WESTLOCK
CONTROLS CORPORATION

Instruction & Operating Manual For
DeviceNet.
CONFORMANCE TESTED

About DeviceNet

DeviceNet is an open network standard originally developed by Allen-Bradley and based on a broadcast-oriented, communications protocol - the Controller Area Network (CAN). The CAN protocol was originally developed by BOSCH the european automotive market for replacing expensive, wire harnesses with a low-cost network.

In 1995 Allen-Bradley released the protocol to the open DeviceNet Vendors Association (ODVA). ODVA oversees the development of the DeviceNet specification and the conformance testing of Devicenet products. ODVA is open to any manufacturer or user of this protocal with a worlwide membership of approximately 300 companies.

DeviceNet is a simple networking solution that reduces the cost and time required to install and wire industrial automation devices. A single DeviceNet Intellis System will accomodate up to 63 valves and 1008 discrete I/O points. Although a simple system to design and implement, DeviceNet has the capability to inter-connect complex as well as simple devices to the same network, easily accomodating both analog and discrete I/O.

Westlock Intellis DeviceNet Module EL-40092

The EL-40092 module is a 4 input, two output network monitor. Inputs 0 and 1 are internal Hall effect sensors that are activated by the field of a magnet (south pole). Inputs 2 and 3 are active high/low (activated by pulling the input up to +24V or activated by pulling the input down to ground). The outputs are open drain active low FETs, fused (solid state resettable) at 0.2A with diode protection to 24Vdc. For current consumption see Table 1, page 9. Minimum power supply input voltage is 19Vdc to insure proper solenoid operation.

Connection to the network is via DeviceNet specific cable. There are both Round and Flat Media. Refer to the Cabling Information section, page 6 of this document for more information. See also Allen-Bradley document "DeviceNet Cable System"' (Cat. No. DN-6.72) for a detailed treatment of this topic.

For data exchange to occur, each network monitor connected to the DeviceNet network must be programmed with a unique address, numbered between 0 and 63 and all nodes must be set to the same Baud rate as the scanner. This may be accomplished via setting the DIP switch, S1, on the electronics module. Refer to Tables 4, 5 and 5.1 page 10.

The address and Baud rate may also be set via explicit Messaging if positions 7 and 8 on S1 are set to the "On" position.

It is possible to exchange or add slaves during normal operation without interfering with communications to other nodes.

The Westlock Controls Corp. DeviceNet Module, EL-40092, operates as a GROUP 2 Only Slave on a DeviceNet network. The unit supports Explicit Messages and Polled I/O Messages of the Predefined Master/Slave Connection Set. The device does not support the Explicit Unconnected Message Manager (UCMM). Refer to the Specification Overview, page 8 for a summary of features.

Installation Instructions

IMPORTANT: If the valve monitor is in the field already mounted on an actuator and valve, please follow the field wiring instructions on the next page.

Warning: The valve monitor should always be handled with care when the cover is removed and wired to an electrical power source.

1. Attach the proper mounting bracket and adapter to the valve monitor housing with the hardware provided.

2. Operate the actuator to full closed position.

3. Attach the valve monitor and mounting bracket to the actuator.

4. Note graphic display of the Beacon and circle one of the coinciding drawings shown below.
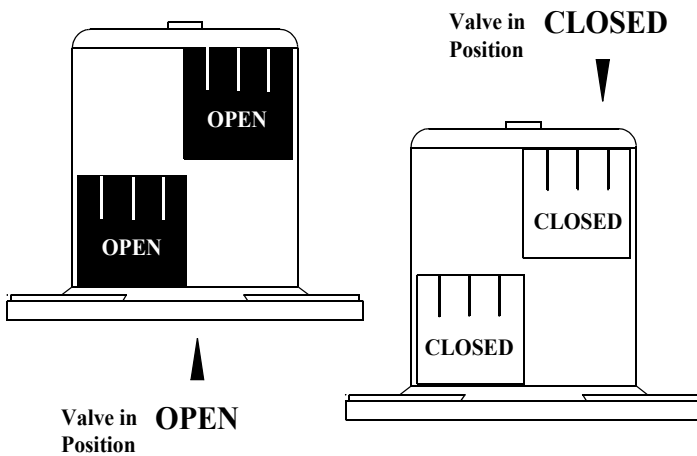
STANDARD FLOW ARRANGEMENTS

PART NO.	ARRANGEMENT NUMBER
90° ROTATION	
BM3-1	1
BM3-3	3
BM3-5	5
180° ROTATION	
BM3-7	7
BM3-9	9

Valve in Position **CLOSED**

Valve in Position **OPEN**
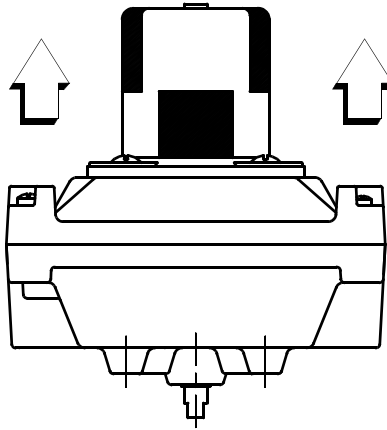
Switch Adjustment

Note: Switches are factory set. If you need to adjust for any reason follow instructions below.

1. To set switches, lift bottom cam and turn until switch is activated and then release. Spring will push cam back onto the splined shaft. Operate the actuator to the opposite extreme, push down on the top cam and turn until the open switch is activated.
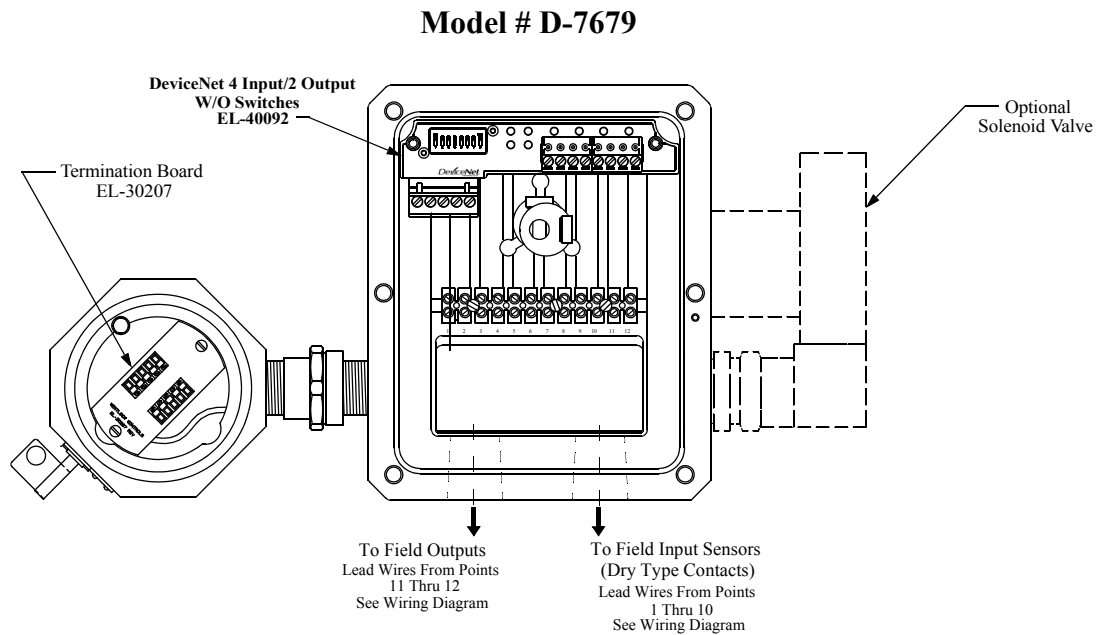
Magnet Embedded in Cam

Push Down, Turn & Release

Lift Up, Turn & Release
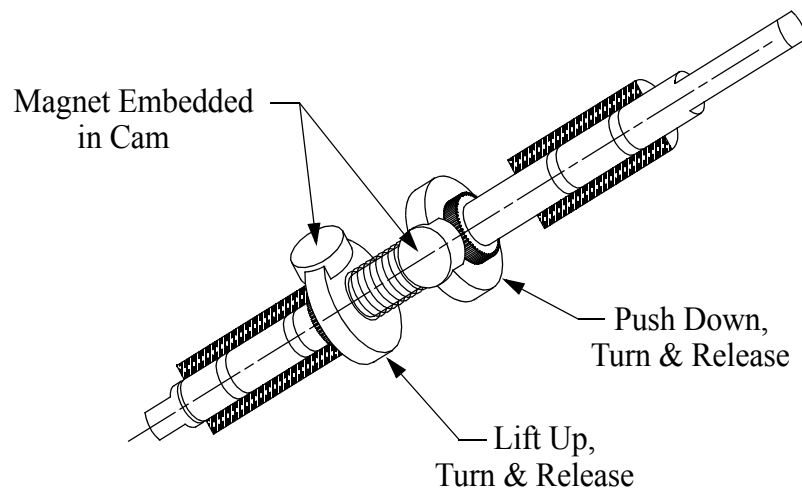
2. Operate actuator from one extreme to the other several times to check switch operation.

Westlock Intellis 7644 & 7679 ME or XE/D-7679 ME or XE Field Wiring Instructions
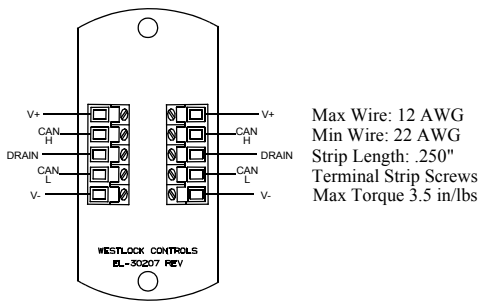
1. Wiring options for 7644 & 7679/D-7679 ME or XE are shown in Fig. 1-3 below. The proper wiring diagram for your unit is shown on the inside of the 7679ME or XE covers.

2. All wiring must be in accordance with National Electrical Code (ANSI-NFPA-70) for area classifications. The valve monitors are approved as explosionproof for Class I, Division 1, Groups C and D; non-incendive for Class I, Division 2, Groups A,B,C and D; dust-ignitionproof for Class II/III, Division 1, Groups E,F and G hazardous (classified) locations; indoor/outdoor (NEMA type 4, 4X).

Always check the nameplate to make sure the agency approval ratings coincide with the application.

Caution: To Prevent Ignition of Hazardous Atmospheres, Replace Cover Before Actuating the Electrical Circuits. Keep Cover Tightly Closed When in Operation.

Model # D-7679

DeviceNet 4 Input/2 Output W/O Switches EL-40092

Termination Board EL-30207

Optional Solenoid Valve

To Field Outputs
Lead Wires From Points 11 Thru 12
See Wiring Diagram

To Field Input Sensors (Dry Type Contacts)
Lead Wires From Points 1 Thru 10
See Wiring Diagram

Junction Housing Wiring

V+
CAN H
DRAIN
CAN L
V-

V+
CAN H
DRAIN
CAN L
V-

Max Wire: 12 AWG
Min Wire: 22 AWG
Strip Length: .250"
Terminal Strip Screws
Max Torque 3.5 in/lbs

WESTLOCK CONTROLS EL-30207 REV

Electronics Housing Wiring

FACTORY WIRING		FIELD WIRING
YEL (+)	12	OUTPUT
RED/YEL (-)	11	
BLK (-)	10	INPUT #5
WHT/RED (+)	9	
BLK (-)	8	INPUT #4
WHT/PRPL (+)	7	
BLK (-)	6	INPUT #3
WHT/ORG (+)	5	
BLK (-)	4	INPUT #2
WHT/BRN (+)	3	
BLK (-)	2	INPUT #1
WHT/GRY (+)	1	

DeviceNet D-7679

Figure 1

Model # 7679XE

Termination Board
EL-30207

Optional
Solenoid Valve

**Junction Housing
Wiring**

Figure 2

V+	V+
CAN H	CAN H
DRAIN	DRAIN
CAN L	CAN L
V-	V-

WESTLOCK CONTROLS
EL-30207 REV

Max Wire: 12 AWG
Min Wire: 22 AWG
Strip Length: .250"
Terminal Strip Screws
Max Torque 3.5 in/lbs

Model # 7679ME

Optional
Solenoid Valve

**FACTORY
WIRING**   **FIELD
WIRING**

DeviceNet 7679ME

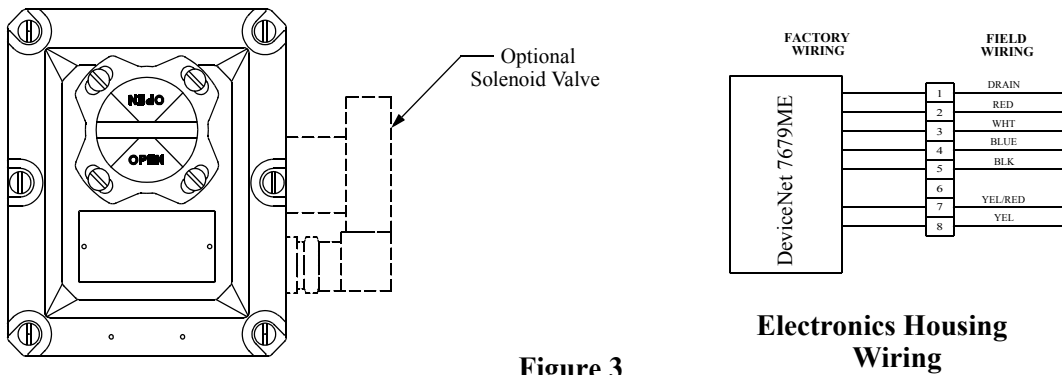|	
1	DRAIN
2	RED
3	WHT
4	BLUE
5	BLK
6	
7	YEL/RED
8	YEL

**Electronics Housing
Wiring**

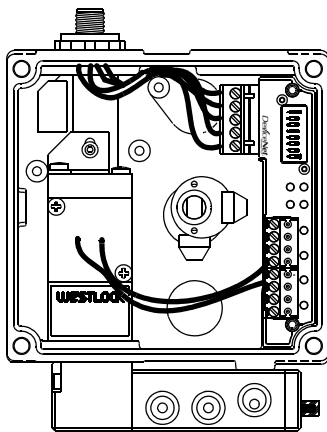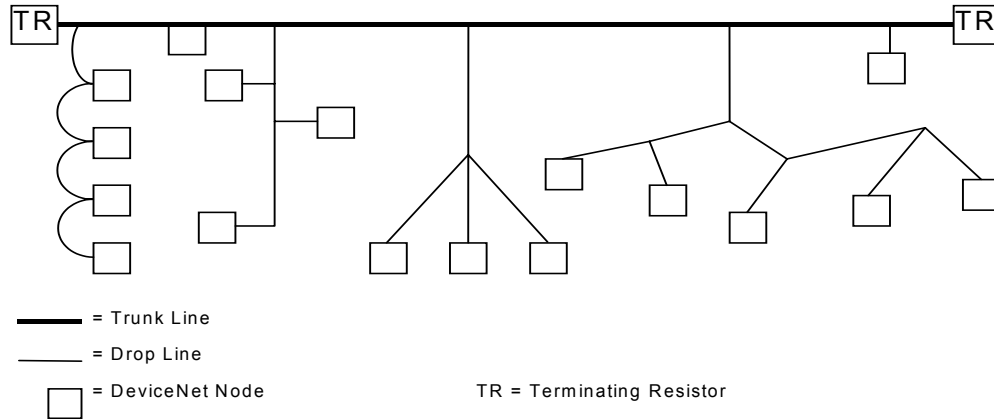**Figure 3**

Model # 7644

WESTLOCK

Figure 4

3. Replace the electronics housing cover or junction housing cover.

4. Unit is now ready for automatic operation. If any assistance is required, please call Westlock
Controls at (201) 794-7650.

Connection Options

DeviceNet Topologies


```
= Trunk Line

_____ = Drop Line

□ = DeviceNet Node          TR = Terminating Resistor
```

Cabling Information

The following is a summary of DevicNet cabling information as it pertains to Westlock Controls Intellis Network Monitors.

1. Round Media: a five conductor, NEC Class 2 cable, providing separate twisted pair buses for signal and power distribution. Available as "Thick", "Medium" and "Thin" cable.
    1.1. "Thick "cable typically used for trunk (Westlock p/n EL-10486 or similar).
        1.1.1. The "thick" DeviceNet cable consists of a 2/15 AWG power pair, a 2/18 AWG data pair and an 18 AWG drain.
    1.2. "Medium" cable typically used for drops (Westlock p/n EL-10433 or similar).
        1.2.1. The "Medium" DeviceNet cable consists of a 2/16 AWG power pair, a 2/20 AWG data pair and an 20 AWG drain.
    1.3. "Thin" cable typically used for drops (Westlock p/n EL-10487 or similar).
        1.3.1. The "thin" DeviceNet cable consists of a 2/22 AWG power pair, a 2/22 AWG data pair and a 22 AWG drain.
    1.4. "Thick", "Medium" or "Thin" cable may be used for either trunklines or droplines, though end-to-end network distances vary with data rate and cable size. Refer to Table 2, page 9 for detailed information.
2. Flat Media: a four conductor cable, providing four parallel 16 AWG conductors for signal and power distribution. Available with either a NEC Class 1 or Class 2 cable rating.
    2.1. Flat NEC Class 2 cable used for trunk only (Westlock p/n EL-10520 or similar).
    2.2. Requires the use of IDC type connectors to connect drops to the trunk.
    2.3. End-to-end network distances are different than with Round Media and vary with data rate. Refer to Table 2, page 9 for detailed information.

View From Top

PHOENIX STYLE CONNECTOR
Pin 1/ V-/ Black
Pin 2/ CAN_H/ Blue
Pin 3/ Shield/ Bare
Pin 4/ CAN_H/ White
Pin 5/ V+/ Red

5
4
3
2
1

**Plug
(Female contacts)**

**Receptacle
(Male contacts)**

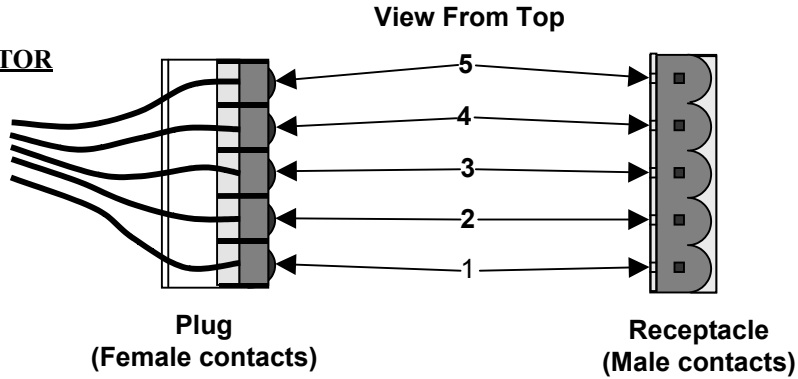**Figure 1**
5 – Pin Open Connector

ROUND CONNECTORS
Pin 1/ Shield/ bare
Pin 2/ V+/ Red
Pin 3/ V-/ Black
Pin 4/ CAN_H/ White
Pin 5/ CAN_L/Blue

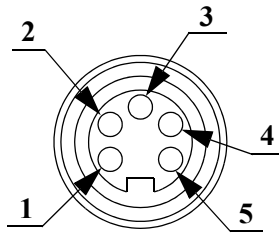**Figure 2**
5-PIN
"MINI" CONNECTOR
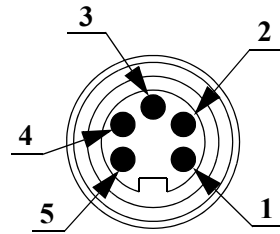**FEMALE**

Figure 3
5-PIN
"MINI" MALE
FIELD WIREABLE
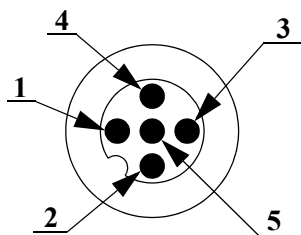
Figure 4
5-PIN
M12 MALE
"MICRO" CONNECTOR
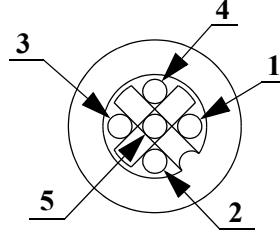
Figure 5
5-PIN
M12 FEMALE
"MICRO" CONNECTOR

Specification Overview

Round Physical Media	Shielded two twisted pairs for communications and power
Flat Physical Media	Unshielded four parallel conductors for communications and power.
Maximum Distance	1640 feet @ 125Kbaud w/round media 1378 feet @ 125Kbaud w/flat media
Maximum Network Monitors per System	63/network, 2 networks/1771-SDN scanner
Maximum I/O Points Per System	378/network
Current Consumption per Network Monitor	80 mA single output energized, 100 mA two outputs energized
Interface Capability	Allen-Bradley, Omron, SST, GE, Siemens, etc.
Communications Method	Group 2 Only slave
Error Checking	CRC
Network Topology	Trunk/drop with branching
Redundancy	No
Valve Specific Diagnostics	Yes

DeviceNet Features	
Device Type	Generic
Explicit Peer to Peer Messaging	No
I/O Peer to Peer Messaging	No
Configuration Consistency Value	No
Faulted Node Recovery	No
Baud Rates	125K, 250K, 500K
Master/Scanner	No
I/O Slave Messaging	
• Bit Strobe	No
• Polling	Yes
• Cyclic	No
• Change of State (COS)	No

DeviceNet Module EL-40092 Current Consumption

Table 1

DeviceNet EL-40092 (LZ-1)		
Input Active	**Output Active**	**Current Draw[1]**
0	0	50mA
4	0	62mA
4	1	80mA
4	2	100mA
4	1	85mA(XP)
4	2	110mA(XP)

[1] All current values acquired using a non-incendive solenoid
except where noted by an XP (explosion proof solenoid).

DeviceNet Maximum Trunk and Drop Lengths

Table 2

Data Rate	Maximum Distance		
	Flat Cable	**Thick Cable**	**Med. & Thin Cable**
125 kbs	420m (1378')	500m (1640')	100m (328')
250 kbs	200m (656')	250m (820')	100m (328")
500 kbs	75m (246')	100m (328')	100m (328')

Table 3

Data Rate	Cumulative Drop Line Length
125 kbs	156m (512')
250 kbs	78m (256')
500 kbs	39m (128')

DeviceNet Switch S1 Settings

Table 4

SWITCH S1		BAUD RATE	RETURNED VALUE
SW8	SW7		
OFF	OFF	125 K BITS PER SECOND	0x00
OFF	ON	250 K BITS PER SECOND	0x01
ON	OFF	500 K BITS PER SECOND	0x02
ON	ON	DEFAULT 125 K BITS PER SECOND OR LAST VALUE SET VIA SET_ATTRIBUTE_SINGLE	0x00 (default) or 0x01 to 0x02 if set

Table 5 MAC IDs 0-30

SW6	SW5	SW4	SW3	SW2	SW1	MacID	RETURNED VALUE
OFF	OFF	OFF	OFF	OFF	OFF	0	0x00
OFF	OFF	OFF	OFF	OFF	ON	1	0x01
OFF	OFF	OFF	OFF	ON	OFF	2	0x02
OFF	OFF	OFF	OFF	ON	ON	3	0x03
OFF	OFF	OFF	ON	OFF	OFF	4	0x04
OFF	OFF	OFF	ON	OFF	ON	5	0x05
OFF	OFF	OFF	ON	ON	OFF	6	0x06
OFF	OFF	OFF	ON	ON	ON	7	0x07
OFF	OFF	ON	OFF	OFF	OFF	8	0x08
OFF	OFF	ON	OFF	OFF	ON	9	0x09
OFF	OFF	ON	OFF	ON	OFF	10	0x0A
OFF	OFF	ON	OFF	ON	ON	11	0x0B
OFF	OFF	ON	ON	OFF	OFF	12	0x0C
OFF	OFF	ON	ON	OFF	ON	13	0x0D
OFF	OFF	ON	ON	ON	OFF	14	0x0E
OFF	OFF	ON	ON	ON	ON	15	0x0F
OFF	ON	OFF	OFF	OFF	OFF	16	0x10
OFF	ON	OFF	OFF	OFF	ON	17	0x11
OFF	ON	OFF	OFF	ON	OFF	18	0x12
OFF	ON	OFF	OFF	ON	ON	19	0x13
OFF	ON	OFF	ON	OFF	OFF	20	0x14
OFF	ON	OFF	ON	OFF	ON	21	0x15
OFF	ON	OFF	ON	ON	OFF	22	0x16
OFF	ON	OFF	ON	ON	ON	23	0x17
OFF	ON	ON	OFF	OFF	OFF	24	0x18
OFF	ON	ON	OFF	OFF	ON	25	0x19
OFF	ON	ON	OFF	ON	OFF	26	0x1A
OFF	ON	ON	OFF	ON	ON	27	0x1B
OFF	ON	ON	ON	OFF	OFF	28	0x1C
OFF	ON	ON	ON	OFF	ON	29	0x1D
OFF	ON	ON	ON	ON	OFF	30	0x1E
OFF	ON	ON	ON	ON	ON	31	0x1F

Table 5.1, MAC IDs 31-63

SW6	SW5	SW4	SW3	SW2	SW1	MacID	RETURNED VALUE
OFF	ON	ON	ON	ON	ON	31	0x1F
ON	OFF	OFF	OFF	OFF	OFF	32	0x20
ON	OFF	OFF	OFF	OFF	ON	33	0x21
ON	OFF	OFF	OFF	ON	OFF	34	0x22
ON	OFF	OFF	OFF	ON	ON	35	0x23
ON	OFF	OFF	ON	OFF	OFF	36	0x24
ON	OFF	OFF	ON	OFF	ON	37	0x25
ON	OFF	OFF	ON	ON	OFF	38	0x26
ON	OFF	OFF	ON	ON	ON	39	0x27
ON	OFF	ON	OFF	OFF	OFF	40	0x28
ON	OFF	ON	OFF	OFF	ON	41	0x29
ON	OFF	ON	OFF	ON	OFF	42	0x2A
ON	OFF	ON	OFF	ON	ON	43	0x2B
ON	OFF	ON	ON	OFF	OFF	44	0x2C
ON	OFF	ON	ON	OFF	ON	45	0x2D
ON	OFF	ON	ON	ON	OFF	46	0x2E
ON	OFF	ON	ON	ON	ON	47	0x2F
ON	ON	OFF	OFF	OFF	OFF	48	0x30
ON	ON	OFF	OFF	OFF	ON	49	0x31
ON	ON	OFF	OFF	ON	OFF	50	0x32
ON	ON	OFF	OFF	ON	ON	51	0x33
ON	ON	OFF	ON	OFF	OFF	52	0x34
ON	ON	OFF	ON	OFF	ON	53	0x35
ON	ON	OFF	ON	ON	OFF	54	0x36
ON	ON	OFF	ON	ON	ON	55	0x37
ON	ON	ON	OFF	OFF	OFF	56	0x38
ON	ON	ON	OFF	OFF	ON	57	0x39
ON	ON	ON	OFF	ON	OFF	58	0x3A
ON	ON	ON	OFF	ON	ON	59	0x3B
ON	ON	ON	ON	OFF	OFF	60	0x3C
ON	ON	ON	ON	OFF	ON	61	0x3D
ON	ON	ON	ON	ON	OFF	62	0x3E
ON	ON	ON	ON	ON	ON	63	0x3F

Status Indicators

The LED's provide information concerning the status of inputs, outputs, the module and/or the network. The LED's provide visual indication whether any inputs or ouputs are active and whether the module or network is in a fault condition. The I/O Status LED's are intended to indicate the state of the inputs and ouputs of the module, not necessarily the on/off condition of the I/O points themselves.

Module P/N	LED	State	Indicates
EL-40092	Module Status LED 1	Off	There is no power applied to the device.
		Green	Device is operating in a normal condition.
		Flashing Green	The device needs commissioning due to configuration missing, incomplete or incorrect.
		Red	Unrecoverable fault, device may need replacing.
		Flashing Red	Recoverable fault.
	Network Status LED 2	Off	Not powered/Not online
		Green	For a Group 2 Only device:Device is allocated to Master
		Flashing Green	Online, not connected. For a Group 2 Only device:Device is not allocated to a Master.
		Red	Failed communication device. The device has detected and error that has rendered it incapable of communication on the network (Duplicate MAC ID or Bus-off).
		Flashing Red	One or more I/O connections are in the Time-out state.
	Closed LS IN0 LED	Yellow	Input 0, Bottom L.S. Closed: Valve is in the closed position as determined by the triggering of the Internal Hall Effect sensor by the travel of the trigger mechanism on the shaft assembly.
	Open LS IN1 LED	Yellow	Input 1, Top L.S. Closed: Valve is in the open position as determined by the triggering of the Internal Hall Effect sensor by the travel of the trigger mechanism on the shaft assembly.
	Aux. Input IN2 LED	Yellow	Input 2, Active: Dry contact type switch attached to this input is closed.
	Aux. Input IN3 LED	Yellow	Input 3, Active: Dry contact type switch attached to this input is closed.
	Output OUT0 LED	Yellow	Output 0. "A" Solenoid is energized.
	Output OUT1 LED	Yellow	Output 1. "B" Solenoid is energized.
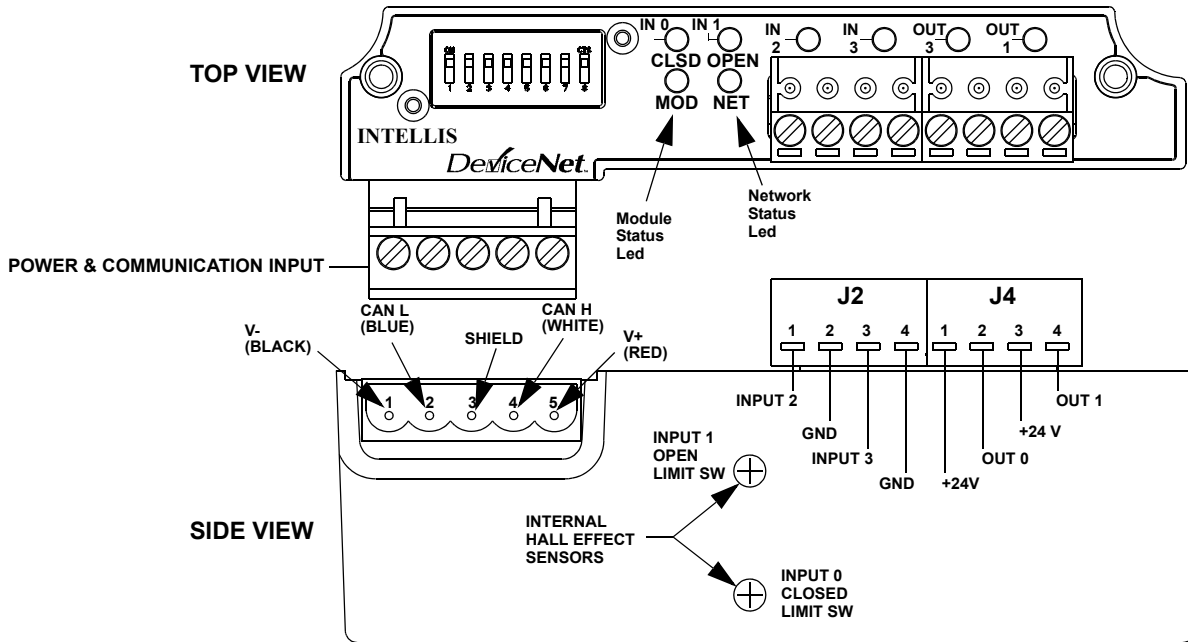
DEVICENET D-PAC MODULE (EL-40092)

WESTLOCK INTELLIS DEVICENET MODULE EL-40092 COMMUNICATIONS

Table 6			
INPUT #	**TYPE**	**MODULE REFERENCE**	**BITMAP OF DATA** INSTANCE #4 (8-POINT INPUT WITH NO STATUS) ATTRIBUTE #3 (DATA)
INPUT 0	Hall Effect	Internal Sensor	BYTE 0, BIT 0 Valve Closed (Bottom L.S.)
INPUT 1	Hall Effect	Internal Sensor	BYTE 0, BIT 1 Valve Open (Top L.S.)
INPUT 2	Active High/Low*	J2-1 (In Hi/Low) to J2-2 (Gnd)	BYTE 0, BIT 2 Aux. Input
INPUT 3	Active High/Low*	J2-3 (In Hi/Low) to J2-4 (Gnd)	BYTE 0, BIT 3 Aux. Input
*Active High indicates that pulling the input pin up to +U or down to ground activates the input.			
OUTPUT #	**TYPE**	**MODULE REFERENCE**	**BITMAP OF DATA** INSTANCE #33 (STATIC OUTPUT) ATTRIBUTE #3 (DATA)
OUTPUT 0	Active Low*	J4-1 (+24V) to J4-2 (Out)	BYTE 0, BIT 0 "A" Solenoid
OUTPUT 1	Active Low*	J4-3 (+24V) to J4-4 (Out)	BYTE 0, BIT 1 "B" Solenoid or Aux. Output
*Active Low indicates that when the output is activated it pulls the pin down to GND drawing current through the load from the +24V			