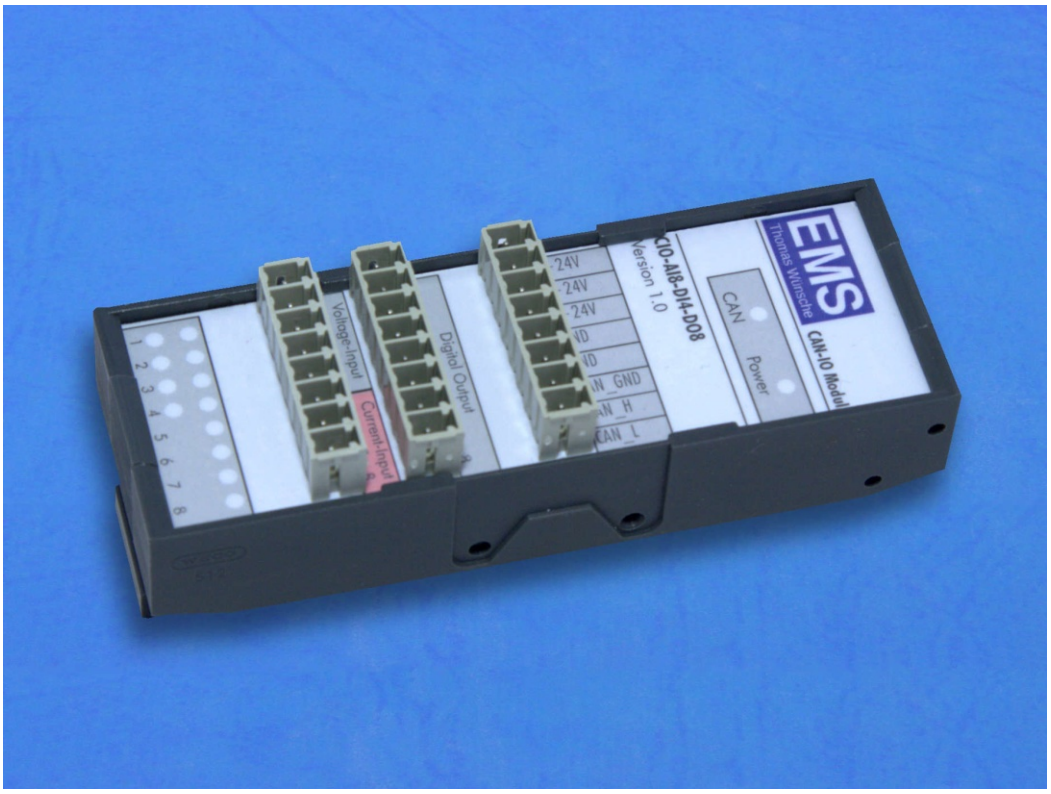

CAN-IO Module

CIO

User manual

EMS
Thomas Wünsche

User manual for CAN IO module series CIO v1.00

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FCC: **This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

WARNING: **CIO hardware and software may not be used in applications where damage to life, health or private property may result from failures in or caused by these components.**

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1 Overview

1.1 Attributes

- CAN I/O module for industrial applications
- 8 digital outputs 24V
- Various input configurations available
- 4 or 8 digital inputs 24V
- 4 or 8 analog voltage inputs 0-10V or 0-24V
- 4 or 8 analog current inputs 0-25mA
- Easy integration in CANopen systems
- CiA DS 102 and ISO 11898 compatible physical layer
- 24V or 12V nominal power supply
- Galvanic decoupled of CAN transceiver
- Extended temperature range
- Compact size

1.2 General description

CIO is a versatile I/O module for the CAN bus. Designed for industrial series applications it has a robust and cost efficient layout. CIO supports 8 digital 24V/500mA output and 8 analog input channels. The analog input channels are available in different combinations of voltage or current inputs. The voltage inputs may be used as digital inputs as well. Four of the eight output channels can be configured for PWM output.

CIO is configured by read and write accesses to registers. Configuration can be stored permanently in an EEPROM. While it is in operating mode it can produce CAN messages on events or while being polled. Different modules are addressed by their module ID which is assigned by the user.

A module with unknown baud rate or module id can be set in a state where it can be recovered. See chapter 2.3 for a detailed description.

1.3 Ordering information

Art.-Nr.	Product String	Description
11-03-101-xx	CIO0001	**CIO-AI8/10V-DI4-DO8** CAN IO module with 4 analog voltage inputs (0-10V) useable as digital inputs, 4 analog current inputs (0-25mA) and 8 digital outputs
11-03-102-xx	CIO0002	**CIO-AI8/10V-DI8-DO8** CAN IO module with 8 analog voltage inputs (0-10V) useable as digital inputs and 8 digital outputs
11-03-103-xx	CIO0003	**CIO-AI8-DO8** CAN IO module with 8 analog current inputs (0-25mA) and 8 digital outputs
11-03-104-xx	CIO0004	**CIO-AI8/24V-DI4-DO8** CAN IO module with 4 analog voltage inputs (0-24V) useable as digital inputs, 4 analog current inputs (0-25mA) and 8 digital outputs
11-03-105-xx	CIO0005	**CIO-AI8/24V-DI8-DO8** CAN IO module with 8 analog voltage inputs (0-24V) useable as digital inputs and 8 digital outputs

Note: xx denotes the language of the delivery:

10 German

20 English

2 Configuration

2.1 Request and Response

The CIO module is configured by requests sent to the module. A request normally addresses a module register by its number. The module answers with a response message. The format of this messages is given below.

Request

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Command	Register number	unused set to 0	Data byte count	Data LSB	Data	Data	Data MSB

Response

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Command	Register number	Error code	Data byte count	Data LSB	Data	Data	Data MSB

The CAN identifiers used for the request and response messages are given by the content of register TX-ID0 (0Fh) and RX-ID0 (30h) plus the module id number. The default content of REQ-ID is 600h, the content of RES-ID is 580h. As the default module id is 1, the module will interact with CAN identifiers 601h and 581h by default.

The command byte has the following coding:

Command	Description
00h	Module will reboot when accessing register FFh
01h	Module will response Manufacturer name when accessing register 01h
02h	Module will response Product version when accessing register 01h
03h	Module will response Serial number when accessing register 01h Module will write factory default values to EEPROM and load them into RAM when accessing register FFh
04h	Module will response Firmware version when accessing register 01h
11h	Read the register value from RAM
12h	Read the register value from EEPROM
21h	Write into register in RAM
22h	Write into register in EEPROM If register is FFh then complete RAM content is written to EEPROM
23h	Write into register in EEPROM and load it immediately into register

The module uses the register values in RAM during runtime. While booting the content of the register values in the EEPROM are loaded into the RAM. There are also hard coded factory default settings used for recovery of a misconfigured module. See section *2.3 Reset factory settings* for more details.

The error code in the response message has the following meaning:

Error code	Description
E0h	Access to a register which does not exist
E1h	Access to a register, which is not associated with anything
E2h	Access is not defined
E3h	Write access is not allowed
E4h	Access to EEPROM is not possible
E5h	Data is out of allowed range
E8h	Attempt to map a register which is not a mapping register
E9h	Timeout

The Data byte count gives the count of significant bytes. Valid values are 0..4.

The factory default baud rate is set to 1MBaud.

2.2 Register

The configuration and runtime functionality of the module is controlled by a series of registers.

2.2.1 Configuration registers

With this set of registers basic module configuration, like baud rate setting is possible.

Number	Name	Bit count	Access	Limits	Default	Description
01h	Identity	64	ro			CMD=1: Manufacturer string CMD=2: Product string CMD=3: Serial number CMD=4: Firmware version
02h	unused					
03h	Module ID	8	rw	00h..3Fh	01h	Module ID is added as offset to TX-ID0..4 and RX-ID0..4
04h	Operation mode	8	rw		03h	01h: Operational 02h: Send response after write access 04h: Send boot up message 10h: Response message has always length 8 20h: Output trigger by synchronisation message
05h	unused					
06h	Baud rate index	8	rw	0..9	09h	0:10k, 1:20k, 2:25k, 3:50k, 4:100k, 5:125k, 6:250k, 7:500k, 8:800k, 9:1000k
07h	Manual baud rate	8	rw			tbd
08h	unused					
09h	unused					
0Ah	Module status	8	ro			01h: supply voltage <9V 02h: supply voltage <20V 10h: Output driver overload
0Bh	Module interrupt mask	8	rw		00h	For each bit set in this register and in case of a related error event the action mapped with register 0Ch will take place
0Ch	Module mapping index	8	rw	20h..2Fh	2Fh	Pointer to TX mapping entry
0Dh	Bus Off Recovery Time	16	rw		0064h	After this period of time (in ms) the CAN controller is reinitialized after a bus off event
0Eh	unused					

The access to the identity register is slightly different. When the module receives a message with TX-ID0 and register number set to 01h, the command byte selects different identity strings, which are returned with the response message.

CMD	Data bytes of response message							
	0	1	2	3	4	5	6	7
1	1	Manufacturer string						
		'E' (45h)	'M' (4Dh)	'S' (53h)	'_' (5Fh)	'T' (54h)	'_' (5Fh)	'W' (57h)
2	2	Product string						
		'C' (43h)	'I' (49h)	'O' (4Fh)	'0' (30h)	'0' (30h)	'0' (30h)	'1' (31h)
3	3	Serial number (Example: 123)						
		00h	00h	00h	00h	00h	01h	23h
4	4	Firmware version						
		'V' (56h)	'1' (31h)	'.' (2Eh)	'2' (32h)	20h	20h	20h

2.2.2 TX Mapping registers

During run time the module can produce or consume messages to perform the functionality as configured by the user. For this purpose a series of registers are implemented.

No.	Name	Bit count	Access	Limits	Default	Description
0Fh	TX-ID0	32	rw		00000580h	The value of this register + the module ID is used as CAN ID for responses of the module
10h	TX-ID1	32	rw		00000180h	TX CAN identifier for mapping register 20h. For effective identifier module ID is added.
11h	TX-ID2	32	rw		00000280h	TX CAN identifier for mapping register 21h. For effective identifier module ID is added.
12h	TX-ID3	32	rw		00000380h	TX CAN identifier for mapping register 22h. For effective identifier module ID is added.
13h	TX-ID4	32	rw		00000480h	TX CAN identifier for mapping register 23h. For effective identifier module ID is added.
14h	TX-ID5	32	rw		00000FFFh	TX CAN identifier for mapping register 24h.
15h	TX-ID6	32	rw		00000FFFh	TX CAN identifier for mapping register 25h.
16h	TX-ID7	32	rw		00000FFFh	TX CAN identifier for mapping register 26h.
17h	TX-ID8	32	rw		00000FFFh	TX CAN identifier for mapping register 27h.
18h	TX-ID9	32	rw		00000FFFh	TX CAN identifier for mapping register 28h.
19h	TX-ID10	32	rw		00000FFFh	TX CAN identifier for mapping register 29h.
1Ah	TX-ID11	32	rw		00000FFFh	TX CAN identifier for mapping register 2Ah.
1Bh	TX-ID12	32	rw		00000FFFh	TX CAN identifier for mapping register 2Bh.
1Ch	TX-ID13	32	rw		00000FFFh	TX CAN identifier for mapping register 2Ch.
1Dh	TX-ID14	32	rw		00000FFFh	TX CAN identifier for mapping register 2Dh.
1Eh	TX-ID15	32	rw		00000FFFh	TX CAN identifier for mapping register 2Eh.
1Fh	TX-ID16	32	rw		00000FFFh	TX CAN identifier for mapping register 2Fh.
20h	MAP-TX1	32	rw		00848580h	Map of digital input data (80h), H>L (84h) and L>H (85h) input change registers

No.	Name	Bit count	Access	Limits	Default	Description
21h	MAP-TX2	32	rw		A3A2A1A0h	Map of analog input channel 0..3 (A0h..A3h)
22h	MAP-TX3	32	rw		A7A6A5A4h	Map of analog input channel 4..7 (A4h..A7h)
23h	MAP-TX4	32	rw		9F9E9D9Ch	Map of analog input upper/lower limit (9Ch, 9Dh) and delta flag register (9Eh, 9Fh)
24h	MAP-TX5	32	rw		00000FFFh	
25h	MAP-TX6	32	rw		00000FFFh	
26h	MAP-TX7	32	rw		00000FFFh	
27h	MAP-TX8	32	rw		00000FFFh	If RX-ID0 is received with command=BFh, then mapped entry is executed
28h	MAP-TX9	32	rw		00000FFFh	TX CAN identifier for mapping register 28h
29h	MAP-TX10	32	rw		00000FFFh	TX CAN identifier for mapping register 29h
2Ah	MAP-TX11	32	rw		00000FFFh	TX CAN identifier for mapping register 2Ah
2Bh	MAP-TX12	32	rw		00000FFFh	TX CAN identifier for mapping register 2Bh
2Ch	MAP-TX13	32	rw		00000FFFh	TX CAN identifier for mapping register 2Ch
2Dh	MAP-TX14	32	rw		00000FFFh	TX CAN identifier for mapping register 2Dh
2Eh	MAP-TX15	32	rw		00000FFFh	TX CAN identifier for mapping register 2Eh
2Fh	MAP-TX16	32	rw		0000000Ah	Map of module status register (0Ah)

2.2.3 RX Mapping registers

No.	Name	Bit count	Access	Limits	Default	Description
30h	RX-IDO	32	rw		00000600h	The value of this register + module ID is used as CAN ID for requests to the module
31h						tbd
..						tbd
35h	RX-S	32	rw		00000080	RX Sync message
..						tbd
3Fh						tbd

2.2.4 Timer registers

No.	Name	Bit count	Access	Limits	Default	Description
40h	T0I	16	rw		0064h	Timer 0 Interval in ms (64h=100ms)
41h	T1I	16	rw		0064h	Timer 1 Interval in ms (64h=100ms)
42h	T2I	16	rw		0064h	Timer 2 Interval in ms (64h=100ms)
43h	T3I	16	rw		0064h	Timer 3 Interval in ms (64h=100ms)
44h	T0M	8	rw	20h-2Fh	20h	On reload of timer mapped entry will be sent
45h	T1M	8	rw	20h-2Fh	21h	On reload of timer mapped entry will be sent
46h	T2M	8	rw	20h-2Fh	22h	On reload of timer mapped entry will be sent
47h	T3M	8	rw	20h-2Fh	23h	On reload of timer mapped entry will be sent
48h	T0C	16	rw		0000h	Timer 0 counter value
49h	T1C	16	rw		0000h	Timer 0 counter value
4Ah	T2C	16	rw		0000h	Timer 0 counter value
4Bh	T3C	16	rw		0000h	Timer 0 counter value
4Ch						unused
4Dh						unused
4Eh	TSEM	8	rw		00h	Timer Sync Enable Mask 0: Timer are incremented by 1kHz clock 1: Timer are incremented by RX-S
4Fh	TEM	8	rw	00h-0Fh	00h	Timer Enable Mask Bit 0-3 enable timer 0-3
50h						tbd
..						tbd
7Fh						tbd

2.2.5 Digital IO registers

No.	Name	Bit count	Access	Limits	Default	Description
80h	DI	8	r			Digital Input
81h	DIPM	8	rw	00h-FFh	00h	Digital Input Polarity Mask 0: Input is not inverted 1: Input is inverted
82h	DIHLM	8	rw	00h-FFh	00h	Digital Input H>L Change Mask A set bit will trigger mapping register 86h on falling edge of related input bit
83h	DILHM	8	rw	00h-FFh	00h	Digital Input L>H Change Mask A set bit will trigger mapping register 86h on rising edge of related input bit
84h	DIHLC	8	r			Digital Input H>L Change Code Shows last Digital Input falling edge change

No.	Name	Bit count	Access	Limits	Default	Description
85h	DILHC	8	r			Digital Input L>H Change Code Shows last Digital Input rising edge change
86h	DIM	8	rw	20h-2Fh	00h	Digital Input Mapping
87h						tbd
88h						tbd
...						tbd
8Dh						tbd
8Eh	DOPM	8	rw	00h-FFh	00h	Digital Output Polarity Mask 0: Output is not inverted 1: Output is inverted
8Fh	DO	8	rw			Digital Output
...						tbd
9Fh						tbd

2.2.6 Analog registers

No.	Name	Bit count	Access	Limits	Default	Description
A0h	AI0	16	r			Analog Input channel 0
A1h	AI1	16	r			Analog Input channel 1
A2h	AI2	16	r			Analog Input channel 2
A3h	AI3	16	r			Analog Input channel 3
A4h	AI4	16	r			Analog Input channel 4
A5h	AI5	16	r			Analog Input channel 5
A6h	AI6	16	r			Analog Input channel 6
A7h	AI7	16	r			Analog Input channel 7
A8h	tbd					tbd
A9	AISC	16	rw	0001h-FFFFh	0001h	Analog Input Sample count Number of samples to calculate a running average. Every 200µs a sample is taken.
...						tbd
DFh						tbd

2.2.7 Counter registers

No.	Name	Bit count	Access	Limits	Default	Description
E0h	C0	32	rw			Counter 0 Register will be incremented on rising edge of DI.0 and if enabled (Register E8h)
E1h	C1	32	rw			Counter 1 Register will be incremented on rising edge of DI.1 and if enabled (Register E8h)
E2h	C2	32	rw			Counter 2 Register will be incremented on rising edge of DI.2 and if enabled (Register E8h)

No.	Name	Bit count	Access	Limits	Default	Description
E3h	C3	32	rw			Counter 3 Register will be incremented on rising edge of DI.3 and if enabled (Register E8h)
E4h	C0L	32	rw		7FFFFFFh	Counter 0 Limit When this limit is reached and reset is enabled (Register Eah) counter will be reset
E5h	C1L	32	rw		7FFFFFFh	Counter 1 Limit When this limit is reached and reset is enabled (Register Eah) counter will be reset
E6h	C2L	32	rw		7FFFFFFh	Counter 2 Limit When this limit is reached and reset is enabled (Register Eah) counter will be reset
E7h	C3L	32	rw		7FFFFFFh	Counter 3 Limit When this limit is reached and reset is enabled (Register Eah) counter will be reset
E8h	CEM	8	rw	00h-0Fh	00h	Counter Enable Mask Bit 0-3 enable counter 0-3
E9h	CD	8	rw	00h-0Fh	00h	Counter Direction Mask Bit 0-3 set count direction for counter 0-3 0: Count up 1: Count down
EAh	CRE	8	rw	00h-0Fh		Count Reset Enable Mask If bit 0-3 is set counter 0-3 will be reset, when limit is reached
EBh						
ECh						
EDh						

2.2.8 PWM registers

No.	Name	Bit count	Access	Limits	Default	Description
F0h	PWMW0	16	rw	0-PWMCT	0000h	PWM 0 Pulse Width (Digital Output 0)
F1h	PWMW1	16	rw	0-PWMCT	0000h	PWM 1 Pulse Width (Digital Output 1)
F2h	PWMW2	16	rw	0-PWMCT	0000h	PWM 2 Pulse Width (Digital Output 2)
F3h	PWMW3	16	rw	0-PWMCT	0000h	PWM 3 Pulse Width (Digital Output 3)
F4h						tbd
F5h	PWME	8	rw	00h-0Fh	00h	PWM Enable Mask Bit 0-3 enable PWM0-3 0: disabled 1: enabled
F6h	PWMP	8	rw	00h-0Fh	00h	PWM Polarity Mask Bit 0-3 set output PWM0-3 inverted 0: not inverted 1: inverted
F7h	PWMCT	16	rw	0001h-FFFFh	0064h	PWM Cycle Time PWM Cycle time in ms (0064h = 100µs)

No.	Name	Bit count	Access	Limits	Default	Description
F8h	PWMCLK	8	rw	00h-03h	01h	PWM Clock 0: 24MHz 1: 1MHz 2: 100kHz 3: 10kHz
..						tbd
FEh						tbd

2.2.9 Miscellaneous registers

No.	Name	Bit count	Access	Limits	Default	Description
FFh	CMD	8	w			00h: Reset module 03h: Store factory default values to EEPROM and load them into RAM 22h: Store RAM content into EEPROM

2.3 Reset factory settings

A module with unknown baud rate or module id can be set in a state where it can be recovered. When CAN_H and CAN_L are shortened at start up for more than 3 seconds while the device is supplied with a voltage below the minimum supply voltage range (~5...9V) it boots with CAN initialized to 1MBaud and node id 1. The state is indicated by two LEDs running.

In this mode the EEPROM can be completely erased by sending a message with extended (29bit) identifier EE0000h and length 0 to the module. When the module is booted again in normal mode the EEPROM is set to its default values by the firmware of the device.

2.4 Examples

For all examples the Module Id is 1.

2.4.1 Set baud rate to 250kBaud permanently

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	22h	06h	00h	01h	06h	-	-	-
Response								
581h	22h	06h	00h	01h	06h	-	-	-

This write access goes into EEPROM and hence will take effect only after reboot.

2.4.2 Request analog value from AD channel 0

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	11h	A0h	00h	02h	-	-	-	-
Response								
581h	11h	A0h	00h	02h	LSB	MSB	-	-

This will return the right aligned raw AD converter value from channel 0.

2.4.3 Enable Timer 0 in RAM register

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	21h	4Fh	00h	01h	01h	-	-	-
Response								
581h	21h	4Fh	00h	01h	01h	-	-	-

After enabling Timer 0 the module will produce every 100ms (Default value of register 40h) a message with CAN ID 181h (Default value of register 10h). The Timer 0 reload register (44h) is set by default to 20h, the TX Mapping register 1, which is set to 00848580h. The produced message will therefor contain the values of register 84h, 85h and 80h.

2.4.4 Inquire Serial Number

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	03h	01h	-	-	-	-	-	-
Response								
581h	03h	00h	00h	00h	00h	01h	23h	45h

This is a response showing serial number 12345.

2.4.5 Enable TX message trigger for Digital Input

The following example is related to a CIO with four Digital Inputs. All write accesses go into RAM and will be lost after a reboot.

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	21h	82h	00h	01h	FFh	-	-	-
Response								
581h	21h	82h	00h	01h	FFh	-	-	-

This will set all Digital Inputs to trigger a falling edge.

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	21h	83h	00h	01h	FFh	-	-	-
Response								
581h	21h	83h	00h	01h	FFh	-	-	-

This will set all Digital Inputs to trigger a rising edge.

Request								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
601h	21h	86h	00h	01h	20h	-	-	-
Response								
581h	21h	86h	00h	01h	20h	-	-	-

This will activate the trigger.

Now a message with the identifier set in register 10h (181h in this example) will be sent when the status of a Digital Input changes. An example message:

Digital Input 1 is high
Digital Input 2 has rising edge
Digital Input 3 is low
Digital Input 4 is low

Trigger message								
ID	**Byte 0**	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
181h	03h	02h	00h	-	-	-	-	-

Description of the data bytes:

Byte 0: 03h Present status of the four Digital Input values (high or low)
Byte 1: 02h Bit 1 (02h) indicates a rising edge of DI2
Byte 2: 00h Indicates no falling edge of Digital Input

3 Electrical characteristics

3.1 Nominal values

3.1.1 General

Parameter	Min	Typ	Max	Unit
Supply voltage Vcc	10	24	30	V
Supply current (module idle, supply voltage 24V)		25		mA
Operating temperature	-20		60	°C

3.1.2 Voltage input

Parameter	Min	Typ	Max	Unit
Input voltage analog input A0-A3 CIO0001-CIO0003	0		10	V
Input voltage analog input A0-A3 CIO0004	0		24	V
Threshold from logical 0 to 1 for digital inputs CIO0001-CIO0003		3,6		V
Threshold from logical 0 to 1 for digital inputs CIO0004, CIO0005		8,5		V
Resolution		12		Bit

3.1.3 Current input

Parameter	Min	Typ	Max	Unit
Input current analog input AI4-AI7 CIO0001 CIO0003 CIO0004	0		25	mA
Current input AI4-AI7 impedance		163,84		Ohm
Resolution		12		Bit

3.1.4 Digital output

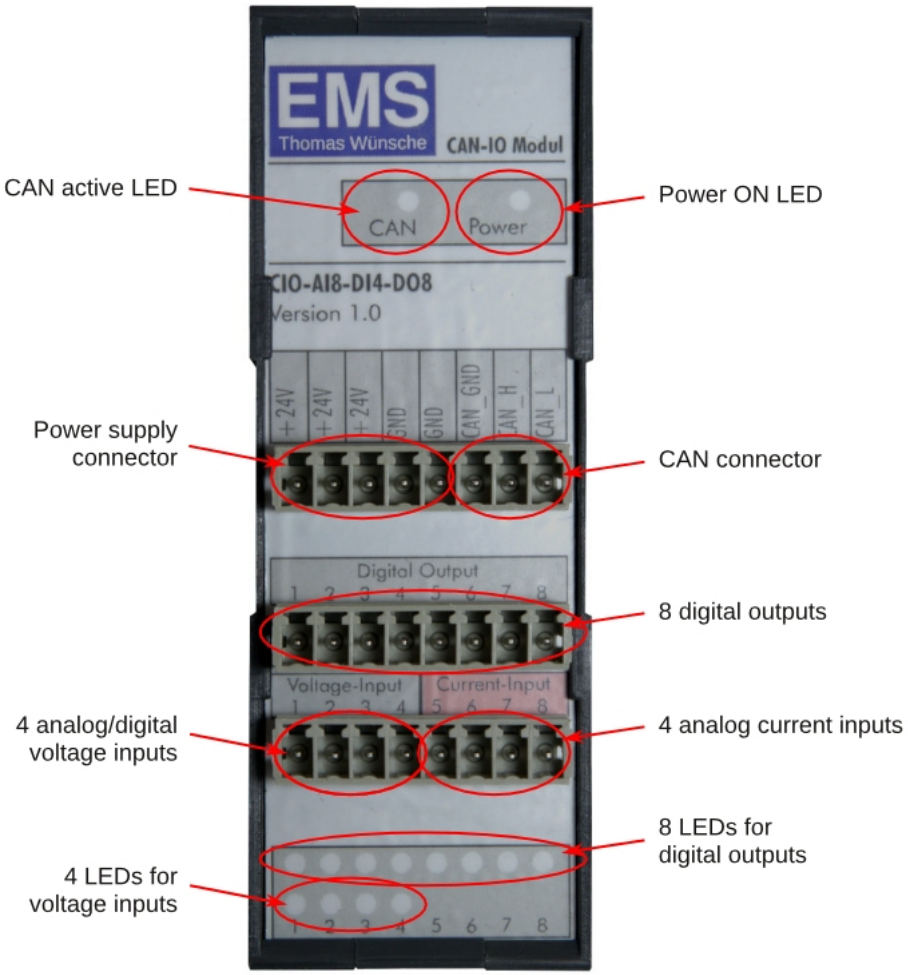
Parameter	Min	Typ	Max	Unit
Output current (per channel)	0	-	500	mA
Reduction of total current at environmental temperature >40°C	-	100	-	mA/°C

3.2 Limiting values

Parameter	Min	Typ	Max	Unit
Supply voltage Vcc	0	24	35	V
Storage temperature	-40		85	°C

4 Mechanical data

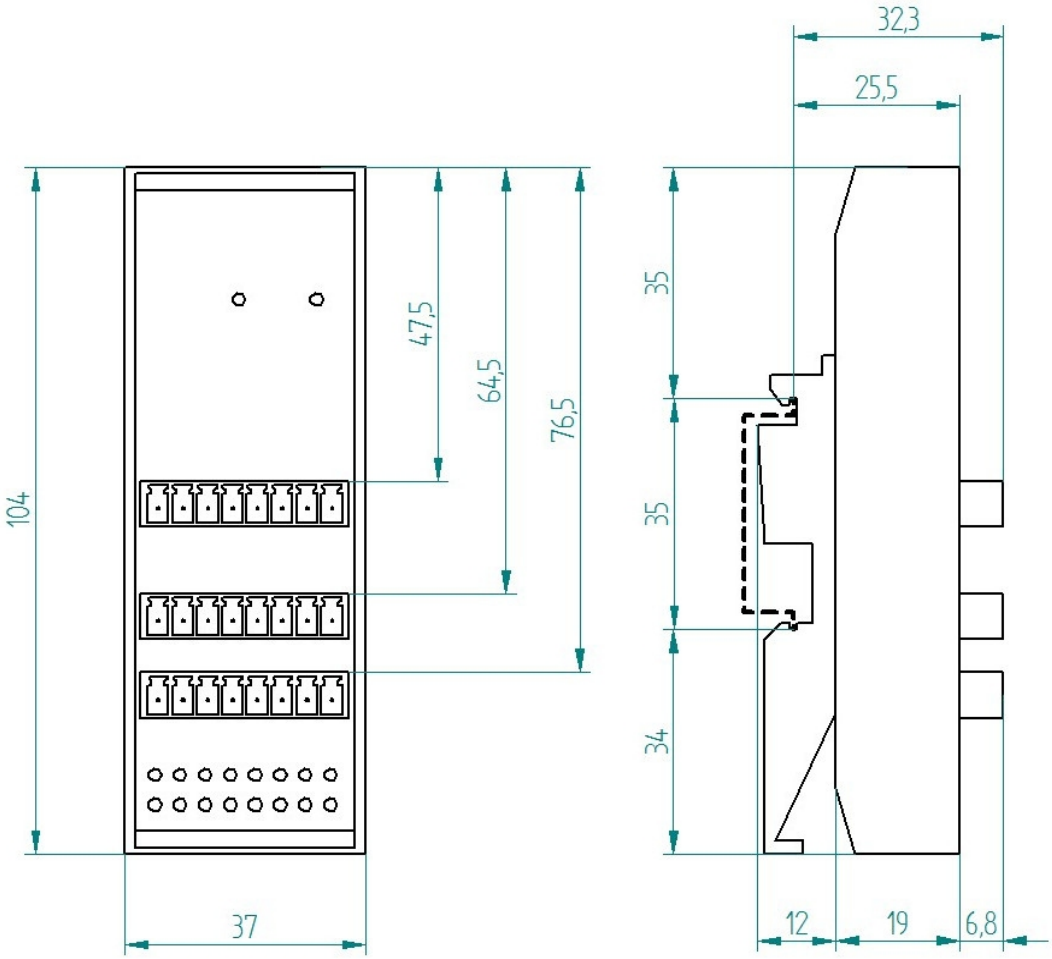
4.1 Connection schema CIO-AI8/10V-DI4-DO8



Supplied plug (scope of delivery):

- Manufacturer: Wieland
- Article number: 25.620.0853.0

4.2 Dimensions



5 Appendix

5.1 Instruction for Disposal

Electronic Equipment Act (WEEE)

EMS is selling its products exclusively to commercial customers. This is the reason why all devices are designed for commercial use and have to be disposed appropriately. In accordance to §10 para. 2 clause 3 Electronic Equipment Act (WEEE) the disposal of EMS products is regulated the following way.

The equipment must not be disposed at the public collection points. In accordance with the applicable law the disposal has to be done by the customer for own account. The same applies to products, which have been sold to third parties, if those parties do not take care of a disposal in accordance to the applicable law. As an alternative the products can be returned to EMS free of charge.

5.2 FCC Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interferences when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

5.3 CE Conformity

Declaration of Conformity

CE

The manufacturer

EMS Dr. Thomas Wünsche e.K.
Sonnenhang 3
85304 Ilmmünster
Germany

hereby declares, that the following products:

Name	Article Number
CIO-AI8/10V-DI4-DO8	11-03-101-xx
CIO-AI8/10V-DI8-DO8	11-03-102-xx
CIO-AI8-DO8	11-03-103-xx
CIO-AI8/24V-DI4-DO8	11-03-104-xx
CIO-AI8/24V-DI8-DO8	11-03-105-xx

meet the requirements of the following standards:

Electromagnetic Immunity
EN 55035:2018-04; VDE 0878-35:2018-04 – Electromagnetic compatibility of multimedia equipment – Immunity requirements (CISPR 35:2016, modified); German version EN 55035:2017

Electromagnetic Emission
EN 55032:2016-02; VDE 0878-32:2016-02 – Electromagnetic compatibility of multimedia equipment – Emission Requirements (CISPR 32:2015); German version EN 55032:2015

and therefore conform with the EU requirements on:

Electromagnetic compatibility (2014/30/EU)

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities.

RoHS 3

The RoHS 3 (EU 2015/863) commits manufacturers of „Electrical and Electronic Equipment" (EEE) to secure compliance with the RoHS Directive before placing a CE mark.

Based on technical documentation and to the best of our knowledge, we hereby confirm that the above mentioned products do not contain any of the restricted substances according to Article 4 of the RoHS Directive in excess of the maximum concentration values tolerated by weight in any of their homogeneous materials.

Ilmmünster, 05.10.2022

Dr. Thomas Wünsche

EMS Thomas Wünsche

5.4 Revision History

Revision	Date	Description	Signed
1.00	02. October 2014	Initial release	G. Uttenthaler
1.01	12. August 2015	Added WEEE, CE and FCC information	G. Uttenthaler
1.02	11. July 2018	Fixed typos	G. Uttenthaler
1.03	26. August 2020	Fixed default request and response identifier	A. Straubinger
1.04	26. January 2021	Added CIO0005 to ordering information. Fixed default values for registers 44h-47h. Removed non existing register 87h from list. Fixed PDF bookmarks. Added examples	G. Uttenthaler
1.05	19. December 2022	Changed CE declaration Added plug information Clarified register description chapters 2.2.2, 2.2.3 and 2.2.8	A. Straubinger
1.06	02. February 2023	Added example to trigger TX message on Digital Input change	A. Straubinger
1.07	17. June 2026	Added security vulnerability	A. Straubinger