



M-317

Mobile Data Terminal



Hardware Guide

Revision 1.2

July 2014

Important Notice

© 2014 Micronet Ltd. All rights reserved.

Micronet Ltd. reserves the right to alter the equipment specifications and descriptions in this publication without prior notice. No part of this publication shall be deemed to be part of any contract or warranty unless specifically incorporated by reference into such contract or warranty.

The information contained herein is merely descriptive in nature, and does not constitute a binding offer for the sale of the product described herein.

All usage of the Micronet Ltd. logotype or trademarks is forbidden without prior written approval from Micronet Ltd.

Information in this manual is subject to change without notice.

Micronet maintains no liability or responsibility to any person or entity with respect to any loss or damage arising from the information contained in this book.

Other company and brand products and service names are trademarks or registered trademarks of their respective holders, for example: ARM Cortex™, Microsoft™, and Microsoft™ products (Windows Embedded CE™, Compact Framework™, Microsoft Active Sync™, Visual Studio™), Google, Android, ADB, ADT, Eclipse.

Please refer to Micronet's website (<http://www.micronet.co.il>) for further information or contact us directly (http://www.micronet.co.il/Contact_Micronet.html).

Table of Contents

Table of Contents.....	3
Revision History.....	5
Safety Precautions	6
Introduction	7
M-317 Platform Overview.....	7
M-317 Model	7
Display.....	8
Physical Interfaces.....	8
Wireless Module (Optional)	8
Special Protection of Application Data Feature	8
Development Tool Kit	8
Hardware	9
Software	9
Documentation.....	9
Useful Links	9
M-317 Platform Key Feature Specifications.....	10
Standard Model Configuration	10
All-In-One Model Configuration.....	12
Platform Accessories	12
OEM Optional Features* (requires M-O-Q)	13
M-317 Device Components	13
M-317 Front Panel Components.....	13
M-317 Right Side Panel Components.....	15
M-317 Left Side Panel Components.....	16
M-317 Rear Panel Components.....	17
M-317 Bottom Panel Components.....	18
Technical and Functional Details	19
Platform Core	19
Operating System.....	19
Application Development Environment	19
Processor	19
RAM.....	20
Flash Memory	20
Memory Card Support	20
Device Connector Slot - Rubber Covers	20
Real Time Clock (RTC).....	21
Watchdog	21
User Interface	21

Display.....	21
Touch Screen and Stylus	22
Light Sensor	22
Keypad.....	22
Customized Front Panel Label (Optional)	23
Audio Support	24
Audio CODEC	24
Internal Speaker	24
External Speaker Connection (Optional)	24
Internal Microphone	25
External Microphone Connection (Optional).....	25
Communication Interfaces	25
Serial Communication	25
USB Communication	26
Peripheral Controls.....	27
Digital Inputs	27
Analog Input	28
Wireless Communication.....	29
Wireless LAN and Bluetooth Class2	29
Main Connector Signal Map.....	30
Overview	30
Pinout of Main Device Connector.....	30
Platform Power.....	35
Overview	35
Battery Voltage Input	35
Super Capacitors	36
Device Power Consumption	36
Power Management	37
Overview	37
Understanding Power States	37
Device Installation	41
Mechanical Installation	41
Mounting Arm	41
Mounting Inserts Location and Dimensions	41
Device Installation Steps	44
Electrical Installation	45
Vehicle Battery Connection	45
Electrical Installation Procedure.....	47
M-317 Platform Physical Characteristics.....	48
Physical Characteristics	48

Revision History

Revision	Date	Change
1.0	March 2014	Document created
1.1	June 2014	Changes fuse voltage value Adding Wi-Fi FCC compliance
1.2	July 2014	IC compliance

Safety Precautions

Read the following safety precautions before installation or operation.



WARNING!

Abnormal Conditions

Should the M-317 become hot, start to emit smoke or a strange odor, immediately turn off the power and contact your original dealer or authorized service provider. Continued usage is dangerous and may result in fire or electric shock.



WARNING!

Foreign Objects

Avoid having foreign matter or objects enter into any opening of the M-317. This could result in fire or electric shock. Immediately turn off the power and contact your original dealer or an authorized service provider.



WARNING!

Location and Physical Damage

If the M-317 falls and is damaged turn off the power immediately and contact the original dealer or authorized service provider. Continuing to use the device in this state or locating the device in extremely humid or dusty areas is dangerous and may result in fire or electric shock.



WARNING!

Liquids

Keep the device away from water, other liquids and liquid containers. Liquid entering into the device can cause fire and electric shock.



CAUTION

LCD Screen

Never apply heavy pressure to the M-317 display or subject it to strong impact. Doing so may crack the screen or LCD panel glass, resulting in personal injury or major damage to the device. Should the LCD panel glass break, do not touch the liquid inside. Should liquid from the LCD panel accidentally touch a person's skin or enter a person's mouth or eyes, immediately rinse the area affected with water and contact a physician.

CAUTION

Power Supply

Do not use the M-317 with any voltage other than that specified. Avoid situations that can cause damage to the power cable. Do not place heavy objects on the power cable and keep it away from sources of heat. Never twist, sharply bend, or pull the power cable. If the power cable is damaged (exposing or breaking wires), contact your original dealer or service provider about repair or replacement. Damage to the electrical cable may result in fire or electrical shock.

1

Introduction

M-317 Platform Overview

The M-317 provides Original Equipment Manufacturers (OEMs) and Telematics Service Providers (TSP's) with a rugged and versatile vehicle-centric mobile-computing platform for a variety of Mobile Resource Management (MRM) applications.

The M-317 platform supports the Google Android™ 4 operating system.

The M-317 offers a comprehensive development environment for independent application programming and system integration.

The M-317 device architecture provides a solid and cost-effective design by simplifying maintenance tasks, significantly extending product life expectancy, and lowering the total cost of ownership (TCO).

The M-317's Base Model configuration contains the standard set of features and functions of the MDT (Mobile Data Terminal). There is a range of optional extensions, add-ons and accessories to enhance the M-317's capabilities, serving advanced fleet management solutions.

The M-317's ruggedness is able to withstand the rough commercial automotive environment, including operation in a wide temperature range, vibrations, and shock.

Using the external vehicle diagnostic and cellular communication accessory devices, the M-317 platform supports the functionality of a fully integrated and standalone, fleet management solution.

M-317 Model

Micronet implemented the M-317 platform in two product models:

- **Standard device model**, which supports the key feature set described below

- **All-In-One model**, which provides additional wireless interfaces.

Display

The M-317 consists of a 7" (800x480 pixels) WVGA display, with a color touch screen and large programmable seven-button keypad. Please refer to the M-317 [Display](#) on page 21, and to the [Keypad](#) on page 22.

Physical Interfaces

The M-317 provides the following physical interfaces:

- USB
- Serial RS232/RS422 (optional) ports
- Digital input signal for ignition switch control
- Interfaces for vehicle and peripheral device connectivity
- Analog and digital control output signals (optional)

Wireless Module (Optional)

The All-In-One model supports cellular communication and GPS via a 3.5G GSM or EV-DO wireless module.

Special Protection of Application Data Feature

Designed to perform in the harsh vehicle operational environment, the M-317 platform incorporates an especially robust hardware and software system to protect application data storage from corruption caused by unstable vehicle power behavior. Using super capacitors for power backup, the system instantaneously prevents any uncontrolled access to the device's storage, when a signal drop is recognized on the device's main power line.

Development Tool Kit

Micronet's M-317 Development Package provides all the tools required for product evaluation, application development, and product testing. The Developers Package includes 20 hours of technical support and contains all of the essential hardware and software components as described in the following sections.

Hardware

- Power supply adapters
- Interface cable
- Mounting accessories and tools
- Mechanical and interface connection accessories

Software

- Software Development Kit (SDK) providing a set of software tools, API, and documentation for programming in Eclipse.
- Java (for Android) demo samples for some device features, including the source code

Documentation

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

Useful Links

Micronet web site: <http://www.micronet.co.il/>

Contact us: <http://www.micronet.co.il/contact-us/index.aspx>

M-317 Platform Key Feature Specifications



Standard Model Configuration

Device Key Features	Details
Platform Core	
Operating System	Google Android™ 4
Application Development Environment	Google Android™ ADT
Processor	<ul style="list-style-type: none"> - ARM Cortex™ - A8 Core - TI Omap 3715 1GHz - Graphics processing unit (GPU)
RAM	512MB
Flash	512MB
Memory Card Support	<ul style="list-style-type: none"> - SD / MMC (SDHC support) card slot x133, up to 32GB - SDIO interface
Audio CODEC	<ul style="list-style-type: none"> - Multi-channel - System audio support - Optional Cellular Voice and Bluetooth audio support
Real Time Clock	<ul style="list-style-type: none"> - HW based - Device Wakeup alarm configuration capability
Watchdog	<ul style="list-style-type: none"> - SW based for application recovery - HW based for system recovery
User Interface	
Display	7" Color TFT LCD, WVGA (800 X 480)
Display Backlight	Multi-level backlight (white LED)
Touch Screen	Analog Resistive, 4 wire

Device Key Features	Details
Keypad	Rubber tactile, multi-level backlight
Light Sensor	Configurable for device backlight adjustment
Internal Microphone	<ul style="list-style-type: none"> - High sensitivity - Noise filtered
Internal Speakers	<ul style="list-style-type: none"> - Mono, 1 x 3W 90 dB nominal @ 0.1m - Multi-level volume control
Communication Interfaces	
RS232 Ports	<ul style="list-style-type: none"> - 1 X 5 Wire (TX, RX, RTS, CTS, GND), 300 - 115200 bps - 1 X 3 Wire (TX, RX, GND) 300 - 115200 bps
USB OTG Port	USB 2.0 low, full and high speed
USB Host Port1 (on device connector)	- USB 2.0 - low, full and high speed, 500mA maximum
USB Host Port2 (on Device Panel)	- USB 2.0 - low, full and high speed, 500mA maximum
Wireless Interfaces	
Wireless LAN	<ul style="list-style-type: none"> - 802.11 b/g/n - Internal on-board antenna
Bluetooth (combined with Wireless LAN option above)	<ul style="list-style-type: none"> - Class 2 - Data transport support only - Internal on-board antenna
Peripherals Control	
Digital I/O	<ul style="list-style-type: none"> - 2 x Automotive inputs - 2 x Open collector outputs
Analog Input	0V – 30V
Power	
Input Power	<ul style="list-style-type: none"> - Direct vehicle battery connection (12V/24V) - ISO 7637 compliant - Super Capacitors for Data storage protection
Mechanical	
Vibration	According to J1455
Mechanical Shock	According to J1455
Device Mounting	RAM® Mount mounting arm compatible
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)
Humidity	95% ±5%RH, +40°C, non-condensing
IP	IP54
RoHS	Compliant
Certifications	
Standards Compliance	FCC, CE

All-In-One Model Configuration

The All-In-One model configuration includes all the Standard model features plus the following features:

Features	Details
Vehicle Diagnostic	
J1939 port	2 x CANBus V2.0B
Cellular Communication and GPS	
Cellular	GSM 3.5G - Data: HSPA, UMTS, EDGE and GPRS - EUD-European bands and NAD-American bands
	EV-DO - Data: CDMA 1xRTT, EV-DO - American bands
GPS	High sensitivity, 50 channels, -160 dBm, NMEA 0183 output format

Platform Accessories

Features	Details
Peripheral Cables	
Main interface cable	Supporting all the platform interfaces
Mechanical Accessories	
Mounting Arm	RAM® Mount, flexible, multi-directional mounting
SD Card Protective Cover	Optional SD card removal protection
SIM card protective cover	Optional SIM card removal protection
Front Panel Label	Optional Customizable "logo" printout

OEM Optional Features* (requires M-O-Q)

Features	Details
Interface Connections	
RS422 Port (Replacing RS232 Com Port 1)	EIA RS422
External Audio	<ul style="list-style-type: none"> - Class A or Class D external speaker amplifier (Mono) - External microphone input (Mono)

*Please inquire about Minimum-Order-Quantity

M-317 Device Components

M-317 Front Panel Components

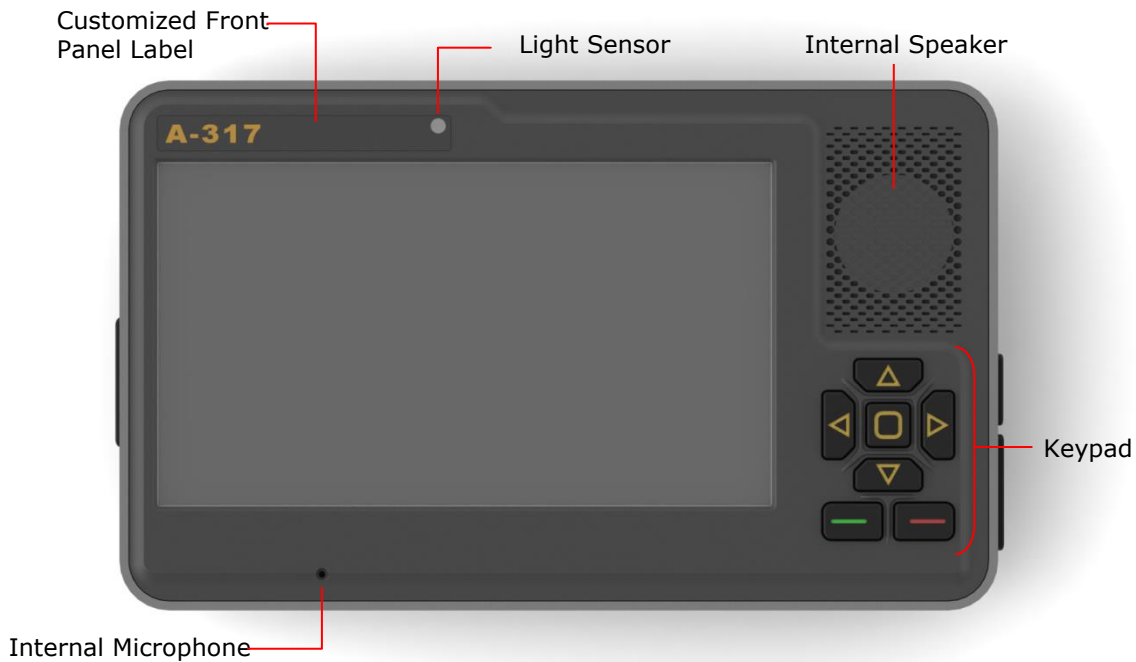


Figure 1: M-317 Front Panel Components

For more information about the M-317 front panel components, see:

- [Display](#), on page 21

- [Customized Front Panel Label](#), on page 23
- [Internal Speaker](#), on page 24
- [Keypad](#), on page 22
- [Light Sensor](#), on page 22
- [Internal Microphone](#), on page 25

M-317 Right Side Panel Components

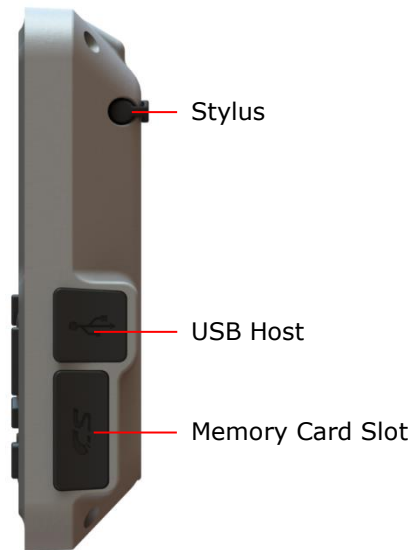


Figure 2: M-317 Right Side Panel Components

For more information about the M-317 right side panel components, see:

- [Memory Card Support](#), on page 20
- [Device Connector Slot - Rubber Cover](#), on page 20
- [USB Host Port](#), on page 26
- [Stylus](#), on page 22

M-317 Left Side Panel Components

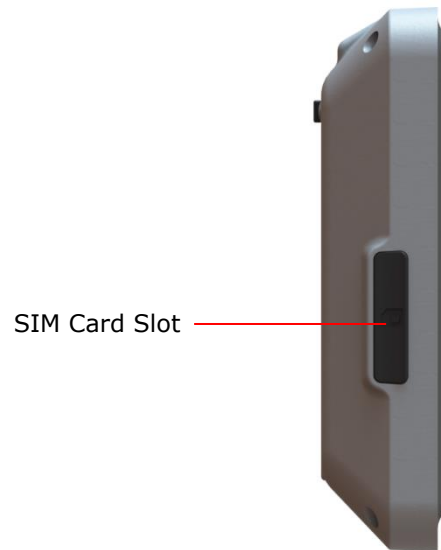


Figure 3: M-317 Left Side Panel Components

For more information about the M-317 left side panel components, see:

- [Device Connector Slot - Rubber Cover](#), on page 20
- [USB Host Port 2](#), on page 27

M-317 Rear Panel Components

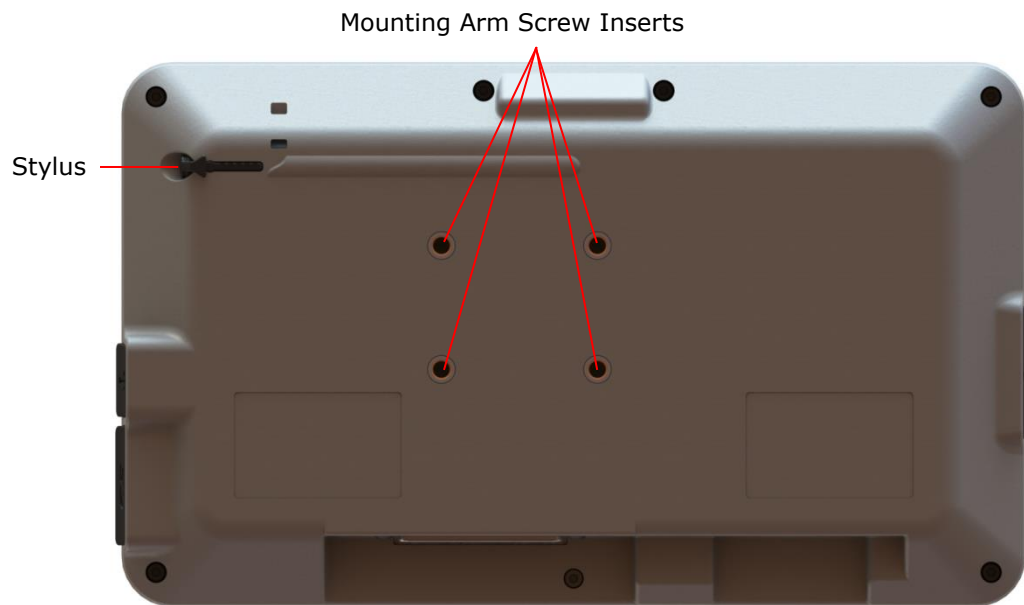


Figure 4: M-317 Rear Panel Components

For more information about the M-317 rear panel components, see:

- [Mounting Arm](#) screw inserts, on page [41](#)
- [Stylus](#), on page [22](#)

M-317 Bottom Panel Components

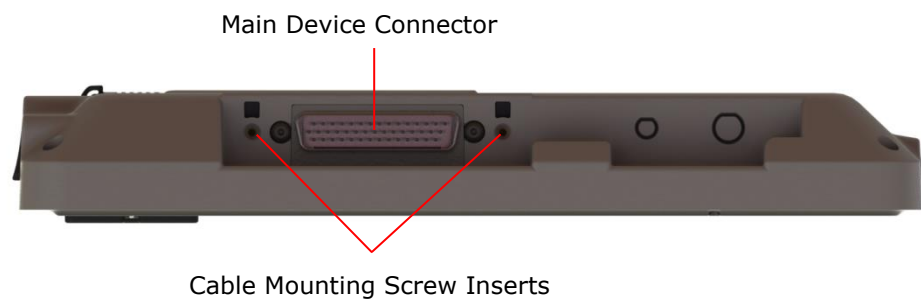


Figure 5: M-317 Bottom Panel Components

For more information about the M-317 bottom panel components, see:

- [Pinout of Main Device Connector](#), on page 30
- Cable mounting screw inserts

2

Technical and Functional Details

Platform Core

Operating System

The M-317 platform is powered by Google Android 4.0.3 ICS. For information about the M-317's OS architecture, please refer to the *M-317 Developer's Guide*.

Application Development Environment

The M-317 platform supports any open source IDE. Micronet recommends using the Android ADT Eclipse IDE.

Micronet's Development Toolkit (DTK) includes the following components:

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

For more details about the development infrastructure, product tools, and DTK contents, please refer to the *M-317 Getting Started Guide*.

Processor

- TI OMAP3715 1GHz
- High-performance Superscalar ARM Cortex™- A8

RAM

The M-317 device provides a total of 512MB of RAM memory (DDR type). Approximately 200MB of the RAM memory is dedicated for Android system use. The remaining memory is used for RAM storage or application use (user configurable).

Flash Memory

The M-317 device provides a total of 512MB of Flash memory (NAND type). Approximately 312MB of the RAM memory is dedicated for Android system use.

The remaining memory is held for data storage and for a Flash File System partition, accessible for the applications as a persistent data storage drive.

**NOTE:**

To prevent uncontrolled power cut-off situations that can cause significant Flash File System damage, verify that you have a proper power connection to the device. For more details, see [Power Management](#), page 37.

Memory Card Support

The M-317 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) supporting 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 Covers

The M-317 device has rubber covers to protect the SD card slot and USB Host connectors from water and dust.

To prevent user access to the SD card and USB Host connector, a permanent plastic cover option is available. 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, these areas can only be accessed by physically breaking the plastic cover, using an external mechanical tool.

Real Time Clock (RTC)

The M-317 platform provides a Real Time Clock (RTC) that continuously operates even when the device is powered off. To maintain the RTC, the device must remain connected to the vehicle's power supply or to an internal battery.

In addition, the 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 an automatic reset of the terminal. The watchdog mechanism is configurable to control application stability and restart the device if an application or the system hangs (freezes).

**NOTE:**

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

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

User Interface

The platform supports a 7" display.

Display

The M-317 model provides a 7" touch color display with WVGA (800 X 480 pixels) resolution.

The display uses the transfective TFT LCD technology, providing high contrast, and supporting 16M colors and a multi-level white LED backlight with a typical luminous intensity of 350cd/m2.

Touch Screen and Stylus

Each model's display provides an analog-resistive-technology-based touch screen overlay that supports a minimum of one million touches (via the stylus or finger).

Stylus

A plastic stylus is stored in the rear panel of the device for signature capture or other touch screen operations.

**NOTE:**

To prevent touch screen overlay damage, avoid coming into contact with the exposed polarizer using anything harder than the 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 near the top center of the front panel. Applications use this sensor to recognize light and dark working modes, as well as to help with device backlight adjustments.

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

Keypad

The M-317 device provides integrated rubber keys for operational convenience and safety. The Elastomer rubber tactile keypad includes the following:

- 4 directional keys (Up, Down, Left, and Right)
- 3 control keys (Accept, Decline, and Push)



Figure 6: M-317 Control, Direction and Menu Keys

All the keys are backlit and configurable to provide system audio feedback during use.

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

Customized Front Panel Label (Optional)

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

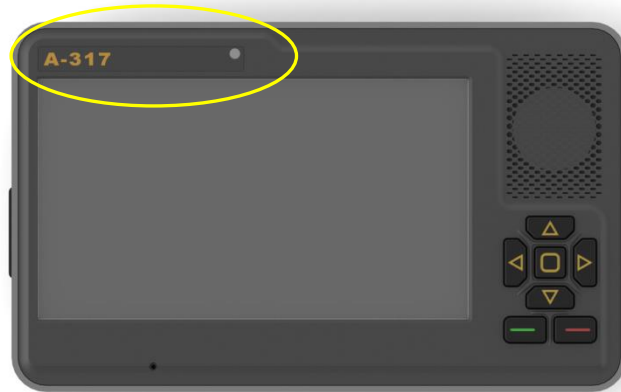


Figure 7: Customized Front Panel Label

Audio Support

Audio CODEC

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 and microphone functions using the software API.

Internal Speaker

The M-317 device provides one 3W / 8 Ω integrated speaker located on the front panel. The speaker connects to the mono channel of the platform's audio CODEC and provides a nominal volume of 90 dB @ 0.1m.

External Speaker Connection (Optional)

The M-317 device optionally provides a mono loudspeaker output of 2.75W / 4 OHM and 2.25W / 8 OHM, connected to the main device connector.

For more information about the interface signals, please see the [External Speaker](#) signal map, page 34.

Internal Microphone

The platform provides an integrated high-sensitivity microphone, located at the bottom left of the front panel.

External Microphone Connection (Optional)

The M-317 device optionally provides an audio mono input signal for an external microphone connection.

Microphone requirements/recommendations:

- Electret type of microphone
- 2.2V Feeding source
- Resistance up to 2K

For more information about these interface signals please see the [External Microphone](#) signal map, page 34.

Communication Interfaces

Serial Communication

The platform supports 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 flow control functionality using serial communication to guarantee a strong and stable communication flow for your application.

Serial Port 1 (COM1)

The platform provides an EIA-RS232 level serial communication port. This port connects to the main device connector, supporting a baud rate of 300 to 115,200bps, 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 more information about the interface signals, please see the [Serial Port 1](#) signal map on page 33.

RS422 Port (COM1) (Optional)

Serial Port 1 can be optionally configured (factory setting) to provide EIA-RS422 level serial communication. This option replaces the RS232 signals using the same connector pins.

For more information about the interface signals, please see the [RS-422 Port](#) signal map on page 33.

Serial Port 2 (COM2)

Serial Port 2 is a second RS232 port. This port connects to the main device connector, supporting a baud rate of 300 to 115,200bps, and only provides the TX and RX signals.

For more information about the interface signals, please see the [Serial Port 2](#) signal map on page 34.

USB Communication

The platform optionally supports up to three USB (Universal Serial Bus) communication ports for external devices / peripheral connections (two USB Hosts and one USB Client device).

The USB Host interface supports the following profiles:

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

The USB Client interface supports Android ADB for application development and device management using the USB Client Extension Cable described below.

USB Host Port

The USB Host communication port is connected to the USB connector located on the right panel of the device.

The USB Host port supports the USB 2.0 low, full, and high-speed communications standards.

USB Host Port 1

The USB Host Port 1 connects to the main device connector. This port supports the USB2.0 low, full, and high-speed communications standards.

**NOTE:**

The USB Host port provides up to 500 mA of power consumption for non-self-powered client devices.

For more information about these interface signals please see the [USB Host 1](#) signal map on page 33.

USB Host Port 2 (Optional)

The USB Host Port 2 is located on the right panel of the device. This port supports the USB2.0 low, full, and high-speed communications standards.

**NOTE:**

The USB Host port provides up to 500 mA of power consumption for non-self-powered client devices.

For more information about these interface signals please see the [USB Host 2](#) signal map on page 33.

USB Client

The USB Client port provides by using a USB Client Extension Cable (Includes in the M-317 DTK). This cable is used for Android's ADB protocol and supports:

- Device configuration
- Management tools
- Application development
- Debugging

Peripheral Controls

Digital Inputs

The platform provides two digital inputs, IN1 and IN2 (automotive voltage level), for monitoring the ignition switch signal and other signals.

The input signals connect to the main device connector.



NOTE:

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, please refer to the *Digital I/O* and *Power Management* sections of the *Developers Guide*.

Table 1: Input State Electrical Parameters

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

For more information about this interface signal, please see the [Digital Input](#) signal map on page 33.

Digital Outputs

The platform provides a digital output (Open Collector) for external peripheral control. This signal connects to the main device connector.

Table 2: Open Collector Output Electrical Parameters

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

For more information about these interface signals please see the [Digital Output](#) signal map on page 33.

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 connects to the main device connector.

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

For more information about these interface signals please see the [Analog Input](#) signal map on page 33.

Wireless Communication

Wireless LAN and Bluetooth Class2

Overview

The M-317 platform provides an optional combined Wireless Local Area Network (IEEE 802.11) and Bluetooth (Class2) communications module.

Wireless LAN communication is especially suited for high-speed data transfer over the air, when a Wireless LAN hotspot infrastructure exists. For applications that require large data transactions, Wireless LAN is the most economical way to implement the solution.

Bluetooth communication is used for Bluetooth-enabled connections with peripherals such as an audio headset and printer.

The M-317 Wireless LAN and Bluetooth Class2 module adopts TI's latest highly integrated WLAN and Bluetooth SoC, LSR's TiWi-R2, which is based on TI's WL1271 chipset.

Wireless LAN Operation

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

In addition to supporting WPA / WPA2, WEP 64-bit, and 128-bit encryption, this module supports the following:

- IEEE's 802.11i security standard through the implementation of AES (Advanced Encryption Standard), CCMP (Counter Mode CBC-MAC Protocol), and WEP with TKIP security mechanisms.
- IPsec with DES / 3DES / ASE encryption and MD5 / SHA-1 authentication
- WAPI specifications for the Chinese market
- (the AW-GH381 supports) 802.11e QoS (Quality of Service) for voice applications

Bluetooth Operation

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

The M-317 system supports the following Bluetooth communication profiles:

- Serial interface profile

3

Main Connector Signal Map

Overview

This chapter describes the basic and optional device interface signals found on the main device connector.

The connector type is a male D-Sub 44 Pin connector. All pins are ESD protected (against electrostatic discharge). The connector’s “shield” pins are tied to ground.

This chapter uses the following abbreviations:

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

Pinout of Main Device Connector

Pinout by Pin Number

The following table lists the connector’s signals by pin number.

Table 3: Main Device Connector Signal Map (by Pin Number)

Pin	Signal	Type	Function	Specifications
1	VIN_GND	G	MDT Power supply Ground	
2	VIN_GND	G		

Pin	Signal	Type	Function	Specifications
3	+VIN	V	Input Power 12V/24V	Typical – 12V/24V - Minimum continues – 6V (5V for up to 40ms according to ISO7637) - Maximum continues – 32V
4	+VIN	V		
5	GND	G	Ground	
6	N/A			
7	N/A			
8	CAN-	I/O	CAN Low Signal	
9	CAN+	I/O	CAN High Signal	
10	USB Host 1 D-	B	USB Host Port1 Data-	Universal Serial Bus Specification Rev 2
11	USB Host 1 D+	B	USB Host Port1 Data+	Universal Serial Bus Specification Rev 2
12	USB Host 1 +5V	V	USB Host Port1 VBUS	Universal Serial Bus Specification Rev 2
13	USB Host 1 GND	G	Ground	Universal Serial Bus Specification Rev 2
14	USB OTG D+	+	USB OTG Data+	Universal Serial Bus Specification Rev 2
15	USB OTG D-	-	USB OTG Data-	Universal Serial Bus Specification Rev 2
16	USB OTG +5V	V	USB OTG VBUS	Universal Serial Bus Specification Rev 2
17	USB OTG GND	G	Ground	Universal Serial Bus Specification Rev 2
18	N/A			
19	N/A			
20	ANA_IN	I	Analog Input	0V-30V max, 12k OHM
21	N/A			
22	N/A			
23	N/A			
24	ANA_IN GND	G	Ground	
25	N/A			
26	N/A			
27	Dig_Out1	O	Digital Output 1	Open Collector Max. switchable current = 300mA Max. switchable voltage = +VIN Max. saturation voltage = 0.6V
28	Dig_In1	I	Digital Input 1 (Ignition)	Typical Min Max

Pin	Signal	Type	Function	Specifications
			switch)	Input Low: VIL 0V -30V 6V Input High: VIH 12V-24V +8V +30V
29	N/A			
30	N/A			
31	GND	G	Ground	
32	TXD1 or 422 RX-	O	RS232 Transmit Data (COM1) or RS422 Receive Data -	EIA-RS232 level EIA-RS422 level
33	RTS1 or 422 RX+	O	RS232 Request To Send (COM1) or RS422 Receive Data +	EIA-RS232 level EIA-RS422 level
34	RXD1 or 422 TX-	I	RS232 Receive Data (COM1) or RS422 Transmit Data-	EIA-RS232 level EIA-RS422 level
35	CTS1 or 422TX+	I	RS232 Clear To Send (COM1) or RS422 Transmit Data+	EIA-RS232 level EIA-RS422 level
36	RS-232 GND	G	Ground	
37	RXD2	I	RS232 Receive Data (COM2)	EIA-RS232 level
38	TXD2	O	RS232 Transmit Data (COM2)	EIA-RS232 level
39	RS-232 GND	G	Ground	
40	EXT_SPEAKER-	G	External Speaker -	(optional)
41	EXT_SPEAKER+	G	External Speaker +	(optional)
42	GND	G	Ground	
43	EXT_MIC+	G	External Microphone +	(optional)
44	EXT_MIC-	G	External Microphone -	(optional)

Pinout by Functionality

The following table lists the connector's signals by functionality.

Table 4: Main Device Connector Signal Map (by Functionality)

Pin	Signal	Type	Function	Specifications
-----	--------	------	----------	----------------

Pin	Signal	Type	Function	Specifications																				
1	VIN_GND	G	MDT Power supply Ground																					
2	VIN_GND	G																						
3	+VIN	V	Input Power 12V/24V	Typical – 12V/24V - Minimum continues – 8V - Maximum continues – 32V																				
4	+VIN	V																						
6	N/A																							
7	N/A																							
8	CAN-	I/O	CAN Low Signal																					
9	CAN+	I/O	CAN High Signal																					
10	USB Host 1 D-	B	USB Host Port1 Data-	Universal Serial Bus Specification Rev 2																				
11	USB Host 1 D+	B	USB Host Port1 Data+	Universal Serial Bus Specification Rev 2																				
12	USB Host 1 +5V	V	USB Host Port1 VBUS	Universal Serial Bus Specification Rev 2																				
13	USB Host 1 GND	G	Ground	Universal Serial Bus Specification Rev 2																				
20	ANA_IN	I	Analog Input	0V-30V max, 12k OHM																				
24	ANA_IN GND	G	Ground																					
27	Dig_Out1	O	Digital Output 1	Open Collector Max. switchable current = 300mA Max. switchable voltage = +VIN Max. saturation voltage = 0.6V																				
28	Dig_In1	I	Digital Input 1 (Ignition switch)	<table border="0"> <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></td> </tr> <tr> <td>6V</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Input High: VIH</td> <td>12V-24V</td> <td>+8V</td> <td></td> </tr> <tr> <td>+30V</td> <td></td> <td></td> <td></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																								
32	TXD1 or 422 RX-	O	RS232 Transmit Data (COM1) or RS422 Receive Data -	EIA-RS232 level EIA-RS422 level																				
33	RTS1 or 422 RX+	O	RS232 Request To Send (COM1) or RS422 Receive Data +	EIA-RS232 level EIA-RS422 level																				
34	RXD1 or 422 TX-	I	RS232 Receive Data (COM1) or RS422 Transmit Data-	EIA-RS232 level EIA-RS422 level																				
35	CTS1 or	I	RS232 Clear To Send (COM1)	EIA-RS232 level EIA-RS422 level																				

Pin	Signal	Type	Function	Specifications
	422TX+		or RS422 Transmit Data+	
36	RS-232 GND	G	Ground	
37	RXD2	I	RS232 Receive Data (COM2)	EIA-RS232 level
38	TXD2	O	RS232 Transmit Data (COM2)	EIA-RS232 level
39	RS-232 GND	G	Ground	
40	EXT_SPEAKER-	G	External Speaker -	(optional)
41	EXT_SPEAKER+	G	External Speaker +	(optional)
42	GND	G	Ground	
43	EXT_MIC+	G	External Microphone +	(optional)
44	EXT_MIC-	G	External Microphone -	(optional)
5	GND	G	Ground	
31	GND	G	Ground	
14-19	N/A			
21-23	N/A			
25-26	N/A			
29-30	N/A			

4

Platform Power

Overview

The M-317 power comes directly from the vehicle's 12V/24V DC battery and provides intelligent power management options that reduce drain on the vehicle's battery. In addition, the M-317 also enables the control of external peripheral power, backlight and power lines for internal modules.

Both internal and external devices can be turned on and off, as required.

Battery Voltage Input

The M-317's power is connected through the main device 44 pin connector [pin 3 and 4 (+) and pin 1 and 2 (-)], directly to the vehicle's battery or VLU (Vehicle Location Unit), to provide constant power. The M-317's nominal voltage supply, from the vehicle's battery is 12v or 24v, and the operating range is between 8v and 30v.



WARNING!

The M-317 has no internal fuse, and should therefore be connected directly to the vehicle's battery power source via a 10A fuse. An inline fuse holder with a 3A fuse (HHC/HHD blade-type fuses), should be added to the M-317 power cable. See [Vehicle Battery Connection](#), on page 45.



WARNING!

Do not connect the terminal power to the ignition switch signal. This can cause uncontrolled power cut offs, which may have a detrimental effect on the operating system. Instead, connect the terminal power directly to the car battery and the ignition switch signal to the device's Automotive Input. When the ignition switch signal is powered off, use the shutdown function to power off the terminal, ensuring that all files and sessions have first been closed.

Super Capacitors

In order to prevent device storage drive corruption during an unpredictable power cut-off or voltage cranking situation (during vehicle ignition for instance), the M-317 offers a super capacitor option for short power backup.

Using this option, the device monitors the input-power voltage level and, if the power voltage drops below 4.7VDC, the system closes the device's backlight and disables the write access to the Flash storage, USB storage and SD card memory. If the voltage level increases to a value above 3.8V DC within 200 milliseconds, the backlight and storage access will be re-enabled and the device will continue to perform as usual. If the voltage remains low for more than 200 milliseconds, the device will perform a shutdown.

Device Power Consumption

Table 5: M-317 Basic Configuration Current Consumption

M-317 Basic Configuration Current Consumption					
<i>Power OFF</i>		<i>Suspend</i>		<i>Idle Mode Load</i>	
<i>12V</i>	<i>24V</i>	<i>12V</i>	<i>24V</i>	<i>12V</i>	<i>24V</i>
3mA	3mA	30mA	20mA	280 mA	160mA

5

Power Management

Overview

The M-317 system provides smart power management during device operation. The power management capabilities include power state management, performance adjustment, automatic backlight and additional power consumption control.

The power management capabilities are especially helpful when the device is connected to the vehicle's battery and 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 use. For more information on the M-317 platform power-management architecture, please refer to the "Power Management" section in the *Developers Guide*.

Understanding Power States

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

Backlight Dimming

The backlight dimming timeout and brightness can be configured through the Settings display screen.

Shutdown

Performing a long press on the **Decline** key will power off the device.

State characteristics:

- Main storage is flushed; settings are preserved

- RTC is alive
- Memory allocation is not preserved
- GPS Almanac is preserved

Triggers to Enter the State:

- Pressing and holding the **Decline** key for 3 seconds
- Calling the API function
- Expiring system Power management timeouts

Triggers to Exit the State:

- Pressing the **Push** key
- RTC alarm occurrence
- Receiving a signal from Automotive Digital Input 1



Figure 8: Device Manual Software Shutdown

Warm BOOT Reset

State characteristics:

- Main storage (files and registry) is flushed; settings are preserved
- RTC is alive
- Memory allocation is not preserved
- Object Store is preserved
- GPS Almanac is preserved

Triggers to Enter the State:

- Pressing and holding the **DECLINE**, **UP** and **DOWN** keys for 1 second
- Calling the API function



Figure 9: Device Manual Warm BOOT Reset



WARNING!

It is highly recommended that the driver not use the Warm BOOT reset. Only a technician or developer should perform this operation for troubleshooting purposes. Do not perform this operation while the application is saving data to the Flash storage as it may damage the Flash File system.

Hardware Power Down

This is a shelf storage power down state.

State characteristics:

- Main storage (files and 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 **DECLINE**, **Up** and **DOWN** keys for 5 seconds

Triggers to Exit the State:

- Pressing the **Push** key



NOTE:

This hardware power down state is for storage purposes only. The RTC is not saved and the memory allocation will reset to its factory settings.



Figure 10: Device Manual Power Down

6

Device Installation

Mechanical Installation

Mounting Arm

The rear panel of the M-317 provides the mechanical infrastructure for a RAM® mounting-stand installation.

The RAM® mounting arm is a flexible, rotating, arm-based mount that provides a wide range of fixed in-cabin positions for maximum comfort and visibility. The mounting-arm screw-insert positions on the M-317 rear panel are compatible with the RAM® Mount's standard mounting-arm products.

**NOTE:**

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

Mounting Inserts Location and Dimensions

There are four M5 thread mounting [PEM Screw Inserts](#) found on the back panel of the M-317.

Micronet provides four screws with the RAM® mounting arm. If you choose another type of mounting arm, you must take in account the [Mounting Arm Ball Stud](#) base depth when calculating the screw thread length.

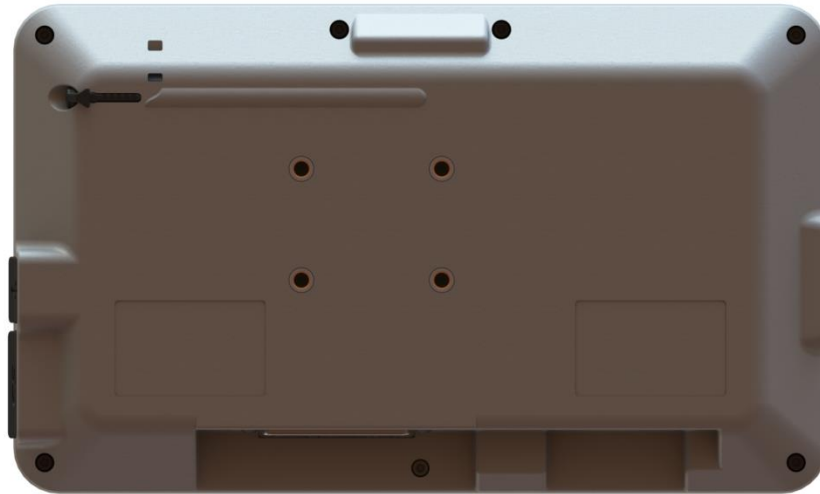


Figure 11: M-317 Back Panel Mounting Arm Screw Inserts

Mounting Arm Screw Inserts Dimensions

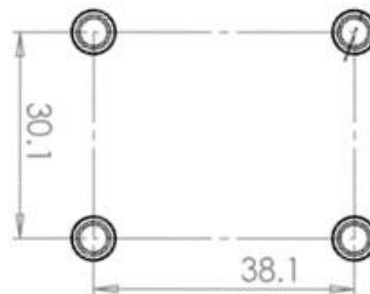


Figure 12: M-317 Back Panel Mounting Arm Screw Insert Dimensions

PEM Screw Inserts

The following parameters present the PEM screw insert dimensions:

1. M5 thread
2. PEM thread length 6.6 mm
3. Screw length 5-5.5 mm + [Mounting Arm Ball Stud](#) depth

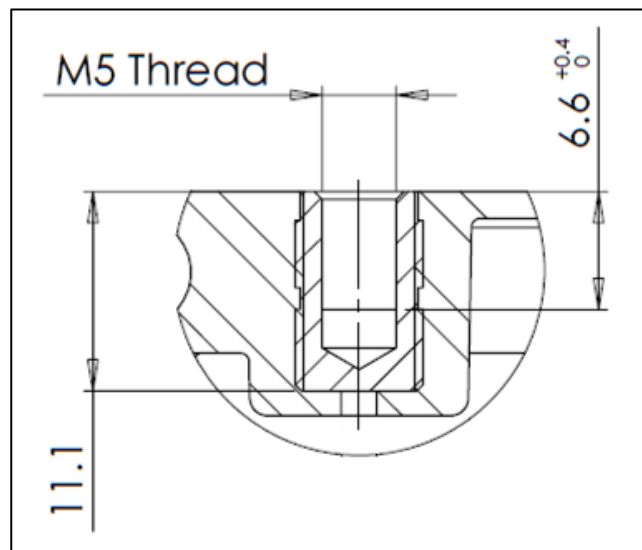


Figure 13: M-317 Back Panel Mounting Arm PEM Screws Inserts Dimensions

Mounting Arm Ball Stud



Figure 14: Mounting Arm Ball Stud

Device Installation Steps

1. Determine the optimal positioning of the M-317 device in the vehicle that provides easy access and a clear view of both the road and the display.
2. Attach the base of the mounting-arm assembly to the dashboard or cabin.
3. Attach the mounting arm to the rear panel of the device, using the mounting screw inserts.
4. Connect the M-317 device with the mounting arm to the mounting arm base.
5. Adjust for the optimal device position and fix it by tightening the mounting-arm wing nut.
6. Follow the power cable preparation as described in [Electrical Installation](#), on page 45.

Electrical Installation

The main device connector, a D-SUB 44 pin male connector, provides most of the interface signals of the device. A matching female connector is used to implement the power and peripherals connectivity of the solution. Please refer to the M-317 Hardware Guide, [Main Connector Signal Map](#), on page 30, for the main device connector's signals map.

For cabling customization, please contact your marketing representative.



Figure 15: M-317 Main Device Connector

Vehicle Battery Connection

The M-317's input power should be connected directly to the vehicle's battery. See the Electrical Installation [Figure 16](#) below.

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



NOTE:

The M-317 device has no internal fuse and therefore, should be connected to the vehicle's power line protected by a 10A fuse. An inline 3A "Slow Blow" fuse (with a fuse holder for HHC/HHD blade-type fuses) should be added to the power cable.



WARNING!

Do not connect the terminal power to the ignition switch signal. This will prevent uncontrolled power cut-offs, which may have a detrimental effect on the operating system.

The +Vin signals of the device must be directly connected to the Vehicle battery. To properly set up the power management, you must connect the vehicle's 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 37.



NOTE:

Connecting power to the M-317 does not enable the device. Only pressing the Push key or having a signal rise on Digital Input 1, enables the device from the power-down state.

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

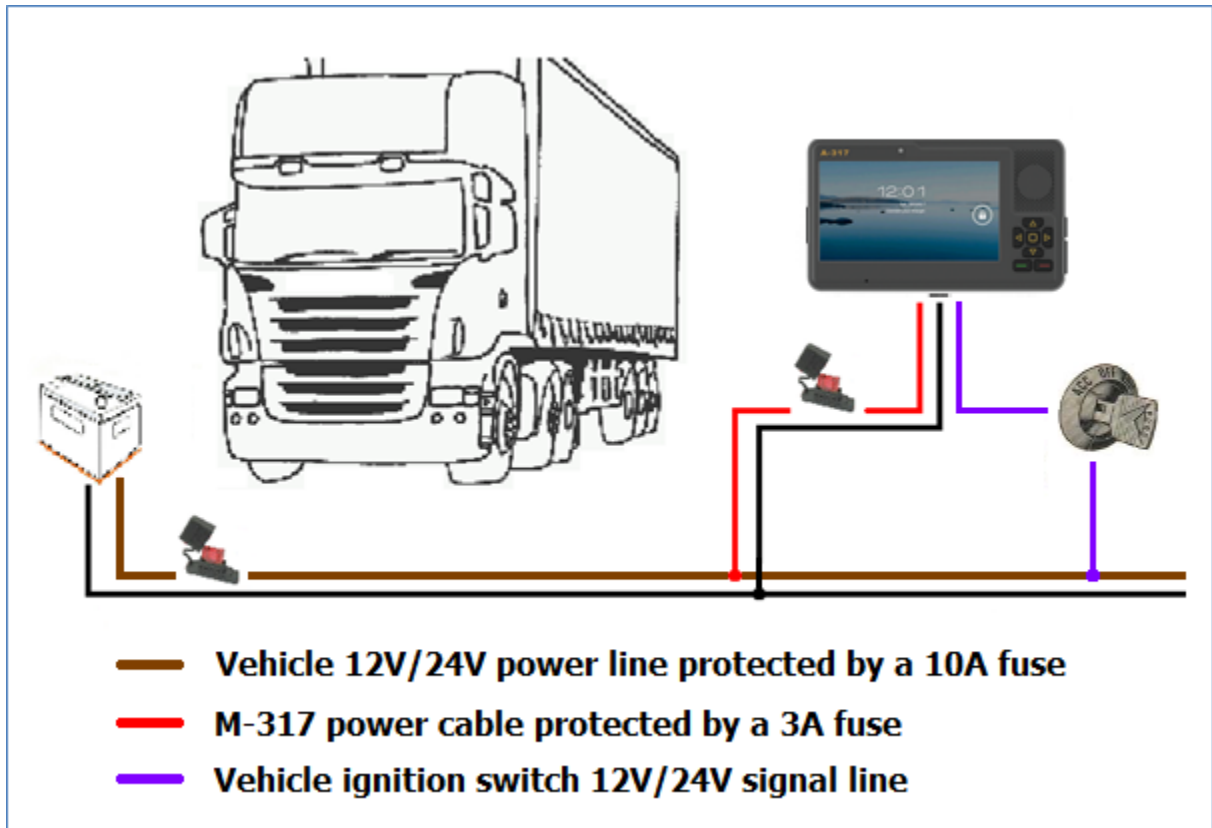


Figure 16: Electrical Installation Scheme

Electrical Installation Procedure

1. Prepare the wiring for power and all other required peripherals in the vehicle, for connection to the Accessory cable.
2. Connect the Accessory cable to the M-317 main device connector.
3. The power signals from the Accessory cable should be connected to the vehicle's power line protected by a 10A fuse. An inline 3A "Slow Blow" fuse (with fuse holder for HHC/HHD blade-type fuses) should be added to the power cable.
4. To power on the M-317 device press the Push button and verify that all connected peripherals operate properly.
5. Fix the Accessory cable with cable mounting screws after verifying that all the functions are performing properly.
6. Arrange the cables using a plastic strip.

7

M-317 Platform Physical Characteristics

Physical Characteristics

Table 6: Physical Characteristics

Dimension	Measurement	
<i>M-317 Dimensions & Weight</i>		
Width	8.70 inch	221 mm
Height	5.23 inch	133 mm
Depth	1.18 inch	30 mm
Weight	17.50 oz. 498 Gram	

8

Appendix

Appendix A

Regulations & Certifications

The M-317 complies with the following requirements:

FCC Rules (Class B)

CFR 47, Part 15 Subpart B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

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.

Instructions concerning human exposure to radio frequency electromagnetic fields

To comply with FCC Section 1.307 (b)(1) discussing human exposure to radio frequency electromagnetic fields, please perform the following:

Maintain a distance of at least 20cm between the equipment and all persons during the operation of the equipment.

FCC Warning

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

THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

IC Canada compliance

This device complies with FCC Rules Part 15 and with Industry Canada license-exempt RSS standard(s). Operation is subject to two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may be received or that may cause undesired operation.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.