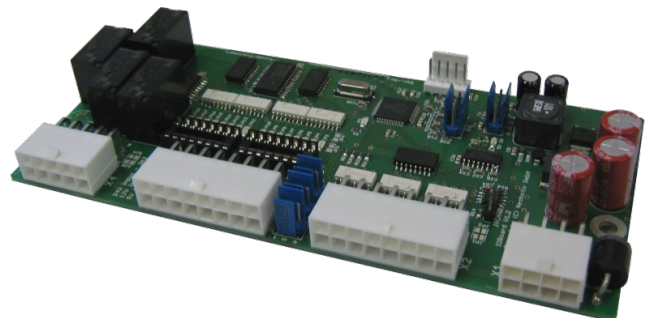


## IOBoard

### Operating Manual



Version 1.3

12 January 2017

## Content

1 Introduction.....	3
2 Technical data.....	3
3 Commissioning.....	3
4 Command set.....	4
5 CAN-Communication.....	4
5.1 Addresses.....	4
5.2 Commands.....	4
CMD_IOBOARD_CONNECT.....	4
CMD_IOBOARD_GETDIGIN.....	5
CMD_IOBOARD_SETDIGOUT.....	5
CMD_IOBOARD_GETANALOGIN.....	5
6 RS-232-Communication.....	6
7 Dimensions and pin assignment.....	7
7.1 Dimensions.....	7
7.2 Pin assignment.....	8
Connector X1.....	8
Connector X2.....	8
Connector X3.....	9
Connector X4.....	9
Connector X5.....	9
Connector X6.....	10
Connector XCAN.....	10
Connector XRS.....	10
8 Additional parts.....	11
9 Legal notes.....	12

## 1 Introduction

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.

## 2 Technical data

- Supply voltage 8 VDC .. 60 VDC, 500 mA max. (5 VDC supply optional)
- 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

## 3 Commissioning

The IOBoard is delivered with the following settings:

- CAN Baud Rate = 1 MBaud
- CAN Basic Address = 0x100
- No CAN Extended ID

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

## 4 Command set

Table 1 lists the available commands for the IOBoard.

Command	Value (dec.)	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

Table 1: List of available commands

## 5 CAN-Communication

### 5.1 Addresses

The basic address to receive messages is set to 0x100 by default. The IOBoard sends its answers with identifier 0X101.

The following addresses are used for CAN-communication by the IOBoard:

Address	Message
Basic address	Receive commands
Basic address + 1	Answer to CMD_IOBOARD_CONNECT
Basic address + 2	Answer to CMD_IOBOARD_GETDIGIN
Basic address + 3	Answer to CMD_IOBOARD_GETANALOGIN

Table 2: Used CAN-addresses

### 5.2 Commands

#### CMD\_IOBOARD\_CONNECT

Use this command to test the connection to the IOBoard.

##### Command format

ID: Basic address

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_CONNECT	0	0	0	0	0	0	0

##### Answer format

ID: Basic address + 1

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_CONNECT	1	2	3	4	5	6	7

## CMD\_IOBOARD\_GETDIGIN

The command requests data from all digital inputs.

### Command format

ID: Basic address

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_GETDIGIN	0	0	0	0	0	0	0

### Answer format

ID: Basic address + 2

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_GETDIGIN	Bit 8 – 15 of digital input	Bit 0 – 7 of digital input	0	0	0	0	0

## 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 format

ID: Basic address

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_SETDIGOUT	Send data to PORTD	Send data to PORTG (Bit 5 - 8) and PORTB (Bit 0 - 4)	0	0	0	0	0

## CMD\_IOBOARD\_GETANALOGIN

The command requests data from analogue inputs.

### Command format

ID: Basic address

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_GETANALOGIN	0	0	0	0	0	0	0

### Answer format

ID: Basic address + 3

DLC: 8

D0	D1	D2	D3	D4	D5	D6	D7
CMD_IOBOARD_GETANALOGIN	analogue input data 1	Read analogue input data 2	Read analogue input data 3	Read analogue input data 4	See explanation below	0	0

Bytes D1 – D4 contain the lower 8 Bit of the 10 Bit AD-value. Byte D5 contains the upper two bits of each 10 bit channel stacked into one byte as follows:

<b>Bit</b>	<b>6-7</b>	<b>4-5</b>	<b>2-3</b>	<b>0-1</b>
content	High bits of input 4	High bits of input 3	High bits of input 2	High bits of input 1

## 6 RS-232-Communication

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



## 7.2 Pin assignment

### Connector X1

#### Molex Mini-Fit Jr., 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

### Connector X2

#### Molex Mini-Fit Jr., 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 1
4	Digital output 3
5	Digital output 5
6	Digital output 7
7	Digital output 9
8	Digital output 11
9	Input ground 1 (digital inputs 1 – 8, JP3)
10	Output ground 2 (digital outputs 7 – 12, JP2)
11	Digital output 2
12	Digital output 4
13	Digital output 6
14	Digital output 8
15	Digital output 10
16	Digital output 12



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.



## Connector X3

### Molex, Mini-Fit Jr., 16 pins

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

**Please use the correct limiting resistors! See figure 1 on page 7 for details.**

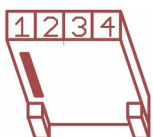
Pin	Description
1	Digital input 16
2	Digital input 14
3	Digital input 12
4	Digital input 10
5	Digital input 8
6	Digital input 6
7	Digital input 4
8	Digital input 2
9	Digital input 15
10	Digital input 13
11	Digital input 11
12	Digital input 9
13	Digital input 7
14	Digital input 5
15	Digital input 3
16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

## Connector X4

### Molex, Mini-Fit Jr., 8 pins

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

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



## Connector X5

### TE Connectivity, HE14, 4 pins

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

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



### Connector X6

#### TE Connectivity, HE14, 4 pins

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

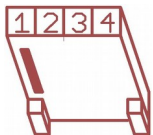
Pin	Description
1	Analogue input 1
2	Analogue input 2
3	Analogue input 3
4	Analogue input 4

### Connector XCAN

#### Molex, Mini-Fit Jr., 2 pins

The CAN bus may be continued from this connector.

Pin	Description
1	CAN High
2	CAN Low



### Connector XRS

#### TE Connectivity, HE14, 3 pins



This connector provides access to the IOBoard's RS232 interface.

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



## 8 Additional parts

The sockets and contacts matching the connectors of the IOBoard can be ordered from Farnell ([de.farnell.com](http://de.farnell.com)), RS Components ([www.rsonline.de](http://www.rsonline.de)) and other distributors.

### Molex – Mini-Fit Jr.

	Number of poles	Molex	Farnell	RS Comp.
	2-poles	39-01-2020	151866	484-1748
	4-poles	39-01-2040	151867	484-1754
	6-poles	39-01-2060	151868	484-1760
	8-poles	39-01-2080	151869	484-1782
16-poles	39-01-2160	4138399	172-9011	
	Crimp contacts MiniFit Jr. 24-18	39-00-0039	9732195	172-9134

### TE Connectivity – HE14

	Number of poles	TE Connect.	Farnell	RS Comp.
	3-poles, 1 row	281838-3	429582	532-333
	4-poles, 1 row	281838-4	429594	532-349
	5-poles, 1 row	281838-5	429600	532-355
	6-poles, 2 rows	281839-3	429650	532-406
	8-poles, 2 rows	281839-4	429661	532-412
	10-poles, 2 rows	281839-5	429673	532-428
12-poles, 2 rows	281839-6	429685	532-434	
	Crimp contact HE14 AWG 28-24	182734-2	429715	532-456

## 9 Legal notes

### Version information

This document has been translated and is not the original. Please refer to the German version in case of uncertainties or questions.

### 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.

The GPS GmbH, Neobotix, cannot be held responsible for any technical or typographical errors and reserves the right to make changes to the product and manual without prior notice.

Neobotix makes no warranty of any kind with regard to the material contained within this document, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Neither the GPS GmbH nor Neobotix shall be liable or responsible for incidental or consequential damages in connection with the improper use of one or more of the products described in this manual.



### Declaration of conformity

This product fulfils all relevant directives of the European Union. For further information please contact Neobotix.

### Downloads and further information

Additional information, data sheets and documentations, also for the other products of Neobotix, can be found on our homepage [www.neobotix.de/downloads](http://www.neobotix.de/downloads).

### Imprint

Neobotix GmbH

Weipertstr. 8-10, D-74076 Heilbronn

[www.neobotix-roboter.de](http://www.neobotix-roboter.de)

Contact: Dipl.-Ing. Till May

Tel.: (+49) 7131 / 7669 - 300

e-mail: [may@neobotix.de](mailto:may@neobotix.de)