



CE-500

Mobile Data Terminal



Hardware Guide

Revision C
January 2011

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Preface

Revision History

Revision	Date	Change
A	February, 2010	Document created
B	March, 2010	Adding new power management functionality
B.1	April, 2010	Keypad keys names has been changed (Backspace to Left)
C	January, 2011	Adding CE and FCC certifications.

Safety Precautions

Usage Precautions

Read the following safety precautions before installation or operation.



WARNING!

Abnormal Conditions

Should the CE-500 become hot or start to emit smoke or a strange odor, immediately turn off the power and contact your original dealer or an authorized service provider. Continued usage is dangerous and may result in fire or electric shock.



WARNING!

Foreign Objects

Should any foreign matter get into the CE-500, immediately turn off the power and contact your original dealer or an authorized service provider.



WARNING!

Damage Caused by Dropping

Should you drop the device and possibly have caused damage, immediately turn off the power and contact your original dealer or an authorized service provider. Continued usage is dangerous and may result in fire or electric shock.



WARNING!

Moisture

Keep the device away from vases, planets, cups, glasses, and other liquid containers. Water or metal getting into the device creates the danger of fire and electric shock. Continued usage after water or metal has gotten into the CE-500 is dangerous and may result in fire or electric shock.



CAUTION

Foreign Objects

Ensure that metal or combustible objects are not inserted into any openings. Such objects may result in fire or electric shock.



CAUTION

Location

Do not place the CE-500 on an unstable or uneven surface. Doing so may cause the CE-500 to fall, which may result in personal injury or major damage to the device. Do not locate the device in extremely humid or dusty areas. Doing so may result in fire or electric shock.



CAUTION

LCD Screen

Never apply heavy pressure on the CE-500 device display or subject it to strong impact. Doing so may crack the screen or LCD panel glass, which may result in personal injury or major damage to the device.

Should the LCD panel glass break, do not touch the liquid inside. Doing so may cause skin inflammation.

Should liquid from the LCD panel accidentally get into a person's mouth, their mouth must be immediately washed out with water and a physician consulted.

Should liquid from the LCD panel accidentally get into a person's eyes or onto their skin, the area must be immediately rinsed for at least 15 minutes with clean tap water and a physician consulted.

Power Supply



WARNING!

Do not use the CE-500 at a voltage other than specified. Doing so may result in fire or electric shock.

Avoid conditions that can cause damage or breaks in the power cable. Do not place heavy objects on the power cable and keep it away from sources of heat. Any of the above may damage the power cable, which may result in fire or electric shock.

Never twist, sharply bend, or pull the power cable. Doing so may result in fire or electric shock.

Should the power cable become severely damaged (to the point that wires are exposed or broken), contact your original dealer or service provider about repair or replacement.

Using a damaged electrical cable may result in fire or electric shock.



CAUTION

Keep the power cable away from sources of extreme heat. Heat may melt the covering of the power cable, which may result in fire or electric shock.

1

Introduction

CE-500 Platform Overview

The CE-500 provides Original Equipment Manufacturers (OEMs) and ASPs Application Service Providers (APS) with a rugged, versatile, vehicle-centric, and fixed-mount or portable mobile-computing platform for a variety of Mobile Resource Management (MRM) applications.

The platform features Microsoft Windows Embedded CE 6 operating system that supports Compact Framework 3.5 and offers comprehensive development environment for independent application programming and system integration.

The CE-500 incorporates a unique layered architecture making the platform highly modular and scalable. This architecture enables setting various factory-set configurations and performing in-field hardware upgrades using plug-in modules.

The layered architecture provides a proof and cost-effective design by simplifying maintenance tasks, significantly extending product life expectancy, and lowering a total cost of ownership (TCO).

The CE-500 [Basic configuration](#) is the standard set of features and functions of the MDT. There is a range of optional [Extensions](#), add-ons and [Accessories](#) to further enhance the CE-500 capabilities to serve advanced fleet management solutions.

The CE-500 is built to withstand a wide temperature range, vibrations, shock, and endure the rough working conditions in commercial vehicle environment.

CE-504 and CE-507 Models

Micronet implemented the CE-500 platform in two product models, which are ergonomically designed for use in commercial vehicles of different sizes. Each model provides a user interface optimized for use in certain conditions.

This document describes the full features list of the CE-500 platform. Some of the features are optional extensions and add-on modules to the Basic configuration. To highlight those extensions, each extension includes an "option" remark on the feature description.

Displays

To support operation in various conditions, you can use different displays with CE-504 and CE-507. The single core-processing unit supports the following display sizes:

- 4.3" 480x272 pixels WQVGA (CE-504 model)
- 7" 800x480 pixels WVGA (CE-507 model)

Each display consists of a color touch screen and large programmable function and control keys.

Physical Interfaces

Both CE-504 and CE-507 provide the following physical interfaces:

- USB
- Serial RS232 ports
- Dedicated interface for Dallas ID button reader
- External cameras and audio device connections
- Analog and digital control I/O signals
- Interfaces for vehicle connectivity

Optionally, a magnetic card reader and camera can be plugged into the models.

Optional Wireless Modules

Both models provide the ability to plug in optional wireless modules:

- Quad band GPRS modem
- GPS
- Wi-Fi
- Bluetooth

All wireless modules are provided with internal antennas.

Fixed Mount and Portable Configuration

You can order CE-504 and CE-507 with the following configuration modes:

- **Fixed-mount mode**, which requires accessory cables for interface connections. The main accessory cable is required for the power and basic interfaces. Enhanced interfaces require additional cables. The required accessory cable is specified in the following interface descriptions.
- **Portable mode**, which includes the following components:
 - Battery for about two hours of full operation. The CE-504 is provided in two configurations, with or without a main battery.
 - Device cradle for recharging, mounting and connectivity

Development Tool Kit

Micronet's CE-500 Developers Package provides all tools required for application development quick-start, product testing, and product evaluation. The Developers Package includes 20 hours of technical support and contains all essential hardware and software components as described in the following sections.

Hardware

- Power supply adaptors
- Accessory cables
- Device cradle
- Mounting accessories and tools
- Mechanical and interface connection accessories

Software

- Software Development Kit (SDK) provides a set of software tools, API, and documentation for programming in Visual Studio .NET for C++, C#, and VB development environment.
- C# Demo samples of some device features, including the source code
- Additional software tools support the CE-500's numerous interfaces

Documentation

- Hardware and software guides
- Getting Started guide
- Certification approvals and declarations

CE-500 Platform Key Feature Specifications



CE-504	CE-507
	
WQVGA (480 X 272)	WVGA (800 X 480)

Table 1 – BASIC configuration

Basic configuration features	Details
Platform Core	
Operating system	- Microsoft Windows Embedded CE 6 Core License - Professional license available (optional)
Application development environment	Microsoft Visual Studio 2005 / 2008
Processor	- TI Omap 3503 - ARM Cortex™ - A8 Core
RAM	256MB
Flash	512MB
Memory card support	- SD / MMC (SDHC support) card slot x133 up to 32GB - SDIO interface
Audio CODEC	- Multi-channel - System audio support - Optional GSM Voice and Bluetooth audio support
Real Time Clock	- HW based - Device Wakeup alarm configuration capability
Watchdog	- SW based for application recovery - HW based for system recovery
User Interface	
Display	Color TFT LCD
Display Backlight	Multi-level backlight (white LED)
Touch screen	Analog Resistive, 4 wire

Basic configuration features	Details
Keypad	Rubber tactile, multi-level backlight
Internal speakers	<ul style="list-style-type: none"> - Stereo, 2 X 1W, 90 dB nominal @ 0.1m - Multi-level volume control
Internal microphone	<ul style="list-style-type: none"> - High sensitive - Noise filtered
Light sensor	Configurable for device backlight adjustment
Communication Interfaces	
Rs232 ports	<ul style="list-style-type: none"> - 1 X 4 Wire (TX, RX, RTS, CTS) - 1 X 2 Wire (TX, RX) - 300 - 115200 bps
USB OTG port	USB 2.0 - low, full and high speeds
USB Host port	USB 2.0 - low, full and high speeds
Peripherals Control	
Digital I/O	<ul style="list-style-type: none"> - 2 X automotive inputs - 1 X open collector output
Analog Input	0V – 30V
1-Wire Interface	Dallas ID memory button support
Power	
Input power	<ul style="list-style-type: none"> - 5V DC power input by device side panel connector - Direct vehicle battery connection (12V / 24V) by cradle or accessory cable - SAE J1455 compliant
Mechanical	
Vibration	5 - 1000 Hz, ~4g, 3 axis
Mechanical Shock	<ul style="list-style-type: none"> - Operational (40g, 11ms, 3 axes) - Crush safety (75g, 6ms, 3 axes)
Drop	According MIL standard
Device Mounting	<ul style="list-style-type: none"> - RAM® Mounts compatible mounting arm - Micronet mounting arm available (optional) - Device cradle available (optional)
Environmental	
Temperature range	<ul style="list-style-type: none"> - Operating: -4 °F to +158 °F (-20 °C to +70 °C) - Storage: -22 °F to +176 °F (-30 °C to +80 °C) - Operating with internal battery option: 14 °F to 140 °F (-10 °C to +60 °C)
Humidity	0 to 95%, non-condensing
IP	IP54
RoHS	Complaint
Certifications	
Standard compliance	FCC, CE, E-Mark

CE-500 Platform Optional Modules

Features	Details
Wireless Communication	
GSM / GPRS	<ul style="list-style-type: none"> - Quad Band, GPRS Class10 - GSM voice support - Including internal on-board antenna
GPS	<ul style="list-style-type: none"> - High sensitive, 50 channel, -160 dBm
Wireless LAN	<ul style="list-style-type: none"> - 802.11 b/g - Including internal on-board antenna
Bluetooth (combined with Wireless LAN option above)	<ul style="list-style-type: none"> - Class 2 - Data and voice support - Including internal on-board antenna
Interface Connections	
Ethernet LAN port (requires Enhanced accessory cable or device cradle option)	LAN 10 / 100Mbit/sec
J1939 port (requires CANBus accessory Cable or Device Cradle option)	CANBus V2.0B
External Audio (requires Audio accessory Cable or Device Cradle option)	<ul style="list-style-type: none"> - External microphone input (Mono) - External audio device input (Stereo) - External audio device output (Mono) - External speakers output (Stereo)
Portable Model	
Internal battery	<ul style="list-style-type: none"> - 3AH Li-Polymer - Providing ~2 hours of the operation (device configuration depended)
Device cradle	<ul style="list-style-type: none"> - Supporting all the platform device models - Cables connection infrastructure with mechanical cover option - Device mounting with quick release mechanism - RAM® Mounts compatible mounting arm - Micronet mounting arm available (optional)

CE-500 Platform Accessories

Features	Details
Power Supply	
Wall power adaptor for device	110V / 220V AC to 5V DC
Wall power adaptor for cradle	110V / 220V AC to 12V DC
Peripheral Cables	
Main interface cable	Device "Con1" to power, USB, serial, and I/O connectors
Enhanced interface cable	Device "Con2" to serial, I/O, and LAN connectors
J1939 (CANBus) interface cable	Device "Con3" to CAN connector
Audio interface cable	Device "Con4" to External Audio connectors
Interface Connections	
J1708 Adaptor (requires Enhanced accessory cable , uses Serial port 2 of CE-500 device)	RS-232 to J1708 (RS-485) convertor box
RS-422 Adaptor (requires Enhanced accessory cable , uses Serial port 2 of CE-500 device)	RS-232 to RS-422 convertor box
Mechanical Accessories	
Mounting arm	<ul style="list-style-type: none"> - Flexible, multi-directional mounting - Compatible with cradle or direct device mounting
SD card protective cover	SD card removing protection
SIM card protective cover	SIM card removing protection
Front panel label	Customizable "logo" printout

CE-50X Device Components

CE-504 Front Panel components

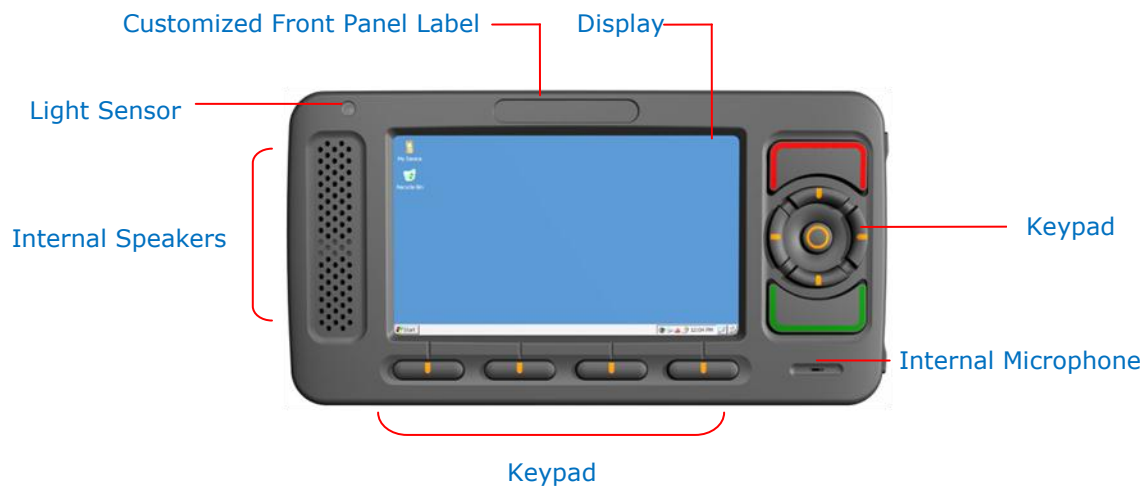


Figure 1 – CE-504 Model, Front Panel components

For more information on CE-504 front panel components, see:

- [Display](#), on page 26
- [Customized Front Panel Label](#), on page 30
- [Internal Speakers](#), on page 30
- [Keypad](#), on page 27
- [Light Sensor](#), on page 27
- [Internal Microphone](#), on page 31

CE-507 Front Panel Components

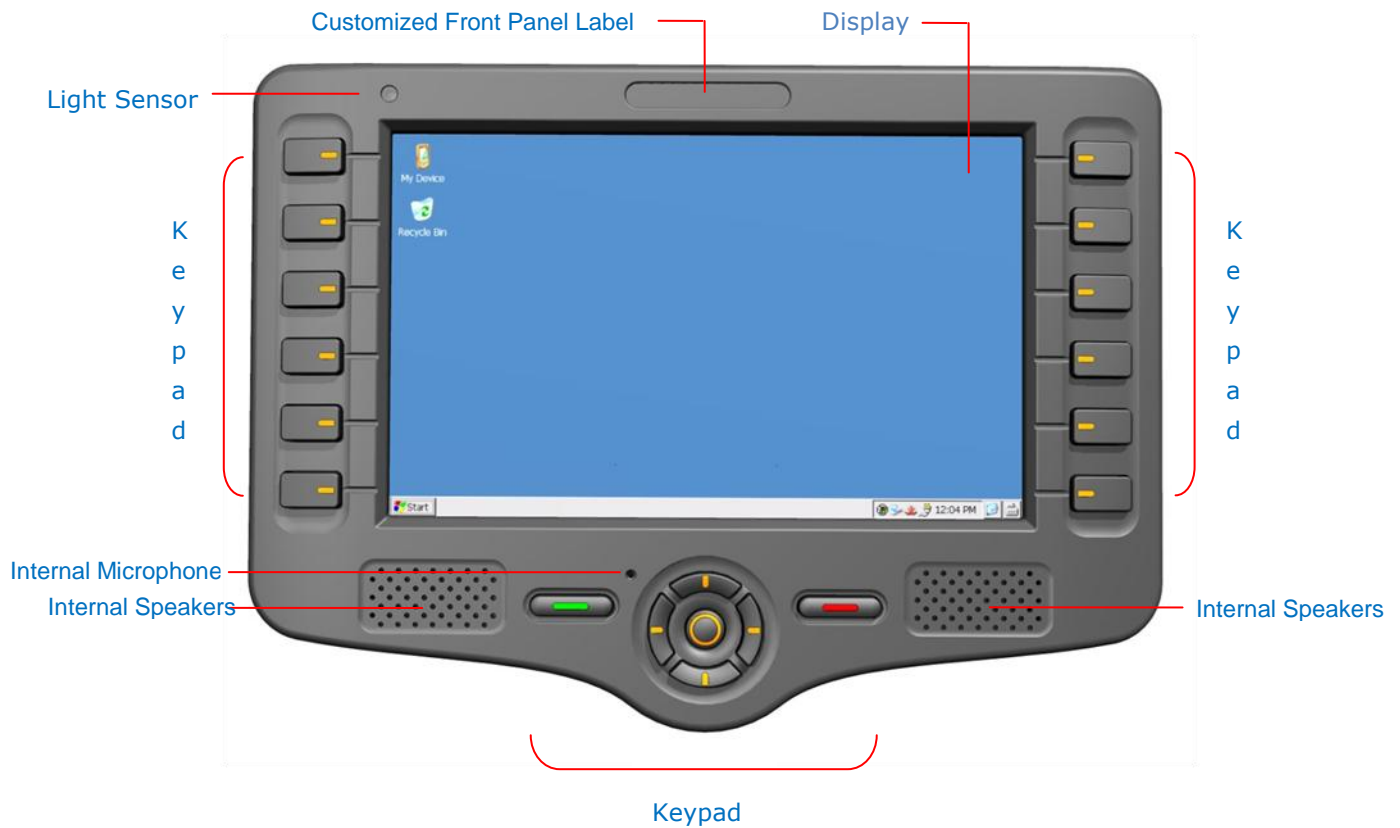


Figure 2 – CE-507 Model, Front Panel components

For more information on CE-507 front panel components, see:

- [Display](#), on page 26
- [Customized Front Panel Label](#), on page 30
- [Internal Speakers](#), on page 30
- [Keypad](#), on page 27
- [Light Sensor](#), on page 27
- [Internal Microphone](#), on page 31

CE-50X Model, Bottom Panel components

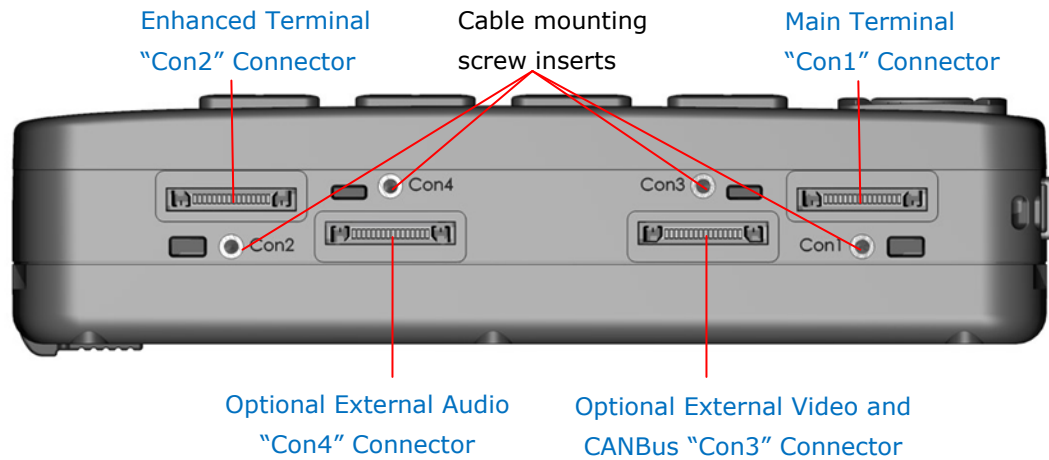


Figure 3 – CE-50X Model, Bottom Panel components

For more information on CE-50X bottom panel components, see:

- [Main Terminal "Con1" Connector](#), on page 38
- [Enhanced Terminal "Con2" Connector](#), on page 39
- [Optional External Video and CANBus "Con3" Connector](#), on page 41
- [Optional External Audio "Con4" Connector](#), on page 41
- [Cable mounting screw inserts](#), on page 59

CE-50X Model, Right Side Panel

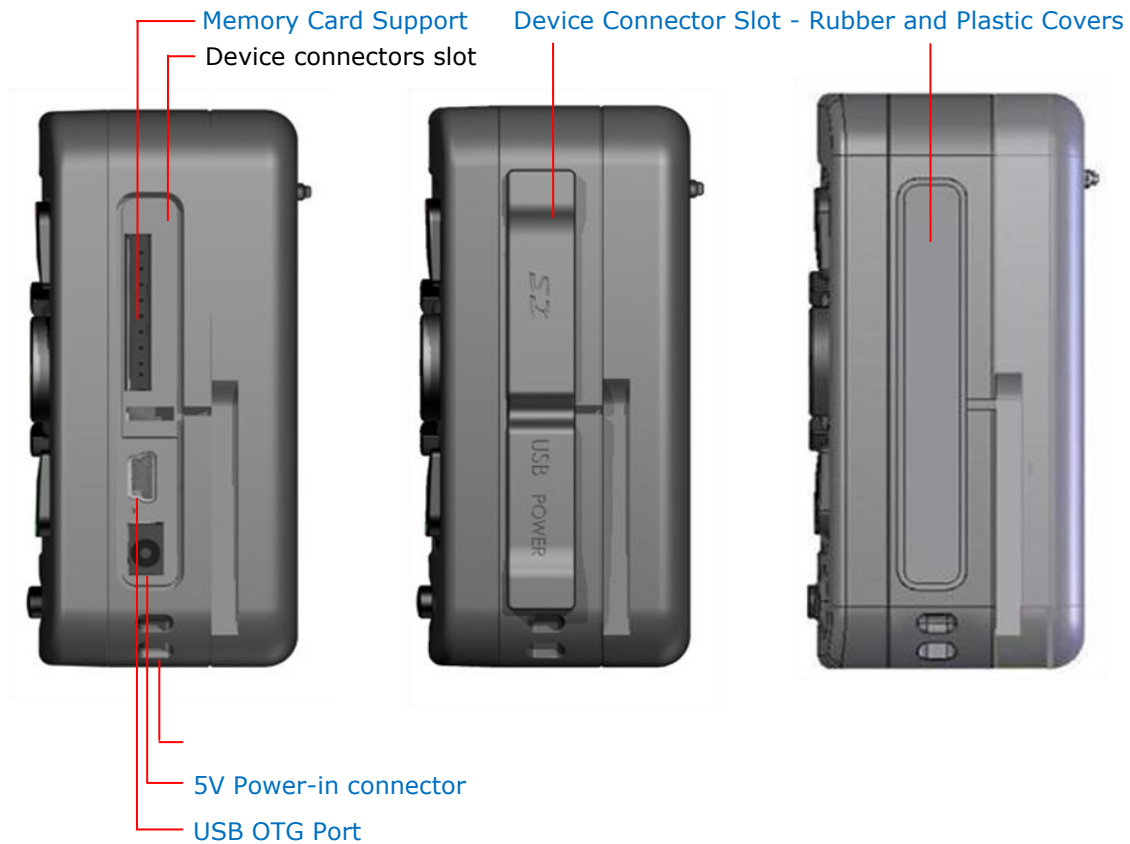


Figure 4 – CE-50X Model, Right Side Panel (Device Connector Slot) and Slot cover components

For more information on CE-50X Right side panel components, see:

- [Device connectors slot](#), on page 25
- [Memory Card Support](#), on page 24
- [USB OTG Port](#), on page 32
- [5V Power-in connector](#), on page 42
- [Device Connector Slot - Rubber and Plastic Covers](#), on page 25
- , on page 69

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CE-50X Model, Left Side Panel Component

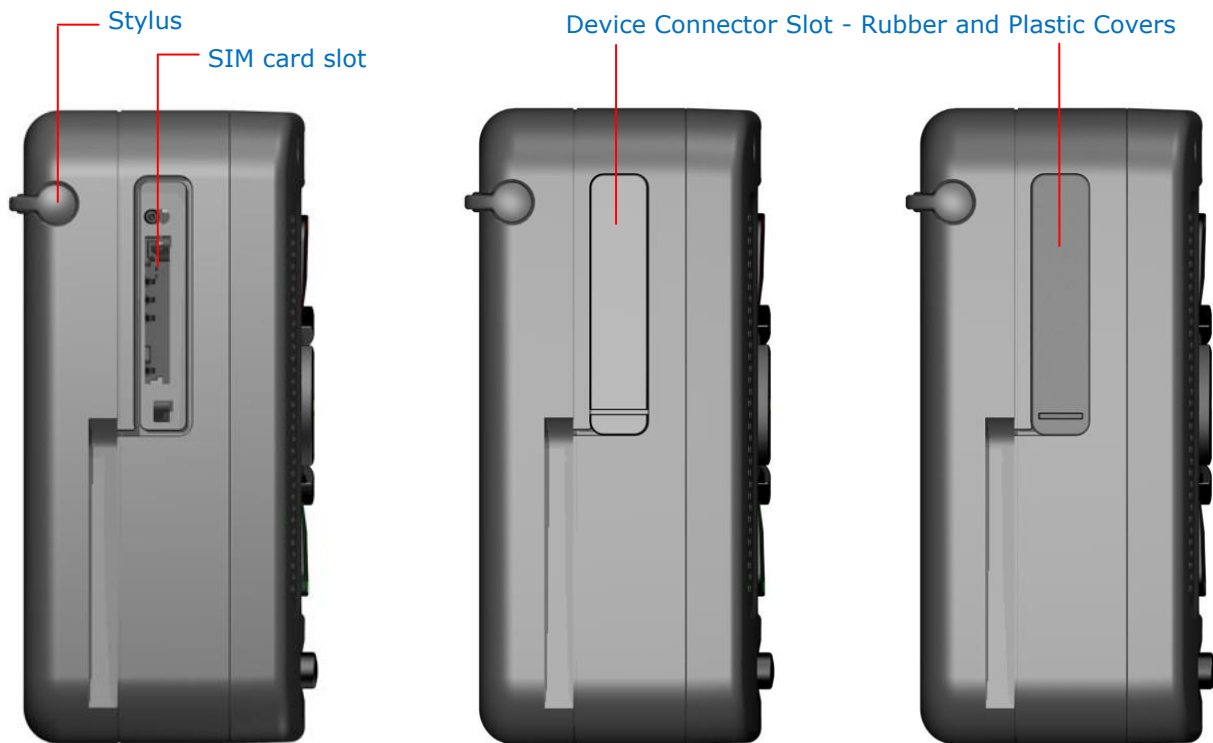


Figure 5 – CE-50X Model, Left Side Panel and SIM Card Slot cover components

For more information on CE-50X Left side panel components, see:

- [SIM card slot](#), on page [53](#)
- [Device Connector Slot - Rubber and Plastic Covers](#), on page [25](#)
- [Stylus](#), on page [27](#)

CE-50X Model, Rear Panel Components

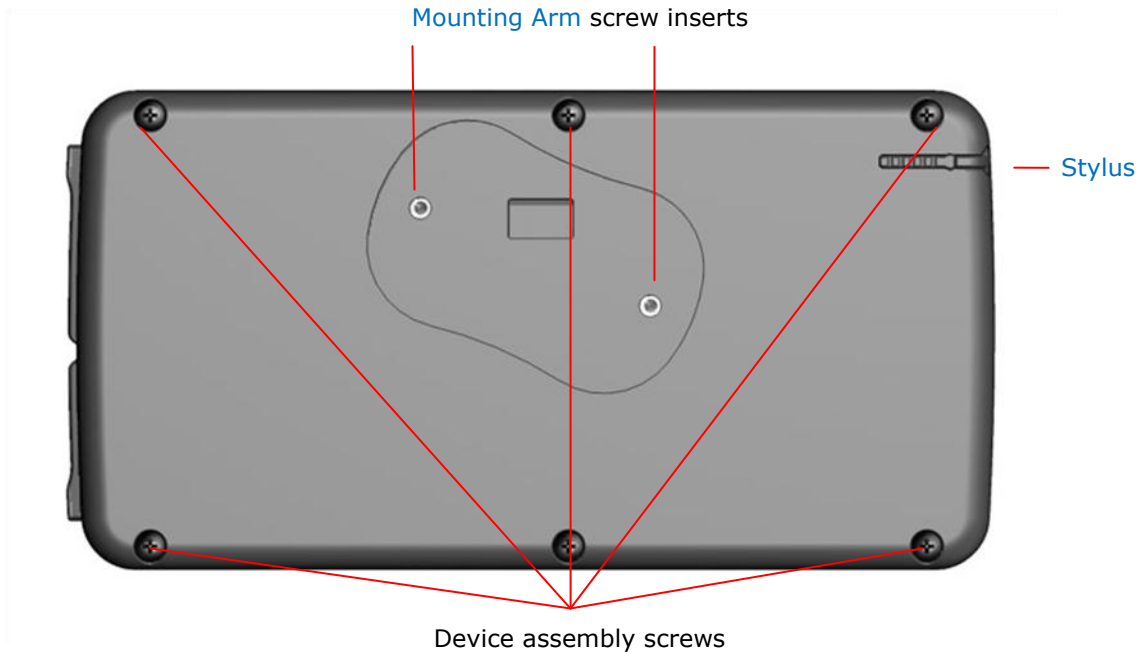


Figure 6 – CE-50X Model, Rear Panel components

For more information on CE-50X Rear panel components, see:

- [Mounting Arm](#) screw inserts, on page 85
- [Stylus](#), on page 27

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Technical and Functional Details

Platform Core

Operating System

The CE-500 platform is powered by Windows CE 6.0 with the Core license. Optionally, you can upgrade to the Professional license at additional cost.

For details on supported operating system components, refer to *CE-500 Operating System Specifications* at http://www.micronet.co.il/CE-500_Operating_system.html

For more details on device's operating system architecture, refer to the *CE-500 Software Developer's Guide*.

Application Development Environment

The CE-500 platform supports Microsoft Visual Studio 2005 or 2008 and C++ (Win32 API) or Microsoft .NET Compact Framework 3.5.

Micronet Development Toolkit (DTK) includes the following components:

- Full Micronet SDK
- Application samples
- Device management and upload tools
- Development accessories
- Documentation

For more details on development infrastructure, product tolls, and DTK contents, refer to the *CE-500 Getting Started Guide*.

Processor

- TI OMAP3503
- High-performance Superscalar ARM Cortex™-A8

RAM

The device provides a total of 256 MB of RAM memory (DDR type), which is partially allocated for system and application usage.

Approximately 64 MB of the RAM memory is allocated for the system. The remaining memory is allocated for RAM storage or application usage (user configurable).

Flash Memory

The CE-500 provides 512 MB of Flash Memory (NAND type). This memory is partially allocated for system image storage and Flash File System partition accessible for the applications as a persistent data storage drive.

Approximately 64 MB of the Flash memory is allocated for system image. The remaining memory is allocated for data storage.

Because the registry is hive-based, the operating system registry is also stored on the Flash File System drive.



NOTE:

To prevent uncontrolled power cut-off situations that can cause significant Flash File System damage, verify that you provide proper power connection to the device. For more details, see

[Power Management](#), page 46.

Memory Card Support

The device provides an MMC / SD card slot with the following parameters:

- HC-MMC / SD cards (SDHC) compliant MMC System Specification V4.2 and SD I/O Cards Specification V2.0
- SD memory cards up to 32GB size support FAT16 / FAT32 Active disk

- Speed: x133
- Clocks: Identification mode – 400 kHz, data mode 20 MHz

The MMC / SD (SDHC) card slot is located on the right side panel. By default, a user can physically access the slot. The platform supports two access protection options. For more details, see the following section.

Device Connector Slot - Rubber and Plastic Covers

The CE-500 device has a rubber cover that protects the SD card slot, 5V Power-In connector, USB OTG connector and the SIM card slot from water and dust (for example, when the device is used in the portable mode out of a vehicle). You must close the cover in any of these conditions.

To prevent access to the connectors, a permanent plastic cover option is available. This cover replaces the rubber cover. To replace the rubber cover with the plastic one:

1. Remove the rubber cover by removing the rubber snap in the center of the cover.
2. Push the plastic cover into the same place.

After the plastic cover is inserted, this cover can only be broken (physically) by an external mechanical tool to access the card

Real Time Clock (RTC)

The platform provides a Real Time Clock (RTC) that continuously operates even when the device is powered off, but still connected to a vehicle or an internal battery.

In addition, RTC enables powering on the device based on a predefined alarm.

Watchdog

To monitor mission-critical processes, the platform provides an intelligent watchdog mechanism. This mechanism provides various capabilities for programming automatic reset of the terminal. The watchdog mechanism can be configured to control application stability and restart the device if an application or system hangs or freezes.



NOTE:

This feature is used for the automatic solution recovery. However, Flash File System corruption problems can occur if executed during file saving operation.

For more details on proper use of the watchdog mechanism, refer to the *Developers Guide*.

User Interface

The mechanical architecture of the platform enables support of various types and sizes of user interface. The CE-500's user interface is an entirely independent module, which is connected to the device's core layer.

The platform currently supports two types of the user interface:

- 7" display based - CE-507 device model
- 4.3" display based - CE-504 device model

A type of the user interface type automatically detected during system startup.

The required user interface type (device model) must be specified while ordering the device.

The user interface model can be ordered separately as well (for field upgrade by a technician). For field installation of the CE-500 user interface modules, see page [93](#).

Display

The CE-504 device model provides a 4.3" Touch Color display with WQVGA (480 X 272 pixels) resolution.

The CE-507 device model provides a 7" Touch Color display with WVGA (800 X 480 pixels) resolution.

Both models are based on the transfective TFT LCD technology, provide the high contrast display, support 16M colors, and provide a multi-level white LED backlight with a typical luminous intensity of 400 cd/m².

The platform enables developers to change the display mode to set up the landscape or portrait orientation programmatically. In addition, developers can enable the automatic change of the display mode based on a cradle state signal. Developers can use this ability to manage how applications are displayed in vehicle and out-of-cab operations.

Touch Screen and Stylus

The device display provides an analog-resistive-technology-based touch screen overlay that supports a minimum of one million times of knocking life.

Stylus

A plastic stylus is mounted on the rear panel for the convenience of signature capture or other touch screen operations.

**NOTE:**

To prevent touch screen overlay damage, do not contact the exposed polarizer with anything harder than a device stylus. To clean dust off the display surface, gently wipe it with cotton, chamois, or any other soft material.

To decrease the wear of the touch screen overlay, specify your software application architecture to use device keys to enable the most commonly used application functions.

Light Sensor

The platform provides a light sensor component, which is located on the front panel. Applications use this sensor to recognize light and dark working modes, as well as device backlight adjustments.

The system provides a function of configurable automatic keypad and display backlight adjustments based on the light sensor status. For more details on light sensor, refer to the Developers Guide.

Keypad

The CE-500 device provides integrated rubber keys for convenience and safety operation. The Elastomer rubber tactile keypad includes all of the following:

- 4 directions (Up, Down, Left, and Right)
- 3 controls (Accept, Decline, and Push)
- 4 (CE-504 model) or 12 (CE-507 model) menu keys

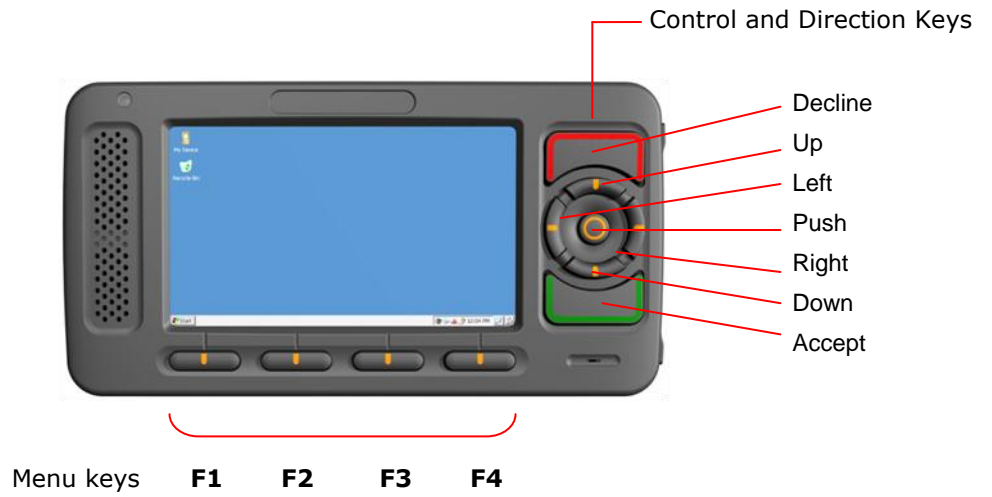


Figure 7 – CE-504 Model, Control, direction and Menu Keys disposition



Figure 8 – CE-507 Model, Control, direction and Menu Keys disposition

The menu (function) "F" keys are located near the device display as indicators for the relevant functions displayed on the screen.

All the keys are backlit and can be configured to provide system audio feedback during use.

The platform provides a function of "rotating" the direction keys to support both landscape and portrait display modes. The automatic adjustment can be configured to switch the keys based on the Cradle indication signal. Developers can use this ability to manage how applications are displayed and controlled in vehicle and out-of-cab device operations.

You can connect an additional external keyboard using the device's USB host port connection, if required.

Customized Front Panel Label (Option)

Micronet provides the ability to attach a customized front panel label based on your specifications. To enable you to rebrand the terminal's front panel, Micronet will provide graphic files and size specifications. This is subject to an additional charge per unit based on quantity. Once printed, Micronet will store the labels and use them for orders placed for this product.



Figure 9 – Customized Front Panel Label

Audio Support

Internal Speakers

The CE-500 device provides two 1W / 8Ω integrated speakers, which are located on the front panel. The speakers are connected to the stereo channel of the platform audio CODEC and provide a nominal of 90 dB @ 0.1m volume.

The internal speakers and internal microphone (which is described in the next section) enables using the device as a hands-free voice calls device in parallel to its general functionality. This capability can be used with the internal or external voice-enabled modem option.

External speakers and other audio device connections are supported by the optional platform's audio module. For more information, see [External Audio Module](#) on page 57.

Internal Microphone

The platform provides an integrated high-sensitive microphone, which is located on the front panel. The microphone supports voice calls along with optional voice recognition and recording engines.

An external microphone and other audio device connections are supported by the optional platform's audio module. For more information, see [External Audio Module](#) on page 57.

Audio CODEC (Option)

The platform provides a multi-channel audio CODEC that supports and manages all basic and optional platform audio components. Developers can control internal and external speakers, microphones, and Bluetooth and GSM voice functions using the API. When setting up these components, dedicated CODEC channels are used to manage audio components, including system sound, voice calls, optional text-to-speech, and voice recognition engines.

Communication Interfaces

Serial Communication

The platform provides two serial communication ports for external devices and peripheral connections. These ports support various hardware and software flow control functions.

**NOTES:**

The Windows OS is not specified as a real time OS. Thus, it is highly recommended to implement a flow control functionality using the serial communication to guarantee a strong and stable communication flow of your application.

Serial Port 1 (COM1)

The platform provides a serial communication port at the EIA-RS232 level. The port is connected to the Main Terminal "Con1" connector, which is located on the bottom panel of the device. This port supports a 300 to 115,200bps baud rate and provides one pair of communication-control handshake signals (CTS / RTS).

Generally, Serial Port 1 operates as a main system serial port for modem or AVL box communication.

For the disposition map of the signals of this port on [Main Terminal "Con1" Connector](#), see page 38.

In the Fixed-mount mode, this port requires the Main Accessory Cable connection. For the disposition map of the signals of this port on the Main Accessory Cable, see Accessories Main Interface cable [COM1 Connector](#), on page 61.

For the disposition map of the signals of this port on the Device Cradle, see Device Cradle connectors [COM1 Connector](#), on page 76.

Serial Port 2 (COM2)

Serial Port 2 is a second Rs232 port. The port is connected to the Enhanced terminal "Con2" connector. This port supports a 300 to 115,200bps baud rate and only provides the TX and RX signals.

For the disposition map of the signals of this port on [Enhanced Terminal "Con2" Connector](#), see page 39.

In the Fixed-mount mode, this port requires Enhanced Accessory Cable connection. For the disposition map of the signals of this port on the Enhanced Accessory Cable, see Accessories Enhanced Interface cable [COM2 Connector](#), on page 65.

For the disposition map of the signals of this port on the Device Cradle, see Device Cradle connectors [COM2 Connector](#), on page 78.

USB (Universal Serial Bus) Communication

The platform provides two USB communication ports for external devices and peripheral connections.

The USB Host interface supports the following profiles:

- USB Standard HID
- USB Printer (PCL)
- USB Storage

The USB Client (Device) interface supports Microsoft Active Sync for application development and device management using the USB OTG port described below.

USB OTG Port

The USB "On The Go" Communication port is connected to the USB OTG connector, which is located on the right panel of the device.

This port can operate either as the USB Host or USB Client interface. Depending on the connected device type, the required interface is automatically recognized and enabled.

The USB Client functionality of this port is used to connect the CE-50X terminal to host devices, such as PC or Notebook. Microsoft Active Sync protocol is implemented in the platform to support a variety of:

- Microsoft Windows CE device configuration
- Management tools
- Application development
- Debugging purposes.

In addition, the USB Client functionality is used by certain Micronet tools for device uploading and management during the boot mode.

The USB Host functionality of this port is used to connect the CE-50X terminal to USB Client devices, including USB keyboard and memory stick.

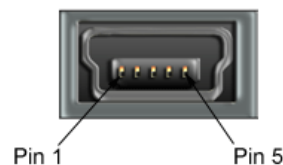


NOTE:

The USB OTG port is limited to provide up to 100mA of power consumption for non-self powered client devices.

The USB OTG port supports USB2.0 - low, full, and high speeds of communication standard.

The USB OTG connector type is – Mini-AB Female.



USB Host Port

The USB Host communication port is connected to the Main Terminal “Con1” connector, which is located on the bottom panel of the device. This port supports USB2.0 - low, full, and high speeds of communication standard.



NOTE:

The USB Host port is limited to provide up to 100 mA of power consumption for non-self powered client devices.

For the disposition map of the signals of this port on [Main Terminal “Con1” Connector](#), see page 38.

In the Fixed-mount mode, this port requires Main Accessory Cable connection. For the disposition map of the signals of this port on the Main Accessory Cable, see Accessories Main Interface cable [USB Connector](#), on page 62.

For the disposition map of the signals of this port on the Device Cradle, see Device Cradle connectors [USB Connector](#), on page 77.

Ethernet Communication (Option)

The platform optionally provides the Ethernet LAN communication port, connected to the Enhanced terminal “Con2” connector, which is located on the bottom panel of the device. The Ethernet LAN communication is a factory set option.

**NOTE:**

Other optional modular-platform features can be separately ordered and installed by the customer. However, this option can only be included in the device by Micronet during device manufacturing and cannot be added afterward. You must specify the Ethernet option requirement with the device order.

This port is fully compliant with IEEE 802.3 / 802.3u standards and supports 10BASE-T and 100BASE-TX functionalities.

For the disposition map of the signals of this port on [Enhanced Terminal “Con2” Connector](#), see page 39.

In the Fixed-mount mode, this port requires Enhanced Accessory Cable connection. For the disposition map of the signals of this port on the Accessory Enhanced interface Cable, see [LAN Connector](#), on page 66.

For the disposition map of the signals of this port on the Device Cradle, see Device Cradle [Enhanced cradle Connectors](#)

[LAN Connector](#), on page 78.

Peripheral Controls

Digital I/O

Digital Inputs

The platform provides two digital inputs at the automotive voltage level for monitoring and controlling external peripherals or sensor signals. These signals are connected to the Main Terminal “Con1” and “Con2” connectors, which are located on the bottom panel of the device.



NOTE:

One of these inputs (In1) is also used to power on the device from the shutdown state. For proper power management implementation, the input must be connected to the vehicle's ignition switch. The platform provides various software control options for this essential feature. For more details, refer to the *Digital I/O* and *Power Management* sections of the *Developers Guide*.

Table 2 – Electrical Parameters of Input States

Input State	Typical	Minimum	Maximum
Low	0V	-30V	5V
High	12V-24V	+8V	+30V

Digital Output

The platform provides a digital output (Open Collector) for external peripherals control. This signal is connected to the Main Terminal “Con1” connector, which is located on the bottom panel of the device.

Table 3 – Electrical Parameters of Open Collector Output

Parameter	Value
Maximum switchable voltage	+VIN
Maximum switchable current	300mA

For the disposition map of the Digital Input1 and Digital Output signals of this port on [Main Terminal “Con1” Connector](#), see page 38.

For the disposition map of the Digital Input2 signal of this port on [Enhanced Terminal “Con2” Connector](#), see page 39.

In the Fixed-mount mode, the Digital Input1 and Digital Output require the Main Accessory Cable and Digital Input2 requires the Enhanced Accessory Cable connection.

For the disposition map of the Digital Input1 and Digital Output on Power-Adaptor-Box of the Main Accessory Cable, see [Power-Adaptor-Box to +Vin Connector](#), on page 64.

For the disposition of the Digital Input2 signal on the Accessory Cables Enhanced Interface cable, see [COM2 Connector](#), on page 65.

For the disposition map of the Digital Input1 and Digital Output on the Device Cradle, see [+Vin Connector](#), on page 76.

For the disposition of the Digital Input2 signal on the Device Cradle, see [COM2 Connector](#), on page 78.

Analog Input

The platform provides an analog input signal to monitor the voltage range of compatible vehicle sensors, such as an analog fuel gauge. This signal is connected to the Main Terminal "Con1" connector, which is located on the bottom panel of the device.

The supported voltage range is from 0V to 30V.

For the disposition map of this signal on [Main Terminal "Con1" Connector](#), see page 38.

In the Fixed-mount mode, this port requires the Enhanced Accessory Cable connection. For the disposition map of the signals of this port on the Accessory Cable Enhanced Interface cable, see [COM2 Connector](#), on page 65.

For the position of this signal on the Device Cradle, see [COM2 Connector](#), on page 78.

1-Wire Interface

The platform provides the 1-Wire Interface Port connected to the Main Terminal "Con1" connector, which is located on the bottom panel of the device.

This port provides control, signaling, and power over a single-wire connection. Developers can connect an optional touch probe accessory and use Dallas ID Memory **DS1990A** 64 bit ID Buttons for identification and authorization control. See <http://www.maxim-ic.com/products/ibutton/ibuttons/memoryoverview.cfm>

For the disposition map of this signal on [Enhanced Terminal "Con2" Connector](#), see page 39.

In Fixed-mount mode, this port requires the Enhanced Accessory Cable connection. For the disposition map of the signals of this port on the Accessory Cables Enhanced Interface cable, see [COM2 Connector](#), on page 65.

For the position of this signal on the Device Cradle, see [COM2 Connector](#), on page 78.

3

Terminal Connector Signal Maps

Overview

This chapter describes the Basic ("Con1" and "Con2") and Full ("Con3" and "Con4") connectors configuration. The power, communication and I/O signals in the Basic configuration, and the Video, CANBus and Audio signals in the Full configuration.

All pins are ESD protected (against electrostatic discharge).

All the "shield" pins of the connectors are attached to the Ground signal.

The following abbreviations are used in this chapter:

- I - Input signal
- O - Output signal
- B - Bus signal
- V - Voltage signal
- G - Ground

All the four connectors' type is Molex [HandyLink™](#) I/O Interconnect System part number - 0448281162.

Pinout of Connectors

Main Terminal “Con1” Connector

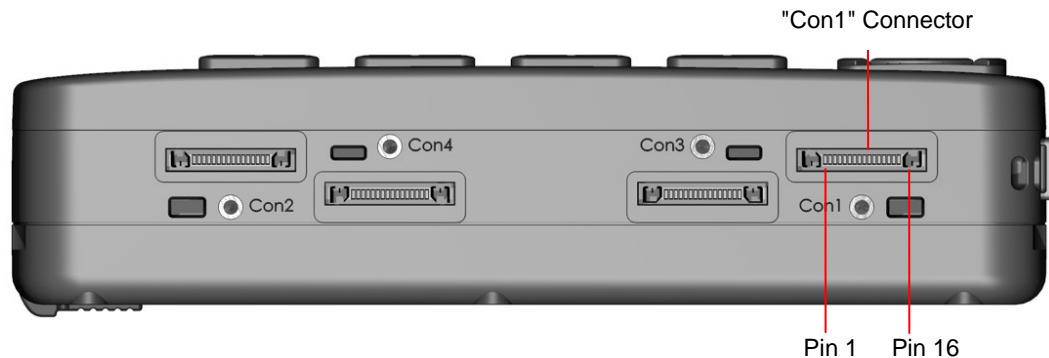


Figure 10 – “Con1” Connector Pinout

Table 4 – Main Terminal “Con1” Connector Signal Map

Pin	Signal	Type	Function	Specifications																		
1	+5Vin	V	MDT Power Supply Voltage	+ 5V																		
2	GND	G	MDT Power Supply Ground																			
3	+5Vin	V	MDT Power Supply Voltage	+5V																		
4	GND	G	MDT Power Supply Ground																			
5	Dig_In1	I	Digital Input 1 (Ignition switch)	<table border="0"> <tr> <td></td> <td style="text-align: center;">Typical</td> <td style="text-align: center;">Min</td> </tr> <tr> <td>Max</td> <td></td> <td></td> </tr> <tr> <td>Input Low: VIL</td> <td>0V</td> <td>-30V</td> </tr> <tr> <td>6V</td> <td></td> <td></td> </tr> <tr> <td>Input High: VIH</td> <td>12V-24V</td> <td>+8V</td> </tr> <tr> <td>+30V</td> <td></td> <td></td> </tr> </table>		Typical	Min	Max			Input Low: VIL	0V	-30V	6V			Input High: VIH	12V-24V	+8V	+30V		
	Typical	Min																				
Max																						
Input Low: VIL	0V	-30V																				
6V																						
Input High: VIH	12V-24V	+8V																				
+30V																						
6	Dig_Out1	O	Digital Output 1	Open Collector Max. switchable current = 300mA Max. switchable voltage = +VIN Max. saturation voltage = 0.6V																		
7	M_Control 1	--	Micronet accessories control signal	This signal is for Micronet-embedded accessory-control purposes only. Do not connect anything to this pin.																		
8	TXD1	O	Transmit Data (COM1)	EIA-RS232 level																		
9	RXD1	I	Receive Data (COM1)	EIA-RS232 level																		

Pin	Signal	Type	Function	Specifications
10	RTS1	O	Request To Send (COM1)	EIA-RS232 level
11	CTS1	I	Clear To Send (COM1)	EIA-RS232 level
12	DGND	G	Digital Ground	
13	USB +5V	V	5V USB Power Out	+5V±10%; 500mA max.
14	USB D+	B	USB Data (+)	Universal Serial Bus Specification Rev 2.
15	USB D-	B	USB Data (-)	Universal Serial Bus Specification Rev 2.
16	USB GND	G	USB Ground	

Enhanced Terminal “Con2” Connector

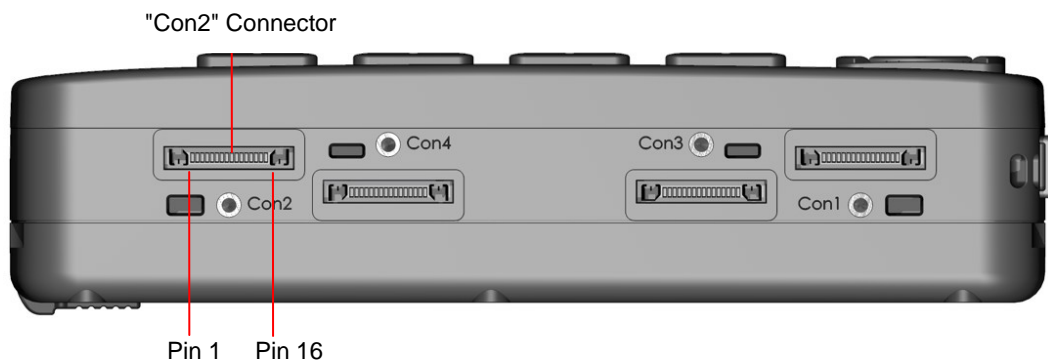
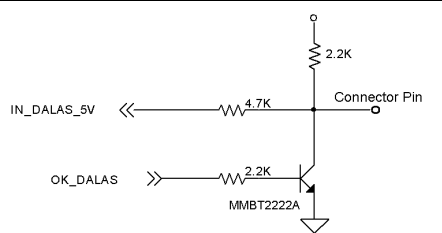


Figure 11 – “Con2” Connector Pinout

Table 5 – Enhanced Terminal “Con2” Connector Signal Map

Pin	Signal	Type	Function	Specifications
1	An_In1	I	Analog Input	0V-30V max, 12k OHM
2	AGND	G	Analog Ground	
3	TXD2	O	Transmit Data (COM2)	EIA-RS232 level
4	RXD2	I	Receive Data (COM2)	EIA-RS232 level

Pin	Signal	Type	Function	Specifications												
5	Dallas	I/O	One-Wire Interface. (DALLAS ID Button Interface) Port													
6	Dig_In2	I	Digital Input 2	<table border="1"> <thead> <tr> <th></th> <th>Typical</th> <th>Min</th> <th>Max</th> </tr> </thead> <tbody> <tr> <td>Input Low: VIL</td> <td>0V</td> <td>-30V</td> <td>6V</td> </tr> <tr> <td>Input High: VIH</td> <td>12V-24V</td> <td>+8V</td> <td>+30V</td> </tr> </tbody> </table>		Typical	Min	Max	Input Low: VIL	0V	-30V	6V	Input High: VIH	12V-24V	+8V	+30V
	Typical	Min	Max													
Input Low: VIL	0V	-30V	6V													
Input High: VIH	12V-24V	+8V	+30V													
7	M_Control 2	--	Micronet accessories control signal	This signal is for Micronet embedded accessories control purposes only. Do not connect anything to this pin.												
8	M_Control 3	--	Micronet accessories control signal	This signal is for Micronet-embedded accessory-control purposes only. Do not connect anything to this pin.												
9	M_Control 4	--	Micronet accessories control signal	This signal is for Micronet-embedded accessory-control purposes only. Do not connect anything to this pin.												
10	M_Control 5	--	Micronet accessories control signal	This signal is for Micronet-embedded accessory-control purposes only. Do not connect anything to this pin.												
11	M_Control 6	--	Micronet accessories control signal	This signal is for Micronet-embedded accessory-control purposes only. Do not connect anything to this pin.												
12	DGND	G	Digital Ground													
13	LAN_TX+	I	Optional – Ethernet LAN Transmit Data +	IEEE 802 3/802 3u Standards												
14	LAN_TX-	I	Optional – Ethernet LAN Transmit Data -	IEEE 802 3/802 3u Standards												
15	LAN_RX+	O	Optional – Ethernet LAN Receive Data +	IEEE 802 3/802 3u Standards												
16	LAN_RX-	O	Optional – Ethernet LAN Receive Data -	IEEE 802 3/802 3u Standards												

Optional External Video and CANBus “Con3” Connector

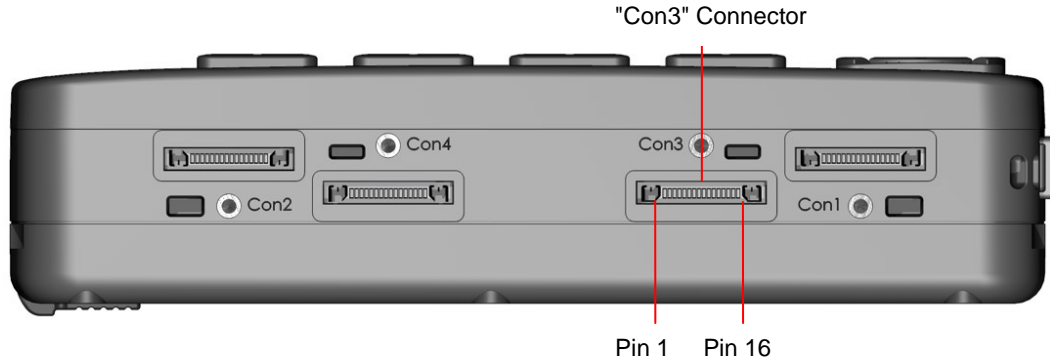


Figure 12 – “Con3” Connector Pinout

Table 6 –Video and CANBus Terminal “Con3” Connector Signal Map

Pin	Signal	Type	Function	Specifications
				To be documented

Optional External Audio “Con4” Connector

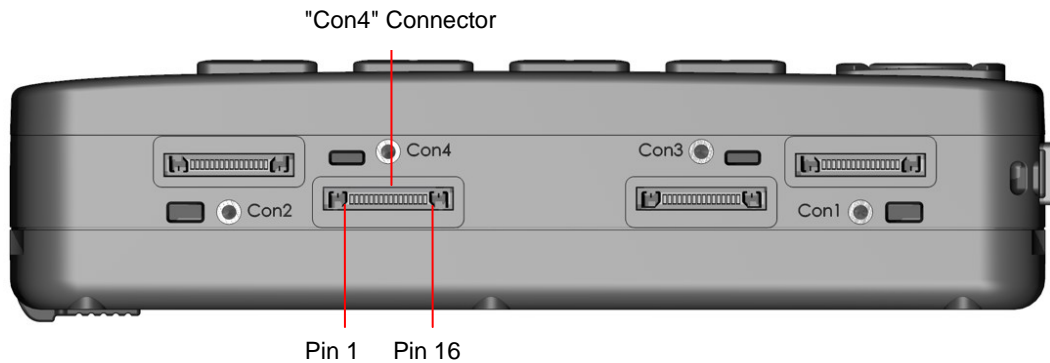


Figure 13 – “Con4” Connector Pinout

Table 7 –Audio Terminal “Con4” Connector Signal Map

Pin	Signal	Type	Function	Specifications
				To be documented

4

Platform Power

Overview

The CE-50X device is powered by a **5V DC** power source. The device power-in signals (+VIN and GND) are connected in parallel to two entities:

5V Power-in connector

Located on the device right side panel

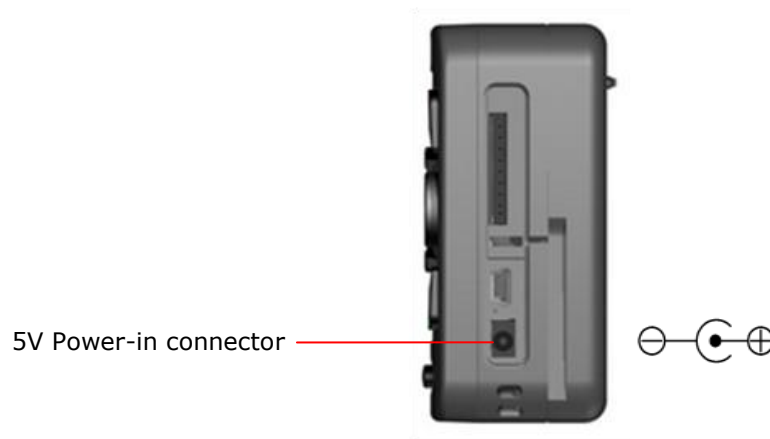
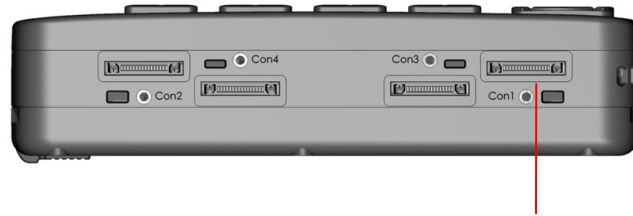


Figure 14 – Device 5V Power-in connector

Main Terminal “Con1” 5V power connector

Located on the device bottom panel



Main Terminal "Con1" connector

Figure 15 –Device Main Terminal "Con1" connector

The platform provides various accessories that enable direct connection of the device to the 12V or 24V vehicle battery.

During application development or when the device is performing in the Stand-alone mode, the device can be powered through the Power-in connector by Wall (110V / 220V AC to 5V DC) or Vehicle Cigarette Lighter (12V / 24V DC to 5V DC) power adaptors.

For Wall Power Adaptor specifications, see [IDC Connector](#), on page 67.

For Vehicle Cigarette-Lighter power-adaptor cable specifications, see , on page 69.

When the device is mainly fixed-mounted in the vehicle or connected to the solution peripherals, the device can be powered through the Terminal Connector, by the Main Interface Accessory cable, or through the device Cradle when the device is portable.

For the disposition map of the device's Power-In signals on [Main Terminal "Con1" Connector](#), see page 38.

Vehicle Battery Connection

The CE-50X device can be directly connected to the vehicle battery using the Device Cradle or Main Interface accessory cable.

The supported nominal battery voltage supply is 12V or 24V DC. The operating range is between 8V to 30V DC.



NOTE:

The CE-50X device has no internal fuse, and therefore its connection to the vehicle's power source line must be protected by a 10A fuse. Additionally, a 4A fuse must be added to the power cable with an inline fuse holder for HHC / HHD blade-type fuses.



WARNING!

If you use a device that does not include the internal battery option, do not connect the terminal power to the ignition switch signal. In this case, you prevent uncontrolled power cut-offs, which may have a detrimental effect on the operating system.

The +Vin signals of the Cradle or Main Accessory cable Power Adaptor Box must be directly connected to the Vehicle battery. To properly setup power management, you must connect the Vehicle Ignition Switch signal to the digital input (In1) of the device. For more information about the power management architecture of the platform, see

[Power Management](#) on page 46.



WARNING!

DO NOT USE another battery type!

Risk of explosion if an incorrect battery is used instead of the original battery supplied by Micronet.

In the Fixed mount mode, the vehicle power connection requires the Main Accessory Cable connection. For the disposition of the +12V / 24V Vin and Ground signals on the Power-Adaptor-Box of the Main Accessory Cable, see [Power-Adaptor-Box to +Vin Connector](#), on page 64.

For the position +12V / 24V Vin and Ground signals on the Device Cradle, see [+Vin Connector](#), on page 76.



NOTE:

Connecting the power to the CE-50X device does not enable the device. Only pressing the Push key or signal rise on the device digital input 1, enables the device from the power-down state.

If your solution requires device enabling consequently to the power connection, connect (shorten) the digital Input1 pin with the power-in signal.

Internal Battery (Option)

The platform provides an internal battery pack option to:

- Support the device functionality in the Portable mode
- Provide power backup in main power source disconnect situations

This option is categorized as a Modular Platform option so it can be included with the device upon delivery by Micronet as well as to be ordered separately. For more details about the Modular option architecture, see [CE-500 Platform Optional Modules](#), on page 15.

3000 mAh Lithium-Polymer-based battery is available.

The platform’s system manages automatic power management and battery recharging control to provide a most effective battery service. However, the developers of portable applications need to:

- Consider the power limitations of this mode
- Provide accurate management of significant power consumer features, such as: wireless communication interfaces, voice enabled solutions, and so on

The operation time of the device while powered by the internal battery is directly dependent on the device configuration and application performance. Nevertheless, the estimated time of continued operation for standard applications is ~2 hours.



NOTE: The operating temperature range of the CE-50X device including the battery option is limited to 14 °F to 140 °F (-10°C to +60°C). The system automatically recognizes out-of-range situations and stops the operation to prevent battery degradation.

Micronet delivers the battery pack charged for 40% of capacity. In this case, the shelf lifetime of the pack is about six months. If you did not use the battery during this period, you must recharge the battery up to 40% of capacity again to continue the storage. CE-50X devices provide a software utility that charge the battery pack up to 40%. For more details on this utility, refer to the Internal Battery section of the Developers Guide.

Before you begin to use the battery, you must to fully charge the battery pack by connecting a power source to the device until the End Of Charge indication.

Device Power Consumption

Table 8 – Device Current Consumption Parameter Table

Operation Mode	CE-504 Model - Current Consumption	CE-507 Model - Current Consumption
Shut-down	To be documented	To be documented
Suspend	To be documented	To be documented
Idle (no application activity)	To be documented	To be documented
Active (with full backlight and wireless communication)	To be documented	To be documented
Maximum	To be documented	To be documented

5

Power Management

Overview

The CE-500 system provides smart power management during the device operation. The power management capabilities include power states management, performance adjustment, automatic backlight, and additional power consumer control.

Using the power management capabilities is especially helpful when the device is powered by the internal battery or connected to the vehicle battery while the ignition switch is off. Most of this functionality is transparent to application developers. However, the rest is configurable and the developer can adjust it for specific usages. For more information on the CE-500 platform power-management architecture, refer to "Power Management" section in the *Developers Guide*.

The OS registry can be resets to factory defaults. For more information on setting the registry to factory default, refer to "Setting Registry to factory default" paragraph below.

The Flash memory storage partition can be formatted. For more information on formatting the Flash memory storage, refer to "Formatting flash Memory Storage" paragraph below.

Understanding Power States

The following states explain characteristics of the power states and events that trigger the device to enter to, and exit from, each state.

Suspend

Developers can define whether or not the device switches to the Suspend state upon pressing the **Accept** button using the Control Panel.

State characteristics:

- Registry is flushed, settings are preserved
- RTC is alive
- Memory allocation is preserved

Triggers to Enter the State:

- Pressing and holding **Accept** key for 3 seconds
- Calling the API function
- System Power management timeouts

Triggers to Exit the State:

- Pressing **Push** key
- RTC alarm notification
- Digital Input 1 signal
- Inserting the device to cradle



NOTE:

These events resume all processes from the same point when the device switched to Suspended.



Figure 16 – Device manual software Suspend

Shutdown

Developers can define whether or not the device switches to the Shutdown state upon pressing the **Decline** button using the Control Panel.

State characteristics:

- Registry is flushed, settings are preserved
- RTC is alive
- Memory allocation is not preserved

Triggers to Enter the State:

- Pressing and holding the **Decline** key for 3 seconds
- Calling the API function

Triggers to Exit the State:

- Pressing **Push** key
- RTC alarm notification
- Digital Input 1 signal



Figure 17 – Device manual software Shutdown

Warm BOOT reset

State characteristics:

- Registry is flushed, settings are preserved
- RTC is alive
- Memory allocation is preserved

Triggers to Enter the State:

- Pressing and holding **F1, F2** and **Up** for 1 second
- Calling the API function



Figure 18 – Device manual Warm BOOT Reset

Hardware Power Down

A Shelf storage power down state for a battery operated CE-500 device.

State characteristics:

- Registry is flushed, settings are preserved
- RTC is not alive (system time is reset)
- Memory allocation is not preserved

Triggers to Enter the State:

- Pressing **F1**, **F2**, and **Up** keys for 5 seconds
- Calling the API function

Triggers to Exit the State:

- Pressing **Push** key



NOTE:

This Hardware Power Down state is for a storage purposes only. The RTC is not kept and Memory allocation resets to factory settings.



Figure 19 – Device manual power down



WARNING!

It is highly recommended not using the Warm BOOT and Power Down. A technician or developer can perform these operations for troubleshooting purposes only.

This operation must not be activated while the application is saving data to the Flash storage because it may damage the Flash File system.

Setting Registry to Factory Defaults

To reset the registry to factory default, follow the steps:

- Shutdown the CE-500 device first by pressing the **Decline** key for 3 seconds
- Pressing and holding simultaneously **F2**, **Up** and **Down** keys
- Pressing the **Push** key while holding the **F2**, **Up** and **Down** keys for 3 seconds

The OS resets the registry and the Stylus calibration screen appears.



Figure 20 – Reset Registry to Factory default

Formatting Flash Memory Storage

To format the Flash memory storage partition, follow the steps:

- Shutdown the CE-500 device first by pressing the **Decline** key for 3 seconds
- Pressing and holding simultaneously **F2**, **Left** and **Right** keys
- Pressing the **Push** key while holding the **F2**, **Left** and **Right** keys for 3 seconds

The OS resets the registry and the Stylus calibration screen appears.

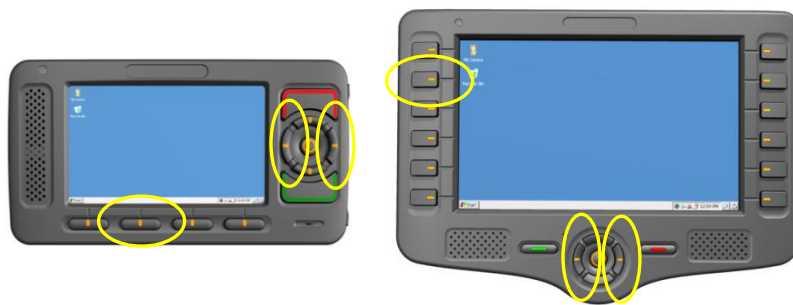


Figure 21 – Format the Flash Memory partition

6

Optional Feature Modules

Overview

Due to the specific mechanical and electronic architecture of the CE-500 device, many optional features are implemented as independent physical modules. You can either order these modules with the device or order them separately and install on an existing device later. Installation of modules requires basic technical skills and must be implemented according to Micronet instructions.

For field installation of the CE-500 [Optional Feature Modules Installation](#), see page 93.

The optional direct interface modules require certain accessory cables for connection in the Fixed-device operation mode, or enhanced device cradle in the Fixed / Mobile operation mode.

Wireless Communication

Overview

The CE-500 platform provides a variety of optional wireless communication modules that enable solution communication service, GPS position control, and peripheral-device support.

All wireless modules are provided with internal antennas. These antennas were specifically developed and tuned for the CE-500 device architecture. The antennas provide high sensitivity and performance for both in-vehicle environment and the portable device mode.

GSM / GPRS

The CE-500 platform provides an optional GSM / GPRS Cellular Modem module that enable wireless communication between the device and any server or back-office application.

Based on the **Telit GE864-Quad Automotive** embedded cellular modem, this module provides the following features:

- Voice and data communication support
- GPRS Multi-slot Class 10
- Quad band 850 / 900 / 1800 / 1900 MHz
- Output power:
 - Class4 (2W) @ 850 / 900 MHz
 - Class1 (1W) @ 1800 / 1900 MHz
- Sensitivity:
 - 107 dBm @ 850 / 900 MHz
 - 106 dBm @ 1800 / 1900 MHz
- Controlled via AT commands according to GSM 07.05, 07.07 and Telit enhancements
- Serial port multiplexer (GSM 7.10) support

The CE-500 system provides automatic GPRS communication management capabilities as well as direct access to the modem communication channel (AT commands) and control functions. For more details on GSM / GPRS communication software management, refer to the *Developers Guide*.

Developers can implement the voice functionality of the module using the integrated device speakers and microphone. In addition, developers can use the optional external audio module for external microphone and speaker connections. Bluetooth headset connection is supported for voice call implementation by the optional Bluetooth module of the CE-500 device.

SIM card slot

The internal modem option requires a SIM card connection. The SIM card slot is located on the left side panel of the device. Two types of SIM-card-slot mechanical covers are provided for card protection:

- Rubber cover that allows the end-user access to the SIM card during operation
- Plastic cover that prevents SIM card access from the end-user. Once inserted, after the SIM card installation it can only be broken (physically) by an external mechanical tool to expose the card.

**NOTE:**

The GSM / GPRS option is a significant power consumer of the platform. If your solution requires Portable operation including cellular communication, consider the Enhanced battery option while specifying your device configuration.

GPS

The CE-500 platform provides an optional GPS receiver module, which is especially suited for navigation applications and traffic reports.

Based on the **u-Blox NEO-5D** high-performance embedded-GPS receiver, this module features u-Blox [SuperSense®](#) Indoor GPS technology that offers unmatched tracking performance in harsh signal environments, such as parking lots and dense urban environments.

The GPS module provides the following features:

- 50-channel u-Blox 5 engine with over 1 million effective correlators
- Under 1 second Time-To-First-Fix for Hot and Aided Starts
- Supports SBAS (WAAS, EGNOS, MSAS, GAGAN)
- SuperSense® Indoor GPS: -160 dBm tracking sensitivity
- Position Accuracy:
 - Autonomous < 2.5 m
 - SBAS < 2.0 m
- High immunity to jamming
- Protocols support:
 - NMEA Input / output, ASCII, 0183, 2.3 (compatible to 3.0)
 - UBX Input / output, binary, u-Blox proprietary
- Supports AssistNow Online and AssistNow Offline A-GPS services; OMA SUPL compliant

The GPS module designed to support the GALILEO system, which is currently being developed by European authorities. The capability of receiving GALILEO L1 signals will provide increased coverage and even better positioning accuracy.

The CE-500 system supports a Microsoft GPS locator engine for automatic GPS data management as well as direct access to the receiver communication port and control functions. For more details on GPS receiver software management, refer to the *Developers Guide*.

Wireless LAN and Bluetooth Class2

Overview

The CE-500 platform provides an optional combined Wireless Local Area Network (IEEE 802.11) and Bluetooth (Class2) communication module. The Wireless LAN communication is especially suited to high-speed data transfer over the air, when the Wireless LAN hotspot infrastructure is provided. For applications that require huge data transactions, Wireless LAN is the most economical way to implement the solution. Bluetooth communication is used for the Bluetooth-enabled connections with peripherals, such as mobile phone, audio headset, and printer.

The CE-500 Wireless LAN and Bluetooth Class2 module adopts Marvell's latest highly-integrated WLAN and Bluetooth SoC - 88W8688.



NOTE:

The Wireless LAN and Bluetooth capability is a significant power consumer of the platform. If your solution requires Portable operation of the CE-500 device including cellular communication, consider the Enhanced battery option while specifying your device configuration.

Wireless LAN Operation

The module is compliant with the IEEE 802.11b/g standard and uses DSSS (Direct Sequence Spread Spectrum), OFDM (Orthogonal Frequency Division Multiplexing), DBPSK, DQPSK, CCK, and QAM baseband modulation technologies.

In addition to the support of WPA / WPA2, WEP 64-bit, and 128-bit encryption, the module supports the IEEE 802.11i security standard. The module supports this standard through the implementation of AES (Advanced Encryption Standard), CCMP (Counter Mode CBC-MAC Protocol), and WEP with TKIP security mechanisms.

The module also supports IPSec with DES / 3DES / ASE encryption and MD5 / SHA-1 authentication.

For the Chinese market, the module supports WAPI specifications.

For video, voice, and multimedia applications, the AW-GH381 supports 802.11e QoS (Quality of Service).

Bluetooth Operation

The module is Bluetooth 2.1+EDR (Enhanced Data Rate) compliant.

The CE-500 system supports the following Bluetooth communication profiles:

- SPP [Service (Serial) Port Profile]
- LAP (LAN Access Profile, applicable in professional license only)
- PAN (Personal Area Networking) Profile
- GAP (Generic Access Profile) **TBD**
- GOEP (Generic Object Exchange Profile) **TBD**
-
- HCRP (Hardcopy Cable Replacement Profile) **TBD**
- DUN (Dial-Up Network) Profile **TBD**
- FTP (File Transfer Profile) **TBD**
- HID (Human Interface Device) Profile **TBD**
- HFP (Hands-Free Profile) **TBD**
- HSP (Headset Profile) **TBD**
- OPP (Object Push Profile) **TBD**

Wireless LAN and Bluetooth Class2 Module Specifications

Table 9 – Wireless LAN and Bluetooth Class2 Module Specifications

Functions	Specifications
WLAN Standard	IEEE 802.11b/g, Wi-Fi compliant
Bluetooth Standard	Bluetooth 2.1+EDR (Enhanced Data Rate)
Major Chipset	Marvell 8688
Frequency Range	2.4 GHz ISM radio band
Number of Channels	<ul style="list-style-type: none"> - 802.11b: USA, Canada and Taiwan – 11 - Most European Countries – 13 - France – 4, Japan – 14 - 802.11g: USA, Canada and Taiwan – 11 - Most European Countries – 13 - Japan – 13
Modulation	<ul style="list-style-type: none"> - DSSS, OFDM, DBPSK, DQPSK, CCK, 16-QAM, 64-QAM for WLAN - GFSK (1Mbps), $\pi/4$ DQPSK (2Mbps) and 8DPSK (3Mbps) for Bluetooth
Output Power	WLAN: <ul style="list-style-type: none"> - 802.11b(Ch1~13): typical 15dBm +/- 2dBm - 802.11b(Ch14): typical 10dBm +/- 2dBm - 802.11g: typical 12dBm +/- 2dBm

Functions	Specifications
	Bluetooth: - Bluetooth Class 2: typical 1dBm+/- 2dBm
Receive Sensitivity	WLAN: - 802.11b: typical -87dBm at 11Mbps - 802.11g: typical -70dBm at 54Mbps Bluetooth: - GFSK: typical -87dBm - $\pi/4$ DQPSK: typical -88dBm - 8DPSK: typical -81dBm
Medium Access Protocol	CSMA / CA with ACK
Data Rates	WLAN: - 802.11b: 1, 2, 5.5, 11Mbps - 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps Bluetooth: - Bluetooth 2.1+EDR data rates of 1,2, and 3Mbps
Operating Range	- Open Space: ~300m; indoor: ~100m for WLAN - Minimum 10m indoor for Bluetooth - The transmission speed may vary according to environment
Security	- WEP 64-bit and 128-bit encryption with H/W TKIP processing - WPA / WPA2 (Wi-Fi Protected Access) - AES-CCMP hardware implementation as part of 802.11i security standard
Co-Existence	Bluetooth and cell phone (GSM / DCS / WCDMA / UMTS / 3G) co-existence

Peripheral Interfaces

CANBus (J1939)

To be documented

External Audio Module

To be documented

External Video Module

To be documented

Additional Integrated Options

Accelerometer

To be documented

7

Platform Accessories

Accessory Cables

Optionally, the CE-500 platform provides accessory cables for connection of device signals in the Fixed-mounted operation mode. All cables are connected to device terminal connectors, which are located on the bottom panel. All of these cables use the same type of a connector.

However a mechanical “key” is implemented on each connector cover to prevent the connection of an incorrect cable to an incorrect device connector. A mechanical cable fixing option supported by the screw inserts is located near each terminal connector. Main and Enhanced accessory cables support connectivity of signals that are provided by the basic device configuration. Therefore, these connectors always exist on the device panel. Additional accessory cables are used to support optional platform features and require the relevant optional device module.

The pinout and types of the interface connectors provided by the accessory cables are similar to those for the CE-500 Device Cradle (they both have the same purposes).

In addition to the interfaces that require the standard type of connector (such as USB and Ethernet), the remaining device signals are implemented on the cables or the Cradle by [Molex Micro-Fit 3.0™](#) Plug type of connectors. For implementing the connectivity, use the opposite (receptacle) type of connector with the relevant amount of pins for each peripheral interface. This is the [Molex 43025 Series](#) type of connector. Use the [Molex Micro-Fit 3.0™ Crimp Terminal Female](#) for the wiring. Ensure that the correct wire size (AWG) for each signal is according to the requirements of the cable-connector Signal Maps specifications.

- Type for all Device connectors of accessory cables – Molex HandyLink™ I/O Interconnect System
- Molex part number – 0453391600

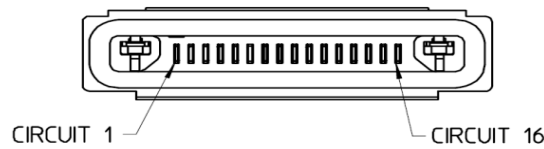


Figure 22 – Terminal Connector Pinout



NOTE:

The device terminal connectors are located at different rotation angles.

All shield pins of the connectors are attached to the Ground signal.

The length of each accessory cable is 1.5 meter.

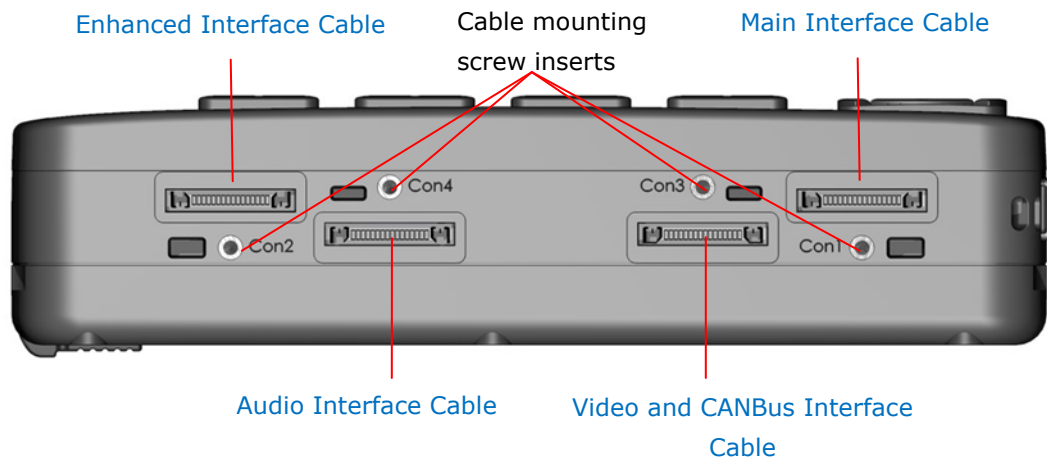


Figure 23 – Accessory Connectors, Bottom Panel

For more information on CE-500 front panel components, see:

- [Main Interface Cable](#), on page 61
- [Enhanced Interface Cable](#), on page 65
- [Video and CANBus Interface Cable](#), on page 67
- [Audio Interface Cable](#), on page 67
- [Cable mounting screw inserts](#), on page 59

Main Interface Cable

The Main interface cable must be attached to the "Con1" terminal connector of the device.

This cable is provided with an integrated power adaptor box. This box converts the vehicle 12V or 24V power signal to 5V, as required by the device.

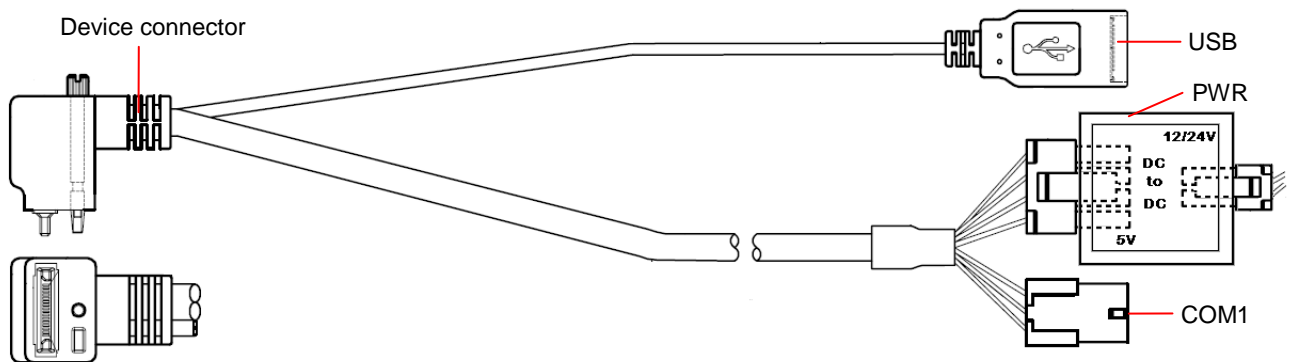


Figure 24 – Main Interface Cable

Main Interface Cable Connectors Signal Map

COM1 Connector

Connector type - Molex Micro-Fit 3.0™ 6 pin plug

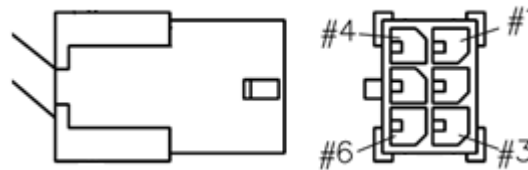


Figure 25 – COM1 Connector Pinout

Table 10 – Main Interface Cable COM1 Connector Signal Map

Pin	Signal	Function	Wire Size (AWG) Required
1	TXD1	Transmit Data (COM1)	28
2	RTS1	Request To Send (COM1)	28
3	DGND	Digital Ground	28
4	RXD1	Receive Data (COM1)	28
5	CTS1	Clear To Send (COM1)	28
6	N/C	Not connected	

USB Connector

Connector type - USB type-A female

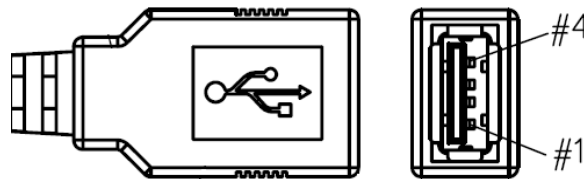


Figure 26 – Main Interface Cable USB Connector Pinout

Table 11 – USB Connector Signal Map

Pin	Signal	Function
1	USB +5V	5V USB Power Out
2	USB D+	USB Data (+)
3	USB D-	USB Data (-)
4	USB GND	USB Ground

Power-Adaptor-Box Connector



WARNING!

The Power-Adaptor-Box connector on the main cable interface must be connected only to the power adaptor box. **Do not connect anything else to these signals!**

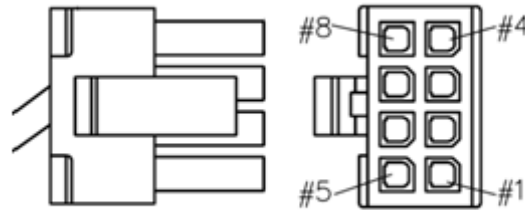


Figure 27 – Power-Adapter-Box Connector Pinout

Power Adaptor Box

The power adaptor box converts the 12V/24V power signal to 5V DC, which the device's main cable accepts.

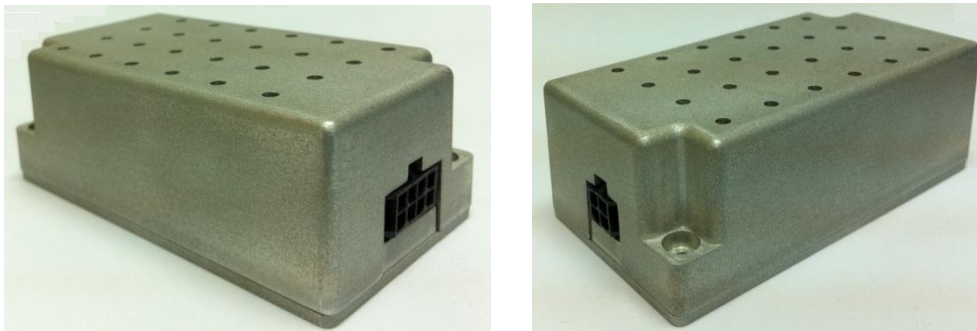


Figure 28 – Power Adapter Box



WARNING!

Metal 'Power Adapter Box' is installed for installation in a restricted access location.

Power-Adaptor-Box to CE-500 Connector



WARNING!

Only the Power-Adaptor-Box Connector of the main interface cable must be attached to this connector. Do not connect anything else to these signals.

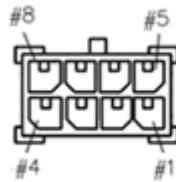


Figure 29 – Power-Adapter-Box to MDT Connector

Power-Adaptor-Box to +Vin Connector



IMPORTANT

The 12V or 24V and Ground signals of the vehicle battery and the ignition switch signal must be attached to this connector.

Connector type - Molex Micro-Fit 3.0™ 4 pin plug



Figure 30 – Power-Adapter-Box to MDT Connector Pinout

Table 12 – Power Adaptor Box +Vin Connector Signal Map

Pin	Signal	Type	Function	Specifications	Wire Size (AWG) Required												
1	Dig_In1	I	Digital Input 1 (Ignition switch)	<table border="0"> <tr> <td></td> <td>Typical</td> <td>Min</td> <td>Max</td> </tr> <tr> <td>Input Low: VIL</td> <td>0V</td> <td>-30V</td> <td>6V</td> </tr> <tr> <td>Input High: VIH</td> <td>12V-24V</td> <td>+8V</td> <td>+30V</td> </tr> </table>		Typical	Min	Max	Input Low: VIL	0V	-30V	6V	Input High: VIH	12V-24V	+8V	+30V	28
	Typical	Min	Max														
Input Low: VIL	0V	-30V	6V														
Input High: VIH	12V-24V	+8V	+30V														
2	Dig_Out1	O	Digital Output 1	Open Collector Max. switchable current = 300mA Max. switchable voltage = +VIN Max. saturation voltage = 0.6V	28												
3	GND	G	MDT Power Supply Ground		24												
4	+VIN	V	MDT Power Supply Voltage	<table border="0"> <tr> <td>Typical</td> <td>Min</td> <td>Max</td> </tr> <tr> <td>+12V / 24V</td> <td>+8V</td> <td>+30V</td> </tr> </table>	Typical	Min	Max	+12V / 24V	+8V	+30V	24						
Typical	Min	Max															
+12V / 24V	+8V	+30V															

Enhanced Interface Cable

The Enhanced interface cable must be attached to the "Con2" terminal connector of the device.

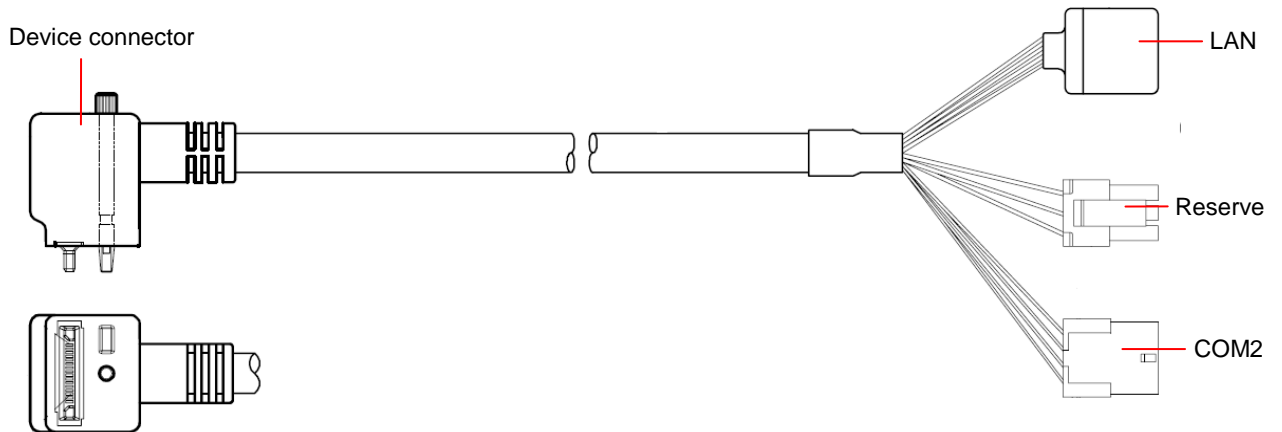


Figure 31 – Enhanced Interface Cable

Enhanced Interface Cable connectors Signal Map

COM2 Connector

Connector type - Molex Micro-Fit 3.0™ 8 pin plug

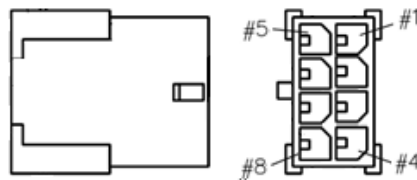


Figure 32 – Enhanced Interface Cable COM2 Connector Pinout

Table 13 – Enhanced Interface Cable COM2 Connector Signal Map

Pin	Signal	Function	Wire Size (AWG) Required
1	TXD2	Transmit Data (COM2)	28
2	Dallas	One-Wire Interface. (DALLAS ID Button Interface) Port	28

Pin	Signal	Function	Wire Size (AWG) Required
3	Dig_In2	Digital Input 2	28
4	N/C	Not connected	
5	RXD2	Receive Data (COM2)	28
6	DGND	Digital Ground	28
7	An_In1	Analog Input	28
8	AGND	Analog Ground	28

LAN Connector



NOTE:

The Ethernet LAN interface is an optional platform feature. The interface signals described below present on this connector only if the device supports these signals. Otherwise, the connector pins are not connected and must not be used.

Connector type –RJ45

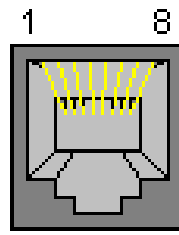


Figure 33 – Enhanced Interface Cable LAN Connector Pinout

Table 14 – Enhanced Interface Cable LAN Connector Signal Map

Pin	Signal	Function	Wire Size (AWG) Required
1	LAN_TX+	Ethernet LAN Transmit Data +	24
2	LAN_TX-	Ethernet LAN Transmit Data -	24
3	LAN_RX+	Ethernet LAN Receive Data +	24
4	N/C	Not connected	

Pin	Signal	Function	Wire Size (AWG) Required
5	N/C	Not connected	
6	LAN_RX-	Ethernet LAN Receive Data -	24
7	N/C	Not connected	
8	N/C	Not connected	

M_Control1 Connector

This connector can only be used for the specified Micronet-accessory devices connection. Do not connect anything else to these signals.

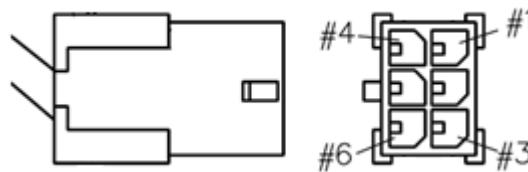


Figure 34 – M_Control1 Connector Pinout

Video and CANBus Interface Cable

To be documented

Audio Interface Cable

To be documented

Power Supply adaptors

IDC Connector

An IDC connector wall power supply adapter (110V / 220V AC to 5V DC) for connecting to the CE-500 5V power-in connector on the right panel slot (For office usage, available in DTK only).



Figure 35 – IDC Wall mount adapter



NOTE:

External power Charger for the unit must be LPS(Limited power sources).

Molex 43025 Series Connector

A Molex 43025 series connector wall power supply adapter (110V / 220V AC to 12V DC) for connecting to the CE-500 Main Interface cable DC to DC convertor, or to the Basic and Enhanced Cradle models (For office usage, available in DTK only).



Figure 36 – Molex 43025 connector Wall mount adapter



NOTE:

External power Charger for the unit must be LPS(Limited power sources).

Interface Support

J1708 Convertor Box

To be documented

RS-422 Convertor Box

To be documented

8

Device Cradle

Overview

Optionally, the CE-500 platform provides the Device Cradle. The Cradle is used for mechanical mounting and electronic connectivity of the device in solutions that require Fixed and Portable operations.

The Device Cradle is fixed-mounted in a vehicle cabin, and all electronic interfaces are connected to the Cradle "Interface" connectors, which are located on the rear panel. All signals connected to Cradle "Interface" connectors are transparently connected to the Cradle "Device" connectors, which correctly meet the device's "Terminal" connectors when the device is placed in the Cradle. When the device is removed from the Cradle, the device can continue to operate using the internal battery. However, the device loses connectivity to the Cradle interface connections.

Two models of the Device Cradle are available:

- Basic, which provides two Cradle "Device" "Con1" and "Con2" connectors with the correct "Interface" connectors. The Basic model supports all interface connections provided with the basic configuration of the CE-500 device.
- Enhanced, which provides additional "Device" "Con3" and "Con4" connectors with the relevant "Interface" connectors that support additional optional features of the device. These optional features are required for implementing the additional interfaces.

The CE-500 Device Cradle supports both CE-504 and CE-507 device models.

**NOTE:**

The pinout and types of interface connectors that are provided with the Device Cradle are similar to those for the same purposes by the relevant CE-500 Accessory Cable.

For the Device Cradle Electrical and Mechanical installation instructions, see [Device Installation](#) on page 83.

CE-500 Device Basic Cradle Components

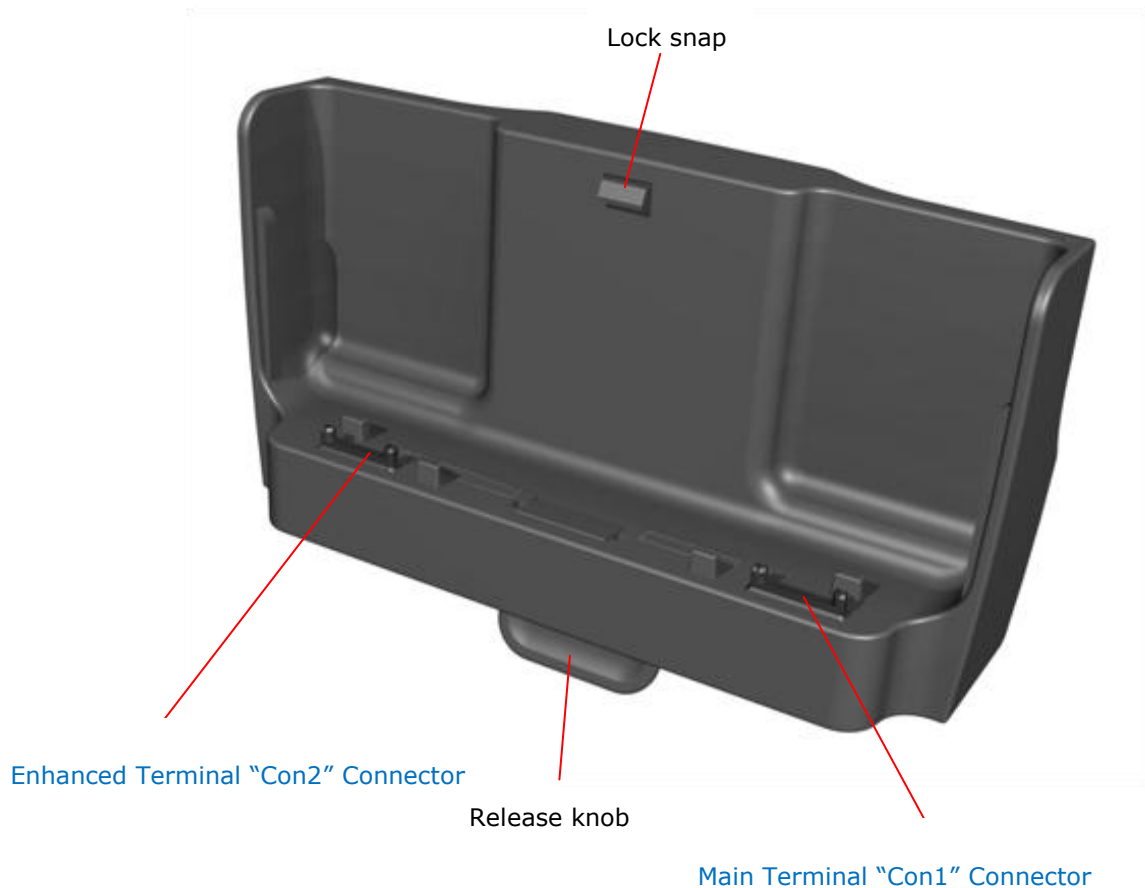


Figure 37 – CE-500 Device Basic Cradle, Front Side

For more information on Basic Cradle front panel components, see:

- [Main Terminal "Con1" Connector](#), on page 38
- [Enhanced Terminal "Con2" Connector](#), on page 39
- [Release knob and Lock snap](#), on page 91

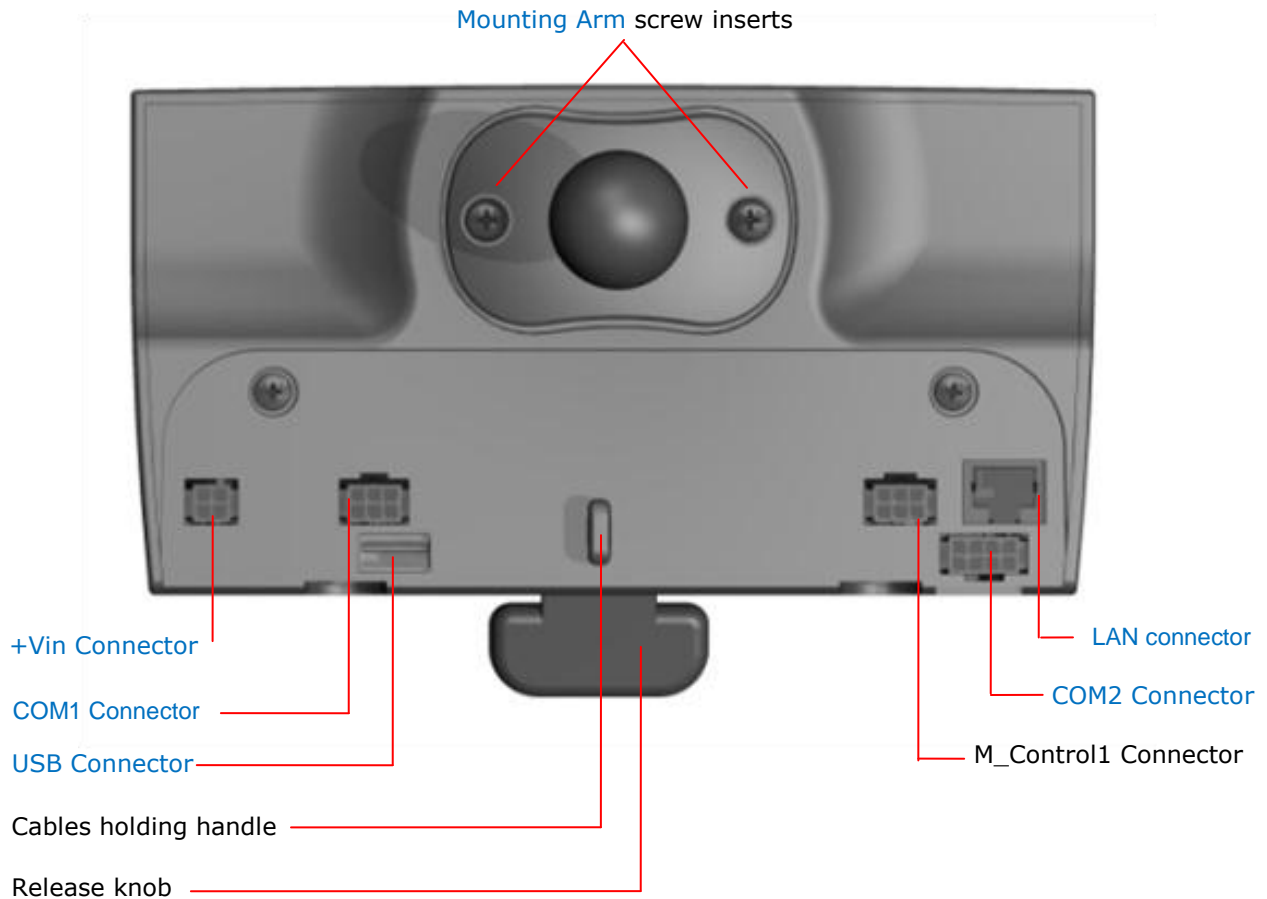


Figure 38 – CE-500 Device Basic Cradle, Rear Panel

For more information on Basic Cradle rear panel components, see:

- [+Vin Connector](#), on page 76
- [LAN connector](#), on page 78
- [COM1 Connector](#), on page 76
- [USB Connector](#), on page 77
- [COM2 Connector](#), on page 78
- [Mounting Arm screw inserts](#), on page 85

CE-500 Device Enhanced Cradle Components



Figure 39 – CE-500 Device Enhanced Cradle, Front Side

For more information on Enhanced Cradle front panel components, see:

- [Main Terminal "Con1" Connector](#), on page 38
- [Enhanced Terminal "Con2" Connector](#), on page 39
- [Optional External Video and CANBus "Con3" Connector](#), on page 41
- [Optional External Audio "Con4" Connector](#), on page 41
- [Release knob and Lock snap](#), on page 91

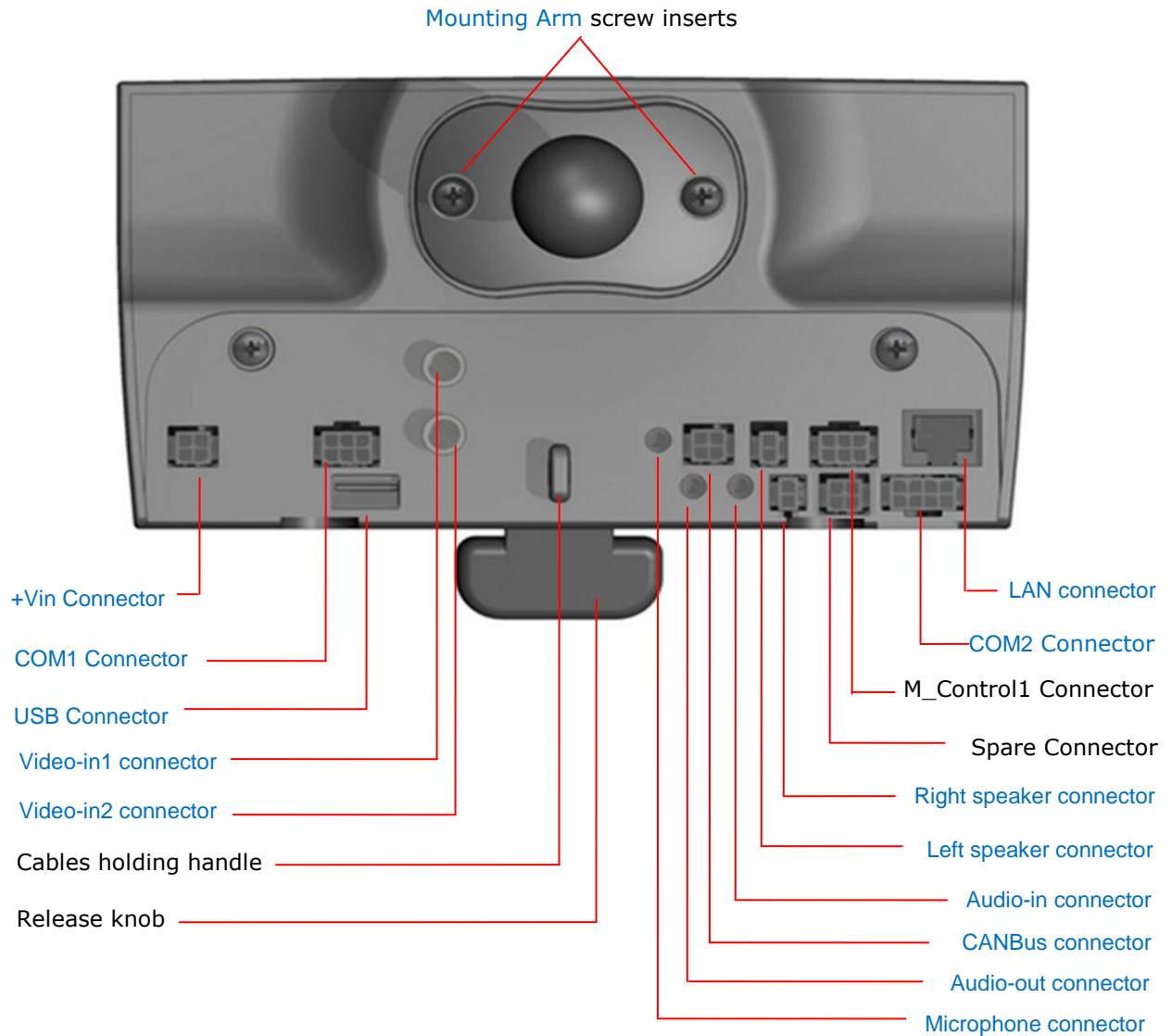


Figure 40 – CE-500 Device Enhanced Cradle, Rear Panel

For more information on Enhanced Cradle rear panel components, see:

- [+Vin Connector](#), on page 76
- [LAN connector](#), on page 78
- [COM1 Connector](#), on page 76

- [USB Connector](#), on page 77
- [COM2 Connector](#), on page 78
- [Video-in1 connector](#), on page 80
- [Microphone connector](#), on page 81
- [Left speaker connector](#), on page 81
- [M_Control1 Connector](#), on page 79
- [Video-in2 connector](#), on page 80
- [Audio-out connector](#), on page 80
- [Audio-in connector](#), on page 81
- [Right speaker connector](#), on page 81
- [CAN Bus connector](#), on page 82
- [Mounting Arm screw inserts](#), on page 85

Device Cradle Connectors

Overview

Instead of the interfaces that require the standard type of connectors (such as USB and Ethernet), all other signals are located on the CE-500 Device Cradle by [Molex Micro-Fit 3.0™](#) Plug connector types. To implement the connectivity, use the opposite (Receptacle) type of connector with the correct amount of pins for each peripheral interface. This is [Molex 43025 Series](#) type of connectors. Use the [Molex Micro-Fit 3.0™ Crimp Terminal Female](#) for wiring. Ensure that the correct wire size (AWG) for each signal is according to the requirements of the interface-connector Signal Maps specifications.

- Type of all device connectors of the Cradle - Molex HandyLink™ I/O Interconnect System
- Molex part number - 0455931600

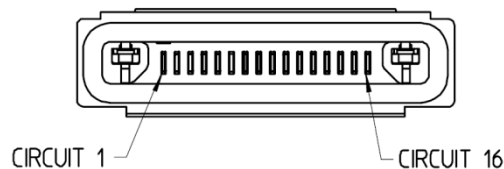


Figure 41 – Device Cradle Connector Pinout



NOTE:

The terminal connectors of the device are located at different rotation angles.

All “shield” pins of the connectors are attached to the ground signal.

Basic cradle connectors

+Vin Connector

The 12V or 24V and Ground signals of the vehicle-battery as well as the ignition switch signal must be attached to this connector.

Connector type - Molex Micro-Fit 3.0™ 4 pin plug



Figure 42 – Cradle +Vin Connector Pinout

Table 15 – Cradle +Vin Connector Signal Map

Pin	Signal	Type	Function	Specifications			Wire Size (AWG) Required
				Typical	Min	Max	
1	Dig_In1	I	Digital Input 1 (Ignition switch)	Input Low: VIL 0V	-30V	6V	28
				Input High: VIH 12V-24V	+8V	+30V	
2	Dig_Out1	O	Digital Output 1	Open Collector Max. switchable current = 300mA Max. switchable voltage = +VIN Max. saturation voltage = 0.6V			28
3	GND	G	MDT Power Supply Ground				24
4	+VIN	V	MDT Power Supply Voltage	Typical +12V / 24V	Min +8V	Max +30V	24

COM1 Connector

Connector type - Molex Micro-Fit 3.0™ 6 pin plug

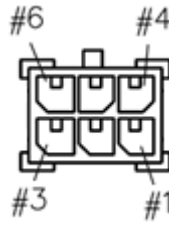


Figure 43 – Cradle COM1 Connector Pinout

Table 16 – Cradle COM1 Connector Signal Map

Pin	Signal	Function	Wire Size (AWG) Required
1	TXD1	Transmit Data (COM1)	28
2	RTS1	Request To Send (COM1)	28
3	DGND	Digital Ground	28
4	RXD1	Receive Data (COM1)	28
5	CTS1	Clear To Send (COM1)	28
6	N/C	Not connected	

USB Connector

Connector type – USB type-A Female

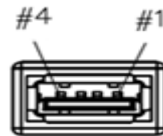


Figure 44– Cradle USB Connector Pinout

Table 17 – Cradle USB Connector Signal Map

Pin	Signal	Function
1	USB +5V	5V USB Power Out
2	USB D+	USB Data (+)
3	USB D-	USB Data (-)
4	USB GND	USB Ground

COM2 Connector

Connector type – Molex Micro-Fit 3.0™ 8 pin plug

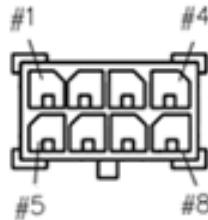


Figure 45 – Cradle COM2 Connector Pinout

Table 18 – Cradle COM2 Connector Signal Map

Pin	Signal	Function	Wire Size (AWG) Required
1	TXD2	Transmit Data (COM2)	28
2	Dallas	One-Wire Interface (DALLAS ID Button Interface) Port.	28
3	Dig_In2	Digital Input 2	28
4	N/C	Not connected	
5	RXD2	Receive Data (COM2)	28
6	DGND	Digital Ground	28
7	An_In1	Analog Input	28
8	AGND	Analog Ground	28

Enhanced cradle Connectors

LAN Connector

Connector type – RJ45

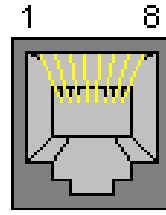


Figure 46 – Cradle LAN Connector Pinout

Table 19 – Cradle LAN Connector Signal Map

Pin	Signal	Function	Wire Size (AWG) Required
1	LAN_TX+	Optional – Ethernet LAN Transmit Data +	24
2	LAN_TX-	Optional – Ethernet LAN Transmit Data -	24
3	LAN_RX+	Optional – Ethernet LAN Receive Data +	24
4	N/C	Not connected	
5	N/C	Not connected	
6	LAN_RX-	Optional – Ethernet LAN Receive Data -	24
7	N/C	Not connected	
8	N/C	Not connected	



NOTE:

The Ethernet LAN interface is an optional feature of the platform. The interface signals are only presented on this connector if supported by the device. Otherwise, this connector pins are not connected and must not be used.

M_Control1 Connector

This connector can only be used for specified Micronet accessory-device connections. Do not connect anything else to these signals.

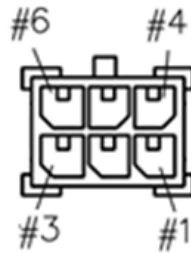


Figure 47 – Cradle M_Control1 Connector

Video-in1 and Video-in2 Connectors

To be documented

This connector is provided by the enhanced Device Cradle model only.



Figure 48 – Cradle RCA Video Connector



NOTE:

The External Video interface support is an optional feature of the platform. This interface signals are only located on this connector if supported by the device. In other cases, this connector pins are not connected and must not be used.

Audio-Out Connector

To be documented

This connector is provided by the Enhanced Device Cradle model only.



Figure 49 – Cradle Audio Jack Connector



NOTE:

The External Audio interfaces support is an optional feature of the platform. This interface signals are located on this connector only if the device supports these signals. Otherwise, the connector pins are not connected and must not be used.

Audio-In Connector

To be documented

This connector is provided by the enhanced Device Cradle model only.



Figure 50 – Cradle Audio Jack Connector



NOTE:

The External Audio interfaces support is an optional feature of the platform. This interface signals are located on this connector only if the device supports these signals. Otherwise, the connector pins are not connected and must not be used.

Microphone

To be documented

This connector is provided by the enhanced Device Cradle model only.



Figure 51 – Cradle Microphone Jack Connector



NOTE:

The External Audio interfaces support is an optional feature of the platform. This interface signals are only located on this connector if supported by the device. In other cases, this connector pins are not connected and must not be used.

Left and Right Speaker Connectors

This connector is provided by the enhanced Device Cradle model only.



Figure 52 – Cradle Speakers Connector



NOTE:

The External Audio interfaces support is an optional feature of the platform. This interface signals are located on this connector only if the device supports these signals. Otherwise, the connector pins are not connected and must not be used.

CANBus Connector

To be documented

This connector is provided by the enhanced Device Cradle model only.



Figure 53 – Cradle CANBus Connector Pinout



NOTE:

The CAN Bus interface is an optional feature of the platform. This interface signals are located on this connector only if the device supports these signals. Otherwise, the connector pins are not connected and must not be used.

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Device Installation

Electrical Installation

Overview

Depending on the required operating mode of the solution, you can perform electrical installation using device accessory cables (Fixed-mounted mode) or the device Cradle (Fixed-portable mode).

Both modes provide a similar connectivity type for each specific interface. For example, the Serial port (COM1) of the device is on the Main accessory cable by a Molex Mini-Automotive 6 pin receptacle connector type. The same type of connector with the same pinout is located on the rear panel of the Cradle that provides this interface. This concept is relevant for all interface connectors.

In addition to interfaces that require the standard type of connector (such as USB and Ethernet), all remaining device signals are located on the cables or Cradle by [Molex Micro-Fit 3.0™](#) Plug connector types.

Connectors

To implement connectivity, use the opposite (Receptacle) type of connector with the correct amount of pins for each peripheral interface. This is [Molex 43025 Series](#) type of connector. Use the [Molex Micro-Fit 3.0™ Crimp Terminal Female](#) for wiring. Ensure the correct wire size (AWG) for each signal according to Accessory cable requirements or Cradle-Connectors Signal-Map specifications.

Electrical Installation Procedure

1. Prepare the Receptacle-connectors wiring connected to the required peripherals and power signals.
2. Connect the receptacle connectors to the Accessory cables or Cradle plug connectors.
3. Connect other peripherals with the standard interface connector types to the Accessory cables or Cradle connectors.
4. Do one of the following depending on the mode:
 - In the Fixed-mounted mode, connect the Accessory cables to the CE-50X device terminal connectors.
 - In the Fixed-portable mode, insert the CE-50X device into the device Cradle.
5. To power on the CE-50X device, press the Push button and verify that all connected peripheral operate properly.
6. In the Fixed-mounted mode, fix the Accessory cables on the CE-50X device with cable mounting screws.

Mechanical Installation

Overview

The rear panels of the CE-50X device and CE-500 device Cradle provide a similar mechanical infrastructure for mounting-stand (arm) installation. If a solution uses the Fixed-portable mode, the CE-500 device Cradle must be fixed-mounted in the vehicle cabin using the mounting arm, when the device is periodically attached and removed from it during operation.

In the Fixed-performing mode, the mounting arm is directly attached to the rear panel of the device (details follow).

The mounting-arm screw-insert disposition is compatible with RAM® Mounts standard mounting-arm types.

The Micronet mounting arm is also available.

**NOTE:**

Mounting arm screws included only with Micronet mounting arm. Screws type and dimension for other mounting arm provided below.



NOTE:

This guide describes Terminal installation options that use the mounting arm only. The in-vehicle installation instructions must be provided by a qualified installation technician.

Pay special attention to mechanical strains when the detachable terminal options are used. A correct installation location and surface must be chosen as along with installation materials.




Mounting Arm




The Micronet CE-500 mounting arm is a flexible, rotating, arm-based mounting stand that provides a wide range of fixed in-cabin positions for maximum comfort and visibility.



Figure 54 – CE-500 Mounting Arm

Table 20 – Mounting Arm Components

Component Picture	Component Name
	Mounting Arm stud ball
	Arm parts
	Screw nut

Component Picture	Component Name
	Screw
	Washer
	Mounting Arm Base ball

Fixed-Mounted Device Installation

1. Determine the optimal positioning of the CE-50X device in the vehicle that provides easy access and clear view.
2. Attach the base of the mounting-arm assembly to the dashboard or cabin.
3. Assemble the stand parts on the mounting-arm base.
4. Attach the mounting arm to the rear panel of the device using the mounting screws inserts.
5. Perform electrical installation. See [Electrical Installation](#), on page 83
6. Install the CE-50X device on the mounting arm.
7. Adjust the optimal device position and fix it by closing the mounting-arm wing nut.
8. Arrange the cables using a plastic strip.



Figure 55 – Components for Fixed-Mounted Device Installation

Mounting arm screws dimension

Proper screws for mounting non-Micronet mounting arm, based on the device inserts depth and the arm stud ball.

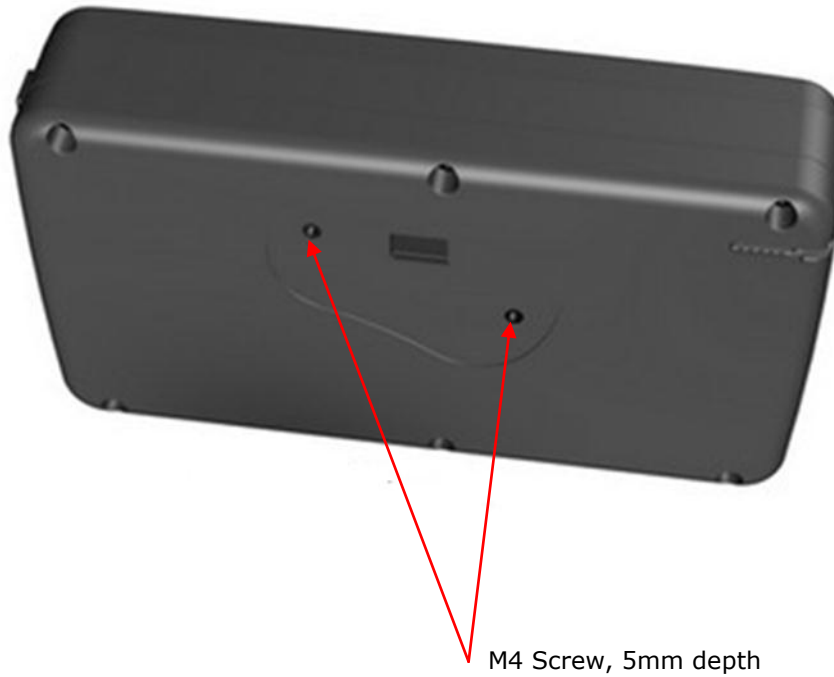


Figure 56 – Device mounting inserts dimension

Fixed / Portable (Device with Cradle) Installation

1. Determine the optimal positioning of the CE-50X device in the vehicle that provides easy access and clear view.
2. Attach the base of the mounting arm assembly to the dashboard or cabin.
3. Assemble the stand parts on the mounting arm base.
4. Attach the mounting arm to the rear panel of the device Cradle using the mounting screws inserts.
5. Perform electrical installation. See [Electrical Installation](#), on page 83
6. Insert the device into the device cradle.
7. Install the device cradle onto the mounting arm.
8. Adjust the optimal device position and fix it by closing the mounting-arm wing nut.
9. Arrange the cables using a plastic strip and the optional protective rear cover of the cradle.



Figure 57 – Components for Fixed / Portable Device (Cradle) Installation

Mounting arm screws dimension

Proper screws for mounting non-Micronet mounting arm, based on the cradle inserts depth and the arm stud ball.

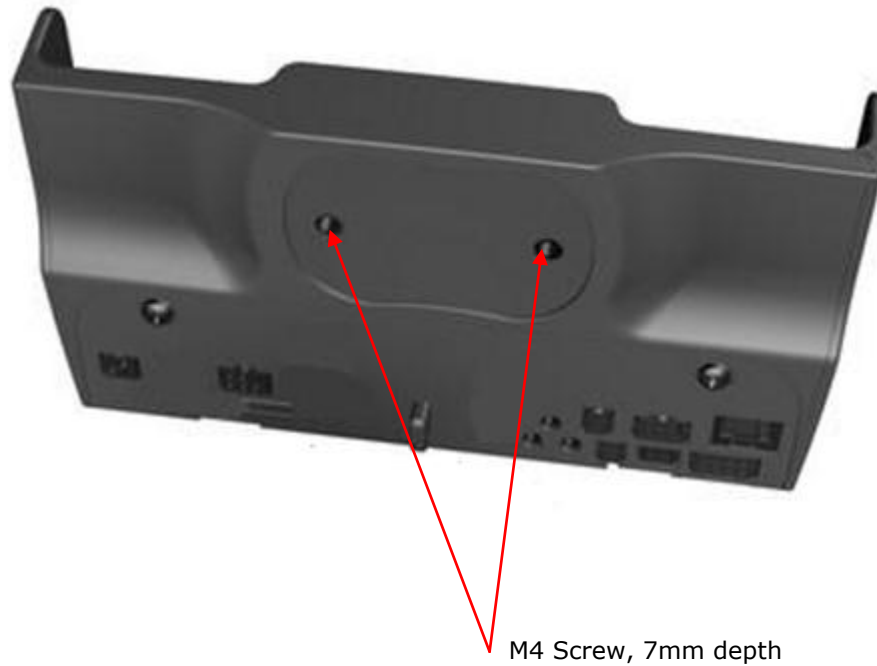


Figure 58 – Cradle mounting inserts dimension

Inserting the Device into the Cradle

To insert the device into the cradle:

1. Insert the device into the cradle slot from the top. Verify that the device tightly enters the slot
2. Pull down the device

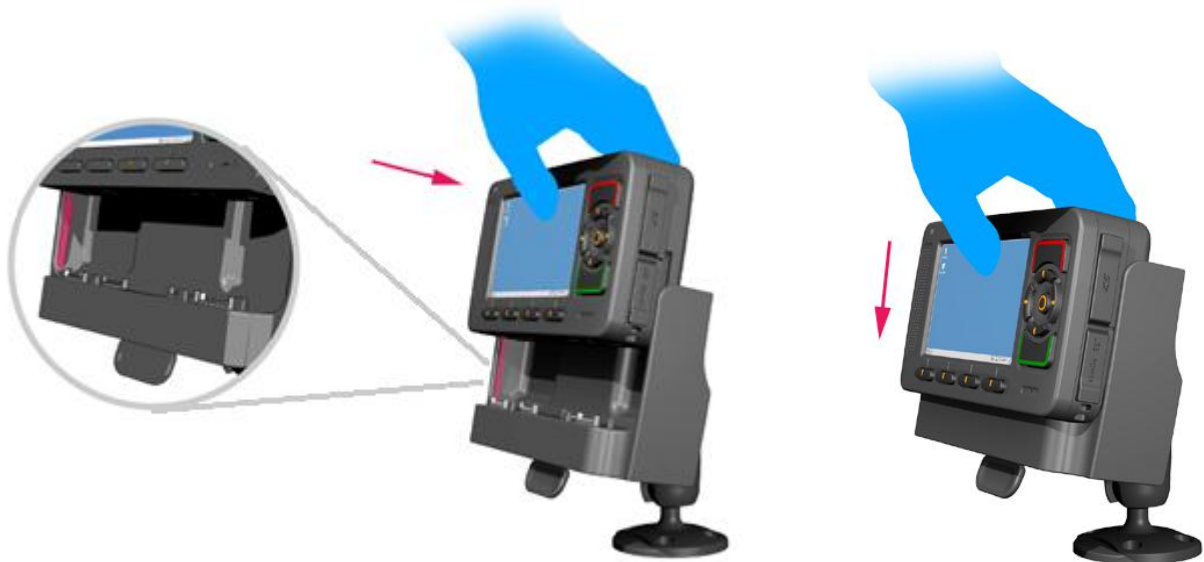


Figure 59 – Device insertion

Removing the Device from the Cradle

To remove the device from the cradle:

1. To unlock the device, push and hold the Release knob on the bottom of the cradle.
2. Pull up the device from the cradle slot.

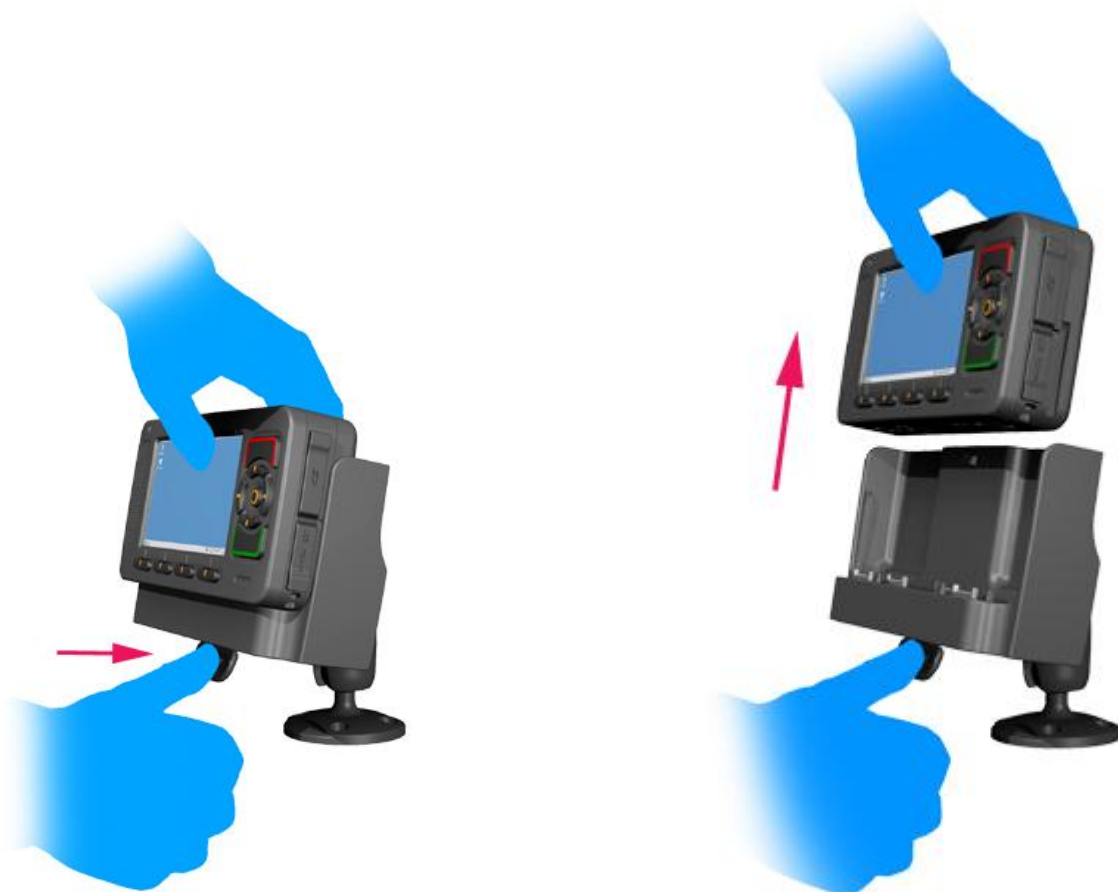


Figure 60 – Device Removal

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Optional Feature Modules Installation

To be documented

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CE-500 Platform Physical Characteristics

Physical Characteristics

Table 21 – Physical Characteristics

Features		Details	
CE-504 Dimensions & Weight			
Width	6.30 inch	160 mm	
Height	3.40 inch	87 mm	
Depth	1.50 inch	38 mm	
Weight (w Battery)	14.70 oz.	410 Gram	
Weight (w/o Battery)	13.50 oz.	380 Gram	
CE-507 Dimensions & Weight			
Width	8.80 inch	225 mm	
Height	6.40 inch	162 mm	
Depth	2.10 inch	53 mm	
Weight (w Battery)	25.80 oz.	730 Gram	
Weight (w/o Battery)	24.70 oz.	700 Gram	
Cradle Dimensions			
Width	7.10 inch	180 mm	
Height	3.50 inch	90 mm	
	4.30 inch with release knob	110 mm with release knob	
Depth	2 inch	50 mm	
	3.30 inch with protective cover	85 mm with protective cover	
Weight	7.80 oz.	225 Gram	
	9.50 oz. with protective cover	270 Gram with protective cover	

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Appendices

Appendix A

Regulations & Certifications

The CE-500 Family (consists of CE-504, CE-507, power sources Comply (together & separately) with the requirements of:

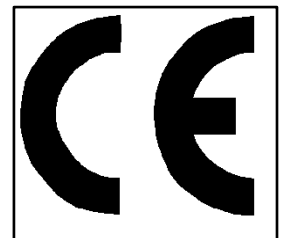
European Market - CE Marking (Class B)

LVD Directive 2006/95/EC (73/23/EEC), According to standards:

- EN60950-1

R&TTE Directive 1999/5/EC, According to standards:

- EN301 489-1,17
- EN300 328 (for Wi-Fi + Bluetooth Configuration)



We, Micronet Ltd.

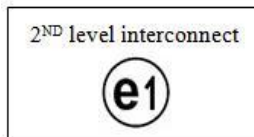
Address: 27, Hametzuda st., Azor 58001, Israel.

Tel: +972-(0)3-5584884.

Certify and declare that the CE-500 Family were tested and found to comply with the harmonized standards EN301 489-1,17, EN 300 328, EN60950-1, therefore comply with the essential requirements of the R&TTE Directive and the LVD Directive.

The tests were done in ITL (Product Testing) LTD. in Israel.

The CE-500 Family Complies with the requirements imposed by the European Directive 2002/95/EC (and its amendment) of the European Parliament and of the council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)



Products labeled with symbol of crossed out wheeled bin need dispose of according to your local regulations. Do not throw this product or its accessories to into public garbage.

Please Contact your local distributor or municipality for more information. This way, you make your contribution to protect our environment and health.

FCC Rules (Class A)

CFR 47, Part 15 Subpart B

CFR 47, Part 15 Subpart C (for Wi-Fi + Bluetooth configuration)

This equipment has been tested and found to comply with the limits for a Class A 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:

- a) Reorient or relocate the receiving antenna.
- b) Increase the separation between the equipment and receiver.
- c) Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

d) Consult the dealer or an experienced radio/TV technician.

FCC ID: U80NB811

The FCC ID valid for the Devices configuration that includes Wi-Fi and Bluetooth module.
This device includes FCC ID: R17GE865 (Telit, GE-865), when contains GSM/GPRS feature.

Each device must be professionally installed in order to comply with section 15.203 of the FCC rules.

The user must use the recommended antenna, which specify in this guide in order to comply with the FCC rules (but no more than the specified gain).

Instructions concerning human exposure to radio frequency electromagnetic fields.

To comply with FCC Section 1.307 (b)(1) for human exposure to radio frequency electromagnetic fields, implement the following instruction:

A distance of at least 20cm. between the equipment and all persons should be maintained during the operation of the equipment.

FCC Warning

Modifications not expressly approved by the manufacturer could void the user authority to operate the equipment under FCC Rules.

Model Name: CE-500 Family.

Trade Name: MDT (Mobile Data Terminal).

Responsible party: Micronet Ltd.

Address: 27, Hametzuda st., Azor, Israel.

Phone: +972-(0)3-5584884.

This device complies with Part 15 of the FCC Rules. Operating is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device accepts any interference received. Including interference that may cause undesired operation.