C-DIAS Digital Output Module CTO 162

The module CTO 162 has 16 digital outputs (GND switching).

Technical data

Digital outputs

Number of outputs	16 (open collector)
Protection against short circuiting	No
Maximum permissible constant current / channel	0,5A
Maximum total current (per 4 channels)	2A (100% operating time)
Maximum total current (whole module)	8A (100% operating time)
Voltage drop across the supply (output switched on)	≤0.5V
Residual current (output switched off)	≤1mA
Switch-on delay time	<10µs
Switch-off delay time	<10µs
Status display	Yellow LEDs

Electrical requirements

Supply voltage +24V	18 – 30V DC	
Supply voltage current consumption +24V	Only at over tension on the outputs of more than 0.6V to the supply voltage +24V	
Supply voltage GND	0V DC	
Supply voltage current consumption GND	Corresponds to the load of the digital outputs (maximum 8A)	
Supply of the C-DIAS bus	+5V	
Current consumption on the C-DIAS bus (+5V supply)	Typically 120mA	Maximum 250mA

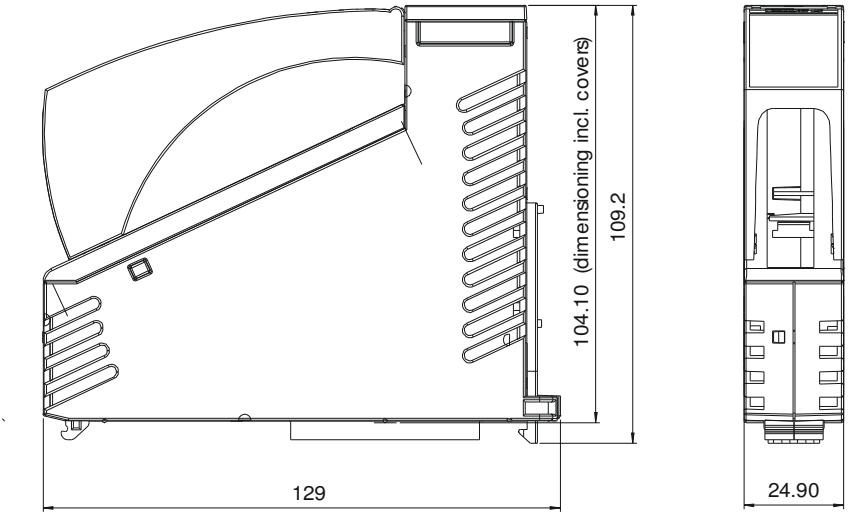
Miscellaneous

Article number	12-007-162
Hardware version	1.x

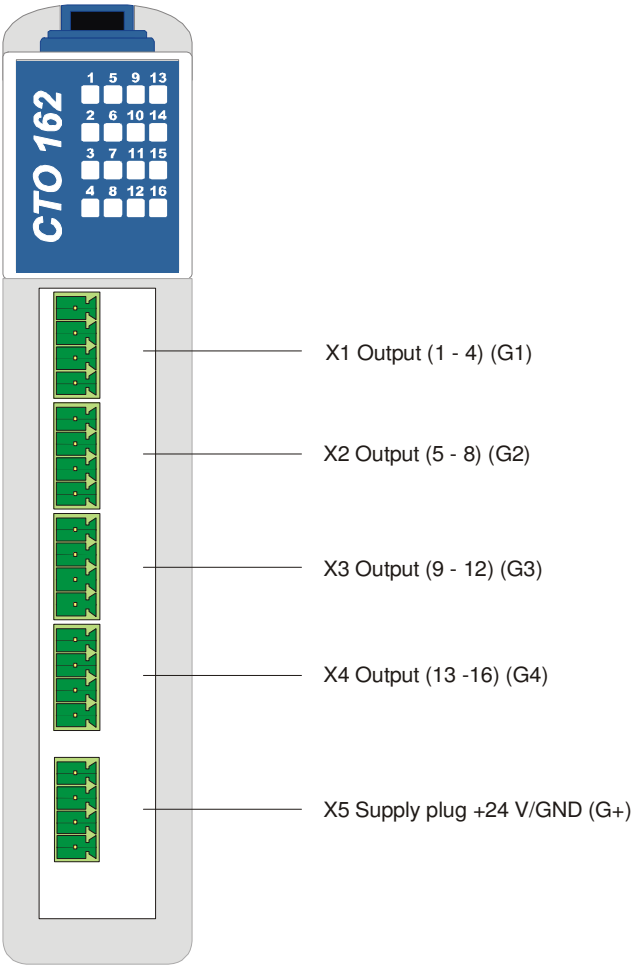
Environmental conditions

Storage temperature	-20 – +85°C	
Operating temperature	0 – +60°C	
Humidity	0 – 95%, without condensation	
EMV stability	In accordance with EN 61000-6-2:2001 (industrial)	
Resistance to shocks	EN 60068-2-27	150m/s²
Protective system	EN 60529	IP 20

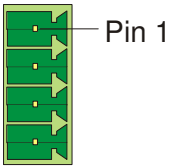
Mechanical dimensions



Connections

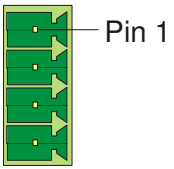


X1: Plug output 1 – 4 (G1)



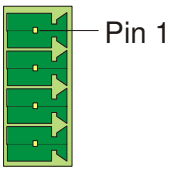
Pin	Function
1	Output 1
2	Output 2
3	Output 3
4	Output 4

X2: Plug output 5 – 8 (G2)



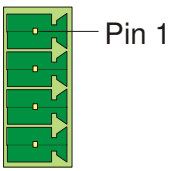
Pin	Function
1	Output 5
2	Output 6
3	Output 7
4	Output 8

X3: Plug output 9 – 12 (G3)



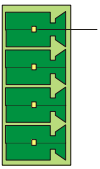
Pin	Function
1	Output 9
2	Output 10
3	Output 11
4	Output 12

X4: Plug output 13 – 16 (G4)



Pin	Function
1	Output 13
2	Output 14
3	Output 15
4	Output 16

X5: Plug supply (G+)



Pin	Function
1	+24V
2	+24V
3	GND
4	GND

Useable connectors

Connector with spring clamp:
Phoenix Contact: FK-MCP 1.5/ 4-ST-3.5

Connector with crew clamp technique:
Phoenix Contact: MC 1.5/ 4-ST-3.5

The complete C-DIAS plug set CKL 031 with spring clamp is available from Sigmatek with the article number 12-600-031.

General comments on digital outputs

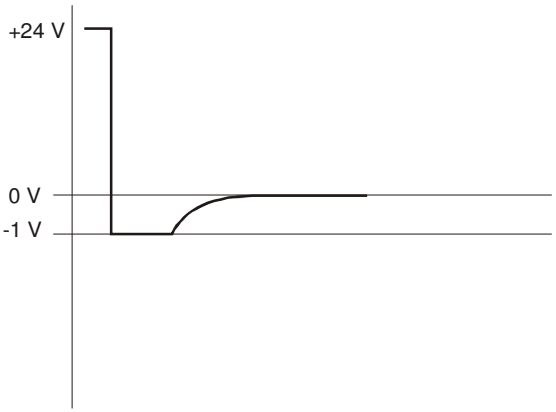
The cable cross-section of both the +24V and the 0V supply has to be matched to the maximum taken output current.

Caution!
If inductive loads are not protectively wired, when the load is disconnected high peak currents will flow through the 0V line, because the internal protective wiring directs the voltage peaks to 0V. With 0V cables, which are longer than permitted and too thin, this can lead to outputs on the module involved reacting in an undesired way.

The application of a voltage to an output, which exceeds the +24V supply around more than 0.6V, respectively, falls below the GND supply around more than 0.6V is not permitted.

All outputs are protectively wired internally against overvoltage and undervoltage. The disconnection of inductive loads is, as depicted in the diagram, limited to about -1V. However additional protective wiring to inductive loads is recommended (recovery diode), so that system malfunctioning through voltage peaks (inductive disturbance in analogue circuits) can be avoided.

Disconnection of inductive loads

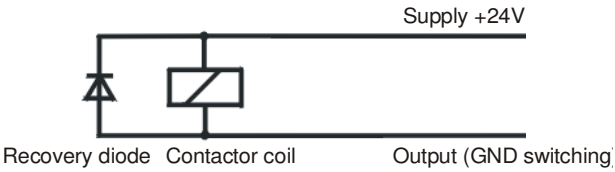


Wiring instructions for digital outputs

Please pay attention to the following guidelines:

- Avoid laying the input cables parallel to the load circuits
- Protective wiring of all contactor coils (RC-network or recovery diodes)
- Correct earthing

Connection of inductive loads



Status displays

LED no.	LED colour	Meaning
1 – 16	yellow	Outputs 1 – 16

Addressing

Address	Access		Description
16#00	WRITE	WORD	Output 1..16

Data in EEPROM (organized byte-wise)

Address	Data	Description
$00	$xx	Check sum
$01	123	Identification
$02	2	Module group 2 = TO
$03	2	Variant 2 = CTO162
$04	16	Number of channels
$05	$1x	Hardware version $10 = HW-V1.0, $11 = HW-V1.1,…
$10		Serial number

Check sum calculation of the EEPROM

- The check sum is calculated byte-wise
- It is calculated from the address following the check sum to the last address of the data block (both inclusive)
- This means, the length of the data block of the check sum to be calculated = 5 BYTE fixed.
- Calculation algorithm:

1.	Load pointer with address of the comparison data (without check sum)	L.DI# ADD.DI		HWKENN 1
2.	Length of data block	L.CX		5
3.	Load check sum with $FF	L.AL		$FF
4.	Rotate check sum 1 bit to the left into Carry	LP	ROL.AL	1
5.	Add up check sum with current WORD and Carry	ADC.AL		(DI)
6.	Increase pointer on next WORD	ADD.DI		1
7.	Finished all addresses? NO ---> 4. YES ---> 8.	LOOP		LP
8.	Check sum is ready			