



Managed Switch User Manual

Industrial Managed Ethernet Switch

Version 1.2

This document applied to models of
MSM-508,MSM-508FC/FCS/FT



Modbus/TCP
conformance tested

April 29, 2008
Please print in double side



Document Control

Date	Author	Version	Description
July 1, 2006	KC Chen	1.0	First draft
Dec 2, 2010	Jerry Chiu	1.1	Add DI/O Wire Connection
Jan 1, 2011	Jerry Chiu	1.2	Modify jumper block label

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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.

Preface

The advent of Ethernet brings the whole world a new territory. So it does in industrial application. More and more industrial devices and equipment now support Ethernet. To make all these devices and equipment integrated and worked, the Ethernet switch is a key character.

For commercial using, the Ethernet switch is very easy to choose, and also cheap. But, in industrial field application, user must take the environment conditions and field requirement into concern.

- Harsh environ, such as extreme high or low temperature, moisture, ground differentials and electrical noise ... etc
- Requirement of fault-tolerant solution.
- For automation and control engineers who have been forced into this IT domain, they really don't want to get too involved with the idiosyncrasies and maintenance of Ethernet networks.

To satisfy these, the *Managed Switch* provides you a rugged, fault-tolerant, plug and play solution.

ICP DAS industrial Switch Series

ICP DAS industrial Ethernet switch has the following series:

- **NS Series:** Network Switch Series, a standard switch with industrial class of quality.
- **RS Series:** Ring Switch Series, a redundant ring switch with industrial class of quality.
- **Managed Series:** A redundant ring switch with industrial class of quality, and provides lots of powerful managed functions.

How to Use this manual

This manual is intended to help user quickly understanding and easily making use of MSM-508 (and other supported products), and the arrangement of chapters and sections follows the steps that user need to take.

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Acronyms

ATM	Acronym for Asynchronous Transfer Mode, a high performance networking technology based on the switching of fixed length, 53 byte cells. ATM switching supports the switching of voice, video, and data; also supports isochronous communication.
BPV	Acronym for Bi-Polar Violation.
B-ISDN	Broadband ISDN. A network standard from the CCITT and ANSI committee. It supports voice, data and video in the same network.
CCITT	Acronym for Consultative Committee, International Telephone and Telegraph. An international standards body responsible for setting international communications standards that allow interoperability among telephony and data communications equipment.
CD (DCD)	Acronym for Carrier Detect (Detect Carrier Detect).
CDDI	The use of unshielded or shielded twisted pair cable to transmit the FDDI signal.
CO	Acronym for Central Office. The local telephone company switch that terminates subscribers' lines for switching and connecting to the public network.
CSMA/CD	Acronym for Carrier Sense Multiple Access with Collision Detection. Access protocol for Ethernet.
CSU	Acronym for Channel Service Unit, a device furnished as an integral part of a digital access line where a user wishes to supply the bipolar signals. It provides the network with protection against user side electrical anomalies such as surges, and provides the user with network clocking.
CTS	Acronym for Clear To Send.
DCE	Acronym for Data Communication Equipment, aka. Data Circuit-Terminating Equipment.
DCR	Acronym for Data Communication Ready.
DS1	Digital Signal, Level 1 is the North American data rate used for T1 carriers. It operates at 1.544Mbps and supports 24 phone lines.
DS2	Digital Signal, Level 2 is the North American data rate used for T2 carriers. It operates at 6.312 Mbps and supports four T1 lines or 96 phone calls
DS3	Digital signal, Level 3 is the North American data rate used for T3 carriers. It operates at 44.736 Mbps and supports 28 T1 lines.
DSU	Acronym for Data Service Unit, a DCE used with digital communications circuits to provide digital data services interface. Located on the users premises, the DSU interfaces directly with the DTE, and provides loop equalization, remote and local test

capabilities, and the logic and timing necessary to provide a standard EIA/TIA or CCITT interface. Converts signals between those used at the DTE's serial interface and bipolar signals used on the digital network. Also Network Terminal Unit (NTU).

DTE	Acronym for Data Terminating or Data Terminal Equipment.
DTR	Acronym for Data Terminal Ready.
E1	The European standard for high speed, point to point transmission operating at 2.048 Mbps and defines 64 Kbps sub-channels.
EIA	Acronym for Electronic Industries Association. EIA, a standards body, has a set of standards which includes data communications and interface standards among others.
EMI	Acronym for Electro-Magnetic Interference.
FEP	Stands for Front End Processor. It is an IBM communication controller that routes traffic to and from cluster controllers.
FDDI	Acronym for Fiber Distributed Data Interface, is a shared medium, ring topology LAN that operates at 100 Mbps. It is ANSI standard X3T9.5, using fiber optic cable as the medium.
FPGA	Acronym for Field Programmable Gate Array.
LAN	A local area network is a group of PCs connected over a common medium within a building.
MAC	Acronym for Medium Access Control. A designated hardware address for each device on a LAN or MAN. This address is burnt into The network interface card (NIC) by its manufacturer.
MAN	A metropolitan area network is a group of PCs connected over a common medium within a campus environment or the same city.
NA	Acronym for Numerical Aperture.
OC1	Optical Carrier Signal Level 1 refers to SONET data transmission at 51.840Mbps.
OC3	Acronym for Optical Carrier 3, a transmission rate standard for fiber optic telephony or data communications circuits. OC3 operates at 155 Mbps speed and is part of the SONET hierarchy.
OC12	Optical Carrier Signal Level 12 refers to SONET data transmission at 622.080Mbps.
OSI	(Open Data Interconnection Reference Model) - This is the International Standards Organization (ISO) model of how data communications systems can be interconnected. Communication is partitioned into seven function layers. Each layer builds on the services provided by those under it.
PBX	Acronym for Private Branch Exchange, is a small private version of a phone company's larger central switching office.

PCM	Acronym for Pulse-Coded Modulation, a means of converting analog to digital form.
RING	Path or channel; usually electrical, where devices along the path receive transmissions sequentially from one device to the next along the ring.
RS-232	An interface used between DTE and DCE employing serial binary data interchange, defined by EIA, aka. EIA-232. Similar to standard V.24 of CCITT.
RS-422	Standard defined by EIA, aka. EIA-422. Deals with the electrical characteristics of balanced voltage digital interface circuits. Similar to standard V.11 of CCITT.
RS-423	Standard defined by EIA, aka. EIA 423. Deals with electrical characteristics of unbalanced voltage digital interface circuits. Similar to standard V.10 of CCITT.
RS-449	Standard defined by EIA, aka. EIA-449. Deals with general-purpose 37- and 9-position interface for data terminal equipment and data circuit-terminating equipment employing serial binary data interchange.
RS-485	Standard defined by EIA, aka. EIA-485. Standard for electrical characteristics of generators and receivers for use in balanced multipoint systems.
RTS	Acronym for Request To Send.
SCADA	Acronym for Supervisory Control and Data Acquisition.
SNMP	Acronym for Simple Network Management Protocol. A standard management protocol used to provide a common means of managing network devices.
SONET	Acronym for Synchronous Optical NETwork, is a hierarchical standard for a high speed (45 Mbps to 2.4 Gbps) transport network.
T1	Transmission rate standard for telephony or data communications circuits. T1 operates at 1.544 Mbps speed. Usually this circuit is subdivided into many 64 Kb channels.
TCP/IP	Acronym for Transmission Control Protocol/Internet Protocol.
WAN	Acronym for Wide Area Network, a computer network interconnected over distances beyond a city or metropolitan area.
802.3	Commonly referred to as Ethernet. It is a local area network protocol that operates at 10Mbps.
802.5	Commonly referred to as Token Ring. Operates at either 4 or 16Mbps.

Introduction

- Ethernet Switch
- Industrial Ethernet
- Industrial Fiber Optic
- Key Features
- Package Contents

Welcome to **ICP DAS Managed Industrial Ethernet Switch** one of the world's best Industrial Ethernet Switch designed for connecting Ethernet-enabled devices in industrial field applications. This manual is for the ICP DAS Managed Switch.

Overview

The *Managed Industrial Ethernet Switch* is designed upon concepts of reliability, quick recovery, easy configuration, self-healing and SCADA for status monitoring. Besides, all models in *Managed Switch* mechanism is also designed to meet IP30¹ above for working under harsh environment.

Unlike other existing ring switch or managed Ethernet switch on the market, the ICPDAS *Managed Switch* is much more easy to use and absolutely free of software setting.

¹ Ingress Protection, see “**Appendix B**” for detail information.

Ethernet Switch

Ethernet is an ideal medium to transport large volumes of data, at speed, across great distances. Previously, multiple networks carrying specific protocols were installed side by side to carry out unique tasks. This inevitably led to project costs increasing as additional fiber optic or copper cables were installed to deal with the increasing volume of data. Using Ethernet a single fiber optic cable can carry multiple protocols. Furthermore, manufacturers are exporting their legacy protocols onto Ethernet, designing new IP based communication protocols and providing embedded Web-Pages within devices that offer real-time information using simple tools like Internet Explorer and Netscape Navigator.

Unfortunately, although network hardware has dramatically increased in speed and technology over the past decade the poor perception of Ethernet has remained; namely as being difficult to fault-find and critically being a non-deterministic network. A key development that overcame some of these issues was the advent of the Ethernet Switch.

Early Ethernet networks were based on a hub or repeater. These units have no intelligence and therefore are unable to identify any information contained within the Header frame of an Ethernet packet. This means that it is not capable of determining which port to send the frame to. Therefore, every frame is sent to every port. A network of repeaters and hubs is called a 'Shared Ethernet' or 'Collision Domain'. Various devices will all compete with each other before sending data using 'Carrier Sense Multiple Access / Collision Detect' (CSMA/CD) protocol. This means that only one system is allowed to proceed with a transmission of a frame within a Collision Domain at any one time. This is a major disadvantage when using Hubs and Repeaters within a network.

A switch, like a hub, has to forward and receive packets from one network or device to another. The switch could forward all packets, but if this was the case it would have similar behaviour to a hub. It would be more intelligent if the switch only forwarded packets which needed to travel from one network or device to another. To do this, the switch must learn which devices or networks are connected to each port. In simplistic terms; it needs to learn the destination and source ports of each and every packet received on each individual Switch port. Once learnt, any identically addressed packet will be automatically be forwarded. With today's enhanced processing power the introduction of a Switch has significantly increase network bandwidth.

Industrial Ethernet

Industrial rated Switches are intended to be installed in both harsh climatic environments and noisy electrical installations. Such Switches are an excellent example of true industrial design principles –

- very high operating temperatures (down to -30°C and up to 75°C)
- dual input power supplies
- wide DC operating voltages

In Roadside and tunnel applications distances between cabinets with a suitable power supply can be challenging. Naturally, fiber optic cable is the preferred solution. Using single mode fiber, runs of up to 85km are possible. Even using standard CAT5e copper cable the Industrial Switch supports the long cable specification and distances of up to 185m are viable. However, the domain of Ethernet has always been controlled by the IT department who normally configured office networks with an iron fist and dictated to the organisation how the network would be designed. Complex network recovery protocols

like spanning tree, and SNMP to help with fault finding and system analysis were often employed to enhance network resilience. If a network failure occurred the IT department would casually look at repairing the equipment; there was no real rush as it was an office network.

However, with industrial Ethernet you need very fast repair time and with an IT department not readily available on the roadside, maintenance personnel need to be made aware of the fault, find the error and repair it - quickly. To aid this, unique network recovery features are employed to significantly enhance network recovery times. When an IT department requires a level of redundancy a common method is to employ the spanning tree protocol. However, spanning tree can be complex to program and critically can take over 30 seconds to detect and recover from the fault – far to long for critical applications!

ICP DAS Managed Switch incorporates propriety protocols that enable multiple Switches to be placed into a redundant ring. A single Switch, configured as the network focal point will monitor, detect and recover from a fiber or copper link failure within approximately 50mS – for the majority of applications a seamless process. The configuration process of the network focal point is simple as it must be remembered that as the switches are to be installed on the roadside the first to be called to rectify a fault will more than likely be Maintenance personnel.

Module Feature	ICPDAS Managed Switch	General Managed Switch
Communication Protocol	Modbus/TCP Modbus/RTU	SNMP IGMP
Managed Interface	Serial Console, Utility Web telnet	Serial Console Utility Web telnet
Service	OoS, HTTP, VLAN, SMTP.	QoS, CoS, VPN, FTP, HTTP, HTTPS, SSH, VLAN
Redundancy	Cyber-Ring (Variable recovery time from 100 ms to 1.5s) Spanning Tree.	Trunking, Spanning Tree, Rapid Spanning Tree
Amount of Rings	2	1
Single Coupling	Yes	No
Redundant Coupling	Yes	No
Router/IP sharing	No	Yes
IEEE standards	802.3 802.3x 802.3u 802.1D 802.1p 802.1q	802.3 802.3x 802.3u 802.1D/w 802.1p 802.1q
Alarm	Relay Output Modbus	SNMP
Convenience	Easy to use/configure	N/A

It is likely that these people will not be fully trained on Ethernet and the protocols that are in operation, nor will they fully understand the principles of SNMP etc. However, with a fault contact, fault LED's and graphical interface implemented they have a multi-level approach to fault finding:

The fault contact is hard-wired to an alarm on a control panel or as an input to a DCS. If a link failure occurs (between two switches or an Ethernet Device) or a network failure occurs the fault contact on the Switches will be energized. The Maintenance Engineer can easily locate the fault.

With the increased use of Ethernet in the field to pass critical data the greater the reliability in network infrastructure. Where multiple rings are configured in a system it is also critical that the links between the rings are also duplicated to provide enhanced redundancy. This can be achieved using Multi-ring Redundancy

Industrial Fiber Optic

Why Fiber Optics?

The utilization of fiber optic data transmission for industrial automation and process control has become increasingly popular over the past decade.

A basic fiber optic system, using an optical transceiver circuit and fiber optic media, offers a wide array of benefits that are not available with traditional copper conductors.

Advantages of Fiber Optic Data Transmission Technology

- High data rate and wide bandwidth
- Immunity to EMI/RFI and lightning damage
- No ground loops
- Low attenuation (data loss)
- Longer distance – up to 1.8 miles (3 km) with Multi Mode fiber and over 15 miles (25 km) with Single Mode fiber
- Small cable diameter fits almost anywhere - requires less duct space
- Light weight
- No sparks if cut – ideal for Hazardous Area applications
- No electric shock hazard
- Secure communications
- Flexible networking topologies
- Corrosion resistant
- Longer life expectancy than copper or coaxial cable
- Economical total system cost

Disadvantages of Electronic Cabling (Twisted Pair (TP), Coax, Twinax)

In selecting the signal/data transmission technology for your Industrial Automation and Process Control networking, the following limitations of electronic cabling should be considered:

- Cabling hassles: weight, routing, size, attenuation and cross-talk
- Distance between terminals and hosts is severely limited
- Large diameter cable fills plenums and conduits
- Needs to be routed away from power cabling
- Poor security
- Limited topologies

- Cost can be high relative to Fiber

Industrial vs. Commercial

Most process plants and factories have unique requirements for communications networks that differ from those of commercial grade networks. Industrial network components must withstand much harsher environmental conditions that can include extreme temperatures, lightning strikes, electromagnetic interference and, in many instances, installation in hazardous area locations.

Mounting and space requirements can also be an issue since industrial networking components are often installed in the same control panel or cabinet with other measurement and control equipment. At ICP DAS, our goal is to meet the demanding requirements of industrial communication networks. Our industry standard, *Managed Switch* of industrially hardened fiber optic communication products addresses these issues and provides you with optimal solutions for your factory automation and process control needs.

Managed Switch Key Features

- ✓ Connectors locate in front panel, reducing wiring complexity and easy maintenance.
- ✓ Dual input power supply for non-stop connectivity
- ✓ Patent pending Cyber-Ring Protocol
- ✓ Versatile DIN-rail, surface, and wall-mountable design
- ✓ Rugged aluminium case with IP30 rated protection
- ✓ Provides redundant dual DC power inputs with reverse polarity protection and alarm
- ✓ Non-blocking, store-and-forward switching architecture
- ✓ Watch dog
- ✓ Support SCADA via Modbus/TCP or Serial Console for status monitoring
- ✓ Support 2 rings
- ✓ Support multiple single coupling and redundant coupling
- ✓ Provides easy-to-use GUI configuration utility
- ✓ Supports email warning via Simple Mail Transfer Protocol (by GUI configuration utility)
- ✓ Support VLAN, QoS, Port Trunking, TELNET...etc. variety protocols.

Package Contents

- ✓ One Industrial Ethernet Switch
- ✓ Quick Installation Guide
- ✓ User Manual
- ✓ RJ-45 Covers
- ✓ 4PCA-090510 cable line

Appearance

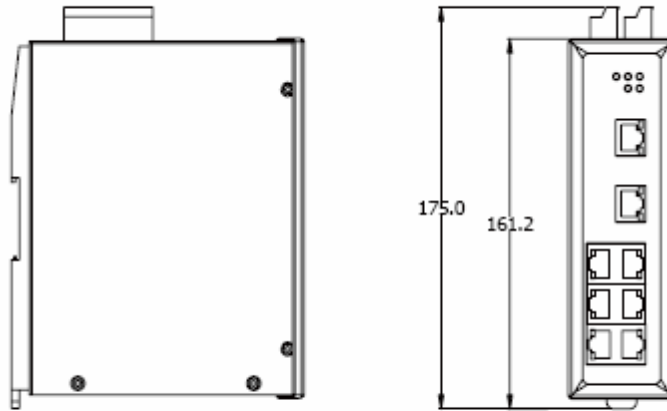
- Dimensions
- Front Panel
- On Case Quick Guide

Overview

The Managed Switch provides useful interfaces to configure the switch functions. For hardware installation, we provide easy DIN rail mounting, wall mounting modes, and come with aluminum case.

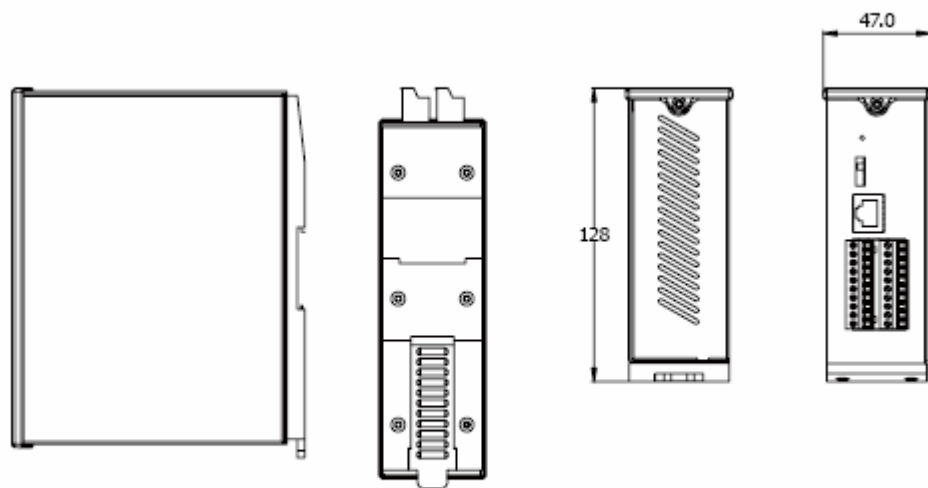
All of connectors are well arranged on the front panel, so it is easier to stack with other devices and to maintain in a small installation space.

Dimensions



Left Side View

Front View



Right Side View

Back View

Bottom View

Top View

Front Panel



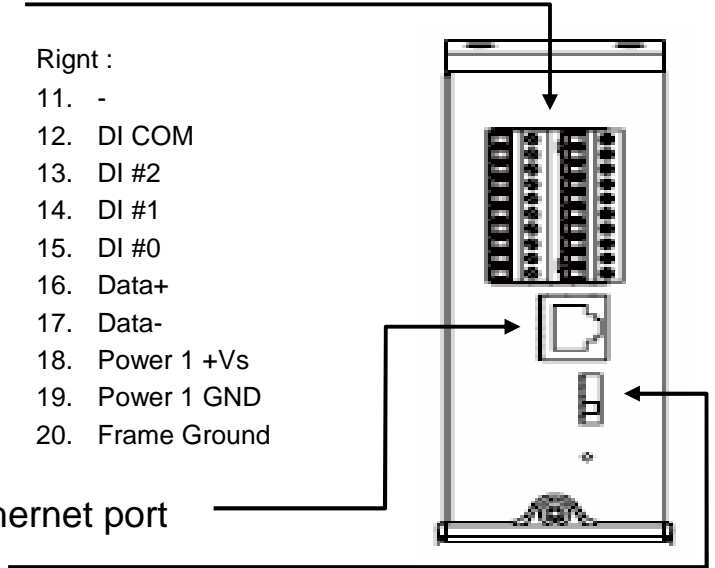
1 Terminal block

Left :

1. DO PWR
2. DO GND
3. DO #2
4. DO #1
5. DO #0
6. Relay (R.NO)
7. Relay (R.COM)
8. Power 2 +Vs
9. Power 2 GND
10. Frame Ground

Right :

11. -
12. DI COM
13. DI #2
14. DI #1
15. DI #0
16. Data+
17. Data-
18. Power 1 +Vs
19. Power 1 GND
20. Frame Ground



2 Serial line via Ethernet port

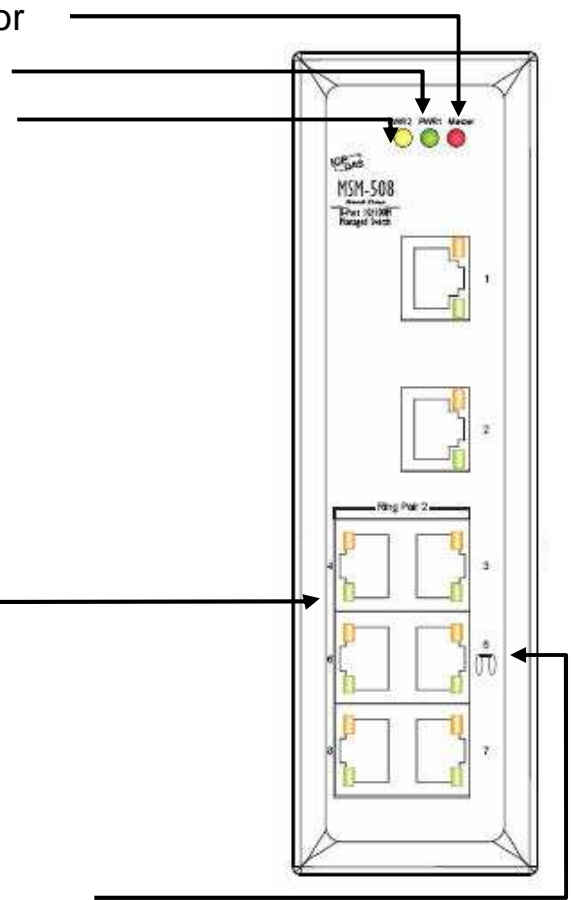
3 Jumper block

- Repair Mode
- Normal Mode
- Upgrade Firmware Mode

4 Master switch LED indicator

5 Power 1 LED indicator

6 Power 2 LED indicator

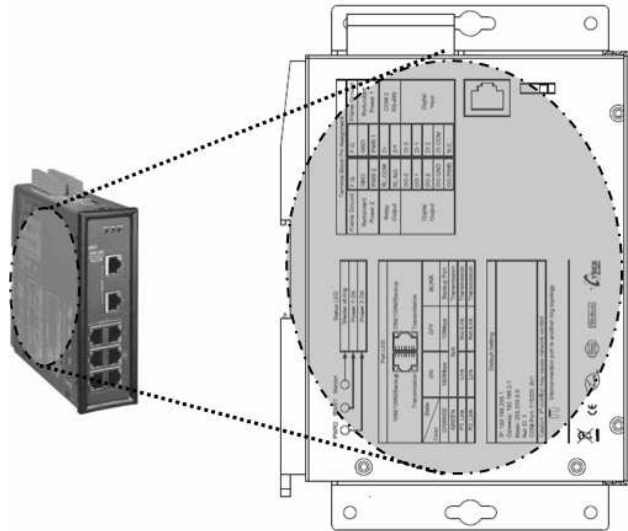


7 RJ-45 Ethernet ports

8 Interconnection port for 2 phase recovering coupling

On Case Quick Guide

LED status and Default Setting have been printed on left side of front panel. After acquainted with *Managed Switch* features, field engineers could deploy switches quickly by referencing those information.



<p>Status LED</p> <p>PWR2 PWR1 Master →</p> <ul style="list-style-type: none"> Master of ring Power 1 OK Power 2 OK <p>Port LED</p> <p>10M/100M/Backup 10M/100M/Backup</p> <p>Transmission Transmission</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Color</th> <th>State</th> <th>ON</th> <th>OFF</th> <th>BLINK</th> </tr> </thead> <tbody> <tr> <td>ORANGE</td> <td></td> <td>100Mbps</td> <td>10Mbps</td> <td>Backup Port</td> </tr> <tr> <td>GREEN</td> <td></td> <td colspan="2">N/A</td> <td>Transmission</td> </tr> <tr> <td></td> <td>P1_Link</td> <td>Link</td> <td>Not Link</td> <td>Transmission</td> </tr> <tr> <td></td> <td>P2_Link</td> <td>Link</td> <td>Not Link</td> <td>Transmission</td> </tr> </tbody> </table> <p>Default Setting</p> <p>IP: 192.168.255.1 Gateway: 192.168.0.1 Mask: 255.255.0.0 Net ID: 1 COM Port: 115200, 8n1</p> <p>Caution: IP-conflict may cause network-conflict</p> <p> Interconnection port to another ring topology</p>	Color	State	ON	OFF	BLINK	ORANGE		100Mbps	10Mbps	Backup Port	GREEN		N/A		Transmission		P1_Link	Link	Not Link	Transmission		P2_Link	Link	Not Link	Transmission	<p>Terminal Block Pin Assignment</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Frame Ground</th> <th>F.G.</th> <th>F.G.</th> <th>Frame Ground</th> </tr> </thead> <tbody> <tr> <td>Redundant Power 2</td> <td>GND</td> <td>GND</td> <td>Redundant Power 1</td> </tr> <tr> <td rowspan="2">Relay Output</td> <td>RL.COM</td> <td>D-</td> <td rowspan="2">COM 2 RS-485</td> </tr> <tr> <td>RL.NO</td> <td>D+</td> </tr> <tr> <td rowspan="4">Digital Output</td> <td>DO 0</td> <td>DI 0</td> <td rowspan="4">Digital Input</td> </tr> <tr> <td>DO 1</td> <td>DI 1</td> </tr> <tr> <td>DO 2</td> <td>DI 2</td> </tr> <tr> <td>DO.GND</td> <td>DI.COM</td> </tr> <tr> <td></td> <td>DO.PWR</td> <td>N.C.</td> <td></td> </tr> </tbody> </table>	Frame Ground	F.G.	F.G.	Frame Ground	Redundant Power 2	GND	GND	Redundant Power 1	Relay Output	RL.COM	D-	COM 2 RS-485	RL.NO	D+	Digital Output	DO 0	DI 0	Digital Input	DO 1	DI 1	DO 2	DI 2	DO.GND	DI.COM		DO.PWR	N.C.	
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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

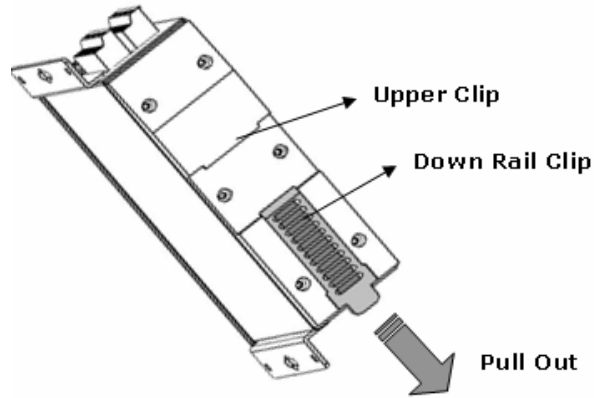
Managed Switch support redundant power, output relay and enhanced isolation to make device much robust. With ICP DAS patent DIN-Clip[®] design, the installation is just as easy as plugging power cord into outlet.

DIN-Rail Mounting Installation

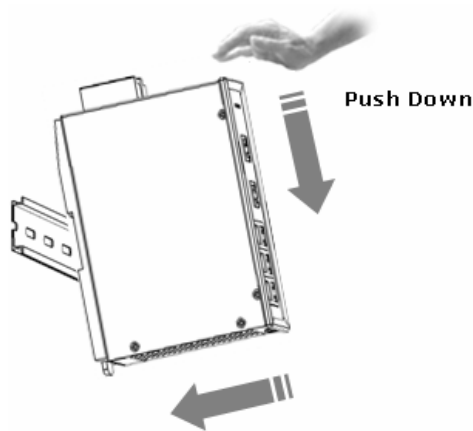
With ICPDAS patent DIN-Clip® design, DIN-Rail mounting installation becomes very easy. Following 3 steps completes installation.



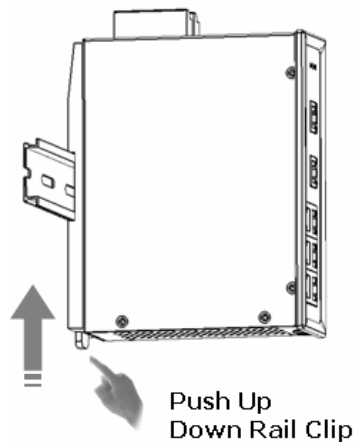
1 Pull the **down rail clip** out.



2 Obliquing the switch and insert the **upper clip** 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.

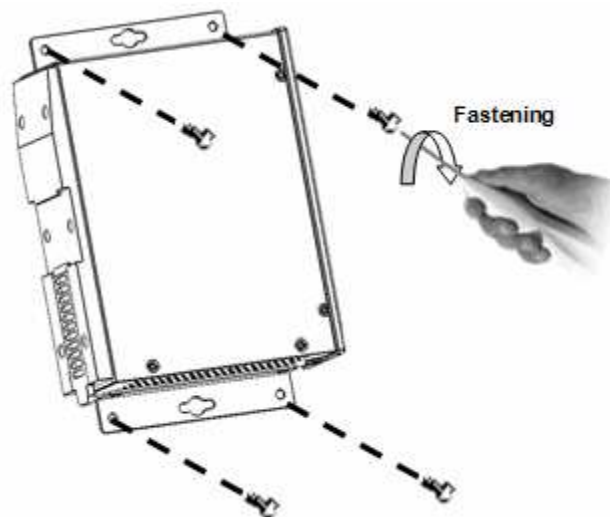


Wall-Mounting Installation

With ICP DAS patent DIN-Clip® design, Wall-Mounting installation becomes very easy. Following 1 step completes installation.

1

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.

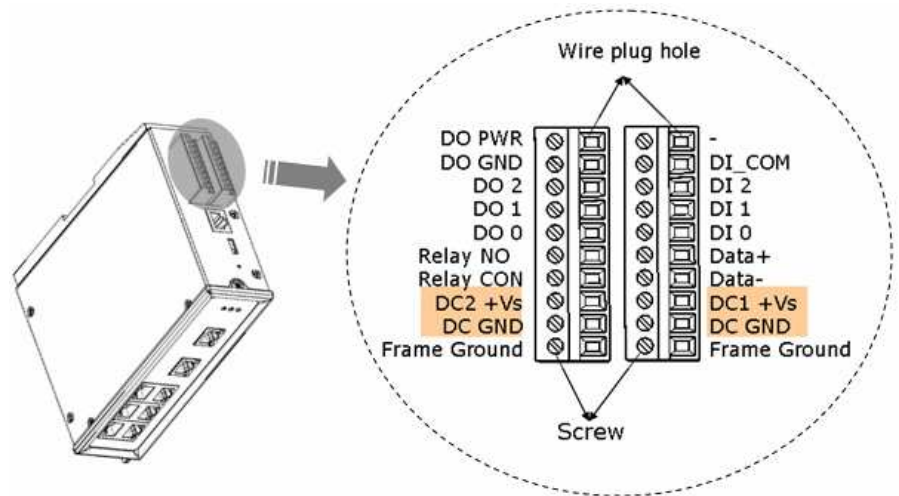


Connecting Input Power

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.

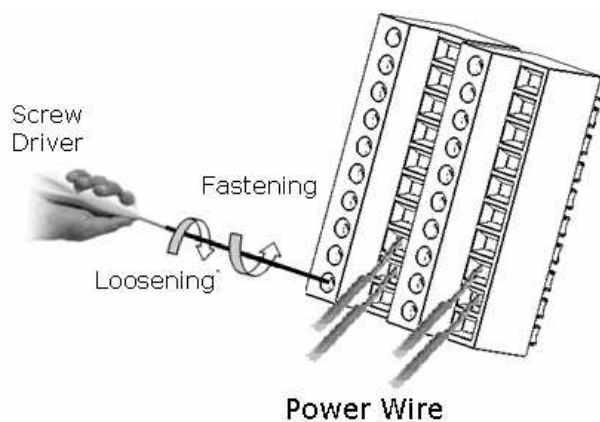
1

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



2

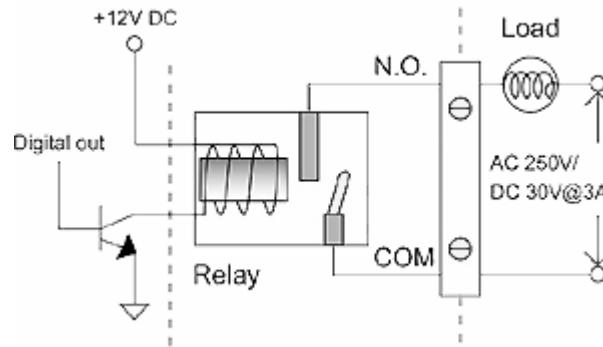
Insert the wire of your DC supply or Battery supply into the PWN1 and/or PWN2 contacts of the terminal block connector, and fastening the terminal screws to prevent the wires from coming loose.



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

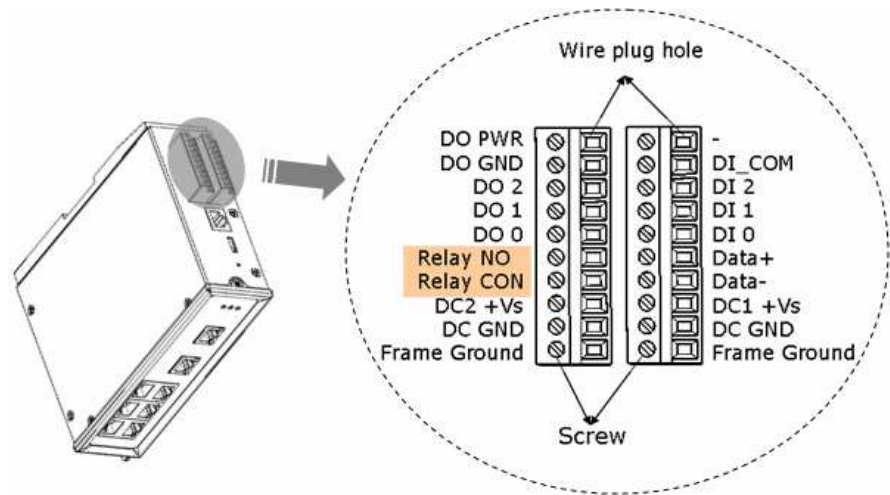
Connecting Output Relay

The diagram of output relay:



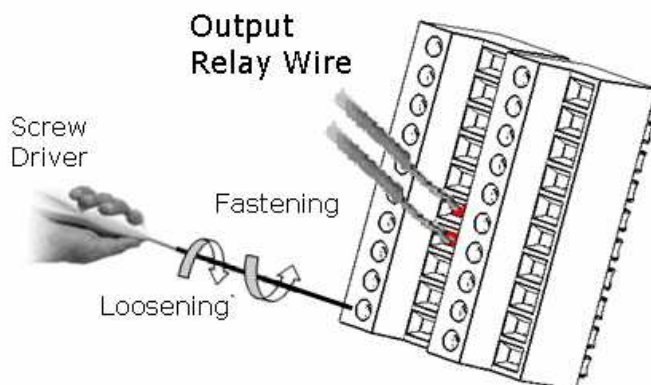
1

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



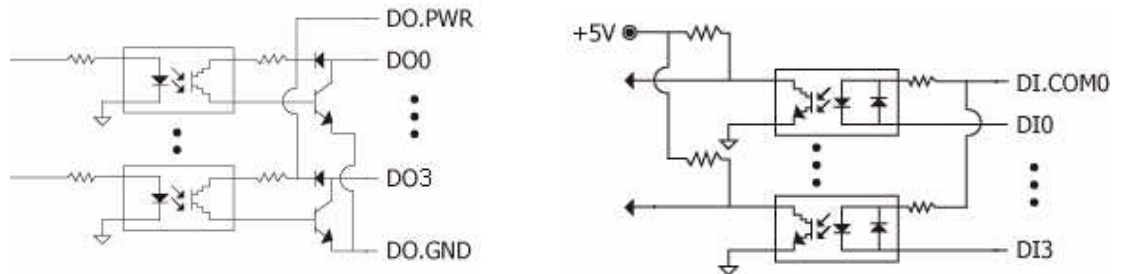
2

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 Digital Input & Output

The diagram of digital input and output:

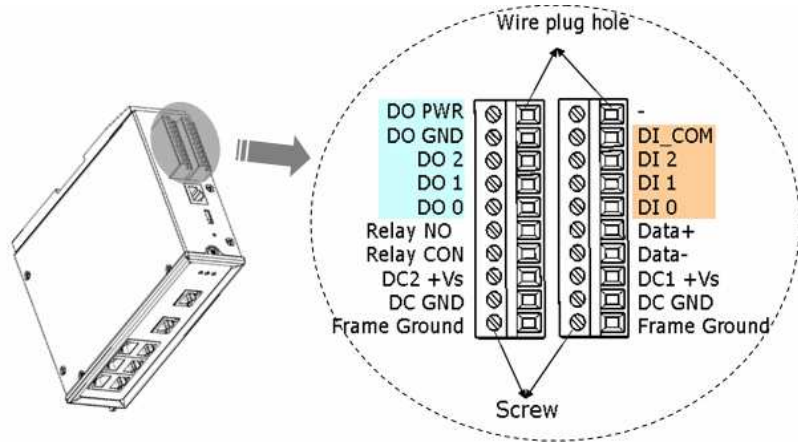


Wire Connection

Input Type	ON State LED ON Readback as 0	OFF State LED OFF Readback as 1
Relay Contact	Relay ON 	Relay Off
	Voltage > 10V 	Voltage < 4V
NPN Output	Open Collector On 	Open Collector Off
	Open Collector On 	Open Collector Off
PNP Output	Open Collector On 	Open Collector Off
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay	Relay ON 	Relay Off
	Resistance Load 	Resistance Load

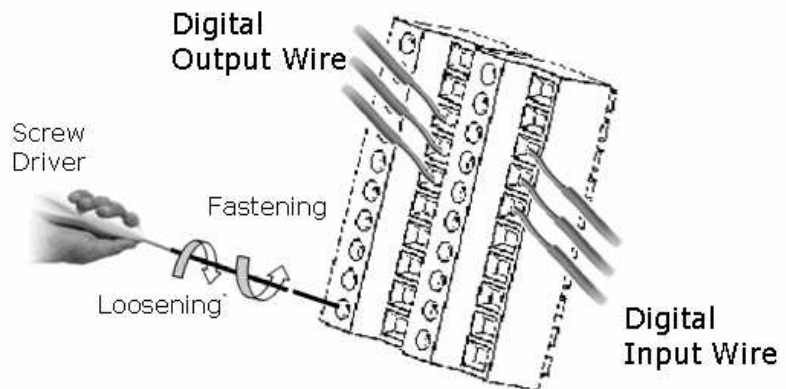
1

Identify digital input and output contacts on terminal block.



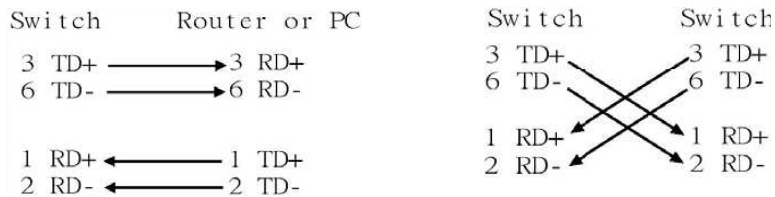
2

Fastening the terminal screws to prevent the wires from coming loose.



Connecting Ethernet Ports

Managed Switch 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:

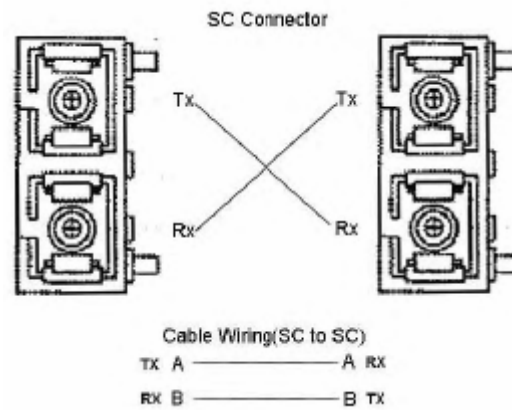
Pin MDI-X	Signals	MDI Signals
1	RD+	TD+
2	RD-	TD-
3	TD+	RD+
6	TD-	RD-

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).

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

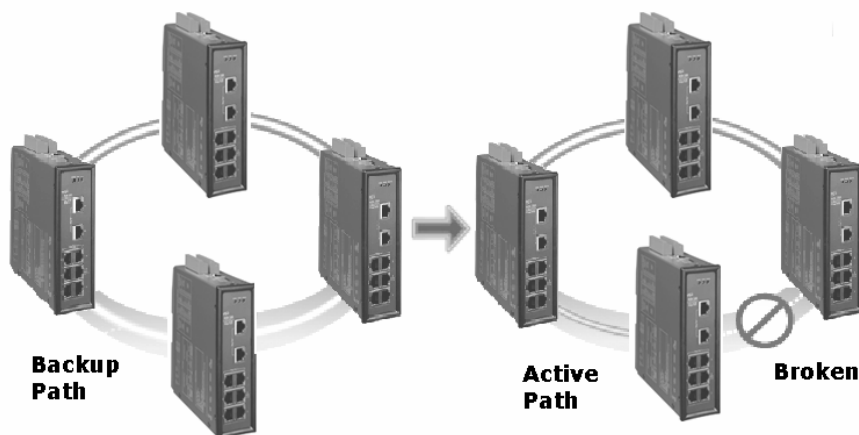
To successfully form a robust industrial Ethernet network, the designing of network pattern is the most important stage. A well-designed network pattern could dramatically reduce the risk network failure in critical situation.

One Ring Topology

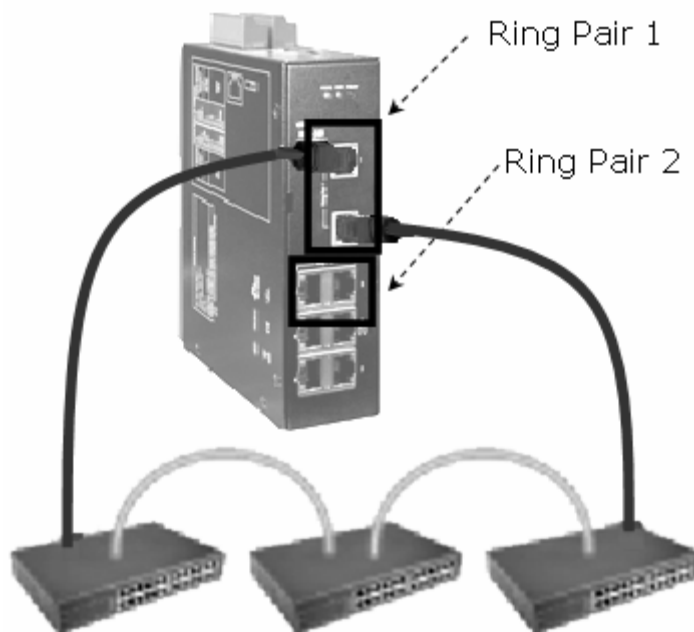


A ring topology ensures the network having **one more chance** to keep connection alive when any connection between 2 switches (nodes) has been broken inside the ring.

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 activate the **Redundant Path** and fire alarm to output relay.



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

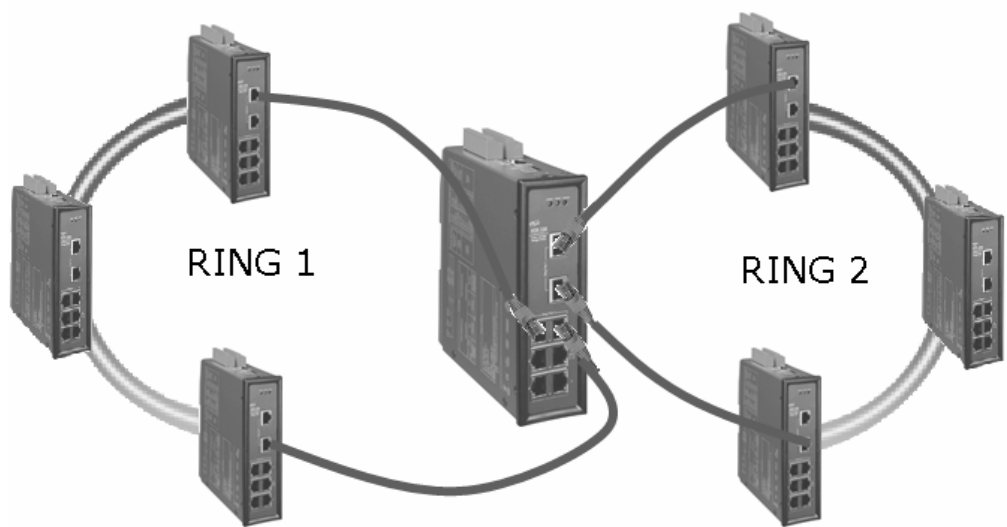


Two Rings Coupling

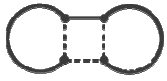


As a ring network is a small group of switches by geography, functionalities, or subsystem, 2 or more rings could be coupled together to form a whole picture of industrial network for an integrated system.

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

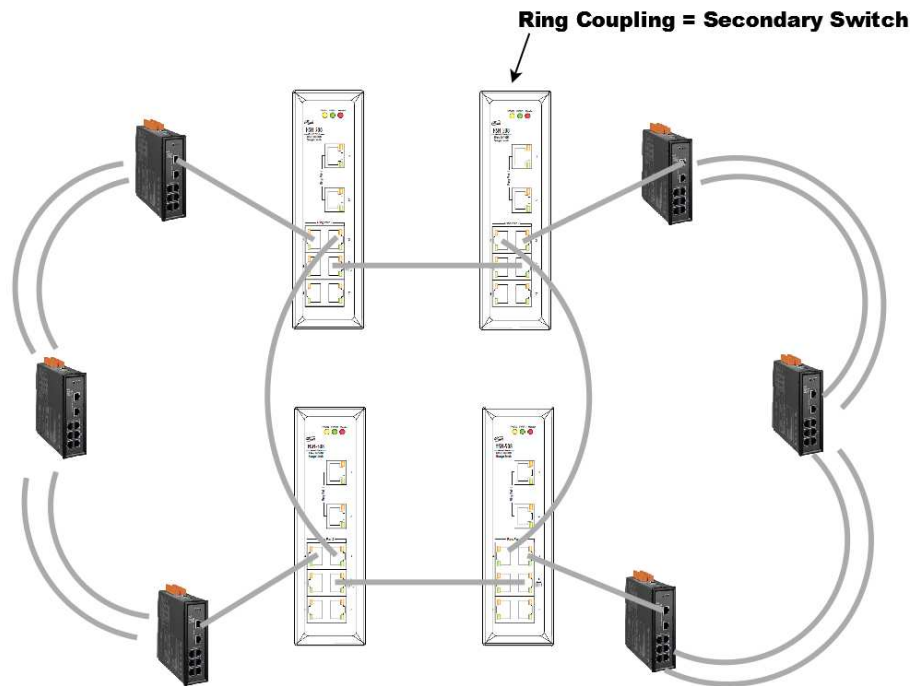


Two Rings Coupling with Two Phase Recovering



Redundant coupling gives **one more chance** to keep connection alive when any connection between 2 rings has been broken. It is much safer 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.



Troubleshooting

- No Power to the Switch
- No Link Light on a Switch Port
- Master LED Keep on Flashing

Overview

This chapter includes some information for general troubleshooting as follows:

- No Power to the Switch
- No Link Light on a Switch Port
- Master LED Keep on Flashing

No power to the switch.

- Check for faulty power cord.
- Check for loose or broken power connections.
- Check connections to ensure the power and ground are attached to the correct terminals.
- Check for power loss or power surges at the AC power outlet.
- Check Voltage of power coming into PWR1 or PWR2 to ensure it is within +10 - +30V DC.
- Ensure there are no shorts between power and ground.

No link light on a switch port.

- Check for faulty or loose Cables(both ends). Visually inspect for loose or faulty connections at all connectors and cables. If that does not correct the problem, try replacing the cable.
- Check the other device to see if it is powered up and operating correctly.
- Try moving the Ethernet cable that has the possible faulty connection to another port in the switch and check for link light.

Master LED keep on Flashing

- Check if the topology is accurate.
- Check if network is functioning properly.
- Check if power supply is connected properly.
- Check if there is devices failure exit (including ring switch or other devices connected to the switch)
- Check if MAC address is duplicated or illegal.
- Check if the length of recovery time (rtime) is adequate; if the recovery time is too short, set a longer time interval.
- Check if the firmware is the newest version , please go to <http://www.icpdas.com/download/download-list.htm> for downloading newest firmware version.
- Check if the firmware upgrading process is completed. If not, redo the upgrading sequence to complete firmware upgrading process.

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

Glossaries

ANSI X3T9	Commonly referred to as FDDI. A local area network protocol that operates at 100Mbps.
Asynchronous	Having a variable time interval between successive data or information in the form of characters, operations, events. Transmission in which the data or information is individually synchronized or timed usually by start and stop bits (S/S).
Attenuation	A general term describing the loss of power between two points, measured in decibels per kilometer (dB/km) at a specified wavelength (nm).
Backbone Network	A main or high speed transmission facility or medium usually designed to connect lower speed channels or clusters of terminals. May describe common carrier main transmission path.
Bandwidth	A range of frequencies available for signaling; the differences between the highest and lowest frequencies of a band are expressed in (Hz).
Bridge	A device used to connect two separate LANs or used to divide a large LAN into smaller LANs. Each LAN acts as its own LAN, but uses a bridge device to communicate from one LAN to another.
Bus	Path or channel, usually electrical, with one or more conductors, where all devices are able to receive all transmissions at the same time.
Counter-Rotating Ring	Aka. Self-Healing Ring; has two physical transmission lines or rings with transmitting and receiving signals in each ring travelling in opposite directions. If the line or a device along the ring fails, the ring re-anneals by bypassing the device and or line and forms with the other ring to form a new single ring.
Crosstalk	The unwanted transfer of energy from the disturbing circuit to another called the disturbed circuit. Usually from an adjacent analog channel.
Dispersion	The spreading of light pulses that takes place in multimode fiber optic transmission. Dispersion limits the potential transmission distance because the spread out light pulses reach the destination at different times making the signal unreadable.
Ethernet	Product name for one of the first popular LAN technologies, later standardized as IEEE 802.3.
Fiber Optic Cable	Thin filaments of glass or other transparent material sheathed in an insulator through which a light beam may be transmitted for long distances by means of multiple internal reflections. A waveguide used to transmit digital information.
Flow Control	A method for a receiver to control the information flow from a transmitter. It eliminates data overflow at the receiver.
Full Duplex	A communication method where both ends can transmit and receive simultaneously.
Half Duplex	A communication method where one end transmits while the other end receives, then reverses the process.

Hub	A device for local area networks (LANs) that is used to interconnect multiple devices over an internal bus.
Jitter	Aka. phase jitter, caused by power line harmonics and perceived in the form of minor phase changes.
Multi-Drop Line	Aka. Multipoint Line, a data link supporting multiple DTE connections, usually with one DTE controlling the link by polling the other DTEs for input and addressing output to the other DTEs. Utilizing frequency division or statistical MUX, a multipoint line can support multiple independent point-to-point channels.
Multimode fiber	An optical fiber that supports more than one propagating mode of light propagation.
Multiplexer	Aka. or Multiplexor or Mux,. A device using several communications channels at the same time, transmits and receives messages and controls communications lines, may be a microprocessor.
Node	A network-connected device, such as a server or PC.
Order Wire	Voice channel used to communicate between two locations.
Packet	A grouping of data, usually consisting of data and an address header prior to being sent over a network.
Point-of Presence (POP)	The physical access location within a specific location of the long distance or common carrier.
Polling	The method used for terminal to controller communications. The controller systematically asks for each terminal if it needs to transmit to the controller.
Protocol	A set of rules for data communication. All devices communicating together must adhere to the same rules.
Router	Similar to a bridge but provides more complex and flexible networking support. It usually also supports WANs.
Single mode fiber	An optical fiber that supports only one mode of light propagation above the cutoff wavelength.
Star	Network in which all terminals are connected through a single point or node, such as a star coupler.
Synchronous Transmission	Having a constant time interval between successive bits of data or information.
Time Division Multiplexing	A type of multiplexer that allocates a defined amount of backbone bandwidth for each connected device.
Time Slot	Unit of backbone bandwidth allocated for each port.
Token Ring	A LAN topology where a control packet or token is passed from station to station in sequential order. The stations wishing to access must wait for the token before transmitting data, in the token ring the next logical station is also the next physical station.
Virtual Path	A software-controlled point-to-point connection between two devices or segments.

Appendix B

Specifications

■ Ethernet switch type	Intelligent store & forward
■ RJ45 ports (shielded)	10/100BaseT(x)
■ RJ45 speed (auto-negotiating)	10 Mbps or 100 Mbps
■ RJ45 auto-mdi/mdix	All 8 ports
■ Ethernet protocols supported	All standard IEEE 802.3
■ Memory bandwidth	3.2 Gbps
■ Completely compliant	IEEE 802.3, IEEE 802.3u, IEEE802.3x
■ Full or half duplex operation	Auto-sensing
■ MAC addresses supported	2K
■ Ethernet isolation	1500 VRMS 1 minute
■ Required supply voltage	+12 ~ +48 VDC
■ Power input isolation	1KV
■ Power consumption (Redundant input terminals)	5 W (typical - all ports active at 100 Mbps)
■ Operating temperature	-30 ~ +75°C
■ Storage temperature	-40 ~ +85°C
■ Vibration	EN 50155 and EN11373.
■ EMC immunity	EN61326-1 (EN61000-4-2, 3, 4, 5, 6)

Appendix C

Modbus Table

Switch Status

Address	Status	Address	Status
10000	Ring Pair 1 Enable	10004	Power 1 Fail
10001	Ring Pair 2 Enable	10005	Power 2 Fail
10002	0 : Ring Protocol 1 : Spanning Tree Protocol	10006	Relay output
10003	Secondary switch	10007	Master

Link Status

Address	Status	Address	Status
10008	Link on port 1	10016	Link on port 9
10009	Link on port 2	10017	Link on port 10
10010	Link on port 3	10018	Link on port 11
10011	Link on port 4	10019	Link on port 12
10012	Link on port 5	10020	Link on port 13
10013	Link on port 6	10021	Link on port 14
10014	Link on port 7	10022	Link on port 15
10015	Link on port 8	10023	Link on port 16

Forwarding Status

Address	Status	Address	Status
10024	Port 1 is forwarding	10032	Port 9 is forwarding
10025	Port 2 is forwarding	10033	Port 10 is forwarding
10026	Port 3 is forwarding	10034	Port 11 is forwarding
10027	Port 4 is forwarding	10035	Port 12 is forwarding
10028	Port 5 is forwarding	10036	Port 13 is forwarding
10029	Port 6 is forwarding	10037	Port 14 is forwarding
10030	Port 7 is forwarding	10038	Port 15 is forwarding
10031	Port 8 is forwarding	10039	Port 16 is forwarding

Communication Status

Address	Status	Address	Status
10040	Port 1 lose pair port	10048	Port 9 lose pair port
10041	Port 2 lose pair port	10049	Port 10 lose pair port
10042	Port 3 lose pair port	10050	Port 11 lose pair port
10043	Port 4 lose pair port	10051	Port 12 lose pair port
10044	Port 5 lose pair port	10052	Port 13 lose pair port
10045	Port 6 lose pair port	10053	Port 14 lose pair port
10046	Port 7 lose pair port	10054	Port 15 lose pair port
10047	Port 8 lose pair port	10055	Port 16 lose pair port

Digital Input & Output

Address	Status	Address	Status
10057	Digital Input channel 1	00001	Digital Output channel 1
10058	Digital Input channel 2	00002	Digital Output channel 2
10059	Digital Input channel 3	00003	Digital Output channel 3
10060	Digital Input channel 4	00004	Digital Output channel 4
10061	Digital Input channel 5	00005	Digital Output channel 5
10062	Digital Input channel 6	00006	Digital Output channel 6
10063	Digital Input channel 7	00007	Digital Output channel 7
10064	Digital Input channel 8	00008	Digital Output channel 8

Appendix E

Ingress Protection (IP)

An IP number is used to specify the environmental protection of enclosures around electronic equipment. These ratings are determined by specific tests.

The IP number is composed of two numbers, the first referring to the protection against solid objects and the second against liquids. The higher the number is, the better the protection.

Note: All ICP DAS MS Series devices are manufactured and tested to IEC IP30 standards.

First Number

0	No protection (Sometimes X)
1	Protected against solid objects up to 50mm ³
2	Protected against solid objects up to 12mm ³
3	Protected against solid objects up to 2.5mm ³
4	Protected against solid objects up to 1mm ³
5	Protected against dust, limited ingress (no harmful deposit)
6	Totally protected against dust

Second Number

0	No protection (Sometimes X)
1	Protection against vertically falling drops of water (e.g. condensation)
2	Protection against direct sprays of water up to 15 degrees from vertical
3	Protection against direct sprays of water up to 60 degrees from vertical
4	Protection against water sprayed from all directions - limited ingress permitted
5	Protected against low pressure jets of water from all directions - limited ingress permitted
6	Protected against low pressure jets of water, limited ingress permitted (e.g. ship deck)
7	Protected against the effect of immersion between 15cm and 1m
8	Protected against long periods of immersion under pressure

Appendix F

Accessories

Power Supply (KA-52F/DIN-KA52F)

Features & Specifications

- Input Range : 100~250AC
- Input Frequency : 50Hz to 60 Hz
- Output : 24Vdc/1Amp max.
- Output Power : 25Watts
- Operating Temperature:0 to 70°C
- Storage Temperature : -40 to 85°C
- Demension :
 - 65 x 105 x 36mm (KA-52F)
 - 68 x 107 x 50mm (DIN-KA52F)

Part No. Information

- | | |
|------------------|--|
| KA-52F | 24V/1A output power supply |
| DIN-KA52F | 24V/1A output power supply with DIN-Rail Mount |



Web Management User Manual

Industrial Managed Ethernet Switch

Version 1.0

This document applied to models of
MSM-508,MSM-508FC/FCS/FT



Modbus/TCP
conformance tested

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Managed Switch

Web Management Operation

=====

- Connection
- Basic Setting
- Redundant Setting
- Port configuration
- Relay Alarm
- Email Alarm
- VLAN
- QoS
- Diagnosis
- Authentication

This manual will guide you how to configure ICPDAS Managed Switch through web browser. Web Management support two levels of authentication : administrator level and user level. The administrator level allows you to monitor, configure and control all functions of Web Management, and the user level is for monitor-only. Web Management implements the VLAN, QoS, Port Trunk, SMTP, TELNET ... protocols with an easy-to-use interface. The IP filter and pre port configuration are also supported.

1. Web Connection

The default network setting (factory default setting) of Managed Switch is :

IP : 192.168.255.1
Mask : 255.255.0.0
Gateway : 192.168.0.1

Before accessing Managed Switch through web browser, please modify above setting to fit your network environment, you can refer 「RS-232 Console Operation」 manual for more detail.

Following, we will show you how to connect to the Web Management step by step.

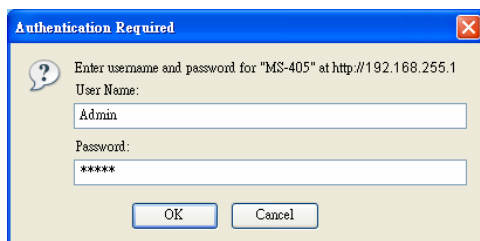
STEP 1 :

Execute web browser application, ex: Mozilla, Netscape, Internet Explorer ...etc, input the Switch's IP address in the Address field of web browser, and press ENTRY to start web connection.



STEP 2:

If connection succeeds, a login box will popup as following:



The default account and password of Web Management are **Admin** and **Admin**.
When authentication succeeds, you can see the welcome information display.




Welcome to the Switch Web Management

Model Name	MS-408
MAC Address	12:23:34:45:56:69
Firmware Version	V0 (Mar 05 2008)
OS Version	Version 2.00.2 (Nov 20 2007)
Web Server Lib Ver.	Version 112 (Feb 15 2008)

Panel Message

Port Amount	<input type="text" value="8"/>
LED Value	Master <input type="checkbox"/> PWR1 <input type="checkbox"/> PWR2 <input type="checkbox"/>
Port Link Status	1 2 3 4 5 6 7 8
Communication Lose	1 2 3 4 5 6 7 8



For login to Web Management, your browser must support HTTP authentication. It allows a web browser to provide credentials when making a request.

2. Basic Setting

This chapter describes how to setting the commonly information on your Managed Switch.

► Information

▪ Display Info Settings

Module Name	<input type="text" value="MS-408"/>
Module Information	<input type="text"/>
Web Server TCP Port	<input type="text" value="80"/>
<input type="button" value="SUBMIT"/>	

Module Name :

Use to specify the Switch Name, and also displayed as the console prompt. Max. 8 characters.

Module Information :

Use to memo the extra description of the Switch Module. 16 characters max..

Web Server TCP Port :

Specify the connection port of the Web Server. Default setting is 80.

Date Time Setting :

▪ Date Time Settings

Time Zone	<input type="text" value="(GMT1:00)Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London"/>			<input type="button" value="v"/>
Current Module time	<input type="text" value="2008"/>	<input type="text" value="3"/>	<input type="text" value="7"/>	
	<input type="text" value="10"/>	<input type="text" value="21"/>	<input type="text" value="12"/>	<input type="button" value="Set Now"/>
	<input type="button" value="Format Checking"/>			
<input type="button" value="SUBMIT"/>				

This function can specify the Time zone and the current date time information of the Switch. You can click the <Set Now> button to get the current date time from your browser, and the <Format Checking> button will help you to verify the setting value. Date Time value can be appended to the email messages, alarm records...etc.

Only MS Series Switch supports a real time clock. For RS Series Switch, the <Date Time Setting> function is invalid.

► Network

▪ Ethernet Settings

Items	Value
IP Address	<input style="width: 100%;" type="text" value="192.168.255.1"/>
Gateway	<input style="width: 100%;" type="text" value="192.168.255.254"/>
Mask	<input style="width: 100%;" type="text" value="255.255.255.0"/>
MAC Address	<input style="width: 100%;" type="text" value="12-23-34-45-56-69"/>
Modbus NetID	<input style="width: 100%;" type="text" value="1"/>
<input style="width: 80%; margin: 0 auto;" type="button" value="MODIFY_SETTING"/>	

IP Address :

IP address is an identifier for a device on a TCP/IP network. It is a 32-bit numeric address consisted as four numbers separated by three dots. The range of each number is from 0 to 255.

Managed Switch doesn't support dynamic IP assignment, you have to specify the IP address of each Switch manually.

Factory default value is 192.168.255.1

Gateway :

A gateway is a device that passes traffic from the local network to another network or Internet.

Like the IP address, it is consisted as 4 numbers separated by three dots. The range of each number is from 0 to 255.

Mask :

The (subnet) MASK is used to determine the subnet of an IP address. Same as the IP address, a MASK contains four bytes (32 bits) and it is often expressed in the dotted-decimal notation.

The factory default value is labeled beside the Switch case.

MAC Address :


MAC Address is a hardware address. It's a uniquely identifies the device of MAC layer network.

The standard (IEEE 802) format for human-readable is six groups of two hexadecimal digits, each digit separated by a dash or colon.

The factory default value is labeled on the Switch case.

Modbus Net ID

Specify the device ID for modbus protocol.



When the Network Setting is modified, you have to reboot the Switch to enable the new setting.

➤ **Serial Port**

▪ **COM port settings**

Port	Baud Rate	Data Bit	Parity Check	Stop Bit
COM1	115200	8	0 (None)	1
COM2	115200	8	0 (None)	1

The Managed Switch supports two interfaces of serial communication. This function enables you to set up the transmission speed(baudrate),data bit(databit), parity check type (parity) and stop bit(stopbit).

COM1 port is the RS232 standard, use for Console Connection. Factory default setting is:

Baud Rate : 115200
 Data Bit : 8
 Parity Check : 0 (None)
 Stop Bit : 1



COM2 is the RS485 standard, use for Modbus communication. Factory default setting is:

Baud Rate : 115200
 Data Bit : 8
 Parity Check : 0 (None)
 Stop Bit : 1

➤ **Digital Input / Output**

ICPDAS Managed Switch supports 3 points of digital input / output interface.
 User can monitor DI/O status from web management.

▪ **Digital Input/Output**

Digital Input	
Digital Output	

3. Redundant Setting

Redundant LAN topology is a structure to provide the link failure recovery and escaping network loops. It allows you to setup the redundant loops for supporting backup connections.

Managed Switch offers redundancy options for various functions, it is a highly reliability device provides the fast error detection and keeps the non-stop connections 24 hours a day, 365 days a year. To manage the Managed Switch for use in redundant network topology, following configuration options are available.

▪ **Redundant Setting**

ITEM	VALUE	
Ring Pair 1	<input checked="" type="radio"/> Disable	<input type="radio"/> Enable
Ring Pair 2	<input checked="" type="radio"/> Disable	<input type="radio"/> Enable
Protocol	<input checked="" type="radio"/> Cyber-Ring Protocol	<input type="radio"/> STP Protocol
Ring Coupling	<input checked="" type="radio"/> Primary Switch	<input type="radio"/> Secondary Switch

► **Redundant Setting**

This function enables you to configure the Switch operation modes.

Ring Pair 1 :

Enable/Disabled Ring Pair 1, it consists of port 1 and port 2.

Ring Pair 2 :

Enable/Disabled Ring Pair 2. it consists of port 3 and port 4.

Protocol :

Managed Switch supports two kinds of redundant communication – Cyber-Ring and STP (Spanning Tree Protocol). Compare to the Spanning Tree Protocol, Cyber-Ring provides less fault recovery time, reconfiguration time and fault detected time.

Ring Coupling:

If “Primary Switch “ is selected, Switch will be forced as a Master of the topology.

► Recovery Time Setting

▪ Recovery Time

Recovery Time	300 ms (100 ms ~ 1500 ms)	
Hello Time	Forward Time	Maxage Time
4000 ms (2000 ms ~ 4000 ms)	10000 ms (10000 ms ~ 10000 ms)	6000 ms (6000 ms ~ 21000 ms)
Default		

Recovery Time (Cyber-Ring Protocol) :

Recovery time is the duration of connections that from failure occurred to return to normal. This function allows you to assign the recovery time in millisecond (ms), the variable is from 100ms to 1500ms (1.5 sec).

Factory default is 300ms.

On *Cyber-Ring Protocol* Mode, user can specify the recovery time manually, and the Managed Switch will calculate adaptable Hello Time, Forward Time and Max age Time automatically.

An adequate recovery time is depended on how many Managed Switch are consisted in the Ring coupling, the more Managed Switch that you have, the more recovery time that you need.



If the recovery time is not longer enough, the Master LED will keep on flashing to make a warning.

Hello Time (STP Protocol) :

Hello time is the interval time that the Master Switch sends hello messages to Switch nodes on the Ring network, this is for making sure if the Switch nodes and the topology still keeping healthy.

This setting is only available on STP Mode. Factory default is 4000ms.

You can tune the time to be between 1000 and 10000 in millisecond (ms).

Forward Time (STP Protocol) :

Forward delay is the duration time that packages from pre-forwarding state to forward state. Factory default is 10000ms, the variable is from 4000ms to 30000ms (30 sec). Setting is only available on STP Mode.

Maxage Time (STP Protocol) :

Max age time is the interval that node Switches waiting for hello messages from the Master Switch. It's 6000ms by factory default, and the variable is from 6000ms to 40000ms.

4. Port configuration

► Mirror

Mirror Port setting is commonly used to monitor the network traffic, it can help you to collect and trace abnormal packets of each port without interrupting data transmission.

User can specify a switch port to receive the packet copies which from another port.

STEP 1

Specify a “**Monitor Port**” that you want to get the packet copies.

STEP 2

Specify the ports will be monitored.

There are two type of monitoring options

Egress

Monitor the packets which are sent out the switch port.

Egress & Ingress

Monitor the packets both entering into and being sent out the switch port.

STEP 3

Click “SUBMIT” button to active mirror setting.

If the setting is succeed. You will see the setting result shown in the **Port Monitoring List** below the setting Table.

NOTE !!

- Lots of mirroring traffic may reduce the performance of Switch. You can tick the “**Clean all Monitoring Setting**” checkbox and press “SUBMIT” button to disable port mirror setting.
- Mirror function will be disabled when the Trunking function is enabled.

Port Mirror Setting

Clean all Monitoring Setting :

Monitor Port : Port 4

Port	Setting
1	None
2	Egress & ingress
3	Egress
4	Egress & ingress
5	None
6	None
7	Egress & ingress
8	None

RESET SUBMIT

Port Mornitoring List

Port	Monitored Port
1	
2	
3	
4	2,3,7,
5	
6	
7	
8	

► Trunking

This function is used for setting the groups of link aggregation. Port trunking allows user to combine multiple physical ports into a single logical channel. It can increase the link speed and provide the better redundancy availability.

Supported groups depend on the total number of switch ports on the equipment. 508 Series Managed Switch supports up to 4 trunking groups.

NOTE!!

Active trunking function will reset and disable VLAN & Ring Pair settings.

▪ **Trunk Setting**

Group	Member Port							
	1	2	3	4	5	6	7	8
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

► Port Status

User can check link status of each port in this function.

▪ **Port Status**

Port	Speed	Duplex	Link
1	100 Mbps	Half-duplex	ON
2	-	-	OFF
3	-	-	OFF
4	-	-	OFF
5	-	-	OFF
6	-	-	OFF
7	100 Mbps	Full-duplex	ON
8	-	-	OFF

- Port** Port Number
- Speed** Port transmission speed. (10 Mbps / 100 Mbps)
- Duplex** Flow Control Mode. Both Half-duplex and Full-duplex modes are supported.
- Link** Port Link status. ON : Link is up ; OFF : Link is down.

► Cable Checking

This function provides a useful tool to detect the quality of cables.

Tick the checkbox of Ports and click “Start Check” button, after a moment waiting, system will report the RX and TX status.

▪ Port Cable Checking

Port/Chk.	RX Cable		TX Cable	
	Status	Length	Status	Length
1. <input type="checkbox"/>	Good	Unknow	Good	Unknow
2. <input type="checkbox"/>	--	--	--	--
3. <input type="checkbox"/>	Open	0 M	Open	0 M
4. <input type="checkbox"/>	Open	49 M	Open	47 M
5. <input type="checkbox"/>	Open	4 M	Open	3 M
6. <input type="checkbox"/>	--	--	--	--
7. <input type="checkbox"/>	Good	Unknow	Good	Unknow
8. <input type="checkbox"/>	--	--	--	--

There are 4 types of status message can be displayed.

- Good Normal cable
- Test Fail Cable checking fail.
- Open Open in cable.
- Short short in cable

Switch Management also can detect the problem approximate location and shows up in the Length field.

5. Relay Alarm

Managed Switch offer a relay contact output on Terminal Block of the Switch equipment. It is able to connect to a light, buzzer ...etc. warning device and notify system failures immediately.

We also offer the web tool to configure the relay manually. It's convenient for you to enable/disable relay warnings since the Switch equipments are far from you.

► Relay Output

This function enables you to configure the relay warnings of Power, Link Lose and Communication Lose.

▪ Relay Output

System Relay Alarm	ON (1)		Disable All <input type="checkbox"/>	
Power Relay Enable	Power 1 <input checked="" type="checkbox"/>	Power 2 <input type="checkbox"/>	Enable All <input type="checkbox"/>	

Relay Enable	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8
Link Lose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication Lose	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

System Relay Alarm

When alarm occurred, the relay output on the Terminal Block is activated, and System Relay Alarm is turned ON.

Power Relay Enable

Managed Switch support dual power inputs to implement the power redundancy, and also support two relay configurations for those two power inputs.

You can tick the “Power1” or “Power2” checkbox to enable the power relay. If power failures occur, system relay will be activated.

Link Lose

Set relay active if port disconnected, such as, no cable connected; cable break; opposing device fail.

Communication Lose

Set relay active if port of the ring pair disconnected.

► Email Setting

User can select “Disable Alarm Mail” to stop the email alarm sending (factory default).

If email alarm is enabled, there are two methods of email report for you select.

The first one is: warning mail is sent immediately when events occur.

The second is: user can specify the interval time between 1 to 99 hour(s), and system will sending the system report by email every the specified hour(s).

▪ **Email Setting**

Disable Alarm Mail.
 Resend time(s) when alarm events occur.
 Frequency System Events mail report. INTERVAL : Hour(s).

Mail Server IP	<input type="text" value="192.168.1.101"/>
Sender	<input type="text" value="sender@icpdas.com"/>
Receiver	1. <input type="text" value="receiver1@icpdas.com"/>
	2. <input type="text" value="receiver2@icpdas.com"/>
	3. <input type="text"/>
	4. <input type="text"/>
	5. <input type="text"/>

Before active email sending, you have to finish following settings.

- Mail Server IP** *IP address of mail server*
- Sender** Specify the email address of sender.
- Receiver.** Specify the email address that you wish to notify.

After finishing and activating above setting, the “Send Test Mail” button will show up. You can click the button to check if the settings are correct.

NOTE!!

Please be sure the MASK and GATEWAY are properly configured. Otherwise, it may cause the email sending fault.

► Email Record

Switch Management can keep the sending date, time and status of each warning emails.

But only the latest 50 sending records will be saved.

User can click the “Clean Record Table” button to delete all the email sending history.

▪ Email Records

Index	Mail Date Time	Status
1	08-04-17 13:46	succeed
2	08-04-17 13:57	succeed
3	08-04-17 13:58	succeed
4	08-04-18 09:38	succeed
5	08-04-18 09:40	succeed

7. VLAN

Virtual LANs (VLAN) allows you to setting logical groups of devices, even they are not located on the same physical segment. The logical group called a VLAN, all devices belong to the VLAN has the same network attributes, and it's isolated from the other network logically. A VLAN provides higher communication security, and makes you to limit traffic flooding easily.

► VLAN Mode

▪ Virtual LAN Setting

Vlan Mode	<input checked="" type="radio"/> Port Based VLAN
	<input type="radio"/> 802.1Q Check Mode <input style="font-size: small; border: 1px solid gray; padding: 0 2px;" type="button" value="?"/>
	<input type="radio"/> 802.1Q Secure Mode <input style="font-size: small; border: 1px solid gray; padding: 0 2px;" type="button" value="?"/>
<input type="button" value="SUBMIT"/>	

Port Based VLAN

The frames which arrive at specified ports belong to the same VLAN.

802.1Q Check Mode

Set mode to 802.1Q VLAN. Forward Ingress frames that frames aren't the VLAN member, but discard ingress frame which VID is unrecognized.

802.1Q Secure Mode

Set mode to 802.1Q VLAN. Discard Ingress frames that frames aren't the VLAN member and VID is unrecognized.

► Port based VLANs

In this function, user can determine the output ports which this input port can send frames to.

▪ Port Based setting

Port / Egress Enable	1	2	3	4	5	6	7	8
Port 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Port 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port 3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port 6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Port 7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Port 8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

For example, in above figure, only the ingress come from Port 4 and Port 8 can be send out from Port 1.

► 802.1Q VLANs

If the 802.1Q VLAN Mode is enabled, you have to specify the VLAN groups to restrict the ingress and egress.

Switch Management supports the different VID setting up to 64 in max. If the rules of the setting have conflict, the smaller number of VID has the higher priority.

▪ Membership and Egress Tagging

VID	Egress Policy								operation		
	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8	Add	Edit	Del
	unmodified	unmodified	unmodified	unmodified	unmodified	unmodified	unmodified	unmodified			
4	unmodified	Disable	unmodified	Tagged	unmodified	Untagged	unmodified	unmodified			
9	Untagged	unmodified	Disable	unmodified	unmodified	Tagged	unmodified	unmodified			

VID

Specify the VID number, the valid value is from 1 to 4095. Smaller number has the higher priority.

Egress Policy

There are 4 options of egress tagging used to support 802.1Q VLAN.

Unmodified : port is a member of this VLAN and egress frames are unmodified.

Disable : Ingress frames with this VID or the default VID are discarded.

Untagged : port is a member of this VLAN and egress frames are untagged.

Tagged : port is a member of this VLAN and egress frames are tagged.

8. QoS

Quality of Service (QoS) provides different priority to different data flow. It can make you to classify and prioritize data frames.

ICPDAS Managed Switch support 4 classes of services priority queues. This function allows you to determine the QoS tag priority and specify the priority processing scheme.

► QoS Mode

There are two options supported to classify egress frames.

- **Quality of Service (QoS) Setting**

- 8,4,2,1 Weight Fair queuing scheme** : Allow lower priority frames through, a few at a time.
- Strict priority scheme** : Send all high priority frames before any others.

Port	Enable 802.1p Tag Priority	Enable IP ToS/DiffServ	802.1p Tag over ToS/DiffServ	Default Priority
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Normal <input type="button" value="v"/>
<input type="button" value="SETTING"/>				

8,4,2,1 Weight Fair queuing scheme

8,4,2,1 weighting is mapped to 4 priority queues.

In this queuing scheme mode, lower priority frames are transferred only have a slight delay to the higher priority frames.

Strict priority scheme

The frames in the highest priority queue are processed until the queue is empty.

If the highest priority queue occupied all the time, the frames in the lower priority queue may never be served.

802.1p Tag Priority

Enable/Disable specified ports using the 802.1p tag if the frame is tagged.

IP ToS/DiffServ

Enable/Disable specified ports using the TOS (Type of Service) and/or DiffServ (Differentiated Service) field in IPv4 frame.

802.1p Tag over Tos/DiffServ

If <802.1p Tag Priority> and <IP ToS/DiffServ> are both enabled, you have to decide a priority between those two settings.

Enable : Use tag fields for priority mapping when both field types are present.

Disable : Use IP fields for priority mapping when both field type are present.

Default Priority

Specify the port priority of the ingress frames to the priority queues.

➤ **Tag Priority**

Set the tag priority mapping to 4 different egress queues.

▪ **IEEE 802.1p Priority Mapping**

Tag value	Priority
0	Normal <input type="button" value="v"/>
1	Low <input type="button" value="v"/>
2	Low <input type="button" value="v"/>
3	Normal <input type="button" value="v"/>
4	Medium <input type="button" value="v"/>
5	Medium <input type="button" value="v"/>
6	High <input type="button" value="v"/>
7	High <input type="button" value="v"/>

9. Diagnosis

► Ping

In this function, user can input the IP address and click SUMIT button to check if the IP is reachable.

▪ Ping Command

IP Address :	<input type="text"/>
<input type="button" value="SUBMIT"/>	

```
Reply from 10.0.9.254 : bytes=32 time=1 ms
Reply from 10.0.9.254 : bytes=32 time=1 ms
Reply from 10.0.9.254 : bytes=32 time=1 ms
Reply from 10.0.9.254 : bytes=32 time=0ms
Ping statistics for 10.0.9.254 :
Packets: Sent = 4, Received = 4
```

10. Authentication

► Account

There are two levels of authentication are provided in Switch Management: administrator level and user level.

Administrator level allows you to monitor and configure all functions of Switch Management, and the user level is for monitor-only.

Switch Management supports 5 accounts for your setting. The account and password are limited to 8 characters max.. Before click SUBMIT, please make sure the Enable checkbox is ticked, otherwise, the setting will be ignored.

Account management

Account : Maximum 8 characters
 Password : Maximum 8 characters
 [Valid characters can be alphanumeric characters (A-Z,a-z,0-9)]

No.	Account	Password	Verify	Authority	Enable
1	Admin	••••	••••	Admin	On
2	AAA	•••••	•••••	Admin	<input type="checkbox"/>
3	BBB	•••	•••	User	<input type="checkbox"/>
4				Admin	<input type="checkbox"/>
5				Admin	<input type="checkbox"/>

SUBMIT Load Account Default Setting

At the system initial, the default account and password are: **Admin and Admin**.

► Accessible IP

You can set the remote IP address here to filter the illegal access. Only the IP address in following table can be allowed to access Managed Switch.

IP filter Settings

Clean All Setting (You Are From : 10.0.9.35)

No.	Active the rule	From (IP Address)	To (IP Address)
1	<input checked="" type="checkbox"/>	192.169.1.5	192.169.1.10
2	<input type="checkbox"/>		
3	<input type="checkbox"/>		
4	<input type="checkbox"/>		
5	<input type="checkbox"/>		
6	<input type="checkbox"/>		
7	<input type="checkbox"/>		
8	<input type="checkbox"/>		
9	<input type="checkbox"/>		
10	<input type="checkbox"/>		

UPDATE

Before UPDATE the setting, you have to tick the <Active the rule> checkbox, otherwise system will ignore the setting data. You also can click the “Clean All Setting” button to reset the IP filter Table. Since the table is empty, system will allows all hosts to access the Switch.

► Default Setting

This function allows you to clean all settings and load the default value to Switch Management.



Current factory default values are :

Network Setting

IP Address : 192.168.255.1
Gateway : 192.168.0.1
Mask : 255.255.0.0
Modbus Net ID : 1

Serial Port Setting

COM1 :baudrate 115200,8bit,none parity check, 1 stopbit
COM2 :baudrate 115200,8bit,none parity check, 1 stopbit

Redundant Setting

Ring Pair 1 : disabled
Ring Pair 2 : disabled
Protocol : Cyber-Ring Protocol
Ring Coupling : Primary Switch
Recovery Time : 300ms

► Reboot Setting

When you finish the Network Setting, you have to reboot the Switch to activate the value, you can restart the system by clicking following reboot icon.

