



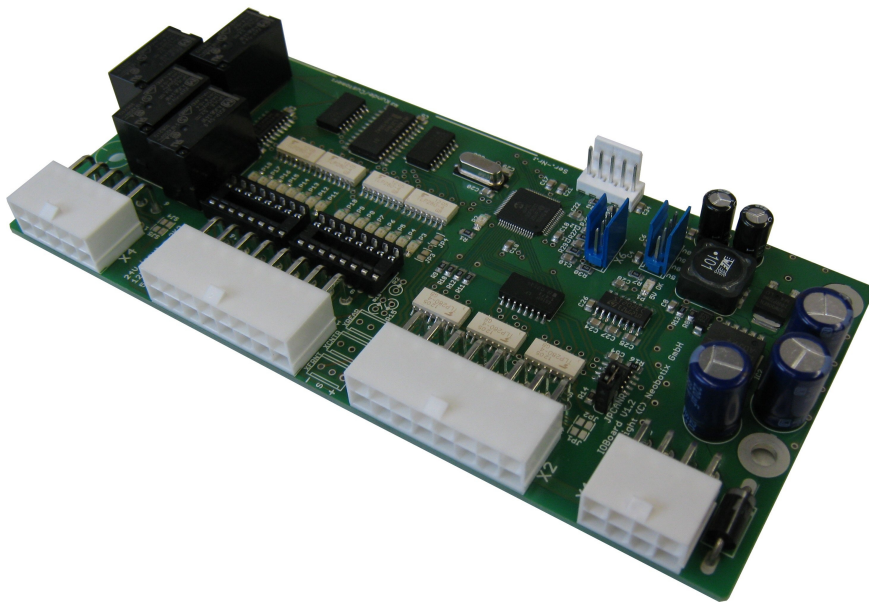
IOBoard

NeobotixGmbH

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The Neobotix IOBoard was designed to provide mobile robots with additional multi-purpose digital inputs and outputs as well as analogue inputs. All ports are managed by an on-board microprocessor that also handles the communication to other devices via CAN-bus or the RS-232 serial interface.

1.1 Technical Data

- Supply voltage 8 VDC .. 60 VDC, 500 mA max.

¹ <https://neobotix-docs.de/hardware/en/IOBoard.pdf>

- Digital communication interfaces CAN and RS-232 (19.2 kBaud)
- 16 digital inputs
- 4 analogue inputs, input range 0 V .. 5 V
- 12 digital outputs
- 4 relay outputs, max. 2 A, 2 x normally open, 2 x changeover
- Operating Temperature -10°C - +45°C

1.2 Commissioning

The IOBoard is delivered with the following settings:

- CAN Baud Rate: 1 MBaud
- CAN Base Address: 0x100
- No CAN Extended ID

The IOBoard is ready for instant use. An individual configuration can be done by Neobotix, if required.

1.3 Command Set

Command	Value	Description
CMD_IOBOARD_CONNECT	0	Test connection / communication
CMD_IOBOARD_GETDIGIN	1	Get values of digital inputs
CMD_IOBOARD_SETDIGOUT	2	Set digital outputs
CMD_IOBOARD_GETANALOGIN	3	Get values of analogue inputs
CMD_IOBOARD_GETALLDATA	9	Get values of digital inputs and analogue inputs

1.4 CAN Communication

You can find the command set at *Command Set* (page 2).

1.4.1 Addresses

The base address to receive messages is set to 0x100 by default.

The addresses used by the IOBoard are calculated from the base address by adding the following offsets.

Offset to base address	Message
+0	Receive commands
+1	Answer to CMD_IOBOARD_CONNECT
+2	Answer to CMD_IOBOARD_GETDIGIN
+3	Answer to CMD_IOBOARD_GETANALOGIN

1.4.2 Commands

In the following, the CAN IDs are given as an offset to the base address, so +3 means base address plus 3.

1.4.2.1 CMD_IOBOARD_CONNECT

Use this command to test the connection to the IOBoard.

Command ID: +0

CMD_CONNECT	0	0	0	0	0	0	0
-------------	---	---	---	---	---	---	---

Answer ID: +1

CMD_CONNECT	1	2	3	4	5	6	7
-------------	---	---	---	---	---	---	---

1.4.2.2 CMD_IOBOARD_GETDIGIN

The command requests data from all digital inputs.

Command ID: +0

CMD_IOBOARD_GETDIGIN	0	0	0	0	0	0	0
----------------------	---	---	---	---	---	---	---

Answer ID: +2

CMD_IOBOARD_GETDIGIN	Bits 8-15	Bits 0-7	0	0	0	0	0
----------------------	-----------	----------	---	---	---	---	---

1.4.2.3 CMD_IOBOARD_SETDIGOUT

The command sets all digital outputs. The outputs are organized as follows:

Port D	8 x optocoupler outputs
Port G	4 x optocoupler outputs
Port B	4 x relay outputs

Command ID: +0

CMD_IOBOARD_SETDIGOUT	Port D	Port G (Bits 4-7), Port B (Bits 0-3)	0	0	0	0	0
-----------------------	--------	--------------------------------------	---	---	---	---	---

Answer No answer.

1.4.2.4 CMD_IOBOARD_GETANALOGIN

The command requests data from analogue inputs.

Command ID: +0

CMD_IOBOARD_GETANALOGIN	0	0	0	0	0	0	0
-------------------------	---	---	---	---	---	---	---

Answer ID: +3

CMD_IOBOARD_GETANALOGIN	low bits 1	low bits 2	low bits 3	low bits 4	high bits	0	0
-------------------------	------------	------------	------------	------------	-----------	---	---

The *high bits* byte contains the high two bits for each channel, in ascending order (Bits 0-1 for channel 1 and so on).

1.4.2.5 CMD_IOBOARD_GETALLDATA

The command requests data from both the digital and the analog inputs. It has the same effect as requesting the digital and analog inputs separately.

Command ID: +0

CMD_IOBOARD_GETALLDATA	0	0	0	0	0	0	0
------------------------	---	---	---	---	---	---	---

Answer The answer consists of two CAN frames that are identical to the answer frames to the commands CMD_IOBOARD_GETDIGIN and CMD_IOBOARD_GETANALOGIN.

1.5 RS-232 Communication

Communication via RS-232 uses the same format as the *CAN Communication* (page 2). Messages are eight bytes long and without control commands like LF or CR.

1.6 Dimensions and Pinout

1.6.1 Dimensions

Note: The resistor arrays for the digital inputs must be chosen according to the used high level voltage!

5V	330Ω
12V	1kΩ
24V	3.3kΩ

Tip: Set switch S1 to ON to activate the CAN terminal resistor.

1.6.2 Pinout

Details on the connectors can be found at *Connectors* (page 10).

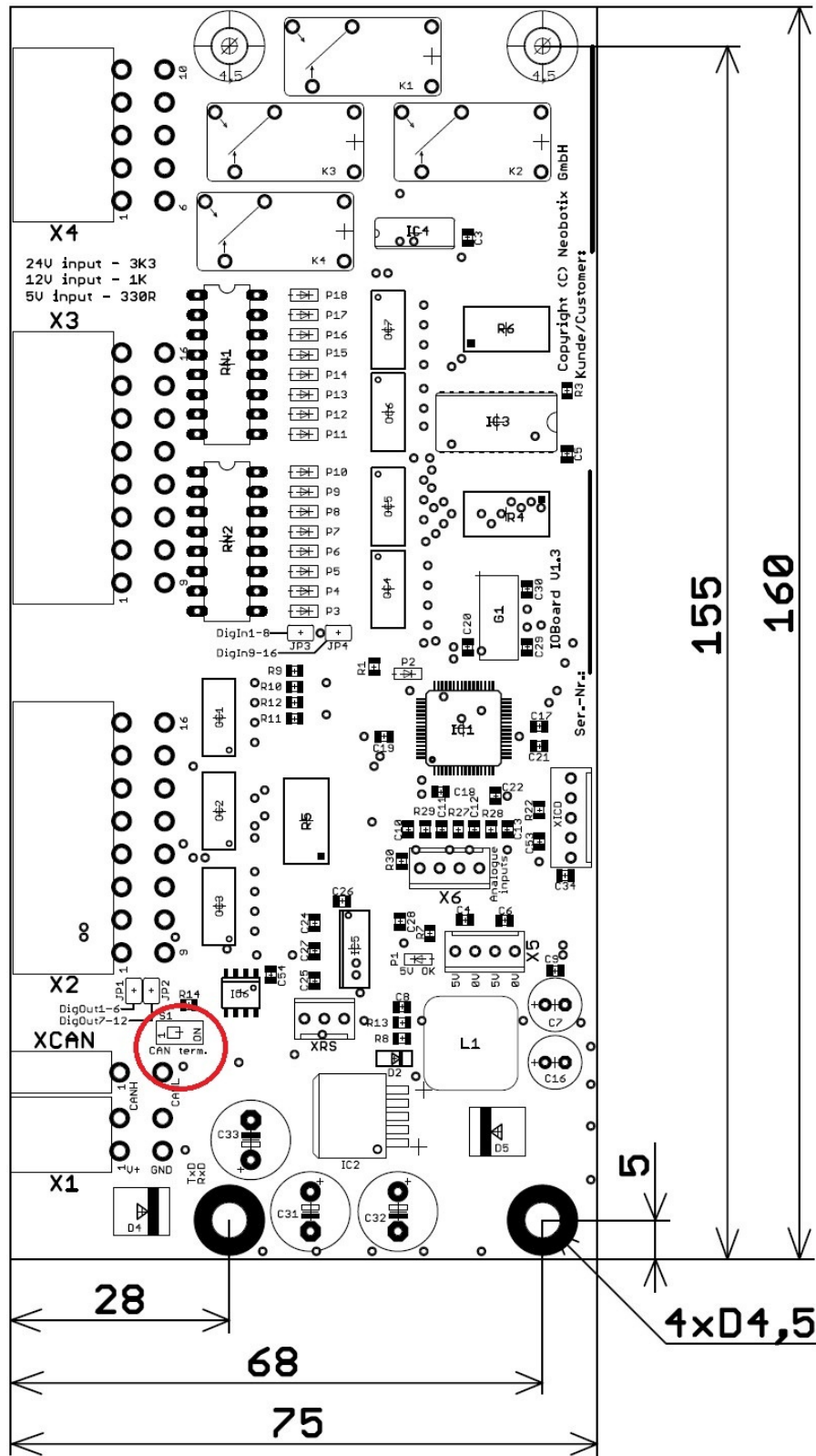


Fig. 1: Dimensions of the IOBoard and switch for CAN termining resistor

1.6.2.1 Connector X1

Würth Elektronik, MPC4, 4 pins

Use this plug to connect the power supply and the CAN bus.

Pin	Description
1	Power supply
2	CAN High
3	Ground
4	CAN Low

1.6.2.2 Connector X2

Würth Elektronik, MPC4, 16 pins

This connector is used for the common ground lines of the optocoupled inputs and outputs and for all signal lines of the digital outputs.

Pin	Description
1	Input ground 2 (digital inputs 9 – 16, JP4)
2	Output ground 1 (digital outputs 1 – 6, JP1)
3	Digital output 12
4	Digital output 9
5	Digital output 8
6	Digital output 6
7	Digital output 4
8	Digital output 2
9	Input ground 1 (digital inputs 1 – 8, JP3)
10	Output ground 2 (digital outputs 7 – 12, JP2)
11	Digital output 10
12	Digital output 11
13	Digital output 7
14	Digital output 5
15	Digital output 3
16	Digital output 1

Tip: Use the solder jumpers JP1 to JP4 to connect the ground lines of the digital inputs and outputs directly to the ground line of the supply voltage.

1.6.2.3 Connector X3

Würth Elektronik, MPC4, 16 pins

The 16 digital inputs are connected to this plug, indicated by LEDs.

Note: Please use the correct limiting resistors!

Pin	Description
1	Digital input 16
2	Digital input 14
3	Digital input 12
4	Digital input 10
5	Digital input 8
6	Digital input 6
7	Digital input 4
8	Digital input 2
9	Digital input 15
10	Digital input 13
11	Digital input 11
12	Digital input 9
13	Digital input 7
14	Digital input 5
15	Digital input 3
16	Digital input 1

1.6.2.4 Connector X4

Würth Elektronik, MPC4, 8 pins

Use this plug to connect to the four isolated relay outputs. The maximum current on each contact is 2 A.

Pin	Description
1	Relay 4: Common
2	Relay 4: Normally closed
3	Relay 3: Common
4	Relay 2: Normally open
5	Relay 1: Normally open
6	Relay 4: Normally open
7	Relay 3: Normally closed
8	Relay 3: Normally open
9	Relay 2: Normally open
10	Relay 1: Normally open

1.6.2.5 Connector X5

TE Connectivity, HE14, 4 pins

The IOBoard's internal 5 V logic supply is available on this connector.

Pin	Description
1, 3	Ground
2, 4	5 V (max. 500 mA)

1.6.2.6 Connector X6

TE Connectivity, HE14, 4 pins

This connector provides four analogue inputs for voltages from 0 V to 5 V, relative to the ground level of the IOBoard.

Pin	Description
1	Analogue input 1
2	Analogue input 2
3	Analogue input 3
4	Analogue input 4

1.6.2.7 Connector XCAN

Würth Elektronik, MPC4, 2 pins

The CAN bus may be continued from this connector.

Pin	Description
1	CAN High
2	CAN Low

1.6.2.8 Connector XRS

TE Connectivity, HE14, 3 pins

This connector provides access to the IOBoard's RS-232 interface.

Pin	Description
1	Ground
2	TxD (IOBoard transmit line)
3	RxD (IOBoard receive line)

1.7 Legal Notes

The general legal notes can be found at [Legal Notes](#) (page 14).

1.7.1 EU Declaration of Conformity



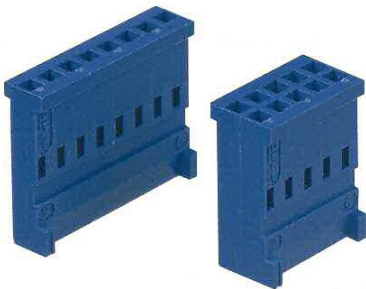
This product fulfils all relevant directives of the European Union.

1.7.2 RoHS Information



This product complies to the RoHS directives 2011/65/EU (RoHS 2) and 2015/863/EU of the European Parliament and the Council on the restriction of the use of hazardous substances in electrical and electronic equipment.

2.1 TE Connectivity - HE14

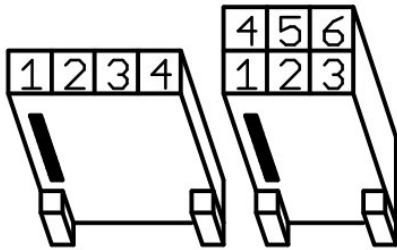


Pins	TE Connectivity	Farnell	RS Components
3 pins, 1 row	281838-3	429582	532-333
4 pins, 1 row	281838-4	429594	532-349
5 pins, 1 row	281838-5	429600	532-355
6 pins, 2 rows	281839-3	429650	532-406
8 pins, 2 rows	281839-4	429661	532-412
10 pins, 2 rows	281839-5	429673	532-428
12 pins, 2 rows	281839-6	429685	532-434



Crimp contacts	TE Connectivity	Farnell	RS Components
AWG 28-24	182734-2	429715	532-456

In Neobotix products the pin assignment of the HE14 connectors is as shown below.



2.2 Würth Elektronik - MPC4

Please check the [Würth Elektronik online catalogue²](#) for details on the MPC4³.



Pins (in 2 rows)	Würth Elektronik
2	649002113322
4	649004113322
6	649006113322
8	649008113322
10	649010113322
16	649016113322

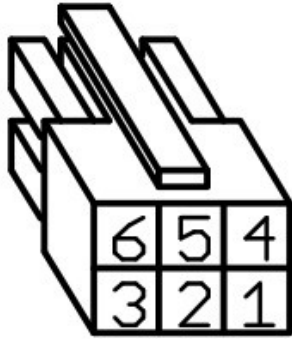


Crimp contacts	Würth Elektronik
AWG 24-18	64900613722

In Neobotix products the pin assignment of the MPC4 connectors is as shown below.

² <https://www.we-online.com/en/products/components/overview>

³ https://www.we-online.de/katalog/de/em/connectors/wire-to-board/wr_mpc4/



2.3 Würth Elektronik - MPC3

Please check the Würth Elektronik online catalogue⁴ for details on the MPC3⁵.



Pins (in 2 rows)	Würth Elektronik
4	662004113322
6	662006113322
12	662012113322

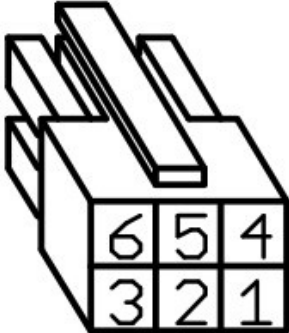


Crimp contacts	Würth Elektronik
AWG 24-20	66200113722

In Neobotix products the pin assignment of the MPC3 connectors is as shown below.

⁴ <https://www.we-online.com/en/products/components/overview>

⁵ https://www.we-online.de/katalog/de/em/connectors/wire-to-board/wr_mpc3/



3.1 Version Information

The English part of this online documentation has been translated and is not the original. Please refer to the German version in case of uncertainties or questions.

3.2 Liability

Every care has been taken in the preparation of this manual which represents the state of technology at the time of its composing. However, inaccuracies or omissions might occur. Please inform Neobotix in case you notice any.

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3.3 Downloads and Further Information

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