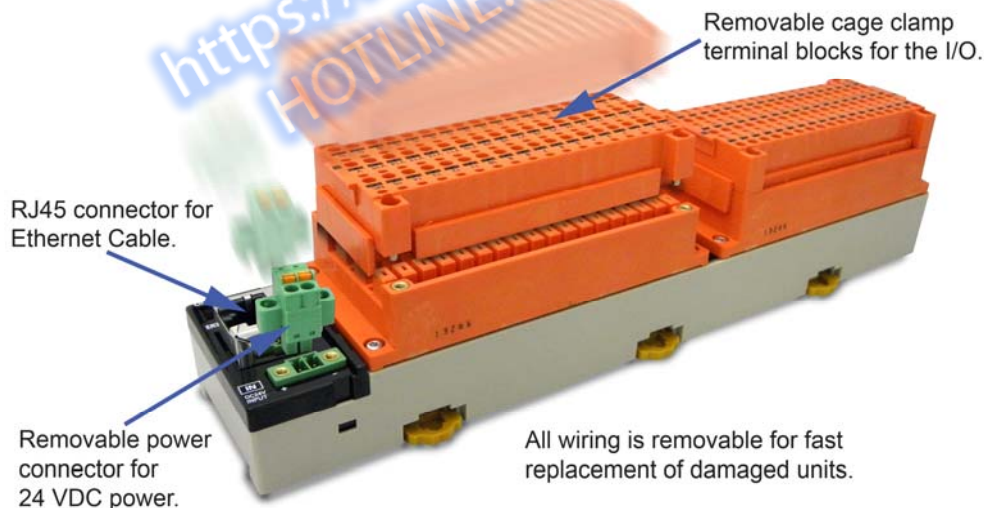


EtherNet/IP Remote I/O Blocks, Cage Clamp Connectors

# ERT1-□□32SLH-1

## High Density EtherNet/IP Remote I/O with Short and Open Circuit Detection

- **Simple & Fast Wiring** – Cage clamp terminals allow for easy & fast wiring saving setup time
- **3 Wire Termination** – for cleaner wiring and easier debugging
- **Cage Clamp Connections** – for vibration resistant wiring.
- **High Density Wiring** – small footprint saves panel space; 32 I/O, 24VDC, PNP--32 inputs, 32 outputs, or 16in/16out versions.
- **Tag Data Links** – Multi vendor communications using CIP messaging makes it easy to talk to Omron and third-party masters.
- **Auto Baud Rate** – simplifies installation, automatically detects the baud rate of a connected switch.
- **Node address can be set by rotary switches** – for fast maintenance, easy swap out.
- **Quick to service:** Removable cage clamp wiring blocks for fast replacement and less downtime.
- **Power connector is removable and so is the Ethernet cable** -for fast maintenance.
- **Status and Error LEDs for each input/output** - for fast troubleshooting.
- **EtherNet/IP conformance tested** – for interoperability with devices from other brands.



### Diagnostics that Pinpoint Wiring Shorts and Sensor Errors in Seconds Not Hours

The ERT1 I/O Block detects shorts at the sensor and prevents the short from affecting the rest of the inputs. It also has LEDs to tell you which input or output is shorted. It also has I/O bits back to the master telling you if an input or output is shorted or open (broken sensor or broken wire to sensor). Each group of 16 I/O has its own power terminals and the communications module has its own power terminals. This way the module can also tell you if power to the I/O terminals is lost.

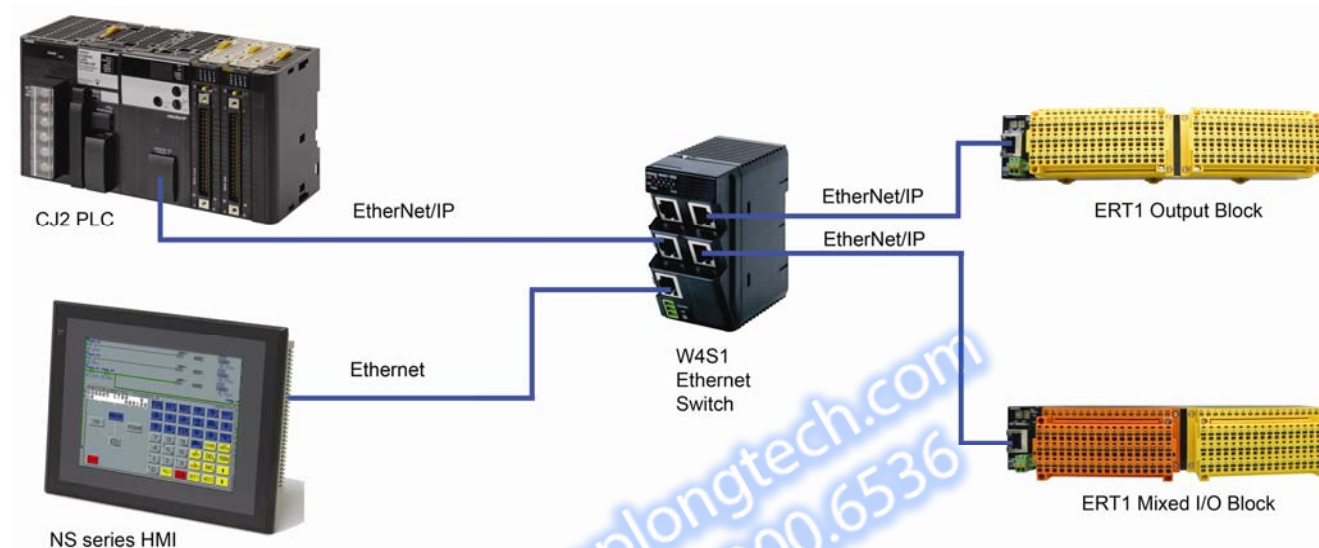
The LEDs are yellow for on, red for shorted, red flashing for disconnected, and off for off. The short and open circuit detection can be enabled or disabled for each input/output.

## International Approvals

CE, cULus Class I, Division 2, Groups A, B, C and D;  
IP20 rating for mounting inside an enclosure.



## System Configuration



## Ordering Information

### EtherNet/IP Remote I/O Units

Inputs	Outputs	I/O type	Output current	Input current	Model
32	--	PNP	--	6mA at 24VDC max.	ERT1-ID32SLH-1
--	32	PNP	0.5A/point 4.0 A/common	--	ERT1-OD32SLH-1
16	16	PNP	0.5A/point 4.0 A/common	6mA at 24VDC max.	ERT1-MD32SLH-1

### Slave I/O Block Compatibility with Omron Controllers

PLC Type	ERT1-ID32SLH-1	ERT1-OD32SLH-1	ERT1-MD32SLH-1
CJ2M-CPU3□	Yes	Yes	Yes
CJ2H-CPU6□-EIP	Yes	Yes	Yes
CJ1, NSJ with CJ1W-EIP21	Yes	Yes	Yes
CS1 with CS1W-EIP21	Yes	Yes	Yes
NJ501-1□00	Yes	Yes	Yes
CP1E	No	No	No
CP1L	No	No	No
CP1H	No	No	No

#### Notes:

- 1) All units require a 24 VDC power supply for power and 24VDC power for each bank of 16 I/O.
- 2) Minimum current for disconnection detection is 0.2mA.
- 3) Maximum current for short circuit detection is 50mA/point min.
- 4) Shorting of one input or output does not affect the rest of the inputs or outputs.
- 5) Short circuit and disconnection detection can be turned on for each I/O independently.

# Status Areas

## Generic Status Area

Generic Status Area which is Tag Set Input\_100.

The Digital I/O Slave Unit's Generic Status Area contains the following 16 bits.

Bit	Content	Description
00	I/O Power Supply Status Flag 1 OFF: I/O power is ON ON: I/O power is not ON	Turns ON when I/O power is not being supplied to terminal block 1.
01	I/O Power Supply Status Flag 2 OFF: I/O power is ON ON: I/O power is not ON	Turns ON when I/O power is not being supplied to terminal block 2.
02	Reserved	---
03	Reserved	---
04	Power or Load short-circuit detection flag: OFF: Normal ON: Short-circuit	Turns ON when there is a short in the power supply or load connection to the connected devices, including wiring mistakes and connected device failure.
05	Disconnection flag; OFF: Connected ON: Disconnected	Turns ON when the sensor power supply is not connected or the load is disconnected due to a wiring error, failure in the connected device, etc.
06	Reserved	---
07	Reserved	---
08	EEPROM data error flag: OFF: Normal ON: Error occurred	Turns ON when there is an error in the EEPROM data.
09	Reserved	---
10	Reserved	---
11	Reserved	---
12	Reserved	---
13	Reserved	---
14	Reserved	---
15	Reserved	---

## I/O Status Area

I/O Status Area which is Tag Set Input\_135.

The I/O Status Area for a Digital I/O Slave Unit consists of the following 8 bytes (64 bits). The I/O Status Area indicates the short-circuit and disconnection error status for each terminal.

Byte offset	Data							
	Bit 07	06	05	04	03	02	01	00
0	Power or Load Short-circuit Detection Flags for Terminal Block 1							
	07	06	05	04	03	02	01	00
1	Power or Load Short-circuit Detection Flags for Terminal Block 1							
	15	14	13	12	11	10	09	08
2	Power or Load Short-circuit Detection Flags for Terminal Block 2							
	07	06	05	04	03	02	01	00
3	Power or Load Short-circuit Detection Flags for Terminal Block 2							
	15	14	13	12	11	10	09	08
4	Disconnection Flags for Terminal Block 1							
	07	06	05	04	03	02	01	00
5	Disconnection Flags for Terminal Block 1							
	15	14	13	12	11	10	09	08
6	Disconnection Flags for Terminal Block 2							
	07	06	05	04	03	02	01	00
7	Disconnection Flags for Terminal Block 2							
	15	14	13	12	11	10	09	08

### 32 input module - ERT1-ID32SLH-1

There are 32 inputs which are input Tag Set Input\_6.

### 32 output module - ERT1-OD32SLH-1

There are 32 outputs which are input Tag Set Output\_36

### 16 input and 16 output module - ERT1-MD32SLH-1

There are 16 inputs which are input Tag Set Input\_5.

There are 16 outputs which are output Tag Set Output\_35.

Note: All of the open and short-circuit status bits are mapped in one of the I/O maps which allows the user to monitor I/O and status bits using polled I/O instead of having to use explicit messages. This makes getting diagnostic data much easier.

## Specifications

### Input Specifications

Item	Specifications
Input points	16 points
Internal I/O common	PNP
ON voltage	15 V DC min. (between each input terminal and 0 V)
OFF voltage	5 V DC max. (between each input terminal and 0 V)
OFF current	1.0 mA max.
Input current	6.0 mA max. at 24 V DC 3.0 mA max. at 17 V DC
ON delay time	1.5 ms max.
OFF delay time	1.5 ms max.
Number of circuits	16 points with one common circuit
Isolation method	Photocoupler isolation
Input indicators	LEDs (yellow)
Power supply short-circuit	Operates at 50 mA/point min.
Disconnection detection	Operates at 0.2 mA/point max.
Connections forms	Screw-less clamp terminal blocks (orange)

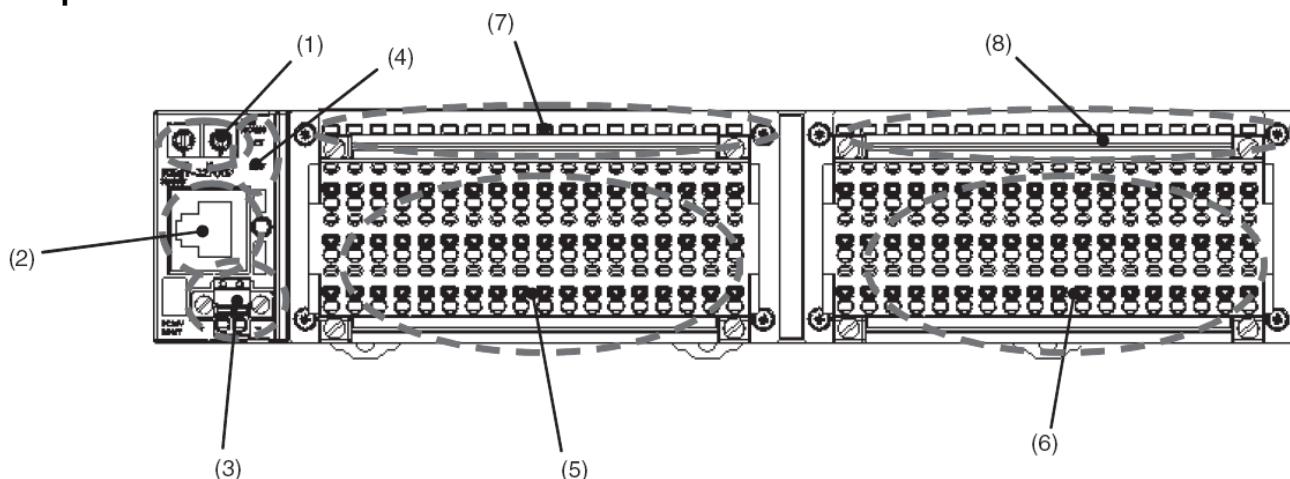
### Output Specifications

Item	Specification
Output points	16 points
Internal I/O common	PNP
Output current	0.5 A/point, 4.0 A/common
Residual voltage	1.2 V max. (0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.3 mA max. (24 V DC, between each output terminal and V terminal)
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	LEDs (yellow)
Power supply short-circuit protection	Operates when output current is exceeded.
Disconnection detection	Operates at current consumption of 3 mA/point max. (Not detected at 3 mA or less.)
Connection forms	Screw-less clamp terminal blocks (yellow)

### Common Specifications

Item	Specifications
Current consumption	Communications power supply (including internal circuits): 110 mA max.
Mounting	35 mm DIN track mounting
Weight	485 g max.
Standard accessories	Connector with lock screws FKMCP1.52STF3.5AUSOO (Phoenix Contact)

## Component Names and Functions



### (1) Rotary Switches

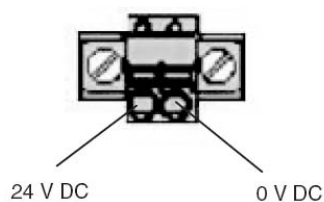
These switches are used to set the node address.

### (2) Ethernet Connector

The network communications cable is connected to this connector.

### (3) Power Supply Connector

The communications and Unit power supply is connected to this connector.



Terminal	Specification
+	24 V DC
-	0 V DC

### Applicable Ferrules

Manufacturer	Model	Applicable wire size
Phoenix Contact	AI-0.5-10	0.5 mm <sup>2</sup> (AWG 20)
Nihon Weidmuller	H 0.5/16 D	0.5 mm <sup>2</sup> (AWG 20)

### (4) Communications Indicators: MS and NS

These indicators show the Unit communications status and network communications status.

### (5) and (6) Terminal Blocks 1 and 2

The I/O devices and output power supply are connected to these terminal blocks.

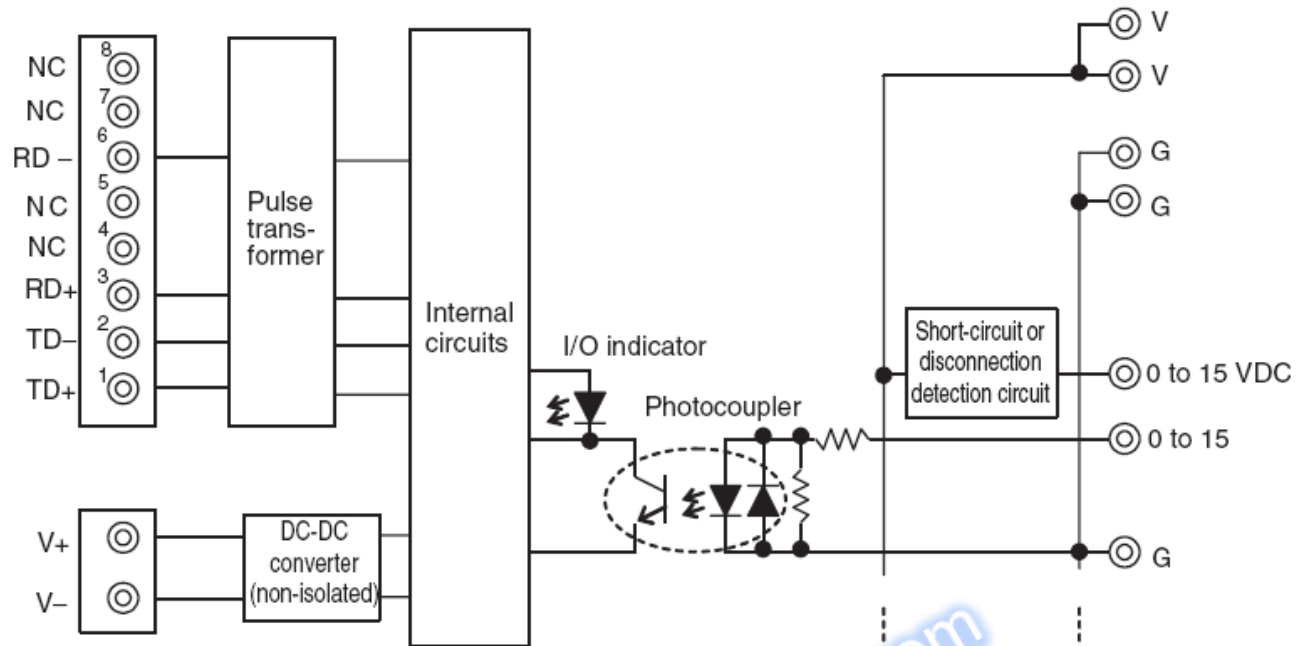
### (7) and (8) I/O Indicators

These indicators show the ON/OFF status of the I/O and the error status of connected devices.

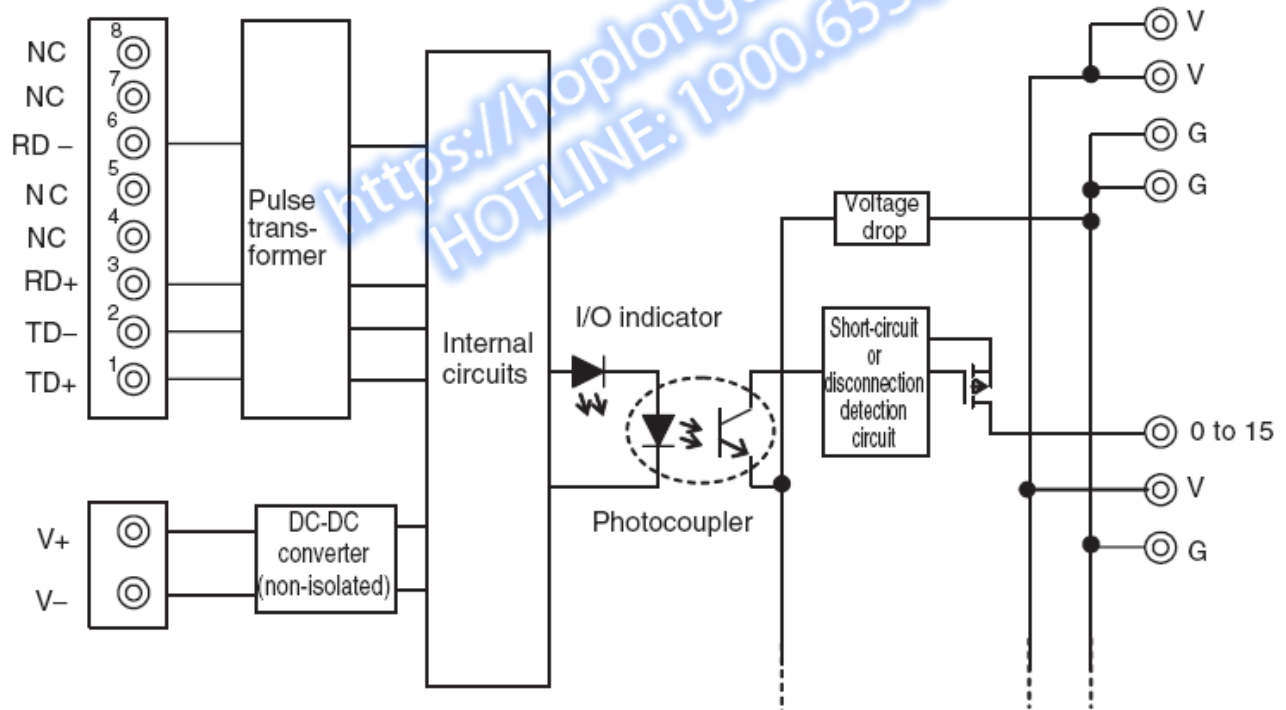


## Internal Circuits

### Inputs



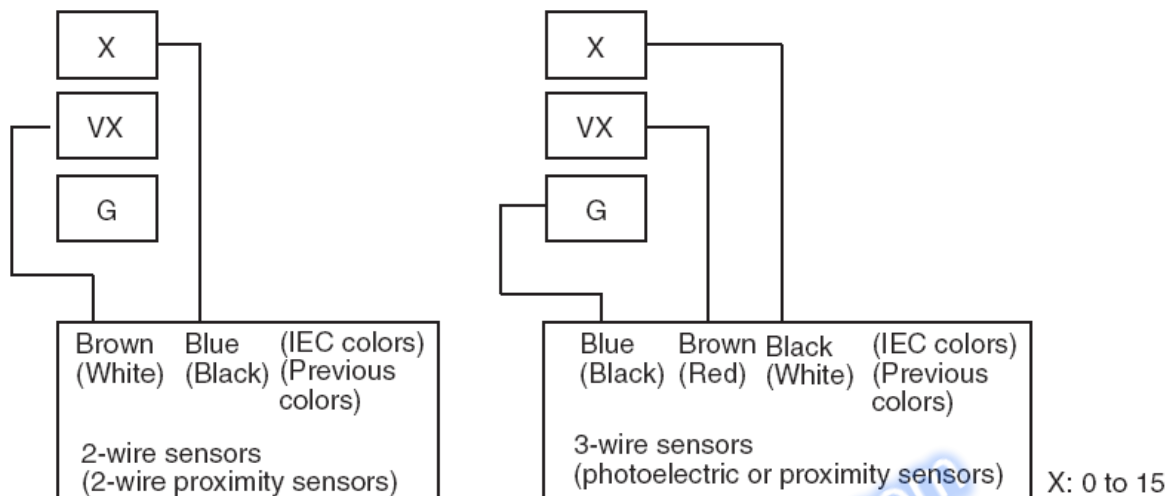
### Outputs



## Wiring

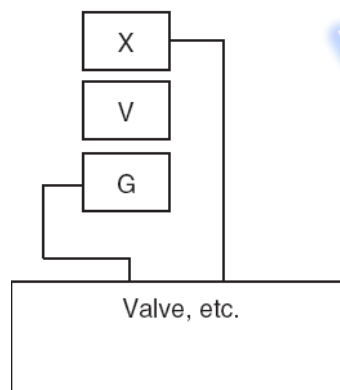
### Inputs

NC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NC
V	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V
G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G



### Outputs

NC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NC
V	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V
G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G



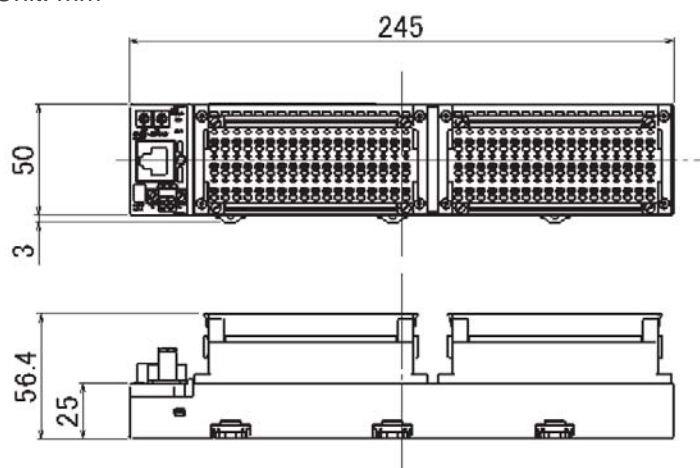
X: 0 to 15

# Common Specifications

## Dimensions

ERT1-ID32SLH-1, ERT1-OD32SLH-1, ERT1-MD32SLH-1

Unit: mm



## Indicators

### I/O Indicators

The meanings of the input indicators are given in the following table.

Indicator name	Status	Color	Meaning (main error)
0 to 15		Yellow	Lit yellow when input or output is ON.
		Red	Flashing red when the load is disconnected. Automatically reset when the load is connected.
		Red	Lit red when the load is short-circuited. Automatically reset when the short-circuit is removed.
		OFF	Not lit when input or output is OFF.
I/O		Green	Lit green when I/O power is being supplied.
		OFF	Not lit when I/O power is not being supplied.

## Setting the Node Address

The rotary switches are used to set the lower digits of the IP address.

Setting method	Two hexadecimal digits
Setting range	01 to FE



## Rotary Switch Settings

00 hex: BOOTP or tool setting enabled (factory setting)

01 to FE hex: Setting on rotary switches is lower 8 bits of IP address.

(Default setting of upper 24 bits: 192.168.250.)

FF hex: Restores default setting.

(To restore the default setting, set the switches to FF hex, cycle the power supply, and then set the switches to 00 hex.)



## Features

### Functions Common to All Slave Units

This section describes the functions common to all EtherNet/IP Slave Units and the procedures for using them.

### Automatic Baud Rate Detection

The EtherNet/IP Slave Units are automatically set to the same baud rate as the hub. It is not necessary to set the baud rate separately for any Slave Unit.

The baud rate is set when communications is established with the hub after the power is turned ON. The baud rate setting is stored in memory until the power is turned ON again or until the Master Unit baud rate setting is changed.

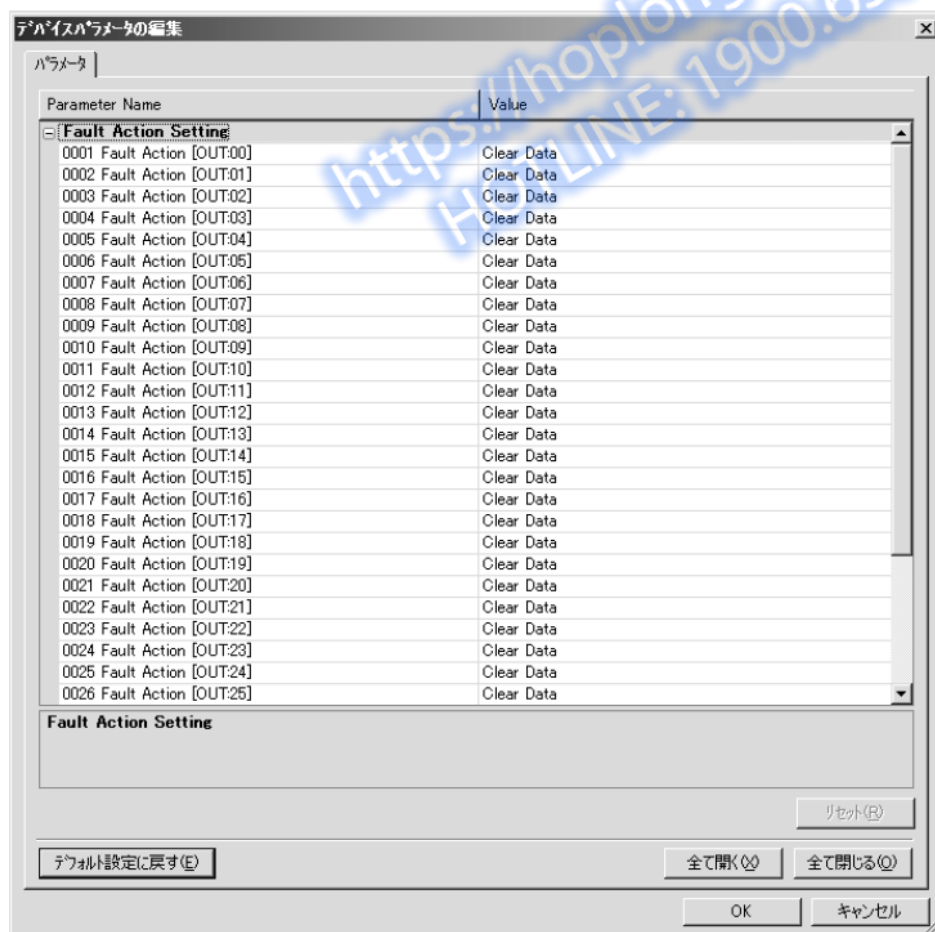
### Hold/Clear Outputs

Output Units can be set to hold or clear outputs when an error occurs.

#### Procedure Using Network Configurator

1. Turn ON the power to the EtherNet/IP Slave Unit.
2. Double-click the icon of the Slave Unit to set in the Network Edit Device Parameters Window to open the Configuration Window.  
(Alternatively, rightclick the icon and select **Parameters - Edit** from the pop-up menu.)
3. The fault action (holding or clearing an output for a communications error) will be displayed for each output in the *Fault Action Setting Group*. Select *Hold Last State* or *Clear Data* for the terminals and then click the **OK** Button.

Clear	Clears all output data from the Master Unit to 0 when a communications error occurs.
Hold	Holds all output data from the Master Unit at its current status when a communications error occurs.



## I/O Power Status Monitor

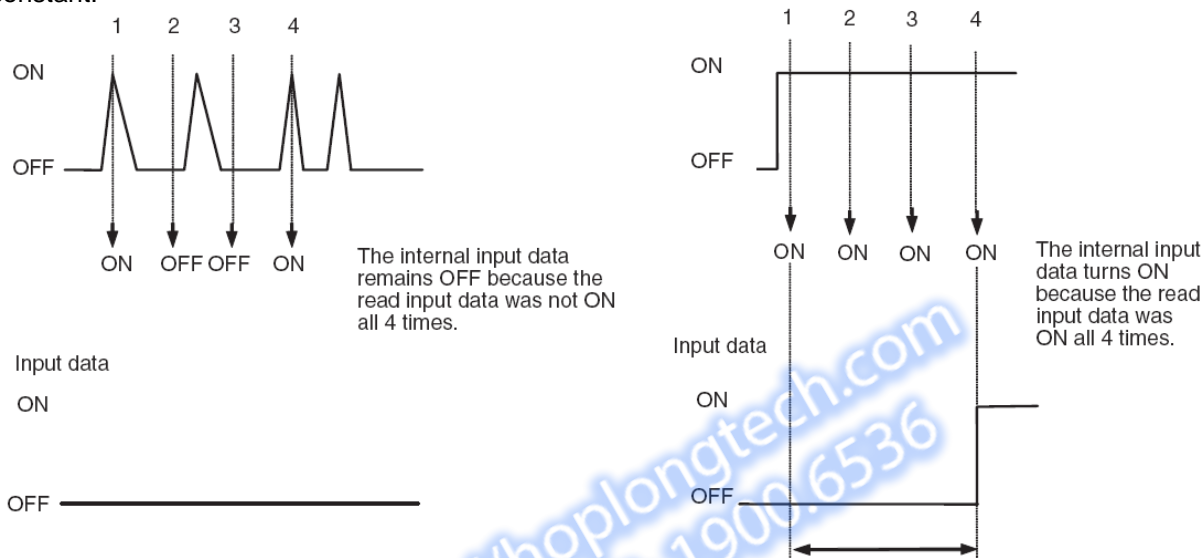
Outputs can be set to be held or cleared when an error occurs in the Output Unit.  
To check the status, refer to bits 0 and 1 in the Generic Status Area.

## Input Filter (Input Units Only)

An input value is read more than once during a set time interval. The input value can be set to be enabled only when all the read values are the same. This function operates for all input points in one Slave Unit.  
The following settings are possible: No delay (no filter), or 4, 8, 16, 32, 64, 128, or 256 ms.

### OFF-ON Delay

When the input data turns ON, the input data is read 4 times at a set time ( $1/4$  of the time setting). The internal input data turns ON only when all four values are ON. The ON timing is delayed by the value of the input time constant.

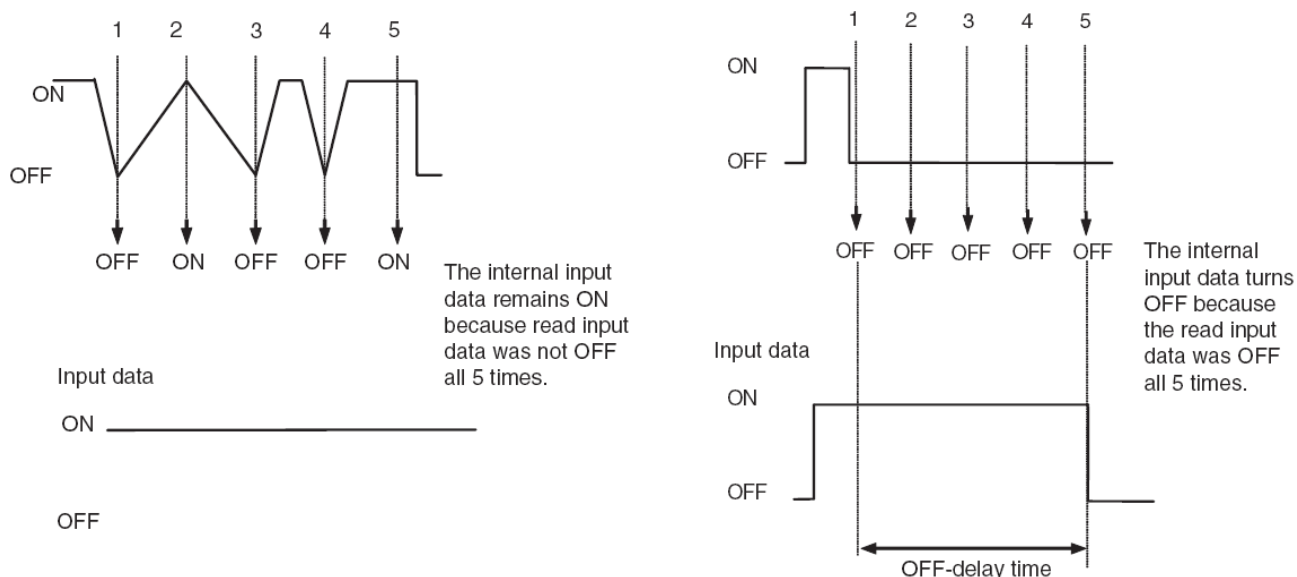


### ON-OFF Delay

When the input data turns OFF, the input data is read 5 times at a set interval ( $1/5$  of the OFF response time setting). The internal input data turns OFF only when all values are OFF. The OFF timing is delayed by the value of the OFF response time.

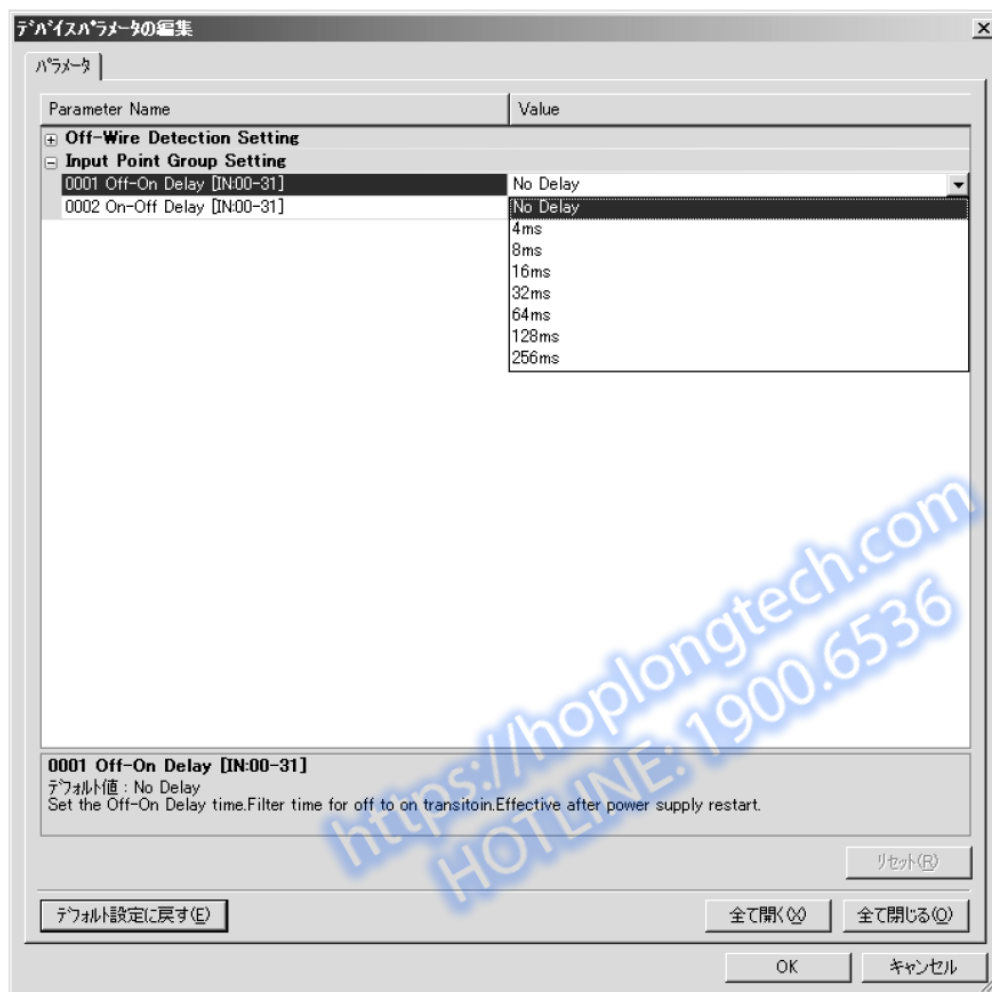
This function can also be used to implement an OFF delay.

To enable reading pulses shorter than the communications cycle time, set the OFF response time to a value longer than the communications cycle time. (The input may remain ON if the input pulse interval is too short.)



## Settings Using the Network Configurator

1. Turn ON the power supply to the EtherNet/IP Slave Unit.
2. Double-click the icon of the Slave Unit to set in the Network Configuration Window to open the Edit Device Parameters Window. (Alternatively, rightclick the icon and select **Parameters - Edit** from the pop-up menu.)
3. Select an input in the *Input Point Group Setting* Group and set the Off-On Delay or On-Off delay from the pull-down menu.



## Power Short-circuit Detection (Input)

This function monitors the sensor power supply current. If the current is 50 mA or higher per input contact, a power short-circuit is detected.

The Slave Unit I/O indicator can be used to check whether a power short-circuit has been detected. When a power short-circuit is detected, a flag in a status area in the Slave Unit turns ON to notify the Master Unit. The notification details can be read using explicit messages. When the cause of the short-circuit is removed, the Slave Unit is automatically reset, and the power output to the connector that had the short-circuit is turned ON again.

## Load Short-circuit Detection (Output)

This function monitors the load current for the output section and detects an load short-circuit if the current per contact (or common) exceeds a specific value. When a load short-circuit is detected, all Unit outputs are turned OFF to prevent damage to the Unit's output circuits.

The I/O power for the Unit turns OFF if a short-circuit is detected for even just one of the contacts being used.

When a load short-circuit is detected, a flag in a status area in the Slave Unit turns ON to notify the Master Unit.

When the cause of the short-circuit is removed, the Slave Unit is automatically reset, and the power output to the connector for which the short-circuit was detected is turned ON again.

## Related Products

### Software

CX-One version 4 contains the Network Configurator for EtherNet/IP. CXONE-AL01C-V4 is the part number for a single license copy on CD.

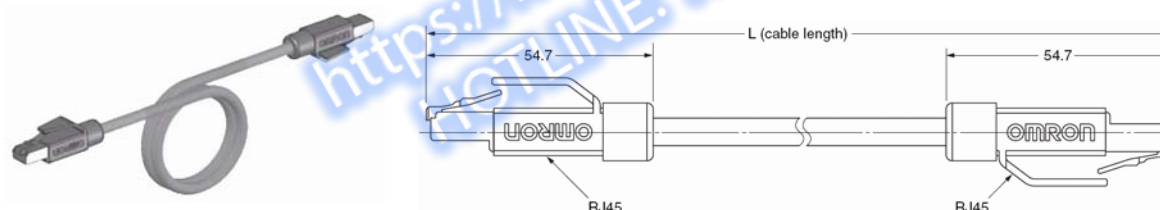
### Ethernet Switch Options

The following network devices are manufactured by OMRON for EtherNet/IP networks.



Function	Number of Ports	Error detection output	Model
Packet priority control (QoS): EtherNet/IP control data priority	3	None	W4S1-03B
	5	None	W4S1-05B
	5	Provided	W4S1-05C
Failure detection: Broadcast storm, LSI error detection, 10/100Base-TX, Auto-Negotiation			

### Ethernet Cables



Description	Connector type	Cable length L	Model
Double-ended EtherCAT Cable with Straight Connectors	RJ45/RJ45 on both ends	0.3 m	XS5W-T421-AMD-K
		0.5 m	XS5W-T421-BMD-K
		1 m	XS5W-T421-CMD-K
		2 m	XS5W-T421-DMD-K
		3 m	XS5W-T421-EMD-K
		5 m	XS5W-T421-GMD-K
		10 m	XS5W-T421-JMD-K
		15 m	XS5W-T421-KMD-K

### Manuals

Description	Media	Publication number
ERT1 Series EtherNet/IP Slave Units Operation Manual	PDF	W481-E1-02
XS5 SmartClick Sensor I/O Connectors Data Sheet	PDF	G016-E1-02

**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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  - d. Delivery and shipping dates are estimates only; and
  - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
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17. **Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
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## Certain Precautions on Specifications and Use

1. **Suitability of Use.** Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
  - (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
  - (ii) Use in consumer products or any use in significant quantities.
  - (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
  - (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
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