CETONI

CE QMIX I/O

Hardware Manual I/O-Module

ORIGINAL INSTRUCTIONS 2.01 – MARCH 2016

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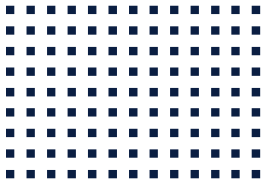


1 Overviews and Indexes

1.1 Content

1.2 Change History

REV	DATE	CHANGE
1.00	01.06.2012	First version of Qmix hardware manual
1.01	05.02.2013	Various minor changes
1.10	12.09.2013	Added Qmix BaseXT and TC, power consumption Q+
1.11	21.08.2014	Adaptation of the maximum heating temperatue of the Reaction module Q+ heating column and the High temperature T-mixer due to material changes.
2.00	08.06.2015	Thematic splitting of the manual “Qmix hardware”
2.01	11.03.2016	New corporate design

2 Technical Data

2.1.1 Mechanical Data

DIMENSIONS (L X B X H)	310 x 72 x 112 mm
WEIGHT	≈1300 g

2.1.2 Electrical Data

SUPPLY VOLTAGE	24VDC
POWER CONSUMPTION	Load-dependent (max. 120W)

2.1.3 Interfaces

The connections are described in section “Description of connections”.

2.1.4 Environment

OPERATING TEMPERATURE	0°C to 50°C
STORAGE TEMPERATURE	-20°C to 75°C
OPERATING HUMIDITY	20% to 90%, non-condensing
STORAGE HUMIDITY	20% to 90%, non-condensing

3 Application Purpose

3.1.1 General Description of the Device

The Qmix I/O module is a part of the Qmix micro reaction and analysis system. It allows the connection of digital and analogue inputs and outputs and also the connection of PT100-temperature-sensors.

3.1.2 Intended Use

The Qmix I/O module is used for measuring and control various parameters in microfluidic systems. It is intended for use in a Qmix micro reaction system from CETONI. Application usually takes place in laboratory-like rooms.

3.1.3 Reasonably Foreseeable Faulty Application

A use for applications distinct from the intended purpose can lead to dangerous situations and is to be omitted.

CAUTION. The unit must not be used as a medical device or for medical purposes.

3.1.4 Safety Advice

For the safe operation of Qmix I/O module it is necessary to observe the safety measures from the general section of the manual for the Qmix micro reaction system.

IMPORTANT. Please read this manual as well as the related software manual carefully and completely before putting your Qmix system into operation.
Additionally please read the general parts of the manual carefully and completely before putting your Qmix system into operation.

4 Transportation and Storage

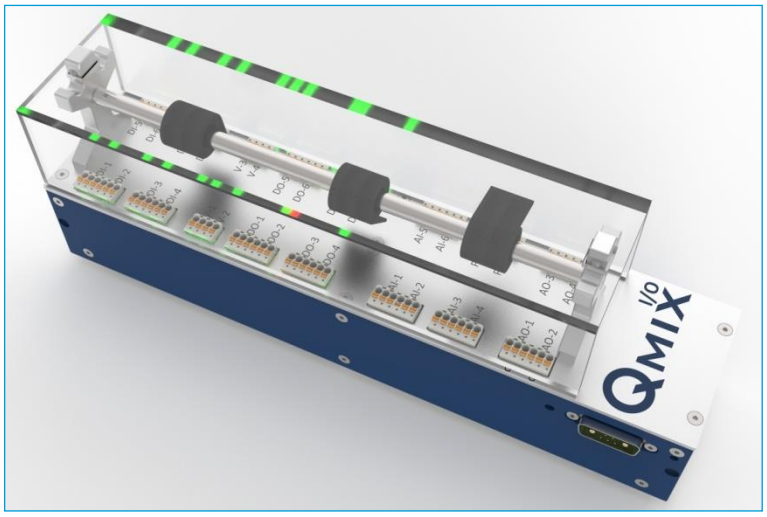
The individual modules must not be lifted or transported plugged-together. Transportation of plugged-together devices is only allowed in the original packaging.

Use the original packaging for transportation or shipping of the module.

Concerning the storage conditions, please observe the data from chapter “Technical data”.

CAUTION. Risk of damaging the device. Do not transport the modules plugged-together.

5 Hardware



Qmix I/O-Modul

The Qmix I/O module extends your Qmix system by a variety of analogue and digital inputs and outputs, to easily integrate external sensors and devices into the Qmix system.

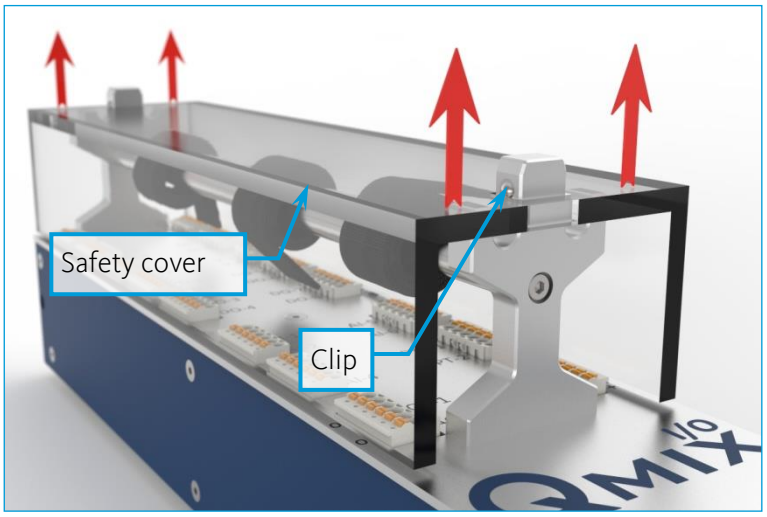
With the contact terminals of the I/O module, signal lines can be connected and removed easily and quickly.

The operation concerning the software is treated in the related software manual.

5.1 Operation

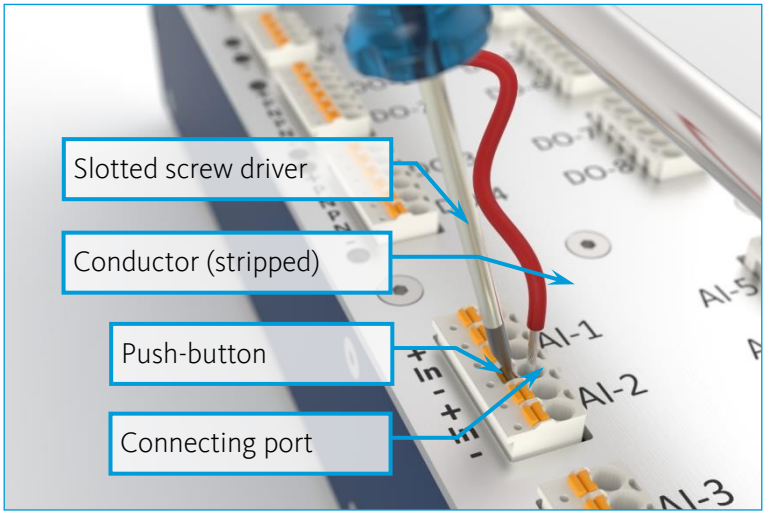
To connect external devices, proceed as follows:

(1) Remove the safety cover. It is simply plugged.



Remove safety cover

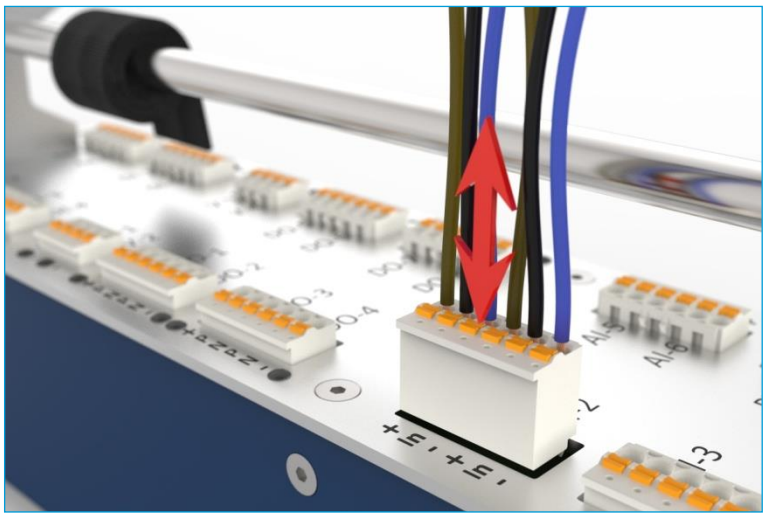
(2) The pluggable connectors on the I/O module are suitable for conductor sizes of 0.2-1.5mm² (AWG 24-14). The strip length should be 8-9mm. To connect fine-stranded conductors, as well as to remove any type of conductor, use a slotted screw driver (2,5mm max.) to press the push-button, as shown in the picture, and insert or remove the connector whilst pressing. Solid conductors and such with ferrules can simply be pushed-in without using any operating tool, but for removal the push-button has to be actuated.



Attaching and Detaching of Conductors

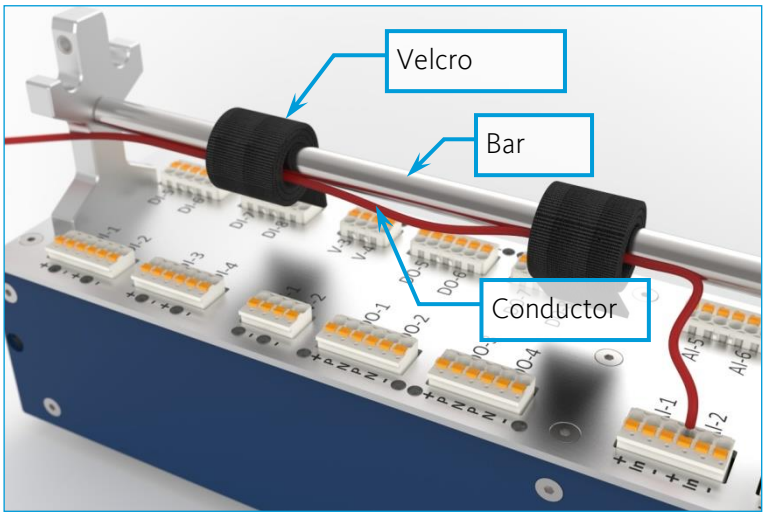
(3) It is also possible to plug and unplug the entire connector with any number of connected conductors.

(4) Try if possible to draw on the main body of the connector.



Decrease Connectors

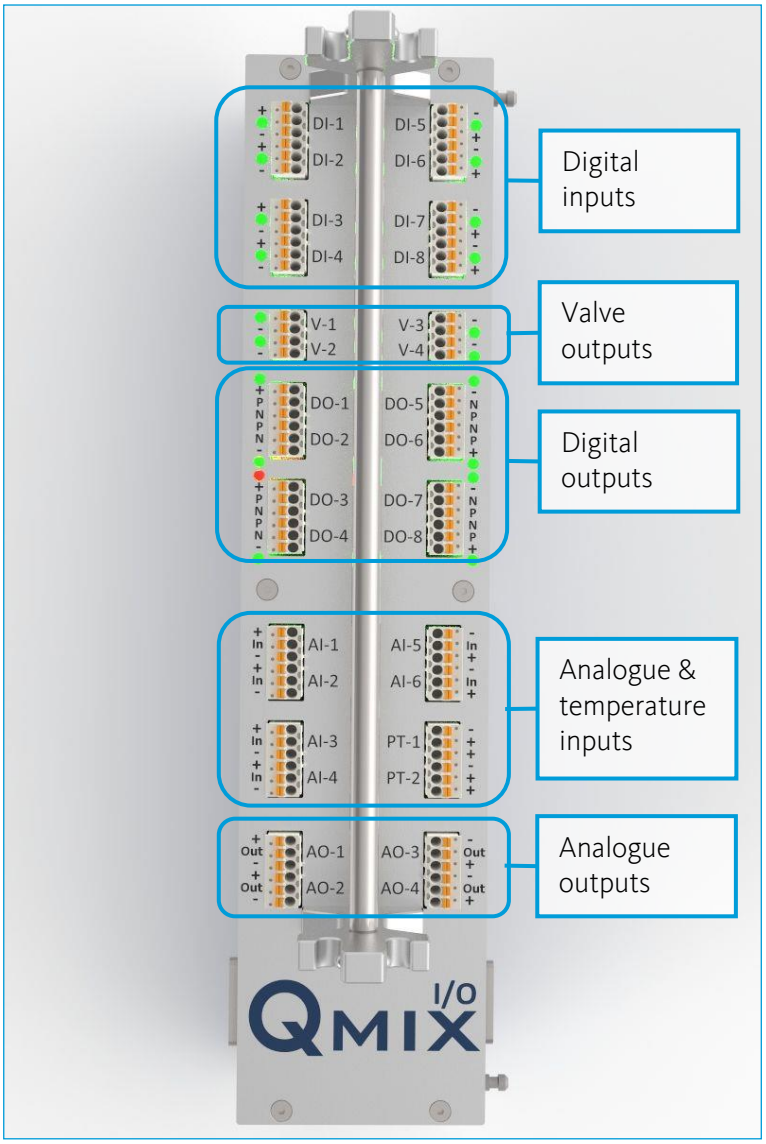
(5) To maintain the order, the conductors can be attached to bar on top of the device, using Velcro fasteners or cable ties.



Mounting possibilities of conductors

(6) To prevent fluids from reaching the connectors, finally put the safety cover back on the module. The conductors can be lead out through both ends of the safety cover.

5.2 Description of Connections



The module provides eight digital inputs, four valve outputs, six analogue inputs, two PT-100 inputs and four analogue outputs. They will be described more detailed in the following sections.

The module can supply a maximum overall current of 3A.

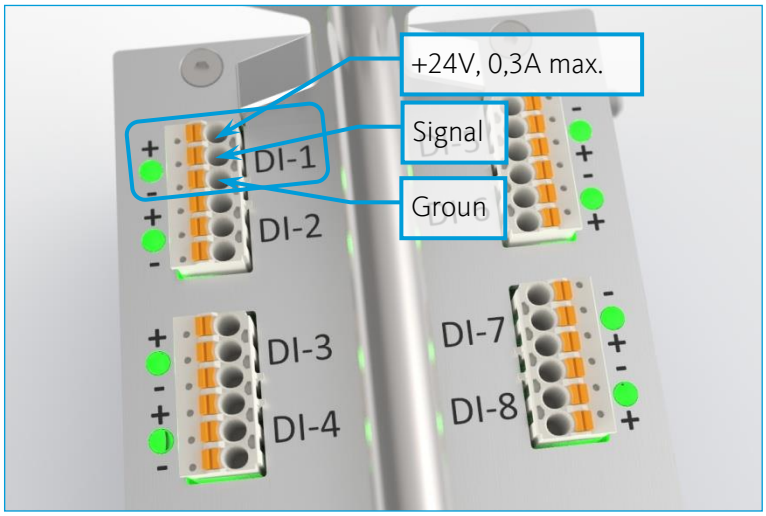
5.2.1 Digital Inputs

The I/O module offers eight digital Inputs, labeled on the device with DI-1 to DI-8. Two of them always share one connector.

The ground is labeled with a "-" Symbol and a status LED is located next to the signal input.

A voltage range of 0...0.4V is considered as low level, the status LED is off. A voltage range of 4...24V means a high level and the status LED lights green.

The "+"connection provides a supply voltage of 24V at a maximum current of 0.3A to power active sensors. In case of overcurrent the self-resetting fuse blows and the status LED lights red.

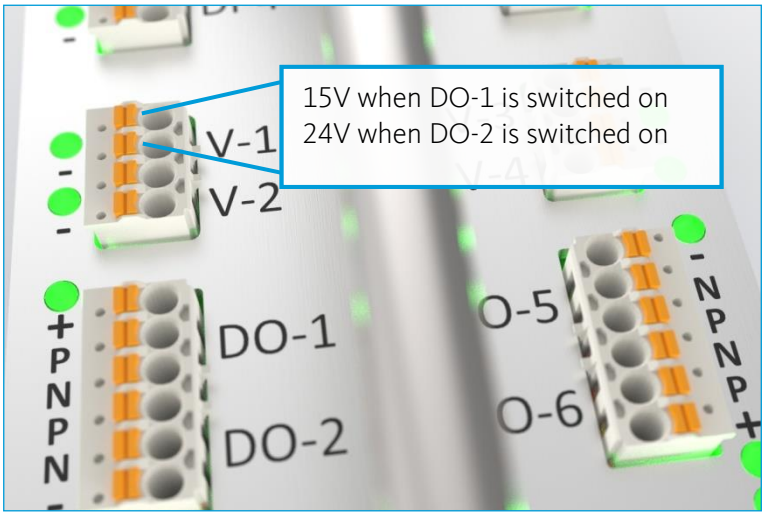


Digital inputs

5.2.2 Valve Outputs

The four valve outputs are linked with the digital outputs. They cannot be switched separately. The valve output V-1 is linked with the digital outputs DO-1 and DO-2, V-2 is linked with DO-3 and DO-4, V-3 is linked with DO-5 and DO-6 and V-4 with DO-7 and DO-8.

When DO-1 is switched on, V-1 supplies 15V. When DO-2 is switched on or DO-1 and DO-2 are switched on, V-1 supplies 24V. This applies analogously for the other valve outputs. This allows switching solenoid valves on with 24V and then to lower the voltage to reduce the warming. In both switching states a maximum current of 1.1A is available.



Valve outputs

5.2.3 Digital Outputs

The I/O module offers eight digital outputs, labeled on the device with DO-1 to DO-8. Two of them always share one connector.

Each output offers a PNP connection (labeled with P) and a NPN connection (labeled with N).

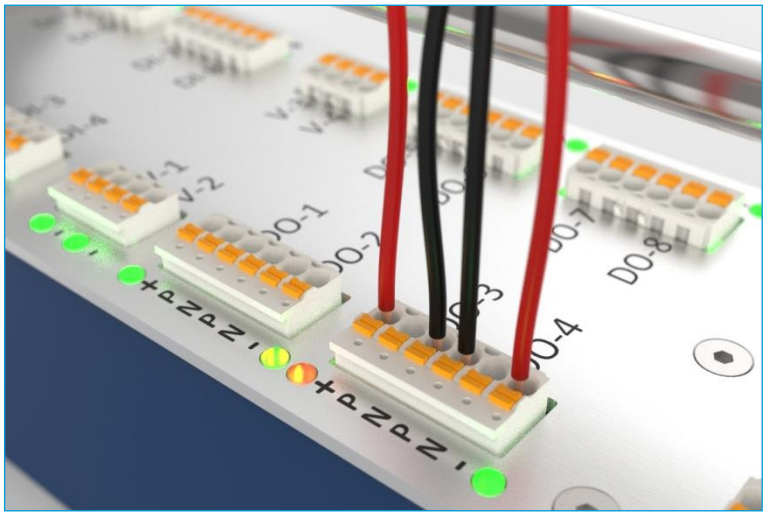
The ground is labeled with a “-“ Symbol and is used by both outputs of the connector. The +24V connection (labeled “+“) is used by both outputs of the connector as well.

Connect electronic components that require a PNP connection to ”P” and ”-” and those requiring a NPN connection to ”N” and ”+”.

When the digital output is set to ”high” level via the software, the PNP connection gets connected to 24V and the NPN connection gets connected to ground. The status LED lights green and each connection can provide a maximum current of 0.3A. In case of overcurrent the self-resetting fuse blows and the status LED lights red.

When the digital output is set to ”low” level via the software, the PNP connection gets switched potential-free and the NPN connection is pulled up to 24V with a pullup resistor. The status LED is off.

In the following picture DO-3 is connected as NPN and DO-4 as PNP. Furthermore the red status LED indicates that DO-3 is on overload.



Digital outputs

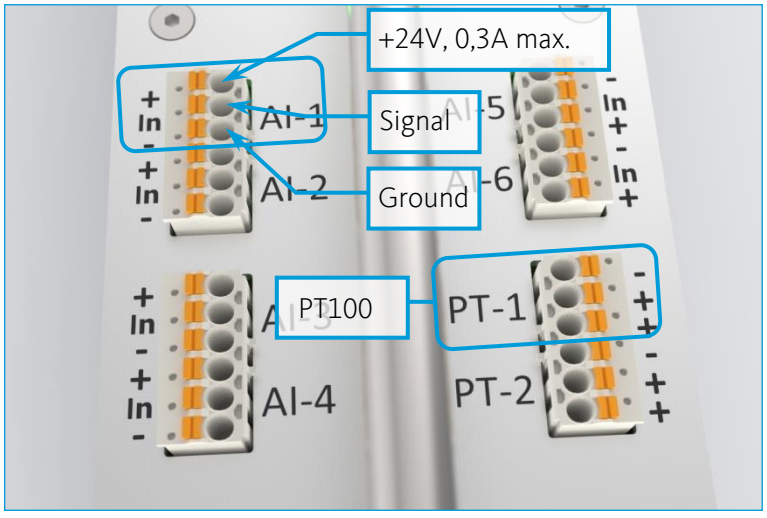
5.2.4 Analogue and PT100 Inputs

The I/O module offers six analogue Inputs, labeled on the device with AI-1 to AI-6. Two of them always share one connector. Furthermore this group of connectors provides two connections for PT100 temperature sensors labeled PT-1 and PT-2.

For the analogue inputs ground is labeled with a "-" and the signal input is labeled "In". The signal voltage must be between 0...10V. The input resistance is 20kΩ for the inputs AI-1 to AI-4 and 100kΩ for AI-5 and AI-6.

The "+"connection provides a voltage of 24V at a maximum current of 0.3A to power active sensors. In case of overcurrent the self-resetting fuse blows.

The PT100 inputs serve to connect three-wire PT100 sensors. If two-wire sensors are supposed to be used, the two "+" connections have to be bridged.



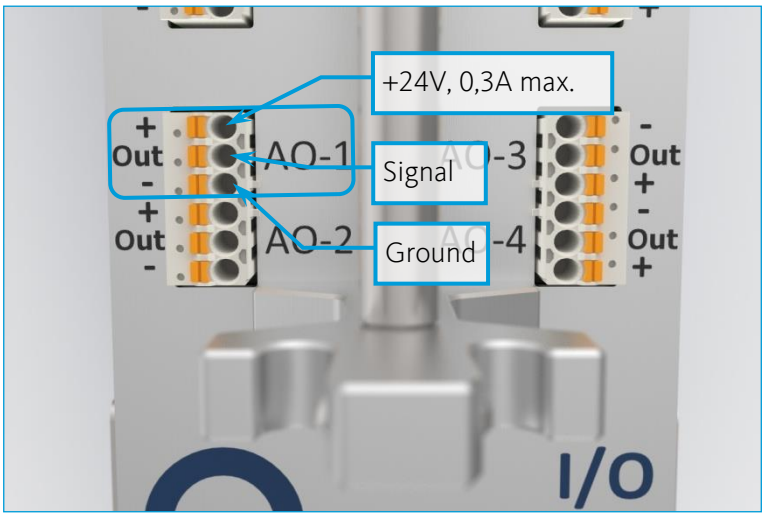
Analouge and PT100 inputs

5.2.5 Analogue Outputs

The I/O module offers four analogue Inputs, labeled on the device with AO-1 to AO-4. Two of them always share one connector.

For the analogue inputs ground is labeled with a "-" and the signal output is labeled "Out". A signal output voltage of 0...10V and a maximum current of 50mA can be supplied.

The "+"connection provides an additional voltage of 24V at a maximum current of 0.3A. In case of overcurrent the self-resetting fuse blows.



Analogue outputs

6 Maintenance and Care

If used in accordance with intended purpose, the device is maintenance-free. Should there be a failure despite this, which you cannot eliminate yourself, or which requires opening the device, please contact CETONI GmbH to coordinate further actions. The device may only be opened by CETONI GmbH or thereby authorized service staff. Otherwise the warranty and guarantee claims are void.

Software-related troubles are dealt with in the Software Manual.

For cleaning it please rub the surface gently with a soft, damp cloth. The cloth must not be wet, so that no fluency can trickle into the device. In case of a heavier soiling you can also use a little bit of detergent or alcohol.