Series is designed to operate in an outdoor environment.
- The mounting method must be able to support the weight of the unit under shock and vibration conditions for the given application.
- To insure proper operation, do not install the unit in tight, confined areas where heat buildup can cause the unit to overheat and shut down until temperatures fall back to normal operating conditions.

#### 4.2.2 Mounting Options

The VisuNet XT can be mounted three different ways.

- **Yoke Mount:** An adapter for mounting on a yoke can be fastened to threaded holes on the left and right sides of the unit. Refer to [4.2.2.1](#).
- **VESA Mount:** Mounting points according to the VESA Mounting Interface Standard are located on the rear of the unit. Refer to [4.2.2.2](#), [Figure 4.11](#). Use M5 x 12 mm screws to mount the VisuNet XT.

- **Panel Mount:** The VisuNet XT can be mounted in a panel opening using a Panel Mount Kit. Refer to [4.2.2.3](#).

Each method requires its own accessory components to assist in mounting.

## 4.2.2.1 Yoke Mount Installation

### Shield Assembly

1. Attach side plates (#547303 and #547302) to the shield (#547309) through the pivot hole location, aligning stop pin into the guide slot. Place two thrust bushings on each side (4x #547642) on both sides of the shield flanges and insert the pivot bearing (2x #547640) through the shield and thrust bushings. Place one washer (2x #547646) and one locknut (2x #547647) on each stud and tighten to 14in-lb. See [Figure 4.1](#).

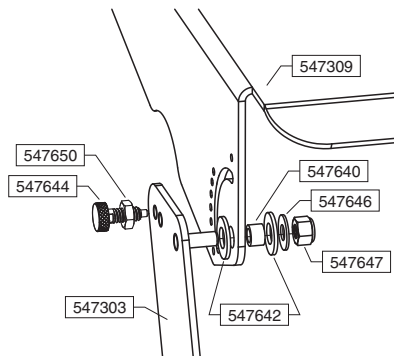


Figure 4.1 Shield Assembly

2. Using one retractable plunger (2x #547644) per side, inert jam nuts (2x #547650) onto the plunger threads then install into threaded hole on shield side plates. Apply Included Loctite 243 (#547659) to the threads of the plungers. Adjust the depth such that the thread end of each plunger (the nose when the plunger is retracted) leaves a .03"-.05" gap from the shield sides as shown. Tighten jam nuts to 30in-lb to secure in place. Refer to [Figure 4.2](#).

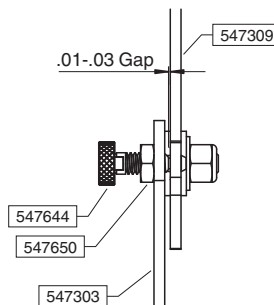


Figure 4.2 Shield lock gap adjustment

### Yoke Adapter Assembly

1. Attach adapter blocks (2x #547304) to the side of the XT using two socket cap screws (4x #547654) for each block. Apply Loctite 243 (#547659) to threads prior to engagement. Insert into the two outer through holes and the outer two threaded holes on the side of the XT. Using a 3/16" hex socket, tighten each to 36in-lb. NOTE: Orient the right side block to ensure the pockets are aligned to the XT side cover screws to allow proper fit. See [Figure 4.3](#).

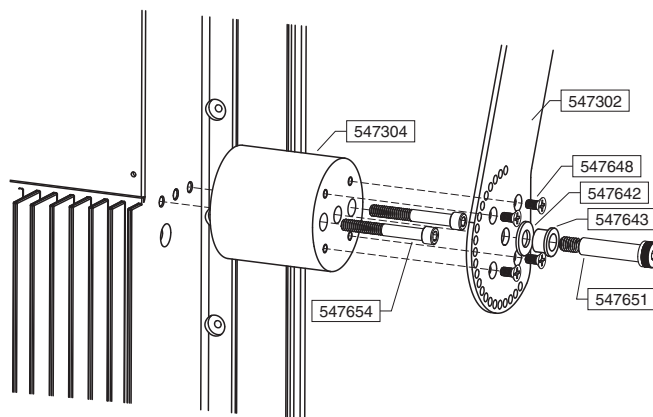


Figure 4.3 Yoke mounting adapter assembly

2. Inserting from the back side, attach the shield brackets to each adapter block using four flat head screws (8x #547648) per side. Apply Loctite 243 (#547659) to each of the screws and tighten to 24in-lb using a #2 Phillips driver.
3. Insert shoulder bushing (2x #547643) and thrust bushing (2x #547642) onto each shoulder screw hinge (2x #547651). Apply Loctite 243 (#547659) to the shoulder screw threads, then insert hinge into adapter block and start 1-2 threads to temporarily hold the shoulder screw before installation to the yoke frame.
4. If no sun shield is used, install adapter plates (2x #547308) similarly to the sun shield installation. Rotate the plate to the position which matches the yoke orientation. Refer to [Figure 4.4](#).

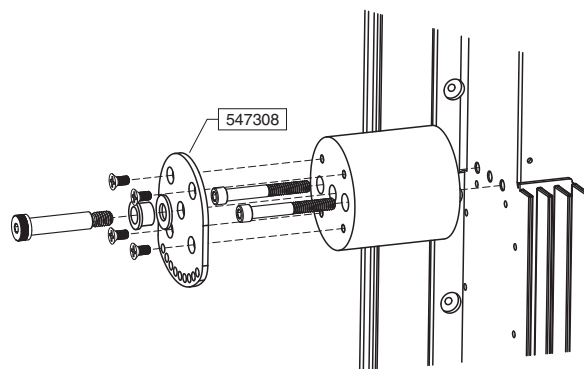


Figure 4.4 Adapter plate installation for no shield

#### Yoke Frame Assembly

1. Insert two larger jam nuts (2x #547656) on the two larger plungers (2x #547645). Apply Loctite 243 (#547659) to the threads of the plunger. Install into the threaded holes near the pivot channel on the yoke frame (#547306). Set the nose end of the plunger when retracted to be protruding no more than .05". once installed, retract the plungers into the open position. Refer to [Figure 4.5](#).

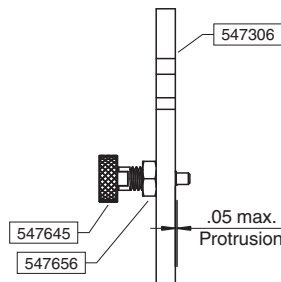


Figure 4.5 Yoke frame clearance setup

2. Install the yoke by spacing the bearings as shown in the figure. Once placed within the circular cutout, push in each sleeve bearing to lock the assembly in place. The plungers can be locked in place to further aid installation.
3. Fasten the hinge shoulder screws using a 3/16" hex socket to 100in-lb. Refer to [Figure 4.6](#).

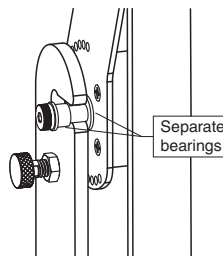


Figure 4.6 Yoke frame attachment

4. Install yoke base (#547305) to desired location. Thread the three thumb screws (3x 547638) into the tube section of the yoke frame.
5. Insert the frame into yoke base and tighten thumb screws by hand in desired position. Refer to [Figure 4.7](#).

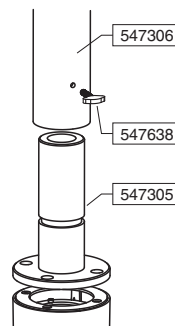


Figure 4.7 Yoke base

#### Yoke Keyboard Tray Assembly

1. Thread the plungers onto each threaded hole on the keyboard tray (547308). Insert a jam nut (2x #547650) onto each plunger (2x 547644). Apply a small amount of Loctite 243 (#547659).
2. Place two of the smaller thrust bushings (2x 547641) onto each of the smaller shoulder screws (2x #547657). Place one bushing (2x #547640) on each shoulder screw. Install inwards on each side to the hinge hole on the keyboard tray.
3. Insert one thrust bushing (2x 547642) on each side. Next, place a spacer (2x 547655) on each shoulder screw. See [Figure 4.8](#).



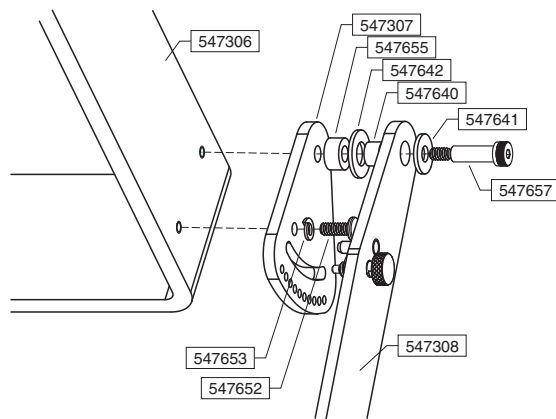


Figure 4.8 Keyboard tray flange assembly

4. Place one keyboard flange (2x 547307) on each shoulder screw, aligning the stop pin to the guide channel.
5. Apply Loctite 243 (#547659) to the threads of the shoulder screw.
6. With the keyboard tray in the lowest setting (against the bottom of the channel), fasten each shoulder screw to the yoke frame. Tighten each shoulder screw using a 1/8" hex socket to 24in-lb.
7. Align the other mounting hole on each flange to the second hole on the yoke. Insert two pan head screws (2x 547652) (one on each side), with a lock washer (2x 547653) on each screw, into each of the remaining threaded holes. See [Figure 4.9](#).

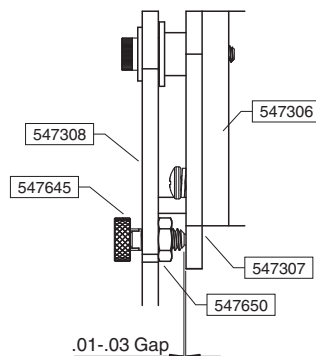


Figure 4.9 Keyboard tray clearance adjustment

8. Once secured, set the plunger depth to a retracted nose clearance gap of .03"-.05". Tighten each jam nut to 30in-lb. See [Figure 4.10](#).

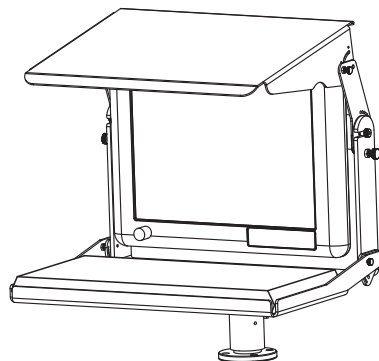


Figure 4.10 Complete yoke assembly with shield and keyboard tray

#### 4.2.2.2 VESA Mount Installation



On the back side of the XT unit is a 100 mm VESA mount for attachment to pedestals, wall arms, ceiling arms, or wall mount brackets. Use M5 x 12 mm long hex head screws (item 1) and lockwashers (item 2) for VESA mounting. Refer to [Figure 4.11](#).



**Note!**

A customer-supplied VESA steel mounting plate must be a minimum of 12 ga. thickness.

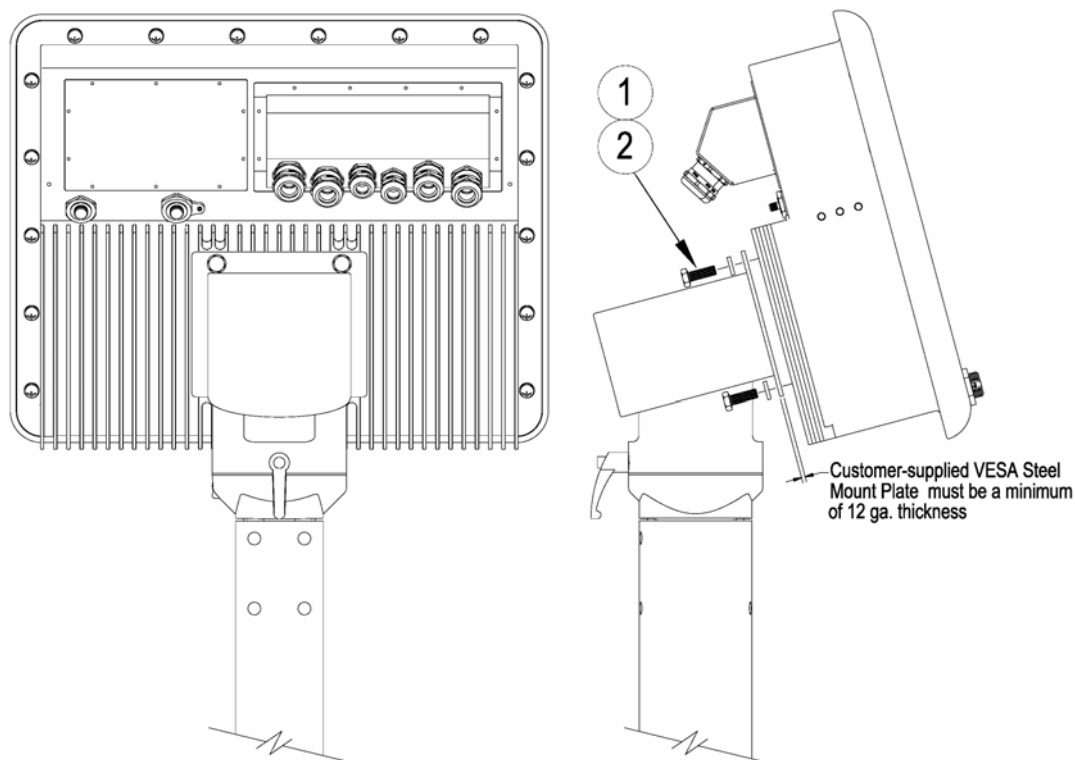


Figure 4.11 VESA Mount

#### 4.2.2.3 Panel Mount Installation

The VisuNet XT unit is designed for easy panel mounting in a control or machine cabinet. Use the provided mounting accessory kit to secure the monitor from the inside of the cabinet. The outer dimensions of the front bezel are as follows.

- 15-inch Display: 16.9 in. W x 13.9 in. H (430 mm x 353 mm)
- 19-inch Display: 19.4 in. W x 16.4 in. H (493 mm x 417 mm)
- Maximum enclosure wall thickness: 0.375 in. (9.5 mm)
- Panel cutout is 15.2 in. x 12.2 in. (386 mm x 310 mm)

Prepare the panel cutout to the dimensions above and perform the following steps to install the XT unit. Refer to FIG.



1. Install the gasket sections to the back of the XT unit, as shown in [Figure 4.12](#). The top and bottom gaskets (item 2) are reversible, and the left and right gaskets (item 1) are reversible.
2. Secure the right panel mount bracket (item 4) and left panel mount bracket (items 3) together with #6-32 Phillips pan head screws (item 6) threaded into the Pemserts (item 5). Tighten the screws to 1.2 Nm (11 in.-lb.). See [Figure 4.13](#).

3. Thread sixteen #10-32 Phillips pan head screws (item 7) into the threaded holes in the frame until they just protrude from the other side. Do not thread them in all of the way.
4. Look at the back of the XT unit and find the six threaded mounting holes. There are two along the top, two along the bottom, and one on each side. Refer to [Figure 4.14](#).
5. Look at [Figure 4.13](#) and [Figure 4.14](#) to see the proper orientation of the panel mount bracket assembly.
6. Install the XT unit (item 1) through the panel cutout (item 2) from the front side.



**Note!**

make sure the surface is clean and free of any surface contaminants before installing the XT unit.

7. From the back side of the panel, place the panel mount bracket assembly over the XT unit and secure the bracket assembly to the XT unit with six #6-32 Phillips pan head screws. Tighten the screws to 1.2 Nm (11 in.-lb.).
8. Secure the XT unit to the panel by tightening the sixteen #10-32 Phillips pan head screws (item 7) against the back side of the panel. Tighten the screws to 1.2 Nm (11 in.-lb.).

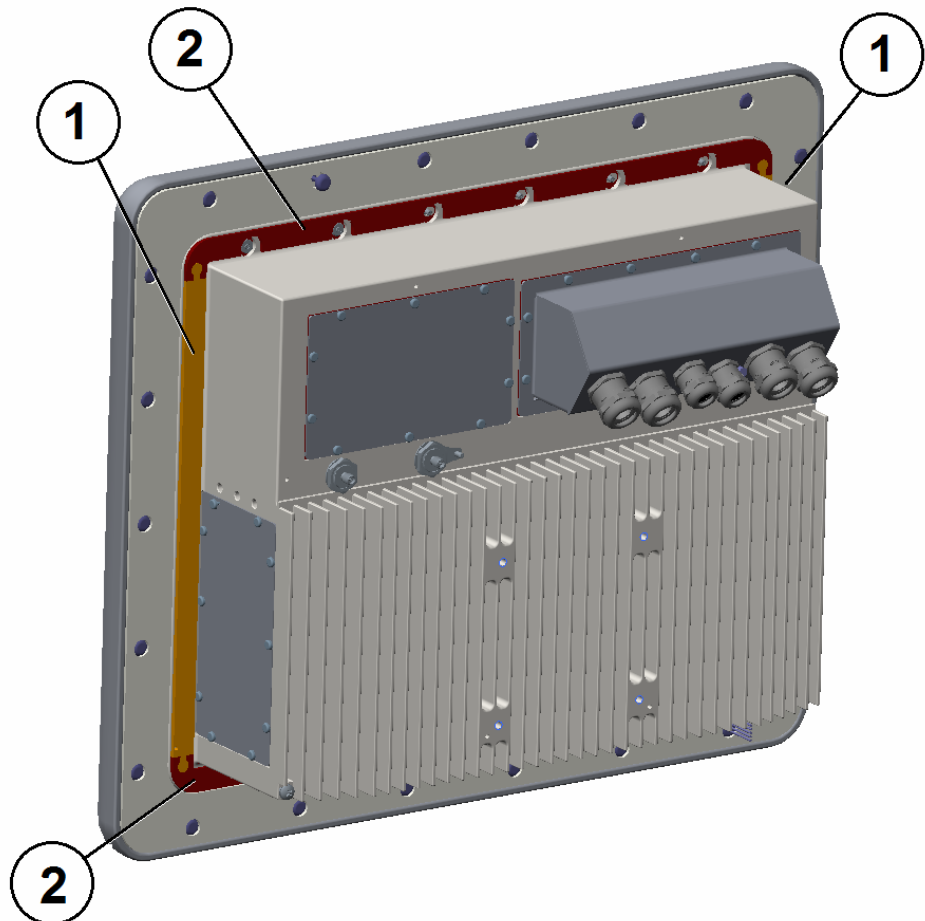


Figure 4.12 XT Unit Gasket

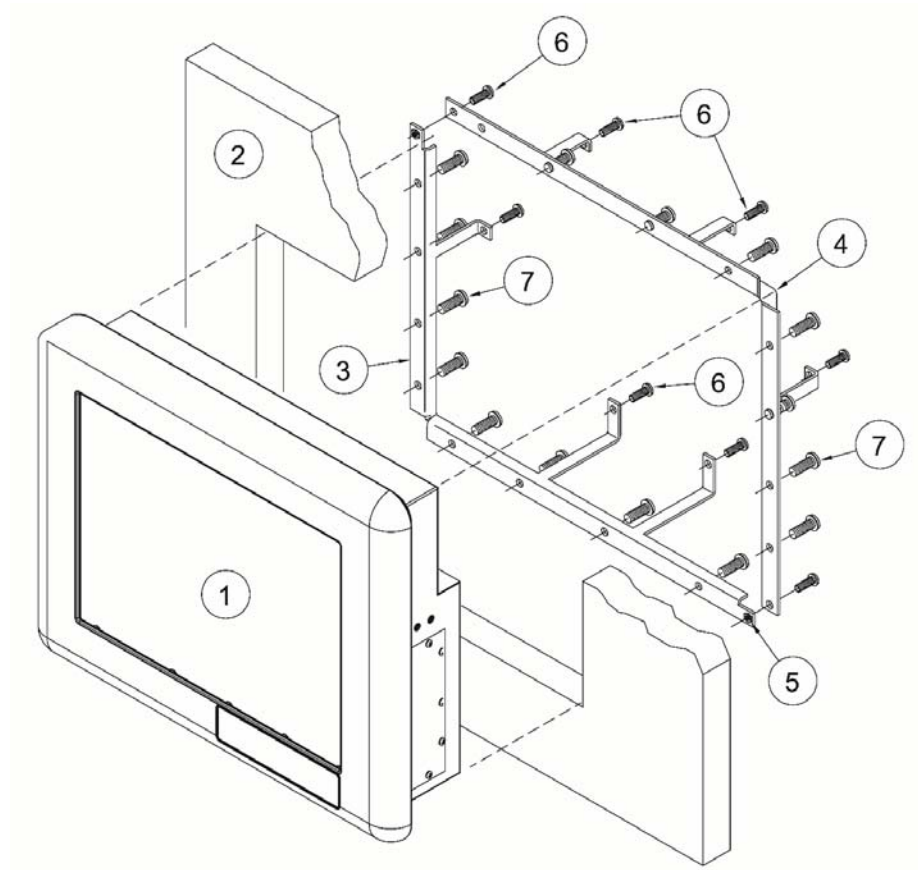


Figure 4.13 Panel Mount Assembly

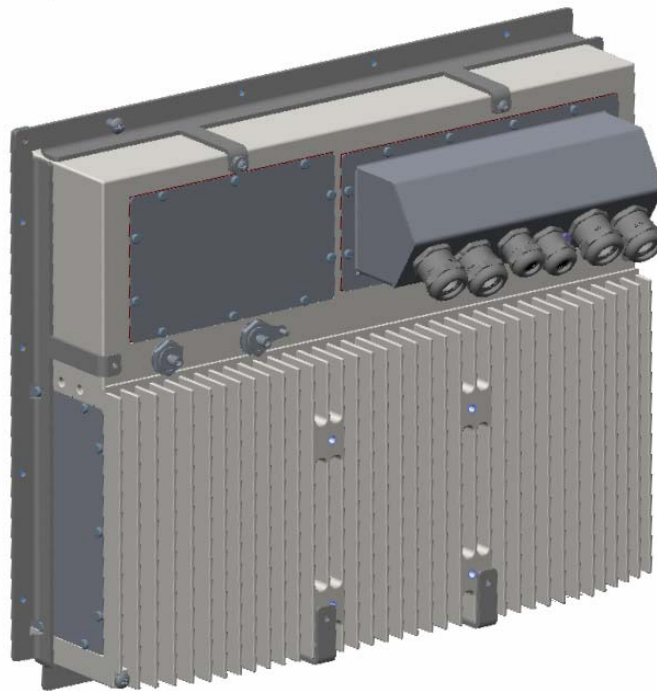


Figure 4.14 Panel Mount Frame Assembly Mounted to XT Unit

## 5 Connectors and Cabling

This section describes the connectors and cabling on the VisuNet XT-9700.

Connectors are located on the rear I/O plate. All cables to the I/O plate must be routed through the cable glands on the junction box.

Input and output wiring methods must be in accordance with local wiring methods and codes, the authority having jurisdiction, and the manufacturer recommendations.

All cables brought through the cable glands must be supported to avoid forces or movement of the cables in the glands. Mount cable supports to the VisuNet housing or to the mounting supports.

All cabling is to be routed in grounded conduit.

All high voltage lines above 300 V must be separated from low voltage lines.

### 5.1 Junction Box

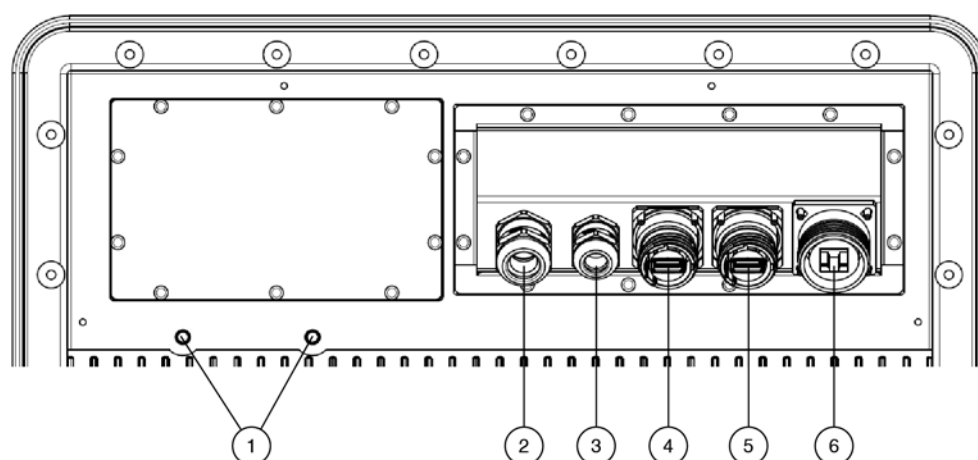
The VisuNet XT provides different pass through cable glands for cable connections (required to maintain the enclosure protection rating). These glands are gas and water tight and must be tightened with a torque described in the manufacturer's instructions. [Figure 5.1](#) identifies the available I/O glands.



#### *Caution!*

Modifying the junction box or the cable glands invalidates enclosure protection and certification.

#### 5.1.1 With Quick Disconnects and Cable Glands

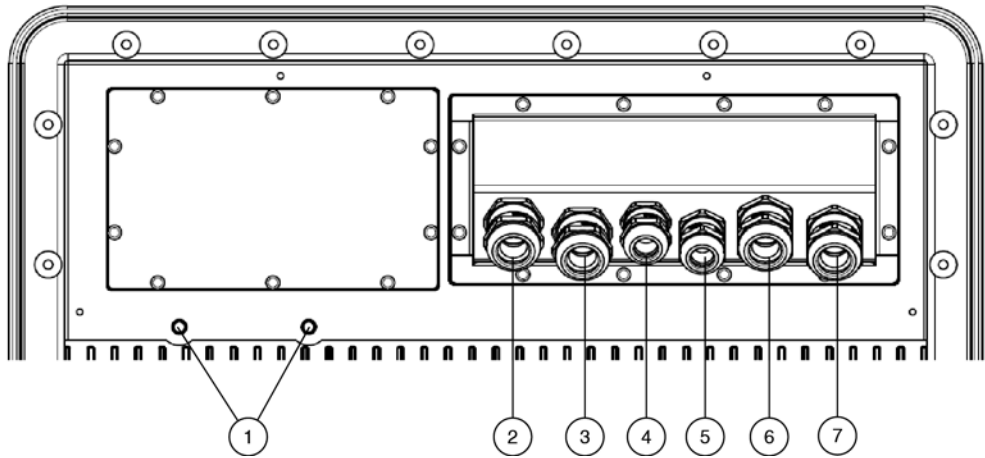


No.	Description	No.	Description
1	WIFI antenna connectors (SMA)	4	USB Type A
2	M20 cable gland for power	5	USB Type A
3	M16 cable gland for customer choice	6	RJ45 LAN connection

Figure 5.1 Junction Box with quick disconnects and cable glands



### 5.1.2 With Cable Glands



No.	Description	No.	Description
1	WIFI antenna connectors (SMA)	5	M16 for USB/COM
2	M20 cable gland for power	6	M20 for customer choice
3	M20 cable gland for customer choice	7	M20 for customer choice
4	M16 for USB/COM		

Figure 5.2 Junction Box with cable glands

### 5.1.3 Removing the Junction Box

Remove the junction box by performing the following steps.

1. Loosen the twelve (12) captive Phillips-head screws securing the junction box to the housing, as shown in [Figure 5.3](#).
2. Carefully remove the junction box from the housing. Make sure not to strain the cables connecting the two (2) USB connectors to the USB ports.

**Note!**

It may be necessary to loosen any gland having a cable passing through it to prevent straining the cables and I/O connectors inside the junction box. Only loosen glands if necessary.

### 5.1.4 Routing Cables Through the Junction Box

All connectors on the I/O plate must be properly secured to prevent accidental unplugging by shock or vibration. Use the securing feature of the connector when available.

#### 5.1.4.1 Cable Gland Torque Values

Refer to the manufacturer's instructions for proper torque values according to gland type, cable type, and cable diameter.

### 5.1.5 Installing the Junction Box

Install the junction box by performing the following steps.

1. Inspect the junction box seal for cuts, tears, or abrasion. Make sure the seal is clean and dry, and free from any dirt or foreign substances.

**Caution!**

Do not use lubricants or sealants on any of the cover plate seals. Using lubrication or sealing materials may cause seal degradation that can result in loss of enclosure protection.

2. Place the junction box on the housing and tighten the captive screws to 0.8 Nm (7 in.-lb.) in an inside-to-outside crisscross pattern using the incremental order shown in [Figure 5.3](#) to ensure the plate seals correctly.



**Caution!**

Do not use thread locker products on any screw thread.

Do not over-tighten the screws.

Failure to install the cover plate in the manner described may result in loss of enclosure protection.

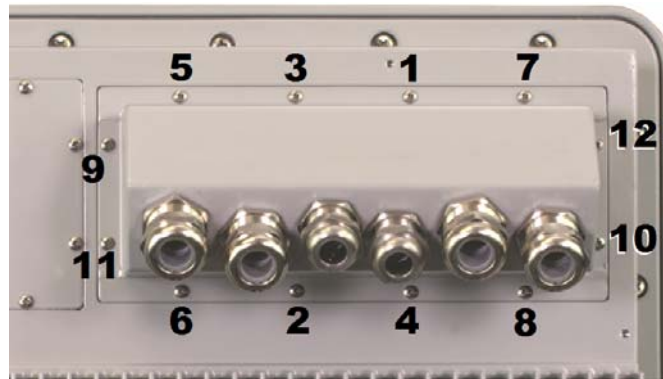


Figure 5.3 Junction Box Incremental Screw Tightening Order

## 5.2 I/O Plates

[Table 5.1](#) lists all the possible available I/O connections.

Table 5.1 Available I/O Connections

I/O	Quantity	Form Factor	Rating
VGA	1	15 pin D-SUB	
USB 2.0	2	Terminal Block	Isolated (Non-Incendive optional)
Serial Ports (RS232)	1	Terminal Block	Isolated
Serial Ports (RS485)	1	Terminal Block	Isolated
Ethernet CAT5	2	RJ45	
Ethernet Fiber	1 (Duplex)	ST Connector	
Power	1	Terminal Block	
Audio I/O	1 of each	Terminal Block	
Digital I/O	1 of each	Terminal Block	
Wireless Antenna	2	SMA Coax	

[Figure 5.4](#) shows I/O plate details and connector locations.

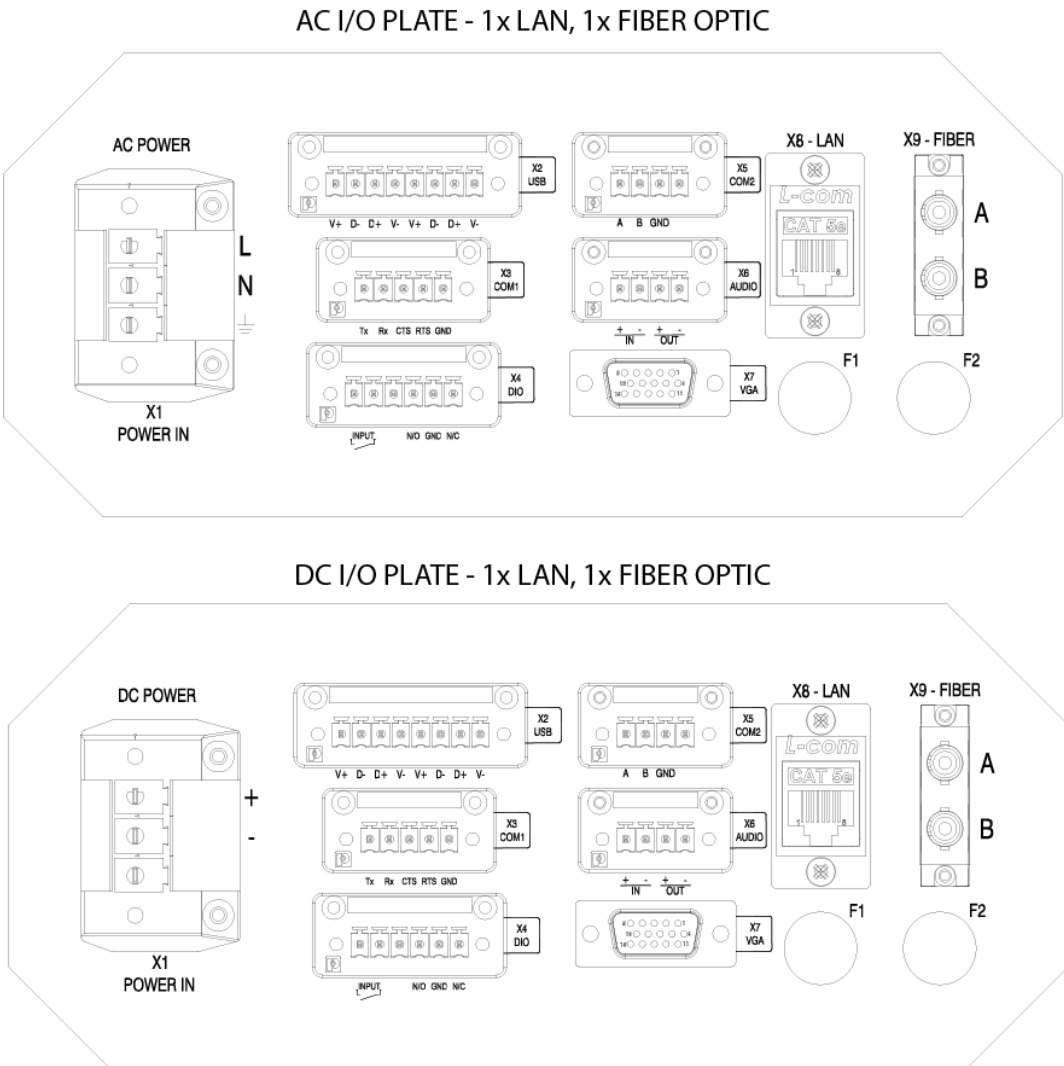


Figure 5.4 I/O Plate Details

5.2.1 X1 - Power

A power connection is provided by removable terminal block. The VisuNet XT has the option to accept either Universal AC input, or 18-30 VDC input.

**Wire size:** Use a minimum of 18 AWG (8 AWG Max) wire for AC power, and 16 AWG wire for DC power input.

**Tightening torque:** The recommended tightening torque is 0.7 Nm (6 in.-lb.).



**Note!**

Customer wiring used to power the main input terminals must use conductors rated for 75° C (167° F) or higher.

X1 Terminal - Power

	AC	DC
X1.1	Hot	+
X1.2	Neutral	-
X1.3	Ground	



## 5.2.2 X2 - USB 2.0 (x2)

Dual USB connections are provided on rear side of panel.

**Wire size:** 16-28 AWG.

**Tightening torque:** Recommended tightening torque is 0.24 Nm (2 in-lbs).

X2 Terminal - USB

X2.1	V+	X2.5	V+
X2.2	D-	X2.6	D-
X2.3	D+	X2.7	D+
X2.4	Ground	X2.8	Ground

## 5.2.3 Rear non-incendive/intrinsically safe USB (optional)

The rear USB ports can be ordered as intrinsically safe for Div 2/Zone 2 installation of P+F EXTA3 keyboards. Must follow connection per control drawing 116-B017. Entity parameters are as follows:

Voc = 4,92 V

Isc = 183 mA

Ca = 52µF

La = 800 uH

## 5.2.4 X3 - Serial Port (RS232)

Serial RS232 port is available via a 5-pin removable terminal block. The RS232 communication line is an isolated line providing 1.5 KV of isolation.

**Wire size:** 16-28 AWG.

**Tightening torque:** Recommended tightening torque is 0.24 Nm (2 in-lbs).

X3 Terminal - RS232

X3.1	Tx
X3.2	Rx
X3.3	RTS
X3.4	CTS
X3.5	Ground

## 5.2.5 X4 - Digital In/Out (I/O)

Digital output is available via an internal form "C" relay capable of 2A at 30 VDC, or 240 VAC into a resistive load. Digital output provided with 1.5 KV isolation. Digital input also provided with 1.5 KV isolation.

**Wire size:** 14-30 AWG.

**Tightening torque:** Recommended tightening torque is 0.24 Nm (2 in-lbs).

X4 Terminal - Digital I/O

X4.1	+ (DI)
X4.2	- (DI)
X4.3	N.O. (DO)
X4.4	Common (DO)
X4.5	N.C. (DO)



5.2.6 X5 - Serial Port (RS485)

An RS485 port is available via a 4-pin removable terminal block. The RS485 communication line is an isolated line providing 1.5 KV of isolation.

**Wire size:** 16-28 AWG.

**Tightening torque:** Recommended tightening torque is 0.24 Nm (2 in-lbs).

X5 Terminal - RS485

X5.1	Tx
X5.2	Rx
X5.3	Ground
X5.4	Not Used

5.2.7 X6 - Audio In/Out (I/O)

Audio connection is done via removable terminal blocks. Terminal block pin-out is as follows.

**Wire size:** 14-30 AWG.

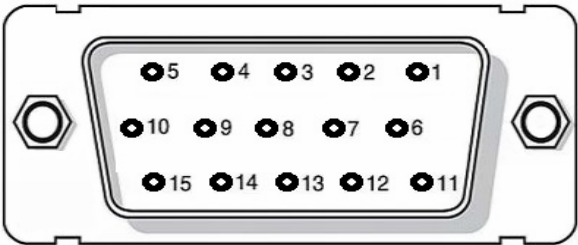
**Tightening torque:** Recommended tightening torque is 0.24 Nm (2 in-lbs).

X6 Terminal - Audio In/Out

X6.1	+ (In)
X6.2	- (Out)
X6.3	+ (In)
X6.4	- (Out)

5.2.8 X7 - VGA

Video output is provided by a standard 15-pin D-sub VGA connector (Figure 5.5).



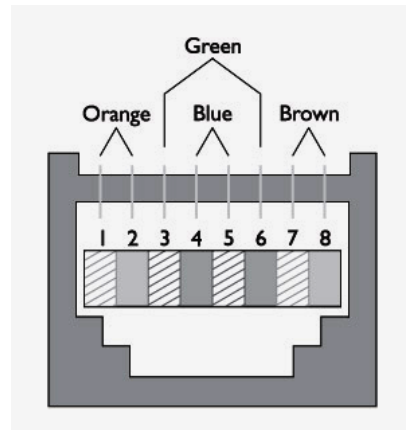
Pin	Assignment	Pin	Assignment
X7.1	Red	X7.9	Key/Pwr
X7.2	Green	X7.10	GND
X7.3	Blue	X7.11	N/A
X7.4	N/A	X7.12	ID1/SDA
X7.5	GND	X7.13	HSync
X7.6	Red_RTN	X7.14	VSync
X7.7	Green_RTN	X7.15	ID3/SCL
X7.8	Blue_RTN		

Figure 5.5 X7 - VGA

5.2.9 X8 - LAN

There are three different LAN communication configurations. Each LAN connection is 1.0 GB Fast Ethernet. See Figure 5.6.

- 2 x RJ45
- 1 x RJ45 and 1 x ST Fiber (multi-mode)
- 1 x LAN and 1 x WiFi.



X8.1	DA+	X8.5	DC-
X8.2	DA-	X8.6	DB-
X8.3	DB+	X8.7	DD+
X8.4	DC+	X8.8	DD-

Figure 5.6 X8 LAN

## 5.2.10 X9 - LAN/Fiber

This connector can either be an RJ45 or a 2 x ST fiber optic (multi-mode). If the standard LAN option is chosen, refer to the pin-out for X8 in [Figure 5.6](#). If the fiber option is chosen, use a 50 or 62.5/125 um fiber cable.

### 5.2.10.1 Fiber Optic (optional)

When fiber optic LAN output is selected as an option, there is 1 x RJ45 connection and 1 x ST fiber optic connection (multi-mode). Fiber optic Ethernet output complies with the IEEE 802.3u standard (100 Mbps Fast Ethernet).

### 5.2.10.2 WLAN Port (optional)

VisuNet XT offers an 802.11 a/b/g/n with speed up to 300 Mbps via two external SMA connectors. SMA connectors are protected internally by a gas tube lightning arrestors having a breakdown voltage of 90 V +/- 20%.



#### **Note!**

IP66 protection is only maintained if antenna, extension cable, or dust cap is attached.



### 5.2.11 Fuses

There are two field replaceable fuses located on the I/O plate. The junction box must be removed to access the fuse holders. [Table 5.2](#) lists the fuse ratings. Refer to [Figure 5.4](#) for the locations of the F1 and F2 fuses holders.

Reinstall the junction box following the procedure in Section 5.1.5.

Table 5.2 Fuses

Fuse	Rating
F1 (AC unit)	250 VAC, 2 A
F1 (DC unit input)	250 V, 10 A
F2 (DC-DC Output Fuse)	250 V, 12.5 A

### 5.2.12 Blanking Plugs



A blanking plug must be installed and properly tightened into any unused cable gland. Refer to the manufacturer's instructions for proper torque values according to gland type, cable type, and cable diameter. See [Figure 5.7](#). Refer to [Section 8](#) for replacement parts.



Figure 5.7 Blanking Plug

### 5.2.13 Front non-incendive/intrinsically safe USB (optional)

Front USB connector for Ex-rated USB memory stick. USB connector is Type 4x/IP66 rated when cover is used. Installation must be in accordance to control drawing 116-B017. Entity parameters are as follows:

Voc = 5.0V

Isc = 240mA

Ca = 60uF (Group IIB)/12uF (Group IIC)

La = 24mH



Figure 5.8 Front USB (non-incendive/intrinsically safe)

### 5.3 External Grounding

An external #10-32 grounding screw is located on the corner of the case near the power supply cover plate. See [Figure 5.9](#). The grounding cable and ring terminal are the responsibility of the customer.



Use a minimum 10 AWG (approximate 4 mm<sup>2</sup>) copper stranded green with yellow stripe wire, and connect the wire to the unit using a stainless steel ring lug suitable for a #10 screw.



Figure 5.9 External Grounding Screw

## 5.4 SD Card Reader Option

The VisuNet XT has the option for a USB 2.0 SD card reader, located in the same compartment as the removable SSD. The optional SD card reader supports SDHC (high capacity), SD or microSD (with adaptor) cards up to 32 GB. The SD card reader allows for read and write function, allowing you to download or store critical files, data, or software programs.



## 6 Calibration and Operation

### 6.1 Touch Screen Interface

#### 6.1.1 Introduction

The integrated touch screen uses 5-wire hardened resistive technology that provides long time use without the need to recalibrate. The touch screen can be manipulated with either a finger, a glove, or a stylus. The hardened resistive glass provides exceptional resistance to scratches, impacts, chemicals, and excessive heat.

#### 6.1.2 Touch Screen Calibration

The VisuNet XT touch screen is factory-calibrated and uses factory-installed Elo touch screen software. Calibration\Alignment of the newly installed touch screen should not be necessary.

However, over a period of time the alignment points may wander slightly and you may notice the cursor does not perform properly. This is a good indication that touch screen calibration may be necessary to realign the screen. As a rule of thumb, it is recommended that you calibrate the touch screen if the cursor is more than 0.25 inch from the exact center of the point of touch.

Doing this will increase the accuracy of touch response and make it easier to touch objects with pinpoint accuracy.

An Elo Touchsystems icon can be found on the computer's desktop or in the taskbar, and in the control panel. See [Figure 6.1](#).



Figure 6.1 Elo Icon

There are 29 calibration target points: 25 main screen targets and four (4) small corner targets. [Figure 6.2](#) shows the pattern for the 5 x 5 main targets and four (4) corner targets.

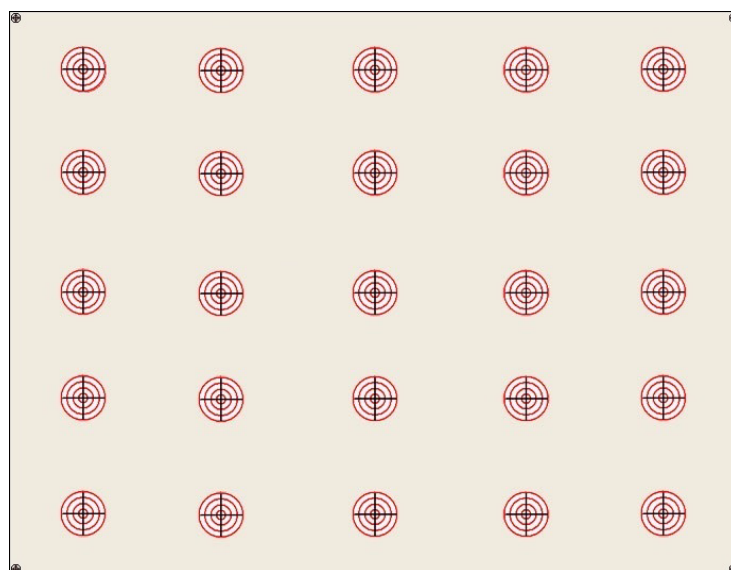


Figure 6.2 Calibration Target Points



Perform the following steps to realign the touch screen using the Elo touch screen software.

1. Close any open programs prior to initiating the Elo program.
2. Right-click the Elo icon and select Align from the dialog box, or double click the Elo Touch screen icon, select the General tab and click the Align button.
3. A white screen appears with a target in the top left corner of the screen. See [Figure 6.3](#).
4. The target calibration points are presented one at a time. (25 main screen target points and 4 corner target points) Touch and then release each of the targets as they appear.

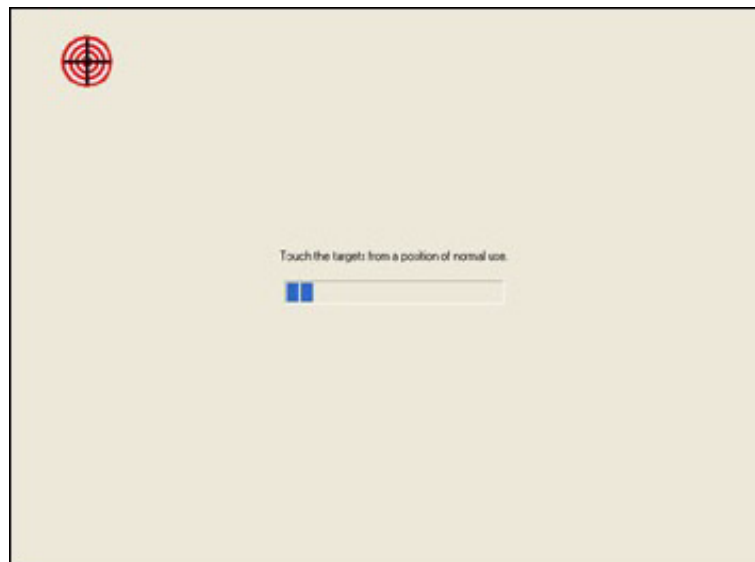


Figure 6.3 Calibrating the Targets

5. After the target points have been calibrated, you are prompted to touch the screen in different areas to check calibration and cursor response. The cursor should jump to your fingertip. See [Figure 6.4](#).
6. Run your finger around the screen to make sure the cursor stays with your fingertip.
7. If the cursor responds correctly, touch the green check mark.
8. If cursor response is questionable, press the Repeat icon and repeat the calibration procedure.

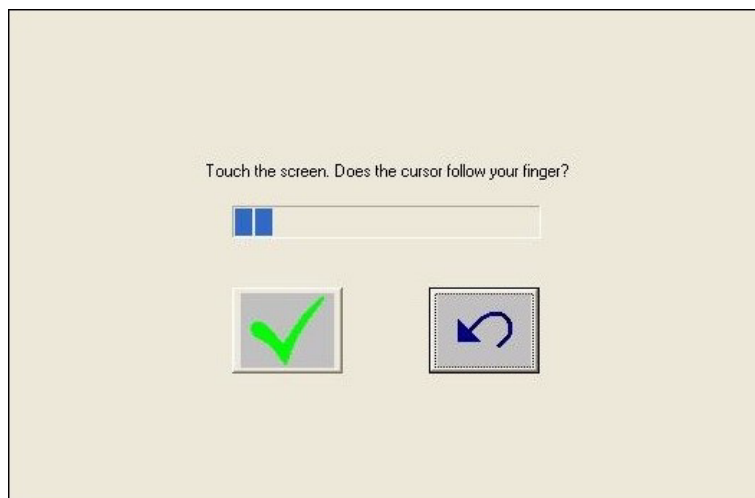
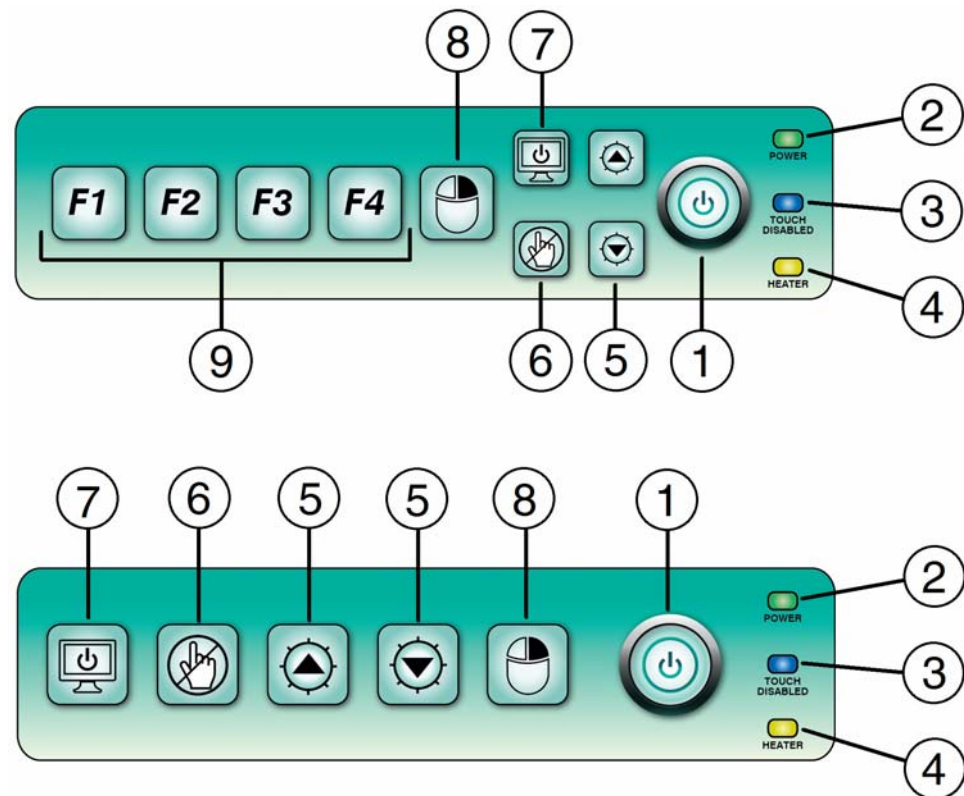


Figure 6.4 Check Cursor Response



## 6.2 Membrane Keypads



1	Power Button	6	Touch Disable ON/OFF Button
2	Power LED - Green	7	LCD Display ON/OFF Button
3	Touch Disable LED - Blue	8	Mouse Right-Click Button
4	Heater LED - Red (optional)	9	Keyboard Function Buttons (optional)
5	Brightness Increase/Decrease Buttons		

Figure 6.5 Membrane Keypad

- Power Button:** The main power switch for the system. When pressed, the computer powers up and boots into the Windows® environment.  
The computer should be shut down properly following the normal Windows® *Start > Shut down* protocol. In an emergency situation, press and hold the power button to force a quick computer shut down.
- Power LED:** The LED flashes once for two seconds when the power button is initially pressed during start up, and then remains illuminated green as long as there is 12VDC power to the main motherboard.  
  
The power LED flashes on and off in slow, two-second intervals when the system is in sleep mode.
- Touch Disable LED:** The touch disable LED illuminates blue when the touch screen is disabled.
- Heater LED:** The heater LED illuminates red when the heaters are on.



5. **Brightness Increase/Decrease Buttons:** Momentarily pulse the buttons up or down to make incremental changes in brightness, or press and hold the buttons up or down for quick changes in brightness.
6. **Touch Disable Button:** Disables the touch screen function for cleaning purposes. The button toggles either ON or OFF while the computer is still operating. The LCD screen remains on when touch disable is activated.
7. **LCD Display ON/OFF Button:** Turns the LCD display on or off while leaving the computer running and operational. Touch disable automatically activates when the LCD display is turned off. No input can take place through the touch screen when the display is turned off.

Return to normal operating conditions by pressing the LCD Display button (item 7) followed by the touch disable button (item 6).

8. **Mouse Right-Click Button:** Pressing this button opens the appropriate right mouse functions of a program.
9. **Keyboard Function Buttons:** Optional feature. These buttons operate the same as the F1 to F4 keys on a keyboard.

### 6.2.1

#### System Power Up with Heaters

1. Press the power button (item 1) to initiate computer cold start up.
2. If the temperature inside of the cabinet is below -20°C (-4°F), the internal heaters will cycle ON first to bring the inside temperature of the housing up to a safe startup temperature before allowing the computer to power up.
3. On the keypad, the red heater LED (item 4) illuminates solid when the heaters are working, and the green power LED (item 2) flashes in quick, half-second intervals to show that the computer is on standby waiting to power up.
4. The computer powers up and the heaters cycle OFF when the temperature reaches -20°C (-4°F).
5. The red heater LED (item 4) turns off and the power LED (item 2) changes from flashing to solid green when the computer is powered up and ready.
6. In the unlikely event the temperature inside of the cabinet drops below -20°C while the computer is on, the heaters will cycle on and off as necessary to maintain a safe operating temperature while the computer remains operational.



#### **Note!**

If the red heater LED (item 4) is lit, the heaters are either ON or cycling.

### 6.2.2

#### Keypad Disable/Enable

The keypad can be disabled for cleaning purposes without affecting the computer. When the keypad is disabled, the touchscreen is also disabled. Disabling the keypad and touch screen does not impede or affect computer programs running at the time.

1. Press and hold the touch disable button (item 6) for four seconds to disable both the keypad and touchscreen.

The blue touch disable LED (item 2) illuminates at the end of four seconds to show that the keypad and touchscreen are disabled.

2. Press and hold the touch disable button (item 6) for another four seconds to enable the keypad and touchscreen. The blue touch disable LED (item 2) will turn off at the end of four seconds.



**Note!**

If the touchscreen was previously disabled, the blue LED (item 2) will already be lit. When you press and hold the touch disable button (item 6) for four seconds to disable the keypad, the blue LED will blink ONCE for a half-second to acknowledge that the keypad disable command was initiated, and then the blue LED will remain lit.

Also, when you press and hold the touch disable button for four seconds to enable the keypad, the illuminated blue LED will blink ONCE for a half-second to acknowledge the keypad enable command was initiated, but the blue LED will remain lit because the LCD screen is still disabled.

### 6.2.3 Heater Fault



If the heaters fail to come on during a cold start up, the green power LED (item 2) and the red heater LED (item 4) will flash in quick, half-second intervals to signal a heater problem.

Press and hold the power button (item 1) for four seconds to clear the LED fault indicators, and try to power up the computer again.

If the heater fault persists, repairs must be made by a qualified Pepperl+Fuchs service technician. Contact the Pepperl+Fuchs Customer Service Department.

### 6.2.4 Computer Fault



If the computer fails to power up, the green power LED (item 2) and the blue touch disable LED (item 3) will flash in quick, half-second intervals to signal a computer start-up issue.

Press and hold the power button (item 1) for four seconds to clear the LED fault indicators, and try to power up the computer again.

If the computer fault persists, there are only three components the customer can easily remove and replace; 1) the solid-state drive (SSD), 2) the fuses, and, 3) the power supply board.

Refer to Section 7, [Field Maintenance and Repair](#) for instructions. All other component repairs must be made by a qualified Pepperl+Fuchs service technician. Contact the Pepperl+Fuchs Customer Service Department.



**Caution!**

**DO NOT attempt to remove the LCD monitor in order to gain access to the inside of the computer housing. Removal of the monitor by unauthorized persons may damage the unit and void all warranties. This procedure must only be performed by a qualified Pepperl+Fuchs Service Technician in a clean room environment.**












**Caution!**

While servicing the unit, make sure no liquids or dust penetrate the unit.



## 6.3 LED Quick Reference Guide

Below is a quick reference guide of Power, Touch Disable, and Heat conditions.

Power LED	Touch Disable LED	Heat LED	Condition
			Power LED stays lit as long as there is power to the motherboard.
			Power LED flashes in slow, two-second intervals when the computer is in sleep mode.
			Touch LED stays lit when the touch screen is disabled.
			Ambient temperature is below -20°C (-4°F) and is too cold to allow safe computer startup: <ul style="list-style-type: none"><li>■ Heat LED is lit as heaters bring ambient temperature up to -15°C (5°F).</li><li>■ Power LED flashes in quick, half-second intervals to show computer startup is on standby until safe temperature is reached.</li></ul>
			Heater failure during cold computer startup. <ul style="list-style-type: none"><li>■ The power LED and heat LED both flash in quick, half-second intervals.</li></ul>
			Computer failure during startup. <ul style="list-style-type: none"><li>■ The power LED and the touch disable LED both flash in quick, half-second intervals.</li></ul>

## 7 Field Maintenance and Repair

### 7.1 Inspection

The VisuNet XT enclosure is watertight and dusttight with an Type 4x/IP66 enclosure rating. Care must be taken to insure the enclosure is not damaged due to mishandling, etc. that could compromise the seal.



**Note!**

Do not open or remove any plates, covers, or connections that are not described in this manual.

The gaskets and seals are integral parts of the watertight seal. When removing a cover plate, inspect the gasket or seal for defects before reinstalling the cover plate to insure the gasket has not been damaged.

### 7.2 Field Serviceable Components



**Caution!**

Field maintenance procedures must be performed in a clean, non-hazardous environment free of dust and contaminants. No maintenance shall be performed unless power is disconnected from the unit. Remove power at the breaker box.



**Caution!**

While servicing the unit, make sure no liquids or dust particles penetrate the unit.

#### 7.2.1 AC Power Supply Removal and Replacement



**Caution!**

**Remove power to the unit before beginning this procedure.**

**This procedure must be performed in a clean, non-hazardous environment free of dust and contaminants. Make sure no liquids or dust penetrate the unit.**

**It is highly recommended that the service technician be properly grounded using a grounding strap during this procedure.**



Remove the power supply by performing the following steps.

1. Loosen the ten (10) #4-40 captive screws securing the power supply cover plate in place. See [Figure 7.1](#).



**Note!**

The power supply is attached to a mounting bracket, and the mounting bracket is attached to the inside surface of the cover plate.

2. Pull the power supply straight out of the housing. See [Figure 7.2](#).
3. Check the cover gasket for damage.



Figure 7.1 Power Supply Cover Plate



Figure 7.2 Remove the Power Supply





Figure 7.3 Power Supply Removed

4. Disconnect the wiring on the primary and secondary side of the power supply. Refer to [Figure 7.4](#).



Figure 7.4 Power Supply Wiring Connections

5. Refer to [Figure 7.5](#). Loosen the four (4) mounting bracket screws and remove the cover plate. The screws stay captured on the mounting bracket.

**Note!**

Do not remove the power supply from the mounting bracket.





Figure 7.5 Loosen the Mounting Screws



Figure 7.6 Cover Plate is Removed

6. Attach the new power supply with mounting bracket assembly to the back side of the cover plate using the four (4) screws.



7. Connect the wiring to the primary and secondary sides of the power supply. Refer to [Figure 7.4](#).
8. Slide the power supply into the housing.
9. Secure the cover plate in place by tightening the 4-40 cover screws to 0.7 Nm (6 in-lbs) in an inside-to-outside crisscross pattern using the incremental order shown in [Figure 7.7](#) to ensure the plate seals correctly.



**Caution!**

Do not use thread locking products on any screw thread.

Do not over-tighten the screws.

Failure to install the cover plate in the manner described may result in loss of enclosure protection.



Figure 7.7 Power Supply Cover Plate Incremental Screw Tightening Order



## 7.2.2 DC Power Supply Removal and Replacement



### **Caution!**

Remove power to the unit before beginning this procedure.

This procedure must be performed in a clean, non-hazardous environment free of dust and contaminants. Make sure no liquids or dust particles penetrate the unit.

It is highly recommended that the service technician be properly grounded using a grounding strap during this procedure.



Remove the power supply by performing the following steps.

1. Loosen the ten (10) #4-40 captive screws securing the power supply cover plate in place. See Figure 7.8.

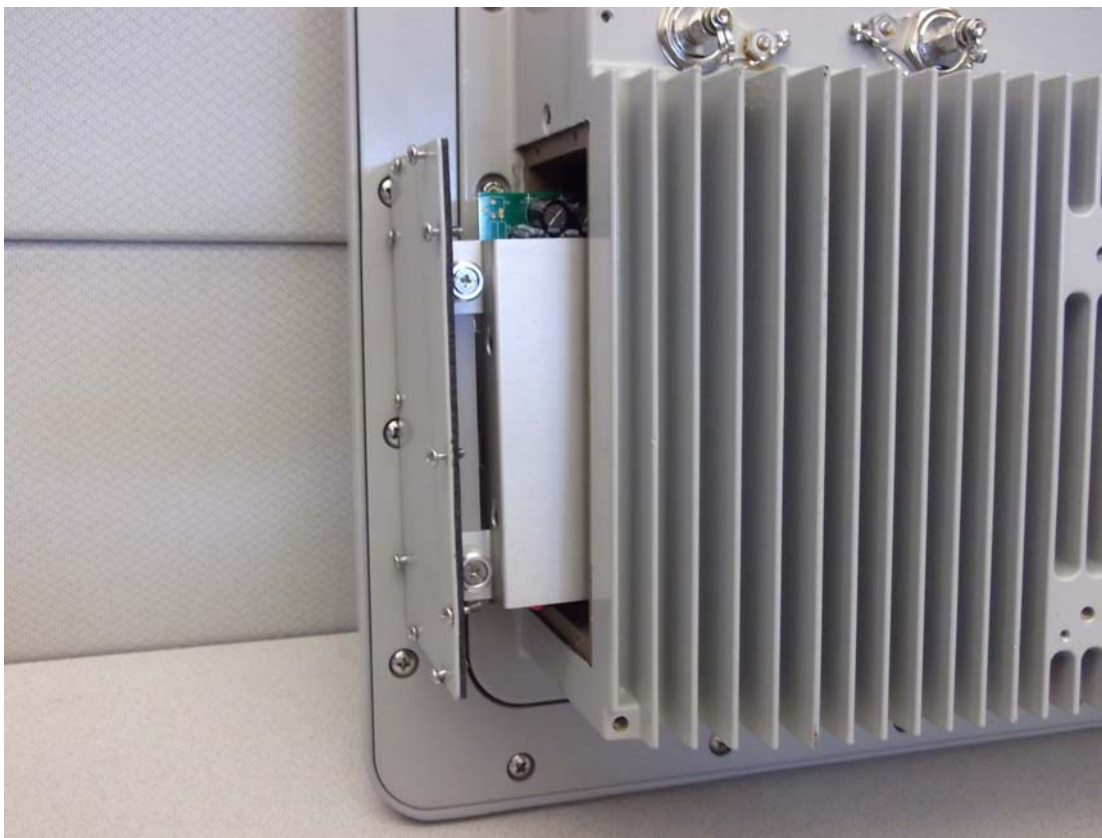


Figure 7.8 Power Supply Cover Plate



### **Note!**

The power supply is attached to a mounting bracket, and the mounting bracket is attached to the inside surface of the cover plate.

2. Pull the power supply straight out of the housing.

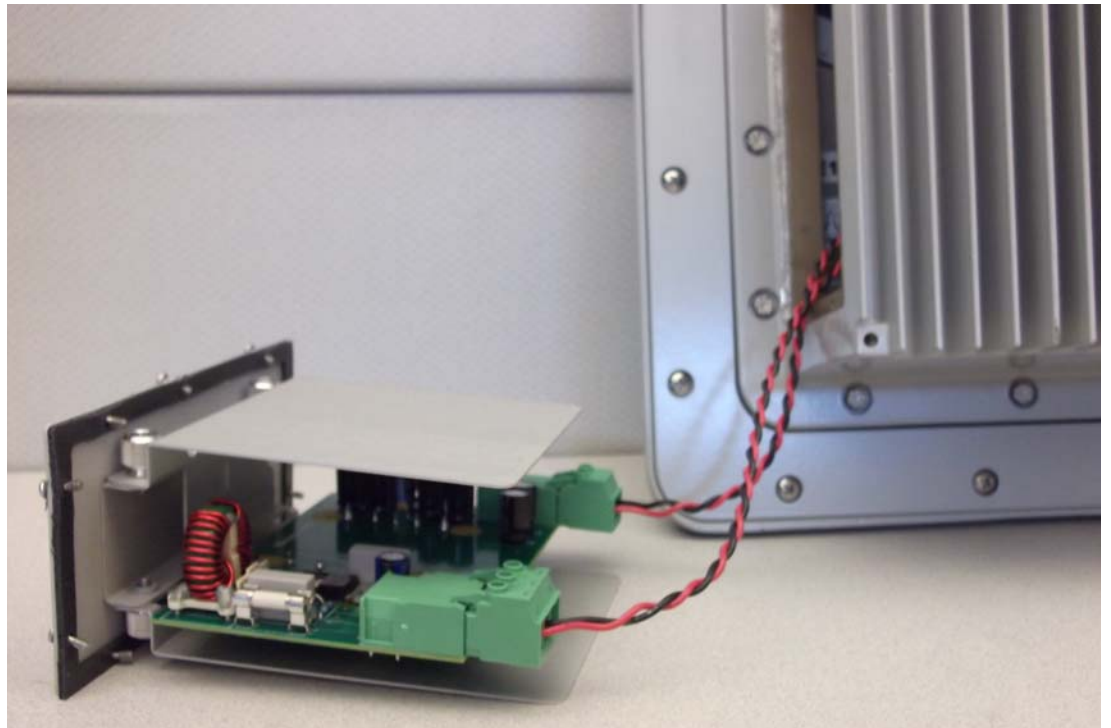


Figure 7.9 Power Supply Removed

3. Check the cover gasket for damage.
4. Disconnect the wiring on the input and output side of the power supply. Refer to Figure 7.10.

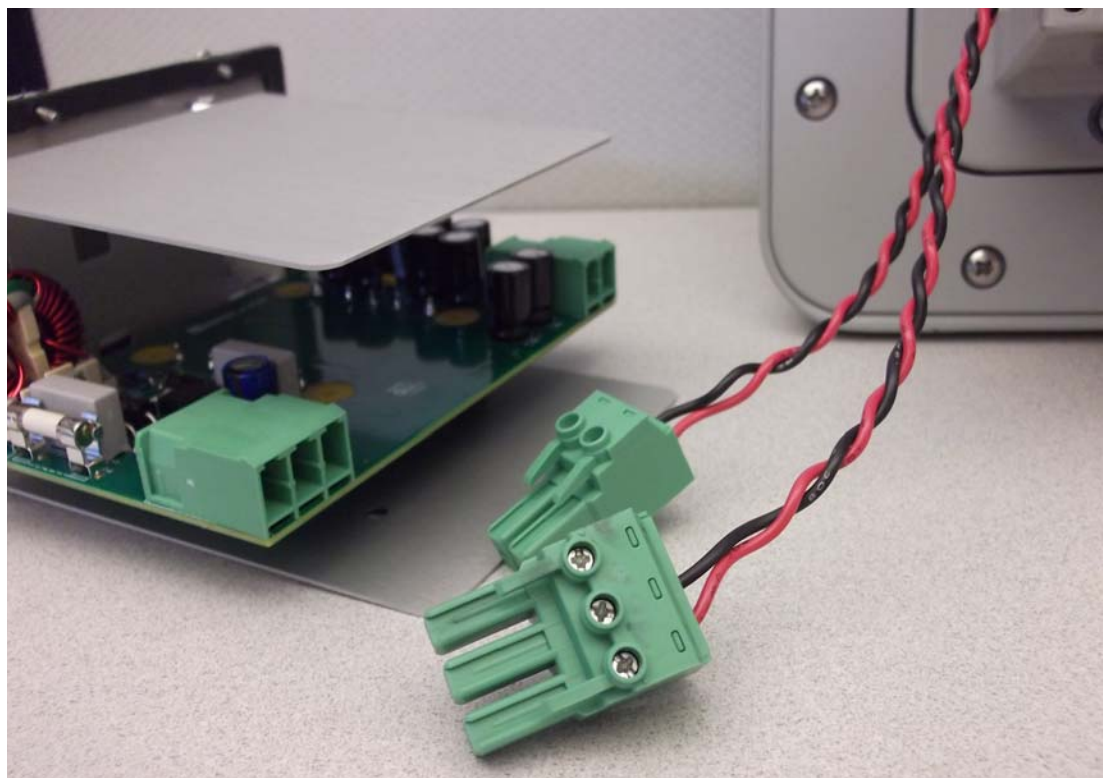


Figure 7.10 Power Supply Wiring Connections

5. Refer to Figure 7.11. Loosen the four (4) mounting bracket screws and remove the cover plate. The screws stay captured on the mounting bracket.

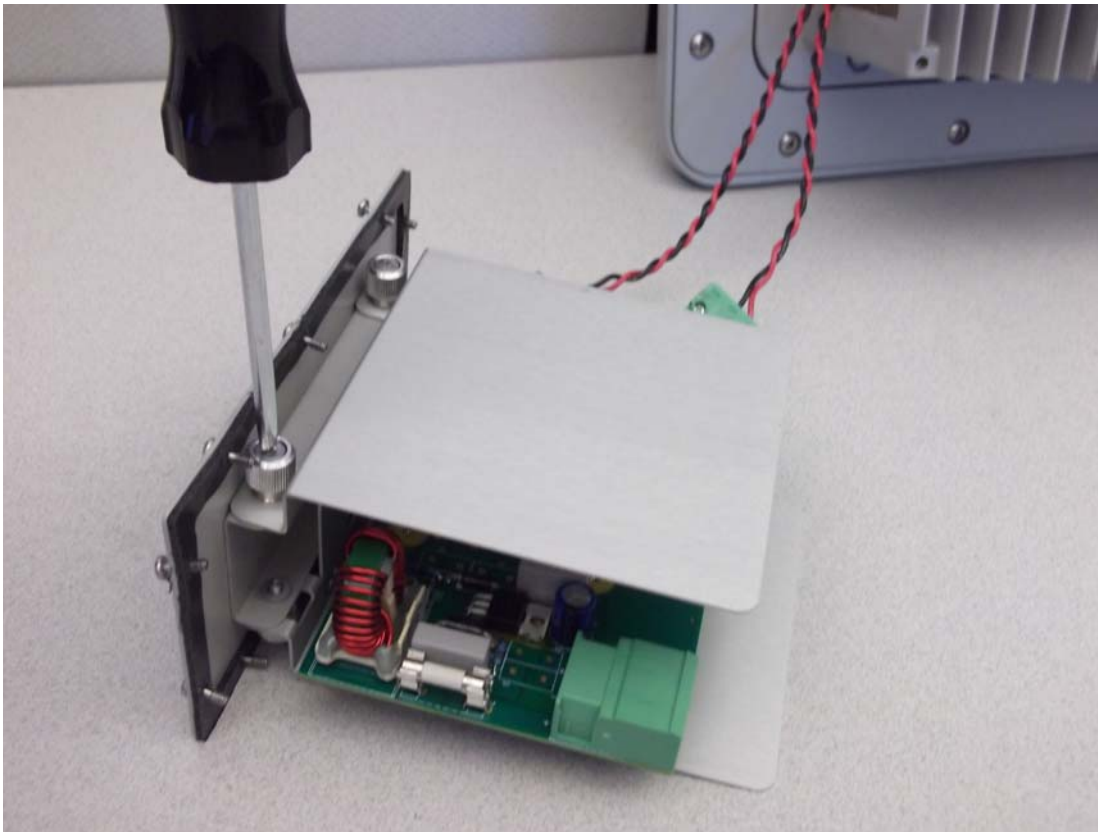


Figure 7.11 Loosen the Mounting Screws



**Note!**

Do not remove the power supply from the mounting bracket.

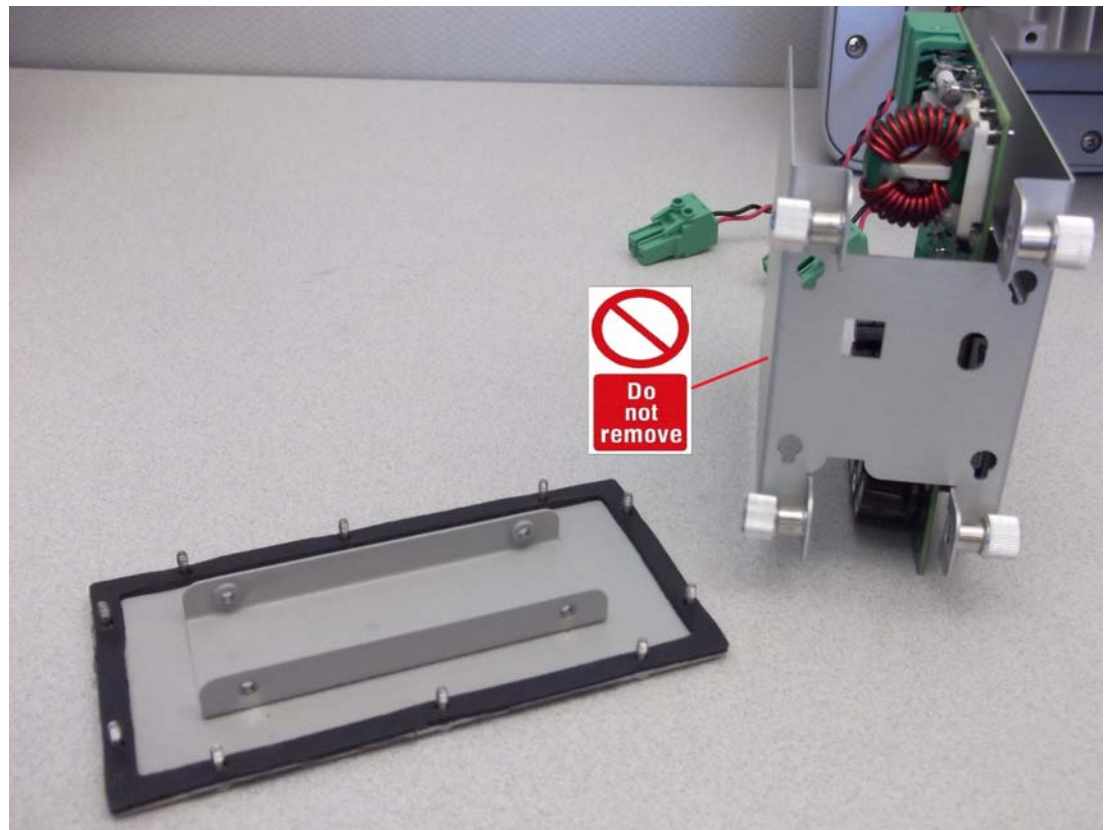


Figure 7.12 Cover Plate is Removed

6. Attach the new power supply with mounting bracket assembly to the back side of the cover plate using the four (4) screws.
7. Connect the wiring to the primary and secondary sides of the power supply. Refer to Figure 7.10.
8. Slide the power supply into the housing.
9. Secure the cover plate in place by tightening the 4-40 cover screws to 0.7 Nm (6 in-lbs) in an inside-to-outside crisscross pattern using the incremental order shown in Figure 7.13 to ensure the plate seals correctly.



**Caution!**

**Do not use thread locking products on any screw thread.**

**Do not over-tighten the screws.**

**Failure to install the cover plate in the manner described may result in loss of enclosure protection.**





Figure 7.13 Correct inside-to-outside crisscross pattern

### 7.2.3 Solid-State Drive (SSD) Removal and Replacement



**Caution!**

Power down the the VisuNet unit before beginning this procedure.

This procedure must be performed in a clean, non-hazardous environment free of dust and contaminants. Make sure no liquids or dust particles penetrate the unit.

It is highly recommended that the service technician be properly grounded using a grounding strap during this procedure.



Perform the following steps to properly remove and replace the solid-state drive.

1. Loosen the ten (10) each 4-40 captive screws securing the SSD cover plate in place, and remove the cover. See [Figure 7.14](#).
2. Check the cover gasket for damage.

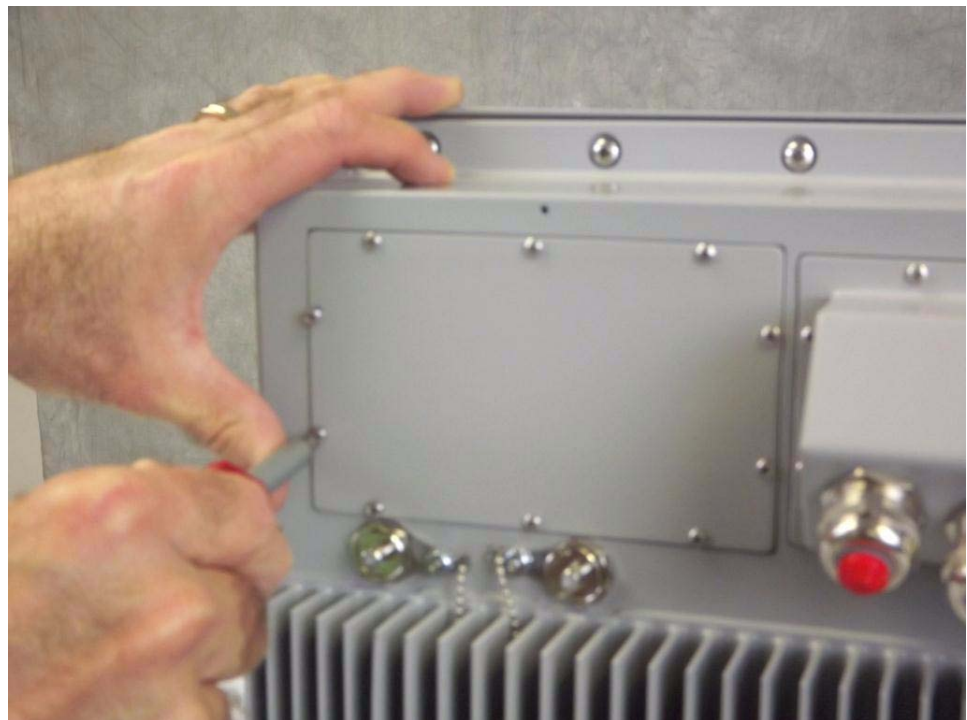


Figure 7.14 Remove the SSD Cover Plate

3. Loosen (do not remove) the three mounting clip screws. Retract the long mounting bracket and carefully remove the SSD. See [Figure 7.15](#) and [Figure 7.16](#).
4. Disconnect the power and data cables from the SSD.
5. Install the new SSD and secure in place with the mounting clips.



Figure 7.15 Loosen the Bracket Screws



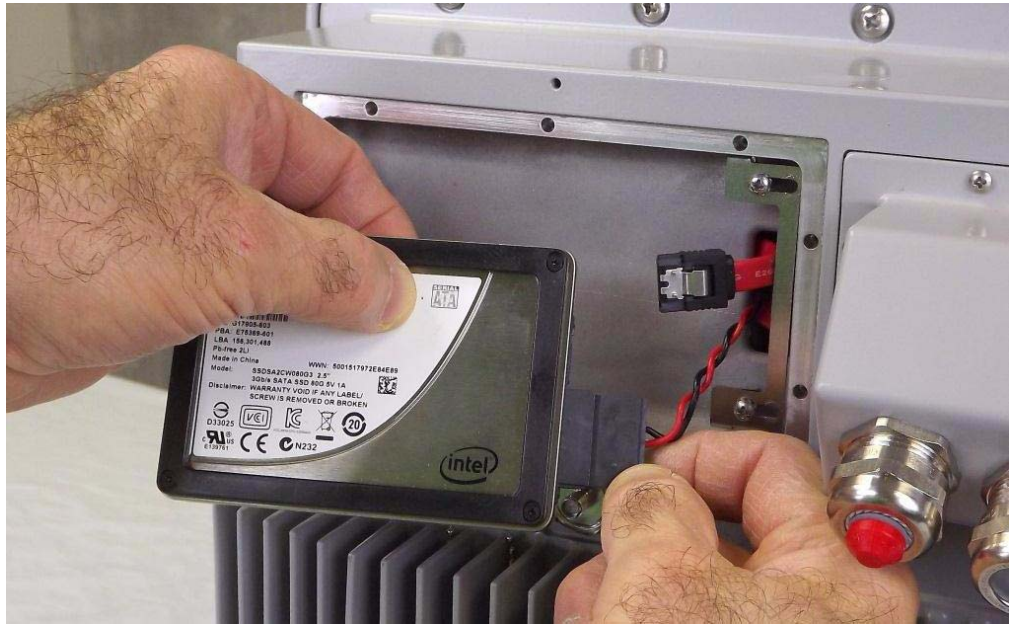


Figure 7.16 Remove the SSD and Disconnect the Power and Data Cables

6. Secure the cover plate in place by tightening the 4-40 cover screws to 0.7 Nm (6 in-lbs) in an inside-to-outside crisscross pattern using the incremental order shown in [Figure 7.17](#) to ensure the plate seals correctly.



**Caution!**

Do not use thread locking products on any screw thread.

Do not over-tighten the screws.

Failure to install the cover plate in the manner described may result in loss of enclosure protection.

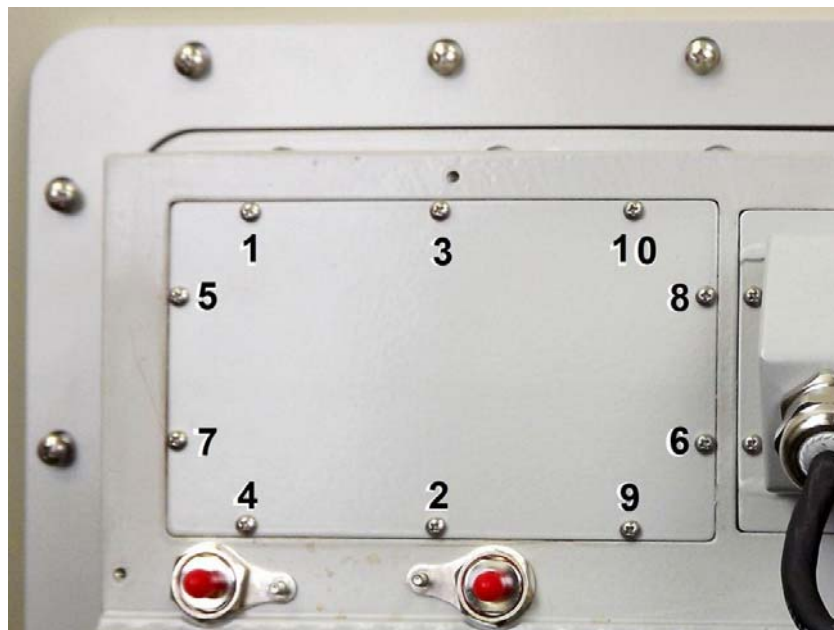


Figure 7.17 SSD Cover Plate Incremental Screw Tightening Order

## 7.2.4 Fuse Replacement

The fuse holders are located on the I/O panel behind the junction box.

### **Caution!**

**Power down the the VisuNet unit before beginning this procedure.**

**This procedure must be performed in a clean, non-hazardous environment free of dust and contaminants. Make sure no liquids or dust particles penetrate the unit.**

**It is highly recommended that the service technician be properly grounded using a grounding strap during this procedure.**

Remove the junction box by performing the following steps.

1. Loosen the twelve (12) captive Phillips-head screws securing the junction box to the housing. Refer to [Figure 5.1](#), if necessary.
2. Carefully pull the junction box away from the housing enough to gain access to the fuse holders. Make sure not to strain the cables connecting the two (2) USB connectors to the USB ports.
3. Remove the fuse holder by turning it counter-clockwise with a flat blade screwdriver and pulling it out of the unit.
4. Pull the damaged fuse out of the holder and install a new fuse.
5. Insert the fuse holder into the unit and turn it clockwise to secure it.
6. Reinstall the junction box by following the procedure in [Section 5.1.5](#).

### **Caution!**

Failure to install the cover plate in the manner described may result in loss of enclosure protection.



Figure 7.18 Fuse Removal

## 8 Replacement Parts

### 8.1 I/O Panel Connectors

Connector	P+F Part Number	Mfgr Part Number
3-Pole TB	914605	Phoenix Contact 1828525
4-Pole TB	524095	Phoenix Contact 1827729
5-Pole TB	523164	Phoenix Contact 1827732
8-Pole TB	914603	Phoenix Contact 1827761

### 8.2 Fuses

Fuse Position	Fuse Value	Product Type	P+F Part Number
F1	2 A	AC Non-Heater Unit	XT-F2.0A-01
F1	10 A	DC Non-Heater Unit	XT-F10.0A-01
F2	12.5 A	AC and DC Unit	XT-F12.5A-01

### 8.3 Solid State Drive (SSD)

SSD	P+F Part Number
SSD (32-bit)	XT-SSD-120-W7.32.1
SSD (64-bit)	XT-SSD-120-W7.64.1

### 8.4 Power Supply

Power Supply	P+F Part Number
DC Supply	XT-PS-DC-1
AC Supply	XT-PS-AC-1



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## A Appendix

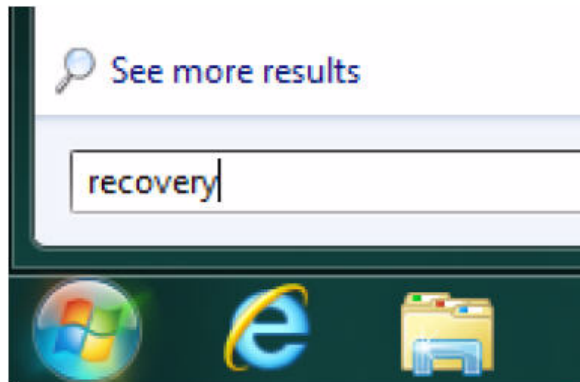
### A.1 Factory Restore Guide

#### A.1.1 Method A

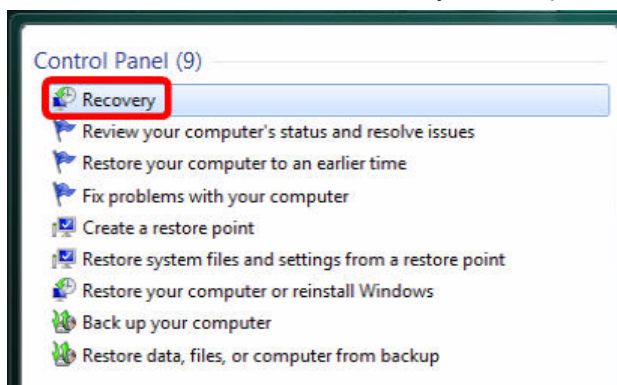
1. Make sure all cables are securely connected (power, USB, monitor).
2. Power on the PC.
3. From the Windows 7 desktop, click the Start button.



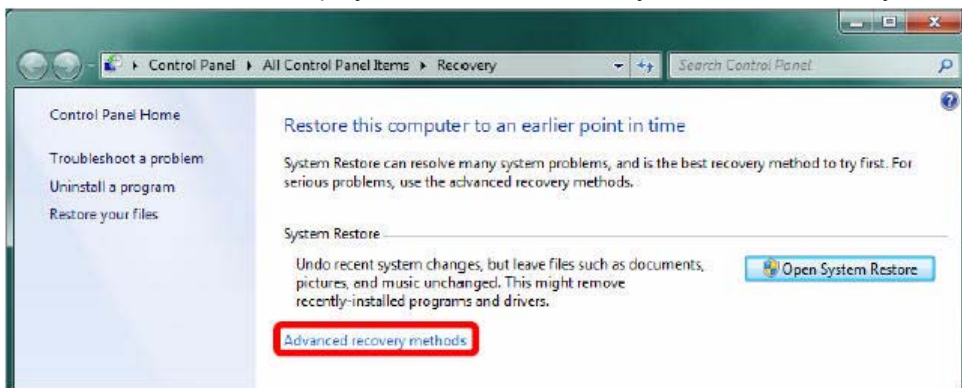
4. Type "recovery".



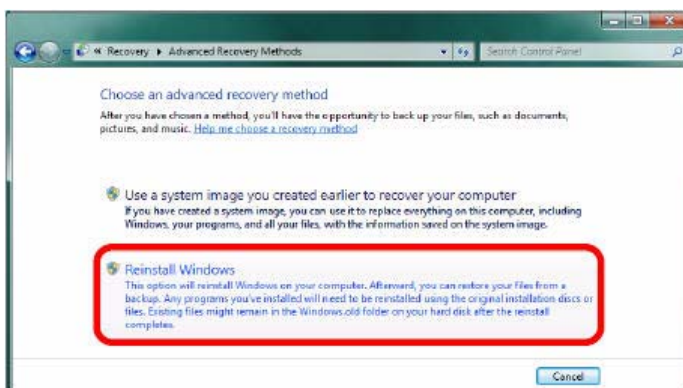
5. Click on the item entitled Recovery at the top of the list.



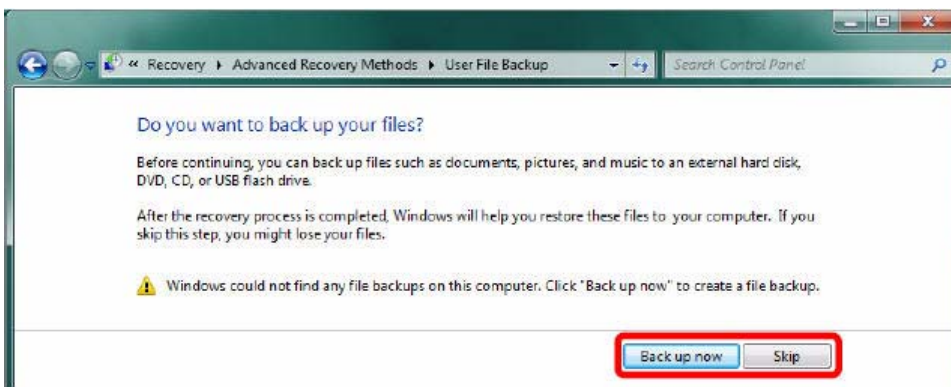
6. In the window that is displayed, click the link that says Advanced recovery methods.



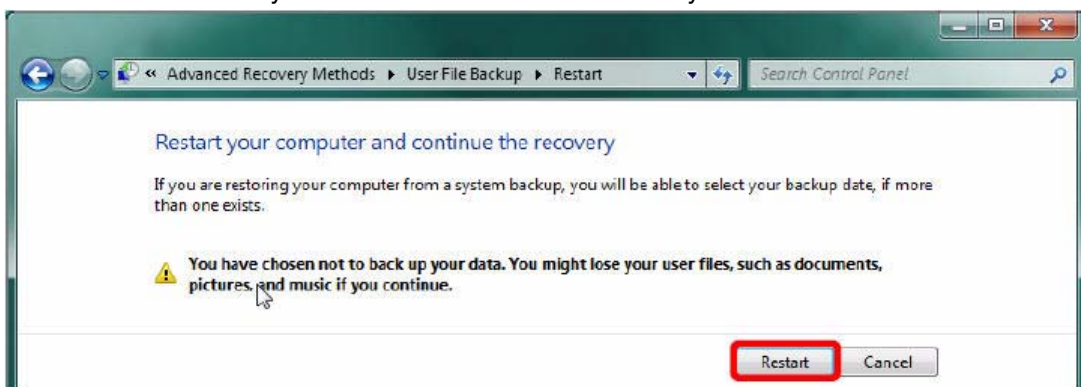
7. Select Reinstall Windows.



8. Click Back up now and follow the instructions to back up any personal data that you wish to keep. (You can also choose Skip if you do not want to back up any data.)

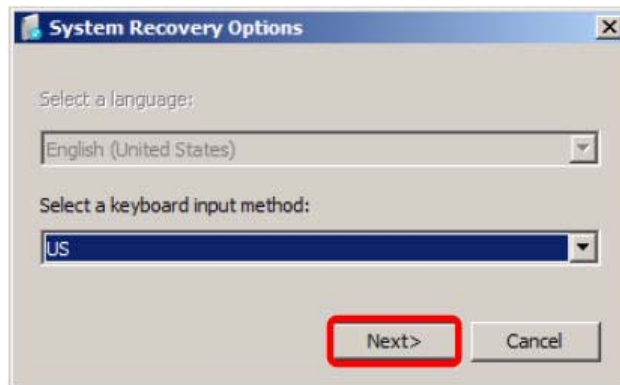


9. Click Restart. The system will now reboot to the recovery environment.





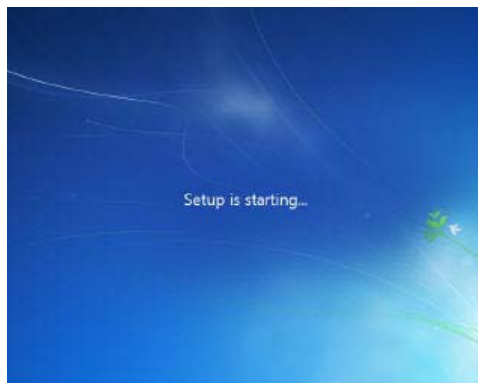
10. Please wait until the device has completely rebooted. At the System Recovery Options window, click Next>.



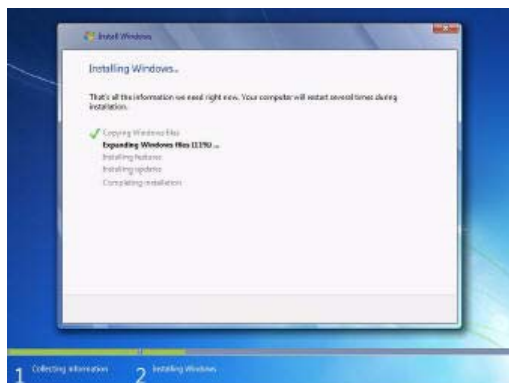
11. Click Yes at the Reinstall Windows box. This message explains that the current (possibly corrupt) Windows system files will be saved to a backup folder that is accessible once the restore process is finished.



12. Windows setup will start.



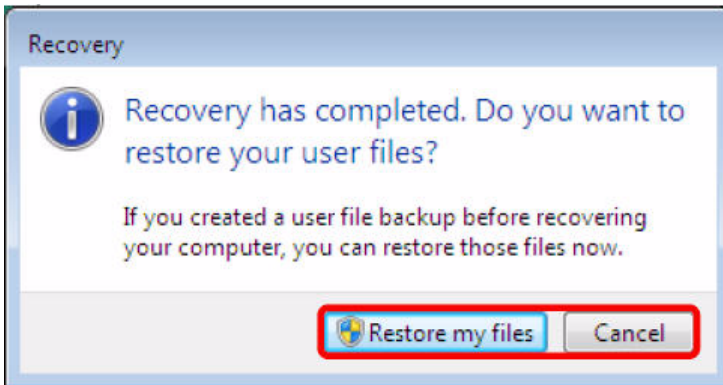
13. Windows will install. After the installation is complete, the device will reboot.



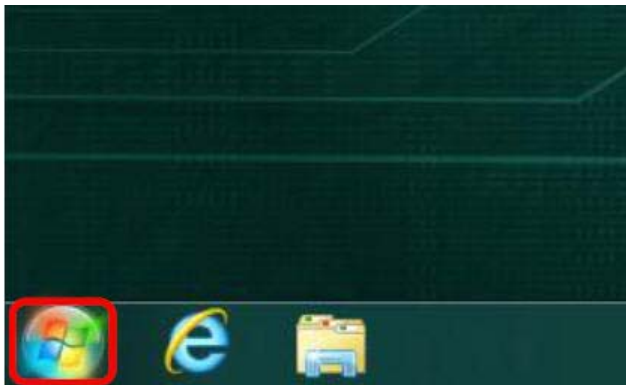
14. After the reboot, Windows 7 will walk you through the first boot procedure. Follow the prompts as instructed.



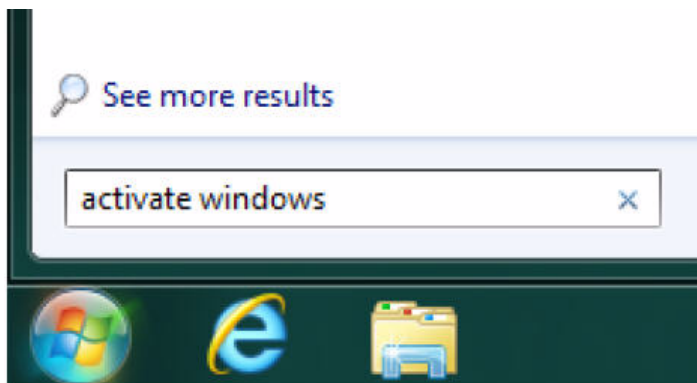
15. After Windows 7 loads to the desktop for the first time, a Window will display asking you to restore back up files. If you chose to back up your data in step 8, use this wizard to restore it by clicking Restore my files; otherwise, click Cancel.



16. From the Windows 7 desktop, click the Start button.

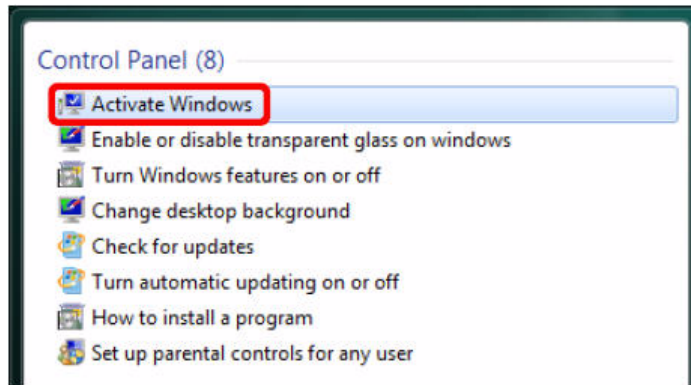


17. Type "activate windows".

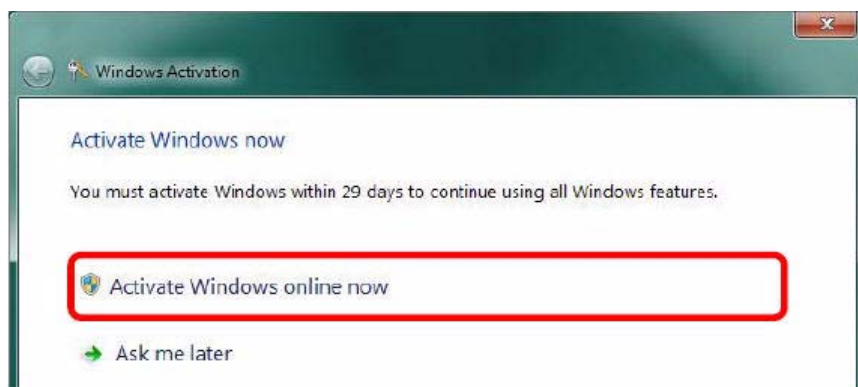




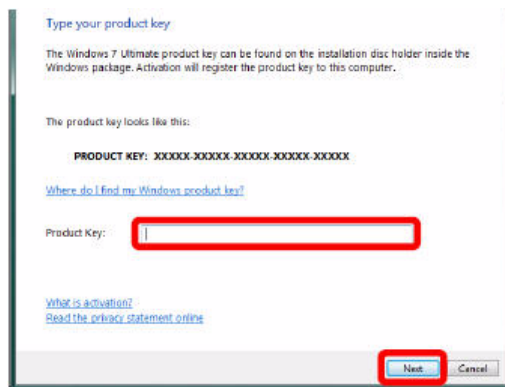
18. Click on the item entitled Activate Windows at the top of the list.



19. Click Activate Windows online now. NOTE: In order to complete this step, the device must be connected to the internet.



20. Enter the Windows 7 product key included with your device. Click Next.



21. Windows will verify the product key you entered. When finished, click Ok. For more help activating Windows see: <http://windows.microsoft.com/en-us/windows7/activate-windows-7-on-this-computer>



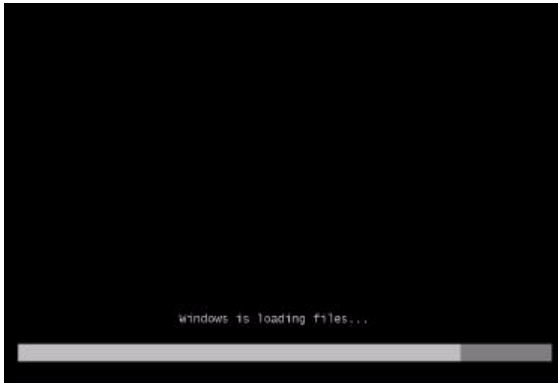


22. The factory restore process is now complete.

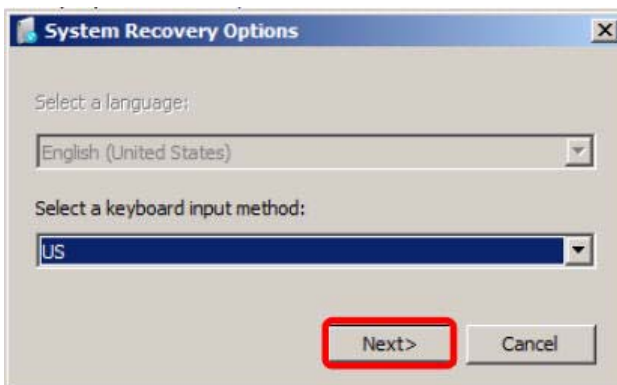
## A.1.2

### Method B

1. Make sure all cables are securely connected (power, USB, monitor).
2. Power on the PC.
3. As the device boots, hold down the F1 key.
4. A loading bar will display with the words Windows is loading files... above it.



5. At the System Recovery Options window, click Next>.



6. At the first window, enter the credentials for the device's administrator account and click OK. Here John Doe is used as an example.



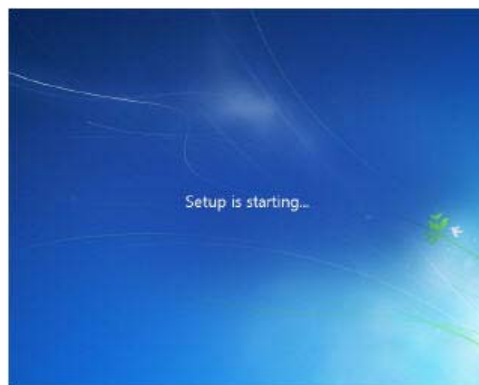
7. Select the last item on the menu: Reinstall Windows.



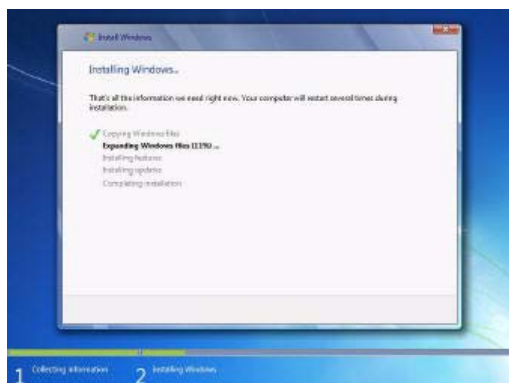
8. Click Yes at the Reinstall Windows box. This message explains that the current (possibly corrupt) Windows system files will be saved to a backup folder that is accessible once the restore process is finished.



9. Windows setup will start.



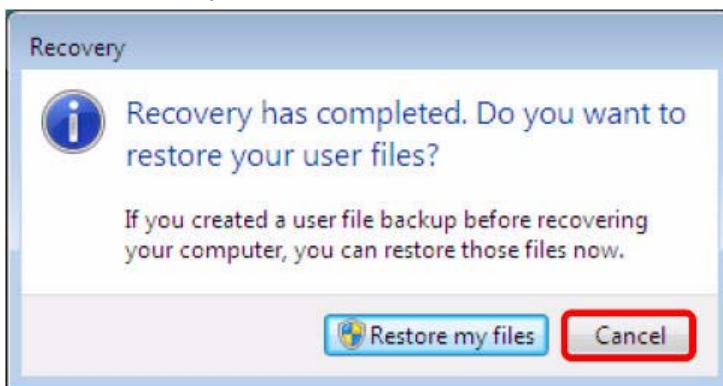
10. Windows will install. After the installation is complete, the device will reboot.



11. After the reboot, Windows 7 will walk you through the first boot procedure. Follow the prompts as instructed.



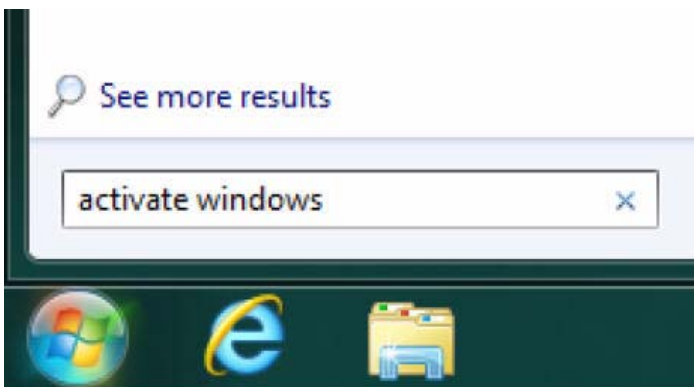
12. After Windows 7 loads to the desktop for the first time, a Window will display asking you to restore back up files. Click Cancel.



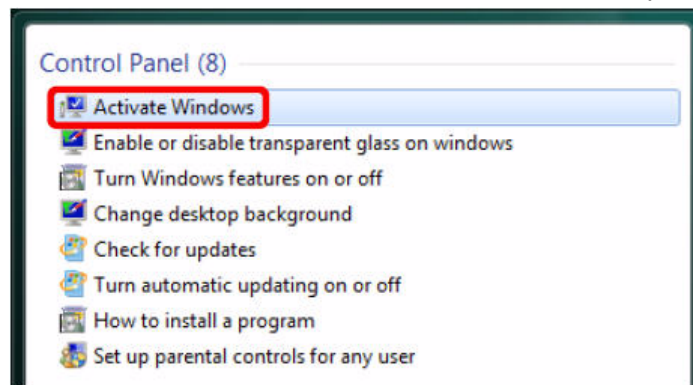
13. From the Windows 7 desktop, click the Start button.



14. Type "activate windows".

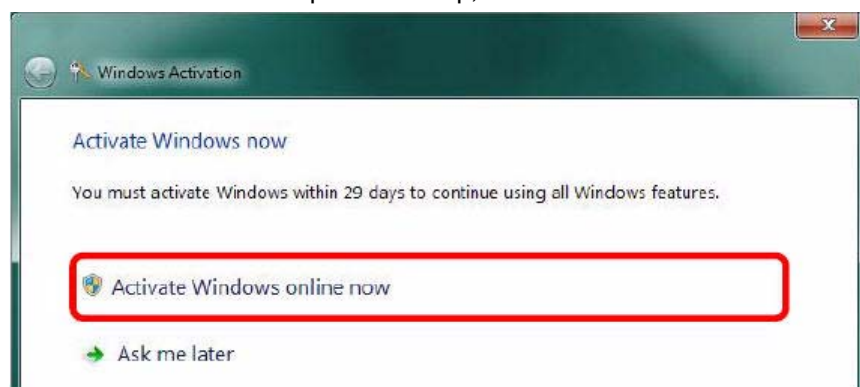


15. Click on the item entitled Activate Windows at the top of the list.

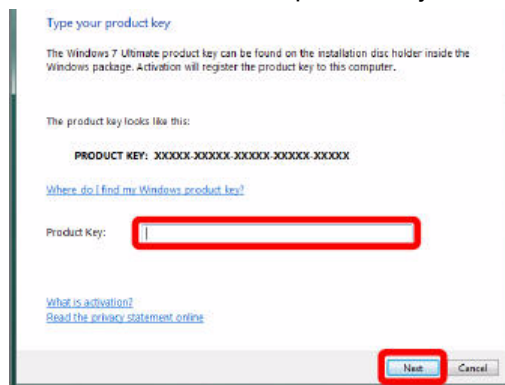


16. Click Activate Windows online now.

NOTE: In order to complete this step, the device must be connected to the internet.



17. Enter the Windows 7 product key included with your device. Click Next.



18. Windows will verify the product key you entered. When finished, click Ok.  
For more help activating Windows see: <http://windows.microsoft.com/en-us/windows7/activate-windows-7-on-this-computer>



19.The factory restore process is now complete.

## A.2 Digital I/O Setting

Below are the source codes written in C, please take them for Digital I/O application examples. The default I/O address is 6Eh.

## C Language Code

```
//===== History =====//
//compile by TCPP 3.0
//R00    5/18/2010        1st modify

//#include "ring1726.h"
#include <stdio.h>
#include <dos.h>
#include <conio.h>

#define EC_CMD_Port          0x6C
#define EC_DATA_Port    0x68

unsigned long Process_686C_Command_Write(unsigned long m_ECCMD, unsigned
long m_ECDATA);
unsigned long Process_686C_Command_Read(unsigned long m_ECCMD );
unsigned long ECU_Write_686C_RAM_BYTE( unsigned long
ECUMemAddr,unsigned long ECUMemData );
unsigned long ECU_Read_686C_RAM_BYTE( unsigned long ECUMemAddr );
unsigned char SMB_Byte_READ(int SMPORT, int DeviceID, int REG_INDEX);
void SMB_Byte_WRITE(int SMPORT, int DeviceID, int REG_INDEX, int REG_DATA);

char APName[]="\\t\\tMB-M671 DIO Testing Program\\n"
            "\\t=====\\n" ;

char APHelp[]="\\n - Pass 'A' key for inver state of DIO GP1x"
            "\\n - Pass 'S' key for inver state of DIO GP2x"
            "\\n - Pass 'D' key for inver state of DIO GP3x"
            "\\n - Pass 'Esc' key for Exit"
            "\\n" ;

void main(void){
    char getkey = 0;
    // char DIOSTS=0;
    // char tempJ=0;
    // char tempA=0;
    unsigned char GP2xVal,GP3xVal,GP1xVal;
```

```

int SMB_PORT_AD = 0xF040;
/--int SMB_DEVICE_ADD = 0x9C; /*75111R's Add=6eh */
int SMB_DEVICE_ADD = 0x6E; /*75111R's Add=6eh */

clrscr(); //clear screen
printf(APName);
printf(APHelp);

//pg DIO as output
//0:input 1:Output
/*
Index 10, GPIO1x Output pin control */
SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x10,0xff);
delay(10);
/*
Index 20, GPIO2x Output pin control */
//poweron default 0x00::: SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_
ADD,0x20,0x00); //pg as Input
SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x20,0xff);
/*
Index 40, GPIO3x Output pin control */
SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x40,0x0f);
delay(10);

//pg DIO default LOW
/*
Index 11, GPIO1x Output Data value */
SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x11,0x00);
GP1xVal = 0;
delay(10);

/*
Index 21, GPIO2x Output Data value */
SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x21,0x00);
GP2xVal = 0;
delay(10);

/*
Index 41, GPIO3x Output Data value */
SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x41,0x00);
GP3xVal = 0;

gotoxy(1,9);
//printf("DIO Status: Low \n");

do{
    if (getkey != 27){
        while (!kbhit());
        getkey = getch();
        switch (getkey){

```



```

case 'D':
case 'd':
    if (GP3xVal == 0)
    {
        GP3xVal = 1; //DIO all
        //pg DIO high
        SMB_Byte_

        gotoxy(1,10);
        printf("GP3x Status:

    }
    else
    {
        GP3xVal = 0; //DIO all
        //pg DIO LOW
        SMB_Byte_

        gotoxy(1,10);
        printf("GP3x Status:

    }
break;
case 'A':
case 'a':
    if (GP1xVal == 0)
    {
        GP1xVal = 1; //DIO all
        //pg DIO high
        SMB_Byte_

        gotoxy(1,8);
        printf("GP1x Status:

    }
    else
    {
        GP1xVal = 0; //DIO all
        //pg DIO LOW
        SMB_Byte_

        gotoxy(1,8);
        printf("GP1x Status:

    }

```





high

```
WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x41,0x0f);
```

```
LED OFF\n");
```

low

```
WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x41,0x00);
```

```
LED ON \n");
```

high

```
WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x11,0xff);
```

```
LED OFF\n");
```

low

```
WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x11,0x00);
```

```
LED ON \n");
```

```

                                break;
                                case 'S':
                                case 's':
                                    if (GP2xVal == 0)
                                    {
                                        GP2xVal = 1; //DIO all
                                        //pg DIO high
                                        SMB_Byte_

                                        gotoxy(1,9);
                                        printf("GP2x Status:

                                    }
                                    else
                                    {
                                        GP2xVal = 0; //DIO all
                                        //pg DIO LOW
                                        SMB_Byte_

                                        gotoxy(1,9);
                                        printf("GP2x Status:

                                    }
                                break;
                                default:
                                    break;
                                };
                                //-printf( "Input: [%c]      ", getkey); //DEBUG
                                };
                                }while (getkey != 27); //ESC ascii==27
                                //pg all DIO as Input
                                }

unsigned long Process_686C_Command_Write(unsigned long m_ECCMD, unsigned
{
//-----
int i,temp;
unsigned long m_OutBuf;
//-----
m_OutBuf=inportb(0x6C);
if ( ( m_OutBuf&0x00000003) > 0 )
{
    // temp=inportb(0x68);
    return 0xFFFFFFFF;
}

```



---

high

WRITE(SMB\_PORT\_AD,SMB\_DEVICE\_ADD,0x21,0xff);

LED OFF\n");

low

WRITE(SMB\_PORT\_AD,SMB\_DEVICE\_ADD,0x21,0x00);

LED ON \n");

long m\_ECDSA)

---

```
    }

    outport(0x6C,m_ECCMD);
    for ( i=0; i<=4000; i++ )
    {
        m_OutBuf=inportb(0x6C);
        if ( ( m_OutBuf&0x00000002) == 0 ) break;
    }
    if ( i < 3999 )
    {
        outport(0x68,m_ECDSA);
        for ( i=0; i<=4000; i++ )
        {
            m_OutBuf=inportb(0x6C);
            if ( ( m_OutBuf&0x00000002) == 0 )
            { return 0x00000000; }
        }
    }

    if ( i > 3999 ) m_OutBuf=inportb(0x68);
    return 0xFFFFFFFF;
}

//-----
unsigned long Process_686C_Command_Read(unsigned long m_ECCMD )
{
    int i,temp;
    unsigned long m_OutBuf,m_InBuf;
    m_OutBuf=inportb(0x6C);
    if ( ( m_OutBuf&0x00000003) > 0 )
    {
        temp=inportb(0x68);
        return 0xFFFFFFFF;
    }

    m_InBuf = m_ECCMD;
    outport(0x6C,m_InBuf);
    for ( i=0; i<=3500; i++ )
    {
        m_OutBuf=inportb(0x6C);
        if ( ( m_OutBuf&0x00000001) > 0 )
        {
            temp=inportb(0x68);
            temp= (temp & 0x000000FF ) ;
            return temp;
        }
    }
}
```

```

    // break;
    }
}
if ( i > 3499 )
{
    temp=inportb(0x68);
    return 0xFFFFFFFF;
}
return 0xFFFFFFFF;
}

//-----
unsigned long ECU_Read_686C_RAM_BYTE( unsigned long ECUMemAddr )
{
    unsigned long uDATA1,uDATA2,ECRamAddrH,ECRamAddrL;
    ECRamAddrL=ECUMemAddr%256; ECRamAddrH=ECUMemAddr/256;
    //
    uDATA1=Process_686C_Command_Write(0x000000A3, ECRamAddrH );
    if ( uDATA1==0xFFFFFFFF ) { return 0xFFFFFFFF; }
    //
    uDATA1=Process_686C_Command_Write(0x000000A2, ECRamAddrL );
    if ( uDATA1==0xFFFFFFFF ) { return 0xFFFFFFFF; }
    //
    uDATA1=Process_686C_Command_Read( 0x000000A4 );
    if ( uDATA1 > 0x000000FF ) { return 0xFFFFFFFF; }
    uDATA2=Process_686C_Command_Read( 0x000000A4 );
    if ( uDATA2 > 0x000000FF ) { return 0xFFFFFFFF; }
    if (uDATA1==uDATA2) return uDATA1;
    else return 0xFFFFFFFF;
}
//-----
unsigned long ECU_Write_686C_RAM_BYTE( unsigned long
ECUMemAddr,unsigned long ECUMemData )
{
    unsigned long uDATA, RD_DATA, ECRamAddrH, ECRamAddrL;
    ECRamAddrL=ECUMemAddr%256; ECRamAddrH=ECUMemAddr/256;
    //
    uDATA=Process_686C_Command_Write(0x000000A3, ECRamAddrH );
    if ( uDATA==0xFFFFFFFF ) { return 0xFFFFFFFF;}
    //
    uDATA=Process_686C_Command_Write(0x000000A2, ECRamAddrL );
    if ( uDATA==0xFFFFFFFF ) { return 0xFFFFFFFF;}
    //
    uDATA=Process_686C_Command_Write(0x000000A5, ECUMemData );

```

```

if ( uDATA==0xFFFFFFFF ) { return 0xFFFFFFFF;}
//
return 0x00000000;
}
//-----

unsigned char SMB_Byte_READ(int SMPORT, int DeviceID, int REG_INDEX)
{
    unsigned char SMB_R;
    outportb(SMPORT+02, 0x00);    /* clear */
    outportb(SMPORT+00, 0xff);    /* clear */
    delay(10);
    outportb(SMPORT+04, DeviceID+1);    /* clear */
    outportb(SMPORT+03, REG_INDEX);    /* clear */
    outportb(SMPORT+02, 0x48);    /* read_byte */
    delay(10);
    //printf(" %02x ",inportb(SMPORT+05));
    SMB_R= inportb(SMPORT+05);
    return SMB_R;
}

void SMB_Byte_WRITE(int SMPORT, int DeviceID, int REG_INDEX, int REG_DATA)
{
    outportb(SMPORT+02, 0x00);    /* clear */
    outportb(SMPORT+00, 0xff);    /* clear */
    delay(10);
    outportb(SMPORT+04, DeviceID);    /* clear */
    outportb(SMPORT+03, REG_INDEX);    /* clear */
    outportb(SMPORT+05, REG_DATA);    /* read_byte */
    outportb(SMPORT+02, 0x48);    /* read_byte */
    /*
    delay(10);
    printf(" %02x ",inportb(SMPORT+05)); */
}

```

## B Glossary

- A** – Ampere, Amps
- AC** – Alternating Current
- Apk** – Peak Amperage.
- ATEX** – Derived from the French term, ATmospheres EXplosibles, it is a directive that applies to connectors intended for safe operation in and around potentially explosive atmospheres and was originally a European Union Directive, although it is now recognized in many parts of the world, including North America.
- AWG** – American Wire Gauge: A standardized wire gauge system used since 1857 predominantly in the United States and Canada for the diameters of round, solid, nonferrous, electrically conducting wire.
  
- BUS** – A subsystem that transfers data between components inside a computer, or between computers.
  
- ° C** – Degrees Celsius (temperature measurement)
- Cable Gland** – A metal or plastic wire cable pass thru device that seals on the outer cable sheath to prevent dust and moisture from entering the electrical or instrument enclosure.
- CCW** – Counter-clockwise
- cfg** – Configuration
- CU** – Copper
- CW** – Clockwise
  
- DC** – Direct Current
  
- EC** – European Commission: The executive body of the European Union (EU) responsible for proposing legislation, implementing decisions, upholding the Union's treaties, and day-to-day running of the EU.
- EDDL** – Electronic Device Description Language: Technology used by major manufacturers to describe the information that is accessible in digital devices.
- Ethernet** – A system for connecting a number of computer systems to form a local area network (LAN), with protocols to control the passing of information.
  
- ° F** – Degrees Fahrenheit (temperature measurement)
- FCC** – Federal Communications Commission: The FCC regulates interstate and international communications by radio, television, wire, satellite and cable.
- Fuse** – A type of low resistance resistor that acts as a sacrificial device to provide overcurrent protection by interrupting excessive current so that further damage by overheating or fire is prevented from either the load or source circuit.
  
- HV** – High Voltage
  
- IEC** – International Electrotechnical Commission: A nonprofit organization headquartered in Geneva, Switzerland, that develops and publishes standards concerning electrical technologies. The world's leading standards organization, the IEC standards reach over 150 countries.
- IECEX** – The IECEX is the IEC system for the certification to standards for electrical equipment for explosive atmospheres.



- IEEE** – Institute of Electrical and Electronics Engineers: A professional association headquartered in New York City that is dedicated to advancing technological innovation and excellence.
- IP66** – IP stand for Ingress Protection. It is a rating that describes the protection a fitting or housing has from intrusion of solid and liquid material.
- Junction Box**– A dust and moisture proof covering that protects the I/O connectors, and also provides a mounting surface for the Cable Glands.
- kHz** – KiloHertz (unit of Alternating Current)
- kg** – Kilogram
- kW** – Kilowatt (unit of power)
- LAN** – Local Area Network: A computer network that interconnects computers in a limited area such as a home, school, computer laboratory, or office building.
- LCD** – Liquid Crystal Display
- LED** – Light Emitting Diode
- LV** – Low Voltage
- NEMA** – National Emergency Management Association: A nonpartisan, nonprofit association dedicated to enhancing public safety by improving the nation's ability to prepare for, respond to, and recover from all emergencies, disasters, and threats to our nation's security.
- OV** – Over Voltage
- OHT** – Over Heat
- OC** – Over Current
- PFC** – Power Factor Correction: Also known as a Power Factor Controller; A feature included in some computer and other power supply boxes that reduces the amount of reactive power generated by a computer.
- Power Supply** – There are various definitions for power supply. In this application it pertains to a device controlling the output voltage or current to a specific value; the controlled value is held nearly constant despite variations in either load current or the voltage supplied by the power supply's energy source.
- RMS** – Root Mean Square deviation
- SOA** – Safe Operating Area
- SSD** – Solid-State Drive: A computer hard drive
- TFT LED-Backlit LCD Display** – A flat panel LCD display using LED backlighting instead of cold cathode fluorescent (CCFL) backlighting used by most LCDs. LED-backlit LCD uses the same TFT LCD (thin film transfer liquid crystal display) technologies as CCFL-backlit displays.
- UL** – Underwriters Laboratories: A safety consulting and certification company headquartered in Northbrook, Illinois.
- USB** – Universal Serial Bus: An industry standard developed in the mid-1990's that defines the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices.



# PROCESS AUTOMATION – PROTECTING YOUR PROCESS



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