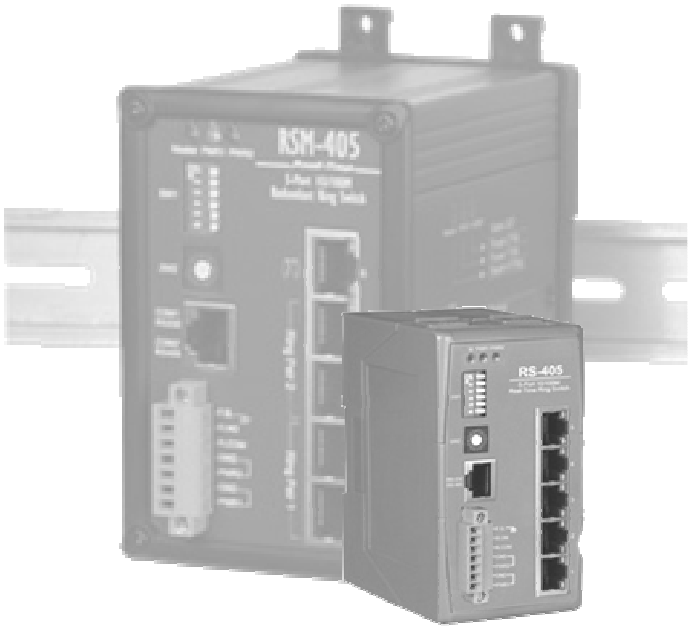
RS Series Quick Start

Industrial Redundant Ring Switch

Version 1.1

This document applied to models of
RS-405/405F/405A/405AF/408/408A, RSM-405/405F/405-R/405AF/408/408A



Revision History

Revision	Date
1.0	***2006/07/01***
1.1	***2012/03/22***

Copyright & Trademarks

Disclaimer

Limited Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser. During this period, if a customer is unable to resolve a product problem with ICP DAS Technical Support, a Return Material Authorization (RMA) will be issued. If the product is not under warranty, the customer may have ICP DAS repair the unit on a fee basis or return it.

This warranty is voided if the customer uses the product in an unauthorized or improper way, or in an environment for which it was not designed.

Standards

The Ring Switch meets the following standards:

- EMC immunity - IEC61326-1, IEEE C37.90
- EMI emissions - FCC part 15, ICES 003, EN55022; Class B
- Electrical safety - UL 508, CSA C22/14; EN61010-1 (IEC1010)

Warning

ICP DAS assume no liability for damages consequent to the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

Safety

Install the Real Time Ring Switch in accordance with local and national electrical codes.

Lightning Danger: Do not work on equipment during periods of lightning activity.

Do not connect a telephone line into one of the Ethernet RJ45 connectors.

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Appearance

- Dimensions
- Front Panel
- On Case Quick Guide

RS Series come with three form factors. One is stand alone with industrial plastic case. The second one is stand alone with aluminum case. And the other is modulized for ICPDAS PAC Series controllers with industrial plastic case.

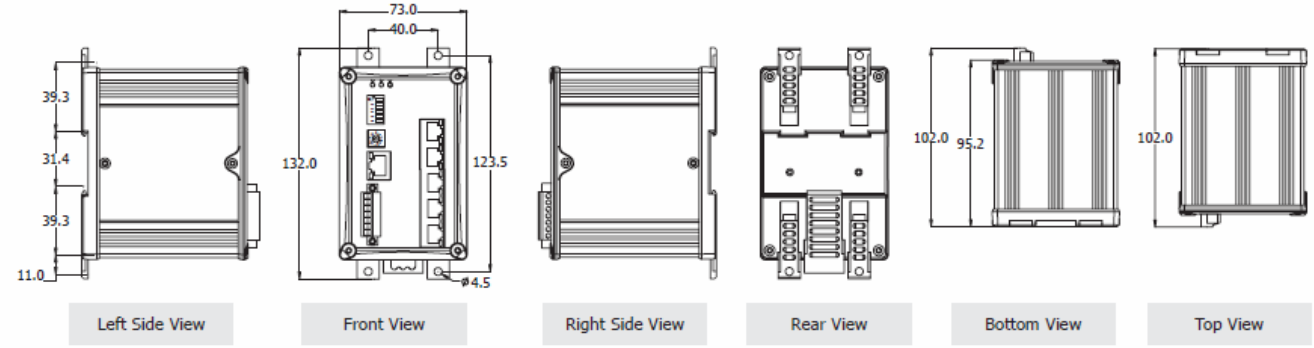
Overview

The RS Series is designed for easy installation, configuration and maintenance. For hardware installation, we provide both easy DIN rail mounting and wall mounting modes. To establish a simple redundant ring, only 2 jumpers on the front panel to set to form a ring. It does not depend on web configuration interface, neither a management server.

All of connectors are well arranged on the front panel, so it is easier to stack with other devices and to maintain in a small installation space.

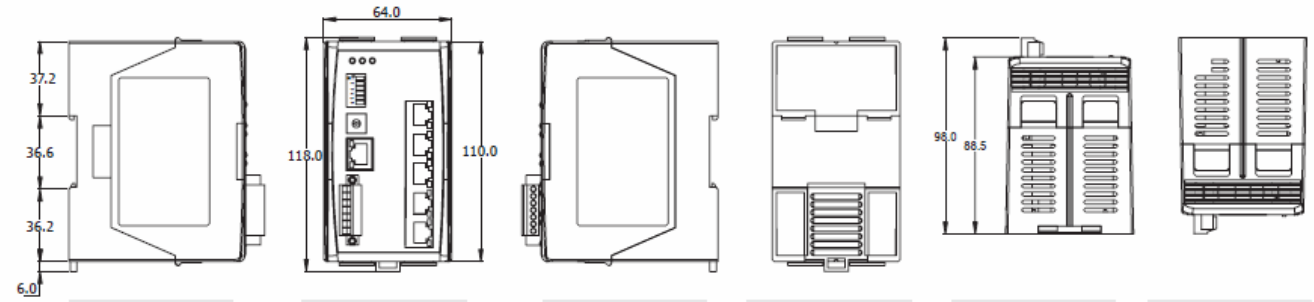
Dimensions(Unit:mm)

RSM-405 Series



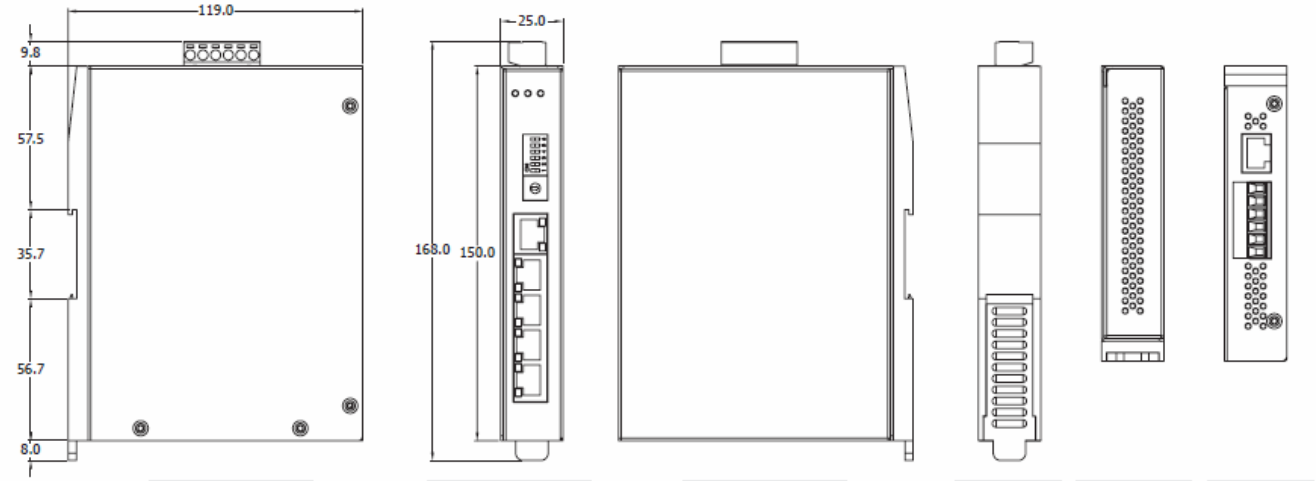
Left Side View | Front View | Right Side View | Rear View | Bottom View | Top View

RS-405 Series



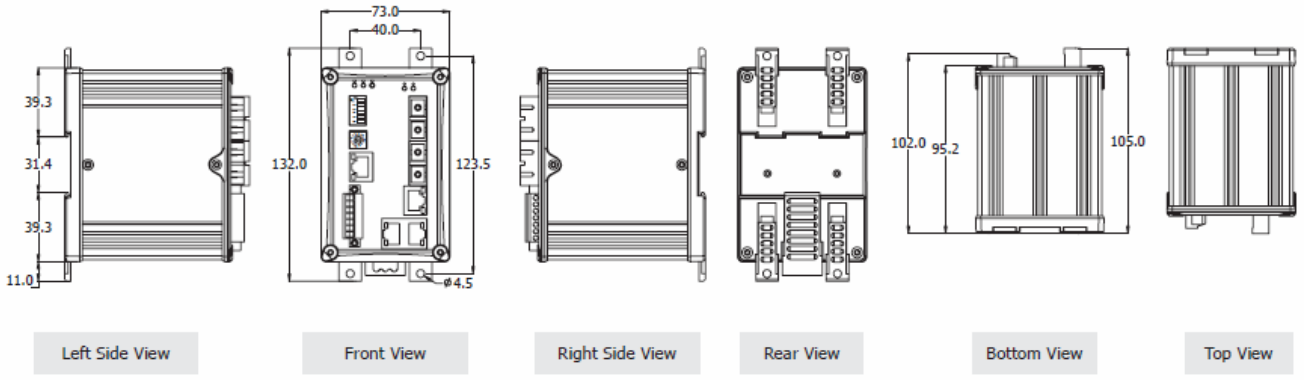
Left Side View | Front View | Right Side View | Rear View | Bottom View | Top View

RSM-405-R



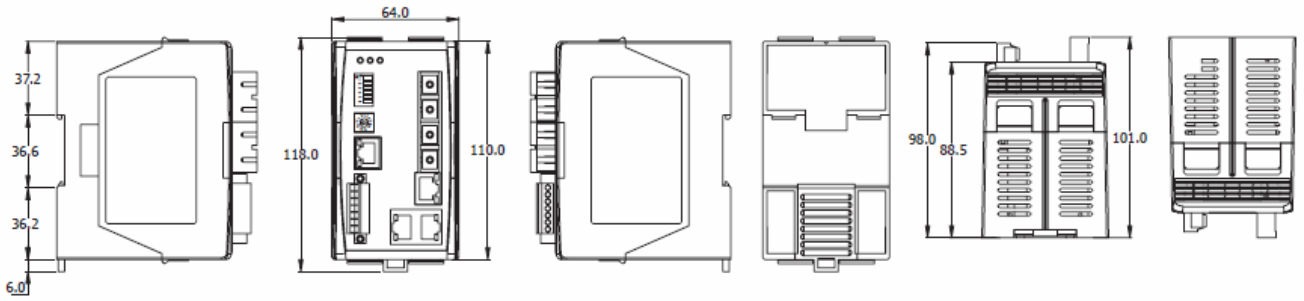
Left Side View | Front View | Right Side View | Rear View | Bottom View | Top View

RSM-405F Series



Left Side View | Front View | Right Side View | Rear View | Bottom View | Top View

RS-405F Series



Left Side View | Front View | Right Side View | Rear View | Bottom View | Top View

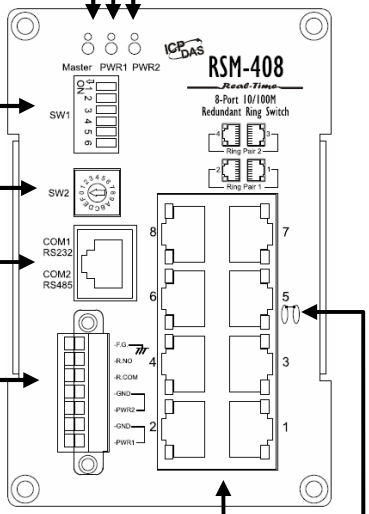
Front Panel

RS(M)-405/408 series

❶ Master switch LED indicator
❷ Power 1 LED indicator
❸ Power 2 LED indicator
❹ Switch jumper block
1. Ring / Normal Switch selecting jumper
2. Reset to default jumper
3. Primary/Secondary Switch setting jumper
4. Ring protocol selecting jumper
5. Enabling Ring 2 jumper
6. Enabling Ring 1 jumper

❺ Rotate jumper block
❻ Serial port
❼ Terminal block
1. Frame Ground(F.G.)
2. Relay (R.NO)
3. Relay (R.COM)
4. Power 2 Grounding (GND)
5. Power 2 (PWR2)
6. Power 1 Grounding (GND)
7. Power 1 (PWR1)

❽ Interconnection port for 2
❾ phase recovering coupling
❿ RJ-45 Ethernet ports

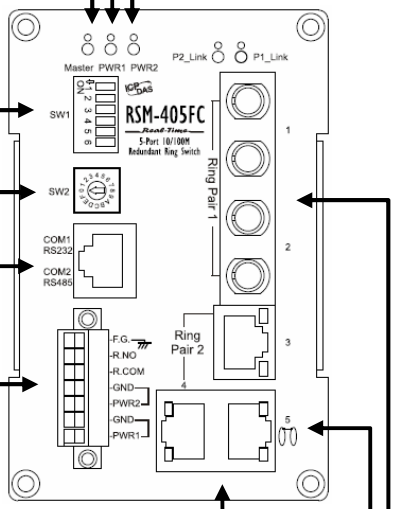


RS(M)-405F series

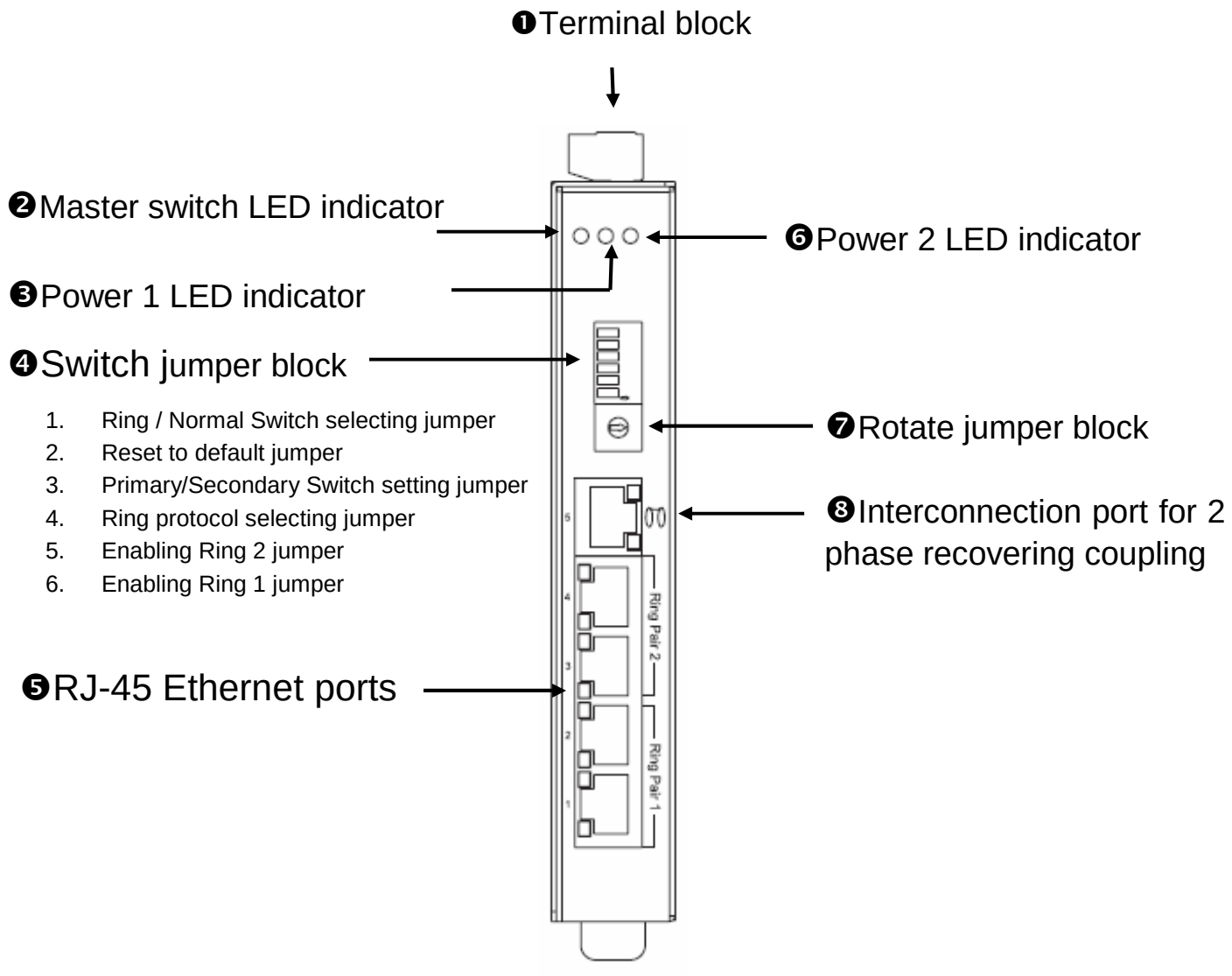
❶ Master switch LED indicator
❷ Power 1 LED indicator
❸ Power 2 LED indicator
❹ Switch jumper block
1. Ring / Normal Switch selecting jumper
2. Reset to default jumper
3. Primary/Secondary Switch setting jumper
4. Ring protocol selecting jumper
5. Enabling Ring 2 jumper
6. Enabling Ring 1 jumper

❺ Rotate jumper block
❻ Serial port
❼ Terminal block
1. Frame Ground(F.G.)
2. Relay (R.NO)
3. Relay (R.COM)
4. Power 2 Grounding (GND)
5. Power 2 (PWR2)
6. Power 1 Grounding (GND)
7. Power 1 (PWR1)

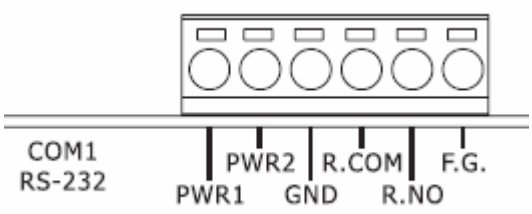
❽ Interconnection port for 2 phase recovering coupling
❾ RJ-45 Ethernet ports
❿ Fiber Ports



RSM-405-R series



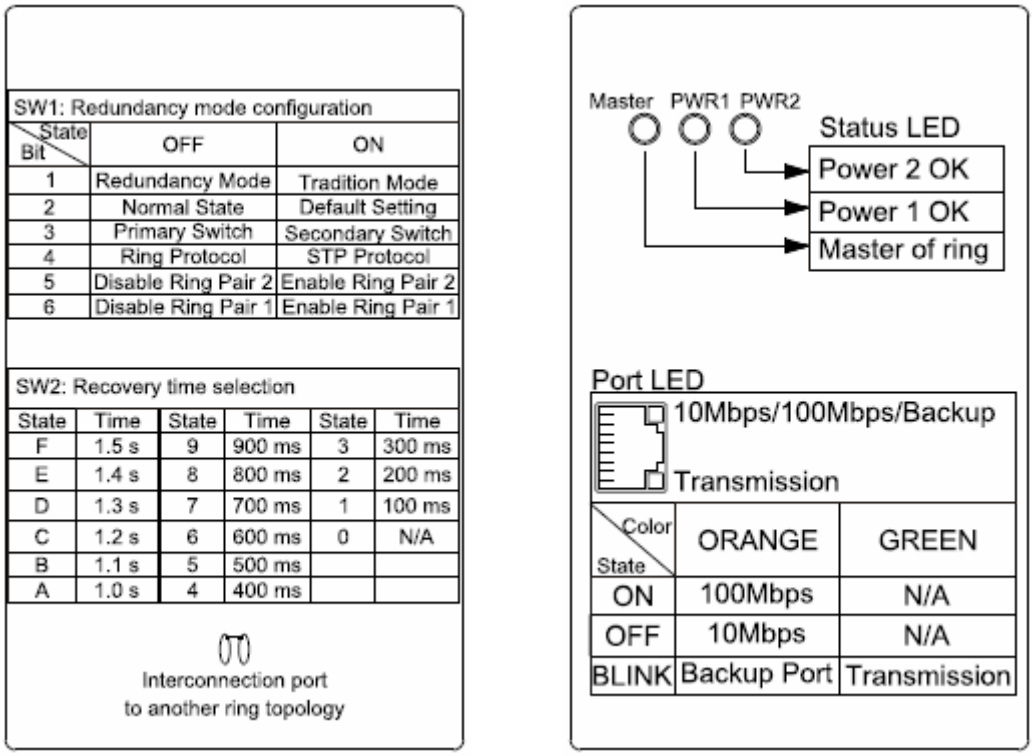
Terminal block



On Case Quick Guide

The simple description of DIP and Rotate jumpers setting value, Quick Config Guide, has been printed on both right and left hand side of front panel. After acquainted with *RS Series* features, field engineers could deploy switches quickly by referencing Quick Config Guide.

RS(M) -405 / 408 series



SW1: Redundancy mode configuration

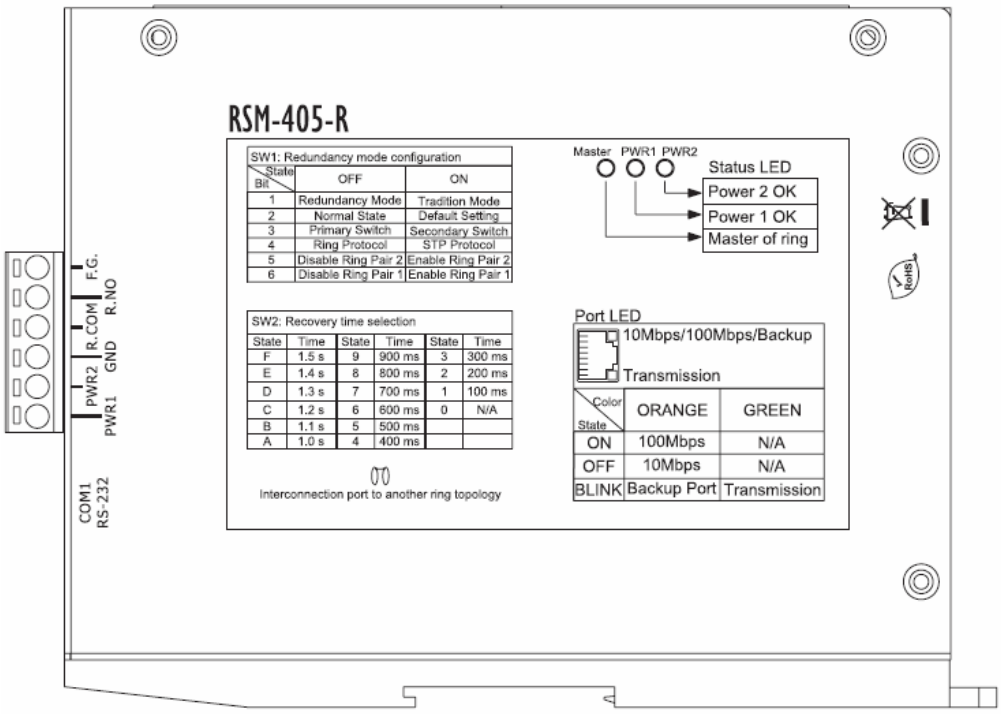
State / Bit	OFF	ON
1	Redundancy Mode	Tradition Mode
2	Normal State	Default Setting
3	Primary Switch	Secondary Switch
4	Ring Protocol	STP Protocol
5	Disable Ring Pair 2	Enable Ring Pair 2
6	Disable Ring Pair 1	Enable Ring Pair 1

SW2: Recovery time selection

State	Time	State	Time	State	Time
F	1.5 s	9	900 ms	3	300 ms
E	1.4 s	8	800 ms	2	200 ms
D	1.3 s	7	700 ms	1	100 ms
C	1.2 s	6	600 ms	0	N/A
B	1.1 s	5	500 ms		
A	1.0 s	4	400 ms		

Interconnection port
to another ring topology

RSM-405-R series



Hardware Installation

- DIN-Rail Mounting Installation
- Wall-Mounting Installation
- Connecting Input Power
- Connecting Output Relay
- Connecting Ethernet Ports
- Connecting Fiber Ports

For hardware installation, we provide both easy DIN rail mounting and wall mounting modes.

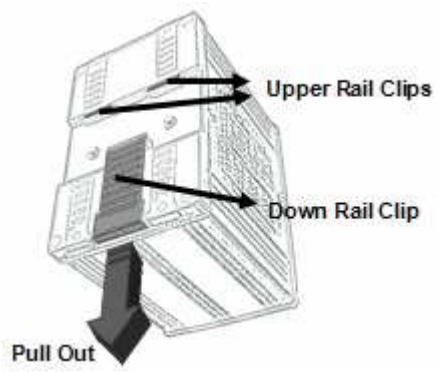
Overview

RS Series support redundant power, output relay and enhanced isolation to make device much robust. With ICP DAS patent DIN-Clip® design, the installation is just as easy as plugging power cord into outlet.

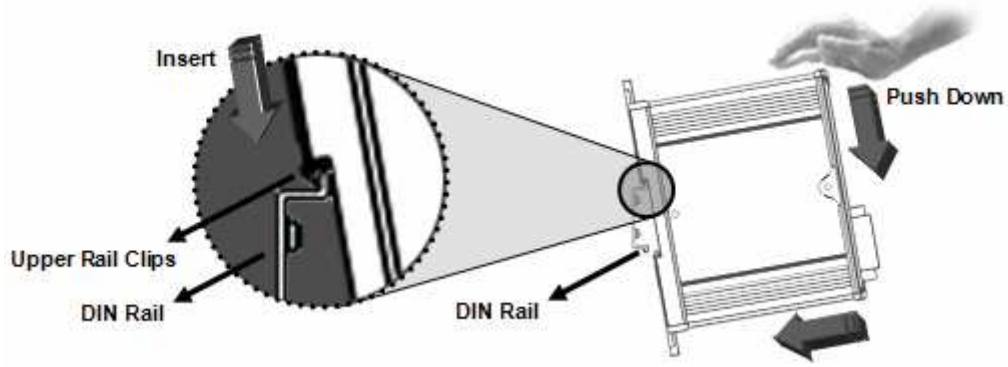
DIN-Rail Mounting Installation

With ICPDAS patent DIN-Clip® design, DIN-Rail mounting installation becomes very easy. Following 3 steps completes installation.

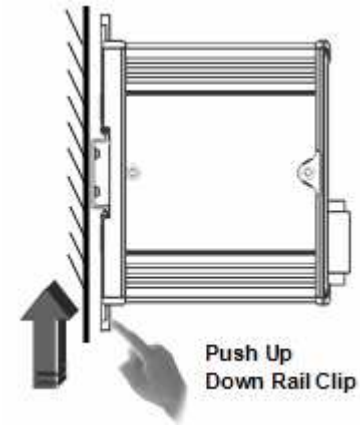
1 Pull the **down rail clip** out.



2 Obliquing the switch and insert the **upper rail clips** onto the upper lip of the DIN-rail track. Then push down the switch to fit into DIN rail as shown below.



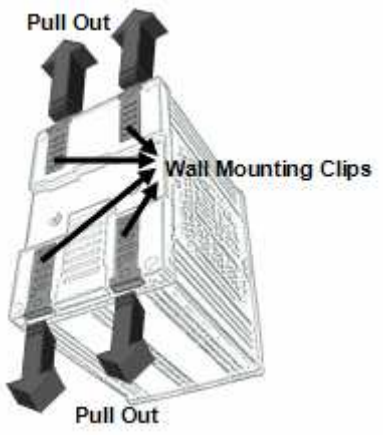
3 Push up **down rail clip** to lock the switch on the DIN rail.



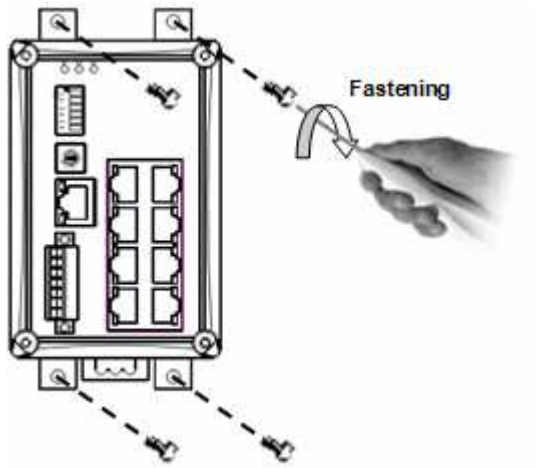
Wall-Mounting Installation

With ICP DAS patent DIN-Clip® design, Wall-Mounting installation becomes very easy. Following 2 steps completes installation.

1 Pull all wall mounting **clip** out.



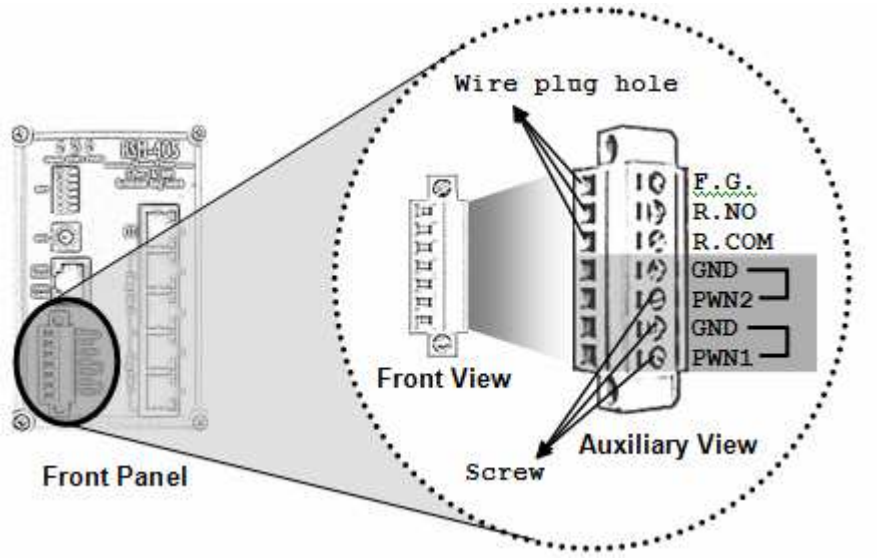
2 Use the slotted holes at each corner of the wall-mounting clip to attach the unit to the wall or other flat surface. Then fasten it on the wall with screw.



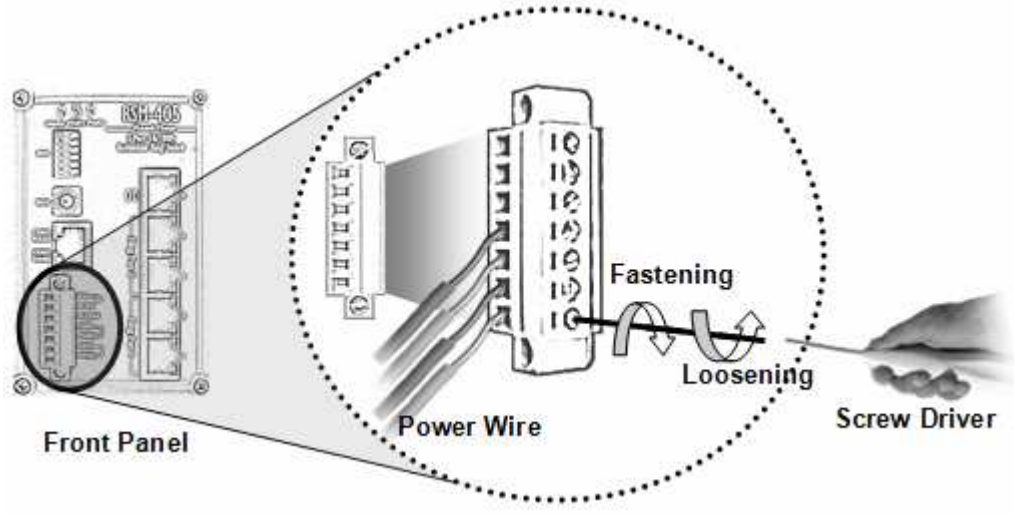
Connecting Input Power

IMPORTANT: *It is good practice to turn off input and load power, and unplug the power terminal block before making wire connections. Otherwise, your screwdriver blade can inadvertently short your terminal connections to the grounded enclosure.*

1 Identify PWR1, GND, PWR2, GND contacts on terminal block. Then identify power wire and ground wire.



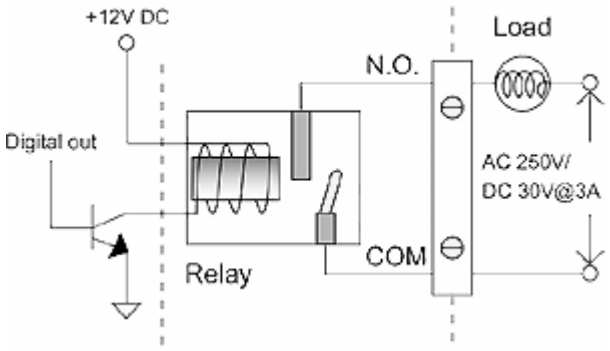
2 Insert the wire of your DC supply or Battery supply into the PWN1 and/or PWN2 contacts of the terminal block connector, and fastening the terminal screws to prevent the wires from coming loose.



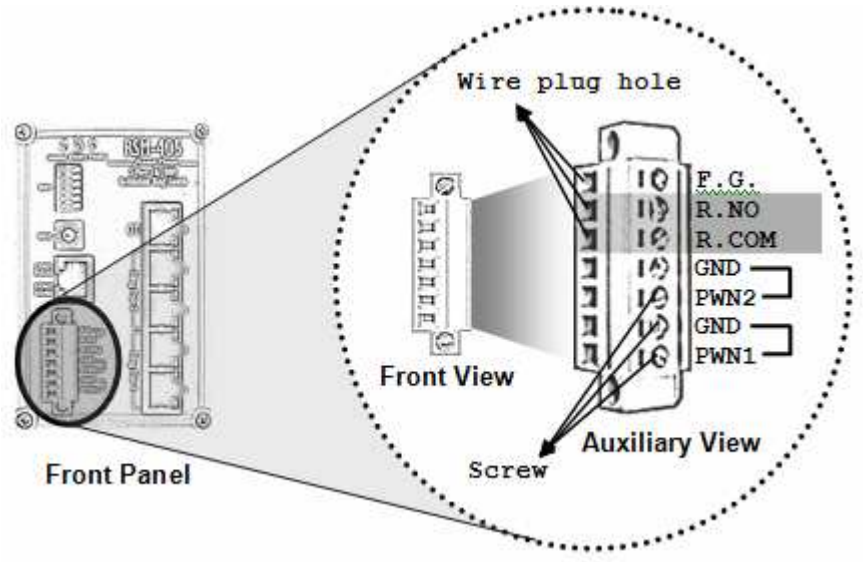
NOTE: *For best reliability, please install both of PWN1 and PWN2 for power redundant.*

Connecting Output Relay

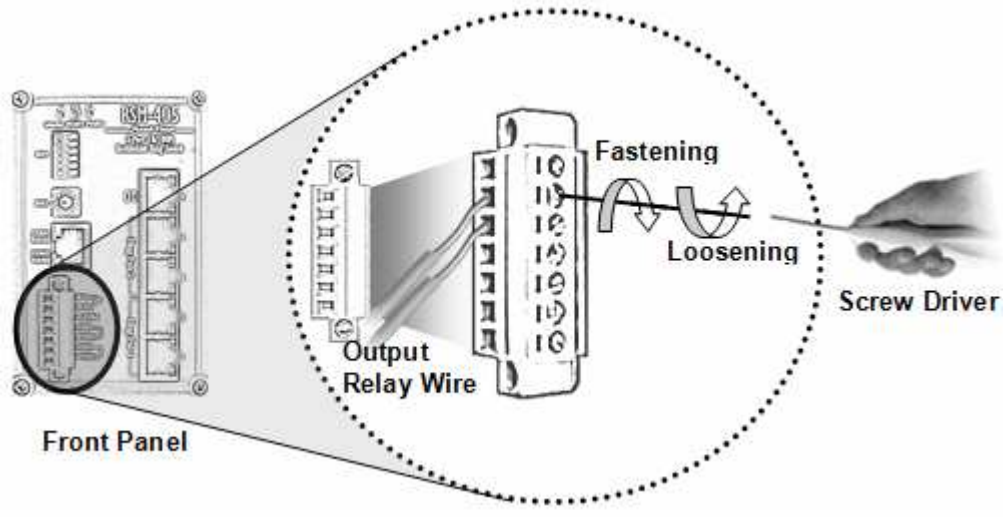
The diagram of output relay:



1 Identify R.NO and R.COM contacts on terminal block.

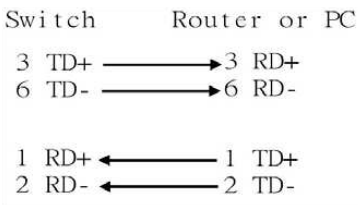


2 Insert the relayed device such as a light bulb or a buzzer pair of wire, and fastening the terminal screws to prevent the wires from coming loose.

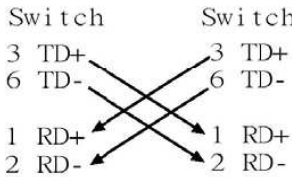


Connecting Ethernet Ports

RS Series includes all RJ-45 ports with automatic MDI/MDI-X crossover, and automatic 10/100Mbps data rate sensing for 10Base-T or 100Base-TX connections. Automatic MDI/MDI-X crossover allows you to connect to other switches, hubs, or workstations, without regard to using straight-through or crossover cabling. The following figures depict the schematic diagram of straight-through and crossover cabling. Note that crossover cables simply cross-connect the transmit lines at each end to the receive lines at the opposite end.



Straight-through Cabling Schematic



Crossover Cabling Schematic

Note that Ethernet cables use pins 1, 2, 3, and 6 of an 8-pin RJ45 connector. The signals of these pins are converted by the automatic MDI-X function, as shown in the table below:

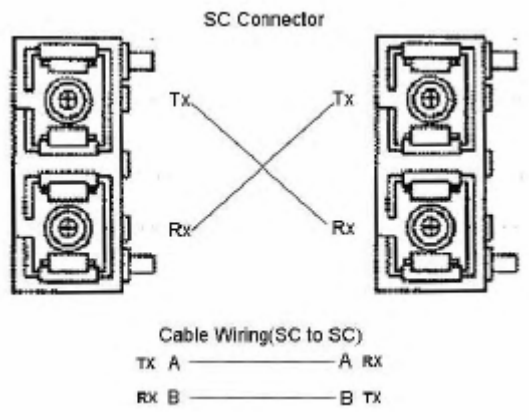
Pin MDI-X	Signals	MDI Signals
1	RD+	TD+
2	RD-	TD-
3	TD+	RD+
6	TD-	RD-

Connect one side of an Ethernet cable into any switch port and connect the other side to your attached device. The green LNK LED will light up when the cable is correctly connected. Always make sure that the cables between the switches and attached devices (e.g. switch, hub, or workstation) are less than 100 meters (328 feet).

Two switches are now up-linked together. If we change the up-link port manually at this time, the MAC address table will change as well. After the MAC address table changes, then the data can be transmitted between these two switches. This period of time is called the MAC address table aging time. The switch's default aging time is 5 minutes, which means that if you manually change the up-link port, you will need to wait up to 5 minutes before the data can be sent. If the aging time is too short, the MAC address table will constantly refresh, resulting in excess consumption of switch computing resources. For this reason, a longer aging time is recommended.

Connecting Fiber Ports (only for models with fiber port)

The automatic MDI/MDI-X crossover function does not apply to fiber connections, as these must be crossed over manually. To connect the fiber port on one switch to the fiber port of another switch, simply cross-connect the transmit channel at each end to the receive channel at the opposite end as illustrated in the figure below.



These models have two 100Base-FX ports with SC type connectors (in multi-mode and single mode versions). Single-mode types have greater distance capability than multi-mode types, but single mode cable is generally more expensive.

A fiber segment using single-mode cable must use 9/125 or 10/125 micrometer single-mode fiber cables. For single-mode, the connection distance can be up to 30 km.

A fiber segment using multi-mode must use 50 or 62.5/125 micrometer multi-mode fiber cables. For multi-mode, the connection distance can be up to 2 km.

Configuration

- One Ring Topology
- Two Rings Coupling
- Two Rings Coupling with Two Phase Recovering

This chapter provide basic techniques to form a redundant ring on your demand.

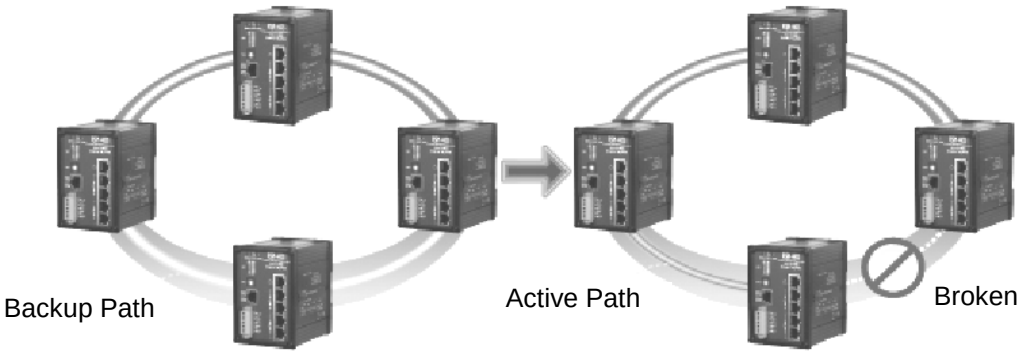
Overview

To successfully form a robust industrial Ethernet network, the designing of network pattern is the most important stage. A well-designed network pattern could dramatically reduce the risk network failure in critical situation.

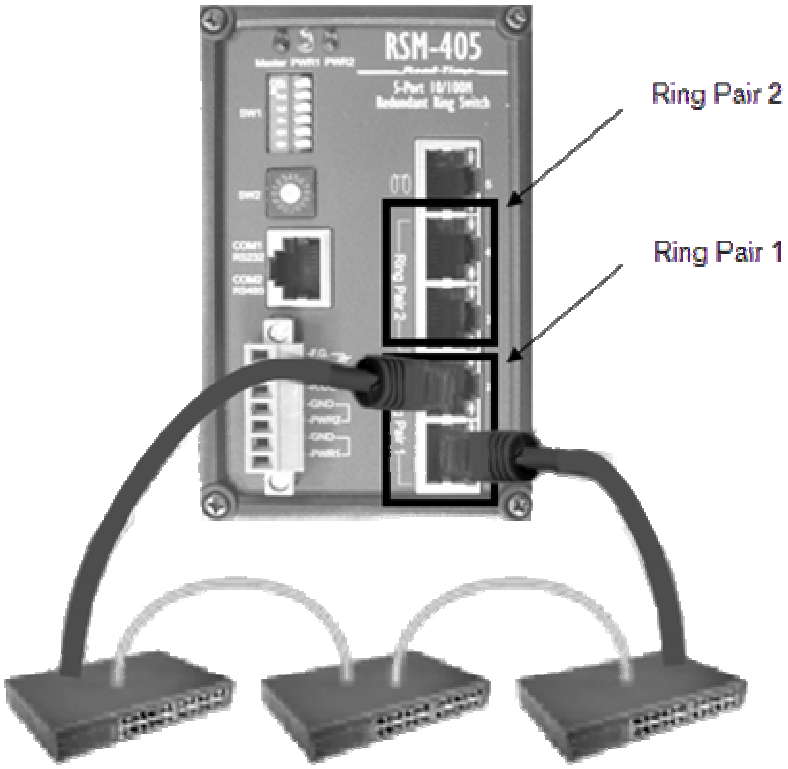
One Ring Topology

A ring topology ensures the network having **one more chance** to keep connection alive when any connection between 2 switches (nodes) has been broken inside the ring.

When we have formed a ring network, the focal point (master) will choose any one and only one path as **Redundant Path**. It is actually inactive when the ring network works properly. At the moment of any connection failure, the focal point will activates the **Redundant Path** and fire alarm to output relay.



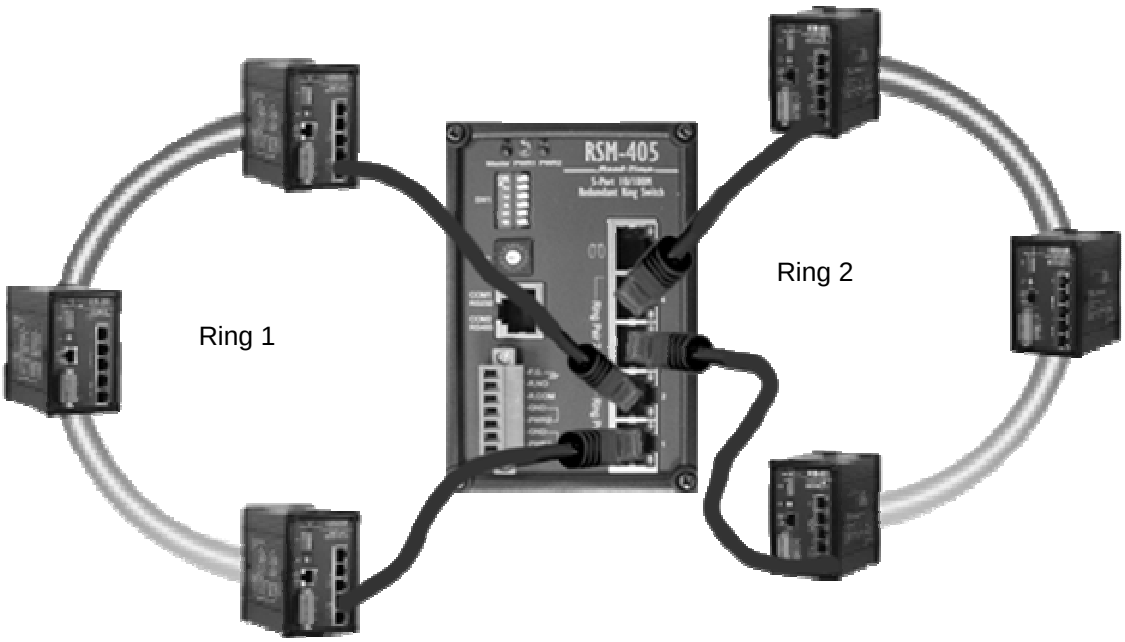
RS Series come with 2 ring pair by default. A ring pair can form a ring with other network devices as below:



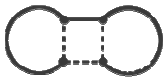
Two Rings Coupling

As a ring network is a small group of switches by geography, functionalities, or subsystem, 2 or more rings could be coupled together to form a whole picture of industrial network for an integrated system.

Single coupling point uses a switch to bridge 2 rings. Each ring still keeps original ring topology features.



Two Rings Coupling with Two Phase Recovering



Redundant coupling gives **one more chance** to keep connection alive when any connection between 2 rings has been broken. It is much safe than Single Coupling, but it takes 3 more switches to form Redundant Coupling.

Be sure to use port 5 (interconnection port) to form two phase recovering coupling and only ring pair 2 can be used in this topology.

Service Information

We sincerely hope that you never experience a problem with any ICP DAS product. If you do need service, call ICP DAS at 886-3-5973366 and ask for Applications Engineering. Our well-trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call.

On-line support

HTTP://WWW.ICPDAS.COM.TW/SEVICES/SUPPORT.HTM

E-MAIL: SUPPORT@ICPDAS.COM

Contact Worldwide

		TELEPHONE	FAX
Taiwan	Hsinchu Headquarter	886-3-5973366	886-3-5973733
	Banchiao Office	886-2-29500655	886-2-29500807
	Hsintien Office	886-2-89192220	886-2-89192221
	Taichung Office	886-4-23582815	886-4-23589114
	Kaoshiung Office	886-7-2157688	886-7-2162602
USA	USA Office	1-310-517-9888 x101	1-310-517-0998
Europe	Europe Office	0049-711-9 97 37 75	0049-711- 9 97 37 84
Shanghai	Shanghai Office	8621-6247-1722	8621-6247-1725
Beijing	Beijing Office	8610-6298-0933	8610-6296-2890

Appendix A

Specifications

Models	RS-405	RSM-405	RS-405A	RSM-405A	RSM-405-R
Technology					
Standards	IEEE 802.3, IEEE 802.3u, IEEE802.3x				
Processing Type	Store & forward wire speed switching				
MAC Addresses	2048				1024
Memory Bandwidth	3.2 Gbps				
Frame Buffer Memory	1 Mbit				
Flow Control	IEEE 802.3x flow control, back pressure flow control				
Interface					
RJ-45 Ports	5 x 10/100 Base-TX auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection				
LED Indicators	Power, 10/100M, Link/Act, Master				
Ethernet Isolation	1500 Vrms 1 minute				
COM1	RS-232 (TxD, RxD and GND); Non-isolation				
COM2	RS-485 (D2+, D2-; self-tuner ASIC inside); Non-isolation				–
Connection	Yes				
Power Input					
Input Voltage Range	+10 ~ +30 VDC (Isolation redundant input)		+12 ~ +48 VDC (Non- Isolation,redundant input)		
Power Consumption	0.22 A @ 24 VDC, +/-5% arrowed with 100M Full duplex				
Protection	Power reverse polarity protection				
Frame Ground for EMS Protection	Yes				
Connection	7-Pin Removable Terminal Block				5-Pin Removable Terminal Block
Mechanical					
Casing	Plastic	Metal	Plastic	Metal	Metal
Environmental Rating	UL 94V-0	IP30 Protection	UL 94V-0	IP30 Protection	IP30 Protection
Dimensions (W x L x H)	64 mm x 97.5 mm x 110 mm	73 mm x 102 mm x 132 mm	64 mm x 97.5 mm x 110 mm	73 mm x 102 mm x 132 mm	25 mm x 168 mm x 119 mm
Installation	DIN-Rail Mounting	DIN-Rail or Wall Mounting	DIN-Rail Mounting	DIN-Rail or Wall Mounting	DIN-Rail Mounting
Environmental					
Operating Temperature	-40 °C ~ + 75 °C				
Storage Temperature	-40 °C ~ + 85 °C				
Ambient Relative Humidity	10 ~ 95% RH, non-condensing				
Accessories					
Include Cable	CA-090510 x 1				

Models	RS-408	RSM-408	RS-408A	RSM-408A
Technology				
Standards	IEEE 802.3, IEEE 802.3u, IEEE802.3x			
Processing Type	I Store & forward, wire speed switching			
MAC Addresses	2048			
Memory Bandwidth	3.2 Gbps			
Frame Buffer Memory	1 Mbit			
Flow Control	IEEE 802.3x flow control, back pressure flow control			
Interface				
RJ-45 Ports	10/100 Base-TX auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection			
LED Indicators	Power, 10/100M, Link/Act, Master			
Ethernet Isolation	1500 Vrms 1 minute			
COM1	RS-232 (TxD, RxD and GND); Non-isolation			
COM2	RS-485 (D2+, D2-; self-tuner ASIC inside); Non-isolation			
Connection	Yes			
Power Input				
Input Voltage Range	+10 ~ +30 VDC (Isolation redundant input)		+12 ~ +48 VDC (Non- Isolation)	
Power Consumption	0.3 A @ 24 VDC, +/-5% arrowed with 100M Full duplex			
Protection	Power reverse polarity protection			
Frame Ground for EMS Protection	Yes			
Connection	7-Pin Removable Terminal Block			
Mechanical				
Casing	Plastic	Metal	Plastic	Metal
Environmental Rating	UL 94V-0			
Dimensions (W x L x H)	64 mm x 97.5 mm x 110 mm	73 mm x 102 mm x 132 mm	64 mm x 97.5 mm x 110 mm	73 mm x 102 mm x 132 mm
Installation	DIN-Rail Mounting	DIN-Rail or Wall Mounting	DIN-Rail Mounting	DIN-Rail or Wall Mounting
Environmental				
Operating Temperature	-40 °C ~ + 75 °C			
Storage Temperature	-40 °C ~ + 85 °C			
Ambient Relative Humidity	10 ~ 95% RH, non-condensing			
Accessories				
Include Cable	CA-090510 x 1			

Models		RS-405F series	RSM-405F series	RS-405AF series	RSM-405AF series
Technology					
Standards		IEEE 802.3, IEEE 802.3u, IEEE802.3x			
Processing Type		Store & forward wire speed switching			
MAC Addresses		1024			
Memory Bandwidth		3.2 Gbps			
Flow Control		IEEE 802.3x flow control, back pressure flow control			
Redundant strategy		STP, Ring (ICP DAS)			
Protocol		Modbus/RTU, Modbus/TCP, OPC, STP, Cyber Ring			
Interface					
RJ-45 Ports		3 x 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDIX connection			
Fiber Optics Port		2 x 100 Base-FX			
LED Indicators		10/100M, Link/Act/Backup, Full duplex/Half duplex (Fiber Port)			
Ethernet Isolation		1500 Vrms 1 minute			
Frame Ground for EMS Protection		Yes			
Ethernet Transmission distance		Ethernet : 2-pair UTP/STP Cat.3,4,5, EIA/TIA-568 100-ohm Fast Ethernet : 2-pair UTP/STP Cat. 5, EIA/TIA-568 100-ohm			
Multi Mode	Multi Mode Fiber Cables	50/125, 62.5/125 or 100/140 μm			
	Distance	2 km, (62.5/125 μm recommended) for full duplex			
	Wavelength	1300 or 1310 nm			
	Min. TX Output	-20 dBm			
	Max. TX Output	-14 dBm			
	Max. RX Sensitivity	-32 dBm			
	Max. RX Overload	-8 dBm			
	Budget	12 dBm			
Single Mode (Standard)	Single-mode fiber cables	8.3/125, 8.7/125, 9/125 or 10/125 μm			
	Distance	30 km, (9/125 μm recommended) for full duplex			
	Wavelength	1300 or 1310nm			
	Min. TX Output	-15 dBm			
	Max. TX Output	-8 dBm			
	Max. RX Sensitivity	-34 dBm			
	Max. RX Overload	-5 dBm			
	Budget	19 dBm			
Single Mode (60T)	Single-mode fiber cables	8.3/125, 8.7/125, 9/125 or 10/125 μm			
	Distance	60 km, (9/125 μm recommended) for full duplex			
	Wavelength	1300 or 1310nm			
	Min. TX Output	-5 dBm			
	Max. TX Output	0 dBm			

	Max. RX Sensitivity	-35 dBm			
	Max. RX Overload	-5 dBm			
	Budget	30dBm			
Ethernet Cables		10 Base-T (Cat.3, 4, 5 UTP cable; 100m Max.) 100 Base-TX (Cat.5 UTP cable; 100m Max.)			
Management interface		Console, DIP/Rotary Switch			
Alarm output		Relay			
Power Input					
Input Voltage Range		+10 ~ +30 VDC (Isolation,redundant input)		+12 ~ +48 VDC (Non-Isolation, redundant input)	
Alarm Contact		One relay output with current carrying capacity of 2 A @ 30 VDC			
Power Consumption		0.3 A @ 24 VDC, +/-5% arrowed			
Protection		Power reverse polarity protection			
Frame Ground for EMS Protection		Yes			
Connection		7-Pin Removable Terminal Block			
Mechanical					
Casing		Plastic	Metal	Plastic	Metal
Environmental Rating		UL 94V-0	IP30 Protection	UL 94V-0	IP30 Protection
Dimensions (W x L x H)		64 mm x 98 mm x 110 mm	72.5 mm x 102 mm x 110 mm	64 mm x 98 mm x 110 mm	72.5 mm x 102 mm x 110 mm
Installation		DIN-Rail Mounting	DIN-Rail or Wall Mounting	DIN-Rail Mounting	DIN-Rail or Wall Mounting
Environmental					
Operating Temperature		0 °C~ +70°C		-30 °C~ +75°C	
Storage Temperature		-20 °C ~ + 85 °C			
Ambient Relative Humidity		10 ~ 90% RH, non-condensing			
Accessories					
Include Cable		CA-090510 x 1			