Translation of the operating instructions

**IO1000**

I/O-Modul

Catalog No.
560-310

From software version
I/O-Modul 1.15
INFICON GmbH
Bonner Strasse 498
50968 Cologne, Germany
Table of Contents

1 About these instructions ................................................................................................................................. 4
  1.1 Target groups .............................................................................................................................................. 4
  1.2 Other associated documents ......................................................................................................................... 4
  1.3 Warnings ....................................................................................................................................................... 4

2 Safety .................................................................................................................................................................. 5
  2.1 Intended use ................................................................................................................................................ 5
  2.2 Owner requirements .................................................................................................................................. 5
  2.3 Operator requirements ................................................................................................................................. 5
  2.4 Safety .......................................................................................................................................................... 6

3 Scope of delivery .............................................................................................................................................. 7

4 Description ........................................................................................................................................................ 8
  4.1 Construction of the unit ................................................................................................................................. 8
  4.2 Function ....................................................................................................................................................... 16
  4.3 Technical data ............................................................................................................................................. 17

5 Installation and removal ................................................................................................................................ 18
  5.1 Mount device on DIN-TS35 top hat rail ...................................................................................................... 18
    5.1.1 Establish connections ............................................................................................................................ 18
  5.2 Remove the I/O module from the DIN-TS35 top hat rail ............................................................................. 19

6 Disposal .............................................................................................................................................................. 20

7 CE Declaration of Conformity .......................................................................................................................... 21

8 RoHS ................................................................................................................................................................ 22
1 About these instructions

1.1 Target groups

These operating instructions are intended for the owner and for technically qualified personnel with experience in leak detection technology and integration of leak detection devices in leak detection systems. In addition, the installation and use of the device require knowledge of electronic interfaces.

1.2 Other associated documents

<table>
<thead>
<tr>
<th>Operating instructions of the connected leak detector</th>
<th>jira54</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDS3000 Interface Protocols</td>
<td></td>
</tr>
<tr>
<td>HLD6000 Interface Protocols</td>
<td>kirb43</td>
</tr>
</tbody>
</table>

1.3 Warnings

- **DANGER**
  Imminent hazard resulting in death or serious injuries

- **WARNING**
  Hazardous situation resulting in potential death or serious injuries

- **CAUTION**
  Hazardous situation resulting in minor injuries

- **NOTICE**
  Hazardous situation resulting in damage to property or the environment
2 Safety

2.1 Intended use

The I/O module is a device interface between a leak detector and an external controller.

- Install, operate and service the device only in compliance with these instructions.

2.2 Owner requirements

Safety conscious operation

- Operate and install the device only if it is in perfect working order and as intended, in a safety-conscious manner and fully aware of dangers, in compliance with these instructions.

- Fulfill and ensure compliance with the following regulations:
  - Intended use
  - General applicable safety and accident prevention regulations
  - International, national and local standards and guidelines
  - Additional device-related provisions and regulations

- Use only original parts or parts approved by the manufacturer.

- Keep this manual available at the operating site.

Personnel qualifications

- All work must be performed only by technical specialists who have been trained on the device.

- Allow personnel in training to work with the device only under the supervision of technical specialists.

- Make sure that the authorized personnel have read and understood these instructions and all other applicable documents (refer to "Other associated documents [4]"), especially the information on safety, maintenance and repairs, before starting work.

- Define responsibilities, authorizations and supervision of personnel.

2.3 Operator requirements

- Read, observe and follow the information in these instructions and the working instructions created by the owner, especially the safety instructions and warnings.

- Perform all work based on the complete instructions.
2.4 Safety

• Only use the device away from areas with a risk of explosions.
3 Scope of delivery

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O module</td>
<td>1</td>
</tr>
<tr>
<td>Operating instructions</td>
<td>1</td>
</tr>
</tbody>
</table>

Please check the scope of delivery of the product for completeness after receipt.

**Transport**

**NOTICE**

**Damage due to unsuitable packaging material**

Transport in unsuitable packaging material can damage the device.

- Transport the device only in the original packaging material.
- Keep original packaging material.
4 Description

4.1 Construction of the unit

![Diagram](image_url)

Fig. 1: Front view

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PLC IN, digital inputs</td>
<td>6</td>
<td>DIP switch cover and fuse</td>
</tr>
<tr>
<td>2</td>
<td>RS232</td>
<td>7</td>
<td>LD, connection of leak detector</td>
</tr>
<tr>
<td>3</td>
<td>Status LED</td>
<td>8</td>
<td>ANALOG IN, analog inputs</td>
</tr>
<tr>
<td>4</td>
<td>ANALOG OUT, analog outputs</td>
<td>9</td>
<td>RS485</td>
</tr>
<tr>
<td>5</td>
<td>PLC OUT, digital outputs</td>
<td>10</td>
<td>24 V OUT, 24 volt output</td>
</tr>
</tbody>
</table>
Digital inputs

Galvanic isolation (max. 60 V DC, 25 V AC against GND)
maximum permissible input voltage: $U = 35$ V

Active signal: $V = 13 \ldots 35$ V (typical 24 V), $I = \text{approx.} 7$ mA
Inactive signal: $U < 7$ V (typical 0 V), $I = 0$ mA

A signal on these digital inputs must have a minimum length of 100 ms, so that it can
be safely evaluated.

Pin assignment: The input pins PLC-IN 1 to PLC-IN 10 can be configured freely, see
example:

Fig. 2: Sample wiring, digital inputs with PLC. Left: Driver outputs, right: Potential-free contacts
PLC OUT, Fig. 1 (5)  Digital outputs

Galvanic isolation (max. 60 V DC, 25 V AC against GND)
maximum permissible load each output: \( U = 30 \text{ V}, \ I = 0.75 \text{ A} \)

Fuses for digital outputs 1 ... 4 and 5 ... 8: 2 x 0.75 A

Pin assignment: The output pins PLC_OUT_1 to PLC_OUT_8 can be configured freely, see example:

Fig. 3: Sample wiring, digital outputs
ANALOG IN, Fig. 1 (8)  
Analog input (input voltage range 0 V to 10.8 V)

Pin assignment:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24V supply (output)</td>
</tr>
<tr>
<td>2</td>
<td>GND to 24V supply</td>
</tr>
<tr>
<td>3</td>
<td>Analog input (0 V to 10.8 V)</td>
</tr>
<tr>
<td>4</td>
<td>GND to analog input</td>
</tr>
</tbody>
</table>

ANALOG OUT, Fig. 1 (4)  
Analog outputs (for example for logging leak rate and backing pressure)

Galvanic isolation (max. 60 V DC, 25 V AC against GND)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage range</td>
<td>0 ... 10 V</td>
</tr>
<tr>
<td>Precision</td>
<td>±15 mV offset, additional ±1% from measurement (current output voltage) as linearity error (at 25 °C)</td>
</tr>
<tr>
<td>Resolution</td>
<td>typ. 2.5 mV</td>
</tr>
<tr>
<td>Load</td>
<td>&gt; 10 kΩ</td>
</tr>
</tbody>
</table>

Pin assignment:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analog output 1: ANALOG-OUT 1</td>
</tr>
<tr>
<td>2</td>
<td>Analog output 2: ANALOG-OUT 2</td>
</tr>
<tr>
<td>3</td>
<td>GND to analog output</td>
</tr>
</tbody>
</table>

The output pins can be freely configured. Specific information can be found in the operating instructions of the respective leak detector.
**RS232, Fig. 1 (2)**

Connection for RS-232

Galvanic isolation (max. 60 V DC, 25 V AC against GND)

Pin assignment:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TxD</td>
</tr>
<tr>
<td>3</td>
<td>RxD</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
</tbody>
</table>

A normal RS-232 cable must be used for the connection (1:1 connection, RxD and TxD not crossed, no zero-modem cable).

- Deactivate RS-232 hardware handshake in RS-232 control program.

If the hardware handshake cannot be deactivated, the RS-232 can be used as follows:

**Fig. 4:** Connection with RS-232 cable (in case hardware handshake cannot be deactivated)
RS485, Fig. 1 (9) Connection for RS-485

Fig. 5: RS-485 bus terminator

| A | Active bus terminator | C | Passive bus terminator |
| B | Without bus terminator |

Galvanic isolation (max. 60 V DC, 25 V AC against GND)

Pin assignment:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect pull-up resistor (562 Ω against +5 V) with D+ if necessary</td>
</tr>
<tr>
<td>2</td>
<td>D+</td>
</tr>
<tr>
<td>3</td>
<td>D-</td>
</tr>
<tr>
<td>4</td>
<td>Connect pull-down resistor (562 Ω against GND) with D- if necessary</td>
</tr>
<tr>
<td>5</td>
<td>COM</td>
</tr>
</tbody>
</table>

The bus terminator integrated in the I/O module (120 Ω) between D+ and D can be disabled via DIP switches S2-4. The BUS address is 1. BUS operation with more than two subscribers is not possible.
### Description

#### Status LED, Fig. 1 (3)

<table>
<thead>
<tr>
<th>Color</th>
<th>Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>illuminates</td>
<td>Device not functional or defective</td>
</tr>
<tr>
<td>Red</td>
<td>flashes</td>
<td>Not ready for operation, communication to leak detector is not available</td>
</tr>
<tr>
<td>Cyan</td>
<td>illuminates</td>
<td>Ready for operation; communication to leak detector available</td>
</tr>
<tr>
<td>Green</td>
<td>Flashes quickly</td>
<td>Boot loader active, ready for software update</td>
</tr>
<tr>
<td>Green</td>
<td>Flashes slowly</td>
<td>Data reception on RS232</td>
</tr>
<tr>
<td>Yellow</td>
<td>Flashes slowly</td>
<td>Data reception on RS485</td>
</tr>
<tr>
<td>–</td>
<td>off</td>
<td>No operating voltage</td>
</tr>
</tbody>
</table>

#### Fuse and Dip Switch S1, S2, Fig. 1 (6)

Fuses for digital outputs and Dip switches (under the cover)

Fuses for digital outputs 1 ... 4 and 5 ... 8:

2 x 0.75 A (Schurter: 7010.9800.xx)

<table>
<thead>
<tr>
<th>DIP switch S1</th>
<th>LDS3000</th>
<th>HLD6000</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 3 2 1</td>
</tr>
<tr>
<td>Factory setting (default value of the interface protocol by the leak detector or control unit)</td>
<td>*</td>
<td>*</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>ASCII protocol</td>
<td>*</td>
<td>*</td>
<td>0 0 1 0</td>
</tr>
<tr>
<td>LD protocol</td>
<td>*</td>
<td>*</td>
<td>0 0 1 1</td>
</tr>
<tr>
<td>Binary protocol</td>
<td>*</td>
<td></td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>LDS1000 protocol</td>
<td>*</td>
<td></td>
<td>0 1 1 0</td>
</tr>
<tr>
<td>Normal protocol</td>
<td>*</td>
<td></td>
<td>0 0 0 1</td>
</tr>
<tr>
<td>Simple protocol</td>
<td>*</td>
<td></td>
<td>0 1 0 0</td>
</tr>
</tbody>
</table>

1 = ON, 0 = OFF

<table>
<thead>
<tr>
<th>DIP switch S2</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 3 2 1</td>
</tr>
<tr>
<td>Activate boot mode for software update</td>
<td>X + 0 0</td>
</tr>
<tr>
<td>Disable bus terminator 120 Ω for RS-485</td>
<td>1 X 0 0</td>
</tr>
</tbody>
</table>

1 = ON, 0 = OFF, + = switching from OFF to ON during operation, X = random
Connection LD, Fig. 1 (7)

Connection for the data cable to the leak detector

24V OUT, Fig. 1 (10)

24V output

Pin assignment:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+ 24 V</td>
</tr>
<tr>
<td>-</td>
<td>GND</td>
</tr>
</tbody>
</table>

The I/O module is supplied with voltage by the leak detector and requires no separate power supply. The 24V output is not used for voltage supply to the I/O module.

The 24V output of the I/O module can be used as an active signal for the PLC inputs and outputs.
4.2 Function

The device is an interface between the leak detector and an external controller. It is equipped with

- one RS-232 connection
- one RS-485 connection
- one analog input
- ten digital inputs
- two analog outputs
- eight digital outputs

The actual function is determined by the software of the connected leak detector.
## 4.3 Technical data

### Mechanical data

| Dimensions (lxwxh) | 107.6 mm x 89.7 mm x 76.6 mm |

### Electrical data

| Type of protection | IP20 |

### Ambient conditions

<table>
<thead>
<tr>
<th>Max. altitude above sea level</th>
<th>2000 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. relative humidity above 40 °C</td>
<td>0.5</td>
</tr>
<tr>
<td>Max. relative humidity from 31 °C to 40 °C</td>
<td>80% to 50% (linear abfallend)</td>
</tr>
<tr>
<td>Max. relative humidity to 40 °C</td>
<td>0.8</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 °C - 60 °C</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>II</td>
</tr>
</tbody>
</table>
5 Installation and removal

5.1 Mount device on DIN-TS35 top hat rail

Fig. 6: Mount the device

1 Hook device on top hat rail at bottom.
2 Press device onto top hat rail at top.

5.1.1 Establish connections

Connecting I/O module with leak detector

The I/O module communicates via data cable with the leak detector and is supplied with voltage by the data cable.

1 Connect I/O module (connection “LD”) via data cable with leak detector (connection “I/O Anybus”).

2 Connect I/O module via desired interfaces with external controller:
   - RS232 (RS-232 interface)
   - RS485 (RS-485 interface)
   - Analog In (analog input)
   - Analog Out (analog outputs)
   - PLC In (digital inputs)
   - PLC Out (digital outputs)
5.2 Remove the I/O module from the DIN-TS35 top hat rail

Fig. 7: Removing the I/O module

1 Use the flat-tip screwdriver to pull out the locking device.
2 Pull the device off of the top hat rail.
6 Disposal

The device can either be disposed of by the operator or be sent to the manufacturer. The device consists of materials that can be recycled. This option should be exercised to prevent waste and also to protect the environment.

► For disposal, always comply with local and regional environmental and safety regulations.
7 CE Declaration of Conformity

EU Declaration of Conformity

We – INFICON GmbH – herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON GmbH.

In case of any products changes made without our approval, this declaration will be void.

Designation of the product:
I/O Module

Models:
IO1000

Catalogue numbers:
590-310

The products meet the requirements of the following Directives:

- Directive 2014/30/EU (Electromagnetic Compatibility)
- Directive 2011/65/EU (RoHS)

Applied harmonized standards:

- DIN EN 61326-1:2013
  Class B according to EN 55011
- DIN EN 50581:2013
- DIN EN ISO 12100:2010

Cologne, July 20th, 2017

Dr. Döbler, President LDT

Cologne, July 20th, 2017

Bausch, Research and Development

INFICON GmbH
Bonner Strasse 498
D-50968 Cologne
Tel.: +49 (0)221 56788-0
Fax: +49 (0)221 56788-60
www.inficon.com
E-mail: leakdetection@inficon.com
8 RoHS

Restriction of Hazardous Substances (China RoHS)
有害物质限制条例（中国 RoHS）

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Lead (Pb)</th>
<th>Mercury (Hg)</th>
<th>Cadmium (Cd)</th>
<th>Hexavalent Chromium (Cr(VI))</th>
<th>Polybrominated biphenyls (PBB)</th>
<th>Polybrominated diphenyl ethers (PBDE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB Mainboard</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>PCB Interface</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Cable Connectors</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

This table is prepared in accordance with the provisions of SJ/T 11364. 本表是根据 SJ/T 11364 的规定编制的。

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.
O：表示该部件所有均质材料中所含的上述有害物质都在 GB/T 26572 的限制要求范围内。

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.
X：表示该部件所使用的均质材料中，至少有一种材料所含的上述有害物质超出了 GB/T 26572 的限制要求。

(Enterprises may further provide in this box technical explanation for marking "X" based on their actual circumstances.)
（企业可以根据实际情况，针对含“X”标识的部件，在此栏中提供更多技术说明。）