Positioning module CNC 115

for 1 Axle

The positioning input is designed for incremental indicators with RS 422 levels. The three digital inputs are available for position reference and/or monitoring the end position. The reference value is out put through a 12-bit D/A converter. Three potential free optical coupler outputs provided (i.e.: for direct control of the “release” and “direction” motor controllers)

Technical Data

Incremental indicator connection

Number of channels	1
Input signals	Incremental Indicator signals (A, /A, B, /B, R, /R) / RS422-level with 150 Ω termination
Input frequency	Maximal 125kHz
Counter frequency	Maximal 500kHz
Signal evaluation	4x
Counter resolution	16 Bit
Sensor supply	+5V / 2A
Status display	LEDs green

ATTENTION!
At the module carriers CMB 022, CMB 042 and CMB 082 the 32 MHZ clock frequency (CLK) is not provided anymore to the modules. This module requires the clock frequency up to HW version 2.0. A module with a HW version less than 2.0 is only functional with the module carriers CMB 021, CMB 041 and CMB 081!

ATTENTION!
Les fonds de panier CMB 022, 042 et CMB CMB 082 n’offrent pas la fréquence d'horloge de 32 MHz (CLK). Ce module nécessite la fréquence d'horloge de 32 MHz. Il fonctionne donc uniquement avec les fonds de panier CMB 021, 041 et CMB 081!

Input Specifications

Number of inputs	3	
Interrupt function	Input 3	
Input voltage	Typical +24V	Maximal +30V
Signal Level	Low: <+5V	High: >+14V
Switch threshold	Typical +10V	
Input current	5 mA at +24V	
Input delay	Typical 0,1ms	
Status display	LEDs green	

Optical coupler output specifications

Number of outputs	3
Type	Potential free
Switch voltage	Maximal +30V DC
Current capacity	Maximal 100mA
Residual voltage	<2V at 100mA
Status display	LEDs yellow

Analog channel specification

Number of channels	1 per axle
Output voltage	-10 to +10V DC
Output value	-2000 to +2000
Resolution	12 Bit (5mV / Bit)
Output voltage capacity	>5KΩ
Short circuit protection	Yes
Rise time	<50µs
Refresh time for all channels	<1ms
Analog accuracy	±0,4% of the output value

Electrical Requirements

Supply Voltage	18 – 30V DC	
Current consumption supply voltage +24V	Depends on the capacity of the signal supply	
Supply from the C-DIAS-Bus	+5V	+24V
Current consumption of the C-DIAS-Bus	<150mA	<50mA

Voltage Monitoring

External +24V	Supply voltage <18V (Error-Led lights red)

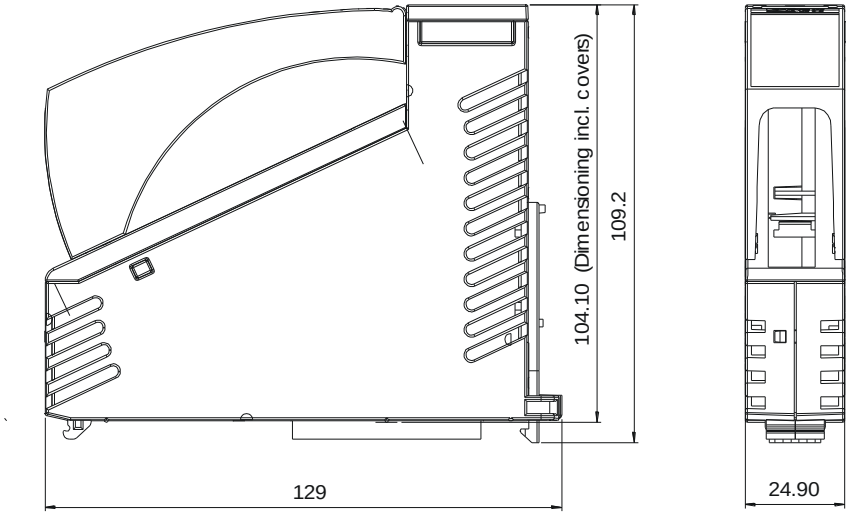
Special

Article number	12-011-115
Hardware version	2.x
Software macro	Available
Standardization	UL (E247993)

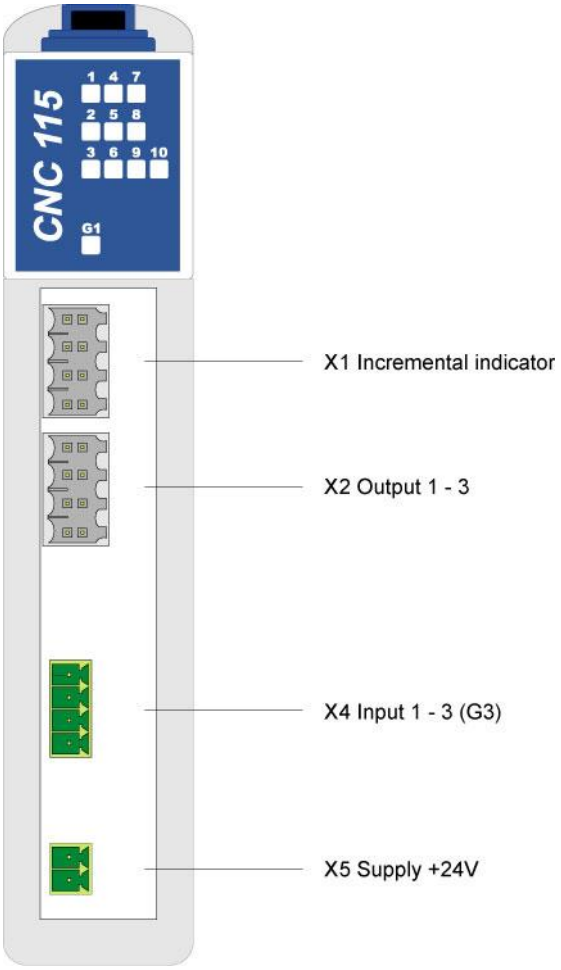
Operating Environment

Storage temperature	-20 – +85°C	
Operating temperature	0 – +60°C	
Humidity	0 – 95%, Uncondensed	
EMV-Strength	Per EN 61000-6-2 (Industrial area)	
Shock resistance	EN 60068-2-27	150m/s²
Protection type	EN 60529	IP 20

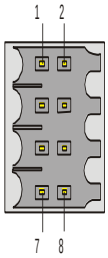
Mechanical dimensions



Connection Assignments

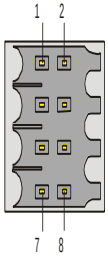


X1: Incremental Indicator



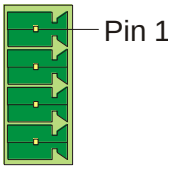
Pin	Assignment
1	A-
2	A+
3	B-
4	B+
5	R-
6	R+
7	GND
8	+5V Sensor

X2: Output connector



Pin	Assignment
1	Output Q1-
2	Output Q1+
3	Output Q2-
4	Output Q2+
5	Output Q3-
6	Output Q3+
7	Analog GND
8	Analog Output

X4: Input connector



Pin	Assignment
1	Input 1
2	Input 2
3	Input 3
4	GND

X5: Power Supply

Pin	Assignment
1	+24V
2	GND

Applicable Plug Connectors

X1, X2: 8-pole Weidmüller plug B2L/B2CF 3,5/8

X4, X5: Connector with screw clamp technique:
Phönix Contact: 1 x 4-pole MC 1,5/ 4-ST-3,5
Phönix Contact: 1 x 2-pole MC 1,5/ 2-ST-3,5

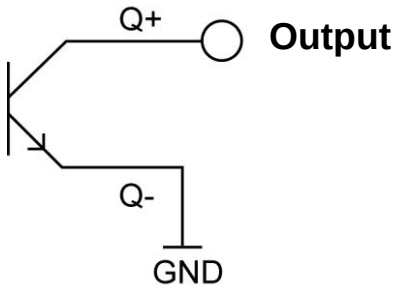
Connector with spring clamp:
Phönix Contact: 1 x 4-pole FK-MCP 1,5/ 4-ST-3,5
Phönix Contact: 1 x 2-pole FK-MCP 1,5/ 2-ST-3,5

The complete C-DIAS connector set, CKL 053 with spring terminals, is available at Sigmatek under the article number 12-600-053.

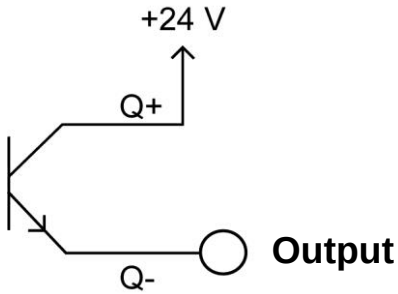
Optical coupler Outputs

There are several possible uses for these outputs:

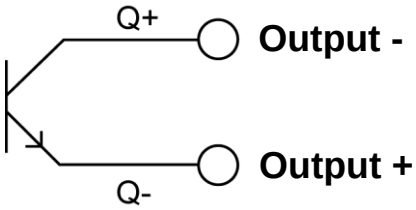
GND switch (not potential free)



+24 V switch (not potential free)

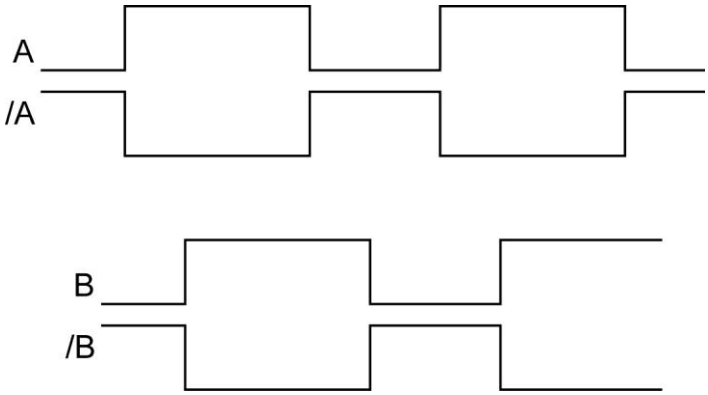


Potential free switch

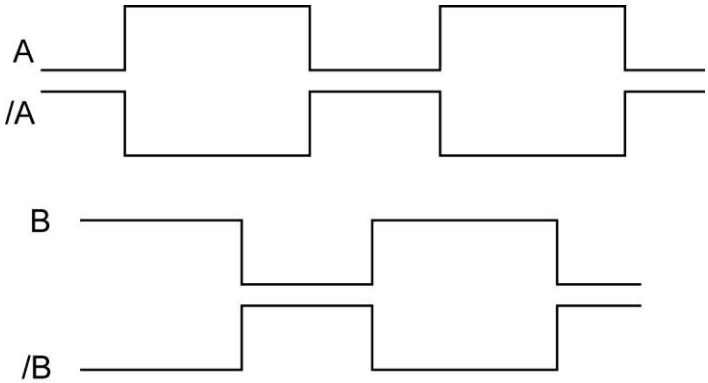


Incremental Indicator Signal

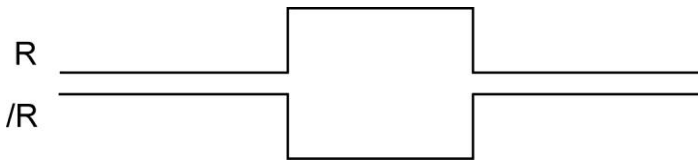
Count-UP:



Count-DOWN:



Reference impulse:



Status Display

LED Nr.	LED Color	Meaning
1 – 3	green	Incremental indicator input
4 – 6	green	Inputs 1..3
7 - 9	Yellow	Outputs 1..3
10	green	+10V Reference voltage.
G1	red	Error-Led+24V external

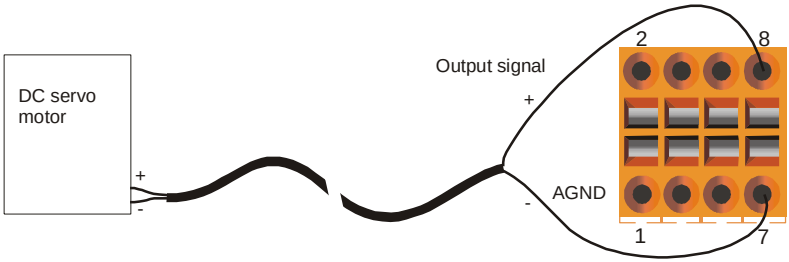
Wiring Instructions

To ensure fault free operation, it is important to follow a careful wiring method:

- The 0V connection of the voltage supply must be connected to the 0V collection point via the shortest route possible.
- The CMB housing must have a solid ground connection.
- The connections to the analog components must be as short as possible and avoid parallel wiring to the digital signal lines.
- The signal lines must be shielded.
- The shielding must be connected to a shielding ground bus.

Analog Output Connections

Application examples: Axle control for DC servo motor, frequency converter



Addressing

The positioning module in not automatically read into the process image by the operating system.

Address	Access		Function
16#00, 16#01	READ	WORD	16 Bit counter
16#02, 16#03	READ	WORD	16 Bit counter latched
16#04	READ	BYTE	NC Status register Bit 0: Incremental indicator Reference impulse Bit1:Incremental indicator Reference impulse latched Bit 2: Digital Input 1 Bit 3: Digital Input 1 latched Bit 4: Digital Input 2 Bit 5: Digital Input 2 latched Bit 6: Digital Input 3 Bit 7: Error Incremental indicator signal
16#05	WRITE	BYTE	Optical coupler output Bit 0: Output 1 Bit 1: Output 2 Bit 2: Output 3
16#06	READ	BYTE	Interrupt Source Register (acknowledge) Bit 0: Input 3, positive edge Bit 1: Input 3, negative edge
16#07	WRITE READ	BYTE	Interrupt Enable Register Bit 0: Input 3, positive edge Bit 1: Input 3, negative edge
16#08	READ	BYTE	Latch Status Register Bit 0: Digital Input 1, positive edge Bit 1: Digital Input 1, negative Edge Bit 2: Digital Input 2, positive Edge Bit 3: Digital Input 2, negative Edge Bit 4: Digital Input 3, positive Edge Bit 5: Digital Input 3, negative Edge Bit 6: Reference Impulse
16#08	WRITE	BYTE	Latch acknowledgement Byte 0 = Latch acknowledged; Byte <> 0 = Software latch

16#09	WRITE	BYTE	Latch Enable Register Bit 0: Digital Input 1, positive Edge Bit 1: Digital Input 1, negative Edge Bit 2: Digital Input 2, positive Edge Bit 3: Digital Input 2, negative Edge Bit 4: Digital Input 3, positive Edge Bit 5: Digital Input 3, negative Edge Bit 6: Reference impulse
16#0A, 16#0B	WRITE	WORD	12-Bit Analog output
16#0C	WRITE	BYTE	Enable Analog output Bit 0: 0 = off (after Reset); 1 = on
16#0F	READ	BYTE	Bit 0: 1 = external +24 V connected Bit 0: 0 = external +24 V not connected

Interrupt Function

This module offers the possibility to signal condition changes from input 3 through hardware interrupts. To accomplish this, the module can be configured through the software.

The following registers are available for the configuration of the interrupt input:

Interrupt-Source-Register: with the help of this register it is possible to specify the edge from input 3 that will trigger the interrupt.

With the READ access, the interrupt is acknowledged and the register is cleared.

The Interrupt Source Register must be read as a byte (no word access) since otherwise the Retry function of the DIAS Bus system is not provided.

Interrupt Enable Register: with the help of this register, the edge from input 3 which will trigger the interrupt is specified.

Latch Function

This module offers the possibility to save the actual counter value from condition changes of the digital inputs and the incremental indicator reference impulse in a register (16#02, 16#03).

The following registers are available for the configuration of the latch function:

Latch-Status-Register: With the help of this register, it is possible to specify the trigger for the latch function.

Latch-Enable-Register: with the help of this register, the source for the latch function is released. There can also be more than one released.

Latch Acknowledgement: clearing this register activates the latch function. It must be released after ever latch operation.

By setting bit 0, the latch function is also executed through software.

Calibration data

(24C02 is byte wise organized)

Address	Data	Description
$00	$xx	Checksum
$01	123	Identification
$02	10	Module group 10 = CNC-MIX
$03	1	Module version = CNC115
$04	1	Channel number
$05	$10	Hardware version $10 = HW 1.0
$06-$3F	$00	FILL
$10		Serial number
		Calibration data in serial EEPROM
$40	$xxxx	Checksum
$42	12345	Identification
$44	4	Length of the following data block in WORD
$46	$0001	Number of channels
		AO-Calibration data for voltage outputs: (-2000 / 0 / 2000 = -10V / 0V / +10V)
$48	2061	AO Offset
$4A	3800	AO Multiplier
$4C	3892	AO Divisor
$4E-$FF	$00	FILL

Conversion Formula for Analog Outputs

Value = (Desired value * Gain Multiplier / Gain Divisor) + Offset

Example

I.e.:	Offset	2050
	Gain Multiplier	3800
	Gain Divisor	3804

I.e.:	Value for 0V:	0 * 3800 / 3804 + 2050	= 2050
	Value for +10V:	+2000 * 3800 / 3804 + 2050	= 4048
	Value for –10V:	- 2000 * 3800 / 3804 + 2050	= 52