



# TRIO-IQ Specifications

Version 0.8



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## Revision history

| Version | Description                                                                                                                                                                                                                                           | Date        |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 0.1     | First version                                                                                                                                                                                                                                         | 24-Oct-2019 |
| 0.2     | Updated <a href="#">Alternate Connector</a> pinout<br>Updated <a href="#">Power section Product Specifications</a>                                                                                                                                    | 04-Nov-2019 |
| 0.3     | Updated <a href="#">Power section Product Specifications</a><br>Updated <a href="#">Supported Payment Applications &amp; Technologies</a>                                                                                                             | 02-Dec-2019 |
| 0.4     | Updated SIM socket size to 3FF, added IK rating, updated <a href="#">connector charts</a>                                                                                                                                                             | 11-Oct-2020 |
| 0.5     | Updated <a href="#">Cellular modem</a> section with modem variants<br>Updated <a href="#">Alternate connector pin diagram</a><br>Added <a href="#">JVMA Cable</a><br>Updated <a href="#">Product specifications table</a> with NFC and Relay details. | 27-Jan-2021 |
| 0.6     | Updated Cellular modem section with <a href="#">LED indication</a>                                                                                                                                                                                    | 15-Mar-2021 |
| 0.7     | Updated <a href="#">Power section Product Specifications</a><br>Updated <a href="#">Alternate cable charts</a>                                                                                                                                        | 24-Feb-2022 |
| 0.8     | Updated <a href="#">Product specifications table</a> with BLE as optional module                                                                                                                                                                      | 2-Mar-2022  |

# 1 Introduction

OTI's TRIO-IQ is a Modular, All-In-One Telemetry and Cashless Reader, that was designed to answer modern unattended payment systems such as Self attended Kiosks, Vending Machines and Pulse operated machines.

The TRIO-IQ Combines a High-Quality touchscreen, HDMI (1080p) multimedia output, Full NFC support, 5mp Camera with QR Code scanner, proximity sensors and advanced networking capabilities all packaged in an elegant, smart and cost-effective design.

Its unique dual CPU architecture allows a dedicated application processor with Linux OS and rich SDK, separated from the certified EMVCo processor and OS.

The SDK includes documentation, API and sample application with source code for various features and functionalities.

otiKiosk Core running on the TRIO-IQ provides a complete pre-certified EMVCo payment application as well as comprehensive and robust Terminal Management System (TMS) for remote management and provisioning.

With a clean modular design, the unit keeps the product simple and supports variety of interfaces. It also offers physical and logical implementation for vending machine specific interfaces such as MDB, DEX, JVMA, RS232, USB, TTL and Pulse operated machines.



## 1.1 Supported Standards

The TRIO-IQ will be compatible<sup>1</sup> with the following standards and international specifications:

- FCC
- CE
- UL
- RoHS compliance
- ISO 9001: 2008
- JVMA
- Radio – MIC



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<sup>1</sup> Certification for some of these standards is still in process

## 1.2 Supported Payment Applications & Technologies

The TRIO-IQ supports the following payment applications:

- Contact EMV®
- EMV® Modular Architecture Label
- Contactless EMV® L1
- Contactless EMV® L2:
  - Kernel C-2 (MasterCard)
  - Kernel C-3 (Visa)
  - Kernel C-4 (Amex)
  - Kernel C-5 (JCB)
  - Kernel C-6 (Discover)
  - Kernel C-7 (UnionPay)
  - Interac Flash
  - MIR
- Apple Pay®, Google Pay®, Samsung Pay®, Huawei Pay®
- Apple VAS
- Felica®
- Mifare – DESFire / Classic / Ultralight
- QR code: Reader / Writer
- Magstripe – 3 tracks



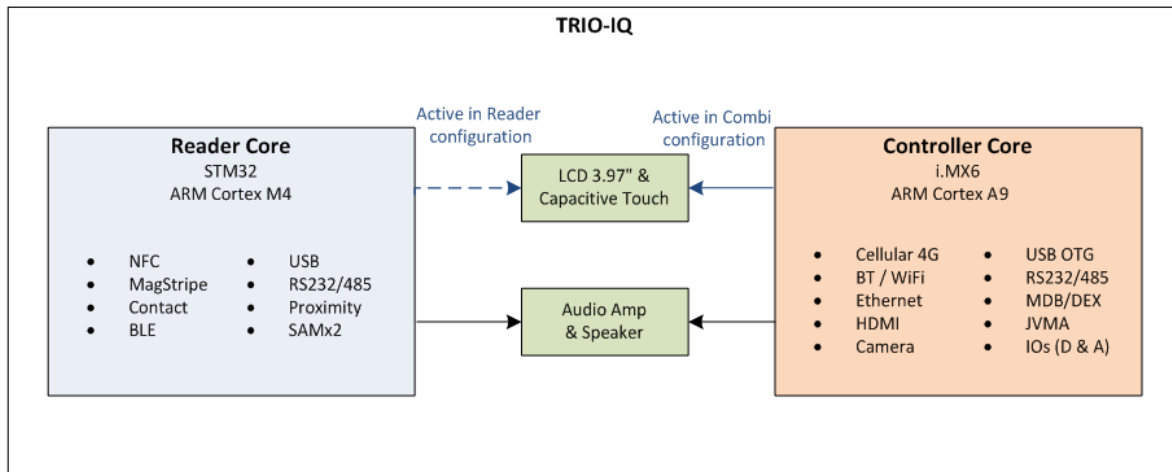
## 2 High-level design

### 2.1 Hardware & software architecture

The TRIO-IQ introduce a unique dual CPU approach with separated CPUs for the EMVCo certified reader and the telemeter application controller.

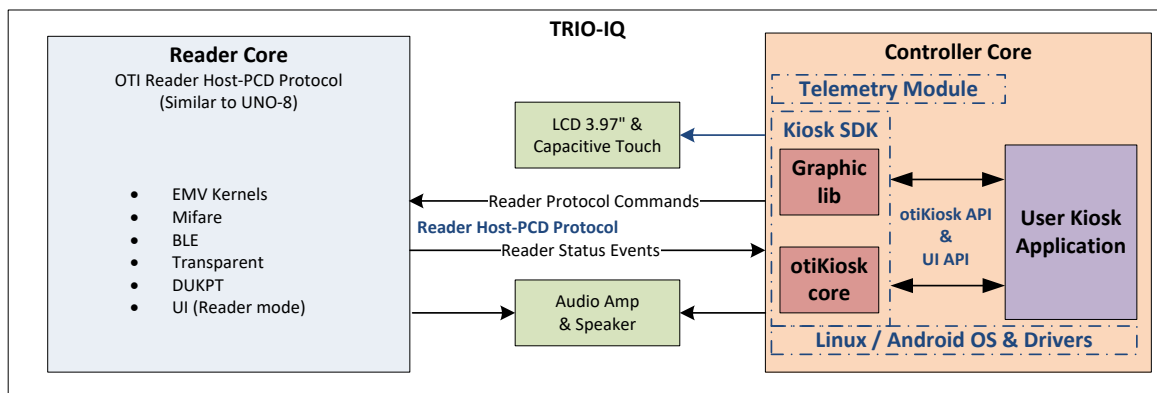
- Telemeter & Application CPU:
  - ARM Cortex-A9 1Ghz Dual Core, Scalable up to Quad-Core
  - 1 GB RAM, 8GB Flash + Micro SD Socket
- Reader CPU:
  - ARM Cortex-M4
  - 4MB RAM, 32MB Flash

The high-level function blocks of each Core are illustrated in the block diagram below:



**Figure 1 : High level functional block diagram**

The TRIO-IQ SDK is provided on top of Linux OS and includes APIs for Payment, Remote terminal management (TMS) and Graphic User Interface (GUI)



**Figure 2 : SDK high level block diagram**

## 2.2 Hardware Interface Map

### 2.2.1 TRIO-IQ Front Panel



Figure 3 : Hardware Interface map – front panel

## 2.2.2 TRIO-IQ Back Panel

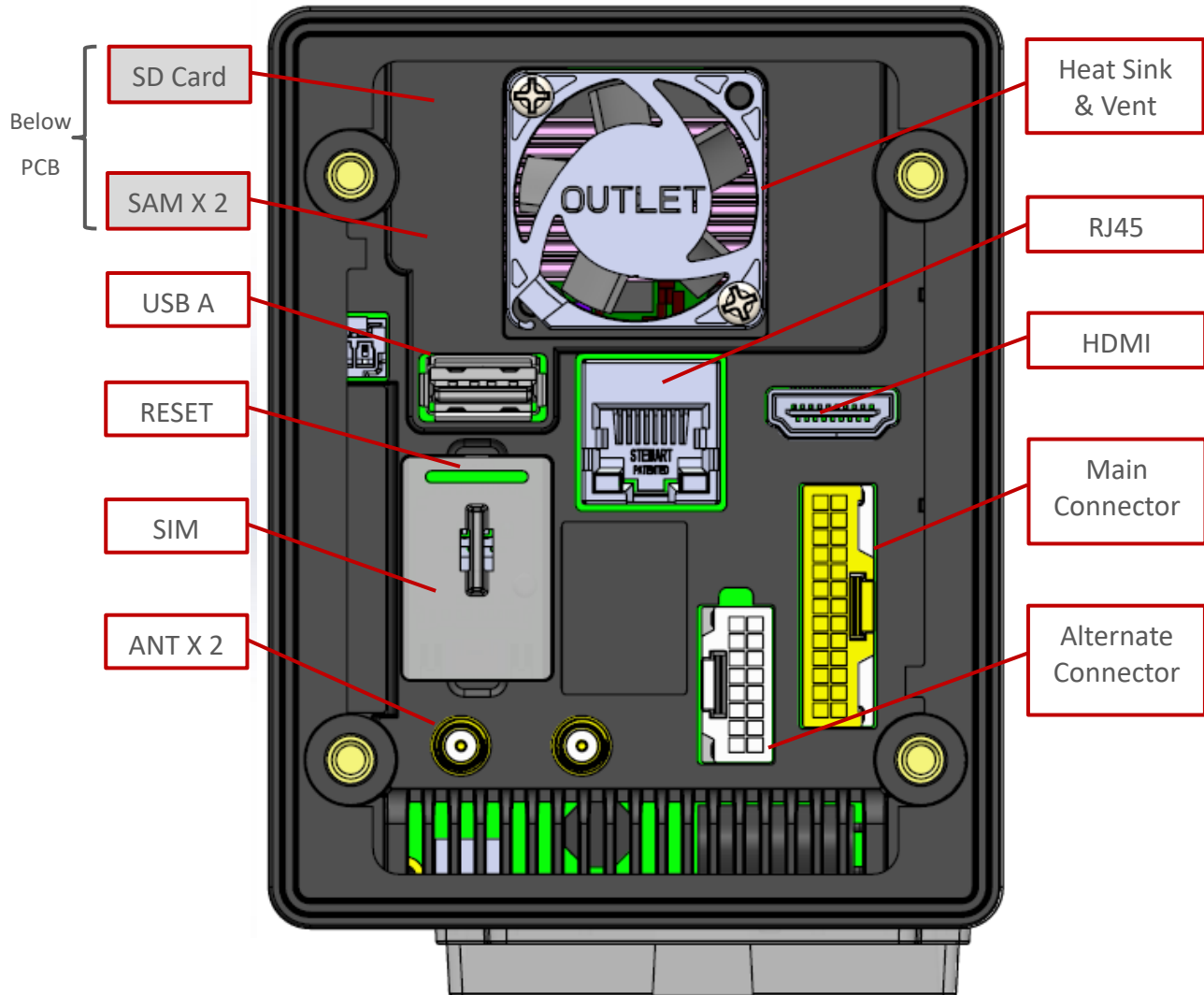


Figure 4 : Hardware interface map – back panel

See more details about the Connectors functionality and pinout at the [Connectors and Cables](#) chapter.

## 3 Technical Specification

### 3.1 Main Features

- Dual CPU: Cortex-M4 for reader and Cortex-A9 with Linux for Terminal
- High Quality 3.97" touch screen
- HDMI (1080p) output
- Full NFC (Felica and P2P) support
- Rugged Full-Bodied All-Weather resistance casing (IP65)
- Network: 4G LTE Cellular, Ethernet, Wi-Fi (optional)
- Interface: MDB, DEX, JVMA, USB, RS232 and IOs.
- Payment interfaces: Contactless EMV, Contact EMV, MagStripe, QR code.
- 5mp Camera, Proximity sensor, 2W Audio Speaker
- Rich Kiosk and Telemeter SDK

### 3.2 Product Specifications

| Item                     | Specifications                                                                                     | Comments                                             |
|--------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>Power</b>             |                                                                                                    |                                                      |
| Power Supply             | 11-43 VDC<br>Optional model: 24VAC RMS $\pm$ 10%<br>(50-60 Hz)                                     | Contact vendor for AC P.S model.                     |
| Output Voltages/Currents | USB: 5V, 0.5A                                                                                      | Switched with over current protection and filtering  |
|                          | AUX USB: 5V, 0.5A                                                                                  | Switched with over current protection and filtering. |
|                          | VOUT:<br>For DC P.S: Vps-1.5V,5Wmax<br>For AC P.S: Full wave rectified<br>Max ripple: 10Vpp, 5Wmax | Switched with over current protection and filtering. |
| Power consumption        | Typical: 10W<br>Maximum peak: 20W                                                                  | Maximum peak power: Max USB and VOUT loading.        |
| Backup battery           | 450 mAhr                                                                                           | Power backup in case of short power supply cut-off.  |
| <b>Controller Core</b>   |                                                                                                    |                                                      |
| CPU core                 | NXP i.MX6 dual core ARM A9                                                                         | Scalable up-to quad core                             |
| CPU speed                | 1Ghz                                                                                               |                                                      |
| OS                       | Linux                                                                                              | Yocto- YP Core Fido 1.8.2                            |
| RAM                      | 1GB DDR3                                                                                           | 800Mbps                                              |
| Flash                    | eMMC 8GB                                                                                           |                                                      |
|                          | microSD socket                                                                                     |                                                      |

| Reader Core       |                                 |                                                            |
|-------------------|---------------------------------|------------------------------------------------------------|
| CPU core          | ARM Cortex A4                   | Scalable up-to quad core                                   |
| CPU speed         | 180 MHz                         |                                                            |
| RAM               | 384KB + 8MB                     |                                                            |
| Flash             | 2MB + 32MB                      |                                                            |
| Connectivity      |                                 |                                                            |
| Cellular modem    | 4G Global with 3G fallback      | CAT4, LTE                                                  |
|                   | micro SIM (3FF) slot x1         |                                                            |
|                   | SMA female antenna connector x2 |                                                            |
| LAN               | RJ45 x1                         | Ethernet 10/100/1000                                       |
| Vending machine   | MDB, DEX, JVMA                  |                                                            |
| Serial            | USB x2                          |                                                            |
|                   | RS232 x1                        |                                                            |
|                   | TTL x1                          |                                                            |
|                   | SAM x 2                         | Below the back cover                                       |
| Wireless          | BLE (Bluetooth Low Energy)      | Optional module                                            |
|                   | Wi-Fi & Bluetooth               | Optional module                                            |
| NFC Interface     | Frequency: 13.56MHz             | Comply with EN 300330, EN 301489 and EN 62479 (EIRP<<20mw) |
|                   | PCD: ISO14443 A/B               |                                                            |
|                   | FeliCa JIS: X6319-4             |                                                            |
|                   | ISO15693                        |                                                            |
|                   | ISO18092 P2P                    |                                                            |
| Auxiliary I/O     |                                 |                                                            |
| Analog            | IN x1                           |                                                            |
| Digital           | IN X2, OUT x2                   | Open collector                                             |
| Relay             | SSR X 1: 400mA, 40Vp            | For Pulse machines                                         |
| User interface    |                                 |                                                            |
| Display           | 480x800                         |                                                            |
|                   | IPS                             | Large view angles                                          |
|                   | 600 nits                        | High brightness                                            |
|                   | 2 mm dragon glass               |                                                            |
|                   | Anti-reflecting coating         |                                                            |
| Touch             | Multi touch                     |                                                            |
| Display output    | HDMI 1.4, 1080p                 |                                                            |
| Camera            | 5MP                             | Fast QR code reading                                       |
|                   | Flash LED                       |                                                            |
| Status LED        | RGB x1                          |                                                            |
| Pin Reset Button  | x1                              | HW Reset button                                            |
| Proximity sensors | Short range                     | Up to 10 cm                                                |
|                   | Long range                      | Up to 2 m                                                  |



| Mechanical                       |                                |                                                  |
|----------------------------------|--------------------------------|--------------------------------------------------|
| <a href="#">Cable connectors</a> | Molex iGrid 26 pins, 2mm pitch | Main connector                                   |
|                                  | Molex iGrid 16 pins, 2mm pitch | Alternate connector                              |
| Dimensions                       | 107 x 85 x 46 mm               | See <a href="#">dimensions chart</a> for details |
| Impact Protection                | IK08                           |                                                  |
| Environmental                    |                                |                                                  |
| Operating Temp.                  | -20°C to 55°C                  |                                                  |
| Water protection                 | IP65                           |                                                  |
| Humidity                         | Up to 95%                      |                                                  |
| Payment applications             |                                |                                                  |
| Contactless EMV                  | EMVCo Modular Design           |                                                  |
|                                  | EMVCo kernel C-2               | MasterCard                                       |
|                                  | EMVCo Kernel C-3               | Visa                                             |
|                                  | EMVCo Kernel C-4               | Amex                                             |
|                                  | EMVCo Kernel C-5               | JCB                                              |
|                                  | EMVCo Kernel C-6               | Discover                                         |
|                                  | EMVCo Kernel C-7               | Union Pay                                        |
| Other Contactless Payment        | Interac                        |                                                  |
|                                  | Apple Pay                      |                                                  |
|                                  | Google Pay                     |                                                  |
|                                  | Samsung Pay                    |                                                  |
|                                  | Felica API                     |                                                  |
| Mifare                           | DESFire/Classic/Ultralight     |                                                  |
| Contact EMV                      | Support all EMV contact apps   |                                                  |
| Magnetic Stripe                  | 3 Tracks                       |                                                  |

### 3.3 Cellular Modem

In its default SDK configuration, TRIO-IQ includes Quectel 4G Global modem EG25-G, supporting the following bands:

LTE FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/ B19/B20/B25/B26/B28

LTE TDD: B38/B39/B40/B41

UMTS: B1/B2/B4/B5/B6/B8/B19

GSM: B2/B3/B5/B8

For mass production there are variants with specific modems for North America (NA) , Europe (EU), Australia (AU) and Japan:

| TRIO-IQ PNs |                                          |                                                      | TRIO-IQ Configuration | Quectel Modem Variant |
|-------------|------------------------------------------|------------------------------------------------------|-----------------------|-----------------------|
| Device only | Device with accessories kit <sup>2</sup> | Device with accessories kit & Power kit <sup>3</sup> |                       |                       |
| 10090000    | 10090001                                 | 10090003                                             | TRIO-IQ Global        | EG25-G                |
| 10096010    | 10096011                                 | 10096013                                             | TRIO-IQ Japan         | EC25-J                |
| 10093000    | 10093001                                 | 10093003                                             | TRIO-IQ NA            | EC25-AF               |
| 10095030    | 10095031                                 | 10095033                                             | TRIO-IQ EU            | EC25-E                |
| 10095020    | 10095021                                 | 10095023                                             | TRIO-IQ AU            | EC25-AU               |

#### 3.3.1 Modem LED indication

The cellular modem includes 4 LED indicators that can be seen at the back of the device next to the SIM socket.

| LED Color | Function       | LED State                            | ON                                      |
|-----------|----------------|--------------------------------------|-----------------------------------------|
| Green     | Power          | ON                                   | Modem Power ON                          |
|           |                | OFF                                  | Modem Power OFF                         |
| Red       | Status         | ON                                   | Modem ON                                |
|           |                | OFF                                  | Modem OFF                               |
| Yellow    | Network mode   | ON                                   | Registered on LTE network               |
|           |                | OFF                                  | Other states                            |
| Blue      | Network status | Blink slowly (200ms high/1800ms low) | Network search                          |
|           |                | Blink slowly (1800ms high/200ms low) | Idle                                    |
|           |                | Blink quickly (125ms high/125ms low) | Data transfer                           |
|           |                | Always ON                            | Voice call (not applicable for TRIO-IQ) |

<sup>2</sup> Accessories kit includes Vending machine Cable, Metal mounting plate and 2 Cellular antennas

<sup>3</sup> Power kit includes Power supply, 12V DC to MDB Connector and Alternate cable

## 4 Connectors & Cables

The TRIO-IQ includes two Molex connectors at the [back panel](#):

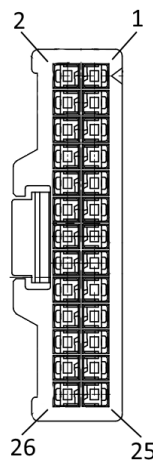
- [Main connector](#) is used for **Vending machine** communication channels, general purpose communication, IOs and power. The main connector is used for connecting the Main interface harness.
- There are 2 variants for the Main interface cable:
  - For [MDB/DEX](#) machines.
  - For [JVMA](#) machines.
- [Alternate connector](#) is used for **Pulse machines** as well as general purpose communication, IOs and power.

### 4.1 Connectors

#### 4.1.1 Main Connector

The main data connector is **Molex iGrid 26 pin**

|          |    |    |        |
|----------|----|----|--------|
| AC/DC-   | 2  | 1  | AC/DC+ |
| AC/DC-   | 4  | 3  | AC/DC+ |
| GND      | 6  | 5  | GND    |
| MDB-COM  | 8  | 7  | MTX1   |
| MDB-TX   | 10 | 9  | MRX1   |
| MDB-RX   | 12 | 11 | DOUT1  |
| VOUT     | 14 | 13 | DIN1   |
| GND      | 16 | 15 | GND    |
| RS232-TX | 18 | 17 | AIN1   |
| RS232-RX | 20 | 19 | DIN3   |
| DEX-COM  | 22 | 21 | DOUT2  |
| DEX-RX   | 24 | 23 | 5V OUT |
| DEX-TX   | 26 | 25 | GND    |



Molex iGrid  
Pitch: 2 mm  
26P Housing

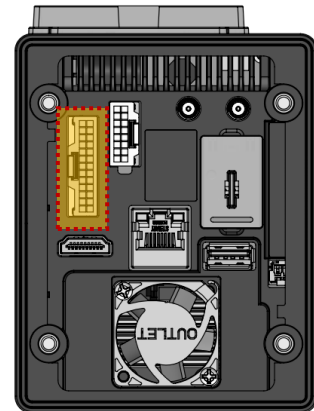


Figure 5 : Main connector pinout

## 4.1.2 Alternate Connector

The alternate connector is **Molex iGrid 16 pin**

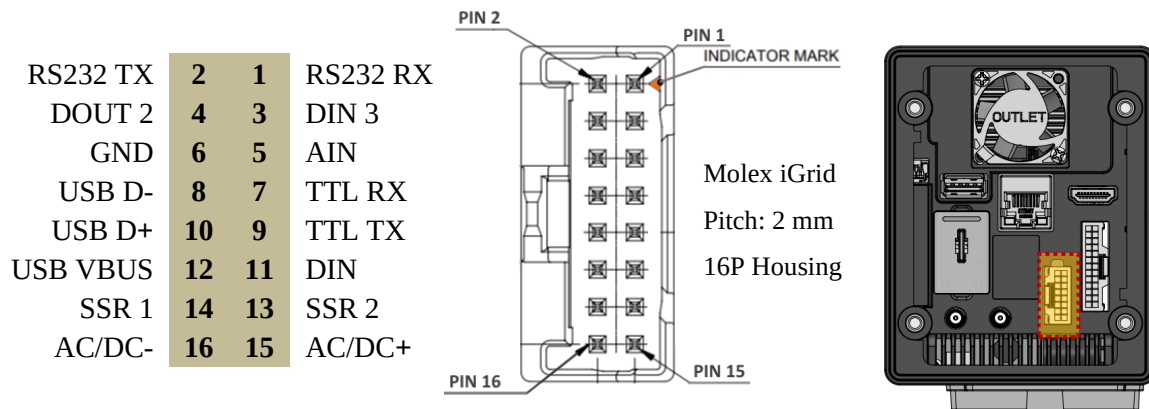


Figure 6 : Alternate connector pinout

## 4.2 Cables

### 4.2.1 Main interface cable – MDB/DEX

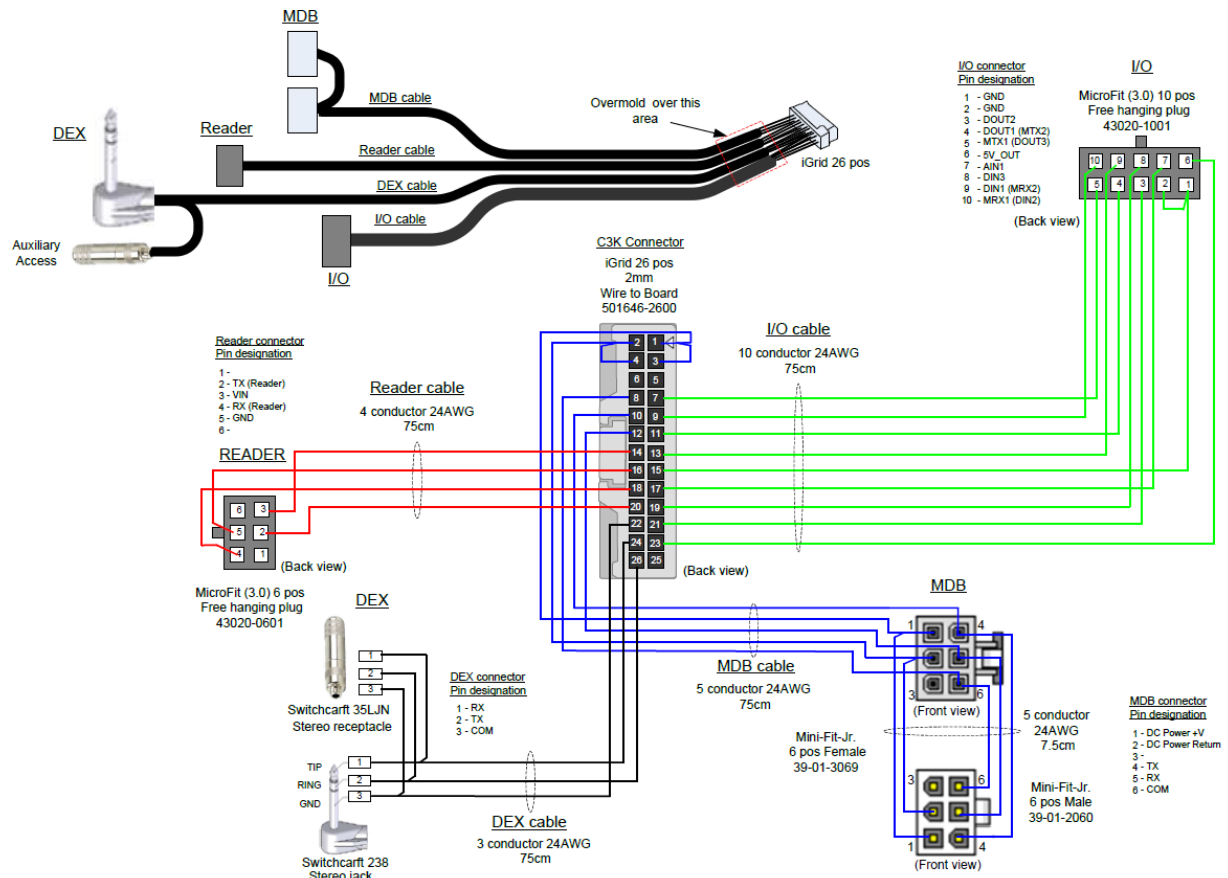


Figure 7: Main interface cable – MDB/DEX

## 4.2.2 Main interface cable – JVMA

For JVMA vending machines, the TRIO-IQ includes interface cable with connectors for JVMA and I/Os.

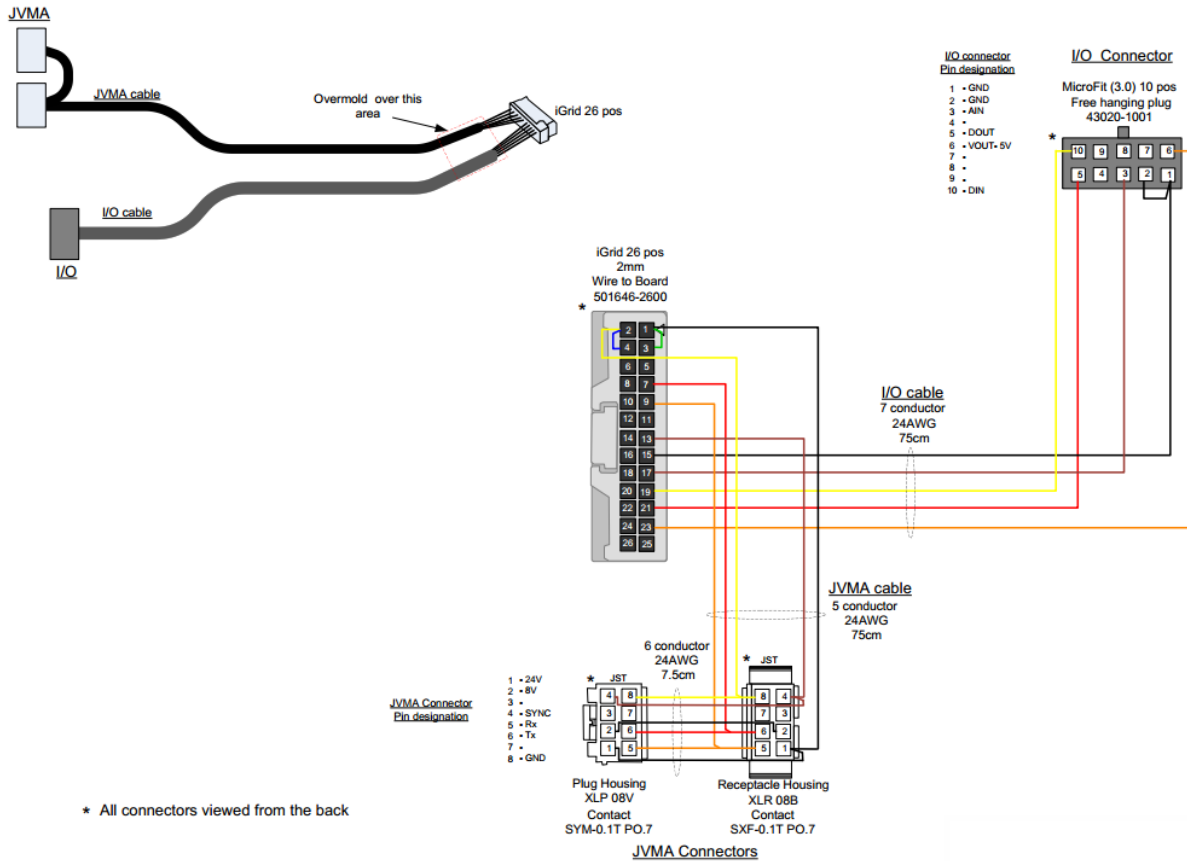


Figure 8: Main interface cable – JVMA

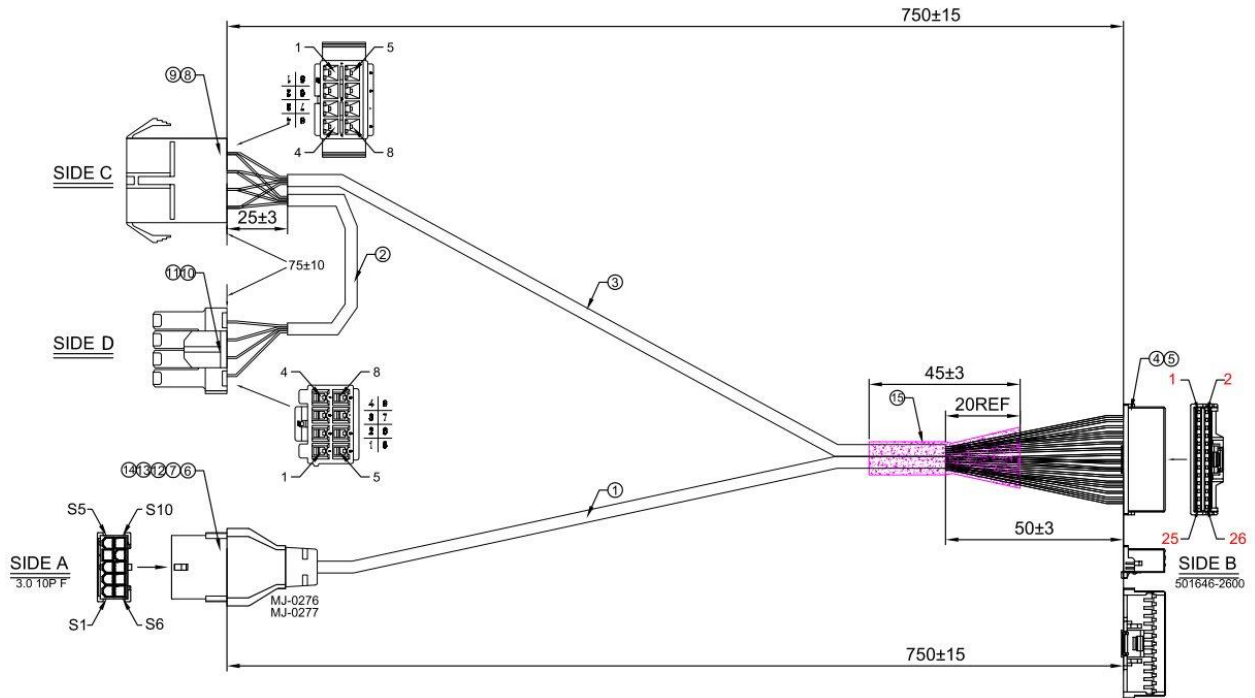


Figure 9: JVMA Interface cable dimensions

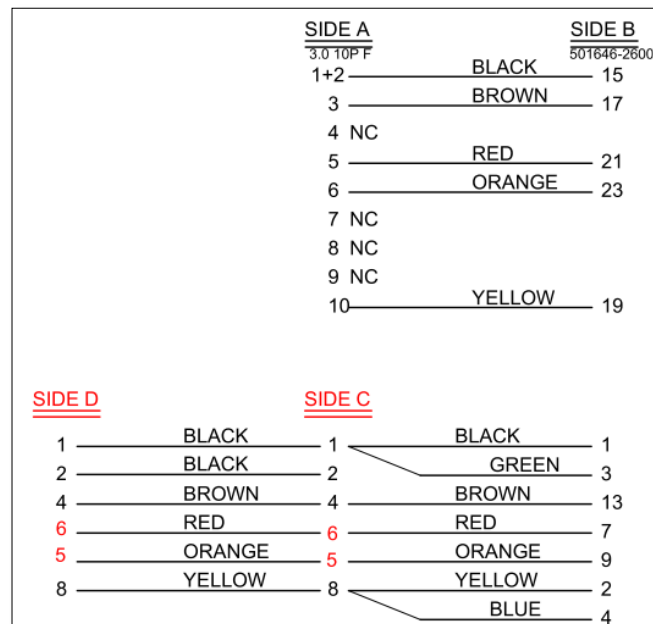


Figure 10: JVMA Interface cable wiring diagram

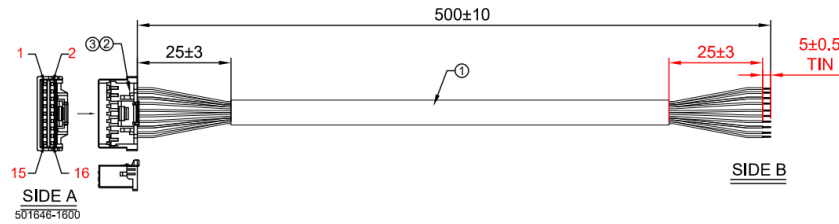
## 4.2.3 Alternate Cable

The SDK and Pulse packages includes open-end wires cable with different colors, with 2 variants of cable colors:

### 1. Color/White:

WIRE LIST:

| SIDE A | SIDE B           |
|--------|------------------|
| 1      | GREEN TIN        |
| 2      | GREEN/WHITE TIN  |
| 3      | PURPLE TIN       |
| 4      | PURPLE/WHITE TIN |
| 5      | GREY TIN         |
| 6      | GREY/WHITE TIN   |
| 7      | BLACK TIN        |
| 8      | BLACK/WHITE TIN  |
| 9      | ORANGE TIN       |
| 10     | ORANGE/WHITE TIN |
| 11     | YELLOW TIN       |
| 12     | YELLOW/WHITE TIN |
| 13     | RED TIN          |
| 14     | RED/WHITE TIN    |
| 15     | BLUE TIN         |
| 16     | BLUE/WHITE TIN   |



| Wire color   | Description | #  | #  | Description | Wire color |
|--------------|-------------|----|----|-------------|------------|
| Green-white  | RS232 TX    | 2  | 1  | RS232 RX    | Green      |
| Purple-white | DOUT 2      | 4  | 3  | DIN 3       | Purple     |
| Grey-white   | GND         | 6  | 5  | AIN         | Grey       |
| Black-white  | USB D+      | 8  | 7  | TTL RX      | Black      |
| Orange-white | USB D-      | 10 | 9  | TTL TX      | Orange     |
| Yellow-white | USB VBUS    | 12 | 11 | DIN         | Yellow     |
| Red-white    | SSR 1       | 14 | 13 | SSR 2       | Red        |
| Blue-white   | AC/DC-      | 16 | 15 | AC/DC+      | Blue       |

### 2. Color/Black:

| Wire color   | Description | #  | #  | Description | Wire color |
|--------------|-------------|----|----|-------------|------------|
| Green-black  | RS232 TX    | 2  | 1  | RS232 RX    | Green      |
| Brown-black  | DOUT 2      | 4  | 3  | DIN 3       | Brown      |
| Grey-black   | GND         | 6  | 5  | AIN         | Grey       |
| White-black  | USB D+      | 8  | 7  | TTL RX      | White      |
| Orange-black | USB D-      | 10 | 9  | TTL TX      | Orange     |
| Yellow-black | USB VBUS    | 12 | 11 | DIN         | Yellow     |
| Red-black    | SSR 1       | 14 | 13 | SSR 2       | Red        |
| Blue-black   | AC/DC-      | 16 | 15 | AC/DC+      | Blue       |

Figure 11 : Alternate cable wire colors

## 5 Dimensions

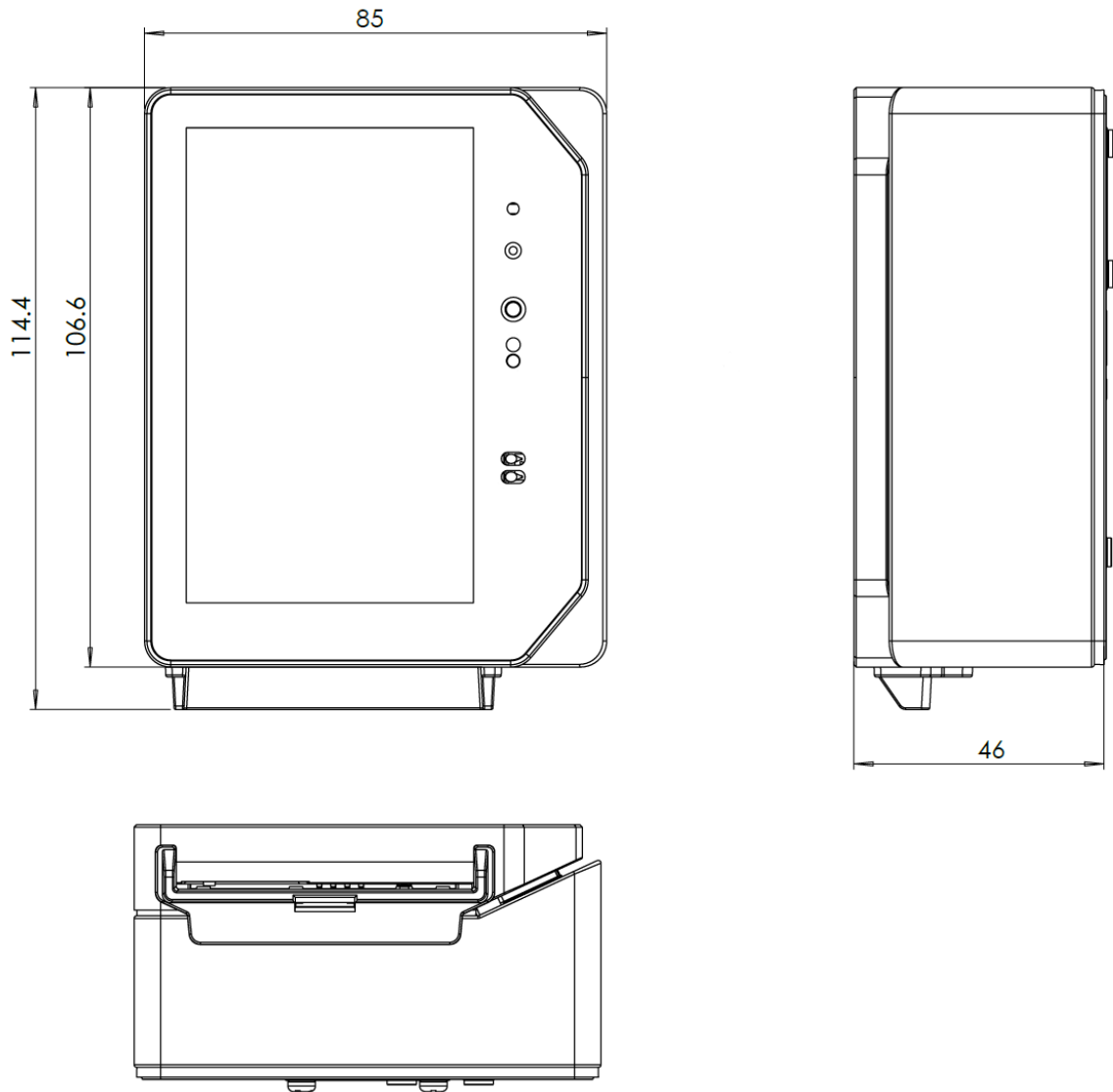


Figure 12 : External Dimensions

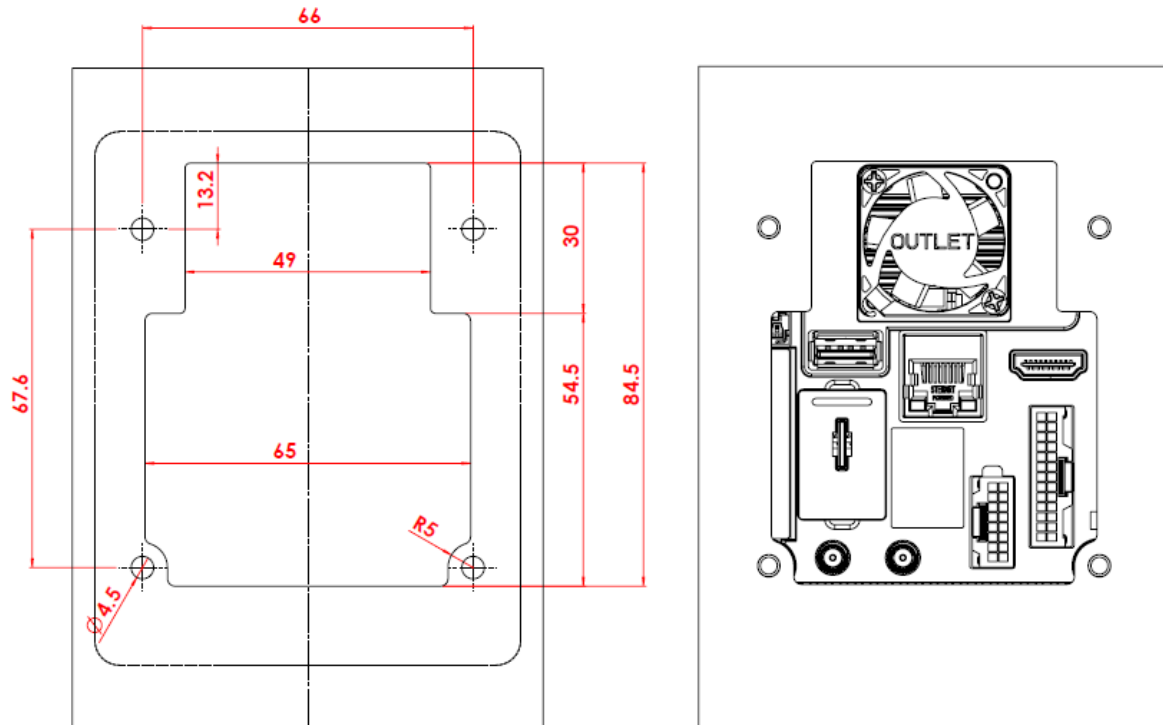


Figure 13 : Mounting Template

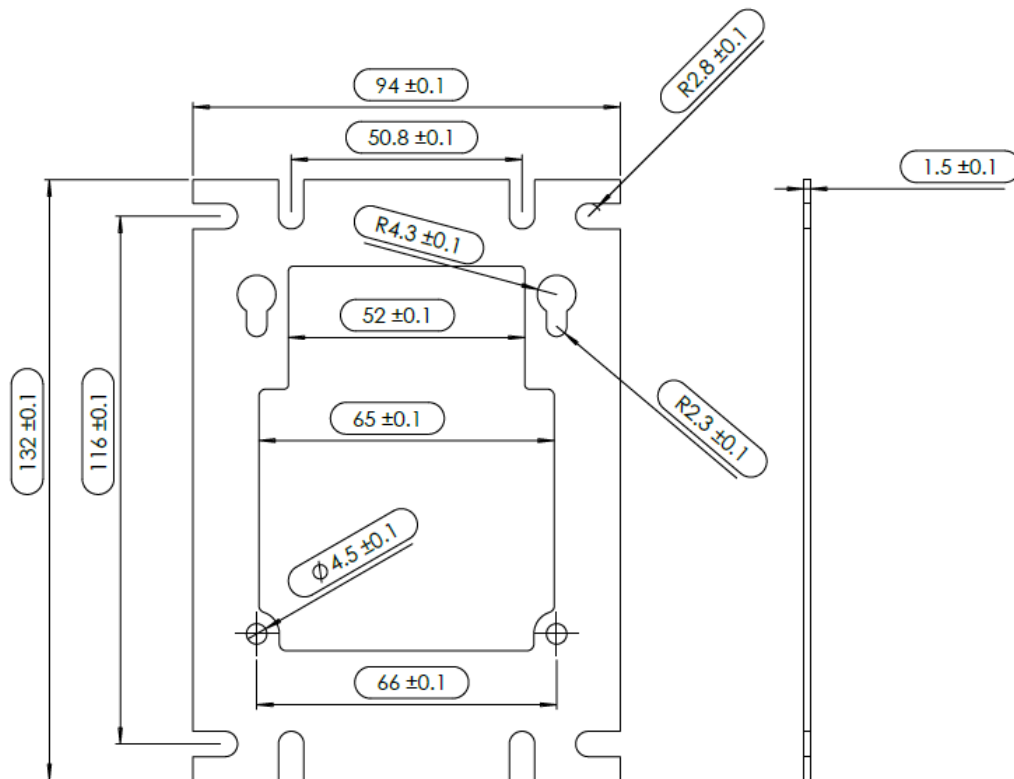


Figure 14 : Installation Plate Dimensions



Figure 15 : Front View

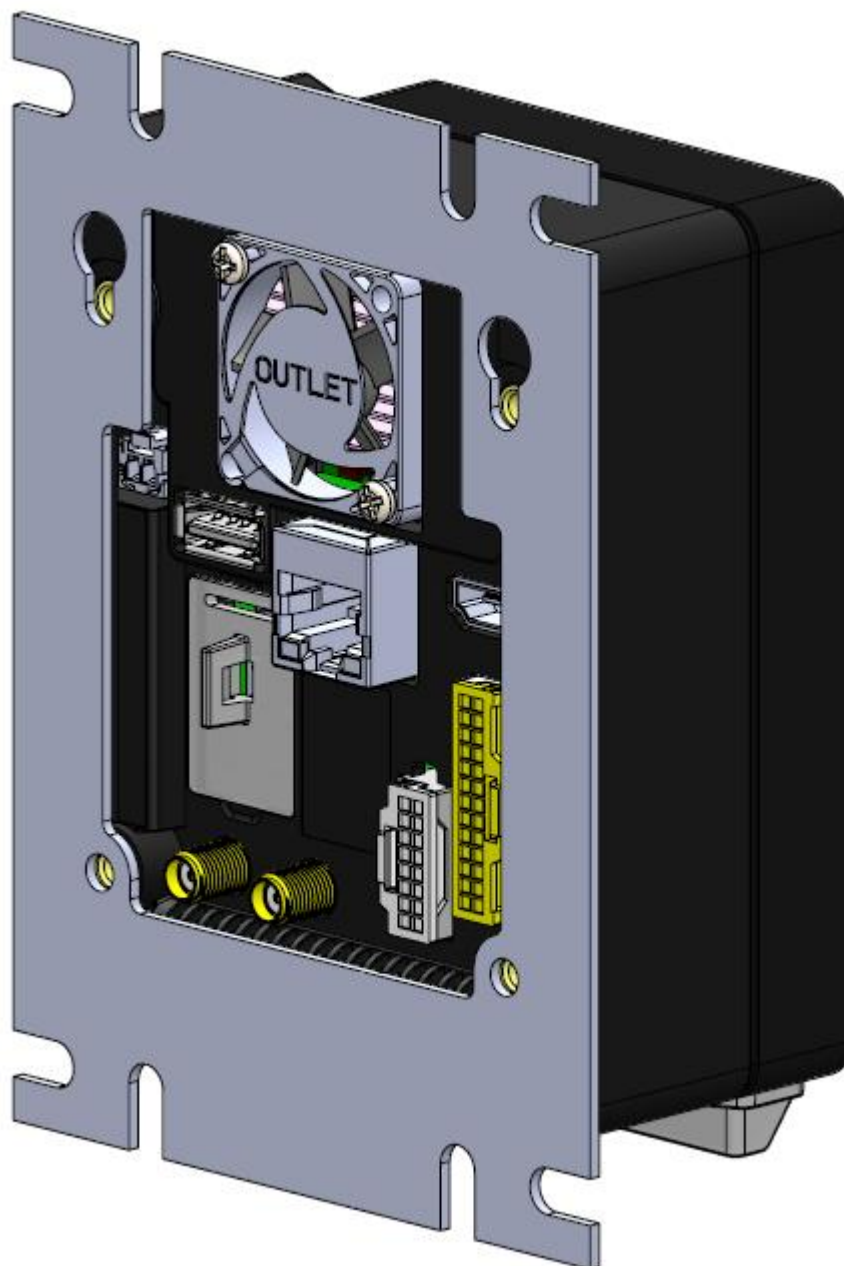


Figure 16 : Back View (with mounting plate)

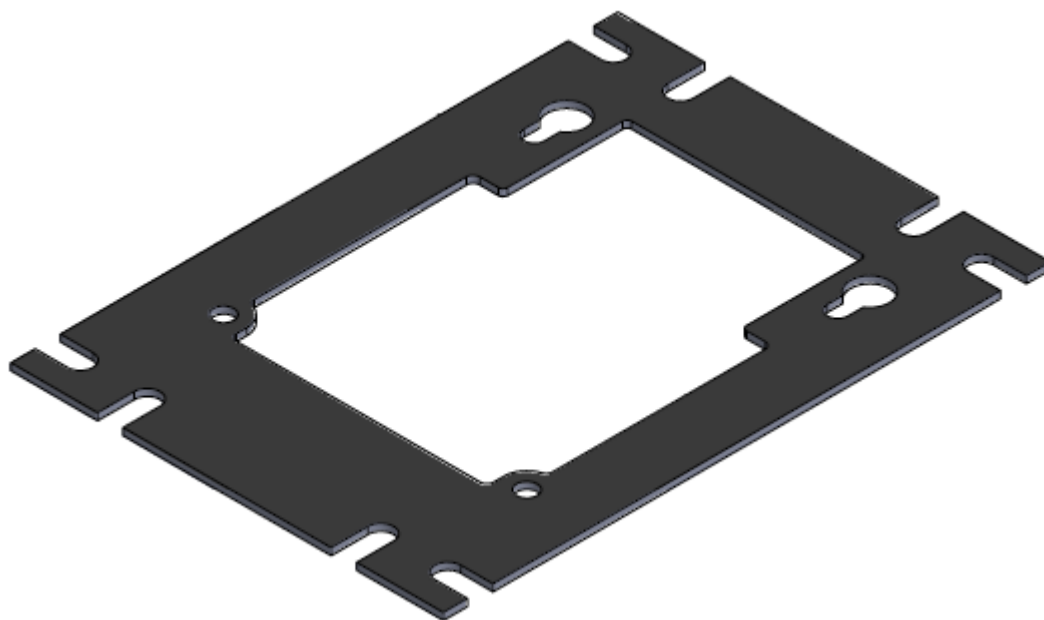


Figure 17 : Metal Mounting Plate

## 6 Contact Us

### **OTI Technical Support (International):**

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### **OTI PetroSmart (Africa)**

- Email: [info@otipetrosmart.com](mailto:info@otipetrosmart.com)
- Phone: +27 21 526 9100 (Monday – Friday 9:00 am to 5:00 pm South Africa time)

**For other options** – see <https://www.otiglobal.com/contact-OTI/>