Assure Adept Validator

Installation Guide

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Revision:	**2.3**
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Document History

REVISION	REVISION DATE	DESCRIPTION	AUTHOR
0.1	14 Jun 2021	Initial Draft.	Atul Sharma
0.2	27 July 2021	Updated with review comments.	Atul Sharma
0.3	13 Dec 2021	Updated document template; Restructured document; Added more instructions.	Carrie Huang
1.0	15 Dec 2021	Formal Release	Atul Sharma
1.1	03 Mar 2022	Added info on accessories (re)placement; Added 1-wire assembly; Added wiring and termination info.	Carrie Huang
1.2	15 Mar 2022	Changed rear connector pinouts; Addressed review comments: Mainly on the wiring diagram and ferrite/cable specifications; Added example on the current rating per conductor as a function of the number of conductors; Changed Adept to Adept Validator and other minor wording adjustments.	Carrie Huang
2.0	15 Mar 2022	Released for use.	Carrie Huang
2.1	04 Apr 2022	Added installation for 4G/GPS; Added battery section; Added ferrites should be installed before cradle mounting; Changed pole cut-out; Added cradle part number and information on the cradle cover and extra parts to suit poles of different diameter.	Carrie Huang
2.2	23 Jun 2022	Changed the way how the cradle kit is delivered and added instructions on how to disassemble it to be ready for installation; Added 1-wire module pinouts.	Carrie Huang
2.3	23 Jun 2022	Added FCC & ISED compliance statement	Steven Yeh

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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.**
Warning:	**Be sure to use the specified power source. Connection to an improper power source may cause fire or electric shock.**
Warning:	**Disconnect all power before carrying out repairs or service.**
Warning:	**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

The following standards have been applied to this device:

- CE/FCC Marking
- UKCA
- ISED
- Safety: EN62368-1
- Automotive Type approval to ECE Regulation No 10
- Rolling Stock – EN 50155 / EN 50121-3-2

1.2.1 FCC RF Radiation Exposure Statement

This equipment complies with radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Après examen de ce matériel aux conformité ou aux limites d'intensité de champ RF, les utilisateurs peuvent sur l'exposition aux radiofréquences et la conformité and compliance d'acquérir les informations correspondantes. La distance minimale du corps à utiliser le dispositif est de 20cm.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.2.2 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.

1.2.3 ISED Compliance Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1) This device may not cause interference.
2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1) L'appareil ne doit pas produire de brouillage;
2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-003 (B)/NMB-003(B)

This product meets the applicable Innovation, Science and Economic Development Canada technical specifications.

Le présent produit est conforme aux spécifications techniques applicables d'Innovation, Sciences et Développement économique Canada.

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 recognized 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.

2 Introduction

2.1 Purpose

This document describes the Adept Validator installation for general and expanded use.

Figure 1: Picture of Adept Validator

2.2 Scope

This document details the recommended installation for the Adept Validator. It describes the mechanical and electrical interfaces and how to interconnect the Adept Validator 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.

The scope of this document is limited to the following Adept Validator models, which are all pole mounting variants. Details on surface mounting will be added in a future revision.

Table 1: Valid Devices

VIX PART NUMBER	DESCRIPTION
ADEPT-AAAx	Adept with QR
ADEPT-AACx	Adept with QR + Full COMMs (WIFI/GPS/4G/Bluetooth)
ADEPT-AADx	Adept without QR

2.3 References

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

[1] DPU-00089 Assure Adept Validator Maintenance Manual

2.4 Glossary/Acronyms

Table 2: Terminology

TERM	DEFINITION
CAT5/6	Category 5/6
CE marking	CE marking is an administrative marking with which the manufacturer or importer affirms its conformity with European health, safety, and environmental protection standards
COMMS	Communications
DC	Direct Current
EMC	Electromagnetic Compatibility
EN	European Standards abbreviated to ENs (literal translation as European Norms).
FCC	Federal Communications Commission
GPO	General Purpose Output
Hot Plugging	Changing components whilst system is operating.
ISED	Innovation, Science and Economic Development Canada
NC	Not Connected
OTG	On the Go
PoE	Power over Ethernet
RTC	Real Time Clock
RF	Radio Frequency
SAM	Secure Access Module
SIM	Subscriber Identity Module
USB	Universal Serial Bus
uSD	Micro Secure Digital

3 Installation Overview

3.1 System Architecture

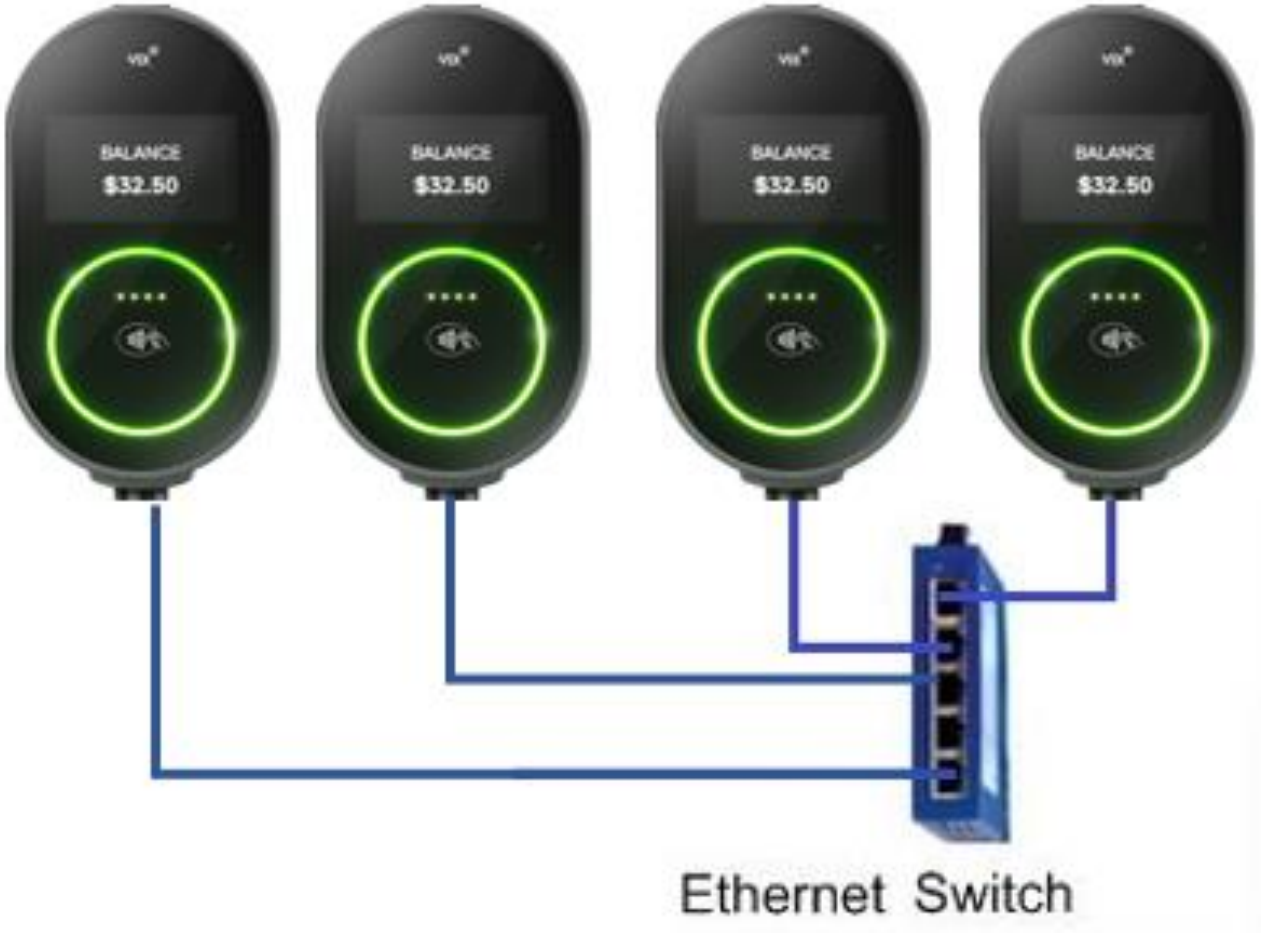


Figure 2: Adept Validator Typical System Architecture

3.2 Power Supply

Adept Validator can be powered either by Power-Over-Ethernet or by 24V DC power supply.

Table 3: Power Supply Specification

PARAMETER	MIN.	TYP.	MAX.	UNIT
Input Supply Voltage	9	24	36	V
Specified Input Current on power-up (@24V)	-	-	1	A
Specified Input Current steady state (@24V)	0.25 (6W)	0.35 (8.4W)	0.7 (16.8W)	A
Reverse Voltage Protection	-	-	-100	V

3.3 Installation Example

Mechanically the Adept Validator is mounted in two ways:

1. Onto a pole with a cradle.

Figure 3: Picture of a Pole-Mounted Adept Validator

2. Onto a surface (e.g. Gates at train stations or TVMs (ticket vending machine)).

Figure 4: Picture of a Surface-Mounted Adept Validator

Refer to 6.7 for the details of the cut-out required on the surface.

4 Accessories

4.1 SAMs / SIM / uSD

Prior to installation, if the SAMs or SIM or uSD card need to be inserted or replaced, the Adept Validator needs to be opened by removing the 6 screws at the rear of the unit. Refer to [1] for details on how to obtain access to the main board/peripheral board. The card slots are located on the top side of the main board or the peripheral board (if installed) as shown below (Left = ADEPT-AAAx, Right = ADEPT-AACx).

Note:	*The Adept Validator is not supplied with any of the above-mentioned accessory by default.*

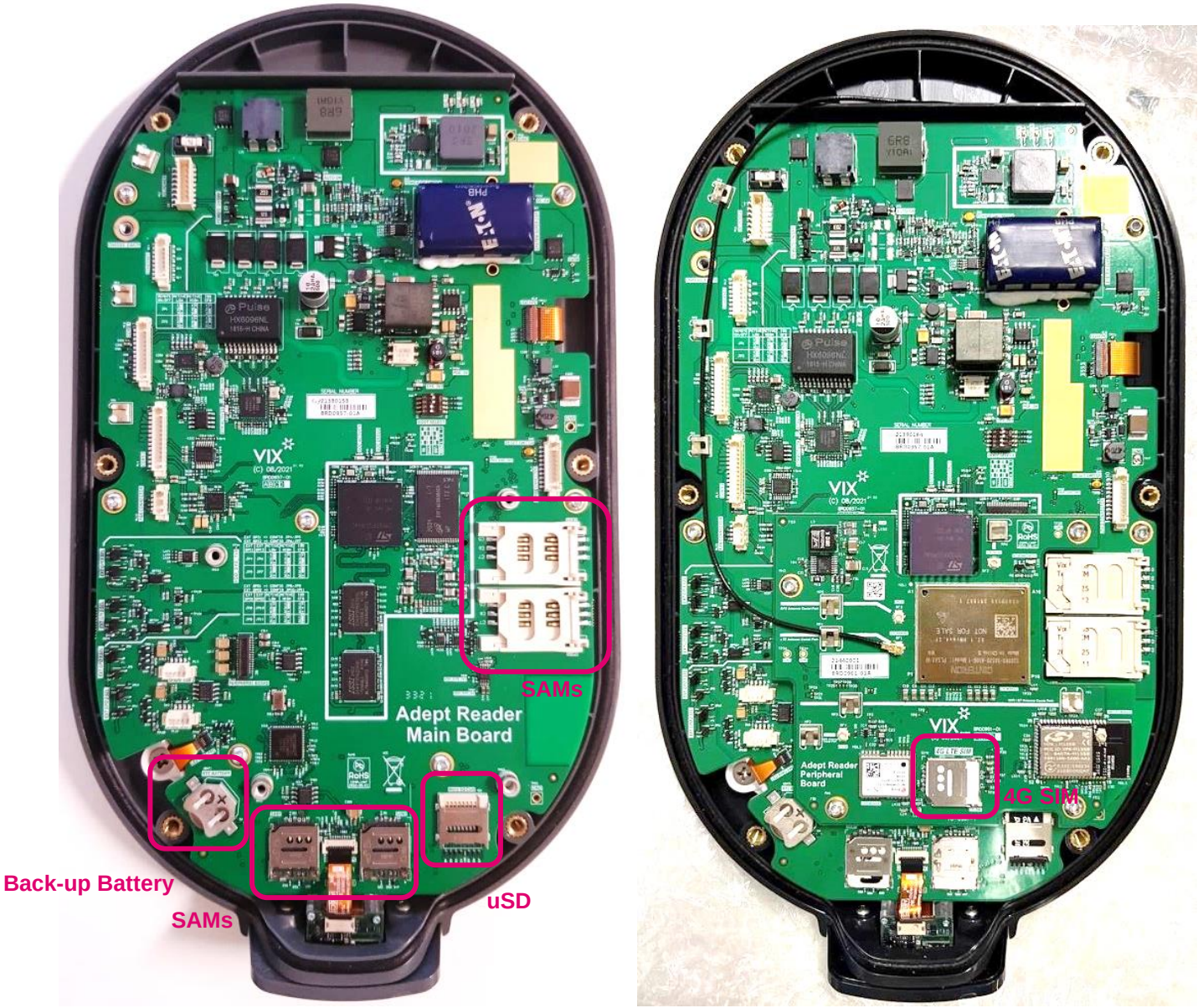


Figure 5: Picture of Adept Validator Internal

4.2 Back-up Battery

The rechargeable battery on the main board provides backup power to the real time clock when the unit is disconnected from the main power.

The battery usually comes with 90% charge when new, and it gets charged further during production testing, so it should be sufficient to power the RTC for approximately half a year, when out of the factory.

If the elapsed time between manufacturing and installation is more than half a year, there is a chance that the battery gets deeply discharged and the performance is not guaranteed.

If the device needs to be opened for the SAM/SIM/uSD insertion, it is recommended to use this opportunity to measure the battery voltage, to ensure it is above 2V, replace it otherwise.

Refer to [1] and Figure 5 for details on how to obtain access to the main board back-up battery if replacement is required.

4.3 1-Wire Assembly (CBL0429)

The 1-wire assembly comes with a connector which could be directly mated with the cable harness without any crimping required. Refer to section 5 for the wires, connector, and crimps to be used on the cable harness.

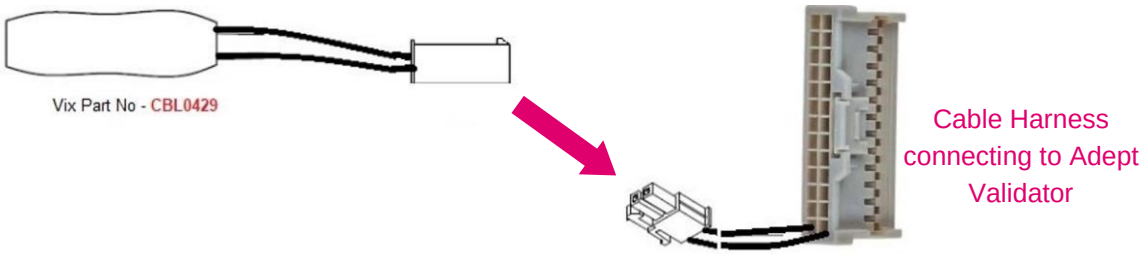


Figure 6: 1-Wire Assembly Connection

5 Wiring and Terminations

5.1 Example Vehicle Wiring Diagram

The following drawing shows an Adept Validator installed in isolation, with only general reference to external devices.

The example diagram is mainly for the Adept Validator end only, any interconnection and extension between the Adept Validator and the terminal end needs to be discussed and confirmed between the customer and VIX.

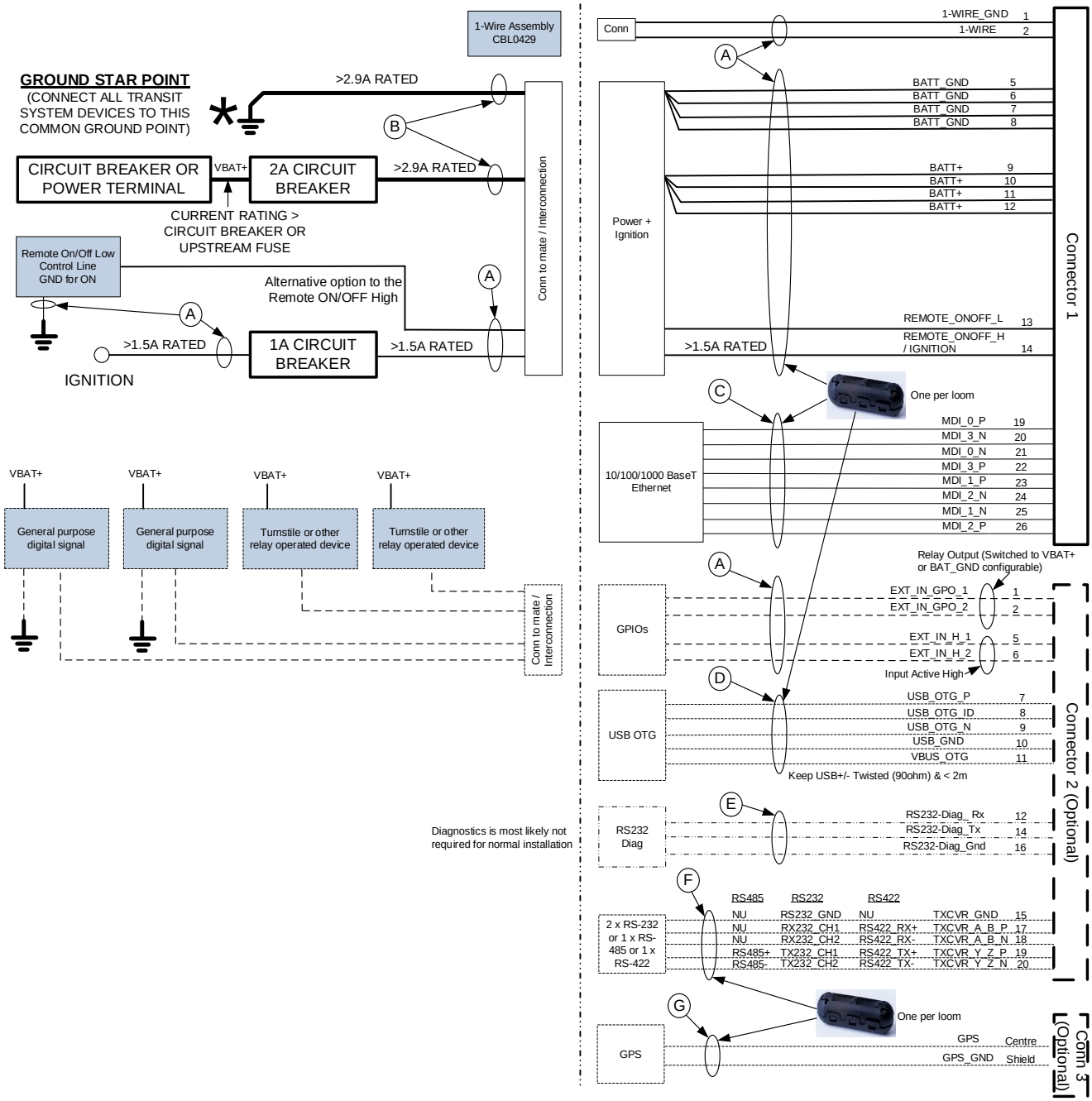


Figure 7: Example Vehicle Wiring Diagram

Refer to section 5.2 for the connectors and crimps to be used at the Adept Validator end. Refer to sections 5.3 and 5.4 for recommendation on circuit breakers and cables.

Note:	*The above diagram is for a 24V bus system, with 0 to 20-meter power cable and 70% derating of cable's maximum current rating. Refer to section 5.5 for information on the power cable selection.*
Caution:	For any connected signal group (power, Ethernet, USB, multiprotocol or GPS), a ferrite MUST be used on the cable on the Adept Validator end to ensure EMC performance. The recommendation is Laird Technologies # 28A0593-0A2 (shown in the above diagram), but any ferrite with similar impedance characteristics and size could be submitted to VIX for approving its use.
Note:	*The ferrites could be offset in position to accommodate for the space constraint within the pole. They should be secured in place on its cable group with cable ties or other means. They need to be installed prior to cradle mounting as it is difficult to position/fit them through the pole/cradle.*

Interconnection connectors are recommended to be used between the validator end and the end terminal/device. This provides flexibility in installation and removal. The below table presents the above wiring in a table format with the interconnection recommendations, but they could be altered, based on the actual application/requirement.

Table 4: Cable Connection Mapping

END TERMINATION		CABLE ID	PIN NAME	PIN	ADEPT END CONN
Molex # 39012020 + suitable crimps	PIN 2	A	1-WIRE-GND	1	1 Molex # 5016462600
	PIN 1	A	1-WIRE	2	
		NC	NC	3	
		NC	NC	4	
Interconnection (suitable for wire gauges on both sides), then: Power: Cable B => BATT_GND to Ground star point, and BATT+ to 2A circuit breaker Control: Pin13 to External low control line AND Pin 14 to 1A circuit breaker then external high control line		A	BATT_GND	5	
		A	BATT_GND	6	
		A	BATT_GND	7	
		A	BATT_GND	8	
		A	BATT+	9	
		A	BATT+	10	
		A	BATT+	11	
		A	BATT+	12	
		A	REMOTE_ONOFF_L	13	
		A	REMOTE_ONOFF_H / IGNITION	14	
		NC	CHASSIS	15	
		NC	CHASSIS	16	
		NC	CHASSIS	17	
		NC	CHASSIS	18	
RJ45 jack		C	MDI_0_P (Gigabit Ethernet)	19	
			MDI_3_N (Gigabit Ethernet)	20	
			MDI_0_N (Gigabit Ethernet)	21	
			MDI_3_P (Gigabit Ethernet)	22	
			MDI_1_P (Gigabit Ethernet)	23	
			MDI_2_N (Gigabit Ethernet)	24	
			MDI_1_N (Gigabit Ethernet)	25	
			MDI_2_P (Gigabit Ethernet)	26	

END TERMINATION	CABLE ID	PIN NAME	PIN	ADEPT END CONN
Molex # 39012040 + suitable crimps	A	EXT_GPO_1	1	2 Molex # 5016462000 (Optional)
	A	EXT_GPO_2	2	
	NC	EXT_IN_0V	3	
	NC	EXT_GPO_ISO	4	
	A	EXT_IN_H_1	5	
	A	EXT_IN_H_2	6	
USB type A jack	D	USB_OTG_P	7	
		USB_OTG_ID	8	
		USB_OTG_N	9	
		GND	10	
		VBUS_OTG	11	
DB9 female	E	DIAG_RX232 (Diagnostic RS232)	12	
		DIAG_TX232 (Diagnostic RS232)	**14**	
		DIAG_GND (Diagnostic RS232)	**16**	
	NC	GND	**13**	
DB9 male	F	XCVR_GND	**15**	
		TXCR_A_B_P (Multiprotocol Txcr)	17	
		TXCR_A_B_N (Multiprotocol Txcr)	18	
		TXCR_Y_Z_P (Multiprotocol Txcr)	19	
		TXCR_Y_Z_N (Multiprotocol Txcr)	20	
Select with the below consideration in mind: Interconnection introduces extra loss	G	GPS	Centre	3 Amphenol # 3FA1ENZRJ-C01ER (Optional)
		GPS_GND	Shield	

5.2 Connector Termination

The design incorporates two robust Molex iGrid automotive connectors, that are easy to crimp large or small cables using a variety of readily available crimps. There is also a FAKRA connector for models with GPS.

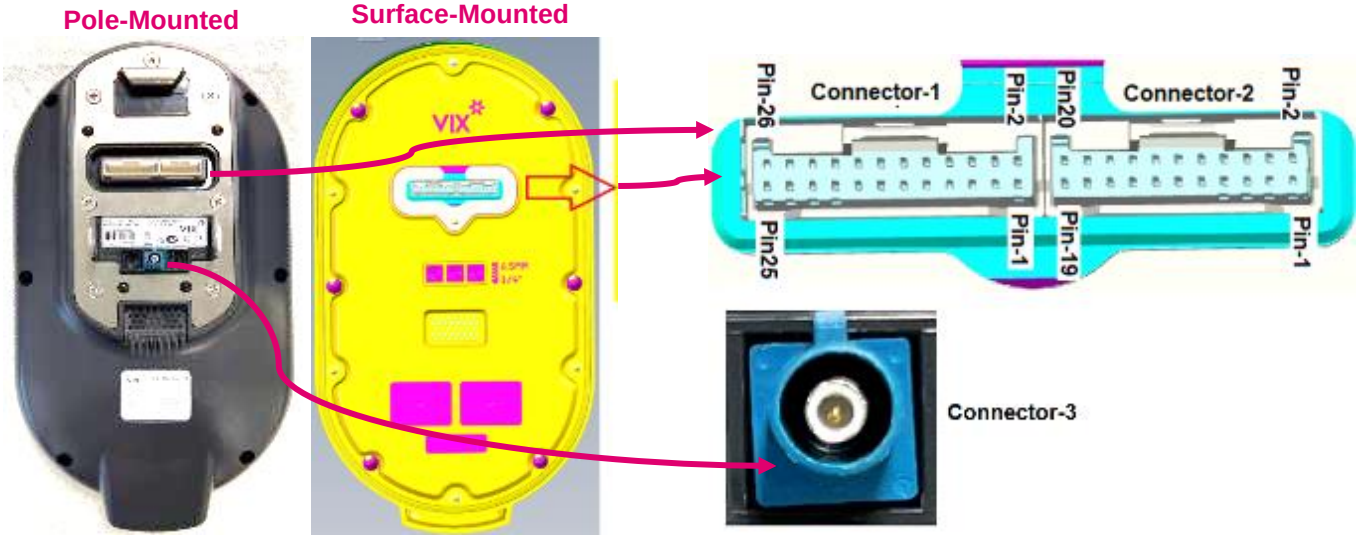


Figure 8: Adept Validator Rear Connectors

Both pole-mounted and surface-mounted Adept Validators use the same rear connectors with the same pinouts.

In most installations only one connector (26WAY) is required to be terminated onto the cable. The second connector (20WAY) and the third connector (GPS) will be required only if external GPIO/USB/RS485/GPS etc. are required in the installation.

The following defines the mating connectors/crimps and tooling requirements used on the **cable harness** that connects to the Adept Validator.

- Refer to the below two tables for the recommended connectors and crimps. The crimps should be selected based on the connecting cable size and the current rating requirement.
- Approved alternative connectors, 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 5: Mating Female Connector Housings 1 & 2

CONN ID	SIZE	MOLEX PART NUMBER	PITCH	MATERIAL	POLARISED
1	26WAY	5016462600	2mm	Nylon	Yes
2	20WAY	5016462000	2mm	Nylon	Yes

Table 6: Mating Female Crimps for Connectors 1 & 2

SIZE	MOLEX PART NUMBER	RATING	MATERIAL	PLATING	WIRE
22-26 AWG	5016471000	2A	Copper Alloy	Tin	0.95-1.50mm
22-24 AWG	5030952201	2A	Copper Alloy	Gold	0.85-1.50mm
26-28 AWG	5016481000	1.5A	Copper Alloy	Tin	0.85-1.40mm
26-28 AWG	5030952200	1.5A	Copper Alloy	Gold	0.85-1.50mm

Table 7: Mating Female Connector 3

CONN ID	STYLE	AMPHENOL PART NUMBER	CONTACT TERMINATION	SHIELD TERMINATION	BODY
3	SMB Right angle 50 Ohm	3FA1ENZRJ-C01ER	Solder	Crimp	Zinc Die Cast IP67

Connector # 3 comes in a kit of 6 components as shown below.

Figure 9: RF Connector Kit

The centre core of the RF cable (refer to section 5.4 for the cable recommendation) is to be soldered to the centre pin of the connector and the shield of the cable is to be crimped to connector body with the ferrule. Follow the manufacturer's instructions to assemble the connector properly.

Caution:	Once the RF cable is terminated and the RF connector is assembled, the connector body MUST be insulated to avoid shorting the metal body to the mounting pole.

Figure 10: Assembled RF Connector

5.3 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.

For a 24V system, the recommended circuit breaker rating is 2A for the power in and 1A for remote on/off high.

5.4 Cable Recommendations

VIX recommends using the following cables for the **Adept Validator end**. Cables between the interconnections and the end terminal/devices should be chosen appropriately, depending on the distances and current ratings.

Local and statutory regulations should be followed for fire proofness and cable material content (i.e. RoHS), which may override these recommendations.

Note:	*Cables must be suitably strain relieved at all times and in appropriate locations.*

Table 8: Cable Recommendations

CABLE ID	DESCRIPTION	MPN	FUNCTION
A	24 AWG Stranded Unshielded	Belden # 9923	1-Wire Power Remote ON/OFF External IN/OUT
B	2 x 20AWG (Red, Black) Stranded Unshielded (Follow Table 10 for cable rating versus distance)	Belden # 9408	Power

CABLE ID	DESCRIPTION	MPN	FUNCTION
C	CAT5e Cable, 24AWG Stranded Shielded Or CAT6a Cable, 24AWG Stranded Shielded (to ensure 1Gbit on 100m cable and EMC performance) For PoE application, a minimum of 24 AWG is required to support the temperature rise.	For CAT5e, Belden # 1300SB Or Madex # CAT5E-SFTP-LCZH	Ethernet
D	USB2.0 Cable (90 Ohm) 1 Twisted Pair + 2 x 24AWG Shielded		USB
E	1 Twisted Pair + 1 Core 24 AWG Stranded		RS232 Diag (Not required in normal installation)
F	2 Twisted Pair + 1 Core 24 AWG Stranded		Multiprotocol Serial Communication
G	RG174 Coaxial Cable (50 Ohm) 26AWG Stranded (RG316 could also be used for lower signal loss and higher durability, but it is less flexible and thicker.)	Prysmian # C1156.41.01	External GPS Antenna

After the primary interconnections, the signal cables can be further extended if required to reach switches, hubs and gate controllers as required. It is highly recommended that the maximum total length is not exceeded, as it may result in problematic operation. The performance is not guaranteed if the extension is achieved by a huge number of interconnections throughout the total allowed length. Signal extenders/amplifiers or additional transmitters could be considered to maintain the performance.

Table 9: Maximum Cable Length Recommendations

FUNCTION	CABLE DESCRIPTION	MAX TOTAL LENGTH
Ethernet	Ethernet extension	100m
RS232	Diagnostic extension	5m
USB	USB Host extension	2m
RS422 / RS485 / RS232	Multiprotocol extension	100m / 1km / 5m
GPS	GPS extension	45m

It is recommended that solid core cables be avoided where possible, to improve the connection reliability of the installed cable. If solid core is used for a CAT5e cable, extra care must be taken in crimping and restraining of wires, and sharp bending should be avoided.

5.5 Power Supply Cable

5.5.1 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.

5.5.2 Hierarchy for Power Supply

Figure 11 shows a typical wiring hierarchy for the equipment power supply cabling in the automotive vehicle environment.

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.

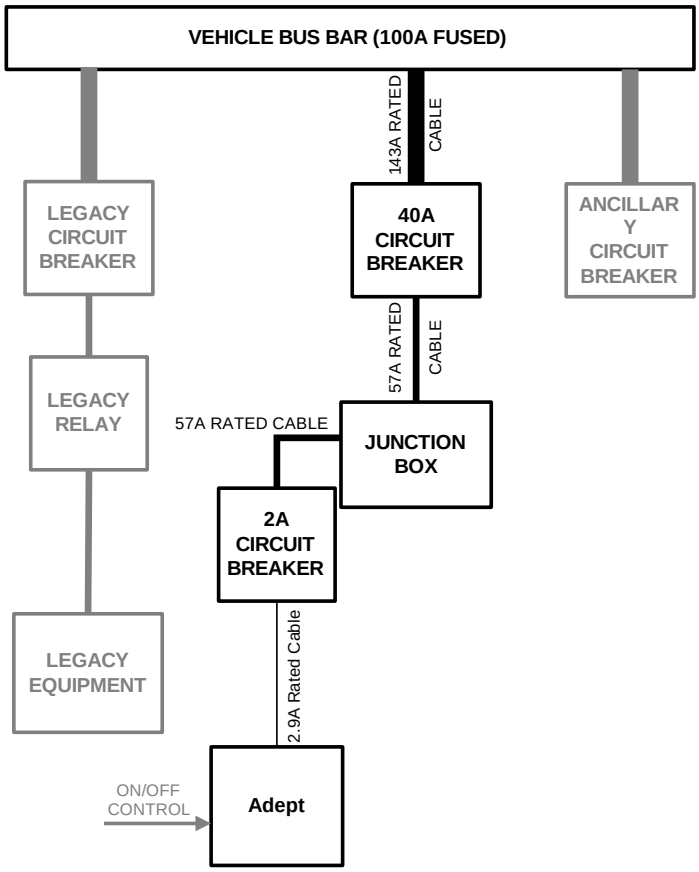


Figure 11: Typical Bus Power Supply Circuit Breaker and Cable Rating

5.5.3 Length Versus Size

For power distribution it is critical that the cable is selected to minimise voltage drop. This selection process shall consider the peak currents generated during equipment start up. As a guide, it is recommended that the cable voltage drop uses a peak current of 1A (in a 24V system) and a maximum voltage drop of 1V (including return, i.e. 0.5V each way) when selecting the cable.

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 Adept Validator wiring in a 24V system, the following is provided as a guide to maintain an acceptable voltage drop.

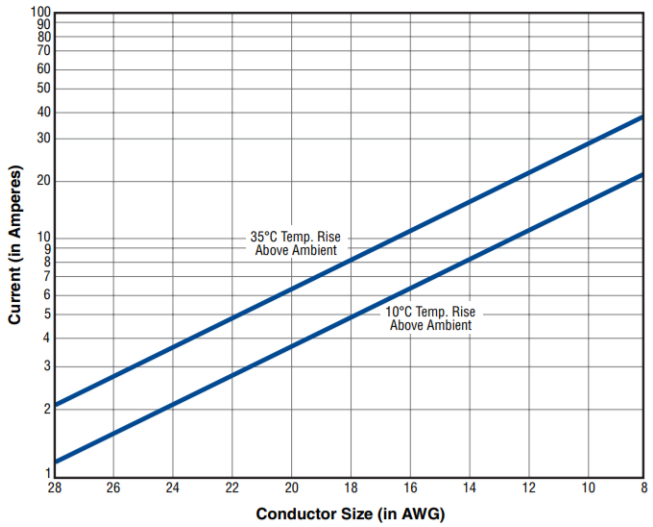
Table 10: Cable Length

DISTANCE FROM START POINT	CONDUCTOR SIZE	EQUIVALENT CABLE
0m-20m	20 AWG	Belden 9408 (2 Conductors)
20m-40m	18 AWG	Belden 9409 (2 Conductors)
40m-50m	16 AWG	Belden 9410 (2 Conductors)

Note:	*The highest rated cable (Belden 9410) can be used in all situations.*

5.5.4 Current Capacity

The maximum continuous current rating for a cable is limited by conductor size, number of conductors contained within the cable, maximum temperature rating of the cable, and environmental conditions such as ambient temperature and air flow. Use the below as a guide to select a cable with suitable current rating.



For example: If a 4x 20AWG copper cable is used, the RMS current **per conductor** at 10°C rise above ambient

= 3.7A (from chart) x 0.8 (from table)

= 2.96A

Current Ratings

No. of Conductors*	Factor
1	1.6
2 to 3	1.0
4 to 5	.8
6 to 15	.7
16 to 30	.5

*Do not count shields unless used as conductor.

Figure 12: Cable Current Capacity Chart

5.5.5 Vehicle Ground Terminations

The star point for the power supply grounds (negative terminals) of the automotive vehicle system units shares a common termination point, thus providing a controlled system ground reference point.

5.5.6 Vehicle Ground Termination Checks

The ground connection resistances of all installed automotive vehicle 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.

5.6 Hot Plugging

Warning:	**It is strongly recommended that Hot Plugging (inserting / removing the Molex iGrid Connectors whilst power is connected) should be avoided where possible.**
Warning:	**If this is not possible, then it is also strongly recommended that the orientation on the connectors is double checked before inserting.**

6 Pole Mounting

This pole mounting process requires no tool, except a key (for unlocking the lock if needed), providing the pole has already been cut out as required.

Refer to Appendix C for the cut-out required on the mounting pole. This includes a cut-out for the cables and a cut-out for the locating pin.

6.1 Adept Validator Positioning

When positioning an Adept Validator within a vehicle cabin, the following provisions should be used as a guideline:

- Metal objects are to be located greater than 200 mm from target area, specifically adjacent to it to prevent antenna de-tuning & card reading range reduction. The metal pole where the cradle is attached has no detrimental impact on the card reading range as there is sufficient clearance between the pole and the antenna.
- The Adept Validator should be located within easy reach of patrons as shown in Figure 13.
- The preferred Compact Validator pole mounting bracing is shown in Figure 14.

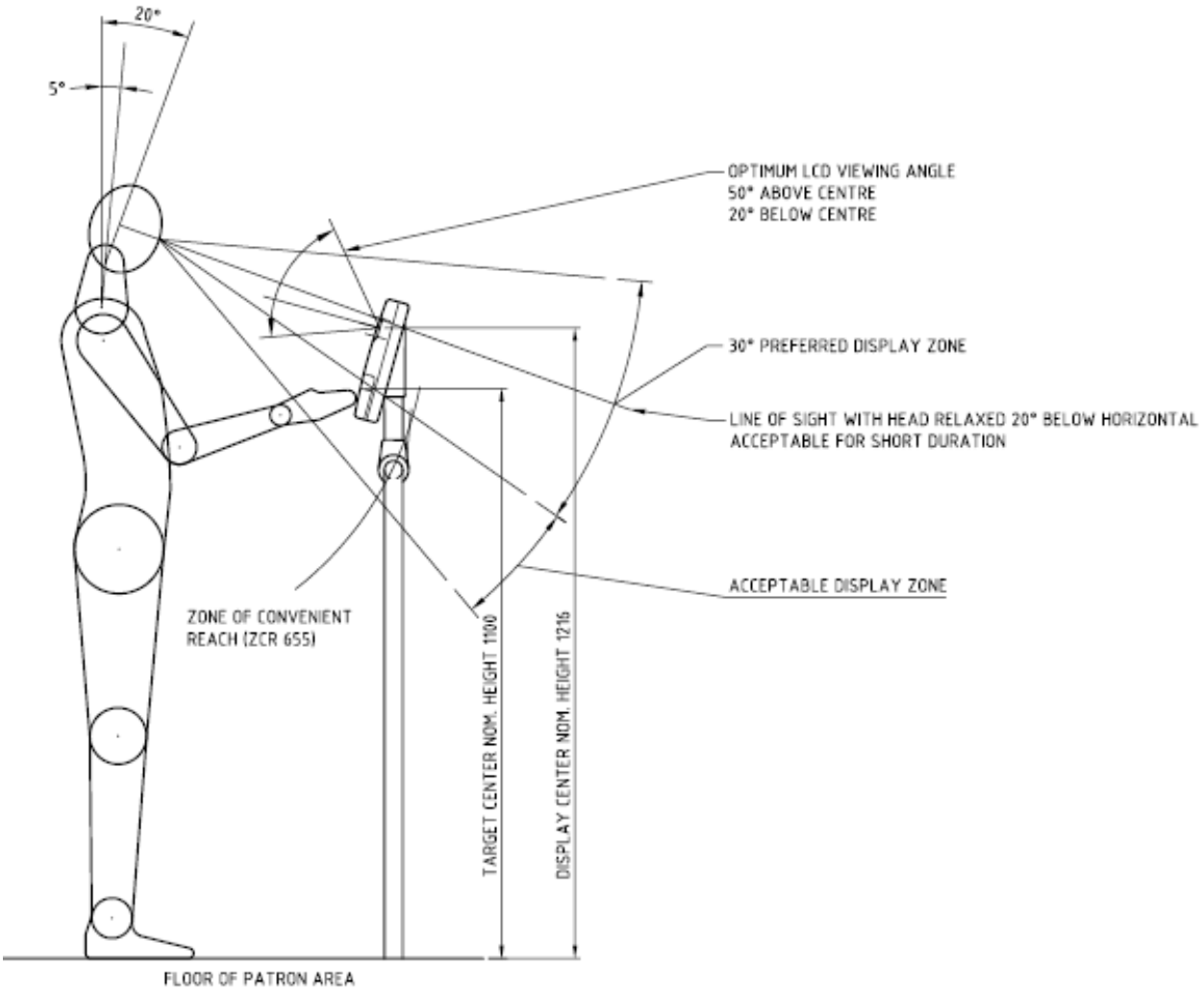


Figure 13: Adept Validator Positioning – Height

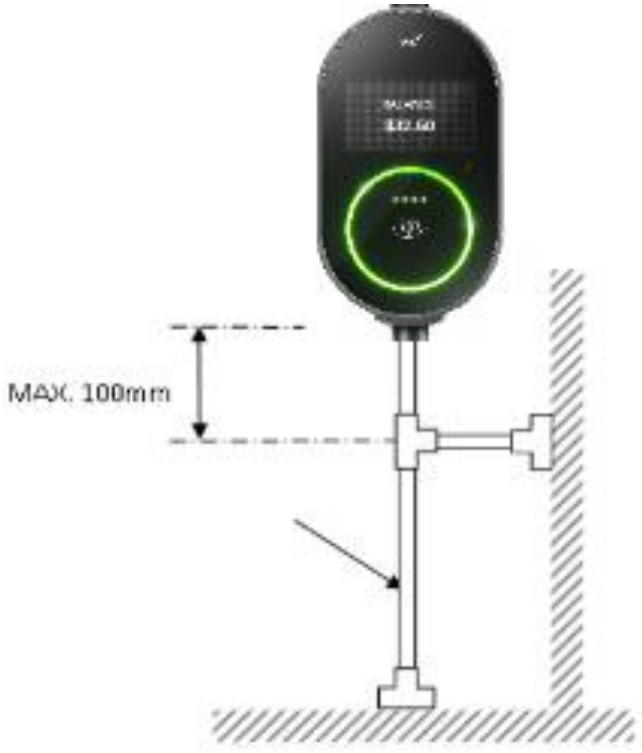


Figure 14: Adept Validator Preferred Pole Mounting Bracing

6.2 Cradle Kit

The cradle components are delivered as a kit (CRADLE-ADEPT-x-Ryy) designed for a standard 32mm pole.

Note:	*If a different diameter pole is to be used, the size needs to be informed to VIX prior to order so that available accessories could be recommended. For a 30mm or 35mm pole, extra parts could be obtained from VIX to suit: CRADLE-KIT-30 or CRADLE-KIT-35.*

The cradle kit comes with the below 4 components.

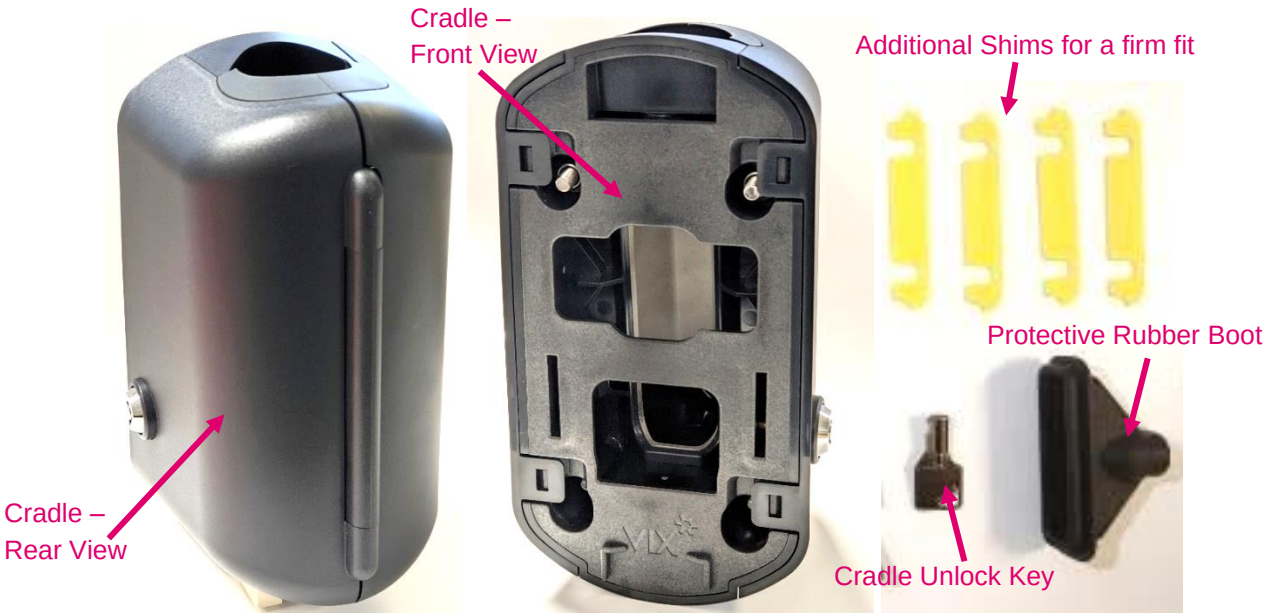


Figure 15: Assure Adept Validator Cradle Kit

To prepare for installation, the cradle has to be disassembled into the below three main parts – cradle front, cradle rear and external cover, by following steps 2 to 4 in section 6.6.

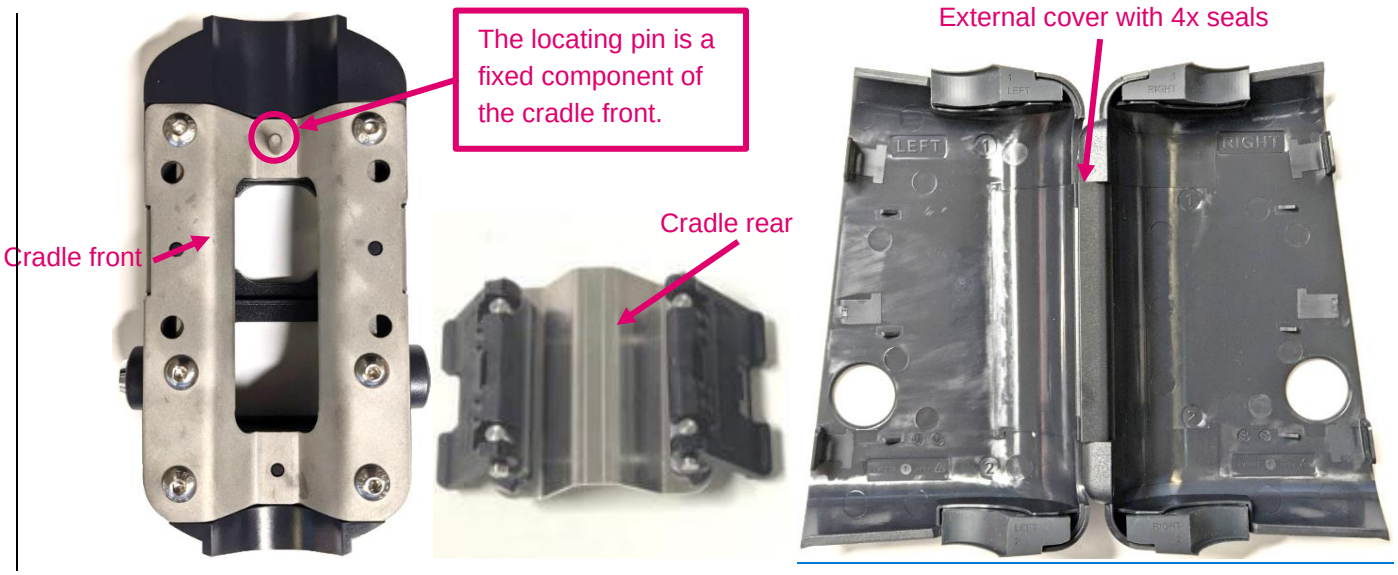


Figure 16: 3 Cradle Main Parts

The cradle plates are manufactured from 304 Stainless Steel and anodised aluminium. Check that the plates have no corners or sharp edges that may present a hazard to operators or installers.

6.3 Cradle Mounting Instructions

1. Carefully bring out the connectors and cables from the pole cut-out. Ensure there is sufficient slack for the Adept Validator connection and mounting.

2. Hold the cradle front with the locating pin aligning with the locating hole on the mounting pole, feed the cables through the cradle front centre aperture.

3. Fit the cradle front to the pole, by inserting the locating pin into the locating hole. Hold the cradle front on the pole until the next step is complete.

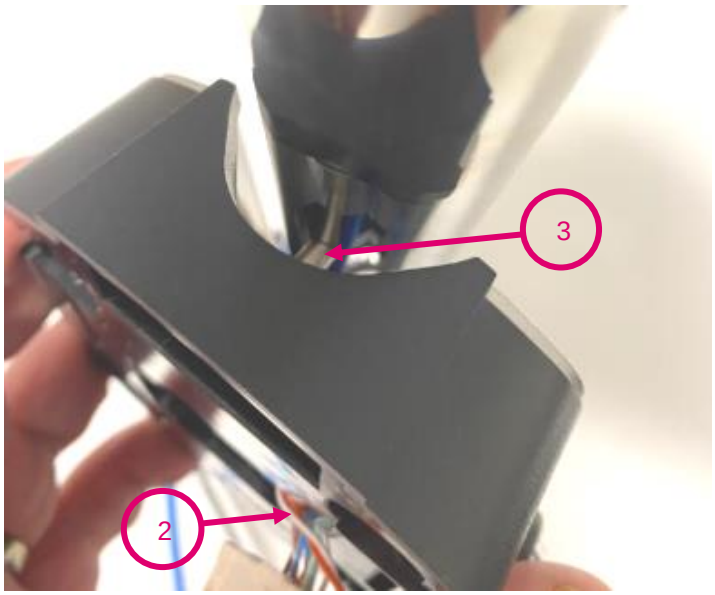


Figure 17: Cradle Front Placement

4. Insert the 4 pins on the cradle rear into the 4 holes on the cradle front. Press the 2 halves together, they should lock into place with a click.

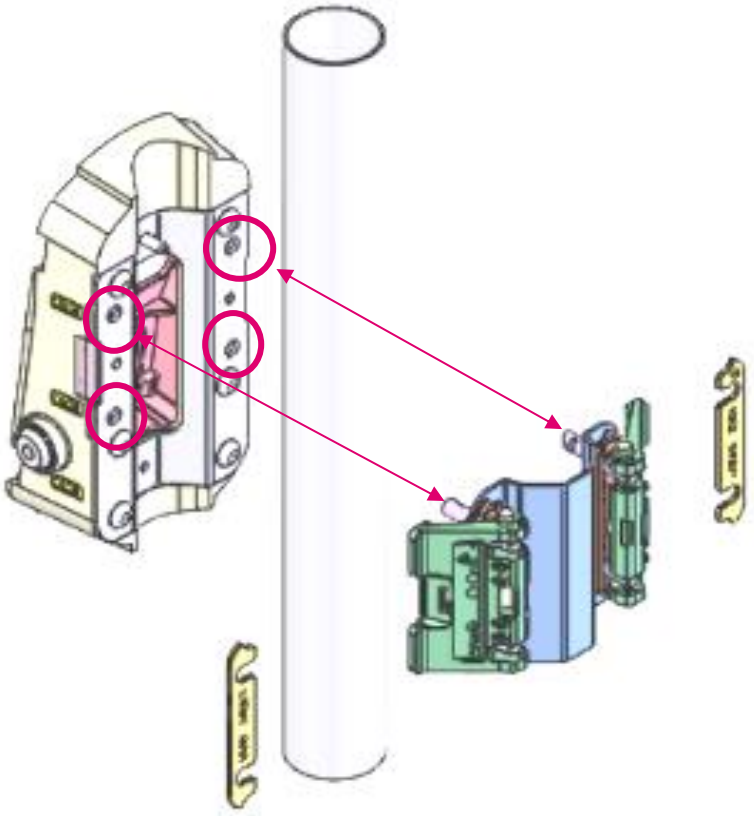


Figure 18: Joining Cradle Front and Cradle Rear

5. Close both cradle mount flaps until they meet evenly, this locks the cradle to the pole (They should not overlap).

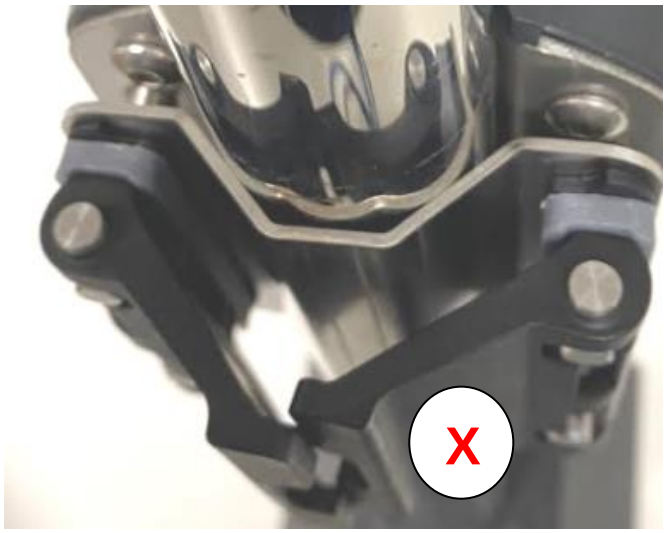


Figure 19: Correct and Incorrect Position of Closed Cradle Arms

6. Check the cradle is secure on the pole. If not, undo the arms and insert the supplied small shims at the indicated location (on both sides), then close the arms and check again.

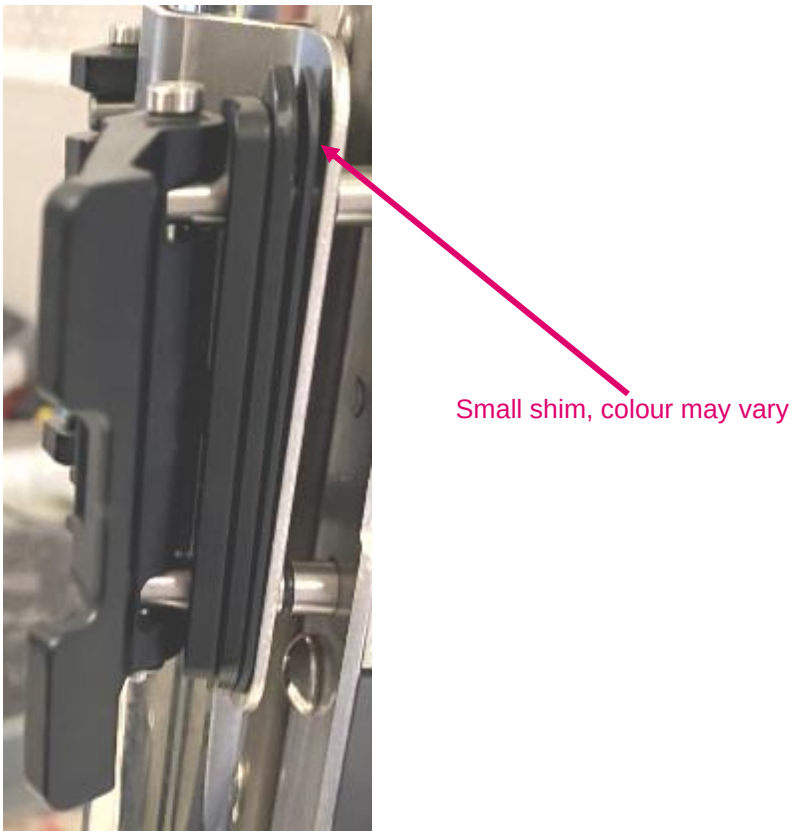


Figure 20: Adept Validator Cradle Mount Shims

7. Check the 4 seals are inserted into the correct position on the external cover.

Note:	*Both the cover and the seals are marked to ensure the correct placement.*

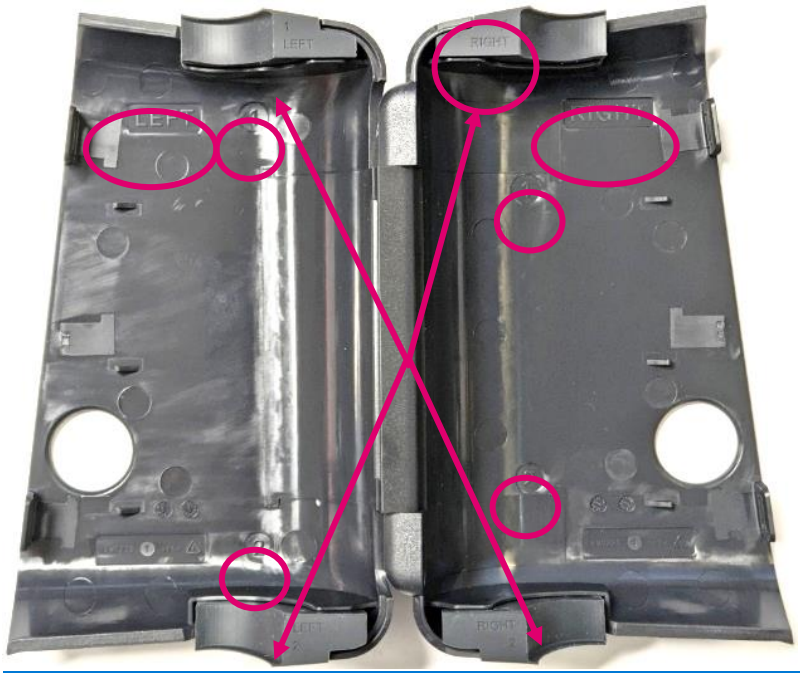


Figure 21: Seals Position on External Cover

8. Wrap the cover around the cradle sub-assembly from the back and clip it in place.

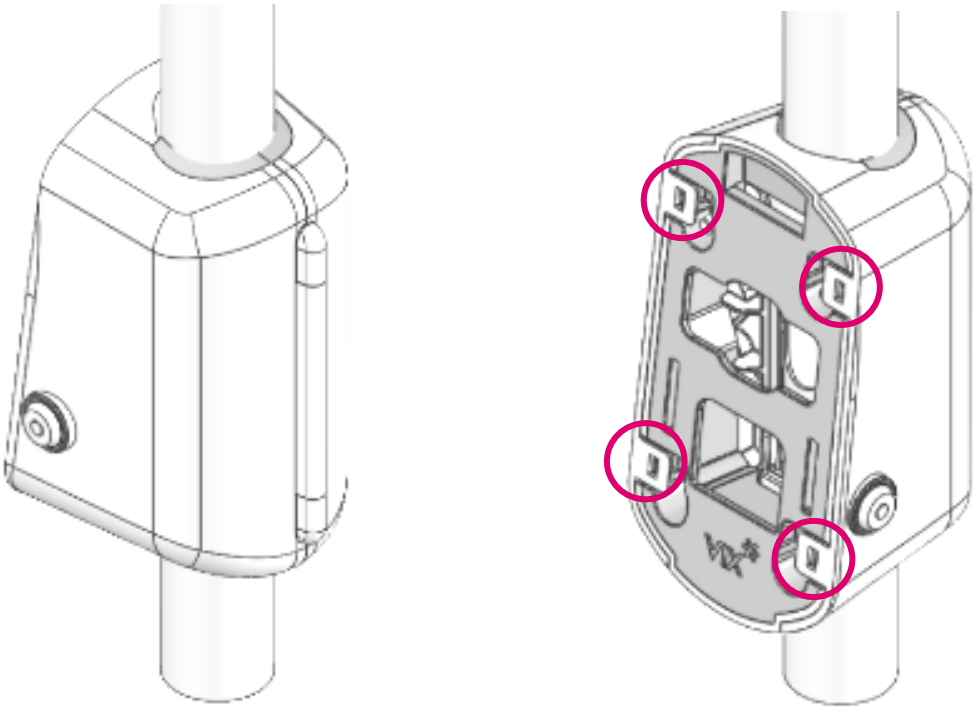


Figure 22: Adept Validator Cradle Mount Cover

9. Feed the cables through the protective rubber boot to provide environmental protection. Ensure there is sufficient slack for the Adept Validator connection and mounting.

Note:	*For an Adept Validator model with GPS, the GPS cable is NOT required to be fed through the rubber boot, and it should go through a different opening as indicated.*

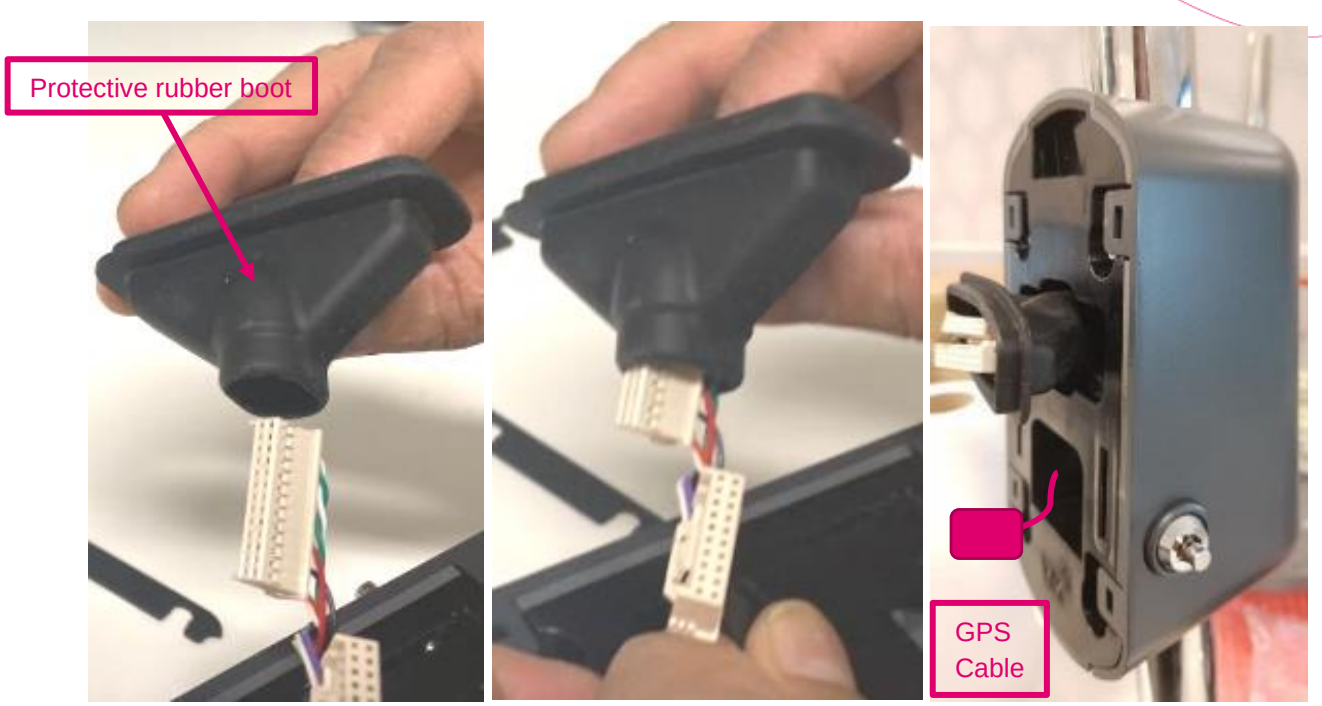


Figure 23: Rubber Boot Installation

6.4 Validator Mounting Instructions

Check that the Adept Validator casing has no corners, sharp edges, or exposed fixings (nuts/bolts) that may present a hazard to personnel.

1. Carefully connect the cables to the rear of the Adept Validator, including the GPS cable for an Adept Validator model with GPS.

Figure 24: Adept Validator Cable Connections

2. Mate the Adept Validator to the cradle by aligning the 3 metal plates at the rear of the device (see Figure 24) with the 3 slots on the cradle plate, and pushing in, then pushing down to clip in as shown below.

Figure 25: Adept Validator Mounting on Cradle

3. Press the lock button to secure the device in place on the cradle.

Note:	*By default, the lock button is on the right of the cradle viewing from the front, if the left side is preferred, inform VIX prior to order.*

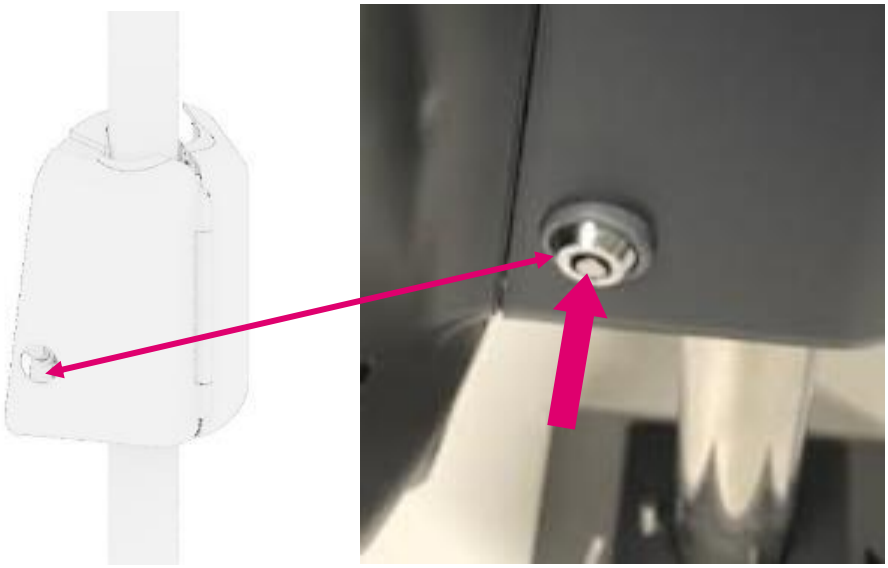


Figure 26: Device Locking

Note:	*Once the device is locked in place, a key is required to unlock it from the cradle. One key is supplied along with the Cradle.*
Note:	*Whenever field installation or maintenance is complete, remember to lock the device.*

6.5 Validator Demounting Instructions

Caution:	The unit connectors present a low risk of accidental short circuit or electric shock if the unit is removed when powered, hence it is recommended the power is turned off prior to disconnection.

1. Unlock the cradle lock by pushing in the key slightly and rotating anti-clockwise or clockwise until the lock button bounces out.

Figure 27: Device Unlocking

2. Push the device upwards and then slowly pull forward.

Figure 28: Adept Validator Removal

3. Press the locking clips on the connectors and carefully disconnect the cables.

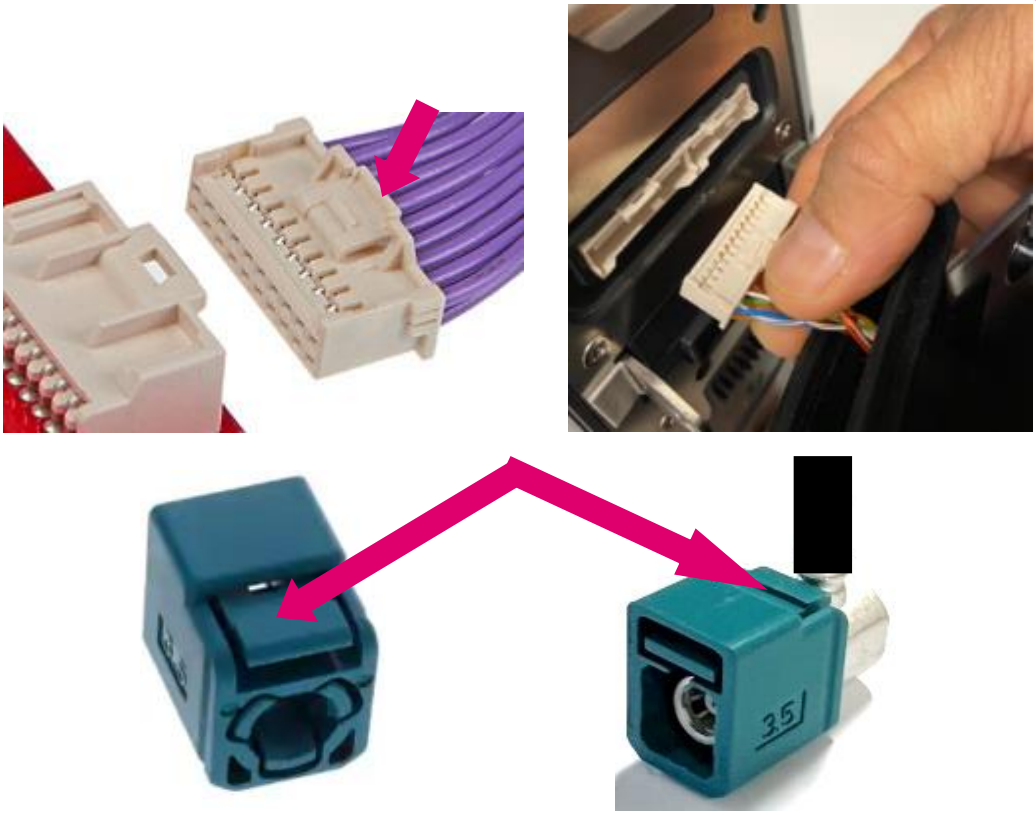


Figure 29: Cable Disconnection

Note:	*Care must be taken not to damage the cables/connectors during unit removal.*

6.6 Cradle Demounting Instructions

1. Carefully remove the rubber boot from the cables.

Note:	*Care must be taken not to damage the cables/connectors during rubber boot removal.*

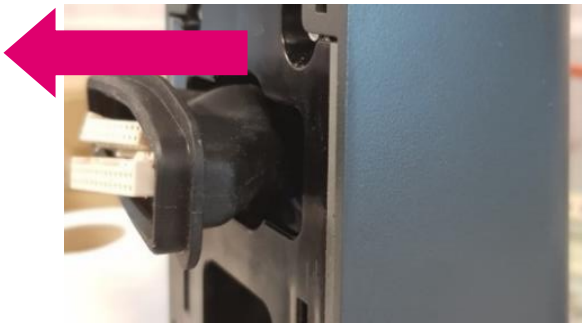


Figure 30: Rubber Boot Removal

2. Remove the external cover by lifting the 4 clips. Do not lose the 4 seals (Figure 21) in the external cover.

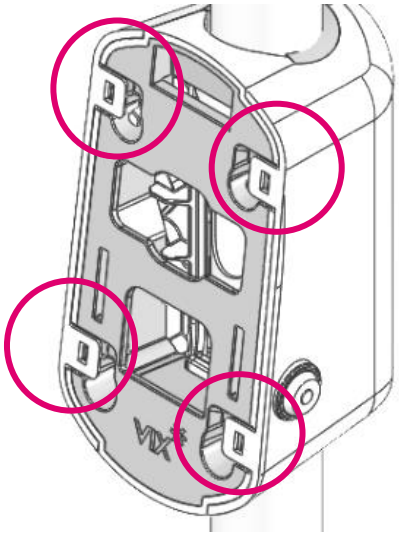


Figure 31: External Cover Removal

3. Open both cradle mount flaps.

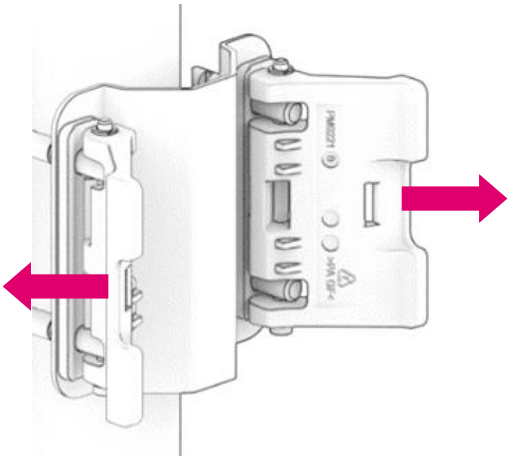


Figure 32: Opening Cradle Arms

4. Remove the cradle rear from the cradle front by pressing the indicated metal part (on both sides) to release the 4 pins.

Note:	*One may prefer to do this step on one side at a time.*

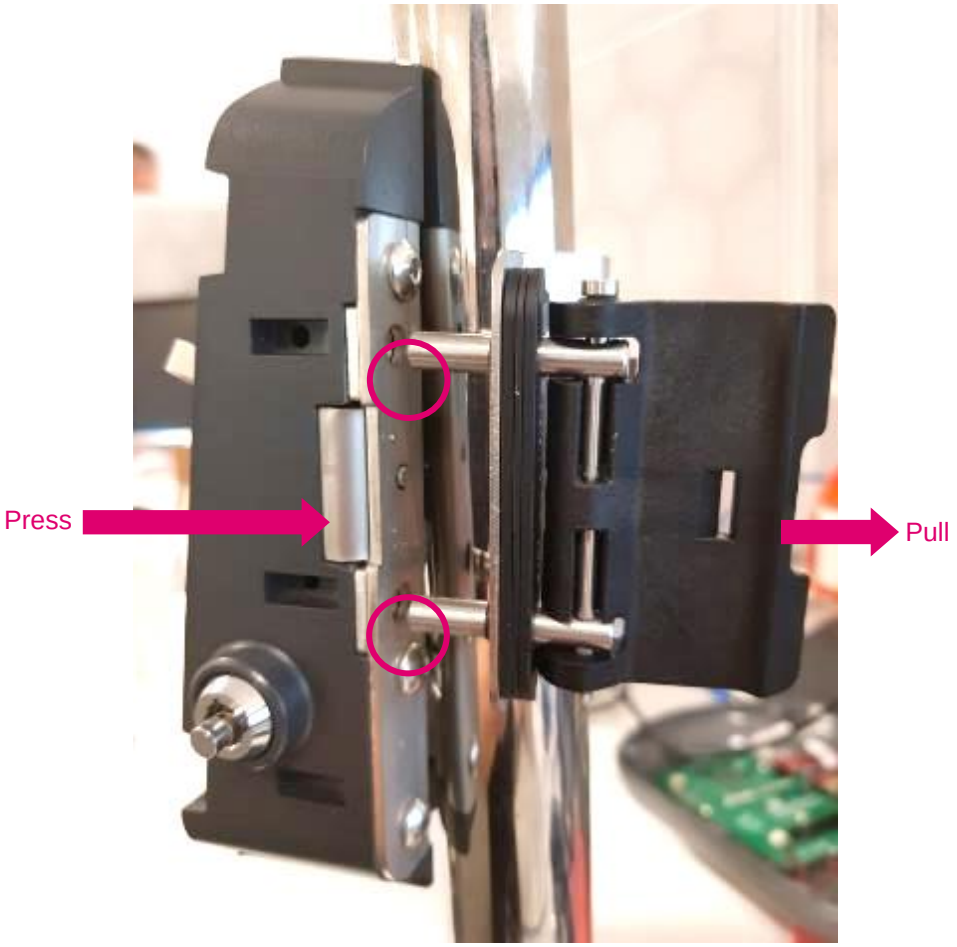


Figure 33: Cradle Front and Rear Separation

5. Remove the cradle front by carefully pulling it out from the pole.

Note:	*Care must be taken not to damage the cables/connectors during cradle front removal.*

Figure 34: Cradle Front Removal

6.7 Cradle Covering

In the case where the installed cradle is not being used, i.e. no validator is mounted on it, a cradle cover should be used to provide ingress protection to the cradle and cables.

The cradle cover could be obtained from VIX with the part number being PROD1000-x.

1. Cover the cradle by aligning the three locating plates, pushing forward, then pushing down to clip in as shown below.

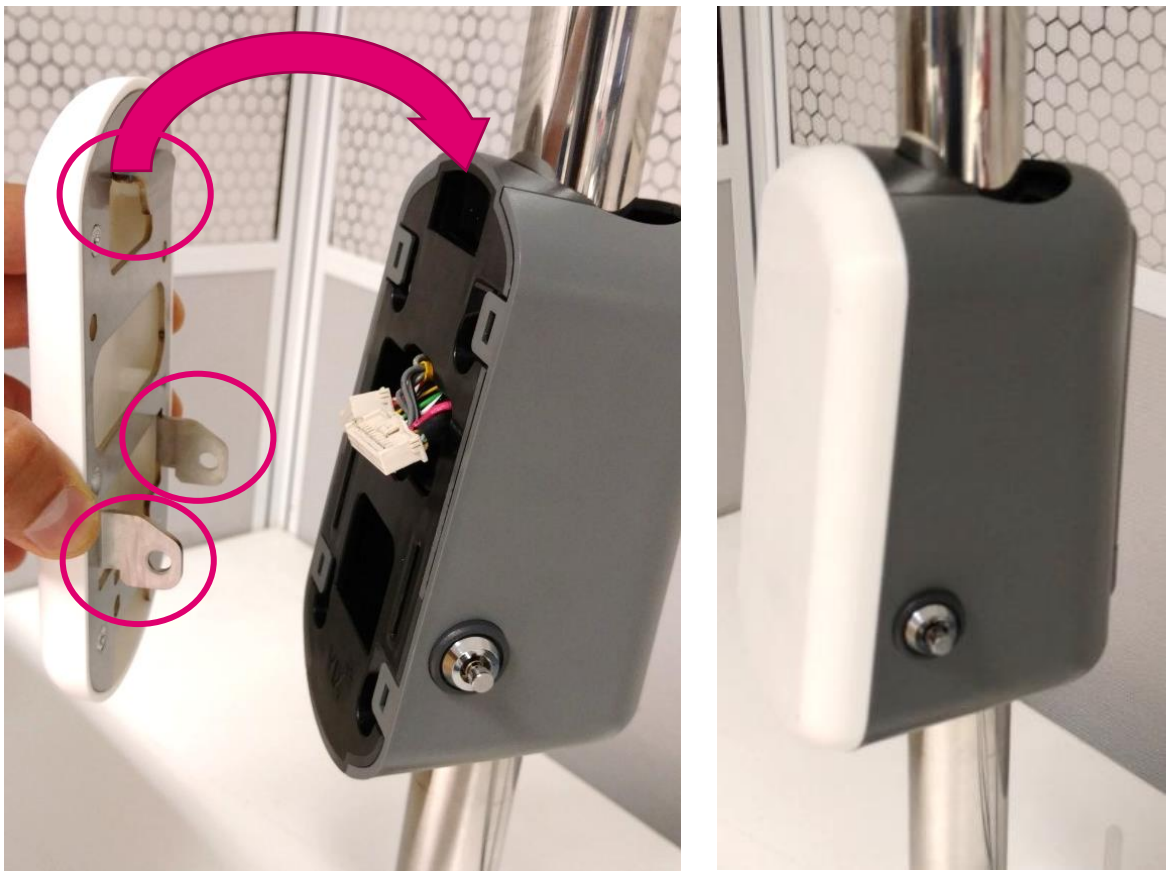


Figure 35: Cradle Covering

2. Press the lock button to secure the cover in place on the cradle.

Figure 36: Cradle Cover Locking

Appendix A Cut-out for Surface Mount Adept Validator

Details of cut-out required for surface mounting the Adept Validator are shown below.

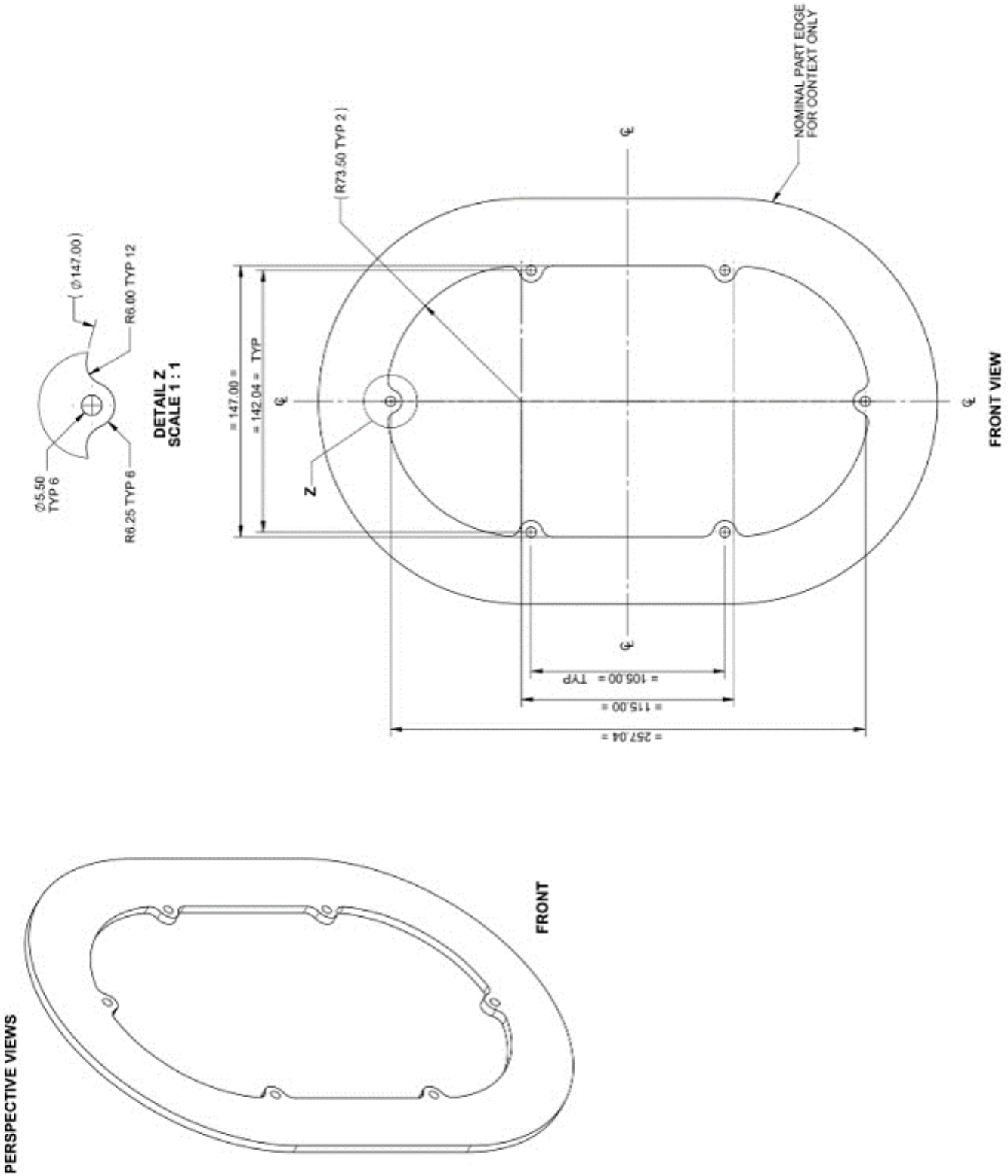


Figure 37: Cut-out for Surface Mount Adept Validator

Appendix B Dimensions and Weight

Pole mounted Adept Validator's physical dimension are approximately 160mm(w) x 278mm(h) x 59mm(d), without cradle.

Unit's weight is approximately 1.5 kg, without cradle.

Figure 38: Dimensions and Weight

Appendix C Pole Cut-out

Recommended cut-out for the pole is shown below.

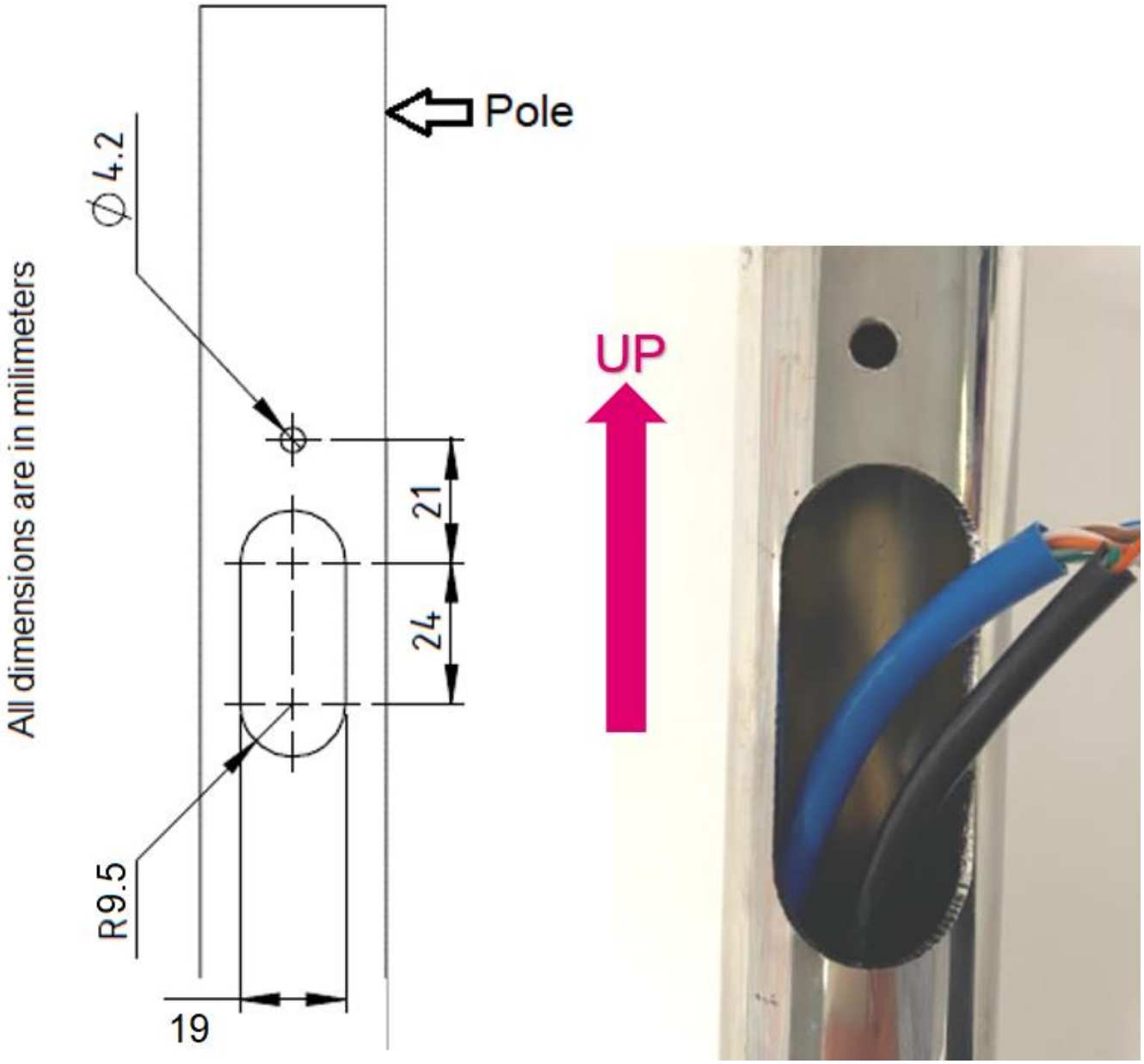


Figure 39: Pole Cut-out