SECTION 1
Features and Slave Units

This section introduces the CompoNet Slave Units and the various models that are available.

1-1 Features of CompoNet Slave Units

1-1-1 Overview

CompoNet Slave Units do not simply input and output ON/OFF signals, they can also collect a variety of information that can improve equipment operating rates.

They can also be used to create maintenance systems separate from control systems. Coexisting control and maintenance systems can contribute to reducing equipment startup time, reduced recovery time after problems, and to preventative maintenance of equipment.

■ **Control System:**

The default setting for remote I/O communications with the PLC is for real I/O to be allocated for each node address. In addition, Slave Unit status information other than real I/O is allocated in the Master Unit's input area (set using the CompoNet Support Software or explicit messages).

■ **Maintenance System:**

All kinds of equipment data can be read from and written to a Slave Unit's memory using the CompoNet Support Software. The equipment data can also be read and written by sending explicit messages from the Master Unit (i.e., from the CPU Unit of the PLC) to the Slave Unit.

1-1-2 Features of CompoNet Slave Units

CompoNet Slave Units have the following features.

Features Common to All Slave Units

Rotary Switch Setting of Node Addresses
Node addresses can now be set more easily using rotary switches.

Automatic Baud Rate Detection
It is not necessary to set the baud rate. The baud rate is automatically set to the same baud rate as the Master Unit.

Network Power Voltage Monitoring
The network power supply voltage (present, maximum, and minimum values) can be stored in the Slave Unit memory. These values can be read using the CompoNet Support Software. A monitor voltage can also be set in the Slave Unit to enable obtaining notification of the status if the voltage drops to the monitor value.

Unit ON Time Monitor
The total ON time of the Slave Unit's internal circuit power supply can be recorded. This value can be read using the CompoNet Support Software or explicit messages. A value can also be set in the Slave Unit to enable obtaining notification of the status if the total time reaches a set monitor value.

Unit Comments
The user can set any name for each Unit. The names are recorded in Slave Unit memory.

Connected Device Comments
Any name can be set for each I/O contact (e.g., sensor or valve) connected to a Slave Unit. The names are recorded in Slave Unit memory.

Communications Error Log Monitor
The previous four error log records (communications error codes and the power voltage when the error occurred) can be held in the Slave Unit memory and can be read using the CompoNet Support Software.

Last Maintenance Date (Maintenance Function)
The date maintenance was performed can be written to Slave Unit memory. This maintenance date can be written using the CompoNet Support Software.

Features of Digital I/O Slave Units and Bit Slave Units

I/O Power Status Monitor

The I/O power monitor function checks if the I/O power is ON or not, and notifies the status. (This data can be read using the CompoNet Support Software or by explicit messages.)

Input Filters

Input values can be read more than once during the set time interval to eliminate data omissions due to noise and switch chattering.

An ON delay or OFF delay can also be implemented using this function.

Prevention of Errors Due to Inrush Current at I/O Power-up

This function holds inputs from when the power is turned ON until the Unit stabilizes, i.e., inputs are not received while the I/O power is OFF and for 100 ms after the I/O power is turned ON. This means input errors caused by inrush current when the I/O power is turned ON can be eliminated.

Contact Operations Monitor

The number of times each input contact or output contact is turned ON can be counted (resolution: 50 Hz max.) and recorded. These values can be read using the CompoNet Support Software or explicit messages. A value can also be set in the Slave Unit to enable obtaining notification of the status if the number of contact operations reaches the set value.

Note The contact operations monitor function and the total ON time monitor function cannot both be used for the same contact at the same time.

Total ON Time Monitor

The cumulative times that sensors, relays, and other connected devices are ON are recorded in the Slave Unit memory. These values can be read using the CompoNet Support Software or explicit messages. A value can also be set in the Slave Unit to enable obtaining notification of the status if the total time reaches the set value.

Note The total ON time monitor function and the contact operations monitor function cannot both be used for the same contact at the same time.

Run Time Monitor

The Slave Unit can quickly measure the time from when an output turns ON until an input turns ON without relying on the ladder program. A time can be set in the Slave Unit memory to enable obtaining notification of the status when the measured time exceeds the set time. (This data can be read using the CompoNet Support Software or by explicit messages.)

Error Output Value Setting (Output Units Only)

The output value when a communications error occurs can be set for each bit of an Output Unit.

Features Unique to Bit Slave Units

Bit-level Distribution

Units are available with 2 inputs, 2 outputs, 4 inputs, 2 inputs/2 outputs. This enables bit-level distribution with Slave Units. At the same time, unused Slave Unit I/O can be suppressed.

Industry Standard e-CON Connectors

Industry-standard e-CON connectors are used so no special tools are required for connections. Power lines do not need to be stripped and are simply inserted with pliers. Connections are compatible with e-CON connectors from any manufacturer.

Units with Clamp Terminal Blocks (CRT1B-MD04SLP (-1))

Using Units with screw-less clamp terminal blocks means that screws do not need to be tightened. Connections are made simply by inserting the ferrules. Wiring can be completed in one step.

IP54 Dust-tight, Splash-proof Units

The CRT1B-□D□□SP(-1) Units conform to the IEC IP54 dust-tight, splash-proof degree of protection (see note). These Units can be used outside of control panels in environments subject to dust and water splashes.

Note The degree of protection is a protection rating against ingress by people, solid matter, and water.
For protection against ingress of people and solid matter, the IEC standard IP54 stipulates that dust particles in quantities sufficient to affect operation cannot penetrate inside the device. For protection against ingress of water, the standard stipulates that the protection is such that any water splashing on the device from any direction will not have a harmful effect on the device.

Flat Cable Connected as a Standard Features

Bit Slave Units are sold with Standard or Sheathed Flat Cable already connected. Bit Slaves cannot be used, however, for a baud rate of 4 Mbit/s (no branch lines).

No I/O Power Supply Wiring Required

The current consumption for external I/O (sensors or actuators) connected to Bit Slaves using e-CON or clamp terminals is supplied through the Flat Cable. No separate wiring is required for I/O power supply.

Sensor Power Supply Short-circuit Detection

The I/O power current is monitored and a sensor power supply short-circuit is detected if a current equal to or greater than the specified value is supplied. The sensor power output is forced OFF if an excessive current is detected.

External Load Short-circuit Detection

The output load current is monitored and an external load short-circuit is detected if a current equal to or greater than a set current is supplied to the Output Unit. The output is forced OFF to prevent damage to the Unit's output circuit.

Features Unique to Digital I/O Slave Units

Removable Terminal Block

The terminal block can be removed.

Expansion I/O Units

One Expansion Unit can be added to each Basic Unit. This means that a variety of I/O combinations are possible, e.g., 16 inputs and 8 outputs or 24 inputs (16 inputs + 8 inputs). This extends the range of possible system configurations.

Features of Analog I/O Slave Units

AD Conversion Points Setting (Input Units Only)

The conversion cycle is 4 ms max. when using all 4 analog inputs. The AD conversion cycle can be made faster if fewer points (i.e., AD conversion points) are used.

Moving Average (Input Units Only)

Analog Input Terminals can calculate the average of the last 8 inputs (moving average) and use it as the converted digital data. Smooth input values can be obtained by averaging the inputs if there are small fluctuations in the input.

Scaling

Converted data can be scaled to any value by the user. Ladder program calculations for the Master Unit are not required if the scaling function is used with the Slave Unit. The offset compensation function can also be used to offset scaled values.

Peak/Bottom Hold (Input Units Only)

The peak/bottom hold function holds the maximum (peak) or the minimum (bottom) value input to the Analog Input Terminal. The maximum (peak) and minimum (bottom) value can be compared with an alarm set value and used as status data to turn ON alarm flags (comparator function).

Top/Valley Hold (Input Units Only)

The top/valley hold function holds the top or valley value input to the Analog Input Terminal. The Top/Valley Detection Timing Flag can be used to check when top and valley values were detected. The top and valley values can be compared with an alarm set value and used as status data to turn ON alarm flags (comparator function).

Rate-of-change Calculations (Input Units Only)

The rate-of-change calculation function can find the rate of change for the set data sampling cycle for the values input to the Analog Input Terminal.

Comparison (Input Units Only)

The inputs to analog input terminals or calculated data can be compared with alarm settings (upper upper limit, upper limit, lower limit, and lower lower limit) and the result stored in the Analog Status Flags. The Normal Flag (pass signal) turns ON for values outside the set range.

Disconnected Line Detection (Input Units Only)

With Analog Input Terminals, the Master Unit can use the Disconnection Line Detection Flag for each channel to check whether the analog input lines (for voltage inputs or current inputs) are disconnected for channels enabled for analog inputs under the AD conversion points setting. This function is enabled only if the input range is 1 to 5 V or 4 to 20 mA.

For Temperature Input Terminals, this function checks for disconnection of connected sensor inputs at each contact. Any disconnected inputs can be checked from the Master Unit using the Disconnected Line Detection Flags.

User Calibration

The user calibration function can be used to compensate offsets in input (or output) values that occur due to the features of or connection method used for input or output devices to adjust the input (or output). The conversion line is compensated at two points: 0% and 100%.

Integral

The integral function calculates the time integral of input (or output) analog values and reads the cumulative value.

Monitor values can be set in Units. If the integral value exceeds the set monitor value, the Integral Monitor Flag in general status turns ON.

Error Output Value Setting (Output Units Only)

The output value when a communications error occurs can be set for each word for Output Units.

1-2 Slave Unit Models

CompoNet Slave Units can be classified into the following groups.

Word Slave Units

Word Slave Units are Slave Units that are allocated units of 16 bits (i.e., 1 word) in I/O memory of the CPU Unit.

Digital I/O Slave Units: Slave Units with digital I/O functions that use Flat Cable (either Standard or Sheathed) or VCTF 2-conductor cable.

Analog I/O Slave Units: Slave Units with analog I/O functions that use Flat Cable (either Standard or Sheathed) or VCTF 2-conductor cable.

IP20 and IP54 Bit Slave Units

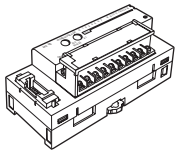
Bit Slave Units are Slave Units that are allocated units of 2 bits in I/O memory of the CPU Unit.

Bit Slave Units provide 2 or 4 digital contact I/O points and have Standard or Sheathed Flat Cable already connected.

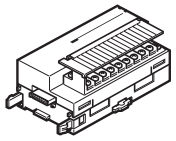
1-2-1 Word Slave Units

Digital I/O Slave Units

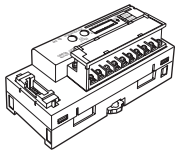
Basic Units

Appearance	I/O capacity	Model	Features
	16 inputs (NPN)	CRT1-ID16	Terminal blocks mounted with screws.
	16 inputs (PNP)	CRT1-ID16-1	
	16 outputs (NPN)	CRT1-OD16	
	16 outputs (PNP)	CRT1-OD16-1	

Expansion Units

Appearance	I/O capacity	Model	Features
	8 inputs (NPN)	XWT-ID08	Expansion Units expand the number of points for a Basic Unit. One Expansion Unit can be added to each Basic Unit.
	8 inputs (PNP)	XWT-ID08-1	
	8 outputs (NPN)	XWT-OD08	
	8 outputs (PNP)	XWT-OD08-1	
	16 inputs (NPN)	XWT-ID16	
	16 inputs (PNP)	XWT-ID16-1	
	16 outputs (NPN)	XWT-OD16	
	16 outputs (PNP)	XWT-OD16-1	

Analog I/O Slave Units

Appearance	I/O capacity	Model	Features
	4 analog inputs	CRT1-AD04	0 to 5 V, 1 to 5 V, 0 to 10 V, -10 to 10 V, 0 to 20 mA, 4 to 20 mA
	2 analog outputs	CRT1-DA02	

1-2-2 Bit Slave Units

IP20 Bit Slave Units

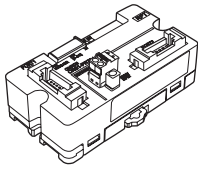
Appearance	I/O capacity	Connectors	Degree of protection	Model	Features
	2 inputs (NPN)	Industrial standard connectors (e-CON)	IP20 indoor enclosure	CRT1B-ID02S	• Flat Cable connected as standard feature • Industrial standard connectors (e-CON)
	2 inputs (PNP)			CRT1B-ID02S-1	
	2 outputs (NPN)			CRT1B-OD02S	
	2 outputs (PNP)			CRT1B-OD02S-1	

IP54 Bit Slave Units

Appearance	I/O capacity	Connectors	Degree of protection	Model	Features
	2 inputs (NPN)	Industrial standard connectors (e-CON)	IP54 dust-tight/splash-proof	CRT1B-ID02SP	• Flat Cable connected as standard feature • Industrial standard connectors (e-CON)
	2 inputs (PNP)			CRT1B-ID02SP-1	
	2 outputs (NPN)			CRT1B-OD02SP	
	2 outputs (PNP)			CRT1B-OD02SP-1	
	4 inputs (NPN)			CRT1B-ID04SP	
	4 inputs (PNP)			CRT1B-ID04SP-1	
	2 inputs/2 outputs (NPN)	Clamp terminal block		CRT1B-MD04SLP	• Flat Cable connected as standard feature • Clamp Terminal Block
	2 inputs/2 outputs (PNP)			CRT1B-MD04SLP-1	

Note Bit Slaves have Standard or Sheathed Flat Cable connected as standard feature. They cannot be at a baud rate of 4 Mbit/s, for which branch lines are not supported.

1-2-3 Repeater Units

Appearance	Specifications	Model	Features
	Two communications connectors (Upstream port and downstream port) One downstream port power supply connector Up to 64 Units can be connected for each Master Unit.	CRS1-RPT01	• For main line-branch line formations, secondary main lines can be connected under a Repeater Unit just like they can be under the Master Unit. • For unrestricted branching formations, there are no restrictions on the connections. • Repeater Units enable branching the main line, adding more nodes, increasing the connection distance, and changing the type of cable upstream and downstream of the Repeater Unit.

1-2-4 CompoNet Slave Functions

❍: Enabled, Blank: Not enabled

Function \ Type	CompoNet Slave Units						
	Digital I/O Slave Units		Bit Slave Units			Analog I/O Slave Units	
	Input Units	Output Units	Input Units	Output Units	I/O Units	Input Units	Output Units
Run Time Monitor	❍					---	
Contact Operations Monitor	❍					---	
Total ON Time Monitor	❍					---	
Automatic Baud Rate Detection	❍						
Unit ON Time Monitor	❍						
Unit Comment	❍						
Connected Device Comment	❍						
Network Power Voltage Monitor	❍						
I/O Power Status Monitor	❍					---	
Communications Error Log Monitor	❍						
Input Filters	❍	---	❍	---	❍	---	
Output Hold/Clear Setting	---	❍	---	❍		---	❍
Prevention of Errors Due to Inrush Current at Power-up	❍	---	❍	---	❍	---	---
Sensor Power Supply Short-circuit Detection	---		❍	---	❍	---	
External Load Short-circuit Detection	---			❍		---	
Expansion I/O Units	❍		---				
Scaling	---					❍	
Last Maintenance Date	❍						
Integral	---					❍	
Moving Average	---					❍	---
AD Conversion Points (Conversion Cycle) Setting	---					❍	---
Rate-of-change Calculation	---					❍	---
Comparison	---					❍	---
Peak/Bottom Hold	---					❍	---
Top/Valley Hold	---					❍	---
Disconnected Line Detection	---					❍	---
User Calibration	---					❍	❍

Note The Contact Operations Monitor Function and the Total ON Time Monitor Function cannot be used at the same time for the same contact.

1-2-5 Slave Unit Installation and Wiring Methods

Installing Slave Units

Refer to the following table for the installation and wiring methods for the Slave Units.

Slave Unit Installation and Wiring Methods

Name		Model	Slave Unitinstallation	I/O wiring method	Internal power	External power
Digital I/O Slave Units		CRT1-ID16(-1)	DIN Track	M3 terminal block	Supplied along with communications power	An external power supply is required for I/O.
		CRT1-OD16(-1)				
Digital I/O Slave Units Expansion Units		XWT-ID16(-1)				Refer to following table.
		XWT-OD16(-1)				
		XWT-ID08(-1)				
		XWT-OD08(-1)				
Bit Slave Units	IP20 Bit Slave Units	CRT1B-ID02(-1)	Screw installation	Industrial standard connector (e-CON)		Supplied along with communications power (See note 1.)
		CRT1B-OD02(-1)				
	IP54 Bit Slave Units	CRT1B-ID02SP(-1)				
		CRT1B-OD02SP(-1)				
		CRT1B-ID04SP(-1)				
		CRT1B-MD04SLP(-1)		Clamp Terminal Block		
Analog I/O Slave Units		CRT1-AD04	DIN Track	M3 terminal block		---
		CRT1-DA02				
Repeater Units		CRS1-RPT01	DIN Track or screw installation	---		Communications power for the downstream line must be supplied from the communications power supply connector.

Note

(1) For Bit Slave Units, the external I/O (sensor and actuator) consumption current is also provided through the Flat Cable from the communications power supply connected to the Master Unit or the Repeater Unit. When calculating the output current of the communications power supply, always include the external I/O current consumption for Bit Slave Units.

(2) Supply I/O power to Expansion Slave Units according to the following table.

Combination	I/O power supply to Expansion Slave Unit
Basic Input Unit with Expansion Input Unit Example: CRT1-ID16 + XWT-ID16 (or XWT-ID08)	Not required (Expansion Slave Unit uses the same I/O power supply as the Basic Slave Unit.)
Basic Input Unit with Expansion Output Unit Example: CRT1-ID16 + XWT-OD16 (or XWT-OD08)	Required (I/O power must be supplied to both Units.)
Basic Output Unit with Expansion Input Unit Example: CRT1-OD16 + XWT-ID16 (or XWT-ID08)	Required (I/O power must be supplied to both Units.)
Basic Output Unit with Expansion Output Unit Example: CRT1-OD16 + XWT-OD16 (or XWT-OD08)	Required (I/O power must be supplied to both Units.)

SECTION 2
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2-2 Header text here

Note

Note (1)
(2)
(3)

1,2,3... 1.

Note (a)
(b)

2.

Note

3.

a.
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SECTION 3
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Note

Note (1)
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SECTION 4
Basic Specifications of Slave Units

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4-1 Basic Specifications of Slave Units

4-1-1 Communications Specifications

Item	Specification
Communications protocol	Special CompoNet Network protocol
Types of communications	Remote I/O communications (programless, constant sharing of data with Slave Units) and message communications (explicit message communications as required with Slave Units and FINS message communications as required with PLCs)
Baud rate	4 Mbits/s, 3 Mbits/s, 1.5 Mbits/s, 93.75 kbits/s
Modulation	Base-band
Coding	Manchester code
Error control	Manchester code rules, CRC
Communications media	The following media can be used. • VCTF 2-conductor cable (JIS C 3306, 2-conductor) • Standard Flat Cable (DCA4-4F10) • Sheathed Flat Cable (DCA5-4F10) **Note** VCTF 2-conductor cable, Standard Flat Cable, and Sheathed Flat Cable are all different types of cable. To use more than one type of cable, they must be separated on the main line and a secondary main line or on different secondary main lines.
Communications distance and wiring	Refer to ntlp Cable Types, Baud Rates, and Maximum Distances given later in this manual.
Connectable Master Units	CompoNet Master Units
Connectable Slave Units	CompoNet Slave Units
Maximum I/O capacity	Word Slave Units: 1,024 input and 1,024 outputs (2,048 I/O points total) Bit Slave Units: 256 inputs and 256 outputs (512 I/O points total)
Maximum number of nodes	Word Slave Units: 64 input nodes and 64 output nodes Bit Slave Units: 128 input nodes and 128 output nodes Repeater Units: 64 nodes
Bits allocated per node address	Word Slave Units: 16 bits Bit Slave Units: 2 bits
Maximum number of nodes without Repeater Units (one main line or secondary main line)	32 nodes
Applicable node addresses	Word Slave Units: IN0 to IN63 and OUT0 to OUT63 Bit Slave Units: IN0 to IN127 and OUT0 to OUT127 Repeater Units: 0 to 63
Repeater Unit application conditions	Up two 64 Repeater Units can be connected per network.When Repeater Units are connected in series from the Master Unit, up to two extra segment layers can be created (i.e., up to 2 Repeater Units are allowed between a Slave Unit and the Master Unit).
Signal lines	Two lines: BDH (communications data high) and BDL (communications data low)
Power lines	Two lines: BS+ and BS- (power for communications and internal Slave Unit circuits) • Power is supplied from the Master Unit and Repeater Units.
Connection forms	Flat Cable at baud rate of 93.75 kbits/s: No restrictions Other cables or baud rates: Main line and branch lines
	Connections for Slave Units and Repeater Units: T-branch or multidrop connections

4-1-2 Performance Specifications

Item	Specification
Communications power supply voltage	14 to 26.4 VDC
I/O power supply voltage	20.4 to 26.4 VDC (24 VDC –15%/+10%)
Noise immunity	Conforms to IEC 61000-4-4 2kV (power line)
Vibration resistance	10 to 150 Hz with double-amplitude of 0.7 or 50 m/s^2
Shock resistance	150 m/s^2
Dielectric strength	500 VAC (between isolated circuits)
Insulation resistance	20 MΩ min. (between isolated circuits)
Ambient operating temperature	–10 to 55°C
Ambient operating humidity	25% to 85% (with no condensation)
Ambient operating atmosphere	No corrosive gases
Storage humidity	–25 to 65°C
Storage humidity	25% to 85% (with no condensation)
Installation	Bit Slave Units: Secured with M4 screws Other Units: 35-mm DIN Track

4-1-3 Communications Indicators

The communications indicators have the following meanings.

MS (Module Status): Indicates the status of the node with a two-color LED (green/red).

MS (Module Status): Indicates the status of communications with a two-color LED (green/red).

Name	Indicator status	Node/communications status	Meaning
MS	Lit green.	Normal status	The Unit is operating normally.
	Lit red.	Fatal error	A hardware error has occurred in the Unit. The watchdog timer has timed-out.
	Flashing red.	Non-fatal error	There is an error in the settings.
	Not lit.	Power OFF/Startup	The power supply is OFF, the Unit is being reset, or the Unit is being initialized.
NS	Lit green.	Online and participating	Normal communications are in progress and the node is participating in the network.
	Flashing green.	Online but no participating	Normal communications are in progress bit the node is not yet participating in the network.
	Lit red.	Fatal communications error	The same address has been set for more than one node.
	Flashing red.	Non-fatal communications error	Polling has timed out. The network has timed out.
	Not lit.	Power OFF/Startup	The power supply is OFF, the Unit is being reset, or the Unit is being initialized.

Note When flashing, indicators are lit for 0.5 s and not lit for 0.5 s.

SECTION 5
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5-1 ntlp

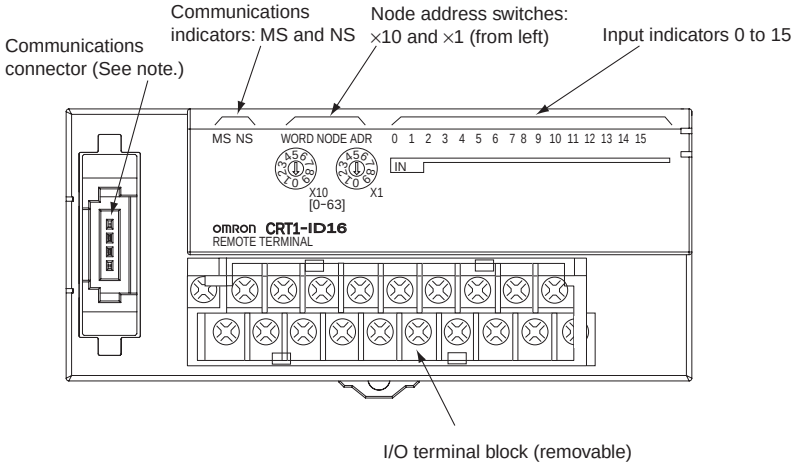
5-2 Basic Units

5-2-1 16-point DC Input Units (CRT1-ID16/CRT1-ID16-1)

Input Section Specifications

Item	Specification	
Model	CRT1-ID16	CRT1-ID16-1
I/O capacity	16 inputs	
Internal I/O common	NPN	PNP
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	At 24 VDC: 6.0 mA max./input At 17 VDC: 3.0 mA max./input	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 inputs/common	
Isolation method	Photocoupler	
Input indicator	LED (yellow)	
Installation	DIN Track	
Power supply type	Multi-power supply	
Communications power supply current consumption	80 mA max.	
Weight	141 g max.	

Component Names and Functions



Note A Branch Line Pressure-welded Connector or Terminal Block Adapter (DCN4-TB4) can be connected to the communications connector.

Indicator Section

Communications Indicators Refer to *SECTION 4 Basic Specifications of Slave Units*.

I/O Indicators

The meanings of the I/O indicators are given in the following table.

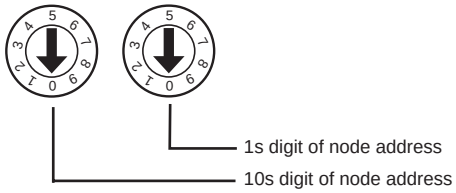
Name	LED status	I/O status	Meaning
0 to 15	Lit yellow.	Input ON	The input is ON.
	Not lit.	Input OFF	The input is OFF.

Setting the Node Address

The node address is set as a decimal number with the 10s digit set on the left rotary switch and the 1s digit set on the right rotary switch. (The maximum node address is 63.)

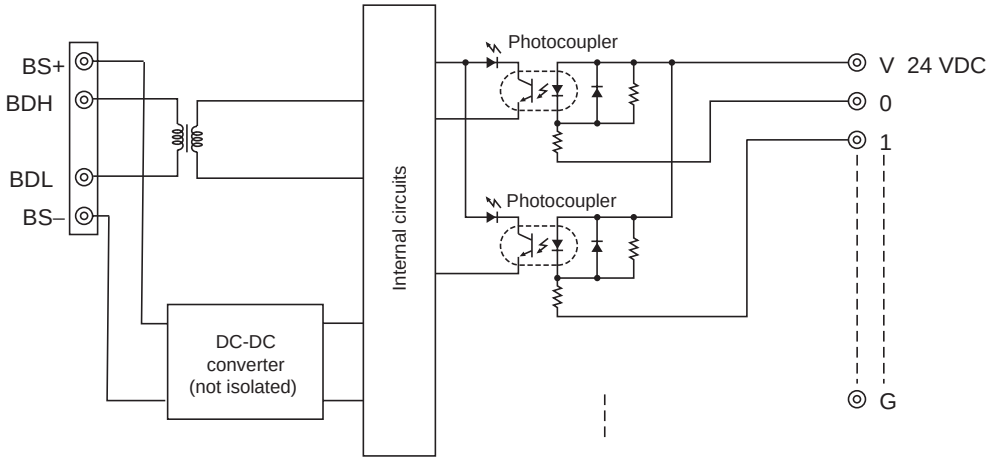
If an illegal address is set, the software setting (default: 0) will be used at start-up.

The setting on the rotary switches is read when power is turned ON.

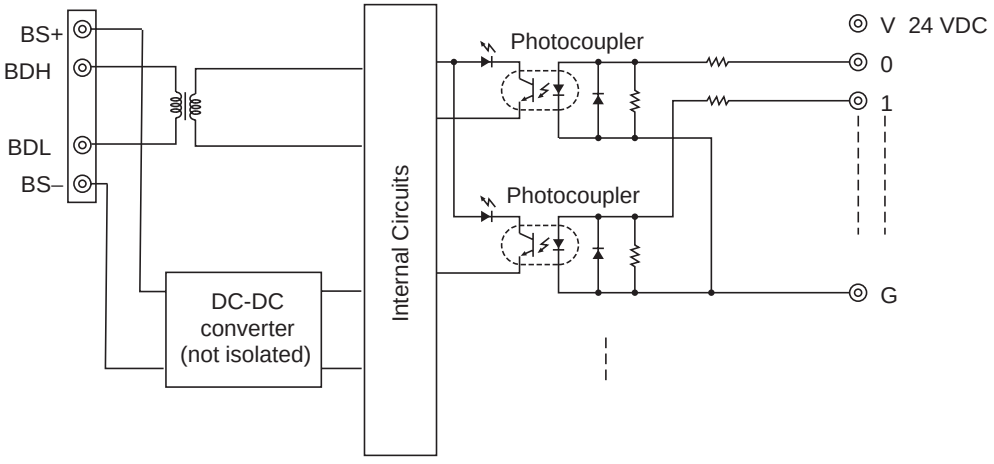


Internal Circuits

CRT1-ID16 (NPN)

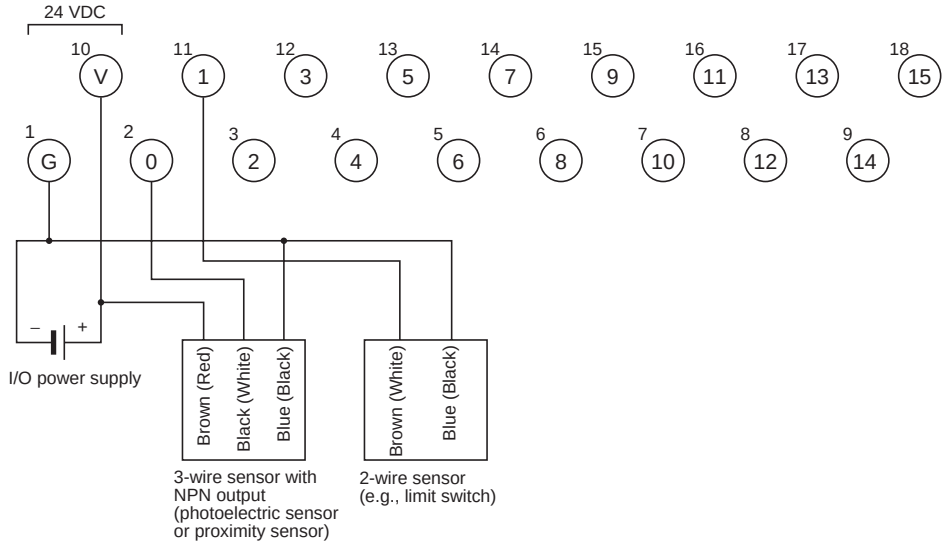


CRT1-ID16-1 (PNP)

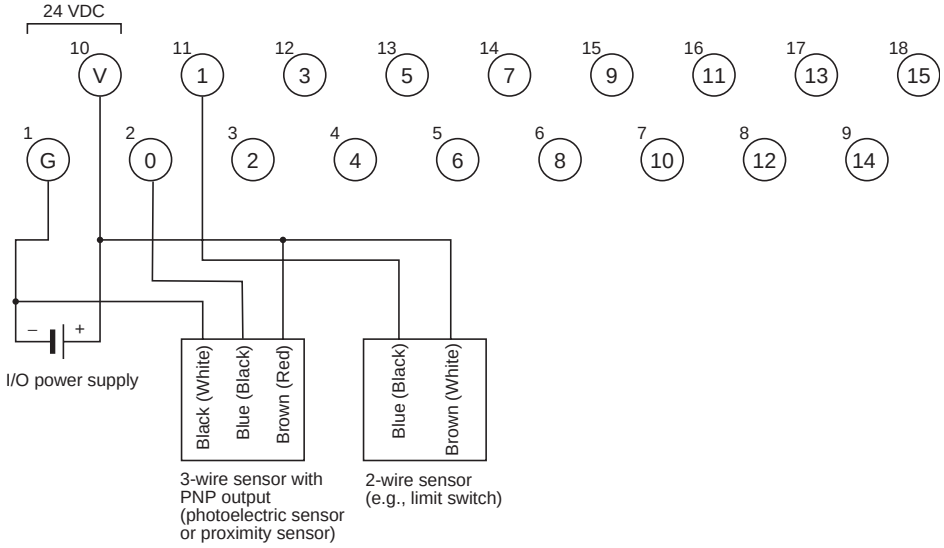


Wiring

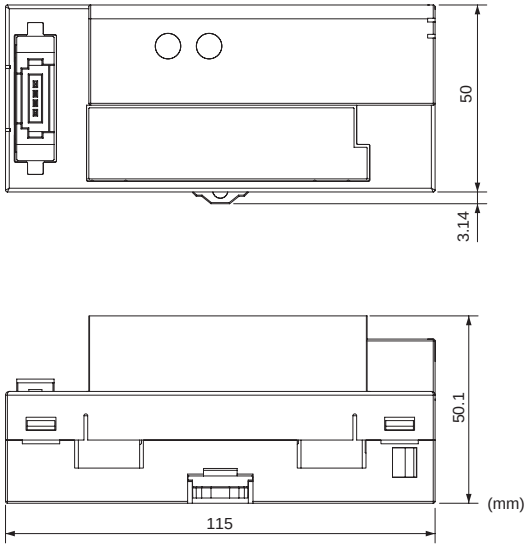
CRT1-ID16 (NPN)



CRT1-ID16-1 (PNP)



Dimensions (Same for CRT1-ID16 and CRT1-ID16-1)

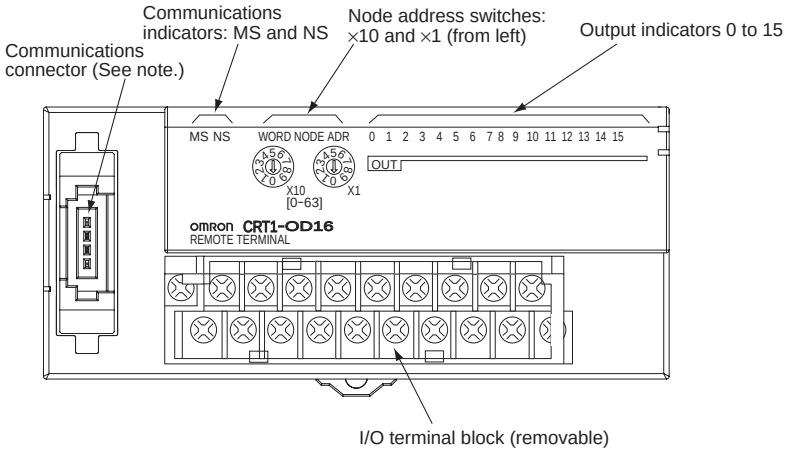


5-2-2 16-point Transistor Output Units (CRT1-OD16/CRT1-OD16-1)

Output Section Specifications

Item	Specification	
Model	CRT1-OD16	CRT1-OD16-1
I/O capacity	16 outputs	
Internal I/O common	NPN	PNP
Rated output current	0.5 A/output, 4 A/common	
Residual voltage	1.2 V max.(0.5 A DC, between each output terminal and the G terminal)	1.2 V max.(0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 outputs/common	
Isolation method	Photocoupler	
Output indicators	LED (yellow)	
Installation	DIN Track	
Power supply type	Multi-power supply	
Communications power supply current consumption	50 mA max.	
Output handling for communications errors	Select either hold or clear from CompoNet Support Software.	
Weight	141 g max.	

Component Names and Functions



Note A Branch Line Pressure-welded Connector or Terminal Block Adapter (DCN4-TB4) can be connected to the communications connector.

Indicator Section

Communications Indicators Refer to *SECTION 4 Basic Specifications of Slave Units*.

I/O Indicators

The meanings of the I/O indicators are given in the following table.

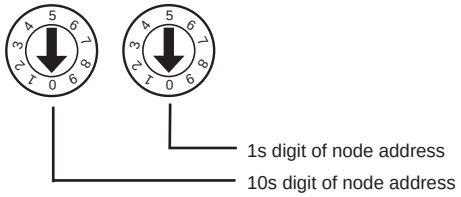
Name	LED status	I/O status	Meaning
0 to 15	Lit yellow.	Output ON	The output is ON.
	Not lit.	Output OFF	The output is OFF.

Setting the Node Address

The node address is set as a decimal number with the 10s digit set on the left rotary switch and the 1s digit set on the right rotary switch. (The maximum node address is 63.)

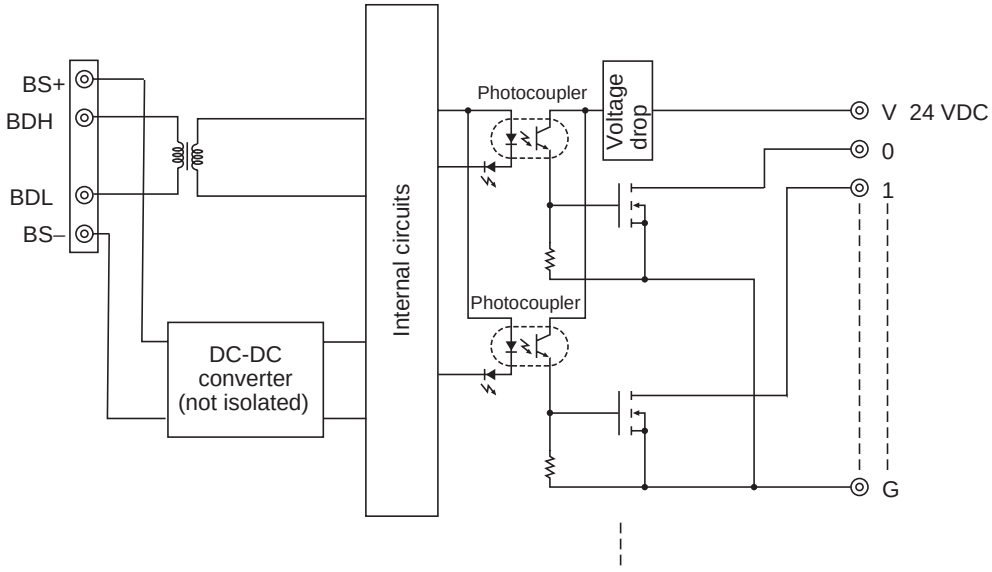
If an illegal address is set, the software setting (default: 0) will be used at start-up.

The setting on the rotary switches is read when power is turned ON.

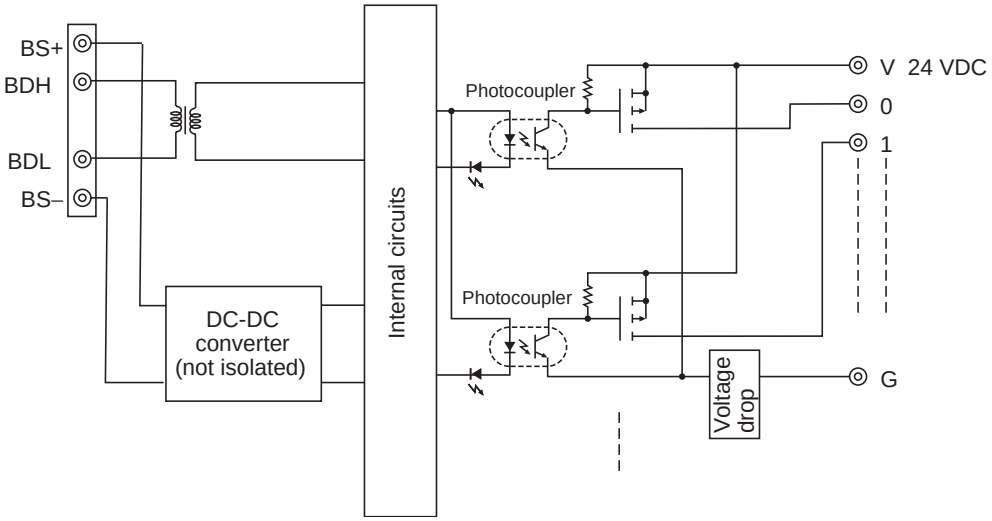


Internal Circuits

CRT1-OD16 (NPN)

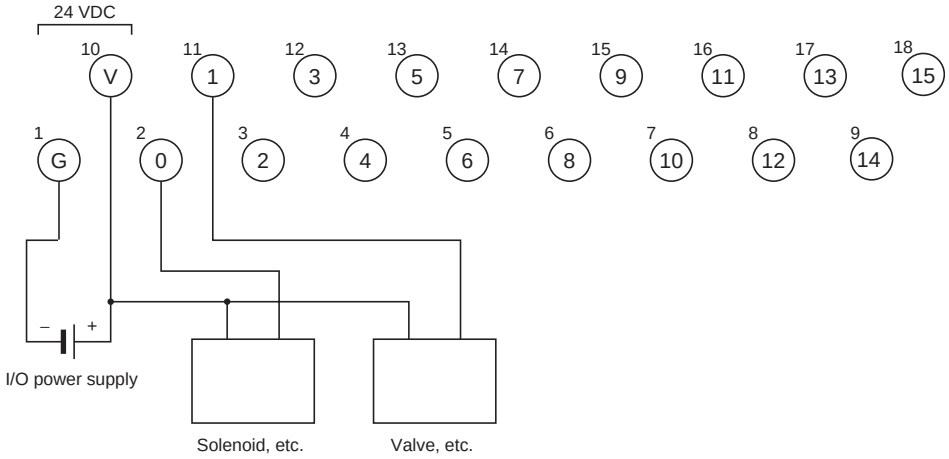


CRT1-OD16-1 (PNP)

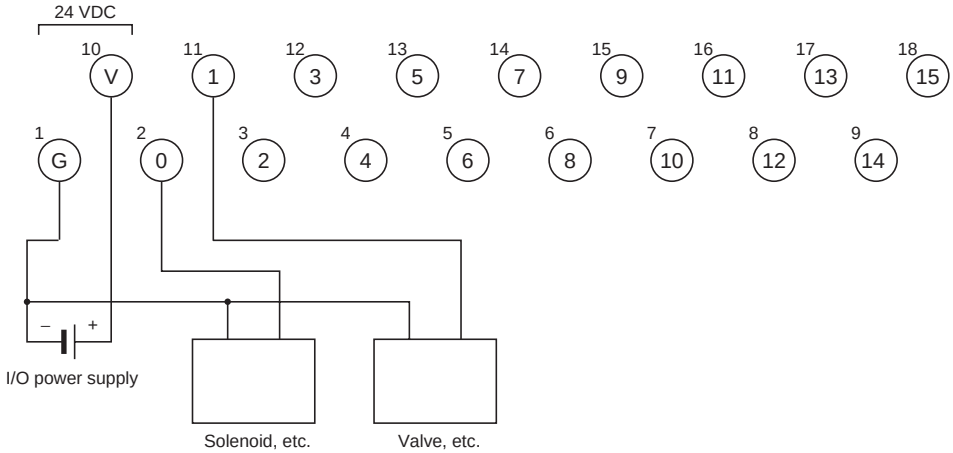


Wiring

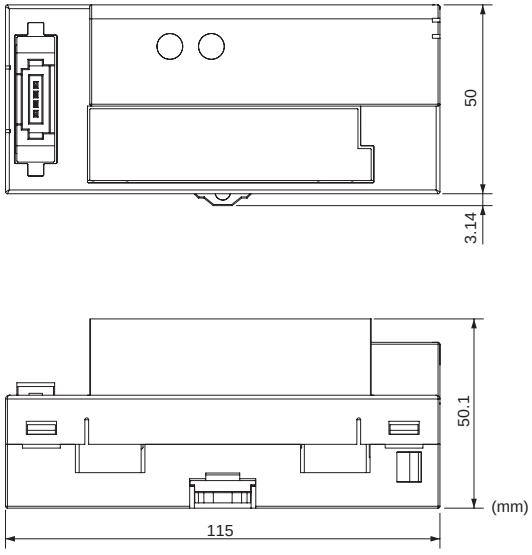
CRT1-OD16 (NPN)



CRT1-OD16-1 (PNP)



Dimensions (Same for CRT1-OD16 and CRT1-OD16-1)



5-3 Expansion Units

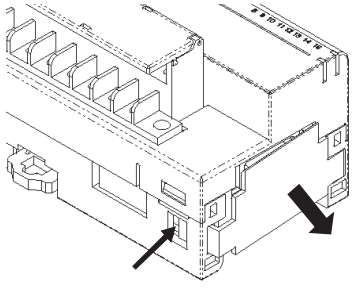
One Expansion Unit can be combined with one Basic Unit.

The following Expansion Units are available. They can be combined in various ways for flexible I/O capacity expansion.

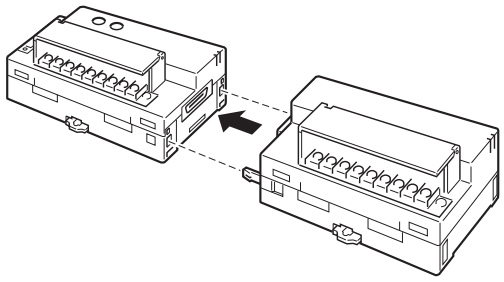
Expansion Unit	Model		Input capacity	Output capacity
Expansion Unit	XWT-ID08	8 DC inputs (NPN)	8	0
	XWT-ID08-1	8 DC inputs (PNP)	8	0
	XWT-OD08	8 transistor outputs (NPN)	0	8
	XWT-OD08-1	8 transistor outputs (PNP)	0	8
	XWT-ID16	16 DC inputs (NPN)	16	0
	XWT-ID16-1	16 DC inputs (PNP)	16	0
	XWT-OD16	16 transistor outputs (NPN)	0	16
	XWT-OD16-1	16 transistor outputs (PNP)	0	16

Installing Expansion Units

1,2,3... 1. Remove the cover from the right side of the Basic Unit.



2. Align the connector on the Expansion Unit with the connector on the Basic Unit and press the Units together.



3. Press the Expansion Unit and Basic Unit together until you hear them lock in place to ensure that the connectors are properly mated.

I/O Power Supply

If an Expansion Input Unit is connected to a Basic Input Unit, then I/O power must be supplied only to the Basic Unit.

If any other combination of Unit is used, I/O power must be supplied to both the Basic Unit and Expansion Unit. This includes connecting an Expansion Input Unit to a Basic Output Unit, an Expansion Output Unit to a Basic Input Unit, or an Expansion Output Unit to a Basic Output Unit.

Refer to the following table and write the I/O power correctly when connecting an Expansion Unit.

Combination	I/O power supply to Expansion Slave Unit
Basic Input Unit with Expansion Input Unit Example: CRT1-ID16 + XWT-ID16	Not required (Expansion Slave Unit uses the same I/O power supply as the Basic Slave Unit.)
Basic Input Unit with Expansion Output Unit Example: CRT1-ID16 + XWT-OD16	Required (I/O power must be supplied to both Units.)
Basic Output Unit with Expansion Input Unit Example: CRT1-OD16 + XWT-ID16	Required (I/O power must be supplied to both Units.)
Basic Output Unit with Expansion Output Unit Example: CRT1-OD16 + XWT-OD16	Required (I/O power must be supplied to both Units.)

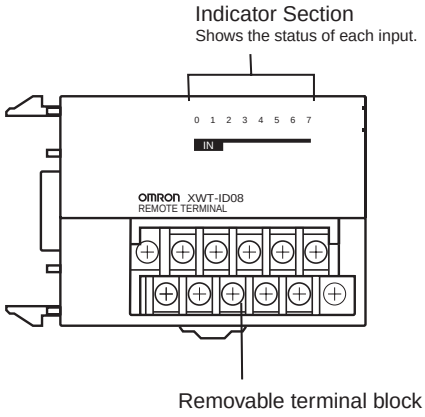
Note Always turn OFF the power supply before connecting an Expansion Unit.

5-3-1 8-point DC Input Units (XWT-ID08/XWT-ID08-1)

Input Section Specifications

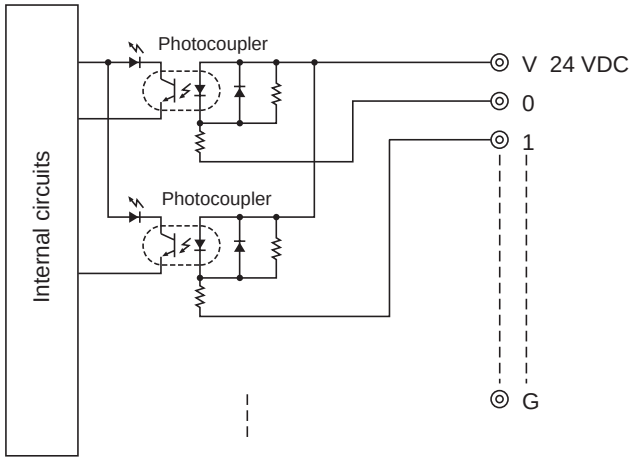
Item	Specification	
Model	XWT-ID08	XWT-ID08-1
Internal I/O common	NPN	PNP
I/O capacity	8 inputs	
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max.(between each input terminal and the V terminal)	5 VDC max.(between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	At 24 VDC: 6.0 mA max./input At 17 VDC: 3.0 mA max./input	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 inputs/common	

Component Names and Functions (Same for XWT-ID08 and XWT-ID08-1)

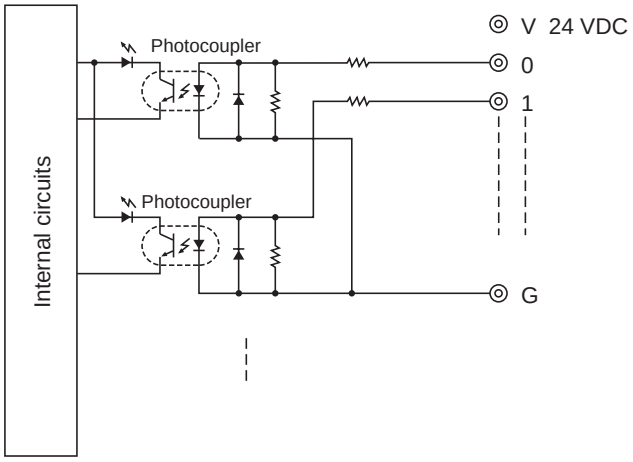


Internal Circuits

XWT-ID08 (NPN)

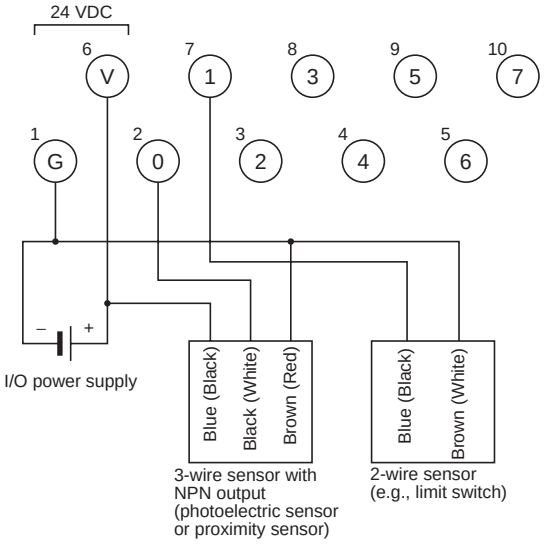


XWT-ID08-1 (PNP)

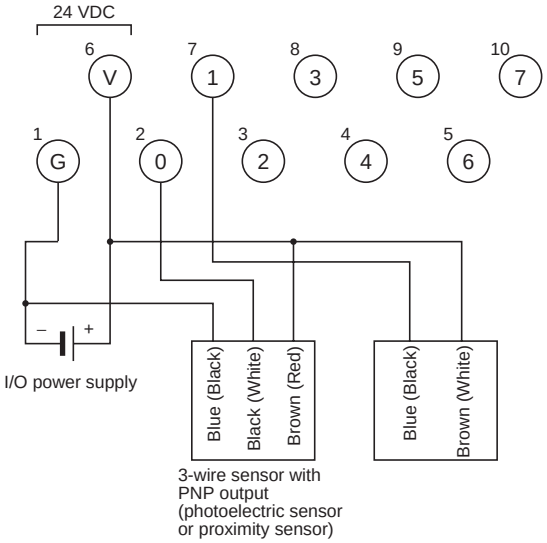


Wiring

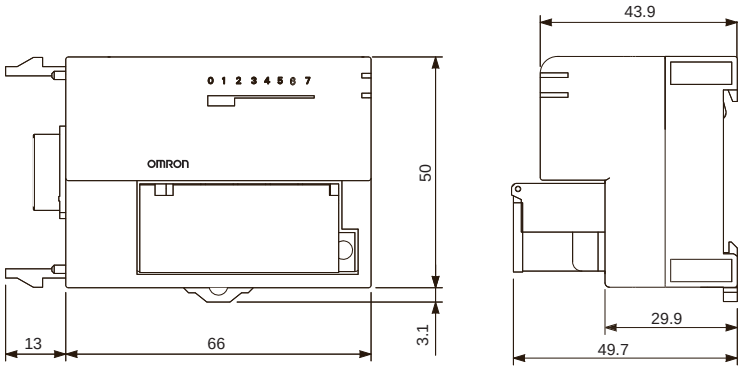
XWT-ID08 (NPN)



XWT-ID08-1 (PNP)



Dimensions (Same for XWT-ID08 and XWT-ID08-1)

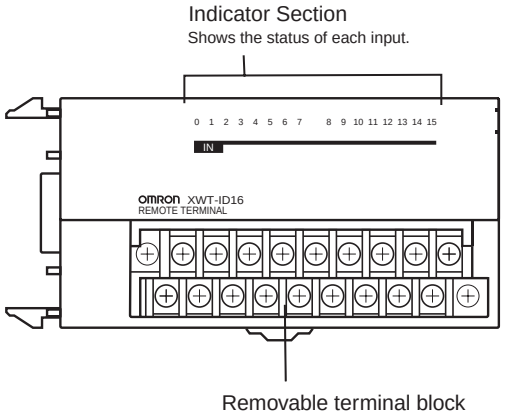


5-3-2 16-point DC Input Units (XWT-ID16/XWT-ID16-1)

Input Section Specifications

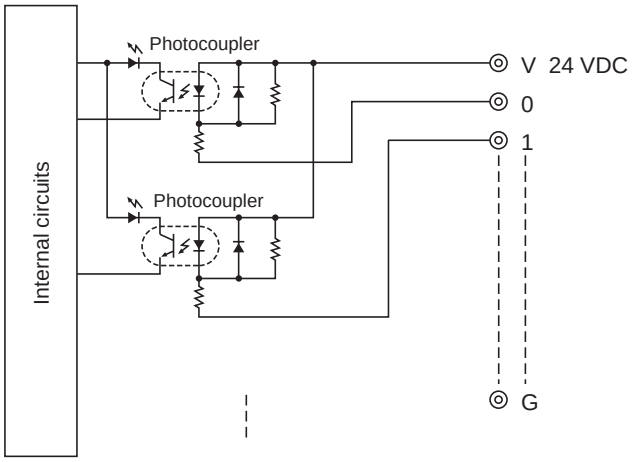
Item	Specification	
Model	XWT-ID16	XWT-ID16-1
Internal I/O common	NPN	PNP
I/O capacity	16 inputs	
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max.(between each input terminal and the V terminal)	5 VDC max.(between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	At 24 VDC: 6.0 mA max./input At 17 VDC: 3.0 mA max./input	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 inputs/common	

Component Names and Functions (Same for XWT-ID16 and XWT-ID16-1)

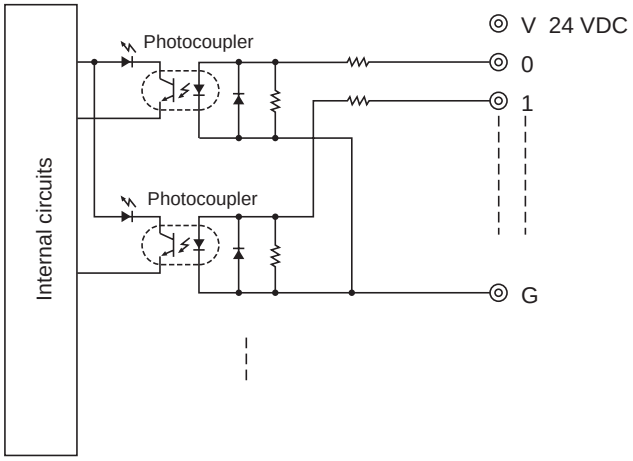


Internal Circuits

XWT-ID16 (NPN)

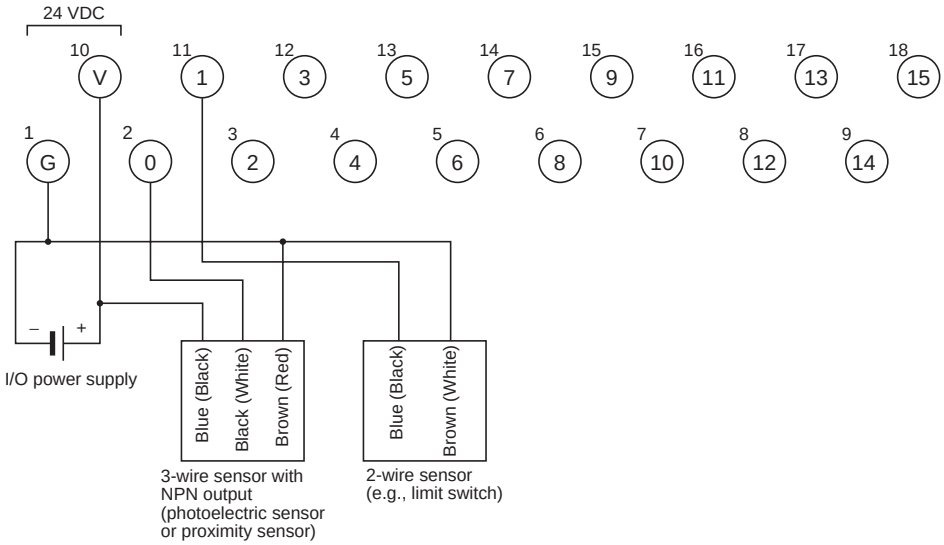


XWT-ID16-1 (PNP)

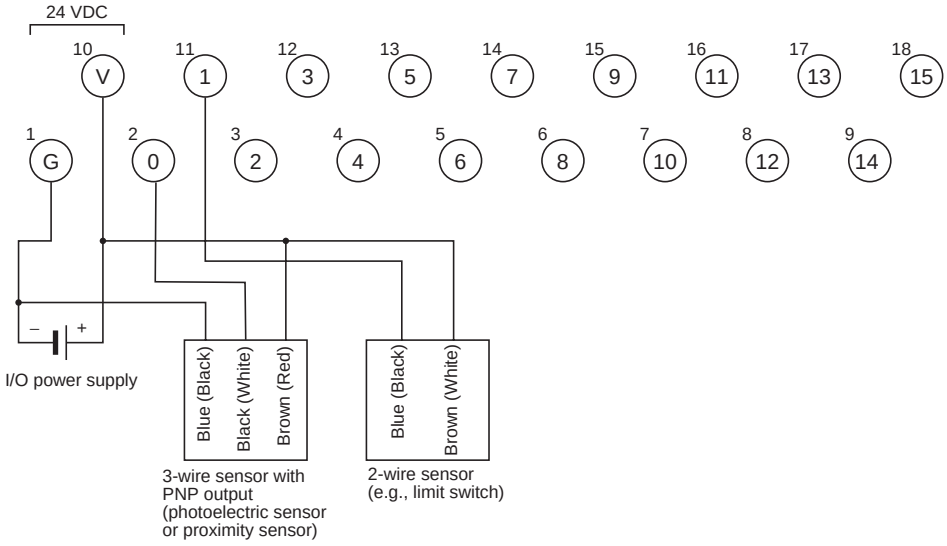


Wiring

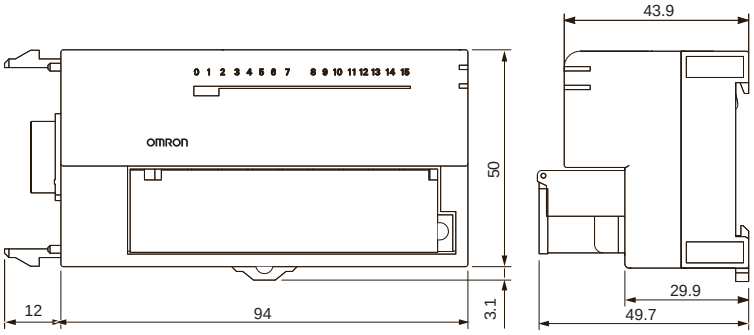
XWT-ID16 (NPN)



XWT-ID16-1 (PNP)



Dimensions (Same for XWT-ID16 and XWT-ID16-1)

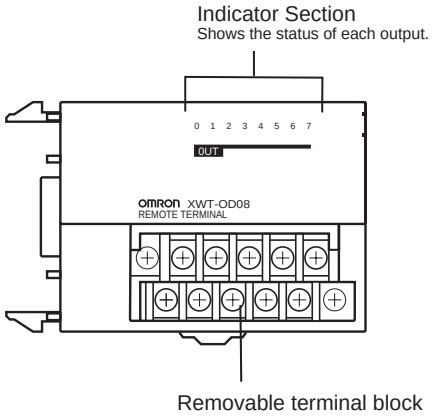


5-3-3 8-point Transistor Output Units (XWT-OD08/XWT-OD08-1)

Output Section Specifications

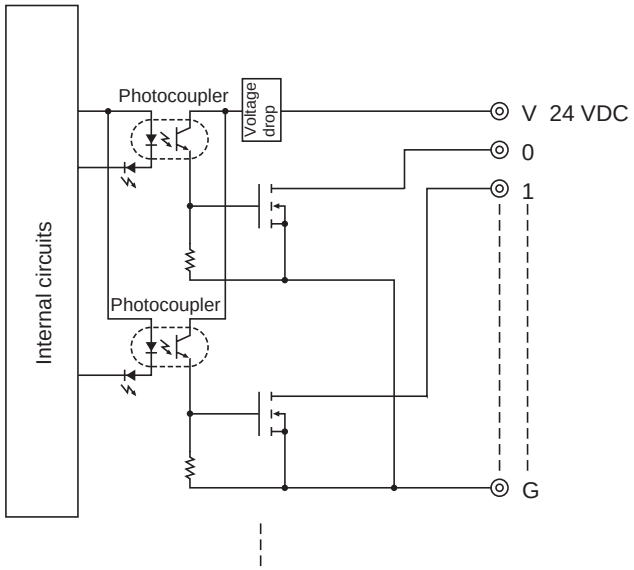
Item	Specification	
Model	XWT-OD08	XWT-OD08-1
Internal I/O common	NPN	PNP
I/O capacity	8 outputs	
Rated output current	0.5 A/output, 2.0 A/common	
Residual voltage	1.2 V max.(0.5 A DC, between each output terminal and the G terminal)	1.2 V max.(0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	0.1 mA max.
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 outputs/common	

Component Names and Functions (Same for XWT-OD08 and XWT-OD08-1)

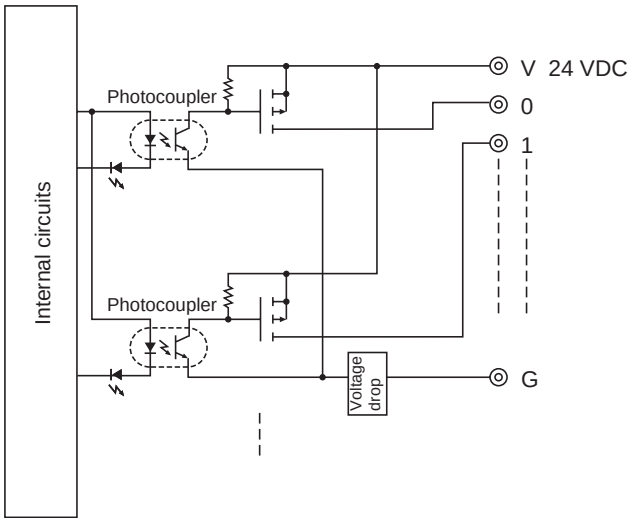


Internal Circuits

XWT-OD08 (NPN)

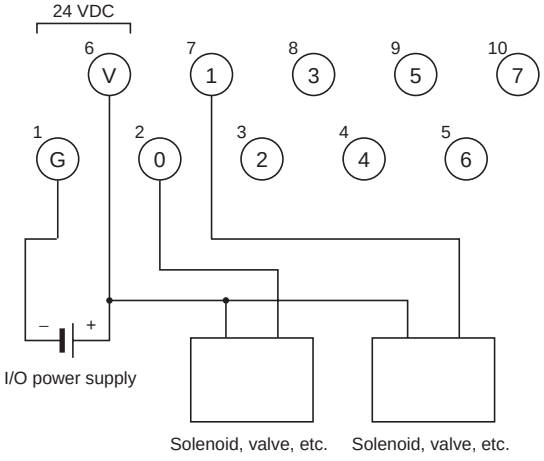


XWT-OD08-1 (PNP)

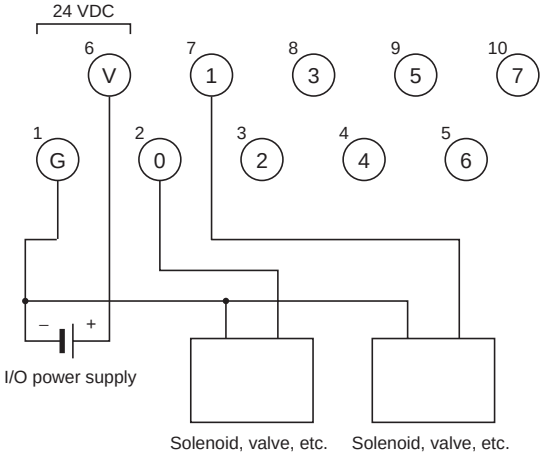


Wiring

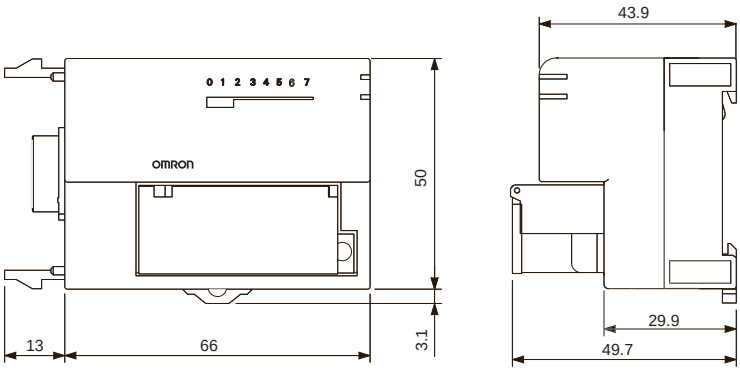
XWT-OD08 (NPN)



XWT-OD08-1 (PNP)



Dimensions (Same for XWT-OD08 and XWT-OD08-1)

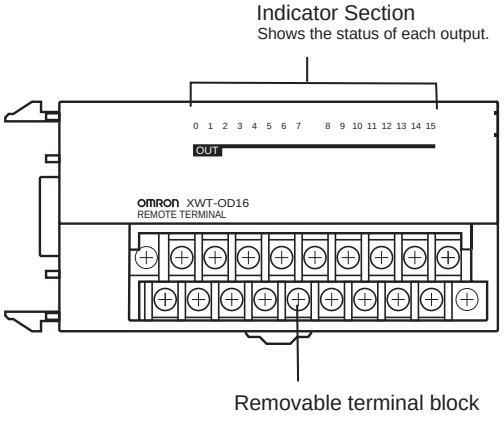


5-3-4 16-point Transistor Output Units (XWT-OD16/XWT-OD16-1)

Output Section Specifications

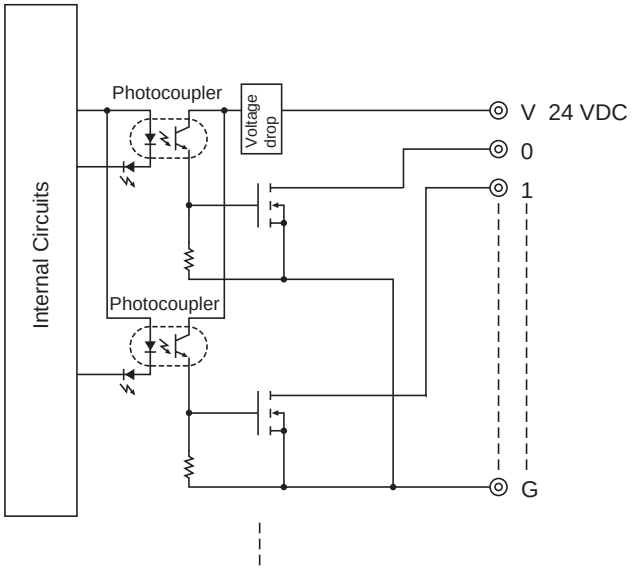
Item	Specification	
Model	XWT-OD16	XWT-OD16-1
Internal I/O common	NPN	PNP
I/O capacity	16 outputs	
Rated output current	0.5 A/output, 4.0 A/common	
Residual voltage	1.2 V max. (0.5 A DC, between each output terminal and the G terminal)	1.2 V max. (0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	0.1 mA max.
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 outputs/common	

Component Names and Functions (Same for XWT-OD16 and XWT-OD16-1)

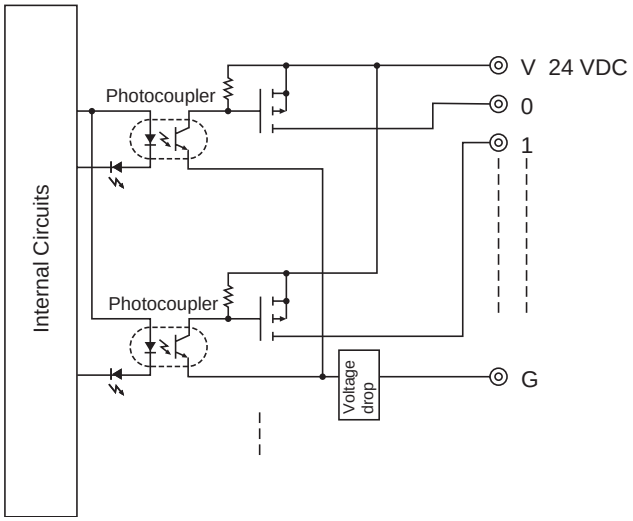


Internal Circuits

XWT-OD16 (NPN)

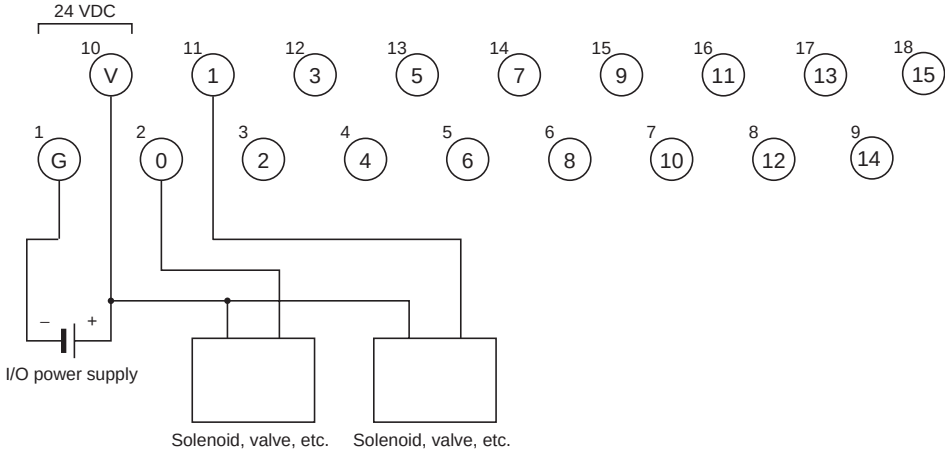


XWT-OD16-1 (PNP)

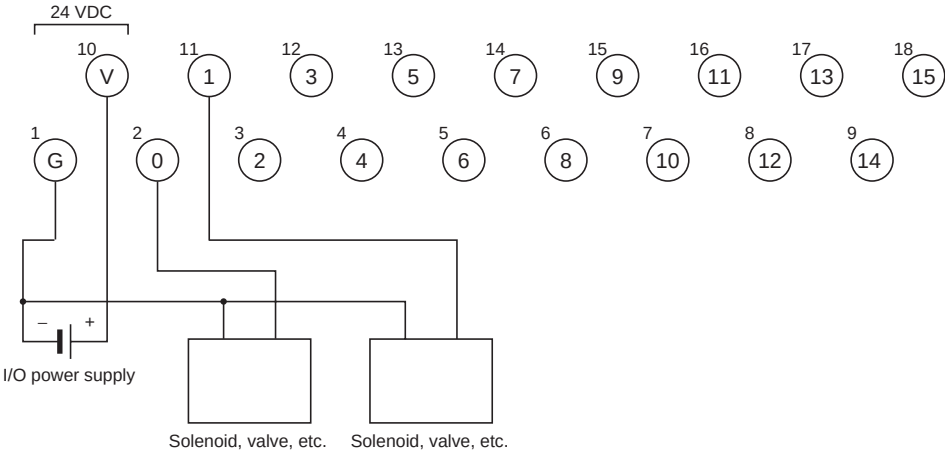


Wiring

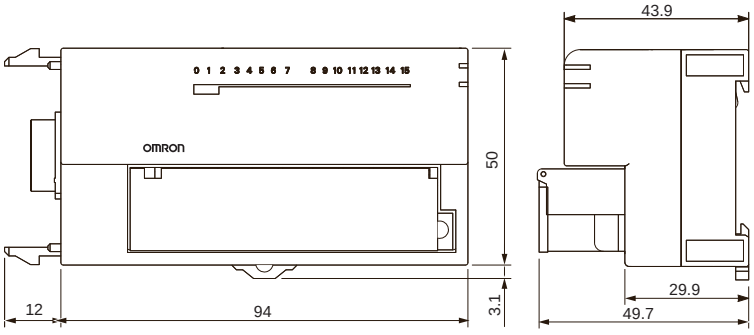
XWT-OD16 (NPN)



XWT-OD16-1 (PNP)



Dimensions (Same for XWT-OD16 and XWT-OD16-1)



SECTION 6
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6-1 ntlp

6-2 IP20 Bit Slave Units

6-2-1 2-point DC Input Units (CRT1B-ID02S/CRT1B-ID02S-1)

Input Section Specifications

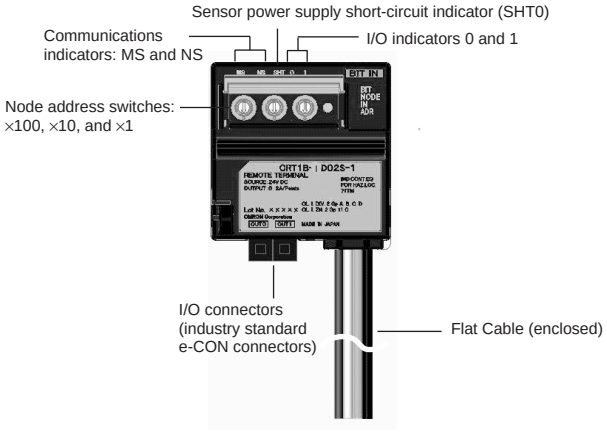
Item	Specification	
Model	CRT1B-ID02S	CRT1B-ID02S-1
I/O capacity	2 inputs	
Internal I/O common	NPN	PNP
ON voltage	10.5 VDC min. (between each input terminal and the V terminal)	10.5 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	3.0 mA max./input (at 10.5 VDC)	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	2 inputs/common	
Sensor power supply short-circuit detection	Detected.	
Isolation method	No isolation	
Input indicators	LEDs (yellow)	
Degree of protection	IEC standard IP20	
Installation	Screw installation (M4)	
Power supply type	Network power supply	
Communications power supply current consumption (See note.)	45 mA max.	
Weight	96 g max.	95 g max.

Note The current consumption is for Bit Slave Unit communications current when all inputs are OFF, i.e., it does not include input device current consumption. The communications power supply is also used for the I/O power supply for sensors. Be sure to consider the sensor current consumption and the number of sensors connected in addition to the communications power.

The power supply current consumption is expressed by the following formula.

Communications power supply current consumption = Bit Slave Unit communications current consumption + (Bit Slave Unit input current × number of inputs used) + (sensor current consumption ´ number of sensors used)

Component Names and Functions



Communications Indicators

Refer to *SECTION 4 Basic Specifications of Slave Units*.

I/O Indicators

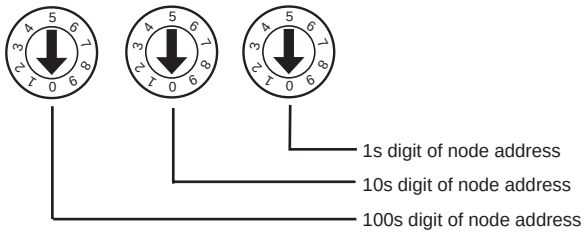
The meanings of the I/O indicators are given in the following table.

Name	LED status	I/O status	Meaning
0 to 1	Lit yellow.	Input ON	The input is ON.
	Not lit.	Input OFF	The input is OFF.
SHT0	Lit red.	Sensor power supply short-circuit	The sensor power supply is short-circuited.

Setting the Node Address

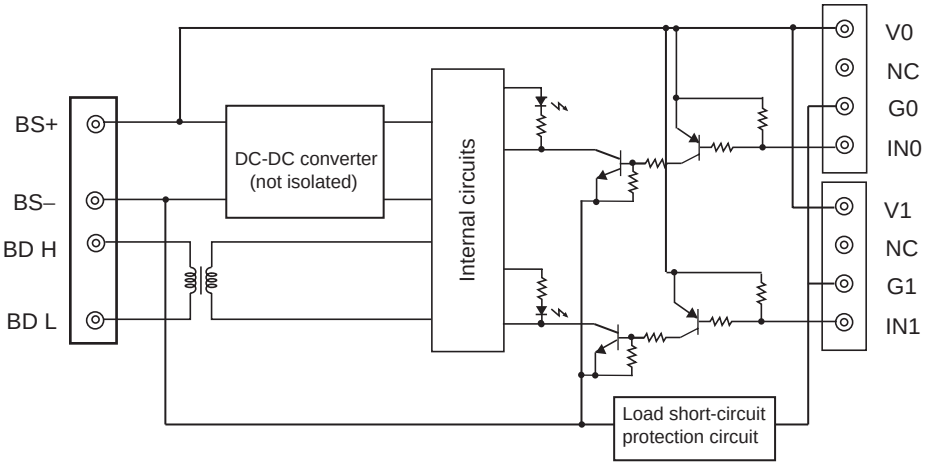
The node address is set as a decimal number with the 100s digit set on the left rotary switch, the 10s digit set on the middle rotary switch, and the 1s digit set on the right rotary switch. The node address can be set to between 0 and 127. If any other address is set, the NS indicator will light red.

The setting on the rotary switches is read when power is turned ON.

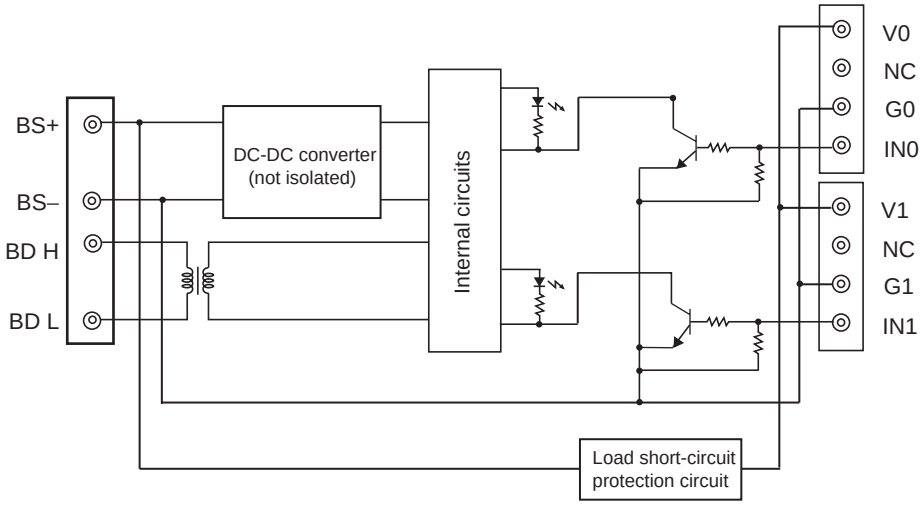


Internal Circuits

CRT1B-ID02S



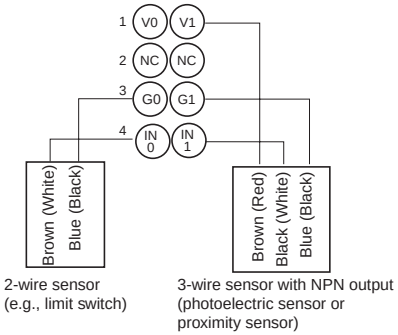
CRT1B-ID02S-1



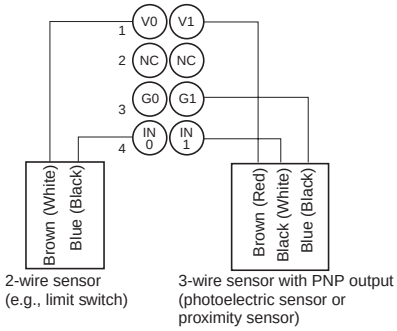
Wiring

The I/O connector section uses industry standard connectors (e-CON). Pins arrangements and signals are shown below.

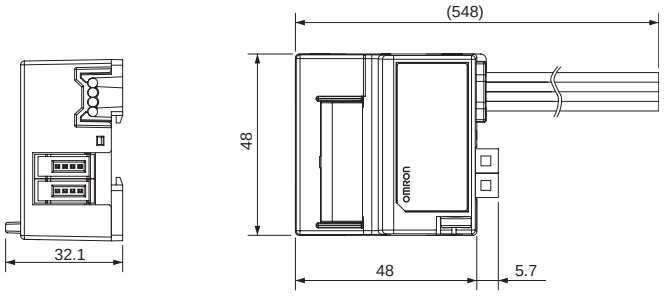
CRT1B-ID02S



CRT1B-ID02S-1



Dimensions (Same for CRT1B-ID02S and CRT1B-ID02S-1)



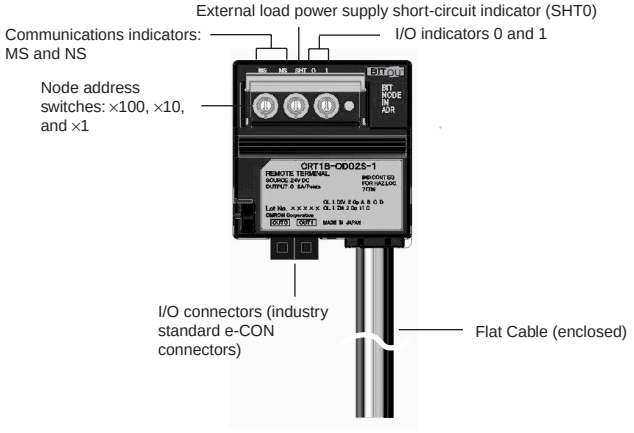
6-2-2 2-point Transistor Output Units (CRT1-OD02S/CRT1-OD02S-1)

Output Section Specifications

Item	Specification	
Model	CRT1B-OD02S	CRT1-OD02S-1
I/O capacity	2 outputs	
Internal I/O common	NPN	PNP
Rated output current	0.2 A/output	
Residual voltage	1.2 V max. (0.5 A DC, between each output terminal and the G terminal)	1.2 V max. (0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	2 outputs/common	
External load power supply short-circuit detection	Detected	
Isolation method	No isolation	
Output indicators	LEDs (yellow)	
Degree of protection	IEC standard IP20	
Installation	Screw installation (M4)	
Power supply type	Network power supply	
Communications power supply current consumption (See note.)	50 mA max.	45 mA max.
Weight	95 g max.	95 g max.

Note The current consumption is for Bit Slave Unit communications current when all outputs are OFF, i.e., it does not include the output device load current consumption. The communications power supply is also used for the I/O power supply for actuators. Be sure to consider the actuator load current consumption and the number of sensors connected in addition to the communications power.
The power supply current consumption is expressed by the following formula.
Communications power supply current consumption = Bit Slave Unit communications current consumption + (actual load current ´ number of actuators used)

Component Names and Functions



Communications Indicators

Refer to ntlp Section 2 Basic Slave Unit Specifications.

I/O Indicators

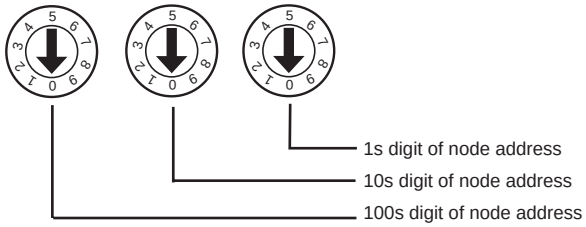
The meanings of the I/O indicators are given in the following table.

Name	LED status	I/O status	Meaning
0 to 1	Lit yellow.	Output ON	The output is ON.
	Not lit.	Output OFF	The output is OFF.
SHT0	Lit red.	Load power supply short-circuit detection	The load power supply is short-circuited.

¦Setting the Node Address

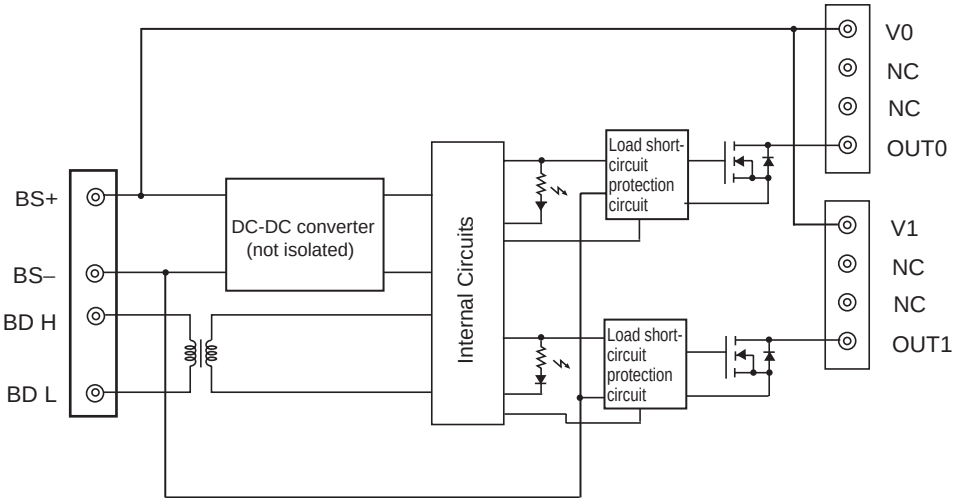
The node address is set as a decimal number with the 100s digit set on the left rotary switch, the 10s digit set on the middle rotary switch, and the 1s digit set on the right rotary switch. If an illegal address is set, the software setting (default: 0) will be used at startup.

The setting on the rotary switches is read when power is turned ON.

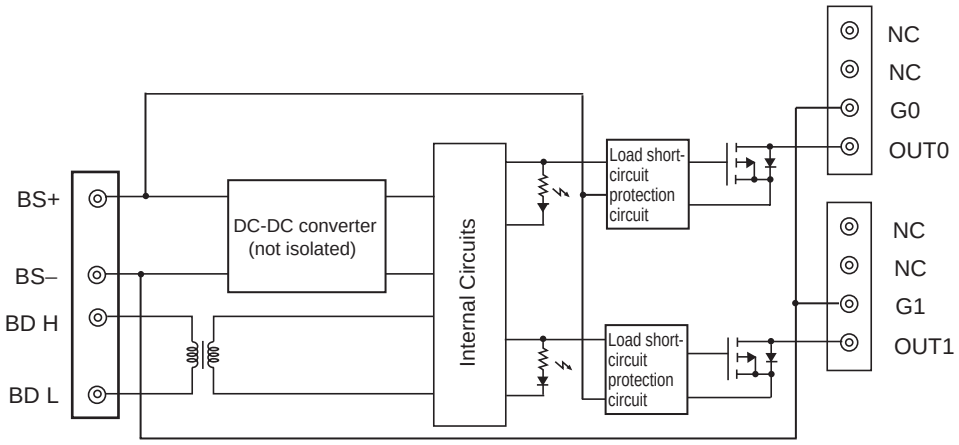


Internal Circuits

CRT1B-OD02S



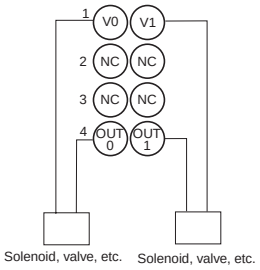
CRT1B-OD02S-1



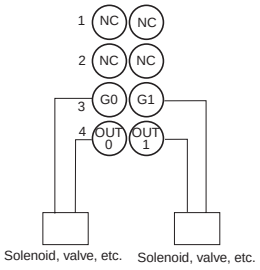
Wiring

The I/O connector section uses industry standard connectors (e-CON). Pins arrangements and signals are shown below.

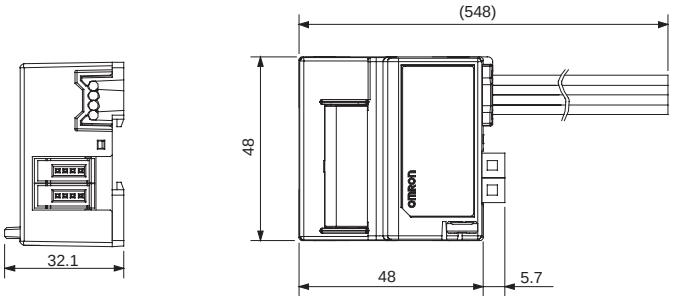
CRT1B-OD02S



CRT1B-OD02S-1



Dimensions (Same for CRT1B-OD02S and CRT1B-OD02S-1)



6-3 IP54 Bit Slave Units

6-3-1 2-point DC Input Units (CRT1B-ID02SP/CRT1B-ID02SP-1)

Input Section Specifications

Item	Specification	
Model	CRT1B-ID02SP	CRT1B-ID02SP-1
I/O capacity	2 inputs	
Internal I/O common	NPN	PNP
ON voltage	10.5 VDC min. (between each input terminal and the V terminal)	10.5 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	3.0 mA max./input (at 10.5 VDC)	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	2 inputs/common	
Sensor power supply short-circuit detection	Detected (input section).	
Isolation method	No isolation	
Input indicators	LEDs (yellow)	
Degree of protection	IEC standard IP54	
Installation	Screw installation (M4)	
Power supply type	Network power supply	
Communications power supply current consumption (See note.)	70 mA max.	65 mA max.
Weight	221 g max.	224 g max.

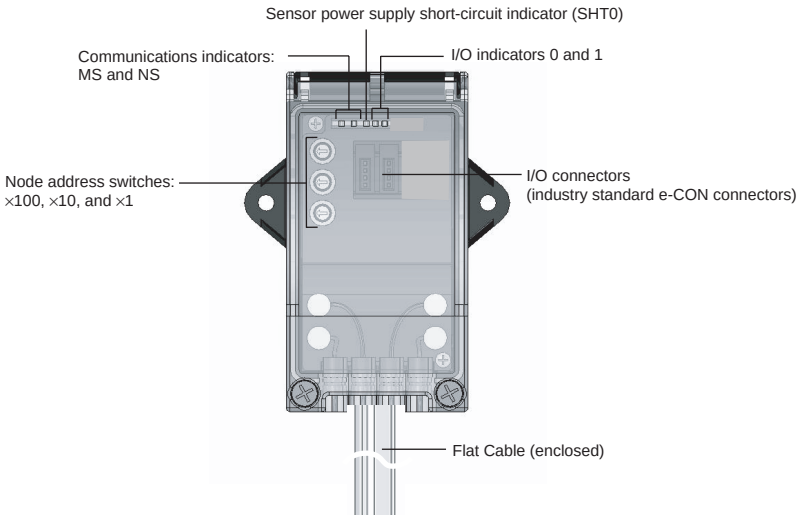
Note The current consumption is for Bit Slave Unit communications current when all inputs are OFF, i.e., it does not include input device current consumption. The communications power supply is also used for the I/O power supply for sensors. Be sure to consider the sensor current consumption and the number of sensors connected in addition to the communications power.

The power supply current consumption is expressed by the following formula.

Communications power supply current consumption = Bit Slave Unit communications current consumption + (Bit Slave Unit input current × number of inputs used) + (sensor current consumption ´ number of sensors used)

Component Names and Functions

CRT1B-ID02SP/CRT1B-ID02SP-1



Communications Indicators

Refer to *SECTION 2 Basic Slave Unit Specifications???*.

I/O Indicators

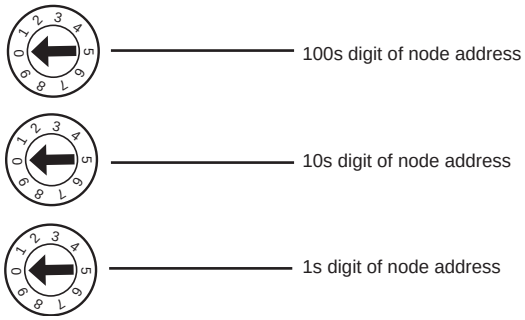
The meanings of the I/O indicators are given in the following table.

Name	LED status	I/O status	Meaning
0 to 1	Lit yellow.	Input ON	The input is ON.
	Not lit.	Input OFF	The input is OFF.
SHT0	Lit red.	Sensor power supply short-circuit	The sensor power supply is short-circuited.

Setting the Node Address

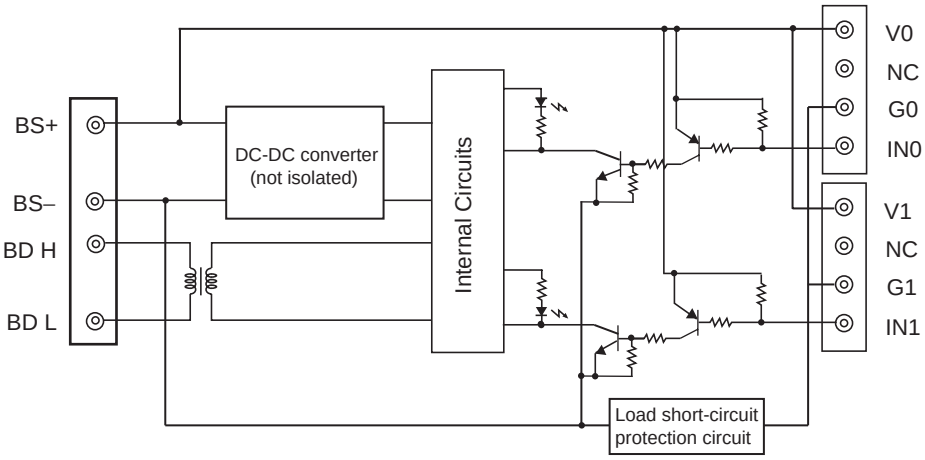
The node address is set as a decimal number with the 100s digit set on the top rotary switch, the 10s digit set on the middle rotary switch, and the 1s digit set on the bottom rotary switch. If an illegal address is set, the software setting (default: 0) will be used at startup.

The setting on the rotary switches is read when power is turned ON.

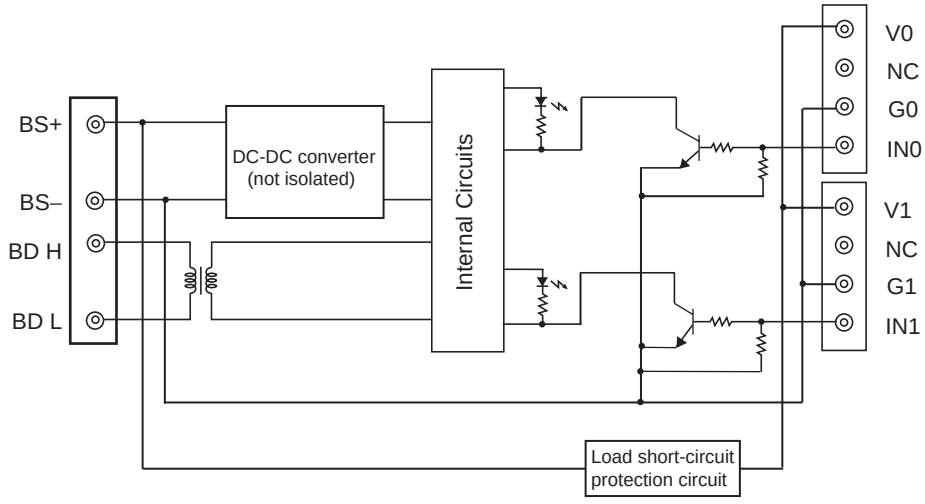


Internal Circuits

CRT1B-ID02SP



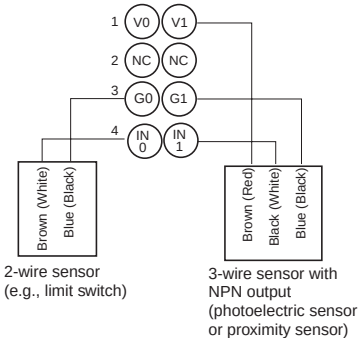
CRT1B-ID02SP-1



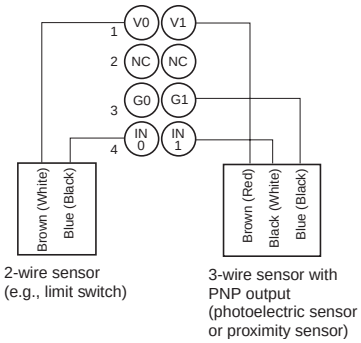
Wiring

The I/O connector section uses industry standard connectors (e-CON). Pins arrangements and signals are shown below.

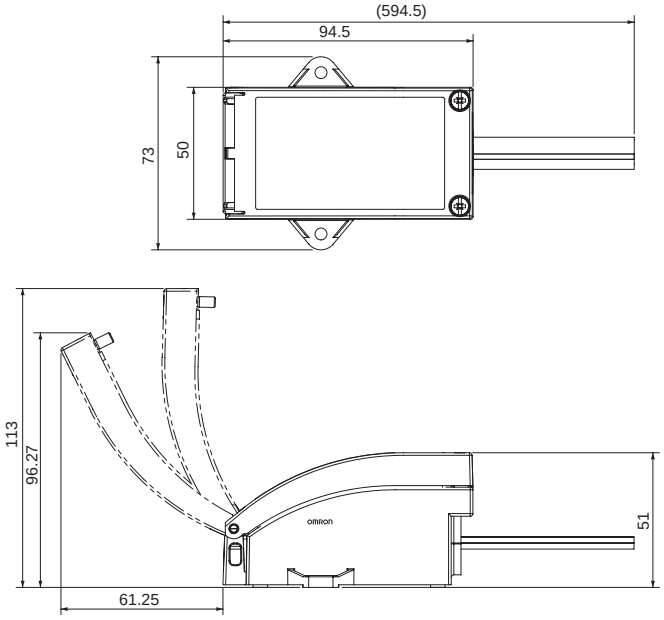
CRT1B-ID02SP



CRT1B-ID02SP-1



Dimensions (Same for CRT1B-ID02SP and CRT1B-ID02SP-1)



6-3-2 2-point Transistor Output Units (CRT1-OD02SP/CRT1-OD02SP-1)

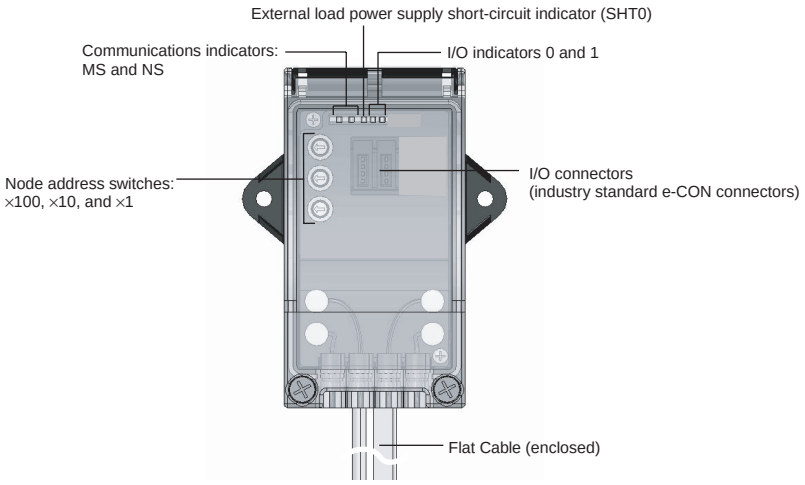
Output Section Specifications

Item	Specification	
Model	CRT1B-OD02SP	CRT1B-OD02SP-1
I/O capacity	2 outputs	
Internal I/O common	NPN	PNP
Rated output current	0.2 A/output	
Residual voltage	1.2 V max. (0.5 A DC, between each output terminal and the G terminal)	1.2 V max. (0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	2 outputs/common	
External load power supply short-circuit detection	Detected	
Isolation method	No isolation	
Output indicators	LEDs (yellow)	
Degree of protection	IEC standard IP54	
Installation	Screw installation (M4)	
Power supply type	Network power supply	
Communications power supply current consumption (See note.)	95 mA max.	90 mA max.
Weight	224 g max.	224 g max.

Note The current consumption is for Bit Slave Unit communications current when all outputs are OFF, i.e., it does not include the output device load current consumption. The communications power supply is also used for the I/O power supply for actuators. Be sure to consider the actuator load current consumption and the number of sensors connected in addition to the communications power.
The power supply current consumption is expressed by the following formula.
Communications power supply current consumption = Bit Slave Unit communications current consumption + (actual load current × number of actuators used)

Component Names and Functions

CRT1B-OD02SP/CRT1B-OD02SP-1



Communications Indicators

Refer to *SECTION 2 Basic Slave Unit Specifications???*.

I/O Indicators

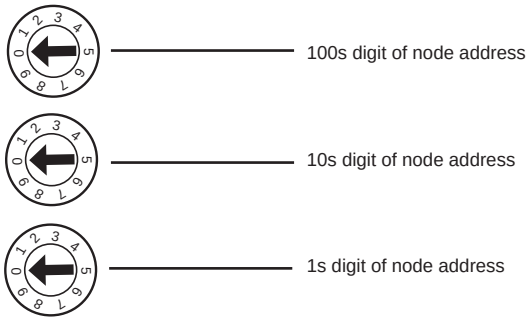
The meanings of the I/O indicators are given in the following table.

Name	LED status	I/O status	Meaning
0 to 1	Lit yellow.	Output ON	The output is ON.
	Not lit.	Output OFF	The output is OFF.
SHT0	Lit red.	Load power supply short-circuit detection	The load power supply is short-circuited.

Setting the Node Address

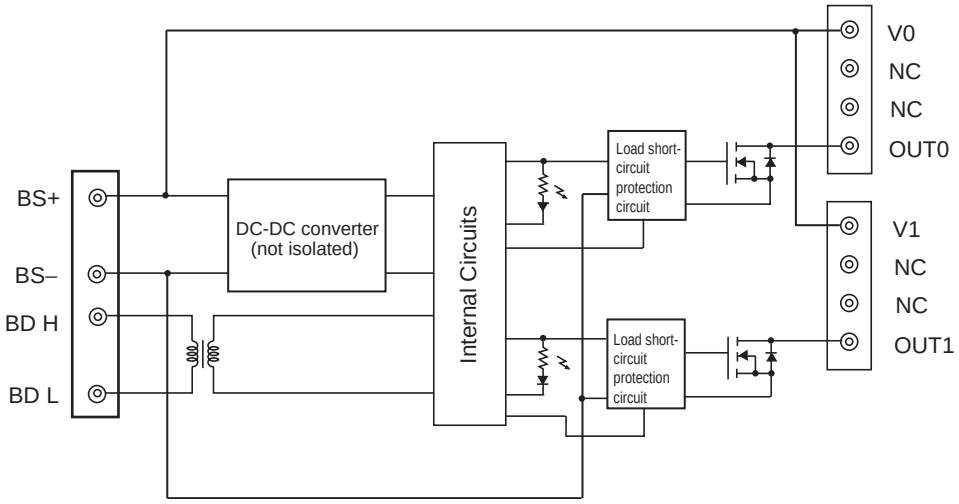
The node address is set as a decimal number with the 100s digit set on the top rotary switch, the 10s digit set on the middle rotary switch, and the 1s digit set on the bottom rotary switch. If an illegal address is set, the software setting (default: 0) will be used at startup.

The setting on the rotary switches is read when power is turned ON.

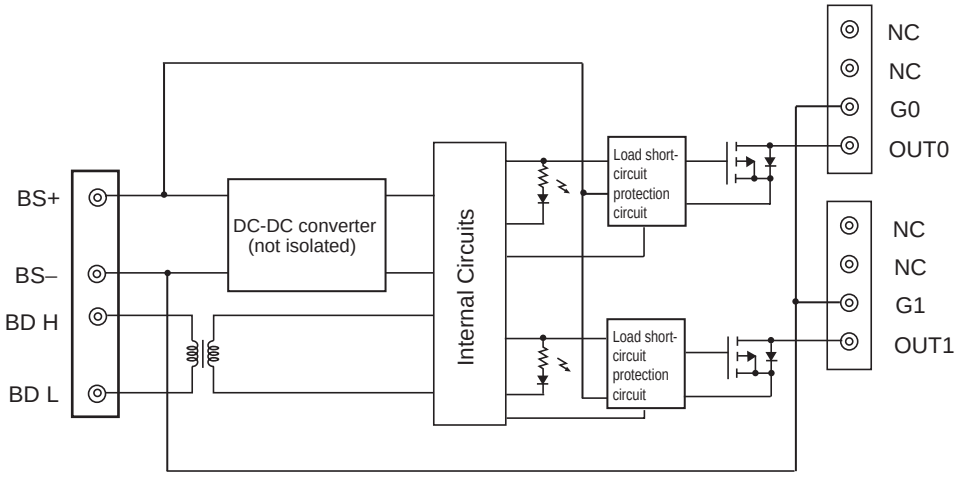


Internal Circuits

CRT1B-OD02SP



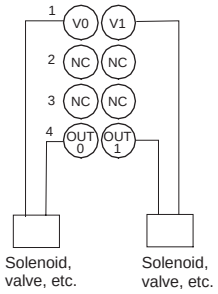
CRT1B-OD02SP-1



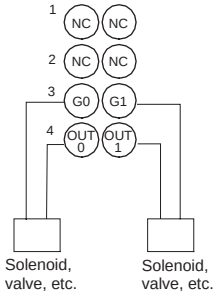
Wiring

The I/O connector section uses industry standard connectors (e-CON). Pins arrangements and signals are shown below.

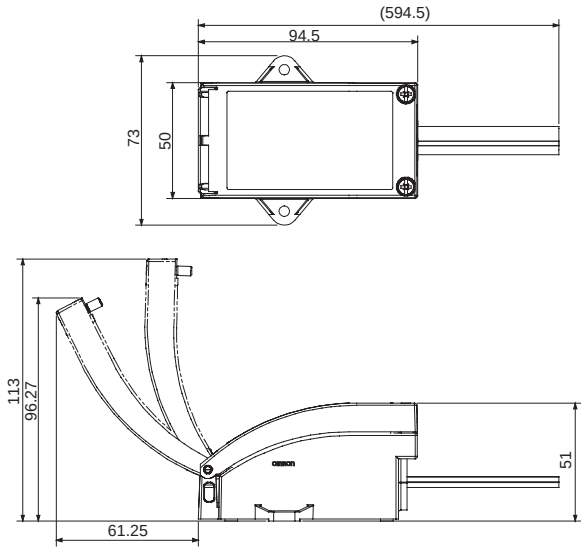
CRT1B-OD02SP



CRT1B-OD02SP-1



Dimensions (Same for CRT1B-OD02SP and CRT1B-OD02SP-1)



6-3-3 4-point DC Input Units (CRT1B-ID04SP/CRT1B-ID04SP-1)

Specification

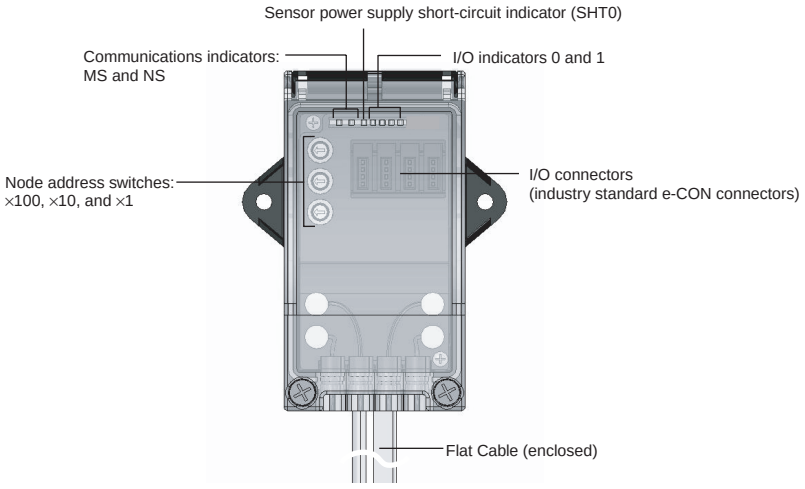
Item	Specification	
Model	CRT1B-ID04SP	CRT1B-ID04SP-1
I/O capacity	4 inputs	
Internal I/O common	NPN	PNP
ON voltage	10.5 VDC min. (between each input terminal and the V terminal)	10.5 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	3.0 mA max./input (at 10.5 VDC)	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	4 inputs/common	
Sensor power supply short-circuit detection	Detected	
Isolation method	No isolation	
Input indicators	LEDs (yellow)	
Degree of protection	IEC standard IP54	
Installation	Screw installation (M4)	

Item	Specification	
Power supply type	Network power supply	
Communications power supply current consumption (See note.)	90 mA max.	85 mA max.
Weight	225 g	225 g

Note The current consumption is for Bit Slave Unit communications current when all inputs are OFF, i.e., it does not include input device current consumption. The communications power supply is also used for the I/O power supply for sensors. Be sure to consider the sensor current consumption and the number of sensors connected in addition to the communications power.
The power supply current consumption is expressed by the following formula.
Communications power supply current consumption = Bit Slave Unit communications current consumption + (Bit Slave Unit input current × number of inputs used) + (sensor current consumption ´ number of sensors used)

Component Names and Functions

CRT1B-ID04SP/CRT1B-ID04SP-1



Communications Indicators

Refer to ntlp Section 2 Basic Slave Unit Specifications.

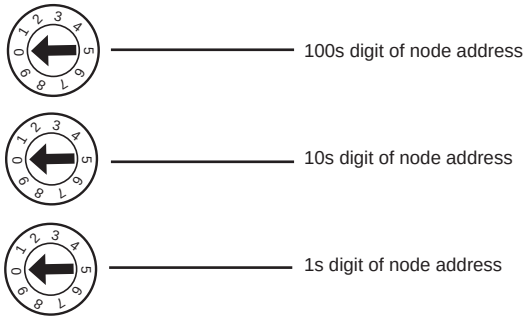
I/O Indicators

The meanings of the I/O indicators are given in the following table.

Name	LED status	I/O status	Meaning
0 to 3	Lit yellow.	Input ON	The input is ON.
	Not lit.	Input OFF	The input is OFF.
SHT0	Lit red.	Sensor power supply short-circuit	The sensor power supply is short-circuited.

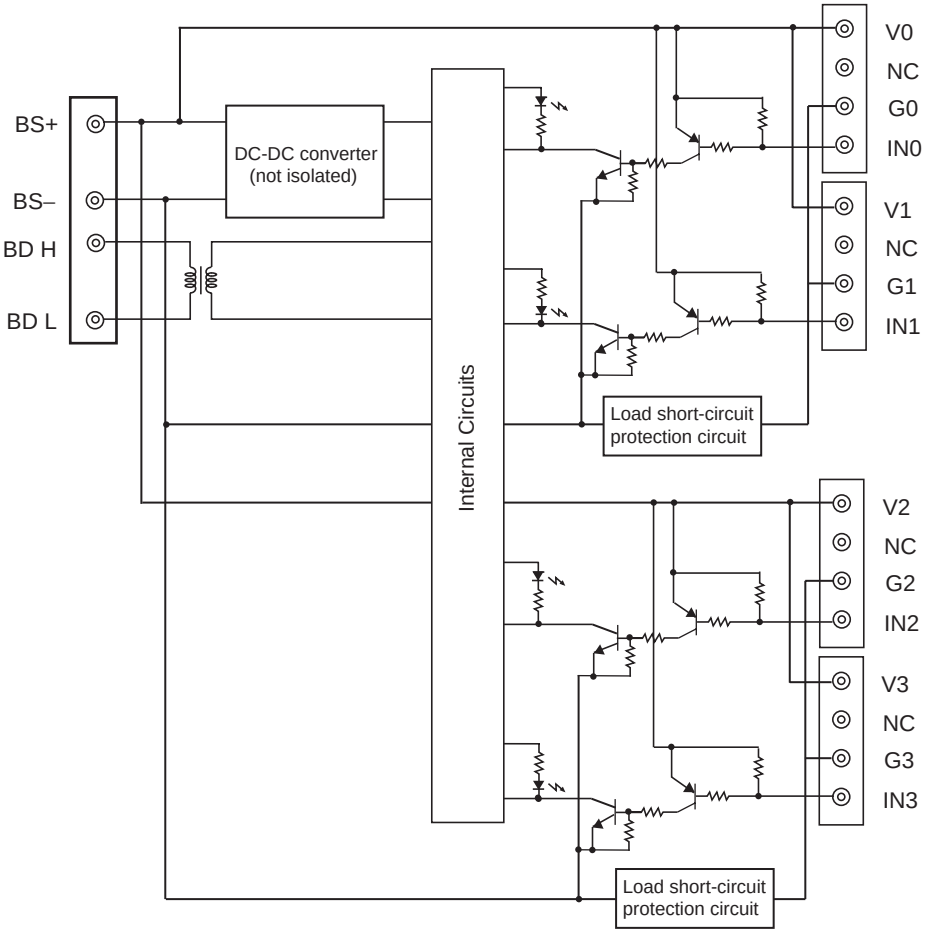
Setting the Node Address

The node address is set as a decimal number with the 100s digit set on the top rotary switch, the 10s digit set on the middle rotary switch, and the 1s digit set on the bottom rotary switch. If an illegal address is set, the software setting (default: 0) will be used at startup. The setting on the rotary switches is read when power is turned ON.

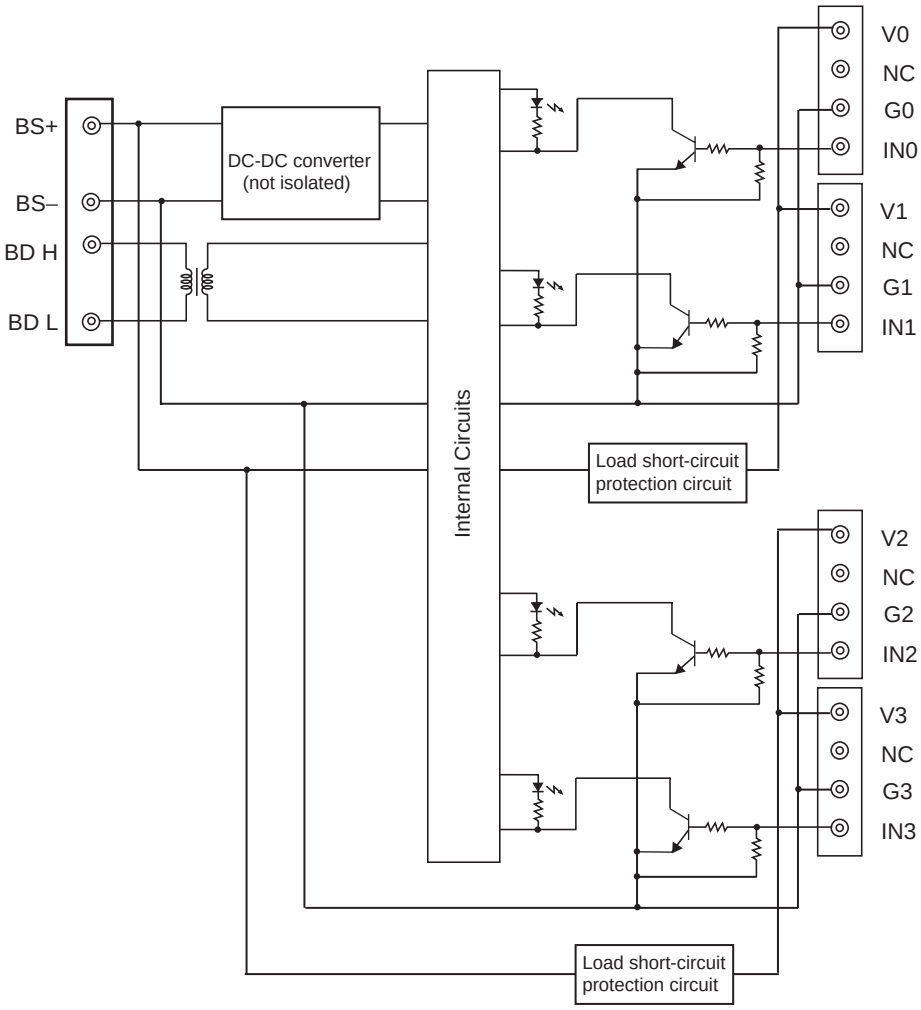


Internal Circuits

CRT1B-ID04SP



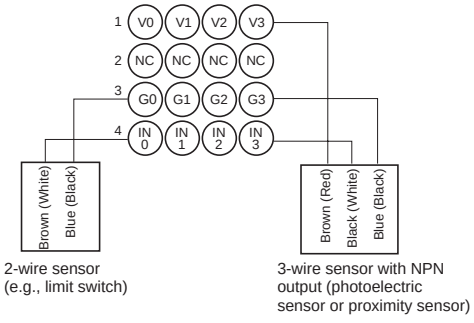
CRT1B-ID04SP-1



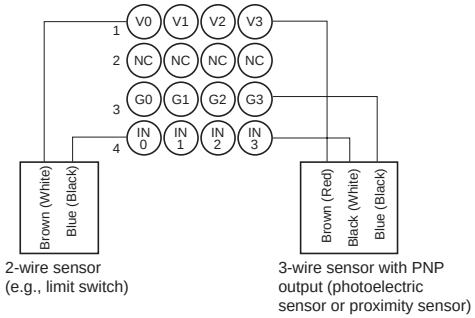
Wiring

The I/O connector section uses industry standard connectors (e-CON). Pins arrangements and signals are shown below.

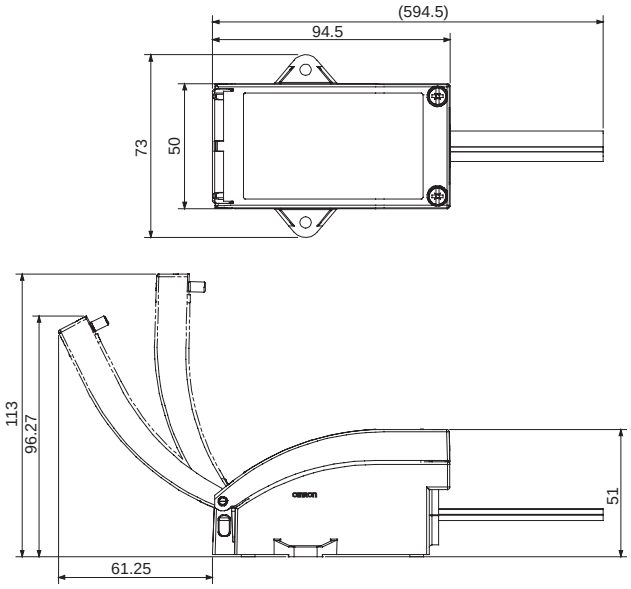
CRT1B-ID04SP



CRT1B-ID04SP-1



Dimensions (Same for CRT1B-ID04SP and CRT1B-ID04SP-1)



6-3-4 2-point DC Input/2-point Transistor Output Units (CRT1B-MD04SLP/CRT1B-MD04SLP-1)

Specifications

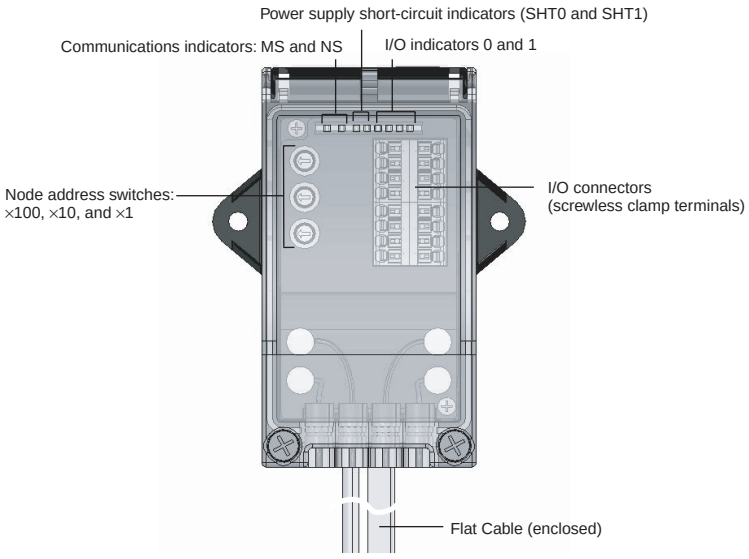
Item	Specification	
Model	CRT1B-MD04SLP	CRT1B-MD04SLP-1
I/O capacity	2 inputs/2 outputs	
Internal I/O common	NPN	PNP
ON voltage	10.5 VDC min. (between each input terminal and the V terminal)	10.5 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1 mA max.	
Input current	3.0 mA max./input (at 10.5 VDC)	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Rated output current	0.2 A/output	
Residual voltage	1.2 V max.(0.5 A DC, between each output terminal and the G terminal)	1.2 V max.(0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	

Item	Specification	
OFF delay	1.5 ms max.	
Number of circuits per common	2 outputs/common, 2 inputs/common	
Sensor power supply short-circuit detection	Detected (input section).	
External load power supply short-circuit detection	Detected (output section).	
Isolation method	No isolation	
Input indicators	LEDs (yellow)	
Degree of protection	IEC standard IP54	
Installation	Screw installation (M4)	
Power supply type	Network power supply	
Communications power supply current consumption (See note.)	115 mA max.	175 mA max.
Weight	247 g max.	236 g max.

Note The current consumption is for Bit Slave Unit communications current when all inputs and outputs are OFF, i.e., it does not include input device current consumption or output load current consumption. The communications power supply is also used for the I/O power supply for sensors and actuators. Be sure to consider the sensor and actuator current consumption and the number of sensors and actuators connected.
The power supply current consumption is expressed by the following formula.
Communications power supply current consumption = Bit Slave Unit communications current consumption + (Bit Slave Unit input current × number of inputs used) + (sensor current consumption x number of sensors used) + (actual load current ´ number of actuators used)

Component Names and Functions

CRT1B-MD04SLP/CRT1B-MD04SLP-1



Communications Indicators

Refer to *SECTION 2 Basic Slave Unit Specifications???*.

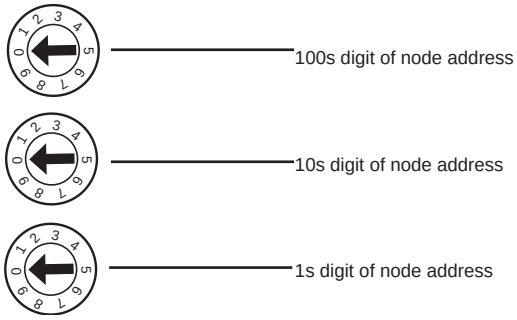
I/O Indicators

The meanings of the I/O indicators are given in the following table.

Name	LED status	I/O status	Meaning
0 to 3	Lit yellow.	Input/output ON	The input/output is ON.
	Not lit.	Input/output OFF	The input/output is OFF.
SHT0	Lit red.	Sensor power supply short-circuit	The sensor power supply is short-circuited.
SHT1	Lit red.	Load power supply short-circuit detection	The load power supply is short-circuited.

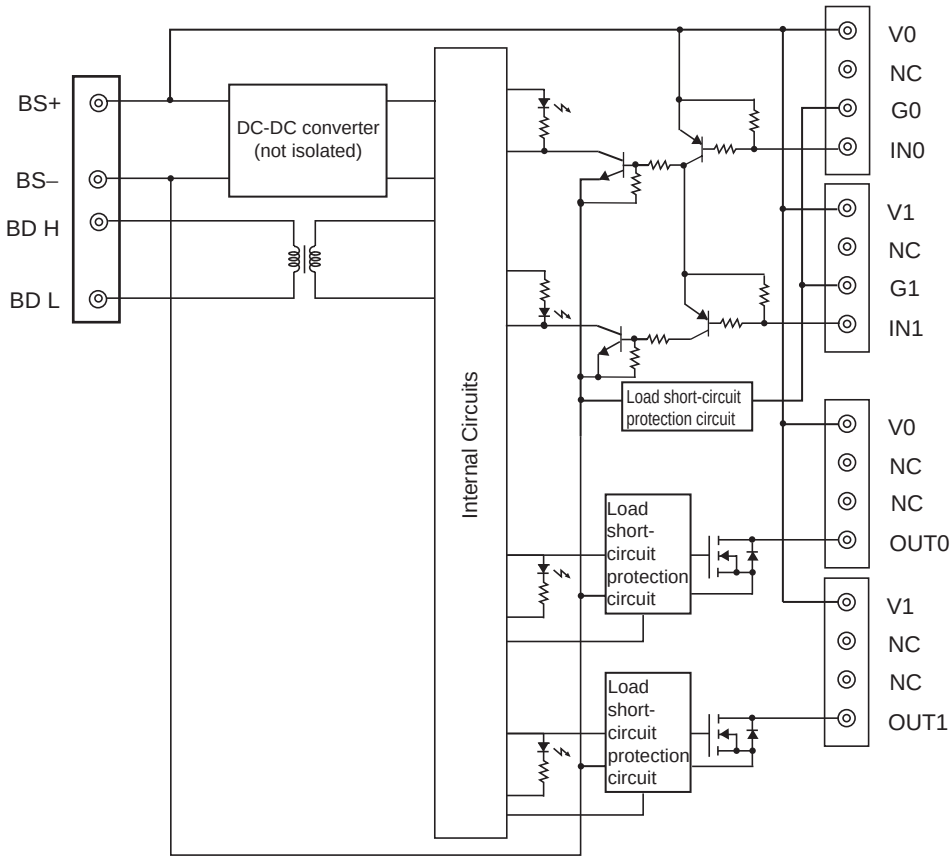
Setting the Node Address

The node address is set as a decimal number with the 100s digit set on the top rotary switch, the 10s digit set on the middle rotary switch, and the 1s digit set on the bottom rotary switch. If an illegal address is set, the software setting (default: 0) will be used at startup. The setting on the rotary switches is read when power is turned ON.

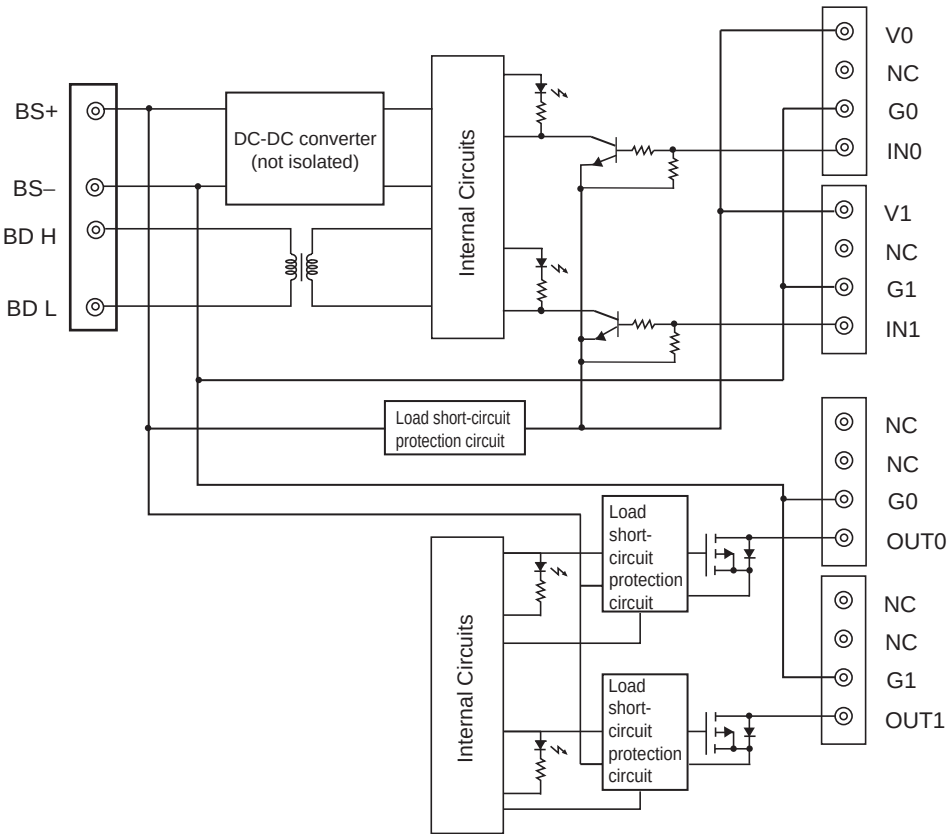


Internal Circuits

CRT1B-MD04SLP



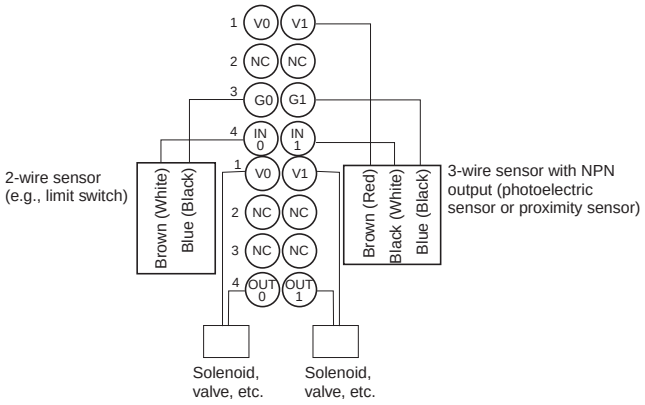
CRT1B-MD04SLP-1



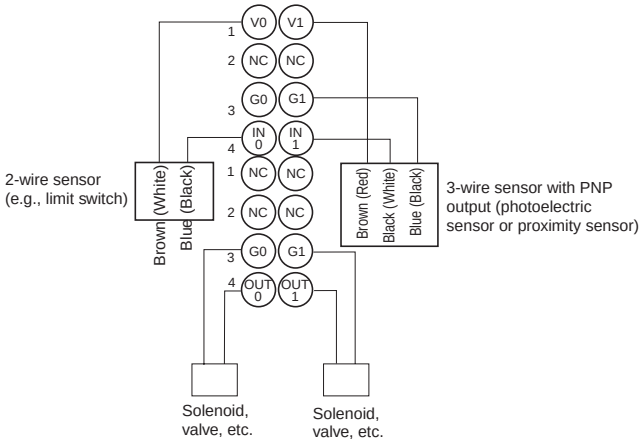
Wiring

The I/O connector section uses industry standard connectors (e-CON). Pins arrangements and signals are shown below.

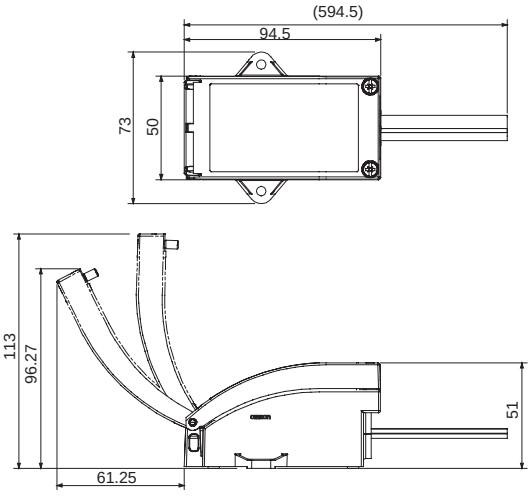
CRT1B-MD04SLP



CRT1B-MD04SLP-1



Dimensions (Same for CRT1B-MD04SLP and CRT1B-MD04SLP-1)



SECTION 7
NTLP Heading Here

ntlpSome intro text here...

7-1 ntlp

7-2 ntlp

7-3 ntlp

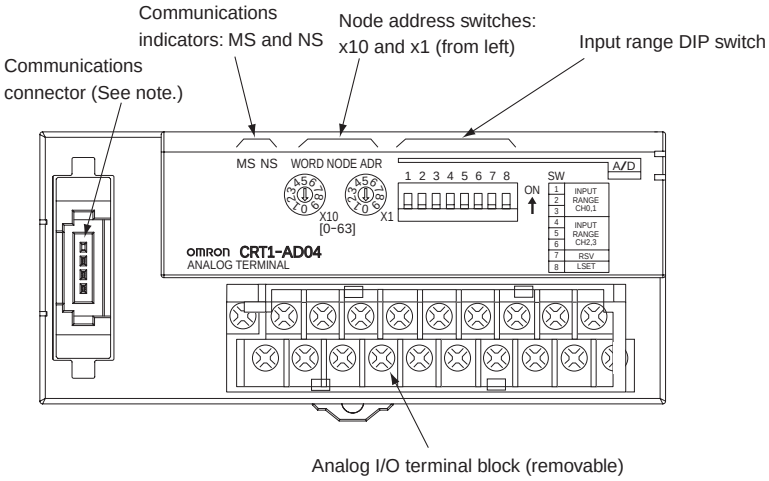
7-4 Analog Input Units

7-4-1 4-point Analog Input Unit

Specifications

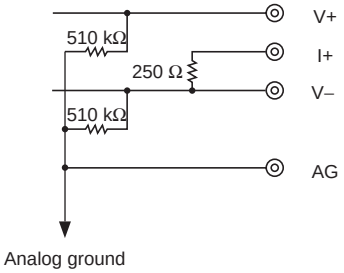
Item		Specification	
Model		CRT1-AD04	
Input signal range		Voltage input	Current input
		0 to 5 V 1 to 5 V 0 to 10 V –10 to 10 V	0 to 20 mA 4 to 20 mA
Maximum signal input		±15 V	±30 mA
Input impedance		1 MΩ min.	Approx. 250 Ω
Resolution		1/6000 (full scale)	
Overall accuracy	25°C	±0.3% FS	±0.4% FS (See note.)
	–10 to 55°C	±0.6% FS	±0.8% FS (See note.)
Analog conversion cycle		For 4 inputs: 4 ms max.	
AD converted data		±10 V FS: F448 to 0BB8 hex (–3000 to 3000 decimal) Other ranges FS: 0000 to 1770 hex (0 to 6000 decimal) AC conversion range: Range ±5% FS	
Isolation method		Photocoupler (between inputs and communications line) Input signals are not isolated from each other.	
Installation		DIN Track	
Power supply type		Multi-power supply	
Communications power supply current consumption		At 24 V: 110 mA max. At 14 V: 175 mA max.	
Weight		153 g	

Component Names and Functions



Note A Branch Line Pressure-welded Connector or Terminal Block Adapter (DCN4-TB4) can be connected to the communications connector.

Internal Circuits



Terminal Arrangement

Communications Connector

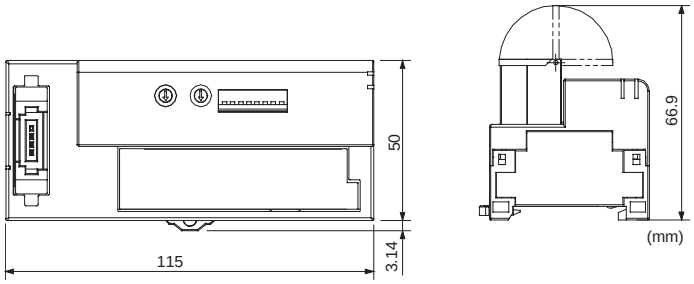
BS+	Communications power supply +
BDH	Communications data high
BDL	Communications data low
BS–	Communications power supply -

I/O Terminal Block

V0+	I0+	V1+	I1+	V2+	I2+	V3+	I3+	NC
AG–	V0–	AG–	V1–	AG–	V2–	AG–	V3–	NC

V0 to V3: Voltage input terminals
I0 to I3: Current input terminals
AG: Analog ground
NC: Do not connect

Dimensions



7-5 Analog Output Units

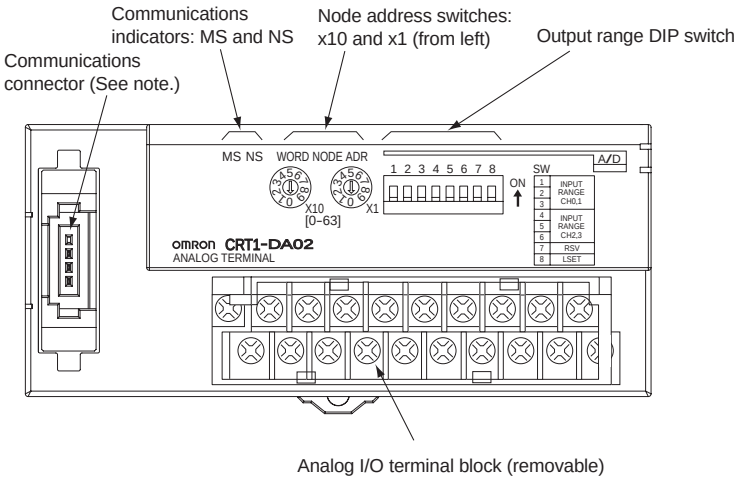
7-5-1 2-point Analog Input Unit

Specifications

Item		Specification	
Model		CRT1-DA02	
Output signal range		Voltage output	Current output
		0 to 5 V 1 to 5 V 0 to 10 V –10 to 10 V	0 to 20 mA 4 to 20 mA
Allowable load resistance for external outputs		1 kΩ min.	600 Ω max.
Resolution		1/6000 (full scale)	
Overall accuracy	25°C	±0.4% FS	±0.4% FS (See note.)
	–10 to 55°C	±0.8% FS	±0.8% FS (See note.)
Conversion time		For 2 inputs: 2 ms max.	
DA converted data		±10 V full scale: F448 to 0BB8 hex (–3000 to 3000 decimal) Other ranges full scale: 0000 to 1770 hex (0 to 6000 decimal) AC conversion range: Range ±5% FS	
Isolation method		Photocoupler (between outputs and communications line) Output signals are not isolated from each other.	
Installation		DIN Track	
Power supply type		Multi-power supply	
Communications power supply current consumption		At 24 V: 125 mA max. At 14 V: 205 mA max.	
Weight		155 g	

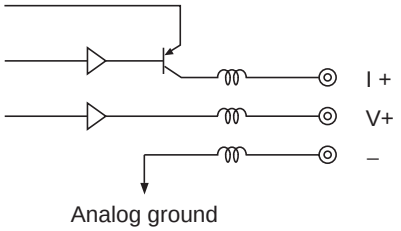
Note The specified accuracy does not apply to currents of less than 0.2 mA when a 0 to 20 mA output range is used.

Component Names and Functions



Note A Branch Line Pressure-welded Connector or Terminal Block Adapter (DCN4-TB4) can be connected to the communications connector.

Internal Circuits



The negative terminals for outputs 0 and 1 are connected internally.

Wiring

Communications Connector

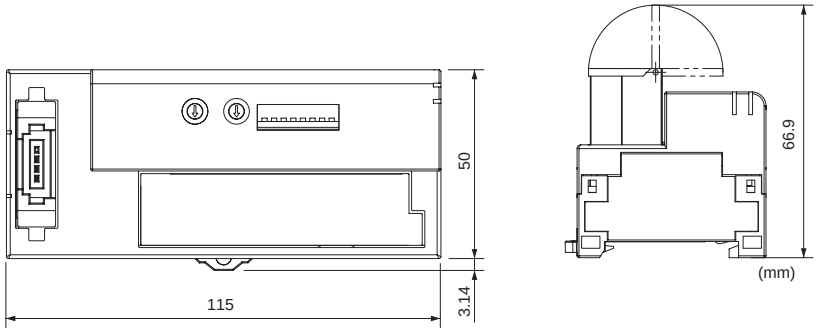
BS+	Communications power supply +
BDH	Communications data high
BDL	Communications data low
BS–	Communications power supply –

I/O Terminal Block

	V0+	I0+	V1+	I1+	V2+	I2+	V3+	I3+	NC
AG–	V0–	AG–	V1–	AG–	V2–	AG–	V3–	NC

V0 to V3: Voltage input terminals
I0 to I3: Current input terminals
AG: Analog ground
NC: Do not connect

Dimensions



SECTION 8
NTLP Heading Here

ntlpSome intro text here...

8-1 ntlp

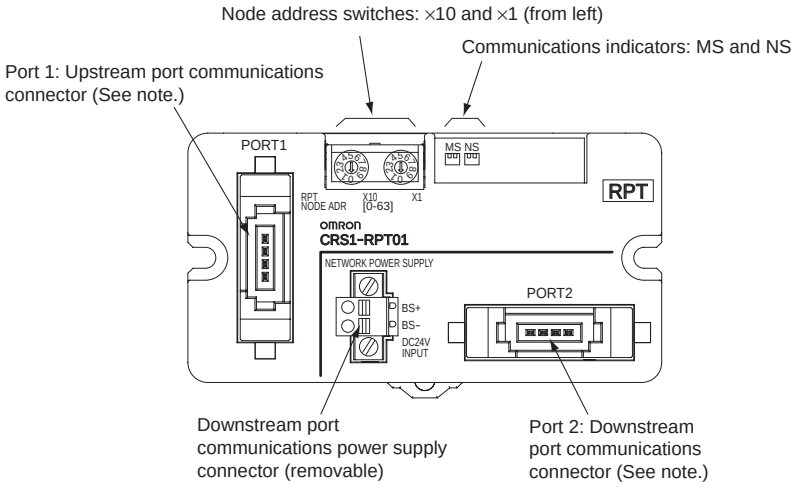
8-2 Repeater Unit

8-2-1 Repeater Unit (CRS1-RPT01)

Specifications

Item	Specification
Model	CRS1-RPT01
Communications ports	Upstream port (port 1): Main line or secondary main line Downstream port (port 2): Secondary main line (Can be wired with the same communications specifications as the Master Unit.) Different types of communications cable can be connected to the upstream and downstream ports.
Maximum number of layers	Up to two extra segment layers can be created (i.e., up to 2 Repeater Units are allowed between a Slave Unit and the Master Unit).
Number of nodes per network (per Master Unit)	64 nodes
Number of nodes per main line or secondary main line	32 nodes
Communications power supply connector	One downstream communications port power supply connector **Note** Communications power for the Repeater Unit is supplied from the BS+ and BS- terminals on the upstream port.
Communications power supply connector allowable current capacity	5 A max.
Noise immunity	Conforms to IEC 61000-4-4 2kV (power line)
Vibration resistance	10 to 150 Hz with double-amplitude of 0.7 mm or 50 m/s^2
Shock resistance	150 m/s^2
Dielectric strength	500 VAC (between isolated circuits)
Insulation resistance	20 MΩ min. (between isolated circuits)
Ambient operating temperature	–10 to 55°C
Ambient operating humidity	25% to 85% (with no condensation)
Ambient operating atmosphere	No corrosive gases
Storage temperature	–25 to 65°C
Storage humidity	25% to 85% (with no condensation)
Installation	35-mm DIN Track or M4 screws
Weight	73 g
Communications power supply voltage	14 to 26.4 VDC
Communications power supply current consumption	45 mA max.

Component Names and Functions



Note A Branch Line Pressure-welded Connector or Terminal Block Adapter (DCN4-TB4) can be connected to the communications connector.

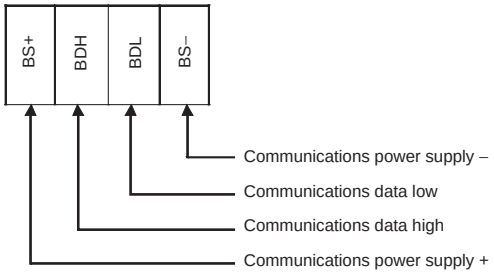
Terminal Arrangement

Upstream Port Communications Connector (Port 1)

BS+	Communications power supply +
BDH	Communications data high
BDL	Communications data low
BS–	Communications power supply –

Note The BS+ and BS– terminals are the communications power for the Repeater Unit.

Downstream Port Communications Connector (port 2)



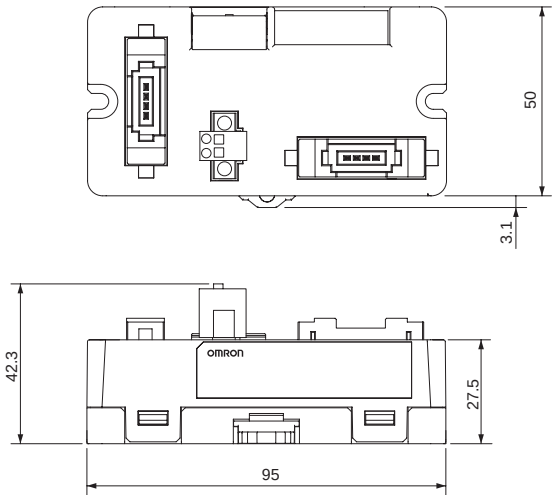
Downstream Port Communications Power Supply Connector

This connector supplies communications power to Slave Units and Repeater Units connected to the downstream communications connector.

BS+	Communications power supply +
BS–	Communications power supply –

Note Communications power for the Repeater Unit is supplied from the BS+ and BS– terminals on the upstream port communications connector (port 1).

Dimensions



SECTION 9
NTLP

ntlpSome intro text here...

9-1 ntlp

ntlp

9-1-1 ntlp

ntlp

ntlp

ntlp: screen 9-2top

ntlp ntlp

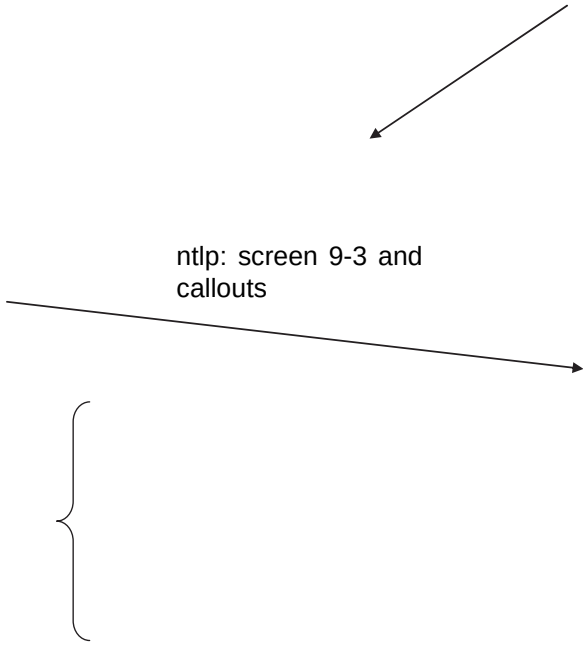
ntlp: screen 9-2bottom

9-1-2 ntlp

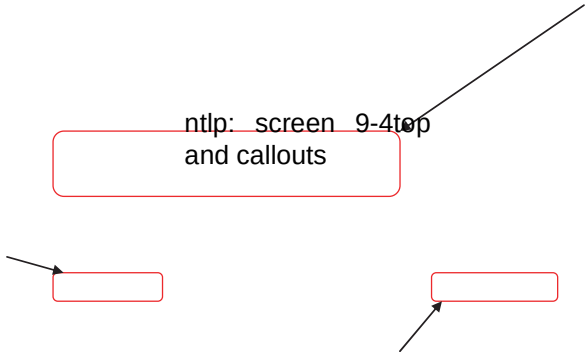
ntlp

Note ntlp

ntlp



ntlp ntlp



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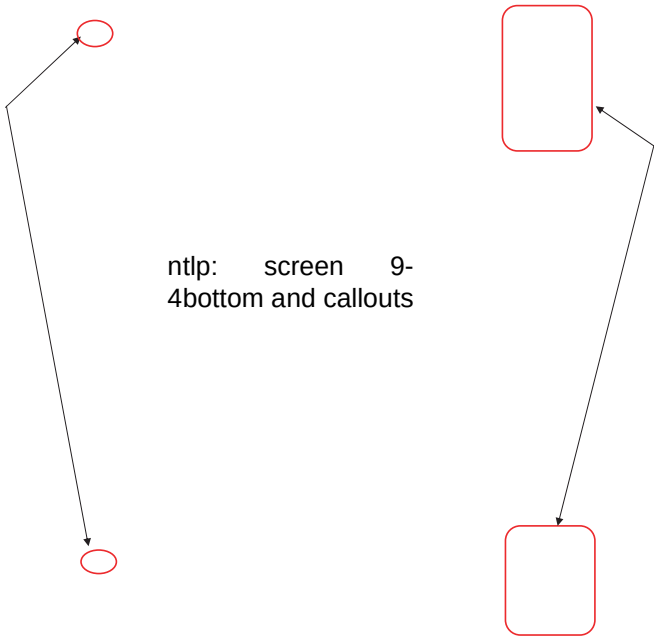
ntlp



ntlp: screen 9-4bottom and callouts

9-1-3 ntlp

ntlp

ntlp

ntlp: screen 9-5

Note ntlp

9-2 ntlp

ntlp

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ntlp

9-3 ntlp

ntlp

9-3-1 ntlp

ntlp

Note ntlp

9-3-2 ntlp

ntlp

1,2,3... 1. ntlp
2. ntlp

ntlp: screen 9-7

3. ntlp

ntlp	ntlp
ntlp	ntlp

ntlp: screen 9-8

4. ntlp
5. ntlp

9-3-3 ntlp

ntlp ntlp

Note (1) ntlp
(2) ntlp

ntlp ntlp

1,2,3... 1. ntlp
2. ntlp
3. ntlp

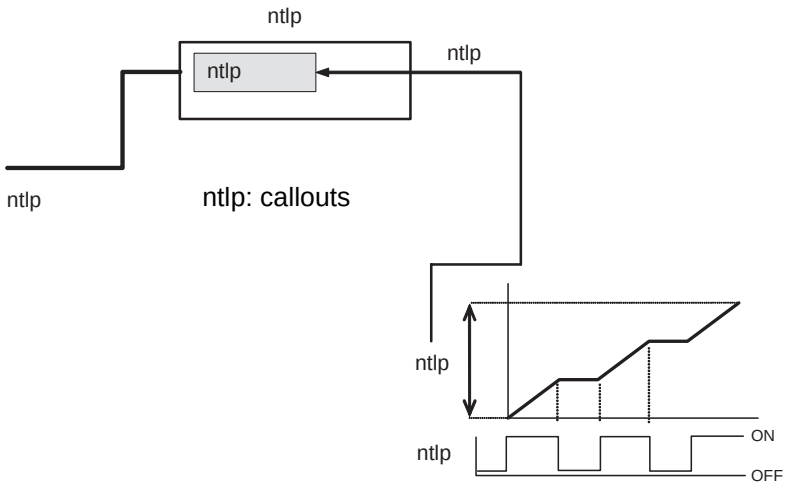
ntlp: screen 9-9

4. ntlp
5. ntlp

9-3-4 ntlp

ntlp ntlp

- ntlp
- ntlp



Note ntlp

ntlp ntlp

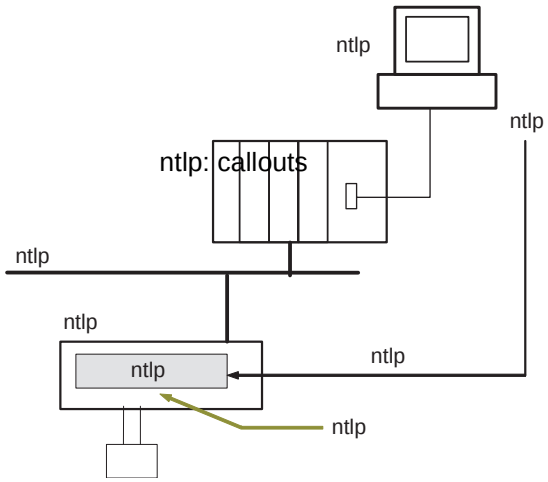
1,2,3... 1. ntlp
2. ntlp
3. ntlp

ntlp: screen 9-11

4. ntlp
5. ntlp

9-3-5 ntlp

ntlp ntlp



ntlp ntlp

ntlp

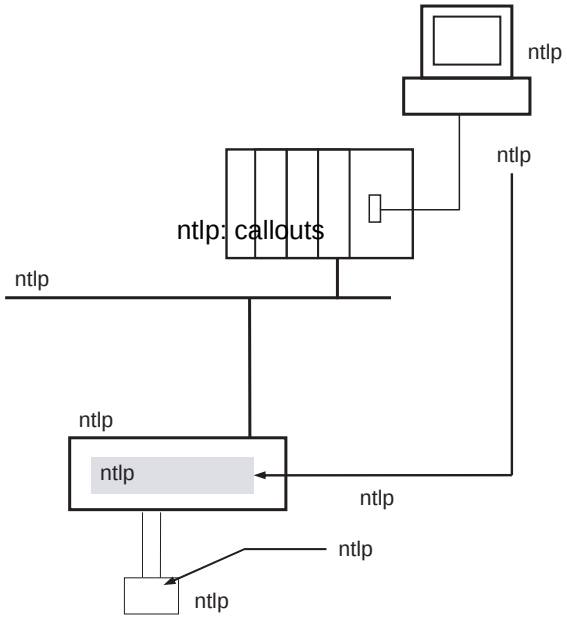
1,2,3... 1. ntlp
2. ntlp
3. ntlp

ntlp: screen 9-12

4. ntlp
5. ntlp
6. ntlp

9-3-6 ntlp

ntlp ntlp



ntlp ntlp

ntlp

1,2,3... 1. ntlp
2. ntlp
3. ntlp

ntlp: screen 9-15top

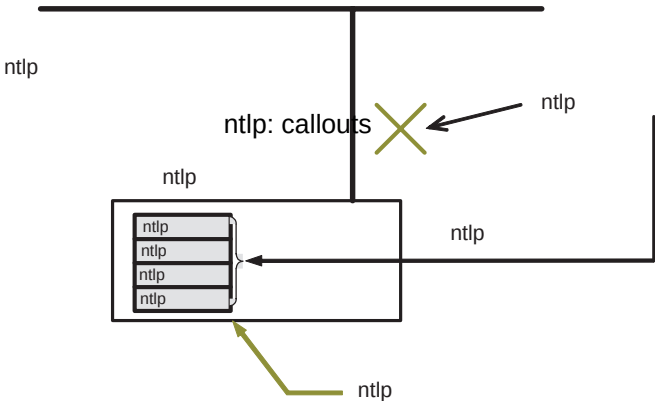
4. ntlp

ntlp: screen 9-15bottom

5. ntlp

9-3-7 ntlp

ntlp ntlp



ntlp ntlp

1,2,3... 1. ntlp
2. ntlp

ntlp: screen 9-16

3. ntlp

ntlp: screen 9-17

Note ntlp

9-3-8 ntlp

ntlp ntlp

ntlp

1,2,3... 1. ntlp
2. ntlp

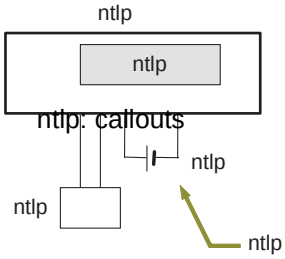
ntlp: screen 9-18

3. ntlp

9-4 ntlp

9-4-1 ntlp

ntlp ntlp



ntlp: callouts

Note ntlp

ntlp ntlp

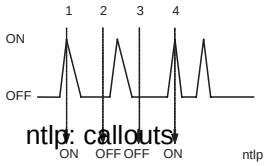
1,2,3... 1. ntlp
2. ntlp

ntlp: screen 9-19

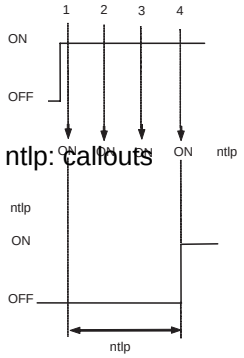
9-4-2 ntlp

ntlp ntlp

ntlp ntlp

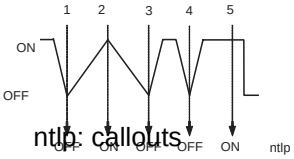


ntlp: callouts



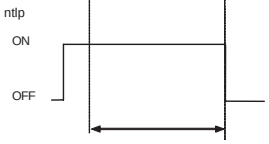
ntlp: callouts

ntlp ntlp



ntlp: callouts

ntlp: callouts



ntlp ntlp

1,2,3... 1. ntlp
2. ntlp
3. ntlp

ntlp: screen 9-21

4. ntlp
5. ntlp

9-4-3 ntlp

ntlp ntlp

ntlp ntlp

1,2,3... 1. ntlp
2. ntlp
3. ntlp

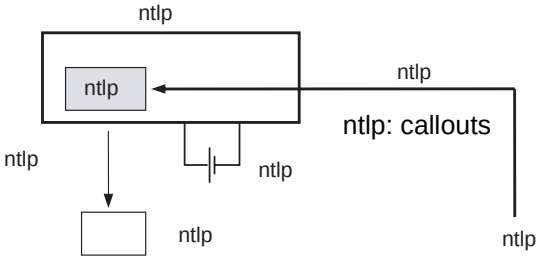
ntlp: screen 9-22

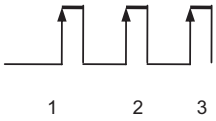
4. ntlp
5. ntlp

9-4-4 ntlp

ntlp ntlp

- ntlp
- ntlp





Note (1) ntlp
(2) ntlp

ntlp ntlp

1,2,3... 1. ntlp
2. ntlp

3. ntlp

ntlp: screen 9-24top

4. ntlp

ntlp: screen 9-24bottom

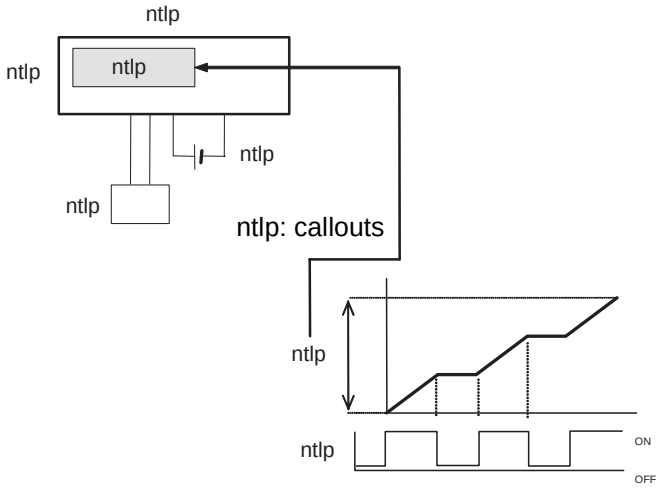
5. ntlp
6. ntlp

9-4-5 ntlp

ntlp

ntlp

- ntlp
- ntlp

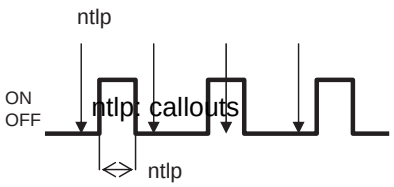


Note (1) ntlp
(2) ntlp

(3) ntlp

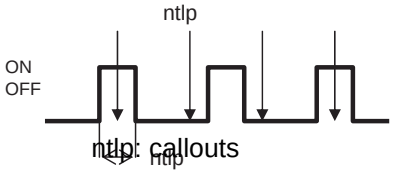
■ **ntlp**

ntlp



ntlp

ntlp



ntlp

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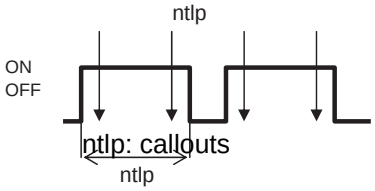
ntlp



ntlp

ntlp ntlp

1,2,3... 1. ntlp
2. ntlp
3. ntlp

ntlp: screen 9-26

4. ntlp

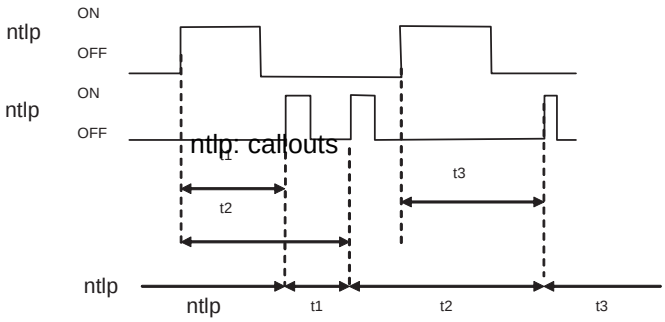
ntlp: screen 9-27

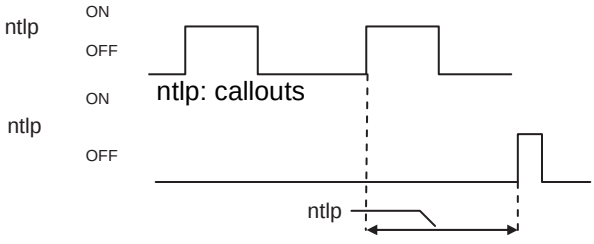
5. ntlp
6. ntlp

9-4-6 ntlp

ntlp ntlp

- ntlp





ntlp

1,2,3... 1. ntlp
2. ntlp

3. ntlp

ntlp: screen 9-29top

4. ntlp

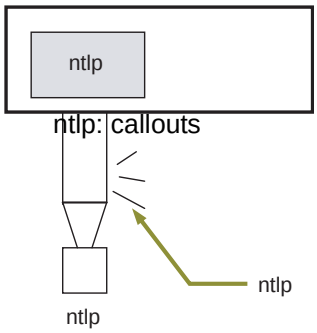
ntlp: screen 9-29bottom

5. ntlp
6. ntlp

9-5 ntlp

9-5-1 ntlp

ntlp ntlp



Note ntlp

- ntlp
- ntlp

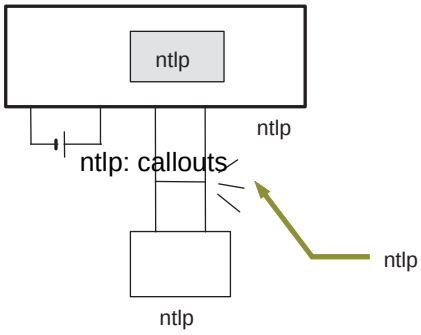
ntlp ntlp

1,2,3... 1. ntlp
2. ntlp

ntlp: screen 9-31

9-5-2 ntlp

ntlp ntlp



Note ntlp

ntlp ntlp

ntlp ntlp

1,2,3... 1. ntlp
2. ntlp

ntlp: screen 9-33tp[

3. ntlp

ntlp: screen 9-33bottom

SECTION 10
Troubleshooting and Maintenance

This section provides troubleshooting information that can be used in the event a problem occurs in CompoNet Slave Unit operation. It also provides information on maintenance that should be performed to ensure optimum application of the CompoNet Slave Units.

10-1 Indicator Meanings and Troubleshooting

MS and NS indicators	Meaning		Remarks
 Lit green  Lit green	Remote I/O communications or message communications are in progress.	Remote I/O communications are being executed.	Either remote I/O communications, message communications, or both are being executed. Status is normal.
 Lit green  Not lit	Synchronizing speed.	Waiting for connection with Master Unit.	If only certain Slave Units show this status, check that the baud rate is the same and then restart the Slave Units.
 Lit green  Flashing green	Waiting for a connection.	Waiting for a connection with the Master Unit to be established.	
 Lit red  Not lit	Watchdog timer error	A watchdog timer error has occurred in the Slave Unit.	Replace the Slave Unit. Alternatively, check the Expansion Unit connection.
 Flashing red  Not lit	Illegal switch setting	A DIP switch or other switch setting is illegal.	Check the switch settings then restart the Slave Units.
 Lit green  Lit red	Configuration error	• The same node address as the Master Unit is being used. • Repeater Unit configuration error	Check that the node address is not duplicated, check the Repeater Unit configuration, and then restart the Slave Units.
 Lit green  Flashing red	Communications timeout	---	Check the following items then restart the Slave Units: Is the baud rate the same for the Master Unit and Slave Units? Is the cable length (main line/branch lines) OK? Is the cable disconnected or loose? Is there terminating resistance on both ends of the main line? Is there too much noise?

10-2 Troubleshooting

10-2-1 Troubleshooting for Errors Shown by Indicators

Indicators Are Lit or Flashing Red

Problem	Cause and possible corrections
MS indicator is lit red.	• The Slave Unit is malfunctioning. Replace the Slave Unit. • The Expansion Unit is disconnected. Check the Expansion Unit connection.
MS indicator is flashing red.	• The DIP switch or other setting is illegal. Check the switch settings then restart the Slave Unit. • There is an error in the Slave Unit's non-volatile memory data. Double-click the icon for the Slave Unit in the Configurator. The Edit Device Parameters Window will open. Click the ??? **Default Setting** Button and then click the **Reset** Button. Replace the Slave Unit if the MS indicator keeps flashing red even after the data has been returned to the default settings.
The NS indicator lights red without flashing green after the MS indicator lights green.	Check the following items, and then restart the Slave Unit with the error: • Check for node address duplication or Repeater Unit configuration errors. Check all node addresses and check the Repeater Unit configuration and change the settings if required. • Refer to the next item "The NS indicator lights green momentarily and then changes to red". • Replace the Slave Unit if its NS indicator is always lit red.
The NS indicator lights green momentarily and then changes to red. The NS indicator lights green momentarily and then changes to flashing red.	Check the following items then restart the Slave Unit with the error: • Check that terminating resistance (121 Ω) is connected to both ends of the network's main line. If the correct terminating resistance is not set, connect terminating resistance of 121 Ω. • Check that all Slave Units are set correctly. • Check that the communications cable is wired correctly. • Check that the power supply cable and power supply are wired correctly and that the settings are correct. • Check connector wiring for all nodes to make sure that the communications cable and power supply cables are not disconnected. • Check that the communications power is supplied correctly. • If there are devices in the vicinity that generate noise, implement noise countermeasures for the Master Unit and Slave Units and the communications cable. • If using an OMRON Master Unit, refer to the manual for that Master Unit if an error has occurred in the Master Unit. If using a Master from another manufacturer, refer to the user's manual for that product if an error has occurred in the Master. • Replace the Slave Unit if its NS indicator is always lit red.

Cannot Participate in Network

Problem	Cause and possible corrections
NS indicator remains not lit and status does not change.	Check that all Slave Unit connectors are connected correctly. Check that the Master Unit is operating correctly. If using an OMRON Master Unit, check the Master Unit mode and the Slave Unit node addresses. If using a Master from another manufacturer, refer to the user's manual for that Master. Check that the communications cable is wired correctly. Check that the power supply cable and power supply are wired correctly and that the settings are correct. Check connector wiring to make sure that the communications cable and power supply cables are not disconnected.

Problem	Cause and possible corrections
NS indicator remains lit green and status does not change.	Check that the Master Unit is operating correctly. Refer to the manual for the Master Unit. Check that the Slave Unit is registered in the Master Unit registration table.
The NS indicator alternates between flashing green and being lit green. Alternatively, the NS indicator alternates between flashing red and flashing green.	Check the following items and take corrective measures based on the Master Unit indicator display. • Re-register the registration table. • Check that the Slave Unit I/O area is not duplicated with the I/O area of another Slave Unit. If the I/O area is duplicated, change the node address so that it is no longer duplicated. • Check that the Slave Unit I/O area is not outside the area permitted by the Master Unit. Change the node address if the I/O area is outside the permitted area.

10-2-2 Troubleshooting by Slave Unit Type

Model	Problem	Cause	Possible correction
All Slave Units	The MS and NS indicators are not lit green.	Refer to *8-2-1 Repeater Unit (CRS1-RPT01)*.	---
	The Network Power Voltage Drop Flag does not turn ON even if the network power supply voltage drops.	The monitor value for the network power supply voltage is set too low. **Note** The default setting is 14 V or less.	Increase the network power voltage monitor value.
	The Network Power Voltage Drop Status is ON even though the network power supply voltage should be appropriate.	The monitor value for the network power supply voltage is set too high.	Decrease the network power voltage monitor value.
	Cannot set the network power voltage monitor value.	The attempted setting is outside the setting range (14 to 26.4 V).	Set the voltage inside the 14 to 26.4-V range.
	Cannot set the I/O comment or Unit comment.	The comment exceeds 32 characters.	Set a comment within 32 characters.
	The status for Unit Maintenance Date and Connected Device Maintenance Date do not turn ON.	The status flag will be OFF regardless if the monitor value is set to 0 (function not executed).	Set the monitor value to a value other than 0.
	When the Unit power was turned ON again, the following values did not change to the values from immediately after the power was turned OFF. Digital I/O Slave Units: Unit ON Time and Maintenance Counter	The Maintenance Counter value is stored in internal nonvolatile memory once every 6 minutes while the power is ON. Execute ??? ***Save Maintenance Counter*** to save the value. If the power is turned OFF without executing saving the maintenance counter, the value saved previously (from up to 6 minutes earlier) will be read.	Execute ??? ***Save Maintenance Counter*** in the CRT1-series Support Software Maintenance Information Window before turning OFF the power.

Model	Problem	Cause	Possible correction
All models other than Analog I/O Slave Units	The Maintenance Counter returned to 0.	• The Maintenance Counter will return to 0 if the Unit is reset. • The Maintenance Counter will always return to 0 when the setting is switched between the Total ON Time Monitor Function and the Contact Operations Monitor Function.	---
	Some functions do not change even after parameters have been edited or set.	The functions that have been changed are enabled only after the power is cycled.	Cycle the power or reset the Configurator.
	The Maintenance Counter is not counting even though outputs are turned ON.	The I/O power supply is OFF.	Check that the I/O power supply is turned ON.
CRT1-ID16 (-1) and CRT1-OD16 (-1) Slave Units to which Expansion Units can be mounted	I/O communications stopped after mounting or removing an Expansion Unit and turning ON the power.	The number of I/O points increase or decrease when Expansion Units are mounted or removed. The number of I/O points may not match the I/O table registered in the Master Unit.	Change the Master Unit I/O table settings.
	The MS indicator is lit red after mounting or removing an Expansion Unit online.	Expansion Units cannot be mounted or removed online.	Turn OFF the power before mounting or removing Expansion Units.
Slave Units with Run Time Monitor Function **CRT1-ID16 (-1) (See note.)** **CRT1-OD16 (-1) (See note.)** **CRT1B-ID02S (-1)** **CRT1B-OD02S (-1)** **CRT1B-ID02SP (-1)** **CRT1B-OD02SP (-1)** **CRT1B-ID04SP (-1)** **CRT1B-MD04SLP (-1)** **Note** An Expansion Unit is mounted enabling use as an I/O Unit.	The Run Time Monitor does not show the expected values.	• If the input filter is set, there is a delay with the ON or OFF time. • The run time ON or OFF edge selection may not be on the intended setting. • The selected run time combination is not supported. If the run time monitor does not show the expected values, the settings may be different from the intended settings. The precision is ±6 ms.	• Use the Run Time Monitor function considering the filter setting or set the filter constant to 0 ms. • Check the run time combination set for Slave Units for which the run time edge can be set.
	The status flag for the Run Time Monitor value has been turns ON and OFF.	The Run Time Flag is refreshed each measurement cycle, when the run time is compared with the monitor value. If the Run Time Flag turns ON for one cycle it will turn OFF when refreshed if the run time has dropped below the monitor value. There is another flag that holds the contents of monitor value exceeded flags.	---
Slave Units with outputs **CRT1-OD16 (-1)** **CRT1B-OD02S (-1)** **CRT1B-OD02SP (-1)** **CRT1B-MD04SLP (-1)**	Cannot hold outputs when communication errors occur.	The Unit is set to clear outputs for communications errors.	Change the setting to hold outputs for communications errors.
	Cannot clear outputs when communication errors occur.	The Unit is set to hold outputs for communications errors.	Change the setting to clear outputs for communications errors.

Model	Problem	Cause	Possible correction
Slave Units with inputs **CRT1-ID16 (-1)** **CRT1B-ID02S (-1)** **CRT1B-ID02SP (-1)** **CRT1B-MD04SLP (-1)**	There is a delay with the ON and OFF timing for input values.	An input filter may be set.	Set the input filter value to 0. Alternatively, change the input filter to an appropriate value.
Slave Units with External Load Short-circuit Detection Function **CRT1B-OD02S (-1)** **CRT1B-OD02SP (-1)** **CRT1B-MD04SLP (-1)**	The short-circuit detection status does not turn OFF after an external load short-circuit has been detected, even though the error has been fixed.	The status will not turn OFF until the power for the node where the error was detected is reset.	Cycle the communications power after fixing the error.
All Analog I/O Slave Units	The status does not turn ON even if the monitor value is exceeded.	The required Analog Smart Function is not enabled. The status will be OFF regardless if the monitor value is set to 0.	Enable the required function. Set the monitor value setting to a value other than 0. Check the decimal point position then set the monitor value again.
	• The expected analog input value is not received or the expected analog output is not output after changing the input type, display mode, or unit. • The Unit does not operate as expected after changing the allocated I/O data or a function enable bit.	• The changes will not be enabled until the power is cycled or the CRT1-series Software Support is used to reset the Unit.	• Cycle the Unit power or reset using the Configurator.
All Analog I/O Slave Units	• The analog data values are different from expected or the analog data error is too large. • A disconnection is detected even though it is not disconnected.	• The I/O data function allocations are not correct. • The scaling function is operating. • The connected Sensor is different from the set input type. • The user calibration error is too large.	• Check again that the analog data type to be set is correctly allocated for the I/O data. • If using the Scaling function, check again that the scaling value is correct. • Remove the Scaling function if it has been allocated by mistake. • Check the input type again. • Execute user calibration again.
	Cannot set using external switches.	• SW8 is turned OFF (default).	• Turn ON SW 8.
	User calibration is not accepted.	• Attempted to calibrate with inputs outside the setting range.	• Calibrate again with the correct input voltage (current). • Change the calibration system if necessary.

Model	Problem	Cause	Possible correction
Analog I/O Slave Units (Inputs) **CRT1-AD04**	The disconnection display does not clear.	• The Sensor is disconnected.	• Restore the Sensor connection. • Check the connected Sensor and input type again.
	No disconnection display.	• Disconnection is not displayed for analog input terminals for ranges other than 1 to 5 V and 4 to 20 mA.	---
	The conversion cycle is too long.	• The AD conversion points setting is on the maximum (4 points). • The processing time gets longer each time a function is added.	• Reduce the number of points if some inputs are unnecessary and execute conversion again. • Delete any unused functions and execute conversion again.
Analog I/O Slave Units (Outputs) **CRT1-DA02**	The expected value is not held when communications errors occur.	• The output value that is set for communications errors is incorrect.	• Check the output value setting for communications errors.

10-3 Device Maintenance

This section describes everyday device maintenance, in particular cleaning methods, inspection methods, and how to replace Units.

10-3-1 Cleaning

Perform the following cleaning regularly to ensure the network is kept in the best condition possible.

- Wipe the network over with a soft, dry cloth when doing daily cleaning.
- If dirt remains even after wiping with a soft, dry cloth, wipe over with a cloth that has been wet with a sufficiently diluted detergent (2%) and wrung dry.
- Units will become stained if items such as rubber or vinyl products or tape are left on the Unit for long periods. Remove such items during regular cleaning.

Note Never use benzine, thinners, or other volatile solvents, or chemical cloths. The Unit coating may change if these products are used.

10-3-2 Inspections

Always perform periodic inspections to ensure the network is kept in the best possible condition.

Periodic inspections should occur every 6 months to a year. Periodic inspections should occur more frequently, however, for Units in environments subject to high temperatures, high humidity, or a lot of dust.

Materials Required for Inspections

The following materials are required to perform periodic inspections.

Materials Used Regularly

Phillips screwdrivers and flat-blade screwdrivers

Screwdrivers for communications connectors

Testers (or digital voltmeters)

Industrial alcohol and pure cotton cloth

Materials Sometimes Required

Synchroscope

Pen oscilloscope

Thermometer and hygrometer

Inspection Items

Periodically inspect the following items to ensure that they do not deviate from the criteria. If the items deviate from the criteria, adjust the environment so the criteria are met or adjust the Unit itself.

Inspection item	Inspection details	Criteria	Inspection method
Environment	Are the ambient and in-panel temperatures appropriate?	Refer to the specifications for each Slave Unit.	Thermometer
	Is the ambient and in-panel humidity appropriate?	Refer to the specifications for each Slave Unit.	Hygrometer
	Has dust collected?	No dust	Visual inspection

Inspection item	Inspection details	Criteria	Inspection method
Installation	Has the Unit been secured?	No looseness	Philips screwdriver
	Are the communications cable connectors inserted properly?	No looseness	Philips screwdriver
	Are the external wiring screws loose?	No looseness	Philips screwdriver
	Are the connection cables damaged?	No visible damage	Visual inspection

10-3-3 Handling Units When Replacing

Networks are constructed from a Master Unit and Slave Units. If a node is malfunctioning, this affects the entire network so the node should be replaced quickly. To restore network functions as quickly as possible, it is recommended that spare Units are kept on hand ready to replace malfunctioning Units immediately.

Precautions When Replacing Nodes

Heed the following precautions when replacing nodes after periodic inspection has revealed a problem.

Check that the new Unit does have errors after replacement.

If returning malfunctioning devices for repair, attach a detailed description of the malfunction to the device and send the device to the OMRON representative listed at the end of this manual or to your OMRON representative.

If contacts are defective, wipe them with a clean pure cotton cloth that has been soaked in industrial alcohol.

Settings after Node Replacement

After replacing a node, make the switch and other settings the same as before the node was replaced.