MAC VALVES, INC.

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TITLE: User's Manual for MAC Valves DeviceNet SM32 Manifold

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User's Manual
for
MAC Valves DeviceNet
SM32 Serial Manifold
1/24/02

1. SYSTEM OVERVIEW

1-1 DeviceNet

The DeviceNet System is an open architure control system based on the Bosch CAN format which supports high speed transfer of control information. A DeviceNet network is an open network consisting of one or more master devices and multiple slave devices. Because it is an open network, the system will consist of products from a wide variety of vendors. The organization which has overall control of bus issues is the ODVA.

The master (a PC or PLC with its network scanner) and slave devices are connected via a standard five conductor cable which has both node power and communications on the same line. There are a number of DeviceNet approved cables which may be used for network wiring.

The scanner communicates with each slave device on the network in an exchange referred to as polled I/O. Data transferred on the network is organized by node addresses. There can be up to 63 slaves on a given network (62 if you have a network PC along with a PLC master scanner). Each slave device is assigned a node number (or address) so it can communicate with the network.

The commissioning (introduction) of a new product on the network varies slightly from master to master but in general, the process is as follows:

1. Set the address dip switches on the slave to correspond to the required node number.
2. Wire the communications bus on the new product.
3. Place power on the new node (product).
4. Initialize the master.
5. Load in the Electronic Data Sheet or EDS (more about that later) into the master.
6. Attach the EDS for the slave to the node assigned it in the master.
7. Program the master for the required work.

1-2 MAC Valves SM32 Serial Manifold

The MAC Serial Manifold (SM32) is a slave device within the DeviceNet network. Thus, it will respond to all of the commands associated with the network like any other node of its type. The PLC programmer will not have to make any special allowances with this product.

Since the MAC SM32 Unit is nothing more than a node on the DeviceNet network, it can also be used in conjunction with our Serial Input Manifold (SIM), SLIM, Addressable Valve, or any other DeviceNet compatible device.

Each SM32 occupies a single node in the network. The output portion consumes 2 bytes (16 bits) and produces 2 bytes (16 bits) so that the system can control up to 16 MAC solenoid valves and read up to 16 user supplied sensors. We will discuss the inputs later in this document. The memory location and addressing of these bytes also will be discussed later in this document.

Along with 16 output channels, the SM32 has the capability to read 16 input channels. These inputs are interfaced to the product by up to four micro connectors on top of the electronics module (which can read up to four input channels, one channel per connector) or all sixteen inputs (one channel per connector) by way of a tethered input box. The inputs which are accepted by our electronics can be either NPN or PNP type. The polarity must be set before powering the unit. **If tethered inputs are used, the polarity jumper must be removed from the SM32 and set inside the tethered input module**. If this is not done, damage to the SM32 is possible. Refer to Figure 4 for the location of the polarity jumper. Also, if the inputs are improperly wired, damage can occur to the switches.

Each SM32 is mounted directly to the MAC Valve manifold and is connected to the PLC network via the DeviceNet standard five conductor cable rather than individual wires for each solenoid and each input as would be the case for discretely wired manifolds. This greatly reduces both the amount of wiring and the time required to get the product on line compared to conventionally wired system.

MAC Valve SM32s have pre-wired solenoid connections. It is only necessary to make the communication and power connections to the Serial Interface terminals and to set the node address and baud rate dip switches, located on the bottom of the electronics box, at the time of installation. The MAC SM32 system comes with a standard five pin Mini type communications cable and with many optional power connectors. It also will support the DeviceNet standard Micro connector or the Phoenix style terminal block for communications. Thus, the amount of wiring by way of the connectors is minimized.

2. SYSTEM STRUCTURE

2.1 Applicable PLCs

The following is a partial list of scanners and cabling approved by the DeviceNet governing body at the time of this wiring. Please consult the ODVA for a complete list of current DeviceNet products.

Table 1

Company	Product
Allen-Bradley	Scanners, PC Cards, Cabling
Belden Wire and Cable	Cables
Crouse-Hinds	Connectors
Daniel Woodhead	Cables, Connectors
Lumberg	Connectors
Molex	Cables, Connectors
Turck	Cables, Connectors
Omron	Scanners
S-S Technologies	Scanners
Huron Networks	Scanners
Synergetic Micro Systems	Scanners
Toshiba	Scanners
Hilscher GmbH	Scanners

2.2 Applicable MAC Valve Series for the SM32

The following are the valves which can be used with the SM32 Valve Manifold:

34 Series
35 Series
37 Series
44 Series
45 Series
47 Series
82 Series
92 Series
93 Series
6200 Series
6300 Series
6500 Series
6600 Series
ISO Series

The maximum wattage per channel is 5.4W which corresponds to 0.225A at 24VDC The total output current load is a maximum of 4.0A. Also, DeviceNet has power through the bus cable which operates the inputs and the node itself. Consult the DeviceNet wiring standards for the correct wiring and power requirements of the bus power.

3. SPECIFICATIONS

3-1 General Specifications Table 2

Item	Specifications
Operating ambient temperature	0~+50°C (consult the factory for higher temperature operation)
Operating ambient humidity	10~90% RH (no condensation)
Vibrating resistance	5G (10~55 Hz, 0.5mm)
Impact resistance	10G
Dielectric strength	500VAC 60 Hz for 1 sec. (between external terminal and case)
Insulation resistance	10Mohm
Operating atmosphere	No corrosive gases

3-2 Performance Specifications Table 3

Item	Specification
Applicable PLC	Refer to Table 1
DeviceNet Processor/Scanner	Refer to Table 1
Max. # of SI Units per Master Station	(Refer to Table 1)
Transmission Speed	125k/ 250k/ 500k
Transmission Distance	300m @125k 100m @250k 100m @500k

Transmission Path	Five Conductor Cable Refer to Table 1

3-3 SM32 Unit Specifications Table 4

Item	**Specification**
Power supply voltage	For solenoid valves 24VDC +/-10% For SM32 (internal) 24VDC +/-10%
Power consumption	For solenoid valves Max. 4.0A For SM32 Node Power (for DeviceNet bus calculations) Max. 200mA plus Input switch power Consult switch company for their requirements
Output points	16 points 5.4W/Channel Max (24VDC) 2 bytes consumed
Input points	16 points (24VDC) 2 bytes produced
Residual voltage	1.0 V or less
Weight (Main Electronics Module)	0.75kg
Dimensions (Without Connectors)	34x71x144mm

4 Dip Switch Settings/Electronic Data Sheet (EDS)

4-1 Addressing

The DeviceNet system uses node numbers as a bases for addressing. The system has a capacity of 64 addresses. Of these addresses, one is used for the master scanner, and one could be used for the system monitor (this arrangement depends on the company used for the communications). From this, we can have as many as 63 SM32s on a given system. Each SM32 must have a unique address for this to work correctly. Please consult the company from which the scanner is obtained for complete scanner specifications and operational methods.

With the power supply OFF, remove the SM32 from its base. On the bottom of the unit, find the eight dip switches. Refer to Figure 1 for the switch locations.

Use a small anti-static screwdriver to set the positions of the 8 bit switch for the unit's node address and baud rate as described below. The Least Significant Bit (LSB) is the left most dip switch and the Most Significant Bit (MSB) is the 6th switch from the left. Note, when the switch is in the position closest to the circuit board it means it is translated as a logic 1 (On).

(1) Address (Bits 1-6)

The address setting establishes the SM32's "identity" within the DeviceNet network. The setting range is 0-63 (64 different settings). The addresses are refer to in decimal format but the dip switches are set up as binary. The following are some examples of decimal to binary conversion and their corresponding dip switches. Refer to Figure 1.

Address 55Dec = 111011Bin
=Switches 1,2,4,5, and 6 ON

Address 12Dec = 001100Bin
=Switches 3 and 4 ON

(2) Baud Rate (Bits 7,8)

It is important to note that all of the units on a particular network must operate at the same baud rate. Thus, the speed which is set into the Scanner Card must be duplicated by all of the nodes on the net or a bus error will occur.

With the power supply OFF, use a small anti-static screwdriver to set the positions of the two right most dip switches.

Table 5

Switch Position	Data Rate	Max. I/O Transmission Distance
00	125k	500m
10	250k	250m
01	500k	100m
11	not used	-------

4-2 Electronic Data Sheet (EDS)

The second part of commissioning a node in the DeviceNet is to attached the Electronic Data Sheet (EDS) to the software in the scanner. This product will use EDS part number 32_2_4.EDS Rev C. Due to the differences in the software for a given scanner, please consult the scanner company's manual for instructions on EDS usage.

The following is a printed copy of the EDS used for the MAC Valves/DeviceNet SM32 A disk copy is available upon request.

```
**********************************************************************************
******************
[File]
        DescText   = "EDS-file for AnyBus I/O 32";
        CreateDate = 08-06-1999;
        CreateTime = 11:29:29;
        ModDate    = 27-03-2000;
        ModTime    = 11:35:13;
        Revision   = 2.4;

[Device]
        VendCode    = 90;
        VendName    = "HMS Fieldbus Systems AB";
        ProdType    = 7;
        ProdTypeStr = "General Purpose Discrete I/O";
        ProdCode    = 1;
        MajRev      = 2;
        MinRev      = 4;
        ProdName    = "AB32";
        Catalog     = "-";
```

```
[IO_Info]
        Default    = 0x0001;

        PollInfo   = 0x0001, 1, 1;

        Input1=
        2, 0, 0x0001,
        "Polled Input Connection",
        5, "20 04 24 05 30 03",
        "";
```



```
        Output1=
        2, 0, 0x0001,
        "Polled Output Connection",
        35, "20 04 24 23 30 03",
        "";

[ParamClass]
        MaxInst     = 34;
        Descriptor  = 0x0000;
        CfgAssembly = 0;

[Params]

        Param1=
        0,
        6, "20 1E 24 01 30 09",
        0x0002, 4, 1,
        "Idle State",
        "",
        "Defines output behavior during program mode.",
        0, 1, 0,
        1, 1, 1, 0,
        0, 0, 0, 0,
        0;

        Param2=
        0,
        6, "20 1E 24 01 30 07",
        0x0002, 4, 1,
        "Fault State",
        "",
        "Defines output behavior in the event of a communication fault.",
        0, 1, 0,
        1, 1, 1, 0,
        0, 0, 0, 0,
        0;

        Param3=
```

0,
6, "20 09 24 01 30 03",
0x0002, 4, 1,
"Output1",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param4=
0,
6, "20 09 24 02 30 03",
0x0002, 4, 1,
"Output2",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param5=
0,
6, "20 09 24 03 30 03",
0x0002, 4, 1,
"Output3",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param6=
0,
6, "20 09 24 04 30 03",
0x0002, 4, 1,
"Output4",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param7=

0,
6, "20 09 24 05 30 03",
0x0002, 4, 1,
"Output5",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param8=
0,
6, "20 09 24 06 30 03",
0x0002, 4, 1,
"Output6",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param9=
0,
6, "20 09 24 07 30 03",
0x0002, 4, 1,
"Output7",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param10=
0,
6, "20 09 24 08 30 03",
0x0002, 4, 1,
"Output8",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param11=

0,
6, "20 09 24 09 30 03",
0x0002, 4, 1,
"Output9",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param12=

0,
6, "20 09 24 0A 30 03",
0x0002, 4, 1,
"Output10",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param13=
0,
6, "20 09 24 0B 30 03",
0x0002, 4, 1,
"Output11",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param14=
0,
6, "20 09 24 0C 30 03",
0x0002, 4, 1,
"Output12",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param15=

0,
6, "20 09 24 0D 30 03",
0x0002, 4, 1,
"Output13",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param16=
0,

6, "20 09 24 0E 30 03",
0x0002, 4, 1,
"Output14",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param17=
0,
6, "20 09 24 0F 30 03",
0x0002, 4, 1,
"Output15",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param18=
0,
6, "20 09 24 10 30 03",
0x0002, 4, 1,
"Output16",
" ",
"The state of the device connected to AB32",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param19=

0,
6, "20 08 24 01 30 03",
0x0012, 4, 1,
"Input1",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param20=
0,
6, "20 08 24 02 30 03",

0x0012, 4, 1,
"Input2",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param21=
0,
6, "20 08 24 03 30 03",
0x0012, 4, 1,
"Input3",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param22=
0,
6, "20 08 24 04 30 03",
0x0012, 4, 1,
"Input4",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param23=

0,
6, "20 08 24 05 30 03",
0x0012, 4, 1,
"Input5",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param24=
0,
6, "20 08 24 06 30 03",
0x0012, 4, 1,

"Input6",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param25=
0,
6, "20 08 24 07 30 03",
0x0012, 4, 1,
"Input7",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param26=
0,
6, "20 08 24 08 30 03",
0x0012, 4, 1,
"Input8",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param27=

0,
6, "20 08 24 09 30 03",
0x0012, 4, 1,
"Input9",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param28=
0,
6, "20 08 24 0A 30 03",
0x0012, 4, 1,
"Input10",

" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param29=
0,
6, "20 08 24 0B 30 03",
0x0012, 4, 1,
"Input11",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param30=
0,
6, "20 08 24 0C 30 03",
0x0012, 4, 1,
"Input12",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param31=

0,
6, "20 08 24 0d 30 03",
0x0012, 4, 1,
"Input13",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param32=
0,
6, "20 08 24 0E 30 03",
0x0012, 4, 1,
"Input14",
" ",

"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param33=
0,
6, "20 08 24 0F 30 03",
0x0012, 4, 1,
"Input15",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

Param34=
0,
6, "20 08 24 10 30 03",
0x0012, 4, 1,
"Input16",
" ",
"The state of the device connected to DeviceLink",
0, 1, 0,
1, 1, 1, 0,
0, 0, 0, 0,
0;

[EnumPar]

Param1=
"Reset Outputs",
"Hold Last State";

Param2=
"Reset Outputs",
"Hold Last State";

Param3=
"OFF",
"ON";

Param4=
"OFF",
"ON";

Param5=

"OFF",
"ON";

Param6=
"OFF",
"ON";

Param7=
"OFF",
"ON";

Param8=
"OFF",
"ON";

Param9=
"OFF",
"ON";

Param10=
"OFF",
"ON";

Param11=
"OFF",
"ON";

Param12=
"OFF",
"ON";

Param13=
"OFF",
"ON";

Param14=
"OFF",
"ON";

Param15=
"OFF",
"ON";

Param16=
"OFF",
"ON";

Param17=
"OFF",

"ON";

Param18=
"OFF",
"ON";

Param19=
"OFF",
"ON";

Param20=
"OFF",
"ON";

Param21=
"OFF",
"ON";

Param22=
"OFF",
"ON";

Param23=
"OFF",
"ON";

Param24=
"OFF",
"ON";

Param25=
"OFF",
"ON";

Param26=
"OFF",
"ON";

Param27=
"OFF",
"ON";

Param28=
"OFF",
"ON";

Param29=
"OFF",
"ON";

Param30=
"OFF",
"ON";

Param31=
"OFF",
"ON";

Param32=
"OFF",
"ON";

Param33=
"OFF",
"ON";

Param34=
"OFF",
"ON";

[Groups]

****
****

5 Wiring/Installation

All Wiring and installation steps should be performed with the system power supply off.

5-1 Communications

The communications and basic node power comes from the 5 pin connector on the top of the SM32 box. The wiring inside the SM32 from the connector is performed by the factory. The user must only connect a standard five pin DeviceNet compatible cable to establish communications. Refer to Figure 2 for terminal identification during installation.

5-2 Valve Power

There is a second connector on the top of the SM32 box. Depending on the type of connector required, the unit can have a variety of combinations of power to the valves.

5-4 Input Wiring

If your system has Input capability (connectors) installed, the wiring for the detectors should follow the pattern shown in Figure 3. The detector manufacturer's recommendations should be follow for the type of module used and the wiring which should be followed.

In some cases damage to the switch or detector could result from incorrect wiring. If there are questions, please consult the factory.

The MAC SM32 employs the industry standard Eurostyle micro four pin female connector for the modules. There are many companies which have lines of pre-assembled wire harnesses which will connect the electronics to a variety of sensors.

Also note the type of switch logic must be know prior to turning the circuit on. The type (NPN or PNP) is selected by way of a jumper next to the dip switches shown in Figure 4.

5-5 PPC (Proportional Pressure Controllers)

The SM32, using special MODs, can operate up to two PPC5Cs. This is performed by using 4 outputs and 1 input channel per PPC for pressure control. This is then divided so that you can have 16 steps (for 4 bits) of pressure from lowest to highest and a pressure achieved input (LMS) to control the PPC. Note, because these pressure controllers consume inputs and outputs, the channels that are used for PPCs can not be used for other valve control on the stack.

When programming for a PPC, consult the output and input memory mapping table later in this document.

5-6 Welding Watersaver Valves

The SM32 can interface to a large variety of welding watersaver valves. In general, it can control up to two output solenoids, and to input switches from the watersaver. These inputs and outputs must be no higher that 5.4W, 24VDC.

When programming for a watersaver, consult the output and input memory mapping table later in this document. Also consider that the connector for the watersaver will take the place of an input connector on top of the electronics module. Because of this, the user can only have up to 3 inputs for proximity switches when a watersaver is required without using the tethered input.

5-7 Fusing/Circuit Protection

The SM32 uses a multi-tiered approach to isolation and protection of the electronics and bus systems. The first line of defense are the two fuses location on the bottom of the unit. One of these fuses is for the valve power circuit, the other is used to protect the electronics and inputs

circuit. Inside this circuit is a blocking diode to prevent any damage from reverse power wiring. Next in line is the opto-isolation imployed for the separation of any electronic interference which might be created by either the valves or input and the communications bus. Along the valve circuits, we have both blocking and spike separation diodes to significantly reduce the valve's de-energized spike from reaching the electronics.

Table 6
Fuse Size/Replacement

Fuse Designation	Value	Protects	Replace P/N
F1	4A	Valve Power	Littelfuse 273 004
F2	1A	Electronics Power	Littelfuse 273 001

6 Output Programming/Bit Map

The outputs to the SM32 unit are mapped according to the node address inside the DeviceNet scanner. Due to the large variety of scanners, please refer to their User's Manual for complete programming instructions.

The MAC Valves SM32 will consume two consecutive bytes (16 bits) which are assigned for use by the output section of the SM32 unit to the PLC memory for programming.

Table 7 is a mapping using Class 9 and Attribute 3.

Table 7

Instance	Location	Channel
1	Valve Solenoid 1	1
2	Valve Solenoid 2	2
3	Valve Solenoid 3	3
4	Valve Solenoid 4	4

5	Valve Solenoid 5	5
6	Valve Solenoid 6	6
7	Valve Solenoid 7 or PPC2 LSB Bit 1	7
8	Valve Solenoid 8 or PPC2 Bit 2	8
9	Valve Solenoid 9 or PPC2 Bit 3	9
10	Valve Solenoid 10 or PPC2 MSB Bit 4	10
11	Valve Solenoid 11 or PPC1 LSB Bit 1	11
12	Valve Solenoid 12 or PPC1 Bit 2	12
13	Valve Solenoid 13 or PPC1 Bit 3	13
14	Valve Solenoid 14 or PPC1 MSB Bit 4	14
15	Valve Solenoid 15 or Water 2	15
16	Valve Solenoid 16 or Water 1	16

7 Input Programming/Bit Map

Like the outputs, the inputs to the SM32 are mapped according to the node address. The SM32 will produce two consecutive bytes (16 bits) which are assigned for use by the input section of the unit to the PLC memory for programming. Refer to Table 8 for a memory map for the input channels using Class 8 and Attribute 3.

In the table below, Top refers to input connectors on top of the electronics, Tether refers to input connectors on the tethered module (to be released later), LMS is the logic monitor for a PPC, and Water is a watersaver valve channel.

Table 8

Instance	Location	Channel
1	Top 1 or Tether 1	1
2	Top 2 or Tether 2	2
3	Top 3 or Tether 3 or Water 2	3

4	Top 4 or Tether 4 or Water 1	4
5	Tether 5	5
6	Tether 6	6
7	Tether 7	7
8	Tether 8	8
9	LMS1 or Tether 9	9
10	LMS2 or Tether 10	10
11	Tether 11	11
12	Tether 12	12
13	Tether 13	13
14	Tether 14	14
15	Tether 15	15
16	Tether 16	16

The location of the Input Connectors can be see in Figure 3. Notice each connector has assignments for one input channel as noted in the above table. Also note, when a watersaver is used, its connector displaces another input connector along with the bit for control. Take this into account when setting up the system.

There are two basic types of inputs based on the direction of current flow. We call the two types Positive Common and Negative Common. The Inputs are factory set by way of a jumper to either of these type. One word of caution, by setting the jumper for the mode of operation for the module, the whole module is that type (Positive Common or Negative Common). There is no option for connector by connector setting of type.

Refer to Figure 3 in selecting the desired mode of operation for the inputs. The terms “sinking” and “sourcing” are not used due to the possibility of confusion. In our terminology, Positive Common is used when the load is connected between the signal pins 2 or 4 and the positive voltage terminal pin 1 (typical for PNP logic switches). Negative Common is used when the load is connected between the signal pins 2 or 4 and the negative voltage terminal pin 3 (typical for NPN logic switches). **Also, if the tethered input module is used instead of the SM32 module inputs, the SM32 polarity jumper must be removed.**

8 Troubleshooting Guide

In the event of difficulties in either operation or installation of the SM32 Manifold, your local MAC Valves Distributor and the factory are ready and able to assist you in solving any problems which might be encountered.

Below is a table of some typical problems, symptoms, and their solutions. All troubleshooting LEDs are visible on the top of the electronics module. Also note there are two sets of LEDs to assist in troubleshooting. One set of three is located in the center of the module. They are for Electronics Power, Module/Network Status, and Bus Address (not used). The other set (for the output channels and valve power) is along the module top edge.

Table 9

Problem	Symptoms	Solutions

Does not operate	Valve Power LED off Electronics Power LED off Mod/Net Status LED off No Output LEDs on No Valve operation	1. Verify primary 24VDC supply 2. Check fuse F2/ replace if blown
Does not operate	Valve Power LED on Electronics Power LED on Mod/Net Status LED red Flashing No Output LEDs on No Valve Operation	1. Verify communications cable properly connected 2. Verify correct address and baud rate is set on the dip switches
Does not operate	Valve Power LED on Electronics Power LED on Mod/Net Status LED Flashing green No Output LEDs on No Valve Operation	1. Verify correct address and is set on the dip switches 2.Unit On-line but not connected
DeviceNet is active/does not drive valves	Valve Power LED off Electronics Power LED on Mod/Net Status LED green No Output LEDs on No Valve Operation	1. Check Output fuse F1 2. Check wiring for power

DeviceNet is active/individual valve does not operate	Valve Power LED on Electronics Power LED on Mod/Net Status LED green Valve Output LED on	1. Check connection of valve 2. If channel flashes when fired, fault is due to short or reversed wiring in valve circuit or cable If valve does not operate and SIM Valve LED is normal, possible open in valve wiring.
DeviceNet is active/Input Channel does not sense change in input detector on PLC	Valve Power LED on Electronics Power LED on Mod/Net Status LED green Valve Operation Normal No Input Activity On PLC	1. Check Memory Map 2. Check whether correct module type (positive common or negative common) is used for application

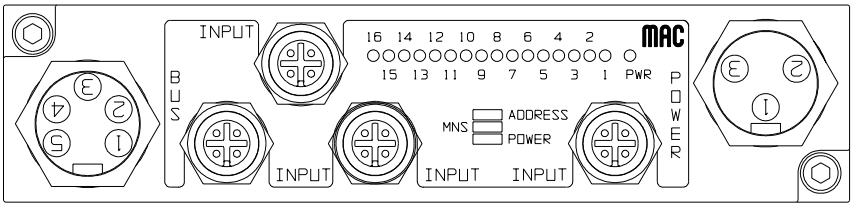
Warning:

Under no circumstances are MAC Valves to be used in any application or system where failure of the valves or related components to operate as intended could result in injury to the operator or any other person.

- Do not operate outside of prescribed pressure or temperature ranges.
- Air supply must be clean. Contamination of valve can affect proper operation.
- Before attempting to perform any service on valve, consult catalog, P & O sheet, or factory for proper maintenance procedures. Never attempt service with air pressure to valve.
- If air line lubrication is used, consult catalog, P & O sheet, or factory for recommended lubricants.
- Before interfacing the product to any bus or serial system, consult the controller and bus manuals

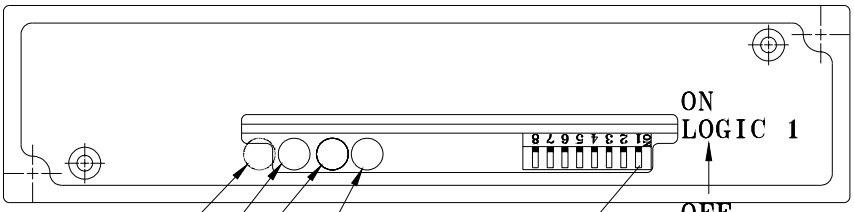
for proper usage.

DIP SWITCH/FUSE GUIDE
FIGURE 1



TOP VIEW

BOTTOM VIEW



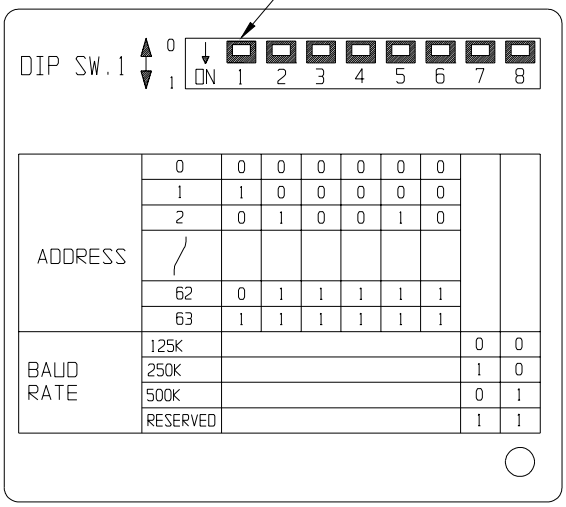
SPARE FUSE, ELECTRONICS

FUSE F2 ELECTRONICS

FUSE F1 VALVES

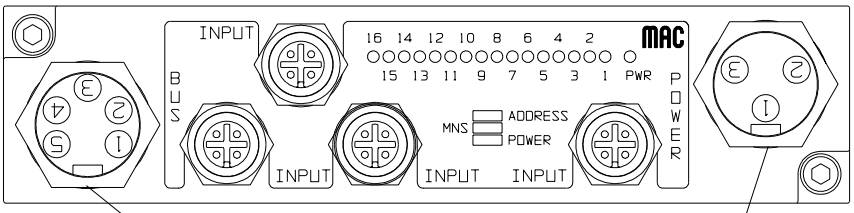
SPARE FUSE, VALVES

DIP SWITCH 1



ADDRESS	0	0	0	0	0	0	0		
	1	1	0	0	0	0	0		
	2	0	1	0	0	0	0		
	/								
	62	0	1	1	1	1	1		
	63	1	1	1	1	1	1		
BAUD RATE	125K							0	0
	250K							1	0
	500K							0	1
	RESERVED							1	1

CONNECTOR GUIDE
FIGURE 2



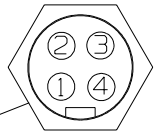
TOP VIEW

DEVICENET CONNECTOR

	MINI 5 PIN (SHOWN)	MICRO 5 PIN	
1	DRAIN	DRAIN	-BARE
2	V+	V+	- RED
3	V-	V-	-BLACK
4	CAN_H	CAN_H	-WHITE
5	CAN_L	CAN_L	-BLUE

POWER CONNECTOR

VIEWED FROM MALE SIDE OF CONNECTOR

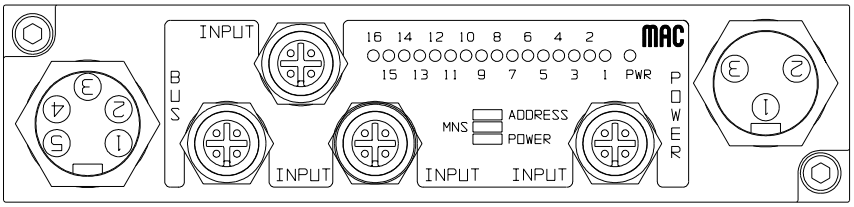


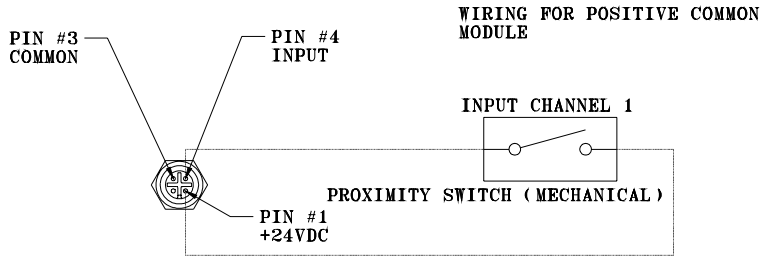
	MINI 3 PIN (SHOWN)
1	EARTH GROUND
2	VALVE +
3	VALVE -

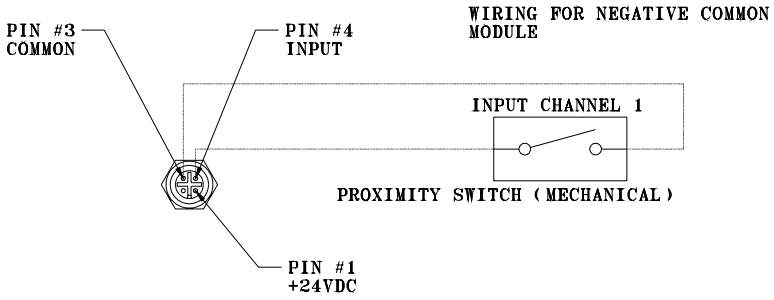
	MINI 4 PIN
1	NC
2	VALVE +
3	NC
4	VALVE -

NOTE:
OTHER CONNECTORS AND CONFIGURATIONS AVAILABLE UPON REQUEST. PLEASE CONSULT THE FACTORY.

INPUT CONNECTOR GUIDE
FIGURE 3



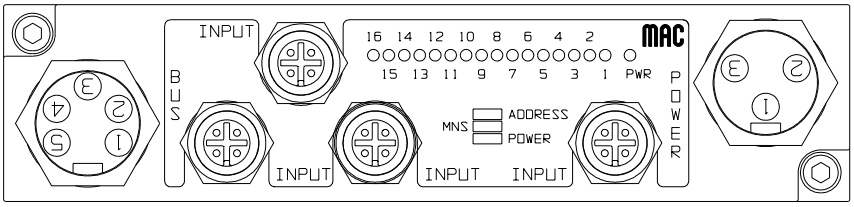




NOTE, FOR ELECTRONIC SWITCHES, CONSULT THE MANUFACTURER'S RECOMMENDED WIRING PROCEDURE.

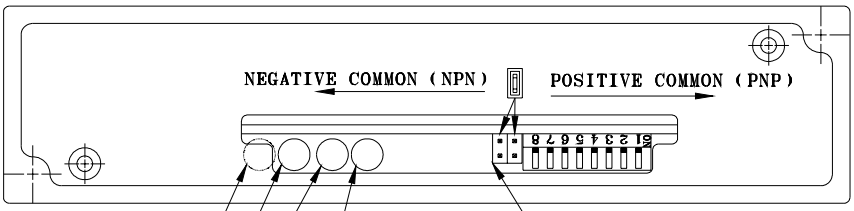
JUMPER LOCATION

FIGURE 4



TOP VIEW

BOTTOM VIEW



SPARE FUSE, ELECTRONICS

FUSE F2 ELECTRONICS

FUSE F1 VALVES

SPARE FUSE, VALVES

JUMPER LOCATION

NOTE, REMOVE PLASTIC JUMPER FROM THE PINS SHOWN FOR TETHERED INPUT MODULE APPLICATION