

CT-5102 2-channel encoder input /5VDC

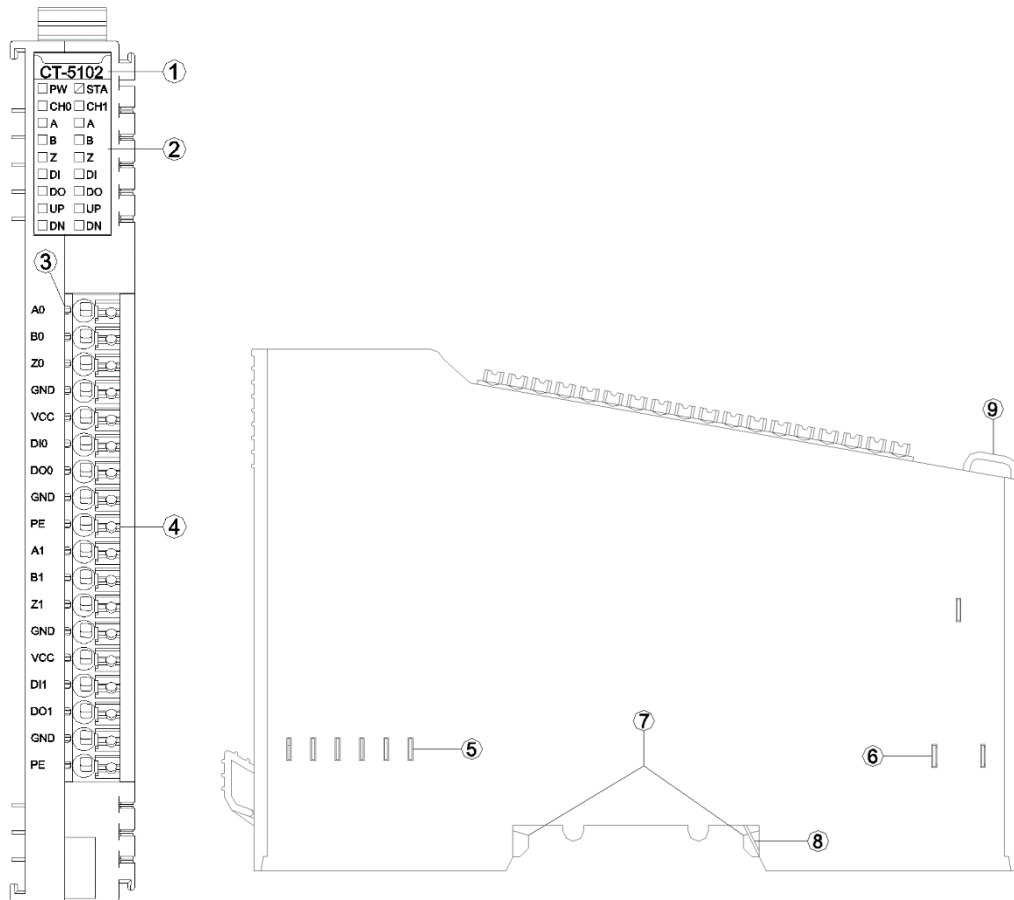
1 Module features

- ◆ the module supports two channels of encoder input.
- ◆ each encoder channel supports A/B incremental encoder or pulse-directional encoder input.
- ◆ each encoder channel supports orthogonal A/B signal input, input voltage 5V, and it supports source and sink input.
- ◆ the incremental encoder mode supports x1/ x2 / x4 frequency multiplication to be selectable.
- ◆ the pulse - direction mode supports nondirectional signal, pulse input only.
- ◆ each encoder channel supports 1 digital input signal with an input voltage of 5Vdc or 24Vdc.
- ◆ each encoder channel supports 1 digital output signal with an output voltage of 5Vdc.
- ◆ each encoder channel supports 1 way of 5V power output, which can be connected to the encoder for power supply.
- ◆ the module internal bus and field input adopt magnetic isolation.
- ◆ the module carries 16 LED indicators.
- ◆ the maximum input frequency of the encoder supported by the module is 1.5MHz.
- ◆ the module supports measurement function, it could detect the load speed or input signal frequency.

2 Technical parameters

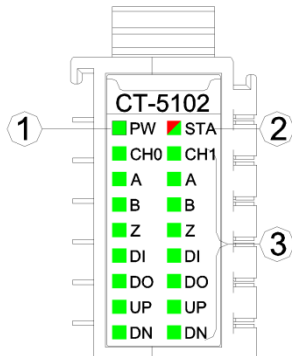
| General Parameters | |
|---------------------------------------|--|
| Power | Max.60mA@5.0Vdc |
| Isolation | I/O to internal bus: magnetic isolation (3KVRms) |
| Field Power | Nominal:24Vdc, Range:20-28Vdc |
| Wiring | Max.1.5mm ² (AWG 16) |
| Mounting Type | 35mm DIN-Rail |
| Size | 115*14*75mm |
| Weight | 65g |
| Environment Specification | |
| Operational Temperature | -40~85°C |
| Operational Humidity | 5%-95% (No Condensation) |
| Protection Class | IP20 |
| Input Parameters | |
| Channel Number | 2-channel encoder |
| LED Indicator | 16 channel input LED indicator |
| Encoder signal voltage range | ABZ input standard 5Vdc, range $\pm 10\%$ |
| Encoder input impedance | Internal pull-up or pull-down resistance 4.7K |
| Encoder filtering time | Could be set, the default value is 0.5 us |
| Encoder count frequency | <1.5MHz |
| Encoder frequency multiplication mode | x1/x2/x4 |
| Encoder measurement function | Load speed or input signal frequency measurement |
| DI turn-on voltage | Min.5Vdc to Max.28Vdc |
| DI turn-off voltage | Max.2.7Vdc |
| DI turn-on current | Max.5mA/channel@28V |
| DI input impedance | >10.0k Ω |
| DI input delay | OFF to ON: Max.3ms ON to OFF: Max.2ms |
| DO output voltage | 5V, range $\pm 10\%$ |
| DO output current | Max.500mA |
| DO output sink current | Max.5uA |

3 Hardware interfaces



- ① Module Type
- ② State indicator
- ③ Channel indicator
- ④ Wiring Terminal and identification
- ⑤ Internal Bus
- ⑥ Field Power
- ⑦ Buckle
- ⑧ Grounding Resilient Sheet
- ⑨ Fixed Wiring Harness

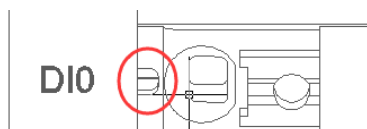
3.1 LED indicator definition



- ① Power LED indicator (green)
- ② Module State indicator LED (red/green)
- ③ Input channel indicator LED (green)

| PW Power State | Definition |
|--------------------------------|---|
| ON | Internal bus power supply normal |
| OFF | Internal bus power supply failure |
| STA Module State | Definition |
| Green slow flash (2.5 Hz) | Module internal bus is not started |
| Red slow flash (2.5 Hz) | Module internal bus offline |
| ON (GREEN) | Operation normal |
| Flash (2.5 Hz) (RED/GREEN) | updating mode |
| Flash (10 Hz) (RED/GREEN) | firmware update |
| Double Flash (RED) | Module exception has been soft-restarted |
| CH0 CH1 channel indicator LED | Definition |
| ON | Channel enable |
| A B Z Encoder signal indicator | Definition |
| ON | Input signal valid |
| OFF | Input signal invalid |
| DI input indicator | Definition |
| ON | Input signal high level |
| OFF | Input signal invalid |
| DO output indicator | Definition |
| ON | Output signal high level |
| OFF | Output signal invalid |
| UP indicator | Definition |
| ON | Encoder in positive rotation |
| OFF | Encoder is stationary or in contrarotation |
| DN indicator | Definition |
| ON | Encoder in contrarotation |
| OFF | Encoder is stationary or in positive rotation |

3.2 Field channel LED indicator (Green)



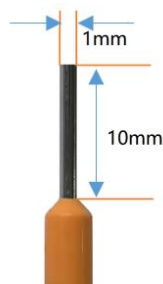
When the input signal of the input channel is valid, the corresponding field channel indicator is on (only the DI/DO/VCC wiring terminal of the encoder channel carries the indicator).

3.3 Terminal definition

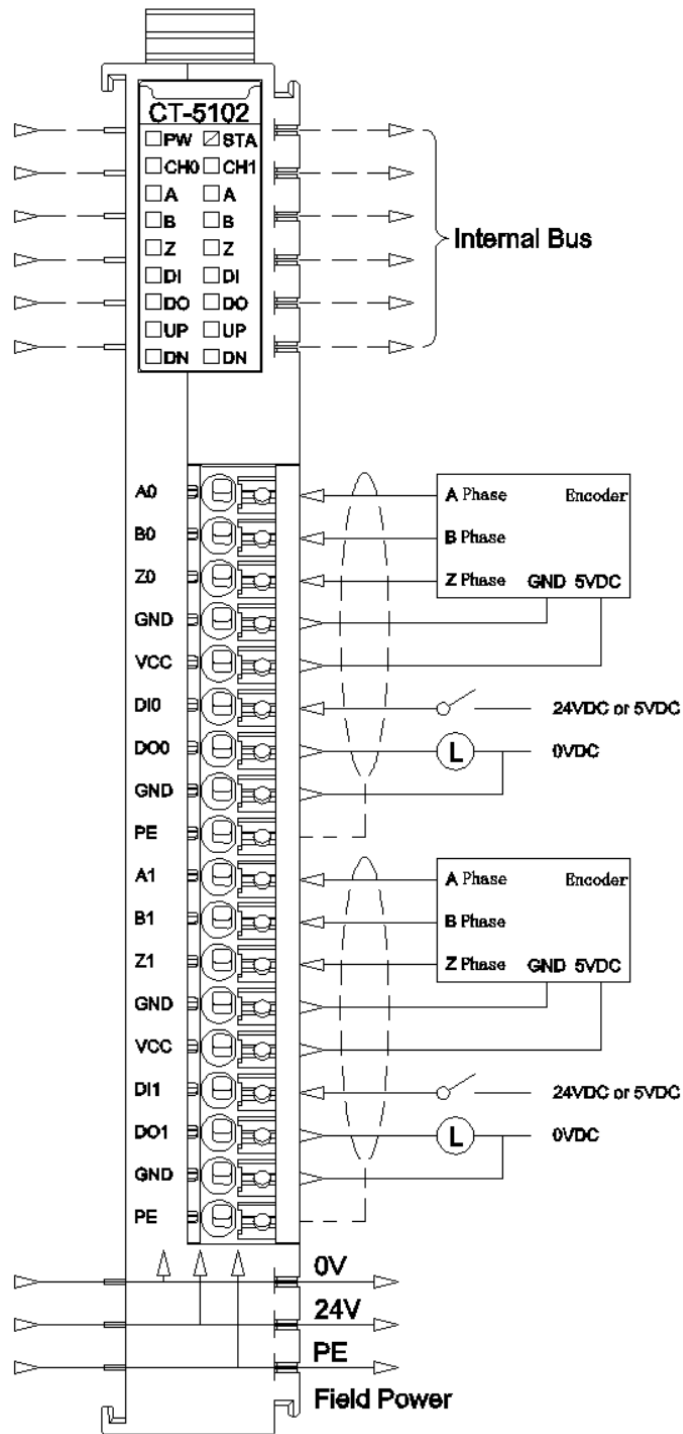
| Terminal Number | Symbol | Description |
|-----------------|--------|---------------------------|
| 1 | A0 | CH0 encoder phase A input |
| 2 | B0 | CH0 encoder phase B input |
| 3 | Z0 | CH0 encoder phase Z input |
| 4 | GND | Signal ground |
| 5 | VCC | 5V power output |
| 6 | DI0 | CH0 digital signal input |
| 7 | DO0 | CH0 digital signal output |
| 8 | GND | Signal ground |
| 9 | PE | Shield earthing |
| 10 | A1 | CH1 encoder phase A input |
| 11 | B1 | CH1 encoder phase B input |
| 12 | Z1 | CH1 encoder phase Z input |
| 13 | GND | Signal ground |
| 14 | VCC | 5V power output |
| 15 | DI1 | CH1 digital signal input |
| 16 | DO1 | CH1 digital signal output |
| 17 | GND | Signal ground |
| 18 | PE | Shield earthing |

It is recommended to use cables with cores smaller than 1mm ?

The cold-pressed terminal parameters are as follows:



4 Wiring



5 Process data definition

< 2 Analog Input (5V Encoder) > Submodule process data definition

| Input Data | | | | | | | | |
|-------------|---------------------|-----------------|------------------------|-----------------------|---------|--------|--------|--------|
| Bit No | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0 | Counter DOWN Ch#0 | Counter UP Ch#0 | Counter Underflow Ch#0 | Counter Overflow Ch#0 | DI Ch#0 | Z Ch#0 | B Ch#0 | A Ch#0 |
| Byte 1 | Reserved | | | | | | | |
| Byte 2 | Counter DOWN Ch#1 | Counter UP Ch#1 | Counter Underflow Ch#1 | Counter Overflow Ch#1 | DI Ch#1 | Z Ch#1 | B Ch#1 | A Ch#1 |
| Byte 3 | Reserved | | | | | | | |
| Byte 4 | Counter value Ch#0 | | | | | | | |
| Byte 5 | | | | | | | | |
| Byte 6 | | | | | | | | |
| Byte 7 | | | | | | | | |
| Byte 8 | Capture value Ch#0 | | | | | | | |
| Byte 9 | | | | | | | | |
| Byte 10 | | | | | | | | |
| Byte 11 | | | | | | | | |
| Byte 12 | Measurements 1 Ch#0 | | | | | | | |
| Byte 13 | | | | | | | | |
| Byte 14 | | | | | | | | |
| Byte 15 | | | | | | | | |
| Byte 16 | Measurements 2 Ch#0 | | | | | | | |
| Byte 17 | | | | | | | | |
| Byte 18 | | | | | | | | |
| Byte 19 | | | | | | | | |
| Byte 20 | Counter value Ch#1 | | | | | | | |
| Byte 21 | | | | | | | | |
| Byte 22 | | | | | | | | |
| Byte 23 | | | | | | | | |
| Byte 24 | Capture value Ch#1 | | | | | | | |
| Byte 25 | | | | | | | | |
| Byte 26 | | | | | | | | |
| Byte 27 | | | | | | | | |
| Byte 28 | Measurements 1 Ch#1 | | | | | | | |
| Byte 29 | | | | | | | | |
| Byte 30 | | | | | | | | |
| Byte 31 | | | | | | | | |
| Byte 32 | Measurements 2 Ch#1 | | | | | | | |
| Byte 33 | | | | | | | | |
| Byte 34 | | | | | | | | |
| Byte 35 | | | | | | | | |
| Output Data | | | | | | | | |
| Bit No | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |

| | | | | |
|---------|----------------------------|--------------------|-----------------------------------|------------|
| Byte 0 | Reserved | Flow Clear Ch#0 | Counter Set Trigger Ch#0 | DO Ch#0 |
| Byte 1 | Reserved | | | |
| Byte 2 | Reserved | Flow Clear Ch#1 | Counter Set Trigger Ch#1 | DO Ch#1 |
| Byte 3 | Reserved | | | |
| Byte 4 | Set Value for Counter Ch#0 | | | |
| Byte 5 | | | | |
| Byte 6 | | | | |
| Byte 7 | | | | |
| Byte 8 | Set Value for Counter Ch#1 | | | |
| Byte 9 | | | | |
| Byte 10 | | | | |
| Byte 11 | | | | |

Data Declaration:

Input data definition:

A/B/Z Ch#(0-1): The position is 1 when the corresponding channel A/B/Z input signal is valid, and 0 when the input is invalid.

DI Ch#(0-1): Digital input signal status.

Counter Overflow Ch#(0-1): Counter overflowed flag bit.

Counter Underflow Ch#(0-1): Counter underflows flag bit.

Counter UP: Encoder positive rotation, counter up counting sign.

Counter DOWN: Encoder contrarotation, counter down count flag.

Counter Value Ch#(0-1): Pulse count value, 32 - bit signed integer, automatically clear after overflow.

Capture value Ch#(0-1): Pulse capture value, 32-bit signed integer, and when DI is set to capture, the pulse count value will be captured to the capture value at the selected edge.

Measurements 1 Ch#(0-1): Measurement value 1, the measurement value will be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Measurements 2 Ch#(0-1): Measurement value 2, the measurement value will

be output according to the measurement value type selected by the user (view the configuration parameter section of the module for optional measurement value)

Output data definition:

DO Ch#(0-1): Digital output channel control.

Counter Set Trigger CH#(0-1): Counter set trigger bit, rising edge trigger counter set, the output value **Set Value for Counter** will be updated to **Counter Value**, this function can be used to set the initial value of the counter.

Flow Clear CH#(0-1): Overflow clear bit, the rising edge can clear the input **Counter Overflow** and **Counter Underflow** flag bits.

Set Value for Counter Ch#(0-1): Counter set value.

6 Configuration parameters definition

<2 Analog Input(5V Encoder)> Submodule configuration parameter definition

| Configuration Parameter | | | | | | | | |
|---------------------------|--------------------------------|--------------------------|-------|---------------------|--------------------------|--------------------------------|----------------------------|-------|
| Bit No | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| Byte 0 | Reserved | | | | | 16Bit Data Format | 32Bit Data Format | |
| Byte 1 | Reserved | | | | | Work Mode Ch#0 | | |
| Byte 2 | Reserved | | | | | Frequency Multiplication Ch#0 | | |
| Byte 3 | Reserved | | | Filtering Time Ch#0 | | | | |
| Byte 4 | Reserved | | | | | | Counter Storage Ch#0 | |
| Byte 5 | Reserved | | | | | Encode Output Signal Type Ch#0 | | |
| Byte 6 | Reserved | | | | | | DI Function Selection Ch#0 | |
| Byte 7 | Reserved | | | | | Capture Mode Ch#0 | | |
| Byte 8 ... Byte 17 | Reserved | | | | | | | |
| Byte 18 | Reserved | | | | | Speed Measurement Time Ch#0 | | |
| Byte 19 | Reserved | Measurements 2 Type Ch#0 | | | Measurements 1 Type Ch#0 | | | |
| Byte 20 | Encoder Resolution Ch#0 | | | | | | | |
| Byte 21 | | | | | | | | |
| Byte 22 | Transmission Ratio Active Ch#0 | | | | | | | |
| Byte 23 | | | | | | | | |
| Byte 24 | Transmission Ratio Slave Ch#0 | | | | | | | |
| Byte 25 | | | | | | | | |
| Byte 26 ... Byte 33 | Reserved | | | | | | | |
| Byte 34 | Reserved | | | | | Work Mode Ch#1 | | |
| Byte 35 | Reserved | | | | | Frequency Multiplication Ch#1 | | |
| Byte 36 | Reserved | | | Filtering Time Ch#1 | | | | |
| Byte 37 | Reserved | | | | | | Counter Storage Ch#1 | |
| Byte 38 | Reserved | | | | | Encode Output Signal Type | | |

| | | | |
|---------------------------|--------------------------------|--------------------------|-----------------------------|
| | | Ch#1 | |
| Byte 39 | Reserved | | DI Function Selection Ch#1 |
| Byte 40 | Reserved | | Capture Mode Ch#1 |
| Byte 41 ... Byte 50 | Reserved | | |
| Byte 51 | Reserved | | Speed Measurement Time Ch#1 |
| Byte 52 | Reserved | Measurements 2 Type Ch#1 | Measurements 1 Type Ch#1 |
| Byte 53 | Encoder Resolution Ch#1 | | |
| Byte 54 | | | |
| Byte 55 | Transmission Ratio Active Ch#1 | | |
| Byte 56 | | | |
| Byte 57 | Transmission Ratio Slave Ch#1 | | |
| Byte 58 | | | |
| Byte 59 ... Byte 66 | Reserved | | |

Data Declaration:

16Bit Data Format: Byte transfer order of channel state. (Default: 0)

0: A-B

1: B-A

32Bit Data Format: The byte transfer order of a channel count value. (Default: 0)

0: AB-CD

1: BA-DC

2: CD-AB

3: DC-BA

Work Mode Ch#(0-1): Working mode of encoder. (Default: 0)

0: Incremental encoder mode.

1: Count direction mode.

2: Count up mode.

3: Count down mode.

Frequency Multiplication Ch#(0-1) : Frequency multiplication number (available only in incremental encoder mode), according to this mode it could output

pulse count value. (Default: 2)

- 0: frequency multiplication 1
- 1: frequency multiplication 2
- 2: frequency multiplication 4

Filtering Time Ch#(0-1): Encoder input filter time (default: 5)

- 0: no filter
- 1: 0.1uS
- ...
- 5: 0.5 uS
- ...
- 31: 3.1 uS

Counter Storage Ch#(0-1): Enable storage. When the storage function is enabled, the IO module will save the count value to the non-volatile memory in real time, and load the last saved count value at the next power-on. (Default: 1)

- 0: Disable
- 1: Enable

Encoder Output Signal Type Ch#(0-1): Encoder output type (default: 0)

- 0: Source
- 1: Sink
- 2: Push-pull

DI Function Selection Ch#(0-1): DI function selection (Default: 0)

- 0: Normal DI function
- 1: Pulse capture function

Capture Mode Ch#(0-1): Capture mode (default: 0)

- 0: Rising edge capture
- 1: Falling edge capture
- 2: Double edge capture

Speed Measurement Time Ch#(0-1): Speed measurement period (Default: 6)

- 0: 10mS
- 1: 20mS
- 2: 50mS
- 3: 100mS
- 4: 200mS
- 5: 500mS
- 6: 1000mS
- 7: 2000mS

Measurements 1 Type Ch#(0-1): Measurement value 1 Type selection (default: 0)

- 0: No measurements
- 1: Measuring speed (min/rotation)
- 2: Measuring frequency

Measurements 2 Type Ch#(0-1): Measurement value 2 Type selection (default: 0)

- 0: No measurements
- 1: Measuring speed (min/ rotation)
- 2: Measuring frequency

Encoder Resolution Ch#(0-1): Encoder resolution (default: 1)

Value range: 1-65535

Transmission Ratio Active Ch#(0-1): 1) Transmission ratio (main) (Default: 1)

Value range: 1-65535

Transmission Ratio Slave Ch#(0-1): Transmission ratio (main) (Default: 1)

Value range: 1-65535

A Dimension drawing

