



CONNECT 3000 Specifications

Version 1.0



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1 Introduction

oti's CONNECT 3000 Telemetry unit is a compact, cost effective, highly modular and certified machine-to-machine (M2M) controller, designed to allow communication of machines, especially vending machines, kiosks and meters, to the outside world via the Internet network or alternatively through internal networks.

With a wide variety of communication interfaces and rich SDK, CONNECT 3000 is the ultimate M2M controller, especially designed to enable network connection and cashless payment.

Although the idea of cellular communication between a device and a back-end server is not new, the international trend called IoT (Internet of Things) has given rise to a growing adoption of such communication units. The main difference between a simple cellular communication box and the CONNECT 3000 is the source; CONNECT 3000 is offered by oti, a leading provider of cashless solutions. Although the unit can communicate and support any cashless acceptance device, the oti build-in modules embedded in the units dramatically ease the integration between the Telemetry unit and oti cashless readers.

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 Multi Drop Bus (MDB) and Data Exchange (DEX).

One of the Telemetry's network communication methods to the outside world is through the unit's cellular modem that is certified to ensure safety, performance and compliance with international standards.

The unit offers the developer a build-in OS as well as rich API that allows for use of the unit as a platform for development of host applications.

The SDK includes a source code for many of the product's software blocks as a means to expedite any development of the host application for the unit processor.

While connected, the unit can collect inputs from different components of the machine such as: sensors, all types of serial payment acceptance devices like readers, security devices such as PIN pads, inventory events, security and anti-vandalism events, operation transaction events, and data collection devices like barcode scanners and more.



1.1 Supported Standards

The CONNECT 3000 is compatible with the following standards and international specifications:

- PTCRB
- AT&T
- FCC
- CE
- UL
- RoHS compliance
- ISO 9001: 2008



2 High-level design

2.1 Hardware architecture

The beating heart of the Telemetry unit is a 32 bits Cortex M3 CPU, connected to a list of hardware peripherals as illustrated in the block diagram below.

Using these peripherals, the unit connects to other devices and supports human interfaces such as buttons and LEDs.

The unit SDK is provided with LLD (Low Level Drivers layer), which operates the different ports.

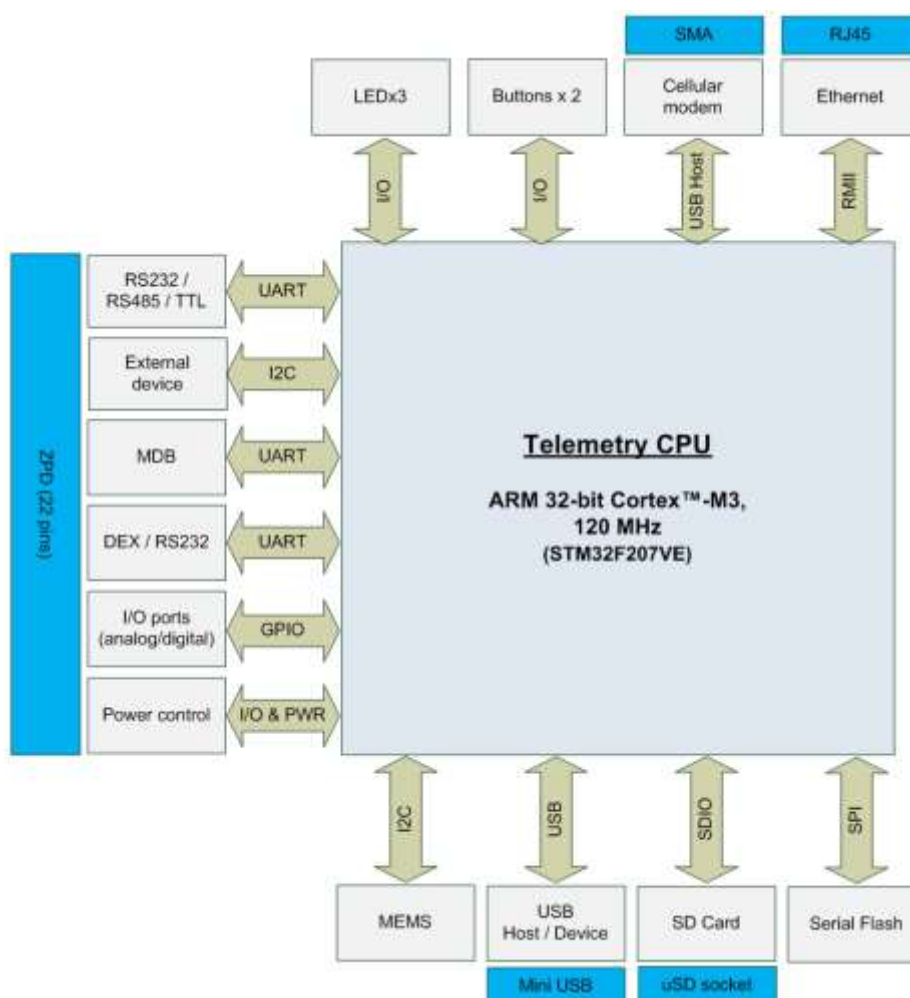


Figure 2-1: Hardware high-level block diagram

The Telemetry unit's hardware interface allows the unit to be connected to a variety of devices that collect feedback about the machine's operations, status, maintenance requirements, events, transactions and more.

A harness of wires and connectors are attached to the unit through its ZPD 22 pin connector. The 22 pin connector is used in order to receive and send information as well as to power the unit. Each of the 22 pins has its functionality. The connector pinout is specified by the table below:

Pin No.	Pin Description
1	AIN1
2	DOUT1
3	GND
4	DOUT3/I ² C SDA
5	DIN1
6	DOUT2
7	DIN2/I ² C SCL
8	GND
9	DEX_RX
10	MDB_RX
11	DEX_TX
12	MDB_TX
13	GND
14	MDB_COM
15	VOUT_5V
16	COM_TX
17	VOUT
18	COM_RX
19	GND
20	VIN
21	GND
22	VIN

Table 2-1: ZPD connector pinout

2.2 Hardware – Online Connectivity

The CONNECT 3000 is part of the IoT (Internet of Things) trend since the essential purpose of this product is to enable machine connectivity – mainly vending, meters and service machines – with information management systems such as web services, application servers, web communication services and back-ends.

For example, a beverage vending machine or a laundromat that is located in the lobby of a multi-floor building can utilize a Twitter or Facebook account through the Telemetry to inform the residents of the building (that choose to follow the machine) about events such as price changes, stock level, failures and availability of the machine or products. The unit can be connected to different parts of the machine and can collect information from a variety of devices. For example, the unit can give users a report about their purchase history or calory consumption when they pay with an identifiable cashless device (e.g. credit or debit card).

In order to achieve this functionality, the Telemetry should have connectivity to the internet or to other internal networks; this connectivity allows the unit to send and receive information to and from online computers or servers.

Option No. 1 – Ethernet

The Telemetry is equipped with an Ethernet connector located on the front panel of the unit. The unit connects to the Internet network (or other internal network) using the standard RJ45 connector.

A software library that facilitates the Ethernet connection as well as SSL implementation is included as part of the product SDK.

Option No. 2 – Cellular modem

The Telemetry is equipped with a certified Telit cellular modem, optional antenna is available as part of the product accessories collection.

The product is delivered with software API that allows for an establishment of connection, through SMS, mobile data and more.

Secured SSL communication is supported as part of the modem API.

Option No. 3 – Third party communication dongle

The Telemetry is equipped with a mini USB socket that can serve as a Device or Host. The availability of the standard USB channel allows integration with a third party communication (usually wireless communication) dongle such as Wi-Fi, Bluetooth, ZigBee or any other similar dongles. In this case, the developer that utilizes the unit as a platform becomes responsible for the implementation of the third party dongle drivers.

Option No. 4 – Multi offline single online

Using communication methods such as RS485 or a third party communication Wi-Fi dongle, the operator can deploy a cluster of machines that communicate using an internal network. This necessitates that only one of the machines have the required equipment and capabilities (e.g. Cellular modem or Ethernet) in order to go online. This unit will function as an access point that enables the entire cluster to transmit messages outside the internal network to the internet. Such configuration will be the most cost-effective in both hardware and network costs.

2.3 Hardware - Under the hood

CONNECT 3000 hardware design is modular, and is comprised of Telemeter main board and optional cellular modem and battery pack. Final software implementation of the host application will depend on the product specific hardware configuration.

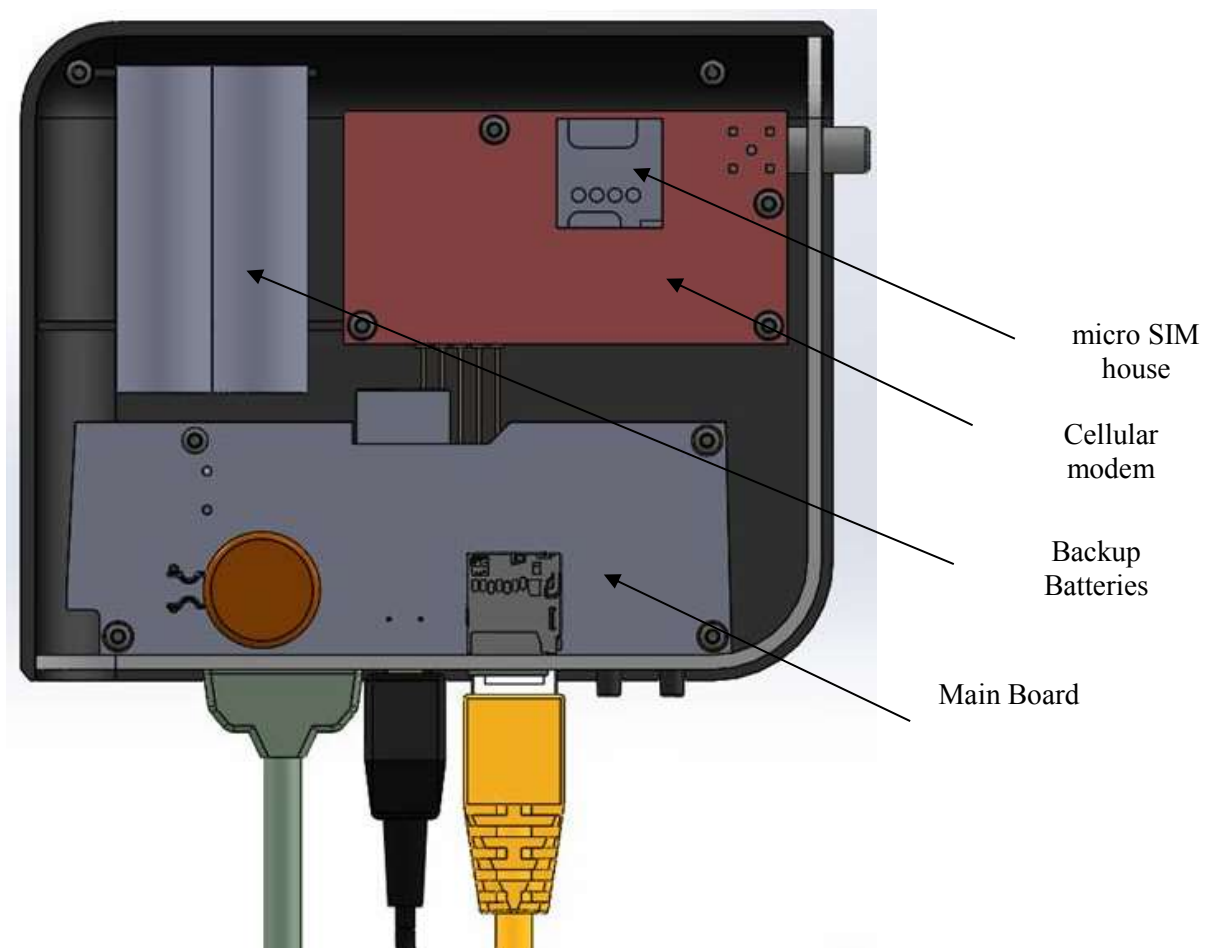


Figure 2-2: Hardware - Under the hood

2.3.1 Cellular Modem

In its cellular configuration, CONNECT 3000 is integrated with a Telit cellular modem. The following two (2) modem hardware configurations are supported:

Variants	Freq. Bands 2G (MHz)	Freq. Bands 3G (MHz)	Features
UL865-EUD (Europe)	900/1800	900/2100	Data-only
UL865-NAD (North America)	850/1900	850/1900	Data-only

- SMS
 - Point to point mobile originated and mobile terminated SMS
 - Concatenated SMS supported
 - SMS cell broadcast
 - Text and PDU mode
 - SMS over GPRS
- Data transmission
 - HSPA: category 8 in downlink e category 6 in uplink
 - DL up to 7.2Mbps
 - UL up to 5.76Mbps
 - WCDMA: up to 384kbps downlink/uplink
 - Asynchronous non-transparent CSD up to 9.6kbps
 - GPRS class 10 for NAX variants and class 33 for EUx variants
 - EDGE class 10 for NAX variants and class 33 for EUx variants
 - Coding scheme 1 to 4 (GPRS) & Modulation Coding scheme 1 to 9 (EDGE)
- SIM phonebook
- 1.8V/3V SIM/USIM interface

Reference: Telit UL865 Product Description

Note: The Telemeter back panel should be removed to access the SIM connector. It is highly recommended to disconnect power supply before SIM insertion.



2.3.2 Rechargeable Backup Batteries

The CONNECT 3000 supports an option for two (2) rechargeable batteries (~AA size), that allow the unit to perform emergency operations (e.g. emergency message) during power loss.

The product design includes a smart charger that operates automatically the charging. An API is provided for the CPU to get information regarding the charging and the battery status. Upon power loss, it is the responsibility of the host application to properly manage the emergency operations and entering controlled power saving mode.

2.4 Hardware Interfaces map

The Telemetry unit offers the user a variety of interfaces that allow communication and maintenance of the unit.

The unit allows communication and maintenance via the following interfaces:

1. Cellular antenna SMA connector
2. Three (3) indication LEDs
3. Two (2) Technician buttons
4. Ethernet RJ45 connector
5. Mini USB connector that can serve as Device or Host socket
6. Micro SD card socket
7. Multi pin connector that supports that different communication channels with the machine

The image below maps the different external hardware ports and interfaces including human UI:

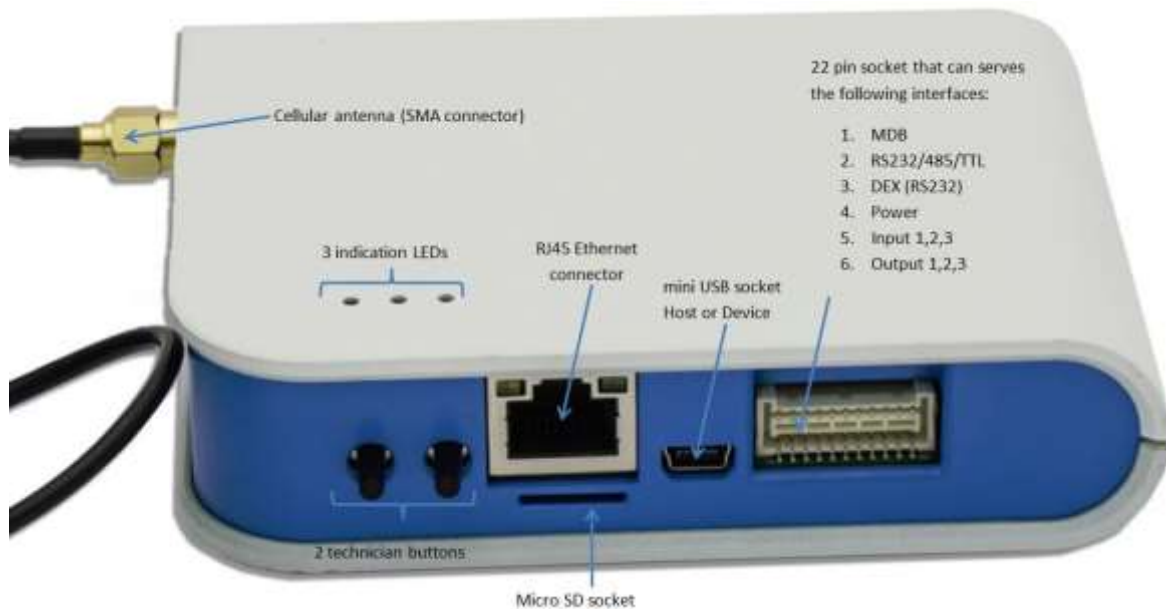


Figure 2-3: Hardware ports map

2.5 Interfaces and cables

2.5.1 Full Interface Cable

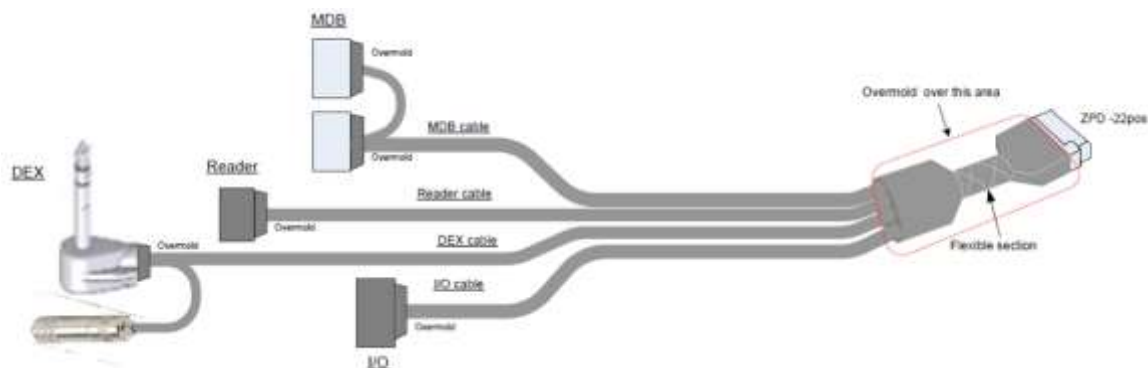


Figure 2-4: Full interface cable harness

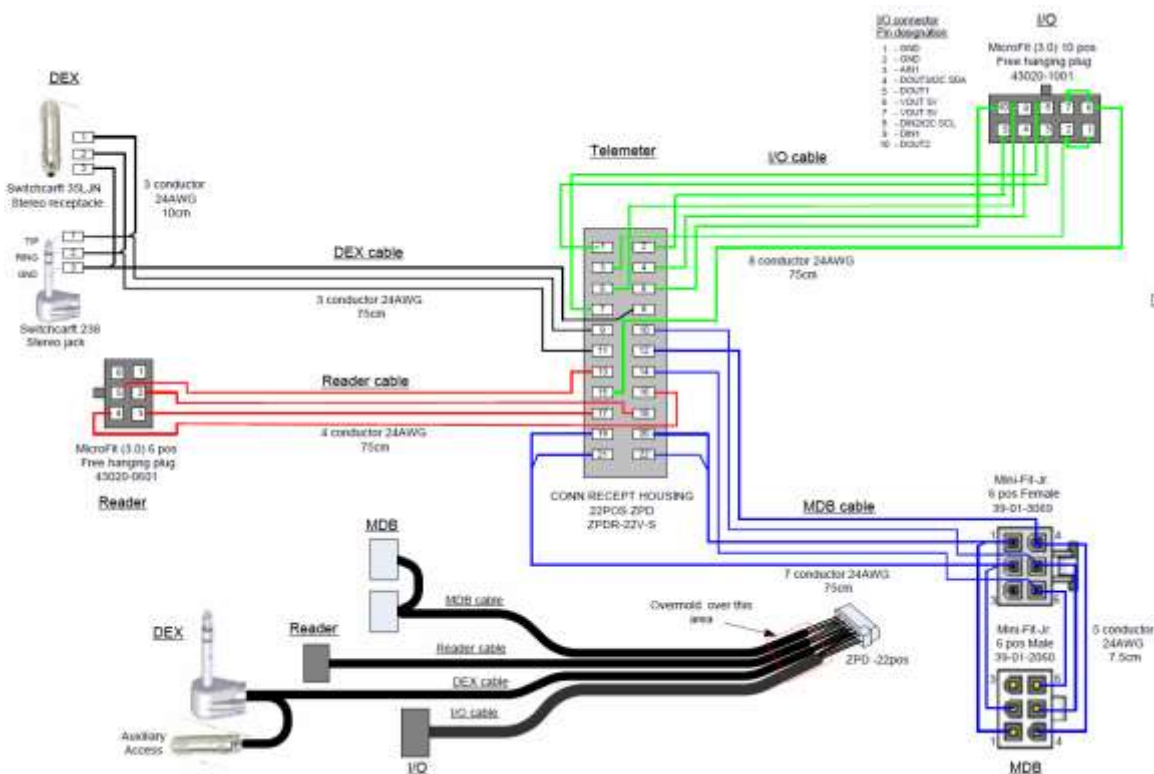


Figure 2-5: Full interface wiring diagram

2.5.2 USB Cable

The USB cable (1.8m) has a mini-USB upstream connector located on the side of the unit and a USB downstream connector on the other side.

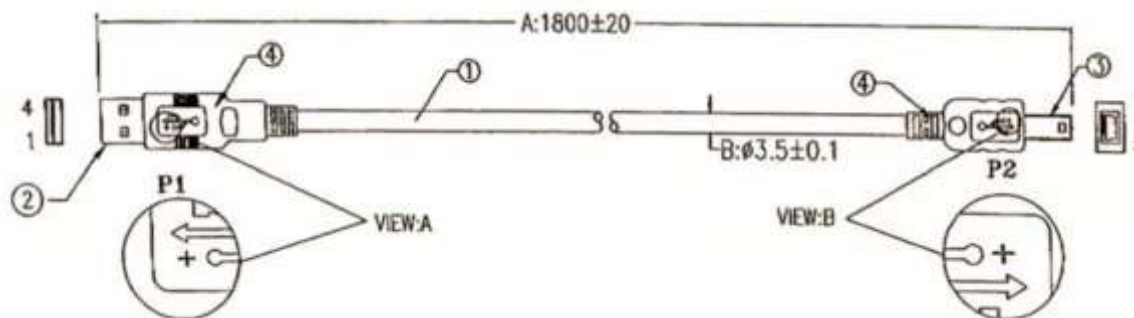


Figure 2-6: USB Cable

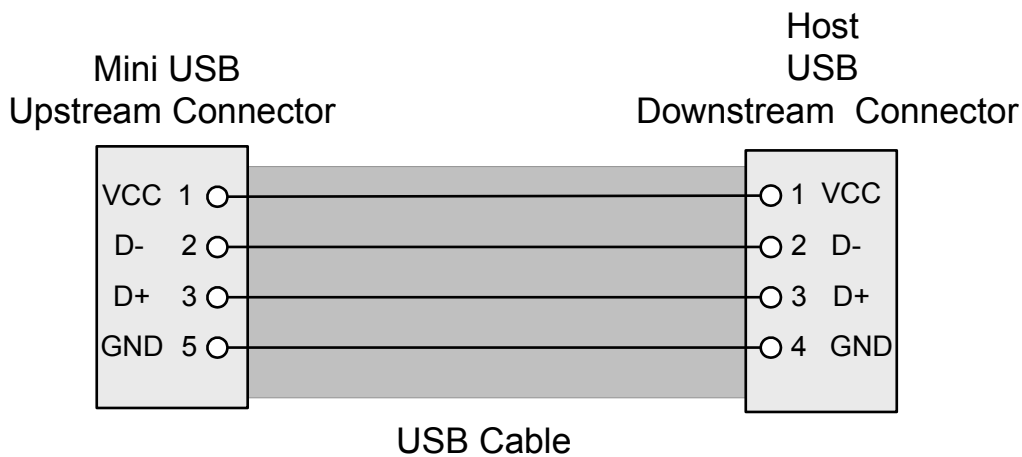


Figure 2-7: USB Connection

2.6 Software architecture

The Telemetry application will run on top of the Hardware Abstraction Layer (HAL) developed by oti and will run in its own RTOS (Real Time Operating System) task.

The HAL API includes the following functionalities:

- ✓ UART communication (send/receive)
- ✓ USB communication (send/receive)
- ✓ I/O communication (get/set)
- ✓ MDB (send/receive)
- ✓ DEX (send/receive)
- ✓ Ethernet (Socket interface)
- ✓ SD Card (File system API)

The block diagram below, specifies the different layers and blocks of the CONNECT 3000 unit software.

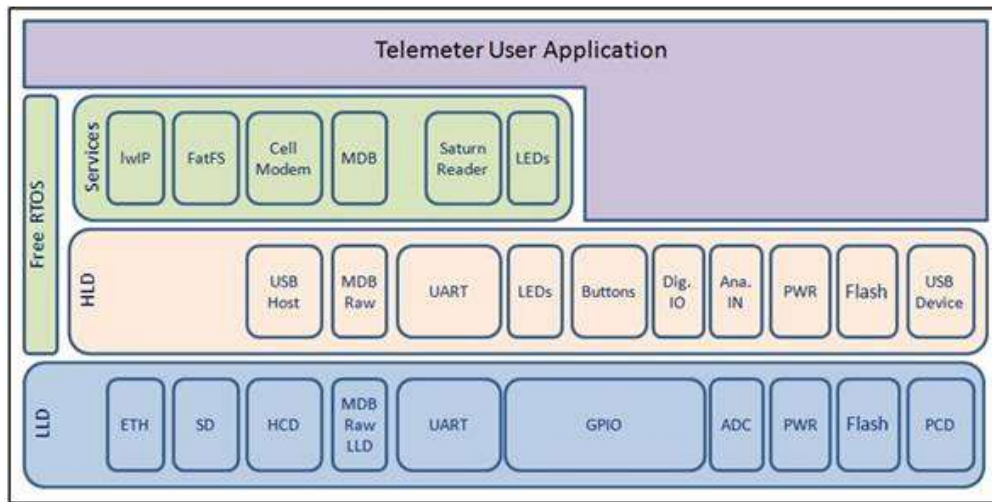


Figure 2-8: Software high-level block diagram

Free RTOS API: <http://www.freertos.org/a00106.html>

3 Technical Specifications

3.1 Product Features

General

- Modular design by Hardware and Software
- OEM configuration available

Software

- Free RTOS included and integrated
- Configurable and upgradable platform
- Remote software update supported
- oti reader drivers included
- MDB, DEX, Ethernet, SD, USB (Device and Host) libraries included
-

Communication Links

- USB 2.0 – full speed, Host/Device
- RS232, RS485 or TTL (3.3V/5V)
- MDB
- DEX
- Optional I²C

Connectors:

- A 22 pin machine interface
- Ethernet RJ45
- mini USB Type AB
- micro SD slot

Cellular modem:

- Telit UL865-EUD (Europe)
- Telit UL865-NAD (North America)
- micro SIM socket

Human User Interface

- Three (3) LED indicators
- Two (2) technician buttons

Power

- Input: 8VDC - 45VDC, On-board switching power supply
- Output:
 - USB 5V, 0.5A
 - 5V, 0.5A
 - Filtered input voltage

Backup Batteries

- 2 x 3.2 VDC (350 mAh) battery pack

Security

- In-box SIM house
- SSL API
- Cryptographic algorithms: AES, TDES, RSA

Memory

- CPU: 512 KB Flash
- On-board: 2MB Serial flash
- External: micro SD card (card not included)

Environmental Conditions

- Operating: -20° to 70°C (-4° to 158°F)

3.2 Product Technical Specifications

Table 3-2: Performance/Electrical Specifications

Product Core

Feature	Specification
■ CPU	
Core	ARM 32 bit Cortex-M3 120 MHz
Model	STM32F207VE
Internal Memory	512 KB Flash
RAM	128 KB
■ I/O (Option No. 1)	
Digital out	Three (3) OC output
Digital in	Two (2) input 0 – 5 VDC
Analog in	One (1) input 0 – 5 VDC
■ I/O (Option No. 2)	
Digital out	Two (2) OC outputs
Digital in	One (1) input 0 – 5 VDC
Analog in	One (1) input 0 – 5 VDC
I ² C	3.3V TTL
■ Communication Links:	
RS232/RS485/TTL (3.3V/5V)	
■ Indicators:	
LEDs	Three (3) general purpose programmable mono/multi-color, high brightness LEDs
Button	Two general purpose
■ Electronic Board Power Requirements:	
Input Voltage	8VDC - 45VDC, On-board switching power supply
Output (USB Host)	5V, 0.5A
Output (via 22 pins connector)	5V, 0.5A
Output (via 22 pins connector)	Filtered input voltage
■ Machine interface connector	
Connector	Manufacturer code: JST SM22B-ZPDSS-TF
■ MDB	
Supported, including MDB spy	
■ DEX	
Supported, Auxiliary access connection (Automatic override) Note: Optionally can be used as secondary general purpose RS232	
■ Mechanical:	
Dimensions	H – 3.62" (92 mm) W – 4.64" (118 mm) D – 1.14" (29 mm)
■ Temperature:	
Operating	-20°C to 70°C (-4°F to 158°F)



Product Optional modules

Feature	Specification
■ On-board memory	
On-board 2MB Serial flash memory	
■ External memory	
micro SD socket	micro SC card could be ordered separately
■ Cellular modem	
Modem	Manufacturer code: Telit UL865-EUD or UL865-NAD
Cellular Generation	GSM and UMTS
Support bands	Dual band (EU/North America)
SIM house	micro SIM
Antenna connector	SMA
Cellular Antenna	Could be ordered separately
■ USB:	
USB 2.0 Full speed	mini USB Type AB
Device	CDC device driver included
Host	Supported
■ Battery	
Note: The unit includes 2 batteries, information below is per battery	
Type	Rechargeable battery
Model	LiFePO4
Typical Rated Capacity	350mAh
Rated Voltage	3.2V (Operation Voltage)
■ Ethernet	
Connector	RJ45
Supported Bit rate	10/100 Mbps
■ MEMS	
Functionality	High performance 3D accelerometer and 3D magnetometer module

4 Dimensions

The unit dimensions are provided in this chapter.

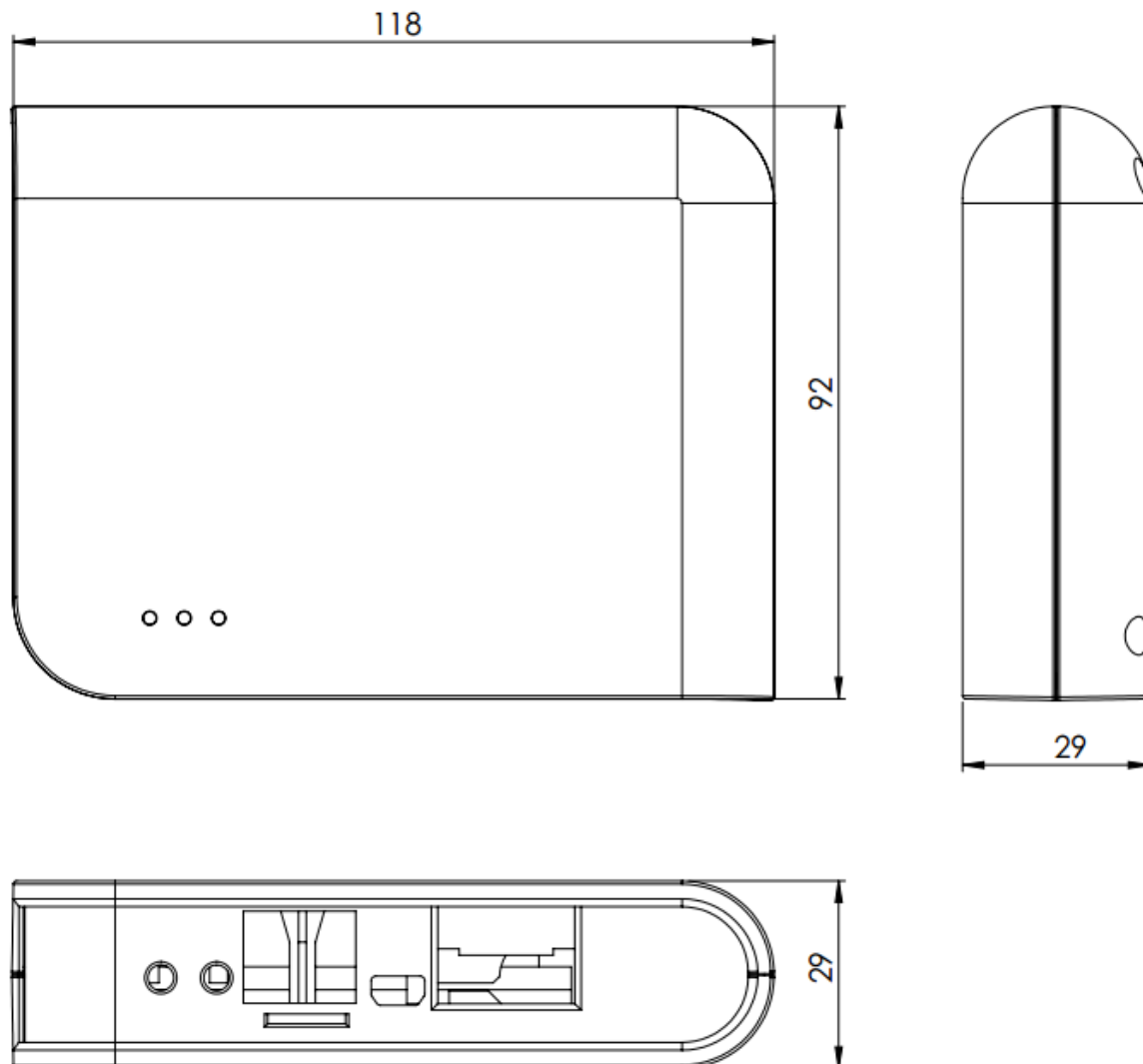


Figure 4-1: External Dimensions

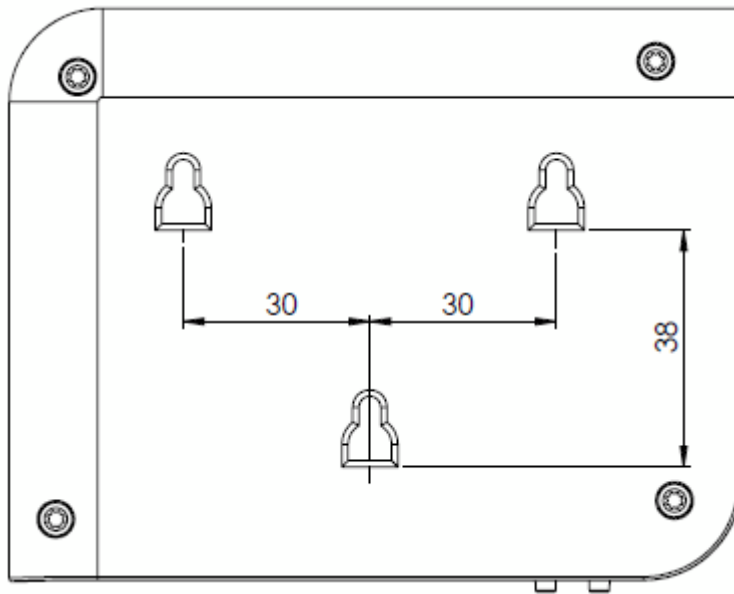


Figure 4-2: Mounting Holes Location

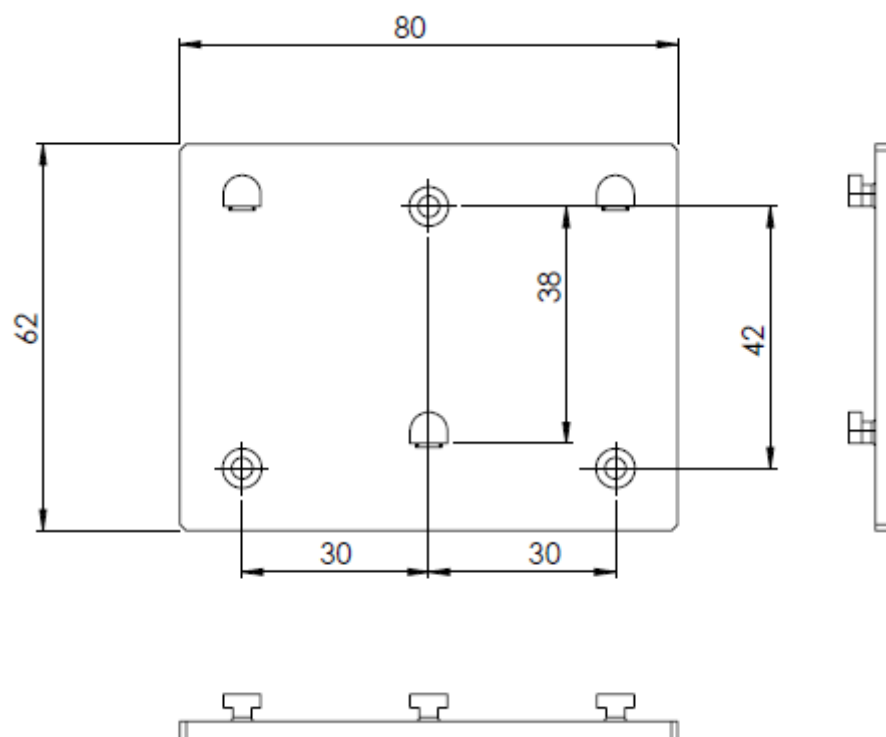


Figure 4-3: Installation Plate Dimensions



Figure 4-4: Back View



Figure 4-5: Front View & Antenna



Figure 4-6: Front View



Figure 4-7: Side View



Figure 4-8: oti CONNECT 3000 vs. oti TRIO

5 SIM Installation

In product configuration that supports cellular communication, a SIM should be inserted into the SIM socket on the modem board.

For security reasons, access to the SIM requires removal of the back plate.

The unit box is closed using four (4) metal screws that fasten into the bottom of the box as demonstrated in the image below:

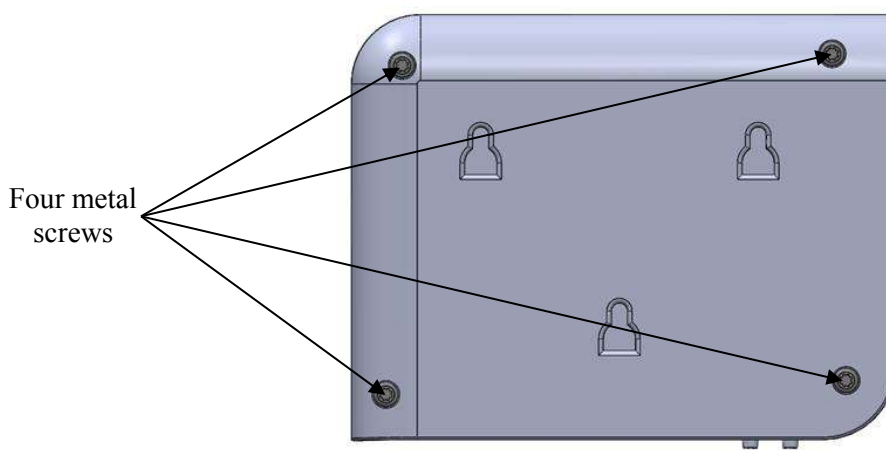


Figure 5-1: Back plate screws

The SIM connector is located on the Cellular modem board as illustrated in the image below:



Figure 5-2: Modem board with SIM socket

The SIM receptacle is a standard push-push micro SIM socket.

Note: The SIM as well any aspect of the communication and/or agreement with the SIM Mobile Network Operator (MNO) are out of the scope of this product.

6 Unit Mounting

6.1 Introduction

The CONNECT 3000 is designed to be installed within machines such as vending machines and to be connected to the machine's different devices, sensors, other I/O accessories and interfaces.

Although the unit was built to handle a relatively wide range of temperatures of -20°C to 70°C (-4°F to 158°F) the unit is not water/dust proof and needs to be installed inside the machine.

The unit is delivered with an optional plastic mounting plate.

The mounting plate has three (3) mushroom studs and three (3) holes as shown in the image below.

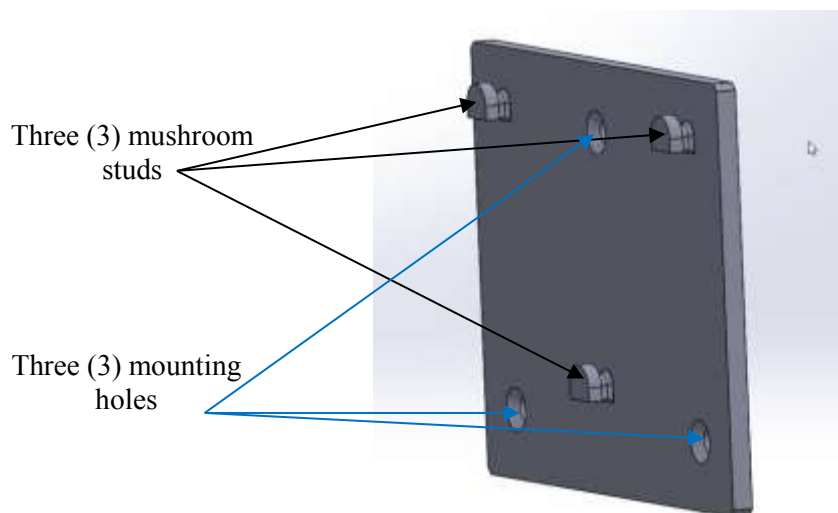


Figure 6-1: Mounting Plate

The back cover of the unit has three (3) mounting stud receptacles as shown in the image below.

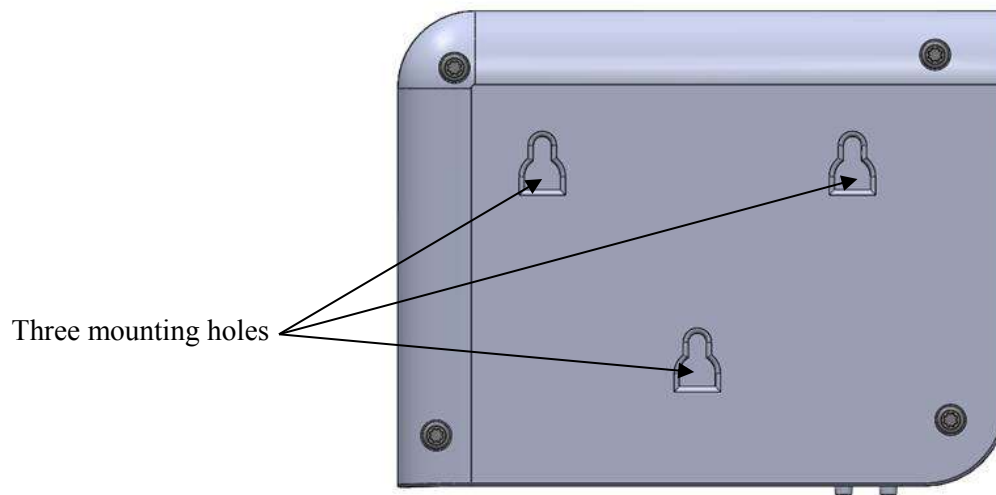


Figure 6-2: Back-cover mounting holes

6.2 Installation procedure

As a first step, the installation plate should be attached to the internal wall of the machine or to any of the machine's internal beams. The attachment of the plate can be achieved by:

1. Drilling three (3) holes in the machine wall or machine internal beam according to the holes in the mounting plate and attaching the plate to the machines with screws.
2. Attaching the mounting plate to any surface in the machine with double-sided adhesive tape that can carry the unit weight.
3. Attaching the installation plate to any surface in the machine using adhesive Velcro tape that can carry the unit weight.
4. Any other way that will allow attachment of the plate to the machine in a way that will support the unit weight.

After the plate is attached to the machine, the unit should be installed by placing the unit on the plate in a way that the three (3) bumps are inserted into the three (3) holes at the back of the unit, then gently pull the unit down to stabilize it.

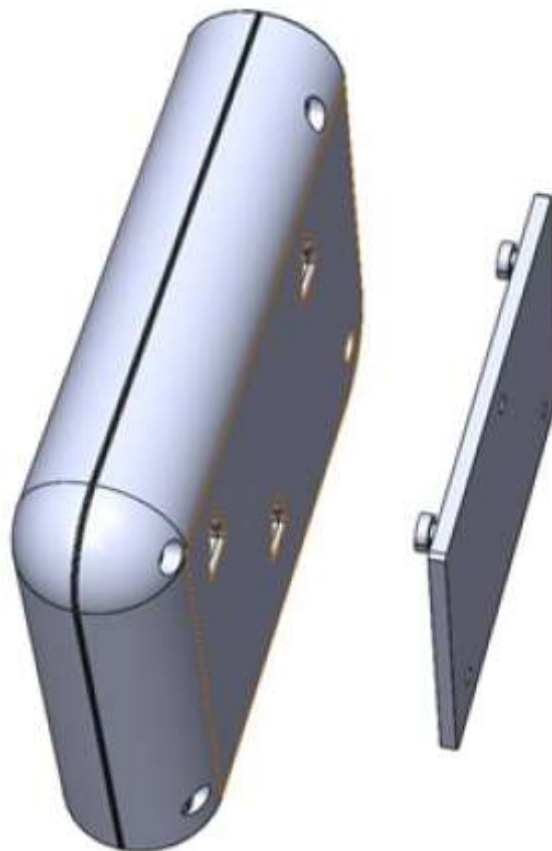


Figure 6-3: Back-cover holes and plate studs

It is recommended to attach the plate to the machine in a way that will allow easy removal of the plate in the future.

An alternative installation method is the attachment of the unit to the machine without the installation plate by attaching the unit to the wall using wide adhesive Velcro tape like the one illustrated below.

Note: The adhesive Velcro tape is not included as part of the unit installation kit.



Figure 6-4: Wide adhesive Velcro tape - illustration



7 Contact Us

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