

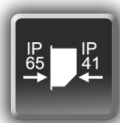
Product information

S7-Panel-PLC

PC431T



Image of PC431T-0-02



(valid from PLC-version PC431T-0-**02**)

Changes to older versions of this document

Rev. 01 → 02:

Description

S7-Panel-PLC with

- 4,3" TFT display (480x272 pixel)
- resistive touch (front protection class IP65)

Standard configuration:

RS232 with

- free ASCII-Protokoll

RS485 with

- free ASCII protocol
- Modbus RTU
- with switchable terminate resistors for RS485

2x Ethernet (as switch or separated) with

- S7-connection (Put/Get)
- Send/ Receive via TCP and UDP,
- Modbus TCP

CAN

- protocol compatible to
 - CANopen®
 - Layer2 communication
- with switchable terminate resistors for RS485

Micro-SD-card slot

- for SD-cards up to 8GByte

Run/Stop switch

State LEDs for

Power, Battery, Error, Run

Onboard-Periphery

12 digital I/Os

thereof 2 PWM-Outputs
thereof 2 PushPull-Outputs

12 digital Inputs

thereof 2 Counters 1kHz
thereof 2 Counters 100kHz

3 analog I/O's

((switchable per channel as input/output and for U / I)

3 analog Inputs

(customizable as RTD/ U/ I/ TC/ DMS)

Inserting stripes

- for Logo and identification (thereby customized adaption possible easy)

Scope of delivery:

- Mounting kit with grounding terminal i
- Technical data sheet

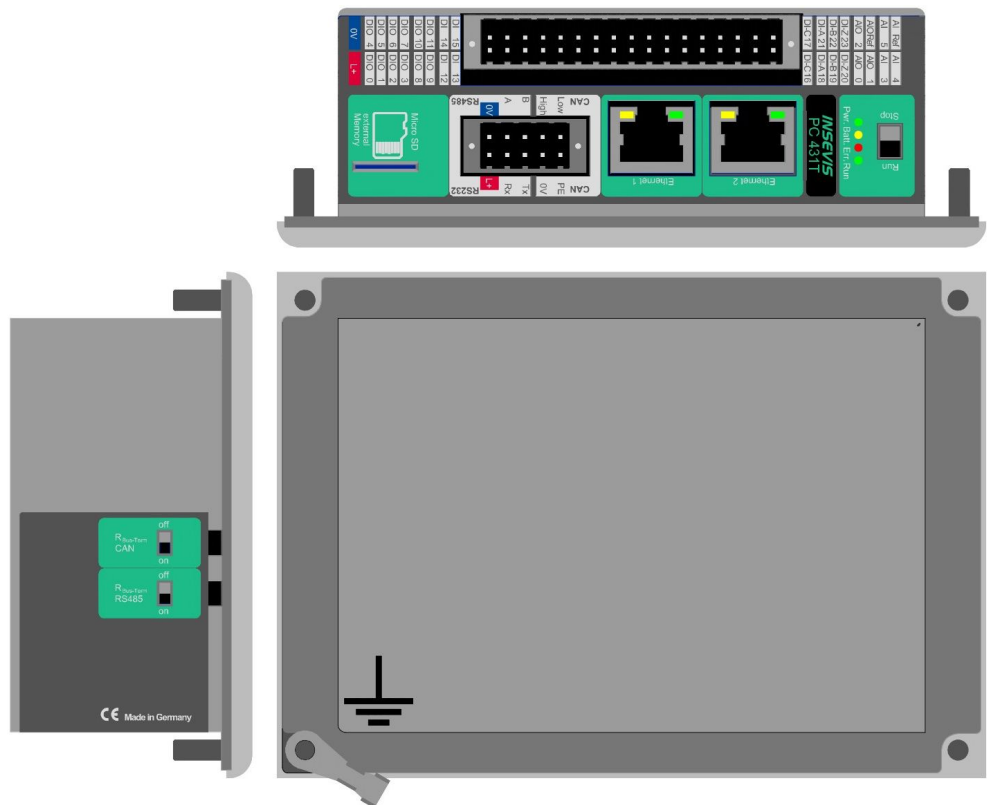


Figure above: View to rear side and connections sides of PC431T (horizontal use)

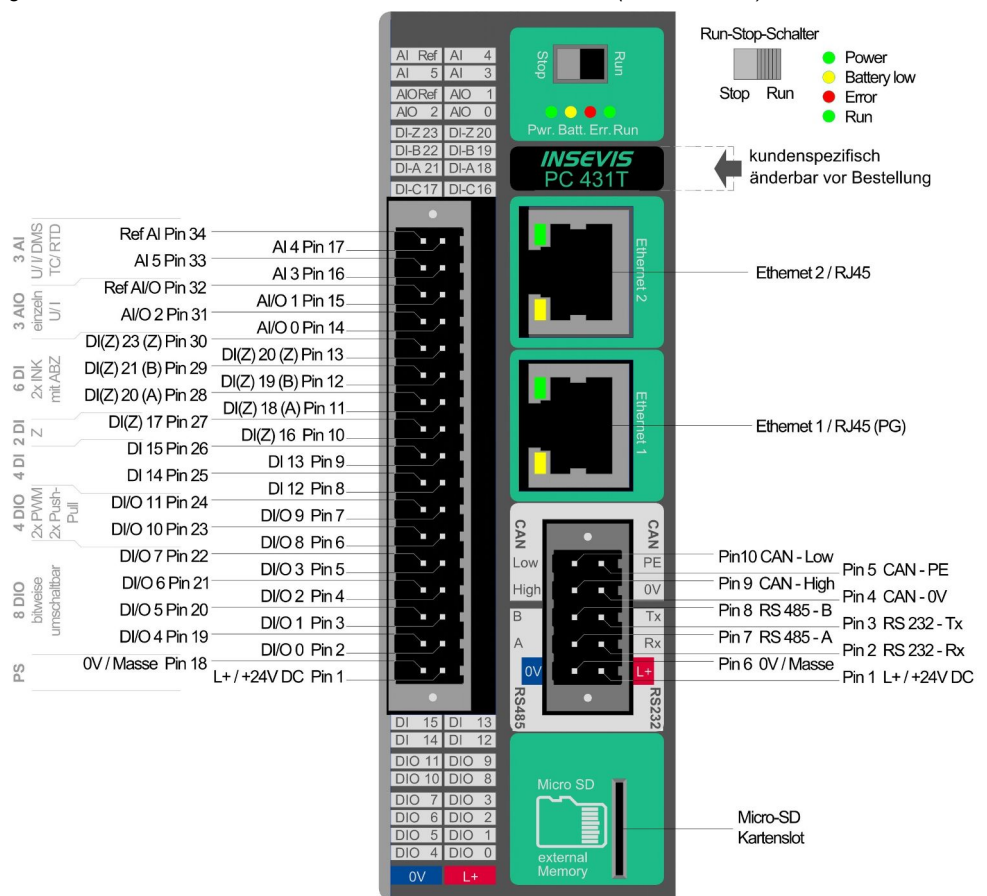
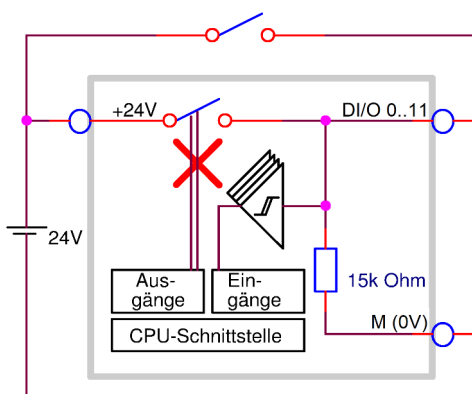


Figure Above: CPU and Periphery connectors of Panel-PLC PC431T

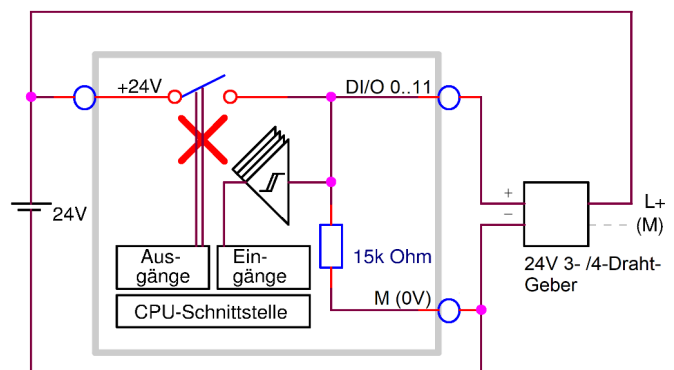
| Technical data | |
|---|---|
| Dimensions W x H x D (mm) | 140 x 100 x 43 118 x 84 |
| Cut out W x H (mm) / Weight | ca. 650g |
| Operating temperature range Storage temperature range | -20°C ... +60°C (without condensation) -30°C ... +80°C |
| IP-protection class front panel rear side | IP65 IP41 |
| Connection technology | removable connector 2 bolt flanges (cage clamp technology) for cross section up to max. 1,5mm ² |
| Load voltage L+ | 24V DC (11 V ... 30V DC) |
| Current consumption Power dissipation | 200mA 5W (typ.) |
| Start-up current | < 3A |
| Diagonal of display (inch) Display resolution (pixel) | 4,3" (111mm) 480x272 Pixel (16:9-Format) |
| Display unit Operating unit | TFT Display with 16Bit colours analog resistive Touchscreen |
| Visualization tool unit to reference there | VisuStage PC43xT |
| Technical data | |
| CPU | |
| CPU-type | Type T (PC431T) |
| Working memory = battery backed load memory Diagnostic buffer | 1MB 512 kByte remanent 8MB 100 entries (all remanent) |
| Flash internal - for visualization external memory | 48 MByte Micro SD, up to max. 8 GByte (not necessary for S7-program, only for archiving) |
| OB, FC, FB, DB Lokal data Number of in- and outputs Process image Number of Merkerbytes Number of Taktmerker Number of timer, counter Depth of nesting | each 2.048 32kByte (2kByte per block) in each case 4.096 Byte (32.769 Bit) addressable in each case 4.096 Byte (default set is 128 Byte) 4.096 (remanence adjustable, default set is 0..15) 8 (1 Merkerbyte) in each case 512 (each remanence adjustable, default set is 0) up to 16 code blocks |
| Real-time clock elapsed hour counter | yes (accumulator-backed hardware clock) 1 (32Bit, resolution 1h) |
| Program language Program system | STEP 7® - AWL, KOP, FUP, S7-SCL, S7-Graph from Siemens SIMATIC® Manager from Siemens or products compatible to it |
| Operating system Program unit to reference | compatible to S7-300® from Siemens CPU 315-2DP/PN (6ES7 315-2EH14-0AB0 and firmware V3.1 Siemens) |
| Serial interfaces (protocols) | COM1: RS 232 (free ASCII) COM2: RS 485 (free ASCII, Modbus-RTU) |
| Ethernet (protocols) | 2x Ethernet: (switch or separated ports): 10/100 MBit with parts of CP343 functionality (RFC1006, TCP, UDP, Modbus-TCP) |
| CAN (protocols) | CAN-telegrams (Layer 2), compatible to CANopen® master 10 kBaud ... 1 MBaud |
| Onboard periphery | 12 di/O, 12 di (Z), 3 a/I/O (U/ I), 3 aI (U/ I/ RTD/ TC/ DMS) |
| Decentral periphery | - INSEVIS- periphery (with automatic configuration via „ConfigStage“) - diverse external periphery families (Modbus RTU/TCP, CAN) - all CANopen® slaves according to DS401 - all Profinet IO devices |

| Technical data | | digital Inputs/Outputs | |
|--|--|---|---|
| Load voltage L+ Current consumption Power loss | 10 V ... 30 V DC 10 mA (without load) internally limited | Cable length - unshielded (max.) - shielded (max.) | 30 m 100 m |
| Digital inputs/outputs Diagnostic LEDs | 8 outputs (each with read-back input) none | Outputs: Switch-on delay Switch-off delay Inputs: Switch-on delay Switch-off delay | 50 μ s (type.) 30 μ s (typ., without load) 1,5 ms 4,5 ms |
| Digital inputs / Digital push-pull outputs | 2x2 push-pull outputs (can be switched off in pairs) (each with read-back input) | Function of the push-pull outputs | output PWM (0..100%) PWM + direction bit (0 .. +/- 100%) |
| Output current for signal 0 for signal 1 Input current for signal 1 | 0,5 mA (max.) 0,5 A (max. up to 60°C) 1 mA (type) | Max. switching frequency of the outputs | 100 Hz (with resistive load) |
| Signal level of the outputs for signal 0 for signal 1 Input voltage for signal 0 for signal 1 | 1,0 V at 500 Ω (max.) L+ - 1,0 V at 0,5 A load (min.) 0V ... +5 V +10,5V ... +30 V | Max. switching frequency of the push/pull PWM outputs | 50 kHz (with resistive load) |
| Function slower counter | 2 up counters 16 bit optionally as counter value or frequency [Hz] | Function fast counters | 2 counters 16 bit Incremental encoder 4-fold or up-counter Optionally with zero-track reference function |
| max. frequency slow counter | 1 kHz | max. frequency at input pins high-speed counters | 100 kHz |
| Open-circuit monitoring, fault diagnosis Potential isolation to the PLC | no no | Total current | 2 A (max. up to 60°C) |

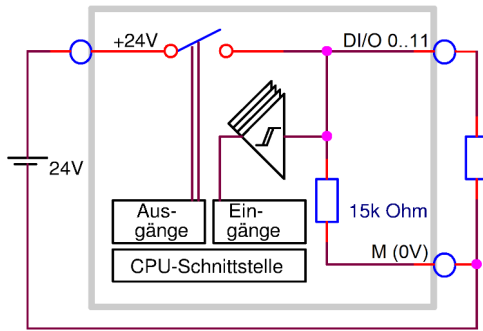
Block diagrams digital inputs/outputs



Block diagram of the DIOs only as input for 2-wire encoders



Block diagram of the DIOs for 3-/4-wire encoders



Block diagram of the DIOs as read-back output

| Input address | |
|-------------------------------------|-----------------------------------|
| Digital : | Start: 0, End: 15 |
| Analog : | Start: 128, End: 139 |
| Output address | |
| Digital : | Start: 0, End: 7 |
| Analog : | Start: 128, End: 133 |
| Channel 0: Digital input and output | |
| | Input address Output address |
| | Disable the output |
| Channel 0.0 | 0.0 <input type="checkbox"/> 0.0 |
| Channel 0.1 | 0.1 <input type="checkbox"/> 0.1 |
| Channel 0.2 | 0.2 <input type="checkbox"/> 0.2 |
| Channel 0.3 | 0.3 <input type="checkbox"/> 0.3 |
| Channel 0.4 | 0.4 <input type="checkbox"/> 0.4 |
| Channel 0.5 | 0.5 <input type="checkbox"/> 0.5 |
| Channel 0.6 | 0.6 <input type="checkbox"/> 0.6 |
| Channel 0.7 | 0.7 <input type="checkbox"/> 0.7 |

Configuration block start/end addresses (in bytes) and I/O assignment in the ConfigStage

Configuration of the PWM outputs

Push-pull outputs or PWM (setting via ConfigStage)

Channel 1.0/1.1 and 1.2/1.3 in pairs

Configuration "Input"

→ both outputs deactivated

Configuration "Input/Output"

→ 2 read-back outputs
(active high AND low switching !)

Configuration "PWM uni"

→ Channel 1.0 or 1.2 deactivated as bit
Set value of the PWM duty cycle in the specified output word,
Specification of the frequency constant
→ Channel 1.1 or 1.3 as output (can be read back)

Configuration „PWM bidir“

→ Channel 1.0 or 1.2 as uni, but setpoint with sign
→ Channel 1.1 or 1.3 as direction bit (= sign)

Channel 1: Digital input and output or PWM output

| | Mode | Input address | Output address | Duty cycle Output address | Frequency [Hz] |
|-------------|--------------|---------------|----------------|---------------------------|----------------|
| Channel 1.0 | Input | 1.0 | | | |
| Channel 1.1 | Input | 1.1 | | | |
| Channel 1.2 | PWM bidir | | | 6 | 500 |
| Channel 1.3 | Input | | | | |
| Channel 1.4 | Input/Output | 1.4 | | | |
| Channel 1.5 | Input | 1.5 | | | |
| Channel 1.6 | Input | 1.6 | | | |
| Channel 1.7 | Input | 1.7 | | | |

Configuration of the counter inputs

Slow counters

(setting via ConfigStage)

Configuration "Input"

→ Channel 2.0 or 2.1 are normal inputs,
Counter is switched off

Configuration "counting up"

→ On channel 2.0 or 2.1, rising edges are counted

Address of the counter word and the reset bit are displayed (input bit switched off)

"Frequency measurement" configuration

→ The frequency [Hz] is output instead of the counter value

Channel 2: Digital input or Low/High speed counter

| | Mode | Input address | Counter word input address | Reset bit output address | Enable bit output address |
|-----------------|-------------------|---------------|----------------------------|--------------------------|---------------------------|
| Channel 2.0 | Counter up | | 4 | 2.0 | |
| Channel 2.1 | Input | 2.1 | | | |
| Channel 2.2 (A) | Frequency measure | 2.2 | | | |

**Fast counters
(setting via ConfigStage)**

Configuration „Input“

→ Channel 2.2 - 2.4 resp. 2.5 - 2.7 are normal Inputs,
Counter is switched off

Configuration "counting up"

→ Rising edges are counted on channel 2.2 or 2.5,
→ the other signals (B and Z) are inputs

Configuration "counting up/down"

→ rising edges are counted on channel 2.2 buw 2.5 and
→ Channel 2.3 or 2.6 serves as a direction bit (0=backwards, 1=forwards)
→ Z is input

Configuration "Encoder x4"

→ Channel 2.2/2.3 or 2.5/2.6 form an encoder input with quadruple evaluation
→ Z is input

Configuration "counting up/down zero" "Encoder x4 zero"

→ In addition, the Z input can be activated via the "enable reference" bit:
On a rising edge at the Z bit, the counter is reset to 0 and the enable reference bit is deleted.
Notes on using the counter inputs

Channel 2: Digital input or Low/High speed counter

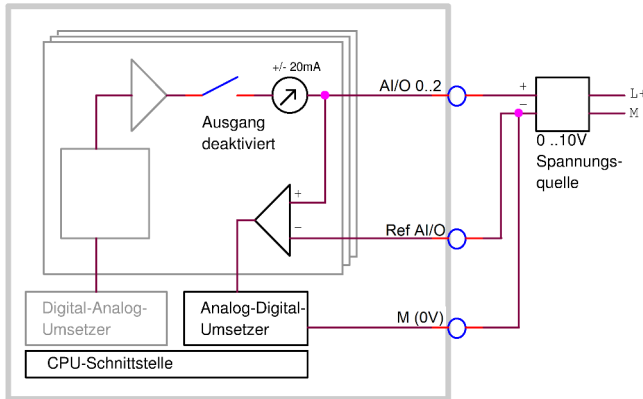
| | Mode | Input address | Counter word input address | Reset bit output address | Enable bit output address |
|-----------------|-------------------|---------------|-------------------------------|-----------------------------|------------------------------|
| Channel 2.0 | Counter up | | 4 | 2.0 | |
| Channel 2.1 | Input | 2.1 | | | |
| Channel 2.2 (A) | Counter up | 2.2 | | | |
| | Frequency measure | | | | |

Notes on using the counter inputs

- Counters can only be set (and held) to zero by setting the reset bit (static)
- the configuration cannot be changed at runtime under Step7:
- all addresses are specified as an offset in relation to the configured start address

| Technical data | analog Inputs/Outputs U/I | | |
|--|---|--|--|
| Load voltage L+ | - (internal supply) | Cable length - unshielded (max.) - shielded (max.) | 30 m 100m |
| Analogue inputs Input ranges | 3 (alternatively configurable to outputs via software) 0...20 mA, 4...20 mA, +/- 20mA 0...10 V | Permissible voltage between inputs and A-GND (max.) | -1 V ... + 24 V DC |
| Diagnostic LEDs | none | Error message if range is exceeded | Parameterizable diagnostic and limit value alarms on request |
| Number format | 9400 ... 6C00 (hexadecimal) for measuring range +/- 20mA otherwise 0000 ... 6C00 (hexadecimal) | Wire break monitoring | by exceeding or falling below the measuring range (for 4..20 mA) |
| Overload range | 20 mA ... 22 mA 10V ... 11,3 V | Signal transmitter connection type | unbalanced to A-GND (single ended) |
| Input resistance | 0Ω (typ.) for measuring range current 1MΩ (typ.) for voltage measuring range | Measuring principle/ Conversion principle Resolution | successive approximation 12 Bit |
| Abtastzykluszeit = IntegrationszeitSampling cycle time = Integration time | parameterizable 1ms ... 35767 ms default: 100 ms (= mains frequency filter 50Hz and 60Hz) | Accuracy (related to measuring range) | < 1% |
| Analogue outputs Output ranges | 3 (alternatively to inputs configurable via software) 0(4)...20mA , 0...10V | Number format | 0000 ... 6C00 (hexadecimal) |
| Output resolution | 12 Bit | Short-circuit protection | yes |
| Diagnostic LEDs | none | Overdrive range | 20 ... 23 mA 10 ... 11,3 Vsettling timeSettling time: |
| Settling time: | Time constant t (typ) 1,5 ms | Short-circuit current (typ.) | 20 mA (at 10V) 32 mA (at mA) |
| Load resistor/ load resistor to A-GND | mA: 500 Ω (max.) V: 1 kΩ (min.) | Accuracy (related to measuring range) | < 1% |

Block diagrams analog inputs/outputs U/I



Block diagram of the analog inputs for 0 ... 10 V

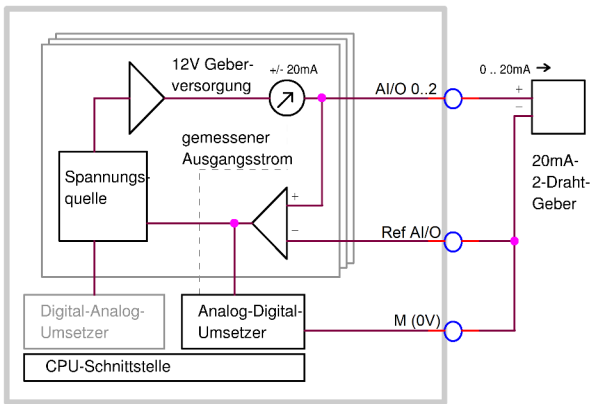
Channel 3...5: Analog Input and Output

Integration time [ms]: 100

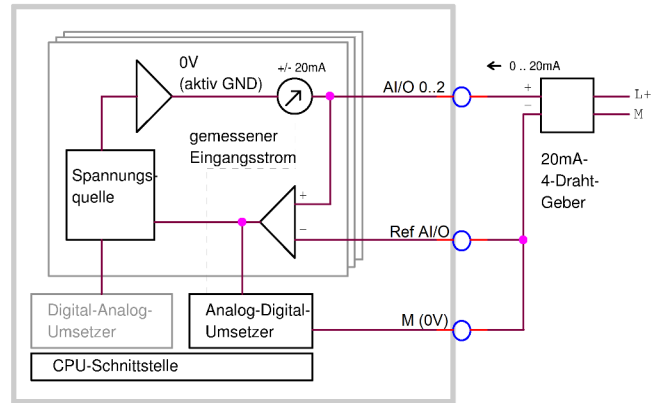
| Channel | Mode | Type | Address |
|-----------|--------|---------|---------|
| Channel 3 | Input | 0...10V | 128 |
| Channel 4 | Output | 0...10V | 130 |
| Channel 5 | Input | 0...10V | 132 |

Dropdown menu for Channel 5 Type: 0...10V, 0...20mA (2-wire), 4...20mA (2-wire), 4...20mA (4-wire), +/- 20mA (4-wire)

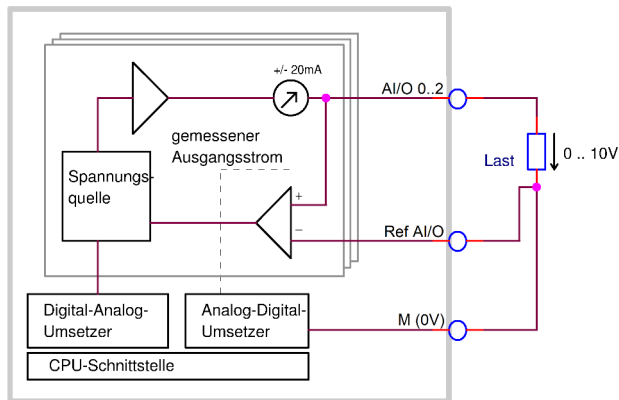
Configuration block addresses (in bytes) and measuring range configuration Analogue I/O in the ConfigStage



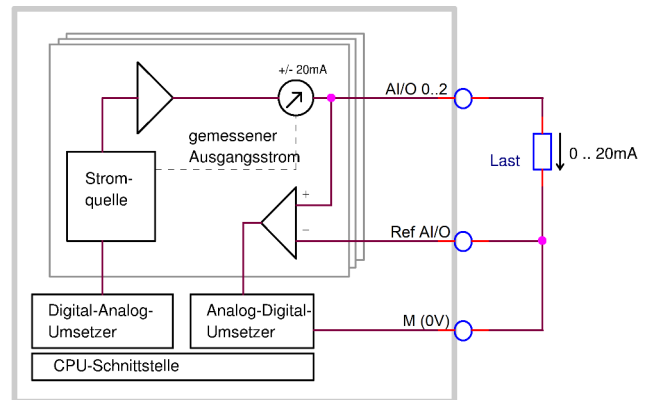
Block diagram of the analogue inputs for 20 mA with 2-wire encoder



Block diagram of the analogue inputs for 20 mA with 3/4-wire encoder



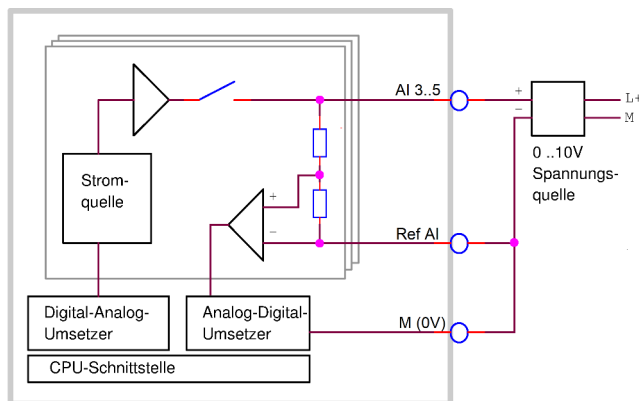
Block diagram of the analogue outputs for 10 V



Block diagram of the analogue outputs for 20 mA

| Technical data | Analog inputs U//RTD/TC | | |
|---|--|--|--|
| Load voltage L+ | - (internal supply) | Cable length - unshielded (max.) - shielded (max.) | 30 m 100m |
| Input ranges | 0...20 mA, 4...20 mA, 0..10 V, DMS, PT100, PT1000, 2 kOhm, TC possible combinations: - 3x 20 mA or 10 V - 1x DMS - 3x PT100/PT1000/R (2 wire) - 1x PT100/PT1000/R (3 wire) + 1x PT100/PT1000/R (2 wire) - 2x ThermoCouples , 1x PT100 | Permissible voltage between inputs and A-GND (max.) | -1 V ... + 24 V DC |
| Diagnostic LEDs | none | Error message if range is exceeded | Parameterizable diagnostic and limit value alarms on request |
| Number formats: Measuring range 20mA /10V: PT100 / TC | 0 ... 6C00 (hexadecimal) 1/10 °C, 1/100 °C | Wire break monitoring | due to overrange or underrange |
| Overdrive range | 20 mA ... 22 mA 10V ... 11,3 V | Connection type of the signal transmitter Measuring ranges mA, V: otherwise: | unbalanced (single ended) against 0V potential-free (floating) |
| Input resistance | 70Ω (typ.) for measuring range mA 1MΩ (typ.) otherwise | Measuring principle/ Conversion principle Resolution | Sigma Delta 16 Bit |
| Sampling cycle time = Integration time | parameterizable default: 100 ms depending on the measuring range | Accuracy (related to measuring range) | < 1% |
| Internal resistance strain gauges | 1kOhm | | |

Blockschaltbilder analoge Eingänge U//RTD/TC



Block diagram of the analog inputs for 0 ... 10 V

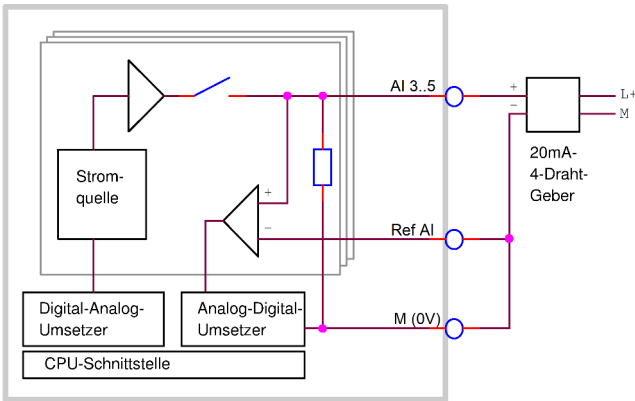
Channel 6...8: Analog Input

Integration time [ms]:

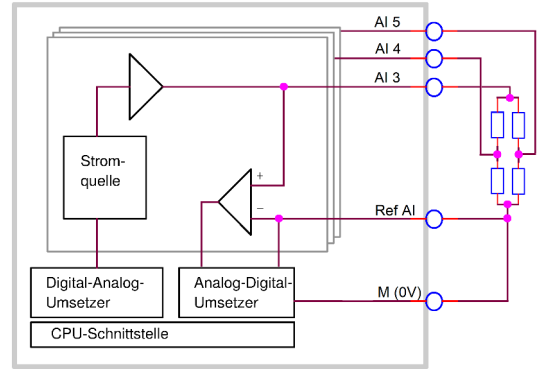
Mode: Voltage / Current (0..10V, 0..20mA, 4..20mA) Temperature (PT100, PT1000, TC)

| Channel | Type | Address |
|-----------|--|---------|
| Channel 6 | 0..10V | 134 |
| Channel 7 | 0..10V | 136 |
| Channel 8 | 0..20mA (4-wire) 4..20mA (4-wire) strain gauge | 138 |

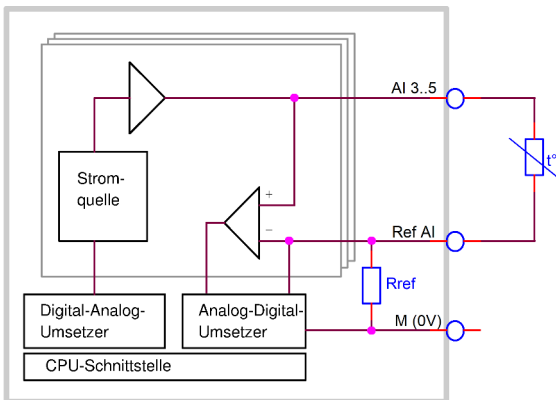
Configuration block addresses (in bytes) and measuring range configuration in the ConfigStage Voltage/current mode



Block diagram of the analog inputs for 20 mA with 3/4 wire encoder



Block diagram of the analog inputs for strain gages (strain gauge)



Block diagram of the analog inputs for PT100/PT1000/R 2-wire

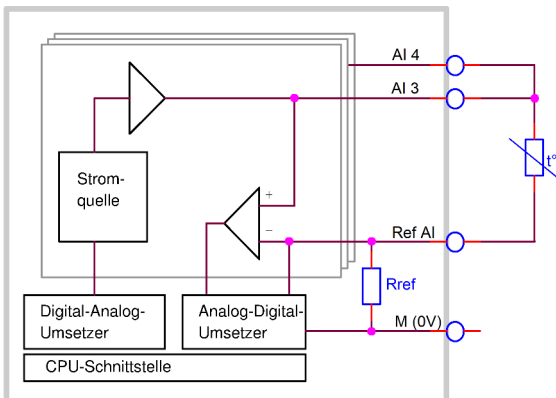
Channel 6...8: Analog Input

Integration time [ms]: 100

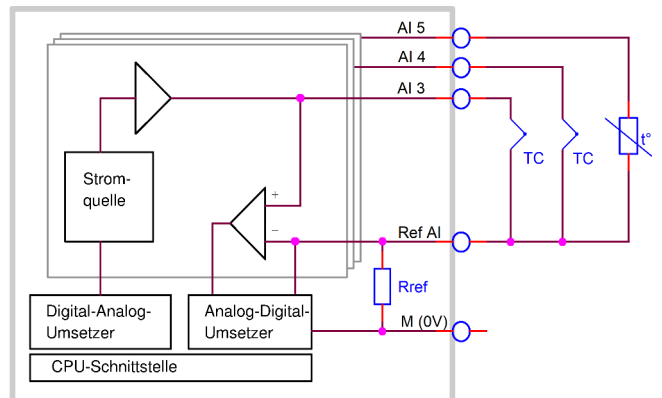
Mode: Voltage / Current (0..10V, 0..20mA, 4..20mA) Temperature (PT100, PT1000, TC)

| Channel | Type | Address |
|-----------|-------------------------|---------|
| Channel 6 | PT100 (2-wire) climatic | 134 |
| Channel 7 | PT100 (2-wire) climatic | 136 |
| Channel 8 | PT100 (2-wire) standard | 138 |

Configuration block addresses (in bytes) and measuring range configuration Analog Input in the ConfigStage Mode temperature



Block diagram of the analog inputs for PT100/PT1000/R 3-Wire



Block diagram of the analog inputs for thermocouples

Assignment of the process image:

| Assignment of the process image: Digital inputs The module occupies 16 bytes in the process image (from the configured start address). | | | |
|---|-----|--------------------|---|
| Offset | I/O | Function | Description |
| 0..2 | I | Input DI0.0..DI2.7 | Input bits (possibly blocked - depending on configuration) |
| 3 | I | reserved | |
| 4,5 | I | Slow counter 0 | Counter word (16-bit high-endian), measuring range depending on configuration |
| 6,7 | I | Slow counter 1 | Counter word (16-bit high-endian), measuring range depending on configuration |
| 8..11 | I | Fast counter 0 | Counter word (32-bit high-endian), measuring range depending on configuration |
| 12..15 | I | Fast counter 1 | Counter word (32-bit high-endian), measuring range depending on configuration |

| Assignment of the process image: Digital outputs The module occupies 8 bytes in the process image (from the configured start address). | | | |
|---|-----|---------------------------------|--|
| Offset | I/O | Function | Description |
| 0 | O | Output DO0..DO7 | Standard-PLC outputs |
| 1 | O | Output DO8..DO11 | 4 push/pull outputs (4 bits unused) |
| 2 | O | Resetbits slow counter | .0 Reset Counter 0, .1 Reset Counter1 |
| 3 | O | Reset-/Controlbits fast counter | .0 Reset Counter 0, .1 Reset Counter1 .2 EnableRef Counter 0, .3 EnableRef Counter1 |
| 4,5 | O | PWM 0 target value | (16 Bit high-endian) |
| 6,7 | O | PWM 1 target value | (16 Bit high-endian) |

| Assignment of the process image: Analog inputs The module occupies 6 input words in the process image (from the configured start address). | | | |
|---|-----|----------------|--|
| Offset | I/O | Function | Description |
| 0,2,4 | I | Input AI0..AI2 | Measurement range depending on configuration |
| 6,8,10 | I | Input AI3..AI5 | Measurement range depending on configuration |

| Assignment of the process image: Analog outputs The module occupies (from configured start address) 3 output words in the process image. | | | |
|---|-----|-----------------|--|
| Offset | I/O | Function | Description |
| 0,2,4 | O | Output AO0..AO2 | Measurement range depending on configuration |

Cut out in switching cabinet

Dimensions / Cut out
W x H (mm) / 118 x 84
4 holes with D 4,5mm

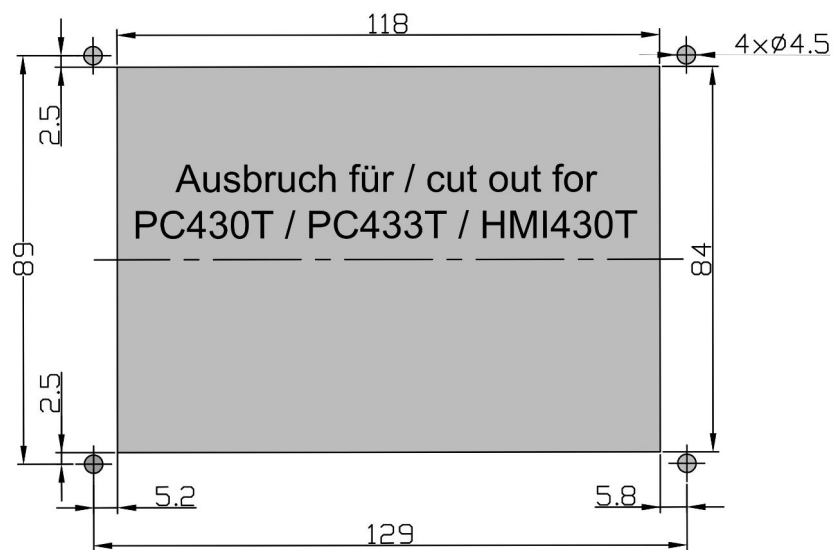
Mounting depth
ca. 43mm max.
(PC431T-0-02)

Wiring outlet
standard interfaces
2x RJ45 (Ethernet)
E-CON(S)10 (Rest)

Periphery connector
E-CON(S) 34
→ downwards*

*) at rear view and
horizontal mounting

Drill jig →



An 1:1 pattern as drill jig is available as PDF at INSEVIS web site for this product
Print it 1:1 and use it for marking the cut out.

Ordering data of devices

| Identification | Standard |
|----------------------------|-------------|
| S7-Panel-PLC PC431T | PC431T-0-02 |

Ordering data of accessoires

| Identification / Order-No. | Identification / Order-No. |
|--|---|
| Connector 2x5pin (bolt flanges) / E-CONS10-00 | Micro SD-card 2GB (external memory) / E-MSD2-00 |
| Connector 2x17polig (Locking lever) / E-CON34-00 | Micro SD-card 4GB (external memory) / E-MSD4-00 |
| Connector 2x17polig (bolt flanges) / E-CONS34-00 | Micro SD-card 8GB (external memory) / E-MSD8-00 |

Qualified personnel

All devices described in this manual may only be used, built up and operated together with this documentation. Installation, initiation and operation of these devices might only be done by instructed personnel with certified skills, who can prove their ability to install and initiate electrical and mechanical devices, systems and current circuits in a generally accepted and admitted standard.

Manuals, sample programs

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Attention: The deletion of personal data on the old devices to be disposed of is the responsibility of the end user.

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