# Inline Terminal
# ILT AO 4/U/SF
# IB IL AO 4/U/SF-PAC

## Device Description

This manual is intended to provide support for installation and usage of the device. The information is believed to be accurate and reliable. However, SysMik GmbH Dresden assumes no responsibility for possible mistakes and deviations in the technical specifications. SysMik GmbH Dresden reserves the right to make modifications in the interest of technical progress to improve our modules and software or to correct mistakes.

We are grateful to you for criticism and suggestions. Further information (device description, available software) can be found on our homepage www.sysmik.de. Please ask for latest information.

SysMik disclaims all warranties in case of improper use or disassembly and software modifications not described in this document or when using improper or faulty tools. Commissioning and operation of the device by qualified personnel only. All applicable regulations have to be observed.



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|---|---|---|
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# Content

# 1 Overview

The terminal ILT AO 4/U/SF is a modular 4-channel analog output terminal for use with SysMik devices ICS-500 and Scalibur. It may be replaced by the Inline terminal type IB IL AO 4/U/SF-PAC.

Features:

- four analog voltage outputs
  - 0-10 V
  - DAC resolution 10 bit
  - load ≥ 670 Ω in source mode, 15 mA in sink mode
- channels independently configurable (default value at power-on or bus reset)
- detection of overload conditions
- two wire actuator connection
- width only 12.2 mm (0.48 inch)

**Note:** This data sheet is only valid in association with the manual “SysMik User’s Guide Inline” (see [1]).

# 2 Order Information

| Device | Part number |
|---|---|
| ILT AO 4/U/SF | 1225-100288-05-2 |
| IB IL AO 4/U/SF-PAC | 2692050 |

**Table 2.1:** Order information

# 3 Connections

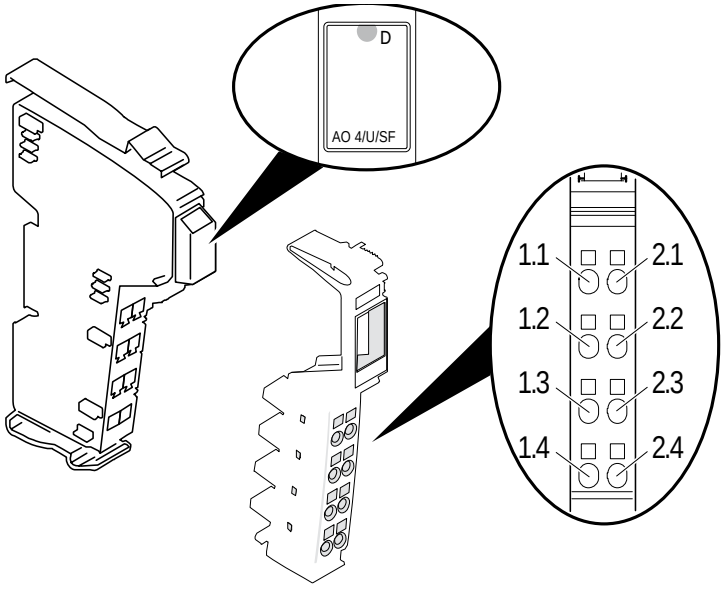


**Fig. 3.1:** Terminal connections

| Indicator | Color | Description |
|---|---|---|
| D | green | bus diagnostics |

**Table 3.1:** Local diagnostic indicator

| Terminal point | Signal | Assignment |
|---|---|---|
| 1.1 | $U_1$ | voltage output channel 1 |
| 2.1 | $U_2$ | voltage output channel 2 |
| 1.4 | $U_3$ | voltage output channel 3 |
| 2.4 | $U_4$ | voltage output channel 4 |
| x.4 | AGND | ground of analog outputs, shield connection |

**Table 3.2:** Terminal assignment

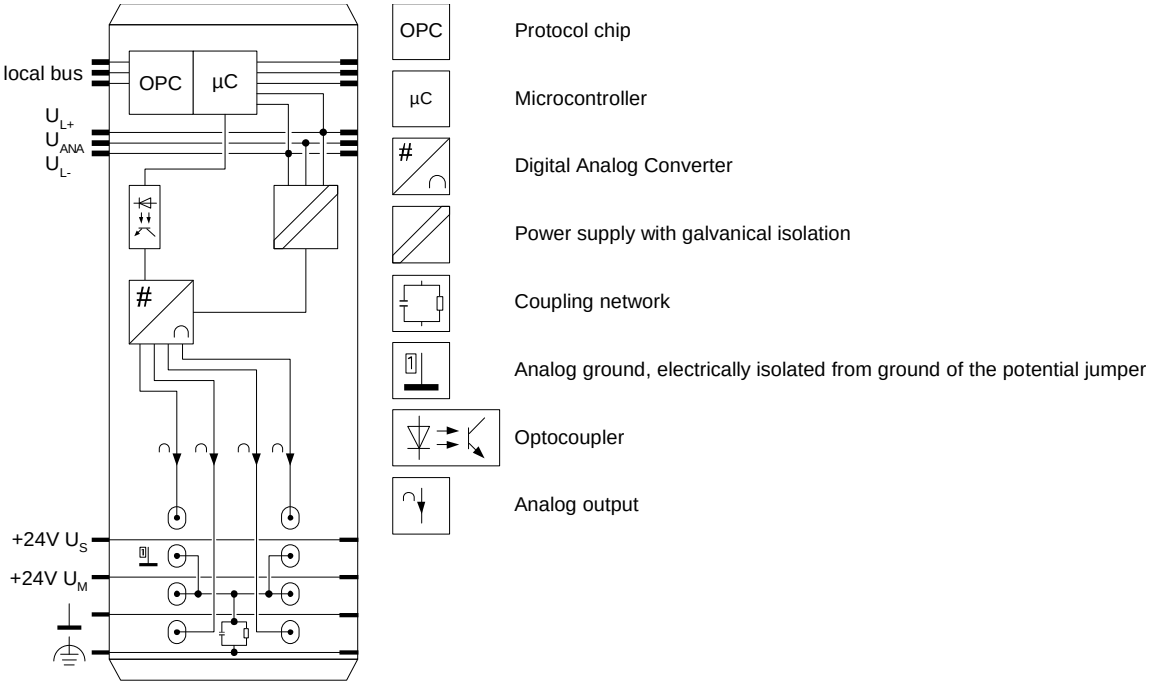


**Fig. 3.2:** Functional overview

## 3.1 Wiring Example

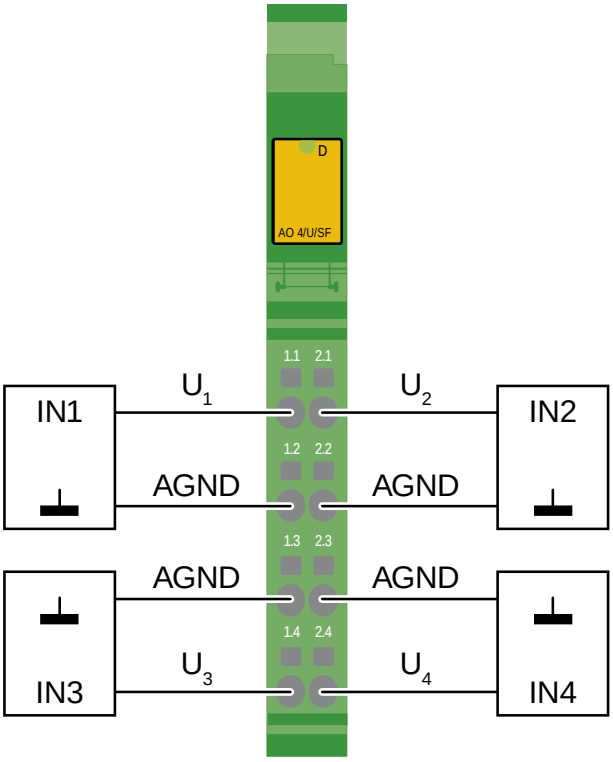


**Fig. 3.1.1:** Wiring example

**Note:** Analog actuators with a cable length of up to 10 m () can be connected using unshielded twisted-pair cables.

**Note:** Connect analog actuators with a cable length of more than 10 m using shielded twisted-pair cables.

Connect the shield only at the terminal and do not connect the shield at the actuator.

## 3.2 Mounting Instruction

High current flowing through the potential jumpers $U_M$ and $U_S$ leads to a temperature rise inside the terminal. Observe the following instruction to minimize this effect.

**Instruction:** Create a separate main circuit for the analog terminals or place the analog terminals at the end of the main circuit!

# 4 Technical Data

| General data | | |
|---|---|---|
| Housing dimensions<br>(width x height x depth) | | 12.2 mm x 120 mm x 71.5 mm<br>(0.48 in. x 4.724 in. x 2.815 in.) |
| Weight | with connector | 64 g |
| | without connector | 48 g |
| Permissible temperature | operation | -25 °C to +55 °C (-13 °F to +131 °F) |
| | storage / transport | -25 °C to +85 °C (-13 °F to +185 °F) |
| Permissible humidity | | 75 % on average, 85 % occasionally<br>(non condensing) |
| Permissible air pressure | operation | 80 kPa to 106 kPa<br>(up to 2000 m / 6562 ft. above sea level) |
| | storage / transport | 70 kPa to 106 kPa<br>(up to 3000 m / 9843 ft. above sea level) |
| Degree of protection | | IP20 according to IEC 60529 |

| Power consumption | |
|---|---|
| Communications power $U_L$ | 7.5 V DC |
| Current consumption at $U_L$ | typ. 32 mA; max. 36 mA |
| Segment supply voltage $U_S$ | 24 V DC |
| Current consumption at $U_{ANA,}$<br>without load ($R_L$ > 1 MΩ)<br>all channels full load<br>($R_L$ = 667 Ω, $V_{out}$ = 10 V) | typ. 17 mA ; max. 23 mA,<br><br>typ. 58 mA ; max. 63 mA, |
| Total power consumption<br>without load ($R_L$ > 1 MΩ)<br>all channels full load<br>($R_L$ = 667 Ω, $V_{out}$ = 10 V) | typical 0.65 W<br><br>typical 1.63 W |

| Analog outputs | |
|---|---|
| Number | 4 |
| Wiring | two wire connection with twisted pair cable |
| Signal | voltage 0 V to 10 V |
| DAC resolution | 10 bit |
| Voltage range / resolution in process data word (quantization) | -0.02 V to 10.02 V<br>typical 10 mV / LSB |
| Output load | 667 Ω minimum (this allows for the max. output current of ±15 mA) |
| Process data update including conversion time of the DAC | < 1 ms |
| Slew rate (> 99 % of the final value) | < 1 ms at ohmic load |

| Safety equipment of analog outputs | |
|---|---|
| Transient protection | yes |
| Over voltage protection | -30 V to +30 V DC |
| Overload protection | for at least 1 minute, unlimited for one channel |

| Electrical isolation / isolation of the voltage areas | |
|---|---|
| **Common potentials** | |
| All four analog outputs refer to the same potential (analog ground AGND), which is galvanically separated from all other circuits (logic circuit $U_L$, analog circuit $U_{ANA}$, main circuit $U_M$, segment circuit $U_S$).<br>Functional earth (FE) is a separate potential area and connected to analog ground AGND via a coupling network, consisting of a resistor of 1 MΩ and a capacitor of 1 nF in parallel. | |
| **Separate potentials** | |
| **Test distance** | **test voltage** |
| Analog outputs vs. $U_L$ / $U_{ANA}$ / $U_M$ / $U_S$ / GND | 500 V AC, 50 Hz, 1 min |

| Error messages to higher-level control system |
|---|
| Failure of the internal IO supply voltage $U_{ANA}$ → peripheral error |
| Overload of analog supply (overload of a single output may not necessarily cause this error) → peripheral error |

| Tolerance- and temperature response | | | | |
|---|---|---|---|---|
| The tolerances refer to the output range final value connected to a typical load (30 kΩ) | | | | |
| | | | | |
| Ambient temperature $T_a$ | Absolute | | Relative | |
| | typical | maximum | typical | maximum |
| 25 °C | ±18 mV | ±51 mV | 0.18 % | 0.51 % |
| -25 °C to +55 °C | ±47 mV | ±158 mV | ±0.47 % | ±1.6 % |

| Signal rise times: Voltage output 0 V to 10 V (typical) | | |
|---|---|---|
| | 10 % to 90 % | 0 % to > 99 % (including overshoot) |
| No load | 26 µs | 50 µs |
| Ohmic load $R_L$ = 1 kΩ | 31 µs | 60 µs |
| Ohmic / capacitive load $R_L$ = 1 kΩ / $C_L$ = 10 nF (in parallel) | 33 µs | 60 µs |
| Ohmic / capacitive load $R_L$ = 1 kΩ / $C_L$ = 220 nF (in parallel) | 90 µs | 150 µs |
| Ohmic / capacitive load $R_L$ = 1 kΩ / $C_L$ = 10 nF (in parallel) | 33 µs | 60 µs |
| Ohmic / inductive load $R_L$ = 1 kΩ / $L_L$ = 3.3 mH (in series) | 29 µs | 55 µs |

| Additional tolerances influenced by electromagnetic fields | | |
|---|---|---|
| Type of electromagnetic interference | typical deviation from the output range final value | |
| | relative | absolute |
| Electromagnetic fields;<br>field strength 10 V/m<br>according to EN 61000-4-3 / IEC 61000-4-3 | < ±0.9 mV | < ±90 mV |
| Conducted interference class 3;<br>test voltage 10 V<br>according to EN 61000-4-6 / IEC 61000-4-6 | < ±0.9 mV | < ±90 mV |
| Shielded twisted pair cables have been used as actuator cables for these tests. | | |

**Table 4.1:** Technical data

# 5 Literature

[1] SysMik User's Guide Inline

[2] www.sysmik.de