# VCMA9-ABC12

# USER MANUAL

## Development Kit for VCMA9 with Display & Case

The VCMA9-ABC12 is a development kit for VCMA9. It is built in a metal case and has display with touchscreen. The Display is a 6.4"-TFT-LCD with a resolution of 640 x 480 pixels (VGA). The touch screen is a 4-wire resistive touch.

On the front of the case the following interfaces are available:
2 x Serial, 1 x CAN, 1 x Ethernet, 2 x USB (or 1 x USB and 1 x IStick-Socket), Analog & Digital I/O's on screw able connector, Power and Reset-Button, Power-Connector.

- **Features:**

- 6.4"-TFT-LCD (VGA)
- Resistive Touchscreen
- 2 Serial lines (RS232)
- 1 CAN
- Ethernet (10 MBit/s)
- 2 x USB1.1
- Socket for ISTICK or SD-Card
- Analog & Digital I/Os


**VCMA9-ABC12**

## TABLE OF CONTENTS

# 1 INTRODUCTION

## 1.1 ABOUT THIS MANUAL

This manual provides all the information necessary to handle and configure the VCMA9-ABC12.
The manual is written for technical personnel responsible for integrating the VCMA9 or into their systems.

**It is strongly recommended to read this manual before the VCMA9-ABC12 is switched on.**

## 1.2 SAFTY PRECAUTIONS AND HANDLING

For personal safety and safe operation of the VCMA9-ABC12, follow all safety procedures described here and in other sections of the miscellaneous manual.

- Remove power from the system before installing (or removing) the VCMA9-ABC12, to prevent the possibility of personal injury (electrical shock) and / or damage to the product.
- Handle the product carefully; i.e. dropping or mishandling the VCMA9-ABC12 can cause damage to assemblies and components.
- Do not expose the equipment to moisture.

**WARNING**

**There are no user-serviceable components on the VCMA9-ABC12.**

## 1.3 ELECTROSTATIC DISCHARGE (ESD) PROTECTION

Various electrical components within the product are sensitive to static and electrostatic discharge (ESD). Even a small static discharge can be sufficient to destroy or degrade a component's operation!
With an open housing, do not touch any electronic components. Handle or touch only the unit chassis.

## 1.4 EQUIPMENT SAFETY

Great care is taken by MPL AG that all its products are thoroughly and rigorously tested before leaving the factory to ensure that they are fully operational and conform to specification. However, no matter how reliable a product, there is always the remote possibility that a defect may occur. The occurrence of a defect on this device may, under certain conditions, cause a defect to occur in adjoining and/or connected equipment. It is your responsibility to protect such equipment when installing this device. MPL accepts no responsibility whatsoever for such defects, however caused.

## 1.5 MANUAL REVISIONS

### 1.5.1 RELATED PRODUCTS

| Manual Revisions | Related To |
|---|---|
| A | • VCMA9-ABC12 Rev. A |
| B | • VCMA9-ABC12 Rev. A |

### 1.5.2 REVISION HISTORY

| Manual Revisions | Date | Description |
|---|---|---|
| A | 2007-02-02 | Initial release of this document. |
| B | 2007-02-23 | • Corrected operating temperature range on page 8<br>• Added storage temperature range on page 8<br>• Added relative humidity on page 8<br>• Added chapter “STANDARDS COMPLIANCE” on page 5 |

## 1.6 RELATED DOCUMENTATION

The following documents are related to this manual. For detailed Information about a specific feature or setting please refer to this additional manuals.

| Reference | Description | Available from |
|---|---|---|
| [1] | VCMA9 User Manual | MPL AG: www.mpl.ch |
| [2] | VCMA9-BB2 User Manual | MPL AG: www.mpl.ch |

## 1.7 ORDERING INFORMATION

The table below gives you an overview of the different VCMA9-ABC variants and its features.

| Product Name | Product Features |
|---|---|
| ABC-11 | • Development Kit for VCMA9 without Display and Case |
| ABC-12 | • Development Kit for VCMA9 with Display and Case |

## 1.8 STANDARDS COMPLIANCE

The VCMA9-ABC12 is designed to meet or exceed the most common industry and military standards. Particular references are:

### 1.8.1 EMC

- EN 55022 Class B (Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement)
- EN 55024 (Information technology equipment - Immunity characteristics - Limits and methods of measurement)
- EN 61000-4-1 (Electromagnetic compatibility (EMC) -- Part 4-1: Testing and measurement techniques - Overview of IEC 61000-4 series)
- EN 61000-4-2 Level 3, Criterion B (Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test)
- EN 61000-4-3 Level 3, Criterion A (Electromagnetic compatibility (EMC) -- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test)
- EN 61000-4-4 Class 3 (Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test)
- EN 61000-4-5 Class 3 (Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test)
- EN 61000-4-6 Class 3 (Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields)
- EN 61000-6-1 (Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments)
- EN 61000-6-2 (Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity for industrial environments)
- EN 61000-6-3 (Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments)
- EN 61000-6-4 (Electromagnetic compatibility (EMC) -- Part 6-4: Generic standards - Emission standard for industrial environments)
- MIL-STD-461E (REQUIREMENTS FOR THE CONTROL OF ELECTROMAGNETIC INTERFERENCE CHARACTERISTICS OF SUBSYSTEMS AND EQUIPMENT)

### 1.8.2 Environmental

- EN 50155 (Railway applications - Electronic equipment used on rolling stock)
- MIL-STD-810-F (ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS)

### 1.8.3 Safety

- EN 60601-1 (Medical electrical equipment -- Part 1: General requirements for safety)
- EN 60950 Class III (Information technology equipment - Safety)

### 1.8.4 Type Approval

- EN 60945 Protected Equipment (Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results)
- IACS E10 (Test Specification for Type Approval)

# 2 General Information and Specifications

## 2.1 Product Description

The VCMA9-ABC12 is a development kit for the VCMA9. Built in the case are the VCMA9 and the Baseboard VCM9-BB2. The most important interfaces are connected to the front of the case, the other interfaces are available by opening the case. The VCMA9-ABC12 has a 6.4"-TFT-Display with a resolution of 640 x 480 pixels. A 4-wire resistive touchscreen is also built in.

On the front of the case the following interfaces are available:
2 x Serial, 1 x CAN, 1 x Ethernet, 2 x USB (or 1 x USB and 1 x IStick-Socket), Analog & Digital I/O's on screw able connector, Power and Reset-Button, Power-Connector.

## 2.2 Specifications

### 2.2.1 Electrical

**Display**

- Resolution: 640 (W) x 480 (H) dots
- RGB, 262144 colors (18 Bit parallel)
- Brightness: typical 400 cd/m$^2$ (min. 300 cd/m$^2$)
- Viewing Angle: Vertical 60° (down) / 30° (up), Horizontal 55° (Left, Right)
- Dual-CFFL- Backlight Inverter (dual 4W)

**Touchscreen**

- 4-wire resistive touchscreen

**Ethernet**

- 10 MBit / s
- RJ45 connector

**Serial Ports**

- Two Serial ports on DSUB9 connector (both RS232)

**CAN Port**

- One CAN port on DSUB9

**USB Ports**

- One dual USB Host port
- Both ports: USB1.1
- USB port 0 / IStick-Socket selectable

**IStick / SD-Card Socket**

- Combo socket for IStick and SD-Card
- When socket is used for IStick, USB Port 0 is disabled

**Analog I/O interface**

- 4 Analog Outputs, 4 Analog Inputs
- Ext. reference Input possible
- Screw able connector

**Digital I/O interface**

- 8 Digital I/O's
- Screw able connector

**External Desktop Supply**

- FSP FSP025-1AD102
- Output Voltage: 5V
- Max. Output current: 5A

For more specifications see User Manual of VCM9 and VCMA9-BB2.

### 2.2.2 Physical / Power

**Form factor:**
Length: 200 mm (7.874 inches)
Width: 150 mm (5.906 inches)
Height: 80 mm (3.150 inches)

**Weight:**
Typical 1350g (fully equipped)

**Input Power Requirement:**
+5V +/- 5%

**Power Consumption:**
Typical 1.25A @ 5V

### 2.2.3 Environment

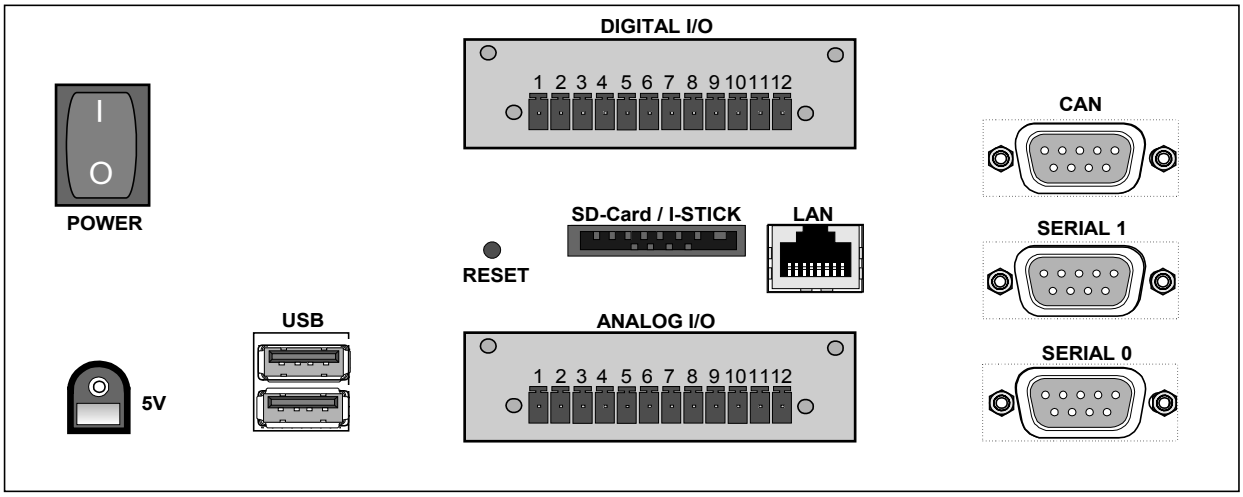
**Operating ambient temperature:**
-20°C to +70°C

**Storage ambient temperature:**
-25°C to +85°C

**Relative humidity:**
5% to 95% RH non condensing

# 3 Preparation for use

## 3.1 Overview connector location




### 3.1.1 Power Switch

**Mechanical:** Molveno, 203160
**Functionality:** Power on/off

### 3.1.2 Reset Switch

**Mechanical:** ITT, Tact Switch KSLOV210
**Functionality:** Reset

### 3.1.3 Power Connector

**Mechanical:** S.C. Precision Industrial, DC14A
**Functionality:** 5V +/- 5% (Center Pin: +5V)

### 3.1.4 USB Connector

**Mechanical:** Dual USB Connector, FCI 72309-0010B
**Functionality:** USB0 (USB 1.1), USB1 (USB 1.1)

| Pin | Signal | Description |
|---|---|---|
| 1 | VCC0 | Port 0 Cable Power +5 V |
| 2 | Data0- | Port 0 Balanced Data Line - |
| 3 | Data0+ | Port 0 Balanced Data Line + |
| 4 | GND0 | Port 0 Cable Ground |
| 5 | VCC1 | Port 1 Cable Power +5 V |
| 6 | Data1- | Port 1 Balanced Data Line - |
| 7 | Data1+ | Port 1 Balanced Data Line + |
| 8 | GND1 | Port 1 Cable Ground |

Pinout

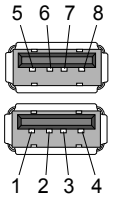


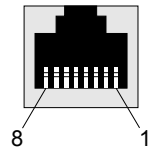

**Figure 1:** Dual USB (Type A) Connector (Connector: FCI, 72309-0010B)

### 3.1.5 SD-Card / ISTICK Socket

**Mechanical:** Proconn, ISD015
**Functionality:** Push-Push Socket for SD Card, possibility to use for IStick (special hardware assembling is needed)

### 3.1.6 Ethernet Connector

**Mechanical:** Molex, RJ45, 95040-2881
**Functionality:** Ethernet (LAN), 10MBit

| Pin Number | Signal | Description | Pinout |
|---|---|---|---|
| 1 | TX+ | Transmit data + |  |
| 2 | TX- | Transmit data - | |
| 3 | RX+ | Receive data + | |
| 4 | NC | Not connected | |
| 5 | NC | Not connected | |
| 6 | RX- | Receive data - | |
| 7 | NC | Not connected | |
| 8 | NC | Not connected | |


RJ45

### 3.1.7 Serial Connectors

**Mechanical:** Compona, DSUB9, 329 151-6
**Functionality:** Serial 0 (RS232), Serial 1 (RS232)

**Pinout Serial 0**

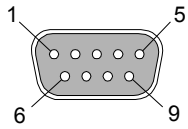
| Pin | Signal | Description | Pinout |
|---|---|---|---|
| 1 | n.c. | not connected |  |
| 2 | RXD | Receive data | |
| 3 | TXD | Transmit data | |
| 4 | n.c. | not connected | |
| 5 | GND | Ground | |
| 6 | n.c. | not connected | |
| 7 | RTS | Request to send | |
| 8 | CTS | Clear to send | |
| 9 | n.c. | not connected | |


**Figure 2:** Serial Port Connector (DSUB 9 male)
(Connector: Compona, 329 151-6)

**Pinout Serial 1**

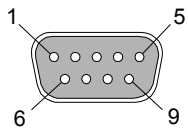
| Pin | Signal | Description | Pinout |
|---|---|---|---|
| 1 | n.c. | not connected |  |
| 2 | RXD | Receive data | |
| 3 | TXD | Transmit data | |
| 4 | n.c. | not connected | |
| 5 | GND | Ground | |
| 6 | n.c. | not connected | |
| 7 | RTS | Request to send | |
| 8 | CTS | Clear to send | |
| 9 | n.c. | not connected | |


**Figure 3:** Serial Port Connector (DSUB 9 male)
(Connector: Compona, 329 151-6)

### 3.1.8 CAN Connector

**Mechanical:** Compona, DSUB9, 329 151-6
**Functionality:** CAN

| Pin | Signal | Description | Pinout |
|---|---|---|---|
| 1 | n.c. | not connected | |
| 2 | CAN L | CAN L bus line (dominant low) | |
| 3 | CAN PWR- | Ext. negative supply voltage input (GND) | |
| 4 | n.c. | not connected | |
| 5 | EARTH | Shield | |
| 6 | CAN PWR- | Ext. negative supply voltage input (GND) | |
| 7 | CAN H | CAN H bus line (dominant high) | |
| 8 | n.c. | not connected | |
| 9 | CAN PWR + | Ext. positive supply voltage input (9..18VDC) | |

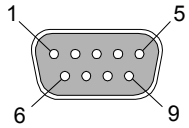



**Figure 4:** Serial Port Connector (DSUB 9 male)
(Connector: Compona, 329 151-6)

For CAN an external supply voltage (9V-18VDC, 100 mA) is necessary. For more details see VCMA9 User Manual.

### 3.1.9 Digital I/O Connector

**Mechanical:** Phoenix Contact AG, DFK-MC 1,5/12-GF-3.81 (12 Pins, 3.81mm)
**Functionality:** 8 Digital In- or Outputs, 3.3V with 5V-tolerant input buffers

| Pin | Signal | Functionality |
|---|---|---|
| 1 | VCC3.3 | 3.3V Supply |
| 2 | DIO 0 | 3.3V In-/Output, 5V tolerant input buffer |
| 3 | DIO 1 | 3.3V In-/Output, 5V tolerant input buffer |
| 4 | DIO 2 | 3.3V In-/Output, 5V tolerant input buffer |
| 5 | DIO 3 | 3.3V In-/Output, 5V tolerant input buffer |
| 6 | DIO 4 | 3.3V In-/Output, 5V tolerant input buffer |
| 7 | DIO 5 | 3.3V In-/Output, 5V tolerant input buffer |
| 8 | DIO 6 | 3.3V In-/Output, 5V tolerant input buffer |
| 9 | DIO 7 | 3.3V In-/Output, 5V tolerant input buffer |
| 10 | GND | GND |
| 11 | not connected | - |
| 12 | not connected | - |

### 3.1.10 Analog I/O Connector

**Mechanical:** Phoenix Contact AG, DFK-MC 1,5/12-GF-3.81 (12 Pins, 3.81mm)
**Functionality:** Analog In- and Outputs, Input Range GND to +3.3V

| Pin | Signal | Functionality |
|---|---|---|
| 1 | AO 0 | Analog Output |
| 2 | AO 1 | Analog Output |
| 3 | AO 2 | Analog Output |
| 4 | AO 3 | Analog Output |
| 5 | AO REFL | Low Reference Input for Analog Outputs, 0..5V |
| 6 | AO REFH | High Reference Input for Analog Outputs, 0..5V |
| 7 | AI 0 | Analog Input |
| 8 | AI 1 | Analog Input |
| 9 | AI 2 | Analog Input |
| 10 | AI 3 | Analog Input |
| 11 | AI VREF | ADC Reference Voltage, 0..3.3V |
| 12 | AGND | Analog GND |

The Default Output Range for Analog Outputs is GND to +3.3V (not depending on AO REFL and AO REFH). With the Pins 5 (AO REFL) and 6 (AO REFH) an other Output Range is possible. For that Dip Switch S1-1 and S 1-2 has to be in the right position. Max. Output Range is from GND to +5.0V. See VCMA9-Manual for additional informations.
The Default ADC Reference Voltage is +3.3V. With Dip Switch S2-1 an external ADC Reference Voltage is possible. Max. Voltage Range is from GND to +3.3V. See VCMA9-Manual for additional informations.

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# 4 COPYRIGHT



# 5 DISCLAIMER

MPL AG has fully tested the VCMA9-ABC12 and reviewed the documentation. However, MPL AG makes no warranty or representation, either expressed, or implied, with respect to this product, its quality, performance, merchantability, or fitness for a particular purpose.
In no event will MPL AG be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect in the product or its documentation, even if advised of the possibility of such damages. In particular MPL AG shall have no liability for any parts connected to this product.
MPL AG reserves the right to make changes to any product herein to improve reliability, function or design.

# 6 TRADEMARKS

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# 7 SUPPORT

## 7.1 SERIAL NUMBER AND REVISION

For support it is needed that you know the product name, the product variant, the serial number and the BIOS number of your VCMA9-ABC12. Please have a look at the label on the bottom of the VCMA9-ABC12 housing for this.

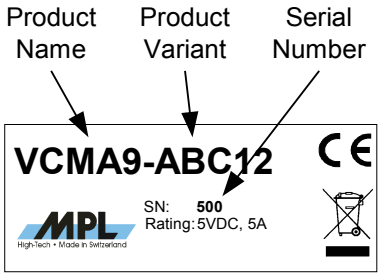


**Figure 5: VCMA9-ABC12** Label

## 7.2 CONTACT MPL AG

In case of general information questions please feel free to contact us at our homepage (www.mpl.ch) or per email (info@mpl.ch).
In case of sales information questions please send an email to sales@mpl.ch.
If you have a technical problem with a VCMA9-ABC12, first please read the BIOS User Manual, the Technical Reference Manual and also this manual carefully. If you can't solve the problem on your own you can contact us for technical support per email at support@mpl.ch.

Our local Distributor: