

PCD2.W525 | PCD3.W525

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0.1 Document history

Document-no	Edition	Changes	Remarks
2007-03-31	pE1	complete	Preliminary Edition
2007-11-15	E1	complete	A few changes to pE1
2008-01-18	E2	Chapter 1.4	PCD3.W525 pluggable terminal: wrong ordering number replaced
2013-09-18	EN03	- Chapter 2	- New Logo and new company name - Nouveau chapitre: Configuration des mots d'E / S
2015-07-16	ENG04	Kap. 1.1 Kap. A.2	- mode Ni1000 L&S added - new phone/fax number

0.2 Trademarks

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Technical modifications and changes are subject to the state of technology

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1 Hardware

1.1 General Information

PCD2/3.W525 is an analogue multipurpose module with four inputs and two outputs. Each input and each output can be individually configured as one of the standard industrial interface type like 0... 10 V, 0... 20 mA and 4... 20 mA. In addition, the inputs can be configured to support Pt/Ni1000 or Pt500 temperature sensors. Furthermore, the module offers high flexibility in selecting filter types and scaling ranges.

Inputs-14 Bit

- 4 Inputs. Every channel has four modes of operation (configurable by DIP-Switches):
 - **Differential Voltage Inputs**
0... 10 V, resolution: 0.61 mV per LSB (14 Bit)
 - **Differential Current Inputs**-measured in differential mode
0... 20 mA, resolution: 1.2 μ A per LSB (14 Bit)
4... 20 mA, resolution: 1.2 μ A per LSB (13.7 Bit)
 - **Temperature**
Pt1000, -50... 400 °C, resolution: 0.1 °C
Pt500, -50... 400 °C, resolution: 0.2 °C
Ni1000, -60... 200 °C, resolution: 0.1 °C
Ni1000 L&S, -70... 240 °C, resolution: 0,1 °C
 - **Resistance**
0... 2500 Ω , resolution 0.2 Ω
- Each channel can be configured to have a software based 50 Hz / 60 Hz filter

Outputs-12 Bit

- 2 Outputs. Every channel has three modes of operation (configurable by software):
 - **Voltage**
0... 10 V, resolution: 2.44 mV per LSB (12 Bit)
 - **Current**
0... 20 mA, resolution: 4.88 μ A per LSB (12 Bit)
4... 20 mA, resolution 4.88 μ A per LSB (11.7 Bit)
 - **High impedance**

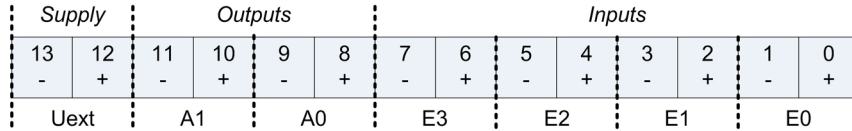
Miscellaneous

- All I/O-Channels are galvanically isolated to the PCD and external power supply. (But all channels are galvanically connected to each other.)
- Every channel has two connection terminals.

1.2 Configuration

1.2.1 Module connections/LED

The connections of the module terminal are the following:



Description of the LED:

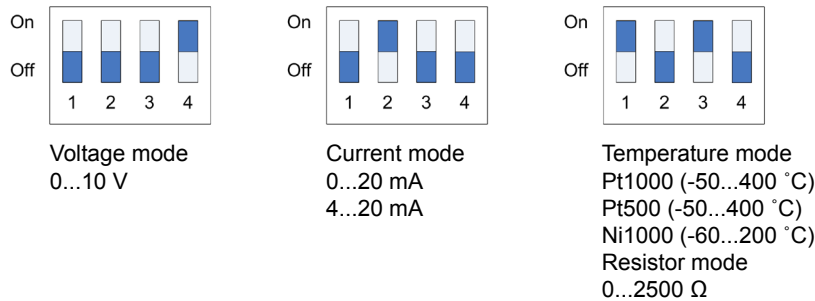
- Off: Module is not powered. U_{ext} (24 V) is missing.
- On: Module is running without errors
- Blinking slow: Channel error (Over range/under range/short circuit/open load)
- Blinking fast: U_{ext} is lower than specified (< 19 V)

1.2.2 How to configure the inputs

Each input channel is configured by a DIP-Switch with four switches. The function of each switch is the following:

Switch nr.	Off	On
1	Differential Mode	Single Ended Mode
2		Current Shunt On
3		Supply for external Resistors On
4	Gain=1	Gain=0.25

According to this table, the configuration for the different modes of operation is as follows:



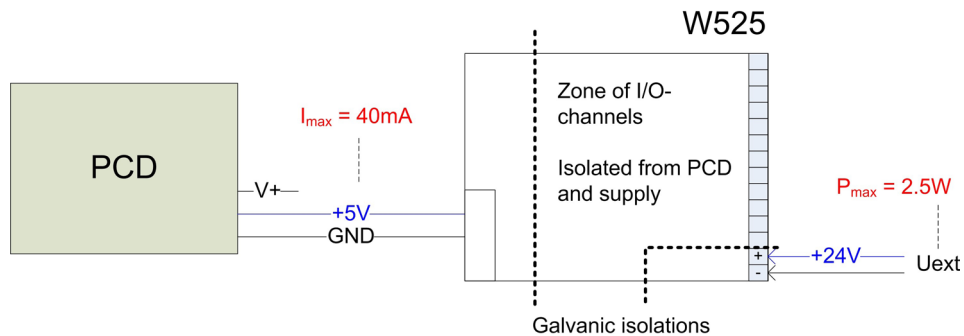
1.2.3 How to configure the outputs

Since the outputs are configured by software (with the corresponding FBox or FB), there is no need to configure the mode of operation of the outputs with any kind of jumpers or DIP-Switches.

1.3 Function

1.3.1 Power Supply

PCD2.W525 / PCD3.W525 has to be supplied externally! This power supply is galvanically isolated to both, the PCD and the I/Os of W525. Furthermore, the design allows using the same power supply for the PCD and for W525 without losing the galvanic isolation. These schematics show the different zones of isolation:



1.3.2 Timing

- **Inputs**

- Internally, W525 finishes acquiring every 2 ms a new value for every input channel
- This value is always ready to be read by the PCD.
- Dependent on the PCD speed, the transmission time of a single 16-Bit scaled value (of a single input channel) takes typically 100 μs (on a PCD2.M480) or 600 μs (on a PCD2.M170)

- **Outputs**

- Internally, W525 outputs the last received output value from PCD with a maximum delay of 2 ms.
- Dependent on the PCD speed, the transmission time of a single 16-Bit scaled output value takes typically 100 μs (on a PCD2.M480) or 600 μs (on a PCD2.M170).

1.3.3 Filter

- **Inputs**

There are two factors, which have filtering effects to the acquired values:

- The base hardware filter with a time constant of 2ms. This filter attenuates the input signal by 6 dB/decade at a cut-off frequency of 80 Hz.
- The second influence is caused by software and results in a delay of the acquired value for 2 ms with a notch filter characteristics at 500 Hz if no software based 50 Hz / 60 Hz filter is selected.

In case of use of a 50 Hz (60 Hz) filter, the notch filter frequency is 50 Hz (60 Hz); the delay remains the mentioned 2ms.

- **Outputs**

There is only the hardware based filter with a time constant of 1 ms, which is active

1.4 Technical Data

Inputs	
General:	
Resolution:	14 Bit
Kind of Measurement:	differential
Number of channels:	4
Galvanic isolated to PCD:	yes
Galvanic isolated to external supply:	yes
Galvanic isolated between other channels:	no
Kind of connections:	two wires per channel
How to configure mode of operation:	by DIP-Switches
Accuracy at 25 °C:	± 0.2% max.
Accuracy repetitive:	± 0.05% max.
Temperature drift (0...55 °C) max.:	± 70 ppm/°C
Over voltage protection:	± 50 V min.
Over current protection:	± 35 mA min.
Common mode voltage max:	± 50 V min.
Common mode rejection ratio:	70 dB min.
Filter:	
Time constant of hardware filter:	2 ms
Attenuation of software based 50 Hz Filter:	40 dB min. between 49.5 and 50.5 Hz
Attenuation of software based 60 Hz Filter:	40 dB min. between 59.5 and 60.5 Hz
Voltage mode:	
Resolution range 0... 10 V mode:	14 Bit; 0.61 mV per LSB
Current mode:	
Current shunt:	125 Ω
Resolution range 0... 20 mA:	14 Bit; 1.22 µA per LSB
Resolution range 4... 20 mA:	13.7 Bit; 1.22 µA per LSB
Temperature / Resistance mode:	
Resolution for Pt1000; Range -50... 400 °C	0.1 °C
Resolution for Pt500; Range -50... 400 °C	0.2 °C
Resolution for Ni1000; Range -60... 200 °C	0.1 °C
Resolution for Resistor; Range 0... 2500 Ω	0.2 Ω
Power dissipation in temp. sensor / resistor:	2.5 mW max
Outputs	
General:	
Resolution:	12 Bit
Number of channels:	2
Galvanic isolated to PCD:	yes
Galvanic isolated to external supply:	yes
Galvanic isolated between other channels:	no
Kind of connections:	two wires per channel
How to configure mode of operation:	by software (FBOX, FB)
Accuracy at 25 °C:	± 0.5% max.
Accuracy repetitive:	± 0.1% max.
Temperature drift (0...55 °C) max.:	± 70 ppm/°C.
Over current protection:	short circuit protected
Time constant of filter:	1 ms
Voltage mode:	
Max. load to guarantee specified accuracy:	> 700 Ω
Resolution range 0... 10 V:	12 Bit; 2.44 mV per LSB

Current mode:		
Working resistance:	< 600 Ω	
Resolution range 0...20 mA:	12 Bit; 4.88 μ A per LSB	
Resolution range 4...20 mA:	11.7 Bit; 4.88 μ A per LSB	
General Data		
Power consumption at I/O-Bus +5V:	max. 40 mA	
Power consumption at I/O-Bus V+:	unloaded	
Temperature range:	0...55 $^{\circ}$ C	
Storage temperature range:	-25...+70 $^{\circ}$ C	
External power supply		
(It is possible and allowed to use the same power supply as the PCD itself is supplied with – without losing the galvanic isolation of the I/Os!)		
Operation voltage:	24 V \pm 4 V smoothed	
Power consumption:	max. 2.5 W (depends on output load)	
Terminal:	PCD2	Pluggable 14-pole screw terminal (PCD2.W525; O no. 4 405 5002 0, will be delivered with the module), both for wires up to 1,5 mm ²
	PCD3	Pluggable 14-pole cage clamp terminal (PCD3.W525; O no. 4 405 4998 0), both for wires up to 1,5 mm ²

2 Meaning of the I/O terminology of a PCD2/3.W525 module

When configuring a W525 module using the Device Configurator or the Profi-S-I/O (or Profibus DP) Network Configurator, the PCD2/3.W525 needs two registers for the analogue outputs and 8 registers for the analogue inputs.

2

The meaning of the registers is as follows:

Output registers		
Register	Bits 31:16	Bits 15..0
n		Value CH0 output
n+1		Value CH1 output

Description of the output registers

Value CH0...1 (Register n, n+1)

This register (bits 0 to 15) contains the analogue output value of the corresponding analogue output. It is a 12 bit value.

Input registers		
Register	Bits 31..16	Bits 15..0
n		Value CH0 input
n+1		Value CH1 input
n+2		Value CH2 input
n+3		Value CH3 input
n+4		Load current/voltage
n+5		Module status
n+6		Input status
n+7		Output status

Description of the input registers

Value CH0...CH3 (Register n...n+3)

This register (bits 0 to 15) contains the analogue input value of the corresponding analogue input. It is a 14 bit value.

Load_Current / Load_Voltage (Register n+4)

The actual current or voltage value is displayed on this register (bits 0 to 15).

- current in [μ A] (0...20,000)
- voltage in [mV] (0...10,000)

Module status (Register n+5)

This register (bits 0 to 15) contains the actual status of the module

Module status table:

Bit	Description
15:14	<i>Reserved</i>
13	Error on the output channel CH1
12	Error on the output channel CH0
11	Error on the input channel CH3
10	Error on the input channel CH2
9	Error on the input channel CH1
8	Error on the input channel CH0
7:5	<i>Reserved</i>
4	<i>Communication: illegal command.</i> Is set to 1 if the module receives a "not known" instruction.
3	<i>Communication: packet too long.</i> Is set to 1 if a data byte (CMD/data = 0) is received during the communication although a command byte is supposed to be received (CMD/data = 1)
2	<i>UExt too low.</i> The voltage of the external power supply is too low.
1	<i>UExt fail.</i>
0	<i>No response.</i>

Input status (Register n+6)

This register (bits 0 to 15) contains the status of the input channels CH0..CH3. The status of each input channel is displayed in 4 bits.

Input status:

Bit	Description
Bits 0...3	CH0 status
Bits 4...7	CH1 status
Bits 8...11	CH2 status
Bits 12...15	CH3 status

Input status table:

Bit	Description
3	<i>Ouput transistor overheated</i>
2	<i>Not calibrated</i>
1	<i>Over range</i>
0	<i>Under range</i>

Output status (Register n+7)

This register (bits 0 to 15) contains the status of the two output channels CH0 and CH1.

The status of each output channel is displayed in 6 bits.

Output status:






Bit	Description
Bits 0..5	CH0 status (LOW BYTE)
Bits 8..13	CH1 status (HIGH BYTE)

Output status table:

Bit	Description	
CH0	CH1	
5	13	<i>Load resistance too high.</i> Only for outputs in current mode. Typically occurs if the output circuit is open.
4	12	<i>Load resistance too low.</i> Only for outputs in voltage mode. Typically occurs in the event of a short circuit.
3	11	<i>Ouput transistor overheated</i>
2	10	<i>Not calibrated</i>
1	9	<i>Over range</i>
0	8	<i>Under range</i>

A Appendix

A.1 Icons

	In manuals, this symbol refers the reader to further information in this manual or other manuals or technical information documents. As a rule there is no direct link to such documents.
	This symbol warns the reader of the risk to components from electrostatic discharges caused by touch. Recommendation: at least touch the Minus of the system (cabinet of PGU connector) before coming in contact with the electronic parts. Better is to use a grounding wrist strap with its cable attached to the Minus of the system.
	This sign accompanies instructions that must always be followed.
	Explanations beside this sign are valid only for the Saia PCD Classic series.
	Explanations beside this sign are valid only for the Saia PCD xx7 series.

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