CCpilot VI

Technical manual

maximatecc

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Contents

1. Introduction

CCpilot VI is an easily configurable, full-colour 3"5 display enabling appealing user interfaces in a compact form factor. Designed especially for the off-highway and industrial markets, CCpilot VI offers exceptional readability and all-weather performance. It is suitable for both bracket mounting and integration in a dashboard.

This technical manual and reference handbook provides important information regarding the hardware and basic usage. For software and operating system specifics please see additional documentation.

1.1   Product models

This documentation is applicable for CCpilot VI. This platform also enables customization of hardware and software. Described herein are the possibilities which can be obtained using above product models, additional features are described in model specific documentation.

1.2 Conventions and definitions

The following definition is used to separate unit specific details. The observe symbol is also used to highlight such difference.

Defines	Use
CCpilot VI	Information that is specific for CCpilot VI
VI or VI device	Information that applies to CCpilot VI

The observe symbol is used to highligt information in this document.

The exclamation symbol is used to highlight important information.

Text formats used in this document.

Format	Use
Italics	Paths, filenames, definitions.
Bold	Command names and important information

1.3 Identification

On the backside of the VI device there is a label containing version and serial numbers which identify your unique device. Take note of them. During service and other contact with the supplier it is important to be able to provide these numbers.

1.4 Care

- During welding or other service on the machine, all cables to the VI device shall be disconnected.

- Serviced shall only be made by authorised personnel. If the unit is opened by unauthorised personnel, the guarantee will cease to be valid.

- Scratches, or in the worst case damages, to the display occur easily if it comes in contact with a sharp edge or hard material. In order to increase the longevity of the screen, this is naturally something which should be avoided.

- The Flash memory used for storage is durable; however as with all flash memory types the write cycles are limited. Avoid unnecessary writing to the flash memory.

- If the unit becomes too hot it will operate at a limited speed and can also be damaged. Therefore, do not cover the unit by covering it, for example hanging a jacket or other clothes on it.

- Consider traffic safety when CCpilot VI is installed and whenever it is used. maximatecc does not recommend that CCpilot VI or its accessories be used actively by the driver when a risk of injury to people, or damage to property, is present.

- Be advised that the VI device draws power from the vehicle battery. This can result in the inability of the vehicle to start if the on-board computer has been on for a period of time without the vehicle engine running.

1.5   Environment and Environmental Tolerance

The VI device has been designed to cope with tough environmental demands. Strict tests have been conducted on the unit in order to ensure that it fulfils the expectations of a rugged unit. Much work has been performed to choose and design internal components so that they, under all circumstances and in the best possible way, provide you with a dependable and user-friendly working instrument. Within the chapter Specifications, a list of standards can be found according to which VI device has been tested and approved.

The VI device is preferably placed in a way that prevents exposure to water contact. It is also important that it is mounted securely on a stand or the like to inhibit the unit from moving and thereby becoming damaged, damaging the vehicle and/or people during, for example, a traffic accident.

1.6   Cleaning

To ensure proper and reliable functionality over time, the unit shall be wiped cleaned of dirt and dust. Use a suitable light damp rag to clean the unit.

Never use alkaline, alcoholic or other chemicals for cleaning which can damage the unit.

2. Overview

The VI device is a compact, robust and versatile indication Display. It is equipped with, a large number of connection alternatives such as CAN, configurable I/O, and USB.

1.7 Front side

3.5'' Color QVGA

Rugged Engineering Resin Enclosure

Keypad for Navigation

1.8 Rear side

On the rear side of the VI device there are the external connectors (Duetsch DTM-12), which are described in more detail in the chapter Connectors. There are also mounting holes for fasteners for attaching the RAM mount shown or bracket for panel mounting.

GORE-TEX membrane, under mount for added protection

External connectors

RAM mount (purchased separately)

3. Installation

Install the device in such a way that is considered safe and does not expose any unnecessary stress to the unit. In this section, some recommendations are made regarding installation.

1.9   Connecting to power supply

This instruction address vehicle installations but the principle is the same also for other types of installations. See also the description of the pin outs for the Power Supply Connector under the section External interface description.

- Carefully follow the connection instructions below. Make sure that all contacts are angled correctly and that they do not have to be forced, but lock gently and pliant.

- GND Pin J1-2 is connected to the vehicles ground.

- Battery Pin J1-1, i.e. the display's power supply (+12/+24 VDC), should be connected directly to the vehicle's battery through 10 A fuse (F1). Wire gauges shall be dimensioned with respect to cable length, supply voltage etc. Minimum cable area is TBD.

- The Switched Power Input Pin J1-3, i.e. the display's on/off signal is connected via the vehicles ignition switch (S1). The maximum allowed input current for the ignition switch signal is 2 mA. The fuse F2 fuse rating and wire gauge shall be dimensioned for the total switch current.
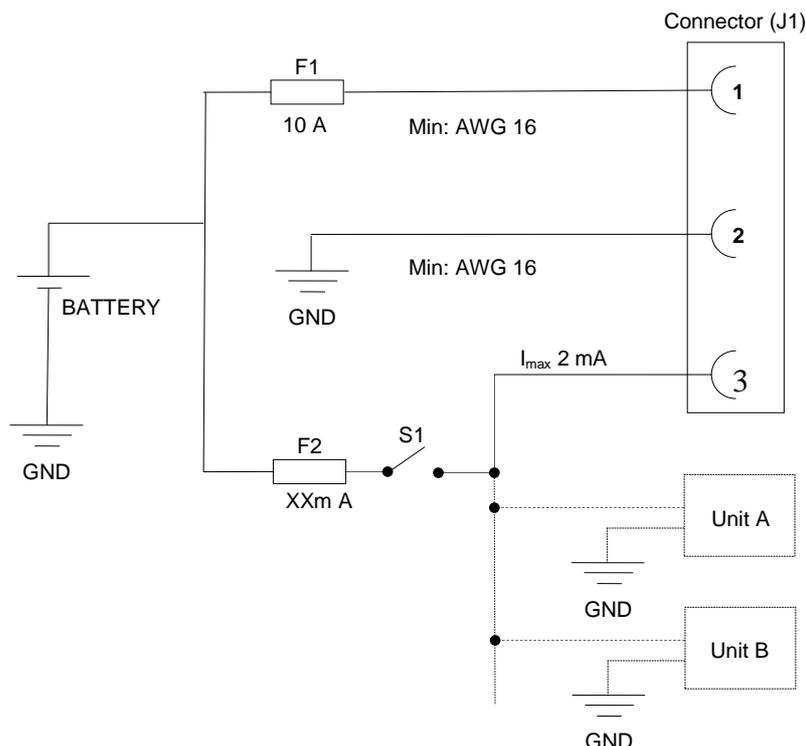
By connecting the power supply according to the illustration above, the device will automatically start when the main switch or turnkey is turned on, and shut down when the switch or turnkey is turned off.

i. Precautions

If applicable connect the power supply to the device before any main switch, as per the illustration above. If this is not possible, ensure that the device is turned off using for example the on/off button or turnkey functionality before turning off the main switch or in any other way making the computer powerless.

Sudden power disruptions may cause the device to shut down, potentially causing lost or corrupt data. If for example the power fluctuates when starting the vehicle engine, the device should be started after the vehicle engine is running.

Ensure that any application data is saved before turning off the device.

During welding or other service on the machine, all cables to the VI device shall be disconnected.

1.10 Mounting

CCpilot VI is preferably mounted using a RAM-B-238U Mount which allows adjustment of the display's position and angle.

To fasten, use the appropriate M5 x 0.8 button head screw of type MRT (Torx). The length of the screws should be 30mm when using the Spacer maximatecc P/N 123295. If the spacer is not used the screw length should be 12mm. The recommended torque for the screws is 1.5-2.0 Nm. Using a split ring or toothed lock washer is recommended.

An alternate mounting method would be in a panel using the 123233 Mounting kit.

Ensure that CCPilot VI is mounted to a smooth, flat surface. Fastening the unit to an uneven surface may stress the enclosure, damage the outer flange or possibly even flex the circuit board inside, leading to a premature failure.

Ensure the M5 mounting screws are clean and dry, and apply torque of 1.5-2.0 Nm. Use lock washers.

1.11 Environmental considerations

- The device shall be placed in a way that prevents the unit from direct exposure to water.

- Use caps on any connectors that do not have attached cables.

- On the back side of the unit there is a hydrophobic membrane, seen as a white disc. This membrane must never be faced upwards when the unit is mounted. Be cautious not to insert any object into this hole since it can puncture the hydrophobic membrane, leaving the unit unprotected from moisture and dust intrusion. If the membrane is punctured the guarantee is void.

- To enable sufficient cooling, the VI device must be installed so that air is able to circulate around the device, avoid installing the device near hot air vents or the like. There must be at least 50 mm free distance around the unit.

- Loose mounting bolts are the most common reason for excessive vibration. Mounting bolts may become loose due to improper techniques such as missing lock washers, over tightening or under tightening. Proper tightening requires clean dry bolts, and a torque wrench.

- When CCpilot VI or any device is installed in a vehicle environment it is important that the installation is traffic-safe. maximatecc does not recommend that CCpilot VI or its accessories are used actively by the driver or operator when a risk of injury to people, or damage to property, is present.

1.12 Cables

Cables shall be installed in such a way that they don't run any risk of being damaged, pinched or worn.

- Avoid bending and twisting cables

- Strain-relief on cables near the connection to the respective unit

- Properly snap the connectors to give good contact and avoid unnecessary strain

4. Basic operations

This section covers basic operation of the VI device such as start-up and shut-down.

1.13 Starting Up

Start CCpilot VI via the vehicle's ignition switch. A menu will appear on the CCpilot VI's LCD screen as an indication that the unit is starting up.

1.14 Turning off

Turn off CCpilot VI via the vehicle's ignition switch.

i.   Shutting Down

To ensure that data does not get lost or the flash memory becomes corrupt, it is recommended that all necessary data shall be saved and all programs closed before the unit is shut down.

ii.   Standby

In this state the ignition switch is in the OFF position but the unit is supplied power through the J1-1 power input. The display can be woken up from this state by any of the following events:

* Keypad button press

* Configurable Input Change Of State

* CAN Receive Event

* Real Time Clock (Alarm Clock)

NOT SURE IF THESE FEATURES ARE ACTUALLY IMPLEMENTED!!!!!! SW input.

1.15 Adjusting the screen brightness

LED screen brightness is software configurable. Adjustability range is 0-100% in 1% increments.

1.16 Clock back-up battery

Time and date information is stored in a memory sustained by a rechargeable back-up battery. In its fully charged state, the battery has a lifetime of approximately 30 days.

5. Interface overview

This section describes the interfaces on the VI device. Note that depending on product model, all interfaces may not be present. See the section standard product model equipment level for information on the respective unit configuration.

1.17   Storage memory

16 Mbytes of NAND Flash memory is used for data storage. A 64 Mbyte version of the CCpilot VI is also available.

1.18   Buzzer

A buzzer that can be used for user notifications exists on the VI. Activation and use of the buzzer is software configurable.

1.19   CAN

The VI device has two CAN interfaces that meet the CAN ISO 11898 2.0B specification. The CAN shields are terminated (AC coupled to ground) per the SAE J1939 physical layer specification.

1.20   USB

USB ports enable connection of a multitude of devices to the VI device. The USB port is designed to the USB 2.0 standard.

The USB port can supply up to 500 mA.

1.21   Configurable inputs

There are four configurable inputs available on the VI device. The input configuration setting is controlled via software. The input configurations consist of:

- Voltage
- Resistive
- Frequency
- Switched To Ground (Internal Pull Up)
- Switched To Battery (Internal Pull Down)

1.22   Switched Outputs

Two switched outputs to control external loads such as a buzzer, relay or lamp are provided. The outputs have a maximum current rating of 4 Amps per channel.

PWM duty cycle and frequency is adjustable via software.

The outputs are protected from short circuit conditions in addition to incorporating fault detection to determine if the output has been shorted to ground, battery or is open circuit.

6. Connectors

All connectors are accessible from the rear of the unit. The connectors are marked with a 1(J1) and a 2(J2).

Use caution and avoid plugging/unplugging of connectors when the display is on.

Always replace a damaged cable. If the pins become bent or damaged they may not function correctly, or in the worst case, the on-board computer or other equipment may be damaged.

1.1. Connector layout

Notice that the connector descriptions are those which are located on the unit, not those that the attached cables shall have in order to mate with them.

J1 Connector

Pin #	Default signal	Comments	
1	+12/24 VDC	Main Power Input	12-pin Deutsch DTM Series Key A
2	GND	Main Ground Input	
3	Switched Power +12/24 VDC	Iginition Input	
4	Switched Output 1		
5	Switched Output 2		
6	CAN 1 Shield		
7	CAN 1+		
8	CAN 1-		
9	USB Ground		
10	USB Data –		
11	USB Data+		
12	USB VBus	USB Power Out	

J2 Connector

Pin #	Default signal	Comments	
1	Configurable Input 1		12-pin Deutsch DTM Series Key B
2	Configurable Input 2		
3	Configurable Input 3		
4	Configurable Input 4		
5	Analog Ground		
6	CAN 2 Shield		
7	CAN 2+		
8	CAN 2-		
9	Not Used		
10	Not Used		
11	Not Used		
12	Not Used		

7. Specifications

The specification may vary depending on your computer configuration.

1.1. Standard models connectivity level

Interface / Feature	CCpilot VI
CAN bus	2
USB Host	1
Configurable Inputs	4
Switched Outputs	2

1.23 Technical data

Kernel	
Processor	Freescale Kinetis K70, ARM Cortex M4, 150 MHz
Program Memory	1 MB
Data storage	16 MB, NAND flash
RAM memory	8 MB, DDR

Interfaces	
CAN	
Type	CAN ISO 11898-2, 2.0B, (High Speed CAN)
Driver	SN65HVD234
Baud Rate	250 kbit/s
USB	
Type	Host, V 2.0
Speed	Full speed, max 12 Mbit/s
Host port	5 V, max 500 mA
Configurable Inputs	
Mode	Voltage
Input Range	0 to 5 VDC
Accuracy	6mV
Resolution	.4mV
Mode	Resistance
Range	1 - 1000Ω
Accuracy	3Ω ±2%
Resolution	2Ω
Mode	Frequency
Range	1 – 12 kHz
Accuracy	3 Hz
Switched Outputs	
Maximum Current	4A per channel, 8A total
Input Voltage Range	9 to 32V

Software	
Operating system	MQX
Additional software	TBD

Display	
3.5"	
Type	TFT
Resolution	QVGA, 320 x 240
Colour depth	24 bit
Backlight	LED, 400 cd/m2

Power Supply	
Supply Voltage	12 or 24 V nominal
Power Consumption	< 1 A at 24 V

1.24 Environmental tolerance

Environmental Test	Standard	
Dry Heat	TBD	Operating: +70°C, 24h Storage: +80°C, 24h
Damp Heat	TBD	Operation: +25°C / +55°C >93% RH 6*24h
Cold	TBD	Operating: -40°C, 24h Storage: -40°C, 24h
Vibration	TBD	0,01 g2/Hz 10-200 Hz 3x0.5h
Shock	TBD	5 g / 11ms 3x ±1000 bumps
EMC Electrical Transient	ISO 7637-2	Pulse 1: -50V 2: +25V 3a: -35V 3b: +35V 4: -5V 5: +70V
EMC Immunity, ESD	ISO 10605	15 kV air, 8 kV contact
EMC Immunity, RF	ISO 11452-2 ISO 11452-4	RF electromagnetic field 200-1000MHz 30V/m Bulk Current Injection 20-200MHz 60mA
EMC Emission	ISO 14982	Radiated Nar.b. Bro.b. MHz dBµV/m dBµV/m 30-75 54-44 64-54 75-400 44-55 54-65 400-1000 55 65
EMC Radiated RF immunity	EN 61000-4-3	RF electromagnetic field 80M-1GHz 10V/m 1G-2GHz 3V/m 2G-2,7GHz 1V/m
EMC Induced RF 1)	EN 61000-4-6	0.15-80MHz 10V
EMC Radiated RF emission	CISPR 25	MHz dBµV/m .150-54MHz 40 230-1000MHz 47
Enclosure	EN 60529	IP65

The tests are performed with 24 V power level. The environmental tolerance may be affected by external factors like mounting and shielded cables etc.

i.   FCC Notice to Users

Users are not permitted to make changes or modify the device in any way. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.25 Weight and dimensions

i.   CCpilot VI 3.5"

Description	
Enclosure size	107.7 x 103.1 x 42.7 mm (W x H x D)
Weight	198 g
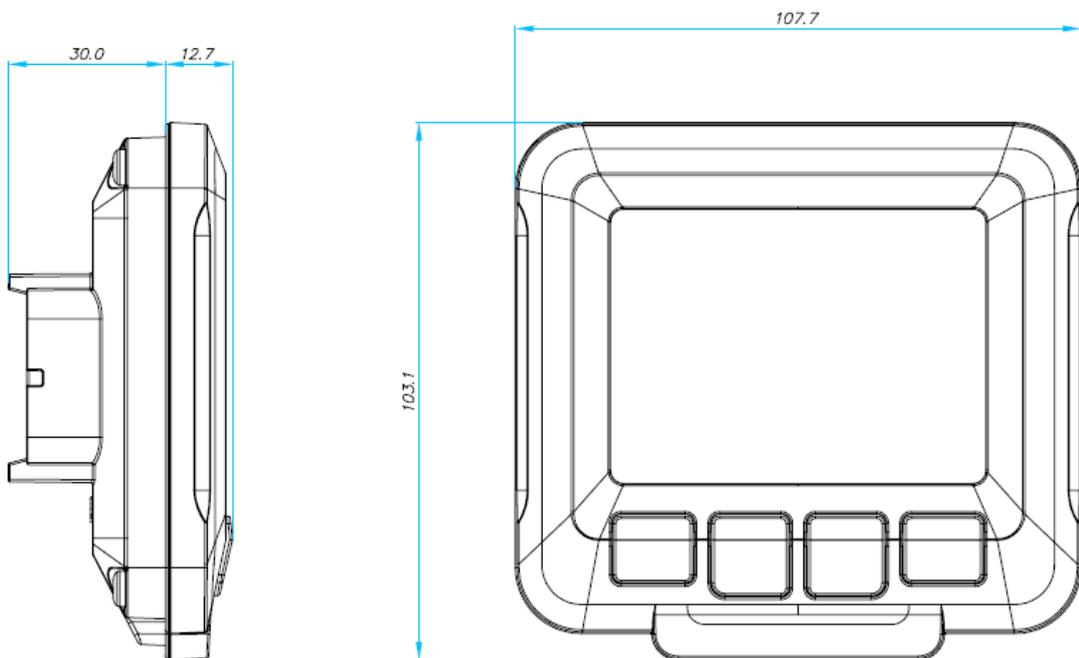
8. Technical Support

Contact your reseller or supplier for help with possible problems with your VI device. In order to get the best help, you should have your VI device in front of you and be prepared with the following information before you contact support.

- Part number and serial number of the unit, which you find on the brand label

- Date of purchase, which is found on the invoice

- The conditions and circumstances under which the problem arises

- LED indicator flash patterns.

- Possible error messages which are shown.

- Operating system type and its version number.

- The VI Device log files (if possible)

- Prepare a system report on the VI device, from within *CCsettings* (if possible).

- Information regarding possible external equipment which is connected to the VI device.

9. Trade Mark, etc.

10. Index