

DRT-series Smart Slaves

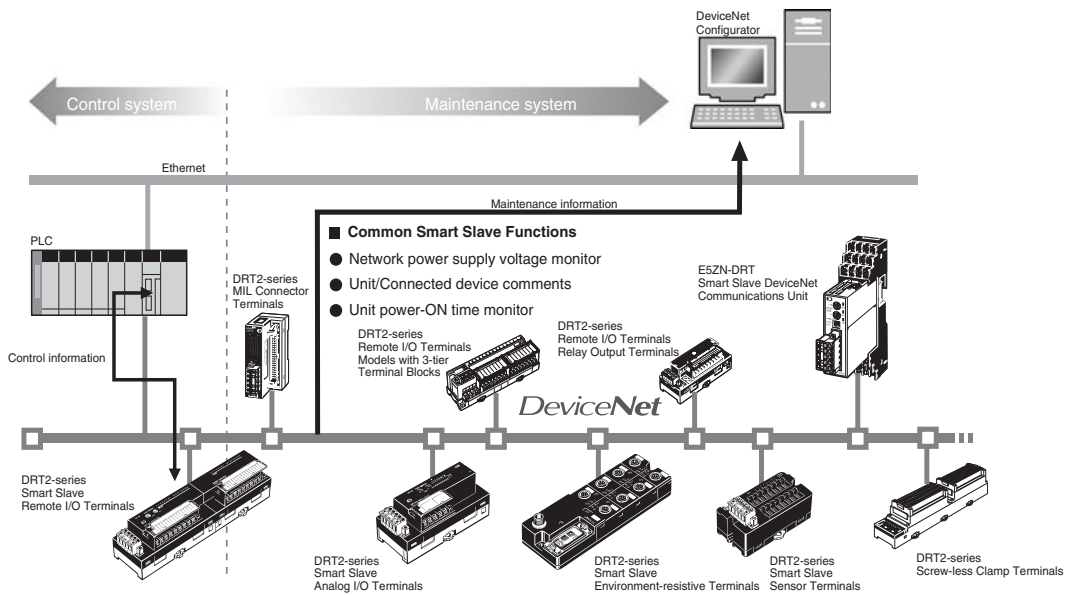
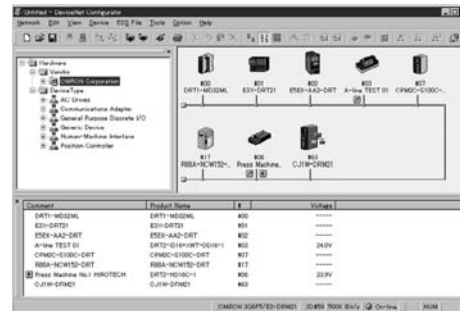
# DeviceNet Remote I/O

DRT2-series Smart Slaves provide you the necessary maintenance and product quality information.

## DRT2-series Smart Slave Features

The DRT2-series Smart Slaves do not just handle the I/O information of field devices. They can also deliver a variety of information to improve the operating efficiency of the production equipment. With this information a maintenance system can be fed with information to schedule preventive maintenance actions. This will reduce machine downtime caused by unscheduled repairs during production.

The control system and the maintenance system both use the same DeviceNet wiring. The benefits are: reduced equipment setup time, reduced downtime in the event of a problem, provides preventive maintenance information.



Reduce Setup Time	Reduce Downtime	Improve Maintenance
<ul style="list-style-type: none"> <li>• Network power supply monitor function</li> <li>• Input filter function</li> <li>• Power-ON inrush current protection function</li> <li>• Communications speed auto-detect function</li> <li>• Scaling function</li> <li>• User compensation function</li> <li>• Cumulative counter</li> </ul>	<ul style="list-style-type: none"> <li>• Moving average processing function</li> <li>• Number of A/D conversion points (conversion cycle) setting</li> <li>• Peak/bottom hold function</li> <li>• Top/valley hold function</li> <li>• Percentage change calculation function</li> <li>• Unit comments function</li> <li>• Connected device comments function</li> <li>• I/O power supply monitor function</li> <li>• Sensor power supply short-circuit detection function</li> <li>• External load short-circuit detection function</li> <li>• Disconnected sensor detection function</li> </ul>	<ul style="list-style-type: none"> <li>• Operation time monitor function</li> <li>• Contact operations counter (See note.)</li> <li>• Unit conduction time monitor function</li> <li>• Total ON time monitor function (See note.)</li> <li>• Network power supply voltage monitor function</li> <li>• Communications error log function</li> <li>• Last maintenance date</li> <li>• Comparator function</li> <li>• Selectable output value after error</li> </ul>

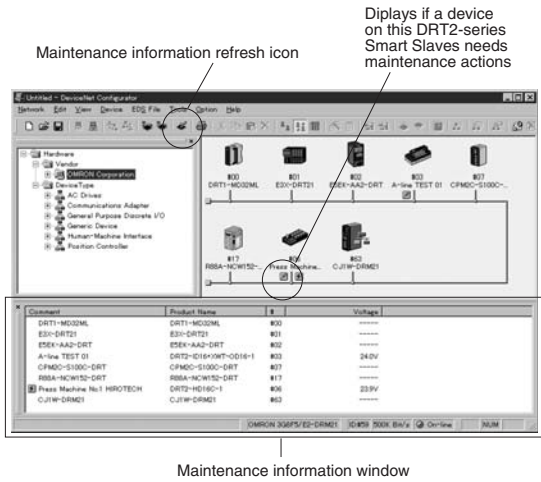
**Note:** The number of contact operations monitor function and the cumulative ON time monitor function cannot be used simultaneously for the same contact.

Remote I/O

## Configurator Maintenance Window

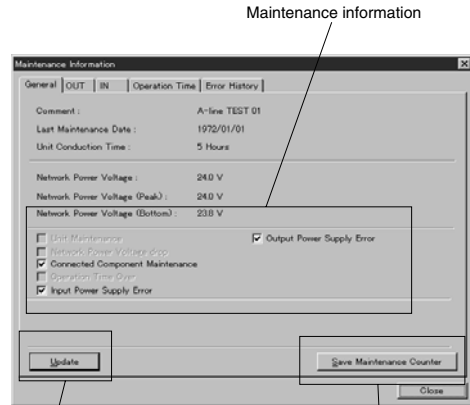
Various equipment information can be monitored from the following Configurator window through DRT2-series Smart Slaves.

### Maintenance Mode Window



### Individual Slave's Maintenance Information Window

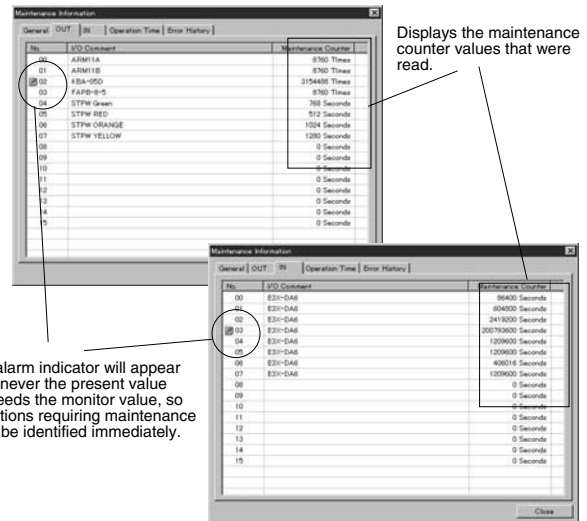
A DRT2-series Smart Slave's maintenance information window can be opened by double-clicking the Slave's icon. If an alarm indicator appears next to the Slave's icon then equipment connected to this DRT2-series Smart Slave needs maintenance.



Refreshes the Maintenance information

A Smart Slave's maintenance counters are normally stored every 6 minutes. So up to 6 minutes of data may be lost when the power is turned OFF. To prevent loss of Smart Slave's maintenance counters it is possible to store them in flash memory manually.

More details can be viewed by clicking the OUT tab, IN tab, or Operation Time tab.



Please refer to the software chapter on page 627 for more information on DeviceNet software.

Functions Supported by Smart Slaves

Function	Group		General Slaves					
	Type	Remote I/O Terminals					Sensor Connector Terminals	
		Transistors	Relays	Transistors with 3-tier terminal block			Transistors with connector	
	Model	DRT2-□D16(-1)		DRT2-ROS16	DRT2-□D16TA(-1)			DRT2-□D16S(-1)
	Input	Output	Output	Input	Output	I/O	Input	I/O
Operation time monitor	OK (Input+Output only)		---	OK			---	OK
Contact operation counter <sup>1</sup>				OK			OK	
Unit conduction time monitor				OK			OK	
Total ON time monitor <sup>1</sup>				OK			OK	
Unit comments				OK			OK	
Connected device comments				OK			OK	
Network power supply voltage monitor				OK			OK	
I/O power supply monitor	OK		---	OK				
Communications error log				OK			OK	
Input filter	OK	---		OK	---	OK	OK	
Power-ON inrush current protection	OK	---		OK	---	OK	OK	
Sensor power supply short-circuit detection				---			OK	
External load short-circuit detection				---			---	OK
External load disconnection detection				---			---	
Disconnected sensor detection				---			---	
Removable terminal block	OK			---			---	
Communications speed auto-detect				OK			OK	
No need to wire Unit power supply				OK			OK	
No need to wire input device power supply	---		OK	---			OK	
Expansion via Expansion I/O Units	OK			---			---	
Scaling				---			---	
User compensation				---			---	
Last maintenance date				OK			OK	
Cumulative counter				---			---	
Moving average processing				---			---	
Number of A/D conversion points (conversion cycle) setting				---			---	
Peak/bottom hold				---			---	
Top/valley hold				---			---	
Percentage change calculation				---			---	
Comparator				---			---	
Selectable output value after error				---			---	

1. The contact operation counter function and the total ON time monitor function cannot be used simultaneously for the same contact.

Function	Group	General Slaves						Environment-resistive Terminals		Analog Slave			
		Screw-less clamp terminals								Analog I/O Terminals			Temperature Input Terminals
		Type	Transistors						Transistors		Analog I/O Terminals		Temperature Input Terminals
			Detection function			No detection function							
		Model	DRT2-□D32SL(-1)			DRT2-□D32SLH(-1)			DRT2-□D08C(-1) DRT2-HD16C(-1)		DRT2-AD04 DRT2-DA02 DRT2-AD04H		DRT2-TS04T DRT2-TS04P
Input	Output	I/O	Input	Output	I/O	Input	Output	Input	Output	Input			
Operation time monitor													
Contact operation counter <sup>1</sup>													
Unit conduction time monitor													
Total ON time monitor <sup>1</sup>													
Unit comments													
Connected device comments													
Network power supply voltage monitor													
I/O power supply monitor													
Communications error log													
Input filter	OK	---		OK	---	OK	OK	---		---		---	
Power-ON inrush current protection	OK	---		OK	---	OK	OK	---		---		---	
Sensor power supply short-circuit detection		---		OK	---	OK	OK	---		---		---	
External load short-circuit detection				---			---	OK		---		---	
External load disconnection detection				---		OK				---		---	
Disconnected sensor detection		---		OK	---	OK	OK	---		---		---	
Removable terminal block				OK			---			OK		OK	
Communications speed auto-detect				OK			OK			OK		OK	
No need to wire Unit power supply				OK			OK			OK		OK	
No need to wire input device power supply				---			OK	---		---		---	
Expansion via Expansion I/O Units				---			---			---		---	
Scaling				---			---			OK		OK	
User compensation				---			---			OK		OK	
Last maintenance date				OK			OK			OK		OK	
Cumulative counter				---			---			OK		OK	
Moving average processing				---			---			OK	---	OK	
Number of A/D conversion points (conversion cycle) setting				---			---			OK	---	OK	
Peak/bottom hold				---			---			OK	---	OK	
Top/valley hold				---			---			OK	---	OK	
Percentage change calculation				---			---			OK	---	OK	
Comparator				---			---			OK	---	OK	
Selectable output value after error				---			---			---	OK	---	
Top/valley count				---			---			---		OK	
Operating time in a preset temperature range				---			---			---		OK	
Temperature difference detection between input channels				---			---			---		OK	

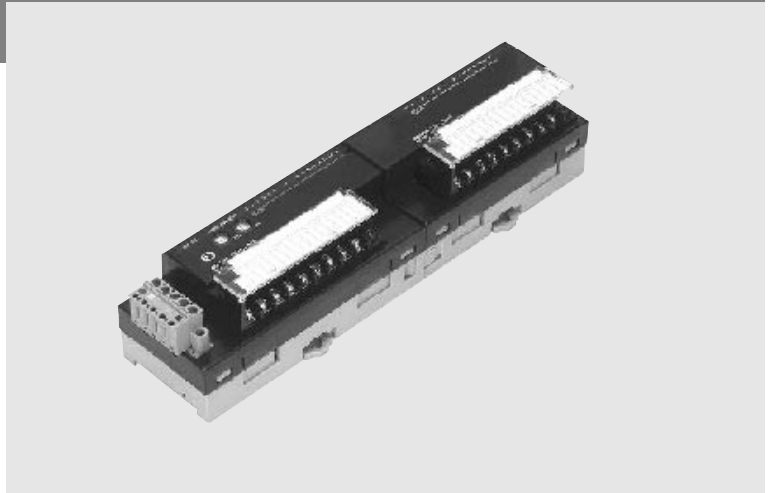
1. The contact operation counter function and the total ON time monitor function cannot be used simultaneously for the same contact.

DRT2-□D16(-1)

# Digital I/O Terminals

## I/O Device with DC-inputs and transistor outputs.

- Maintenance data can be collected without affecting the functionality of the control system.
- Valuable information can be collected and managed through the network, including information on the communications power supply voltage level, unit wear and tear, and equipment operating information.
- Easily locate trouble spots in the system.
- Setup has been simplified with features like auto-detection of the communication speed.



Remote I/O

## Smart Slave Functions

### Compact unit

Basic Units are just 115-mm wide (just 77% of DRT1-series) and the Expansion Units are just 94-mm wide, so the overall width is 209 mm.

### Detachable Terminal Block

The terminal block can be detached.

### Expansion I/O Units

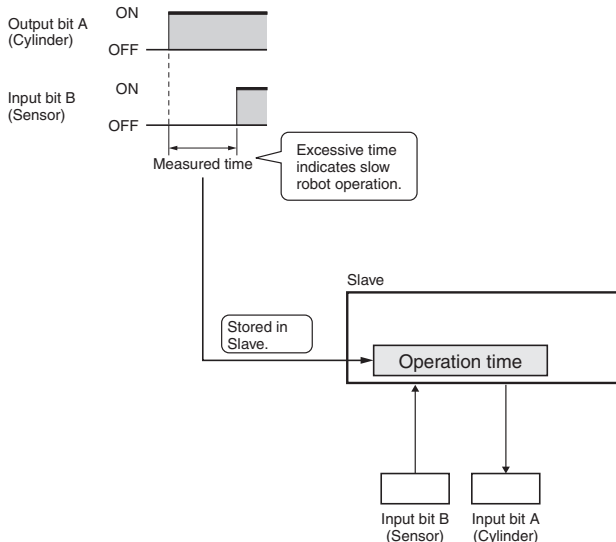
One Expansion Unit can be attached to the Basic Unit. Different I/O Terminals can be combined to suit the system requirements, for example, 16 inputs + 8 outputs or 24 inputs (16 inputs + 8 inputs.)

### Operation Time Monitor Function

The device can measure the time it takes for an input to go ON after a corresponding output is set (independent of the ladder program).

If this time exceeds the value that was preset in the device the master is notified through the status bits.

**Note:** This function is only supported in a device that has both inputs and outputs.

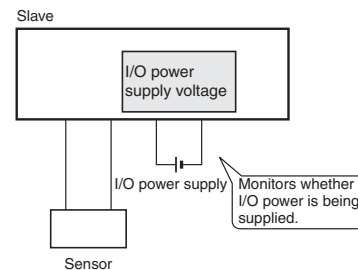


### No Wiring Required for Internal Circuits

Power for the device's internal circuits is supplied from the communications power supply.

### I/O Power Supply Status Monitor Function

This function checks if I/O power is being supplied. If I/O power is not present this is indicated in the status information.

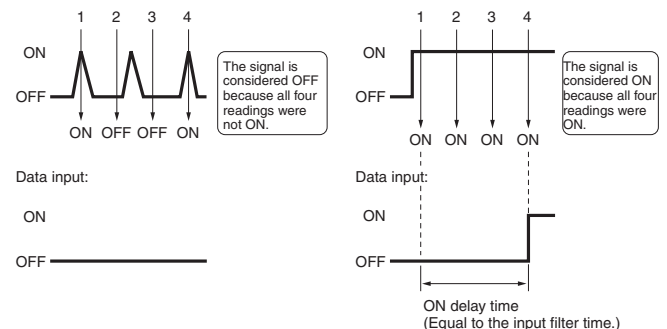


### Input Filter Function

To eliminate incorrect signal interpretation due to contact bouncing or signal corruption by noise a filter is needed.

This filter is implemented by reading the input value several times within a preset period. If the input value is within the preset period for all measurements of the same state the input value is presumed to be of that state.

The input filter function can also be used to create an ON and OFF delay.



## Power-ON Inrush Current Protection Function

When this function is set the inputs are not being read for 100 ms after the I/O power supply is turned ON. This gives the power supply time to stabilize after being turned ON. The 100-ms delay is used to eliminate false inputs generated by inrush currents.

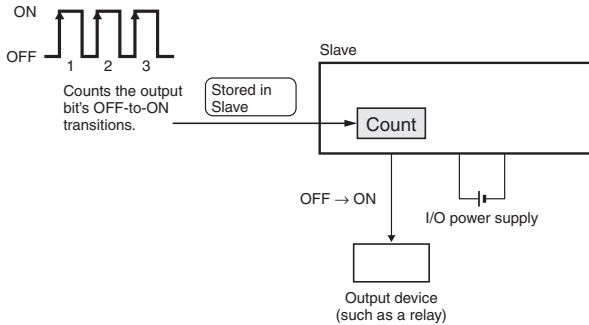
## Contact Operation Counter

The number of times an input or output is switched ON is counted and stored in the device.

When the counter reaches a set value than this is indicated in the status information.

The maximum frequency that can be measured is 50 Hz.

**Note:** The contact operation counter function and the total ON time monitor function cannot be used simultaneously for the same contact.

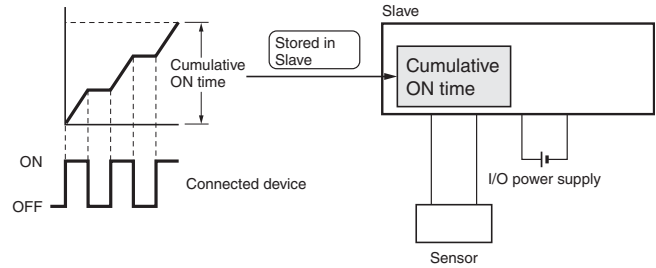


## Total ON Time Monitor Function

The device keeps track of the total time an input or output is switch ON. This total On time is stored in the device.

When the counter reaches a set value than this is indicated in the status information.

**Note:** The contact operation counter function and the total ON time monitor function cannot be used simultaneously for the same contact.



## Ordering Information

### Basic Units

I/O type	Internal I/O common	Number of I/O points	I/O connections	Internal circuit power	Rated I/O power supply voltage	Model
Inputs	NPN (+ common)	16	Screw terminals	Supplied from communications connector.	24 V DC	DRT2-ID16
	PNP (- common)					DRT2-ID16-1
Outputs	NPN (- common)	16	Screw terminals	Supplied from communications connector.	24 V DC	DRT2-OD16
	PNP (+ common)					DRT2-OD16-1

### Expansion Units

I/O type	Internal I/O common	Number of I/O points	I/O connections	Internal circuit power	Rated I/O power supply voltage	Model
Inputs	NPN (+ common)	8	Screw terminals	Supplied from Basic Unit.	24 V DC	XWT-ID08
	PNP (- common)					XWT-ID08-1
Outputs	NPN (- common)	8	Screw terminals	Supplied from Basic Unit.	24 V DC	XWT-OD08
	PNP (+ common)					XWT-OD08-1
Inputs	NPN (+ common)	16	Screw terminals	Supplied from Basic Unit.	24 V DC	XWT-ID16
	PNP (- common)					XWT-ID16-1
Outputs	NPN (- common)	16	Screw terminals	Supplied from Basic Unit.	24 V DC	XWT-OD16
	PNP (+ common)					XWT-OD16-1

## Specifications

### General Specifications

Communications power supply voltage	11 to 25 V DC
Unit power supply voltage	Not required (Supplied from the communications connector.)
I/O power supply voltage	20.4 to 26.4 V DC (24 V DC <sup>+10%</sup> / <sub>-15%</sub> )
Current consumption	Communications:Basic Unit:60 mA max. With 16-point expansion:70 mA max. With 8-input expansion:65 mA max. With 16-output expansion:64.5 mA max.
Dielectric strength	500 V AC (between isolated circuits)
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power line)
Vibration resistance	10 to 56 Hz, 0.7-mm double amplitude 56 to 150 Hz, 50 m/s <sup>2</sup>
Shock resistance	150 m/s <sup>2</sup>
Mounting method	35-mm DIN rail mounting
Screw tightening torque	M3 (power supply and I/O terminals): 0.3 to 0.5 Nm
Ambient temperature	Operating:-10°C to 55°C Storage:-25°C to 65°C
Ambient humidity	Operating:25% to 85% (with no condensation)
Weight	Basic Unit:140 g max. 16-point Expansion Unit:120 g max. 8-point Expansion Unit:80 g max.

**Ratings**

**Inputs**

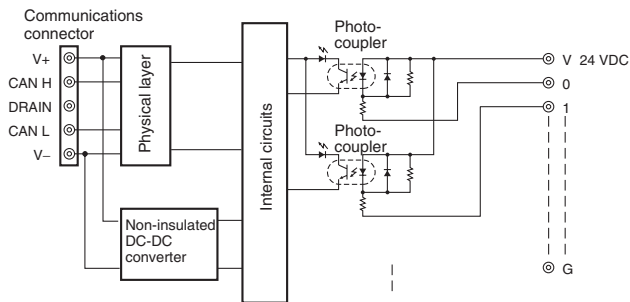
Input current	6 mA max./point (at 24 V DC)
ON delay time	1.5 ms max.
OFF delay time	1.5 ms max.
ON voltage	NPN 15 V DC min. between each input terminal and V PNP 15 V DC min. between each input terminal and G
OFF voltage	NPN 5 V DC max. between each input terminal and V PNP 5 V DC max. between each input terminal and G
OFF current	1 mA max.
Insulation method	Photocoupler
Input indicators	LED (yellow)

**Outputs**

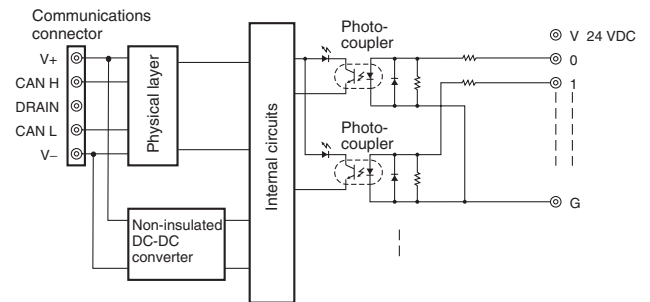
Rated output current	0.5 A/point, 4.0 A/common
ON delay time	0.5 ms max.
OFF delay time	1.5 ms max.
Residual voltage	1.2 V max.
Leakage current	0.1 ms max.
Isolation method	Photocoupler
Output indicators	LED (yellow)

**Internal Circuit Configuration**

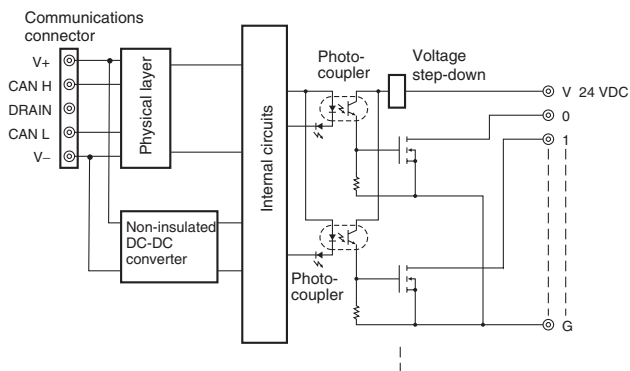
**DRT2-ID16 (NPN)**



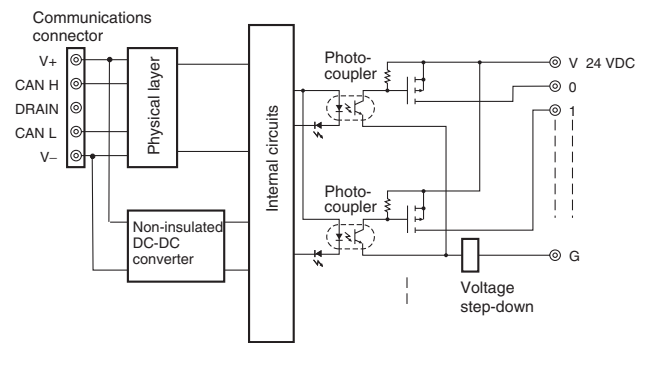
**DRT2-ID16-1 (PNP)**



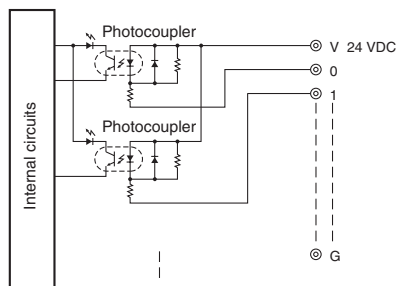
**DRT2-OD16 (NPN)**



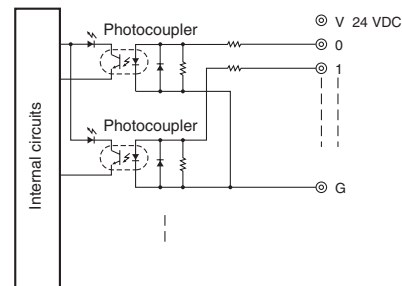
**DRT2-OD16-1 (PNP)**



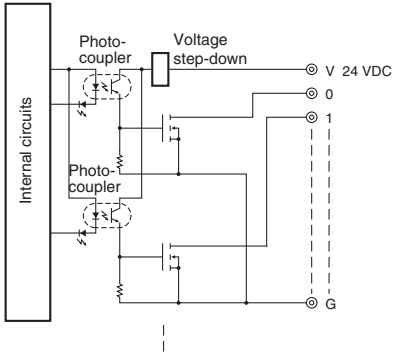
**XWT-ID08 (NPN)**  
**XWT-ID16 (NPN)**



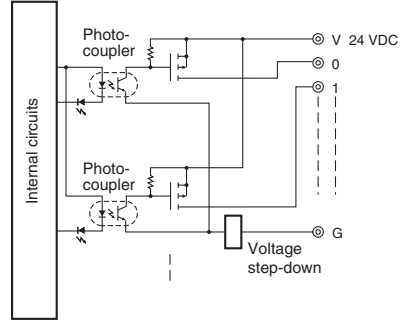
**XWT-ID08-1 (PNP)**  
**XWT-ID16-1 (PNP)**



**XWT-OD08 (NPN)**  
**XWT-OD16 (NPN)**



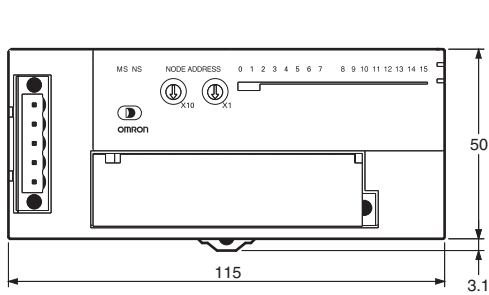
**XWT-OD08-1 (PNP)**  
**XWT-OD16-1 (PNP)**



**Dimensions**

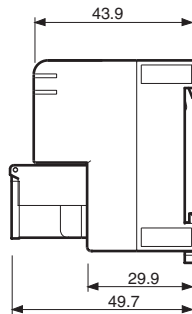
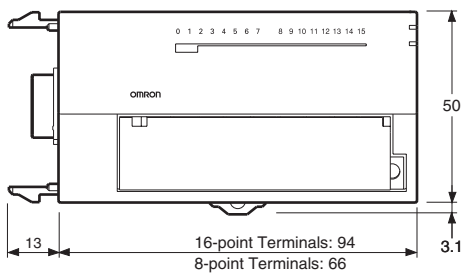
**Remote I/O Terminals: Basic Units**

- DRT2-ID16**
- DRT2-ID16-1**
- DRT2-OD16**
- DRT2-OD16-1**



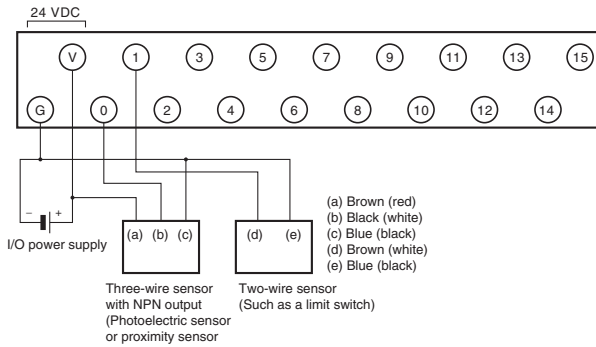
**Remote I/O Terminals: Expansion Units**

- |                   |                   |
|-------------------|-------------------|
| <b>XWT-ID16</b>   | <b>XWT-ID08</b>   |
| <b>XWT-ID16-1</b> | <b>XWT-ID08-1</b> |
| <b>XWT-OD16</b>   | <b>XWT-OD08</b>   |
| <b>XWT-OD16-1</b> | <b>XWT-OD08-1</b> |

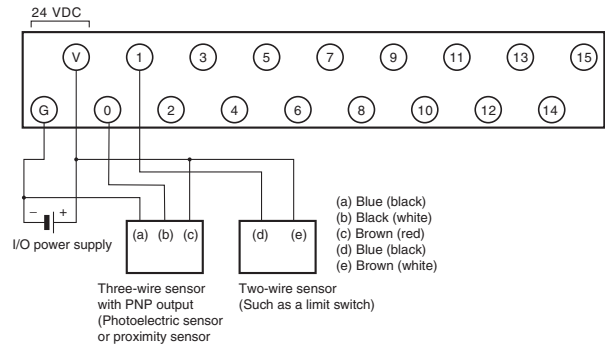


Wiring

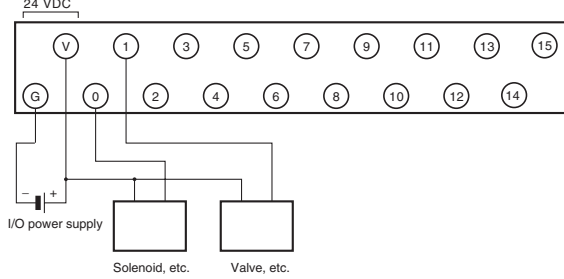
DRT2-ID16 (NPN)



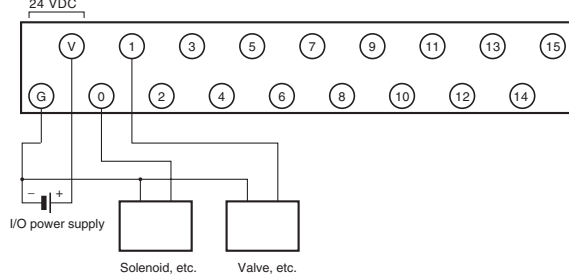
DRT2-ID16-1 (PNP)



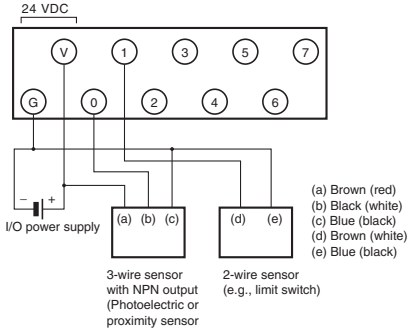
DRT2-OD16 (NPN)



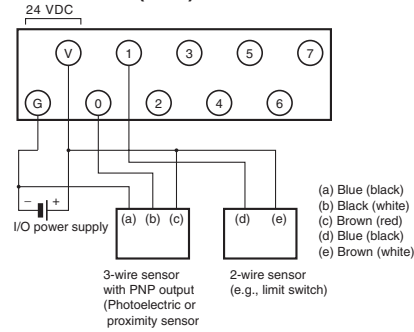
DRT2-OD16-1 (PNP)



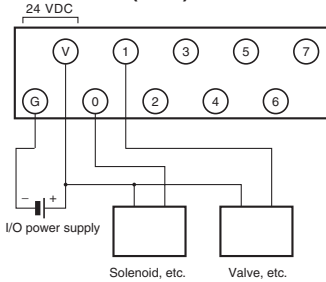
XWT-ID08 (NPN)



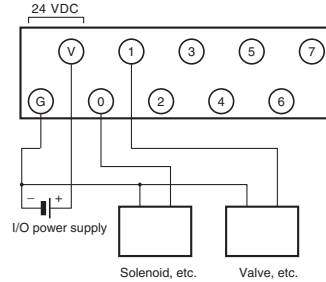
XWT-ID08-1 (PNP)



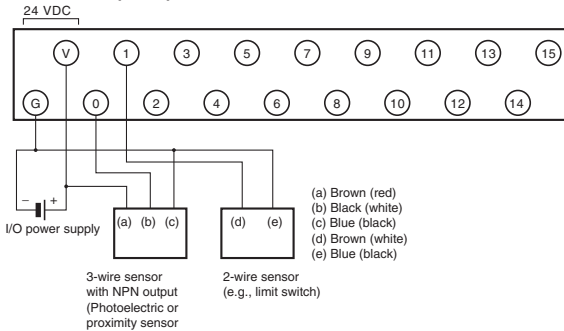
XWT-OD08 (NPN)



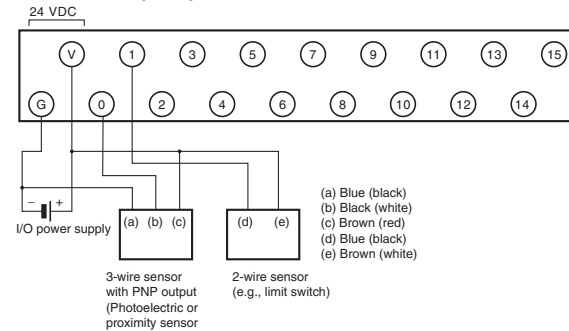
XWT-OD08-1 (PNP)



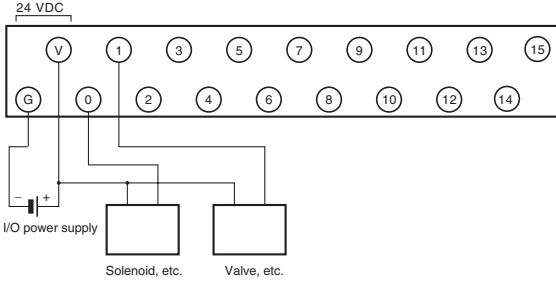
XWT-ID16 (NPN)



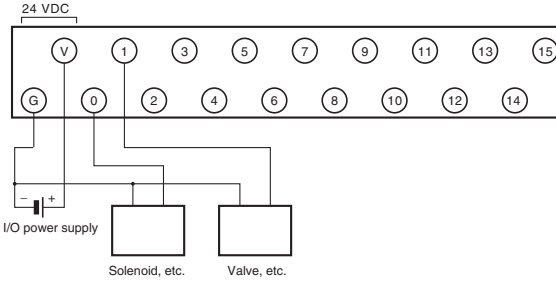
XWT-ID16-1 (PNP)



**XWT-OD16 (NPN)**



**XWT-OD16-1 (PNP)**



DRT2-□D08C(-1)/-□D16C(-1)

# Harsh Environment Terminals

## Environment-resistive (IP67) I/O terminals with fault-detection and maintenance functions

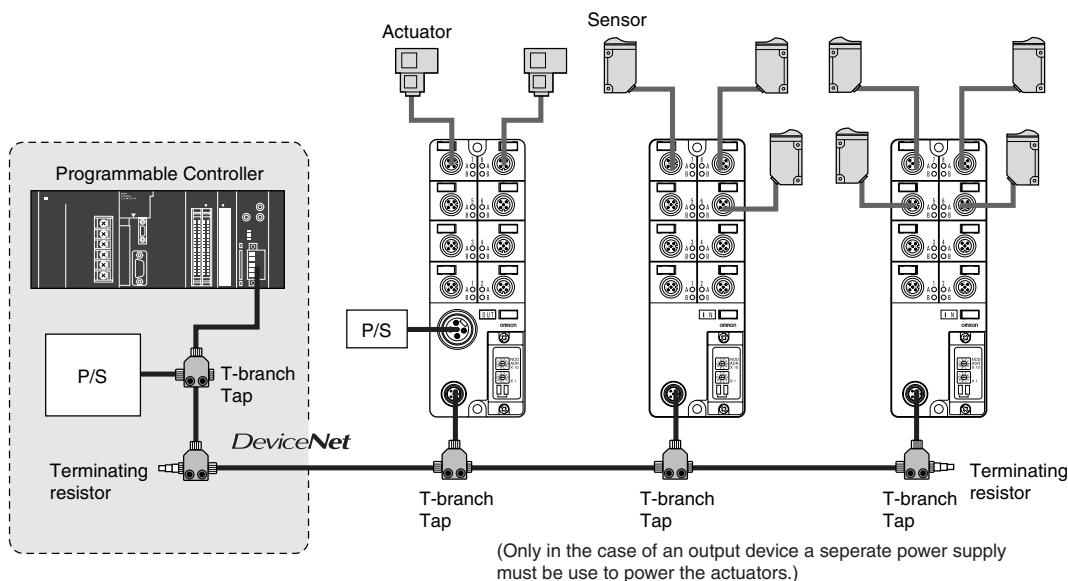
- Equipped with the standard Smart Slave functions for preventive maintenance and troubleshooting.
- Conforms to IP67 standards. The terminal housing is also oil- and spatter-resistant.
- The DeviceNet power supply is used by input devices to power the sensors. A extra power supply is not needed for this. (An extra power supply is required for output devices.)
- The terminal detects shortcircuits and broken wires in the cables of the sensors and actuators. In case of a fault the terminal notifies the master.



Remote I/O

## System Configuration

The communications and internal electronics of the terminal and in case of an input device also the sensors are fed by the DeviceNet power supply.



## Smart Slave Functions

### Superior Dust-tight, Drip-proof Construction (IP67)

The environment-resistive terminals are rated IP67, so they can be used in severe environments and subjected to direct oil and water spray without a protective enclosure. Because an enclosure is not needed space is saved and installation and wiring time is reduced.

### Power Supply Wiring not required for Input Devices

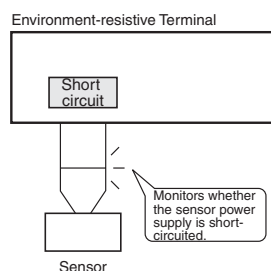
The same power supply is shared for communications, internal circuits, and input devices. Only the communications power supply needs to be wired.

### High-load Devices (1.5 A max.) can be connected

The rated output current is 1.5 A, so even output devices with relatively large loads can be connected directly.

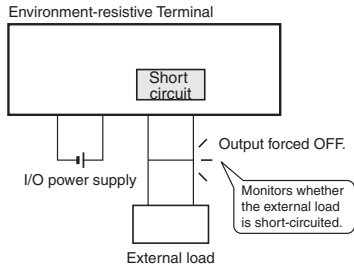
### Sensor Power Supply Short-circuit Detection Function

The Slave monitors the I/O power supply current and detects a "sensor power supply short-circuit" if a connector's current exceeds 100 mA. If a sensor power supply short circuit is detected, the sensor power supply output is turned OFF.



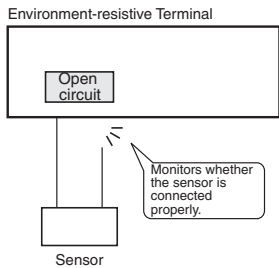
### External Load Short-circuit Detection Function (Output Units Only)

The Slave monitors the Output Unit's load current and detects an "external load short-circuit" if the current to the Output Unit exceeds the rated maximum of 1.5A. If an external load short circuit is detected, the output is turned OFF in order to prevent damage to the Unit's output circuit.



### Disconnected Sensor Detection Function (Input Units Only)

The Slave monitors the I/O power supply current and detects a "disconnected sensor" if a connector's current falls below 0.5 mA. The DeviceNet configurator or Explicit message communication can be used to read which sensor has been disconnected.

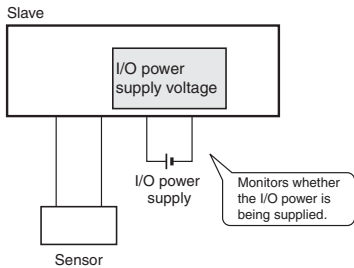


### Power Supply Wiring not required for the Slave's Internal Circuits

Power is supplied to the Unit's internal circuits from the communications power supply, so there is no need for an extra power supply to power the unit's internal circuits.

### I/O Power Supply Monitor Function

The Slave detects whether or not the I/O power supply is being supplied and notifies the Master through the status bits.

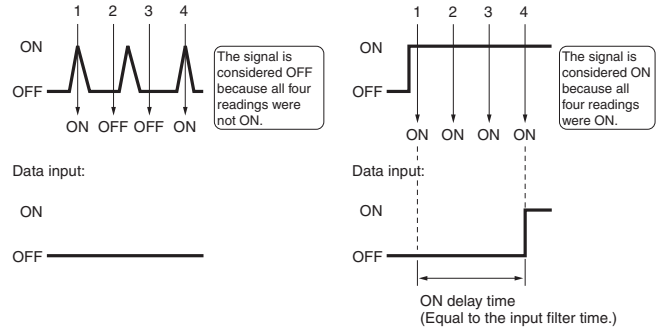


### Input Filter Function (Input Units Only)

To eliminate incorrect signal interpretation due to contact bouncing or signal corruption by noise a filter is needed.

This filter is implemented by reading the input value several times within a preset period. If the input value is within the preset period for all measurements of the same state the input value is presumed to be of that state.

The input filter function can also be used to create an ON and OFF delay.



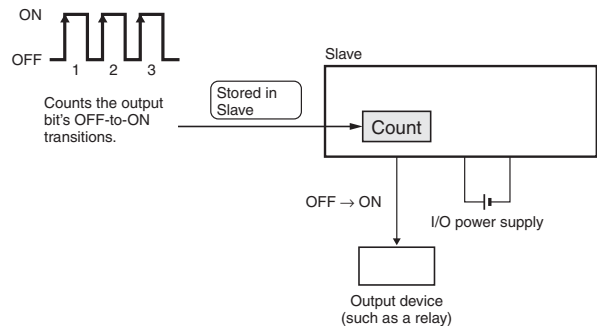
### Contact Operation Counter

The number of times an input or output is switched ON is counted and stored in the device.

When the counter reaches a set value then this is indicated in the status information.

The maximum frequency that can be measured is 50 Hz.

**Note:** The contact operation counter function and the total ON time monitor function cannot be used simultaneously for the same contact.

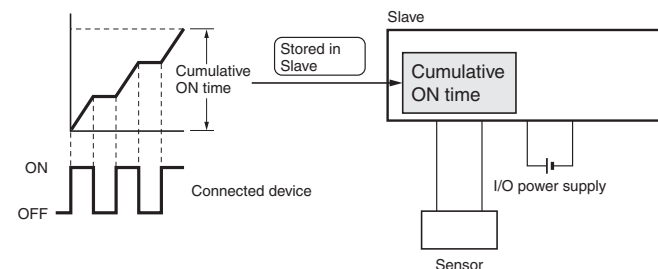


### Total ON Time Monitor Function

The device keeps track of the total time an input or output is switched ON. This total ON time is stored in the device.

When the counter reaches a set value then this is indicated in the status information.

**Note:** The contact operation counter function and the total ON time monitor function cannot be used simultaneously for the same contact.



Ordering Information

I/O type	Internal I/O common	Number of I/O points	I/O connections	Internal circuit power	Rated I/O power supply voltage	Model
Input	NPN (+ common)	8	Sensor I/O connector	Supplied from the communications connector.	Supplied from the communications connector.	DRT2-ID08C
	PNP (- common)					DRT2-ID08C-1
Output	NPN (- common)				24 V DC	DRT2-OD08C
	PNP (+ common)					DRT2-OD08C-1
Input	NPN (+ common)	16			Supplied from the communications connector.	DRT2-HD16C
	PNP (- common)					DRT2-HD16C-1

Specifications

Ratings

Inputs

Input current	11 mA max./point (at 24 V DC) 3 mA min./point (at 11 V DC)
ON delay time	1.5 ms max.
OFF delay time	1.5 ms max.
ON voltage	NPN 9 V DC min. between each input terminal and V
	PNP 9 V DC min. between each input terminal and G
OFF voltage	NPN 5 V DC max. between each input terminal and V
	PNP 5 V DC max. between each input terminal and G
OFF current	1 mA max.
Isolation method	Not isolated.
Input indicators	LED indicators (yellow)

Outputs

Rated output current	1.5 A/point, 8.0 A/common
ON delay time	0.5 ms max.
OFF delay time	1.5 ms max.
Residual voltage	1.2 V DC max.
Leakage current	0.1 mA max.
Isolation method	Photocoupler
Output indicators	LED indicators (yellow)

Characteristics

Item	DRT2-ID08C(-1) DRT2-HD16C(-1)	DRT2-OD08C(-1)
Communications power supply voltage	11 to 25 V DC	
Internal power supply voltage	Not required (Supplied from the communications connector.)	
I/O power supply voltage	Supplied from the communications connector.	20.4 to 26.4 V DC (24 V DC <sup>+10%</sup> / <sub>-15%</sub> )
Current consumption	Communications power supply DRT2-ID08C(-1):115 mA max. DRT2-OD08C(-1):60 mA max. DRT2-HD16C(-1):190 mA max.	
Dielectric strength	500 V AC between insulated circuits	
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power line)	
Vibration resistance	10 to 56 Hz, 0.7-mm double amplitude 56 to 150 Hz, 50 m/s <sup>2</sup>	
Shock resistance	150 m/s <sup>2</sup>	
Mounting method	M5 screw mounting	
Screw tightening torque	M5 screws: 1.47 to 1.96 N • m Round connectors: 0.39 to 0.49 N • m	
Ambient temperature	Operating:-10°C to 55°C Storage:-25°C to 65°C	
Ambient humidity	Operating:25% to 85% (with no condensation)	
Weight	340 g max.	390 g max.

## Connectors

### Communications Cables

#### Thin Cable

Thin cable with attached Micro Connectors (formerly M12).

Model	Specifications
DCA1-5CN□□W1	Cable with shielded connectors on both ends
DCA1-5CN□□F1	Cable with shielded connector socket (female) on one end
DCA1-5CN□□H1	Cable with shielded connector plug (male) on one end
DCA1-5CN□□W5	Cable with shielded connectors on both ends (a Mini-size male connector plug on one end and a Micro-size female connector socket on the other end)
DCN2-1	Shielded T-branch Connector (1 branch)

#### Thick Cable

Thick cable with attached Mini Connectors

Model	Specifications
DCA2-5CN□□W1	Cable with shielded connectors on both ends
DCA2-5CN□□F1	Cable with shielded connector socket (female) on one end
DCA1-5CN□□H1	Cable with shielded connector plug (male) on one end
DCN3-11	Shielded T-branch Connector (1 branch)
DCN3-12	Shielded T-branch Connector (1 branch) The branch connector is M12 (Micro) size.

#### Terminating Resistors

Model	Specifications
DRS2-1	Micro-size male connector plug with terminating resistance
DRS2-2	Micro-size female connector socket with terminating resistance
DRS3-1	Mini-size male connector plug with terminating resistance

### I/O Wiring Cables

#### I/O Power Supply Wiring

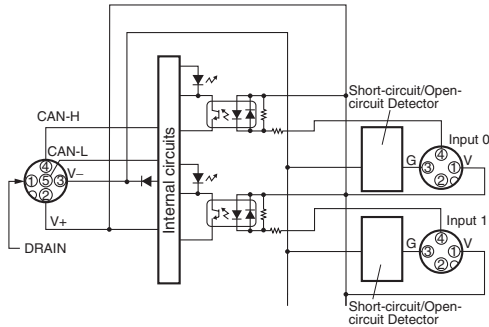
Model	Specifications
XS4W-D421-1□□-A	Cable with connectors on both ends (one socket and one plug)
XS4F-D421-1□□-A	Cable with female connectors (sockets) on both ends
XS4H-D421-1□□-A	Cable with male connectors (plugs) on both ends
XS4R-D424-5T	T-shaped Joint

#### I/O Wiring

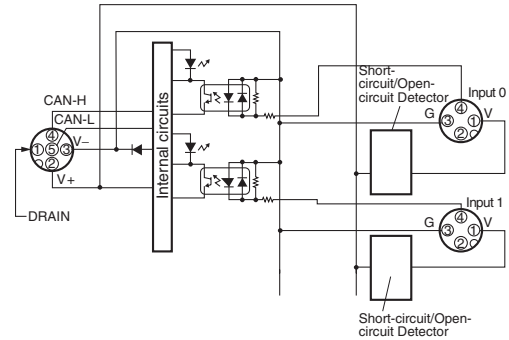
Model	Specifications
XS2H-D421-□80-A	Cable with male connector plug on one end
XS2W-D42□-□81-A	Cable with connectors on both ends (one socket and one plug)
XS2G-D4□□	Male connector plug for assembly (Crimp connection or solder connection)

Internal Circuit Configuration

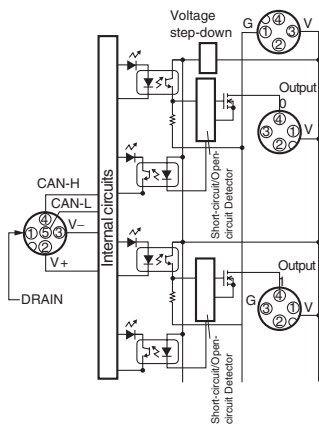
DRT2-ID08C (NPN)



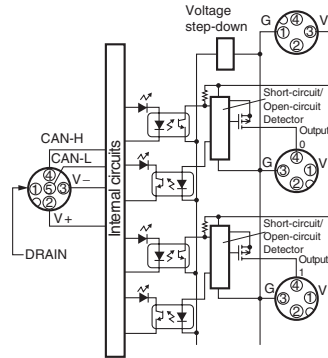
DRT2-ID08C-1 (PNP)



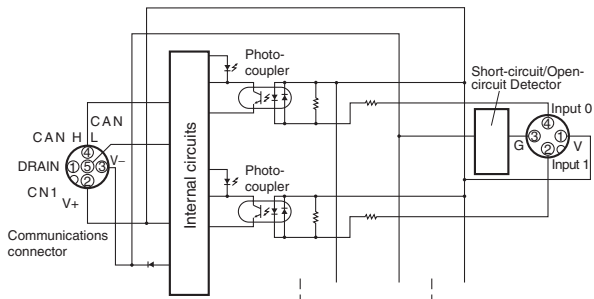
DRT2-OD08C (NPN)



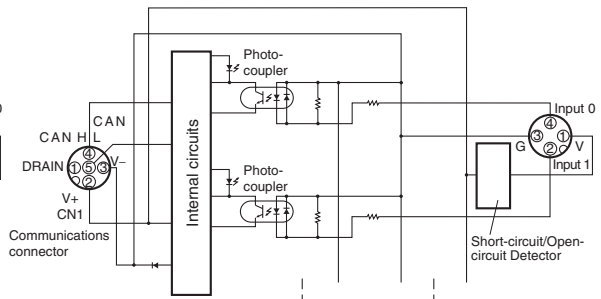
DRT2-OD08C-1 (PNP)



DRT2-HD16C (NPN)



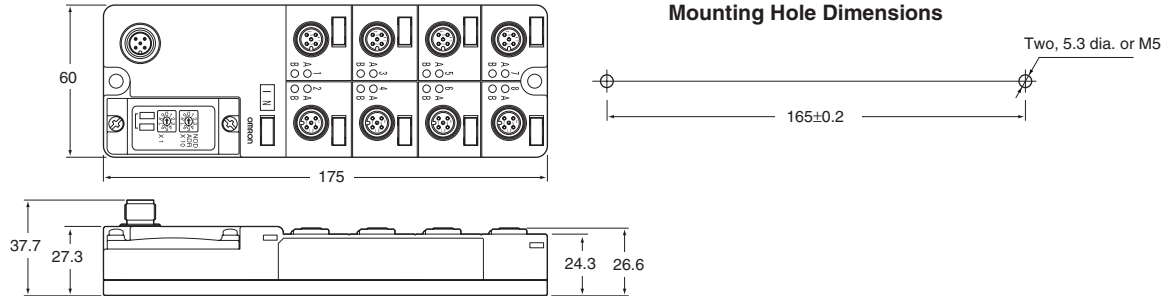
DRT2-HD16C-1 (PNP)



Dimensions

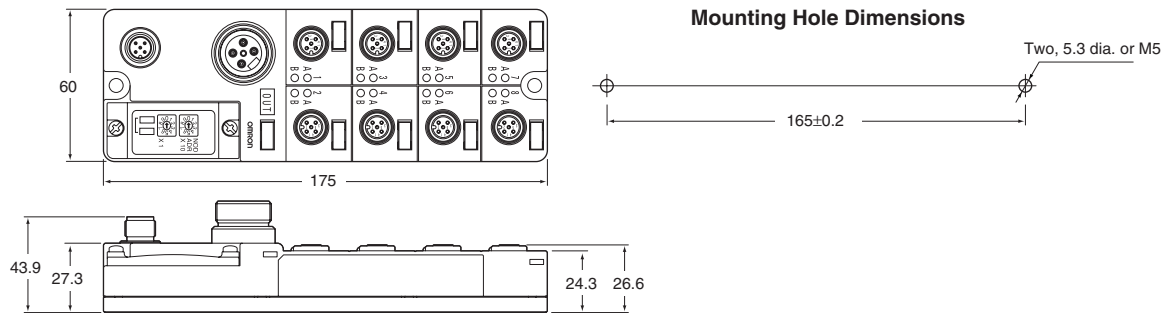
Environment-resistive Terminals (8 or 16 Inputs)

- DRT2-ID08C
- DRT2-ID08C-1
- DRT2-IDHD16C
- DRT2-ID16C-1



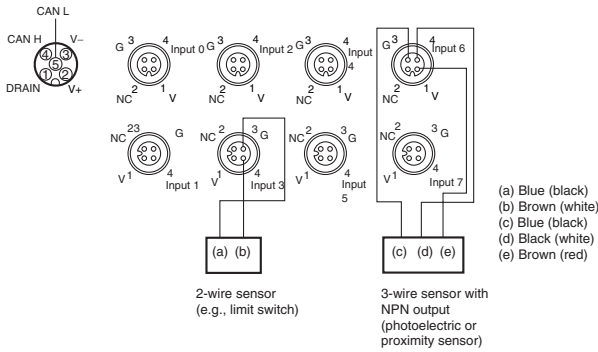
Environment-resistive Terminals (8 Outputs)

- DRT2-OD08C
- DRT2-OD08C-1

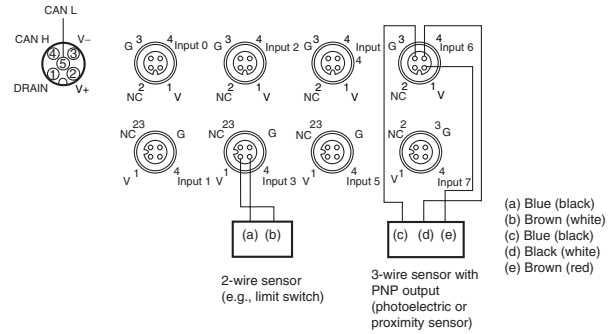


Wiring

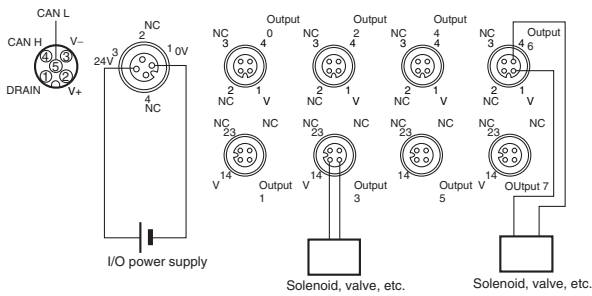
DRT2-ID08C (NPN)



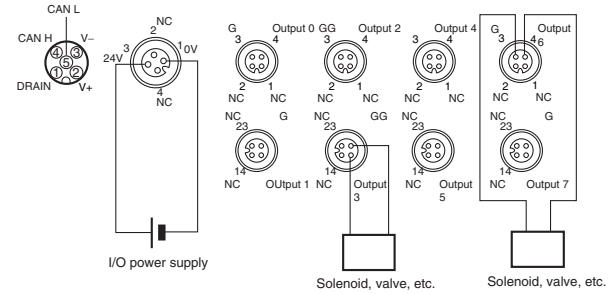
DRT2-ID08C-1 (PNP)



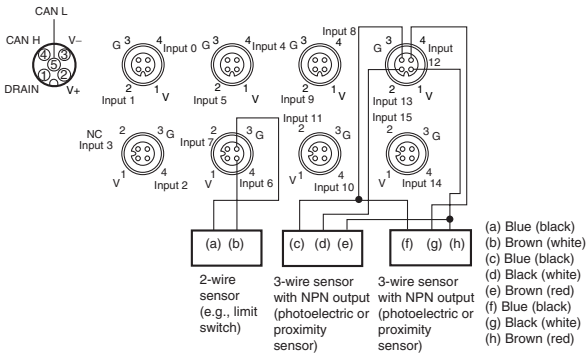
DRT2-OD08C (NPN)



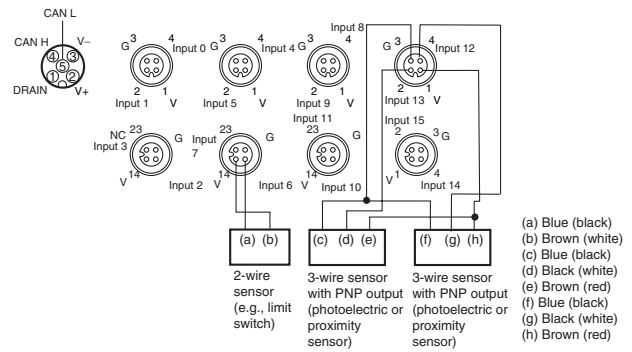
DRT2-OD08C-1 (PNP)



DRT2-HD16C (NPN)



DRT2-HD16C-1 (PNP)

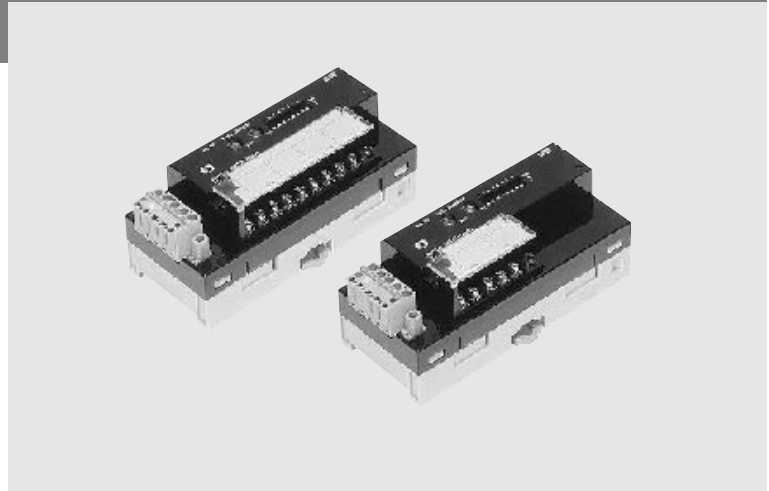


DRT2-AD04-DA02

# Analog I/O Terminals

## Calculations on Analog Values Can Be Performed within the Slave Itself

- Equipped with the standard Smart Slave functions for preventive maintenance and troubleshooting.
- Equipped with functions such as the scaling function, peak/bottom hold; top/valley hold; comparator function, cumulative counter, and rate of change.
- Two I/O values can be allocated to any two of the following values: analog input, peak/bottom, top, valley, or rate-of-change. Values without an allocated I/O point can be read with message communications.



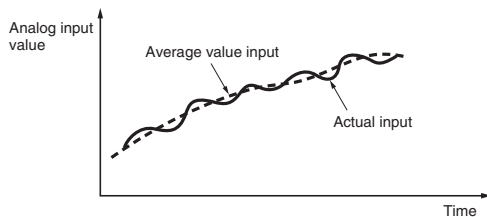
## Smart Slave Functions

### Number of A/D Conversion Points can be Selected (Input Terminals Only)

The conversion cycle is just 4 ms max. when all 4 analog inputs are being used. The conversion cycle can be made even shorter by reducing the number of inputs used (the number of A/D conversion points.)

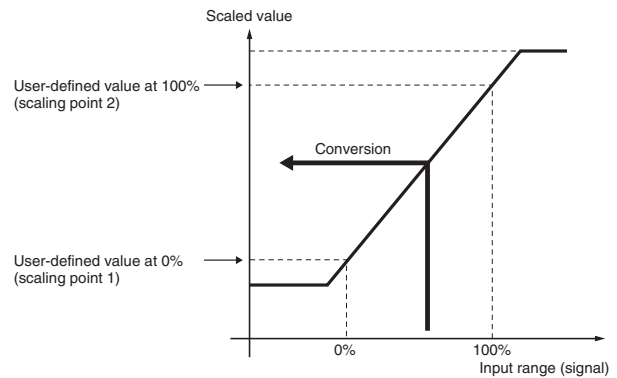
### Moving Average Processing Function (Input Terminals Only)

The average of the last 8 inputs (the moving average) can be calculated in the Analog Input Terminal and used as the conversion data. The moving average can be used to obtain a smooth input value when the actual input value is fluctuating slightly.



### Scaling Function

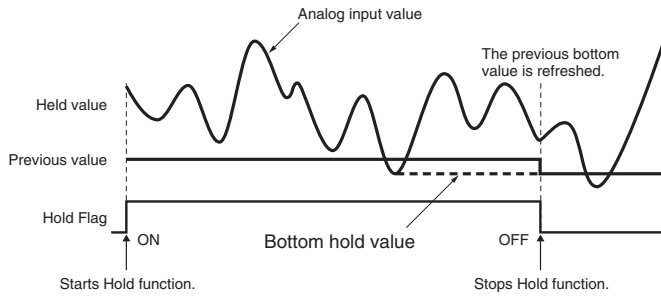
The analog input's raw data can be scaled to engineering value's. Using the scaling function in the Slave can reduce the ladder program processing load for the Master. If an offset is required, the offset value function can be used to offset the analog value calculated by the scaling function.



**Note:** The Output Terminals also support scaling.

### Peak/Bottom Hold Function (Input Terminals Only)

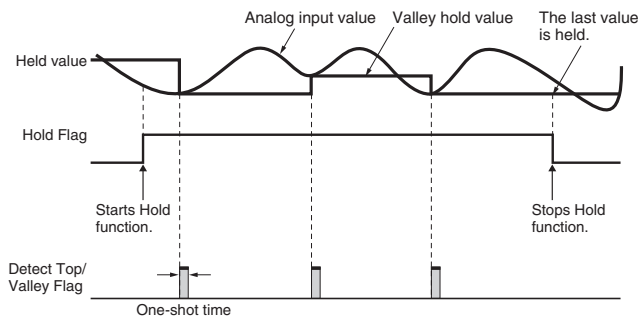
Holds the maximum (peak) value or minimum (bottom) value read by the Analog Input Terminal. In addition, the comparator function can be used to compare the peak value or bottom value to a preset alarm value and turn ON a flag in the status bits when the alarm value is exceeded.



### Top/Valley Hold Function (Input Terminals Only)

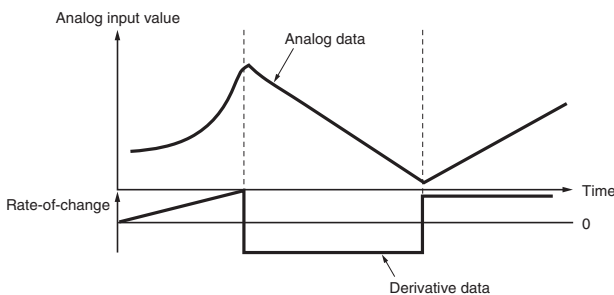
Holds the top value or valley value read by the Analog Input Terminal. The Top/Valley Detection Timing Flags can be used to set the timing for detection of the top/valley. In addition, the comparator function can be used to compare the top value or valley value to a preset alarm value and turn ON a flag in the status bits when the alarm value is exceeded.

#### Example: Valley Hold Operation



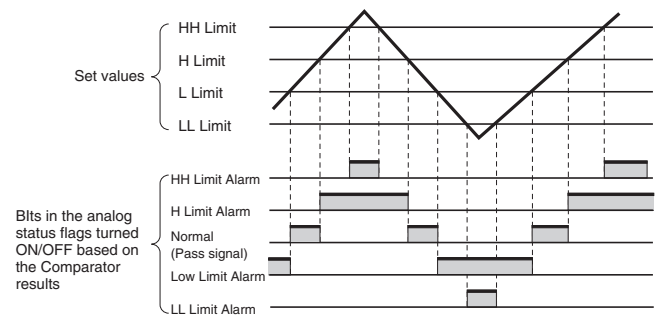
### Rate-of-change Calculation Function (Input Terminals Only)

The rate-of-change in the analog input value data can be calculated for the data read by the Analog Input Terminal during each sampling period.



### Comparator Function (Input Terminals Only)

Compares the raw data or processed data read by the Analog Input Terminal with the alarm SVs (High-High Limit, High Limit, Low Limit, and Low-Low Limit) and can reflect the result of the comparison in the status bits. The Normal Flag (Pass signal) will be turned ON if the value is within the set range.



### Disconnection Detection Function (Input Terminals Only)

The disconnection detection function checks for open circuits in the analog input wiring (voltage inputs or current inputs) of channels for which A/D conversion is enabled. If an open circuit is detected, the Master can be notified through that channel's Disconnection Detection Flag. The input range must be set to 1 to 5 V (voltage input) or 4 to 20 mA (current input) in order to use this function.

### User Adjustment Function

Depending on an input or output device's characteristics and connection method, it may be necessary to compensate for an offset in the value. This function can adjust the input or an output and compensate if an offset is required in the input or output's voltage or current. The conversion line can be compensated at two points: the 0% value and the 100% value.

### Cumulative Counter

This function calculates the time integral of the input or output's analog value and reads the cumulative value. Also, a monitor value can be set in the Terminal so that the general-purpose status bits' Analog Cumulative Counter Flag will be turned ON when the cumulative value exceeds the monitor value.

### Selectable Output Value after Error (Output Terminals Only)

This function can be used to set the Output Unit's output values that will be output from each channel when a communications error has occurred.

Ordering Information

Classification	I/O points	Model
Analog input	4 points	DRT2-AD04
Analog output	2 points	DRT2-DA02

Specifications

Ratings

Input

Item	DRT2-AD04	
	Voltage input	Current input
Input points	4 points (inputs 0 to 3)	
Input type	0 to 5 V 1 to 5 V 0 to 10 V -10 to 10 V	0 to 20 mA 4 to 20 mA
Max. signal input	±15 V	±30 mA
Input impedance	1 MΩ min.	Approx. 250 Ω
Resolution	1/6,000	
Accuracy	25°C: ±0.3% FS -10°C to 55°C: ±0.6% FS	25°C: ±0.4% FS -10°C to 55°C: ±0.8% FS
Conversion time	4 ms max. for 4 inputs (when calculation functions are not used and the DeviceNet communications cycle is 4 ms)	
Converted data	Input ranges other than -10 to 10 V: Full scale is 0000 to 1770 hexadecimal (0 to 6,000). -10 to 10 V input range: Full scale is F448 to 0BB8 hexadecimal (-3,000 to 3,000). A/D conversion range: ±5% FS	
Isolation method	Photocoupler isolation between inputs and communications lines (There is no isolation between input signals.)	
Insulation resistance	20 MΩ min. at 250 V DC (between isolated circuits)	
Accessories	Four shorting bars for use with current inputs.	

Output

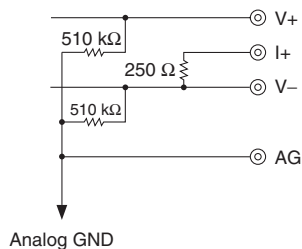
Item	DRT2-DA02	
	Voltage output	Current output
Output points	2 points	
Output type	0 to 5 V 1 to 5 V 0 to 10 V -10 to 10 V	0 to 20 mA 4 to 20 mA
Allowable output load resistance	1 KΩ min.	600 Ω max.
External output impedance	0.5 Ω max.	---
Resolution	1/6,000	
Accuracy	25°C: ±0.4% full scale -10°C to 55°C: ±0.8% full scale	
Conversion time	2 ms/2 points	
Converted data	Output ranges other than -10 to 10 V: Full scale is 0000 to 1770 hexadecimal (0 to 6,000). -10 to 10 V output range: Full scale is F448 to 0BB8 hexadecimal (-3,000 to 3,000). D/A conversion range: ±5% FS	
Isolation method	Photocoupler isolation between outputs and communications lines (There is no isolation between output signals.)	
Insulation resistance	20 MΩ min. at 250 V DC (between isolated circuits)	
Accessories	None	

Characteristics

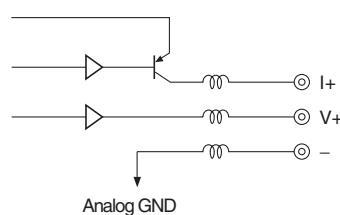
Item	DRT2-AD04	DRT2-DA02
Communications power supply voltage	11 to 25 V DC	
Internal power supply voltage	Not required. (Supplied from the communications connector.)	
Current consumption	90 mA max. at 24 V DC	120 mA max. at 24 V DC
Dielectric strength	500 V AC for 1 min between the communications circuit and analog circuit (1-mA sensing current)	
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power line)	
Vibration resistance	10 to 150 Hz, 0.7-mm double amplitude	
Shock resistance	150 m/s <sup>2</sup>	
Mounting strength	50 N (10 N in the DIN rail direction)	
Screw tightening torque	0.3 to 0.5 N·m (terminal screws) 0.25 to 0.3 N·m (communications connector screws)	
Ambient temperature	Operating: -10°C to 55°C Storage: -25°C to 65°C	
Ambient humidity	Operating: 25% to 85% (with no condensation)	
Ambient environment	No corrosive gases	
Weight	170 g max.	150 g max.

Internal Circuit Configuration

DRT2-AD04



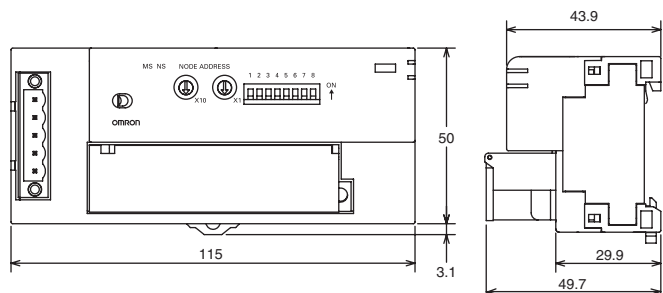
DRT2-DA02



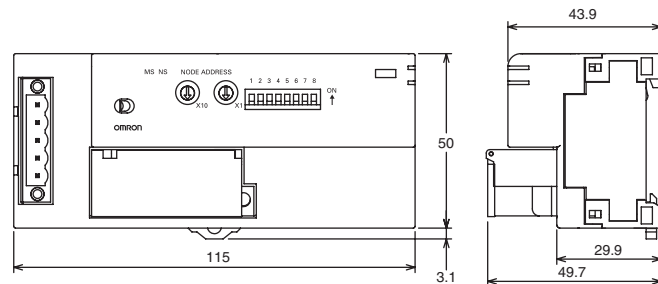
The - terminals of outputs 0 and 1 are connected internally.

Dimensions

DRT2-AD04

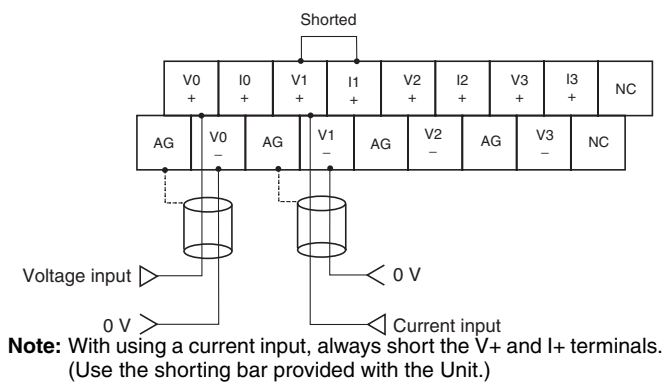


DRT2-DA02

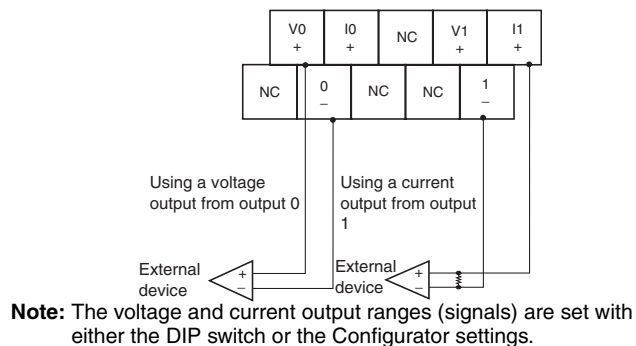


Wiring

DRT2-AD04



DRT2-DA02

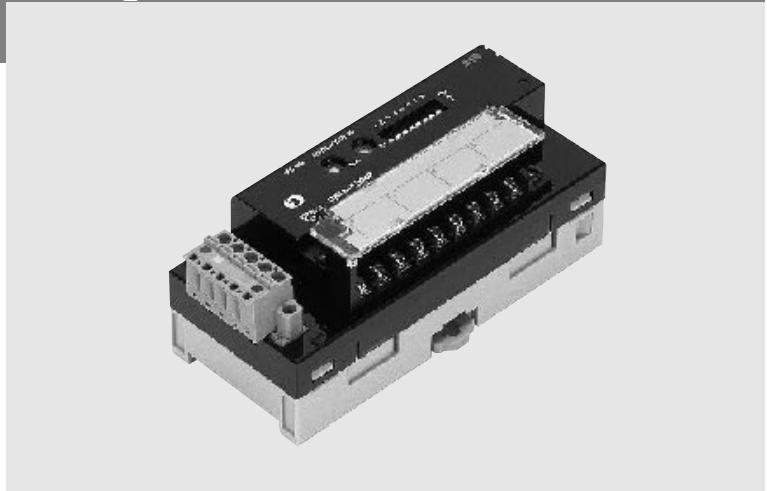


DRT2-TS04□

# Temperature Input Terminals

## Measure temperatures. A wide range of temperature sensors is supported

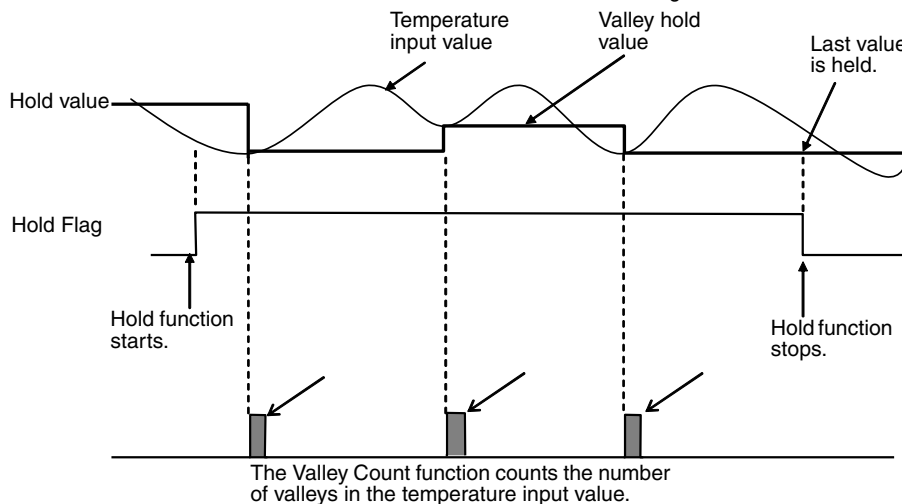
- Four inputs
- Models for platinum resistance thermometers or thermocouples are available.
- Incorporating wire burnout detecting function.
- All inputs are insulated to one another



## Smart Slave Functions

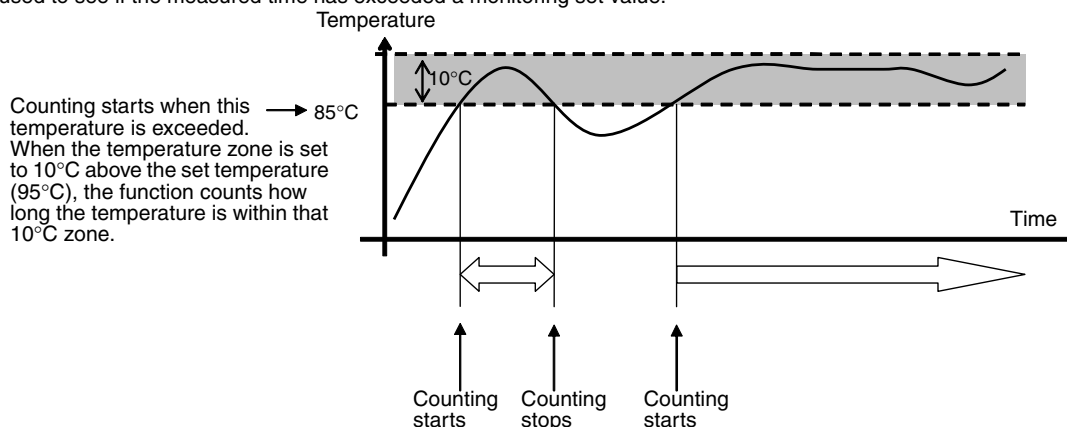
### Top/Valley Count Function

The number of times the top or valley value is reached can be counted for an application that has fixed cycles of temperature changes. Explicit messages can be used to see if the number of times that is counted has exceeded a monitoring set value.



### Temperature Range Timing Function

The length of time that the system is at a user-set temperature or within a user-set temperature range can be measured in seconds. Explicit messages can be used to see if the measured time has exceeded a monitoring set value.



### Input Temperature Variation Detection Function

A relative comparison can be made between two inputs (0 to 3) and to detect temperature differences between two inputs or with a monitoring set value. Explicit messages can be used to see if the temperature difference has exceeded a monitoring set value.

Ordering Information

Classification	I/O points	Model
Temperature Input Terminal	4 inputs (Occupies 4 input words of the Master Unit)	DRT2-TS04T
		DRT2-TS04P

Specifications

Ratings

Model	DRT2-TS04T	DRT2-TS04P
Input type	Switchable between R, S, K1, K2, J1, J2, T, E, B, N, L1, L2, U, W, and PL2 types Configurator: Each input contact set separately. DIP switch: 4 points set at a time.	Switchable between PT, JPT, PT2, and JPT2 types Configurator: Each input contact set separately. DIP switch: 4 points set at a time.
Indicator accuracy	(Indicator value $\pm 0.3\%$ or $\pm 1\text{ }^\circ\text{C}$ , whichever is larger) $\pm 1$ digit max. (See note 2.)	Input range of $-200$ to $850\text{ }^\circ\text{C}$ : (Indicator value $\pm 0.3\%$ or $\pm 0.8\text{ }^\circ\text{C}$ , whichever is larger) $\pm 1$ digit max. Input range of $-200$ to $200\text{ }^\circ\text{C}$ : (Indicator value $\pm 0.3\%$ or $\pm 0.5\text{ }^\circ\text{C}$ , whichever is larger) $\pm 1$ digit max.
Conversion cycle	250 ms/4 points	
Temperature conversion data	Binary (4-digit hexadecimal, 8-digit hexadecimal for 1/100 display)	
Isolation method	Photocoupler isolation (between input and communications lines) Photocoupler isolation (between temperature input signals)	
I/O connection method	Terminal block connection	

Note: 1. Current flow to the Sensor is 0.35 mA when connected to the DRT2-TS04P.  
2. Exceptional accuracy

Input type	Input accuracy
Less than $-100\text{ }^\circ\text{C}$ of K1, K2, T, or N	$\pm 2\text{ }^\circ\text{C} \pm 1$ digit max.
U, L1, L2	$\pm 2\text{ }^\circ\text{C} \pm 1$ digit max.
Less than $200\text{ }^\circ\text{C}$ of R, S	$\pm 3\text{ }^\circ\text{C} \pm 1$ digit max.
Less than $400\text{ }^\circ\text{C}$ of B	Not specified
W	(Command value $\pm 0.3\%$ or $\pm 3\text{ }^\circ\text{C}$ , whichever is larger) $\pm 1$ digit max.
PL2	(Command value $\pm 0.3\%$ or $\pm 2\text{ }^\circ\text{C}$ , whichever is larger) $\pm 1$ digit max.

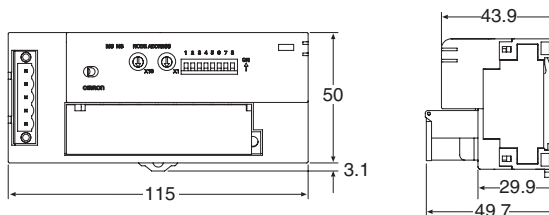
Characteristics

Model	DRT2-TS04T	DRT2-TS04P
Communications power supply voltage	11 to 25 VDC (supplied through communications connector)	
Current consumption	70 mA max. (24 VDC)	
Noise immunity	Conforms to IEC61000-4-4, 2.0 kV	
Vibration resistance	10 to 150 Hz, 0.7 mm double amplitude	
Shock resistance	150 m/s <sup>2</sup>	
Dielectric strength	500 VAC between isolated circuits	
Insulation resistance	20 M $\Omega$ min. at 100 V DC (default value)	
Ambient temperature	Operating: $-10$ to $55\text{ }^\circ\text{C}$ (with no icing or condensation) Storage: $-25$ to $65\text{ }^\circ\text{C}$	
Ambient operating humidity	25% to 85%	
Atmosphere	Must be free from corrosive gases.	
Mounting method	35-mm DIN track mounting	
Mounting strength	50 N (10 N in the DIN track direction)	
Terminal strength	Pulling: 50 N	
Weight	160 g max.	160 g max.

Dimension

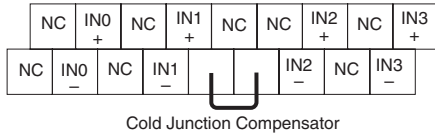
Note: All units are in millimeters unless otherwise indicated

DRT2-TS04

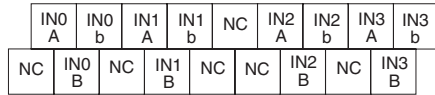


Terminal Arrangement

DRT2-TS04T

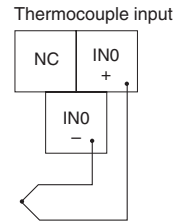


DRT2-TS04P

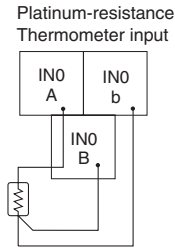


Wiring

DRT2-TS04T



DRT2-TS04P

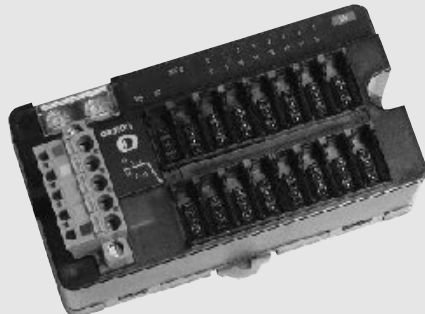


DRT2-□D16S(-1)

# Sensor Connector Terminals

## New Slave Equipped with Industry-standard Sensor Connectors

- Equipped with the standard Smart Slave functions that provide powerful preventative maintenance and troubleshooting capabilities.
- Digital I/O Terminal compatible with industry-standard sensor connectors
- Connect sensors easily without special tools. Reduce time required for wiring.
- Load short-circuit detection.



Remote I/O

## Ordering Information

I/O type	Internal I/O common	Number of I/O points	I/O connections	Internal circuit power	Rated I/O power supply voltage	Model
Input	NPN (+ common)	16	Sensor connector	Supplied from the communications connector	Supplied from the communications connector	DRT2-ID16S
	PNP (- common)					DRT2-ID16S-1
I/O	NPN (+ common for inputs, - common for outputs)	8 inputs and 8 outputs			Supplied from external source for outputs	DRT2-MD16S
	PNP (- common for inputs, + common for outputs)					DRT2-MD16S-1

## Specifications

### Characteristics

Item	DRT2-ID16S(-1)	DRT2-MD16S(-1)
Communications power supply voltage	11 to 25 VDC	
Unit power supply voltage	Not required. (Supplied from the communications connector.)	
I/O power supply voltage	Supplied from the communications connector.	
Current consumption	Communications power supply: 230 mA max.	Communications power supply: 135 mA max.
Dielectric strength	500 VAC between isolated circuits	
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power line)	
Vibration resistance	10 to 56 Hz: 0.7-mm double amplitude 56 to 150 Hz: 50 m/s <sup>2</sup>	
Shock resistance	150 m/s <sup>2</sup>	
Mounting method	M4 screw mounting or 35-mm DIN track mounting	
Screw tightening torque	M4: 0.6 to 0.98 N·m	
Ambient temperature	Operating: -10°C to 55°C Storage: -25°C to 65°C	
Ambient humidity	Operating: 35% to 85% (with no condensation)	
Weight	90 g max.	95 g max.

## Input Ratings

### Terminals with 16 inputs

Item	DRT2-ID16S	DRT2-ID16S-1
Internal I/O common	NPN	PNP
Number of inputs	16 inputs	
ON voltage	15 VDC min. between each input terminal and V	15 VDC min. between each input terminal and G
OFF voltage	5 VDC max. between each input terminal and V	5 VDC max. between each input terminal and G
OFF current	1 mA max.	
Input current	11 mA max./point (at 24 VDC) 3.0 mA min./point (at 11 VDC)	
ON delay time	1.5 ms max.	
OFF delay time	1.5 ms max.	
Number of circuits/common	16 points/common	

### Terminals with 8 Inputs and 8 Outputs

Item	DRT2-MD16S	DRT2-MD16S-1
Internal I/O common	NPN	PNP
Number of inputs	8	
ON voltage	9 VDC min. between each input terminal and V	9 VDC min. between each input terminal and G
OFF voltage	5 VDC max. between each input terminal and V	5 VDC max. between each input terminal and G
OFF current	1 mA max.	
Input current	11 mA max./point (at 24 VDC) 3.0 mA min./point (at 11 VDC)	
ON delay time	1.5 ms max.	
OFF delay time	1.5 ms max.	
Number of circuits/common	8 points/common	
Sensor short-circuit detection current	100 mA min. (per input)	

## Output Ratings

### Terminals with 8 Inputs and 8 Outputs

Item	DRT2-MD16S	DRT2-MD16S-1
Internal I/O common	NPN	PNP
Number of inputs	8 (8 to 15)	
Rated output current	0.3 A/point, 2.4 A/common	0.3 A/point, 1.6 A/common
Residual voltage	2 VDC max. (0.3 A DC between output and G terminal)	2 VDC min. (0.3 A DC between input and V terminal)
Leakage current	0.1 mA max.	
ON delay time	1.5 ms max.	
OFF delay time	1.5 ms max.	
Number of circuits/common	8 points/common	
Load short-circuit detection current	2.4 A min./common	1.6 A min./common

## Connectors

### OMRON Connectors

Model	Specifications	Compatible wire size
XN2A-1430	Spring-clamp style	28 to 20 AWG (0.08 to 0.5 mm <sup>2</sup> ) wire, 1.5 mm max. outer diameter including insulation

### Tyco Electronics Connectors

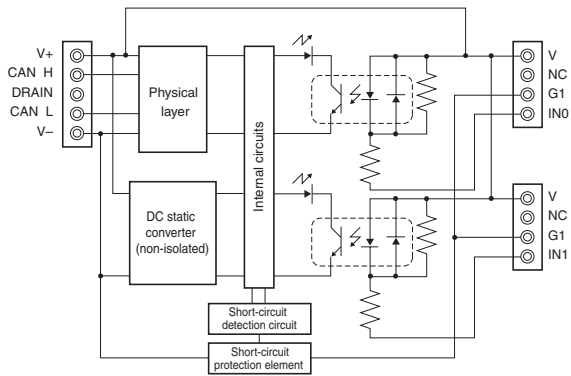
Model	Specifications	Compatible wire size
1-1473562-4	Red	28 to 24 AWG (0.08 to 0.2 mm <sup>2</sup> ) wire, 0.9 to 1.0 mm max. outer diameter including insulation
1473562-4	Yellow	24 to 22 AWG (0.2 to 0.3 mm <sup>2</sup> ) wire, 1.0 to 1.15 mm max. outer diameter including insulation
2-1473562-4	Blue	22 to 20 AWG (0.3 to 0.5 mm <sup>2</sup> ) wire, 1.15 to 1.35 mm max. outer diameter including insulation

### Sumitomo 3M Connectors

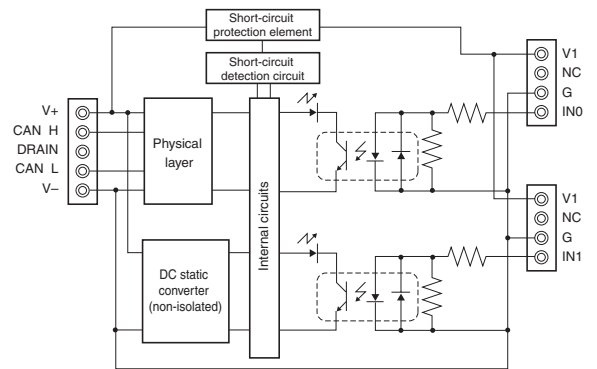
Model	Specifications	Compatible wire size
37104-3101-000FL	Red	26 to 24 AWG (0.14 to 0.2 mm <sup>2</sup> ) wire, 0.8 to 1.0 mm max. outer diameter including insulation
37104-3122-000FL	Yellow	26 to 24 AWG (0.14 to 0.2 mm <sup>2</sup> ) wire, 1.0 to 1.2 mm max. outer diameter including insulation
37104-3163-000FL	Orange	26 to 24 AWG (0.14 to 0.2 mm <sup>2</sup> ) wire, 1.2 to 1.6 mm max. outer diameter including insulation
37104-2124-000FL	Green	22 to 20 AWG (0.3 to 0.5 mm <sup>2</sup> ) wire, 1.0 to 1.2 mm max. outer diameter including insulation
37104-2165-000FL	Blue	22 to 20 AWG (0.3 to 0.5 mm <sup>2</sup> ) wire, 1.2 to 1.6 mm max. outer diameter including insulation
37104-2206-000FL	Gray	22 to 20 AWG (0.3 to 0.5 mm <sup>2</sup> ) wire, 1.6 to 2.0 mm max. outer diameter including insulation

Internal Circuit Configuration

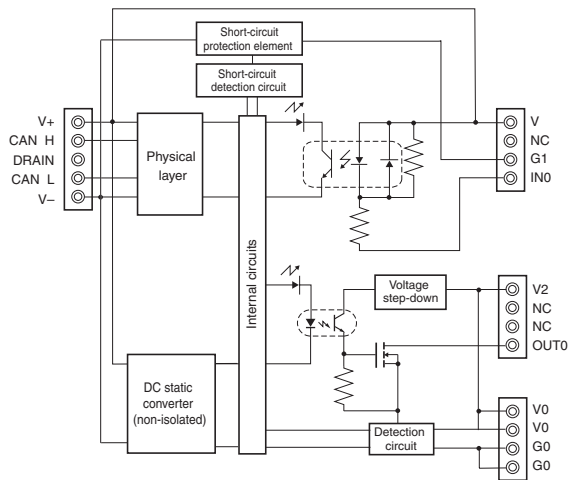
DRT2-ID16S (NPN)



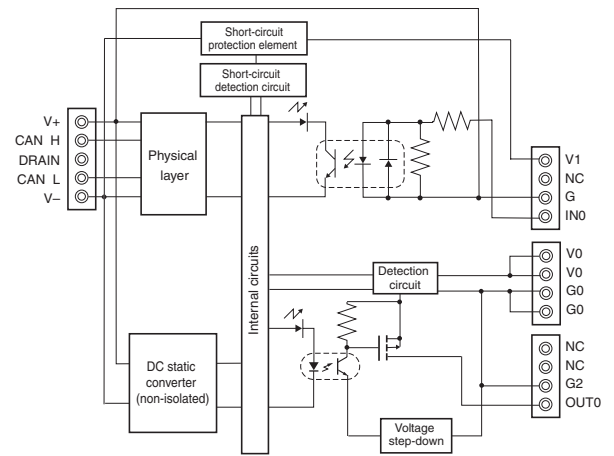
DRT2-ID16S-1 (PNP)



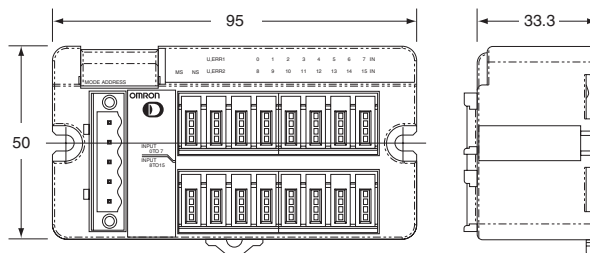
DRT2-MD16S (NPN)



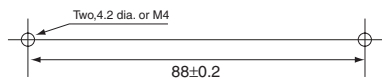
DRT2-MD16S-1 (PNP)



Dimensions

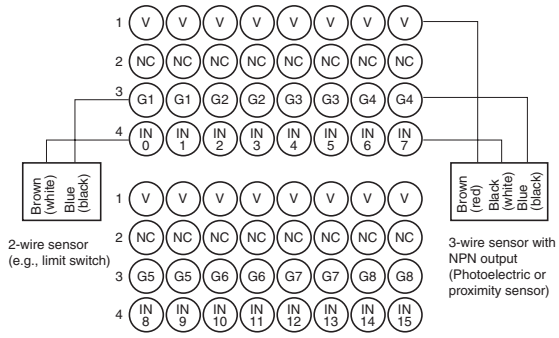


Mounting Hole Dimensions

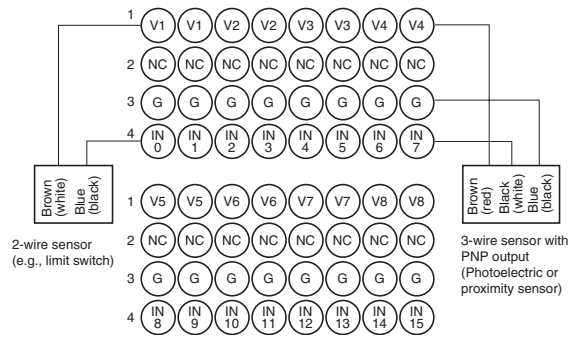


Wiring

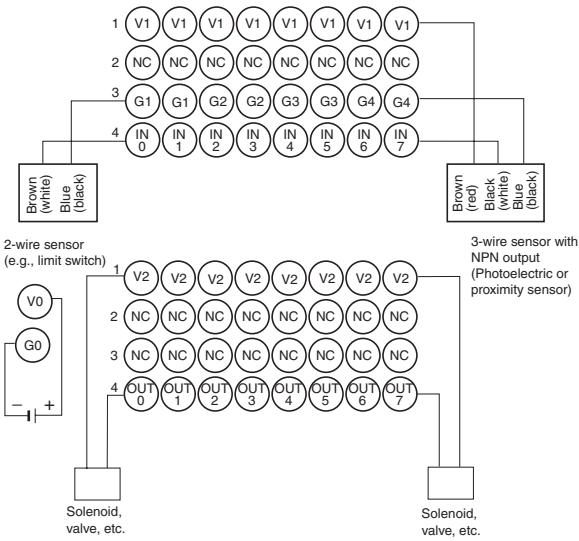
DRT2-ID16S (NPN)



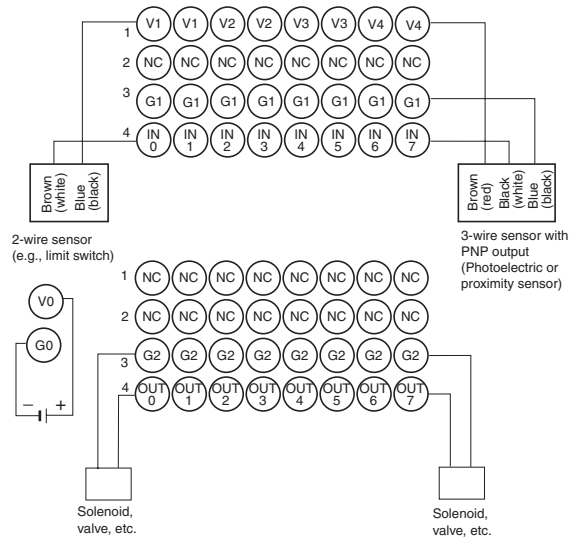
DRT2-ID16S-1 (PNP)



DRT2-MD16S (NPN)



DRT2-MD16S-1 (PNP)

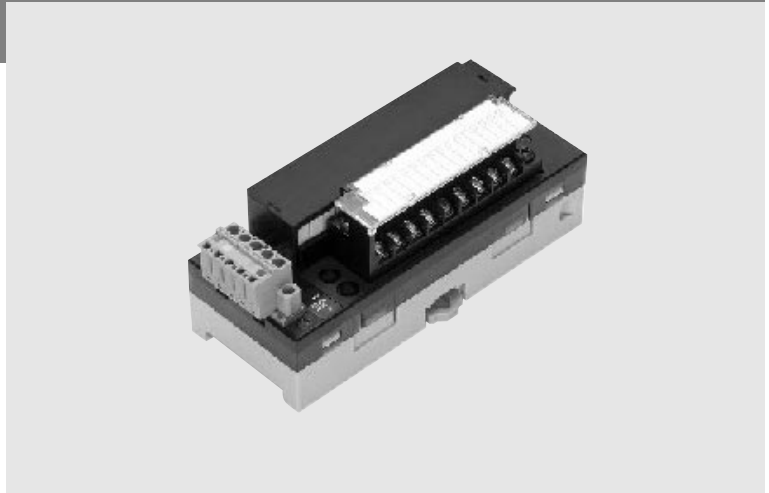


DRT2-ROS16

# Relay output Terminal

*I/O terminal enhances maintenance capabilities due replaceable relays.*

- Smart DeviceNet slave that provides preventive maintenance and trouble shooting information
- 3A replaceable relays
- Relays replaced easily, without special tools needed
- Units can be extended with the XWT I/O blocks, reducing the number of network nodes required



Remote I/O

## Ordering information

I/O type	Number of I/O	I/O connections	Rated load	Rated carry current	Applicable relay	Model
Output	16	M3 screw terminals	250 V AC, 2 A, 8-A common 30 V DC, 2 A, 8-A common	3 A	DRTANY5W-K	DRT2-ROS16

## Specifications

### Common Specifications

Item	Specifications
Communication power supply voltage	11 to 25 V DC (Supplied from the communications connector)
Noise immunity	Conforms to IEC61000-4-4. 2kV (power lines)
Vibration resistance	10 to 55 Hz, 0.7-mm double amplitude
Shock resistance	100 m/s <sup>2</sup>
Dielectric strength	500 V AC (between isolated circuits)
Insulation resistance	20 MW min. at 250 V DC
Ambient temperature	-10 to +55°C
Ambient humidity	25% to 85% (with no condensation)
Operating environment	No corrosive gases
Storage temperature	-25 to +65°C
Mounting	35-mm DIN Track mounting
Screw tightening torque	M2 (communications connector without set screws): 0.26 to 0.3 Nm M3 (screw terminals): 0.3 to 0.5 Nm

### Output Specifications (for One Relay)

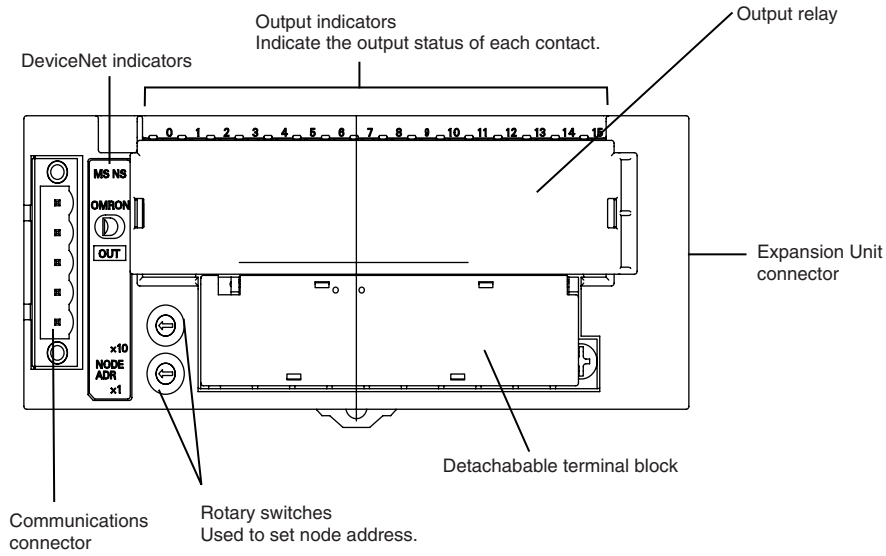
Item	Specifications
Relay	DRTANY5W-K
Rated load	Resistive load 250 V AC, 2 A, 8-A common 30 V DC, 2 A, 8-A common
Rated carry current	3 A <sup>1</sup>
Maximum switching voltage	250 V AC, 125 V DC
Maximum switching current	3 A
Maximum switching capacity	750 V AC, 90 V DC
Maximum applicable load (reference value)	5 V DC at 1 mA

1. The rated carry current can be as high as 3 A (10-A common) if the number of terminal that turn ON simultaneously is four or less per common, or if the ambient temperature is 45°C or lower.

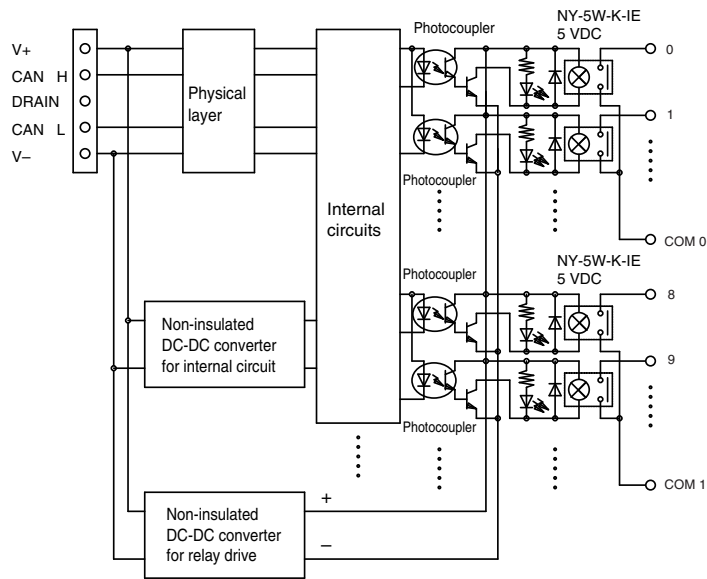
### Real Life Expectancy

Item	Specifications
Mechanical life expectancy	20,000,000 times min.
Electrical life expectancy	100,000 times min.

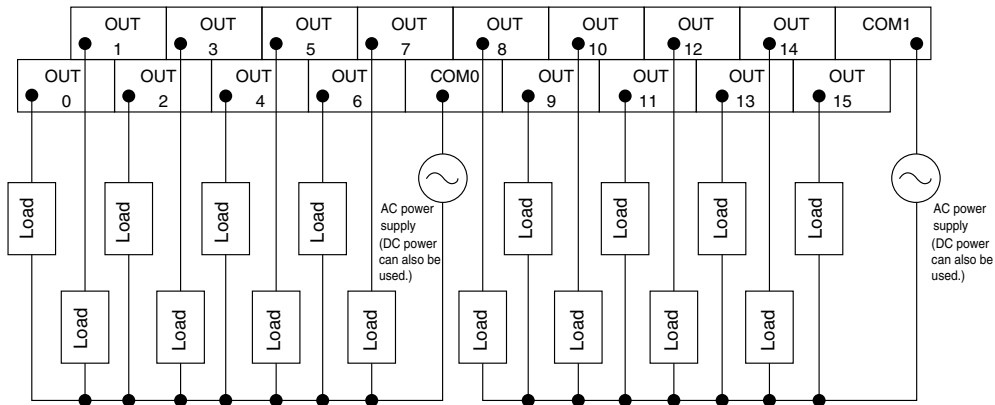
Nomenclature



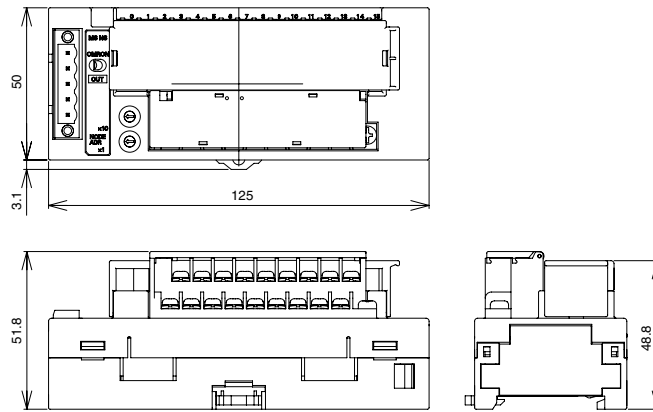
Internal Circuit Diagrams



Wiring



Dimensions



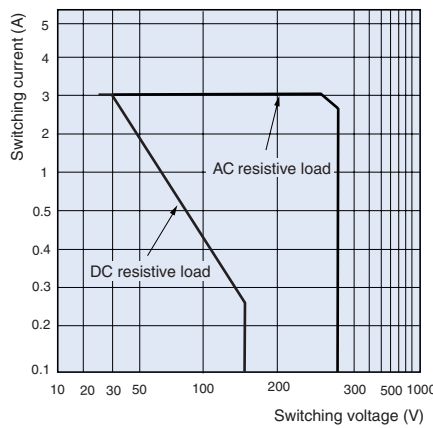
Engineering Data

Reference Data

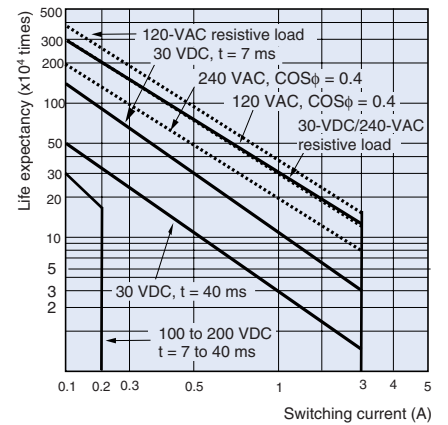
The data shown below is based on actual measurements of samples taken from the production line. There is some degree of variation in relay characteristics and so this data should be used only for reference purposes.

- Note: 1. With a current between 2 and 3 A (common: 8 to 10 A), either ensure that the number of points per common that simultaneously turn ON does not exceed 4 or ensure that the temperature does not exceed 45°C. There are no restrictions if the current does not exceed 2 A (common: 8 A).
2. Using at the rated current value assures normal unit operation but does not assure the life expectancy of the relay itself. The relay's life expectancy varies greatly with the operating temperature, type of load, and switching conditions, and so be sure to check the relay characteristics under the actual conditions.

Maximum Switching Capacity

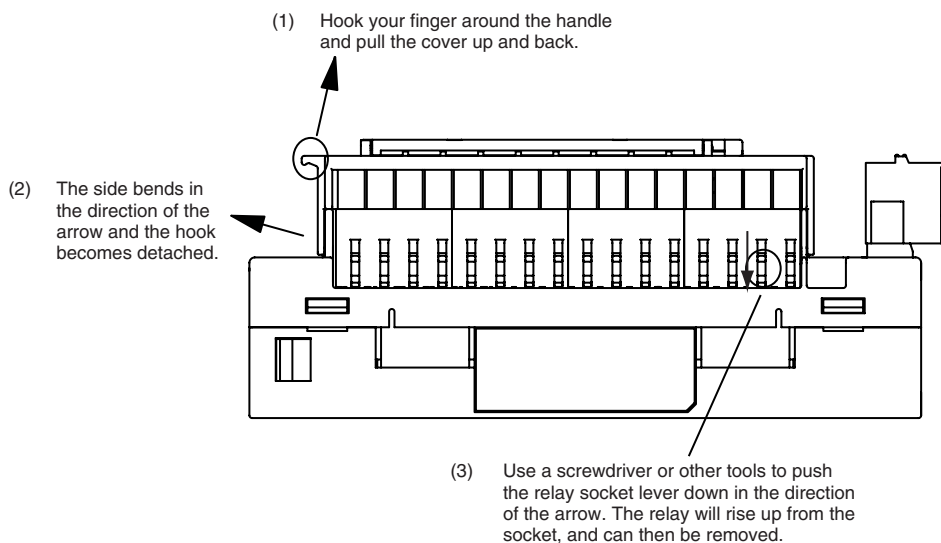


Life Expectancy Curve



Relay Replacement Method

When replacing output relays, remove the cover as shown below.

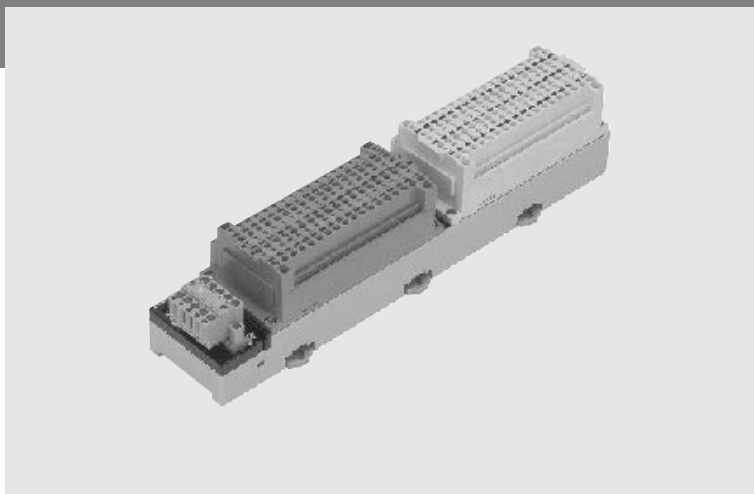


DRT2-□D32SL(-1)/□D32SLH(-1)

# Screw-less Clamp Terminals

## Reduced Wiring and Labor on Factory Sites with Screw-less Terminal Wiring

- Screw-less (M3) structure eliminates tightening work.
- Removable terminal blocks for easier maintenance.
- Single-step wiring by simply inserting pole terminals.



## Smart Slave Functions

### I/O Short and Disconnection Detection. Communicate Detection Results to Host.

### Improved Monitor Functions

- Operation time monitor
- Contact operation counter
- Unit conduction time monitor
- Total ON time monitor
- Unit comments
- Connected device comments
- Network power supply voltage monitor
- I/O power status monitor

### Slave and Connected Device Comments

### Expansion I/O Units Can Be Added.

### Shared Internal and Communications Power Supply

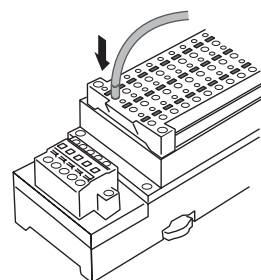
- Reduces wiring. (I/O power supplied externally.)

### Automatic Detection of Communications Speed

### Power-ON Inrush Current Protection on Input and I/O Terminals

### Just Insert Pole Terminals to Complete Wiring

One Step



## Ordering Information

Short/disconnection detection	I/O type	Internal I/O common	Number of I/O points	I/O terminals	Internal circuit power	Rated I/O power supply voltage	Model	
Supported	Inputs	NPN (+ common)	32	Clamp terminals	Supplied from communications connector.	24 VDC	DRT2-ID32SLH	
		PNP (- common)					DRT2-ID32SLH-1	
	Outputs	NPN (+ common)					16 inputs and 16 outputs	DRT2-OD32SLH
		PNP (- common)						DRT2-OD32SLH-1
	I/O	NPN (+ common for inputs, - common for outputs)					DRT2-MD32SLH	
		PNP (- common for inputs, + common for outputs)					DRT2-MD32SLH-1	
Not supported	Inputs	NPN (+ common)	32				DRT2-ID32SL	
		PNP (- common)					DRT2-ID32SL-1	
	Outputs	NPN (+ common)					DRT2-OD32SL	
		PNP (- common)					DRT2-OD32SL-1	
	I/O	NPN (+ common for inputs, - common for outputs)					DRT2-MD32SL	
							DRT2-MD32SL-1	

Specifications

Terminals with 32 Transistor Inputs (Input Ratings)

Item	DRT2-ID32SL	DRT2-ID32SL-1	DRT2-ID32SLH	DRT2-ID32SLH-1
Internal I/O common	NPN	PNP	NPN	PNP
Input points	32 inputs			
I/O power supply voltage	20.4 to 26.4 (24 VDC -15% to +10%)			
Input current	24 VDC: 6.0 mA max./point, 17 VDC: 3.0 mA max./point			
Input resistance	4 kΩ			
ON delay time	1.5 ms max.			
OFF delay time	1.5 ms max.			
ON voltage	15 VDC min. (between input and V terminal)	15 VDC min. (between input and G terminal)	15 VDC min. (between input and V terminal)	15 VDC min. (between input and G terminal)
OFF voltage	5 VDC max. (between input and V terminal)	5 VDC max. (between input and G terminal)	5 VDC max. (between input and V terminal)	5 VDC max. (between input and G terminal)
ON current	3 mA min.			
OFF current	1 mA max.			
Circuits per common	16			
Power short-circuit protection	---		Operates at 50 mA/point min.	
Disconnection detection	---		Operates at 0.3 mA/point max.	

Terminals with 32 Transistor Outputs (Output Rating)

Item	DRT2-OD32SL	DRT2-OD32SL-1	DRT2-OD32SLH	DRT2-OD32SLH-1
Internal I/O common	NPN	PNP	NPN	PNP
Output points	32 outputs			
I/O power supply voltage	20.4 to 26.4 (24 VDC -15% to +10%)			
Rated output current	0.5 A/point, 4.0 A/common (See note.)			
Residual voltage	1.2 V max.			
Leakage current	0.1 mA max.		0.1 mA max.	
ON delay time	0.5 ms max.			
OFF delay time	1.5 ms max.			
Disconnection detection	---		Operates at current consumption of 3 mA/point max. (Not detected at 3 mA or higher.)	
Output for errors	According to hold/clear setting for errors (default: clear)			

Input Ratings with 16 Transistor Inputs/16 Transistor Outputs

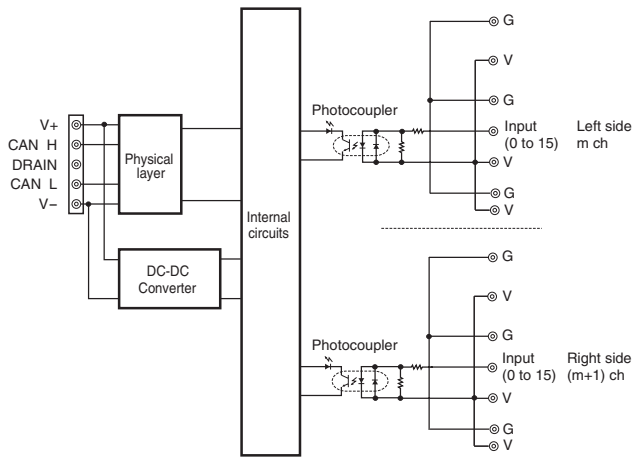
Item	DRT2-MD32SL	DRT2-MD32SL-1	DRT2-MD32SLH	DRT2-MD32SLH-1
Internal I/O common	NPN	PNP	NPN	PNP
I/O points	16 inputs			
I/O power supply voltage	20.4 to 26.4 (24 VDC -15% to +10%)			
Input current	24 VDC: 6.0 mA max./point, 17 VDC: 3.0 mA max./point			
Input resistance	4 kΩ			
ON delay time	1.5 ms max.			
OFF delay time	1.5 ms max.			
ON voltage	15 VDC min. (between input and V terminal)	15 VDC min. (between input and G terminal)	15 VDC min. (between input and V terminal)	15 VDC min. (between input and G terminal)
OFF voltage	5 VDC max. (between input and V terminal)	5 VDC max. (between input and G terminal)	5 VDC max. (between input and V terminal)	5 VDC max. (between input and G terminal)
ON current	3 mA min.			
OFF current	1 mA max.			
Circuits per common	16			
Power short-circuit protection	---		Operates at 50 mA/point min.	
Disconnection detection	---		Operates at 0.3 mA/point max.	

Output Ratings with 16 Transistor Inputs/16 Transistor Outputs

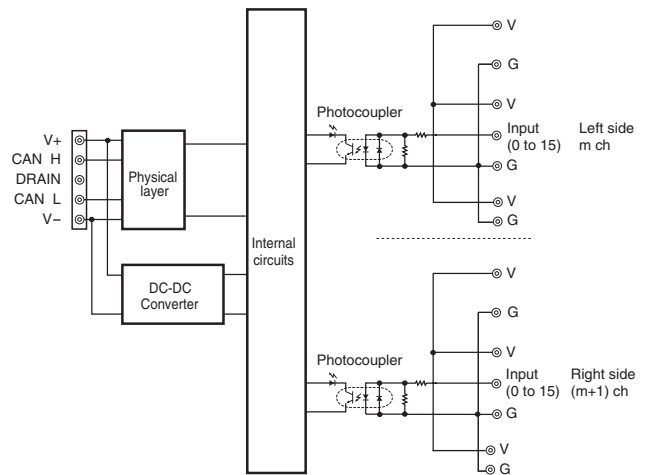
Item	DRT2-MD32SL	DRT2-MD32SL-1	DRT2-MD32SLH	DRT2-MD32SLH-1
Internal I/O common	NPN	PNP	NPN	PNP
Output points	16 outputs			
I/O power supply voltage	20.4 to 26.4 (24 VDC -15% to +10%)			
Rated output current	0.5 A/point, 4.0 A/common (See note.)			
Residual voltage	1.2 V max.			
Leakage current	0.1 mA max.			
ON delay time	0.5 ms max.			
OFF delay time	1.5 ms max.			
Disconnection detection	---		Operates at current consumption of 3 mA/point max. (Not detected at 3 mA or higher.)	
Output for errors	According to hold/clear setting for errors (default: clear)			

Internal Circuit Configuration

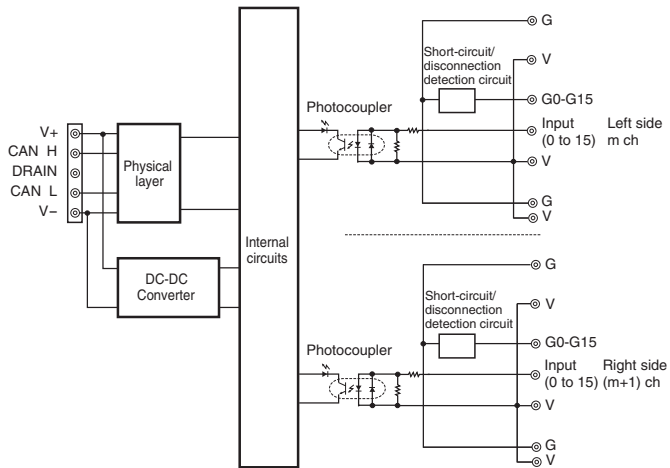
DRT2-ID32SL



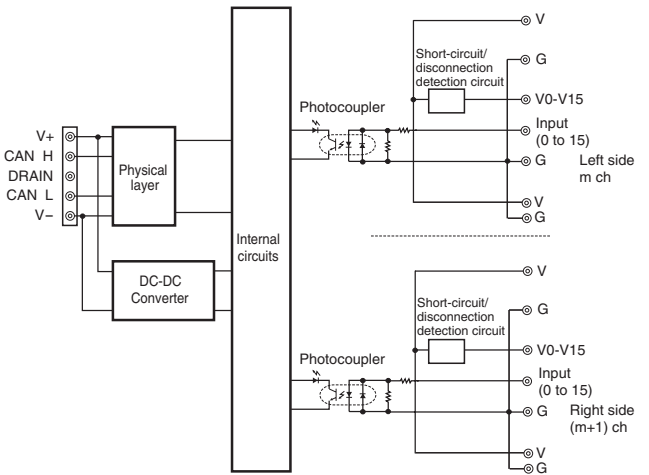
DRT2-ID32SL-1



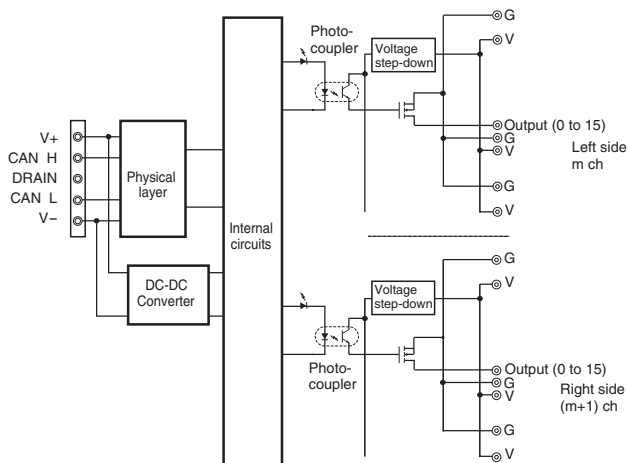
DRT2-ID32SLH



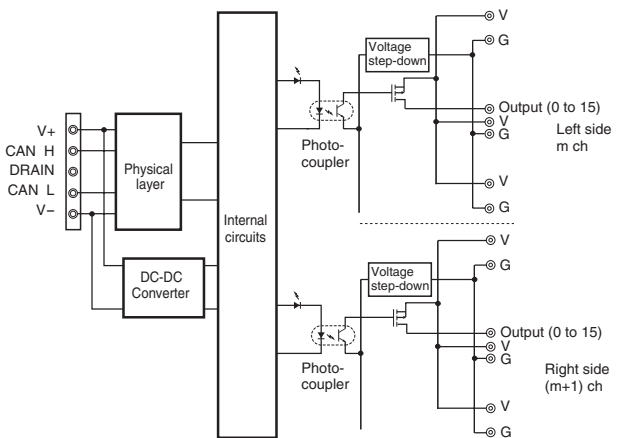
DRT2-ID32SLH-1



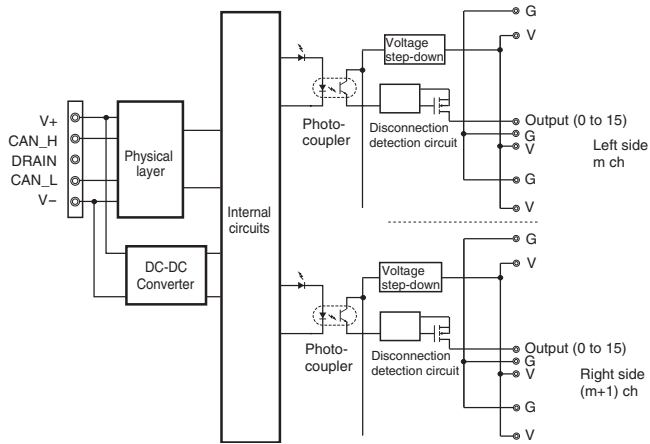
DRT2-OD32SL



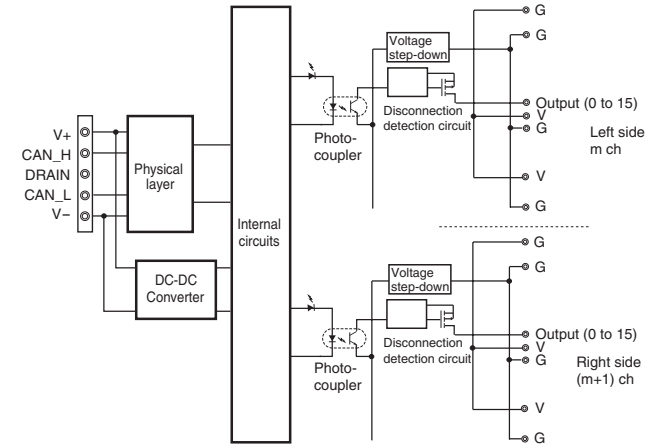
DRT2-OD32SL-1



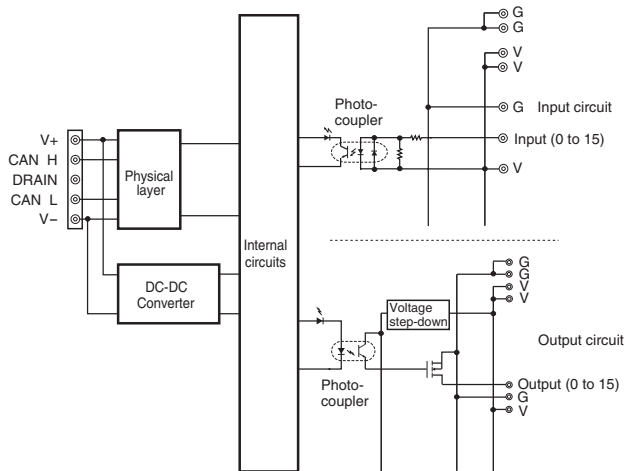
DRT2-OD32SLH



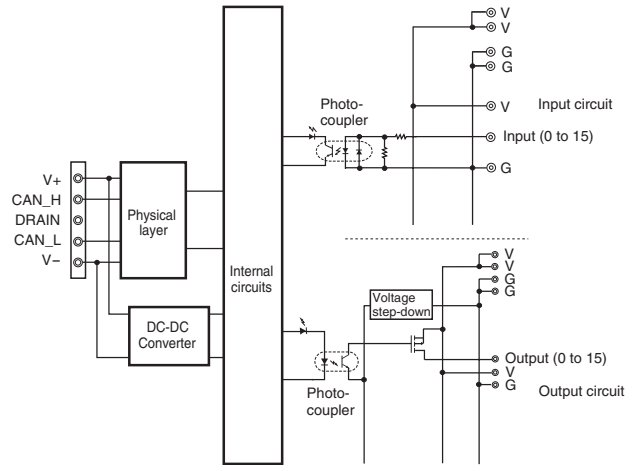
DRT2-OD32SLH-1



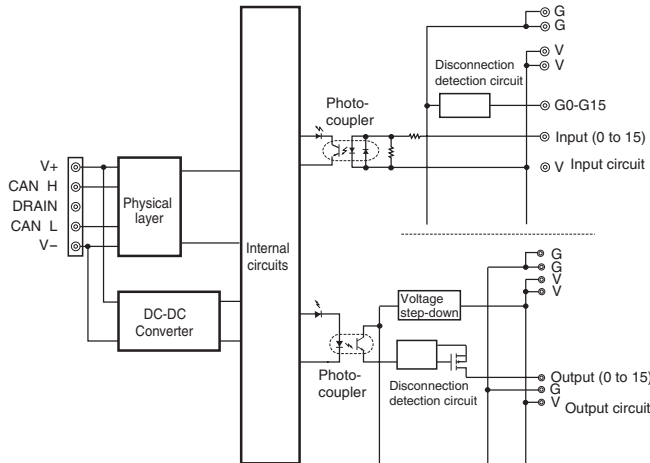
DRT2-MD32SL



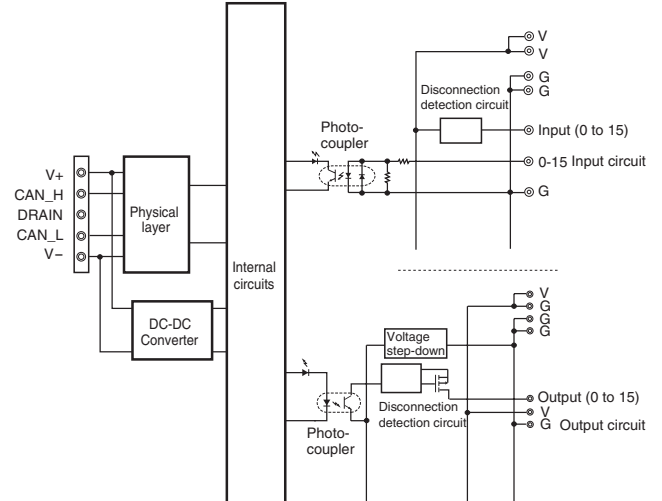
DRT2-MD32SL-1



DRT2-MD32SLH



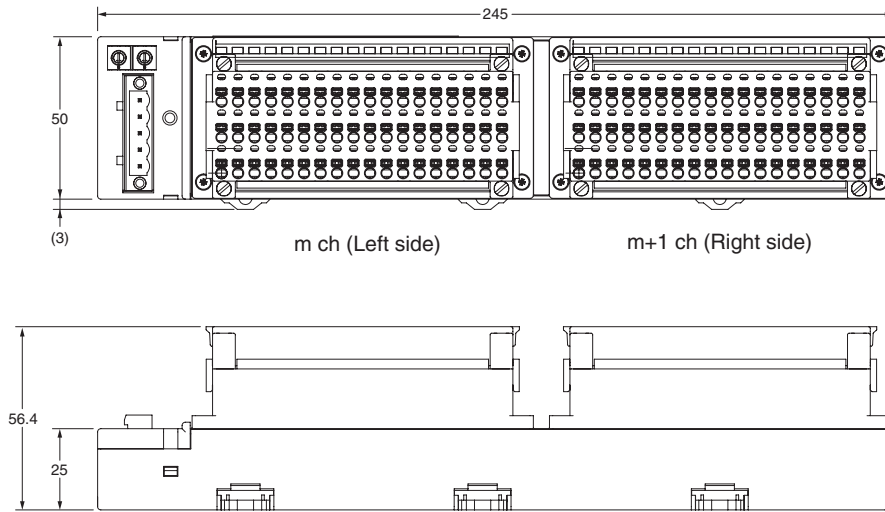
DRT2-MD32SLH-1



Remote I/O

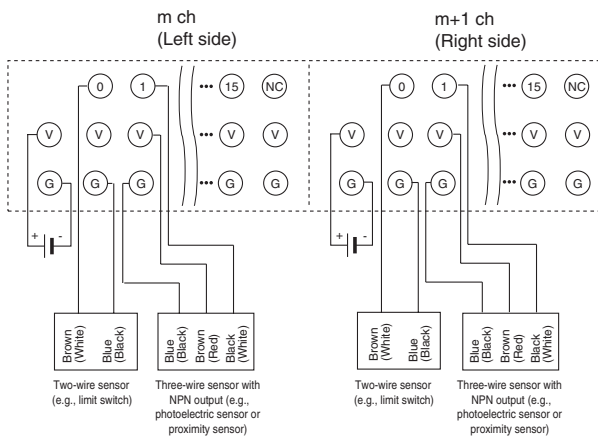
Dimensions (Unit: mm)

DRT2-ID32SLH(-1)  
 DRT2-OD32SLH(-1)  
 DRT2-MD32SLH(-1)  
 DRT2-ID32SL(-1)  
 DRT2-OD32SL(-1)  
 DRT2-MD32SL(-1)

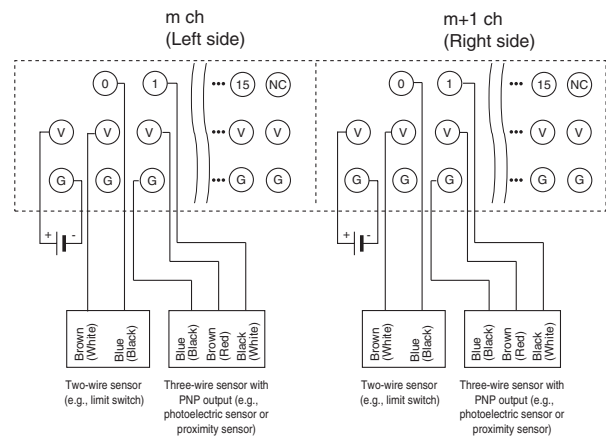


Wiring

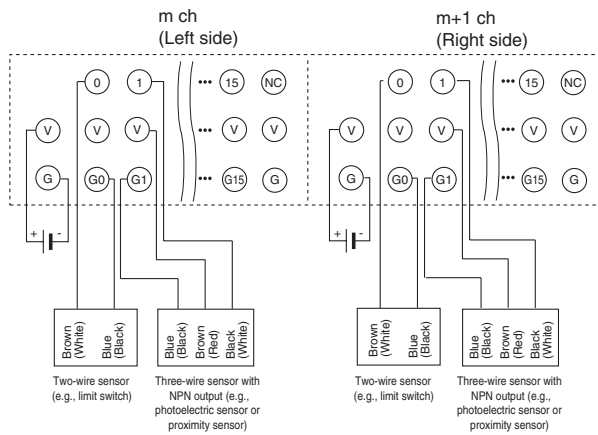
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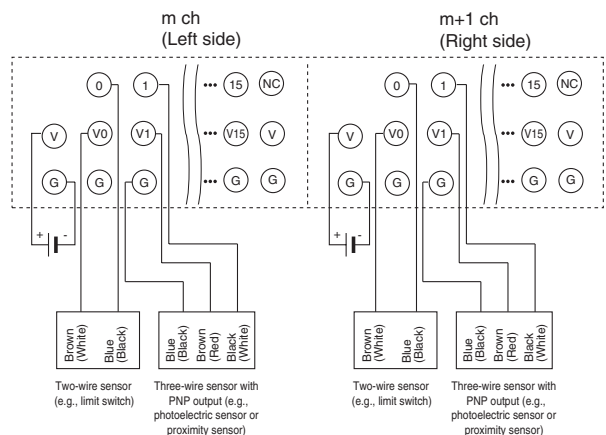
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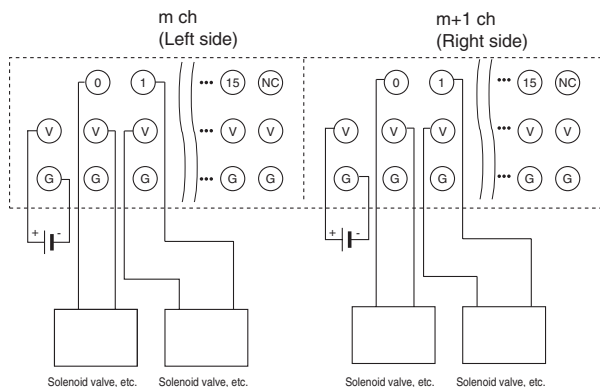
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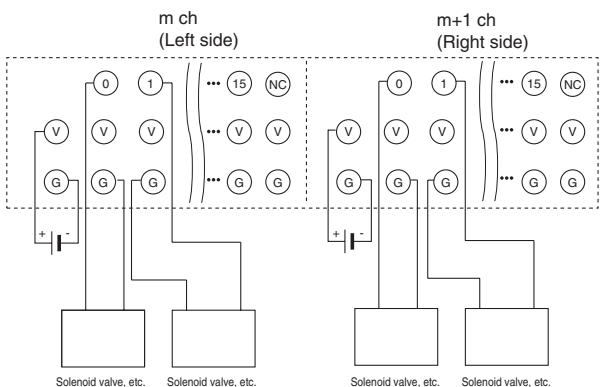
DRT2-ID32SLH-1



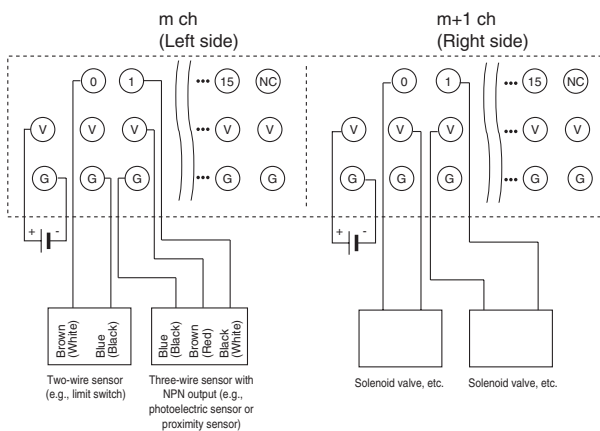
**DRT2-OD32SL**



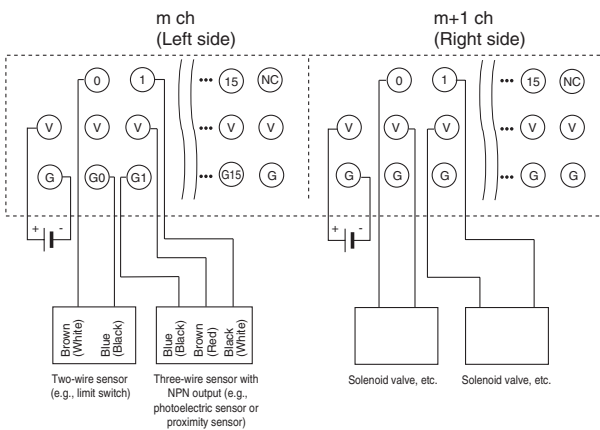
**DRT2-OD32SL-1**



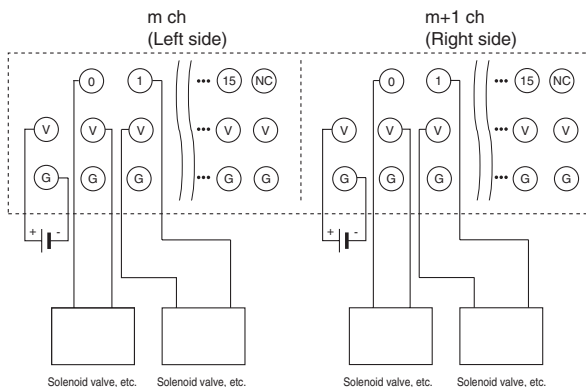
**DRT2-MD32SL**



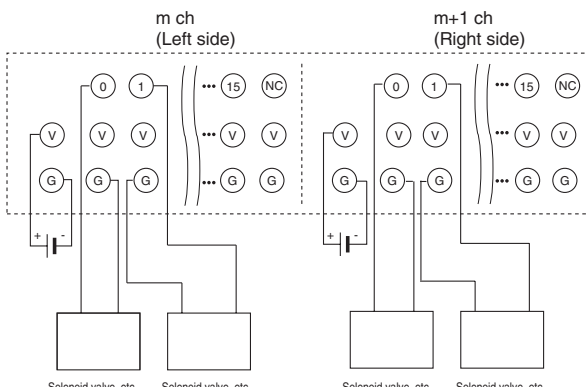
**DRT2-MD32SLH**



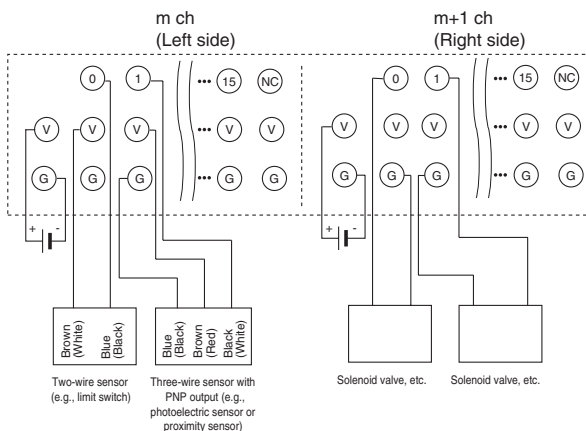
**DRT2-OD32SL**



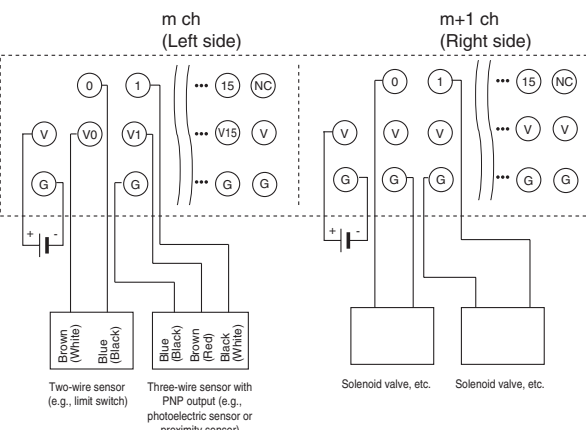
**DRT2-OD32SLH-1**



**DRT2-MD32SL-1**



**DRT2-MD32SLH-1**



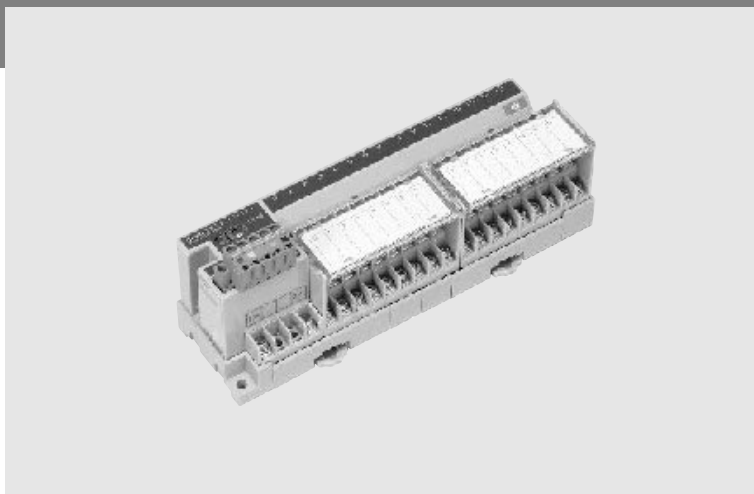
Remote I/O

DRT2-□D16TA(-1)

# 3-tier Connection Terminals

## Terminals with 3-tier Terminal Blocks Added to DRT2 Smart Slaves

- Easy wiring with no sharing of terminals. Easy-to-understand wiring locations.
- No relay terminal block terminals required.
- Removable cassette-type circuit sections.



## Smart Slave Functions

### Improved Monitor Functions

- Contact operation counter
- Unit conduction time monitor
- Total ON time monitor
- Network power supply voltage monitor
- Communications error log
- Last maintenance date
- Operation time monitor

### Slave and Connected Device Comments

**Automatic Detection of Communications Speed**

**Input filter on Input and I/O Terminals**

**Power-ON Inrush Current Protection on Input and I/O Terminals**

## Ordering Information

I/O type	Internal I/O common	Number of I/O points	I/O terminals	Internal circuit power	Rated I/O power supply voltage	Model
Inputs	NPN (+ common)	16	M3 terminal block	Supplied from communications connector.	24 VDC	DRT2-ID16TA
	PNP (- common)					DRT2-ID16TA-1
Outputs	NPN (+ common)					DRT2-OD16TA
	PNP (- common)					DRT2-OD16TA-1
I/O	NPN (+ common for inputs, - common for outputs)	8 inputs and 8 outputs				DRT2-MD16TA
	PNP (- common for inputs, + common for outputs)					DRT2-MD16TA-1

Specifications

Input Ratings

Terminals with 16 Transistor Inputs

Item	DRT2-ID16TA	DRT2-ID16TA-1
Internal I/O common	NPN	PNP
I/O points	16 inputs	
ON voltage	15 VDC min. (between input and V terminal)	15 VDC min. (between input and G terminal)
OFF voltage	5 VDC max. (between input and V terminal)	5 VDC max. (between input and G terminal)
OFF current	1.0 mA max.	
Input current	24 VDC: 6.0 mA max./point 17 VDC: 3.0 mA max./point	
ON delay time	1.5 ms max.	
OFF delay time	1.5 ms max.	
Circuits per common	8	

Terminals with 8 Transistor Inputs and 8 Transistor Outputs

Item	DRT2-MD16TA	DRT2-MD16TA-1
Internal I/O common	NPN	PNP
I/O points	8 inputs	
ON voltage	15 VDC min. (between input and V terminals)	15 VDC min. (between input and G terminals)
OFF voltage	5 VDC max. (between input and V terminals)	5 VDC max. (between input and G terminals)
OFF current	1.0 mA max.	
Input current	24 VDC: 6.0 mA max./point 17 VDC: 3.0 mA max./point	
ON delay time	1.5 ms max.	

Item	DRT2-MD16TA	DRT2-MD16TA-1
OFF delay time	1.5 ms max.	
Circuits per common	8	

Output Ratings

Terminals with 16 Transistor Outputs

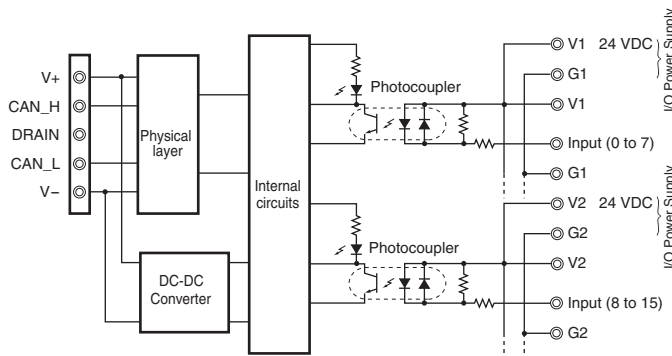
Item	DRT2-OD16TA	DRT2-OD16TA-1
Internal I/O common	NPN	PNP
I/O points	16 outputs	
Rated output voltage	0.5 A/point	
Residual voltage	1.2 VDC max. (0.5 A DC between output and G terminal)	1.2 VDC min. (0.5 A DC between input and V terminal)
Leakage current	0.1 mA max.	
ON delay time	0.5 ms max.	
OFF delay time	1.5 ms max.	
Circuits per common	8	

Terminals with 8 Transistor Inputs and 8 Transistor Outputs

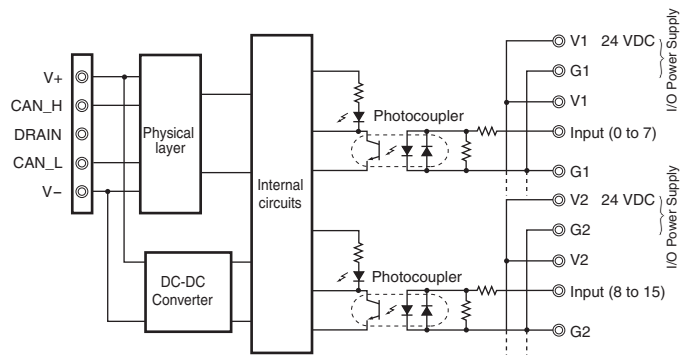
Item	DRT2-MD16TA	DRT2-MD16TA-1
Internal I/O common	NPN	PNP
I/O points	8 outputs	
Rated output voltage	0.5 A/point	
Residual voltage	1.2 VDC max. (0.5 A DC between output and G terminal)	1.2 VDC min. (0.5 A DC between input and V terminal)
Leakage current	0.1 mA max.	
ON delay time	0.5 ms max.	
OFF delay time	1.5 ms max.	

Internal Circuit Configuration

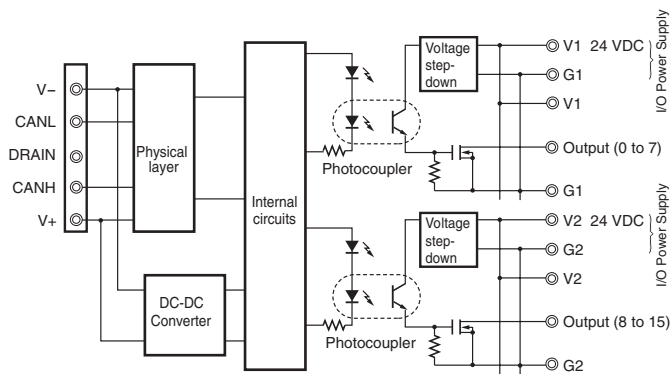
DRT2-ID16TA



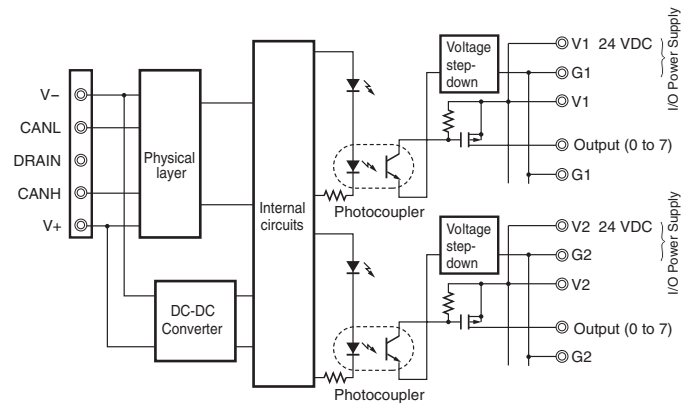
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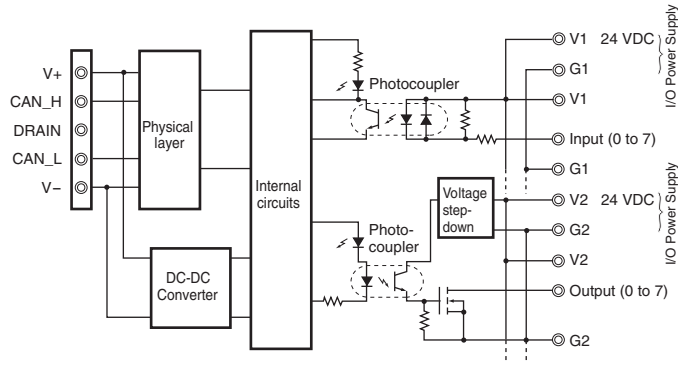
DRT2-OD16TA



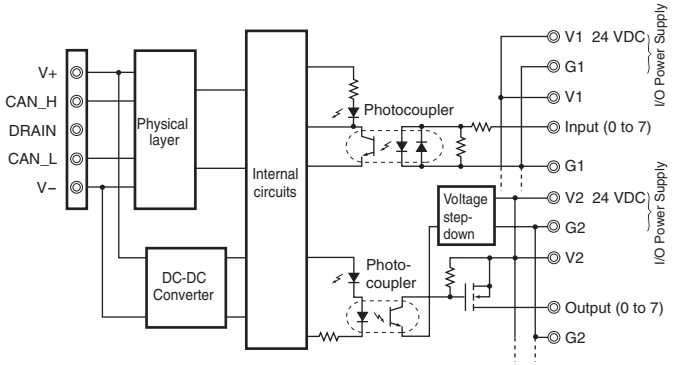
DRT2-OD16TA-1



DRT2-MD16TA

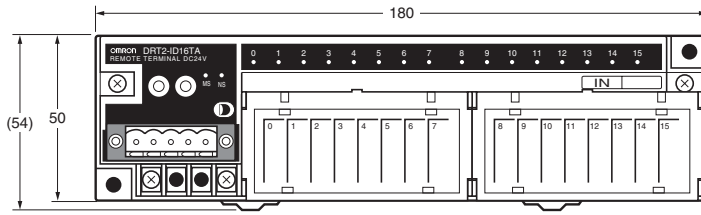


DRT2-MD16TA-1

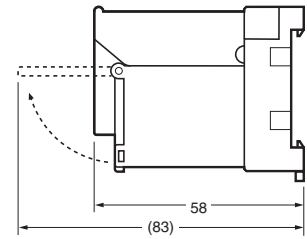
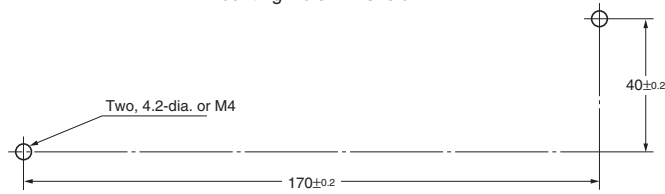


Dimensions (Unit: mm)

- DRT2-ID16TA(-1)
- DRT2-OD16TA(-1)
- DRT2-MD16TA(-1)



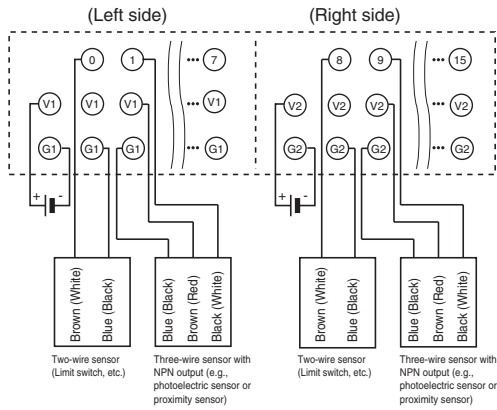
Mounting Hole Dimension



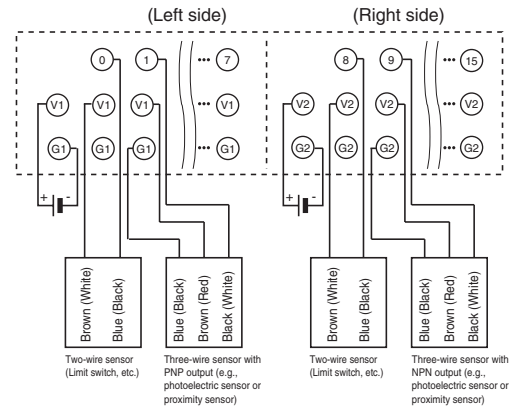
Dimensions in parentheses are reference values.

Wiring

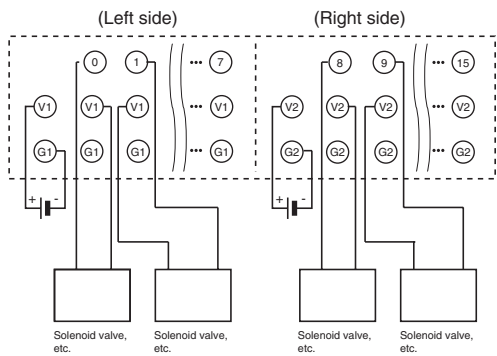
DRT2-ID16TA



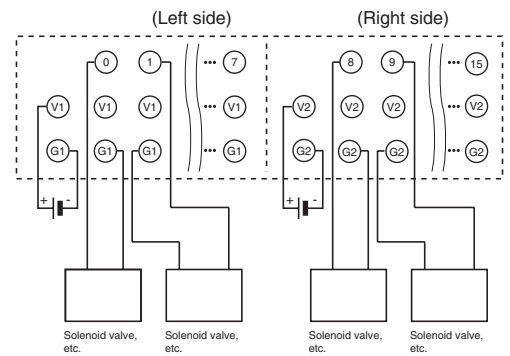
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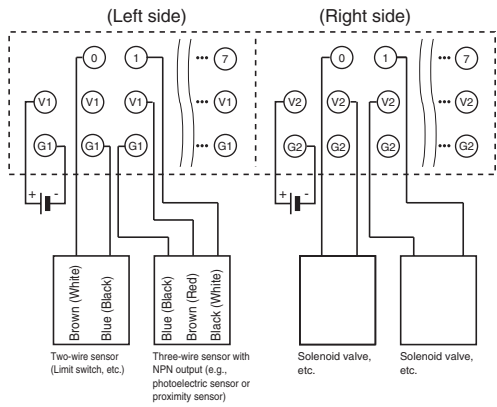
DRT2-OD16TA



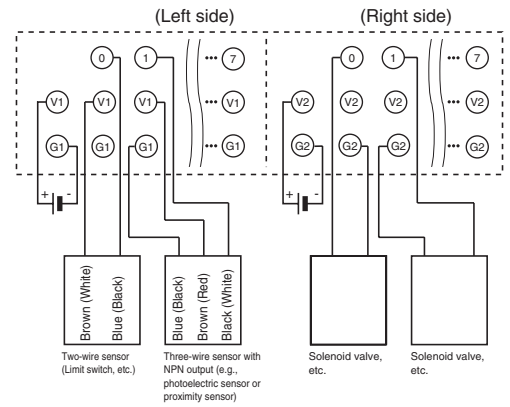
DRT2-OD16TA-1



DRT2-MD16TA



DRT2-MD16TA-1



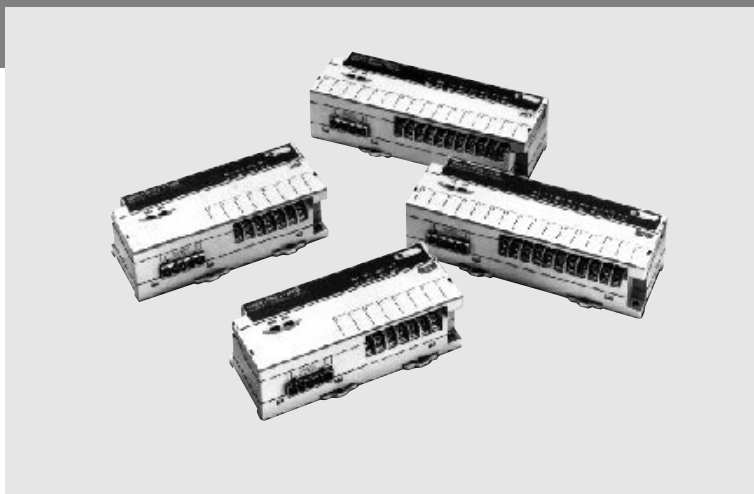
Remote I/O

DRT1-□D08(-1)-MD16

# 8 Points I/O Terminals

## Compact 8-point and 16-point Transistorized Terminals

- Compact  
(8-point models: 125 x 40 x 50 mm (W x H x D),  
16-point models: 150 x 40 x 50 mm (W x H x D))
- Two independent power supplies can be used because the I/O terminals are insulated from the internal circuits.
- DIN rail mounting and screw mounting are available.
- Approved by UL and CSA.



## Ordering Information

I/O classification	Internal I/O circuit common	I/O points	I/O connections	Internal circuit rated voltage	I/O rated voltage	Model
Input	NPN (+ common)	8	M3 terminal block	24 V DC	24 V DC	DRT1-ID08
	PNP (- common)					DRT1-ID08-1
Output	NPN (- common)					DRT1-OD08
	PNP (+ common)					DRT1-OD08-1
I/O	NPN inputs (inputs: + common; outputs: - common)	8 inputs and 8 outputs			DRT1-MD16	

## Specifications

### Ratings

#### Input

Item	DRT1-ID(-1)/DRT1-MD	
Input current	10 mA max./point	
ON delay time	1.5 ms max.	
OFF delay time	1.5 ms max.	
ON voltage	NPN	15 V DC min. between each input terminal and V
	PNP	15 V DC min. between each input terminal and G
OFF voltage	NPN	5 V DC max. between each input terminal and V
	PNP	5 V DC max. between each input terminal and G
OFF current	1 mA max.	
Insulation method	Photocoupler	
Input indicators	LED (yellow)	

#### Output

Item	DRT1-OD(-1)/DRT1-MD
Rated output current	0.3 A/point (See note.)
Residual voltage	1.2 V max.
Leakage current	0.1 mA max.
Insulation method	Photocoupler
Output indicators	LED (yellow)

**Note:** Do not connect the DRT1-OD16 (-1) to loads consuming a total current exceeding 2.4 A.

**Characteristics**

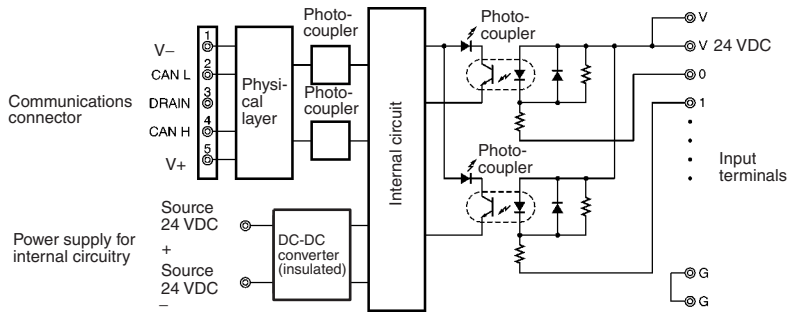
Communications power supply voltage	11 to 25 V DC
Internal power supply voltage	20.4 to 26.4 V DC (24 V DC <sup>+10%</sup> / <sub>-15%</sub> )
I/O power supply voltage	
Current consumption (See note.)	Communications:30 mA max. (25 mA max. for DRT1-MD16) Internal circuit:50 mA max. at 24 V DC (See note.)
Dielectric strength	500 V AC for 1 min (1-mA sensing current between insulated circuits)
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power line)
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction:200 m/s <sup>2</sup> Destruction:300 m/s <sup>2</sup>
Mounting strength	No damage when 50 N pull load was applied for 10 s in all directions (10 N min. in the DIN rail direction)
Terminal strength	No damage when 50 N pull load was applied for 10 s
Screw tightening torque	0.6 to 1.18 N • m
Ambient temperature	Operating:0°C to 55°C (with no icing or condensation) Storage:-20°C to 65°C (with no icing or condensation)
Ambient humidity	Operating:35% to 85%
Weight	8-point model:135 g max. 16-point model:170 g max.

**Note:** The above current consumption is a value with all 8 and 16 points turned ON excluding the current consumption of the external sensor connected to the input Remote Terminal and the current consumption of the load connected to the output Remote Terminal.

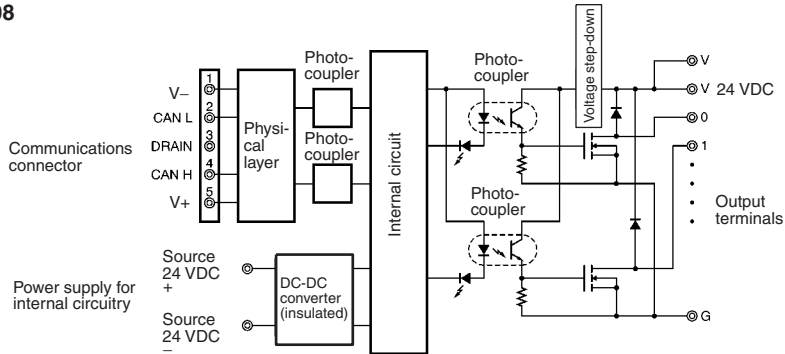
Remote I/O

Internal Circuit Configuration

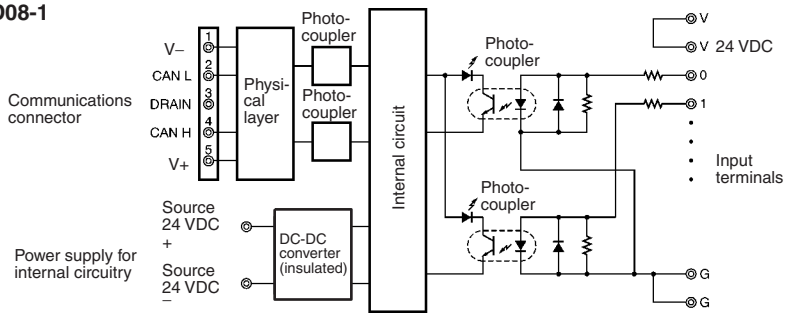
DRT1-ID08



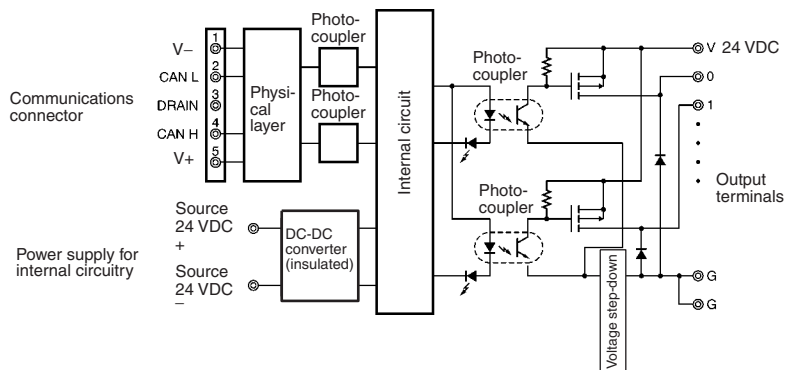
DRT1-OD08



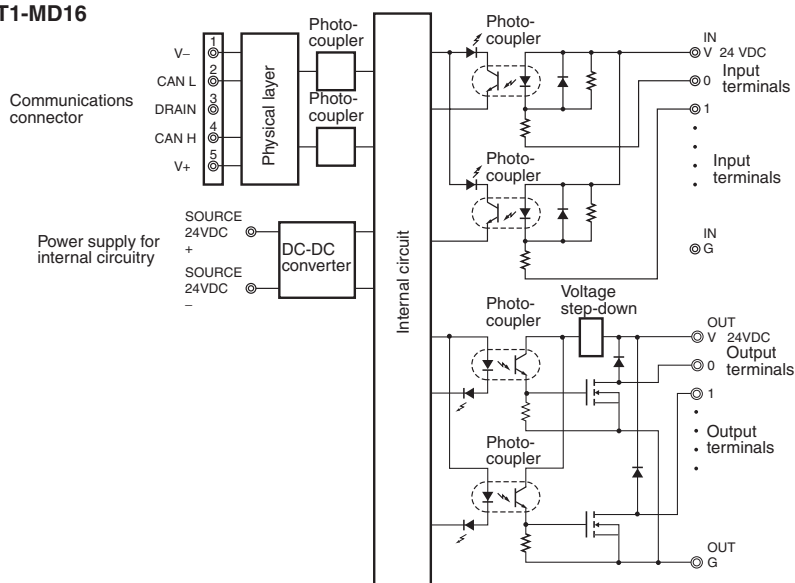
DRT1-ID08-1



DRT1-OD08-1



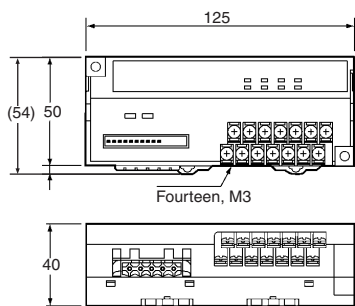
**DRT1-MD16**



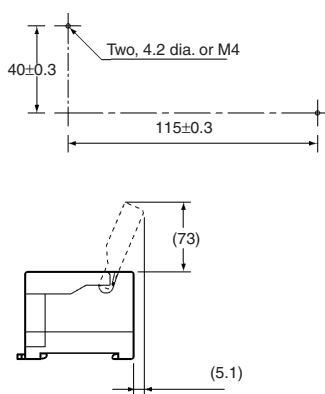
**Dimensions**

**Note:** All units are in millimeters unless otherwise indicated.

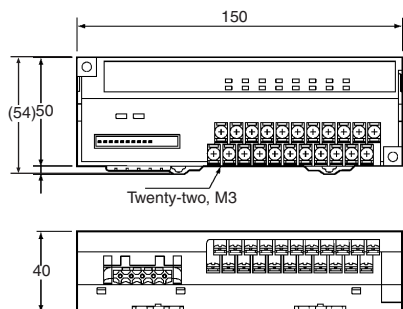
**DRT1-ID08 (-1)  
DRT1-OD08 (-1)**



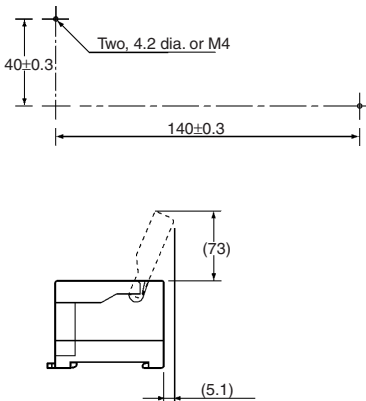
**Mounting Holes**



**DRT1-MD16**

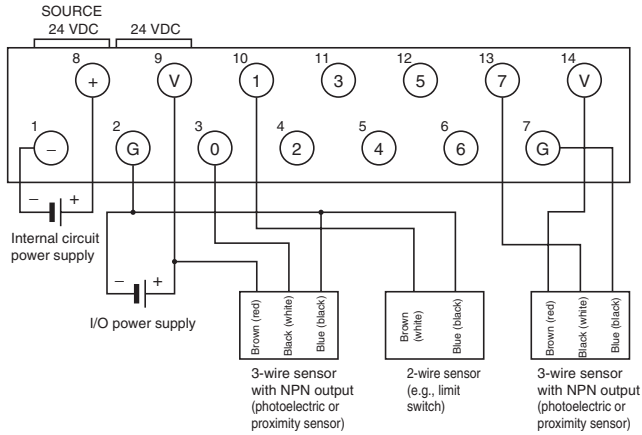


**Mounting Holes**

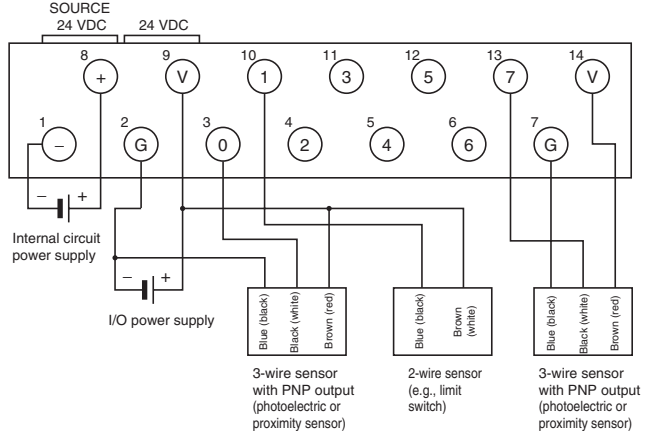


Wiring

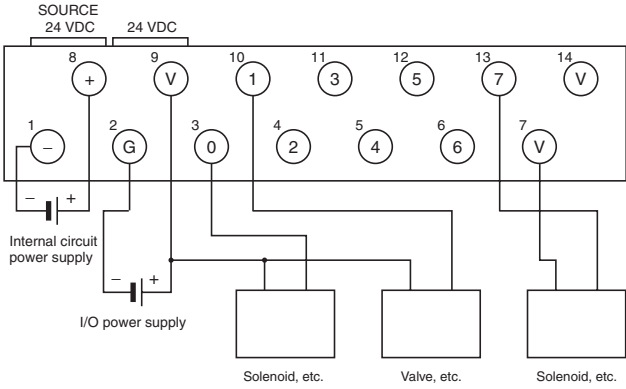
DRT1-ID08 (NPN)



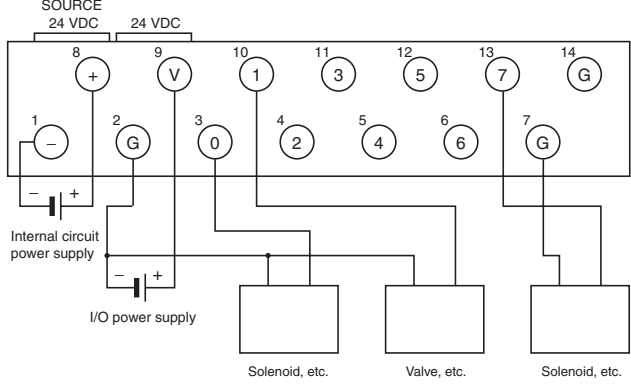
DRT1-ID08-1 (PNP)



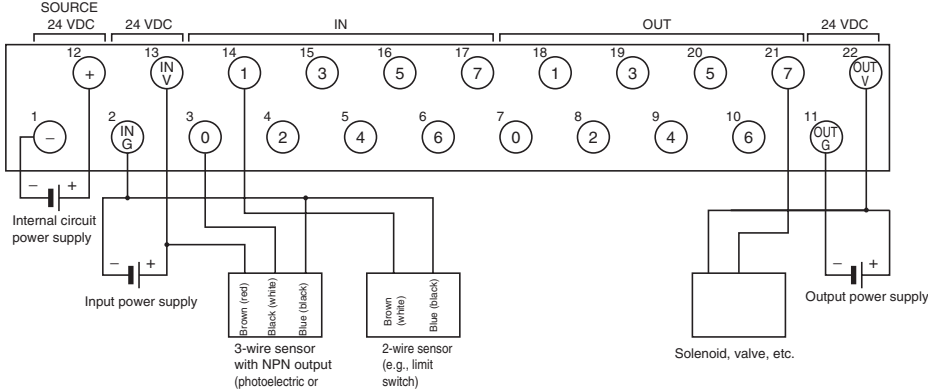
DRT1-OD08 (NPN)



DRT1-OD08-1 (PNP)



DRT1-MD16



**Note:** Wire colors have been changed in accordance with revisions to JIS standards for photoelectric and proximity sensors. The previous colors are given in parentheses.

DRT1-□D0□CL(-1)

# Waterproof Terminals

**Economical Waterproof Terminals Available in 8 Different Models**

- **Reduced Labor**  
Connectors eliminate the need for connection tools.
- **Reduced Wiring**  
The Terminals can be mounted closer to Sensors and so less wiring is required for signal lines.
- **Relay Box Not Required**  
Waterproof, dust-tight, drip-proof construction (IP67) enables direct, on-site mounting.
- **Easier Maintenance**  
Significant reductions not only in setup time but also maintenance time.
- **Reduced Space, Improved Operability**  
Compact design: 160 × 54 (W × H) (8-point models)  
Connect to devices using connectors on front side.  
Switch settings also available.

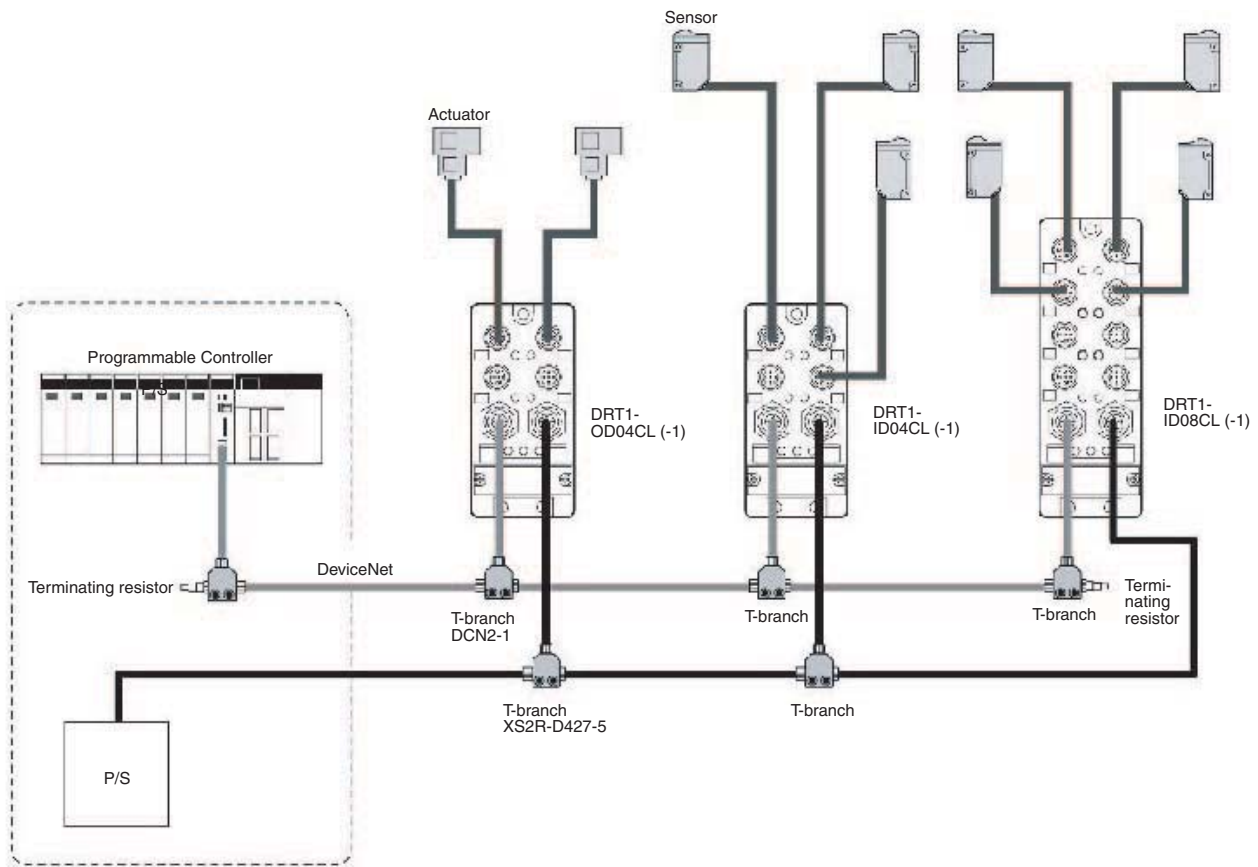


Remote I/O

## Ordering Information

I/O classification	Internal I/O circuit common	I/O points	I/O connection method	Rated voltage for I/O power supply	Model
Input	NPN (+ common)	4 points	Sensor I/O connector	24 V DC	DRT1-ID04CL
		8 points			DRT1-ID08CL
	PNP (- common)	4 points			DRT1-ID04CL-1
		8 points			DRT1-ID08CL-1
Output	NPN (- common)	4 points			DRT1-OD04CL
		8 points			DRT1-OD08CL
	PNP (+ common)	4 points			DRT1-OD04CL-1
		8 points			DRT1-OD08CL-1

System Configuration



Specifications

General Specifications

Item	DRT1-ID04CL DRT1-ID04CL-1	DRT1-OD04CL DRT1-OD04CL-1	DRT1-ID08CL DRT1-ID08CL-1	DRT1-OD08CL DRT1-OD08CL-1
Communications power supply voltage	11 to 25 V DC			
I/O power supply voltage	20.4 to 26.4 V DC (24 V DC -15%/+10%)			
Communications power supply current consumption	25 mA max.	35 mA max.	30 mA max.	40 mA max.
Ambient operating temperature	-10 to 55°C (with no icing)			
Ambient operating humidity	25% to 85% (with no condensation)			
Ambient storage temperature	-25 to 65°C			
Ambient storage humidity	25% to 85% (with no condensation)			
Connector tightening torque	0.39 to 0.49 Nm			
Construction	IEC IP67			
Mounting method	M5 screw mounting			
Weight	180 g max.		240 g max.	

Input Specifications

Item	DRT1-ID04CL DRT1-ID04CL-1	DRT1-ID08CL DRT1-ID08CL-1
Input current	For input voltage of 24 V DC: 6 mA max. per point For input voltage of 17 V DC: 3 mA min. per point	
Input impedance	4.4 kΩ	
ON delay time	1.5 ms max.	
OFF delay time	1.5 ms max.	
ON voltage	15 V DC min.	
OFF voltage	5 V DC max.	
OFF current	1 mA max.	
Number of circuits	4 points with 1 common	8 points with 1 common

Output Specifications

Item	DRT1-OD04CL DRT1-OD04CL-1	DRT1-OD08CL DRT1-OD08CL-1
Rated output current	0.5 A per point (2 A per common)	0.5 A per point (2.4 A per common)
Residual voltage	1.2 V max.	
Leakage current	0.1 mA max.	
ON delay time	0.5 ms max.	
OFF delay time	1.5 ms max.	
Number of circuits	4 points with 1 common	8 points with 1 common

Applicable Connectors

Communications Connectors

Model	Specifications
DCA1-5CN□□W1	Cable with a connector at both ends
DCA1-5CN□□F1	Cable with a connector at one end (socket)
DCA1-5CN□□H1	Cable with a connector at one end (plug)
DCN2-1	T-branch connector
DRS2-1	Connector with terminating resistor (plug)

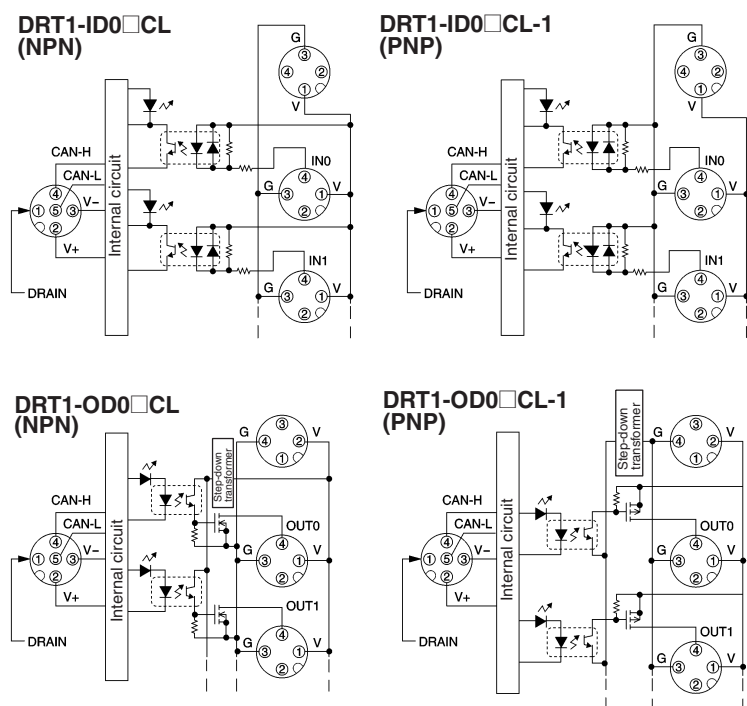
I/O Connectors

Model	Specifications
XS2G-D4□□	Assembling-type connector (crimp, solder, or screw)
XS2H-D421-□□□□□	Cable with connector at one end (plug)
XS2W-D42□-□□□□□	Cable with connector at both ends
XS2Z-12	Waterproof cover
XS2Z-15	Dust cover

Power Supply Connectors

Model	Specifications
XS2C-D4□□	Assembling-type socket (crimp, solder, or screw)
XS2W-D42□-□□□□□	Cable with connector at both ends
XS2F-D42□-□80-□	Cable with connector at one end (socket)
XS2R-D427-5	T-branch connector

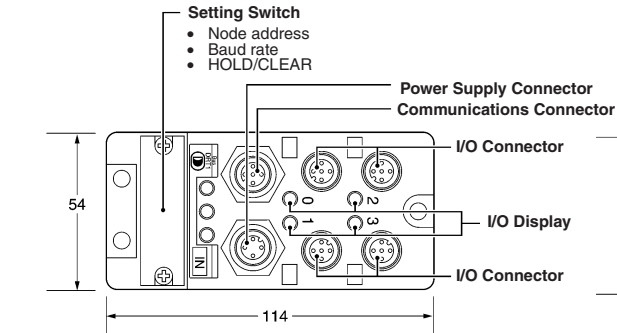
Internal Circuit Diagrams



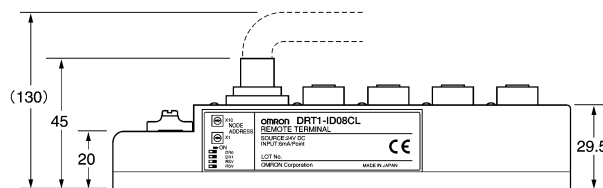
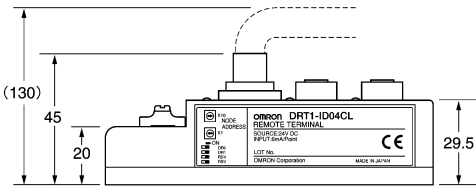
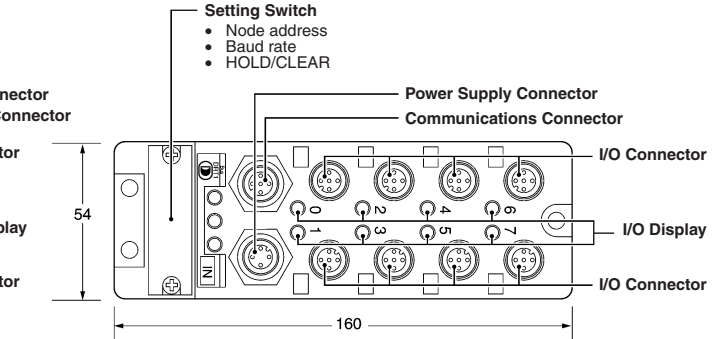
Dimensions

Note: All units are in millimeters unless otherwise indicated.

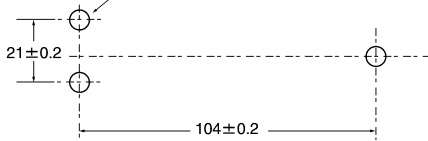
**Models with 4 Points**  
**DRT1-ID04CL/DRT1-ID04CL-1**  
**DRT1-OD04CL/DRT1-OD04CL-1**



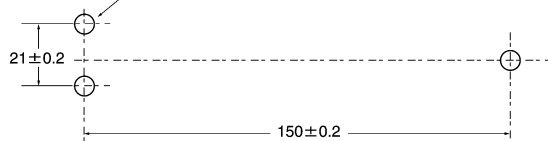
**Models with 8 Points**  
**DRT1-ID08CL/DRT1-ID08CL-1**  
**DRT1-OD08CL/DRT1-OD08CL-1**



Mounting Hole Dimensions  
 Three, M5 or 5.3-dia. holes

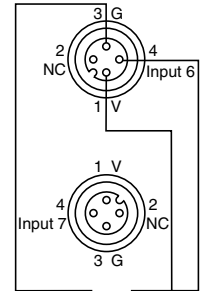
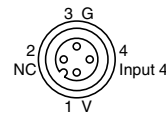
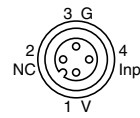
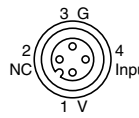
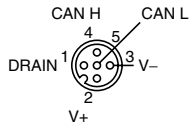


Mounting Hole Dimensions  
 Three, M5 or 5.3-dia. holes

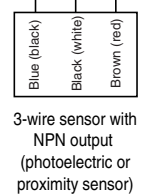
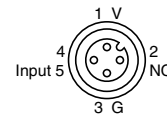
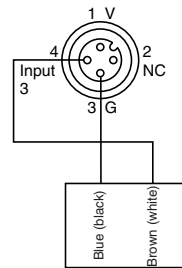
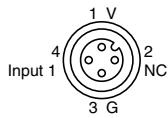
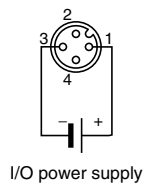


Wiring

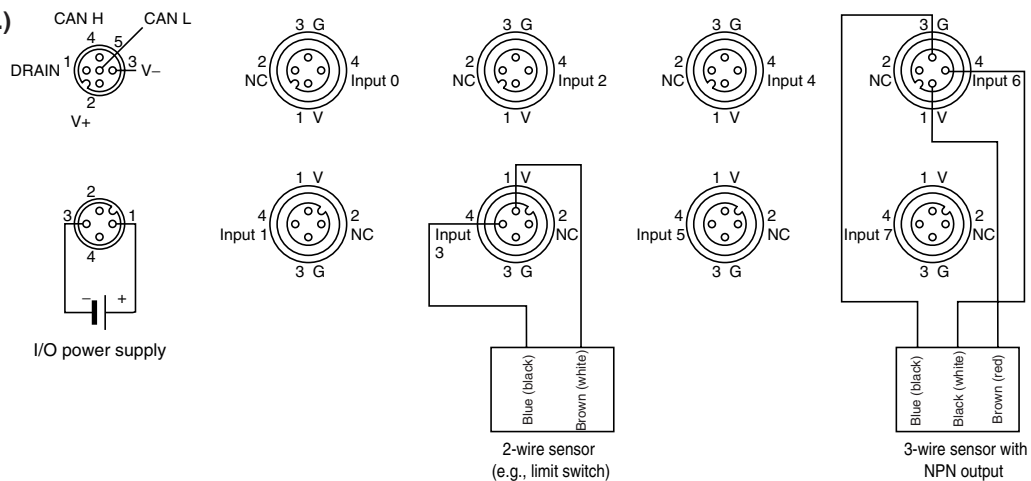
**DRT1-ID04CL (See note.)**  
**DRT1-ID08CL**  
**(NPN)**



Note: The DRT1-ID04CL has only inputs 0 to 3



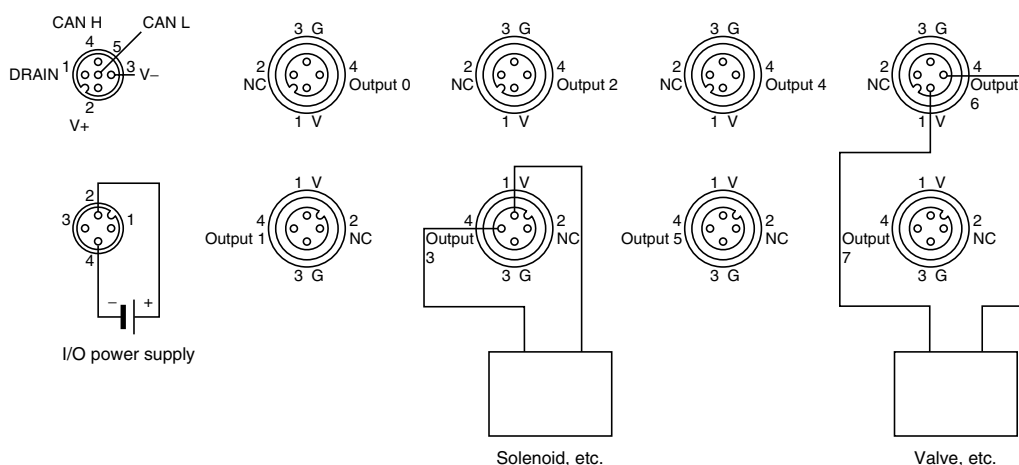
**DRT1-ID04CL-1 (See note.)  
DRT1-ID08CL-1  
(PNP)**



**Note:** The DRT1-ID04CL-1 has only inputs 0 to 3.

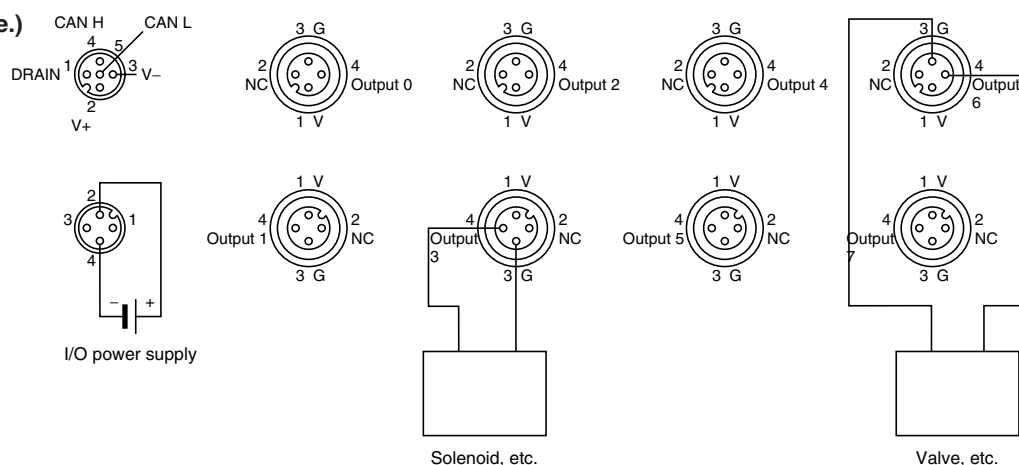
Remote I/O

**DRT1-OD04CL (See note.)  
DRT1-OD08CL  
(NPN)**



**Note:** The DRT1-OD04CL has only outputs 0 to 3.

**DRT1-OD04CL-1 (See note.)  
DRT1-OD08CL-1  
(PNP)**



**Note:** The DRT1-OD04CL-1 has only outputs 0 to 3.

DRT1-232C2

# RS-232C Unit

## Enables Data Exchange between DeviceNet and Peripheral Devices, Such as Bar Code Readers with an RS-232C Port

- Equipped with two RS-232C ports that can be set and controlled independently.
- Data exchanged using explicit message communications.
- Allows reading and writing of up to 151 bytes.



## Ordering Information

Name	No. of words	Model
RS-232C Unit (DeviceNet-compatible)	One input word as status area	DRT1-232C2

## Specifications

### Ratings/Characteristics

#### General Specifications

Item	Specification
Communications power supply voltage	11.0 to 25.0 V DC
Internal circuit power supply voltage	20.4 to 26.4 V DC (24 V DC +10%/–15%)
Current consumption	Communications power supply: 50 mA max. Internal circuit power supply: 100 mA max.
Insulation resistance	20 MΩ max. (at 100 V DC) between all DC power supply terminals and FG
Dielectric strength	500 V AC at 50/60 Hz for 1 min between all DC power supply terminals and FG with a leakage current of less than 1 mA
Noise immunity	Conforms to IEC61000-4-4, 2 kV (power line)
Vibration resistance	10 to 57.7 Hz, 0.75-mm single amplitude and 57.7 to 150 Hz at 98 m/s <sup>2</sup> acceleration
Shock resistance	Malfunction: 196 m/s <sup>2</sup> three times each in X, Y, and Z directions Destruction: 294 m/s <sup>2</sup> three times each in X, Y, and Z directions
Ambient temperature	Operating: –10°C to 55°C (with no icing or condensation)
Ambient temperature	Storage: –25°C to 65°C
Ambient humidity	25% to 85% (with no icing or condensation)
Operating environment	With no corrosive gas
Mounting method	M4 screw or 35-mm DIN rail mounting
Mounting strength	100 N: 10 s 10 N in track direction: 10 s
Terminal strength	Pulling force: 100 N: 10 s
Weight	250 g max.
External dimensions	110 x 65 x 60 mm

RS-232C Communications Specifications

Item	Specification
Communications method	Full duplex, start-stop synchronization communications control
Transmission distance	15 m max.
Baud rate	1,200/2,400/4,800/9,600/19,200 bps
Transmission code	ASCII (7 bits)
Parity check	Even, odd, or none
Stop bit length	1/2 bit
No. of ports	2
Connector	9-pin D-sub connector (male) x 2 ports
Communications memory capacity	1,024 bytes x 2 ports
Header code	Enabled (1 byte)/Disabled (selectable)
Delimiter code	Enabled (1 byte)/Disabled (selectable)
Flow control	Enabled/Disabled (selectable) for RS/CS control only

Dimensions

Note: All units are in millimeters unless otherwise indicated.

