DMS-3K

Distributed Monitoring System

Installation & Operation Manual

Document no. 1088-351

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Scope

This manual describes the functions, features, installation, and configuration of DMS-3K. This includes usage of the Web browser interface.

Chapter 1 Product Overview

DMS-3K is an advanced distributed alarm management system that accepts a variety of digital and analog inputs and provides outputs to remote Annunciator displays and other devices used for Alarm Management. The DMS-3K provides advanced communication outputs via serial and Ethernet ports using various non-proprietary protocols. Each DMS-3K product can work as a stand-alone system monitoring up to 128 digital inputs or multiple DMS-3K units can be networked together to form a larger system with all alarms consolidated to a single master unit for common output and display.

Features and Functions

Inputs

Each DMS-3K card rack can accommodate up to 128 digital contact inputs or 32 analog inputs (or combinations of both digital and analog). In addition, there are up to 64 control inputs which can be assigned as functions to test, acknowledge, reset the lamp displays or inhibit specific inputs. Up to 16 card racks can be combined to form a system with maximum capacity of 2,048 digital inputs or 512 analog inputs (or combinations of both).

Outputs

Each DMS-3K card rack can accommodate up to 240 outputs which can consist of relay contacts or solid state outputs. The outputs can be used to drive a remote Annunciator display, retransmit an alarm input or group of inputs, and connect to a horn or other device.

Annunciator Logic

The DMS-3K system has logic to assign how an input or group of inputs drives an output. This is used to assign an input or group of inputs to an Annunciator window, retransmit relay, alarm horn, common alarm relay etc. The logic can be used with AND / OR functions to group multiple inputs to a single output. In addition, you can apply ‘Voting Logic’ which will require scenarios like 2 of 3 or 3 of 4 inputs in alarm before activating an output. The Logic is also used to assign the control pushbuttons (Test, Acknowledge, Reset, etc) to specific groups of inputs. All logic is confined to I/O contained in a single Logic Card Rack.

Sequence of Events Recording (SER)

The DMS-3K provides timestamping of alarms to the millisecond for quick determination of root cause and verification that control systems responded in an appropriate manner. Up to 40,000 events per Logic Card Rack are stored in non-volatile RAM.

Power Supply Options

The DMS-3K logic card rack has a built in power supply regulator for 24VDC and 48VDC power inputs. These regulators can provide a non-isolated 24 VDC or 48 VDC field contact voltage for wetting the ‘dry’ field contact inputs. The regulators can also connect to an isolated external field contact voltage supply of 24, 48 or 125 VDC for distribution to field inputs. Other input power options (125VDC, 120/240VAC) are available through external power supplies which can be provided in a redundant fashion, or different voltages for the Primary Power and Back Up Power.

Time Synchronization

The DMS-3K can be synchronized externally via IRIG-B and NTP time formats. This is used for applying a time stamp to the digital and analog inputs synchronized to real time via GPS synchronized time clocks.

Communications

Each DMS-3K unit has a built-in RS-232/485 Serial Port (DB9) and RJ45 Ethernet Port. The ports can be used to retransmit the alarm status to other devices using Modbus, DNP or ASCII Protocols. In addition, the multi-user Ethernet port can be used for time sync, networking multiple card racks together to form a system and connect to a web browser for configuration and display of alarms and events.

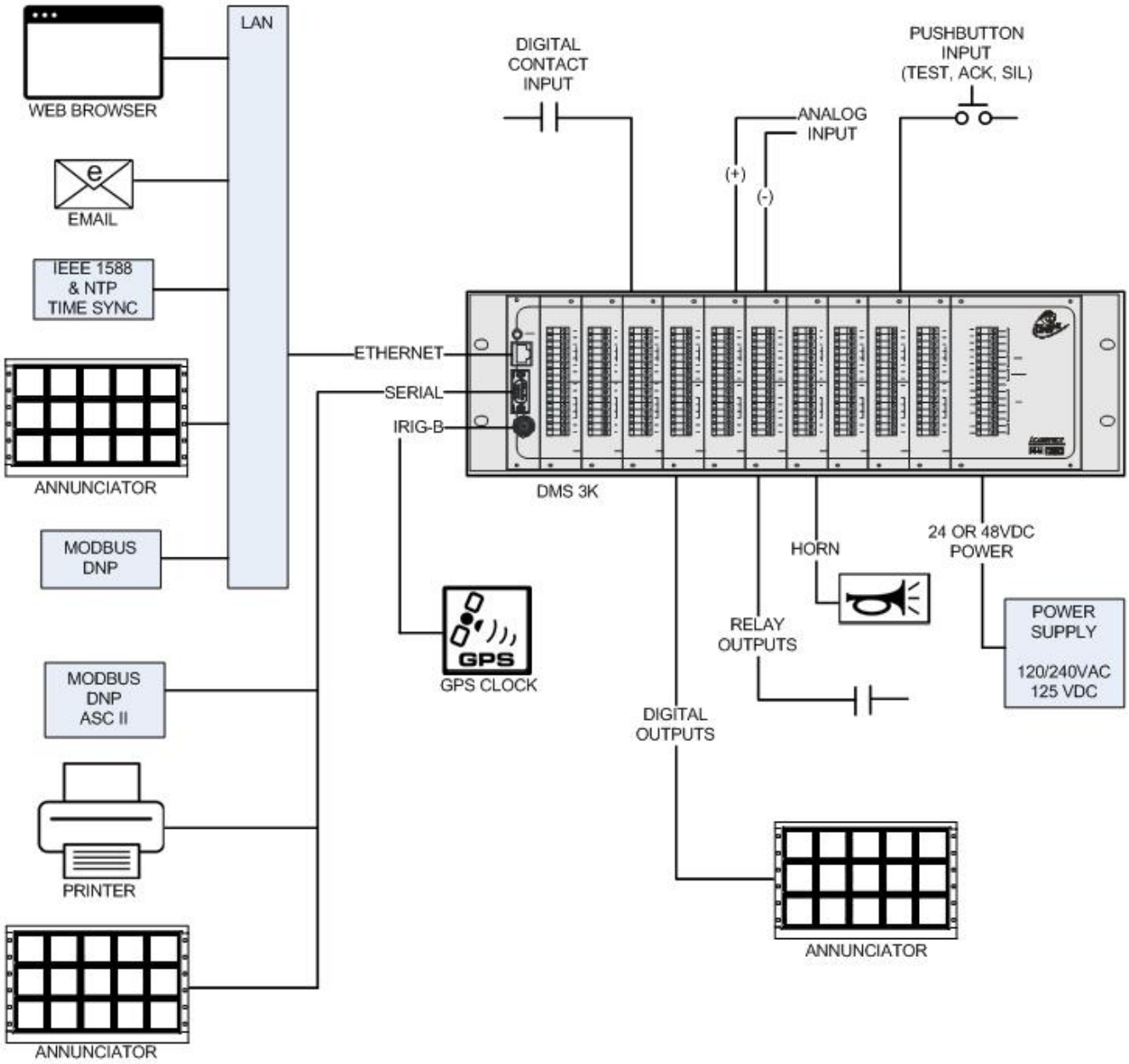
System Configuration

The DMS-3K System is configured using a WEB Browser connected to the CPU Ethernet Port. The PC with WEB Browser (Internet Explorer, Mozilla Firefox, etc) can be connected directly to the DMS-3K CPU or via the LAN where the DMS-3K is installed. The DMS-3K I/O Modules have switches or jumpers for some configuration items. The configuration is flexible so that any single input or group of inputs can operate any number of outputs configured as lamp outputs (for remote Annunciator Display), Alarm Relay Outputs, Horn Outputs, etc. In addition, inputs can be retransmitted using Modbus and DNP protocols.

Alarm Display and Notification

The DMS-3K WEB Browser will display the alarms as they occur graphically using an ‘Annunciator style’ display and in list format showing the alarm details and timestamp. The DMS can also generate an email for selected alarms.

DMS 3K SYSTEM ARCHITECTURE



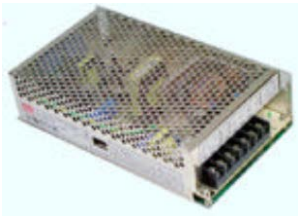
DMS 3K System Components

The DMS-3K System Components consist of:

- Logic Card Racks – Holds I/O modules, CPU and Power Supply
- Power Supplies – Internal and external power supply combinations
- CPU – Used for system configuration, Annunciator Logic, communications
- I/O Modules – Modules that accept digital and analog inputs and provide solid state and relay contact outputs
- Annunciator Displays – Remote mounted displays that connect to logic card racks

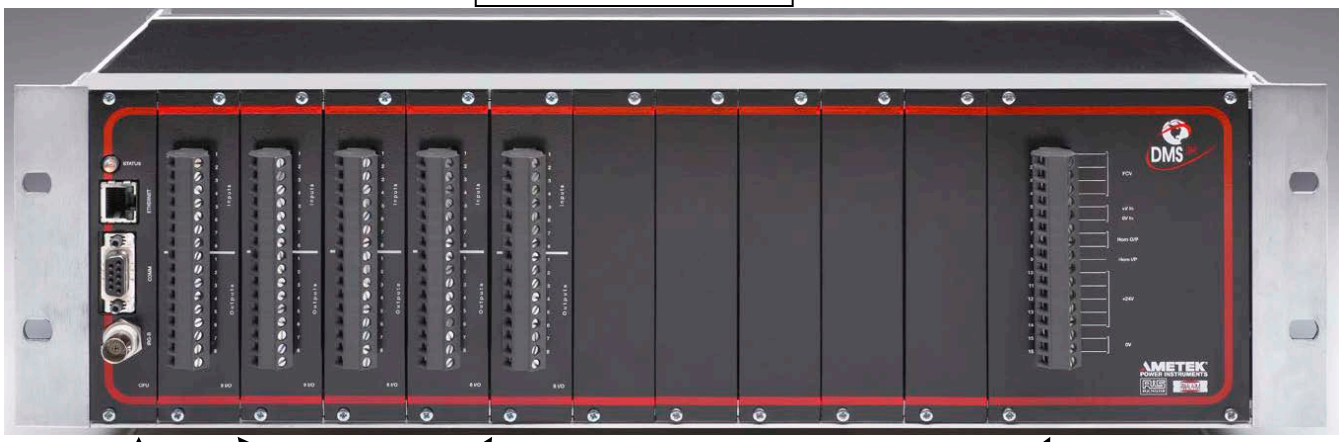
The quantity of card racks, modules and displays is configurable to the application and defined in the model number.

External Power Supply



Annunciator Display

Logic Card Rack



CPU

I/O Modules

Power Supply Regulator

Logic Card Racks

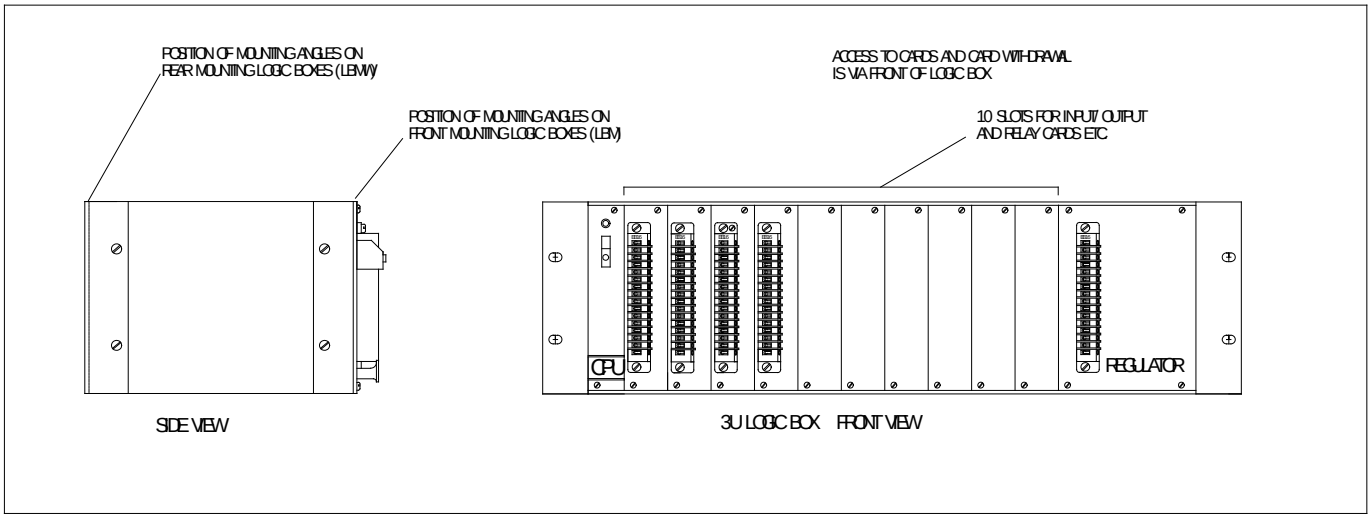
The DMS-3K I/O is housed in a 3U card rack (type LBM or LBW) that can accept up to 10 I/O modules or a 6U card rack (type LB2M or LB2W) that can accept 23 I/O Modules. Each Card Rack has it's own CPU and Power Supply.

LOGIC BOX: Type LBM OR LBMW

This is a standard 19"- 3U single euro-crate which will house the CPU and REG units plus 10 usable slots for input/output modules. The mounting angles are easily moveable to give front or rear mounting.

LBM - 3U Front Mounting

LBMW - 3U Rear (Wall) Mounting



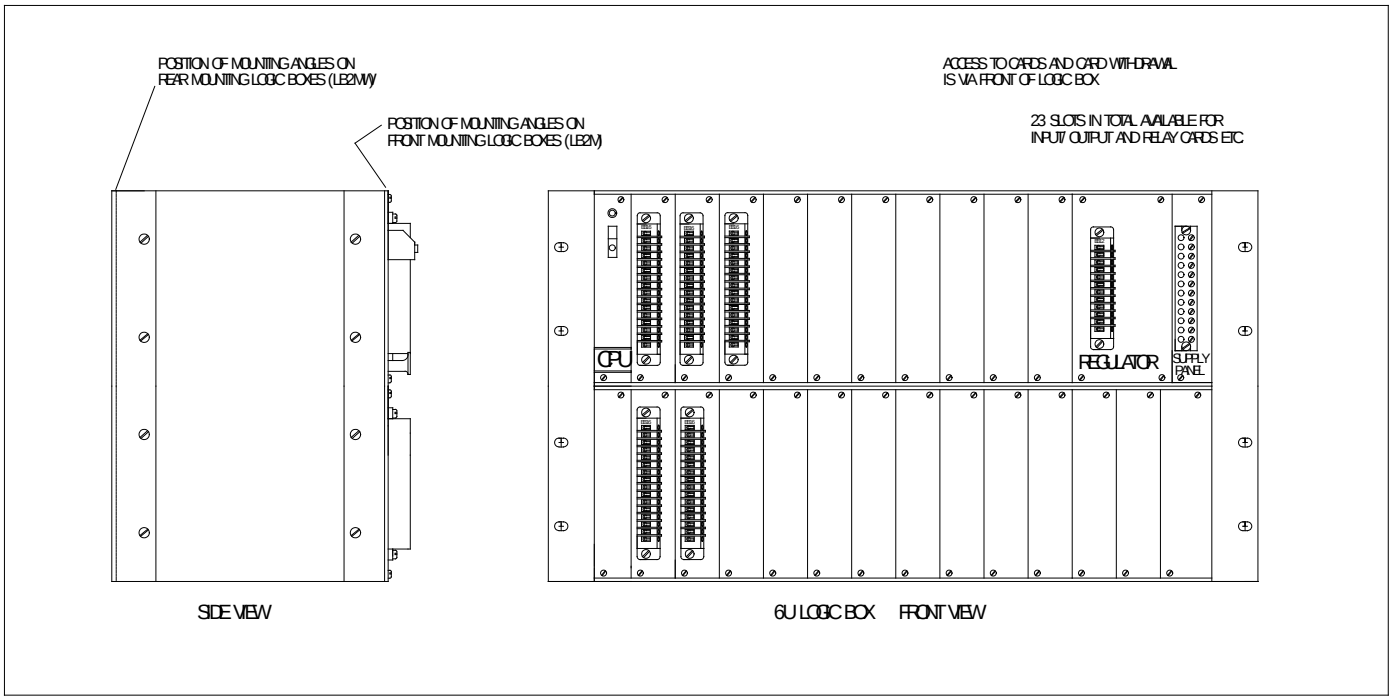
NOTE: Both types can be 19" rack mounted so that terminals / card withdrawal is either outwards or inwards to cubicle.

LOGIC BOX: Type LB2M OR LB2MW

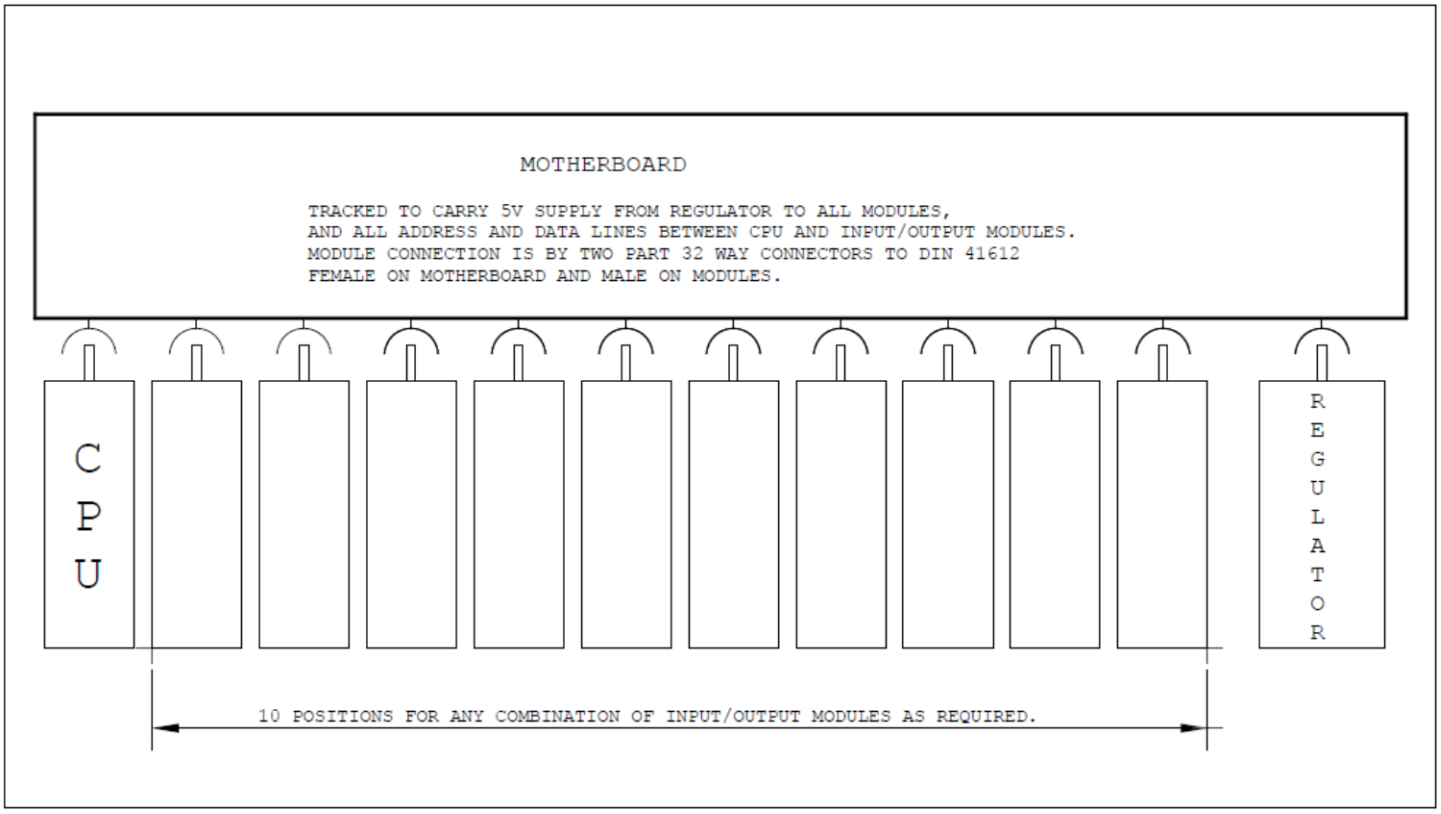
This is a standard 19"- 6U double euro-crate which will house the CPU and REG units plus 23 usable slots for input/output boards. The mounting angles are easily moveable to give front or rear mounting.

LB2M - 6U Front Mounting

LB2MW - 6U Rear (Wall) Mounting



Logic Box Diagram



Power Supply Regulators

Power Supply Regulators are used for direct power inputs of 24 or 48VDC. In systems with 120/240VAC and 125VDC Power Input, an external power supply is required to provide a 24 VDC output to the Power Supply Regulator. The Power Supply Regulators may be used to provide an internal Field Contact Voltage of 24 or 48 VDC or accept an external isolated customer supplied field contact voltage of 24, 48 or 125 VDC. The field contact voltage is bussed to several terminals for connection to the field inputs. The Power Supply Regulator also provides an internal horn relay which is driven from a digital output (8 I/O or 16 O Module) assigned as a horn output. In systems with external Annunciator Displays, the Power Supply Regulator provides a 24V Supply for the Annunciator Lamps (LED's). The Power Supply Regulators may have a suffix of A depending on the version. Ex. REG-90A

The different types of Power Supply Regulators are shown below:

REGULATOR Type REG-90 and REG-91

This unit is used in 3U logic boxes where the system supply is 24V DC.

It provides the 5V supply necessary for the 10 usable slots plus the CPU, which equates to 128 inputs and 160 outputs maximum.

An auxiliary horn relay is mounted within.

REG-90 (STANDARD) Intended for use where the initiating contacts are being powered from the 24 V supply voltage.

REG-91 (ISOLATED) Intended for use where the initiating contacts are being powered from a supply other than the system supply. This isolated supply would be connected to "+VIN" and "OV IN" terminals.

All connections to the above units are by screw type terminals.

REGULATOR Type REG-92 and REG-93

This unit is used in 6U logic boxes where the system supply is 24V DC.

It provides the 5V supply necessary for the 23 usable slots plus the CPU which equates to 128 inputs and 240 outputs including auxiliary cards to box capacity. Otherwise they are generally as per REG-90/91.

REG-92 - (STANDARD)

REG-93 - (ISOLATED)

REGULATOR Type REG-96 and REG-97

This unit is used in 3U logic boxes where the system supply is 48V DC.

It provides the 5V supply necessary for the 10 usable slots plus the CPU, which equates to 128 inputs and 160 outputs maximum.

An auxiliary horn relay is mounted within.

REG-96 (STANDARD) Intended for use where the initiating contacts are being powered from the 48 V supply voltage.

REG-97 (ISOLATED) Intended for use where the initiating contacts are being powered from a supply other than the system supply. This isolated supply would be connected to "+VIN" and “OV IN” terminals.

All connections to the above units are by screw type terminals.

REGULATOR Type REG-94 and REG-95

This unit is used in 6U logic boxes where the system supply is 48V DC.

It provides the 5V supply necessary for the 23 usable slots plus the CPU which equates to 128 inputs and 240 outputs including auxiliary cards to box capacity. Otherwise they are generally as per REG-96/97.

REG-94 - (STANDARD)

REG-95 - (ISOLATED)

CPU-200

The CPU is used to configure the system and provide serial and Ethernet outputs for real time alarm status. The CPU has a 9 pin D connector for serial communications, RJ45 port for Ethernet communications, BNC connector for IRG-B time synchronization and a LED for system status. The serial port is used for real time alarm outputs using Modbus, DNP or ASCII outputs depending on the application. The Ethernet port is used for configuring the unit using any standard web browser. The Ethernet port is also used for real time alarm outputs using Modbus TCP/IP and DNP outputs. The Ethernet Port can be used for external time synchronization using NTP time formats.

I/O Modules

The DMS-3K System can support a variety of I/O Modules:

8 I/O 8 digital inputs and 8 solid state outputs

16 I 16 digital inputs

16O 16 solid state outputs

8RR 8 relay contact outputs

16RR 16 relay contact outputs

5PR 5 relay contact outputs

8PR 8 relay contact outputs

I/R 4 digital inputs and 6 relay contact outputs

8 IAM 8 analog inputs (4-20mA)

8 I/O Module

This module accepts 8 digital contact inputs and provides 8 digital solid state outputs. The digital inputs can use field contact voltages of 24, 48 or 125VDC. The field contact voltage can be provided internally via the power supply regulator or externally supplied by the customer. Digital Inputs can be Field Contacts, Control Pushbuttons (Ack, Test, Reset, etc), as assigned via the web browser. Digital Outputs can be configured as Lamp Outputs (for remote Annunciator display) or Horn Outputs (for direct connection to low power audible devices or to the Regulator Module Horn Input to drive external high power devices).

The variations available are:

8 I/O Module	**Inputs**
8 I/O 90	24 VDC FCV, Internally
8 I/O 91	24 VDC FCV, Externally
8 I/O 92	48 VDC FCV, Externally
8 I/O 95	125VDC FCV, Externally

The Modules may have a suffix of A or B depending on the version. Ex. 8I/O 90B

16 I Module

This module accepts 16 digital contact inputs using field contact voltages of 24, 48 or 125VDC. The field contact voltage can be provided internally via the power supply regulator or externally supplied by the customer. Digital Inputs can be Field Contacts, Control Pushbuttons (Ack, Test, Reset, etc) as assigned via the web browser.

The variations available are:

16I Module Type	Inputs
16I 90	24 VDC FCV, Internally Supplied
16I 91	24 VDC FCV, Externally Supplied
16I 92	48 VDC FCV, Externally Supplied
16I 95	125VDC FCV, Externally Supplied
16I 96	24VDC FCV, Externally Supplied (IDC connector input)
16I 98	48VDC FCV, Externally Supplied (IDC connector input)
16I 125	125VDC FCV, Externally Supplied (IDC connector input)

(Modules may have a suffix of A or B depending on the version. Ex. 16I 90A)

16 O Module

This module provides 16 solid state digital outputs. Digital Outputs can be configured as Lamp Outputs (for remote Annunciator display) or Horn Outputs (for connection direct connection to low power audible devices or to the Regulator Module Horn Input to drive external high power devices). The variations available are:

16O Module	Connection Type
16O-90	Screw Terminal
16O-91	IDC Connector

8 RR Module

This module provides 8 Form A or Form B Reed Relay Outputs. Reed Relay Outputs can be configured as Retransmit Relay Outputs (to retransmit the status of the alarm input), Horn Outputs, Alarm Outputs, Reflash Outputs, etc via the WEB Browser.

The different variations are:

8RR Module	Output Type
8RR-90	Form A (Normally Open)
8RR-91	Form B (Normally Closed)

16 RR Module

This module provides 16 Form A or Form B Reed Relay Outputs. Reed Relay Outputs can be configured as Retransmit Relay Outputs (to retransmit the status of the alarm input), Horn Outputs, Alarm Outputs, Reflash Outputs, etc via the WEB Browser.

The different variations are:

16RR Module	Output Type
16RR-90	Form A (Normally Open)
16RR-91	Form B (Normally Closed)

PR Module

These modules provide 5 or 8 Relay Outputs. Relay Outputs can be configured as Horn Outputs, Alarm Outputs, Reflash Outputs, etc via the WEB Browser.

The different variations are:

5PR Module (5 Relay Outputs)	Module Type
5PR-90	24V Systems
5PR-91	48V Systems

8PR Module (8 Relay Outputs)	Module Type
8PR-90	24V Systems
8PR-91	48V Systems

(Modules may have a suffix of A or B depending on the version. Ex. 5PR-90A)

I/R Module

This module accepts 4 digital contact inputs and provides 6 Form A Relay Outputs. The digital inputs can use field contact voltages of 24, 48 or 125VDC. The field contact voltage can be provided internally via the power supply regulator or externally supplied by the customer. Digital Inputs can be Field Contacts, Control Pushbuttons (Ack, Test, Reset, etc) as assigned via the web browser. Relay Outputs can be configured as Horn Outputs, Alarm Outputs, Reflash Outputs, etc via the WEB Browser.

The different variations are:

I/R Module	Field Contact Voltage
I/R 90	24 VDC (Internal)
I/R 91	48 VDC (External)
I/R 93	48 VDC (Internal)

8 IAM Module

This module can accept 8 Analog Inputs (4-20mA). The inputs require an external 24VDC power supply for use in 2 wire systems. Each analog input is configured for up to 4 trip points which can be used to drive lamp outputs, alarm relays and horns. Connection is by screw type terminals (1.5mm², 16 AWG max.).

Annunciator Displays

The DMS-3K System can be connected to a remote Annunciator Display(s) using several methods:

-Solid State Lamp Outputs

In this configuration, the DMS would provide solid state outputs (8 I/O or 16O modules) that would be cabled to a remote Annunciator Display. The lamp outputs would be configured to follow a operating sequence and respond to pushbutton controls. Outputs can be directly wired to the display in multi-conductor cables. The cables are either connected directly to the output module terminal blocks or with a plug-in connector arrangement.

The following Annunciator Displays are compatible with the DMS-3K Lamp Outputs:

- AN-3100D-LC / Series 90A-LC
  This display can be configured in cell configurations up to 13 rows high by 13 columns wide (max 169 cells) and each cell has 4 window sizes available: Quad 1.5H x 1.5W", Triple 1.0H x 3.0W", Dual 1.5H x 3.0W", Single 3.0H x 3.0W". Customer connections can be made using a plug-in connector or directly to 'barrier' style terminal blocks. The display comes with LED lamps as standard.

- AN-6150
  This display can be configured in cell configurations up to 6 rows high by 6 columns wide (max 36 cells) and each cell has 4 window sizes available: Small 0.98H x 1.14W", Medium 0.98W x 2.40H", Large 2.13H x 2.40W", Extra large 2.13H x 4.96W". It can support a maximum of 288 windows. Customer connections can be made using a plug-in connector or directly to 'barrier' style terminal blocks. The display comes with incandescent bulbs as standard and can be upgraded with LED replacements.

- AN-5131
  This display can be configured in cell configurations up to 10 rows high by 10 columns wide (max 100 cells) and each cell has 4 window sizes available: Quad 0.38H x 2.85W", Triple 1.11H x 2.85W", Dual 1.67H x 2.85W", Single 3.34H x 2.85W". Customer connections can be made using a plug-in connector or directly to 'barrier' style terminal blocks. The display comes with incandescent bulbs as standard and can be upgraded with LED replacements.

-Modbus Communication Outputs to Annunciator

In this configuration, the DMS-3K System uses either Serial (RS-232/485) or Ethernet communications with Modbus TCP/IP Protocol to transmit alarm inputs to a remote Annunciator. The Modbus configuration allows you to map individual or groups of alarm inputs to the Modbus Outputs up to the maximum 128 Modbus outputs. The communication outputs are provided on the system CPU and use either a DB9 or RJ45 connector.

The following Annunciators are compatible with the communication lamp outputs:

- AN-3100D / Series 90A
  This display can be configured in cell configurations up to 13 rows high by 13 columns wide and each cell has 4 window sizes available: Quad 1.5H x 1.5W", Triple 1.0H x 3.0W", Dual 1.5H x 3.0W", Single 3.0H x 3.0W". There is a maximum of 50 cells in any Annunciator. Customer connections can be made using a DB9 or RJ45. The display comes with LED lamps as standard.

- AN-6100C / Series 100
  This display can be configured in cell configurations up to 5 rows high by 5 columns wide (max 25 cells) and each cell has 4 window sizes available: Small 0.98H x 1.14W", Medium 0.98W x 2.40H", Large 2.13H x 2.40W", Extra large 2.13H x 4.96W". Customer connections can be made using a DB9 or RJ45. The display comes with LED lamps as standard.

Model Number Codes / Ordering Information

Code	Logic Card Rack
SR	Single Chassis Rack (3U) - 19" Rack Mount [10 I/O Card Slots]
SP	Single Chassis Rack (3U) - Panel Mount [10 I/O Card Slots]
DR	Dual Chassis Rack (6U) - 19" Rack Mount [23 I/O Card Slots]
DP	Dual Chassis Rack (6U) - Panel Mount [23 I/O Card Slots]

Code	Prime Power
A	230 VAC Power, 24 VDC FCV
A1	230 VAC Power, 48/125 VDC FCV
C	125 VDC Power, 125 VDC FCV
C1	125 VDC Power, 48/125 VDC FCV
B	115 VAC Power, 24 VDC FCV
B1	115 VAC Power, 48/125 VDC FCV
H	250 VDC Power, 24/48 VDC FCV
H1	250 VDC Power, 48 VDC FCV
E	48 VDC Power, 24 VDC FCV
E1	48 VDC Power, 48/125 VDC FCV
F	24 VDC Power, 24 VDC FCV
F1	24 VDC Power, 48/125 VDC FCV

Code	Field Contact Voltage
X	24 VDC FCV (AMETEK Supplied)
T	48 VDC FCV (AMETEK Supplied)
D	125 VDC FCV (AMETEK Supplied)
CS24	24 VDC FCV Customer Supplied)
CS48	48 VDC FCV Customer Supplied)
CS125	125 VDC FCV Customer Supplied)

Code	I/O Module Type	
A	8 I/O 8 Input/Output, screw terminal (DC FCV only)	
B	16 I 16 Input, screw terminal (DC FCV only)	
C	16I 16 Input, ribbon cable (DC FCV only)	
D	8IAM 8 Analog Input, screw terminal (4-20mA)	
E	I/R 4 Input / 6 Form C Relay Output, screw terminal	Select a Qty for each Module Type:
F	16O 16 Output, screw terminal, NPN sink	
G	16O 16 Output, ribbon cable, NPN sink	
H	8RR 8 Output (reed relay), screw terminal, Form A	Example:
I	8RR 8 Output (reed relay), screw terminal, Form B	8A
J	16RR 16 Output (reed relay), ribbon cable, Form A	4B/4F/1L
K	16RR 16 Output (reed relay), ribbon cable, Form B.	4A/1E
L	5PR 5 Output power relay, screw terminal	
M	8PR 8 Output power relay, screw terminal	
N	8IRM 8 RTD Input (100 ohm Platinum), screw terminal	
O	8ITM 8 T/C Input (J, K, T, R, S), screw terminal	

Code	Operational Sequence
A, A4, M, R, R-12, F1A, F3A, F2M-1, FFAM2 (select one or use IMO option for multiple)	
IMO	Multiple Sequences, provide matrix

Code	Display Cables	
NR	No Display Cables	
PT	Point to Point pig tail, 32 inputs/cable	Indicate qty of cables, type of cable and length Ex. 4PT25 , 2SC15
STY	Integral plug connector, 32 inputs/cable	
SC	RS-232/485 Serial Cable	

Code	Control Pushbuttons
CS	Customer Supplied (Test, Ack, Sil, Reset)
DC	Pushbuttons on Display (Test, Ack, Sil, Reset)

Code	Options
All systems include an RS-232/485 serial port and RJ45 Ethernet port that can operate with the protocols below. A WEB Browser is provided for system configuration.	
WEB	WEB display of Active Alarms and Events
IB	IRIG-B Time Sync
NTP	NTP Time Sync
1588	IEEE 1588 Time Sync
EM	Email on alarm
MB	Modbus Protocol RTU, TCP/IP(Master/Slave)
DNP	DNP Protocol (Slave)
ASC	ASCII Protocol
BAC	BACnet Protocol
CR	Combine up to 16 Racks in a system *This option is only required on one rack/system*

Sample Model Number

DMS-3K-SR-B-X-1A/4B/4F/1L-A-2SC20-CS-IB/WEB//CR/MB	
SR	Single Chassis Rack (3U) - 19" Rack Mount [10 I/O Card Slots]
B	115 VAC Power, 24 VDC FCV
X	24 VDC FCV (AMETEK Supplied)
1A/4B/4F/1L	(1) 8 Input/Output, screw terminal (DC FCV only) (4) 16 Input, screw terminal (DC FCV only) (4) 16 Output, screw terminal, NPN sink (1) 5 Output power relay, screw terminal
A	Sequence A
2SC20	(2) RS-232/485 Serial Cable, 20FT
CS	Customer Supplied (Test, Ack, Sil, Reset)
IB/WEB/CR/MB	IRIG-B Time Sync WEB Based Alarm Display Combined System – Up to 16 Logic Card Racks in one System Modbus RTU, TCP/IP, Master/Slave

DMS-3K System Configuration

Each DMS-3K system is provided with a system configuration sheet that indicates the model number for each Card Rack in the system, the type of I/O and Power Supply Regulator Cards provided and the location in each card rack. The Input and Output number assignments are also provided to assist with the WEB Browser Configuration.

DMS-3K Card Rack

3 U Card Rack (slots 1-10)		CPU	SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10	Power Supply Regulator		
6 U Card Rack (slots 1-23)			SLOT 11	SLOT 12	SLOT 13	SLOT 14	SLOT 15	SLOT 16	SLOT 17	SLOT 18	SLOT 19	SLOT 20	SLOT 21	SLOT 22	SLOT 23

DMS-3K System Configuration Sheet

DMS-3K-SR-B-X-1A/4B/4F/1L-A-2SC20-CS-IB/WEB/CR/MB				
1	Card Slot #	Module Type	Input #	Output #
Single Chassis Rack (3U)	1	16 I	1-16	
	2	16 I	17-32	
	3	16 I	33-48	
	4	16 I	49-64	
	5	16 O		1-16
	6	16 O		17-32
	7	16 O		33-48
	8	16 O		49-64
	9	5 PR		65-69
	10	8 I/O	129-136	129-136
Dual Chassis Rack (6U)	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			
	21			
	22			
	23			
Power Supply Regulator			REG-90B	

Approvals

Chapter 2. Installation & Setup

Safety and Agency Approvals

DMS-3K models are CE certified for operation under the following conditions:

Indoor Use

Altitude:	Up to 2000 m
Operating Temperature:	–20 to 60 ˚C (–4 to 140 ˚F)
Relative Humidity:	20 – 95 % non-condensing
Transient Over-Voltages	2500 V (Installation or Measurement Category II)
Pollution Degree	2
Equipment Category	Permanently Connected
Operating Voltage Ranges	120/240 Vac, 50/60 Hz 125 Vdc 24 Vdc

WARNING – To comply with the electrical safety requirements, use of a 125V dc Field Contact Voltage is only permitted as shown in the table below:

Safety requirements table when using 125V dc Field Contact Voltage (FCV)	
Field Contact Voltage derived from	**125 V FCV Permitted**
Station Battery (not subject to voltage transients)	Yes
Mains Power supply (mains voltage below 150V)	Yes
Mains Power supply (mains voltage above 150V)	No

Installation and start-up must be performed by trained and qualified personnel. If the unit is not installed and operated as specified, the protection provided by the unit may be impaired.

Before start-up it is important to ensure that:

- The unit can be powered down by a switch, or a circuit breaker, clearly marked as the disconnecting device for the unit. The maximum rating of the disconnecting device is 20 A.
- The disconnecting device is located in close proximity to the unit.
- The equipment is not in a position so that it is difficult to operate the disconnecting device.
- The protective earth terminal is properly connected to protective earth ground.
- The Power Supply line(s) have been connected securely and protection is provided against electric shock.
- Symbols

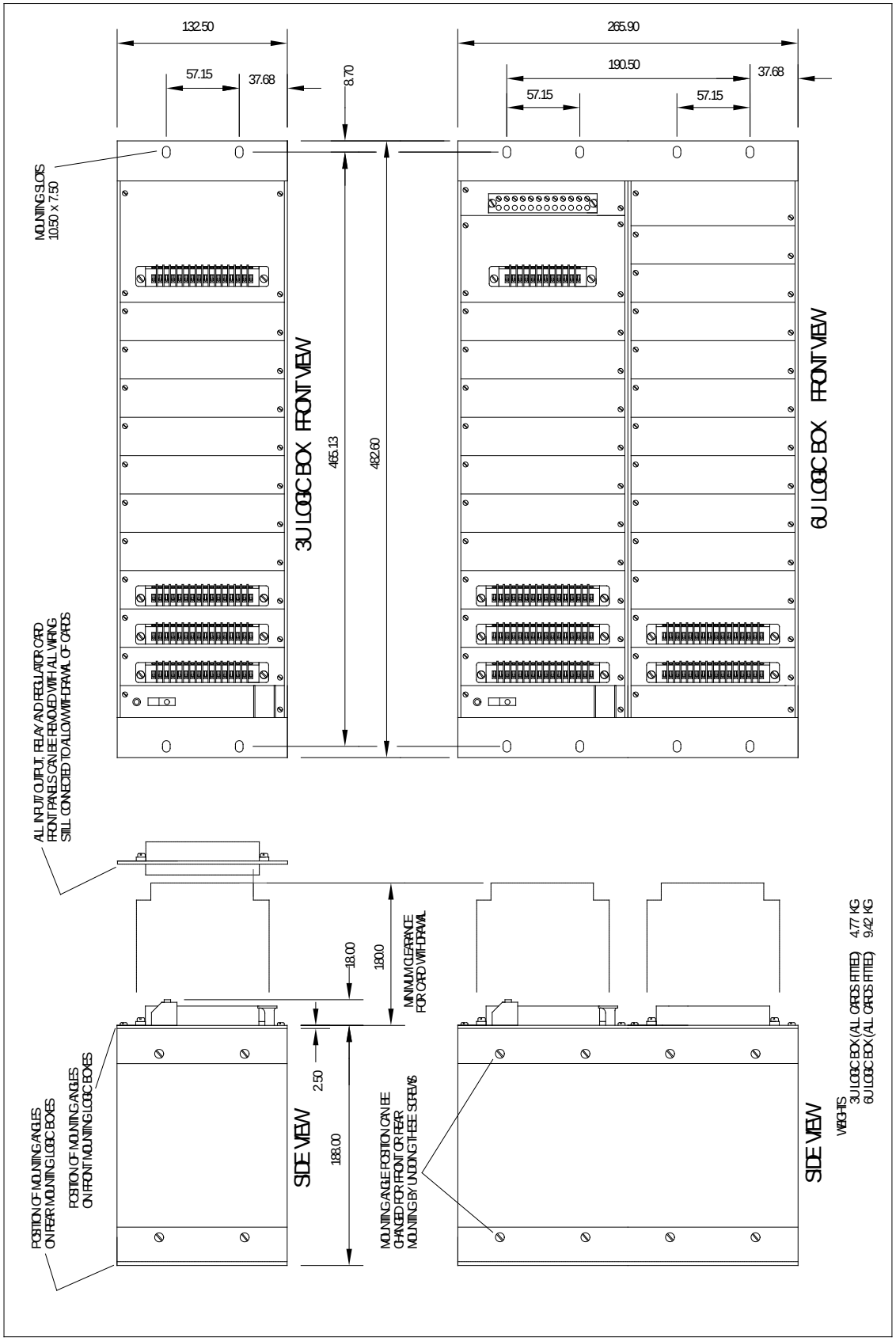
Caution, risk of danger. Refer to the Instruction Manual.

Caution, risk of electric shock.

Protective Earth Conductor Terminal

Mounting

The unit is available in two versions, a 3U Card Rack with 10 Card Positions and a 6U Card Rack with 23 Card Positions.



Wiring

Terminal Blocks

The I/O and Power Supply Regulators use a removable front plate with terminal block for connection to power supplies, field contact voltage, inputs, and outputs. The front plate is fastened with screws to prevent accidental removal. Connection is by screw type terminals (1.5mm², 16 AWG max.)

IDC Connectors

IDC Connectors are used for some output modules. The IDC Connector is a 34 position (2 rows of 17) and is typically used with 34 conductor ribbon cables.

Protective Earth Connection

A Protective Earth Terminal is located on the side of the Logic Card Rack and must be connected to earth ground. For proper EMC protection, this connection should be made using a minimum ¼" braided conductor or 12 AWG copper wire. An optional Earth connection is supplied on the front 19" mounting angle should access to the side connection be prohibitive.

Power Input and Field Contact Voltage

The DMS 3K will accept a 24VDC or 48VDC Power Input directly to the Power Supply Regulator located in the right position of the Card Rack. External Power Supplies are used for other voltages, such as 120/240VAC and 125 VDC. The Regulator is used for distributing voltage to the field contacts and power to the digital outputs installed in the system. In addition, it has a built in 'Horn' Relay which, when connected to a Digital Output, can be used to drive an external High Power Audible device. The regulators used for 6U Card Racks have extra current capacity for driving more digital outputs and more terminals available for distributing field contact voltage.

The following chart shows the different combinations of Power, FCV (Field Contact Voltage) and Power Supplies.

Power Input	Field Contact Voltage (FCV)	Internal or External FCV	Power Supply Regulator
24 VDC	24 VDC	Internal	Reg 90 (3U), Reg 92 (6U)
24 VDC	24 VDC	External	Reg 91 (3U), Reg 93 (6U)
24 VDC	48 VDC	External	Reg 91 (3U), Reg 93 (6U)
24 VDC	125 VDC	External	Reg 91 (3U), Reg 93 (6U)
48 VDC	48 VDC	Internal	Reg 96 (3U), Reg 94 (6U)
48 VDC	24 VDC	External	Reg 97 (3U), Reg 95 (6U)
48 VDC	48 VDC	External	Reg 97 (3U), Reg 95 (6U)
48 VDC	125 VDC	External	Reg 97 (3U), Reg 95 (6U)

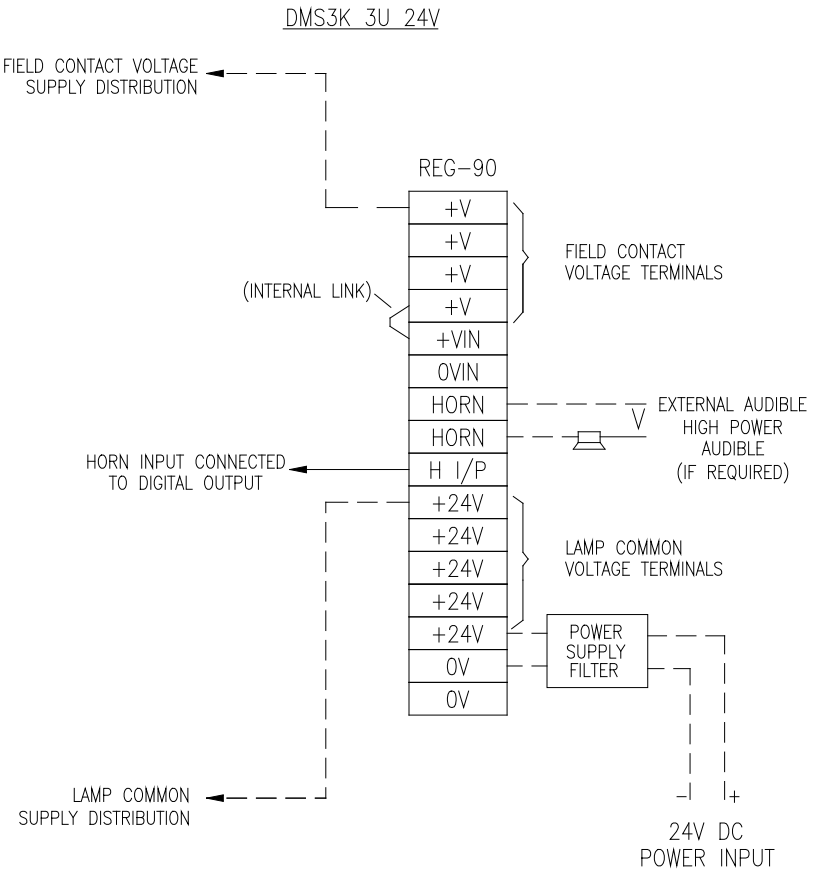
Internal Field Contact Voltage refers to voltage provided by the DMS, External refers to voltages provided remotely to the unit.

*Power Inputs 120/240VAC and 125 VDC will use external power supplies that provide 24 VDC Power to the rack.
(Power Supply Regulators may have a suffix of A depending on the version. Ex. Reg 90A)

Power Supply Regulators – Connection Wiring

REG 90

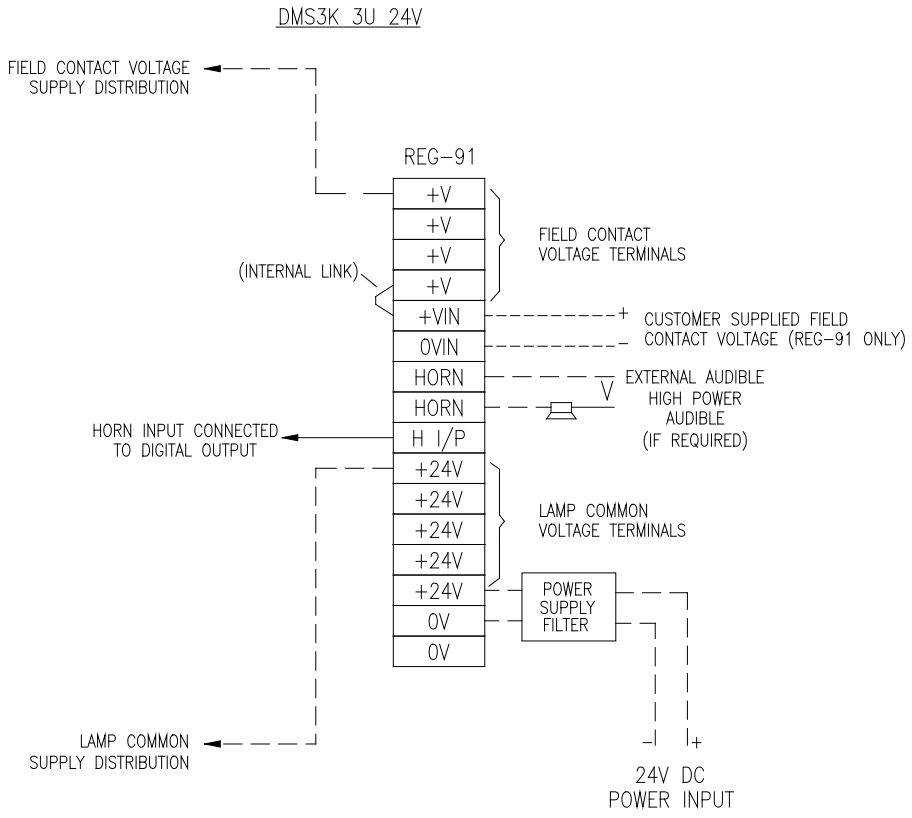
The REG 90 Power Supply Regulator is used for 3U Card Racks with 24 VDC Power and internal 24 VDC Field Contact Voltage. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 24V DC REGULATOR CONNECTION DIAGRAM (3U CRATE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 91

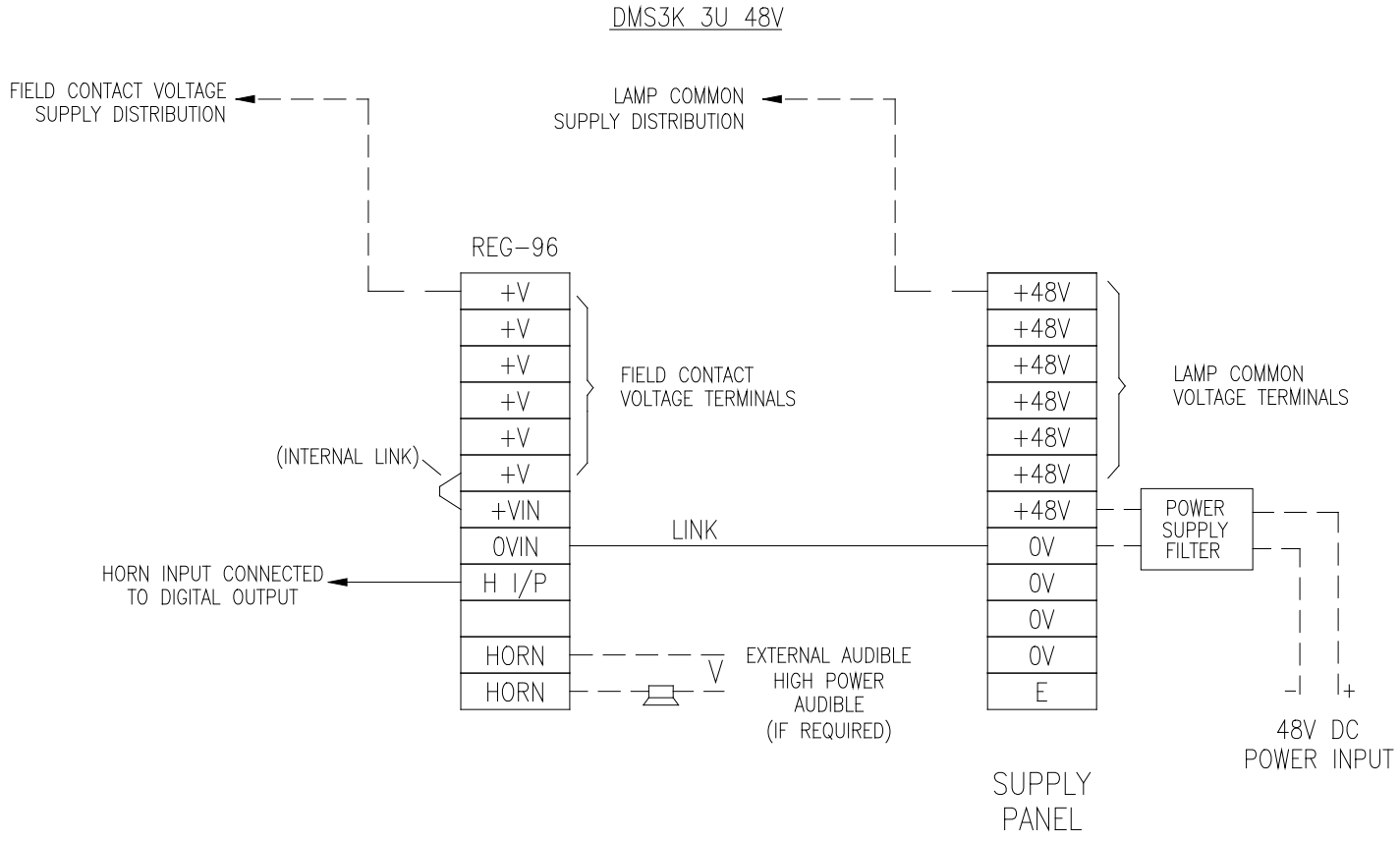
The REG 91 Power Supply Regulator is used for 3U Card Racks with 24 VDC Power and connection for external Field Contact Voltages of 24, 48 or 125VDC. This Field Contact Voltage connection is jumpered to the +V terminals for distribution to the field contacts. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 24V DC REGULATOR CONNECTION DIAGRAM (3U CRATE)
(CUSTOMER SUPPLIED FIELD CONTACT VOLTAGE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 96

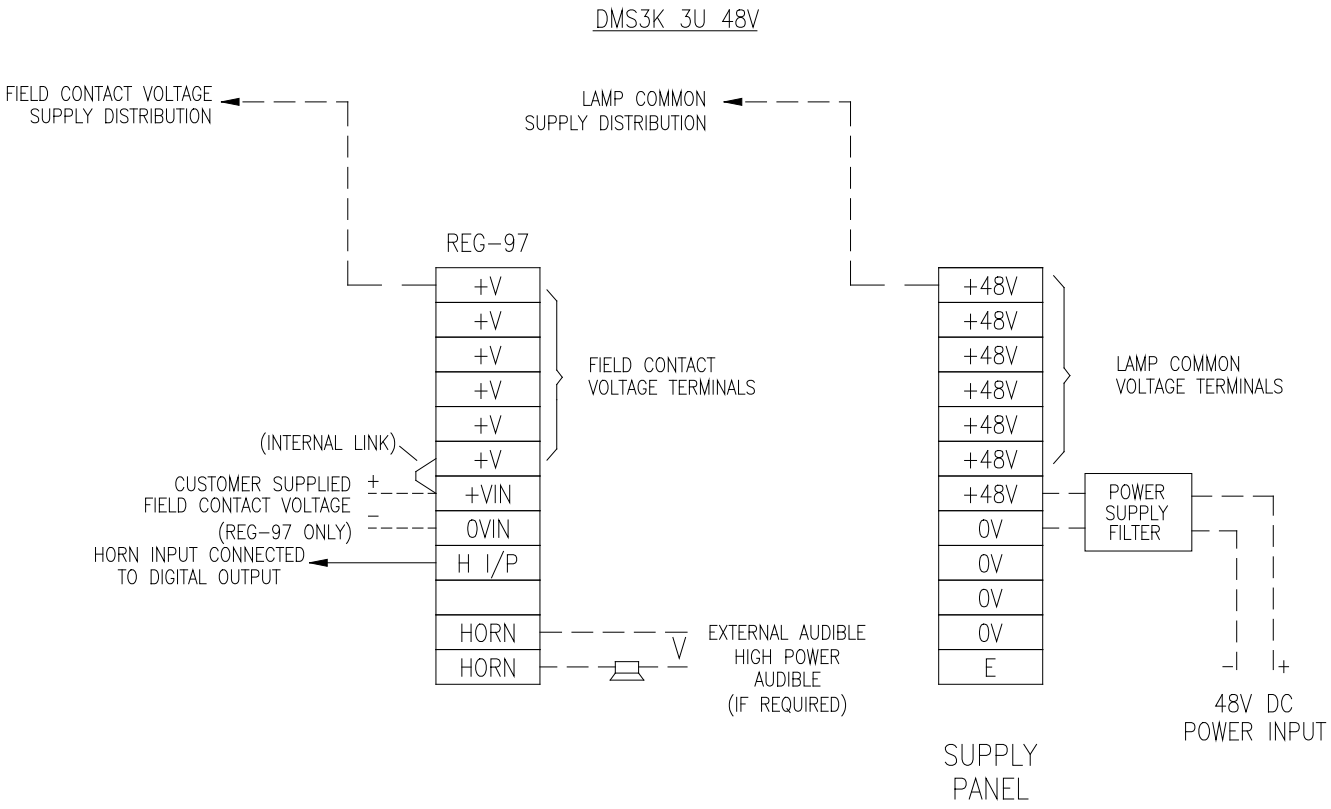
The REG 96 Power Supply Regulator is used for 3U Card Racks with 48 VDC Power and internal 48 VDC Field Contact Voltage. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 48V DC REGULATOR CONNECTION DIAGRAM (3U CRATE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 97

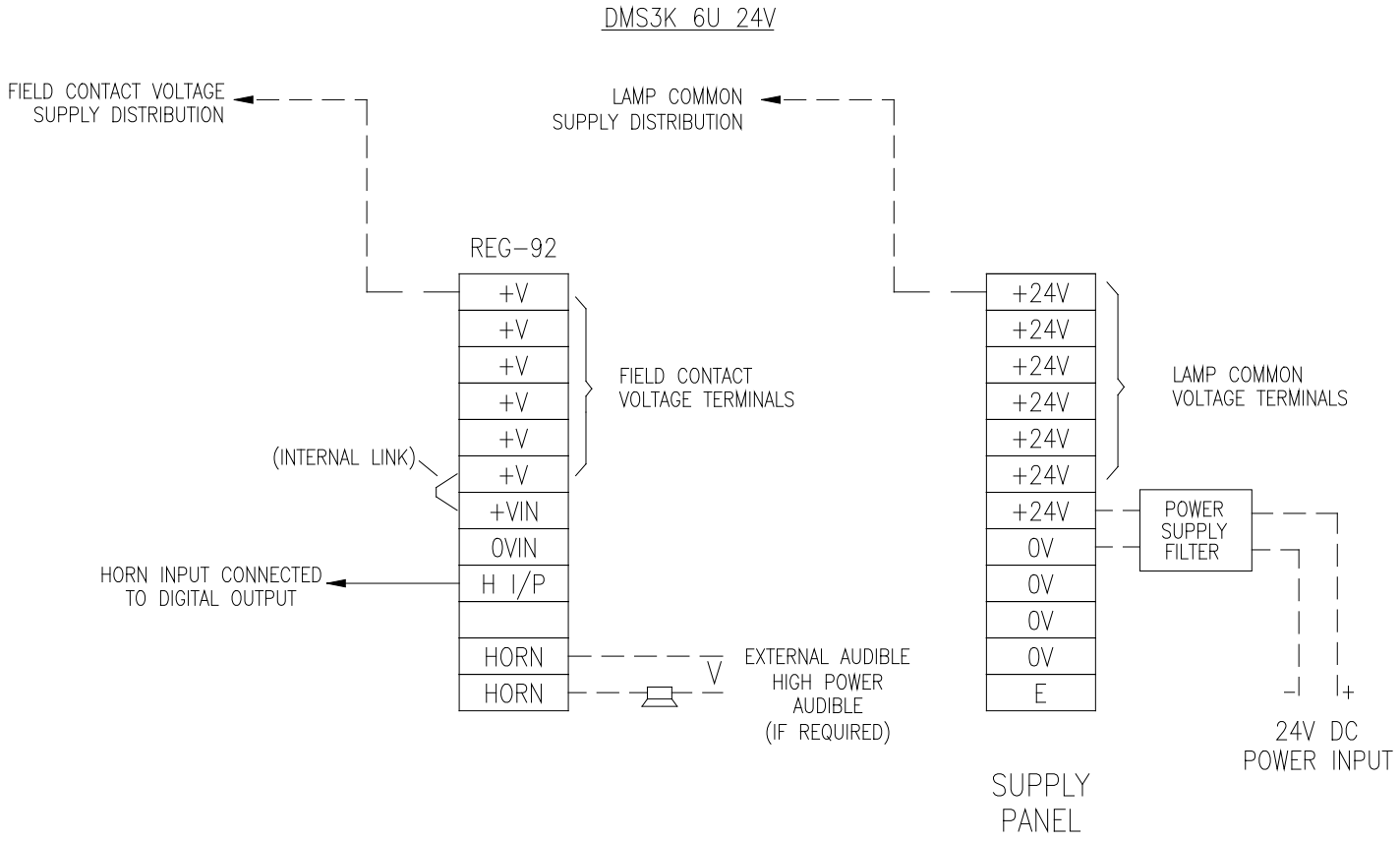
The REG 97 Power Supply Regulator is used for 3U Card Racks with 48 VDC Power and connection for external Field Contact Voltages of 24, 48 or 125VDC. This Field Contact Voltage connection is jumpered to the +V terminals for distribution to the field contacts. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 48V DC REGULATOR CONNECTION DIAGRAM (3U CRATE)
(CUSTOMER SUPPLIED FIELD CONTACT VOLTAGE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 92

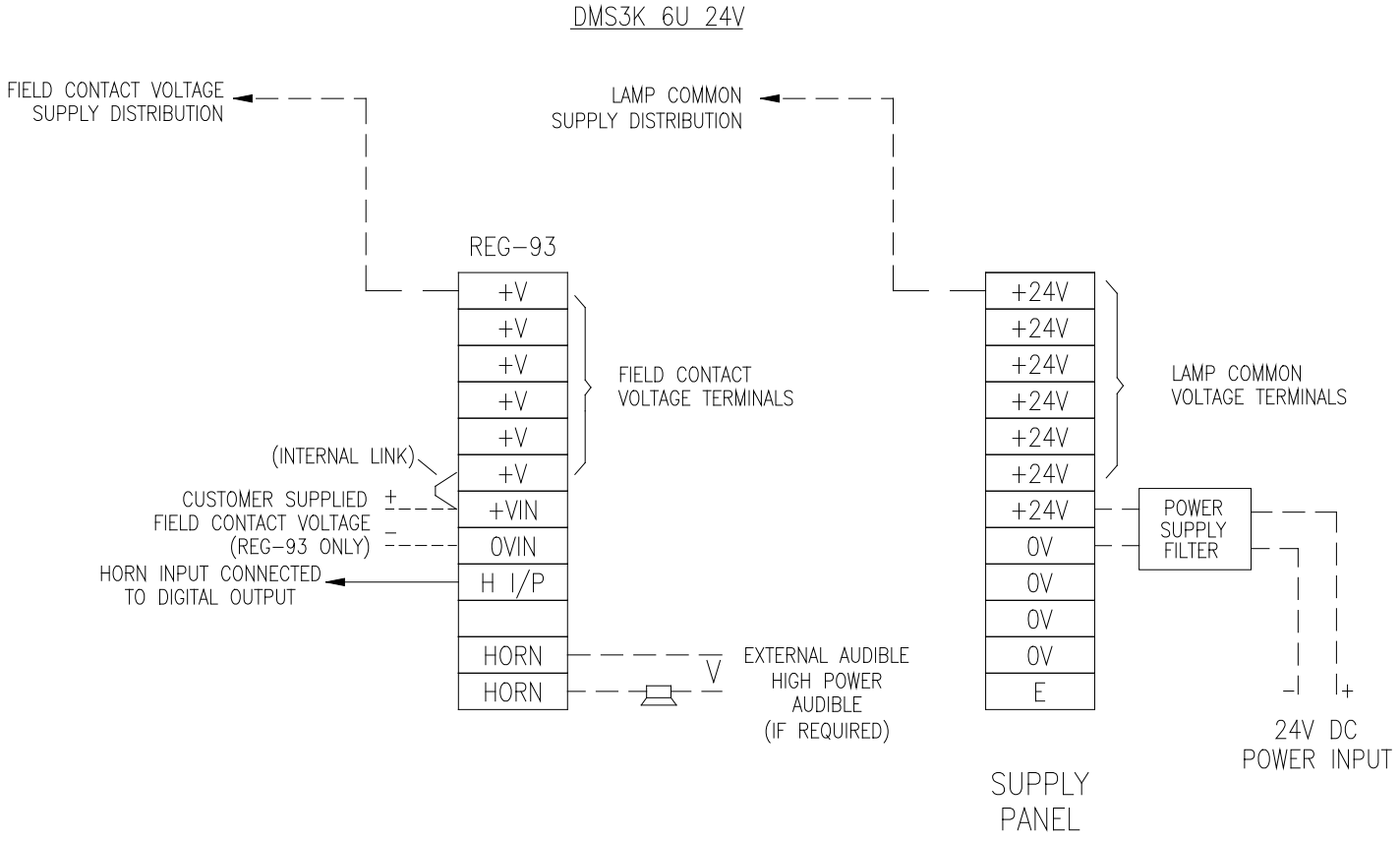
The REG 92 Power Supply Regulator is used for 6U Card Racks with 24 VDC Power and internal 24 VDC Field Contact Voltage. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 24V DC REGULATOR CONNECTION DIAGRAM (6U CRATE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 93

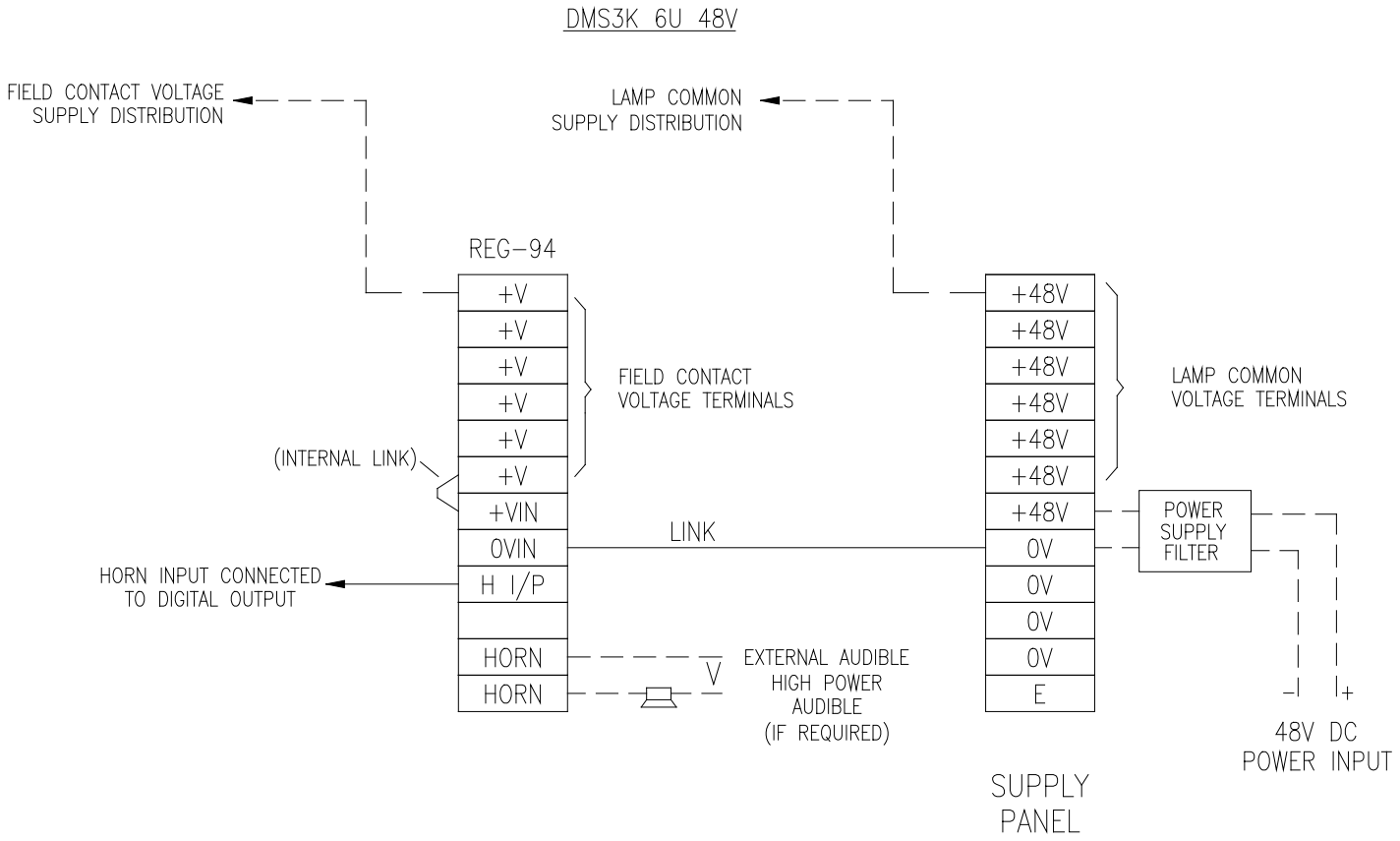
The REG 93 Power Supply Regulator is used for 6U Card Racks with 24 VDC Power and connection for external Field Contact Voltages of 24, 48 or 125VDC. This Field Contact Voltage connection is jumpered to the +V terminals for distribution to the field contacts. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 24V DC REGULATOR CONNECTION DIAGRAM (6U CRATE)
(CUSTOMER SUPPLIED FIELD CONTACT VOLTAGE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 94

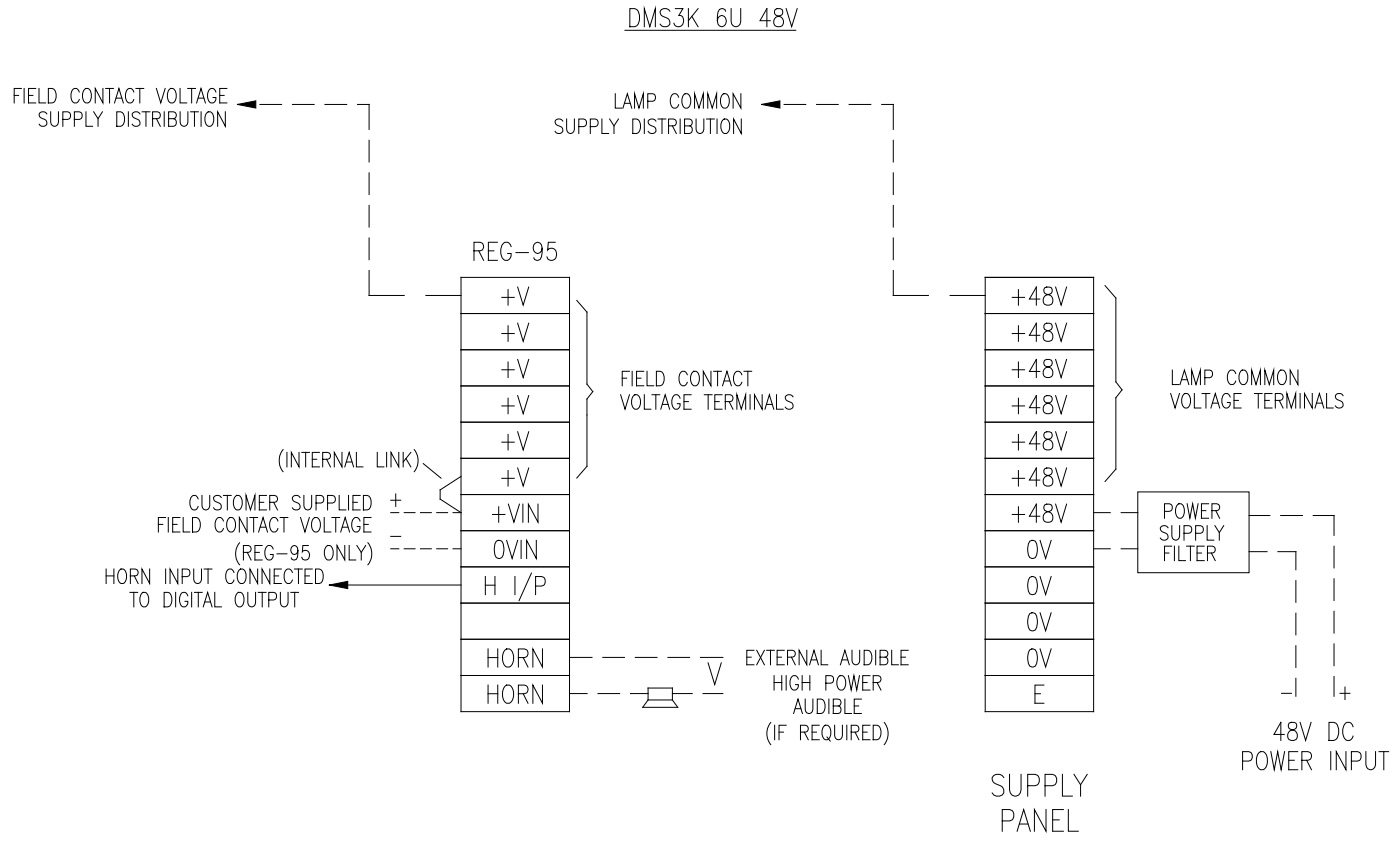
The REG 94 Power Supply Regulator is used for 6U Card Racks with 48 VDC Power and internal 48 VDC Field Contact Voltage. Connection is by screw type terminals (1.5mm², 16 AWG max.)



TYPICAL 48V DC REGULATOR CONNECTION DIAGRAM (6U CRATE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

REG 95

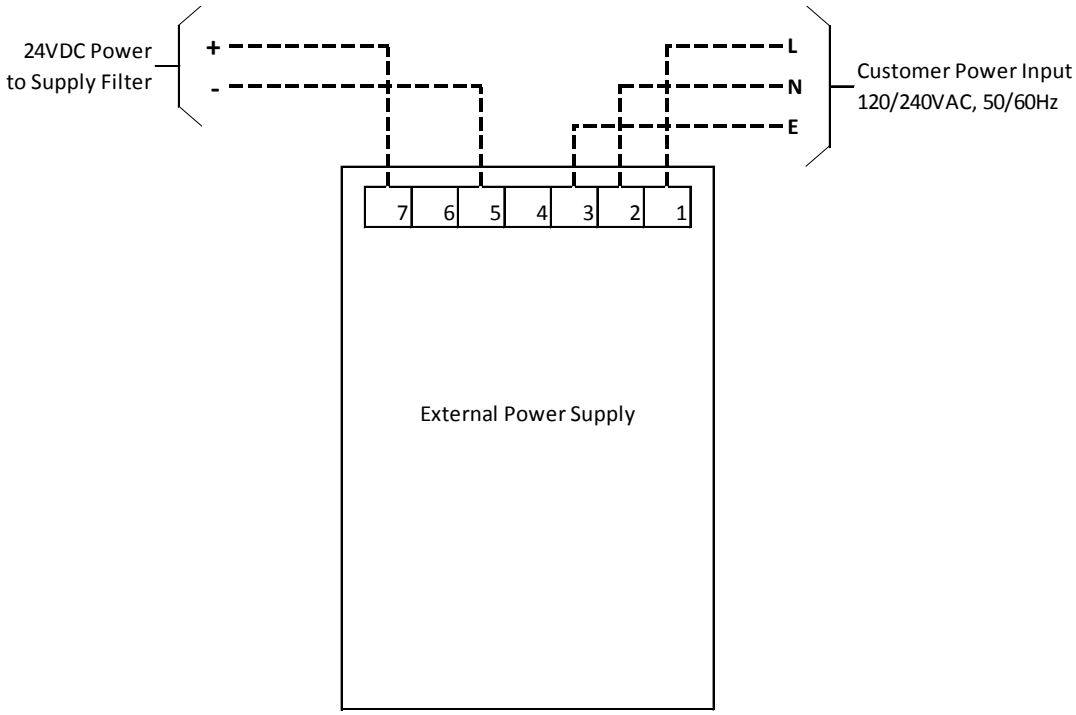
The REG 95 Power Supply Regulator is used for 6U Card Racks with 48 VDC Power and connection for external Field Contact Voltages of 24, 48 or 125VDC. This Field Contact Voltage connection is jumpered to the +V terminals for distribution to the field contacts. Connection is by screw type terminals (1.5mm², 16 AWG max.)



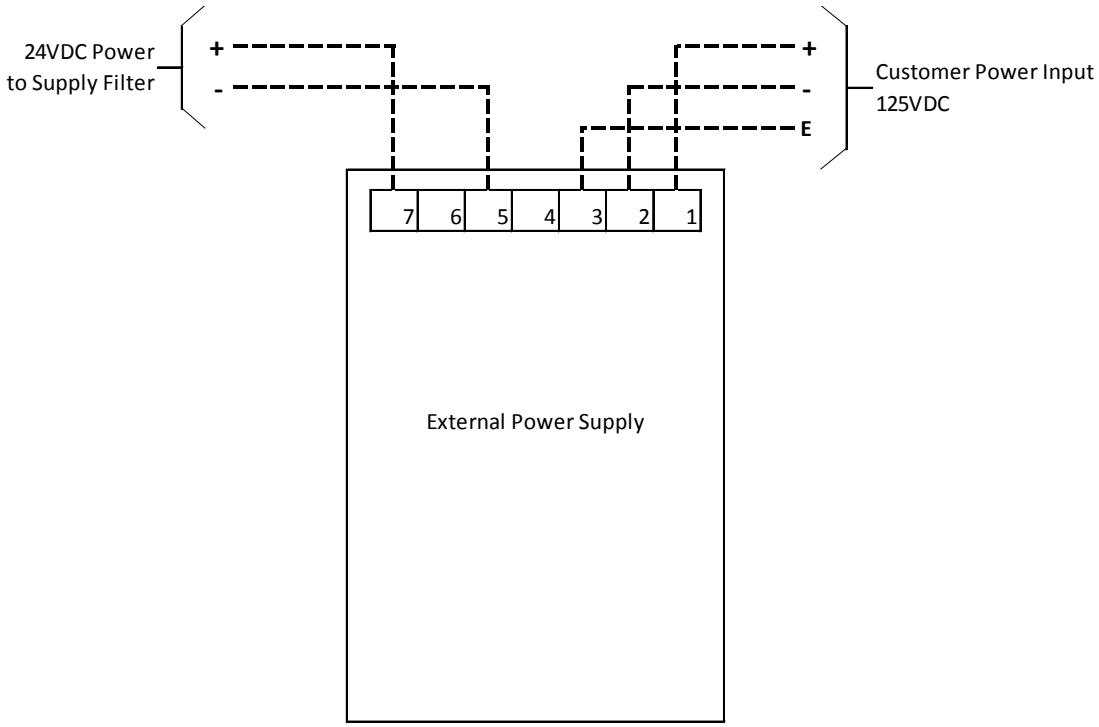
TYPICAL 48V DC REGULATOR CONNECTION DIAGRAM (6U CRATE)
(CUSTOMER SUPPLIED FIELD CONTACT VOLTAGE)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

External Power Supply Wiring

120/240 VAC External Power Supply



125VDC External Power Supply



Input / Output Wiring

I/O wiring is typically interconnected with the power supply regulators as shown. Inputs are either digital inputs (contact or switch) or Analog Inputs (4-20mA). Digital inputs can be wet or dry. (Wet = voltage provided externally to field contact; Dry = voltage provided internally by DMS). The following chart shows the different combinations of Power, FCV (Field Contact Voltage), Power Supplies and Input Modules. *Notes: Power Input is to the Logic Card Rack. External supplies used for 120/240 VAC or 125 VDC provide 24 VDC to the Logic Card Rack. Internal Field Contact Voltage refers to voltage provided by the DMS, External refers to voltages provided remotely to the unit.*

Outputs are either digital outputs (solid state switching), Reed Relays or Power Relays. The following chart shows the different types of Output Modules.

Input Modules	Power Input	Field Contact Voltage (FCV)	Internal or External FCV	Power Supply Regulator
8 I/O 90, 16I 90, IR 90	24 VDC	24 VDC	Internal	Reg 90 (3U), Reg 92 (6U)
	24 VDC	24 VDC	External*	Reg 91 (3U), Reg 93 (6U)
8 I/O 92, 16I 92, IR 92	24 VDC	48 VDC	External*	Reg 91 (3U), Reg 93 (6U)
8 I/O 95, 16I 95	24 VDC	125 VDC	External*	Reg 91 (3U), Reg 93 (6U)
8 I/O 92, 16I 92, IR 92	48 VDC	48 VDC	Internal	Reg 96 (3U), Reg 94 (6U)
8 I/O 90, 16I 90, IR 90	48 VDC	24 VDC	External*	Reg 97 (3U), Reg 95 (6U)
8 I/O 92, 16I 92, IR 92	48 VDC	48 VDC	Internal	Reg 97 (3U), Reg 95 (6U)
8 I/O 95, 16I 95, IR 95	48 VDC	125 VDC	External*	Reg 97 (3U), Reg 95 (6U)
8 IAM Module	24 VDC	n/a	n/a	Reg 90,91 (3U), Reg 92,93 (6U)
	48 VDC	n/a	n/a	Reg 96,97 (3U), Reg 94,95 (6U)

**See Module Data sheet for correct link settings*

Output Modules	Output Method	Output Type	Power Input	Rating
8 I/O 90, 91, 92, 95	Digital	Switch 0V	24, 48 VDC	5 Watts, max 63 VDC, 0.2 Amp
16 O 90, 91	Digital	Switch 0V	24, 48 VDC	5 Watts, max 63 VDC, 0.2 Amp
I/R 90, 91	Relay	Form A	24 VDC	Max 240 VAC, 62 VDC, 2.0 Amp
I/R 92, 93	Relay	Form A	48 VDC	Max 240 VAC, 62 VDC, 2.0 Amp
8 RR 90	Reed Relay	Form A	24, 48 VDC	10 Watts, max 100 VDC, 0.5 Amp
8 RR 91	Reed Relay	Form B	24, 48 VDC	10 Watts, max 100 VDC, 0.5 Amp
16 RR 90	Reed Relay	Form A	24, 48 VDC	10 Watts, max 100 VDC, 0.5 Amp
16RR 91	Reed Relay	Form B	24, 48 VDC	10 Watts, max 100 VDC, 0.5 Amp
5 PR 90	Relay	Form C	24 VDC	Max 240 VAC, 62 VDC, 2.0 Amp
5 PR 91	Relay	Form C	48 VDC	Max 240 VAC, 62 VDC, 2.0 Amp
8 PR90	Relay	Form A/B	24 VDC	Max 240 VAC, 62 VDC, 2.0 Amp

Notes: Power Input is to the Logic Card Rack. External supplies used for 120/240 VAC or 125 VDC provide 24 VDC to the Logic Card Rack.

8 I/O Module

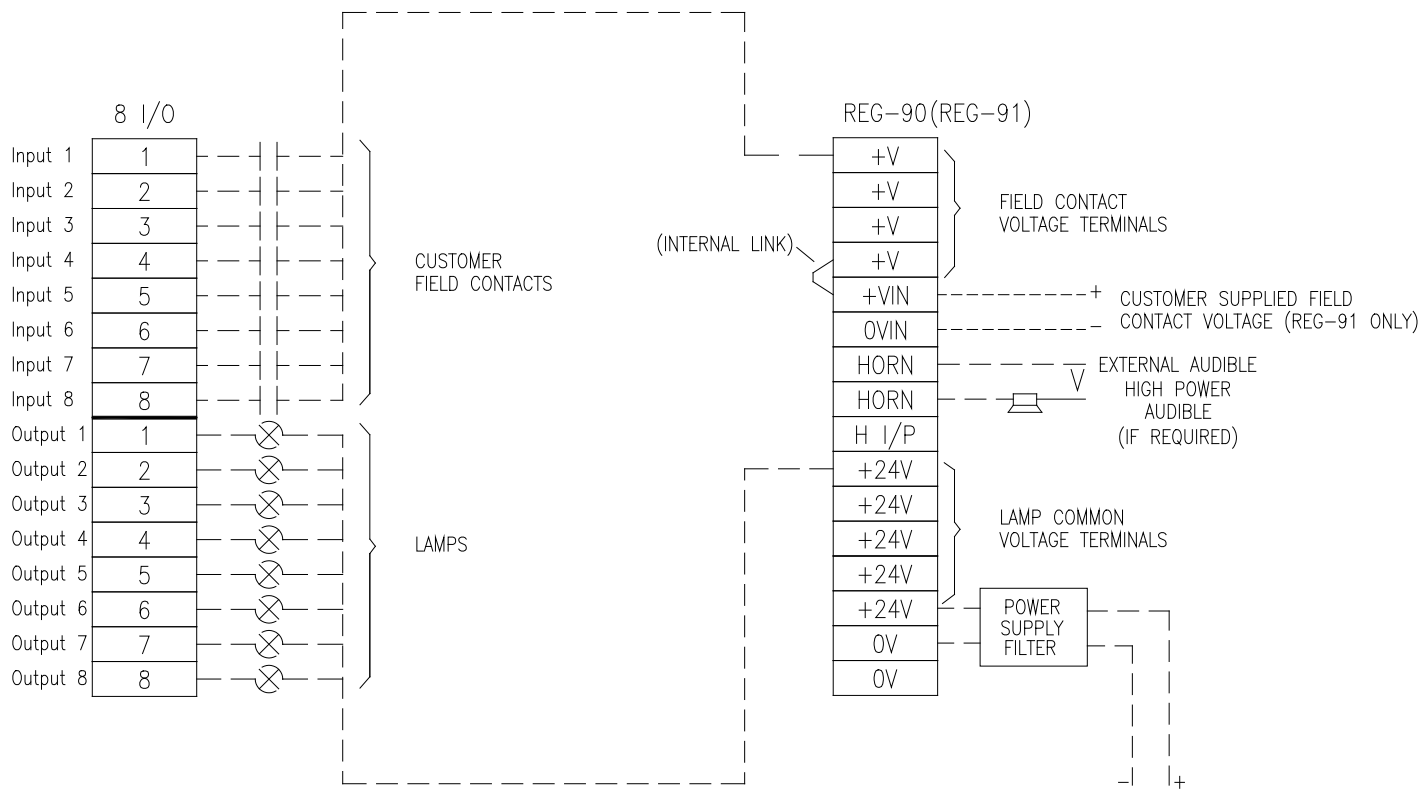
The 8 I/O module supports 8 Field Contact Inputs and 8 Solid State Digital Outputs. Each input requires approximately 2 mA current per input and each input is optically isolated. The digital outputs can switch up to 5 watts per input with a maximum voltage of 63 VDC and maximum current of 200mA. There are jumpers on the board for N.O. (Normally Open – Contact closes on alarm) or N.C. (Normally Closed – Contact opens on alarm). In addition, there are jumpers for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.).

The different card types available are shown below.

Card Type	**Field Contact Voltage**
8 I/O 90	24 VDC (Internal)
	24 VDC (External)
8 I/O 92	48 VDC (External)
8 I/O 95	125 VDC (External)

(Modules may have a suffix of A or B depending on the version. Ex. 8I/O 90B)

DMS3K 3U 24V



TYPICAL 8 INPUT / 8 OUTPUT CONNECTION DIAGRAM
24VDC REGULATOR SHOWN (REG-90/91)
SEE REGULATOR CONNECTION (REG-96/97) FOR 48VDC

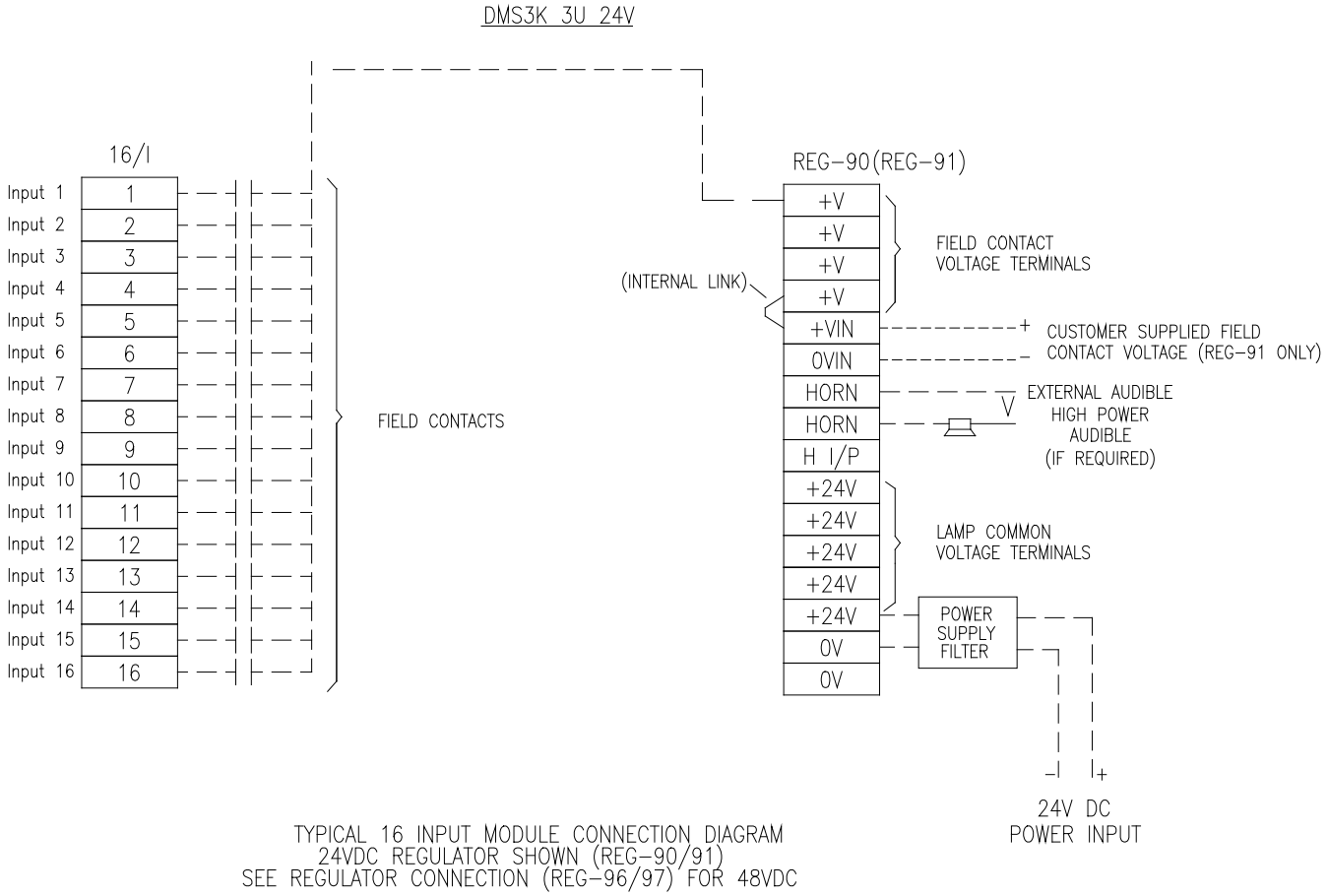
16 I Module

The 16 I module supports 16 Field Contact Inputs. The different card types available are shown below. Each input requires approximately 2 mA current per input and each input is optically isolated. There are jumpers on the board for N.O. (Normally Open – Contact closes on alarm) or N.C. (Normally Closed – Contact opens on alarm). In addition, there are jumpers for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.).

The different card types available are shown below.

Card Type	Field Contact Voltage
16I 90	24 VDC (Internal)
	24 VDC (External)
16I 92	48 VDC (External)
16I 95	125 VDC (External)

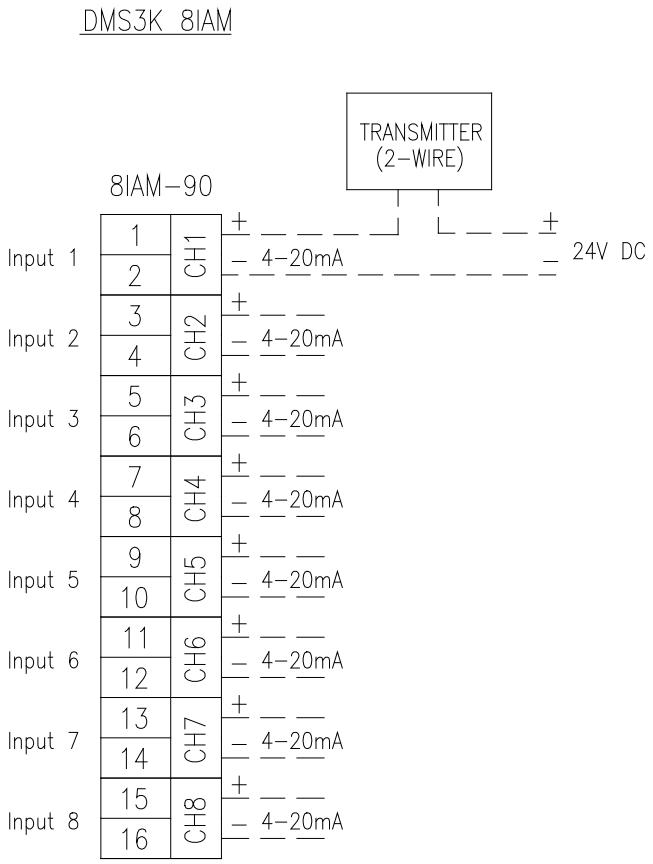
(Modules may have a suffix of A or B depending on the version. Ex 16I 90A)



TYPICAL 16 INPUT MODULE CONNECTION DIAGRAM
24VDC REGULATOR SHOWN (REG-90/91)
SEE REGULATOR CONNECTION (REG-96/97) FOR 48VDC

8 IAM Module

The 8 IAM 90 module supports eight 4-20mA Analog Inputs. The Analog inputs require an external 24VDC power source as shown. Connection is by screw type terminals (1.5mm², 16 AWG max.)



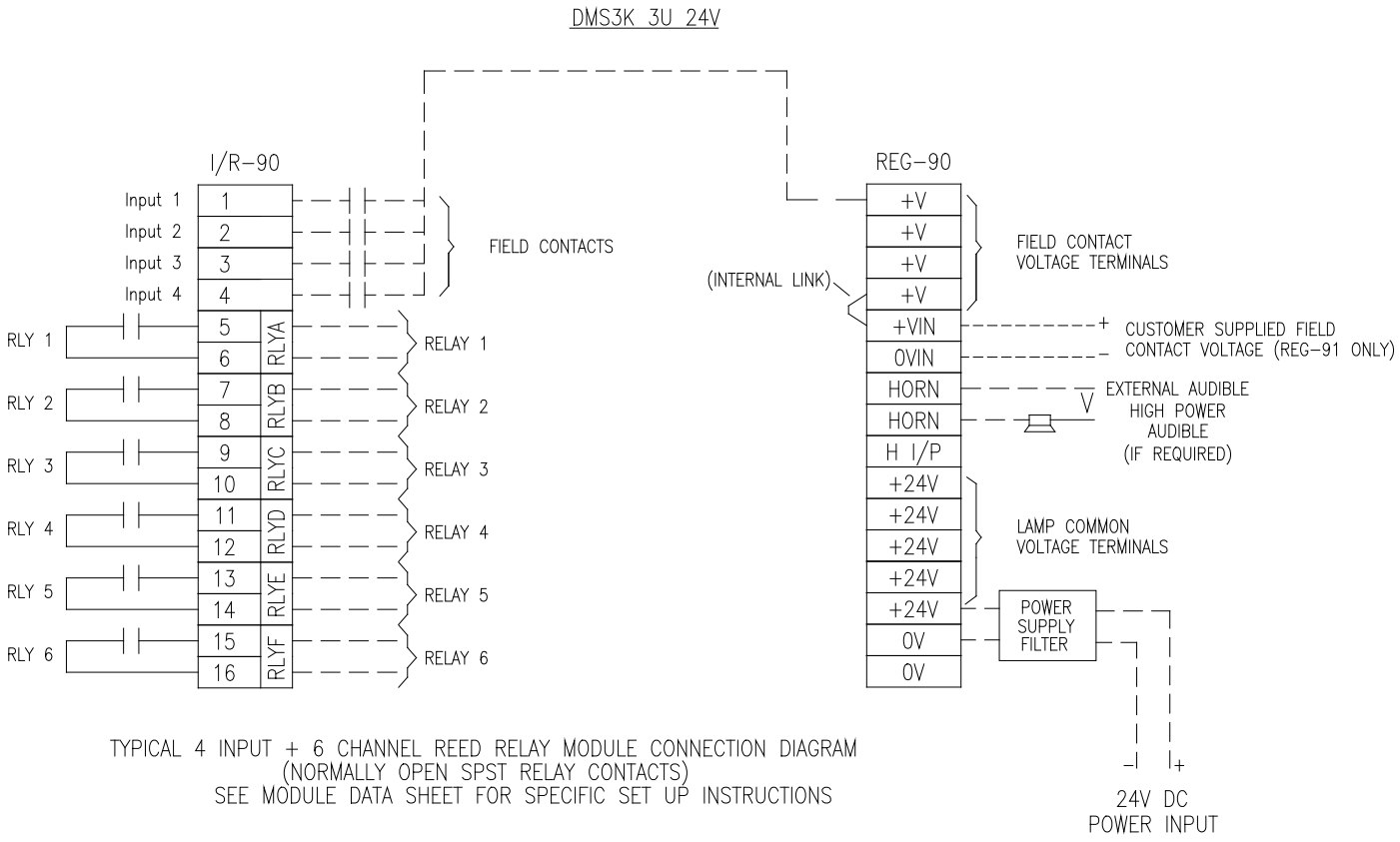
TYPICAL 8 CHANNEL 4-20mA ANALOGUE INPUT MODULE CONNECTION DIAGRAM
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

I/R Module

The I/R90 module supports 4 Field Contact Inputs and 6 Form A Relay Outputs. Each input requires approximately 2 mA current per input and each input is optically isolated. The relay outputs can switch a maximum voltage of 240VAC or 62 VDC and maximum current of 2.0A. There are jumpers on the board for N.O. (Normally Open – Contact closes on alarm) or N.C. (Normally Closed – Contact opens on alarm). In addition, there are jumpers for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.).

The different card types available are shown below.

Card Type	Field Contact Voltage
I/R 90	24 VDC (Internal)
I/R 91	48 VDC (External)



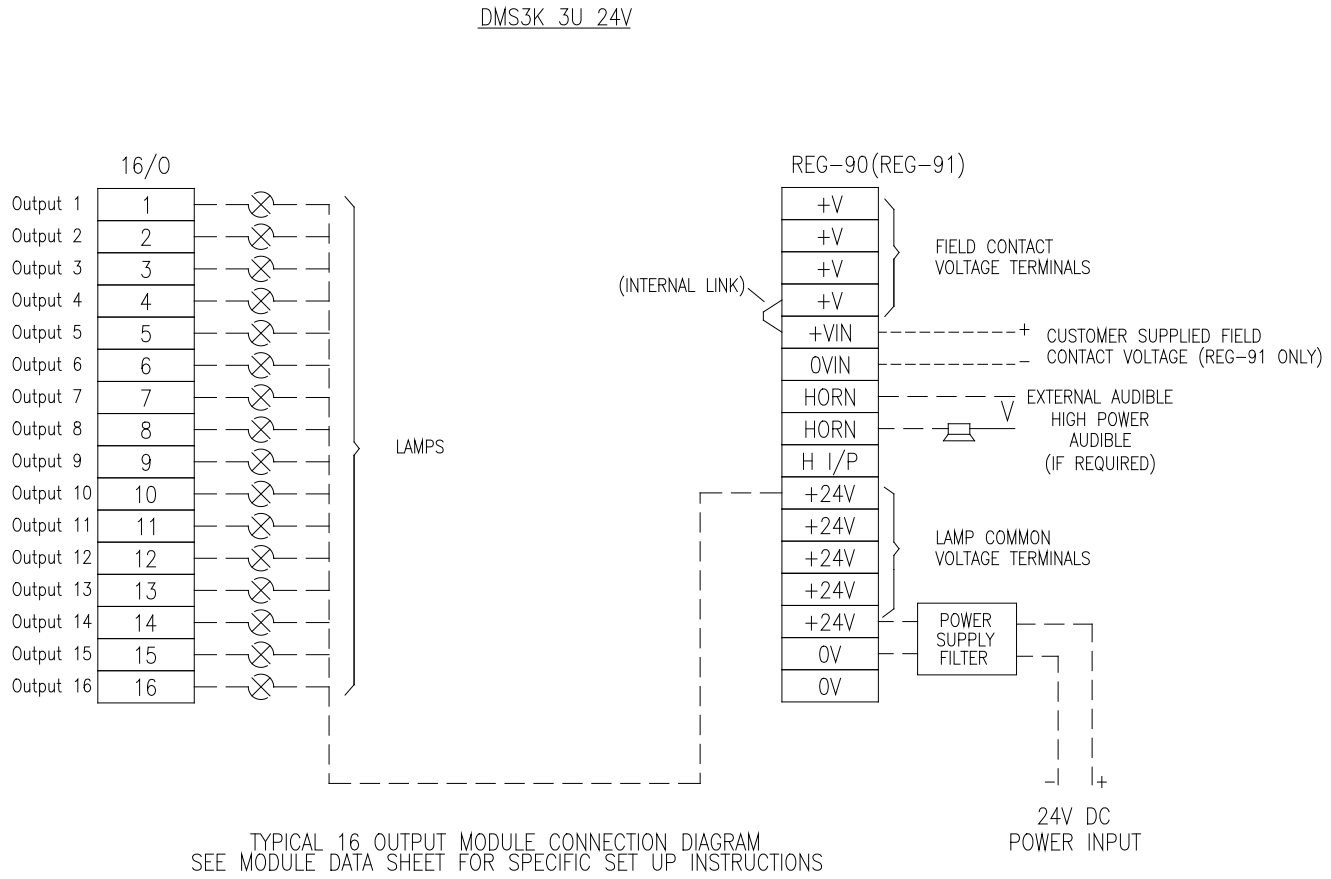
TYPICAL 4 INPUT + 6 CHANNEL REED RELAY MODULE CONNECTION DIAGRAM
(NORMALLY OPEN SPST RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

16 O Module

The 16O module supports 16 Solid State Digital Outputs. The digital outputs can switch up to 5 watts per output with a maximum voltage of 63 VDC and maximum current of 200mA. There are jumpers on the board for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.).

The different card types available are shown below.

Card Type	Output Rating / Type
16O 90	63V, 5W / switch 0V
16O 91	63V, 5W / switch 0V (w/IDC Connector)



TYPICAL 16 OUTPUT MODULE CONNECTION DIAGRAM
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

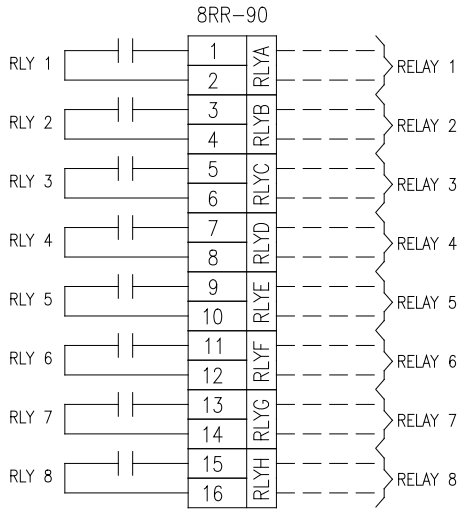
8 RR Module

The 8RR module supports 8 Reed Relay Outputs. The relay outputs can switch up to 10 watts per output with a maximum voltage of 100 VDC and maximum current of 0.5 Amp. There are jumpers on the board for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.)

The different card types available are shown below.

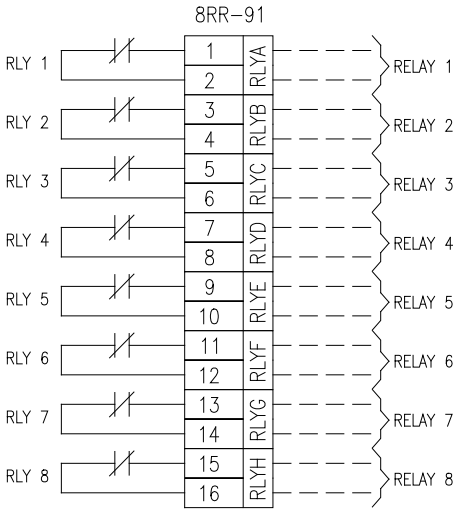
Card Type	Output Type
8RR 90	Form A Relays (SPST Normally Open)
8RR 91	Form B Relays (SPST Normally Closed)

DMS3K 8RR-90



TYPICAL 8 CHANNEL REED RELAY MODULE CONNECTION DIAGRAM
(NORMALLY OPEN SPST RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

DMS3K 8RR-91



TYPICAL 8 CHANNEL REED RELAY MODULE CONNECTION DIAGRAM
(NORMALLY CLOSED SPST RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

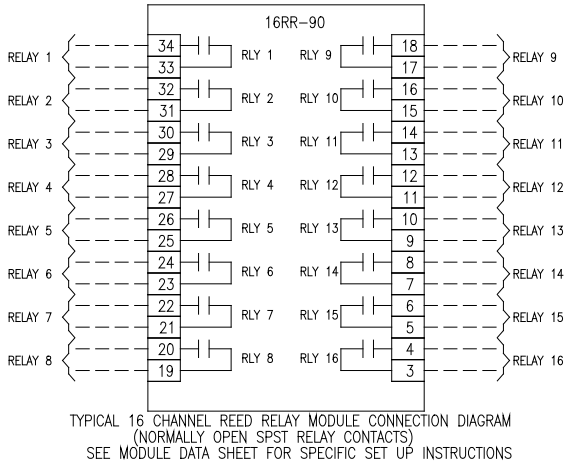
16 RR Module

The 16RR module supports 8 Reed Relay Outputs. The relay outputs can switch up to 10 watts per output with a maximum voltage of 100 VDC and maximum current of 0.5 Amp. There are jumpers on the board for selecting an address within the Input Card Rack. Connections are made through a 34 pin IDC Connector (2 rows of 17) for use with Ribbon Cables.

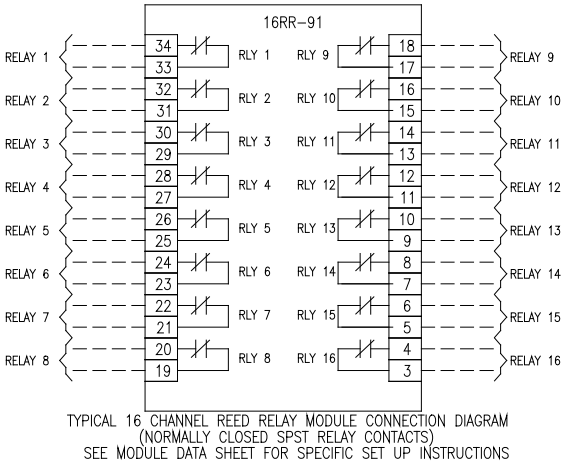
The different card types available are shown below.

Card Type	Output Type
16RR 90	Form A Relays (Normally Open)
16RR 91	N/C (Normally Open) Relays, w/IDC Connector

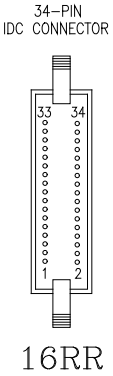
DMS3K 16RR



TYPICAL 16 CHANNEL REED RELAY MODULE CONNECTION DIAGRAM
(NORMALLY OPEN SPST RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS



TYPICAL 16 CHANNEL REED RELAY MODULE CONNECTION DIAGRAM
(NORMALLY CLOSED SPST RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS



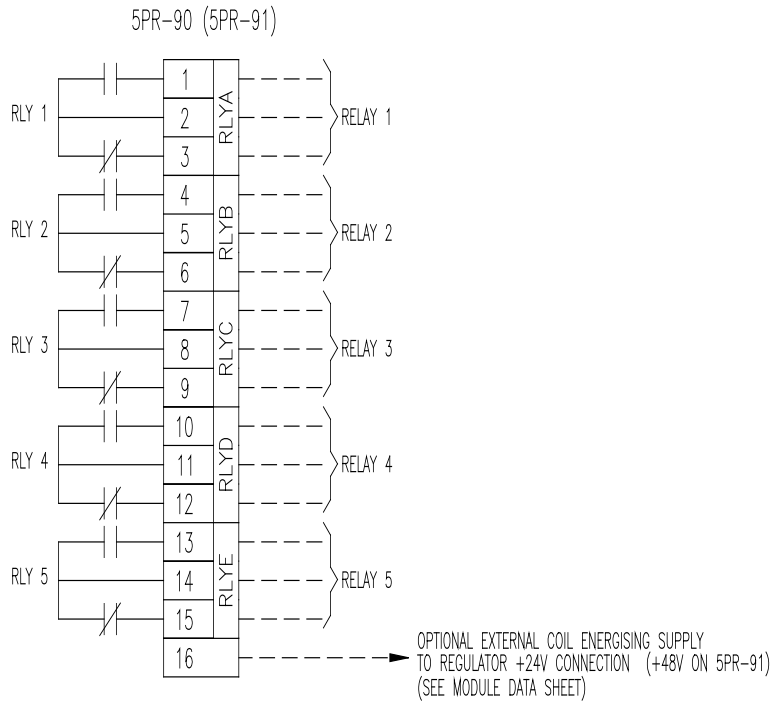
5 PR Module

The 5 PR Module supports 5 Power Relay Outputs. The relay outputs can switch a maximum voltage of 240VAC or 62 VDC and maximum current of 2.0A. There are jumpers on the board for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.). Connection is by screw type terminals (1.5mm², 16 AWG max.)

The different card types available are shown below.

Card Type	Output Type
5PR 90	Form C (for 24VDC Systems)
5PR 91	Form C (for 48VDC Systems)

DMS3K 5PR



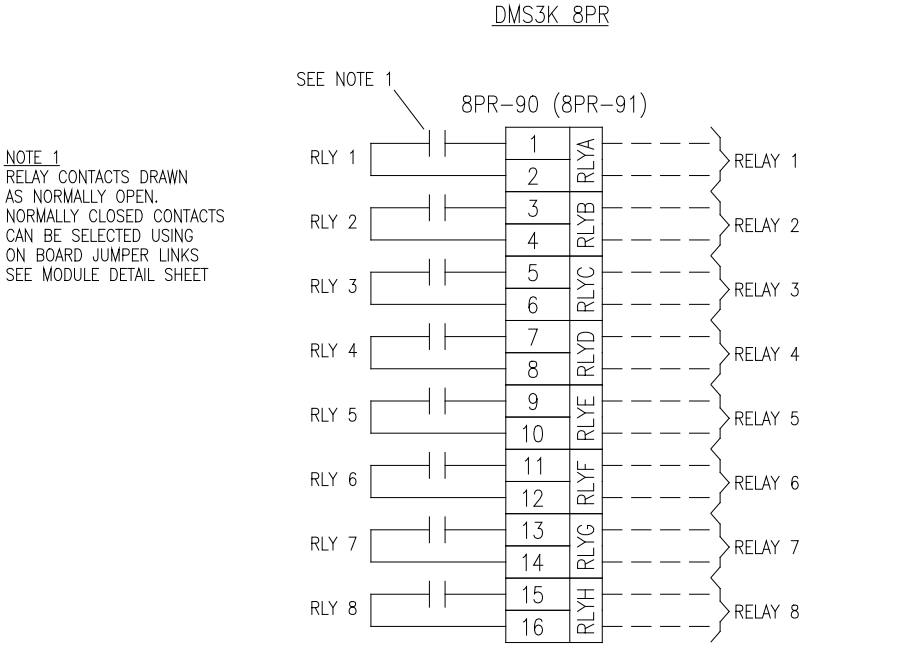
TYPICAL 5 CHANNEL POWER RELAY MODULE CONNECTION DIAGRAM
(CHANGEOVER SPDT RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

8 PR Module

The 8 PR Module supports 8 Power Relay Outputs. The relay outputs can switch a maximum voltage of 240VAC or 62 VDC and maximum current of 2.0A. There are jumpers on the board for selecting a Form A or Form B contact output and jumpers for selecting an address within the Input Card Rack. Connection is by screw type terminals (1.5mm², 16 AWG max.). Connection is by screw type terminals (1.5mm², 16 AWG max.)

The different card types available are shown below.

Card Type	Output Type
8PR 90	Form A/B (for 24VDC Systems)



TYPICAL 8 CHANNEL POWER RELAY MODULE CONNECTION DIAGRAM
(CHANGEOVER SPDT RELAY CONTACTS – SEE NOTE 1)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

Control Input Wiring

Control Pushbuttons are wired to any of the digital input modules (8 I/O, 16I, I/R) in place of a field contact input. The operation of these pushbuttons is either ‘Momentary’ which is a pulse on and off or ‘Sustained’ which is continuously on or off. The assignment of control inputs to input terminals is configured via the web browser. The Control Pushbuttons can consist of the following types:

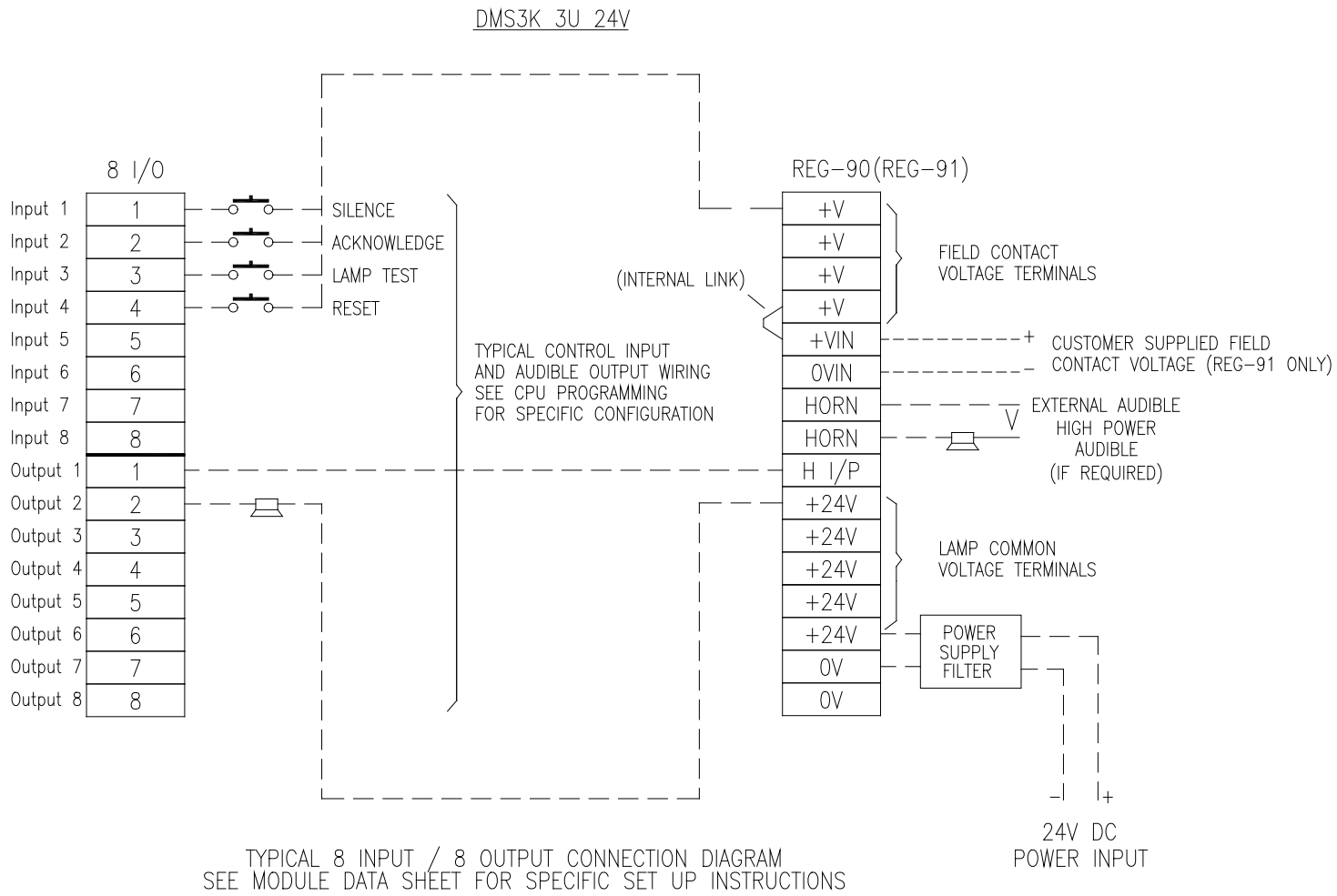
Pushbutton	Operation	Function
Silence	Momentary	Used to silence an audible device.
Acknowledge	Momentary	The Acknowledge pushbutton is used for multiple functions: -silence an audible device -impact the operation of lamp outputs as per the operating sequence selected (refer to the alarm sequence tables) -impact the operation of digital and relay alarm outputs when configured as ‘Fault to Acknowledge’
Lamp Test	Momentary	Used to activate the lamp outputs to verify they function per the operating sequence configured
Full Function Test	Momentary	Used to activate the lamp, group lamp and auxiliary outputs to verify they function per the operating sequence configured and to activate any audible device
Reset	Momentary	The Reset pushbutton is used for multiple functions: -impact the operation of lamp outputs as per the operating sequence selected (refer to the alarm sequence tables) -impact the operation of digital and relay alarm outputs when configured as ‘Fault to Reset’
First Out Reset	Momentary	The First Out Reset pushbutton is used to impact the operation of lamp outputs for First Out operating sequences selected (refer to the alarm sequence tables)
Inhibit	Sustained	This is used to disable an input or group of inputs. It will prevent them from operating the outputs including lamps, alarm relays, and horns.

The pushbuttons can be arranged to perform their function for all inputs and outputs or for specific ones. This is configured via the web browser which can assign the pushbutton to a specific group which is part of the input configuration.

Example of Control Input wiring using 8 I/O Module

Notes:

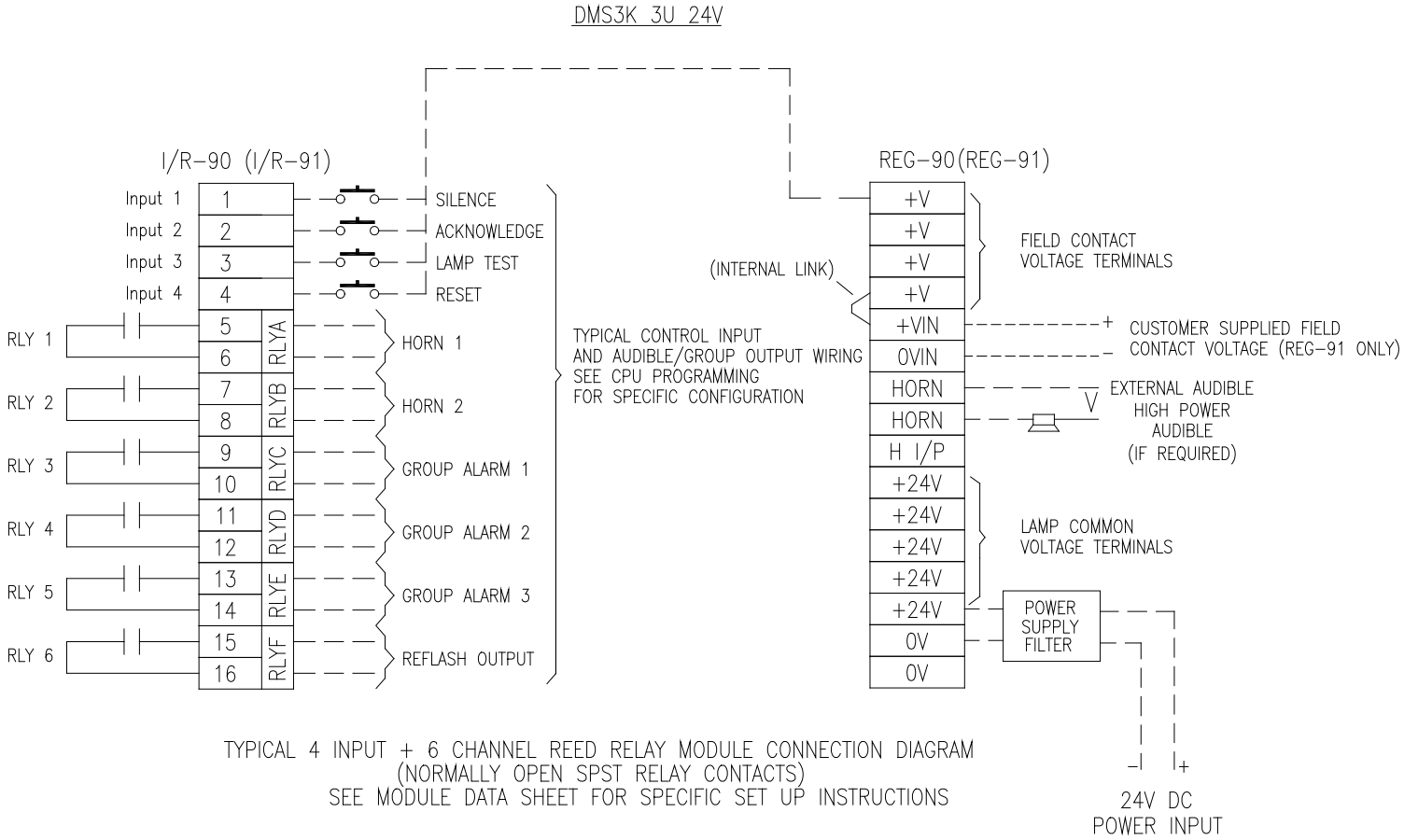
1. Pushbutton functions are assigned to specific input terminals via the web browser.
2. 16I module can also be used for control inputs
3. Horn Output: One of the digital outputs can be configured as a Horn Output and then wired to the regulator Horn IN. This will operate the Horn Relay contact on the regulator.



Example of Control Input Wiring and Output Relays using I/R 90 Module

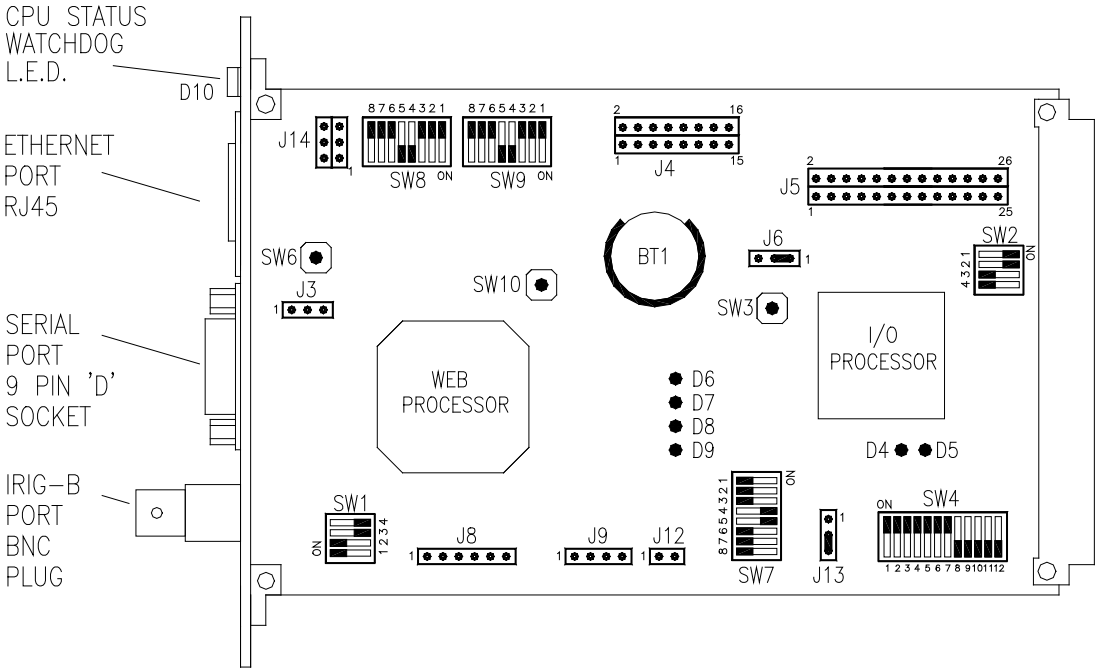
Notes:

1. Pushbutton functions are assigned to specific input terminals via the web browser.
2. Horn, Group Alarm and Reflash Relay Outputs functions are configured via the WEB Browser. These outputs can also be used on the 8RR, 16RR and 5PR Modules.



TYPICAL 4 INPUT + 6 CHANNEL REED RELAY MODULE CONNECTION DIAGRAM
(NORMALLY OPEN SPST RELAY CONTACTS)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

Communication and Time Sync Ports



CPU–200 CARD LAYOUT

Serial Port, RS-232 / RS-485

On the *Serial Communications* page of the Web browser, the serial port can be configured for either RS-232 or RS-485 mode. The termination for the RS-485 mode is internal (via checkbox on Serial Communications page).

RS-232 mode

The RS-232 connection is a standard DB-9 female connector. The port can be connected directly to the DB-9 male (AT) connector on a PC. Use a straight cable.

DMS-3K Signal	DMS-3K pin	PC pin	PC signal
TX	2	2	RX
RX	3	3	TX
COM	5	5	COM

RS-485 mode

The following are the connections for RS-485 mode

DMS-3K Signal	DMS-3K pin
TX/RX +	9
TX/RX –	1
COM	5

Ethernet

The RJ45 Ethernet connection is compatible for networks up to Gigabit speeds

IRIG-B

The IRIG-B signal connects to a standard BNC connector on DMS-3K CPU. Modulated or Demodulated mode must be selected via DIP switches, which are accessible from SW1 on the CPU.

Caution: Disconnect power from the system before removing the CPU Module

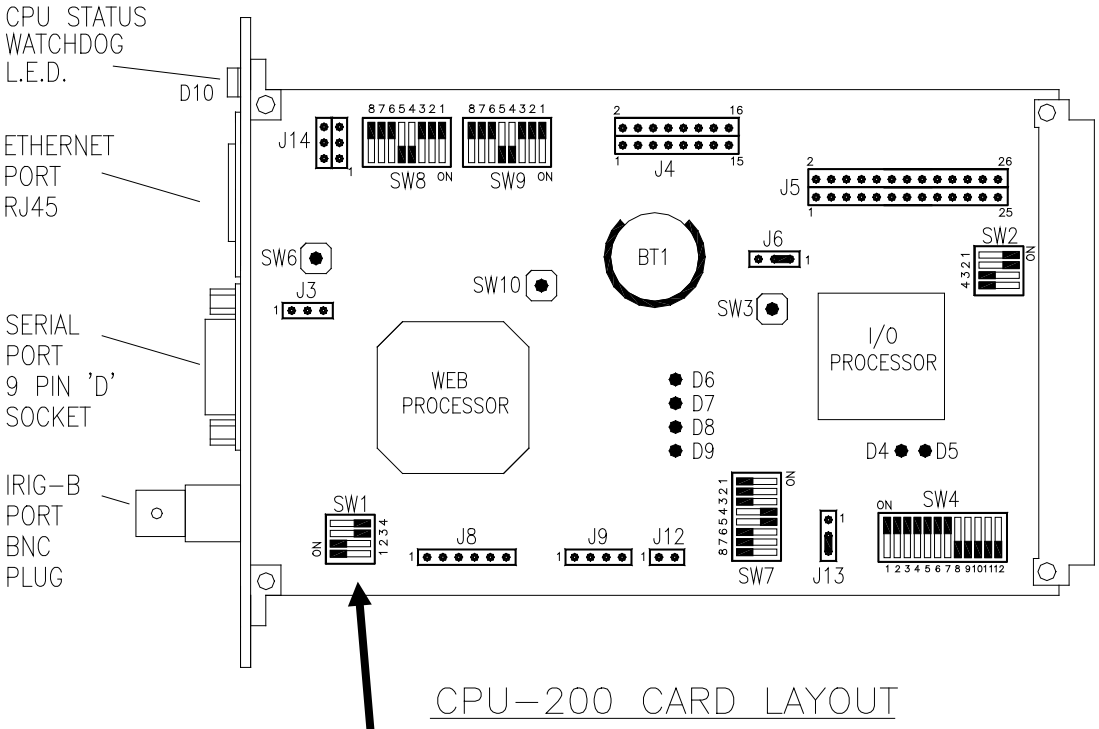


Figure 2–11, IRIG-B Modulated/Demodulated Selection

IRIG-B Format		
Switch SW1	Modulated	Demodulated
1	ON*	OFF
2	ON*	OFF
3	OFF*	ON
4	OFF*	ON

Chapter 3. DMS-3K Web Browser Configuration

The DMS-3K has a built-in WEB server that can be used with your Web browser client such as Internet Explorer or Firefox for displaying your alarms and unit configuration. Refer to Appendix F for compatibility requirements and browser configuration.

Launch your browser and type in your unit's IP address. The DMS-3K is shipped with a default address of: http://192.168.250.100
A User ID/Password dialog box will pop up as shown in Figure 3–1.

The DMS-3K has two levels for access and can be configured as shown, later in this chapter. The default username is: admin with password: admin and user: user. The unit's home page will be displayed where you can view and access all the features of the unit, depending on your user account rights.

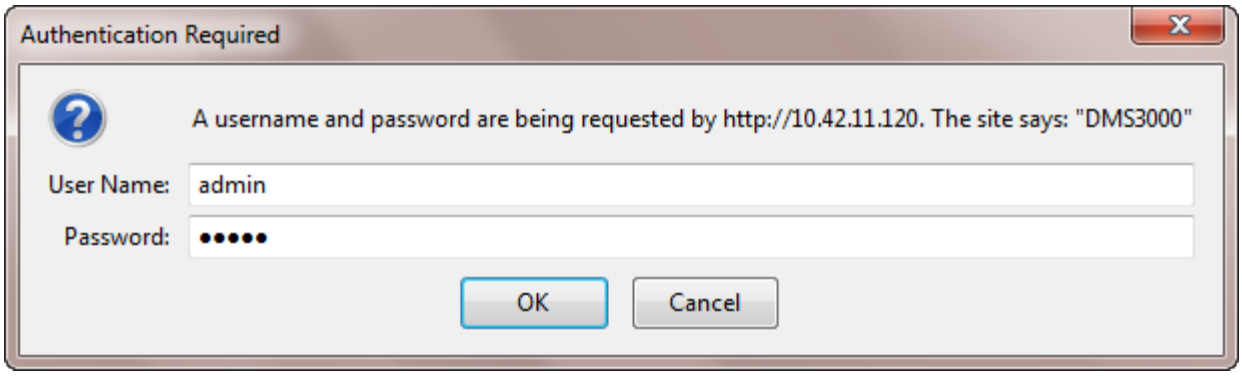


Figure 3–1. DMS-3K Login Dialog Box

Note: Your system or network administrator must set up the user accounts. There are two basic types, Admin and User. An Administrator account has full rights and can change anything. The User account has limited rights and cannot change passwords, apply or discard changes. Some action buttons will be grayed out under a User account.

DMS-3K Home Page

Figure 3–2a shows the home page with administrator logged in. The top bar of the home page displays the current date/time (in UTC and local time), and latest alarm that is *not* acknowledged. The check box – *Enable 30 second auto-refresh*, when checked, will refresh the top portion of the page (blue box) every 30 seconds.

The main page has a graphic display of the alarms and several editable fields that identify the unit's Station ID and Device ID. The graphic display of the DMS-3K is provided with alarms shown in any selectable color with their alarm legend. Inputs in their normal state will be shown with a user selected background and their normal legend. When the alarm clears, the display automatically refreshes itself to the normal state. Alarm inputs that have been disabled will have a user selectable color background to highlight the disabled state. The configuration below has new alarms shown in red background, acknowledged alarms in green and normal inputs in a clear background.

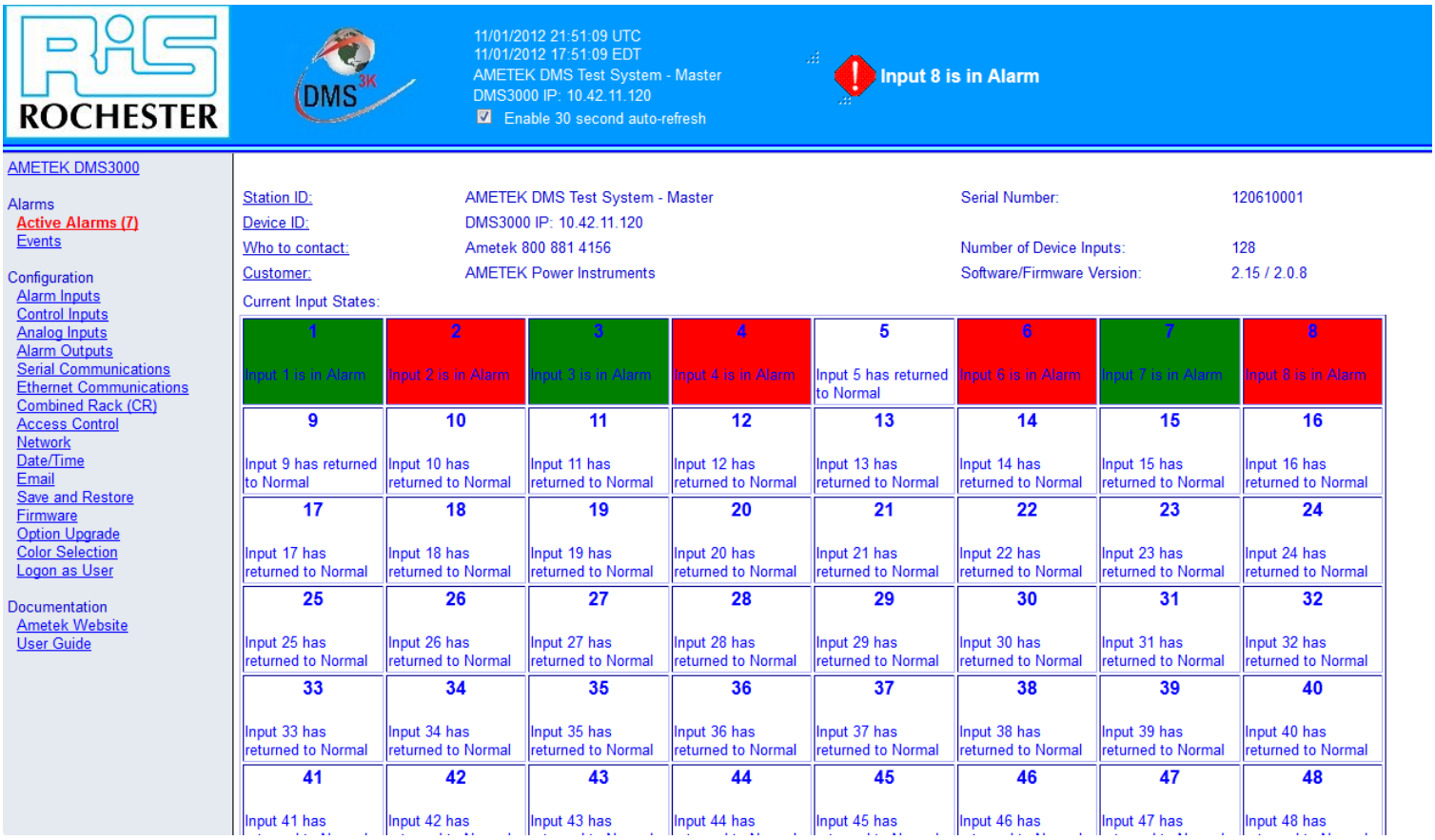


Figure 3–2a. DMS-3K Home page

Systems with CR Option (Combined Master)

For combined systems where a Master Unit collects alarms from multiple Slave units (CR option), the top header of the Master Unit will indicate 'Combined Rack (CR) Master Unit' in place of the latest Alarm as shown in Figure 3-2b

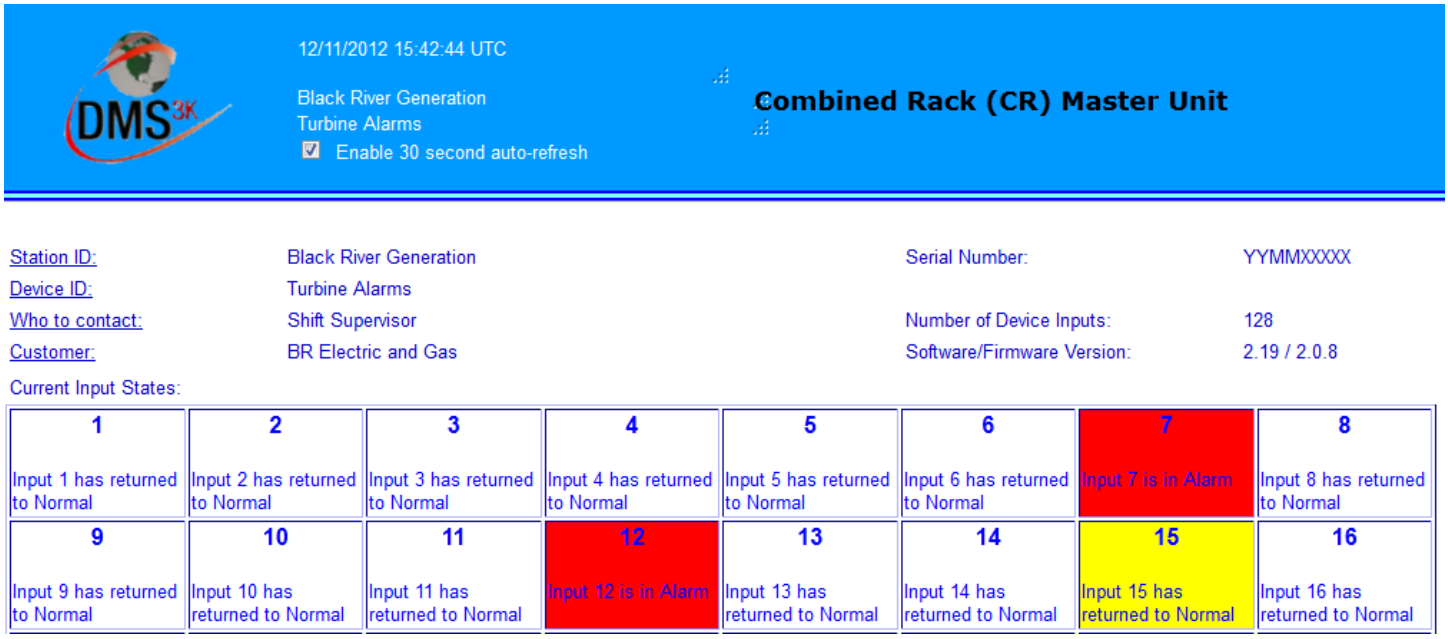


Figure 3–2b. DMS-3K Home page w/Combined Master

The Master DMS-3K equipped with the CR (Combined Rack) option will include a graphic showing every Slave DMS-3K unit connected. As shown in figure 3-2c, the graphic will include the Slave Station ID, Device ID and Input numbers assigned to the slave unit. When an alarm is present on that slave unit, it will have a red backfill.

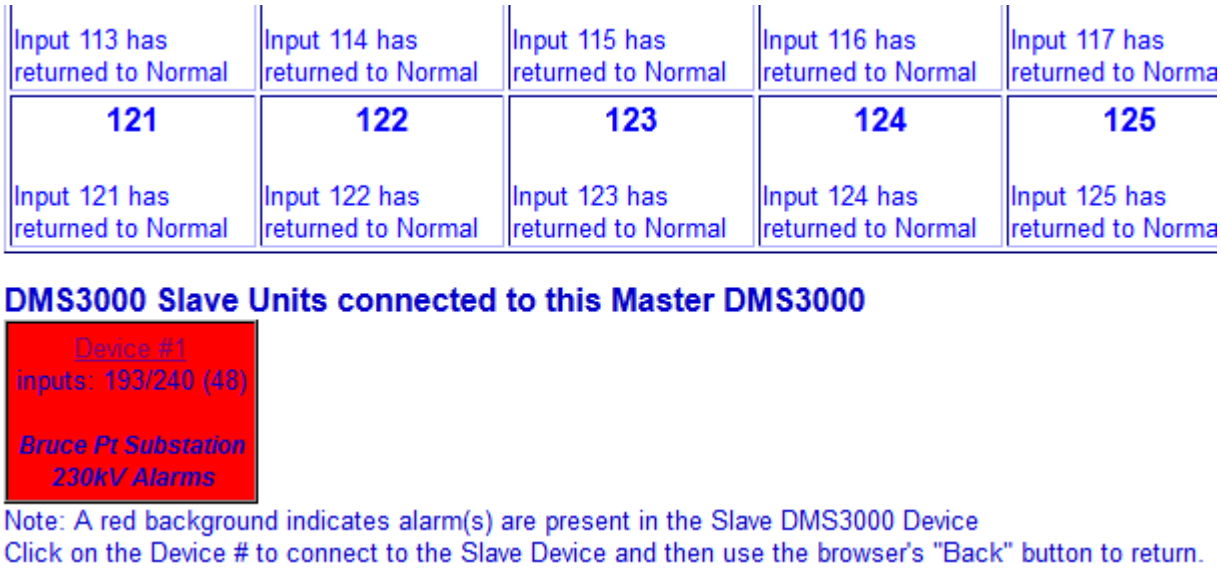


Figure 3–2c. DMS-3K Slaves (on Combined SER CR Page)

Home Page Editable Fields

In this section, please refer to the links directly below the top bar. The items on the right, *Serial Number, Number of Device Inputs* and *Software/Firmware Version*, are configured at the factory.

Links that you can edit are underlined, such as: *Station ID, Device ID, Who to contact, Customer*. When you click on a link in this section, a small dialog box will appear where you can enter the appropriate information (see Fig. 3–3). After typing in a name, for instance, you simply click the save button. All editable fields, i.e. Station ID, may contain up to 32 alphanumeric characters.

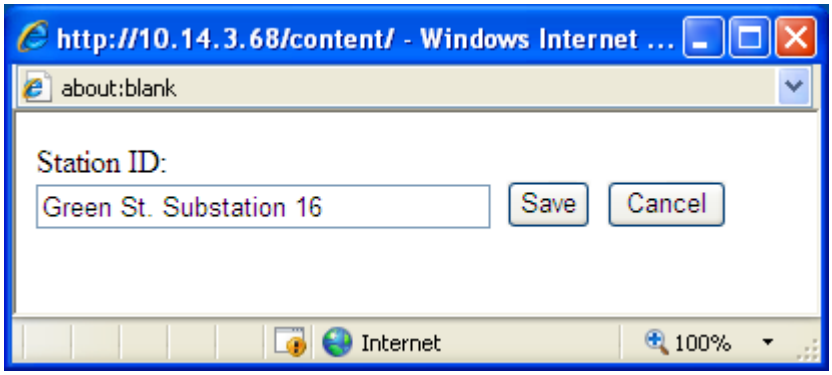


Figure 3–3. Pop-up Dialog Box

Station ID

Click this link to enter a specific location name for the unit. i.e. Green St. Substation 16. This name will be reported in the Active Alarms and Events list, event download, ASCII output and printouts.

Device ID

This name is more specific, i.e. to identify a single unit in a substation containing many units. It should be used to identify a DMS-3K unit or group of alarms connected to the unit. i.e. DMS-3K Device 1 or Breaker XYZ. The device ID will be reported in the Alarms and Events list, event download, ASCII output and printouts.

Who to Contact

This field is used to identify a contact such as in case of emergency.

Customer

Here is where you enter the customer's name.

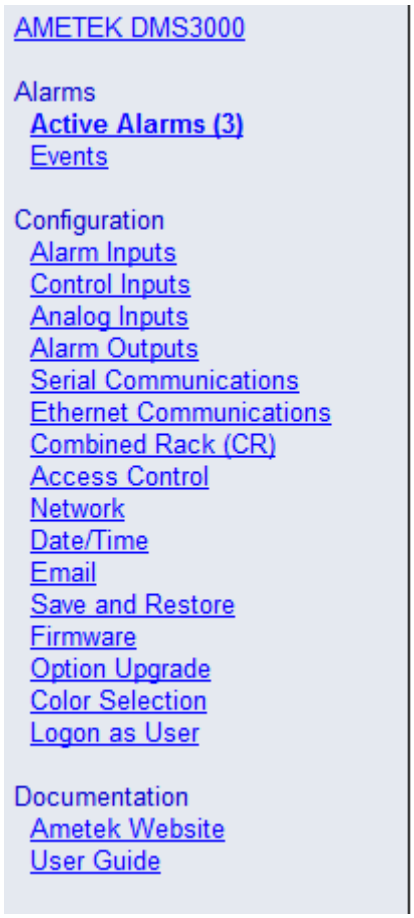


Figure 3–4. DMS-3K Navigation Sidebar.

WEB Browser Navigation

The side-bar on the home page contains links to all of the pages for unit access and configuration.

The AMETEK DMS3000 link on the top always redirects you to the Home Page shown in Figure 3-2a, similarly to when Refresh is performed on the Browser.

The side-bar is separated into two Categories: Alarms and Configuration. The links under ‘Alarms’ allow you to view active or historical alarms. The links under ‘Configuration’ are used for configuring the DMS-3K unit.

WEB Browser System Configuration

The DMS-3K is configured through the web browser. The configuration consists of setting up the alarm inputs and outputs, setting the time and date and the device communications. All configuration items require a log-in of administrator. A user log-in will let you view the configuration, but not make any changes.

Whenever making a change to the configuration, you must press the apply button.

The DMS-3K comes from the factory pre-configured for the number of inputs and outputs as specified in the DMS Model Number. Reference the System Configuration Sheet for the exact number of inputs, outputs and their location in the card rack. Each I/O module has factory configured switch settings to determine their addressing. For example, a system with (3) 16I Input modules will be configured for inputs 1-16, 17-32 and 33-48.

The configuration process consists of the following steps. It is not required to configure every single item in the system. The items highlighted in bold should be configured as a minimum. Other items (non bold) are used depending on the options installed in the system or personal preferences.

1. **Alarm Inputs**
   Use this to enable or disable an alarm, set up alarm filters, program NO/NC (normally open/normally closed) contact states, set up control groups and configure alarm/normal legends

2. **Control Inputs**
   Use this to assign the various control functions (Acknowledge, test, silence, test, etc) to the input channels. Set up operational alarm sequences for lamp outputs.

3. Analog Inputs
   Set up the trip settings for each analog input.

4. **Alarm Outputs**
   Use this to select the various output functions (lamp output, horn, alarm relay, etc) for each output and assign which input(s) drive them.

5. Serial and Ethernet Configurations
   This is used to configure the optional ASCII, Modbus and DNP communication protocols.

6. **Combined Rack**
   This optional feature is used to group multiple racks to form a system with one common unit that can display all alarms and transmit them using the communication protocols. It is only configured on the unit with option CR in the model number.

7. Access Control
   This is used to grant or deny access to various functions.

8. **Network**
   Used to configure the IP Address for your unit.

9. **Date/Time**
   Used to set the time and date or configure the system for external time synchronization

10. Email
    Used to configure the optional email notification upon alarm

11. **Save/Restore**
    Used for saving and restoring the web browser configuration

12. Firmware
    Used for uploading new firmware to the unit

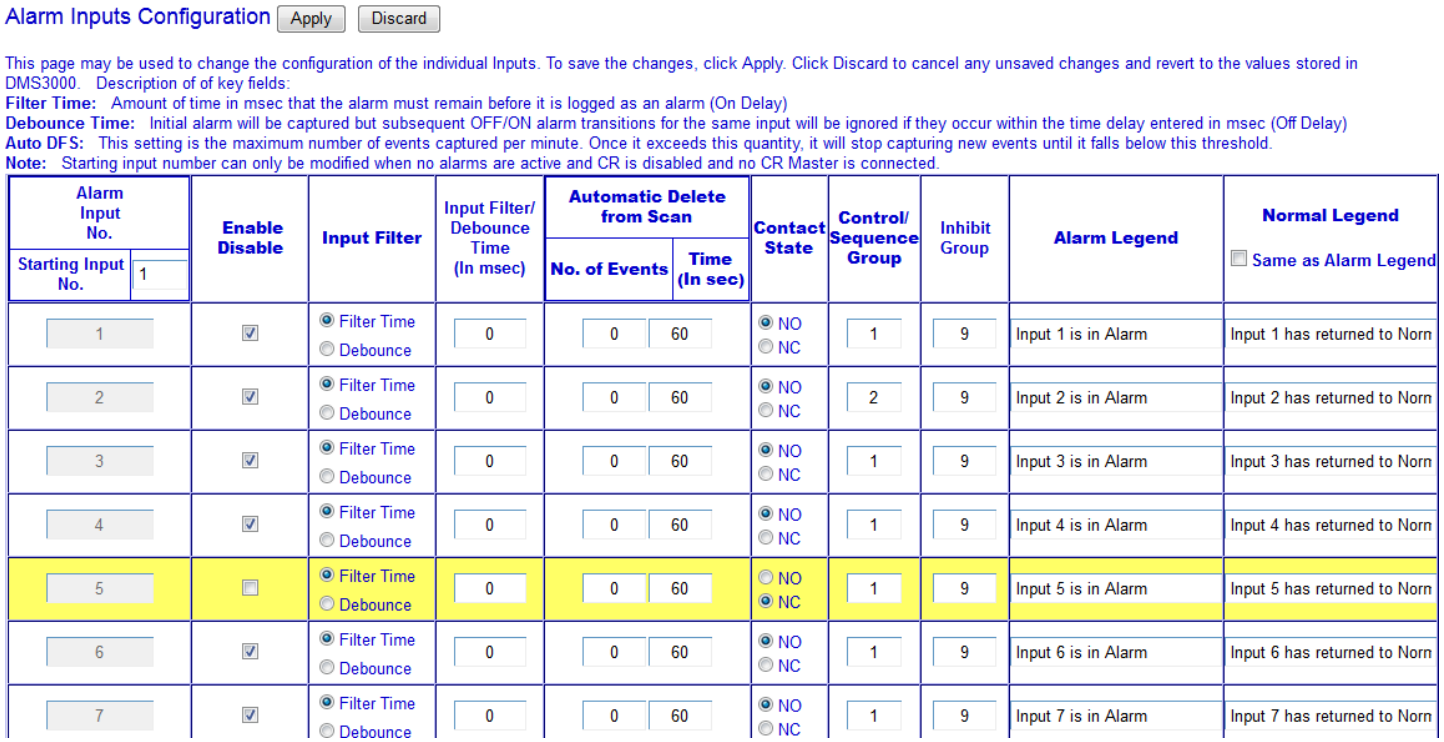
13. Option Upgrade
    Used for upgrading the unit with available options

14. Color Selection
    Used for customizing the color of alarms and events on the web browser

15. Logon as User
    Allows you to switch from Administrator log-on to the User logon.

Alarm Inputs Configuration

This configuration screen will display the quantity of input channels in your DMS-3K model up to the maximum 128 inputs. The configuration allows you to configure the contact alarm details and add a input and a unique legend that is used to describe the alarm or normal state. Alarm Inputs can be connected to the 8 I/O, 16 I, I/R and 8 IAM modules.



Alarm Inputs Configuration [Apply] [Discard]

This page may be used to change the configuration of the individual Inputs. To save the changes, click Apply. Click Discard to cancel any unsaved changes and revert to the values stored in DMS3000. Description of of key fields:
Filter Time: Amount of time in msec that the alarm must remain before it is logged as an alarm (On Delay)
Debounce Time: Initial alarm will be captured but subsequent OFF/ON alarm transitions for the same input will be ignored if they occur within the time delay entered in msec (Off Delay)
Auto DFS: This setting is the maximum number of events captured per minute. Once it exceeds this quantity, it will stop capturing new events until it falls below this threshold.
Note: Starting input number can only be modified when no alarms are active and CR is disabled and no CR Master is connected.

Alarm Input No. / Starting Input No.	Enable Disable	Input Filter	Input Filter/ Debounce Time (In msec)	Automatic Delete from Scan: No. of Events	Automatic Delete from Scan: Time (In sec)	Contact State	Control/ Sequence Group	Inhibit Group	Alarm Legend	Normal Legend / Same as Alarm Legend
1	☑	Filter Time / Debounce	0	0	60	NO / NC	1	9	Input 1 is in Alarm	Input 1 has returned to Norn
2	☑	Filter Time / Debounce	0	0	60	NO / NC	2	9	Input 2 is in Alarm	Input 2 has returned to Norn
3	☑	Filter Time / Debounce	0	0	60	NO / NC	1	9	Input 3 is in Alarm	Input 3 has returned to Norn
4	☑	Filter Time / Debounce	0	0	60	NO / NC	1	9	Input 4 is in Alarm	Input 4 has returned to Norn
5	☐	Filter Time / Debounce	0	0	60	NO / NC	1	9	Input 5 is in Alarm	Input 5 has returned to Norn
6	☑	Filter Time / Debounce	0	0	60	NO / NC	1	9	Input 6 is in Alarm	Input 6 has returned to Norn
7	☑	Filter Time / Debounce	0	0	60	NO / NC	1	9	Input 7 is in Alarm	Input 7 has returned to Norn

Figure 3–11. Alarm Inputs Configuration Page

Input

The input number is included with every alarm and return to normal event. The default input number will start at 1. It can be changed to start on any input and will automatically increment all subsequent input numbers.

Input Number Assignments:

The Alarm Input numbers correspond to the Digital and Analog I/O installed in your system. Each I/O card is addressed via switch settings to correspond to a group of inputs. For example, if your system has (4) 16 I Digital Input Modules addressed for the first 4 positions and you start your inputs at 1, the first module will have inputs 1-16, second module has 17-32, third has 33-48 and fourth has 49-64.

In systems with Analog Inputs, each Analog Input Channel allocates 4 Alarm Inputs to allow for 4 trip settings. Analog Inputs always start at the beginning of the inputs assigned. In the example above, if the system had (2) 8 IAM Analog Modules and (4) 16 I Digital Input Modules, the first 8 IAM Analog Input Module would be assigned inputs 1-32, second 8 IAM module

would have inputs 33-64, first 16 I Digital Input module will have inputs 65-80, second 16 I module has 81-96, third 16 I module has 97-112 and fourth 16 I module has 113-128.

Combined Systems:
When multiple DMS-3K units are used in a system using 'CR' option, it will be necessary to increment the input numbers, so you don't end up with the same input number on different systems. *(The CR option is used to collect alarms from up to 15 DMS-3K units and display them on a single DMS-3K unit)*

The unit with the CR feature is designated as a Master and must start the input numbering at 1. The first slave unit would then start after the alarm input and control input numbers.

Example: If the Master had 128 Alarm Inputs and the Slave had the same configuration; the starting input on the master would be 1 and the starting input on the slave would be 129.

Note: Before enabling the CR feature on the Master, the Slave unit input numbers must be assigned.

Enable/Disable

You have the ability to disable alarms that may be out for service. Once disabled, they will no longer indicate an alarm regardless of the input state. This prevents it from being displayed, saved to the event log and sent out through the email notification or any of the communication protocols (ASCII, Modbus, DNP). Disabled alarms are highlighted as a reminder on this configuration page and the Home Page Graphic view as well as an entry in the event log.

Input Filter:

Input Filters are typically used to screen out momentary (false) alarms and Debounce Filters are used to eliminate repetitive alarms from a chattering contact. The Automatic Delete from Scan function is used to disable a repetitive alarm for a period of time until it settles down and then record it when it finally stays in the alarm state.

Input Filter / Debounce Time:

Values can be 0–65535ms. 0 defaults to 1ms input response.

If the filter mode is set as "Filter Time", this value is the time that the alarm must be present before an alarm is registered. For example, if you set the time to 200ms, then the contact must stay in alarm for 200ms before it is registered. Once it exceeds the filter time, the alarm will be recorded using the time stamp when it first went into the alarm state.

If the filter mode is set to "Debounce", active alarms will be prevented from multiple occurrences for the set time period. For example, if you set the Debounce time to 200 ms and the contact goes in alarm but toggles on and off 100 ms apart for several seconds before eventually staying in the alarm state, only one alarm will be recorded with a timestamp when it first went into the alarm state.

The DMS-3K has a built-in filter to screen out sub-millisecond contact bounce or noise. Each Input requires 4 continuous successful samples (at 0.5 msec each) before an alarm is captured. Time stamp is recorded at first successful sample of the 4.

Automatic Delete From Scan:
This is designed to block inputs that occur beyond a configured frequency. You enter a number of events over a time period and once it exceeds that level, it will stop more alarms from filling up the event log until the frequency of alarms falls below the settings. Example: If the setting was 10 events in 60 seconds and more than 10 events occurred in 60 seconds (input goes in alarm, returns to normal, goes back in alarm, etc), the system would capture the first 10 events but stop capturing new alarms. Once the alarm rate dropped below this rate, it would re-enable this alarm input. This setting can be applied to each input channel individually.

Contact State:
Depending on the contacts used, set the contact for NO (Normally Open) or NC (Normally Closed). Normally Open = field contact input is open in normal state, closes on alarm
Normally Closed = field contact input is closed in normal state, opens on alarm.
Note: The selection of NO/NC can also be performed via the input module DIP Switches (reference chapter 6). If the input module dip switch is set for NC, it will override the NO/NC setting on the web browser.

Control / Sequence Group:
Control/Sequence groups are used for determining the operating sequence which determines how the lamp outputs, Horn Outputs and Control Pushbuttons (Test, Ack, Reset, etc) function for a given input. This is used in conjunction with the Pushbutton Inputs and Sequence Group selections on the Control Inputs Configuration WEB page. For example, if you configure Sequence M (Manual Reset) on Group 2 (as per the Control Inputs web page) and you want Alarm Input 7 to follow that sequence, you would select group 2 on the Alarm Inputs page for that input. Up to 8 Control/Sequence groups are allowed. This is useful when dividing the inputs up into several First Out Groups. The First Out Sequence will ‘flash’ the lamp output differently for the first alarm in that group making it easy to differentiate.
The default is Group 1.

Inhibit Group:
Inhibit Groups are used in conjunction with the Inhibit Switch Input which can disable a group of inputs. Up to 16 groups are allowed. The Inhibit Switch is configured on the Control Inputs WEB page. Example, if you wish to disable Alarm Inputs: 1,4,5,8,9,11,45,87 from a single Inhibit Switch that was configured as Group 3 on the Control Inputs WEB Page, you would select inhibit group 3 on every input: 1,4,5,8,9,11,45,87
The default is group 1.

Alarm Legend:
You may identify each input with a specific description up to to 32 Alpha Numeric characters (including spaces). If no description is entered, the default will be Input # is in Alarm. The Alarm Legend will be displayed on the DMS-3K Home Page Annunciator Graphic, Active Alarm Page, Event Log page, event download, ASCII output and printouts. Legends support the 1st 128 characters of ASCII character set.

Normal Legend:
The Normal Legend will be displayed when the input has cleared. You can enter up to 32 Alpha Numeric characters (including spaces). It will be displayed on the DMS-3K Home Page Annunciator Graphic, Active Alarm Page, Event Log page, event download, ASCII output and printouts. If you click the *Same as the Alarm Legend* check box, the description will mirror the Alarm Legend. And nothing will be displayed in this column. Legends support the 1st 128 characters of ASCII character set.

Set all Inputs
(at bottom) To set an entire column to the same setting, enter the value and press the tab key. You will be prompted to set all settings to the same value. This can save you time rather than setting each input individually.

Import / Export Legends
As shown in figure 3-12a, the legend import / export allows you to upload or download legends from a csv file. To see the csv file format, refer to Appendix J. Or, simply export the default legends configured into the DMS-3K and you will see the required format in your csv file. Also, the instructions are included in the csv export file for reference.

Note: The legend format matches the ISM SER format for legends. When transferring the legends from an ISM system, export the legends from the ISM and then import that file into the DMS-3K.

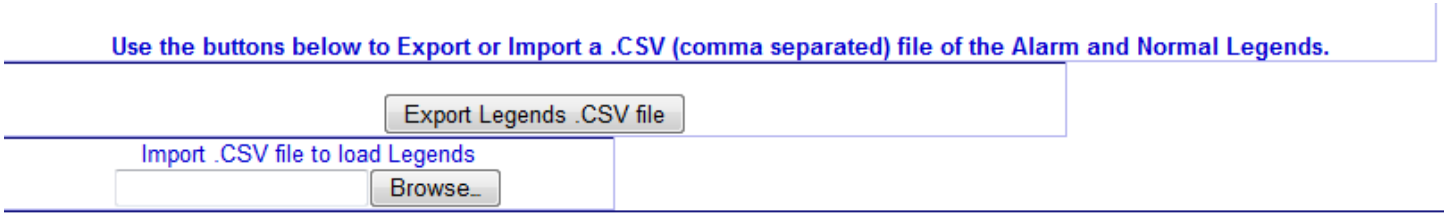
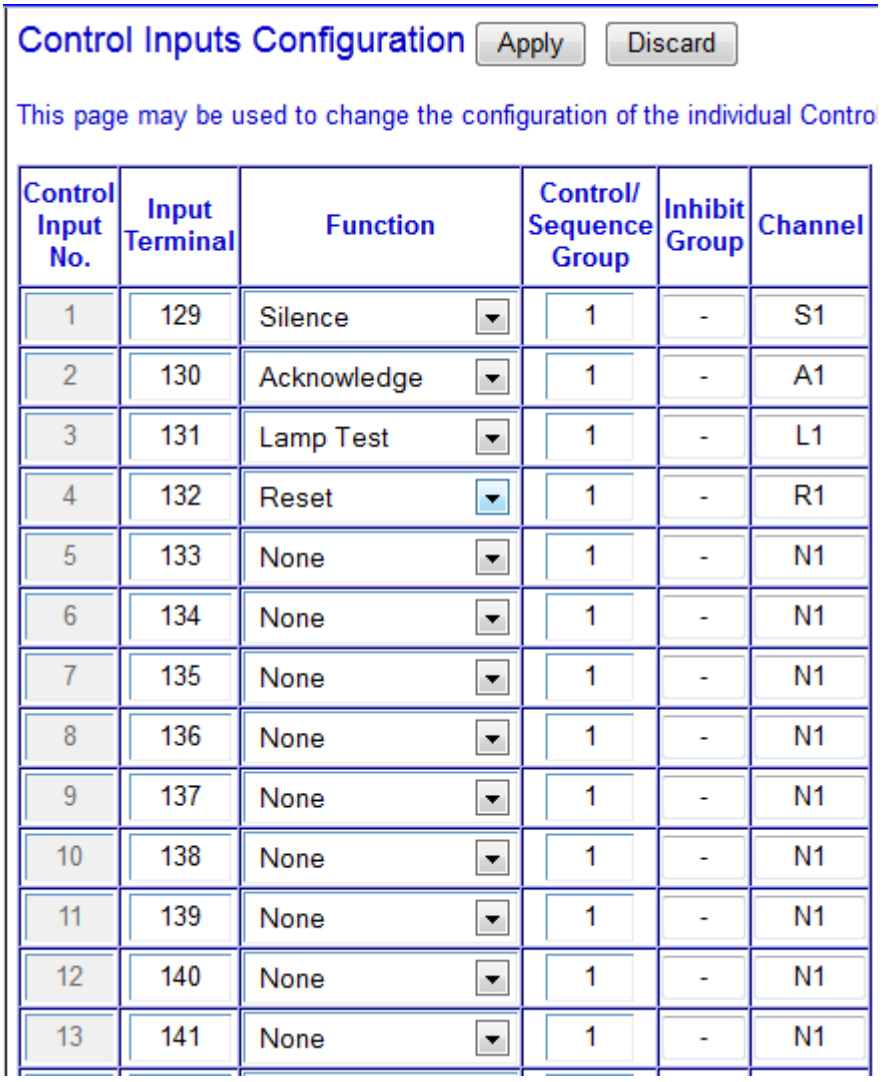


Figure 3-12a Import / Export Legends

Once you are finished with the settings, click *Apply* (must be logged in as Administrator)

Control Inputs Configuration

The Control Inputs Configuration page is used for setting up which control pushbuttons are used and what terminals they are connected to. This page is also used for setting up the different operating sequences which determines how the lamp outputs, Horn Outputs and Control Pushbuttons (Test, Ack, Reset, etc) function. Up to 64 Control Inputs are available. Control Input pushbuttons and switches are connected to the 8 I/O, 16 I or I/R modules.



Control Input No.	Input Terminal	Function	Control/ Sequence Group	Inhibit Group	Channel
1	129	Silence	1	-	S1
2	130	Acknowledge	1	-	A1
3	131	Lamp Test	1	-	L1
4	132	Reset	1	-	R1
5	133	None	1	-	N1
6	134	None	1	-	N1
7	135	None	1	-	N1
8	136	None	1	-	N1
9	137	None	1	-	N1
10	138	None	1	-	N1
11	139	None	1	-	N1
12	140	None	1	-	N1
13	141	None	1	-	N1

Figure 3–13. Control Inputs Configuration Page

Input Terminal:

The Input Terminal assignment is based on the number of digital Alarm Inputs in the system and the switch settings used for that module. These Input terminals should start after the last input number configured up to a maximum of Input Terminal 192. Example: In a system

configured with 128 Alarm Inputs and 8 Control Inputs using a 8 I/O module, the Control Inputs would be assigned to input terminals 129-136.

Note: Control Inputs can be configured for any digital input channel 1-128 if desired. There is no restriction to start them at input 129. Input 129 is the default to keep them isolated from digital inputs so that a field contact isn't mistakenly connected to a control input.

Function:

The function selection lets you pick the type of control pushbutton or inhibit switch. The available selections are:

Acknowledge:	This pushbutton input is used to silence a horn and change the lamp output status per the operating sequence. For example, when using a 'M' manual reset sequence, the acknowledge pushbutton will change the lamp output from flashing on and off to steady on.
Silence:	This control input will turn off the Horn Output when there is an active alarm.
Reset:	This pushbutton input is used for operating sequences that latch an alarm until it is manually reset by an operator, causing the lamp output to turn off.
First Out Reset:	This pushbutton input is used for First-Out operating sequences that latch an alarm until it is manually reset by an operator, causing the lamp output to turn off.
Lamp Test:	This pushbutton input will operate all lamp outputs per the designated operating sequence to verify correct operation – no burned out lamps, disabled horns.
Full Function Test:	This pushbutton input will operate lamp and horn outputs per the designated operating sequence to verify correct operation - no burned out lamps, disabled horns. (Requires a momentary pushbutton closure.)
Inhibit:	This switch input is used to disable an input or group of inputs.

All pushbuttons above are activated via a momentary closure. The Inhibit Switch is a sustained closure. Refer to Appendix E for a list of all operating Sequences and their operation.

Control/Sequence Group:
This is used to assign the control input to any of 8 groups. The groups correspond to specific alarm inputs as configured in the Alarm Inputs page. For example: If you wanted a test pushbutton to only operate specific alarm inputs, you would designate that group number for the test pushbutton and assign it to all inputs in the Alarm Inputs configuration page.
Control Group 1 is a global 'system-wide' group that controls all inputs regardless of which control group is assigned.
For example: If Input channel #23 is configured for Control Group 4 (reference the Alarm Inputs Configuration screen), any pushbutton assigned to Control Group 4 will control that input channel #23. In addition, any pushbutton assigned to Control Group 1 will also control the same input channel #23.

Inhibit Group:
Similar to above but with the Inhibit Switch inputs.

Channel:
This will display an abbreviation of the control switch and group number configured.

Operating Sequence Configuration:
Up to 12 operating sequences can be configured for each Logic Card Rack. The available operating sequences are:

- ISA-A Automatic reset with lock-in of alarms
- ISA-A-4 Automatic reset with no lock-in of alarms
- ISA-A-4-5-6 Automatic reset, non-locking, no flash, no audible, NO PB
- ISA-M Manual Reset with lock-in of alarms
- ISA-F1A-1 First Out Flash, Subsequent alarm steady, auto reset
- ISA-F2A-1 First Out, Fast Flash, auto reset
- ISA-F2M-1 First Out, no subsequent alarm flash, manual reset
- ISA-F3A First Out, triple flash, first out reset
- ISA-F3M First out, triple flash, first out manual reset
- ISA-FFAM2 First Out, manual reset
- ISA-R Ringback, separate flash for return to normal
- ISA-R-12 Automatic Momentary Ringback, dual flash, manual reset

Refer to Appendix H for a list of all operating Sequences and their operation.

Control Interlock:
This requires that the Silence, Acknowledge and Reset pushbuttons are pressed in this exact order. Anything else will be ignored.
For example; if the Acknowledge pushbutton is pressed before the Silence, it will not have any effect. (Note: If the Reset function is not required for the alarm sequence selected, it will be ignored.)

Flash Type Settings:

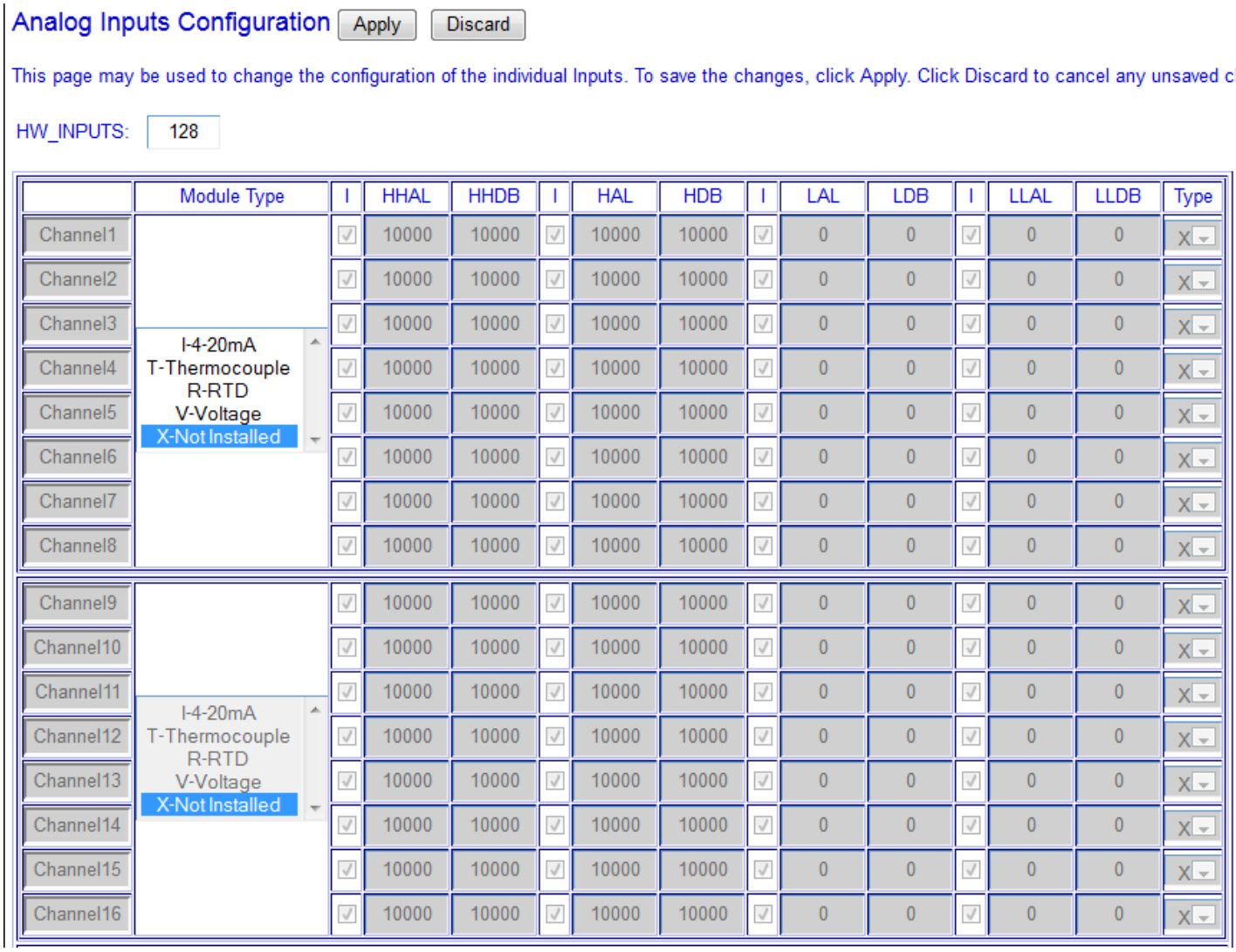
The flashing of the lamp outputs can be adjusted for on and off times.

Sequence Group	Sequence	Control Interlock
1	ISA-M	☐
2	ISA-M	☐
3	ISA-M	☐
4	ISA-M	☐
5	ISA-M	☐
6	ISA-M	☐
7	ISA-M	☐
8	ISA-M	☐

Flash Type	ON		OFF	
Slow	1.2	sec	1.2	sec
Fast	0.4	sec	0.4	sec
Intermittent	0.4	sec	0.4	sec
Intermittent Period	2.4	sec	2.4	sec

Analog Inputs Configuration

This page is used to configure the analog inputs from the 8 IAM module



Module Type:

This allows you to select the type of Analog Input Module. (The 4-20mA module is the only one supported)

Analog Input Trip Settings:

For each analog input channel, you can select up to 4 trip settings:

- HHAL High-High Alarm
- HAL High Alarm
- LAL Low Alarm
- LLAL Low-Low Alarm

For each analog channel, you also have a corresponding deadband setting:

- HHDB High-High Deadband
- HDB High Deadband
- LDB Low Deadband
- LLDB Low-Low Deadband

Deadband is the range you select that will latch an alarm until it exceeds that setting. HHDB and HDB settings are below the HHAL and HAL settings while LLDB and LDB setting are above the corresponding LLAL and LAL settings.

Analog Input Alarm Trip Settings:
These settings can range from 1-10,000 which correspond to the analog input.
Example, if using a 4-20mA input, a setting of 5,000 would be at 50% of full scale or 12mA.

Converting mAmps to Setting
Subtract mA by 4 then divide by 0.0016 to get 5 digit entry value.
Example: to determine the trip setting for 8mA input 8-4 / 0.0016 = 2,500

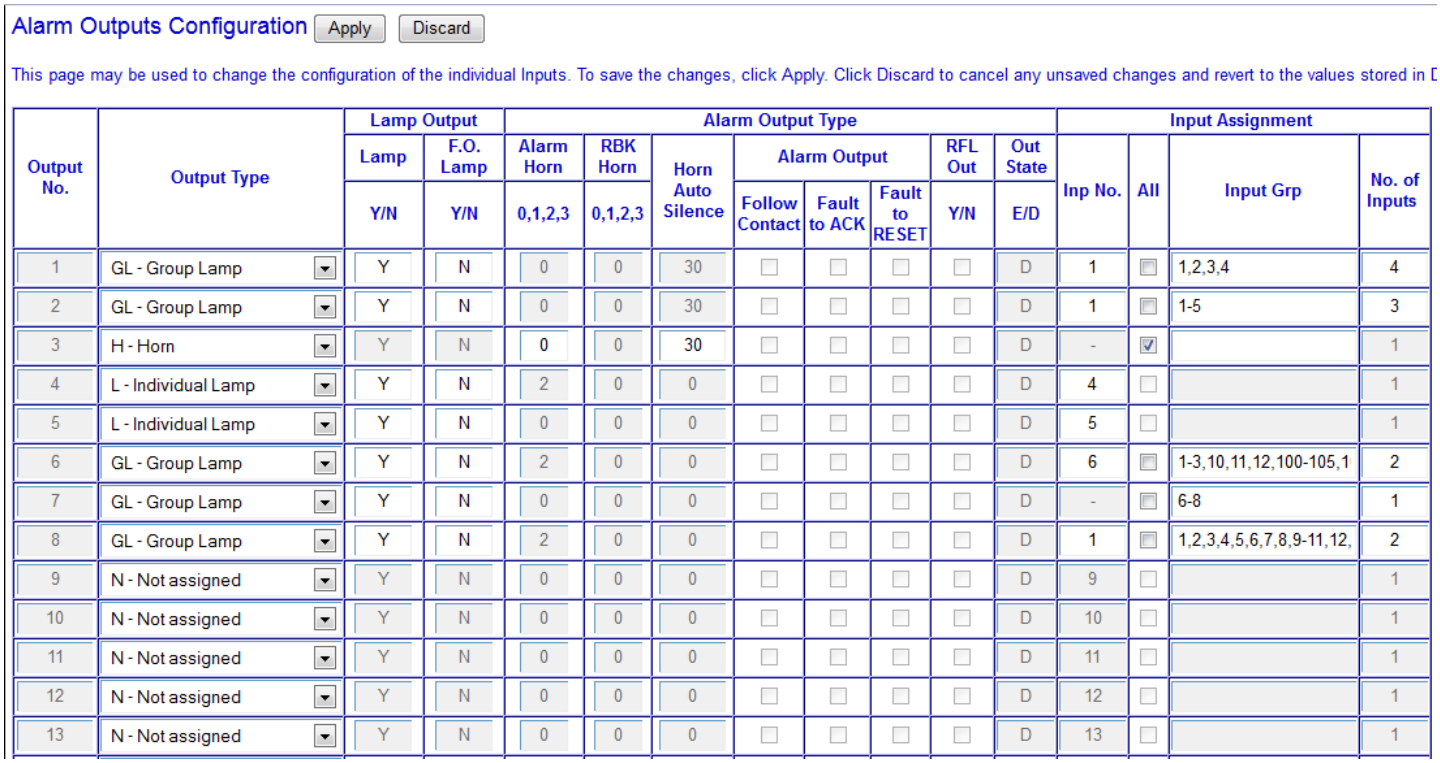
Converting % of Scale to Setting
Multiply % of Scale x 10,000 to get 5 digit entry value
Example: to determine the trip setting for 75% of Full Scale: (75% x 10,000) = 7,500

Analog Input Alarm Deadband Settings:
These settings can range from 1-10,000 which correspond to the analog input.
Deadband or 'Hysteresis' is the value used to reset the alarm.
For example, if the HHAL setting was set at 90% of full scale (setting of 9,000) and it needs to reset at 85% of Full Scale, the HHDB setting would be 8,500.
LLDB and LDB settings must be higher than the LLAL and LAL setting.
Example, if the LLAL setting was 10% of full scale (setting of 1,000) and it needs to reset at 15% of Full Scale, the LLDB setting would be 1,500.

Enabling or Disabling Settings:
All Alarm and Deadband settings need to be enabled (checkbox) before they will operate. They can be disabled by un-checking the selection box.

Alarm Outputs Configuration

This configuration screen will display the output channels in your DMS-3K model up to the maximum 240 outputs. The configuration allows you to configure the output type (Lamp or Alarm) and which input(s) are assigned to each output. Alarm Outputs can be connected to the 8 I/O, 16 O, I/R, 8RR, 16RR and 5 PR modules.



Alarm Outputs Configuration [Apply] [Discard]

This page may be used to change the configuration of the individual Inputs. To save the changes, click Apply. Click Discard to cancel any unsaved changes and revert to the values stored in D

Output No.	Output Type	Lamp Output		Alarm Output Type								Input Assignment			
		Lamp	F.O. Lamp	Alarm Horn	RBK Horn	Horn Auto Silence	Alarm Output			RFL Out	Out State	Inp No.	All	Input Grp	No. of Inputs
		Y/N	Y/N	0,1,2,3	0,1,2,3		Follow Contact	Fault to ACK	Fault to RESET	Y/N	E/D				
1	GL - Group Lamp	Y	N	0	0	30	☐	☐	☐	☐	D	1	☐	1,2,3,4	4
2	GL - Group Lamp	Y	N	0	0	30	☐	☐	☐	☐	D	1	☐	1-5	3
3	H - Horn	Y	N	0	0	30	☐	☐	☐	☐	D	-	☑		1
4	L - Individual Lamp	Y	N	2	0	0	☐	☐	☐	☐	D	4	☐		1
5	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	5	☐		1
6	GL - Group Lamp	Y	N	2	0	0	☐	☐	☐	☐	D	6	☐	1-3,10,11,12,100-105,1	2
7	GL - Group Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	-	☐	6-8	1
8	GL - Group Lamp	Y	N	2	0	0	☐	☐	☐	☐	D	1	☐	1,2,3,4,5,6,7,8,9-11,12,	2
9	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	9	☐		1
10	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	10	☐		1
11	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	11	☐		1
12	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	12	☐		1
13	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	13	☐		1

Output No:

Outputs start at 1 and can go to the maximum 240.

Output Number Assignments:

The Output numbers correspond to the Digital and Relay Output Modules installed in your system. Each I/O card is addressed via switch settings to correspond to a group of outputs. For example, if your system has (4) 16 O Digital Output Modules addressed for the first 4 positions, the first module will have Outputs 1-16, second module has 17-32, third has 33-48 and fourth has 49-64. If using a 8RR or 16RR module, the same concept is applied.

Output Type:

Available output types consist of:

- L Individual Lamp
  This output is commonly used for connection to remote Annunciator Displays. The output operates from a single alarm input channel which you can assign. The Lamp Output will follow the operating sequence selected for the alarm input assigned to this output. This output is typically used with 8 I/O and 16 O modules but can be used with 8RR, 16RR, 5 PR, 8PR and I/R modules.

- GL Group Lamp
  This output can be used to multiplex several alarm inputs into a single lamp output for connection to a remote Annunciator Display. Or it can be used as an output to a common alarm indicator to represent the general alarm status of the system. The output operates from a group of alarm input channels which you can assign. The group operates with OR logic, so that any alarm input in that group will activate an alarm. The Lamp Output will follow the operating sequence selected for the alarm input assigned to this output. This output is typically used with 8 I/O and 16 O modules but can be used with 8RR, 16RR, 5 PR, 8PR and I/R modules.

- FP First Up Lamp
  This output is commonly used for connection to remote Annunciator Displays, although specifically for systems with First-out operating sequences. In these cases, a remote Annunciator Display may use two separate lamp inputs per window; one for a standard lamp output and another for a first Up lamp output. The output operates from a single or group of alarm input channels which you can assign. The First Up Lamp Output will follow the first out operating sequence selected for the alarm input assigned to this output. This output is typically used with 8 I/O and 16 O modules but can be used with 8RR, 16RR, 5 PR, 8PR and I/R modules.

- GR Group Relay
  This output is used as a common alarm relay to present the status of multiple inputs. It will follow the status of all the inputs selected so if one input in the group is in alarm, the relay will operate. There are settings to select the operation of this contact to: always follow the status of all inputs selected, de-activate the relay when the Acknowledge Pushbutton is used or de-activate the relay when the Reset Pushbutton is used. There is a setting to determine the relay coil state (energized or de-energized when normal). Energized is used as a failsafe mode, so that a loss of power would have the same condition as an alarm. This output is typically used with 8RR, 16RR, 5 PR, 8PR and I/R modules, but can be used for 8 I/O and 16 O modules.

- IR Individual Relay
  This output is used as an alarm repeat relay to re-transmit the status of a single Alarm Input. There are settings to select the operation of this contact to: always follow the status of the input selected, de-activate the relay when the Acknowledge Pushbutton is used or de-activate the relay when the Reset Pushbutton is used. There is a setting to

determine the relay coil state (energized or de-energized when normal). Energized is used as a failsafe mode, so that a loss of power would have the same condition as an alarm. This output is typically used with 8RR, 16RR, 5 PR, 8PR and I/R modules, but can be used for 8 I/O and 16 O modules.

- H Horn
  This output is used to activate a horn from a group of inputs. The horn will operate in conjunction with the operating sequence selected. (clears with silence and acknowledge pushbuttons) There are additional settings to select the priority of this horn (from 1-3) when multiple horns are provided in a system to avoid the sound of multiple horns going off simultaneously. The Horns selected as 1 will have priority over the horns selected as 2 or 3. If an alarm horn is activated as a priority 2 and a priority 1 horn turns on, the priority 2 horn will turn off. Horns selected with priority 0 have no priority over other horns. The horn can be configured with an automatic silence feature configured for 0-300 seconds. This output is typically used with 8RR, 16RR, 5 PR and I/R modules. In many cases, the digital output from the 8 I/O and 16 O modules is used for a Horn output which is connected to the Power Supply Regulator Horn Input which can provide a higher powered relay output.

- CH Clear Horn
  This output is used to activate a ‘clear horn’ from a group of inputs configured with a Ringback operating sequence. (clears with silence and acknowledge pushbuttons) When used in a Ringback operating sequence, the ‘clear horn’ sounds when an input returns to normal. There are additional settings to select the priority of this ‘clear horn’ (from 1-3) when multiple ‘clear horns’ are provided in a system to avoid the sound of multiple horns going off simultaneously. The ‘clear horns’ selected as 1 will have priority over the ‘clear horns’ selected as 2 or 3. If a ‘clear horn is’ activated as a priority 2 and a priority 1 ‘clear horn’ turns on, the priority 2 ‘clear horn’ will turn off. Clear horns selected with priority 0 have no priority over other horns. The horn can be configured with an automatic silence feature configured for 0-300 seconds. This output is typically used with 8RR, 16RR, 5 PR and I/R modules. In many cases, the digital output from the 8 I/O and 16 O modules is used for a Horn output which is connected to the Power Supply Regulator Horn Input which can provide a higher powered relay output.

- RP Group Reflash Pulse
  This output is used as a common alarm relay to present the status of multiple inputs. It will follow the status of all the inputs selected so if one input in the group is in alarm, the relay will operate. Whenever there is a new alarm in that group, the contact will pulse open for a half second and remain closed until all alarms in the group return to normal. The Reflash Output needs to be enabled with a check box in the RFL Out box. There is a setting to determine the relay coil state (energized or de-energized when normal). Energized is used as a failsafe mode, so that a loss of power would have the same condition as an alarm. This output is typically used with 8RR, 16RR, 5 PR and I/R modules, but can be used for 8 I/O and 16 O modules.

Input Assignments:
Each output channel can have alarm inputs assigned in several methods:

- Inp. No.
  Individually, one input per output
  -used with individual lamp and individual relay outputs

- All
  All alarm inputs in the system
  -used with Group Lamps, First Up Lamps, Group Relays, Horns, Clear Horns and Reflash Outputs

- Input Grp
  This is used to select a group of alarm inputs that are multiplexed together to trigger some output. The output follows Boolean OR logic, so that any one input in the group will trigger that output. Enter the group of inputs with commas to separate inputs (1,2,3,4 etc) or dashes (1-4) for a group of alarm or combinations of both (1-4,5,9). Up to 32 digits may be entered including commas and dashes.
  -used with Group Lamps, First Up Lamps, Group Relays, Horns, Clear Horns and Reflash Outputs

- No. of Inputs
  This is used in conjunction with the Input Group above. It is used to apply Boolean AND/OR Logic to the group of Inputs or used to apply Voting Logic. Examples below.

  Example of AND Logic:
  If the quantity of inputs in the group is equal to 5, a setting of 5 requires all 5 inputs to be in alarm before triggering the output.

  Example of OR Logic:
  If the quantity of inputs in the group is equal to 5, a setting of 1 requires any one of the 5 inputs to be in alarm before triggering the output.

  Example of Voting Logic:
  If the quantity of inputs in the group is equal to 5, a setting of 3 requires a minimum of 3 inputs to be in alarm before triggering the output.

Example for a System Configuration of Input / Output Assignments:

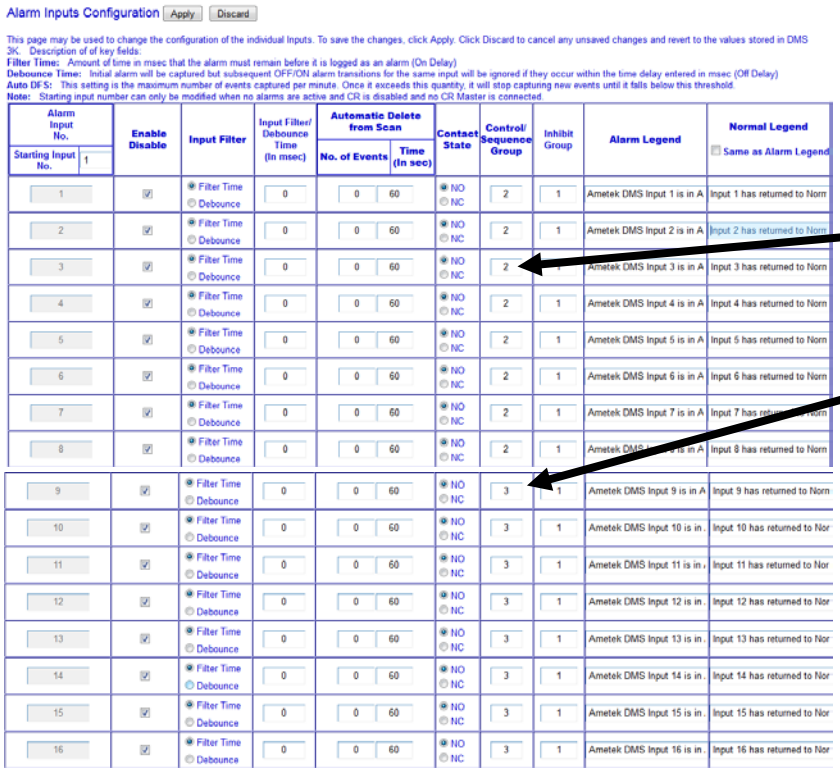
System Requirements for example:

- 16 field contact inputs
- 16 lamp outputs for connection to a remote display
- Inputs 1-8 follow Alarm Operating Sequence A (Automatic Reset)
- Inputs 9-16 follow Alarm Operating Sequence M (Manual Reset)
- Test Pushbutton provided for all inputs 1-16
- Acknowledge Pushbutton provided for inputs 1-8
- Acknowledge Pushbutton provided for inputs 9-16
- Reset Pushbutton provided for inputs 9-16
- Horn Relay Output provided for all inputs
- 10 second automatic silence for the horn
- Common Alarm Relay contact output for inputs 1-8
- Common Alarm Relay contact output for inputs 9-16

DMS-3K Hardware Provided:

- One 3U input card rack (10 Card Slots)
- Two 8 I/O input modules installed in rack (card slots 1 & 2)
- One I/R input relay module installed in rack (card slot 10)

Alarm Inputs Configuration



Notes:

- Inputs 1-8 configured for Control Group 2 (8 I/O card in slot #1)
- Inputs 9-16 configured for Control Group 3 (8 I/O card in slot #2)

Control Inputs Configuration

Control Inputs Configuration Apply Discard

This page may be used to change the configuration of the individual Control

Control Input No.	Input Terminal	Function	Control/ Sequence Group	Inhibit Group	Channel
1	129	Full Function Test	1	-	T1
2	130	Acknowledge	2	-	A2
3	131	Acknowledge	3	-	A3
4	132	Reset	3	-	R3

Sequence Group	Sequence	Control Interlock
1	ISA-A	
2	ISA-A	
3	ISA-M	
4	ISA-M	
5	ISA-M	
6	ISA-M	
7	ISA-M	
8	ISA-M	

Notes:

- I/R Card installed in slot #10. Card Dip Switches set to start input numbering at 129
- Test Pushbutton configured for Group 1 (controls all inputs). Wired to input terminal 129 (I/R module input 1)
- One Acknowledge PB configured for Group 2 (inputs 1-8) Wired to input terminal 130 (I/R module input 2)
- One Acknowledge PB configured for Group 3 (inputs 9-16) Wired to input terminal 131 (I/R module input 3)
- One Reset PB configured for Group 3 (inputs 9-16) Wired to input terminal 132 (I/R module input 4)
- Sequence A configured for group 2 (inputs 1-8)
- Sequence M configured for group 3 (inputs 9-16)

Alarm Outputs Configuration

Alarm Outputs Configuration [Apply] [Discard]

This page may be used to change the configuration of the individual Inputs. To save the changes, click Apply. Click Discard to cancel any unsaved changes and revert to the values stored in

Output No.	Output Type	Lamp Output		Alarm Output Type								Input Assignment			
		Lamp	F.O. Lamp	Alarm Horn	RBK Horn	Horn Auto Silence	Alarm Output			RFL Out	Out State	Inp No.	All	Input Grp	No. of Inputs
		Y/N	Y/N	0,1,2,3	0,1,2,3		Follow Contact	Fault to ACK	Fault to RESET	Y/N	E/D				
1	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	1	☐		1
2	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	2	☐		1
3	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	3	☐		1
4	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	4	☐		1
5	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	5	☐		1
6	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	6	☐		1
7	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	7	☐		1
8	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	8	☐		1
9	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	9	☐		1
10	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	10	☐		1
11	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	11	☐		1
12	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	12	☐		1
13	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	13	☐		1
14	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	14	☐		1
15	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	15	☐		1
16	L - Individual Lamp	Y	N	0	0	0	☐	☐	☐	☐	D	16	☐		1
129	H - Horn	Y	N	0	0	10	☐	☐	☐	☐	D	-	☑		1
130	GR - Group Relay	Y	N	0	0	0	☑	☐	☐	☐	D	-	☐	1-8	1
131	GR - Group Relay	Y	N	0	0	0	☑	☐	☐	☐	D	-	☐	9-16	1
132	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	4	☐		1
133	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	5	☐		1
134	N - Not assigned	Y	N	0	0	0	☐	☐	☐	☐	D	6	☐		1

Notes:

- Input #1-8 are assigned to Lamp outputs #1-8 (8 I/O card in slot #1)
- Input #9-16 are assigned to Lamp outputs #9-16 (8 I/O card in slot #2)
- I/R Card installed in slot #10 corresponds to Outputs 129,130,131 as shown
- Output 129 configured as a Horn with all inputs assigned to it. Auto-silence configured for 10 seconds. (It will operate when any input 1-16 goes into alarm and will be silenced by either the Acknowledge pushbutton or automatically in 10 seconds)
- Output 130 configured as a 'Group Relay - Alarm Output', follows field contact, assigned to inputs 1-8. (It will operate when any input 1-8 goes into alarm and stay activated until all alarms return to normal)
- Output 131 configured as a 'Group Relay - Alarm Output', follows field contact, assigned to inputs 9-16. (It will operate when any input 9-16 goes into alarm and stay activated until all alarms return to normal)

Serial Communications Configuration (optional)

On this page, you configure the unit's Serial Communications parameters based on which protocol is enabled as an option. These settings are dependent on the device to which you will connect. The serial port supports a single connection of either: Modbus RTU, DNP and Serial ASCII protocol. After you make your selections, click *Apply*.

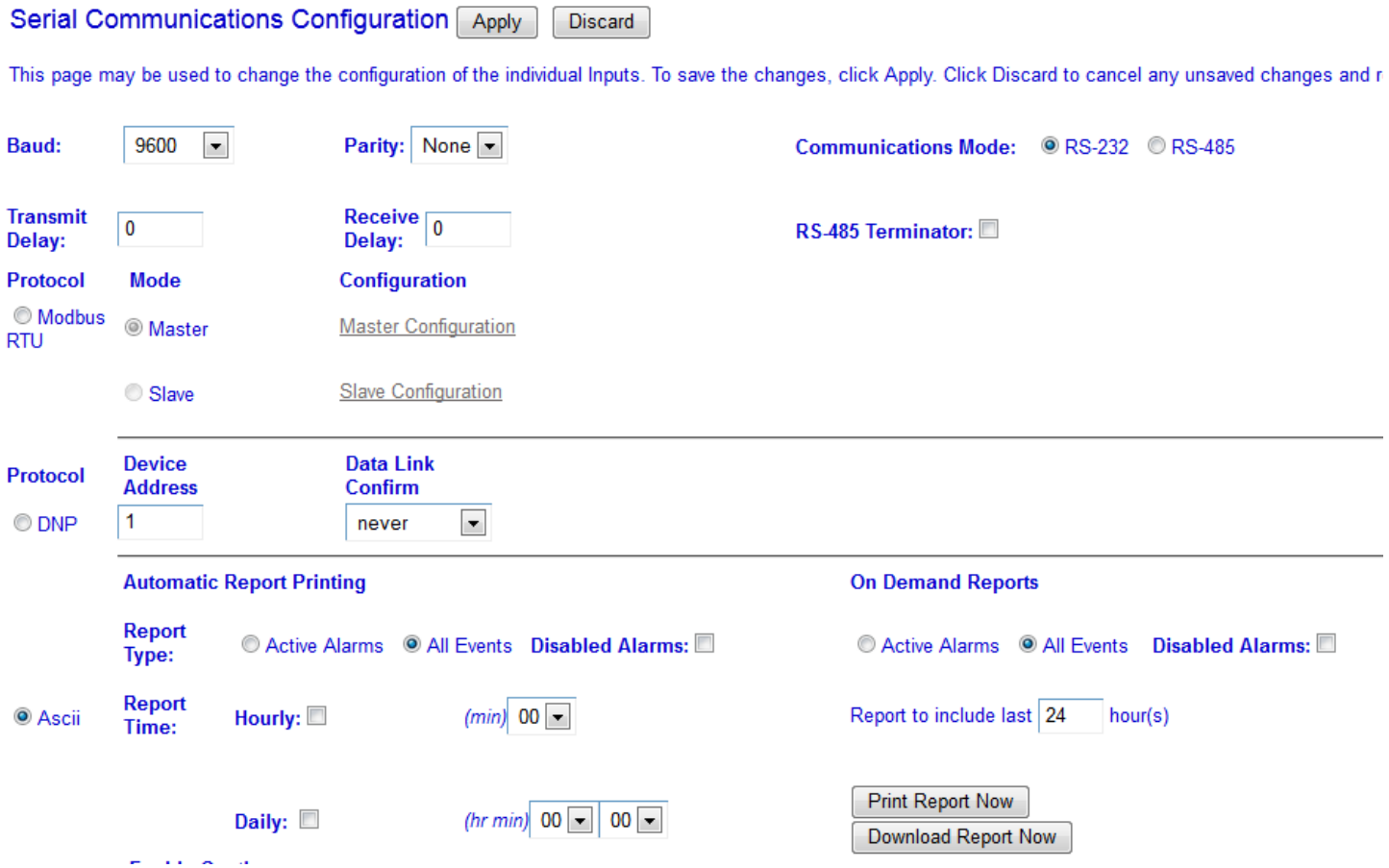


Figure 3–14a. Serial Communications Configuration Page (Top Half)

Serial Communication Set-up:

Select the Baud Rate, Parity and communication delays to match your application.
The DMS-3K has a single DB9 serial port that can be configured for RS-232 or RS-485 communication mode. Refer to Chapter 2 for RS-232 and RS-485 connections.

When using RS-485 to connect multiple devices together, the last unit in the RS485 network must be terminated with the RS-485 Terminator checkbox , all others devices in between should have RS485 terminator set to Disabled.

Once your communications parameters are set, you can choose the type of output desired. They are as follows:

Modbus RTU

The DMS-3K Modbus port supports both Master and Slave Modes. For either mode, the Modbus implementation will transmit the status (On/Off) and timestamp of each event. The transmitted alarms can be used to drive an AMETEK Annunciator, RTU, SCADA, PLC or other device. Refer to Appendix A for details on Modbus Functions supported and the mapping of I/O. The Modbus port supports device addresses of 1-255, a maximum Baud Rate of 19,200 and no parity.

The DMS-3K can transmit 'Events' or 'Alarms'

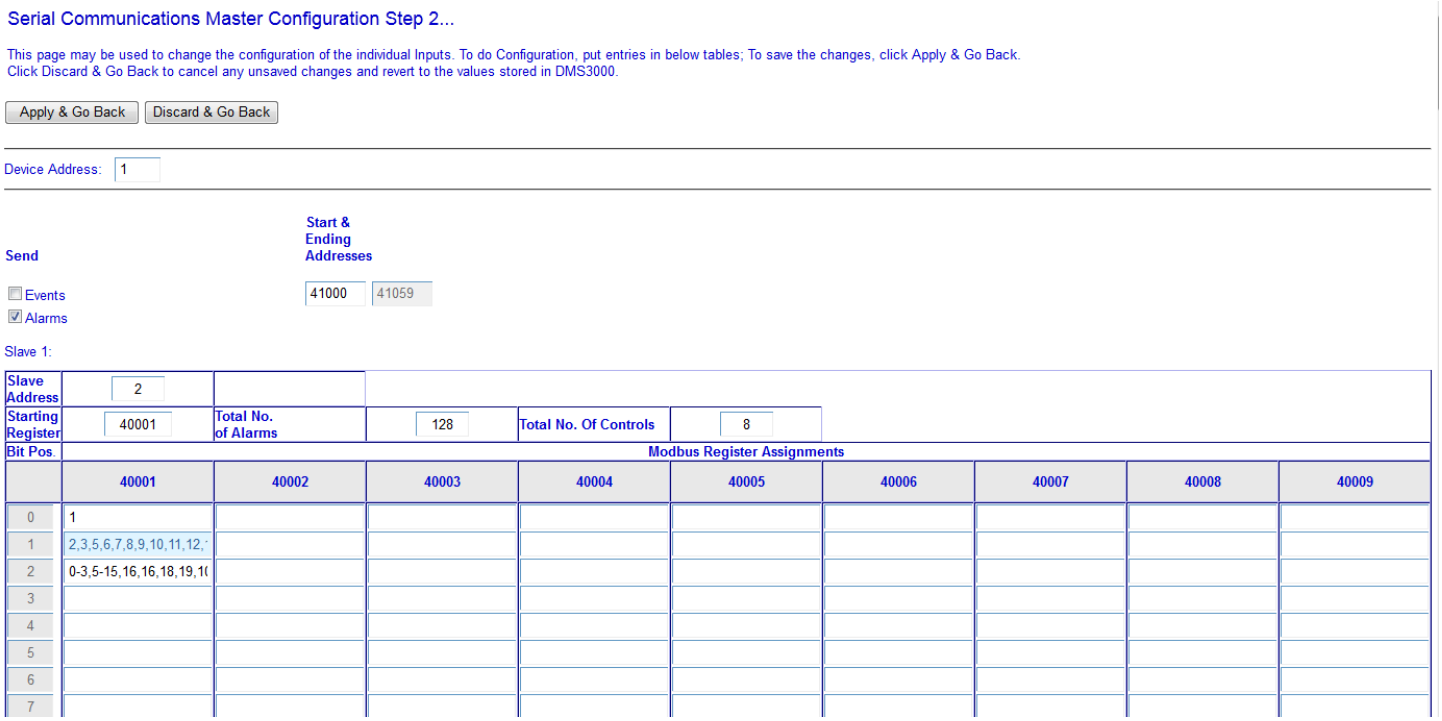
Events Mode: Select this to provide alarm status with a time and date stamp. The Modbus data will include the following data (decoded).

Date	Time	Input #	Time Sync Status	Event Type
10/26/12	15:32:43.163	124	Sync On or Off	Alarm or Normal

The Modbus interface requires six 16-bit registers for each event to provide the above event information (year, month, day, hour, min, sec, msec, alarm #, time sync, etc..) 10 events are returned per poll for a total of 60 registers per poll. The Modbus Start address can be configured based on the application. The ending address will automatically be calculated for the 60 registers required. Refer to Appendix A for complete details.

Alarm Mode: Select this to provide Alarm Status (On/Off status per input). Alarm Status is provided by reading 16-bit holding registers with a single bit designated per input or group of inputs. The configuration screen shows every bit (0-15) of the 16 bit register and you can enter a single alarm in any order you want or a group of alarms. In the figure below, the first bit (bit 0) of the Modbus register 40001 will present the status of input 1 and the second bit will present the status of a group of inputs (2,3,5,6,7,etc). When entering a group of inputs, any input in that group that goes in alarm will activate that Modbus bit.

The last Modbus register is used to accept remote control pushbutton inputs from another Modbus Device or transmit the DMS-3K control pushbutton to another Modbus Device.



To configure Modbus, select Protocol - MODBUS and then Mode Master or Slave , and then Master Configuration or Slave Configuration.

Modbus Master Configuration

The Device Address at the top of the page is for the DMS-3K Master. Up to 6 Modbus Slave Devices can be configured with the same or different inputs to the single DMS-3K Modbus Master.

The Set-up for each Slave Device is the same format as shown.

1. Slave Address
   Enter a unique Slave Address for each Slave Device you wish to connect to. (1-255)

2. Starting Register
   Enter the Modbus Starting register from 40001 to 49990.

3. Total No. of Modbus Alarms
   Enter the total number of alarms you wish to transmit up to 128. You have a choice of designating a single alarm per Modbus Register Bit or combining multiple inputs into a single Modbus Register Bit. In cases where you group multiple alarm inputs into a single Modbus register, this number should reflect the total number of individual or grouped alarms. Once this is entered, it will automatically provide the required amount of Modbus

registers to support the number of alarms. Example: If the total number of alarms was 64, it would show four 16 bit registers.

4. Total No. of Controls
   Enter the total number of Pushbutton Controls up to 16. Once this is entered, it will add an extra Modbus register at far right of table.

5. Set Up the Modbus Mapping for Alarm Inputs
   For each 16 bit Modbus registers enter a single input number or group of inputs with commas to separate inputs (1,2,3,4 etc) or dashes (1-4) for a group of alarms or combinations of both (1-4,5,9). Up to 32 digits may be entered including commas and dashes. When selecting a group of alarms for a single Modbus bit, it will act as a Logic OR which will activate an alarm when any of the inputs goes into the alarm state and stay activated until all inputs in the group return to normal.

6. Set up the Modbus Mapping for Control Pushbuttons

   If Control Inputs are used, the last 16 bit register is used for this set-up. For each bit position, you can assign the function, control group 1 and whether it is being transmitted from the DMS-3K to the Modbus Device or received from the Modbus Device. When selecting the controls, they will be labeled as follows:

   Function Control Group # Transmit or Receive

   Example: ***T 1 +*** = *Full Function Test, Control Group 1, Transmit Status*

Function	**Control Group #**	**Transmit or Receive**
Full Function Test (T) Lamp Test (L) Acknowledge (A) Reset (R) First Out Reset (F) Silence (S) Inhibit (I)	1 (only Control Group #1 is supported)	+ = transmit, - = receive This refers to whether the control is transmitted via one of the control inputs or received through the serial communications.

Modbus Slave Configuration

When the DMS-3K is configured as a Modbus Slave Device, it can communicate to a single Modbus Master Device.

If the Master is going to retrieve Event Data, you can list the starting register and it will automatically increment by 60 registers. The register address provided is the location in the unit. (40000 is implied)

Enter the Device address for the Modbus Slave. All other Modbus entry fields are the same as shown in the Master Configuration.

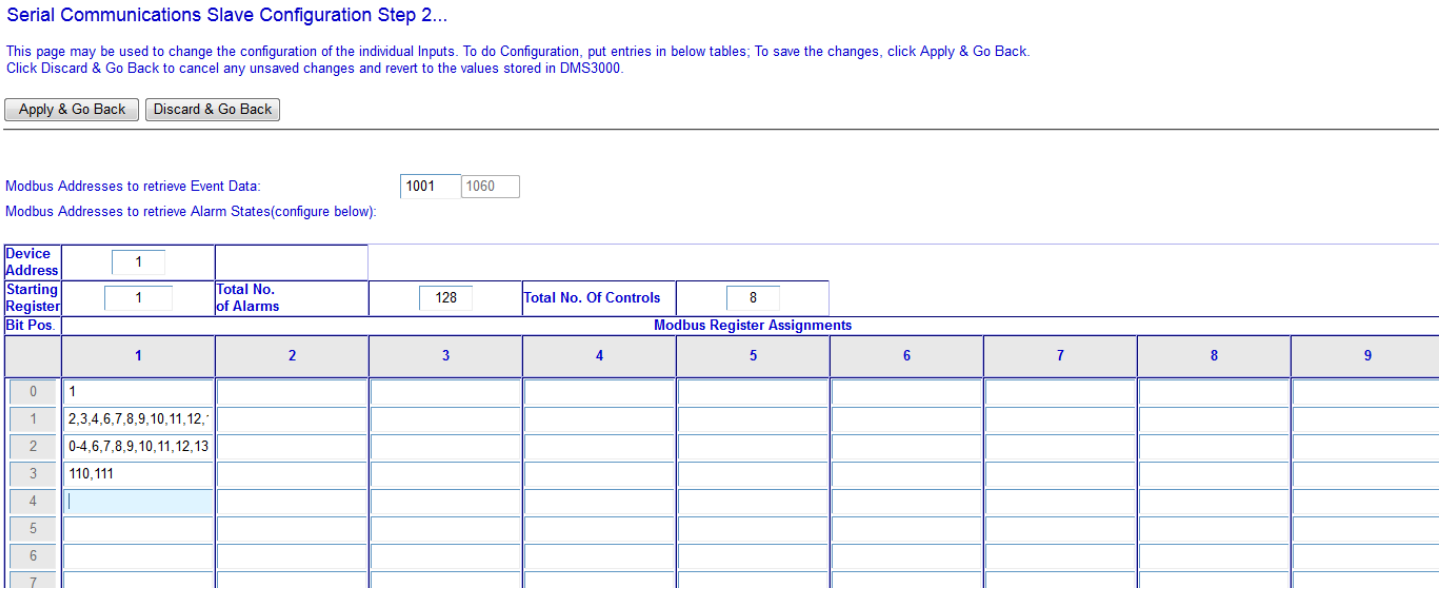


Figure 3–14b. Serial Communications Configuration Page (Bottom Half)

Systems with CR Option

With CR enabled, alarms from other Logic Card Racks will be sent to the Logic Card Rack with the CR Master enabled. This allows you to select inputs from all Logic Card Racks on the CR Master for one Modbus output. For example, if you had a DMS-3K system with 3 Logic Card Racks, and the first rack had inputs labeled 1-128, second rack with inputs 129-256, third rack with inputs 257-384; the Modbus input numbers you select for mapping can consist of any inputs from 1-384.

Note: Before configuring Modbus on a unit with the CR Option enabled, you must first configure and connect all the remote DMS-3K units in the CR Configuration page. If not, you will receive an error message to do so.

DNP Protocol (option)

The DMS-3K DNP port will transmit the status and timestamp of each alarm. The transmitted alarms can be used to drive an RTU, SCADA, PLC or other device. Refer to Appendix B for detailed DNP operation and mapping.

The only configuration required is the selection of the DNP Device Address (1-65,535) and Data Link Confirm (Always, Sometime or Never)

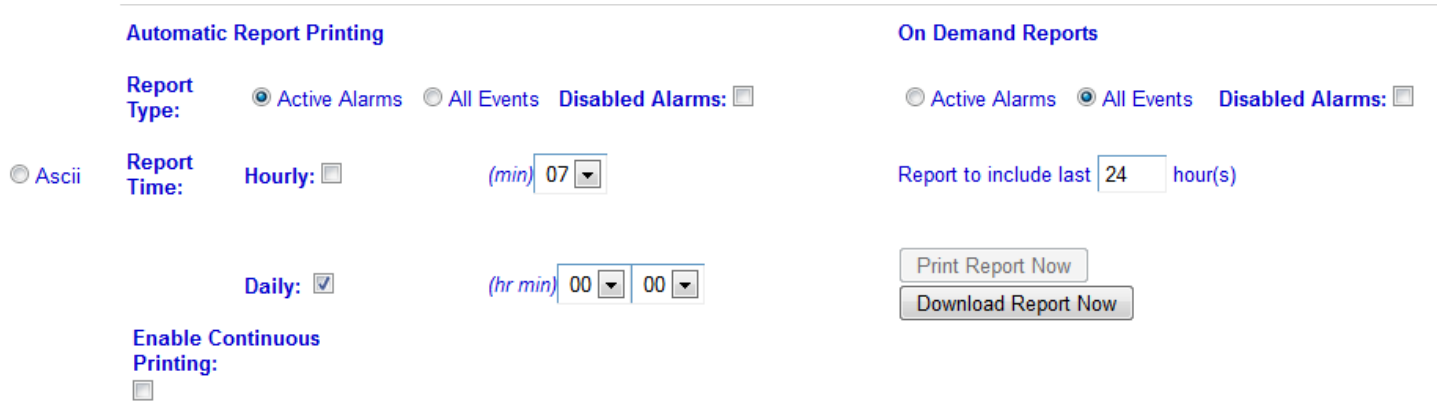
ASCII Protocol (option)

With the ASCII option, you can transmit events for direct connection to a serial printer or PC terminal application. You can configure the ASCII Output to transmit events as they are recorded (Enable Continuous Printing) or configure it to send out a report at selected intervals. (Automatic Report Printing or On Demand Reports)

By selecting the appropriate radio buttons, and then entering your desired time criteria, you can create Automatic or 'On Demand' Event Reports in a variety of ways:

Hourly – report alarms currently active or within the last hour.
Daily – report alarms currently active or for the entire day.
Active Alarms – report only events that are in the Alarm State.
All Events – report all events (alarm & return to normal)
Disabled Alarms – report any input that has been disabled

If you enable continuous output, the DMS-3K will output the events as they occur into the event log. If the master has the CR option all slave alarms will be included in the report.



The output will resemble the Web browser display by order, columns etc. Sample reports are provided in the following figures.

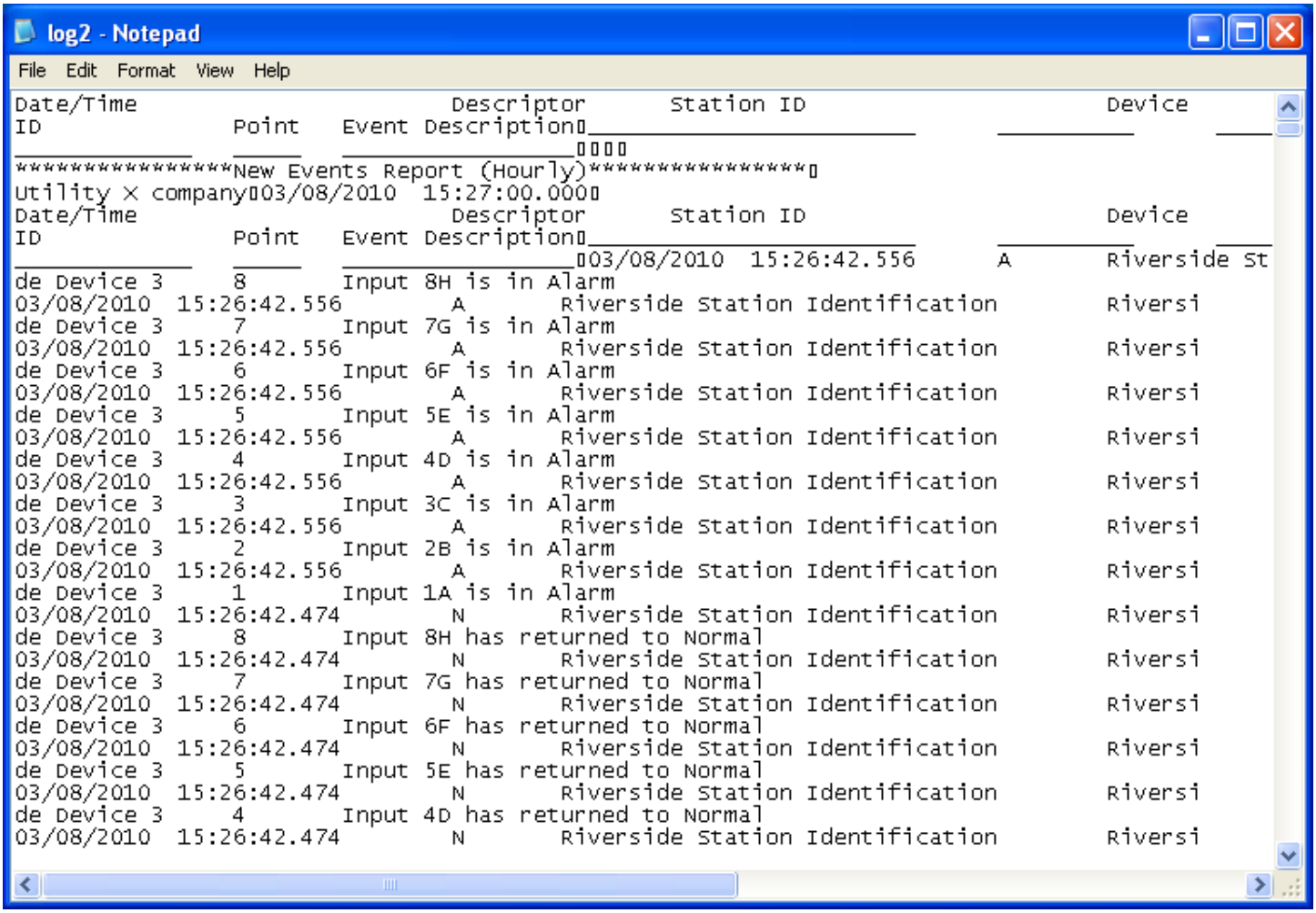


Figure 3–15a - Event Log Output in ASCII Format (Hourly).

Ethernet Communications Configuration (optional)

On this page, you configure the unit's Ethernet Communications parameters. The Ethernet port supports 10Mbs or 100Mbs using simultaneous Modbus TCP/IP and DNP communication protocols.

The Modbus TCP/IP set-up is similar to the serial Modbus, except for the following:

- Master Mode:
  The Modbus TCP/IP Master will support up to 12 Modbus TCP/IP Slave Devices.
  The Modbus TCP Port (default is 502) is for the DMS-3K Master.
  You enter the IP addresses for each of the slave ports you configure.
- Slave Mode:
  The DMS-3K Modbus TCP/IP Slave can connect to multiple Modbus TCP/IP Master Devices.

After making your changes, click *Apply*.

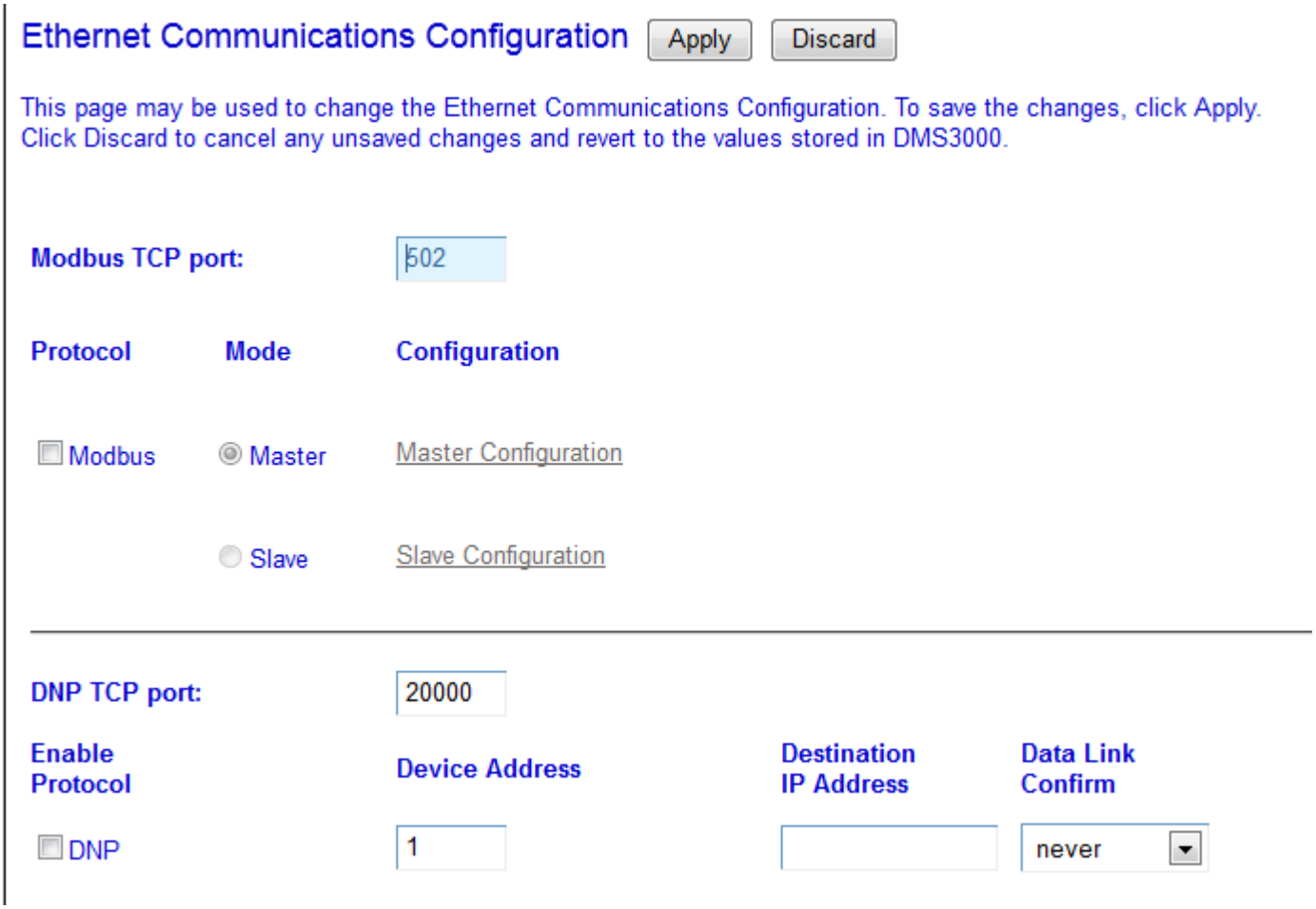


Figure 3–16a Ethernet Communications Configuration Page (Top Half)

Ethernet Communications Master Configuration Step 2...

This page may be used to change the configuration of the individual Inputs. To do Configuration, put entries in below tables; To save the changes, click Apply & Go Back. Click Discard & Go Back to cancel any unsaved changes and revert to the values stored in DMS3000.

Apply & Go Back | Discard & Go Back

Send	Starting & Ending Addresses
☐ Events	41000 41059
☑ Alarms	

Slave 1:

IP Address		Device Address		3					
Starting Register	40001	Total No. of Alarms	128	Total No. Of Controls	8				
Bit Pos.	Modbus Register Assignments								
	40001	40002	40003	40004	40005	40006	40007	40008	40009
0	1	17							
1	2	18							
2	3								
3	4								
4	5								
5	6								
6	7								
7	8								

Figure 3–16b Ethernet Communications Configuration Page (Bottom Half)

DNP Protocol (option)

The DMS-3K DNP port will transmit the status and timestamp of each alarm. The transmitted alarms can be used to drive an RTU, SCADA, PLC or other device. Refer to Appendix B for detailed DNP operation and mapping.

The DNP implementation over Ethernet requires the assignment of a TCP Port for the DMS-3K DNP Slave, a DNP Device Address (1-65,535), Destination IP Address for the remote DNP Master and Data Link Confirm (Always, Sometime or Never)

DNP TCP port: 20000

Enable Protocol	Device Address	Destination IP Address	Data Link Confirm
☐ DNP	1		never

Combined Rack (CR)

The Combined Rack (CR) option enables a single DMS-3K master to manage and collect alarms from up to 15 DMS-3K slaves in one browser window. *The terminology 'master' and 'slave' should not be confused with Modbus or DNP master/slave.* In a system with several Logic Card Racks, only one rack is typically enabled for the CR Option, although this option could be added to any unit.

The following steps should be followed when configuring a system with the CR Option.

1. Before a DMS-3K master is enabled with the CR option, you must first configure each DMS-3K slave device with unique input numbers. The master DMS-3K will start with input number 1 and the slave units will be numbered in succession. For example, if the master unit has 128 channels, the inputs will be numbered 1-128 and the first slave unit with 128 channels would be numbered 129-256, etc.
   Note: If the slave unit inputs are not numbered in succession or if the input numbers overlap, the master DMS-3K will not allow you to enable the CR option.

2. Make sure that all DMS-3K units have the same firmware version. This is shown on the web browser 'Home Page'.

3. Make sure that the TCP/IP port on the master and slave devices match. Also make sure that this port address is unique on your network. Avoid using commonly used ones; ie <2000.

4. After all the slave units are configured with their own IP Address, same TCP/IP Port and alarm numbering scheme described above, enter each of the slave unit's IP address on the unit with the CR option enabled.

5. You need to remove any active alarms from the master or slave units before enabling this feature. If you are unable to do this easily, just disable all the inputs (use the global setting on the bottom of the Alarm Input Configuration Page).

6. Select 'Enabled (master)' and it should connect to all units.

CR Operation – Connection Status

The CR Master communicates to the DMS-3K slaves to retrieve events as they occur via Ethernet communications. The DMS-3K slave units initiate continuous communications to the CR Master.

The colored annunciator box around the device number indicates:

- White – a connection not yet attempted.
- Green – a slave is connected
- Red – the slave did not connect within the initial 2 minutes
- Orange – a DMS-3K that was once connected, has gone off-line and is no longer communicating to the master DMS-3K. The CR master will continue to reconnect to this unit every 15 seconds

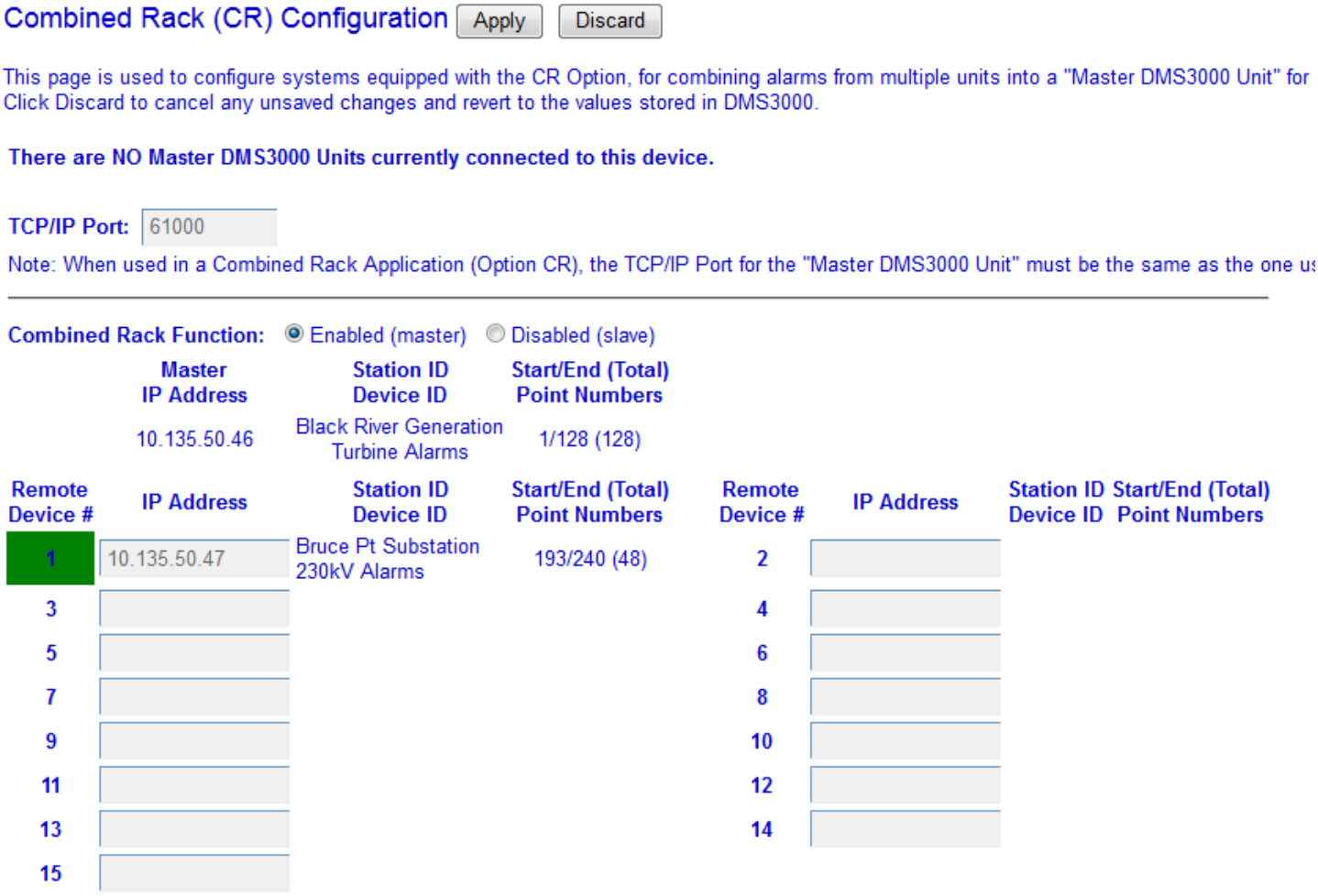


Figure 3–17 Combined SER (CR) Configuration Page

Once enabled, the master's pages will have "*Combined SER Master Unit*" in the top bar of each page. At the time the master is enabled, slave units will immediately send the current input states to the master. In addition, the slave sends its active alarm states to the master every 2 minutes. If the master does not receive this periodic update from the slave, it will query the slave unit to determine if it has gone off-line. When a slave stops responding, the CR master removes all active alarms for this slave and re-attempts a new connection.

Slaves may report to no more than 3 masters. For example, in a network of 10 units, one DMS-3K unit can be master for all 10 units. One of the 10 units can be a master for 5 of the slaves. And a third master can show alarms from the remaining 5 units. This would require 3 browser windows, one window for each group of 5 units and one window for all 10.

Combined TCP/IP Port:

All units in the network must have the same TCP/IP Port number. The default is 61000.

To change the port number:
Disable the Master.
Log on to each unit and change the port number.
Re-enable the Master.

Access Control Configuration

Access control is available to Administrators only. As shown in the following figure, the DMS-3K is equipped with built-in security to prevent unauthorized access to network configuration parameters, firmware upgrades and other critical settings. This page is where the system administrator sets up user passwords and network configuration such as SNMP and Modbus access and port numbers. As with most password fields, you will only see asterisks as you type in your password.

User and Admin authority are detailed below (respectively):

User Account can:

- View Active Alarms
- View Event Logs
- View Configuration Details
- Sort and Filter Events for viewing purposes
- Export events via csv download
- Print events

Admin Account can:

- Include all of the 'User' functions above
- Change configuration details (anything with an 'Apply' button)
- Set time and date
- Acknowledge Alarms
- Erase the Event Log
- Enable or Disable an alarm
- Change Passwords
- Save and Restore Configuration
- Firmware Upgrade
- Option Upgrade

Trusted IPs/hostnames

To add another level of security to your network, select the appropriate checkboxes if you wish to restrict IP/hostnames for either SNMP or Modbus. Once checked, the traffic to the port will be restricted, allowing access to only those addresses/hostnames that you entered into the trusted field. This works like a firewall. You enter a semi-colon separated list of addresses or hostnames into the trusted field.

Ports

You can enter specific Ethernet Port Addresses for Modbus TCP/IP, DNP, WEB Browser (HTTP & HTTPS)

HTTPS

HTTPS requires users to select the secure web log on. You need to identify the specific port address used for this secure connection.

Note: When HTTPS is enabled, you must precede the web browser url address by HTTPS://iIP Address, instead of HTTP://IP Address.

Basic Authentication

The standard authentication method used is called ‘Digest’ which encrypts the log-in information to the unit. In some applications where you have difficulty logging into the DMS-3K, you may need to switch the authentication method to ‘basic’.

Note: After switching the authentication method to ‘basic’, the DMS-3K username and password will be reset to the defaults.

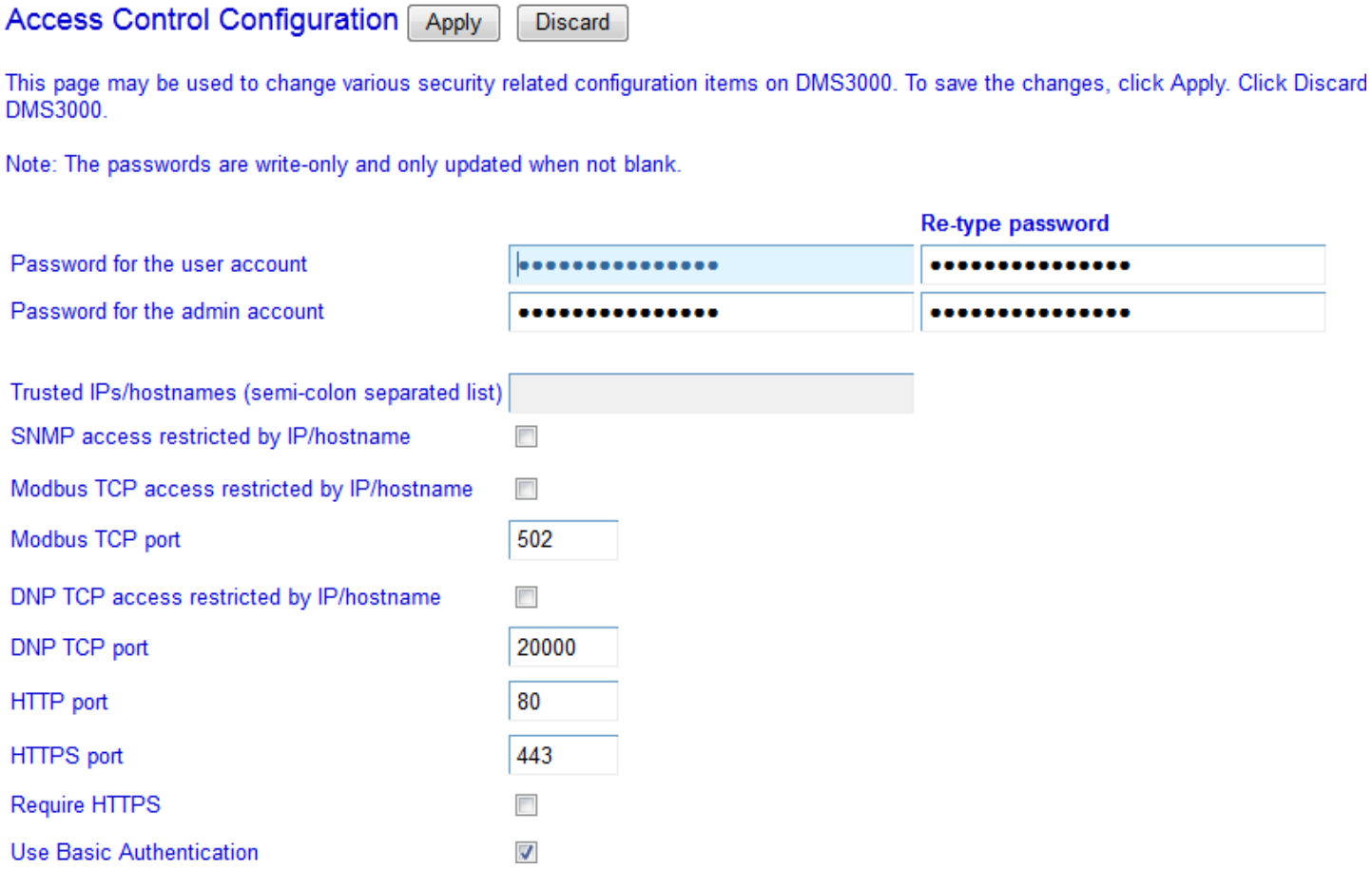


Figure 3–22 Access Control Configuration Page

Network Configuration

This page allows the administrator to configure the network settings. Refer to the following figure. Here you can change your IP address. All units in the network must have a unique IP address. The network administrator configures the network & gateway information according to your location.

If you enable DHCP, you must enter the DNS servers (Nameserver) and the domain into the appropriate fields.

Notice the Ping test field and button at the bottom. If you suspect a unit is not responding or question its connectivity, type its IP address into this field and click the *Test* button. The DMS-3K will ping the requested unit. The results will be displayed in a new Web browser window.

After all settings have been made, click the Apply button for those changes to take effect. If you wish to clear all fields to start over, click the Discard button. The “Reboot DMS-3K” button is available if you wish to restart the system. If using NTP, you must have the Gateway configured properly for NTP to synchronize to its server.

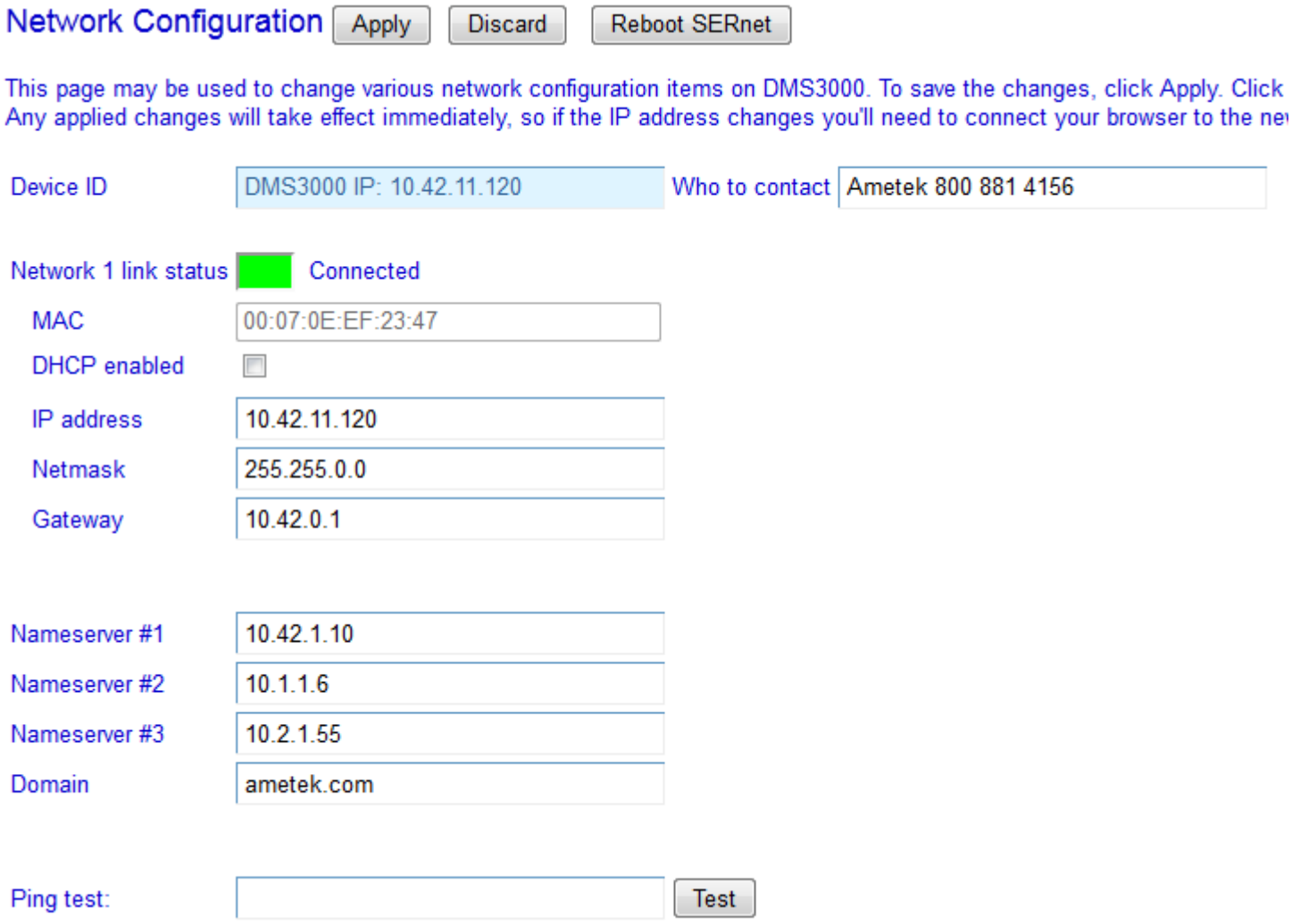


Figure 3–23 Network Configuration Page

Date / Time Configuration

The DMS-3K date and time can be synchronized to an external time source using IRIG-B or NTP. IRIG-B is the preferred time source. You should configure an alternate time source if IRIG-B is not available or its signal is lost.

IRIG-B does not require any configuration other than selecting either the modulated or demodulated mode (Fig. 2–11). Once connected to a suitable time source, the IRIG-B time sync status will be noted in red as 'IRIG-B signal detected'.

NTP configuration will allow up to three NTP timeservers at different IP addresses. Preference will be given to the best NTP time source and will automatically switch to one of the other NTP timeservers when a signal drops out.

When external time synchronization is not used, the DMS-3K can be configured with the PC time and date or any time and date you enter.

Note: IRIG-B date does not include the year. If the year is incorrect, you should initially set the year by selecting either "Set Date/Time from PC Clock" or "Set Date/Time Manually" as shown in Figure 3–24 (2nd & 3rd radio buttons under Alternate Time Source). After the year has been programmed you can select NTP for the alternate time source.

The DMS-3K has built-in diagnostics to check the time synchronization continuously and every hour, it will be noted in the Event Log. If you wish to remove this hourly time synchronization event, select the option to 'Suppress Hourly Time Sync'.

At the bottom of the page (not shown) are the fields for setting the date/time format displayed in Event Log , and in optional ASCII printouts (mm/dd/yyyy) , and for choosing your time zone.

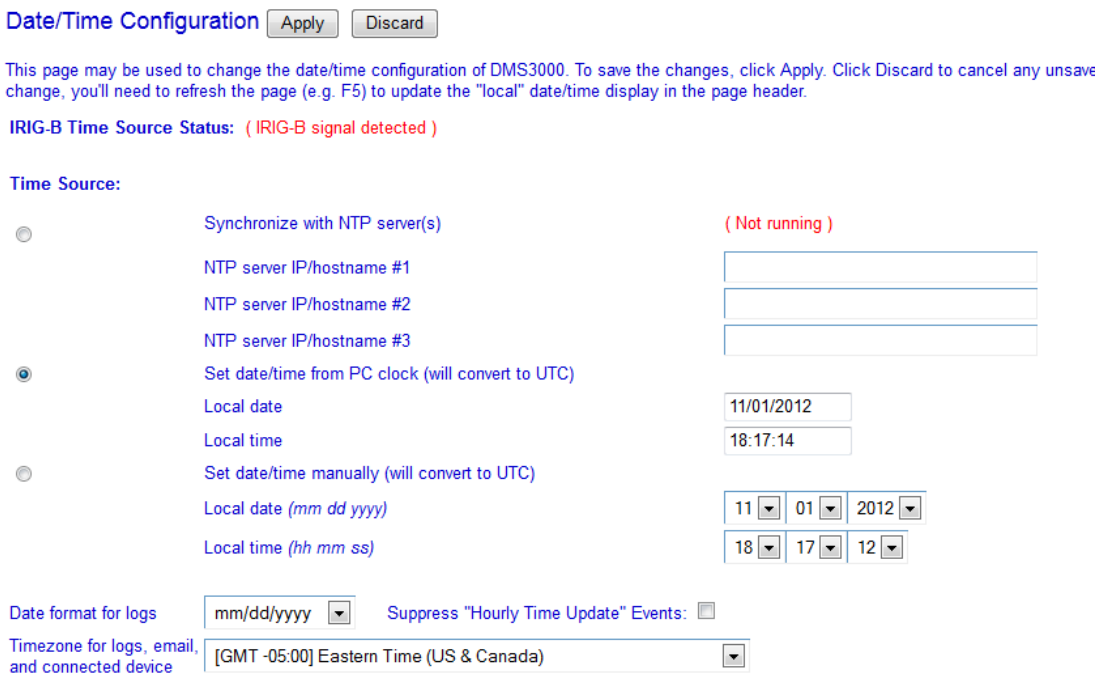


Figure 3–24 Date & Time Configuration Page

Email Configuration

The DMS-3K can transmit any alarm to three separate email recipients. All alarms or specific ones can be used to trigger an email. The alarm email will include the input number, time and date of alarm and the alarm legend configured in the unit. The frequency of emails can be configured to send them out as soon as an alarm occurs or batch them up at specified intervals.

The SMTP Server IP address or host name needs to be entered based on whatever email system you are using. You must include your username and password that is used for this system. Consult your IT administrator if unsure of the settings. After configuring the SMTP selections, you can test the settings by pressing the 'Test SMTP Server Connection'. If the SMTP Server address is not recognized, it will provide an error message when you try to save the Email settings.

Enter the recipient email address and select which alarms will trigger the email notification. The frequency of how often the emails will be sent can be configured as '0' which is immediately after an alarm or in hourly increments from 1 to 24. When a selection of 1-24 is used, any alarms that occurred in that interval will be included in the email. Selecting 'Active Alarms' will only provide alarm inputs that are in the alarm state at the time the email is generated. Selecting 'All Events' will include Active Alarms and Alarms that returned to Normal.

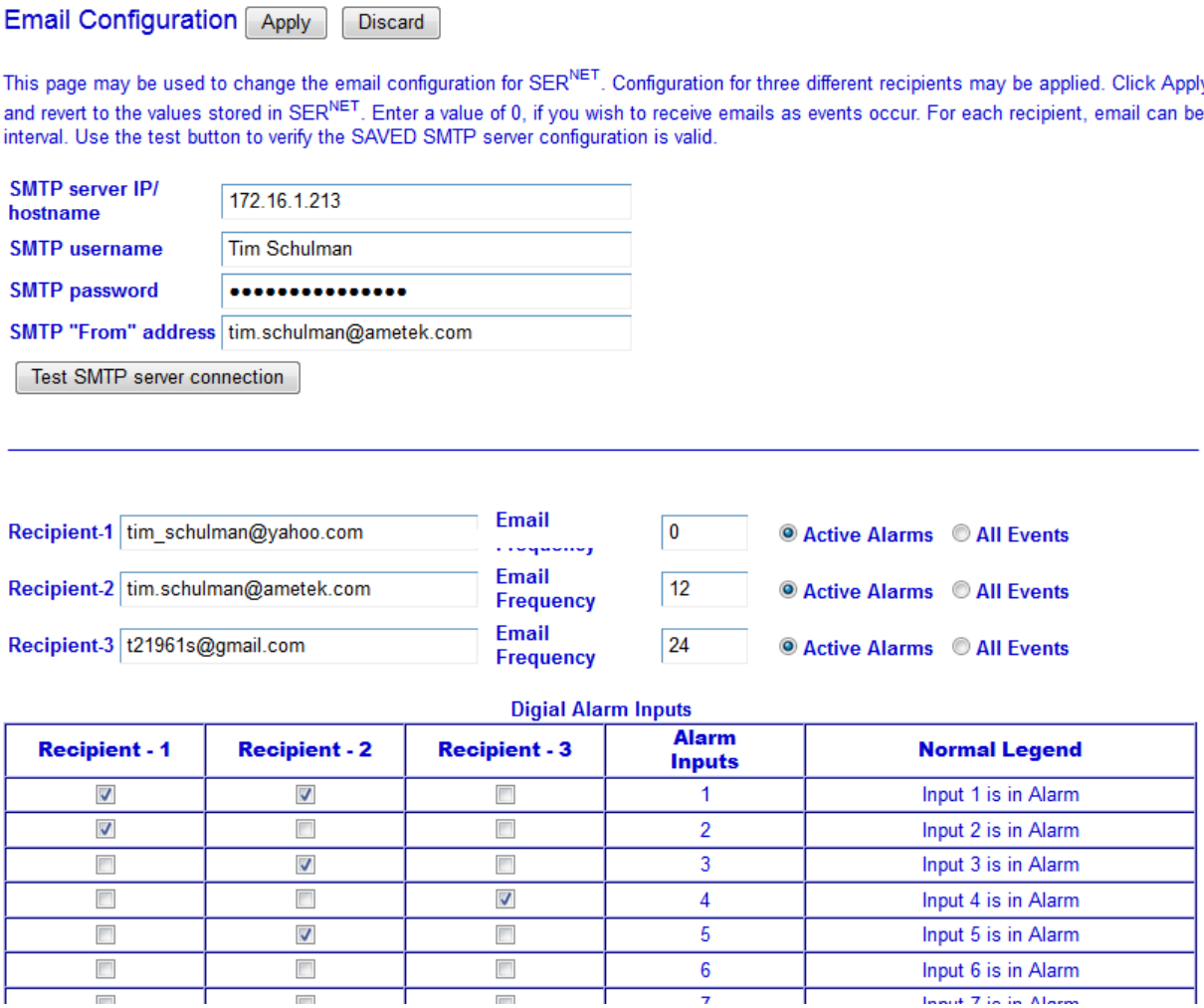


Figure 3–25 Email Configuration Page

Save and Restore Configuration

Available to Administrator only, this page provides a way for you to save the unit's configuration to an XML file. The advantage to this is if for whatever reason you need to reload the DMS-3K configuration at a later date, you'll have the configuration file saved already. Simply browse to the file on your PC and restore the configuration file to the unit.

Note: it is strongly advised to have a copy of each DMS-3K configuration file saved at all times. After you make changes, save a new copy by clicking on the *Save Configuration* button.

To restore a configuration (refer to Figure 3–26):

Click the *Browse* button.

From the choose file dialog, select the configuration file to be downloaded to DMS-3K.

Click Open and a message box will pop up asking you to confirm your action. Click Ok.

Your DMS-3K unit will be re-configured with the saved file, including all Alarm Inputs and Outputs.

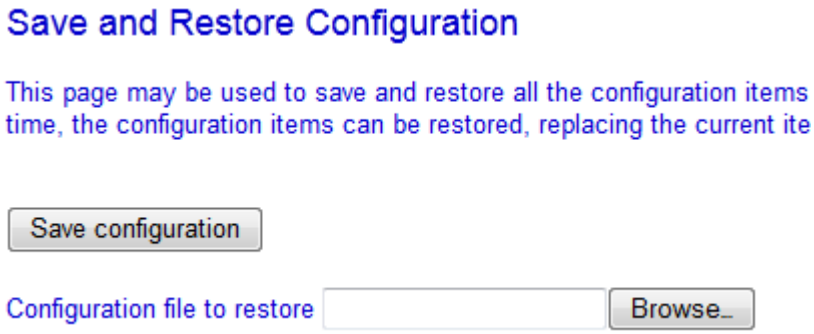
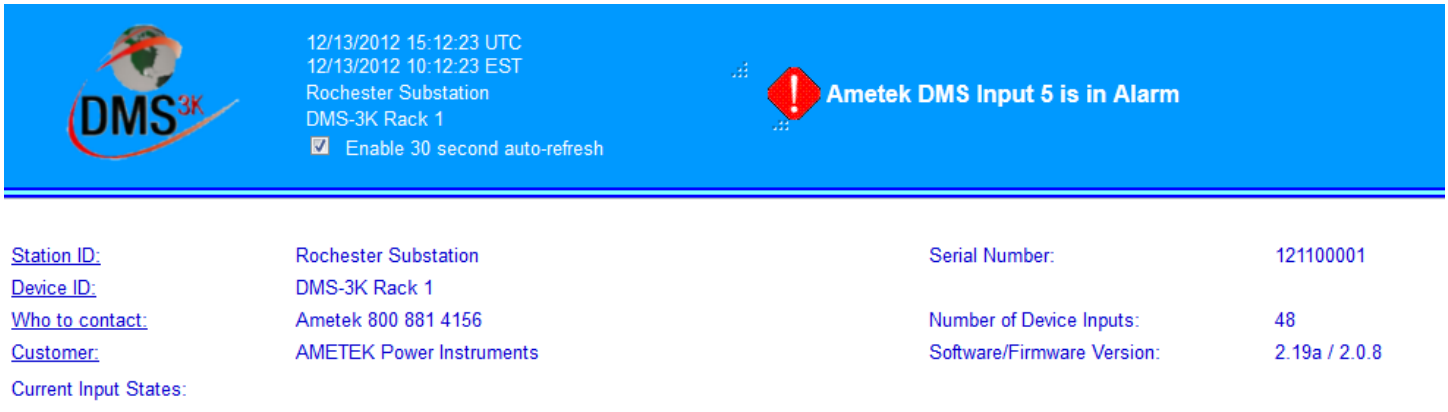


Figure 3–26 Save and Restore Configuration Page

Firmware Configuration

The current version number of Software/Firmware installed on your unit is provided on the DMS-3K Home Page.



If a new version of the DMS-3K firmware is available, you can flash it to the DMS-3K using the 'Firmware Configuration' page.

Before starting the process of upgrading the firmware in your unit; save a copy of the DMS-3K configuration using the 'Save and Restore' function as the upgrade process will restore some settings back to the defaults depending on the changes made.

After the firmware is upgraded, you will be prompted to re-boot the DMS-3K. This can be done automatically by selecting the checkbox 'Reboot when complete' before you start the upgrade process.

To upgrade the firmware, simply browse for the file on your PC and after you choose the new file, it will begin uploading after your confirmation.

Caution: *during a firmware update, do not close the browser window or power down the unit. Doing so will cancel the upload process and corrupt the firmware.*

As seen in Figure 3–27b, during the firmware update process, the file status progress bar will indicate the status of the update.

Green status (Finished or No Update) – update successful.

Yellow status – potential red status event with one of the module updates, or the main board download may have exceeded the 5 minutes allotted to its download. Either way, it's more of an alert than necessarily an error for that particular update.

Red status (File Error, or Hardware Error) – may be one of the following:

- the file that you were trying to download is not correct
- the file could be corrupted
- there was a hardware problem in attempting to erase, or write to the flash

Any status other than green should be reported to AMETEK Factory Support.

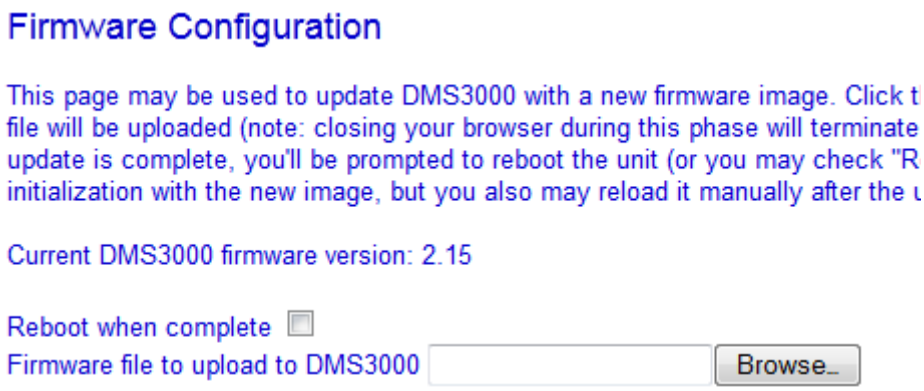


Figure 3–27a Firmware Configuration Page

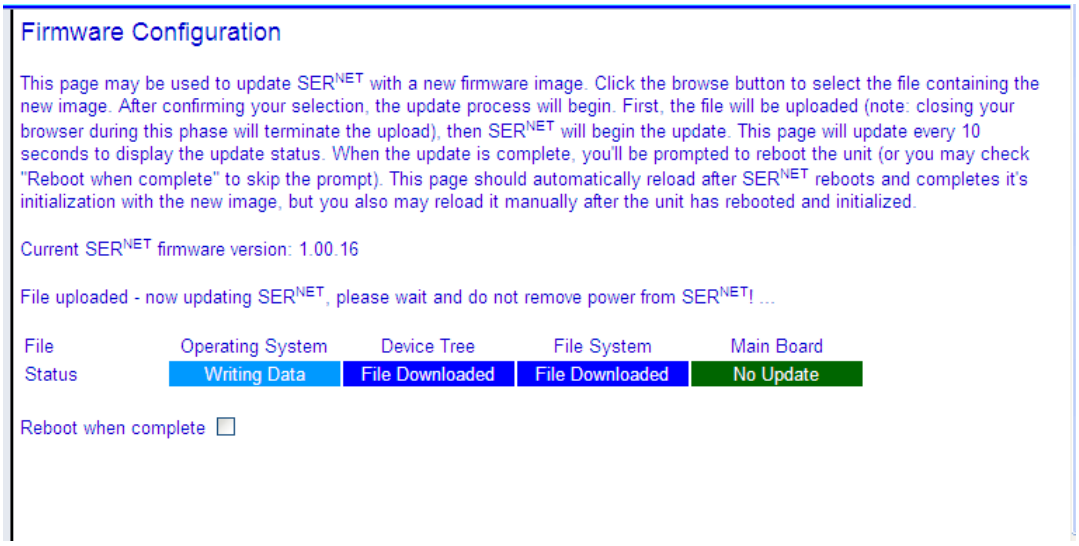


Figure 3–27b Firmware Configuration Page After Update

Option Upgrade

DMS-3K can be upgraded in the field. The primary purpose of this function is to enable various options that were not supplied with the original unit. The DMS-3K home page will identify the model number of your DMS-3K unit and the options provided. A description of this model number is shown in Chapter 1. The available options that can be upgraded are:

Option Code	Option	Description
WEB	WEB Browser Display	Displays Active Alarms and Events. Configuration via the WEB Browser is included as standard with the base unit.
IB	IRIG-B	IRIG-B Time Sync
NTP	NTP Time Sync	NTP Time Sync
EM	Email	Email notification of alarms
MB	Modbus Protocol	Modbus communications (Serial and Ethernet)
DNP	DNP Protocol	DNP communications (Serial and Ethernet)
ASC	ASCII Protocol	ASCII communications (Serial)
CR	Combined Rack	Single web browser displays alarms from up to 24 DMS-3K Units via Ethernet LAN

1. Simply call your AMETEK representative to request new options.

a. You will need to know your unique MAC address on the DMS-3K (displayed on upgrade page) and which options you desire to upgrade.
b. Your rep. will then give you a unique Upgrade Key specific to the unit you wish to upgrade.

2. This Upgrade Key must be entered exactly as provided.

3. Once you enter the Upgrade Key, click the *Submit Key* button and the unit will display the proposed model configuration.

4. Examine the details and if they are correct, click *Upgrade Unit*.

5. Click the *Yes* button to complete the process, which will reboot the unit.

Note: If an error occurs or perhaps you mistyped a letter, a failure message will appear at the bottom of the page. Carefully retype the Upgrade Key in and click *Submit Key* again. And repeat steps 2–5.

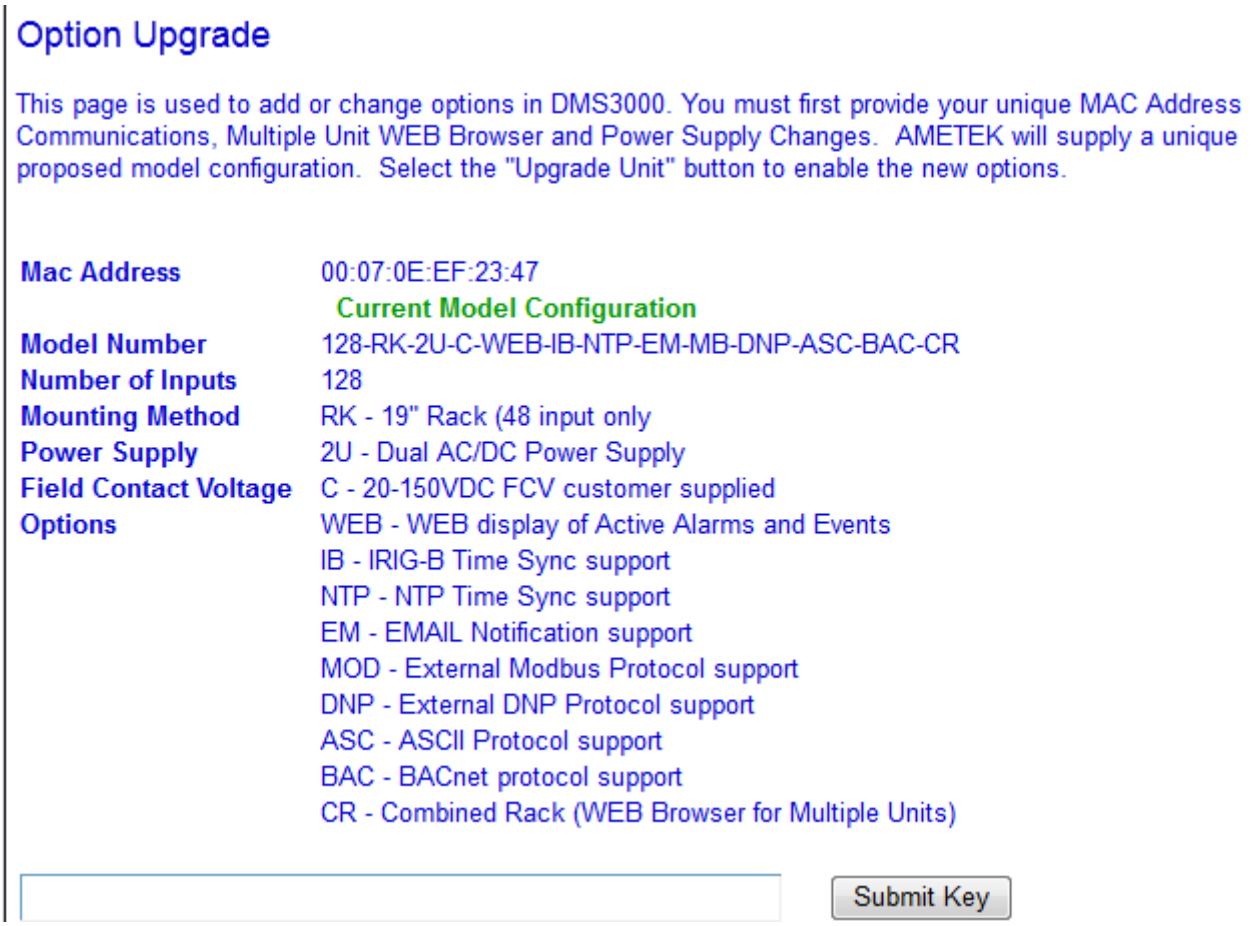


Figure 3–28 Option Upgrade Page

Color Selection

The DMS-3K can display alarms in several graphical formats which can be selected in the color configuration screen. The Home Page, Active Alarm and Event pages can be color coded for the background and text colors of various events. The configuration page will show the current color selection and provide new selections for background and text colors as applicable.

Figure 3–29 Color Selection Page

Logon as User

To switch logon type click this link. If you are logged in as User, it will display *Logon as Admin* and vice versa. Remember, User logon is restricted. You will be prompted with a logon dialog box as shown in Figure 3–1.

Documentation

At the bottom of the side-bar you'll find links to the Ametek Power Instruments Web site and the User Guide in pdf format.

Chapter 4-WEB Browser Alarm and Events Display Option

This option provides the ability to see alarms and events with timestamps via the WEB Browser display. The WEB Browser display option provides an Active Alarm page and an Event Log page.

Active Alarms

This web page will display any inputs that are currently in the Alarm State. The alarms are displayed in chronological order and can be color coded to differentiate alarms that have been acknowledged or returned to normal. New alarms are automatically updated on this page as they occur. In systems equipped with the CR (Combined Rack) option, all the alarms from multiple Logic Card Racks will be presented on one common Active Alarm Display page for easy determination of root cause. Alarms include their data and time stamp, station ID, device ID, input number and pre-configured alarm legend.

The web display also includes an Acknowledge Pushbutton so operators can respond to alarms remotely. There is a selection for latching alarms in case you want them to remain on this display when they clear until they are acknowledged. Otherwise, they will clear from this display when the alarm returns to normal.

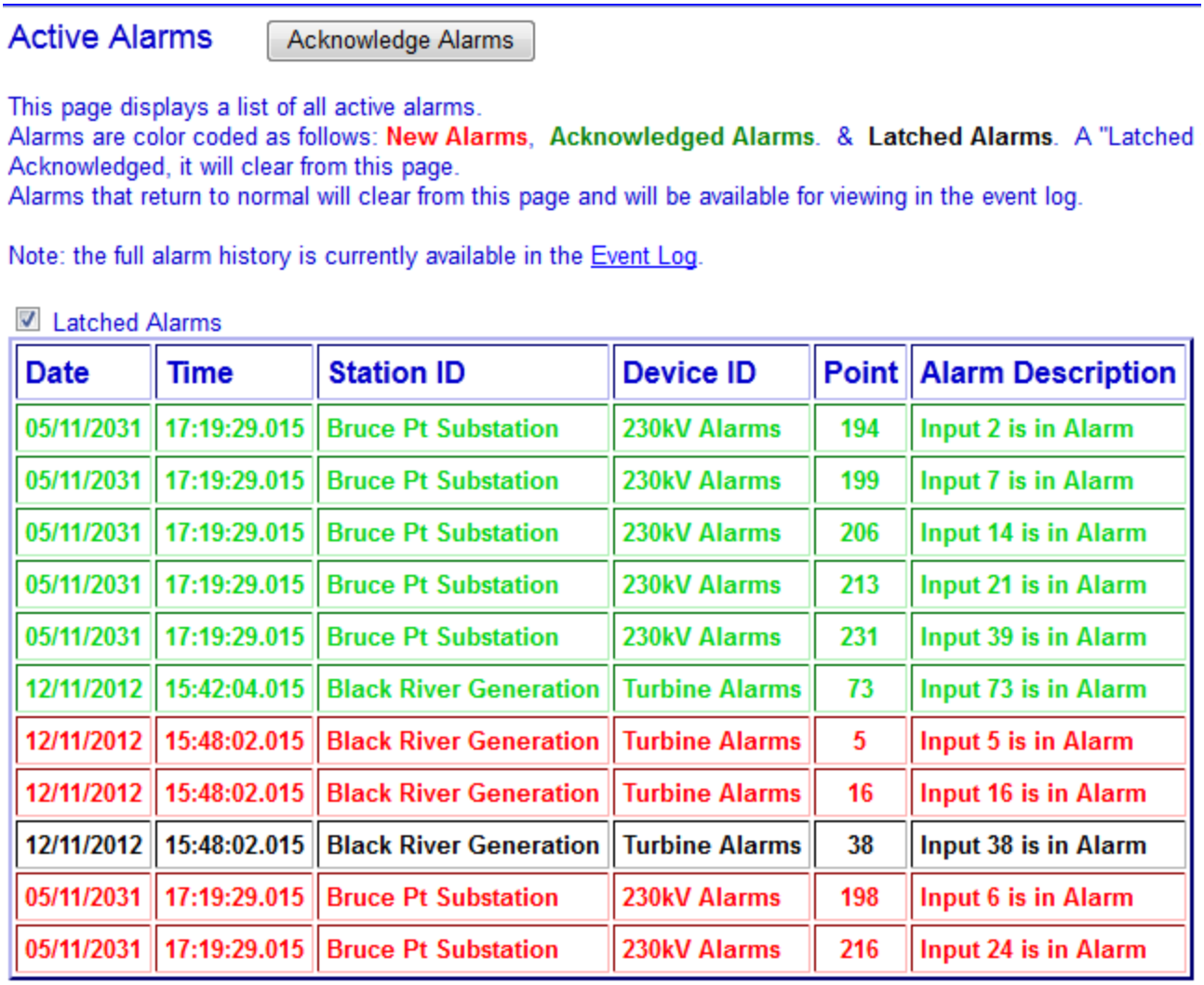
Event Log

This web page is used to view all alarms, past and present , up to 1000 events max. It displays the date and timestamp when the inputs went into alarm and returned to normal. It also logs any diagnostic events and monitors the external time synchronization status. The alarms are presented in chronological order, but can be sorted by any field: date and time, event type, station ID, device ID, input number. It will store a maximum of 40,000 events.

In addition, the event log can be filtered to display events in a specific time frame, type of events or specific alarm inputs so you can create a custom report detailing the information you need. You can then download the events into a csv file and send them to a printer on your network.

Active Alarms Page

The Active Alarm screen is used as a 'heads-up display' for identifying all inputs that are currently in the alarm state along with a timestamp. When equipped with the CR option, the Master DMS-3K will display alarms from itself as well as every slave DMS-3K connected to it, in chronological order.



Date	Time	Station ID	Device ID	Point	Alarm Description
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	194	Input 2 is in Alarm
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	199	Input 7 is in Alarm
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	206	Input 14 is in Alarm
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	213	Input 21 is in Alarm
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	231	Input 39 is in Alarm
12/11/2012	15:42:04.015	Black River Generation	Turbine Alarms	73	Input 73 is in Alarm
12/11/2012	15:48:02.015	Black River Generation	Turbine Alarms	5	Input 5 is in Alarm
12/11/2012	15:48:02.015	Black River Generation	Turbine Alarms	16	Input 16 is in Alarm
12/11/2012	15:48:02.015	Black River Generation	Turbine Alarms	38	Input 38 is in Alarm
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	198	Input 6 is in Alarm
05/11/2031	17:19:29.015	Bruce Pt Substation	230kV Alarms	216	Input 24 is in Alarm

Figure 4–1. Active Alarms (#)

As shown in figure 4-1, the Active Alarm page displays all active alarms in chronological order as they occur. The active alarms can be latched by selecting the 'latched alarms' box or unlatched. The alarms can be color coded to show the various alarm states: Alarm, Acknowledged and Normal.

In Figure 4-1, Alarms are shown in Red, latched alarms that returned to normal before they were acknowledged are shown in Black and active alarms that have been acknowledged are shown in green. Different colors can be selected in the color selection configuration screen.

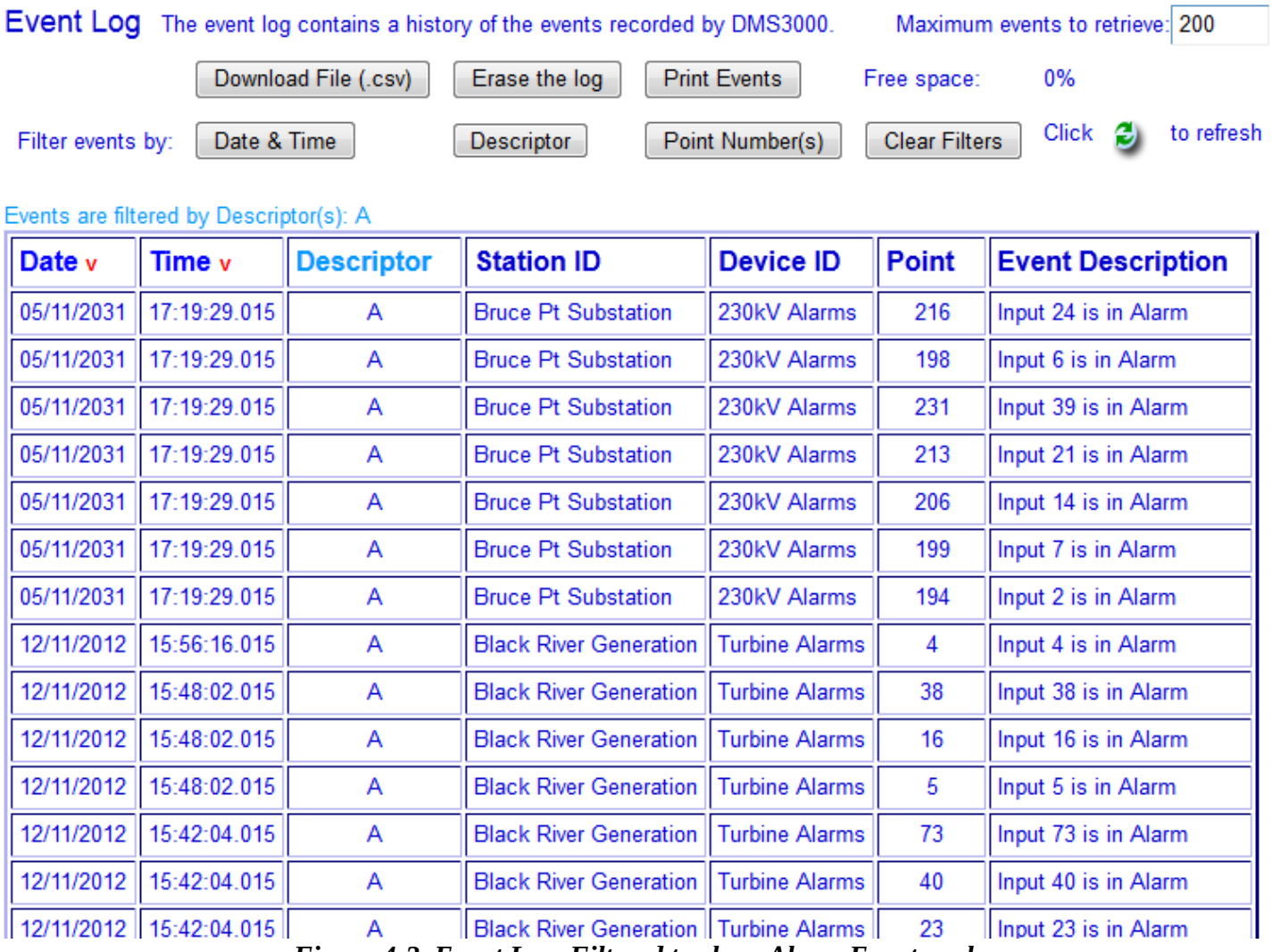
The selection box for Latched Alarms allows you to latch alarms on this web page until they have been acknowledged. Unlatched alarms will disappear from this web page as soon as they return to normal. In all cases, the alarms are stored in memory after they clear for future analysis and viewing on the Event Log.

Event Log Page

The Event log is used to view, sort, filter, print and download all alarms in memory. Each DMS-3K Logic Card Rack can store up to 40,000 events. When equipped with the CR option, the Master DMS-3K will display events from itself as well as every slave DMS-3K connected to it, in chronological order, An event can be an input going into alarm, returning to normal, diagnostic message and time synchronization status.

The event log is used to perform alarm management by filtering the list to a specific date and timeframe, sorting them by chronological order to determine the exact sequence of events for root cause analysis. In addition, events can be filtered to a specific input number or group of numbers to trend the number of occurrences within a given time frame. The event log can be downloaded for further analysis and data manipulation.

The Event Log displays all active and archived alarms, system status and diagnostics. In addition, the Event Log provides various sorting and filtering options and the ability to download or print events.



Date v	Time v	Descriptor	Station ID	Device ID	Point	Event Description
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	216	Input 24 is in Alarm
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	198	Input 6 is in Alarm
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	231	Input 39 is in Alarm
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	213	Input 21 is in Alarm
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	206	Input 14 is in Alarm
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	199	Input 7 is in Alarm
05/11/2031	17:19:29.015	A	Bruce Pt Substation	230kV Alarms	194	Input 2 is in Alarm
12/11/2012	15:56:16.015	A	Black River Generation	Turbine Alarms	4	Input 4 is in Alarm
12/11/2012	15:48:02.015	A	Black River Generation	Turbine Alarms	38	Input 38 is in Alarm
12/11/2012	15:48:02.015	A	Black River Generation	Turbine Alarms	16	Input 16 is in Alarm
12/11/2012	15:48:02.015	A	Black River Generation	Turbine Alarms	5	Input 5 is in Alarm
12/11/2012	15:42:04.015	A	Black River Generation	Turbine Alarms	73	Input 73 is in Alarm
12/11/2012	15:42:04.015	A	Black River Generation	Turbine Alarms	40	Input 40 is in Alarm
12/11/2012	15:42:04.015	A	Black River Generation	Turbine Alarms	23	Input 23 is in Alarm

Figure 4-2. Event Log, Filtered to show Alarm Events only

The Event Log format consists of a Date and Time of the event, a Descriptor that identifies the type of event, the Station ID and Device ID identifying where the Alarm came from, Point Number for the alarm and Event Description which is configured for every input. Any of these fields can be sorted by selecting the field description. Selecting it again will do a reverse sort.

The different types of events are identified with a descriptor as shown in the table below.

Event Types	**Event Descriptor**	**Event Description**
Alarm Event	A N	Input goes into the Alarm State Input Returns to Normal State
Diagnostic Event	D	System Diagnostic for: -Unit Configuration -Disabled Alarms (Manual or Automatically) -Acknowledged Alarms -System Watchdog Faults *Refer to Appendix I for a complete list of diagnostic events*
Time Event	T	Event associated with Time Clock -Time Sync enabled -Time sync lost -Time Reset

At the top of the Event Log WEB page you will find buttons for downloading to a .csv file, erasing and printing the log and setting the filters. The options are described below.

Download File (.csv)

If you want to save a copy of the events log to your pc, click the 'Download File (.csv) button. You may see a yellow warning bar across the top of the window. If so, follow the steps in Appendix F to configure your browser. If not, you will be prompted with a Script Prompt asking you if you want to download all events. Answering *Yes* will download all events, *No* will download only the events in view (with filters applied). Next you'll be prompted with the dialog box (Fig. 4-3) to open or save this file. Either open the file to view it, or select a folder where to save it. If you open the file, typically MS Excel® will open displaying the events in tabular form. From Excel® you can print the file in that form. Printing with the "Print Events" button will print the list as seen in the browser.

Note: There is a maximum of 1,000 events that you can view through the browser. To obtain a copy of all events (up to 40,000), you must answer *yes* after you click the *Download File* button.

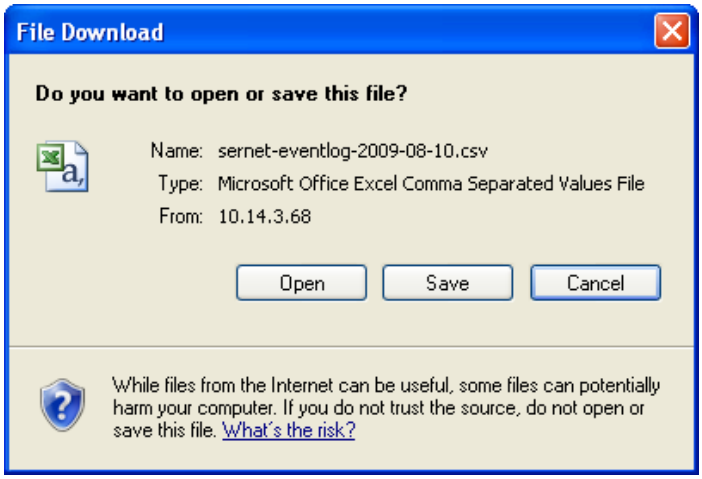


Figure 4-3. Save .csv File Dialog Box

Erase the log *(only for administrators)*

Use caution, as this will permanently wipe out all events in the log. Under a User login, this option is grayed out. The event buffer stores a maximum of 40,000 events in non-volatile RAM. Events are automatically deleted on a FIFO basis (First In, First Out).

Print Events

Click here to create a printout of the events in the current view. It will print as viewed on the web page.

Maximum events to retrieve

The DMS-3K Event Buffer can store 40,000 events. The number of events displayed at any one time can be selected by entering the number in this text box, (top right), followed by clicking the  icon to refresh the page with the desired number of events. A range of 1 – 1000 of the most recent events are allowed in this entry. Depending on how you sort and filter the list of events, it could be the most recent group of events or oldest alarms stored in memory.

Event Sorting and Filtering

Event Sorting

The column headings are active elements, meaning you can click on the column heading to change the sorted order of the events. It works similar to the column headings in Windows explorer. An arrow will appear, next to the heading title, toggling up and down each time you click the heading. For example, each time you click the Date column heading, the events are resorted chronologically or in reverse. Depending on the number of events, this could take a few seconds to change.

Filter Events by:

The Event Log can be filtered to only show alarms within a given date and time, specific event types and specific inputs.

You can combine 2 filters at one time to obtain an even more selective set. The following combinations of filters can be entered:

- Date & Time and Descriptor
- Date & Time and Point Number

When a filter is active, the filter criteria are displayed above the events table.

Date & Time

To set date/time filters, click the Date & Time button on the page. This brings up the dialog box shown in the following figure. The events will be displayed according to your selection criteria. The default entry shows the current Date/Time range of the events currently in view.

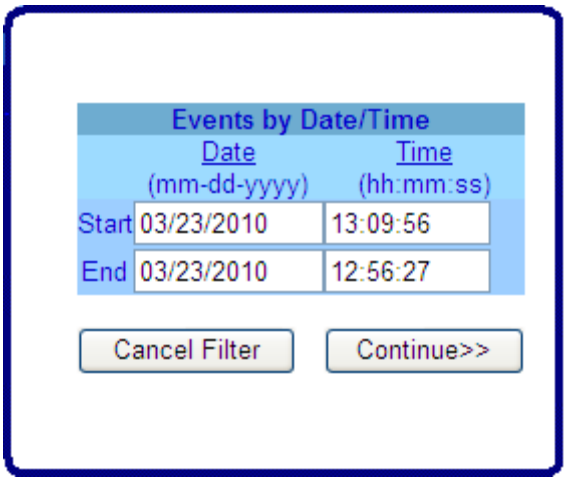


Figure 4-4. Date/Time Filter Dialog Box

Descriptor:

In this dialog box you can set what descriptors you want to display in the event log. Multiple descriptors may be selected. Place a check in the appropriate check box to enable that option. Please refer to the following figure.

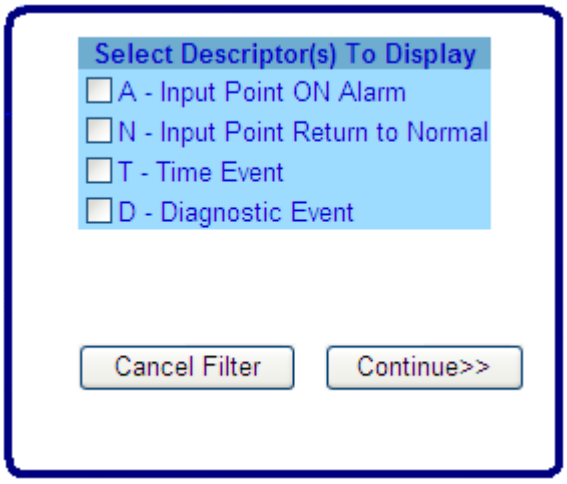


Figure 4-5. Descriptor Dialog Box

Point Number(s):

Here you can set which points you want displayed in the events list. Multiple points may be selected by using a comma between input numbers.

Figure 4-6. Points Dialog Box

The *Clear Filters* button will remove the event filters that you configured and displays the latest events.

Chapter 5-System Hardware

System Hardware Data Sheets

Logic Box

3U Logic Box (10 card slots)

6U Logic Box (23 card slots)

CPU Modules

CPU-200

Power Supply Regulator Modules

Reg-90, Reg-91	*3U, 24VDC Power Regulator*
Reg-92, Reg-93	*6U, 24VDC Power Regulator*
Reg-94, Reg-95	*6U, 48VDC Power Regulator*
Reg-96, Reg-97	*3U, 48VDC Power Regulator*

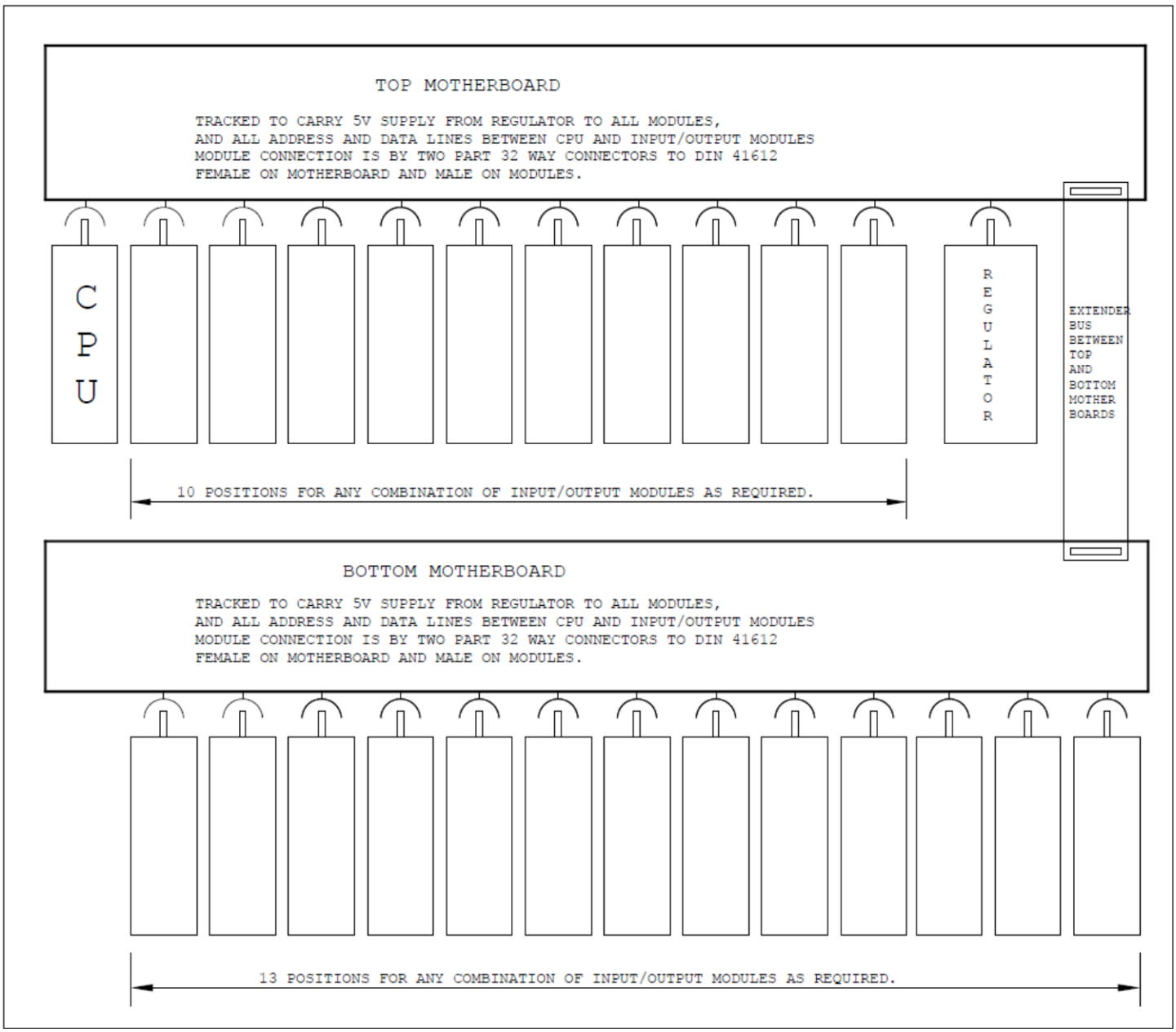
I/O Modules

System Addressing Guidelines

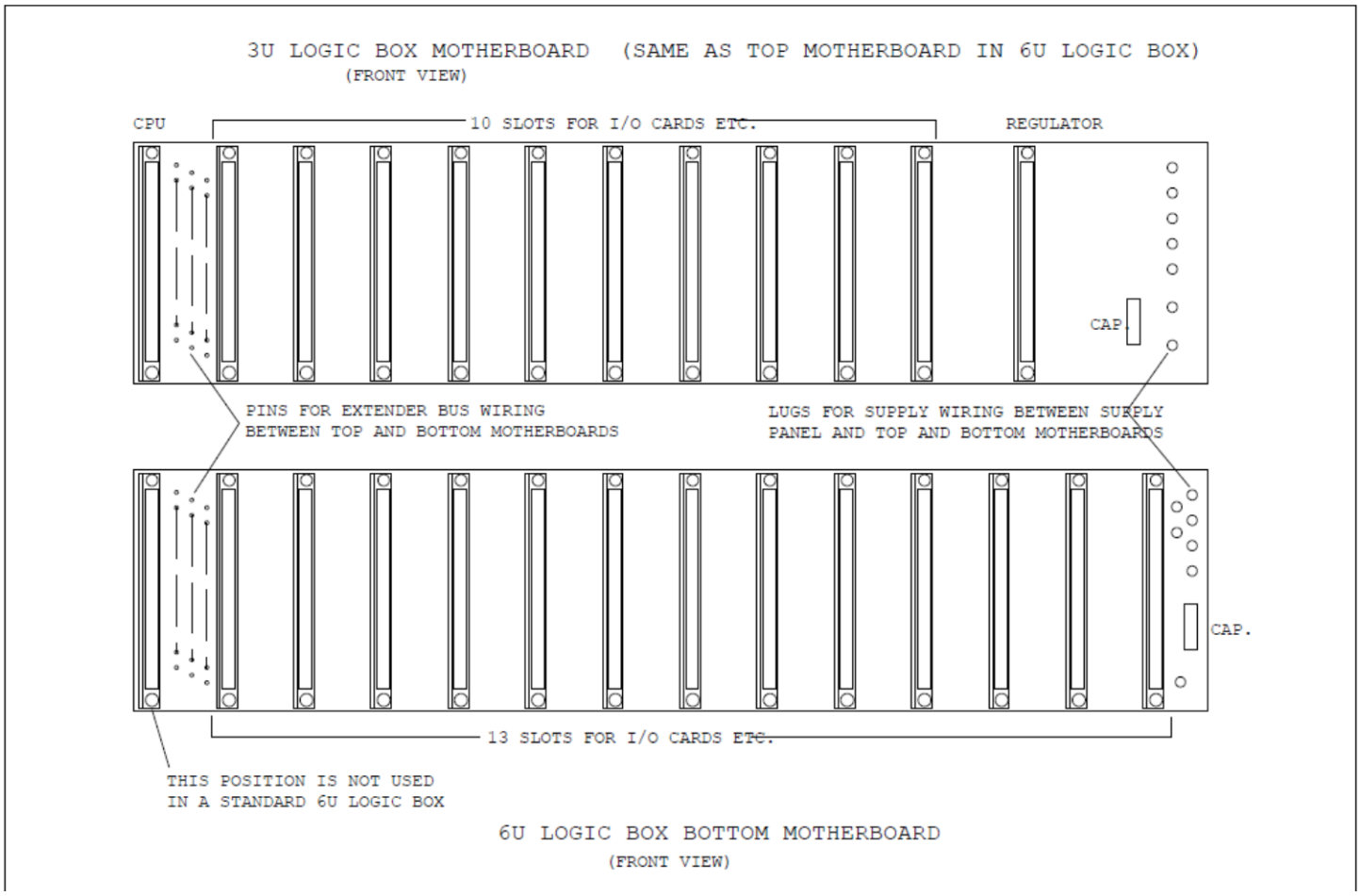
8 I/O Module	*8 Ch. Digital Input / Output Module*
16I Module	*16 Ch. Digital Input Module (Terminal Block)*
16I Module	*16 Ch. Digital Input Module (IDC Connector)*
16O Module	*16 Ch. Digital Output Module (Terminal Block)*
8 IAM Module	*8 Ch. Analog Input Module*
I/R Module	*4 Ch. Digital Input, 6 Ch. Power Relay Output Module*
8 RR Module	*8 Ch. Reed Relay Output Module*
16RR Module	*16 Ch. Reed Relay Output Module*
5PR Module	*5 Ch. Power Relay Output Module*
8PR Module	*8 Ch. Power Relay Output Module*

DMS-3K System Specifications

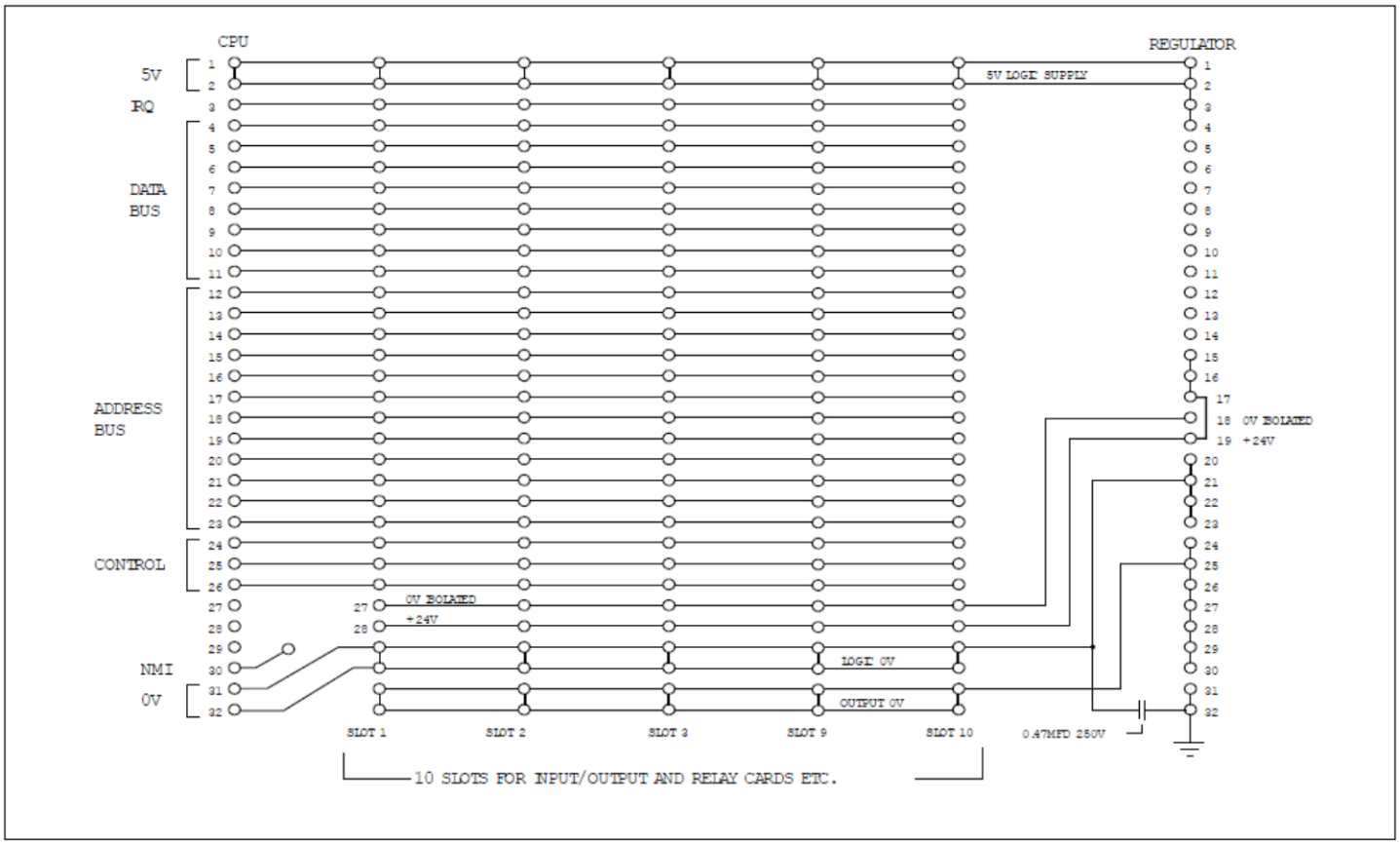
Logic Box Diagram



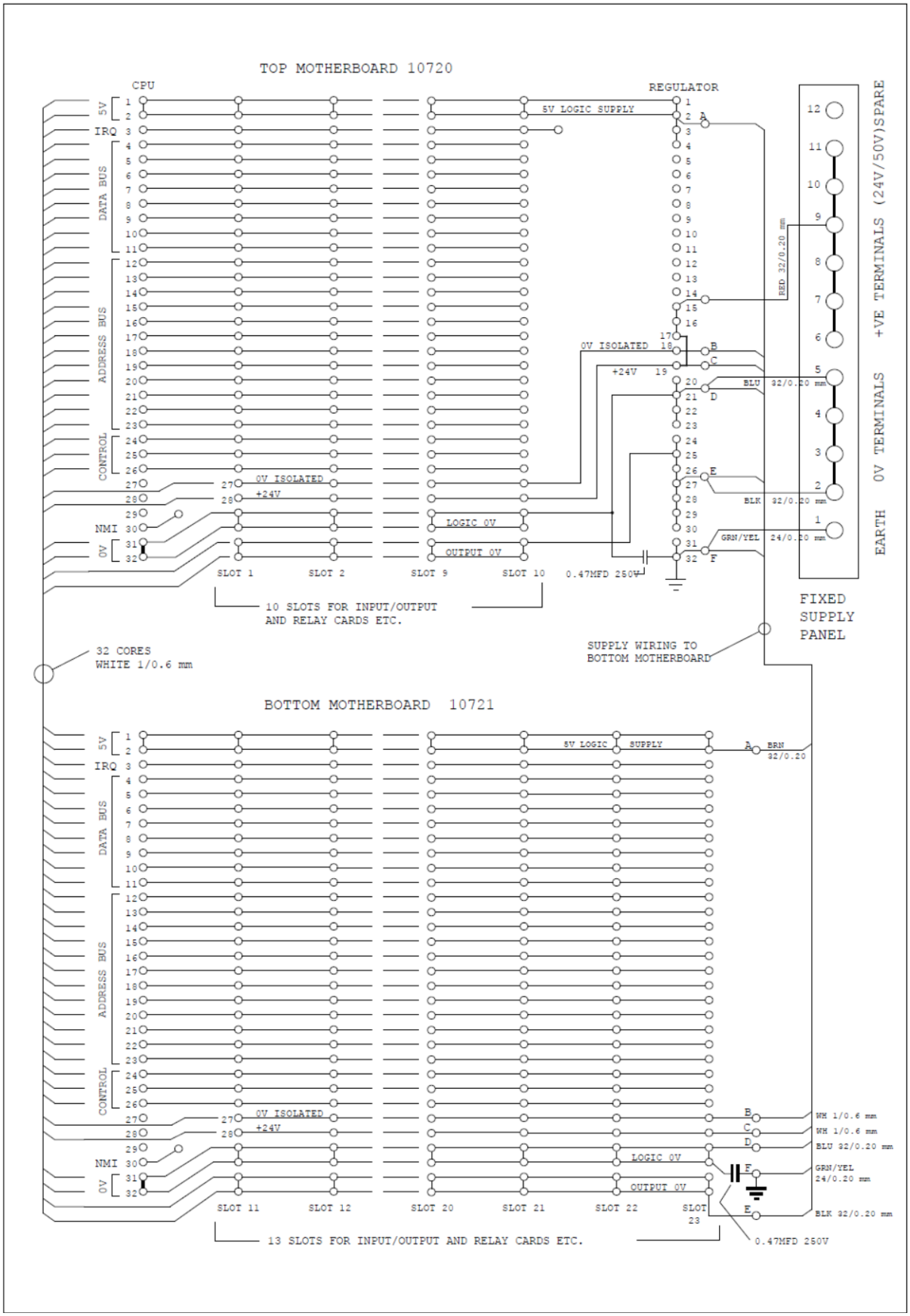
Logic Box Motherboard Outline

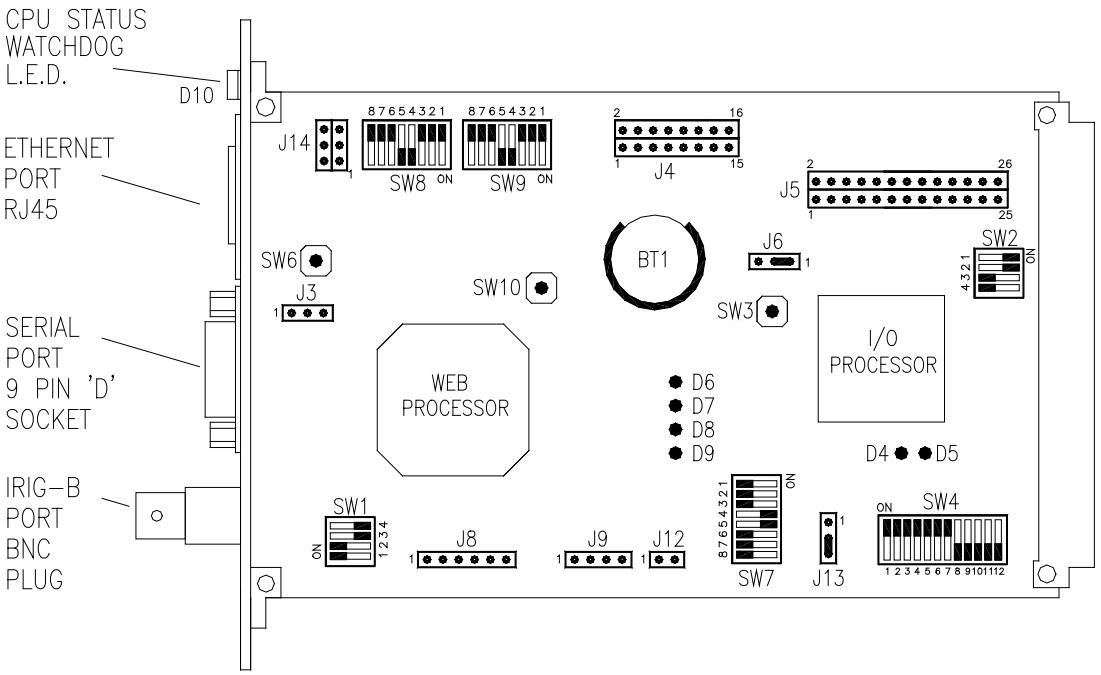


3U Logic Box Motherboard Schematic (Front View)



6U Logic Box Motherboard Schematic (Front View)





CPU–200 CARD LAYOUT

NOTES

1.0 Front Panel indications/connections

Red/green Status LED (D10)

Red	System fault
Blinking Green	System OK, No NTP or IRIG time sync
Steady Green	System OK, NTP or IRIG time sync

DB9S RS485/232 Serial Port

RS232	
Tx	2
Rx	3
Gnd	5
RS485	
Tx/Rx+	9
Tx/Rx-	1
Gnd	5

2.0 On Board Switches

SW1 IRIG-B Set Up

	IRIG-B Format	
Switch	Modulated	Demodulated
1	ON*	OFF
2	ON*	OFF
3	OFF*	ON
4	OFF*	ON

Default setting *

3.0 On Board LED Indicators

D4 I/O Processor Running (red) 0.5s flash

D5 I/O Processor Internal Comms (green) Fast flash

D6 Web Processor Running (green) 0.5s flash

D7 Web Processor DHCP access (green) steady on

D8 Web Processor spare (red)

D9 Web Processor Status (red) steady on

REG-90 (REG-91)

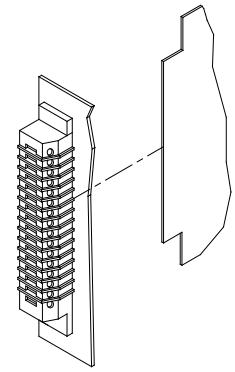
This unit is used in 3U logic boxes where the system supply is 24V DC.

It provides the 5V supply necessary for the 10 usable slots plus the CPU, which equates to 128 inputs and 160 physical outputs maximum

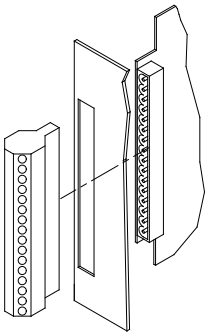
REG-90 (STANDARD) Is intended for use where the initiating contacts are being powered from the 24 VDC system supply.

REG-91 (ISOLATED) Is intended for use where the initiating contacts are being powered from a supply other than the system supply. This isolated supply would be connected to "+VIN" and “OV IN” terminals. All connections to the above units are by screw type terminals.

Regulator Type	Inputs
REG-90B	24 VDC Internal FCV supply
REG-91B	24 , 48, or 125 VDC External FCV supply

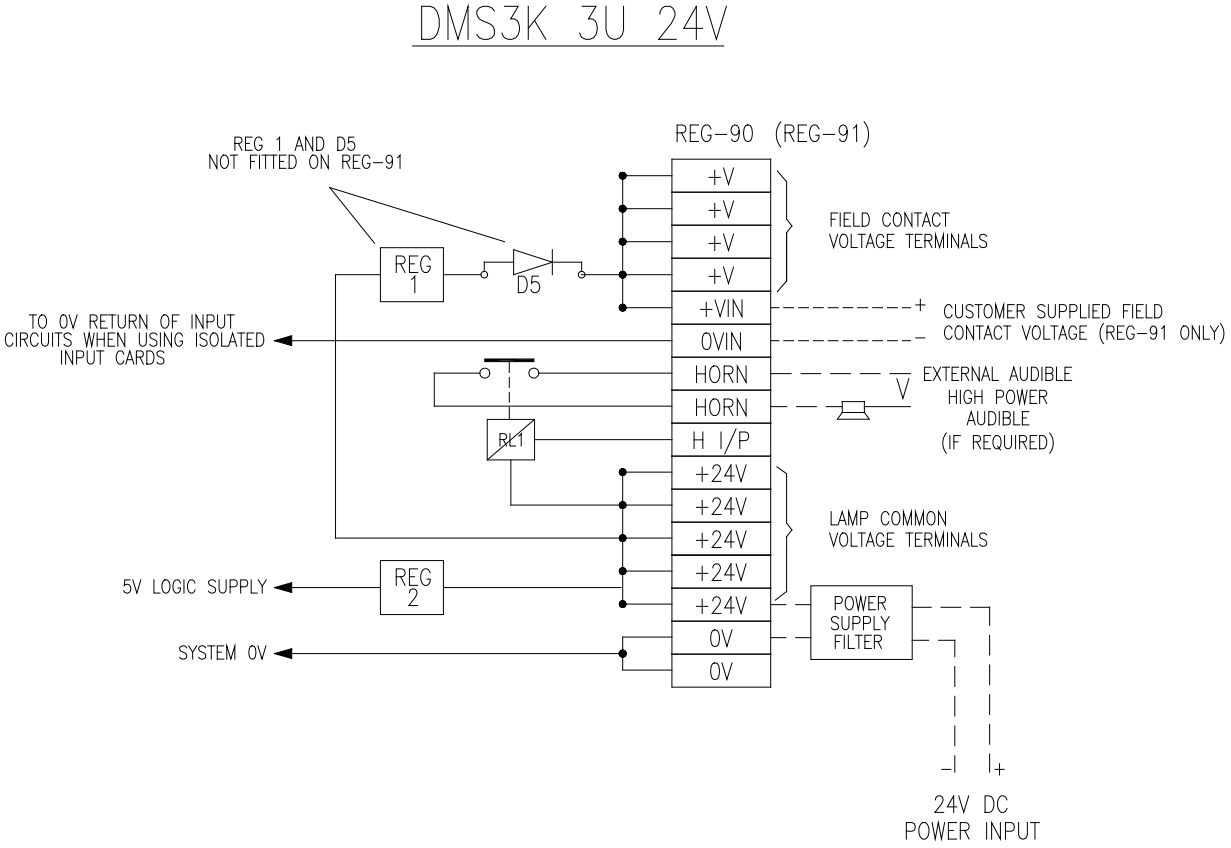


OLD STYLE FRONT CONNECTOR



NEW STYLE FRONT CONNECTOR

Typical Module Wiring Connections



Alarm Contact wetting is direct from the 24V DC supply when using the REG-90 Regulator, and is not isolated

If contact wetting is required to be from a different supply source, or isolated then the REG-91 Regulator, should be installed

Module Addressing, Link & Switch settings

There are no customer link or switch settings on this module

Reg-90 (Reg-91) Module Specifications

SYSTEM SUPPLY

Nominal Supply Voltage: 24V DC
Minimum Supply Voltage: 21V DC
Maximum Supply Voltage: 27V DC

The System supply voltage can be unregulated and used for Lamp Voltage and audible Supply. The '+V' supply is internally regulated with limited current load rating. It is required to supply the small current load requirement of the alarm initiating contacts and control switches to ensure the input response parameters are kept within the specified limits.

OUTPUT 1

Contact wetting supply: 24V DC ± 1v @ 1 Amp Maximum

OUTPUT 2 (Internal)

Logic supply: 5V DC ± 0.25v @ 3.0 Amp Maximum
Short Circuit Protected
The 5V Supply is not available as an output
DO NOT attempt to use this supply for external use.

Relay

Audible (or Auxiliary) relay 24V Coil
Rating 2 Amp @240V a.c. Max
Form A (Normally Open) Contact

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90 (Highland Electronics Limited)
RTU3000 Rochester Instrument systems Limited
DMS3000 AMETEK Power Instruments Limited

The REGULATOR modules are backward compatible per the following table

DMS-3K MODULE		COMPATIBLE MODULES		
Module Ref	Part No*	Module Ref	Part No	Comment
REG-90B	1087-425	REG-90A	8025-159	Two part Edge Connector
REG-91B	1087-427	REG-91A	8025-197	Two part Edge Connector

*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

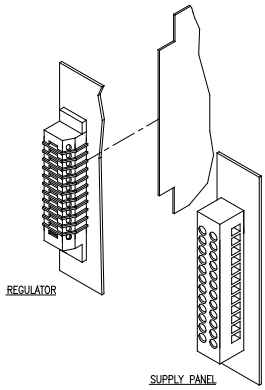
REG-92 (REG-93)

This unit is used in 6U logic boxes where the system supply is 24V DC.

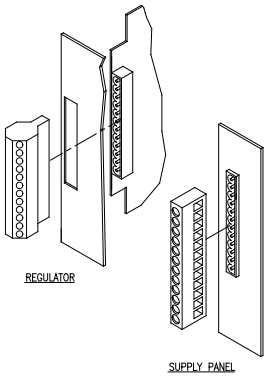
It provides the 5V supply necessary for the 23 usable slots plus the CPU, which equates to 128 inputs and 240 physical outputs maximum

REG-92 (STANDARD) Is intended for use where the initiating contacts are being powered from the 24 VDC system supply.REG-93 (ISOLATED) Is intended for use where the initiating contacts are being powered from a supply other than the system supply. This isolated supply would be connected to "+VIN" and “OV IN” terminals. All connections to the above units are by screw type terminals.

Regulator Type	**Inputs**
REG-92B	24 VDC Internal FCV supply
REG-93B	24 , 48, or 125 VDC External FCV supply

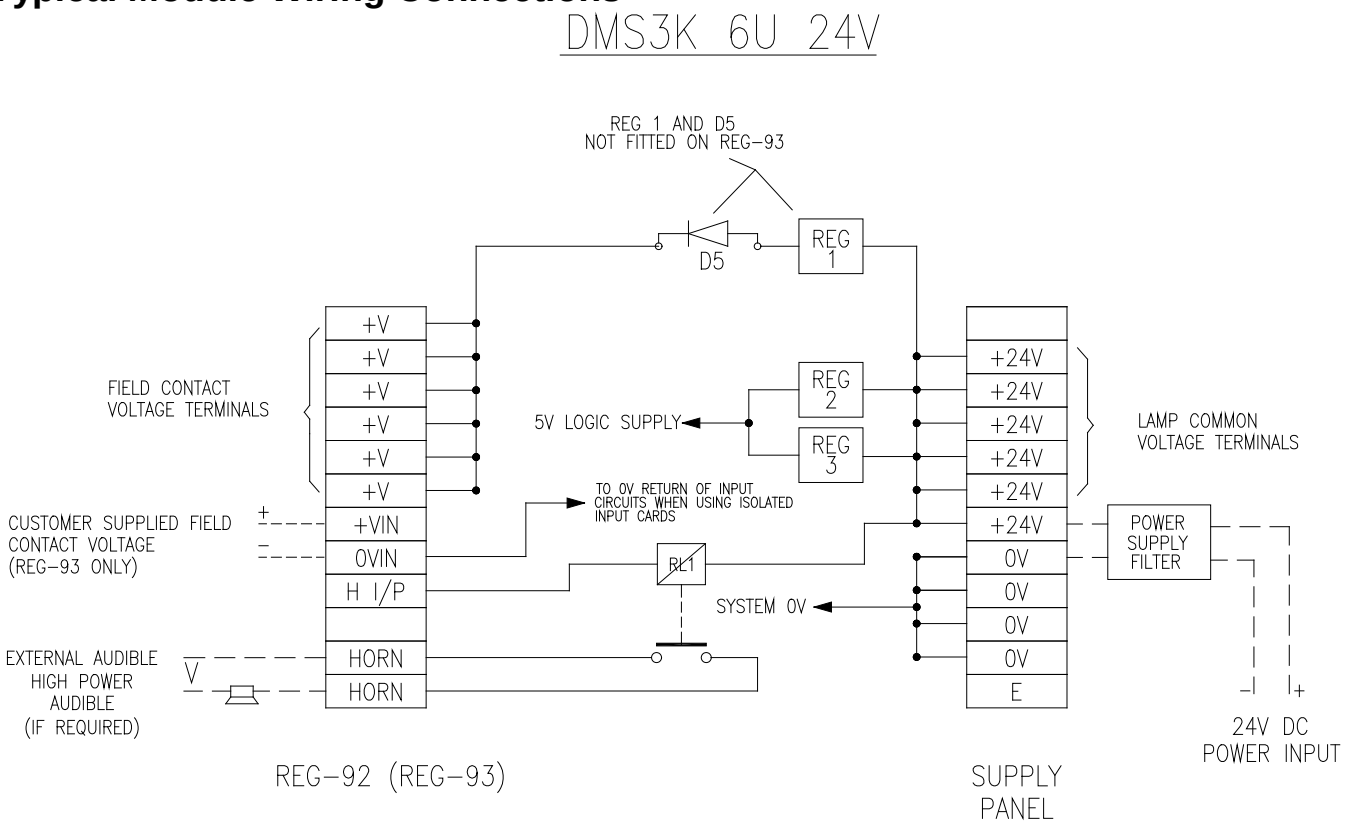


OLD STYLE FRONT CONNECTOR



NEW STYLE FRONT CONNECTORS

Typical Module Wiring Connections



Alarm Contact wetting is direct from the 24V DC supply when using the REG-92 Regulator, and is not isolated

If contact wetting is required to be from a different supply source, or isolated, then the REG-93 Regulator should be installed

Regulators REG-92 & REG-93 require to be used in conjunction with a Supply (Terminal) Panel which is fixed in the Logic Crate.

Module Addressing, Link & Switch settings

There are no customer link or switch settings on this module

Reg-92 (Reg-93) Module Specifications

SYSTEM SUPPLY

Nominal Supply Voltage: 24V DC
Minimum Supply Voltage: 21V DC
Maximum Supply Voltage: 27V DC

The System supply voltage can be unregulated and used for Lamp Voltage and audible Supply. The '+V' supply is internally regulated with limited current load rating. It is required to supply the small current load requirement of the alarm initiating contacts and control switches to ensure the input response parameters are kept within the specified limits.

OUTPUT 1

Contact wetting supply: 24V DC ± 1v @ 1 Amp Maximum

OUTPUT 2 (Internal)

Logic supply: 5V DC ± 0.25v @ 5.0 Amp Maximum
Short Circuit Protected
The 5V Supply is not available as an output
DO NOT attempt to use this supply for external use.

Relay

Audible (or Auxiliary) relay 24V Coil
Rating 2 Amp @240V a.c. Max
Form A (Normally Open) Contact

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90 (Highland Electronics Limited)
RTU3000 Rochester Instrument systems Limited
DMS3000 AMETEK Power Instruments Limited

The REGULATOR modules are backward compatible per the following table

DMS-3K MODULE		COMPATIBLE MODULES		
Module Ref	Part No*	Module Ref	Part No	Comment
REG-92B	1087-409	REG-92A	8025-215	Two part Edge Connector
REG-93B	1087-411	REG-93A	8025-229	Two part Edge Connector

*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

REG-94 (REG-95)

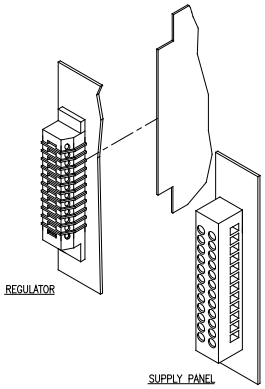
This unit is used in 6U logic boxes where the system supply is 48V DC.

It provides the 5V supply necessary for the 23 usable slots plus the CPU, which equates to 128 inputs and 240 physical outputs maximum

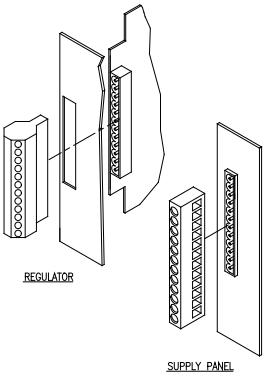
REG-94 (STANDARD) is intended for use where the initiating contacts are being powered from the 48 VDC system supply.

REG-95 (ISOLATED) is intended for use where the initiating contacts are being powered from a supply other than the system supply. This isolated supply would be connected to "+VIN" and “OV IN” terminals. All connections to the above units are by screw type terminals.

Regulator Type	**Inputs**
REG-94B	48 VDC Internal FCV supply
REG-95B	24, 48, or 125 VDC External FCV supply

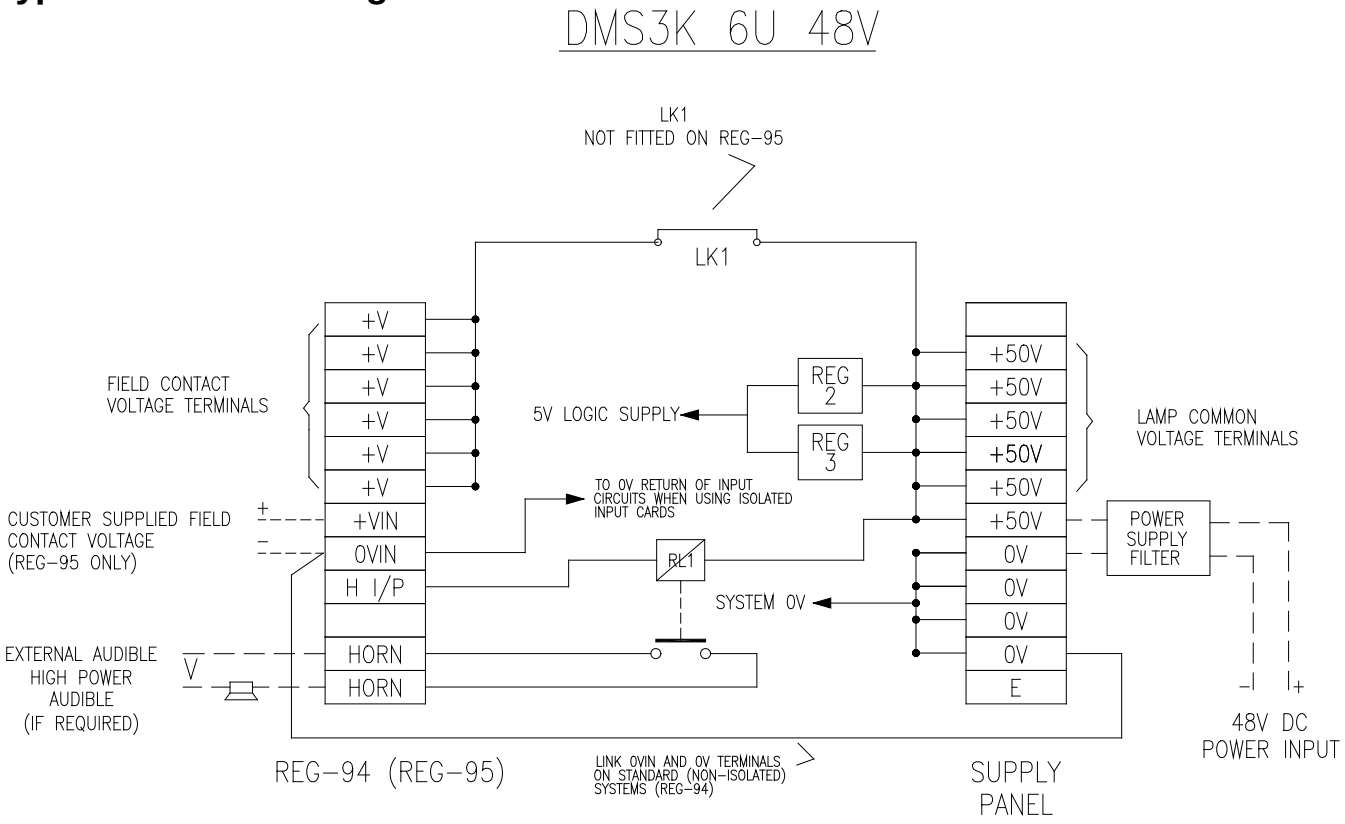


OLD STYLE FRONT CONNECTOR



NEW STYLE FRONT CONNECTORS

Typical Module Wiring Connections



Note:

Alarm Contact wetting is direct from the 48V DC supply when using the REG-94 Regulator, and is not isolated
If contact wetting is required to be from a different supply source, or isolated, then the REG-95 Regulator should be installed

Regulators REG-94 & REG-95 require to be used in conjunction with a Supply (Terminal) Panel which is fixed in the Logic Crate.

Module Addressing, Link & Switch settings

There are no user link or switch settings on this module

Reg-94 (Reg-95) Module Specifications

SYSTEM SUPPLY

Nominal Supply Voltage: 48V DC
Minimum Supply Voltage: 44V DC
Maximum Supply Voltage: 63V DC

The System supply voltage must be regulated and within the limits of 44-63V DC and is used for Lamp Voltage, Control Switches, Audible Supply and for Alarm Contact wetting when using the REG-94.
The REG-95 should be used if the inputs are to be supplied independently of the system supply. This Isolated Input supply must match the voltage rating of the Input or Output modules installed in the Logic Crate

OUTPUT 1 (Internal)

Logic supply: 5V DC ± 0.25v @ 5.0 Amp Maximum
Short Circuit Protected
The 5V Supply is not available as an output
DO NOT attempt to use this supply for external use.

Relay

Audible (or Auxiliary) relay 60V Coil
Rating 2 Amp @240V a.c. Max
Form A (Normally Open) Contact

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90 (Highland Electronics Limited)
RTU3000 Rochester Instrument systems Limited
DMS3000 AMETEK Power Instruments Limited

The REGULATOR modules are backward compatible per the following table

DMS-3K MODULE		**COMPATIBLE MODULES**		
Module Ref	Part No*	Module Ref	Part No	Comment
REG-94B	1087-415	REG-94A	8025-235	Two part Edge Connector
REG-95B	1087-419	REG-95A	8025-242	Two part Edge Connector

*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

REG-96 (REG-97)

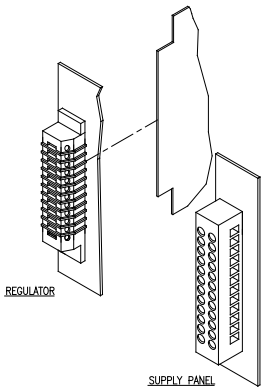
This unit is used in 3U logic boxes where the system supply is 48V DC.

It provides the 5V supply necessary for the 10 usable slots plus the CPU, which equates to 128 inputs and 160 physical outputs maximum

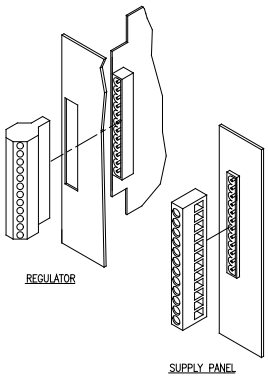
REG-96 (STANDRD) is intended for use where the initiating contacts are being powered from the 48 VDC system supply.

REG-97 (ISOLATED) is intended for use where the initiating contacts are being powered from a supply other than the system supply. This isolated supply would be connected to "+VIN" and “OV IN” terminals. All connections to the above units are by screw type terminals.

Regulator Type	Inputs
REG-96B	48 VDC Internal FCV supply
REG-97B	24, 48, or 125 VDC External FCV supply

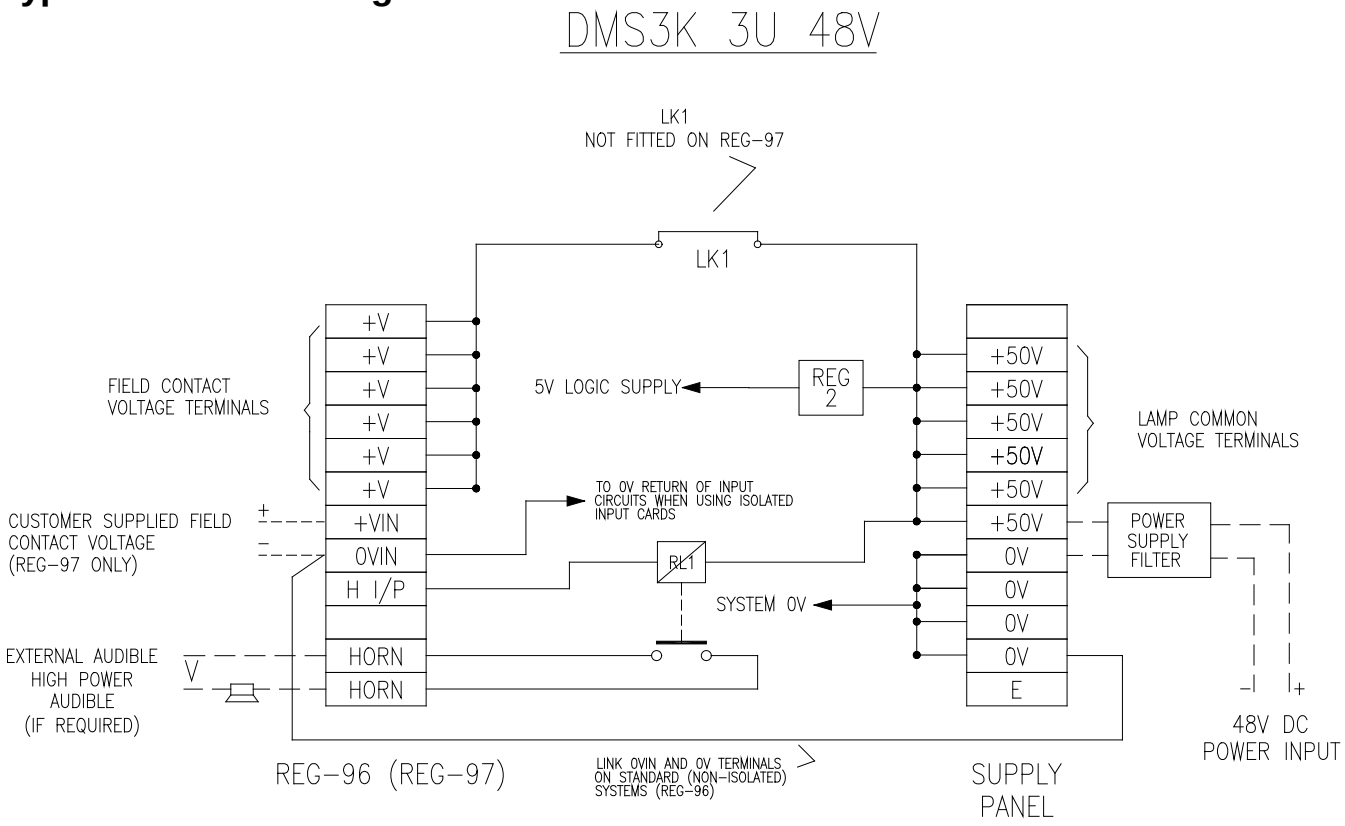


OLD STYLE FRONT CONNECTOR



NEW STYLE FRONT CONNECTORS

Typical Module Wiring Connections



Note:

Alarm Contact wetting is direct from the 48V DC supply when using the REG-96 Regulator, and is not isolated

If contact wetting is required to be from a different supply source, or isolated, then the REG-97 Regulator should be installed

Regulators REG-96 & REG-97 require to be used in conjunction with a Supply (Terminal) Panel which is fixed in the Logic Crate.

Module Addressing, Link & Switch settings

There are no user link or switch settings on this module

Reg-96 (Reg-97) Module Specifications

SYSTEM SUPPLY

Nominal Supply Voltage: 48V DC
Minimum Supply Voltage: 44V DC
Maximum Supply Voltage: 63V DC

The System supply voltage must be regulated and within the limits of 44-63V DC and is used for Lamp Voltage, Control Switches, Audible Supply and for Alarm Contact wetting when using the REG-96.
The REG-97 should be used if the inputs are to be supplied independently of the system supply. This Isolated Input supply must match the voltage rating of the Input or Output modules installed in the Logic Crate

OUTPUT 1 (Internal)

Logic supply: 5V DC ± 0.25v @ 3.0 Amp Maximum
Short Circuit Protected
The 5V Supply is not available as an output
DO NOT attempt to use this supply for external use.

Relay

Audible (or Auxiliary) relay 60V Coil
Rating 2 Amp @240V a.c. Max
Form A (Normally Open) Contact

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90 (Highland Electronics Limited)
RTU3000 Rochester Instrument systems Limited
DMS3000 AMETEK Power Instruments Limited

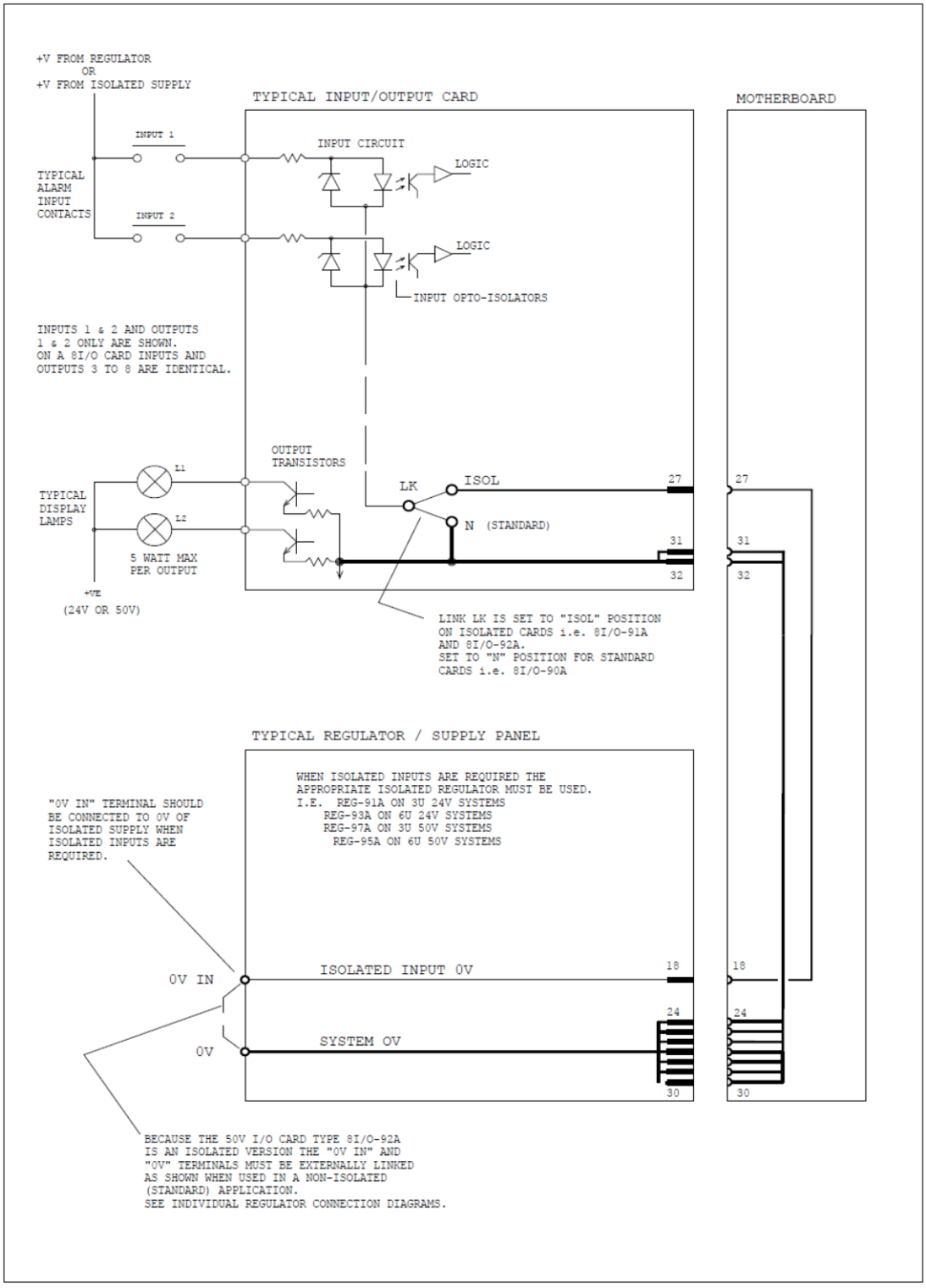
The REGULATOR modules are backward compatible per the following table

DMS-3K MODULE		COMPATIBLE MODULES		
Module Ref	Part No*	Module Ref	Part No	Comment
REG-96B	1087-413	REG-96A	8025-244	Two part Edge Connector
REG-97B	1087-416	REG-97A	8025-246	Two part Edge Connector

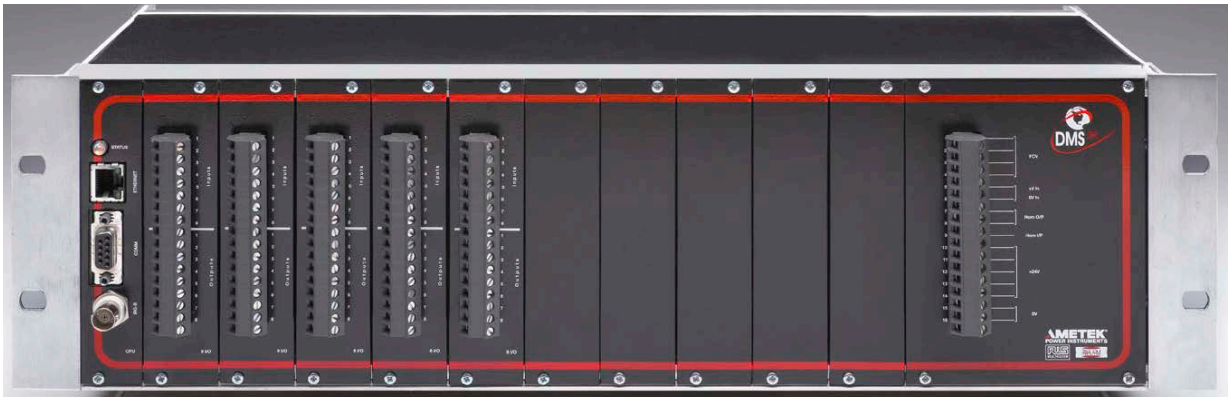
*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

I/O Modules

Typical Alarm Circuit Arrangement



I/O System Addressing



All of the I/O Cards have a unique address to determine the inputs and outputs they represent. The 8 channel cards (8 I/O, 8RR, 8 IAM, I/R, 5 PR, 8PR) cards use 5 switch settings for the address and the 16 channel cards (16 I, 16 O, 16 RR) have 4 switch settings. The address is based on a binary scale.

		8 CHANNEL CARDS					16 CHANNEL CARDS			
SYSTEM OUTPUTS / CONTROL INPUTS / ALARM INPUTS	1 to 8	O	O	O	O	O	O	O	O	O
	9 to 16	C	O	O	O	O				
	17 to 24	O	C	O	O	O	C	O	O	O
	25 to 32	C	C	O	O	O				
	33 to 40	O	O	C	O	O	O	C	O	O
	41 to 48	C	O	C	O	O				
	49 to 56	O	C	C	O	O	C	C	O	O
	57 to 64	C	C	C	O	O				
	65 to 72	O	O	O	C	O	O	O	C	O
	73 to 80	C	O	O	C	O				
	81 to 88	O	C	O	C	O	C	O	C	O
	89 to 96	C	C	O	C	O				
	97 to 104	O	O	C	C	O	O	C	C	O
	105 to 112	C	O	C	C	O				
	113 to 120	O	C	C	C	O	C	C	C	O
	121 to 128	C	C	C	C	O				
	129 to 136	O	O	O	O	C	O	O	O	C
	137 to 144	C	O	O	O	C				
	145 to 152	O	C	O	O	C	C	O	O	C
	153 to 160	C	C	O	O	C				
	161 to 168	O	O	C	O	C	O	C	O	C
	169 to 176	C	O	C	O	C				
	177 to 184	O	C	C	O	C	C	C	O	C
	185 to 192	C	C	C	O	C				
	193 to 200	O	O	O	C	C	O	O	C	C
	201 to 208	C	O	O	C	C				
	209 to 216	O	C	O	C	C	C	O	C	C
	217 to 224	C	C	O	C	C				
	225 to 232	O	O	C	C	C	O	C	C	C
	233 to 240	C	O	C	C	C				

Addressing Notes:

The module addressing will determine how to configure the system using the WEB Browser. System addressing is done at the factory. There is no need to set up the modules you have in your system. If replacing a module in your system, duplicate all card settings in the replacement module. If adding a new module to your system, follow the guidelines below.

1. Analog Input Modules need to be addressed as the first inputs in the system. Keep in mind that the 8 channel Analog Input Module uses the equivalent of 32 alarm inputs.

2. No duplication of switch settings is allowed for the same group of inputs/outputs.

3. Alarm inputs are reserved for inputs 1-128. Control Inputs typically start at input number 129 (factory default), but can use any input from 1-192.
   Note: If the control input is assigned to an input from 1-128, it will show up in the Active Alarm and Event Log.

4. The card slot positions in the rack are universal, so any card can go on any location.

Addressing Example 1:

DMS-3K system with:
24 Digital Inputs, 24 Digital Outputs, 8 Control Inputs, 8 Alarm Outputs, 5 Power Relay Outputs

Card Slot #	Module Type	Inputs	Outputs	Module Switch Settings (SW2)				
				8 CHANNEL CARDS				
1	8 I/O	1 to 8	1 to 8	O	O	O	O	O
2	8 I/O	9 to 16	9 to 16	C	O	O	O	O
3	8 I/O	17 to 24	17 to 24	O	C	O	O	O
4	5 PR	25 to 29		C	C	O	O	O
10	8 I/O	129 to 136	129 to 136	O	O	O	O	C

Addressing Example 2:

DMS-3K system with:
8 Analog Inputs, 32 Digital Inputs, 48 Digital Outputs, 4 Control Inputs, 6 Relay Outputs

Card Slot #	Module Type	Inputs	Outputs	Module Switch Settings (SW2)								
				8 CHANNEL CARDS					16 CHANNEL CARDS			
1	8 IAM	1 to 32		O	O	O	O	O				
2	16 I	33 to 48							O	C	O	O
3	16 I	49 to 64							C	C	O	O
4	16 O		1 to 16						O	O	O	O
5	16 O		17 to 32						C	O	O	O
6	16 O		33 to 48						O	C	O	O
10	I/R	129 to 132	129 to 134	O	O	O	O	C				

8I/O-9xB 8 Ch. Digital Input / Output Module Data Sheet

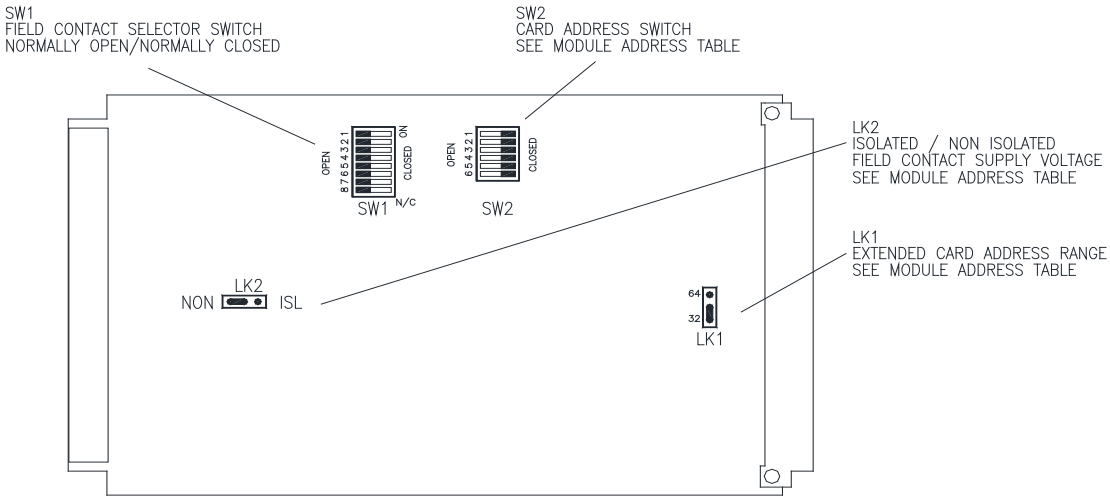
The 8I/O-9xB module accepts 8 digital contact inputs and provides 8 open collector digital (transistor driven) outputs. The digital inputs can use field contact voltages of 24, 48 or 125VDC. The field contact voltage can be provided internally via the power supply regulator or externally supplied by the customer as shown below. Each card has an 8 way DIL switch to allow configuration for Normally Open or Normally Closed initiating contacts as required.

Digital Inputs can be Field Contacts, Control Pushbuttons (Ack, Test, Reset, etc), as assigned via the web browser. Digital Outputs can be configured as Lamp Outputs (for remote Annunciator display) or Horn Outputs (for connection to Regulator Module Horn Input).

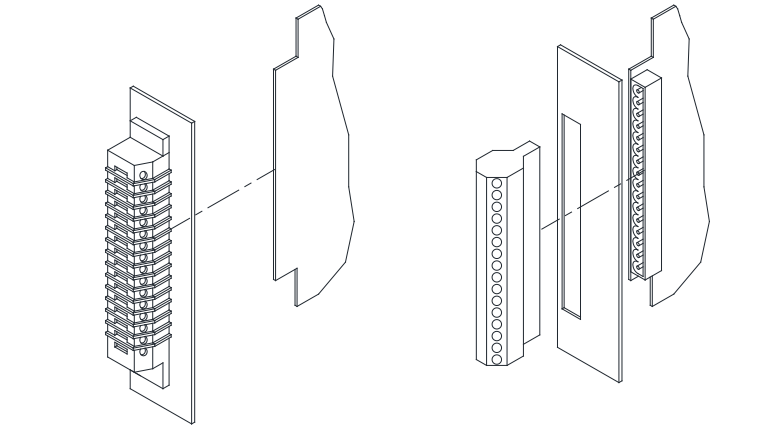
The variations available are:

8 I/O Module	Inputs
8 I/O 90B	24 VDC FCV, Internally or Externally*
8 I/O 92B	48 VDC FCV, Internally or Externally*
8 I/O 95B	125VDC FCV, Externally* Supplied

* For Externally supplied FCV, Link LK2 must be set to ISL



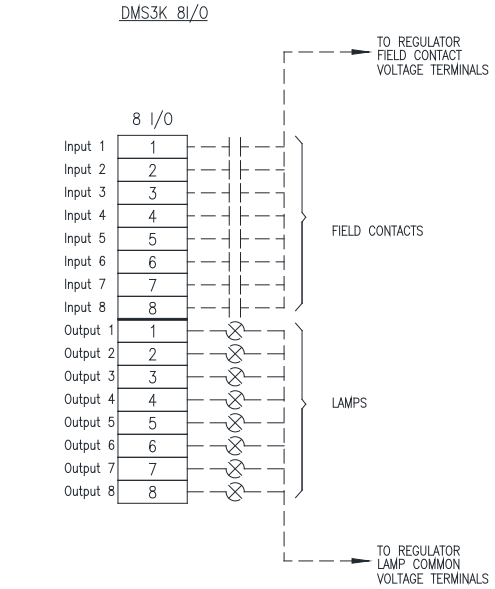
8I/O–9xB CARD LAYOUT



SINGLE PART EDGE CONNECTOR (OLDER STYLE CARDS)

TWO PART EDGE CONNECTOR (NEW STYLE CARDS)

Typical Module Wiring Connections



TYPICAL 8 INPUT / 8 OUTPUT CONNECTION DIAGRAM

Module Address Settings																	
ADDRESS RANGE	TYPE	Contact Setting SWITCH 2								Address Setting SWITCH 2						LK1	LK2
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	32/64	ISL/N
1-8	8I/O									O	O	O	O	O	O	32	N
9-16	8I/O									C	O	O	O	O	O	32	N
17-24	8I/O									O	C	O	O	O	O	32	N
25-32	8I/O									C	C	O	O	O	O	32	N
33-40	8I/O									O	O	C	O	O	O	32	N
41-48	8I/O									C	O	C	O	O	O	32	N
49-56	8I/O									O	C	C	O	O	O	32	N
57-64	8I/O									C	C	C	O	O	O	32	N
65-72	8I/O									O	O	O	C	O	O	32	N
73-80	8I/O									C	O	O	C	O	O	32	N
81-88	8I/O									O	C	O	C	O	O	32	N
89-96	8I/O									C	C	O	C	O	O	32	N
97-104	8I/O									O	O	C	C	O	O	32	N
105-112	8I/O									C	O	C	C	O	O	32	N
113-120	8I/O									O	C	C	C	O	O	32	N
121-128	8I/O									C	C	C	C	O	O	32	N

The Address range indicates the input and output number assignments for this module. Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed
Refer to the System Addressing guidelines in the manual for additional information.
LK2 should be set Isolated (ISL) for systems with external field contact wetting supplies.

8I/O-9xB Module Specifications

INPUT CIRCUIT

Input circuits are suitable for alarm or control switch inputs and are optically isolated with a transient protection network on each input circuit.

Filtering	: 50/60Hz Digital Filtering. Rejecting of inputs less than 16mS duration.
Series Mode Rejection	: 10V rm 50Hz with 30 ohm source resistance.
Common Mode Rejection	: 100V rms 50Hz between initiating contact and earth.
Source Resistance	: 200K ohms minimum loop resistance contact open.
	: 1K ohms maximum loop resistance contact closed.
Surge Test	: BS EN 60060-2; 1995.
50Hz Rejection	: Induced 500V @ 50Hz between input and ground.
Input Current (approx.)	: 2.6mA per input.

WETTING VOLTAGE

8I/O-90B : 24V system	(minimum 21V, maximum 27V smooth d.c.)
8I/O-92B : 50V system	(minimum 44V, maximum 63V smooth d.c)
8I/O-95B : 125V system	(minimum 100V, maximum 150V smooth d.c)

OUTPUT CIRCUIT

Number and Type	8 output circuits - open collector NPN transistors.
Maximum Voltage	+ 63V d.c.
Maximum Wattage	5 Watts.

SUPPLY

5V ± 0.25V @ 40mA approx.

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90	(Highland Electronics Limited)
RTU3000	Rochester Instrument systems Limited
DMS3000	AMETEK Power Instruments Limited

The 8I/O modules are backward compatible per the following table

DMS-3K MODULE		**COMPATIBLE MODULES**		
Module Ref	Part No*	Module Ref	Part No	Comment
8I/O-90B	1087-429	8I/O-90B	2702-450	Single Part Edge Connector
		8I/O-90A	8025-145	24 VDC FCV, Internally Supplied
		8I/O-91A	8025-187	24 VDC FCV, Externally Supplied
		8I/O-90	-	24 VDC FCV, Internally Supplied
		8I/O-91	-	24 VDC FCV, Externally Supplied
8I/O-92B	1087-433	8I/O-92B	2702-451	Single Part Edge Connector
		8I/O-92A	8025-209	48 VDC FCV, Internally Supplied
		8I/O-92	5600-32015	48 VDC FCV, Internally Supplied
8I/O-95B	1087-431	8I/O-95B	2702-452	Single Part Edge Connector
		8I/O-95A	8025-239	125 VDC FCV, Externally Supplied
		8I/O-95	-	125 VDC FCV, Externally Supplied

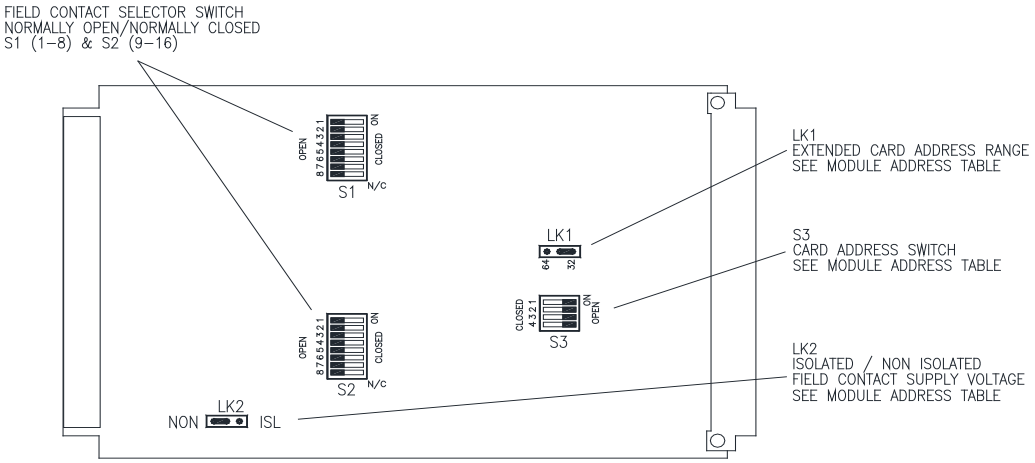
*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

16I-9XB 16 Ch. Digital Input Module Data Sheet (Terminal Block Connection)

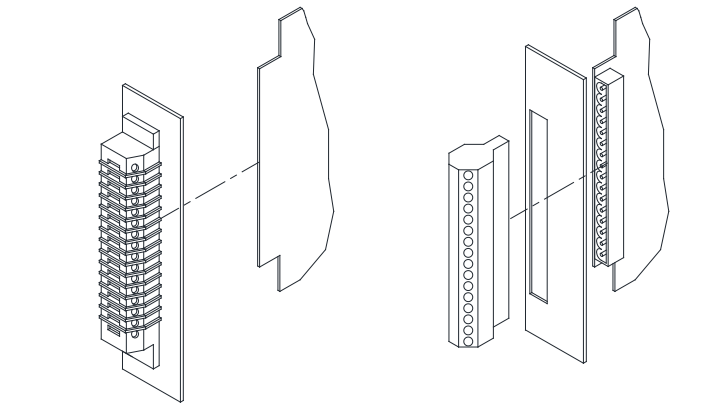
The 16I-9xB module accepts 16 digital contact inputs using field contact voltages of 24, 48 or 125VDC. The field contact voltage can be provided internally via the power supply regulator or externally supplied by the customer as shown below.
Each card has two 8 way DIL switches to allow configuration for Normally Open or Normally Closed initiating contacts as required.
Digital Inputs can be Field Contacts, Control Pushbuttons (Ack, Test, Reset, etc), as assigned via the web browser.
Connection to the card is via a two part screw terminal connector block
The variations available are:

16I Module	Inputs
16I 90B	24 VDC FCV, Internally or Externally* Supplied
16I 92B	48 VDC FCV, Internally or Externally* Supplied
16I 95B	125VDC FCV, Externally* Supplied

* For Externally supplied FCV, Link LK2 must be set to ISL



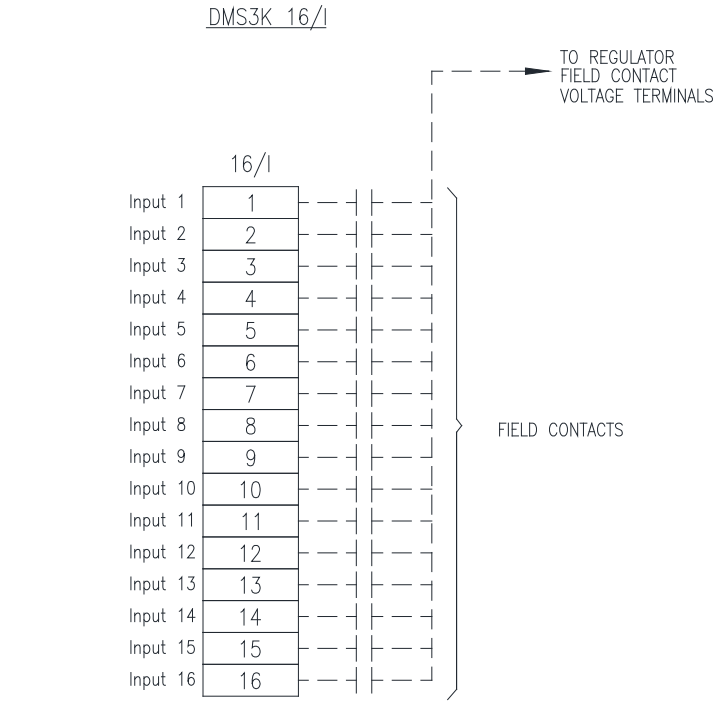
16I–9xB CARD LAYOUT



SINGLE PART EDGE CONNECTOR (OLDER STYLE CARDS)

TWO PART EDGE CONNECTOR (NEW STYLE CARDS)

Typical Module Wiring Connections



TYPICAL 16 INPUT MODULE CONNECTION DIAGRAM
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

MODULE ADDRESS SETTING																							
ADDRESS RANGE	TYPE	Contact Setting																Address Setting					
		SWITCH 1								SWITCH 2								SWITCH 3				LK1	LK2
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	32/64	ISL/N
1-16	16I																	O	O	O	O	32	N
17-32	16I																	C	O	O	O	32	N
33-48	16I																	O	C	O	O	32	N
49-64	16I																	C	C	O	O	32	N
65-80	16I																	O	O	C	O	32	N
81-96	16I																	C	O	C	O	32	N
97-112	16I																	O	C	C	O	32	N
113-128	16I																	C	C	C	O	32	N

The Address range indicates the input number assignments for this module.
Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed
Refer to the System Addressing guidelines in the manual for additional information.
LK2 should be set Isolated (ISL) for systems with external field contact wetting supplies.

16I-9xB Module Specifications

INPUT CIRCUIT

Input circuits are suitable for alarm or control switch inputs and are optically isolated with a transient protection network on each input circuit.

Filtering	: 50/60Hz Digital Filtering. Rejecting of inputs less than 16mS duration.
Series Mode Rejection	: 10V rm 50Hz with 30 ohm source resistance.
Common Mode Rejection	: 100V rms 50Hz between initiating contact and earth.
Source Resistance	: 200K ohms minimum loop resistance contact open.
	: 1K ohms maximum loop resistance contact closed.
Surge Test	: BS EN 60060-2; 1995.
50Hz Rejection	: Induced 500V @ 50Hz between input and ground.
Input Current (approx.)	: 2.6mA per input.

WETTING VOLTAGE

16I-90B :	24V system	(minimum 21V, maximum 27V smooth d.c.)
16I-92B :	50V system	(minimum 44V, maximum 63V smooth d.c)
16I-95B :	125V system	(minimum 100V, maximum 150V smooth d.c)

SUPPLY

5V ± 0.25V @ 40mA approx.

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90	(Highland Electronics Limited)
RTU3000	Rochester Instrument systems Limited
DMS3000	AMETEK Power Instruments Limited

The 16I modules are backward compatible per the following table

DMS-3K MODULE		COMPATIBLE MODULES		
Module Ref	Part No*	Module Ref	Part No	Comment
16I-90B	1087-437	16I-90B	2702-430	Single Part Edge Connector
		16I-90A	8025-146	24 VDC FCV, Internally Supplied
		16I-91A	8025-188	24 VDC FCV, Externally Supplied
		16I-90	-	24 VDC FCV, Internally Supplied
		16I-91	-	24 VDC FCV, Externally Supplied
16I-92B	1087-435	16I-92B	2702-457	Single Part Edge Connector
		16I-92A	8025-210	48 VDC FCV, Internally Supplied
16I-95B	1087-440	16I-95B	2702-458	Single Part Edge Connector
		16I-95A	8025-240	125 VDC FCV, Externally Supplied

*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

16I-9xB 16 Ch. Digital Input Module Data Sheet (IDC Ribbon Connection)

The 16I-9xB module accepts 16 digital contact inputs using field contact voltages of 24, 48 or 125VDC. The field contact voltage can be provided internally via the power supply regulator or externally supplied by the customer as shown below.

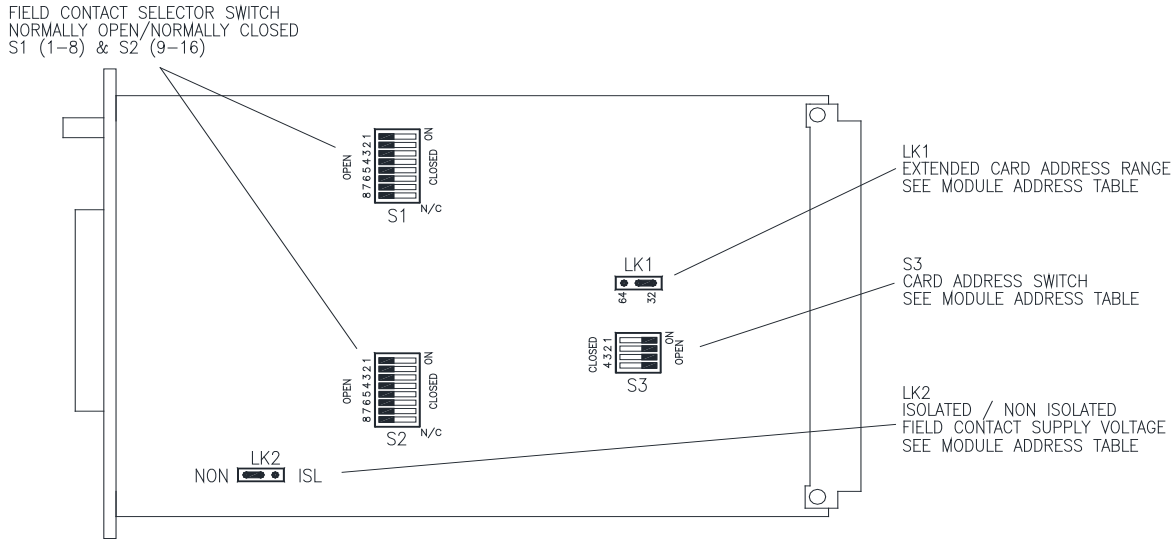
Each card has two 8 way DIL switches to allow configuration for Normally Open or Normally Closed initiating contacts as required.

Digital Inputs can be Field Contacts, Control Pushbuttons (Ack, Test, Reset, etc), as assigned via the web browser.

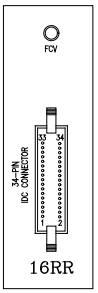
The variations available are:

16I Module	Inputs
16I 96B	24VDC FCV, Externally Supplied (IDC connector
16I 97B	48VDC FCV, Externally Supplied (IDC connector
16I 99B	125VDC FCV, Externally Supplied (IDC

* For Externally supplied FCV, Link LK2 must be set to ISL



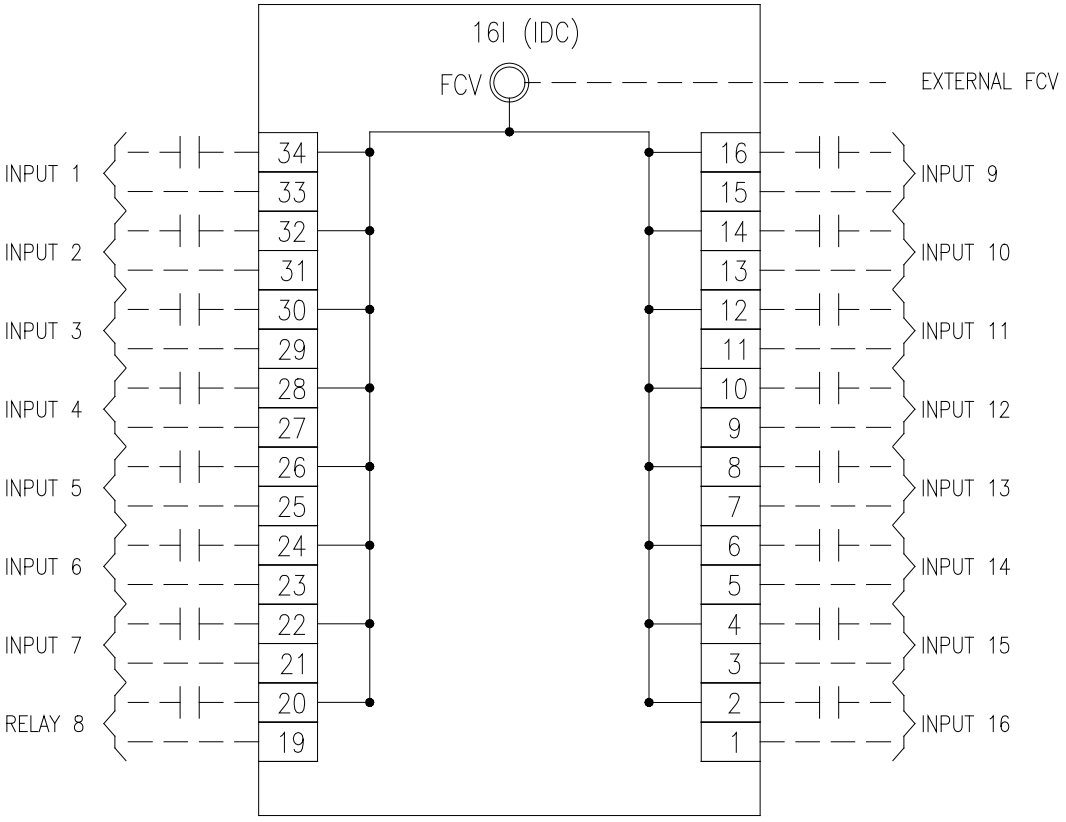
16I–9xB CARD LAYOUT



16I (IDC) FRONT CONNECTION

Typical Module Wiring Connections

DMS3K 16I–IDC



TYPICAL 16 CHANNEL INPUT CARD (IDC RIBBON CONNECTION)
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

MODULE ADDRESS SETTING																							
ADDRESS RANGE	TYPE	Contact Setting																Address Setting					
		SWITCH 1								SWITCH 2								SWITCH 3				LK1	LK2
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	32/64	ISL/N
1-16	16I																	O	O	O	O	32	ISL
17-32	16I																	C	O	O	O	32	ISL
33-48	16I																	O	C	O	O	32	ISL
49-64	16I																	C	C	O	O	32	ISL
65-80	16I																	O	O	C	O	32	ISL
81-96	16I																	C	O	C	O	32	ISL
97-112	16I																	O	C	C	O	32	ISL
113-128	16I																	C	C	C	O	32	ISL

The Address range indicates the input number assignments for this module.
Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed
Refer to the System Addressing guidelines in the manual for additional information.
LK2 should be set Isolated (ISL) for systems with external field contact wetting supplies.

16I-9xB Module Specifications

INPUT CIRCUIT

Input circuits are suitable for alarm or control switch inputs and are optically isolated with a transient protection network on each input circuit.

Filtering	: 50/60Hz Digital Filtering. Rejecting of inputs less than 16mS duration.
Series Mode Rejection	: 10V rm 50Hz with 30 ohm source resistance.
Common Mode Rejection	: 100V rms 50Hz between initiating contact and earth.
Source Resistance	: 200K ohms minimum loop resistance contact open.
	: 1K ohms maximum loop resistance contact closed.
Surge Test	: BS EN 60060-2; 1995.
50Hz Rejection	: Induced 500V @ 50Hz between input and ground.
Input Current (approx.)	: 2.6mA per input.

WETTING VOLTAGE

16I-96B :	24V system	(minimum 21V, maximum 27V smooth d.c.)
16I-97B :	50V system	(minimum 44V, maximum 63V smooth d.c)
16i-99B :	125V system	(minimum 100V, maximum 150V smooth d.c)

SUPPLY

5V ± 0.25V @ 40mA approx.

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90	(Highland Electronics Limited)
RTU3000	Rochester Instrument systems Limited
DMS3000	AMETEK Power Instruments Limited

The 16I modules are backward compatible per the following table

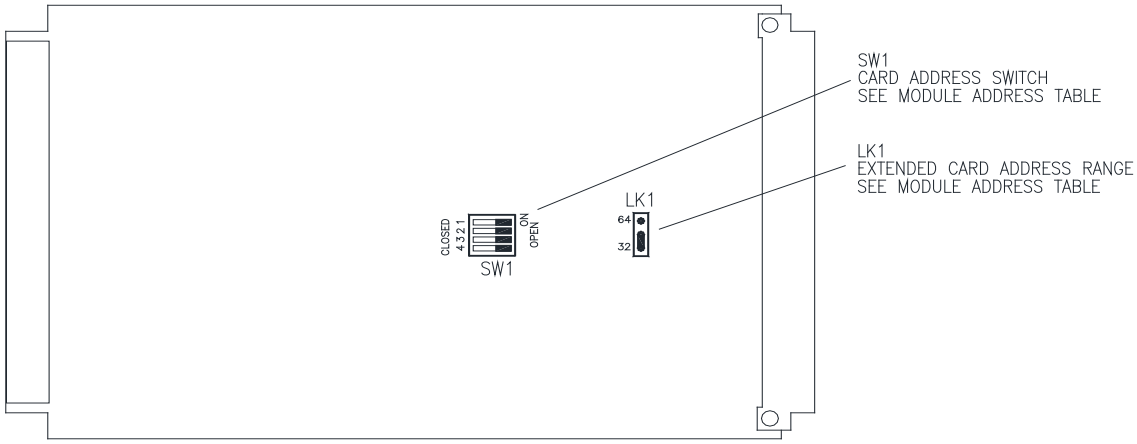
DMS-3K MODULE		**COMPATIBLE MODULES**		
Module Ref	Part No*	Module Ref	Part No	Comment
16I-96B	2702-395	16I-96	8025-194	24 VDC FCV, Externally Supplied
16I-97B	2702-396	16I-97	8025-155	48 VDC FCV, Externally Supplied
16I-99B	2702-397	16I-99	8025-167	125 VDC FCV, Externally Supplied

*(*Assembly Part Numbers listed include Ribbon Interface Cable 8090-004)*

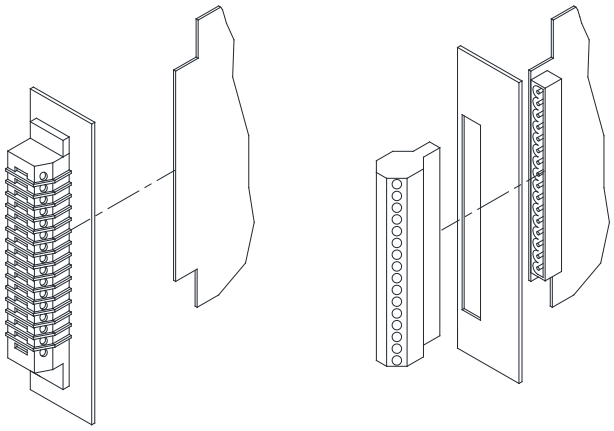
16O-9xB 16 Ch. Digital Output Module Data Sheet (Terminal Block Connection)

The 16O-9xB provides 16 open collector digital (transistor driven) outputs which can be configured as Lamp Outputs (for remote Annunciator display) or Horn Outputs (for connection to Regulator Module Horn Input) via the web browser.
Connection to the card is via a two part screw terminal connector block
The variations available are:

16I Module	Inputs
16O 90B	24 to 48 VDC NPN (sink)



160—9xB CARD LAYOUT

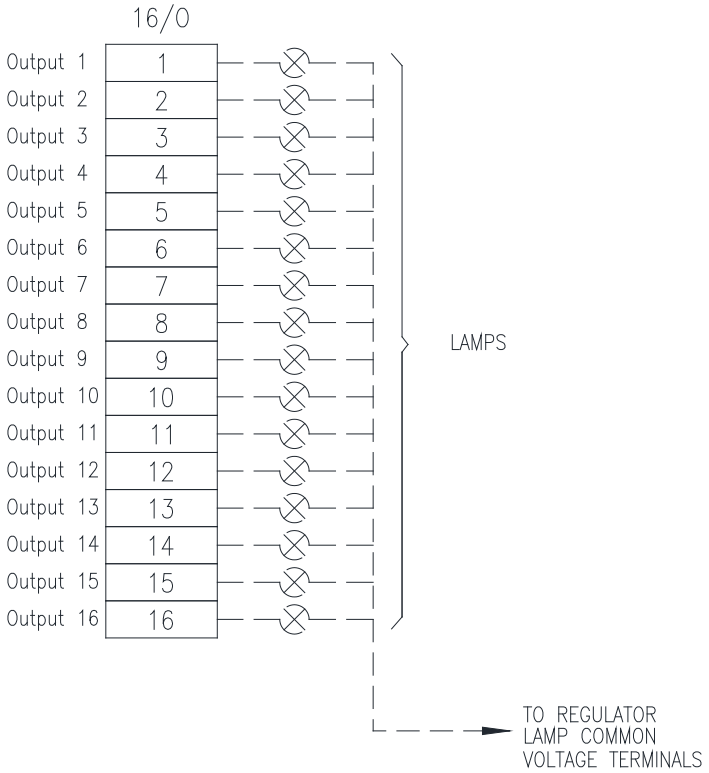


SINGLE PART EDGE CONNECTOR (OLDER STYLE CARDS)

TWO PART EDGE CONNECTOR (NEW STYLE CARDS)

Typical Module Wiring Connections

DMS3K 16/O



TYPICAL 16 OUTPUT MODULE CONNECTION DIAGRAM
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

MODULE ADDRESS SETTING						
ADDRESS RANGE	TYPE	Address Setting				
		SWITCH 1				LK1
		1	2	3	4	32/64
1-16	16O	O	O	O	O	32
17-32	16O	C	O	O	O	32
33-48	16O	O	C	O	O	32
49-64	16O	C	C	O	O	32
65-80	16O	O	O	C	O	32
81-96	16O	C	O	C	O	32
97-112	16O	O	C	C	O	32
113-128	16O	C	C	C	O	32

The Address range indicates the output number assignments for this module.
Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed
Refer to the System Addressing guidelines in the manual for additional information.

16O-9xB Module Specifications

OUTPUT CIRCUIT

Number and Type	16 output circuits - open collector NPN transistors.
Maximum Voltage	+ 63V d.c.
Maximum Wattage	5 Watts.

SUPPLY

5V ± 0.25V @ 40mA approx.

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90	(Highland Electronics Limited)
RTU3000	Rochester Instrument systems Limited
DMS3000	AMETEK Power Instruments Limited

The 16I modules are backward compatible per the following table

DMS-3K MODULE		**COMPATIBLE MODULES**		
Module Ref	Part No*	Module Ref	Part No	Comment
16O-90B	1087-438	16O-90B	2702-443	Single Part Edge Connector
		16O-90	8025-139	24 VDC NPN sink
		16O-92	8025-174	48 VDC NPN sink

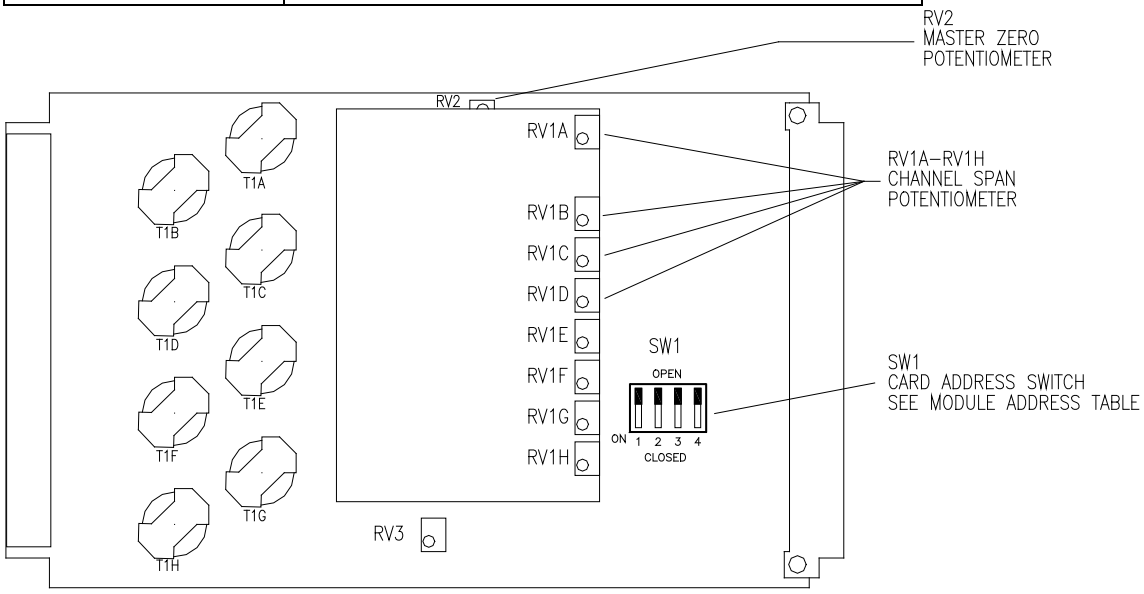
(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)

8 IAM – 90B 8 Ch. Analog Input Module Data Sheet

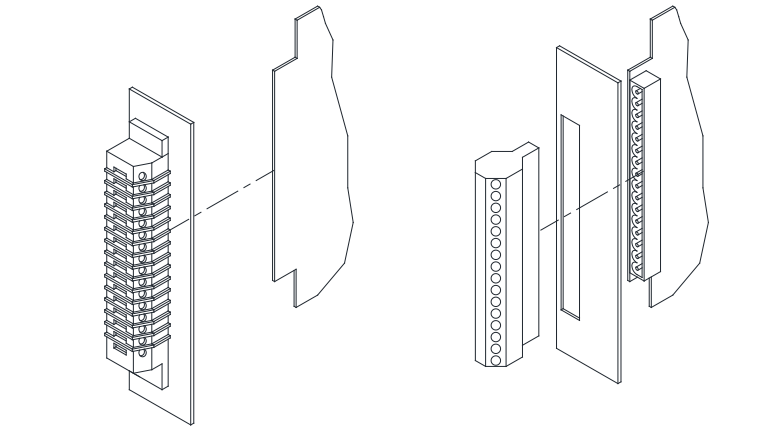
The 8IAM-90 module accepts 8 Analog Inputs (4-20mA). The inputs require an external 24VDC power supply for use in 2 wire systems. Each analog input channel can be configured for up to 4 Alarm Trip points which can be used to drive lamp outputs, alarm relays and horns. Connection is by screw type terminals (1.5mm², 16 AWG max.).

:

8 IAM Module	Inputs
8 IAM-90B	4-20ma Isolated Input, External Supply 24



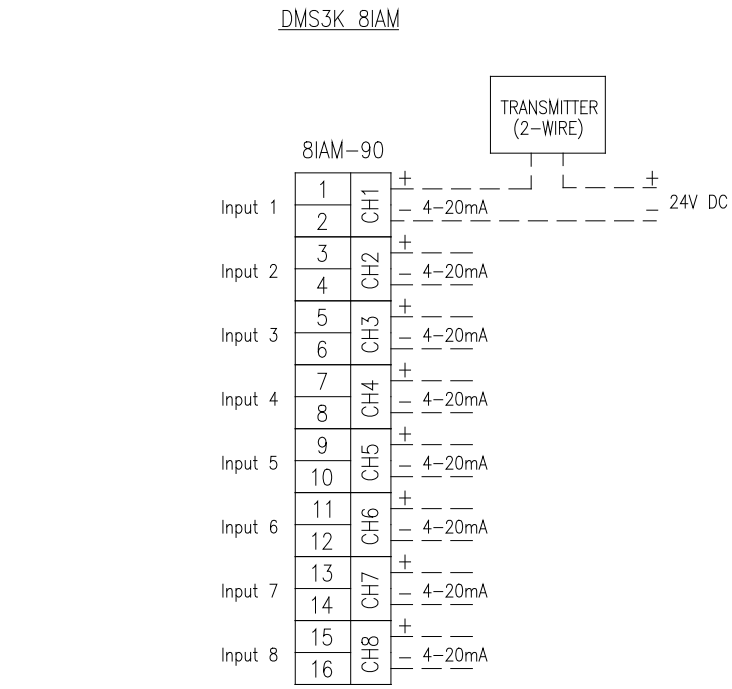
8IAM CARD LAYOUT



SINGLE PART EDGE CONNECTOR (OLDER STYLE CARDS)

TWO PART EDGE CONNECTOR (NEW STYLE CARDS)

Typical Module Wiring Connections



TYPICAL 8 CHANNEL 4–20mA ANALOGUE INPUT MODULE CONNECTION DIAGRAM
SEE MODULE DATA SHEET FOR SPECIFIC SET UP INSTRUCTIONS

MODULE ADDRESS SETTING					
ADDRESS RANGE	TYPE	Address Setting			
		SWITCH 1			
		1	2	3	4
1-32	16O	O	O	O	C
33-64	16O	C	O	O	C
65-96	16O	O	C	O	C
97-128	16O	C	C	O	C

The Address range indicates the input channel assignments for this module. Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed.
Up to 4 off 8IAM-90 cards are permitted in one Logic Rack (32 channels).
Refer to the System Addressing guidelines in the manual for additional information.

Module Specifications

INPUTS

Number & Type : 8 off 4-20mA DC Isolated.

Voltage Drop : 6V DC. Maximum at 20mA input.

Sampling Rate : 40mS per channel.

Ripple & Noise Rejection : >50dB @50Hz, series mode.
: >80dB @50Hz, common mode.

Isolation : 1kV d.c. between inputs.
: 1kV d.c. between inputs and system 0V.

OUTPUTS

Type : 12 bit, available in two 8 bit bytes, under control of system address bus and control bus.

Transfer Characteristics: : Input = 4mA Output = 0048(DEC) / 030(HEX)
Input = 20mA Output = 4048(DEC) / FD0(HEX)
(Linear over zero to full scale)

Resolution : 0.025% of span.

Linearity : Error <±0.15%, typically).10% of span.

Stability and Drift :<±0.005% of span/ºC [i.e. ±0.25% of span over the ambient temperature range of -20ºC to +70ºC.

Isolation : 1kV d.c. between inputs. 1kV d.c. between inputs and system 0V.

SUPPLY

5V ± 0.25V @ 120mA approx.

COMPATIBITY TABLE

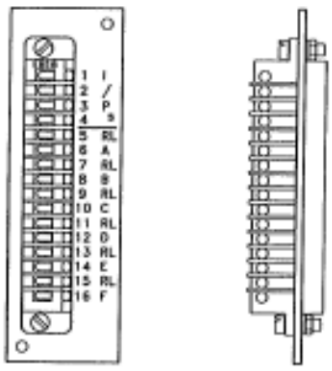
The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:
MPAS90 (Highland Electronics Limited)
RTU3000 Rochester Instrument systems Limited
DMS3000 AMETEK Power Instruments Limited

The 8IAM modules are backward compatible per the following table

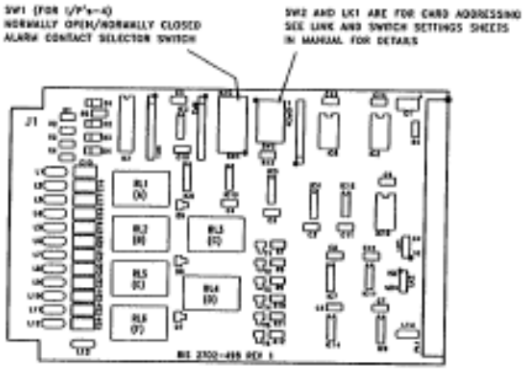
DMS-3K MODULE		COMPATIBLE MODULES		
Module Ref	Part No*	Module Ref	Part No	Comment
8IAM-90B	1087-447	8IAM-90	8025-500	Single Part Edge Connector

*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

I/R Module



FRONT PANEL ASSEMBLY



4 INPUT / 6 RELAY OUTPUT CARD

INPUT CIRCUIT

Number and Type	4 Input circuits - suitable for alarm or control switch inputs – inputs opto isolated with transient protection network on each way.
Alarm Contacts	Normally open or Normally closed. Programmed normally open in software - alter to normally closed by on board 8 way DIL switch.
Filtering	50/60Hz Digital Filtering. Rejection of inputs less than 16mS duration.
Series Mode Rejection	10V rm 50Hz with 30 ohm source resistance.
Common Mode Rejection	100 rms 50Hz between initiating contact and earth.
Source Resistance	200K ohms minimum loop resistance contact open. 1K ohms maximum loop resistance contact closed.
Spike Protection	BS EN 60060-2: 1995.
50Hz Rejection	Induced 500V @ 50Hz between input and ground.
Input Current (approx.)	2.6mA per Input
Wetting Voltage	24V system - max. - 27V, min. - 21V smooth d.c. 50V system - max. - 63V, min. - 44V smooth d.c.

OUTPUT CIRCUIT

Number and Type	6 PCB mounted, flat pack relays.
Contacts	Single pole, single throw, volt free, normally open.
Rating	Maximum Load, 2A @ 250V a.c. (2A @ 62V d.c.) Minimum Load, 10mA, 5V d.c. 100,000 operations minimum at rated load.
Modes	i) Fault on to Fault Clear - Normal - Code CS ii) Fault on to Fault Clear - Fail Safe - Code CF iii) Fault on to Accept - Normal - Code AS iv) Fault on to Accept - Fail Safe - Code AF v) Fault on to Reset - Normal - Code RS vi) Fault on to Reset - Fail Safe - Code RF

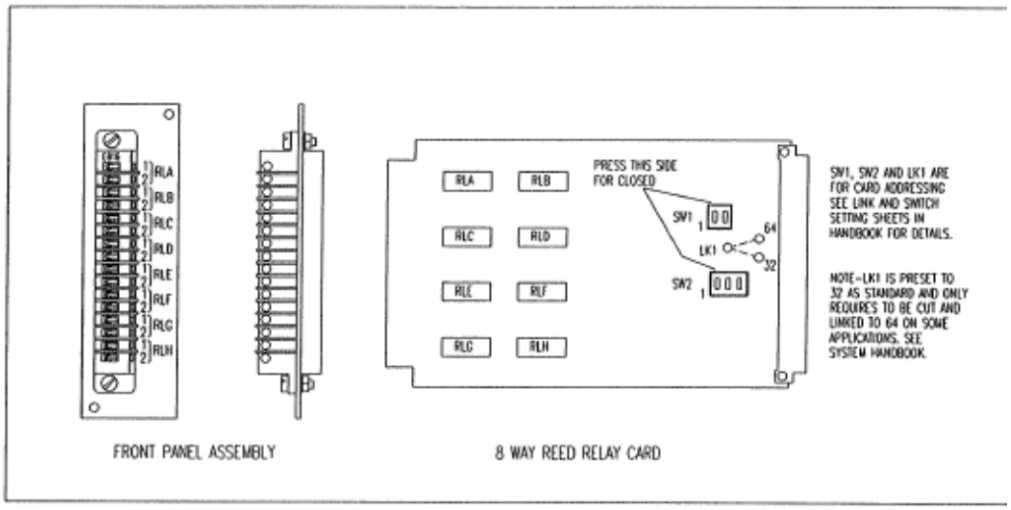
CONSTRUCTION

NOTE:	Front panel assembly is not part of the I/R Card assembly and must be ordered separately if required with spare cards.
Front connector	16 Way "PYE" edgeblock. 2 terminals per each relay. 1 terminal per each input. Screw terminals suitable for 1.50mm^2 maximum wire size.
Supply	5V + 0.25V @ 340mA approx.

CODES

I/R-90	Standard 24V supply (LK2=N) Isolated supply (LK2=ISL)
I/R-92	50V supply - The input circuit has a resistor change in each input and is isolated as per I/R-91 card. (LK2=ISL)

8 RR Module



8 WAY REED RELAY CARD

Address	Each RR card in a system has a unique address, set on switch SW1 AND SW2. These are factory set and should not be altered.

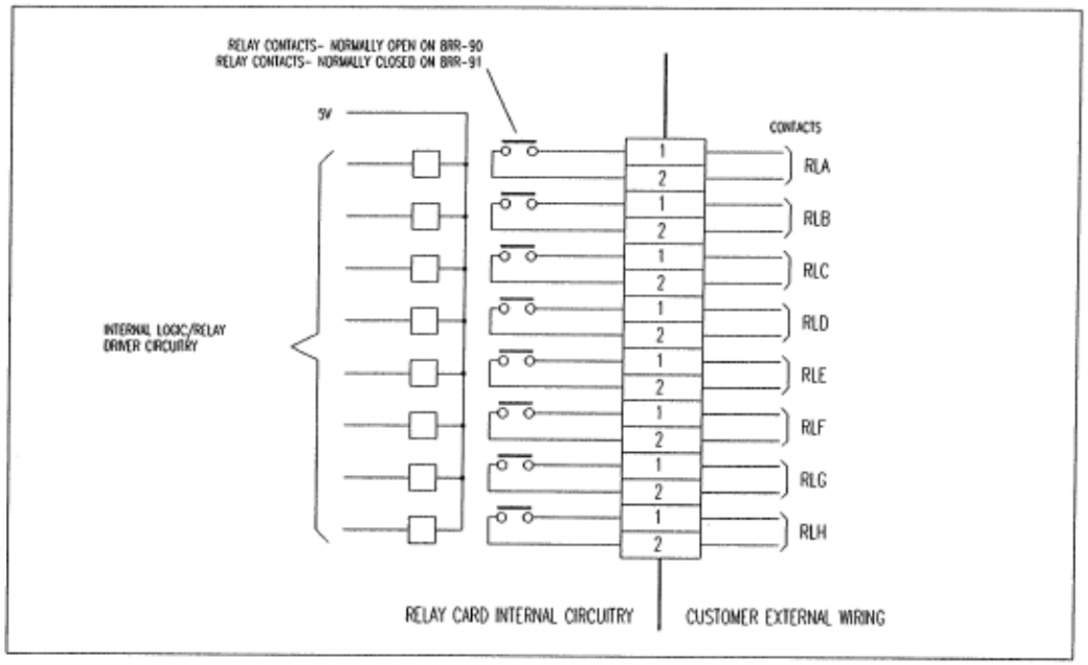
RELAYS

Type	DIL mounted encapsulated reed relays.
Contacts	Single pole, single throw, volt free. N/O on RR-90, N/C on RR-91
Rating	10W maximum contact rating Maximum switching voltage 100V d.c. Maximum switching current 0.5A Number of operations @ full rating: 2×10^6 Maximum number of operations : 250×10^6 Minimum switch current 1mA
Modes	i) Alarm on to Alarm **C**lear - **S**tandard - Code **CS** ii) Alarm on to Alarm **C**lear - **F**ail Safe - Code **CF** iii) Alarm on to **A**ccept - **S**tandard - Code **AS** iv) Alarm on to **A**ccept - **F**ail Safe - Code **AF** v) Alarm on to **R**eset - **S**tandard - Code **RS** vi) Alarm on to **R**eset - **F**ail Safe - Code **RF**

CONSTRUCTION

P.C.B.	High grade glass fibre with 1 oz copper track. Single euro-card size, plated through hole board. Single euro card, plated thru' hole board. size, plated through hole board. Solder resist masked both sides, component identification screen printed.
Front Panel	Etched and painted aluminium. Identification silk screened. Panel fixed by top and bottom screws. Panel 6E wide.
NOTE :	Front panel assembly is not part of the 8RR Card assembly and must be ordered separately if required with spare cards.

Front Connector	16 way "PYE" edgeblock 2 terminals per each reed relay. Terminals are screw type suitable for 1.50mm² maximum wire size.
Rear Connector	32 Way, 2 Part to DIN 41612. Male right angle on 8 way R/R card. Female straight on motherboard.
Supply	5V ± 0.25V @ 100mA approx.



CONNECTION DIAGRAM - 8 WAY REED RELAY CARD

The Reed Relay operation Mode is detailed on the Reed Relay chart in System Handbook.

The Relays contacts, as shown, are isolated.

Do not exceed contact or P.C.B. track rating (200mA)

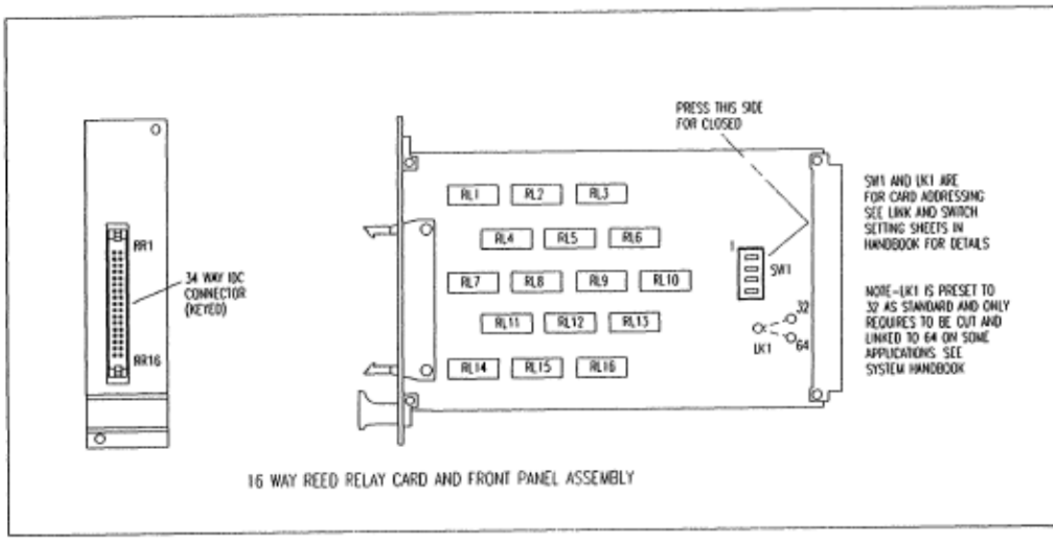
Indicator Filament Lamps can have high cold start current which could weld the contacts - do not use reed relays for this purpose.

Suppress external Relay coils with a reverse connected diode.

8RR-90 Relay Contacts are open with coil de-energised.

8RR-91 Relay Contacts are closed with coil de-energised.

16 RR Module



16 WAY REED RELAY CARD AND FRONT PANEL ASSEMBLY

16 WAY REED RELAY CARD

Address

Each 16RR card in a system has a unique address, set on switch SW1. These are factory set and should not be altered.

RELAYS

Type

DIL mounted encapsulated reed relays.

Contacts

Single pole, single throw, volt free.
N/O on 16RR-90, N/C on 16RR-91

Rating

10W maximum contact rating
Maximum switching voltage 100V d.c.
Maximum switching current 0.5A
Number of operations @ full rating: 2 x 10
Maximum number of operations : 250 x 10
Minimum switch current 1mA

Modes

i) Alarm on to Alarm Clear - Standard - Code **CS**
ii) Alarm on to Alarm Clear - Fail Safe - Code **CF**
iii) Alarm on to Accept - Standard - Code **AS**
iv) Alarm on to Accept - Fail Safe - Code **AF**
v) Alarm on to Reset - Standard - Code **RS**
vi) Alarm on to Reset - Fail Safe - Code **RF**

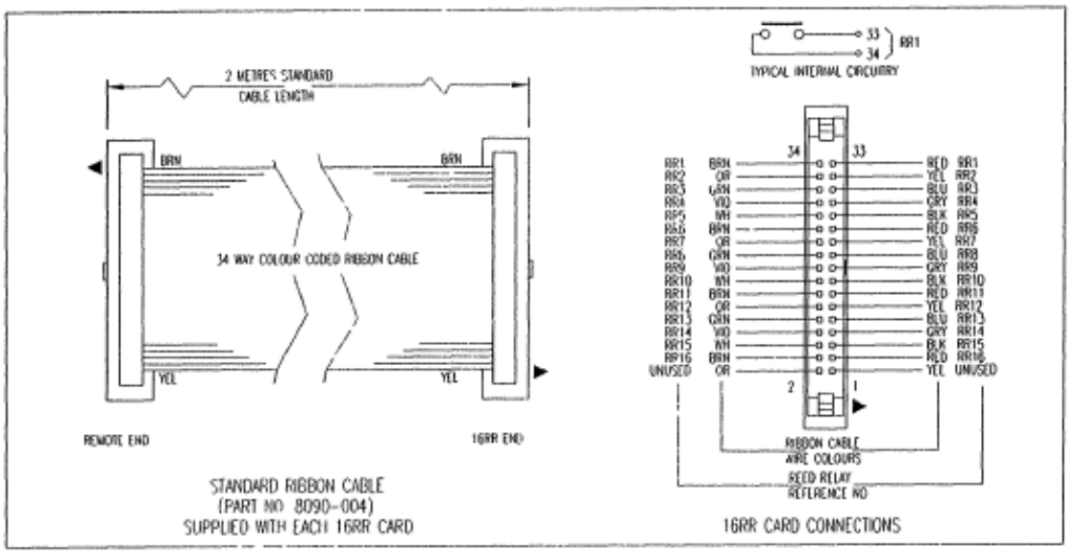
CONSTRUCTION

P.C.B.

High grade glass fibre with 1 oz copper track. Single euro-card size, plated through hole board.
Single euro card, plated thru' hole board. Size, plated through hole board.

Solder resist masked both sides, component identification screen printed.

Front Panel	Etched and painted aluminium. Identification silk screened. Panel fixed by top and bottom screws. Panel 6E wide.
Front Connector	34 way IDC shrouded header, bump polarised and compatible with requirements of BT224. 2 pins per each Reed Relays as per diagram below. Each 16RR card is supplied with a standard 2 metre long ribbon cable.
Rear Connector	32 Way, 2 Part to DIN 41612/ Male right angle on 16 way R/R card. Female straight on motherboard.
Supply	5V ± 0.25V @ 200mA approx.



CONNECTION DETAILS – 16 WAY REED RELAY CARDS

The Reed Relay operation modes are detailed on the Reed Relay chart specific to each system.

The Relays contacts, as shown, are isolated.

Do not exceed contact or P.C.B. track rating (200mA)

Indicator Filament Lamps can have high cold start current which could weld the contacts – do not use Reed relays for this purpose.

Suppress external Relay coils with a reverse connected diode.

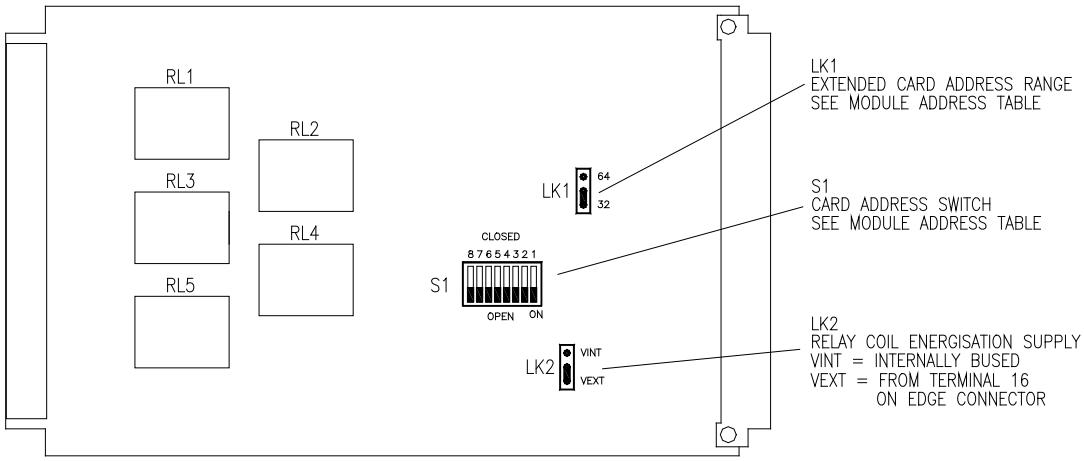
16RR-90 Relay Contacts are open with coil de-energised.

16RR-91 Relay Contacts are closed with coil de-energised.

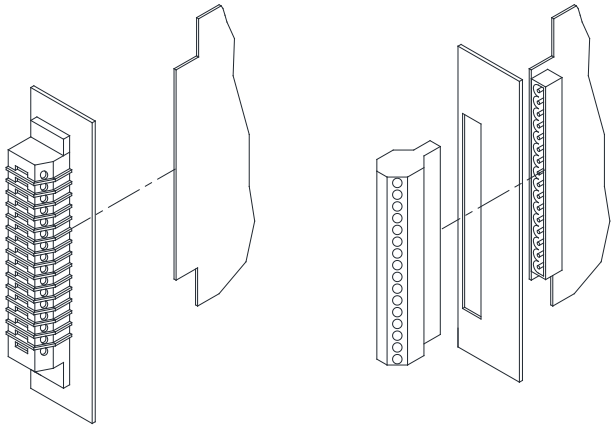
5 PR-9xB 5 Channel Relay Output Module

The 5 PR Module provides 5 Single Pole Double Throw (SPDT, Form C, Changeover) Power Relay Outputs. The relay outputs can switch a maximum load current of 10A at 240VAC or 5A at 48 VDC, (10A at 24VDC). Relay Outputs can be can be configured as Group Relays, Group Reflash Relays, Lamp Outputs or Horn Outputs as assigned via the web browser.
Connection is by screw type terminals (1.5mm², 16 AWG max.)
The variations available are:

5 PR Module	Outputs
5 PR- 90B	5 SPDT Relays, 24 VDC Coil, Internally
5 PR- 91B	5 SPDT Relays, 48 VDC Coil, Internally



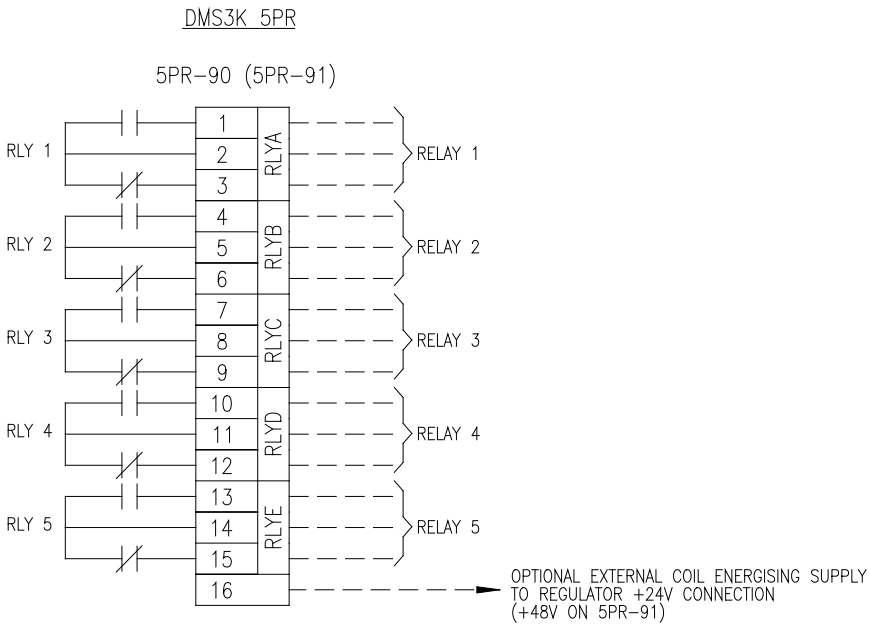
5PR–9xB CARD LAYOUT



SINGLE PART EDGE CONNECTOR (OLDER STYLE CARDS)

TWO PART EDGE CONNECTOR (NEW STYLE CARDS)

Typical Module Wiring Connections



TYPICAL 5 CHANNEL POWER RELAY MODULE CONNECTION DIAGRAM
(CHANGEOVER SPDT RELAY CONTACTS)

Module Address Settings									
ADDRESS RANGE	TYPE	Address Setting							
		SWITCH 1						LK1	LK2
		1	2	3	4	5	6	32/64	VINT/VEXT
1-5	5PR	O	O	O	O	O	O	32	VINT
9-13	5PR	C	O	O	O	O	O	32	VINT
17-21	5PR	O	C	O	O	O	O	32	VINT
25-29	5PR	C	C	O	O	O	O	32	VINT
33-37	5PR	O	O	C	O	O	O	32	VINT
41-45	5PR	C	O	C	O	O	O	32	VINT
49-53	5PR	O	C	C	O	O	O	32	VINT
57-61	5PR	C	C	C	O	O	O	32	VINT
65-69	5PR	O	O	O	C	O	O	32	VINT
73-77	5PR	C	O	O	C	O	O	32	VINT
81-85	5PR	O	C	O	C	O	O	32	VINT
89-93	5PR	C	C	O	C	O	O	32	VINT
97-101	5PR	O	O	C	C	O	O	32	VINT
105-109	5PR	C	O	C	C	O	O	32	VINT
113-117	5PR	O	C	C	C	O	O	32	VINT
121-125	5PR	C	C	C	C	O	O	32	VINT

The Address range indicates the output number assignments for this module. Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed
Refer to the System Addressing guidelines in the manual for additional information.

Module Specifications

OUTPUT CIRCUIT

Number and Type	5 output circuits – Single Pole (Changeover), Volt Free.
Rated Load	10A at 250VAC
	8A at 30VDC
Max Switching Current:	AC – 10A
	DC – 8A
Max Switching Power:	1,200VA, 240W

SUPPLY

5V ± 0.25V @ 80mA approx.

COIL ENERGISING LOAD

Due to current limitations on the motherboard it is recommended that a maximum of five 5PR modules are fitted per 3U rack (ten on 6U if split equally over top and bottom rows)
This can be extended to the Rack's physical capacity if the coil energized link LK2 is set to VEXT.

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90	(Highland Electronics Limited)
RTU3000	Rochester Instrument systems Limited
DMS3000	AMETEK Power Instruments Limited

The 5PR modules are backward compatible per the following table

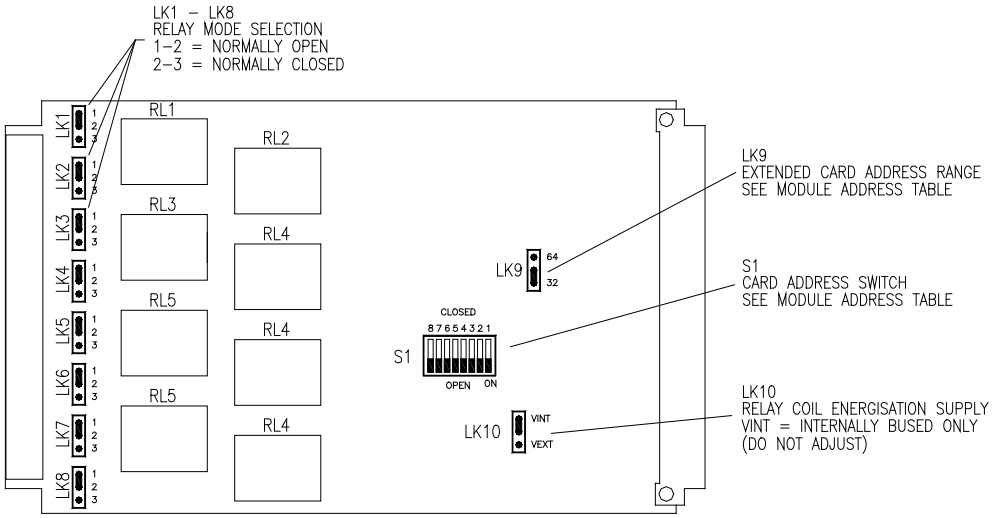
DMS-3K MODULE		**COMPATIBLE MODULES**		
Module Ref	Part No*	Module Ref	Part No	Comment
5PR-90B	1087-454	5PR-90B	2702-454	Single Part Edge Connector
		5PR-90B	8025-142	OMRON LZN203 Relays (24v)
5PR-91B	1087-397	5PR-91B	2702-455	Single Part Edge Connector
		5PR-91B	8025-182	OMRON LZN203 Relays (48v)

*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

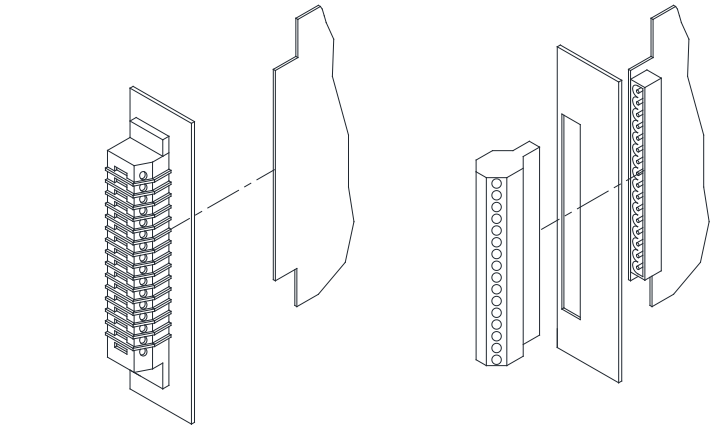
8 PR-9xB 8 Channel Relay Output Module

The 8 PR Module provides 8 Single Pole Single Throw (SPST) Power Relay Outputs. The relay outputs can switch a maximum load current of 10A at 240VAC or 5A at 48 VDC, (10A at 24VDC).
There are jumpers on the board for selecting a Form A or Form B contact.
Relay Outputs can be can be configured as Group Relays, Group Reflash Relays, Lamp Outputs or Horn Outputs as assigned via the web browser.
Connection is by screw type terminals (1.5mm², 16 AWG max.)
The variations available are:

8 PR Module	Outputs
8 PR- 90B	8 SPST Relays, 24 VDC Coil, Internally
8 PR- 91B	8 SPST Relays, 48 VDC Coil, Internally



8PR–9xB CARD LAYOUT

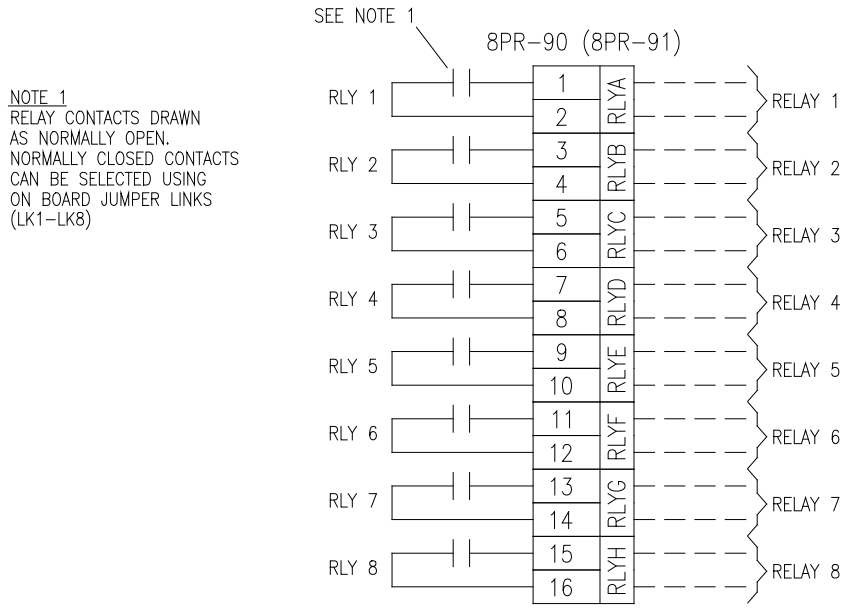


SINGLE PART EDGE CONNECTOR (OLDER STYLE CARDS)

TWO PART EDGE CONNECTOR (NEW STYLE CARDS)

Typical Module Wiring Connections

DMS3K 8PR



TYPICAL 8 CHANNEL POWER RELAY MODULE CONNECTION DIAGRAM

Module Address Settings									
ADDRESS RANGE	TYPE	Address Setting							
		SWITCH 1						LK9	LK10
		1	2	3	4	5	6	32/64	VINT/VEXT
1-8	8PR	O	O	O	O	O	O	32	VINT
9-16	8PR	C	O	O	O	O	O	32	VINT
17-24	8PR	O	C	O	O	O	O	32	VINT
25-32	8PR	C	C	O	O	O	O	32	VINT
33-40	8PR	O	O	C	O	O	O	32	VINT
41-48	8PR	C	O	C	O	O	O	32	VINT
49-56	8PR	O	C	C	O	O	O	32	VINT
57-64	8PR	C	C	C	O	O	O	32	VINT
65-72	8PR	O	O	O	C	O	O	32	VINT
73-80	8PR	C	O	O	C	O	O	32	VINT
81-88	8PR	O	C	O	C	O	O	32	VINT
89-96	8PR	C	C	O	C	O	O	32	VINT
97-104	8PR	O	O	C	C	O	O	32	VINT
105-112	8PR	C	O	C	C	O	O	32	VINT
113-120	8PR	O	C	C	C	O	O	32	VINT
121-128	8PR	C	C	C	C	O	O	32	VINT

The Address range indicates the output number assignments for this module. Each module should have a unique address. Switch setting O= DIL Switch Open, C=Closed
Refer to the System Addressing guidelines in the manual for additional information.

Module Specifications

OUTPUT CIRCUIT

Number and Type	8 output circuits – Single Pole (Changeover), Volt Free.
Rated Load	10A at 250VAC 8A at 30VDC
Max Switching Current:	AC – 10A DC – 8A
Max Switching Power:	1,200VA, 240W

SUPPLY

5V ± 0.25V @ 80mA approx.

COIL ENERGISING LOAD

Due to current limitations on the motherboard it is recommended that a maximum of three 8PR modules are fitted per 3U rack (six on a 6U if split equally over top and bottom rows)

COMPATIBITY TABLE

The DMS-3K module range is fully backwards compatible with previous versions of this product, namely:

MPAS90	(Highland Electronics Limited)
RTU3000	Rochester Instrument systems Limited
DMS3000	AMETEK Power Instruments Limited

The 8PR modules are backward compatible per the following table

DMS-3K MODULE		**COMPATIBLE MODULES**		
Module Ref	Part No*	Module Ref	Part No	Comment
8PR-90B	1087-421	8PR-90	2702-445	Single Part Edge Connector
8PR-91B	1087-423	8PR-91	2702-446	Single Part Edge Connector

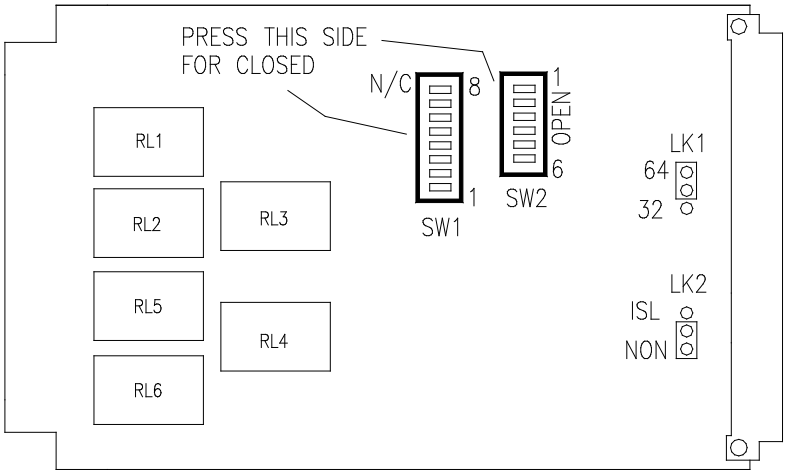
*(*Assembly Part Numbers listed include Front Panel and Wiring Connectors)*

I/R Module Switch Settings

		Switch 1								Switch 2							
		Contact															
		Setting				Not Used				Address Setting						**LK1**	**LK2**
Slot No.	**Type**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**	**6**	**32/64**	**ISL/N**
10	I/R-90B	O	O	O	O	O	O	O	O	O	O	O	O	C	O	32	N

I/R CARD RELAY CHART

Alarm	Slot	Relay	Terminal	Mode
1	1	A	1 / 2	AS
2	1	B	1 / 2	AS
3	1	C	1 / 2	AS
4	1	D	1 / 2	AS
5	1	E	1 / 2	AS
6	1	F	1 / 2	AS



SW2 AND LK1 ARE FOR CARD ADDRESSING SEE ABOVE SETTINGS FOR DETAILS.

LK2 IS PROVIDED WHERE AN ISOLATED WETTING VOLTAGE IS UTILISED IN THE SYSTEM.

4 INPUT / 6 RELAY OUTPUT CARD

8 RR Module Switch Settings

	Address Switch					Address
	SW1		SW2			Range
Slot No.	1	2	1	2	3	LK1
11	O	O	O	O	O	32
12	C	O	O	O	O	32
13	O	C	O	O	O	32
14	C	C	O	O	O	32
15	O	O	C	O	O	32
16	C	O	C	O	O	32
17	O	C	C	O	O	32
18	C	C	C	O	O	32

NOTES

1. For address range 32 - no link required. DO NOT CUT X1

2. For address range 64 - add link. CUT X1

3. Address switches are factory set and should not be altered.

16 RR Module Switch Settings

Slot No.	Address Switch SW1 1	2	3	4	Address Range LK1
	O	O	O	O	32
	C	O	O	O	32
	O	C	O	O	32
	C	C	O	O	32
	O	O	C	O	32
	C	O	C	O	32
	O	C	C	O	32
	C	C	C	O	32

NOTES

1. For address range 32 - no link required. DO NOT CUT X1

2. For address range 64 - add link. CUT X1

3. Address switches are factory set and should not be altered.

DMS-3K SPECIFICATIONS

Specifications are subject to change without notice.

System Capacity

16 I/O Card Racks per system

• 2,048 digital inputs or 512 analogs or combination of both

• 3,584 outputs per remote unit

• 640,000 events in non-volatile memory

I/O Card Rack Capacity

• 128 digital inputs or 32 analogs or combination of both

• 240 outputs per remote unit

• 40,000 events in non-volatile memory

INPUTS

Digital Inputs (8 I/O, 16I, I/R)

• N.O. or N.C., field contact selectable via browser config or DIP switches

Input Current

• Approximately 2mA per input

Input Loop Resistance

• N.O. Field Contacts: 200K ohm minimum

• N.C. Field Contacts: 1K ohm maximum

Field Contact Voltage

Internally Supplied Field Contact Voltage: 24 VDC nominal

Externally Supplied Field Contact Voltage: 24 VDC, 48 VDC, 125VDC +/- 12.5%

Input Response

• Hardware Filter: 16 msec (Timestamp corrected to show Alarm within 1 msec of occurrence)
• Software Filter: Adjustable filter from 1-65,536 msec

Analog Inputs (8 IAM)

• 4-20mA and 1-5 VDC

• Requires 24VDC Loop Power Source

• Voltage Drop : 6V DC maximum at 20mA input.

Input Response

• Analog input: 40mS Adjustable filter from 40-65,536 msec

Sequence of Events Recording

Time Stamp Resolution

• 1mS Resolution between alarms

• 40,000 events in non-volatile memory

Time Stamp Outputs

• WEB Browser Display

• Email Notification

• Modbus, DNP, ASCII Communication Outputs

Time Synchronization

IRIG-B

• Modulated or demodulated

• 10K Input Impedance

• Accurate to 1 msec UTC

NTP

• 1-3 NTP Servers

• Typical Accuracy to 1 msec UTC

Internal Crystal

• Typical Accuracy 1 sec/day

OUTPUTS

Lamp Drive (8 I/O, 16 O)

• Solid State

• 5 Watts: max200mA, max 63 VDC

Relays (I/R)

• S.P.S.T contact (Form A)

• Max 62 VDC 2.0 amp resistive

• Max 240 VAC 2.0 amp resistive

Power Relays (I/R, 5 PR, 8 PR)

• S.P.D.T contact (Form C)

• Max 62 VDC 2.0 amp resistive

• Max 240 VAC 2.0 amp resistive

Reed Relays (8 RR, 16 RR)

• S.P.S.T. contact (Form A or Form B)

• 10 Watts: max 100 VDC, 0.5 A resistive

Horn Output (on Regulator)

• S.P.S.T contact (Form A)

• Max 62 VDC 2.0 amp resistive

• Max 240 VAC 2.0 amp resistive

COMMUNICATIONS

Serial Port

• RS-232/485 selectable via web browser

• Modbus RTU, DNP 3.0, serial ASCII

Ethernet Port 10/100

• DHCP or Fixed IP

• Modbus TCP/IP, DNP 3.0, SMTP

WEB Server

• Multi-user support

• Used for configuration of unit

• Graphical and text display of alarms

• Can combine up to 16 units on a single master (CR Option)

• Acknowledgement of alarms

• Separate screens for active alarms and archived event log

• Email notification

• Export to CSV

• Printing of alarms (auto/manual)

• Multiple levels of security: HTTPS and encrypted username/password

OPERATING VOLTAGES

Prime Power (Regulator Modules)

• 24 VDC +/- 12.5% (3U Reg 90, 91) Max 40 Watts / Logic Card Rack

• 24 VDC +/- 12.5% (6U Reg 92, 93) Max 50 Watts / Logic Card Rack

• 48 VDC +/- 12.5% (3U Reg 96, 97) Max 40 Watts / Logic Card Rack

• 48 VDC +/- 12.5% (6U Reg 94, 95) Max 50 Watts / Logic Card Rack

Prime Power (External Power Supply Options)

DC Supply

• 125 VDC +/- 15%, Max 180 Watts / Supply

AC Supply

• 115/230 VAC 50/60 Hz +/- 15%, Max 180 Watts / Supply

Field Contact Voltage (Internally Supplied)

• 24 VDC +/- 12.5%, 1A (Reg 90, 91, 92, 93)

MECHANICAL

19” I/O Card Rack

• 3U Single chassis, 10 card slots

5.5" H x 7.25" D x 19.0" W

• 6U Dual chassis, 23 card slots

11.5" H x 7.25" D x 19.0" W

Mounting

• Front or rear optional

Terminals

• Combined edge connector with terminal block – up to 1.5 sq. mm

EMC Compliance

IEC 61326-1:2012

Safety Compliance

IEC 61010-1:2010

ENVIRONMENTAL

Operating Temperature

• 32° to 140°F (0° to 60°C)

Storage Temperature

• -13° to 185°F (-25° to 85°C)

Humidity

• 0 to 90% non-condensing

Chapter 6-Service & Maintenance

-Firmware Upgrade *(Firmware Configuration Page)*

Your AMETEK sales rep. will notify you of firmware upgrades. And you can download the new file from their Web site or via e-mail. To upgrade the firmware:

Make sure you are logged in as Administrator.

Click the *Browse* button

From the Choose File dialog box, locate the new firmware file (.tar).

Click Open.

Confirm that you want to upgrade the firmware.

As the system firmware is being upgraded, the status will be displayed detailing each step of the upgrade. You can check the box labeled “Reboot when complete” to have the system automatically reboot after the upgrade is complete.

Real Time Clock (RTC) battery

The DMS-3K uses a 3 volt lithium coin cell for maintaining the internal RTC. The expected battery life is as follows:

Unit continually off:	10 years
Unit off 50 % of the time and operating 50% of the time:	19 years

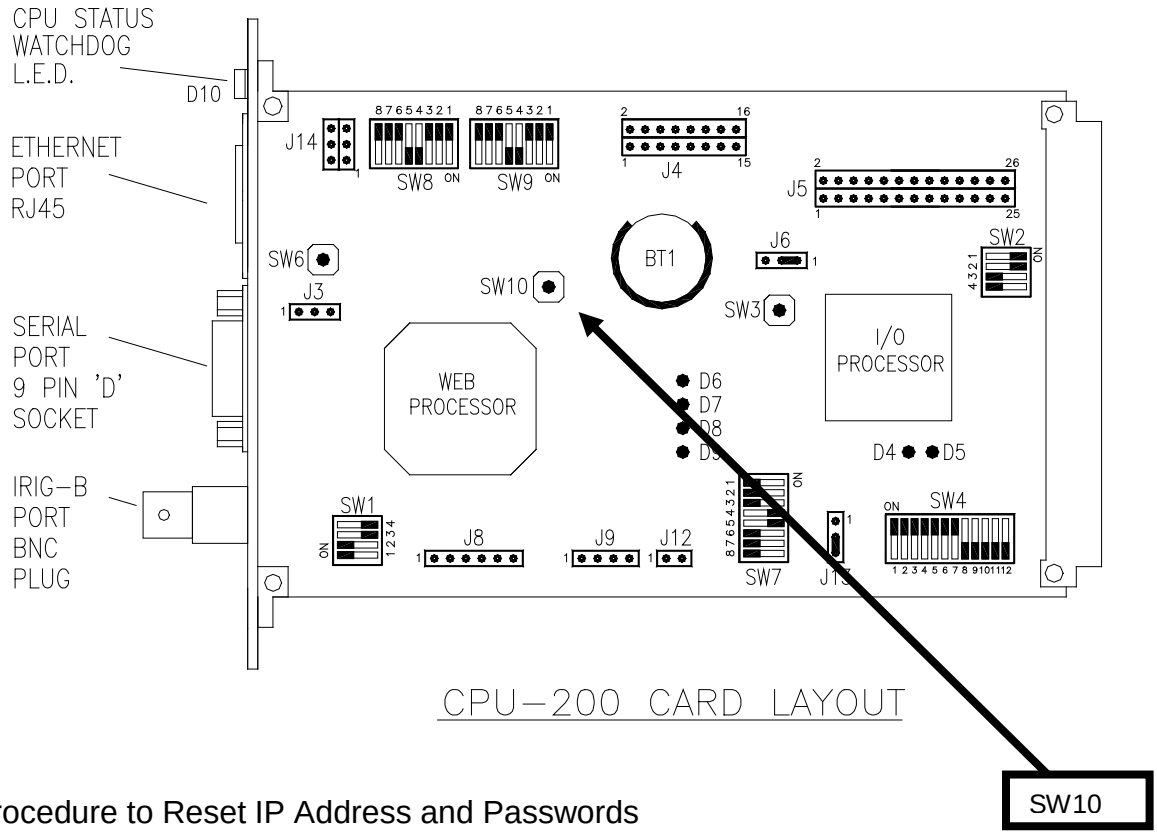
Reset Password & IP Address

If you lose the password or IP Address to the DMS-3K WEB Browser, first try the original defaults supplied with the equipment:

IP Address: 192.168.250.100

User Name: admin
Passwword: admin

If that doesn't work, you can follow the procedure below for viewing and resetting the IP Address and Passwords.



Procedure to Reset IP Address and Passwords

1. Remove power from the system.
2. Remove any plates and modules from the two card slots near the CPU.
3. Press and hold the switch SW10 shown above and power up the unit. Release the switch after power up.
4. Power down the system.
5. Connect a standard modem (1-1, straight thru) cable to the CPU DB9 serial port and the other to your PC.
6. Power up system and wait at least 15 seconds.
7. Connect to the unit using a PC Terminal application (like hyper terminal) using: 9600 baud, 8 bit, no parity and 1 stop.

8. The following screen will be displayed.

The PC Terminal software will show the following screen.

```
------------------------------------------------------------------------------
----------------------------- SERnet Settings --------------------------------
------------------------------------------------------------------------------

 1.  Ethernet Port 1 Settings

 2.  DNS Server (Primary)           :  [None]
 3.  DNS Server (Secondary)         :  [None]

 4.  Reset all passwords to Factory Defaults

 0.  Exit

Select an option ==>  _
```

Pressing menu item 1 will display the current Ethernet IP Address as shown below.
Pressing 4 will reset the passwords to factory defaults.

```
------------------------------------------------------------------------------
-------------------- Network Settings: Ethernet Port 1 -----------------------
------------------------------------------------------------------------------

 1.  Dynamic Addressing (DHCP)      :  Disabled

 2.  IP Address                     :  10.135.50.47
 3.  Subnet Mask                    :  255.255.0.0
 4.  Default Gateway                :  10.135.0.1
 5.  Media Type                     :  [Auto-negotiate]

     MAC Address                    :  00:0F:88:80:48:8B
     Link Status                    :  Enabled

 0.  Exit to previous menu

Select an option ==>
```

You can make changes to the IP address by selecting menu item 2.

After making the changes, type y for Save & apply all settings.

When finished, exit to the Main Menu and select 0.

Appendix A MODBUS Protocol

The Modbus Protocol is an option that can be enabled at the factory or can be enabled in the field via a software key using the Web Browser Option Upgrade screen.

The following Modbus functions may be used.

Modbus Function	Description	Data Units	Mode
03	Read Holding Registers	Words	Master or Slave
16	Preset Multiple Registers	Words	Master or Slave

A function value of 03 (Read Holding Registers) is set to read alarm data from the system (in slave configuration). Single and multiple register writes are supported. Exception codes for unrecognized received messages are also included.

The system has the capability of operating with two distinct data formats: Status Mode (On/Off status) and Event Mode (Alarm Status with Time Stamp). These formats are embedded within Modbus data registers for transmission and reception.

Modbus Operation

The DMS-3K Modbus operates as a Master or Slave in both Modbus RTU and Modbus TCP/IP modes. The DMS-3K Modbus port will transmit the ON/OFF Status (called 'Alarms') and the timestamp recorded for every alarm and return to normal occurrence (called 'Events').

Modbus Alarms

Alarm ON/OFF Status is provided by reading 16-bit holding registers (Modbus Function 03) with a single bit designated per input (or group of inputs). A 48 input system could indicate the status of all alarms using three 16-bit holding registers. The Modbus implementation also allows the transmitting or receiving of the Control Pushbutton functions for Control Group 1. (Acknowledge, Test, reset, etc)

Modbus Events

Event Data is provided by reading six 16-bit holding registers (Modbus Function 03) that contain the time, date, input number and alarm status for each event. An event could be an input going into alarm or returning to normal. Event data is provided in blocks of ten events for a total of sixty 16-bit holding registers (Six 16 bit registers per event x 10 events). If there are no new events since the last Modbus poll, it will return all FF's. If there are more than 10 events in the buffer, then it will continue to submit 10 events every new poll until there are no new events.

Modbus Master and Slave Modes

The DMS-3K support both Modbus Master and Modbus Slave Modes for Modbus Alarms and Modbus Events.

Modbus Alarms

In Modbus Slave Mode, the DMS-3K provides up to eight 16-bit registers for a total of 128 inputs and one register for pushbutton controls to a single Modbus Master.
In Modbus Master Mode, the DMS-3K provides up to eight 16-bit registers for a total of 128 inputs and one register for pushbutton controls per Modbus Slave Device. This can be repeated for up to 6 slave devices using serial communications and up to 8 slave devices when using Ethernet (Modbus TCP/IP) communications.

Modbus Events

In Modbus Slave Mode, the DMS-3K can send time stamped event data to a single Modbus Master device.
In Modbus Master Mode, the DMS-3K can send time stamped event data to a single Modbus Slave device.

Systems with CR (Combined Rack) option

When multiple racks are combined to form a system (option CR), the Master DMS-3K rack (rack with option CR enabled) will have the capability to transmit the 'Modbus Events' for the entire system from the one Master rack whether configured as a Modbus Slave or Modbus Master.

For 'Modbus Alarms', the Master DMS-3K rack can transmit the alarm status for as many alarms as will fit in the available registers. (see below)

Modbus Mode	**Communications Mode**	**# of devices we can transmit alarms to**	**# of alarms/Device**	**Total # of inputs Transmitted**
Master	Serial	Up to 6 Slave devices	128	768
Master	Ethernet	Up to 8 Slave devices	128	1,024
Slave	Serial or Ethernet	One Master Device	128	128

Notes: Multiple inputs can be grouped together for a single Modbus bit to expand the quantity of inputs. Example: DMS inputs 1 thru 5 can trigger a single Modbus bit. Serial and Ethernet communications can be used simultaneously, each with their own group of inputs to extend the total quantity of Modbus Outputs.

Modbus Alarms Data Mapping (Status)

Alarm ON/OFF Status is provided by reading 16-bit holding registers (Modbus Function 03) with a single bit designated per input (or group of inputs) The Modbus Alarm data provides the On or Off status for each input as configured. Every poll of our device will show the current status of each Modbus register selected with a binary 1 for a specific bit position representing an input in alarm and a binary 0 representing an input in the normal mode. This is not a representation of the Field Contact Input status which can be set for N.O. or N.C. operation, but the true state of each alarm input.(Alarm or Normal) The mapping of inputs to specific Modbus Addresses and Bits is done via the WEB Browser Configuration pages.

Any Modbus bit position can contain any DMS-3K input number(s) so the mapping is performed by the user. Multiple inputs can be grouped together for one common alarm for that Modbus Register bit. The Modbus implementation also allows the transmitting or receiving of the Annunciator Pushbutton Control functions.

When configuring the Modbus mapping, you can select Slave or Master Mode, your starting register address from 40001 to 49990, how many Modbus Inputs you wish to transmit up to 128 (Eight 16 bit registers) and one extra 16 bit register for control pushbutton functions.
A sample Modbus Map shown below indicates the following:
Starting Modbus Register = 40001, 112 total Modbus Alarms (7 registers x 16 bits) and 8 Control Pushbuttons. Modbus Registers 40001-40005 show DMS-3K Input numbers in sequential order, Register 40006 shows the Alarm Inputs continuing in reverse order and Register 40007 shows a mixture of grouped inputs using a dash (-) or comma (,) to define the group of inputs. Register 40008 is used for Control Pushbutton Inputs.

	Modbus Register Address								
Bit #	40001	40002	40003	40004	40005	40006	40007		40008
0	1	17	33	49	65	96	97,98		T1+
1	2	18	34	50	66	95	99,100		T1-
2	3	19	35	51	67	94	1-4		A1+
3	4	20	36	52	68	93	5-8		A1-
4	5	21	37	53	69	92	9-12		S1+
5	6	22	38	54	70	91	13-16		S1-
6	7	23	39	55	71	90	1-3,8,9		R1+
7	8	24	40	56	72	89	4-6,15		R1-
8	9	25	41	57	73	88	101		
9	10	26	42	58	74	87	102		
10	11	27	43	59	75	86	103		
11	12	28	44	60	76	85	104		
12	13	29	45	61	77	84	105		
13	14	30	46	62	78	83	106		
14	15	31	47	63	79	82	107		
15	16	32	48	64	80	81	108		

This Modbus map can be repeated for the different Modbus Slave Devices.

If Control Inputs are used, the last 16 bit register is used for this set-up. For each bit position, you can assign the function, control group 1 and whether it is being transmitted from the DMS-3K to the Modbus Device or received from the Modbus Device. When selecting the pushbutton control mapping, they will be labeled as follows:

Function	Control Group #	Transmit or Receive

Example: ***T 1 +*** = *Full Function Test, Control Group 1, Transmit Status*

Function	**Control Group #**	**Transmit or Receive**
Full Function Test (T)	1	+ = transmit, - = receive
Lamp Test (L)	*only Control Group #1 is supported*	*This refers to whether the control is transmitted via one of the control inputs or received through the serial communications.*
Acknowledge (A)		
Reset (R)		
First Out Reset (F)		
Silence (S)		
Inhibit (I)		

Modbus Event Data Mapping (Status + Time Stamp)

Event data may be read in blocks of 10 events at a time. These appear in a block of 60 registers (6 per event). Once ten events are read then the registers are reloaded with any subsequent ones from the event buffer until all events are retrieved. If no event has occurred, then all sixty registers are filled with FF HEX.

The event data format is as shown below:

16-bit Word	MSB (bit positions 8 - 15)	LSB (bit positions 0 - 7)
1	Year	Month
2	Day	Hour
3	Minute	Second
4	Millisecond	
5	Input Point Number	
6	IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]

An example of the register format for 10 events is shown below.

Modbus Address	Event #	Modbus Data	
		MSB (bit positions 8 - 15)	LSB (bit positions 0 - 7)
41001	1	Year [0-99]	Month [1-12]
41002		Day [1-31]	Hour [1-24]
41003		Minute [1-60]	Second [1-60]
41004		Millisecond [0-999]	
41005		Input Point Number [1-1200]	
41006		IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]
41007	2	Year [0-99]	Month [1-12]
41008		Day [1-31]	Hour [1-24]
41009		Minute [1-60]	Second [1-60]
41010		Millisecond [0-999]	
41011		Input Point Number [1-1200]	
41012		IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]
41055	10	Year [0-99]	Month [1-12]
41056		Day [1-31]	Hour [1-24]
41057		Minute [1-60]	Second [1-60]
41058		Millisecond [0-999]	
41059		Input Point Number [1-1200]	
41060		IRIG-B Status [0 = off, 1 = on]	Input Status [0= Alarm, 1=Normal]

Appendix B DNP Protocol

DNP Data Formats

The DNP Protocol is an option that can be enabled at the factory or can be enabled in the field via a software key using the Web Browser Option Upgrade screen. The DNP Communication option is used to transmit point status (Binary Inputs) and time stamped events (Binary Input Change with Time). The DNP Communications work in a slave mode and operate over RS-232/485 or Ethernet. The DNP implementation is outlined in the Device Profile Document.

Device Profile Document

<table>
<tr><td colspan="2">DNP V3.0
DEVICE PROFILE DOCUMENT</td></tr>
<tr><td colspan="2">Vendor Name: AMETEK Power Instruments</td></tr>
<tr><td colspan="2">Device Name: DMS-3K, using the Triangle MicroWorks, Inc. DNP3 Multi-Port Slave Source Code Library</td></tr>
<tr><td>Highest DNP Level Supported:
For Requests: Level 2
For Responses: Level 2</td><td>Device Function:
Slave</td></tr>
<tr><td colspan="2">Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):
For static (non-change-event) object requests, request qualifier codes 00 and 01 (start-stop), and 17 and 28 (index) are supported in addition to request qualifier code 06 (no range – or all points). Static object requests received with qualifiers 00, 01 or 06, will be responded to with qualifiers 00 or 01. Static object requests received with qualifiers 17 or 28 will be responded to with qualifiers 17 or 28. For change-event object requests, qualifier codes 06 (no range) and 07 and 08 (limited quantity) are supported. Qualifiers 17 or 28 are always returned.</td></tr>
<tr><td>Maximum Data Link Frame Size (octets):
Transmitted: 292
Received 292</td><td>Maximum Application Fragment Size (octets):
Transmitted: Configurable up to 2048
Received 2048</td></tr>
<tr><td>Maximum Data Link Re-tries:
Configurable from 0 to 255</td><td>Maximum Application Layer Re-tries:
None</td></tr>
<tr><td colspan="2">Requires Data Link Layer Confirmation:
Configurable as: Never, Sometimes or Always</td></tr>
<tr><td colspan="2">Requires Application Layer Confirmation:
When sending multi-fragment responses (Slave devices only)
Sometimes</td></tr>
<tr><td colspan="2">Timeouts while waiting for:
Data Link Confirm: Configurable.
Complete Appl. Fragment: None
Application Confirm: None
Complete Appl. Response: None</td></tr>
</table>

Sends/Executes Control Operations: WRITE Binary Outputs **Never** SELECT/OPERATE **Never** DIRECT OPERATE **Never** DIRECT OPERATE – NO ACK **Never** Count > 1 **Never** Pulse On **Never** Pulse Off **Never** Latch On **Never** Latch Off **Never** Queue **Never** Clear Queue **Never**	
Reports Binary Input Change Events when no specific variation requested: **Never**	Reports time-tagged Binary Input Change Events when no specific variation requested: **Never**
Sends Unsolicited Responses: **Never**	Sends Static Data in Unsolicited Responses: **Never** No other options are permitted.
Default Counter Object/Variation: Default Object N/A Default Variation: N/A	Counters Roll Over at: **No Counters Reported**
Yes	

Implementation Table

OBJECT			**REQUEST**	**RESPONSE**	
Object Number	**Variation Number**	**Description**	**Function Codes (decimal)**	**Function Codes (decimal)**	**Qualifier Codes (hex)**
1	1	Binary Input	1 (read)	129 (response)	00, 01 (start-stop) 17,28 (Index)
2	2	Binary Input Change with Time	1 (read)	129 (response)	00, 01 (start-stop) 17,28 (Index)
50	1	Time and Date	1 (read)	129 (response)	07
60	1	Class 0 Data	1 (read)	129 (response)	
60	2	Class 1 Data	1 (read)	129 (response)	
60	3	Class 2 Data	1 (read)	129 (response)	
60	4	Class 3 Data	1 (read)	129 (response)	

DMS-3K DNP Data Map

Binary Inputs

Each Object 1, Variation 1 request will provide the status (on/off) of all DMS-3K inputs as shown below. This is not the status of the alarm contact (open/closed), but whether an input is in alarm or has returned to normal. Alarms are reflected as a '1' and Normal inputs are '0'.

Index #	DNP Object		Description
	Object Number	Variation Number	
00	01	01	Point 1 Digital Contact Alarm
01	01	01	Point 2 Digital Contact Alarm
02	01	01	Point 3 Digital Contact Alarm
03	01	01	Point 4 Digital Contact Alarm
04	01	01	Point 5 Digital Contact Alarm
05	01	01	Point 6 Digital Contact Alarm
06	01	01	Point 7 Digital Contact Alarm
07	01	01	Point 8 Digital Contact Alarm
08	01	01	Point 9 Digital Contact Alarm
09	01	01	Point 10 Digital Contact Alarm
10	01	01	Point 11 Digital Contact Alarm
2044	01	01	Point 2045 Digital Contact Alarm
2045	01	01	Point 2046 Digital Contact Alarm
2046	01	01	Point 2047 Digital Contact Alarm
2047	01	01	Point 2048 Digital Contact Alarm

Note: The number of Index's (point #) is based on the system size.
For example: A stand-alone 128 input unit will include Index # 00-127.
A distributed CR system with (1) Master 128 input unit and (15) Slave 128 input units will include index # 00-2047 as shown above.

Binary Input Change with Time

The time stamped alarms are presented as Binary Input Changes with Time as shown below: An event includes any change of status (inputs going to the alarm state or inputs returning to normal).

DNP Object		Description
Object Number	Variation Number	
02	02	Digital Contact Alarm w/time of event

These events will be reported as they occur and will include the input number and time stamp.

Time and Date

This DNP Object is used to set the DMS-3K clock with the time and date. It uses the Absolute Time which is recorded as milliseconds since midnight, January 1st, 1970, at zero hours, zero minutes, zero seconds, and milliseconds.

DNP Object		Description
Object Number	Variation Number	
50	01	Time and Date

Appendix C Browser Compatibility

If using Internet Explorer you must disable the caching of web pages.

To disable caching with Microsoft Internet Explorer V7

1 Choose **Internet Options** from the **Tools** menu. The Internet Options window opens.

2 On the **General** tab, in the **Browsing History** group, Click **Settings**. The Settings window opens.

3 Make sure that the “Check for newer versions of stored pages” option is set to Every time I visit the web page.

4 Click **OK** to close the Settings window.

5 Click **OK** to close the Internet Options window.

To disable caching with Microsoft Internet Explorer (v5 only)

1 Choose **Internet Options** from the **Tools** menu. The Internet Options window opens.

2 Click **Settings** in the **Temporary Internet files** group. The Settings window opens.

3 Make sure that the Check for newer versions of stored pages option is set to Every visit to the page.

4 Click **OK** to close the Settings window.

5 Click **OK** to close the Internet Options window.

To disable caching with Microsoft Internet Explorer 4.01 to 5

1 Choose **Internet Options** from the **View** menu. The Internet Options window opens.

2 In the **General** tab’s **Temporary Internet Files** group, click the **Settings** button. The Settings window opens.

3 Make sure that the Check for newer versions of stored pages option is set to Every visit to the page.

4 Click **OK** to close the Settings window

5 Click **OK** to close the Internet Options window.

To disable caching with Microsoft Internet Explorer on Mac OS

1 Choose **Preferences** from the **Edit** menu. The Internet Explorer Preferences window opens with a list of preference categories on the left side of the window.

2 Locate and click **Advanced** (listed under **Web Browser**). The advanced options for the browser are displayed in the right side of the window.

3 In the **Cache** group, choose **Always** for the **Update pages** option.

4 Click **OK** to save your options and close the window.

To disable caching with Netscape Navigator

1 Choose **Preferences** from the **Edit** menu. The Preferences window opens.

2 In the **Category** group (left frame), click the **plus sign (+)** next to the **Advanced** category.

3 Under **Advanced**, select the **Cache** option. The right side of the Preferences window changes to the Cache options.

4 At the bottom of the Cache group of options, be sure that the **Document in cache is compared to document on network** option is set to **Every time**.

5 Click **OK** to close the Preferences window.

The DMS-3K IP address must be in the trusted zone. Or, in IE, you will see a yellow bar with a script warning when you try to download a .csv file, follow these steps to configure your browser.

To add your DMS-3K to the trusted zone:

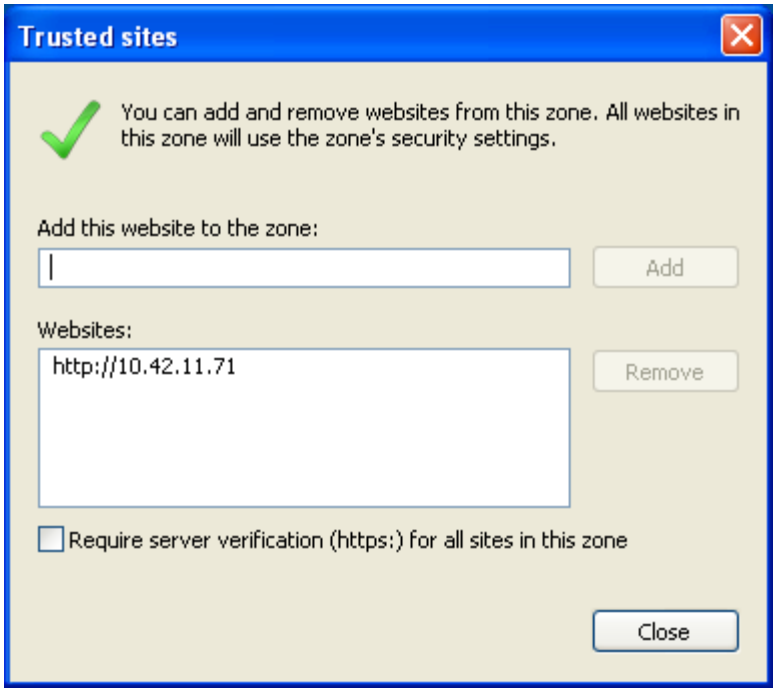
1. From within Internet Explorer, click “Tools”, in the drop-down menu, click “Internet Options”.

2. In the “Internet Options” dialog box, select the “Security” tab.

3. From Zones, select “Trusted sites” (large check mark).

4. Below Zones and next to “Trusted sites”, click the “Sites” button.

5. You will be prompted with the following:



Enter your unit's IP address in the top field and click the "Add" button which will add the IP address to the trusted zone.

6. Click Close, then OK.

Appendix D Notes on saving the event file as .csv

Opening the .csv file with Excel corrupts the time column.

When saving the event file as a .csv and then opening this file with Excel, the data in the time column gets corrupted. The reason is that Excel automatically formats this column as a type “general” and therefore tries to interpret the time as a number. The work around is to save the file as a .txt, and then when opening this file with Excel tell Excel to format the time column as text.

Download .csv button prompts a yellow script bar blocking the yes/no question box.

The DMS-3K IP address must be in the trusted zone. Or, in IE, you will see a yellow bar with a script warning when you try to download a .csv file, follow these steps to configure your browser.

To add your DMS-3K to the trusted zone:

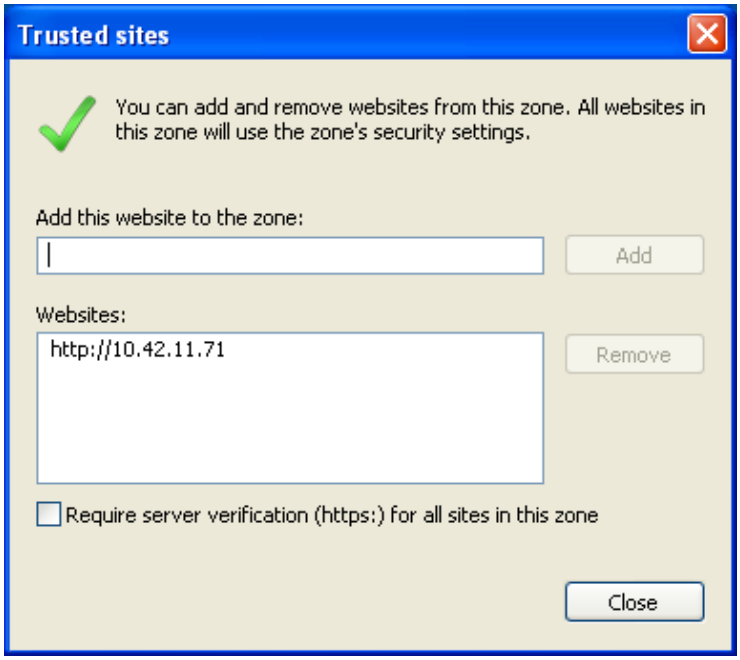
1. From within Internet Explorer, click “Tools”, in the drop-down menu, click “Internet Options”.

2. In the “Internet Options” dialog box, select the “Security” tab.

3. From Zones, select “Trusted sites” (large check mark).

4. Below Zones and next to “Trusted sites”, click the “Sites” button.

5. You will be prompted with the following dialog box:



Enter your unit’s IP address in the top field and click the “Add” button which will add the IP address to the trusted zone under “Websites”.

6. Click Close, then OK.

Formatting the Excel .csv file for milliseconds

Excel does not have a standard number format for milliseconds. It can be added using the custom formatting.

1. Select the top timestamp in your spreadsheet.
2. Right click the cell and select Format Cells
3. Under Number, select Custom
4. The format should present hh:mm:ss.0
5. Add two extra 0's so it looks like this: hh:mm:ss.000
6. Copy this format to all cells in this column

Appendix E Default Settings

Alarm Input Configuration:

Starting Input #: 1
Enabled/Disabled: All set to enabled
Filter Mode: All set to Filter time
Filter Time: All set to 0
Auto DFS: All set to 0 Events, 60 seconds
Contact State: NO (Normally Open)
Control/Sequence Group: 1
Inhibit Group: 9
Alarm Legends: “Input X is in Alarm”
Alarm Legends: “Input X has returned to Normal”

Control Inputs:

Input Terminal	Function	Control/Sequence Group
129	Acknowledge	1
130	Reset	1
131	Silence	1
132	Lamp Test	1
133	Acknowledge	2
134	Reset	2
135	Silence	2
136	Lamp Test	2
137	Acknowledge	3
138	Reset	3
139	Silence	3
140	Lamp Test	3
Continued for 64 controls		

Sequence: ISA-M

Analog Inputs:

Not Installed

Alarm Outputs:

Output Type: Individual Lamp
Lamp Output: Lamp
Alarm Output Type: not used
Input Assignment: Input No. 1 through 128, followed by 1-112
No. of Inputs: 1

Serial Communications:

Baud Rate:	9600
Parity:	None
Comm Mode:	RS-232
Transmit & Receive Delay:	0
Protocol:	None

Ethernet Communications:

Modbus TCP port:	502
Protocol:	None selected

Combined Rack (CR Option):

TCP/IP Port:	61000
Combined Rack Function:	Disabled (Slave)

Access Control:

Password for user account:	user
Password for admin account:	admin
Modbus TCP/IP Port:	502
DNP TCP/IP Port:	20000
HTTP Port:	80
HTTPS Port:	443
Require HTTPS:	no
Authentication:	Standard Digest (unchecked)

Network Configuration:

IP Address:	192.168.250.100

Date/Time:

Date/Time Format:	mm/dd/yyyy
Timezone:	EST

Appendix F Diagnostic Events

The following diagnostic events could be reported in the Event Log.

M = Master

S = Slave

Unit	Diagnostic Events (Descriptor 'D')	Description
Configuration Related Events		
M/S	Configuration Changed via WEB	Alarm Inputs/Outputs configuration Change
M/S	Configuration Changed via File Restore	Alarm Inputs/Outputs configuration Change by importing a configuration file via the web page Restore feature
M/S	Enabled Alarm Input via WEB Page	Alarm manually enabled via configuration
M/S	Disabled Alarm Input via WEB Page	Alarm manually disabled via configuration
System Operational Events		
M/S	Alarm Acknowledged	Alarm Acknowledged via the browser at the same unit
M	Remote Alarm Acknowledged	Alarm Acknowledged at the Master browser for a Slave unit
S	Alarm Acknowledged at Remote Master	Alarm Acknowledged at the Master browser for a Slave unit
M/S	Restored to Scan	Auto Delete from scan de-activated for a repetitive alarm
M/S	Off Scan	Auto Delete from Scan activated for a repetitive alarm
M/S	SER Buffer Overflow	The number of alarms received exceeded the capability of the unit 80 events/sec x 35 inputs for several minutes
M/S	Lost a maximum of X events.	This event may occur in conjunction with an "SER Buffer Overflow" event. An attempt is made to recover the lost event(s).
Power Related Events		
M/S	Main Board Power On	Unit powered up or configuration just performed which took the system off line
M/S	Power Loss / Reboot	Loss of power or unit powered down automatically during a firmware upgrade
M/S	Power Restored / Reboot Complete	Power restored or unit powered up automatically during a firmware upgrade
Combined SER (CR) Events		
M	Connected to Remote Device at *Station ID*	Master unit connected to Slave unit (occurs during initial set-up)
M	Disconnected from Remote Device at *Station ID*	Master unit manually disconnected from Slave unit
M	Slave at Station ID no longer responding	Master unit no longer communicating to the Slave
S	Master Combined SER at Station ID Disconnected	Slave unit identifying that it is no longer connected to a Master
S	Master Combined SER at Station ID Connected	Slave unit identifying that it has been connected to a Master
M	Alarm Out of Sync Forced ON	When a Master Reconnects to a Slave, any existing Slave alarms are treated at the Master as new alarms
M	Alarm Out of Sync Forced OFF	When a Master disconnects from a Slave, any existing Slave alarms at the Master are automatically returned to normal

Unit	Diagnostic Events (Descriptor 'D')	Description
Serial and Ethernet Communications		
M/S	Modbus RTU Master Response Error: Invalid response from Slave (Slave Address #)	Serial Modbus Master did not receive a response from the Slave unit
M/S	Modbus RTU Master Response Error (Exception from Slave (Slave Address #)	Serial Modbus Master received an Exception from this slave
M/S	Modbus RTU Master Response Error (Address Error from Slave (Slave Address #))	Serial Modbus Master received an invalid address request from this slave
M/S	Modbus RTU Master Response Error (No response from Slave (Slave Address #))	Serial Modbus Master received no response from this slave
M/S	Ethernet Modbus Master Failed to connect to (Slave IP Address)	Modbus TCP/IP Master did not receive a response from the Slave unit
M/S	Ethernet Modbus Master successfully connected to (Slave IP Address)	Modbus TCP/IP Master connect to slave after failure.
M/S	Ethernet Modbus Master Response Error (Exception from Slave (Slave Address #))	Modbus TCP/IP Master received an Exception from this slave
M/S	Ethernet Modbus Master Response Error (Address Error from Slave (Slave Address #))	Modbus TCP/IP Master received an invalid address request from this slave
M/S	Ethernet Modbus Master Response Error (No response from Slave (Slave Address #))	Modbus TCP/IP Master received no response from this slave
M/S	Ethernet Modbus Master Response Error (MBAP transaction id error from slave (Slave Address #))	Modbus TCP/IP Master found a transaction problem with the MBAP (ethernet message header)
M/S	Ethernet Modbus Master Response Error (MBAP protocol id error from slave (Slave Address #))	Modbus TCP/IP Master found a protocol error in the MBAP (ethernet message header)
M/S	Serial Port Timed out	When configured for Serial Comms Ascii Protocol this indicates a failure to write to the serial port after waiting for 1 minute.
M/S	Failed to initialize serial port	Indicates a hardware failure of the serial port.
Firmware Upgrade Events		
M/S	Error opening file jffs/update/DMS-3Kmainboard.S19	Indicates a failure during firmware upgrade.
M/S	FAILED to update firmware on main board	Indicates a failure during firmware upgrade reported by the Web Board.
M/S	Firmware Update Succeeded	This is a message to indicate that the firmware update was completed OK.
M/S	Firmware Update Failed	If the firmware update to the Main Board has failed you will see this event.

Unit	Diagnostic Events (Descriptor 'D')	Description
Internal Communication Events		
M/S	Cold Start with Default Settings	This should only occur if the main board is jumpered to reinitialize the Alarm Input/Output configuration
M/S	Received invalid Event code(X) for input number(Y)	Main Board firmware is out of date with Web board firmware; (Should Not occur)
M/S	Communications Failure with Main Board	This event may occur immediately after a firmware upgrade. It is usually pared with the event "Communications Restored with main Board". If you do not see the Restored event then a hardware failure has occurred.
M/S	Communications Restored with Main Board	When an internal communications failure occurred but has been corrected you will see this events. Should only occur after a firmware upgrade.

Unit	Time Sync Events (Descriptor 'T')	Description
M/S	Hourly Time Update	Time updated on the hour successfully between the Main Board and WEB Board
M/S	Obtained IRIG-B Synchronization	IRIG-B Time Sync signal detected
M/S	Lost IRIG-B Synchronization	The IRIG-B Time Sync signal was lost
M/S	Obtained IRIG-B Synchronization	IRIG-B Time Sync signal detected
M/S	Lost IRIG-B Synchronization	The IRIG-B Time Sync signal was lost
S	Obtained Serial Synchronization	Slave unit has synchronized it's time to the master via the RS485 time sync
S	Lost Serial Synchronization	Slave unit has lost it's synchronization to the master via the RS485 time sync

Appendix G Legend Format for CSV Import

The following formatting instructions for the csv import file must be followed:

1. The first value must be the point number you wish to update 1->48; this must be followed by a comma character.
   For CR (Combined SER) systems, the input numbers in your file should match the input channel assignments, ex. Master SER has inputs 1-128, slave 1 has inputs 129-256, etc
2. The second field is the text string you want loaded for Alarm Legend. If there is a separate legend for the normal state, enter a comma after the Alarm legend. The max length for the Alarm Legend is 32 characters; therefore; only the first 32 characters will be stored.
3. The 3rd field is the text string you want loaded for Normal Legend; this string MUST NOT contain any commas. The max length for the Normal Legend is 32 characters; therefore; only the first 32 characters will be stored.

An example of a valid entry is: **1, Input 1 is in Alarm, Input 1 has returned to Normal**

Additional Notes:

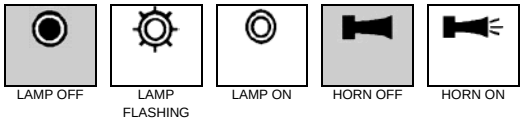
- Lines beginning with a # character indicate a comment line; these are allowed as they are not processed
- Only include lines for inputs you wish to change either the Alarm Legend or Normal Legend. If you only wish to update the Alarm Legend; you may skip entering the 3rd field as defined above in 3. For example:
  1, Fire Alarm
  This a valid entry and will modify only the Alarm Legend for input 1.
- If you only wish to update the Normal Legend; you must still enter it as the 3rd field as defined above in 3; but you can skip modification of the Alarm Legend by not entering any characters between the commas. For example:
  1, , Fire Alarm has returned to Normal
  This a valid entry and will modify only the Normal Legend for input 1.
  Note: if you put a space between the 2 commas above it will be interpreted as entering a single space for the Alarm Legend and this would clear out any previous entry.

Appendix H Operating Sequence Tables

The available operating sequences are:

- ISA-A-4-5-6 Automatic reset, non-locking, no flash, no audible, NO PB
- ISA-A-4 Automatic reset with no lock-in of alarms
- ISA-A Automatic reset with lock-in of alarms
- ISA-M Manual Reset with lock-in of alarms
- ISA-F1A-1 First Out Flash, Subsequent alarm steady, auto reset
- ISA-F2A-1 First Out, Fast Flash, auto reset
- ISA-F2M-1 First Out, no subsequent alarm flash, manual reset
- ISA-F3A First Out, triple flash, first out reset
- ISA-F3M First out, triple flash, first out manual reset
- ISA-FFAM2 First Out, manual reset
- ISA-R Ringback, separate flash for return to normal
- ISA-R-12 Automatic Momentary Ringback, dual flash, manual reset

LEGEND



AUTO RESET, NON LOCKING STATUS ONLY INDICATION						
SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT	ACKNOWLEDGE	RETURN TO NORMAL	RETURN TO NORMAL BEFORE ACK
A-456	VISUAL					
	AUDIBLE					

AUTO RESET, NON LOCKING						
SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT	ACKNOWLEDGE	RETURN TO NORMAL	RETURN TO NORMAL BEFORE ACK
A-4	VISUAL					
	AUDIBLE					

AUTO RESET, LOCKING

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT	ACKNOWLEDGE	RETURN TO NORMAL	RETURN TO NORMAL. BEFORE ACK	ACKNOWLEDGE
A	VISUAL						
	AUDIBLE						

MANUAL RESET, LOCKING

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT	ACKNOWLEDGE	RETURN TO NORMAL	RETURN TO NORMAL. BEFORE ACK	ACKNOWLEDGE	RESET
M	VISUAL							
	AUDIBLE							

FIRST OUT, AUTORESET

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT		ACKNOWLEDGE		RETURN TO NORMAL		RETURN TO NORMAL BEFORE ACK.		ACKNOWLEDGE	
			INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT
F1A	VISUAL											
	AUDIBLE											

FIRST OUT WITH FIRST OUT RESET

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT		ACKNOWLEDGE		RETURN TO NORMAL AND ACK.		RETURN TO NORMAL.
			INITIAL	NEXT	INITIAL	RESET	INITIAL	NEXT	RESET
F2A	VISUAL		FAST 		SLOW 	SLOW 			
	AUDIBLE								

FIRST OUT WITH FIRST OUT RESET

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT		ACKNOWLEDGE		RETURN TO NORMAL		RETURN TO NORMAL BEFORE ACK.		ACKNOWLEDGE		
			INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	RESET
F2M	VISUAL												
	AUDIBLE												

FIRST OUT, TRIPLE FLASH, FIRST OUT RESET

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT		ACKNOWLEDGE		RETURN TO NORMAL		RETURN TO NORMAL BEFORE ACK.		ACKNOWLEDGE		FIRST OUT
			INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	RESET
F3A	VISUAL		INT. FAST	FAST	SLOW		SLOW		INT. FAST	FAST	SLOW		
	AUDIBLE												

FIRST OUT, TRIPLE FLASH, FIRST OUT RESET

SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT		ACKNOWLEDGE		RETURN TO NORMAL BEFORE ACK.		RETURN TO NORMAL AND RESET		RETURN TO NORMAL AND RESET
			INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	INITIAL	RESET
F3M	VISUAL		INT. FAST	FAST	SLOW		INT. FAST	FAST			
	AUDIBLE										

FIRST OUT, MANUAL RESET														
SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT		ACKNOWLEDGE		RETURN TO NORMAL		RETURN TO NORMAL BEFORE ACK.		ACKNOWLEDGE		
			INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	INITIAL	NEXT	RESET
FFAM 2	VISUAL												
(RIS)	AUDIBLE												

RINGBACK, DUAL FLASH, LOCK IN UNTIL ACKNOWLEDGED						
SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT	ACKNOWLEDGE	RETURN TO NORMAL	RESET
R	VISUAL		FAST		SLOW	
	AUDIBLE					

✶ A distinctly different ringback audible can be provided in most cases

RINGBACK, DUAL FLASH, MANUAL RESET								
SEQUENCE CODE	ALARM DEVICE	NORMAL	ALERT	ACKNOWLEDGE	RETURN TO NORMAL	RETURN TO NORMAL. BEFORE ACK	ACKNOWLEDGE	RESET
R-12	VISUAL		FAST		SLOW	SLOW	SLOW	
	AUDIBLE				*	*	*	

✶ A distinctly different ringback audible can be provided in most cases

CONTACT LIST & WARRANTY

Telephone / Fax Number List

This errata sheet provides an easy-to-use reference for all major departments. Use these numbers for ordering equipment, application assistance, technical support, and scheduling field service

Please Note: Your instruction manual may contain other phone and fax numbers; this list will take precedence.

MAIN OFFICE

AMETEK Power Instruments – Rochester
255 North Union St., Rochester, NY 14605

DEPARTMENT/PRODUCT LINE	TELEPHONE	FAX
MAIN PHONE	585-263-7700	585-262-4777
FIELD SERVICE	800-374-4835	585-238-4945
REPAIRS/RETURNS	888-222-6282	585-238-4945
SALES SUPPORT	800-950-5503	585-454-7805

FAR EAST OFFICE

AMETEK Power Instruments
271 Bukit Timah Road, #03-09
Balmoral Plaza, Singapore 259708
Tel: 65-732-8675
Fax: 65-732-8676

UK OFFICE

AMETEK Power Instruments
Unit 20, Ridgeway
Donibristle Industrial Estate
Dunfermline, UK
Tel: 1383-825630
Fax: 1383-825715

Procedures for Factory Repair and Return

Obtain a Returned material Authorization (RMA) number by calling AMETEK Repair Sales and giving the following information:

Model and ***Serial Number*** of the equipment
Failure Symptom – **Be Specific**
Approximate date of installation
The site name and address of the failed equipment
Complete shipping information for the return of the equipment if other than the operating site
Name and telephone number of person to contact if questions arise.

Enclose the information with the equipment and pack in a commercially accepted shipping container with sufficient packing material to insure that no shipping damage will occur. Mark the outside of the container with the RMA number. Ship to the appropriate location: **Attention:** Repair Department

AMETEK Power Instruments
255 North Union Street
Rochester, New York 14605 USA
Tel: (888) 222-6282

Your emergency equipment will be tested, repaired and inspected at the factory. Factory turnaround is ten working days or less (excluding shipping time).

For emergency service or repair status information, please contact the AMETEK Repair Sales Engineer at (800) 374-4835.

Warranty

AMETEK warrants equipment of its own manufacture to be free from defects in material and workmanship, under normal conditions of use and service. AMETEK will replace any component found to be defective, upon its return, transportation charges prepaid, within one year of its original purchase. AMETEK will extend the same warranty protection on accessories that is extended to AMETEK by the original manufacturer. AMETEK assumes no responsibility, expressed or implied, beyond its obligation to replace any component involved. Such warranty is in lieu of all other warranties expressed or implied.