



VIX Products

CP6100 User Manual

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Table of Contents

1	SAFETY PRECAUTIONS	5
1.1	WARNINGS AND CAUTIONS	5
1.2	EMC AND SAFETY STANDARDS APPLIED.....	5
1.2.1	<i>FCC compliance statement</i>	<i>6</i>
1.3	SAFETY	6
1.3.1	<i>FCC RF Radiation Exposure Statement</i>	<i>6</i>
2	INTRODUCTION	7
2.1	PURPOSE	7
2.1.1	<i>Applicable devices</i>	<i>7</i>
2.2	SCOPE	7
2.3	REFERENCES.....	8
3	DESIGN SOLUTION	9
3.1	SYSTEM ARCHITECTURE	9
3.2	CP6100 MODULES	9
3.3	POWER SUPPLY.....	9
4	INSTALLATION INSTRUCTIONS	11
4.1	WIRING DIAGRAM.....	13
4.2	CONNECTOR TERMINATION.....	14
4.2.1	<i>Cradle Wiring.....</i>	<i>14</i>
4.2.2	<i>Chassis.....</i>	<i>15</i>
4.3	CIRCUIT BREAKERS.....	15
4.4	CABLE REQUIREMENTS	16
4.5	HIERARCHY FOR SUPPLY.....	16
4.6	HOT PLUGGING.....	16
4.7	CABLE RECOMMENDATIONS	17
4.8	LENGTH VERSUS CABLE SIZE.....	17
4.9	GROUND TERMINATIONS	17
4.10	GROUND TERMINATION CHECKS	18
4.11	CABLE SPECIFICATIONS	18
4.11.1	<i>Cable Extension Recommendations</i>	<i>18</i>
5	PHYSICAL CHARACTERISTICS.....	19
5.1	CP6100 POSITIONING	19
6	ENVIRONMENTAL CHARACTERISTICS.....	20
6.1	DIMENSIONS AND WEIGHT	20
6.2	GENERAL	20
6.3	CRADLE.....	20
6.4	CRADLE MOUNTING INSTRUCTIONS.....	20
7	INSTALLATION GUIDELINES FOR THE CRADLE	23

List of Tables

TABLE 1:	APPLICABLE DEVICES	7
TABLE 2:	POWER SUPPLY SPECIFICATION	9
TABLE 3:	CP6100 HARNESS PIN-OUT.....	14
TABLE 4 :	MATING FEMALE CONNECTORS	15
TABLE 5 :	MATING FEMALE CRIMP	15
TABLE 6:	CP6100 CABLE SIZE AND LENGTH GUIDE	17
TABLE 7:	CABLE SPECIFICATION	18

TABLE 8: CABLE RECOMMENDATIONS	18
TABLE 9 : PROD0059 BILL OF MATERIALS	21

List of Figures

FIGURE 1: CP6100 IMAGES	7
FIGURE 2: CP6100 TYPICAL SYSTEM ARCHITECTURE	9
FIGURE 3: PHOTO OF CP6100 REAR	10
FIGURE 4: PHOTO OF CRADLE UNLOCKING	10
FIGURE 5: INSTALLATION WIRING DIAGRAM	13
FIGURE 6: TYPICAL BUS POWER SUPPLY CIRCUIT BREAKER AND CABLE RATING	16
FIGURE 7: CABLE CURRENT HANDLING TABLE	17
FIGURE 8: CP6100 POSITIONING - HEIGHT	19
FIGURE 9: CP6100 PREFERRED POLE MOUNTING BRACING	19
FIGURE 10 : MECHANICAL DIMENSIONS	20
FIGURE 11: PROD0059 CRADLE ASSEMBLY (45-0710) PAGE 1	22
FIGURE 12: PROD0059 CRADLE ASSEMBLY (45-0710) PAGE 2	22
FIGURE 13: INSTALLATION INSTRUCTIONS (57-0073) PAGE 1	23
FIGURE 14: INSTALLATION INSTRUCTIONS (57-0073) PAGE 2	23
FIGURE 15: INSTALLATION INSTRUCTIONS (57-0073) PAGE 3	24
FIGURE 16: INSTALLATION INSTRUCTIONS (57-0073) PAGE 5	24
FIGURE 17: INSTALLATION INSTRUCTIONS (57-0073) PAGE 6	25
FIGURE 18: INSTALLATION INSTRUCTIONS (57-0073) PAGE 7	25
FIGURE 19: INSTALLATION INSTRUCTIONS (57-0073) PAGE 8	26
FIGURE 20: INSTALLATION INSTRUCTIONS (57-0073) PAGE 9	26

1 Safety Precautions

This document presents important information that is intended to ensure the safe and effective use of this device. Please read this information carefully, and store it in an accessible location near your installation.

1.1 Warnings and Cautions

Warnings and cautions are used to call attention to potential hazards. Failure to observe the information provided with the warnings and cautions may result in personal injury or property damage. Be sure that you understand the meaning of each before you proceed.



WARNING:

Indicates a potentially lethal hazard. Failure to observe a WARNING may result in severe injury or death.



CAUTION:

Failure to observe a CAUTION may result in personal injury or damage to the device or other property.



WARNING:

- The device should only be opened and repaired by a qualified service technician. Improper repair work can be dangerous. Tampering with this device may result in injury, fire, or electric shock.
- Be sure to use the specified power source. Connection to an improper power source may cause fire or electric shock.
- Risk of fire or explosion if incorrect fuses are used. Fuses should only be replaced with new fuses of the same rating.

1.2 EMC and Safety Standards Applied

Product Name: CP6100

The following standards have been applied to this device:

- CE Marking
- Safety: EN60950-1
- FCC part 15

1.2.1 FCC compliance statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help



WARNING:

THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

1.3 Safety

All installation work must be carried out in accordance with State and Federal Safety Codes and Codes of Practice as well as recognised industry standards. The appropriate protective clothing must be worn where necessary. Tools must be used in accordance with manufacturers' instructions and suitable for the task.

Personnel attempting to perform any work on the electrical wiring must be trained and suitably qualified in the appropriate electrical codes of practice and must work in accordance with those codes.

1.3.1 FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not operate in conjunction with any other antenna or transmitter and must be installed to provide a separation distance of at least 25 cm from all persons.

2 Introduction

2.1 Purpose

This document describes the Card Processor (CP6100) installation for general and expanded use in buses. Other than the connector interface the CP6100 is mounted exactly the same way as a CP6000 or CP6500 onto a pole on a bus. So any previous installation manuals can be used, with only minor changes needed for the interface connector and crimping methods.



Figure 1: CP6100 Images

2.1.1 Applicable devices

This document is applicable to all CP6100 variants detailed in the following table.

Table 1: Applicable Devices

VIX Part Number	Description
CP6100.AAAA	CP6100,3.5"TFT,RDR
CP6100.AAEA	CP6100,3.5"TFT,RDR,GPS,GPRS,WLAN
CP6100.AEGA	CP6100,3.5"TFT,RDR,GPS,4G, WLAN
CP6100.AEFD	CP6100,3.5"TFT,RDR, ORANGE
PROD0059	CRADLE & CLAMP,CP6x00, POLE MNT,GREY

2.2 Scope

This document details the recommended installation for the CP6100. This document describes the mechanical and electrical interfaces and how to interconnect the CP6100 into the target environment. This document defines some of the system interfaces but does not provide in depth details, description is limited to function and potential use.

2.3 References

The following materials are to be used in conjunction with or are referenced by this document.

- [1] VXP-00240 CP6100 Manufacturing Pack
- [2] VXP-00212 CP6100 Production Test Plan
- [3] VXP-00241 CP6100 Build Instructions

3 Design Solution

3.1 System Architecture

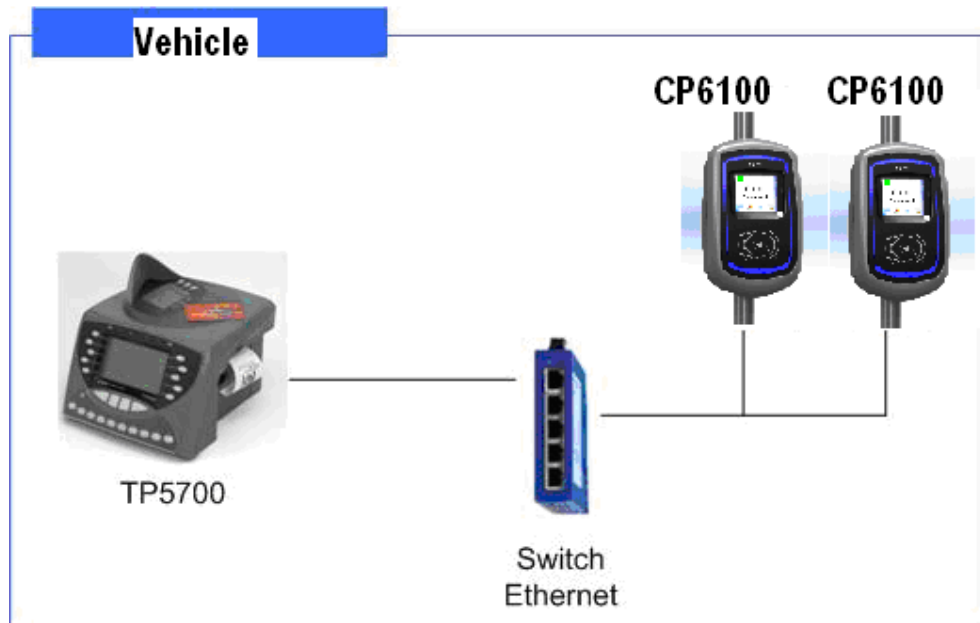


Figure 2: CP6100 Typical System Architecture

3.2 CP6100 Modules

3.3 Power Supply

Table 2: Power Supply Specification

Parameter	Min.	Typ.	Max.	Unit
Input Supply Voltage	9	24	38	V
Input Supply Current (@24V)	No Standby	0.25 (6W)	0.5 (12W)	A
Specified Input Maximum Current (@9V)			2	A
Reverse Voltage Protection	-	-	-400	V



Figure 3: Photo of CP6100 Rear

The design of the CP6100 rear plate also facilitates the easy access of the two SAM's, one SIM and uSD socket by the removal of just four screws holding down the cradle locking bracket.

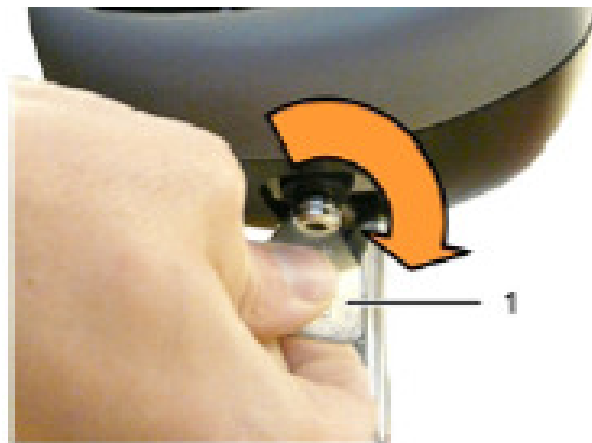
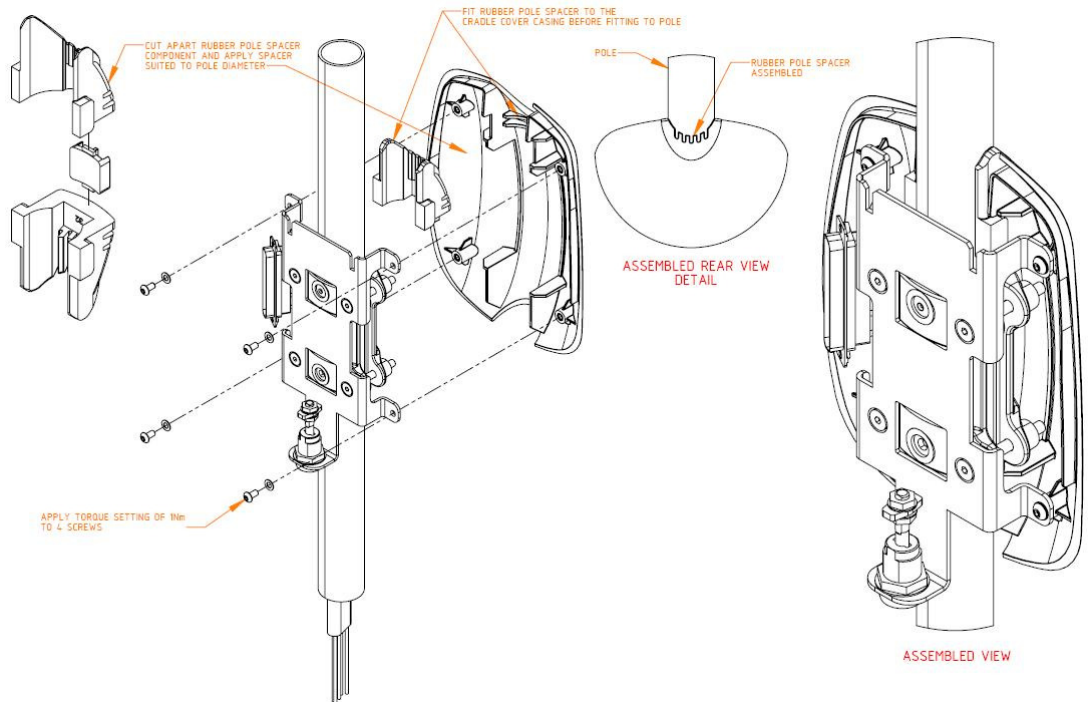


Figure 4: Photo of Cradle Unlocking

- Supports pole diameters of 32mm to 42.5mm
- Uses a Southco™ Female round Key, supplied with PROD0059

4 Installation Instructions

4.1 Installing cradle (PROD0059) on to pole



4.2 Installing CP6100 onto cradle

1. Get the CP6100 validator out of its package (cardboard, foam protection and plastic film).



Do not throw away the packaging: It can be re-used for an eventual future dismantling, storage, and shipping.



Before installation of the validator, turn the catch in the same position as it was during removal (see. Figure 5).



Figure 5: Position of the catch

2. Connect the connectors to the validator.
3. Place the validator above its cradle.
4. Push the CP6100 validator downwards taking care that the 4 fixing points at the rear of the validator are well installed on the cradle.
5. Ensure that the CP6100 validator is firmly engaged on the cradle.
6. Turn the key clockwise to lock the CP6100 validator.
7. Remove the key.

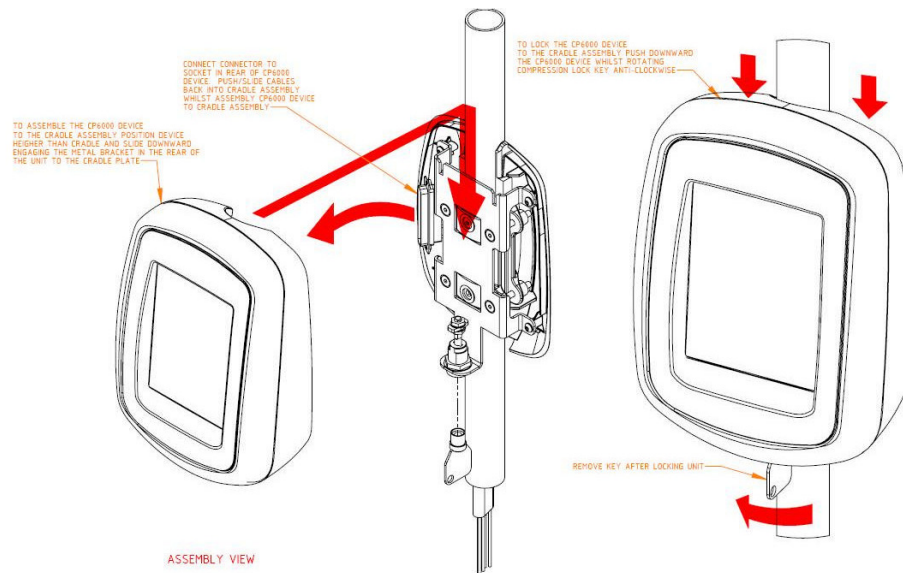
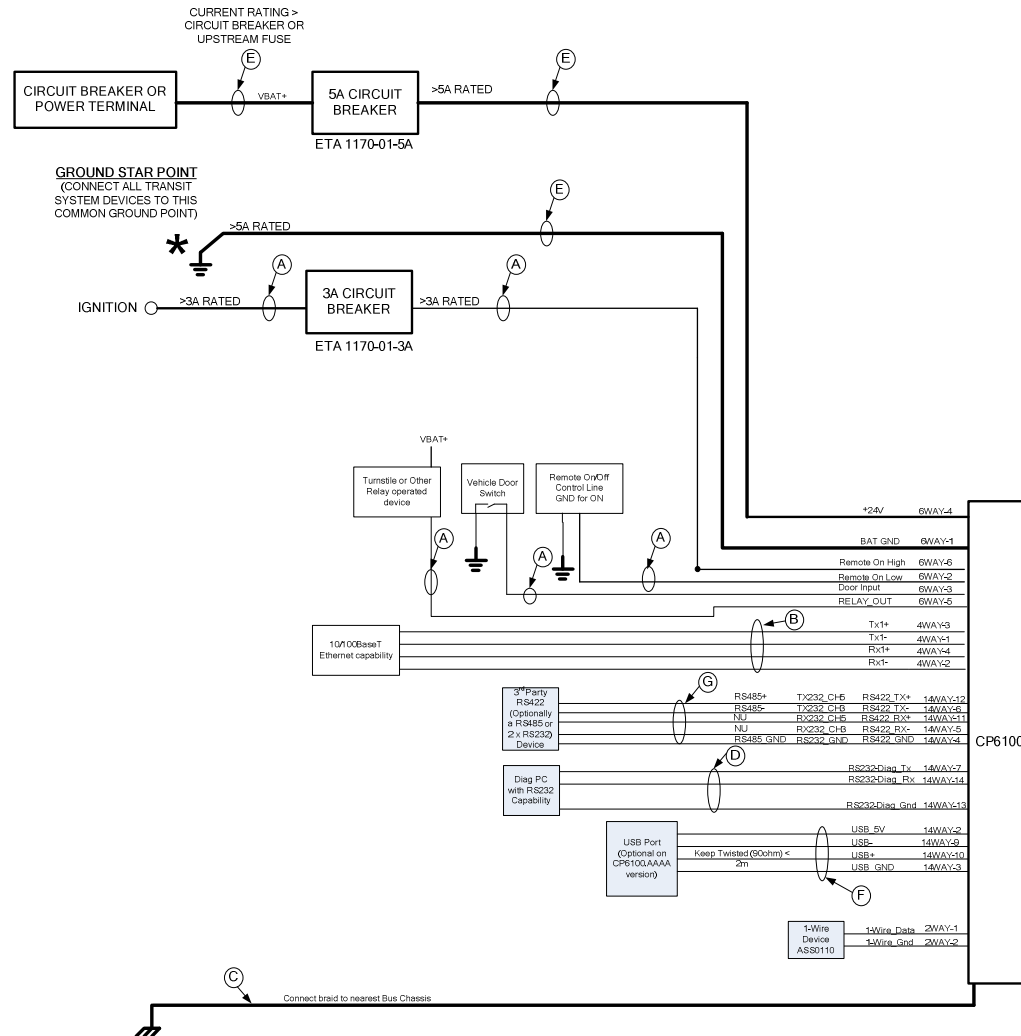


Figure 6: Installing CP6100 onto cradle

4.3 Wiring Diagram

The following drawing shows a CP6100 installed in isolation, with only general reference to external devices.

CP6100 GENERAL BUS WIRING DIAGRAM



CABLE REQUIREMENTS

Cables must be suitably strain relieved at all times. Shielded is always recommended, but not mandatory for CP6100.

Cable ID	Description	Suggestion
A	20 AWG Stranded Unshielded.	
B	CAT5e Cable, Un-Shielded (24AWG stranded).	
C	Earth Braid (>0.75mm ²)	
D	1 twist Pair + 1 core 22 AWG Stranded	
E	2x1.5mm ² Stranded. (Red, Black) Unshielded.	
F	USB2.0 Cable (90ohm) 1xPair, 2x20AWG Core	
G	2 twist Pair + 1 core 22 AWG Stranded	

Figure 7: Installation Wiring Diagram

4.4 Connector termination

The following table defines the connector and subsequent tooling requirements for interconnections to the CP6100.

The design incorporates robust Molex Mini-Fit Jr automotive connectors, that are easy to crimp large or small cables using a variety of readily available crimps, and that can easily be plug in and our multiple times without damage.

4.4.1 Cradle Wiring

Table 3: CP6100 Harness Pin-out

CP6100 Header	Terminal	Description
6WAY – POWER Molex#039288060	Pin1	0V (Connect to Vehicle 0V)
	Pin2	Remote switch Low
	Pin3	Door Switch Input
	Pin4	BAT+ (Connect to Vehicle 12V/24V)
	Pin5	Relay Output (1A to GND)
	Pin6	Remote switch High (Ignition)
14WAY – SERIAL Molex#039288140	Pin1	LINEOUT_GND (optional SPK-)
	Pin2	5V USB 500mA Output
	Pin3	GND (for USB reference)
	Pin4	GND (Transceiver)
	Pin5	RS422 RX- (or RX232_CH3)
	Pin6	RS422 TX- (or RS485- or TX232_CH3)
	Pin7	RS232 TX
	Pin8	LINEOUT (optional SPK+)
	Pin9	USB-
	Pin10	USB+
	Pin11	RS422 RX+ (or RX232_CH5)
	Pin12	RS422 TX+ (or RS485+ or TX232_CH5)
	Pin13	GND (for RS232 reference)
	Pin14	RS232 RX
4WAY – ETHERNET Molex#039288040	Pin1	Ethernet TX-
	Pin2	Ethernet RX-
	Pin3	Ethernet TX+
	Pin4	Ethernet RX+
2WAY - 1Wire Molex#039288020	Pin1	1-Wire
	Pin2	1Wire GND

- The mating connector plug requirements are as follows :
- The receptacle housings shall be Molex® Mini-Fit Jr.™ series 5557.
- The crimp female terminals shall be Molex® Mini-Fit Jr.™ series 5556 are available in 16AWG to 28AWG sizes.

- It is recommended the solid core cables be avoided where possible to improve the connection reliability of the installed cable. *{This is difficult for CAT5e so if solid core is used extra care must be taken in crimping and in restraining of wires and avoidance of bending}.*
- Alternative connector suppliers/manufacturers, that are compatible with the defined interfaces, can be used.
- Defined tools should be used to ensure good termination coupling in both the cable manufacture and installation.

Table 4 : Mating Female Connectors

Size	Molex Part Number	Pitch	Material	Polarised
6Way	39-01-2060	4.2mm	Nylon	Yes
4Way	39-01-2040	4.2mm	Nylon	Yes
14Way	39-01-2140	4.2mm	Nylon	Yes
2Way	39-01-2020	4.2mm	Nylon	Yes

Table 5 : Mating Female Crimp

Size	Molex Part Number	Rating	Material	Wire
18-24 AWG	0039000214	9A	Phosphor Bronze	1.3-3.1mm
22-28 AWG	0039000216	9A	Phosphor Bronze	0.90-1.80mm
16 AWG	0039000218	9A	Phosphor Bronze	1.80-3.10mm

4.4.2 Chassis

If the CP6100 cradle is not mounted on the buses metal chassis it should be electrically connected by means of an additional braided cable to the nearest chassis point. This will maintain good electrical and magnetic immunity (EMI). This 0.75mm² cable should be attached to an M4 stud inside the cradle.

4.5 Circuit Breakers

It is vitally important to protect the power cabling against over current conditions. Circuit breakers are an ideal way of protecting the wiring over conventional fuses. Circuit breakers must be selected to trip before the cable current limit is reached.

Recommended circuit breaker ETA 1170-01-5A for CP6100 power and ETA 1170=01-3A for CP6100 remote on high (can be ignition).



D_1170_e_030305.p
df

4.6 Cable Requirements

Power supply cables wired to the input of a circuit breaker must be rated with respect to the previous circuit breaker or fuse from which they were derived. Adequate current de-rating should be applied to the cable as per the manufacturer's instructions.

4.7 Hierarchy for Supply

Figure 8 shows a typical wiring hierarchy for the equipment power supply cabling.

Notice that the cable ratings are higher than the circuit breakers and fuse ratings. In this example the circuit breaker rating has been de-rated to 70% of the cable maximum continuous current rating.

Also note that the current rating of the input side of the circuit breaker from the vehicle bus bar. This cable must be rated to exceed the current rating of the bus bar. In this case 70% de-rating has been applied.

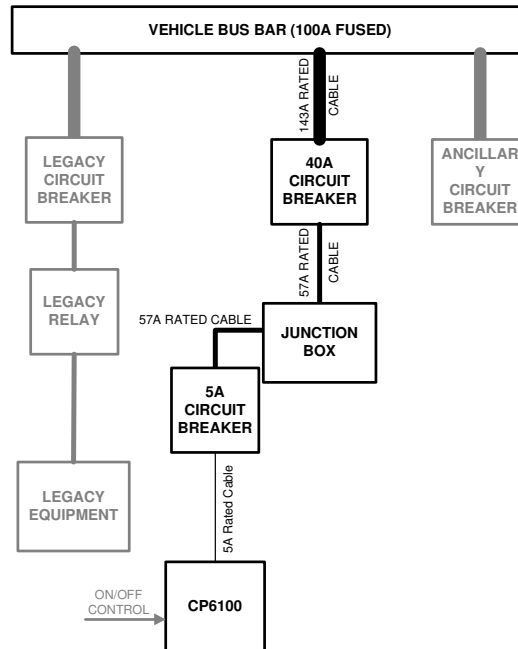


Figure 8: Typical Bus Power Supply Circuit Breaker and Cable Rating

4.8 Hot Plugging



WARNING:

It is strongly recommended that power is turned off before the power is plugged in or out.

4.9 Cable Recommendations

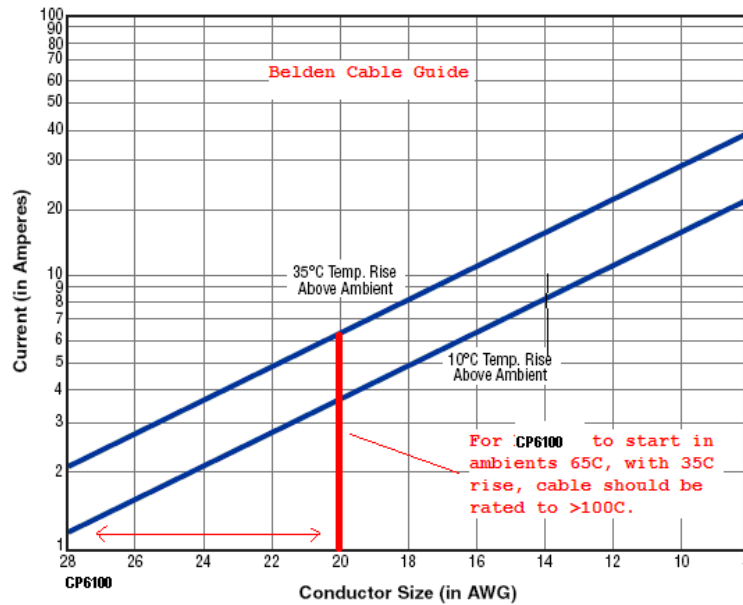


Figure 9: Cable current handling table

For power distribution it is also critical that the cable is selected to minimise voltage drop, especially during start up peak currents. It is recommended that the cable voltage drop uses a peak current of 3A and a full voltage drop of <1V (including return) to select the cable.

4.10 Length Versus Cable Size

All cables have resistance. When comparing cables of the same type and style, then generally, the thicker the copper the lower the resistance for the same length.

If cables are to be used over long lengths then it may be necessary to increase the cable size to reduce the voltage drop caused by the resistance of the wire and the load current.

For the CP6100 wiring the following is provided as a guide to maintain an acceptable voltage drop.

Table 6: CP6100 Cable Size and Length Guide

Distance from Star Point	Cable Size	Equivalent Cable
0m-10m	20 AWG	Belden 9408
10m-20m	18 AWG	Belden 9409
20m-30m	16 AWG	Belden 9410
30m-50m	14 AWG	Belden 9411

4.11 Ground Terminations

Notice In Figure 7: Installation Wiring Diagram the star point for the power supply grounds (negative terminals) of the transit system units. They share a common termination point thus providing a controlled system ground reference point.

4.12 Ground Termination checks

The ground connection resistances of all installed transit system units should be measured to ensure good conductivity.

Connection should be referenced to the Transit System Ground Star Point. The resistance from any negative power connection to the star point should be less than 0.5Ω.

4.13 Cable Specifications

VIX Products recommends using the following cables for CP6100 installation. Local and statutory regulations should be followed for fire proofness and cable material content (i.e. RoHS), which may override these recommendations.

Table 7: Cable Specification

Cable Function	Cable Description	Manufacturer	Part No.	Data
POWER to power connector. See Note:	2 x 16AWG 1.5mm ² Pair Low smoke Halogen free	Belden		
Power/Relay/Control /Door Switch	20 AWG Stranded	Belden	9920	
Ethernet	Cat5e 24AWG Un-Shielded			
RS232 Serial				
Chassis	Earth Braid 0.75mm ²			

Note: Follow table 5 for cable rating versus distance.

4.13.1 Cable Extension Recommendations

The Ethernet cable can be extended if required to reach switches, hubs and gate controllers as required. It is highly recommended that the maximum extension length is not exceeded, as it may result in problematic operation.

Table 8: Cable Recommendations

Function	Cable Description	Manufacturer	Part No.	Max L
Ethernet	Ethernet extension	Off-the-shelf	NA	30m
RS232	Diagnostic extension	Off-the-shelf	NA	5m
USB	USB Host extension	Off-the-shelf	NA	2m
RS422 / RS485 / RS232	Multiprotocol extension	Off-the-shelf	NA	100m / 1km / 5m

5 Physical characteristics

5.1 CP6100 Positioning

When positioning a CP6100 cradle within a vehicle cabin the following items should be used as a guideline:

- Metal objects are to be located greater than 200 mm from target area to prevent antenna de-tuning & card range reduction.
- The CP6100 should be located within easy reach of Patrons as shown in Figure 10: CP6100 positioning.

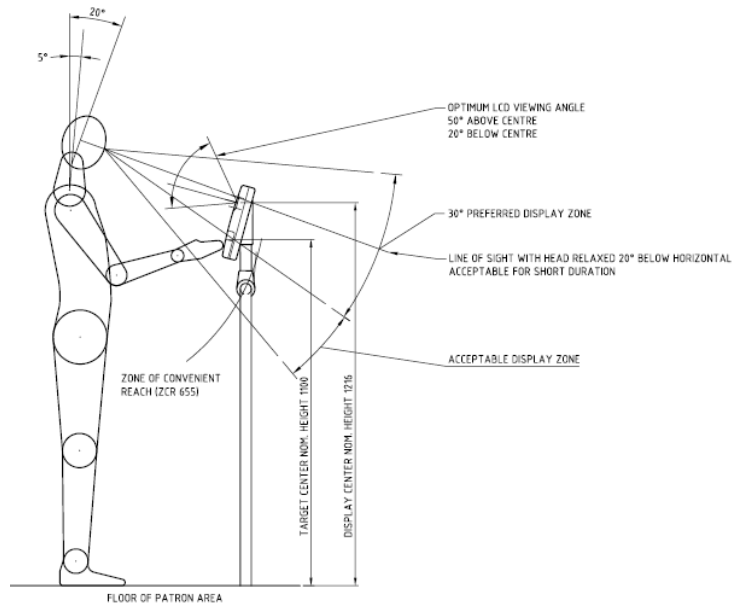


Figure 10: CP6100 positioning - height

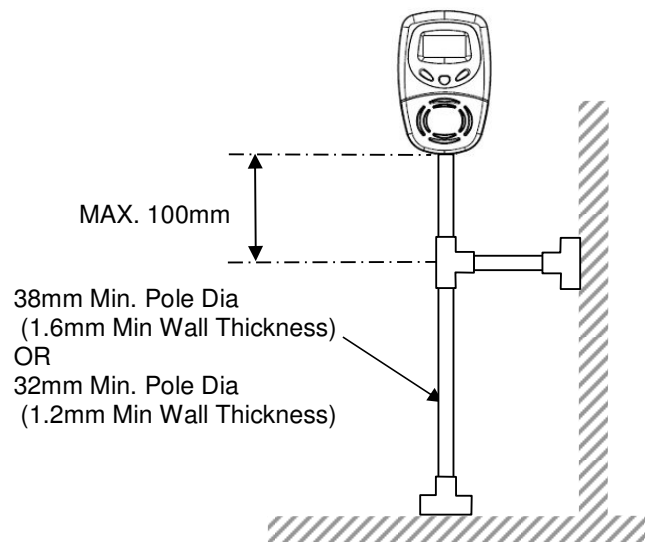


Figure 11: CP6100 Preferred Pole Mounting Bracing

6 Environmental Characteristics

6.1 Dimensions and Weight

Units physical dimension 164mm(w) x x 232mm(h) x 121mm(d) – Including Cradle

Weight = 1 kg. Without Cradle



Figure 12 : Mechanical Dimensions

6.2 General

The casing shall have no corners, sharp edges, or exposed fixings (nuts/bolts) that may present a hazard to the driver.

The casing shall provide unit resistance to most solvents and general-purpose cleaners.

6.3 Cradle

The cradle plates are manufactured from 304 Stainless Steel and anodised aluminium.

The plates have no corners or sharp edges that may present a hazard operators or installers.

6.4 Cradle Mounting Instructions



The CP6100 is hard mounted to bus structure via the cradle, which are shipped as part of the PROD0059 pole mounting kit.

The unit connectors present a low risk of accidental short circuit or electric shock when the unit is removed, it is always recommended that power is disconnected.

Table 9 : PROD0059 Bill of Materials

Part	Description	Supplier	Manufacturer	Manufacturer Part
LCK0012	LCK ASSY,EXTD SHFT,VISE	SOUTHCO FASTENERS PTY LTD	SOUTHCO	E3-99-3694
LCK0013	KEY,FEMALE ROUND,FOR SOUTHCO VICE ACTION LOCK	SOUTHCO	SOUTHCO	E3-99-622-15
MF0184	MF,BKT,CRADLE MOUNT,S/S,			
MF0185	MF,POLE CLAMP,			
MTRL0040	MTRL,TAPE,CLOSED CELL,	INDUSTRIAL RUBBER WA	TESA	60203 3.2MMX40MM
NUT0025	NUT,M5,HEX,NYLOC,SS,A2	COVENTRY FASTENERS WA	BOSSARD	BN637 M5
PKG0042	PKG,BOX,CARDBOARD,CP6100	TONTEC INT'L LIMITED	TONTEC	
PKG0043	PACKAGING,BAG,MAGIC-SEAL	Bunzl Limited (Cospak)	COSPAK	9/7561(150 X 225M)
PM0098	PM,CRADLE COVER,CP6100			
PM0098.A	ASSY,CFG,PM,CRADLE COVER			
PM0102	PM,SPACER,VARIABLE POLE,			
RIV0004	RIVET,4.8X10.8(X9.5),SS,	COVENTRY FASTENERS WA	BOSSARD	BN 3313 4.8x10.8
SCW0032	SCW,M4X8,BTN,SKT,S/S 304	FJ SWEETMAN	BOSSARD	BN1593 M4X8
SCW0032	SCW,M4X8,BTN,SKT,S/S 304	PORTER AGENCIES PTY LTD	Porter	SSBHAS408
SCW0032	SCW,M4X8,BTN,SKT,S/S 304	COVENTRY	BOSSARD	BN1593 M4X8
SCW0090	SCW,M5x45,CSK,SKT,S/S,A2	COVENTRY FASTENERS WA	BOSSARD	BN 616 M5x45
WSH0038	WSH,M4,SPR,HLX,LCK,SS	PORTER AGENCIES PTY LTD	PORTER A	SSLW4

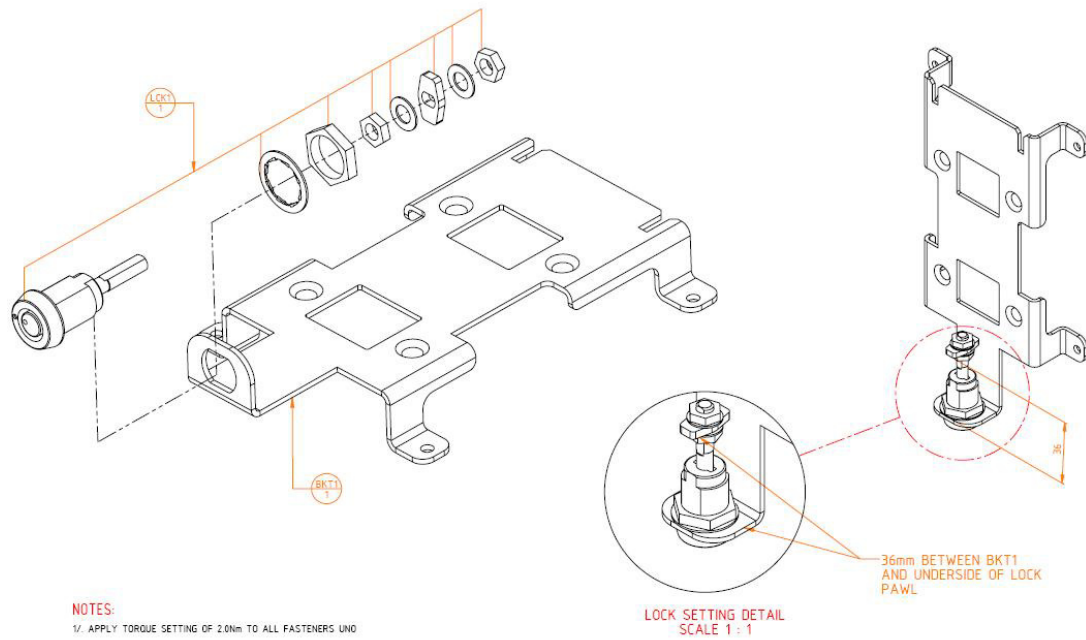


Figure 13: PROD0059 Cradle Assembly (45-0710) Page 1

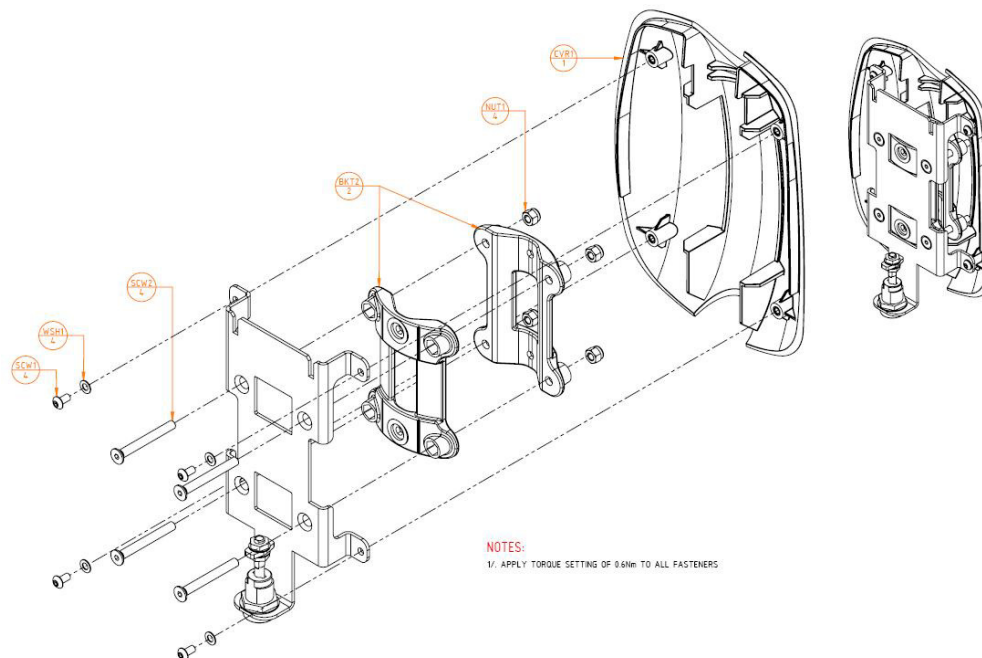


Figure 14: PROD0059 Cradle Assembly (45-0710) Page 2

7 Installation Guidelines for the Cradle

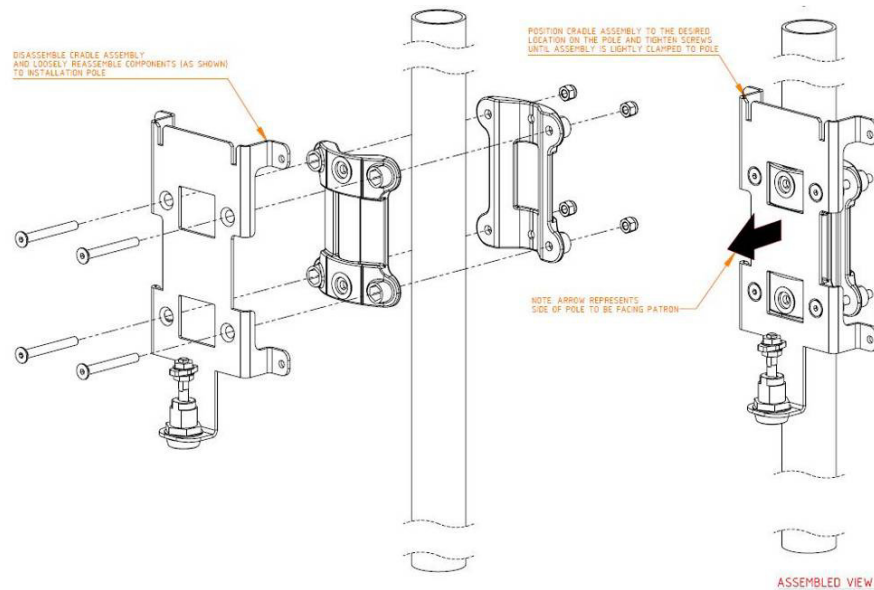


Figure 15: Installation Instructions (57-0073) Page 1

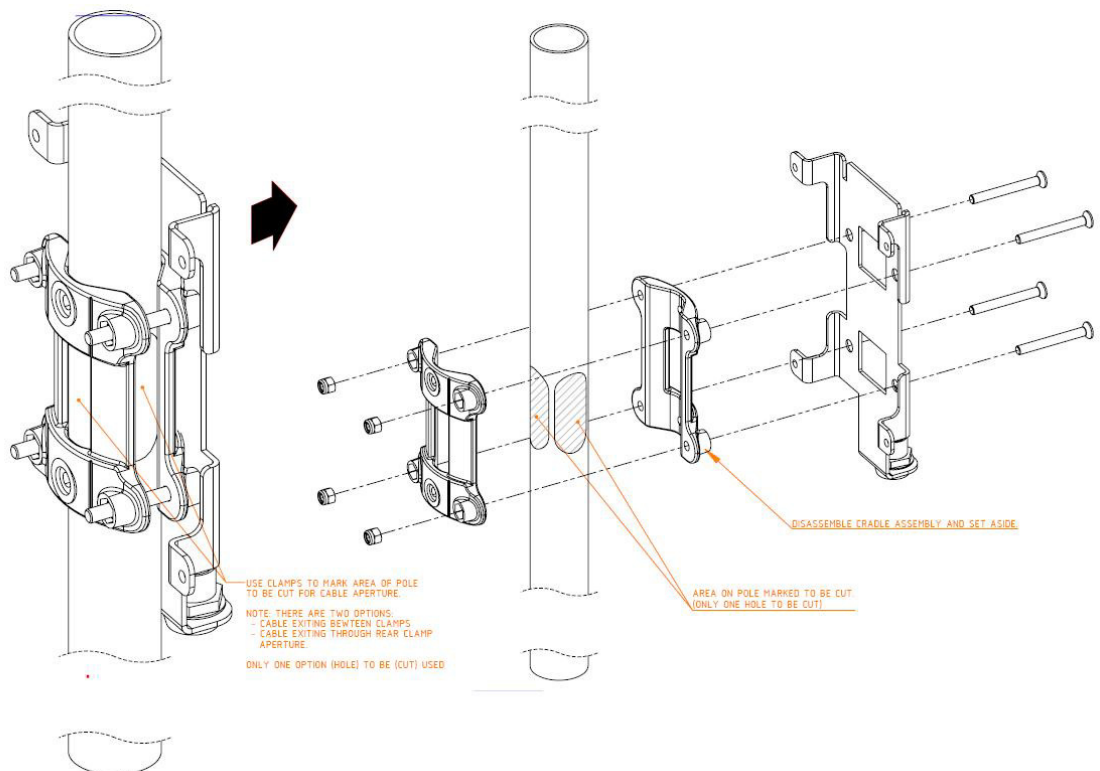


Figure 16: Installation Instructions (57-0073) Page 2

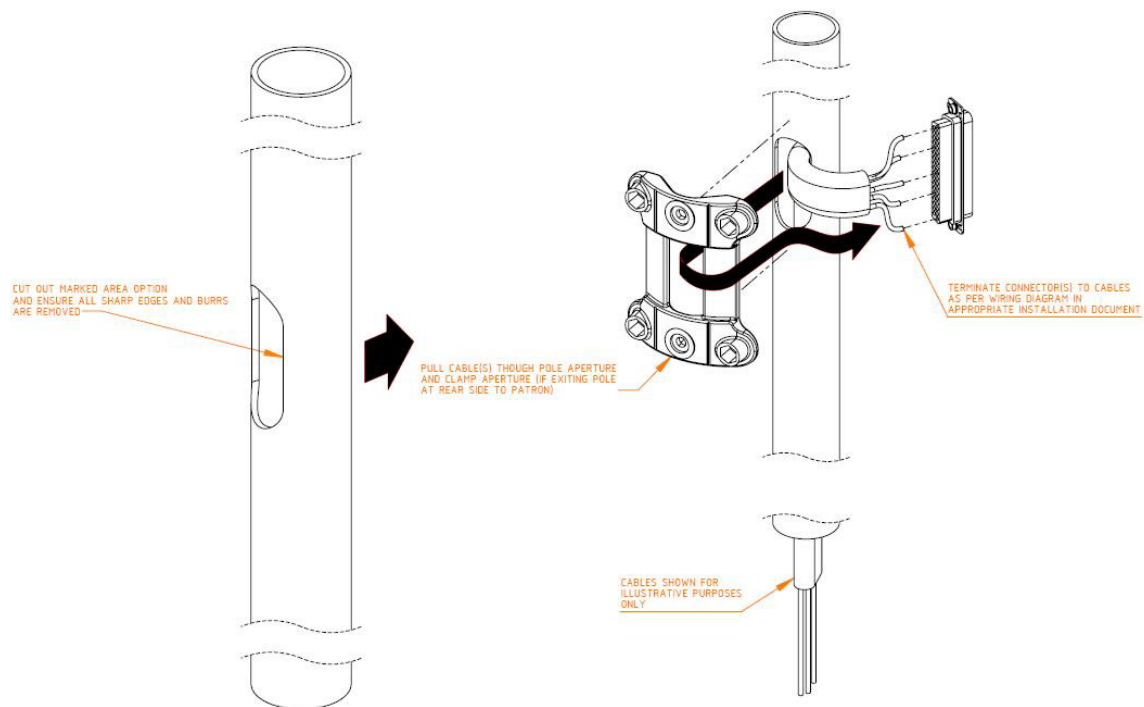


Figure 17: Installation Instructions (57-0073) Page 3

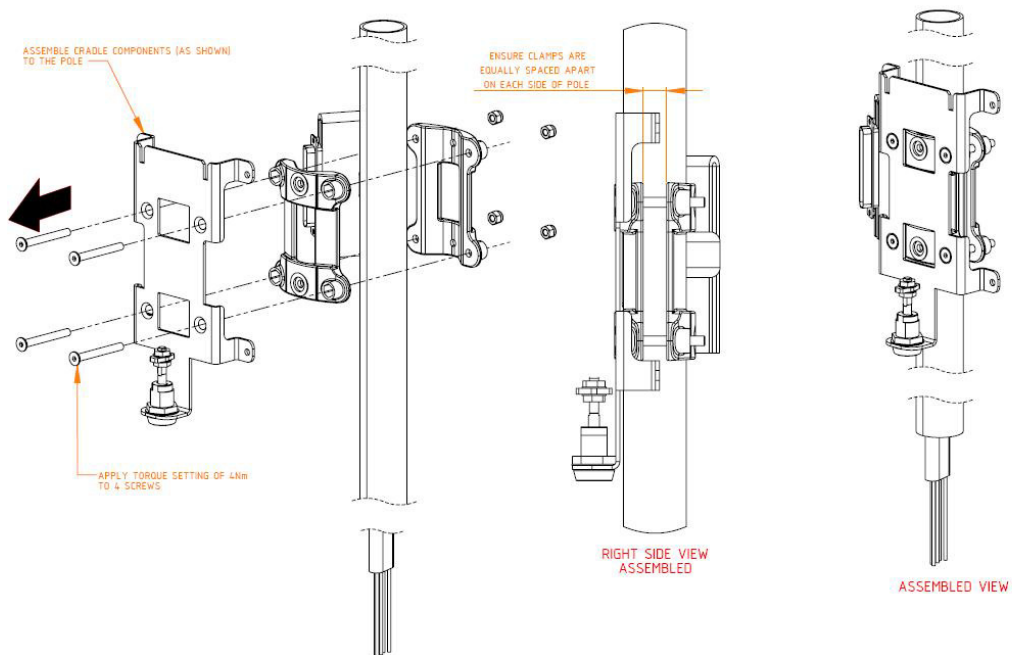


Figure 18: Installation Instructions (57-0073) Page 5

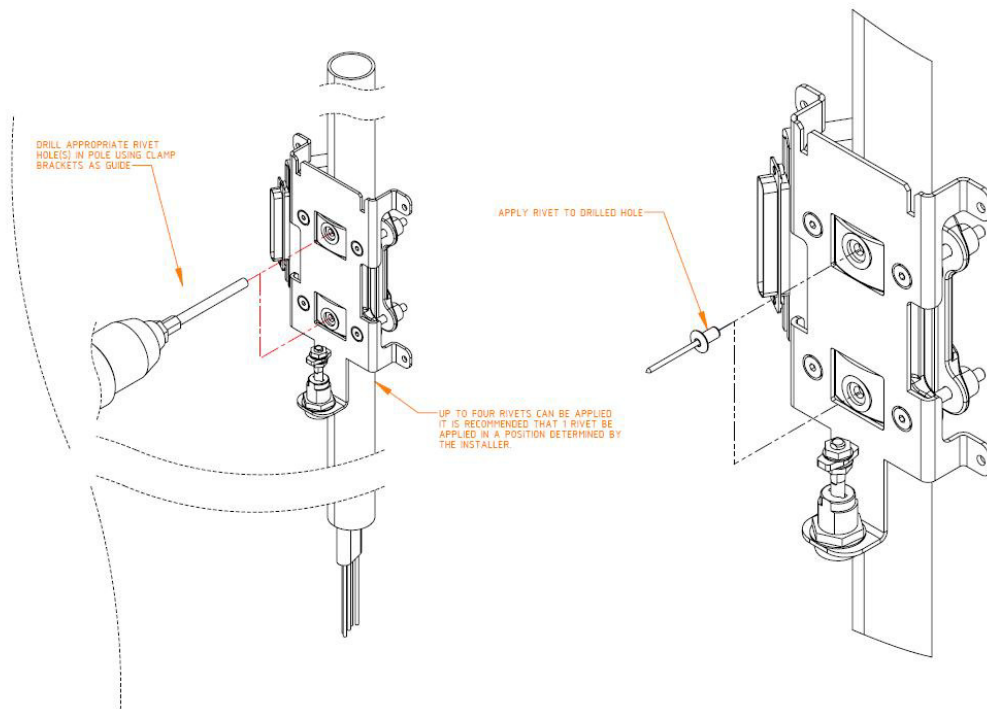


Figure 19: Installation Instructions (57-0073) Page 6

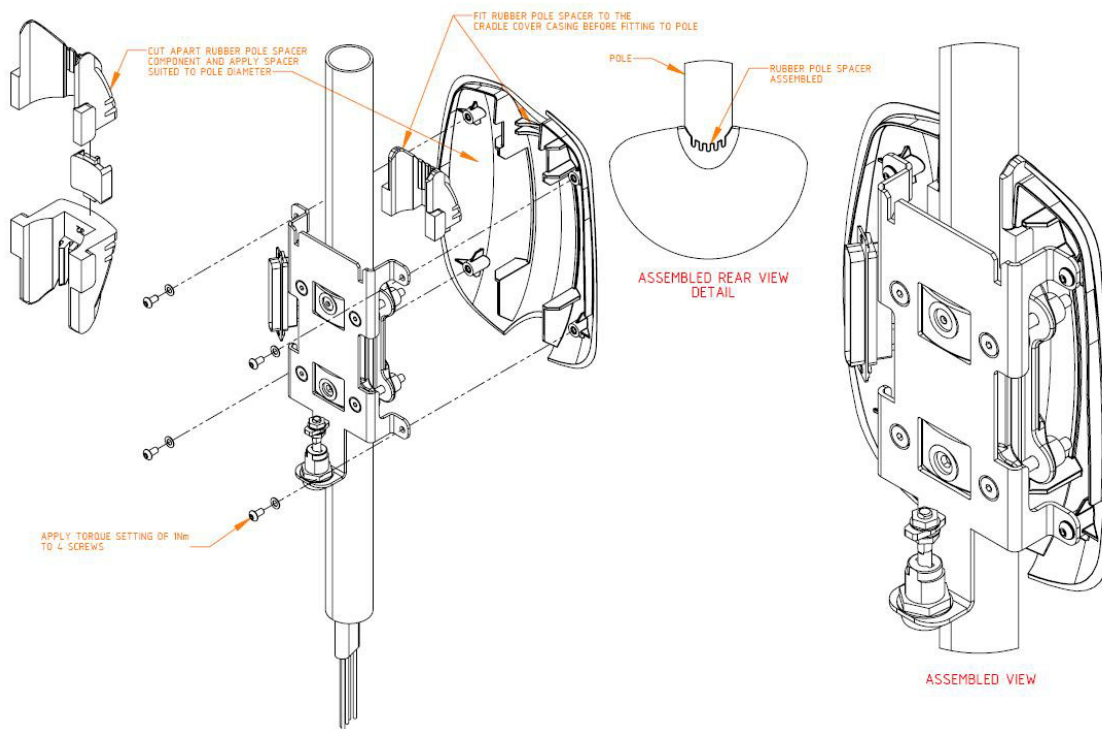


Figure 20: Installation Instructions (57-0073) Page 7

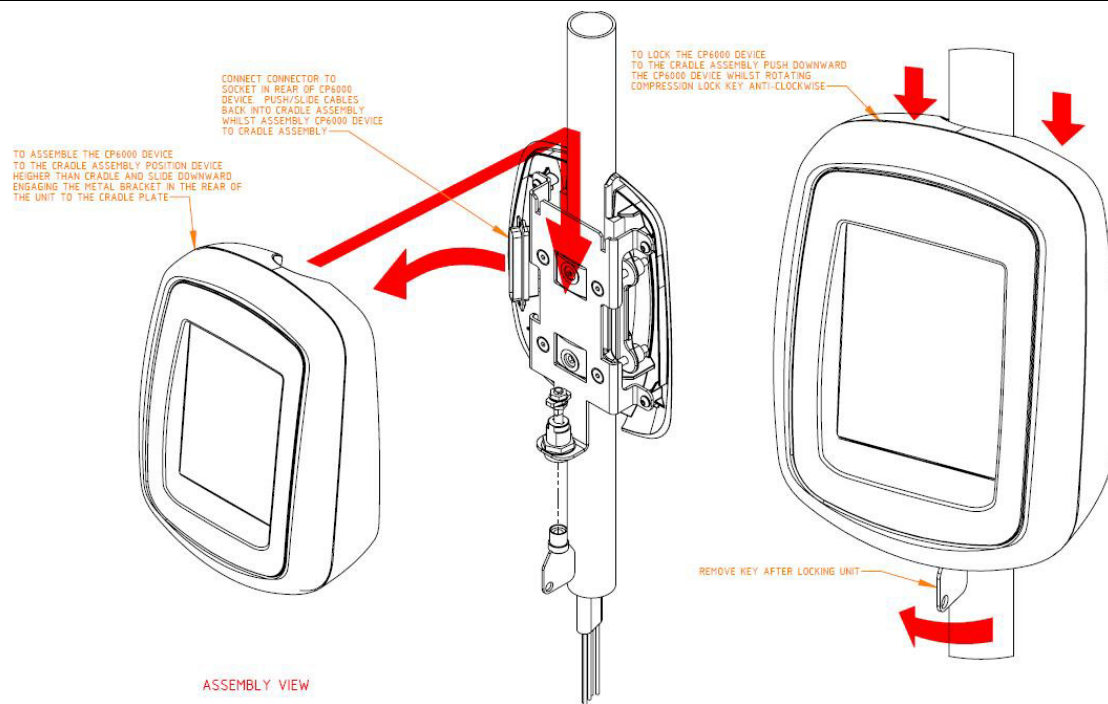


Figure 21: Installation Instructions (57-0073) Page 8

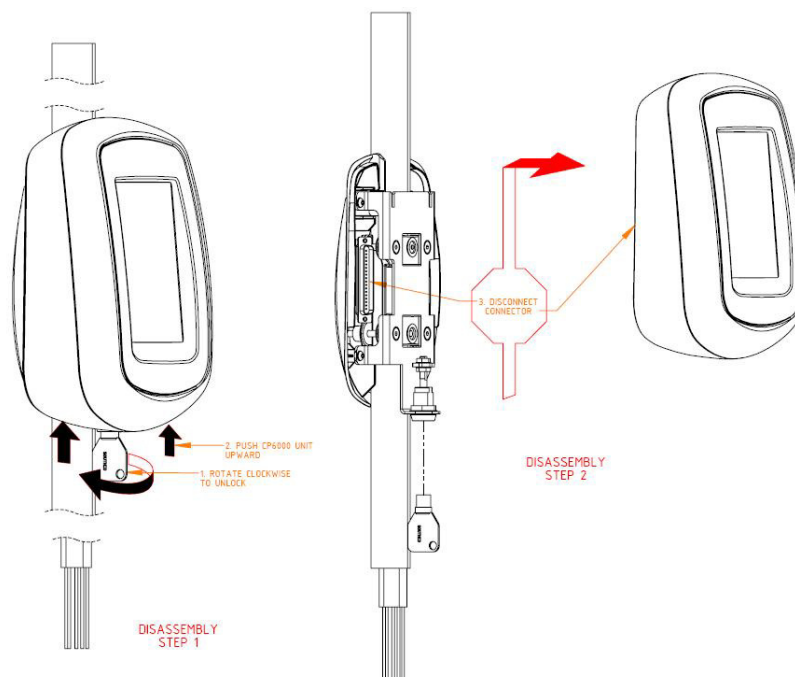


Figure 22: Installation Instructions (57-0073) Page 9

Note: Regard references to CP6000 as CP6100, where DB37 is show, this is to be considered as replaced by the four new Molex Mini-Fit Jr connectors.