WESTLOCK
CONTROLS CORPORATION

Intellis 7604, 7644, 7645, 7675, 7679 with DeviceNet MiniPAC Module EL-40218 OPERATING MANUAL

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Reviewed By: Frank Oster	**Date:** 8/25/11	**Approved By:** Rhonda K. Frey	**Date:** 8/26/11
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Revision History

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1. Introduction

1.1 Product Certification

7a44 bcde2HES 00 f . Network Valve Monitor
NI / I / 2 ABCD; S / II, III / 2 / FG / T4 Ta = 60°C; Type 4X
a = Series: 2, 3, 4, 5, 6, 7.
b = Enclosure: 04, 44, 45.
c = Shaft: S, N 0.
d = Beacon: BY, RG, AG, AB, AR, B1, B3, B5, B7, B9, FC.
e = Entry: None, 1A.
f = Solenoid: 0, D.

7a44 bcde2HES 00 f . Network Valve Monitor
NI / I / 2 ABCD / T4 Ta = 60°C; Type 4, 4X
a = Networks: 5, 6, 7.
b = Enclosure: 04, 44, 45.
c = Shaft: S, N 0.
d = Beacon: BY, RG, AG, AB, AR, B1, B3, B5, B7, B9, FC.
e = Entry: 1M, 1U.
f = Solenoid: 0, D.

7a79b c X8 XSOd01, 7a75b c X8 XSOd01. Network Valve Monitor
XP / I / 1 / CD T6 Ta = 60°C; NI / I / 2 / ABCD / T5 Ta = 60°C; DIP / II, III / 1 / EFG T6 Ta = 60°C; Type 4, 4X
a = Networks 2, 3, 4, 5, 6 or 7.
b = Shaft S or N.
c = Beacon BY, AG, AB,B1, B3, B5, B7 or B9.
d = Solenoid 21, 31, 41, 51, 61, 61, 22, 32, 42, 52, 62, 23, 33, 43, 53, 63, 34, 64, 25, 35, 45, 55, 65, 26, 36, 46, 56, 66, 27, 37, 47, 57, 67, 38 or 68

1.2 Warnings

This symbol warns the user of possible danger. Failure to heed this warning may lead to personal injury or death and/or severe damage to equipment.

This symbol identifies information about operating the equipment in a particular manner that may damage it or result in a system failure. Failure to heed this warning can lead to total failure of the equipment or any other connected equipment.

This symbol draws attention to information that is essential for understanding the operation and/or features of the equipment.

1.3 Description

The EL-40218 module is a 2 input, 2 output network monitor. Inputs 0 and 1 are internal Hall Effect Sensors that are activated by the field of a magnet. The outputs are open drain active low FETs, fused (solid sate resettable) at 0.2A with diode protection to 24VDC. The module consumes 58 mA of current with one input and one output active, driving a standard NI Falcon solenoid (20mA non-incendive solenoid coil). For current consumption see Page 15. Minimum power supply input voltage is 19VDC to insure proper solenoid operation.

Connection to the network is via DeviceNet specification cable. There are both Round and Flat Media. Refer to the Cabling Information section on page 14-15 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.

1.4 Principles of Operation

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 page 17.

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-40218 operates as a Group 2 Only slave on a DeviceNet network. The unit supports Explicit Messaging and Polled I/O Messages of the Predefined Master/Slave

Connection Set. The device does not support Explicit Unconnected Message Manager (UCMM). Refer to the Specification Overview on page 14 for a summary of features.

1.5 Special Features

To avoid build-up and discharge of static electricity in a hazardous area, only clean Westlock units with a static-free cloth dampened with water. Avoid the use of alcohol-based cleaners.

2. Order Guide

Ordering guides for all DeviceNet product series covered by this IOM are available through a local Westlock distributor, the current Westlock Controls catalog literature or the Westlock Controls website at www.westlockcontrols.com. Spare parts lists for refurbishments or repairs are also available for common DeviceNet models.

3. Definitions

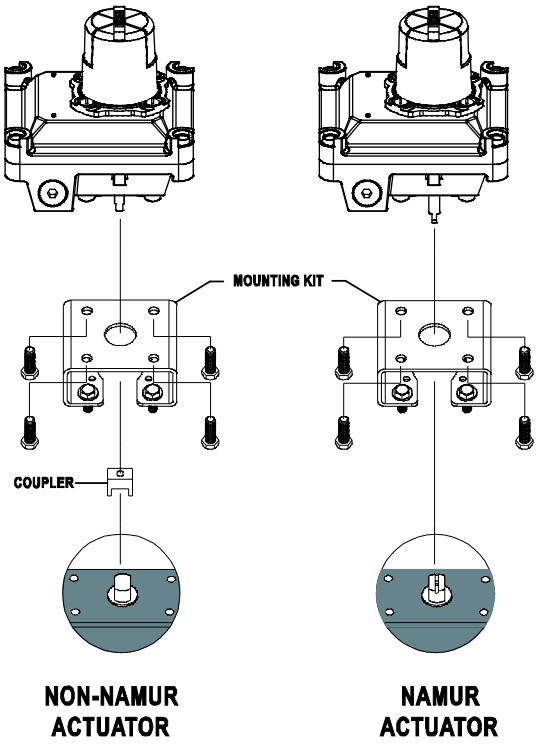
CAN – The Controller Area Network
ODVA – The Open DeviceNet Vendors Association
UCMM – The Explicit Unconnected Message Manager

4. Installation

4.1 Mounting

Required Tools: Open-end wrenches or adjustable wrench to fit all sizes of hex head bolts in the mounting kit.

1. Obtain a mounting kit suited for the actuator/valve, commonly available through a local Westlock Controls distributor.
2. Attach the mounting bracket and coupler (if required) to the unit housing with the hardware provided.
3. Attach the unit and mounting system to the actuator.
4. Ensure proper axial alignment between unit shaft, coupler and actuator shaft. Failure to ensure alignment could result in long-term stress-related failure of unit shaft in high cycle or high torque applications.



4.2 Calibration

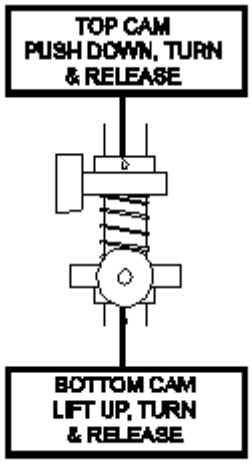
Note 1: Switch actuation can be confirmed using a 24 VDC powers supply or a DeviceNet network applied to DeviceNet + and DeviceNet -. Use LED2 (IN0 CL) to show lower switch activation and LED3 (IN1 OL) to show upper switch activation.

Note 2: Adjust cams by hand by pushing/pulling the cam against the shaft spring to disengage from the mating spline, rotating to adjust and re-engaging firmly onto spline.

Required Tools: Power source (see note 1); slotted screw drivers for cover screws (M4, #10 or 5/16 by model)

Switch Adjustment (two switches):

1. Remove unit cover as follows: loosen (but do not remove) captive screws, rotate cover slightly to grip corners, pull firmly.
   DO NOT PRY COVER WITH TOOLS.
2. With valve in the closed position, adjust bottom cam until bottom switch (#2) actuates.
3. Stroke valve to the open position, adjust top cam until top switch (#1) actuates.
4. Cycle actuator several times to confirm proper switch indication at each end of stoke. Finely adjust cams if necessary.
5. Skip to Field Wiring section or replace unit cover, applying approximately 20 in-lbs of torque to cover screws.



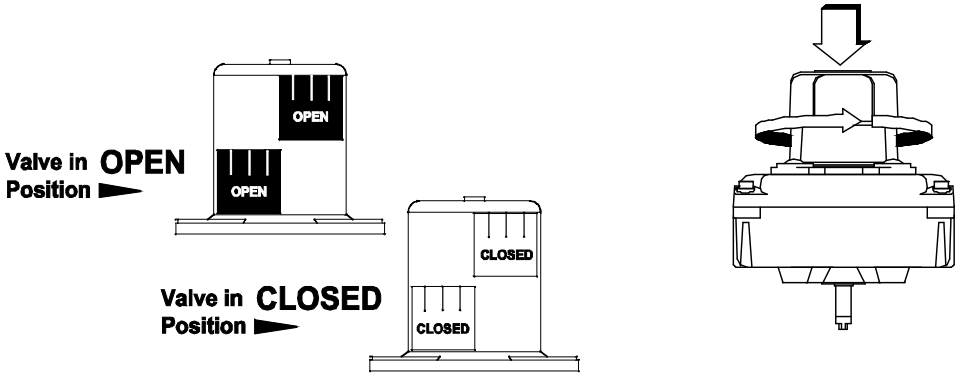
INTENAL HALL SENSOR

Beacon Adjustment:

Note: Skip this step if cover is flat or Beacon already displays the correct valve status.

Required Tools: slotted screw driver for #12 screws.

1. For two-way OPEN/CLOSED: remove, rotate and re-fasten outer beacon to synchronize displayed position with valve position.
2. For three-way flow paths: remove, rotate and re-fasten outer beacon and/or inner beacon coupler to synchronize displayed flow path with valve/actuator flow path.



4.3 Operating Instructions for Falcon Solenoid

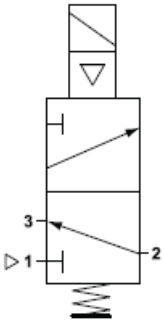
General Description

The Flacon Solenoid valve incorporates elastomer static seals through which a shaped spool moves and are manufactured for 3 or 4 way operation. 3 way is normally used for pilot control of the other relay valves or for the operation of single acting cylinders. 4 way is normally used to control the action of double acting cylinders.

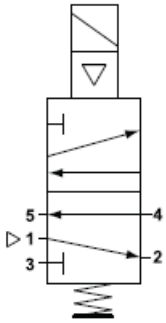
The seal spacer assembly forms individual annular chambers opposite each valve port and the grooved spool either closes or allows flow between adjacent chambers, hence the position of the spool determines which ports are open or closed.

The spool is moved by way of a manually or mechanically operated mechanism normally against a return spring. Operation may be by application or removal of a pilot air supply acting as a pilot piston. This form of control is utilized for electrical actuation where integral solenoid valves control the pilot air supply.

Description of Operation



3 Way Spring Return Valve
Solenoid De-energized - air flows from Outlet Port 2 to Echaust Port 3.
Solenoid Energized - air flows from Inlet Port 1 to Outlet Port 2



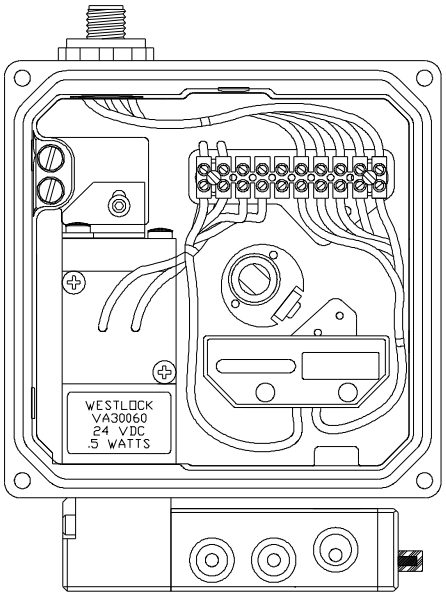
4 Way Spring Return Valve
Solenoid De-energized - air flows from Inlet Port 1 to Outlet Port 2 and exhausts from Port 4 to Port 5.
Solenoid Energized - air flows from Inlet Port 1 to Outlet Port 4 and exhausts from Port 2 to Port 3.

5. Field Wiring

See the warnings section of this document for important warnings pertaining to the wiring of DeviceNet units. Remove and replace cover before and after wiring, per instructions given in the Switch Adjustment section above.

Required Tools: slotted screw drivers for terminal strip screws (#2), cover screws (M4, #10 or 5/16 by model), and grounding screw (#8 or M4 by model); wire strippers as required for field wires.

1. Wire the DeviceNet Module strictly according to the wiring diagram on the inside of the enclosure cover.
2. Confirm that the ground wire is secure under the green grounding screw in the enclosure.
3. Seal all unused conduit entries as required with suitably certified plugs having an ingress protection rating of IP67 or better.
4. Ensure that only suitably certified cable glands are used, having an ingress protection rating of IP67 or better.
5. Ensure that the temperature rating of all field wiring meets the service temperature range of the application.



6. Maintenance and Repair

Attention

Maintenance or repair of Westlock equipment must only be done by Westlock Controls or by qualified personnel that are knowledgeable about the installation of electromechanical equipment in hazardous areas. All parts needed for repairs or maintenance must be purchased through a Westlock Controls authorized distributor to maintain warranty and to ensure the safety and compliance of the equipment.

No routine maintenance of Westlock DeviceNet units is recommended when units are installed in environments for which they are designed. Severe environments may warrant regular replacement of field units every two to five years for maximum performance and safety.

Troubleshooting

Problem: *No signal at the control device*

- Check that power supply to the loop is functioning correctly and adequate to power all devices on the loop;
- Check that power wiring is in the correct location (device is polarity sensitive);
- Check that power being supplied is within the rated specifications;
- Check wiring integrity immediately at the connection to the control device;

- Check field wiring coming into the DeviceNet terminal strip for proper connection and good wire preparation practices (approximately ¼" of insulation removed and all strands intact);
- Check that field wiring is no larger than 12AWG for proper fit in terminal strip and compliance with terminal strip rating;
- Check that wiring integrity is good between switches and terminal strip;

Problem: *Device does not appear on network or no communication*

- Check address and make sure another unit is not using the same address;
- Check and make sure CAN-L and CAN-H are connected to the correctly;
- Check to see if 120 Ohm resistor is placed across CAN-L and CAN-H.

Problem: *Beacon does not display the correct flow path*

- Reset Beacon per the Beacon Adjustment section under Calibration.

Problem: *Unit appears to be binding during valve stroke or unit shaft has broken*

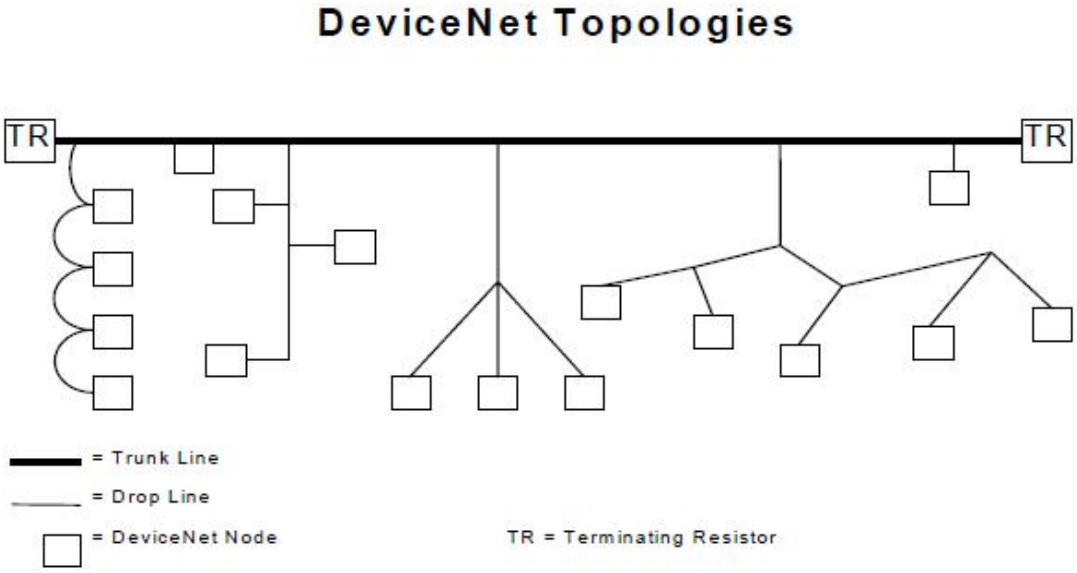
- Carefully measure and adjust axial alignment of unit shaft, coupler and actuator shaft to eliminate lifting or twisting of the coupler during travel.

Problem: *Unit has signs of moisture ingress*

- Check torque on cover screws
- Check gaskets and sealing surfaces for debris and clean if necessary
- Check that conduit connections are properly sealed, including gland fittings and quick-disconnect receptacles
- Check that conduit pipes are properly pitched to direct condensing moisture away from units
- Check that all unused conduit entries are properly sealed with suitably certified plugs having an ingress protection rating of IP67 or better.

7. Appendix

7.1 Connection Option

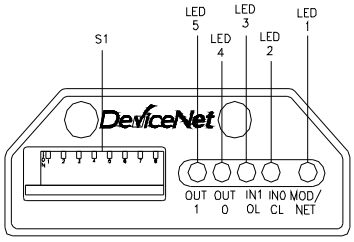


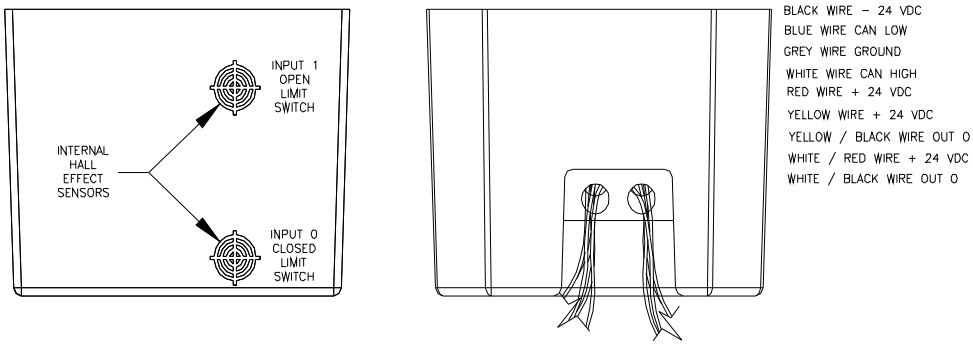
Cabling In formation

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.
        - 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.
        - 1.2.1. The “Medium” DeviceNet cable consists of a 2/16 AWG power pair, a 2/20 AWG data pair and a 20 AWG drain.
    - 1.3. “Thin” cable typically used for drops.
        - 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 trunk lines or drop lines, though end-to-end network distances vary with data rate and cable size. Refer to page 15 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.
    - 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 page 15 for detailed information.

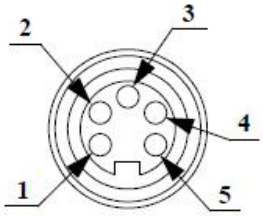
7.2 DeviceNet MiniPAC EL-40218 Layout



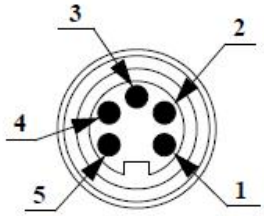


7.3 Connector Options

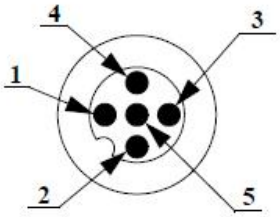
ROUND CONNECTORS
Pin 1/ Shield/ bare
Pin 2/ V+/ Red
Pin 3/ V-/ Black
Pin 4/ CAN_H/ White
Pin 5/ CAN_L/Blue



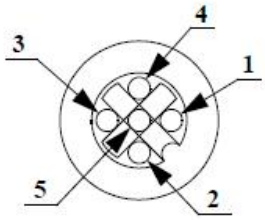
5-PIN
"MINI" CONNECTOR
FEMALE



5-PIN
"MINI" MALE
FIELD WIREABLE



5-PIN
M12 MALE
"MICRO" CONNECTOR



5-PIN
M12 FEMALE
"MICRO" CONNECTOR

7.4 L.E.D. 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 of whether any inputs or outputs 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 outputs.

Module P/N	LED	State	Indicates
EL-40218 Refer to Figure 1	Module Status LED 1	Off	There is no power applied to 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.
	Close L.S. IN0 LED 2	Yellow	Input 0, Bottom L.S. Closed: Valve is in the closed position.
	Open L.S. IN1 LED 3	Yellow	Input 1, Top L.S. Closed: Valve is in the open position.
	Output OUT0 LED 4	Yellow	Output 0, "A" Solenoid is energized.
	Output OUT1 LED 5	Yellow	Output 1, "B" Solenoid is energized.

7.5 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

7.6 DeviceNet Module EL-40218 Current Consumption

INPUT ACTIVE	OUTPUT ACTIVE	CURRENT DRAW[1]
0	0	32 mA
1	0	40 mA
1	1	58 mA
2	2	84 mA
1	1	68 mA(XP)
2	2	101 mA(XP)

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

7.7 Module Bit Map

I/O	TYPE	MODULE REFERENCE	BITMAP OF DATA
Input 0	Active High/Low[1]	Closed, Bottom Limit Switch	Byte0, Bit 0
Input 1	Active High/Low[1]	Open, Upper Limit Switch	Byte 0, Bit 1
Output 0	Active Low[2]	OUT_0 to Solenoid A	Byte 0, Bit 0
Output 1	Active Low[2]	OUT_1 to Solenoid B	Byte 0, Bit 0

[1] Active High indicates that pulling the input pin up to V+ activates the input. Active Low indicates that pulling the input pin down to ground activates the input.
[2] Active Low indicates that the output is an open collector type circuit.

7.8 DeviceNet Maximum Trunk And Drop Lengths

MAXIMUM DISTANCE			
DATA RATE	**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')

DATA RATE	CUMULATIVE DROP LINE LENGTH
125 kbs	156m (512')
250 kbs	78m (256')
500 kbs	39m (128')

7.9 Westlock DeviceNet Module EL-40218 Communications

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.)
*Active High indicates that pulling the input pin up to +24V 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
*Active Low indicates that when the output is activated it pulls the pin down to GND drawing current through the load from +24V.			

7.10 DeviceNet Switch S1 Settings

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

MAC IDs 0-30

SWITCH S1					MacID	RETURNED VALUE
SW6	SW5	SW4	SW3	SW2	SW1		
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	ON	16	0x10
OFF	ON	OFF	OFF	ON	OFF	17	0x11
OFF	ON	OFF	OFF	ON	ON	18	0x12
OFF	ON	OFF	ON	OFF	OFF	19	0x13
OFF	ON	OFF	ON	OFF	ON	20	0x14
OFF	ON	OFF	ON	ON	OFF	21	0x15
OFF	ON	OFF	ON	ON	ON	22	0x16
OFF	ON	OFF	ON	ON	OFF	23	0x17
OFF	ON	OFF	ON	ON	ON	24	0x18
OFF	ON	ON	OFF	OFF	OFF	25	0x19
OFF	ON	ON	OFF	OFF	ON	26	0x1A
OFF	ON	ON	OFF	ON	OFF	27	0x1B
OFF	ON	ON	OFF	ON	ON	28	0x1C
OFF	ON	ON	ON	OFF	OFF	29	0x1D
OFF	ON	ON	ON	OFF	ON	30	0x1E
OFF	ON	ON	ON	ON	OFF	31	0x1F

MAC IDs 31-63

SWITCH S1					MacID	RETURNED VALUE
SW6	SW5	SW4	SW3	SW2	SW1	
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	ON	OFF	ON	51	0x33
ON	ON	OFF	ON	ON	OFF	52	0x34
ON	ON	OFF	ON	ON	ON	53	0x35
ON	ON	OFF	ON	OFF	OFF	54	0x36
ON	ON	OFF	ON	OFF	ON	55	0x37
ON	ON	OFF	ON	ON	OFF	56	0x38
ON	ON	OFF	ON	ON	ON	57	0x39
ON	ON	ON	OFF	OFF	OFF	58	0x3A
ON	ON	ON	OFF	OFF	ON	59	0x3B
ON	ON	ON	OFF	ON	OFF	60	0x3C
ON	ON	ON	ON	OFF	OFF	61	0x3D
ON	ON	ON	ON	OFF	ON	62	0x3E
ON	ON	ON	ON	ON	OFF	63	0x3F