Product Information

S7-PLC-CC303V
Retrofit-Cube

with 16dI, 8dI/O and 4aI/O

Changes to older versions of this document

Description CC303V

Compact-PLC for 35mm DIN-rail

- CC303V with
PM DI16 on slot 1
PM MIO84 on slot 2
1 free peripheral slot

Standard configuration:
• **RS232 with**
  - free ASCII-protocol

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

• **Ethernet with**
  - RFC1006 (S7-Connection with Put/Get),
  - Send/ Receive via TCP and UDP,
  - Modbus TCP

• **CAN with**
  - protocol compatible to CANopen®
  - layer2-communication
  - with switchable teminate resistors for CAN

• **Micro-SD-slot**
  - for SD-cards up to 8 Gbyte (just to archive DBs as csv-file, not for storing program – this is kept in CPU-flash

• **Run/Stop-switch**

• **Status LEDs** for Power, Battery, Error, Run

• **Inserting stripes** for Logo and identification (thereby customized adaption possible easy)

optional configuration:
(optional)
- Profibus DP-Master
- Profibus DP-Slave
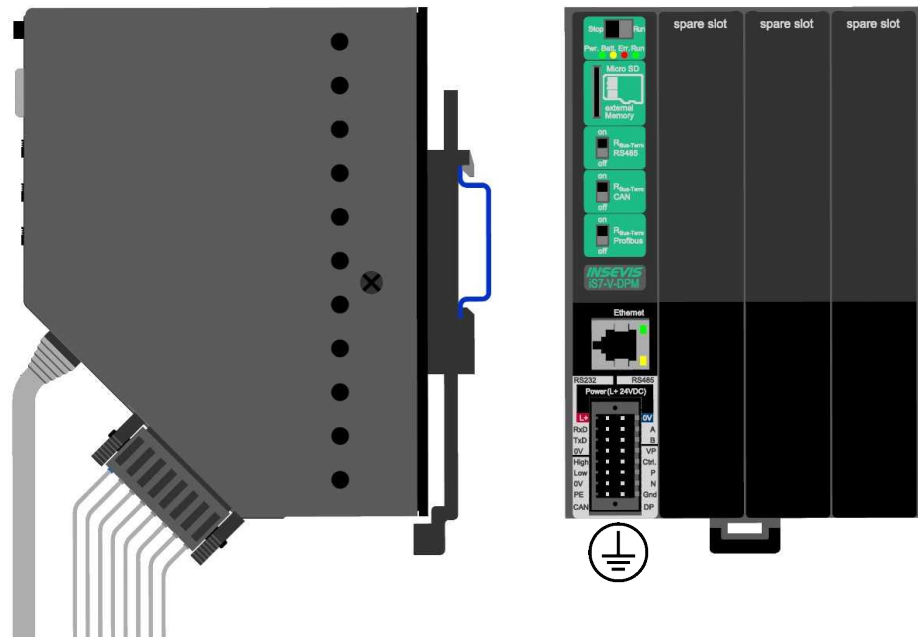 - with switchable terminate resistors for Profibus

Figure above: Compact-PLC CC303V rear view and view from the side
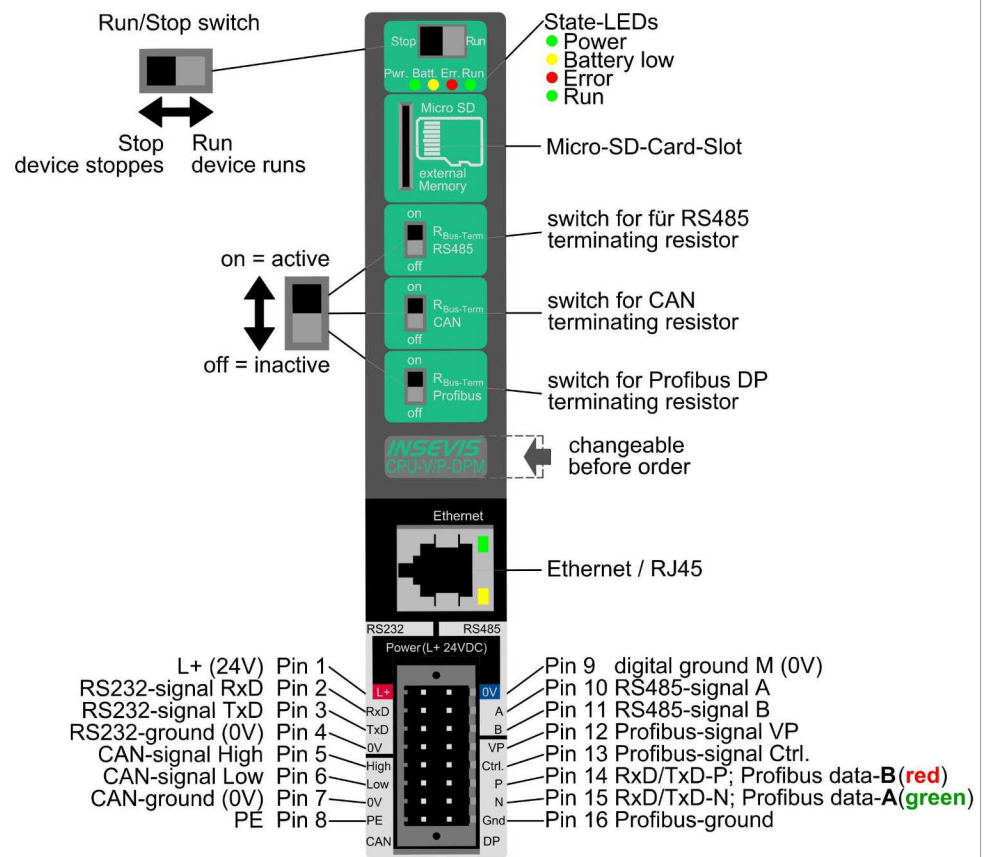

Run/Stop switch
Stop — device stoppes
Run — device runs

on = active
off = inactive

State-LEDs
● Power
● Battery low
● Error
● Run

Micro-SD-Card-Slot

switch for für RS485 terminating resistor

switch for CAN terminating resistor

switch for Profibus DP terminating resistor

changeable before order

Ethernet / RJ45

L+ (24V) Pin 1	Pin 9 digital ground M (0V)
RS232-signal RxD Pin 2	Pin 10 RS485-signal A
RS232-signal TxD Pin 3	Pin 11 RS485-signal B
RS232-ground (0V) Pin 4	Pin 12 Profibus-signal VP
CAN-signal High Pin 5	Pin 13 Profibus-signal Ctrl.
CAN-signal Low Pin 6	Pin 14 RxD/TxD-P; Profibus data-**B**(red)
CAN-ground (0V) Pin 7	Pin 15 RxD/TxD-N; Profibus data-**A**(green)
PE Pin 8	Pin 16 Profibus-ground

Figure above: Identification of all CPUs of all CompactPLCs devices with periphery slots, with CPU-type V and with Profibus DP Master

Technical data CC303V

Dimensions W x H x D (mm) Weight	80 x 116,5 x 92 ca. 400g
Mounting IP-leak protection class	to clip on a 35mm DIN-rail IP41
Operating temperature range Storage temperature range	-20°C ... +60°C (without condensation) -30°C ... +80°C
Connection technology	connector with pin-marked pushers and 2 bolt flanges on side (cage clamp technology) for cross sections up to max. 1,5mm^2
Load voltage L+	24V DC (11 ... 30V DC)
Current consumption Power dissipation	20 mA ... 485 mA 0,5 W (typ.), 10 W (max.)

Technical data CC303V   CPU

CPU-type	**Type V** (CC303**V**)
Working memory = battery backed load memory Diagnostic buffer	512kB, thereof 256 kByte remanent data 100 messages (all remanent)
Internal flash memory External flash memory	4 MByte Micro SD, up to max. 8 GByte (not necessary for operation)
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 1.024 32kByte (2kByte per block) in each case 2.048 Byte (16.384 Bit) adressable in each case 2.048 Byte (default set is 128 Byte) 2.048 (remanence adjustable, default set is 0..15) 8 (1 Merkerbyte) in each case 256 (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 compatible products
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)	Ethernet: 10/100 Mbit with CP343 functionality (RFC1006, TCP, UDP, Modbus-TCP)
CAN (protocols)	CAN-Telegramms (Layer 2), compatible to CANopen® Master 10 kBaud ... 1 MBaud
Profibus (protocols)	Profibus DP V0 master/ slave 9,6kBaud ... 12 MBaud
Onboard periphery	16 dI + 8dI/O +4aI/O and one free slot for INSEVIS-periphery modules
Decentral periphery	- INSEVIS- Periphery (with automatic configuration via „ConfigStage") - all CANopen® Slaves according to DS401 - all Profibus DP-V0-slaves - diverse external periphery families
Configuration in ConfigStage	New system with CC303V and PM-DI16 in slot 1 and PM-MIO84 in slot 2

compact periphery module for 16 digital inputs 24V

- green diagnostic LED for each input

- insertion stripe with description field for every signal
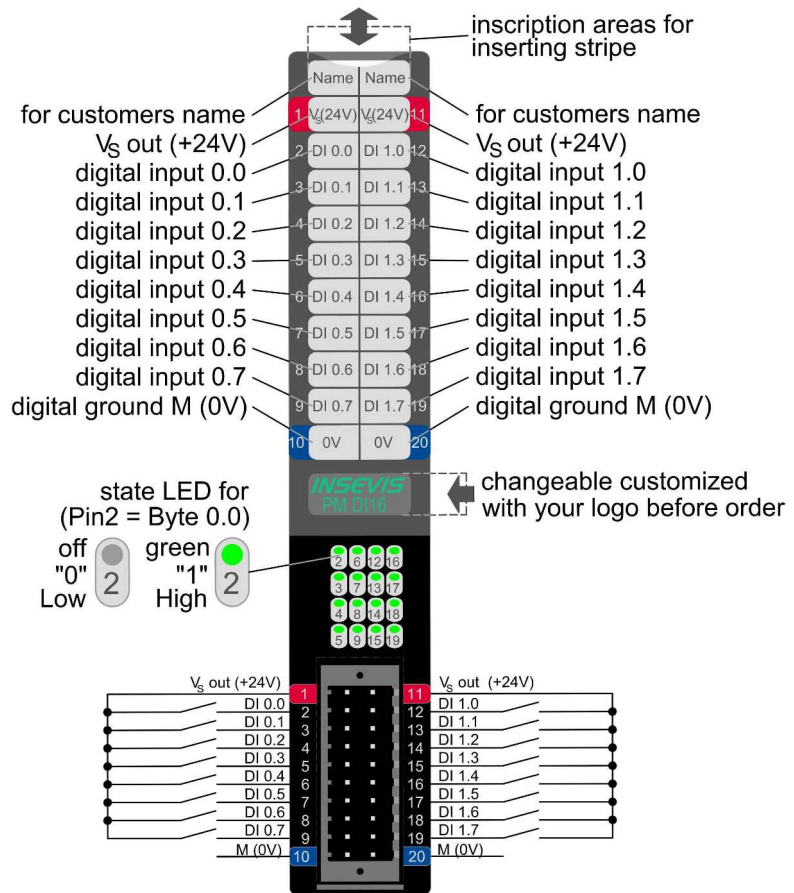
- cage-clamp connector with bolt flanges on side

inscription areas for inserting stripe

for customers name
V_S out (+24V)
digital input 0.0
digital input 0.1
digital input 0.2
digital input 0.3
digital input 0.4
digital input 0.5
digital input 0.6
digital input 0.7
digital ground M (0V)

for customers name
V_S out (+24V)
digital input 1.0
digital input 1.1
digital input 1.2
digital input 1.3
digital input 1.4
digital input 1.5
digital input 1.6
digital input 1.7
digital ground M (0V)

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state LED for (Pin2 = Byte 0.0)
off "0" Low
green "1" High

V_S out (+24V)
DI 0.0
DI 0.1
DI 0.2
DI 0.3
DI 0.4
DI 0.5
DI 0.6
DI 0.7
M (0V)

V_S out (+24V)
DI 1.0
DI 1.1
DI 1.2
DI 1.3
DI 1.4
DI 1.5
DI 1.6
DI 1.7
M (0V)

Figure above: Description and wiring of all connections of periphery module DI16

DI16
1, 11 L+
DI(0..15) 2..9, 12..19
15k Ohm
Back-plane
M 10, 20

Input	
Start address:	0
End address:	1
Output	
Start address:	0
End address:	0

Figure above: Block diagram of DI16 for 2 wire swiches

Figure above: Configuration block of start-/ end addresses of DI16-inputs (in byte) in the ConfigStage

Description PM-DI16 — Application with 3- / 4-wire switches

compact periphery module for 16 digital inputs 24V

- green diagnostic LED for each input

- insertion stripe with description field for every signal
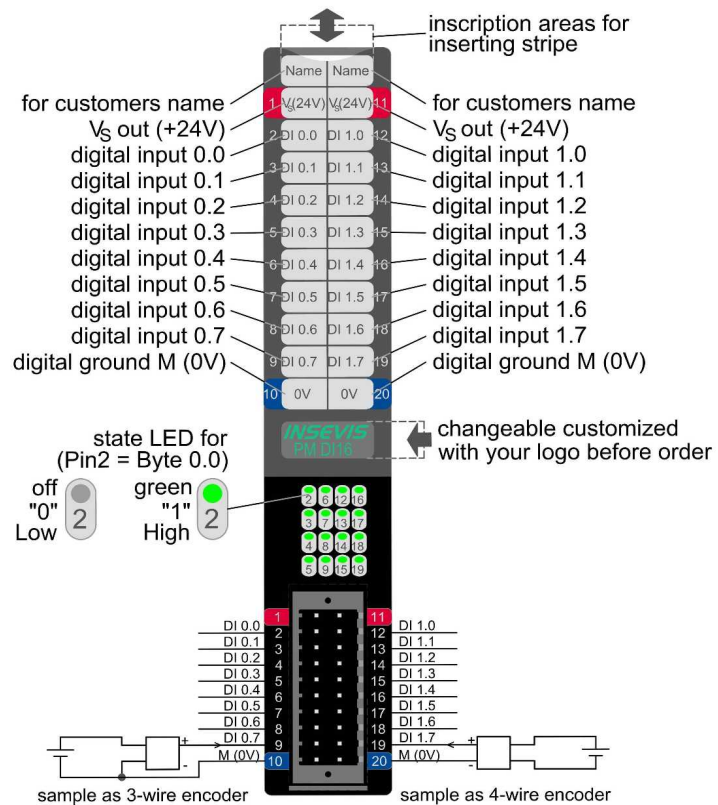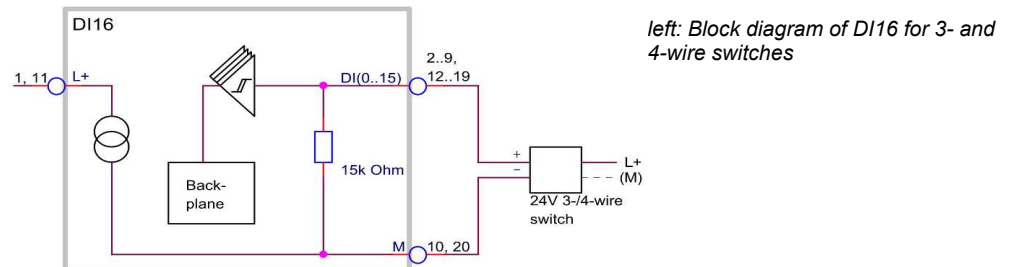
- cage-clamp connector with bolt flanges on side

inscription areas for inserting stripe

for customers name
V_S out (+24V)
digital input 0.0
digital input 0.1
digital input 0.2
digital input 0.3
digital input 0.4
digital input 0.5
digital input 0.6
digital input 0.7
digital ground M (0V)

for customers name
V_S out (+24V)
digital input 1.0
digital input 1.1
digital input 1.2
digital input 1.3
digital input 1.4
digital input 1.5
digital input 1.6
digital input 1.7
digital ground M (0V)

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state LED for (Pin2 = Byte 0.0)
off "0" Low
green "1" High

sample as 3-wire encoder   sample as 4-wire encoder

Figure above: Description and wiring of all connections of periphery module DI16

left: Block diagram of DI16 for 3- and 4-wire switches

Technical data PM-DI16

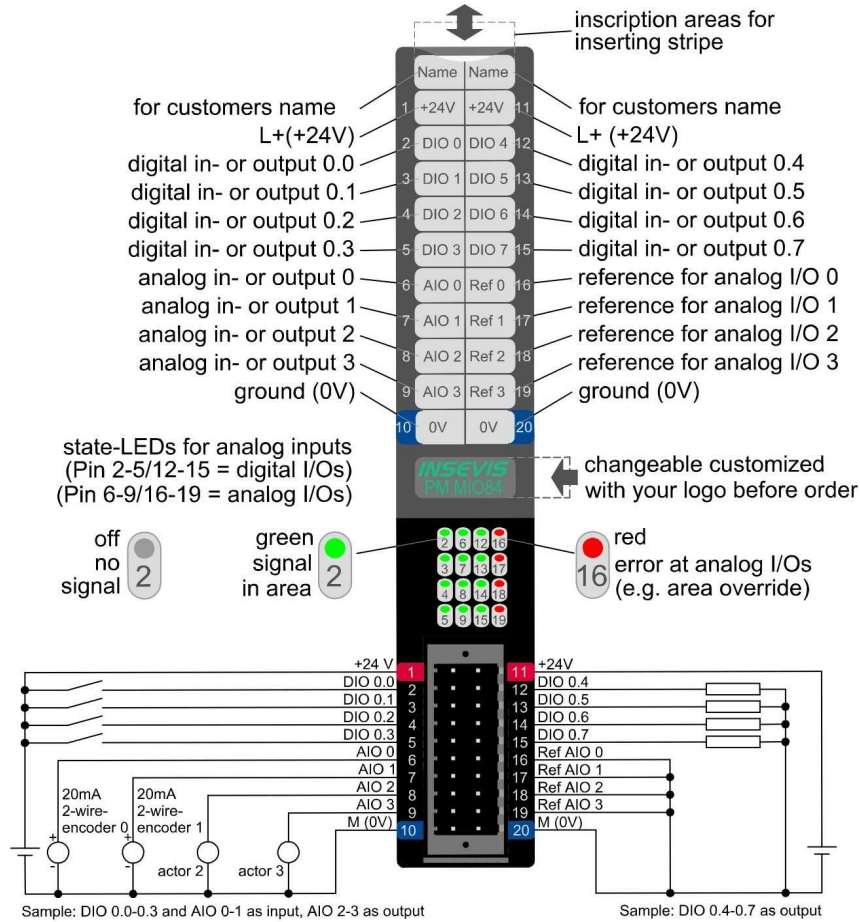|	
Operating temperature range Storage temperature range Relative humidity	-20°C ... +60°C (without condensation) -30°C ... +80°C up to 96% (without condensation)
Sensor supply Load voltage L+	short circuit proof output, current limited to 30 mA (typ.) 24V DC (11V ... 30V DC, is connected by device supply)
Wire length	(unshielded) max. 30m | (shielded) max. 100 m
Digital inputs	1616, each with green diagnostics LED
Input voltage	Signal low 0V ... +5 V | Signal high +10,5V ... +30 V
Input current for signal 1	1 mA
Broken wire detection Potential separation to PLC Access of 2-wire-BERO	no no no
Switch on/off delay Sampling cycle time	Switch on delay 90µs (typ.) | Switch off delay 1,4ms (typ.) as onboard module on the PLC = cycle synchronous

compact periphery module for

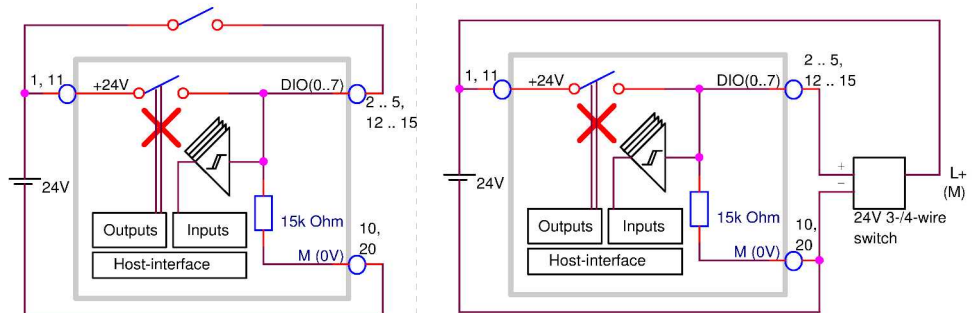**8 digital transistor outputs 24V with back-readable inputs**

• green diagnostic LED for each in-/ output

• insertion stripe with description field for every signal

• cage-clamp connector with bolt flanges on side

• **Scope of delivery:**
  - technichal information
 - brief instruction

INSEVIS-benefit:

Each single outputs can be switched off, so that you can realize different ratios of I/Os e.g. 6dI and 2dO or 3dI and 5dO. Only the total sum of I/Os must be ≤8.

inscription areas for inserting stripe

for customers name	1	+24V	+24V	11	for customers name

L+(+24V) — digital in- or output 0.0 — digital in- or output 0.1 — digital in- or output 0.2 — digital in- or output 0.3 — analog in- or output 0 — analog in- or output 1 — analog in- or output 2 — analog in- or output 3 — ground (0V)

L+ (+24V) — digital in- or output 0.4 — digital in- or output 0.5 — digital in- or output 0.6 — digital in- or output 0.7 — reference for analog I/O 0 — reference for analog I/O 1 — reference for analog I/O 2 — reference for analog I/O 3 — ground (0V)

state-LEDs for analog inputs
(Pin 2-5/12-15 = digital I/Os)
(Pin 6-9/16-19 = analog I/Os)

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off no signal — green signal in area — red error at analog I/Os (e.g. area override)

Sample: DIO 0.0-0.3 and AIO 0-1 as input, AIO 2-3 as output

Sample: DIO 0.4-0.7 as output

above: Description and wiring of MIO84 for 2-wire switches

above: Block diagram of digital inputs for 2-wire-switches (left) and 3-/4-wire-switches (right)
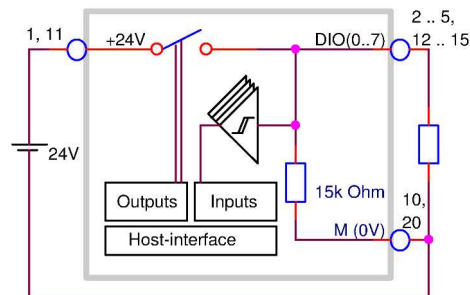
above: Block diagram of backreadable outputs

Digital	Input address	Output address
		Disable the output
Channel 0.0	16.0	☑
Channel 0.1	16.1	☑
Channel 0.2	16.2	☐ 16.2
Channel 0.3	16.3	☐ 16.3
Channel 0.4	16.4	☑
Channel 0.5	16.5	☐ 16.5
Channel 0.6	16.6	☐ 16.6
Channel 0.7	16.7	☐ 16.7

above: Configuration block of I/O-parametrizing in the ConfigStage

Description PM-MIO84   for analog inputs (2-wire-encoders)

- 4 analog in- or outputs configurable by software
Inputs:
- 0..10V, 0 (4)..20 mA for 2-wire-encoders including encoder supply
- 4..20 mA or ±20 mA for 4-wire-encoders

Outputs:
- 0..10V
- 0 (4)..20 mA

• Resolution 12 …16 Bit (depending on integration time)

• green diagnostic-LEDs
 - LED 6 for A I/O 0
 - LED 7 for A I/O 1
 - LED 8 for A I/O 2
 - LED 9 for A I/O 3

• red diagnostic-LEDs for errors (override or short circuit on AI)
 - LED 16 for A I/O 0
 - LED 17 for A I/O 0
 - LED 18 for A I/O 0
 - LED 19 for A I/O 0

• insertion stripe with description field for every signal

• cage-clamp connector with bolt flanges on side

• **Scope of delivery:**
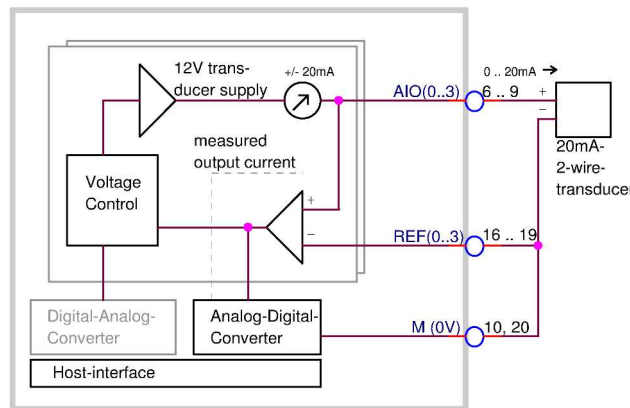 - technichal information
 - brief instruction

Hint:
Connect Ref AIO 0..3 with ground (0V) always

INSEVIS-benefit:
This module has an internal supply for the 2-wire encoders .
So it is not necessary to care for external supply!
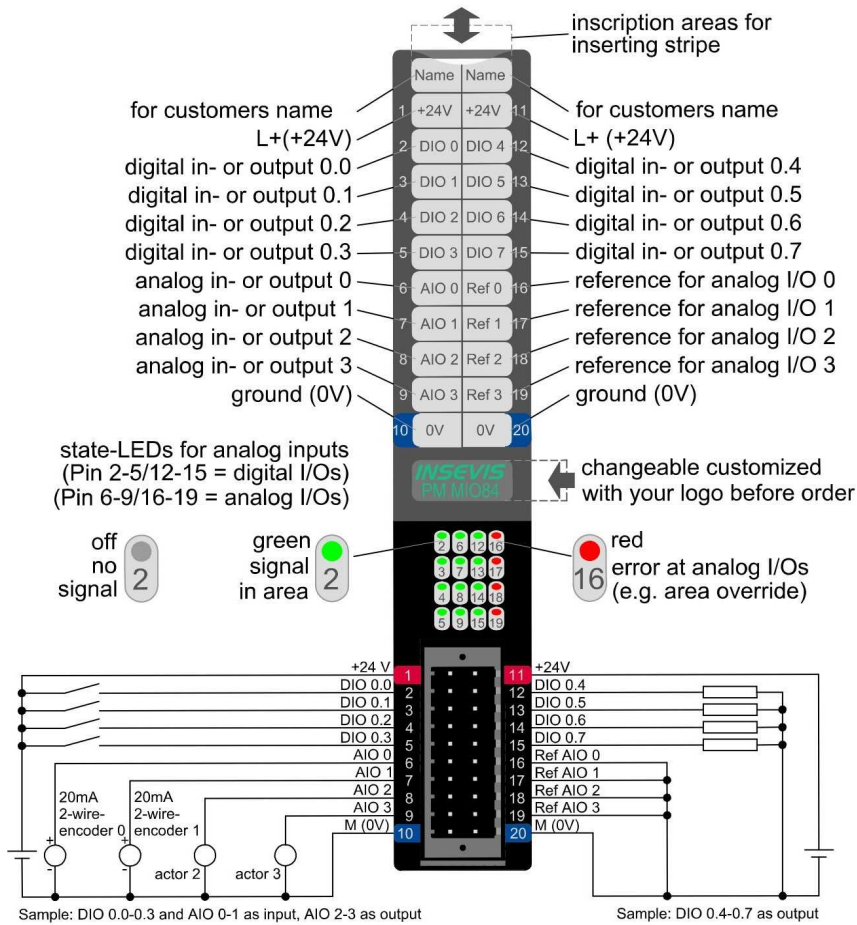
above: Description and wiring of all connections of PM MIO84 with 2-wire encoders

above: Block diagram for 2-wire-encoders (0..20mA)

Analog

	Type		Mode		Address
Integration time [ms]:					4
Channel 1:	Input	∨	0..10V	∨	8
Channel 2:	Input	∨	4..20mA (2-wire)	∨	10
Channel 3:	Output	∨	0..10V	∨	12
Channel 4:	Output	∨	4..20mA	∨	14

above: Configuration block of I/O-parametrizing in the ConfigStage

- 4 analog in- or outputs configurable by software

Inputs:
- 0..10V, 0 (4)..20 mA for 2-wire-encoders including encoder supply
- 4..20 mA or ±20 mA for 4-wire-encoders

Outputs:
- 0..10V
- 0 (4)..20 mA

• Resolution 12 …16 Bit (depending on integration time)

• green diagnostic-LEDs
  - LED 6 for A I/O 0
  - LED 7 for A I/O 1
  - LED 8 for A I/O 2
  - LED 9 for A I/O 3

• red diagnostic-LEDs for errors (override or short circuit on AI)
  - LED 16 for A I/O 0
  - LED 17 for A I/O 0
  - LED 18 for A I/O 0
  - LED 19 for A I/O 0

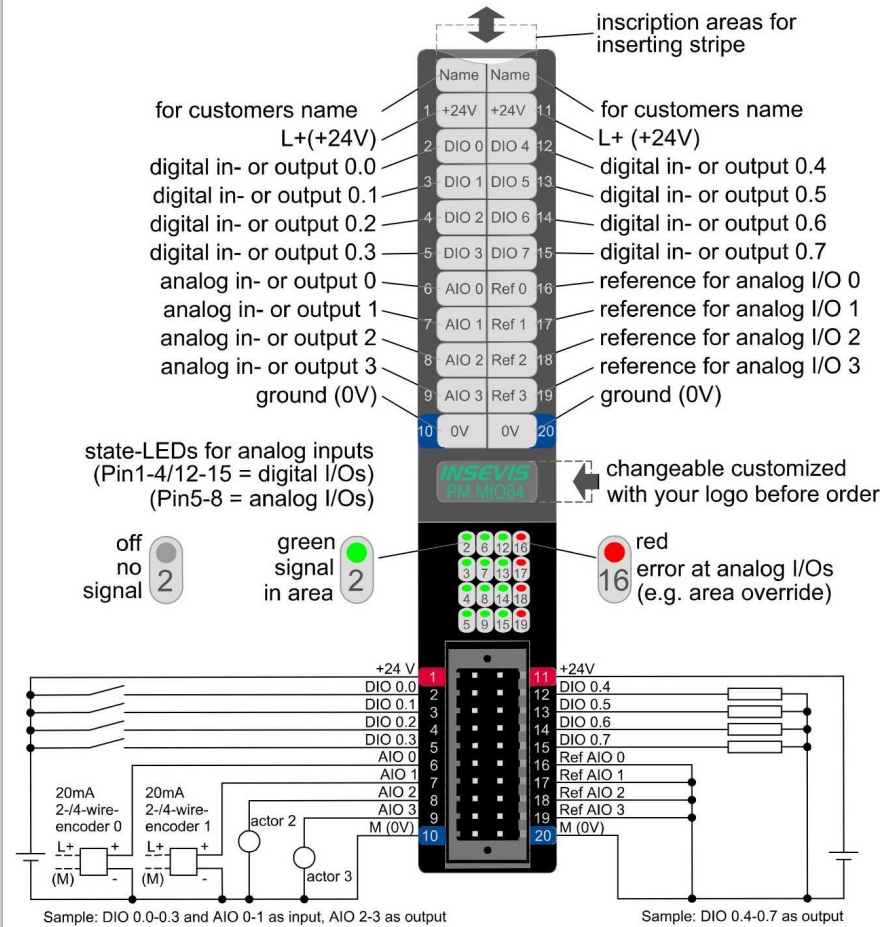• insertion stripe with description field for every signal

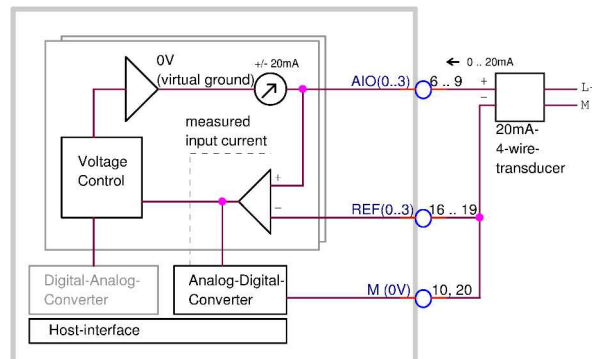• cage-clamp connector with bolt flanges on side

• **Scope of delivery:**
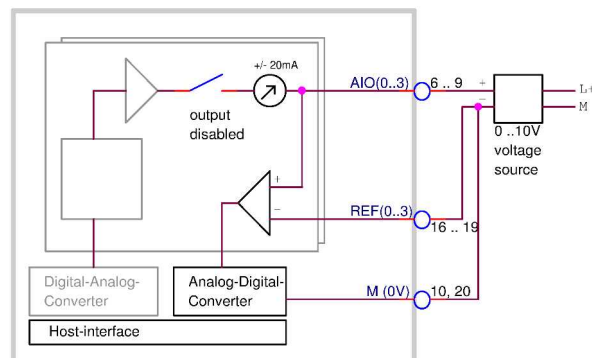 - technichal information
  - brief instruction

Hint:
Connect Ref AIO 0..3 with ground (0V) always

above: Description and wiring of all connections of PM MIO84 with 3-/4-wire encoders

left: Block diagram for 3-/4-wire-encoders (0...20mA)

left: Block diagram for 3-/4-wire-encoders (0...10V)

Description PM-MIO84   for analog outputs

- 4 analog in- or outputs configurable by software

Inputs:
- 0..10V, 0 (4)..20 mA for 2-wire-encoders including encoder supply
- 4..20 mA or ±20 mA for 4-wire-encoders

Outputs:
- 0..10V
- 0 (4)..20 mA

• Resolution 12 …16 Bit (depending on integration time)

• green diagnostic-LEDs
  - LED 6 for A I/O 0
  - LED 7 for A I/O 1
  - LED 8 for A I/O 2
  - LED 9 for A I/O 3

• red diagnostic-LEDs for errors (override or short circuit on AI)
  - LED 16 for A I/O 0
  - LED 17 for A I/O 0
  - LED 18 for A I/O 0
  - LED 19 for A I/O 0

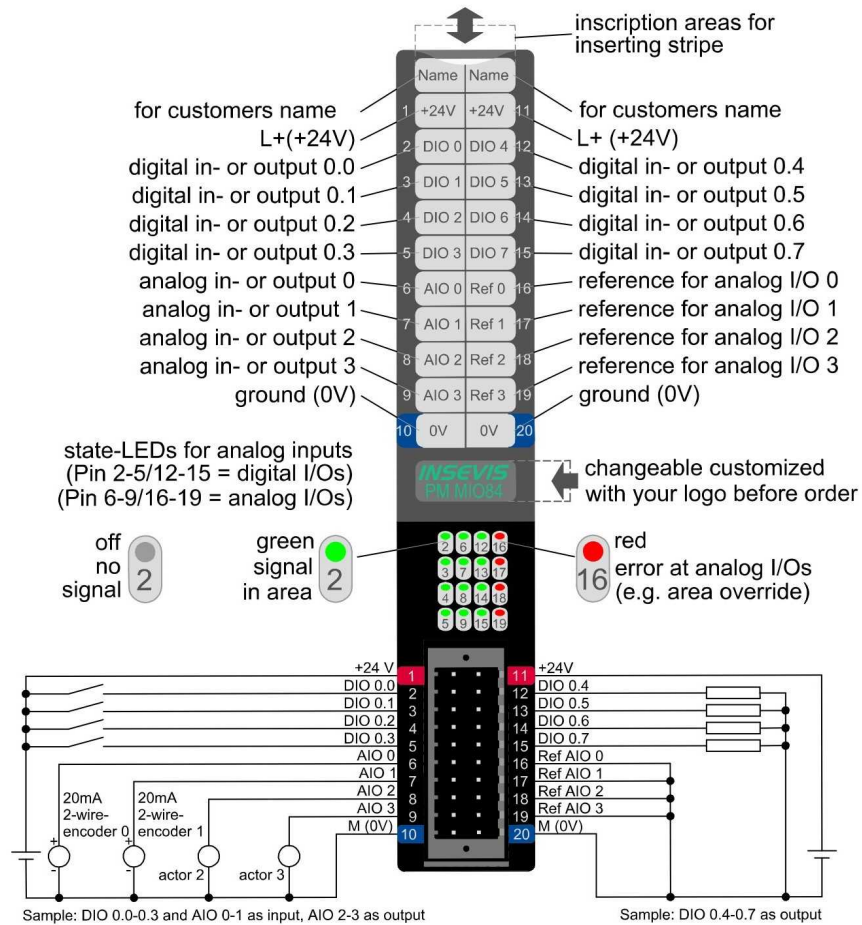• insertion stripe with description field for every signal

• cage-clamp connector with bolt flanges on side

• **Scope of delivery:**
  - technichal information
  - brief instruction

Hint:
Connect Ref AIO 0..3 with ground (0V) always

inscription areas for inserting stripe

for customers name L+(+24V)
digital in- or output 0.0
digital in- or output 0.1
digital in- or output 0.2
digital in- or output 0.3
analog in- or output 0
analog in- or output 1
analog in- or output 2
analog in- or output 3
ground (0V)

for customers name L+ (+24V)
digital in- or output 0.4
digital in- or output 0.5
digital in- or output 0.6
digital in- or output 0.7
reference for analog I/O 0
reference for analog I/O 1
reference for analog I/O 2
reference for analog I/O 3
ground (0V)

state-LEDs for analog inputs
(Pin 2-5/12-15 = digital I/Os)
(Pin 6-9/16-19 = analog I/Os)

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off no signal

green signal in area

red error at analog I/Os (e.g. area override)

Sample: DIO 0.0-0.3 and AIO 0-1 as input, AIO 2-3 as output
Sample: DIO 0.4-0.7 as output

above: Description and wiring of all connections of PM MIO84 for analog outputs

left: Block diagram for analog outputs (0...20mA)

left: Block diagram for analog outputs (0...10V)
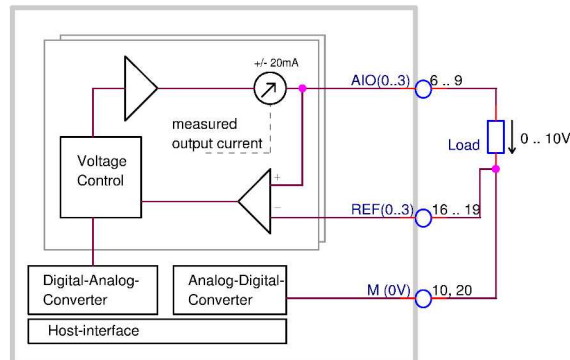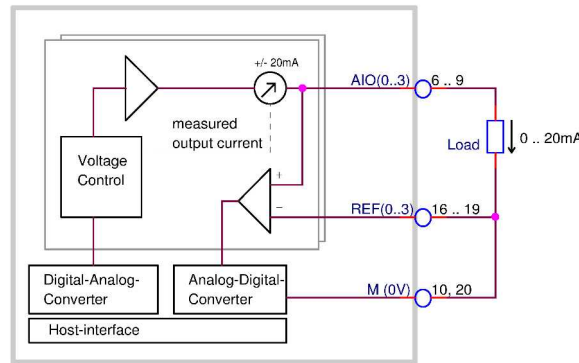
Configuration of the counter inputs

Counter Channel 1 (settings by ConfigStage)

Configuration „**counting forward (up)**"
→ rising edges at input DI 0.0 will be counted

Configuration „**counting for- / backwards (down)**"
→ rising edges at input DI 0.0 will be counted and
→ input DI 0.1 is used as direction bit
    (0=backwards, 1=forward)

Configuration „**Encoder**"
→ inputs DI 0.0 and DI 0.1 represent the encoder interface
    with quadruple evaluation

In " Address " the number of the input double word is displayed, which contains the counter value.

Counter Channel 2 (settings by ConfigStage)

Configuration „**counting forward (up)**"
→ rising edges at input DI 0.2 will be counted

Configuration „**counting for- / backwards (down)**"
→ rising edges at input DI 0.2 will be counted and
→ input DI 0.3 is used as direction bit
    (0=backwards, 1=forward)

Configuration „**Encoder**"
→ inputs DI 0.2 and DI 0.3 represent the encoder interface
    with quadruple evaluation

In " Address " the number of the input double word is displayed, which contains the counter value.

Hints for usage of the counter inputs

All following addresses are specified as offset related to configured start address of the MIO84 module!

onboard:
- read in counter by reading of ED16 / ED20 (synchronous to control point)
- set counter by writing to PAD16 / PAD20 (by direct periphery access only)
- this configuration can be modified in runtime with Step7 too:

    configuration word for counter 1 is PAW24
    configuration word for counter 2 is PAW28
    "inactive"   0x00
    "counting forward / up"   0x01
    "for- / backward (pulse, direction)"   0x02
    "encoder (x4)"   0x03

Technical data		digital in-/ outputs	
Load voltage L+ Power dissapation Connection technology	24V DC (10 V ... 30 V DC) internal limited cage clamp technology for cross section up to max. 1,5mm²	Wire length unshielded (max.) shielded (max.)	30 m 100 m
Digital in- / outputs Diagnostic LEDs	8 in- or outputs 8, green	Outputs: switch on delay switch off delay Inputs: switch on delay switch off delay	50 µs (typ.) 30 µs (typ., without load) 25µs
Output current for signal 0 for signal 1	0,5 mA (max.) 0,5 A (max. to 60°C)	Max. switching frequency of outputs	100 Hz with ohmic load
Cumulated current	2 A (max. to 60°C)	Counter Frequency limit	2 each as forward counter, forward/backward counter or incremental encoder 10 kHz
Broken wire detection Error diagnostic Potential seperation to PLC	no no	Signal level of outputs for signal 0 for signal 1 Signal level of intputs 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

Technical data		analog in-/ outputs	
Load voltage L+	24V DC (17 V ... 30 V DC) connected by device supply	Wire length unshielded (max.) shielded (max.)	30 m 100 m
Analog inputs Input areas	4 (alternatively to outputs what is to be configured by software) ±20 mA, 4...20 mA, 0..10 V	Valid voltage between inputs and A-GND (max.)	-1 V ... +24 V DC
Diagnostic LEDs	4 green: signal in valid area 4 red: override or saturation no displaying broken wires and open inputs	Error message during override metering area	adjustable diagnosis- and limit value alert on request
Value number format	9400 ... 6C00 (hexadecimal) for range ± 20 mA all other 0000 ... 6C00 (hexadecimal)	Broken wire detection	by overrun / shortfall of metering area
Override area	20 mA ... 22 mA 10V … 11,3 V	Acces of sensor	unsymetric against A-GND (single ended)
Imput resitance	0Ω (typ.) for metering area current 1MΩ (typ.) for metering area voltage	Metering priciple / conversion priciple Resolution	successive approximation 12…16Bit (depending on integration time assigned in ConfigStage)
Sampling cycle time = Integration time	adjustable 1ms ... 35767 ms default: 100 ms (=line frequency filter 50Hz and 60Hz)	Deviation (based on input area)	< 1%
Analog outputs Output area (nominal values)	4 (alternatively to inputs what is to be configured by software) 0(4)...20 mA, 0...10V	Value number format	0000 ... 6C00 (hexadecimal)
Resolution	15 Bit ΣΔ-Modulation	Short cut protection	yes
Diagnostic LEDs	4 green: signal in valid area 4 rot: override or Load error	Override area	20 ... 23 mA 10 ... 11,3 V
Setting time: response time τ (typ)	1,5 ms	Short cut current (typ.)	20 mA (at 10V) 32 mA (at mA)
Load resistance against A-GND	mA: 500 Ω (max.) V: 1 kΩ (min.)	Deviation (based on output area)	< 1%

Configuration of the **process image onboard:**
module allocates 24 bytes of process data input and output.

Offset	I/O	Function	Description
0, 2, 4, 6	I	Input AI 0..AI 3	Measuring range according to configuration - in voltage output mode: measure of output current - in current output mode: measure of output voltage
0, 2, 4, 6	O	Output AO0..AO 3	Measuring range according to configuration - in input mode: ignored
8	I	Digital inputs .0 to .7	(**Byte** access)
8	O	Digital outputs .0 to .7	(**Byte** access)
9 … 15	I/O	Reserved	
16, 20	I/O	Counter 0, 1	Counter value (**DINT, DWORD** access)

Ordering data devices

Identification:	Standard
S7 compact PLC CC303V-Cube ((includes pre-assembled DI16 and MIO84 peripheral modules and required connectors)	CC303V-AKT

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.

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With publication of this information all other versions are no longer valid.