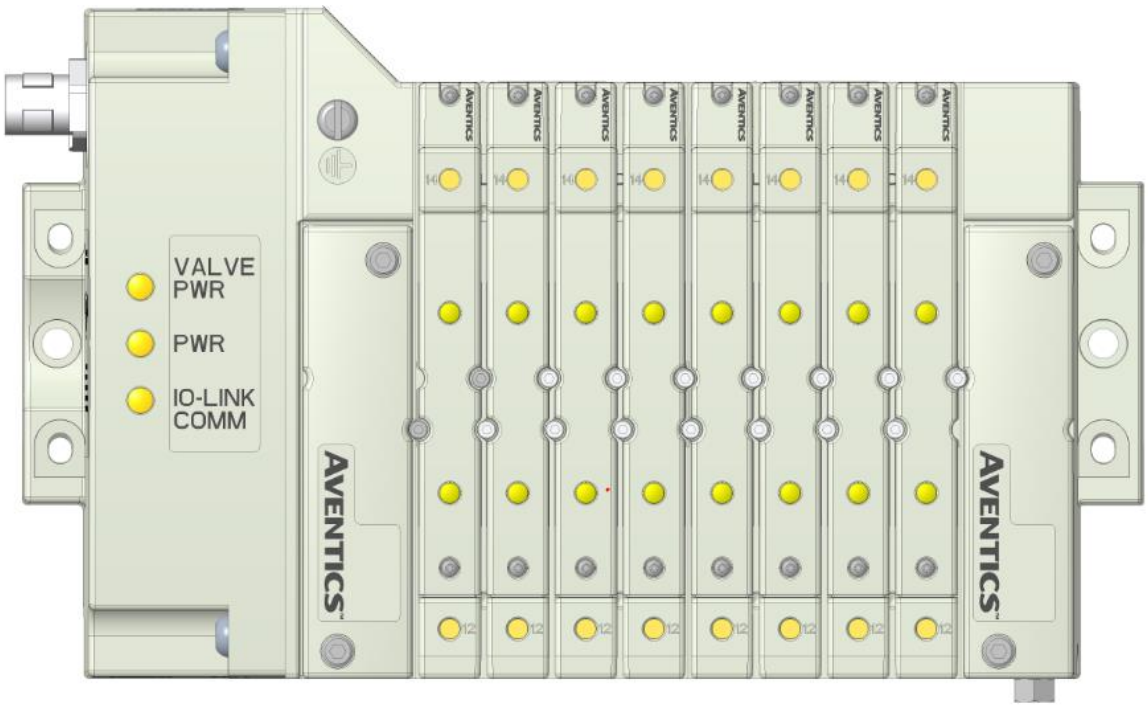
AVENTICS™

580 IO-Link™
Technical Manual

IO-Link



EMERSON

Conditions for use of this product

(1) Aventics Manifold ("the PRODUCT") shall be used in conditions;

i) Where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident.

ii) Where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

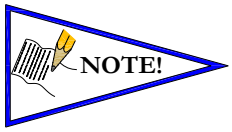
Aventics shall have no responsibility or liability including but not limited to any and all responsibility or liability based on contract, warranty, tort, product liability for any injury or death to persons, loss or damage to property caused by the product that are operated or used in application not intended or excluded by instructions, precautions or warnings contained in Aventics. Technical, User, Instruction, Safety manuals or bulletins.

Safety precautions

Before using this product, please read this manual and the relevant manuals carefully and pay attention to safety and product application. The following symbols are used in the manual to identify important safety, installation and application information.

CAUTION

Caution symbol indicates a possible hazard which may cause injury or equipment damage.



Note symbol indicates important information regarding equipment installation and setup.

Electrical installation and operational guidelines

CAUTION

- *To be connected to Class 2 power source only*
- *All Aventics. communication nodes should be grounded during the installation process. These grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.*
- *All Aventics 580 Electronics Products to be installed or wired in accordance with Aventics's published instructions and applicable electrical codes.*
- *MULTIPLE CLASS 2 POWER SOURCES: When interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection*
- *Sources shall be Listed and rated suitable for parallel interconnection*
- *CLASS 2 WIRING: All field wiring shall be suitable for Class 1, Electric Light and Power, or Class 2, 3 wirings are routed separately and secured to maintain separation between 1) Class 2 wiring and all other class wiring, and 2) Limited energy circuit conductors from unlimited energy circuit conductors*
- *Class 2 Device Wiring Only – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring*
- *When using molded connector power cables, Do Not rely on wire colors for Pin-Out. Always use pin number references.*
- *Wire connections shall be rated suitable for the wire size (lead and building wiring) employed*
- *MULTIPLE CLASS 2 POWER SOURCES: When interconnects, class 2 sources shall be Listed and rated suitable for parallel interconnection*
- *Sources shall be Listed and rated suitable for parallel interconnection*

Table of Contents

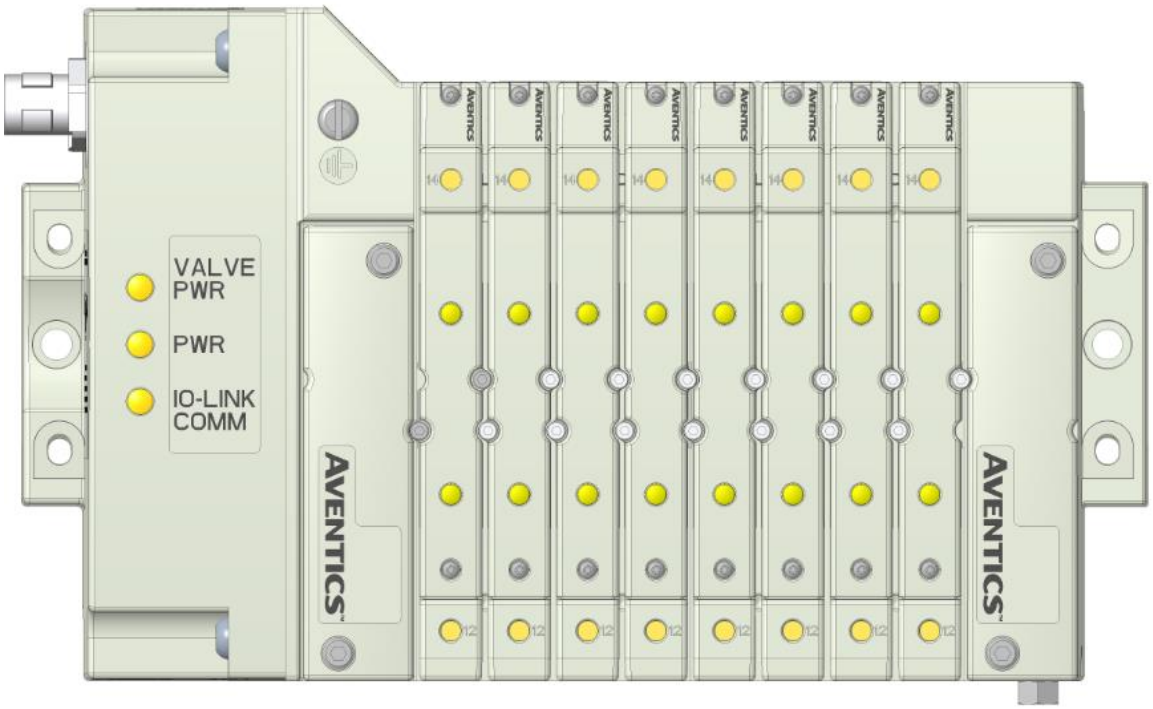
1. About IO-Link™

IO-Link™ is the first standardized IO technology worldwide (IEC 61131-9) for the communication with sensors and also actuators. The powerful point-to-point communication is based on the long established 3-wire sensor and actuator connection without additional requirements regarding the cable material. IO-Link™ is not fieldbus but the further development of the existing, tried-and-tested connection technology for sensors and actuators.

2. 580 Introduction

The 580 IO-LINK™ Node is an electronic valve control interface that enables any I/O link master to control 32 valve coils. The 580 IO-Link™ module supports Aventics 500 Series valves including, the 501, 502, and 503 and the 2035 Series. The 580 IO-Link™ Node can address a total of (32) coil outputs, with diagnostic functionality built in for the 500 Series valves and can address a total of (16) coil outputs, with diagnostic functionality built in the 2035 Series. With proper assembly and termination, the 580 IO-Link™ Node has an IP65 rating.

This manual details specific information for configuring and commissioning the Aventics 580 IO-Link™ Node. For more information, relating to Aventics 500 Series valve manifold assemblies, please refer to the Aventics *501 & 503 Series Catalogs or the 2035 Series Catalog, both can be found* at www.asco.com.

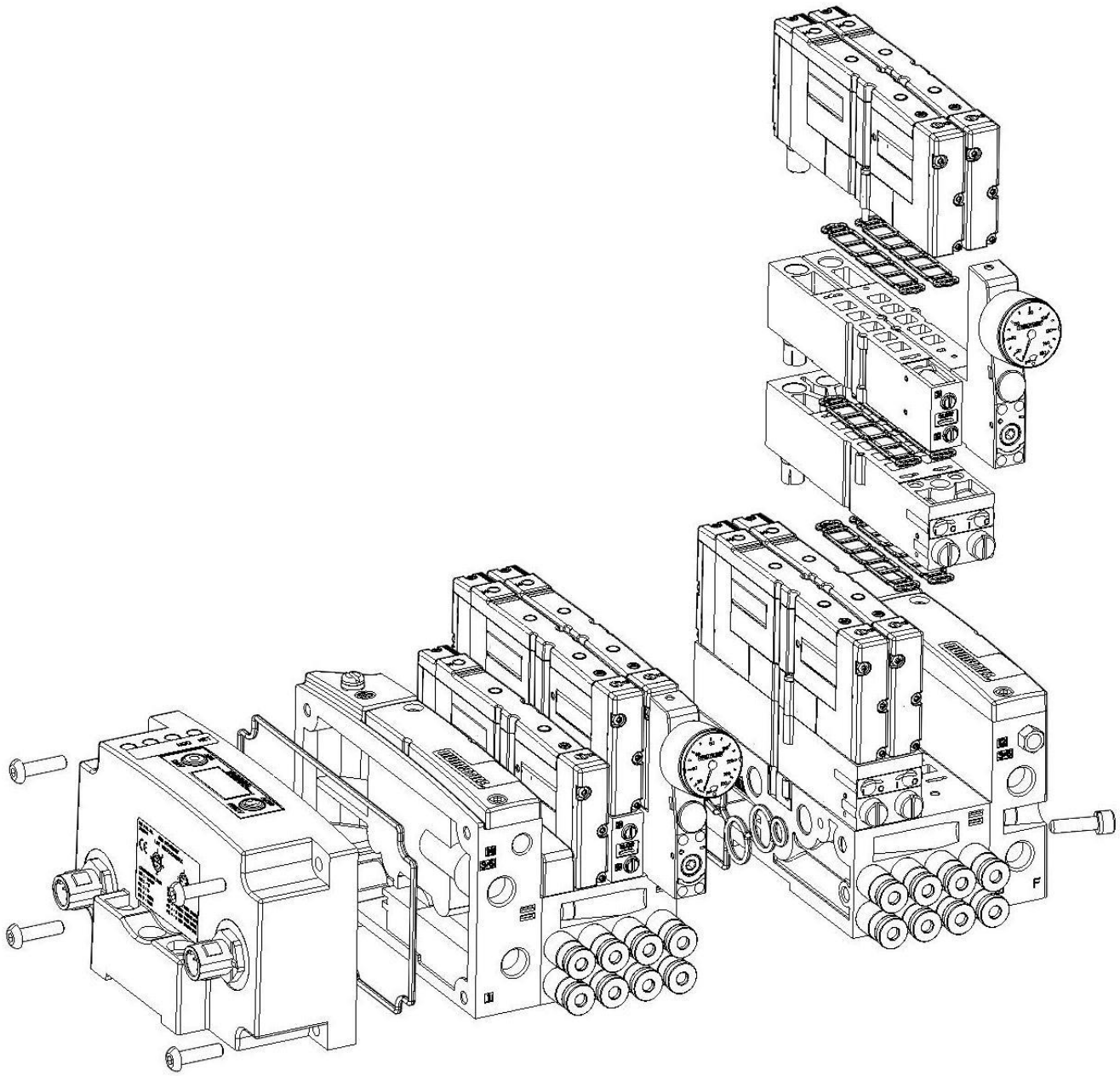


580 IO-Link™ Module

Valve Side
Drives up to 32 coils on the 500 Series or 16 coils on the 2035 Series

2.1 Pneumatic Valve Manifold – 501 Series shown

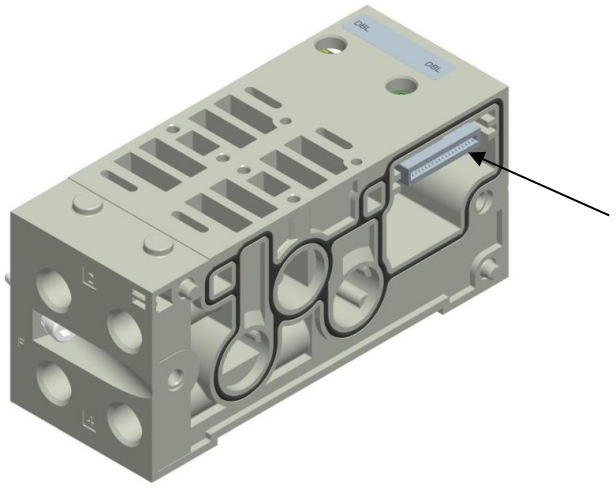
The pneumatic valve manifold with internal circuit board technology is modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards, which allow internal connections from solenoid coils to output drivers without the use of wires). This allows easy assembly and field changes.

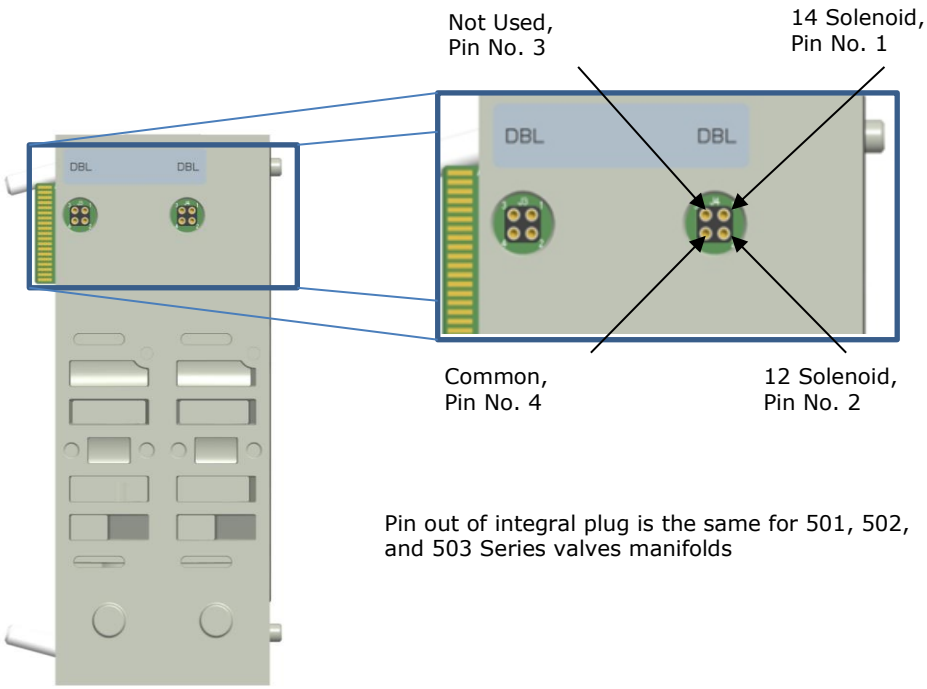


2.2 Manifold Connectors

Solenoid Coil Connections using Z-Board™ Technology for 501/502/503 valve series

Z-Board™ plug together technology connects all valve solenoids to the valve coil output drivers, located in the 580 Node. There is a maximum of 32 coil outputs available on the complete manifold assemblies. The 32 available outputs are accessed on the 501 series valves utilizing 4 station manifolds and on the 502 and 503 series utilizing 2 station manifolds.





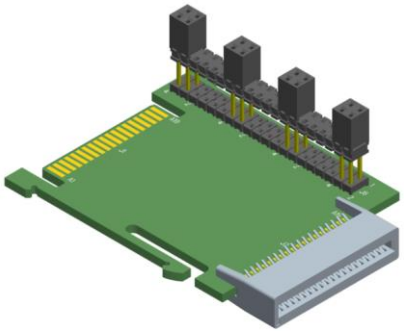
Pin out of integral plug is the same for 501, 502, and 503 Series valves manifolds

NOTE! *A single solenoid valve's coil is always on the "14" end.*

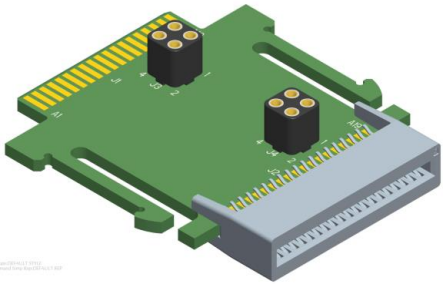
2.3 Z-Board™ Connectors

The 501/502/503 valve series utilize 2 different Z-Board™ designs to achieve the single and double solenoid output functions. This yields the possible 32 single, 16 double, or various combinations of valve coil output capabilities. The 501 Z-Board™ is minimum (3) station, the 502 and 503 Z-Board™ is minimum (2) stations.

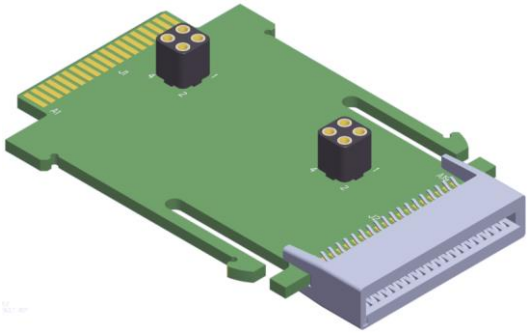
501 Series



502 Series



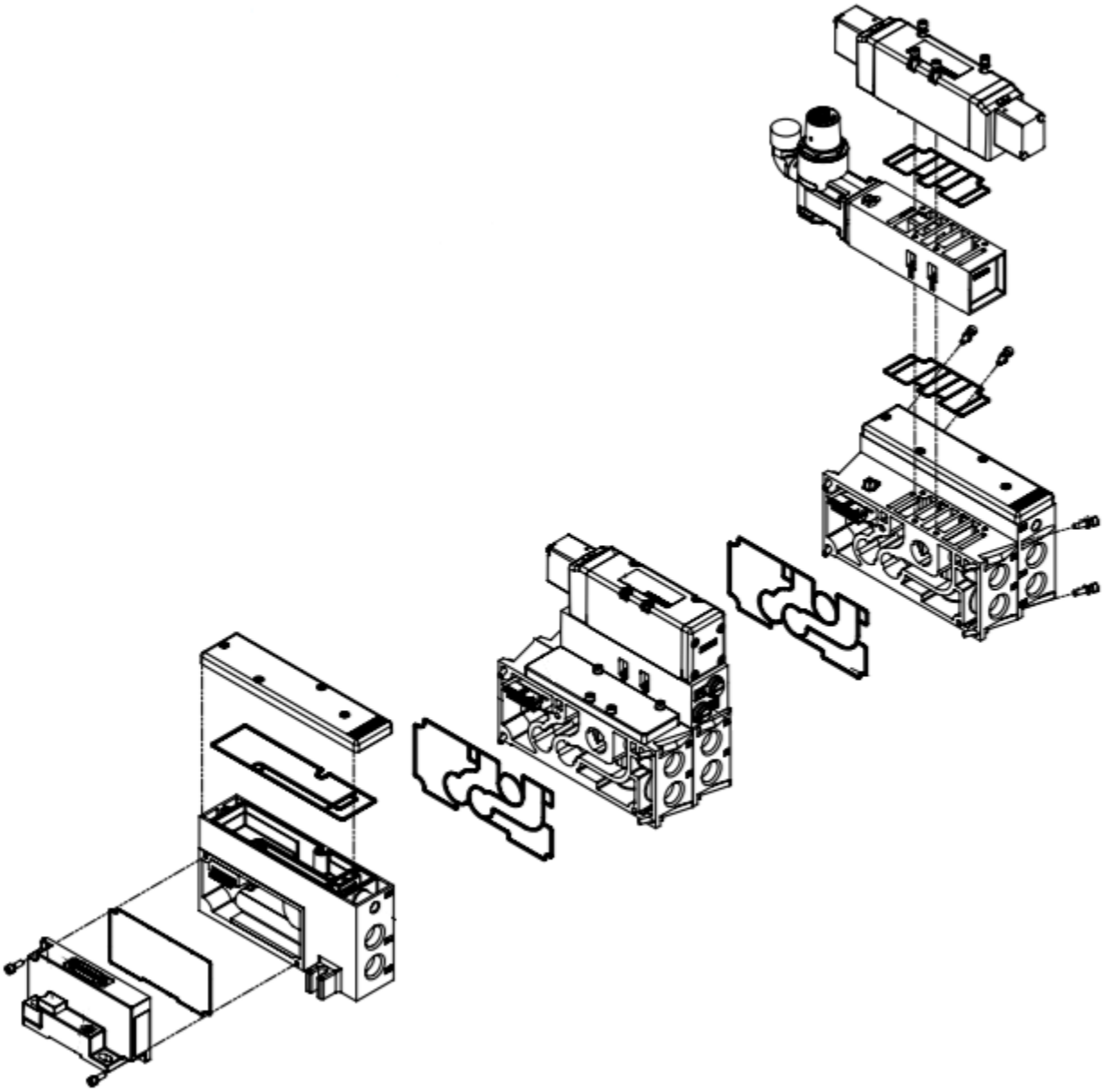
503 Series



Each series Z-Board™ can be selected in either SINGLE or DOUBLE output (coil) versions. The SINGLE and DOUBLE output function cannot be mixed on the Z-Boards™

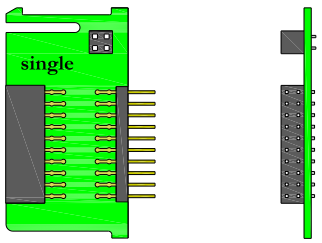
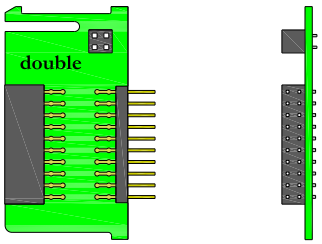
2.4 2035 Series Pneumatic Valve Manifold

The pneumatic valve manifold with internal circuit board technology is also modular. The valve solenoid coil connections are automatically made using Z-Board™ technology (plug together PC boards), which allow internal connection from solenoid coils to output drivers without the use of wires). This allows easy assembly and field changes.



2.5 2035 Series Z-Board™ Connectors

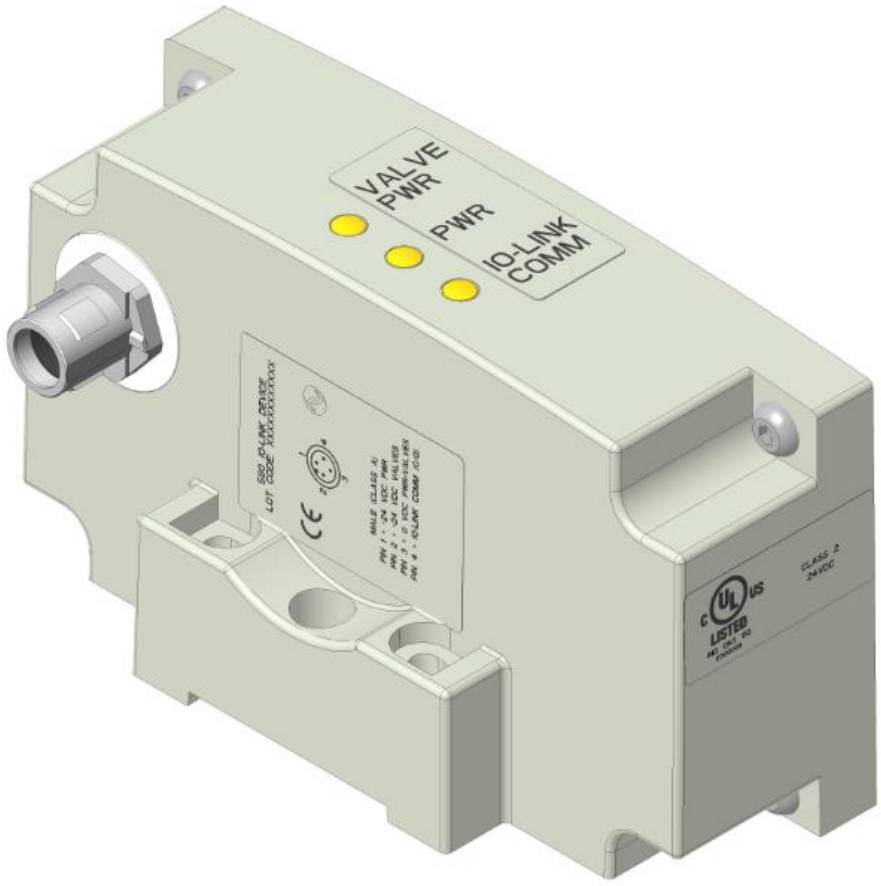
The 2035 valve series utilize 2 different Z-Board™ designs to achieve the single and double solenoid output functions. This yields the possible 16 single, 8 double, or various combinations of valve coil output capabilities.

Single Z-Board™	*Double Z-Board™*
	

3. IO-Link™ Communication Module

This module provides Communication to the manifold. It contains communication electronics and internal short circuit protection.

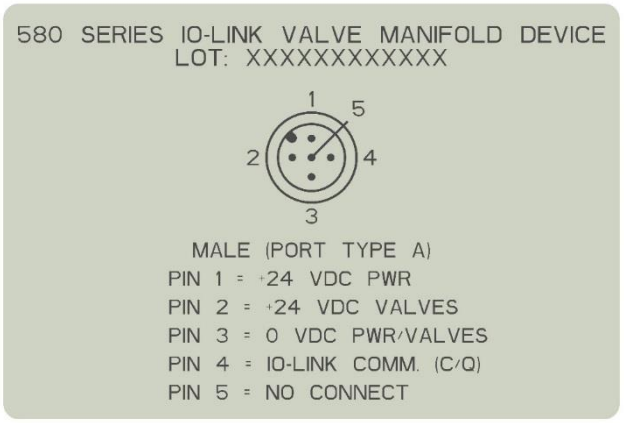
Communication Node	*Part Number*
580 IO-Link™ Node (Port Type A) – 500 Series Valves	P580AELM1010A00
580 IO-Link™ Node w/DIN Rail (Port Type A) – 500 Series Valves	P580AELM1010DRM
580 IO-Link™ Node (Port Type B) – 500 Series Valves	P580AELM2010A00
580 IO-Link™ Node w/DIN Rail (Port Type B) – 500 Series Valves	P580AELM2010DRM
580 IO-Link™ Node (Port Type A) – 2035 Series Valves	P580AELM3010A00
580 IO-Link™ Node (Port Type B) – 2035 Series Valves	P580AELM4010A00



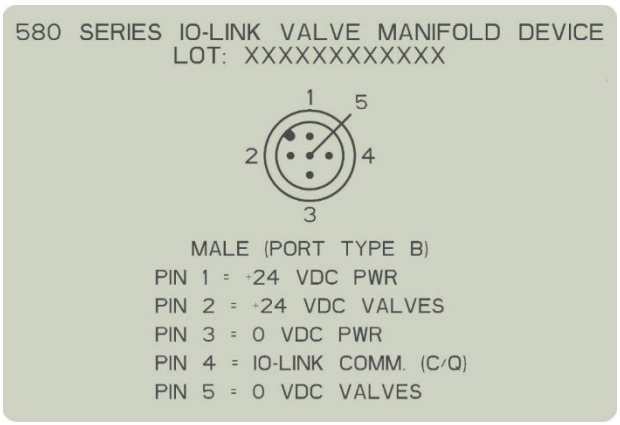
3.1 Connector Pin-Outs

IO-Link™ devices are available with either Port Type A or Port Type B. The IO-Link™ slave device needs to match the port type of the IO-Link™ master device.

The IO-Link™ (Port Type A) connector is a single keyway 4 pin M12 male connector.



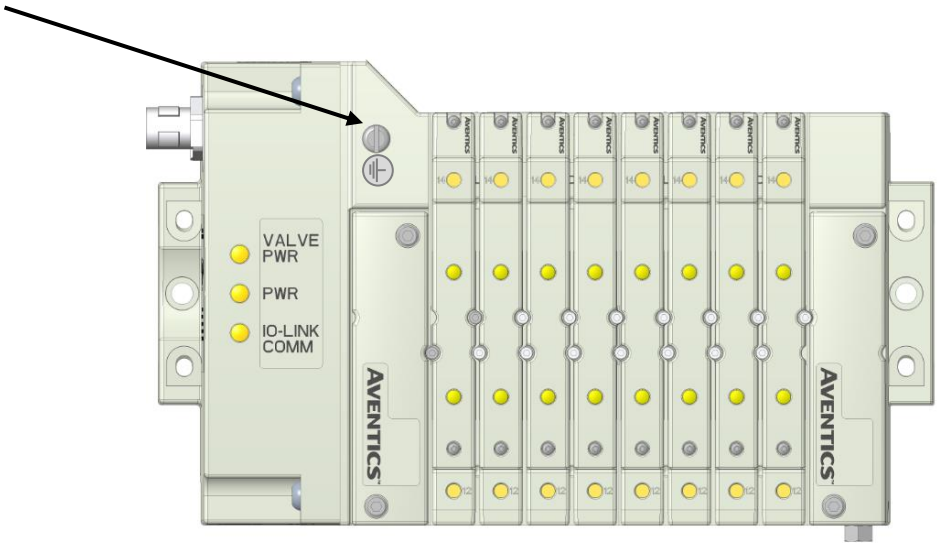
The IO-Link™ (Port Type B) connector is a single keyway 5 pin M12 male connector.



3.2 Chassis Ground

All Aventics manifolds should be grounded for safety. Grounding guidelines can be found in National Electrical code IEC 60204-1 or EN 60204-1.

CHASSIS GROUND CONNECTION POINT



CAUTION

- *When grounding to a machine frame, please ensure that the machine frame itself is already properly grounded.*
- *Better grounding can be achieved when larger diameter (lower gauge) wire is used.*

3.3 Power Consumption

Power and communication Connection – Port Type A

Pin No.	*Function*	*Description*
1	+24 VDC (Node)	Voltage used to power node electronics
2	+24 VDC (Valve)	Voltage used to power valves
3	0 VDC Common (Node and Valve)	0 VDC (-V) Voltage used to power node and valves
4	I/O Link Communication	I/O Link Communication

Power and communication Connection – Port Type B

Pin No.	*Function*	*Description*
1	+24 VDC (Node)	Voltage used to power node electronics
2	+24 VDC (Valve)	Voltage used to power valves
3	0 VDC (Node)	0 VDC (-V) Voltage used to power node
4	I/O Link Communication	I/O Link Communication
5	0 VDC (Valve)	0 VDC (-V) Voltage used to power valves

Power Rating

- The maximum system current capability is 4 Amps. Care should be taken not to exceed 4 Amp draw through the M12 Power connector pins.

Component	*Voltage*	*Tolerance*	*+24VDC (Valve)*		*+24VDC (Node)*	
			Current	*Power*	*Current*	*Power*
Solenoid Valve Coil 501 (Each)	24 VDC	+10%/-15%	0.03 Amps	0.8 Watts	NA	NA
Solenoid Valve Coil 502 (Each)	24 VDC	+10%/-15%	0.04 Amps	1.0 Watts	NA	NA
Solenoid Valve Coil 503 (Each)	24 VDC	+10%/-15%	0.07 Amps	1.7 Watts	NA	NA
Solenoid Valve Coil 2035 (Each)	24 VDC	+10%/-15%	0.10 Amps	2.5 Watts	NA	NA
580 IO-Link™ Module	24 VDC	+/- 10%	0.017 Amps	0.4 Watts	0.02 Amps	0.5 Watts

3.4 Recommended External Fuses

External fuses should be chosen based upon the physical manifold configuration. Please refer to table below for the external fuse sizing chart.

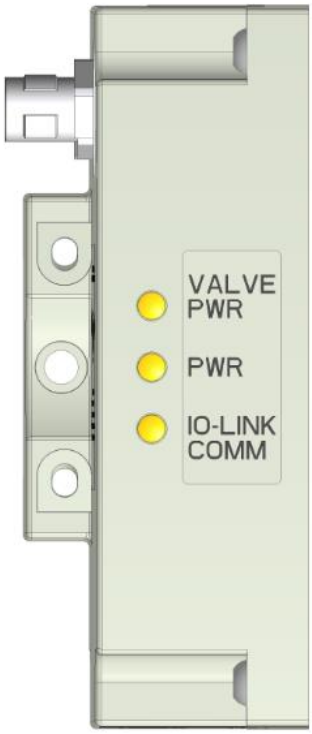
External Fuse Sizing Chart

Power Consumption - Power Connector Pin for VALVES		
Description		*Current*
Number of Solenoid Valve Coils Energized Simultaneously		
___ X 0.03 A (501 Series)	=	_____Amps
___ X 0.04 A (502 Series)	=	_____Amps
___ X 0.07 A (503 Series)	=	_____Amps
___ X 0.10 A (2035 Series)	=	_____Amps
580 IO-Link™ module power consumption	+	0.017 Amps
Total:	=	_____Amps
Surge Compensation:	X	1.25
Suggested External +24 VDC (Valves) Fuse Value:	=	_____Amps

Power Consumption – Power Connector Pin for NODE		
Description		*Current*
580 IO-Link™ module power consumption	=	0.020 Amps
Surge Compensation:	X	1.25
Suggested External Pin +24 VDC (Node) Fuse Value:	=	0.060 Amps

- *The Module Power pins supply power to the node electronics. These pins must be powered at all times for the communication node to be functional. See page 12 for reference.*
- *Reverse polarity protection is provided.*

3.5 Diagnostics – LED Functions



LED Name	*Color*	*Status*	*Description*
Valve PWR	Off	OFF	Valve Power Off
	Green	ON	Valve Power On
PWR	Off	OFF	Module Power OFF
	Green	ON	Module Power On
IO-Link™ Comm.	Off	OFF	No I-O Link Communication Established
	Green	FLASHING	I-O Link Communication Established

3.6 Diagnostic I/O Data

In the example below; the I/O link master writes the Aventics 580 manifold diagnostic data into the PLC data table as shown below.

Byte 0: Reserved
Byte 1: Module Summary Status
- Bit 0: Valve power is below 21
- Bit 1: Shorted / Over-Current Coil condition present
- Bit 2: Open Coil condition present

Byte 2: Open Coils 0-7
Byte 3: Open Coils 8-15
Byte 4: Open Coils 16-23
Byte 5: Open Coils 24-31
Byte 6: Shorted/Over-current Coils 0-7
Byte 7: Shorted/Over-current Coils 8-15
Byte 8: Shorted/Over-current Coils 16-23
Byte 9: Shorted/Over-current Coils 24-31

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Open Coil Status	Shorted Coil Status	Valve Power Status
2	Open Coil Status, Coil No. 7	Open Coil Status, Coil No. 6	Open Coil Status, Coil No. 5	Open Coil Status, Coil No. 4	Open Coil Status, Coil No. 3	Open Coil Status, Coil No. 2	Open Coil Status, Coil No. 1	Open Coil Status, Coil No. 0
3	Open Coil Status, Coil No. 15	Open Coil Status, Coil No. 14	Open Coil Status, Coil No. 13	Open Coil Status, Coil No. 12	Open Coil Status, Coil No. 11	Open Coil Status, Coil No. 10	Open Coil Status, Coil No. 9	Open Coil Status, Coil No. 8
4	Open Coil Status, Coil No. 23	Open Coil Status, Coil No. 22	Open Coil Status, Coil No. 21	Open Coil Status, Coil No. 20	Open Coil Status, Coil No. 19	Open Coil Status, Coil No. 18	Open Coil Status, Coil No. 17	Open Coil Status, Coil No. 16
5	Open Coil Status, Coil No. 31	Open Coil Status, Coil No. 30	Open Coil Status, Coil No. 29	Open Coil Status, Coil No. 28	Open Coil Status, Coil No. 27	Open Coil Status, Coil No. 26	Open Coil Status, Coil No. 25	Open Coil Status, Coil No. 24
6	Shorted Coil Status Coil No. 7	Shorted Coil Status, Coil No. 6	Shorted Coil Status, Coil No. 5	Shorted Coil Status, Coil No. 4	Shorted Coil Status, Coil No. 3	Shorted Coil Status, Coil No. 2	Shorted Coil Status, Coil No. 1	Shorted Coil Status, Coil No. 0
7	Shorted Coil Status, Coil No. 15	Shorted Coil Status, Coil No. 14	Shorted Coil Status, Coil No. 13	Shorted Coil Status, Coil No. 12	Shorted Coil Status, Coil No. 11	Shorted Coil Status, Coil No. 10	Shorted Coil Status, Coil No. 9	Shorted Coil Status, Coil No. 8
8	Shorted Coil Status, Coil No. 23	Shorted Coil Status, Coil No. 22	Shorted Coil Status, Coil No. 21	Shorted Coil Status, Coil No. 20	Shorted Coil Status, Coil No. 19	Shorted Coil Status, Coil No. 18	Shorted Coil Status, Coil No. 17	Shorted Coil Status, Coil No. 16
9	Shorted Coil Status, Coil No. 31	Shorted Coil Status, Coil No. 30	Shorted Coil Status, Coil No. 29	Shorted Coil Status, Coil No. 28	Shorted Coil Status, Coil No. 27	Shorted Coil Status, Coil No. 26	Shorted Coil Status, Coil No. 25	Shorted Coil Status, Coil No. 24

*The example Input table above is for 500 Series valves; the 2035 Series will map differently (see section 4.4).

Diagnostic Status Bit Action

Output Type	*Output State*	*Fault Condition*	*Status Bit*
Valve Solenoid Coil Driver	ON	No Fault	0
		Fault - Short Circuit, Over Temp/Over Current	1
Valve Solenoid Coil Driver	OFF	No Fault	0
		Fault - Open Load	1

- *Coils cannot be detected as "shorted" unless commanded as energized.*
- *Coils cannot be detected as "open" if commanded as energized*
- *The IO-Link node will send an Events 0x7700 if at least one coil detected as open and 0x7710 if at least one coil detected as shorted*

3.7 Diagnostic Events

Event driven diagnostic codes are also reported by the Aventics 580 IO-Link™ module to the IO Link master. The Event driven diagnostics are mapped to the Baluff input table as shown below. The events are queued in three byte blocks from the newest to oldest

Balluff:I.Data[47]	16#b0		Hex	SINT	First Event Status
Balluff:I.Data[48]	16#77		Hex	SINT	First Event Code Hi Byte
Balluff:I.Data[49]	16#10		Hex	SINT	First Event Code Low Byte
Balluff:I.Data[50]	16#f0		Hex	SINT	Second Event Status
Balluff:I.Data[51]	16#77		Hex	SINT	Second Event Code Hi Byte
Balluff:I.Data[52]	16#00		Hex	SINT	Second Event Code Low Byte
Balluff:I.Data[53]	16#f0		Hex	SINT	Third Event Status
Balluff:I.Data[54]	16#77		Hex	SINT	Third Event Code Hi Byte
Balluff:I.Data[55]	16#10		Hex	SINT	Third Event Code Low Byte

The following (HEX) diagnostic “Event Status” and "Event Codes” are reported by the Aventics 580 IO-Link™ module include;

Event Status

F4	Event Active
B4	Event Cleared

Event Code

51 12	Switched power low or off (below 20.8 Volt threshold)
77 00	Wire break detected (open coil detected)
77 10	Short circuit detected (shorted coil)

3.8 ISDU Object Data

The following service data objects are available from the 580 IO-Link™ Valve Manifold Driver:

3.8.1 General (IO-Link Predefined) Device Parameters

Vendor Name (READ ONLY) Index 0x0010 (16d), Subindex 0x00	READ: Returns string "ASCO Numatics Inc"
Vendor Text (READ ONLY) Index 0x0011 (17d), Subindex 0x00	READ: Returns string "www.asco.com"
Product Name (READ ONLY) Index 0x0012 (18d), Subindex 0x00	READ: Returns string "IO-Link Valve Manifold Driver"
Product ID (READ ONLY) Index 0x0013 (19d), Subindex 0x00	READ: Returns string "518571" for 4-pin version 518571 Returns string "520225" for 5-Pin version 520225
Product Text (READ ONLY) Index 0x0014 (20d), Subindex 0x00	READ: Returns string "32 Channels / Sinking Outputs"
Serial Number (READ ONLY) Index 0x0015 (21d), Subindex 0x00	READ: Returns string which contains the Serial Number of the device
Hardware Revision ID (READ ONLY) Index 0x0016 (22d), Subindex 0x00	READ: Returns string which contains Hardware Revision description
Firmware Revision ID (READ ONLY) Index 0x0017 (23d), Subindex 0x00	READ: Returns string which contains Firmware Revision description along with build time
Application Specific Tag (READ/WRITE) Index 0x0018 (24d), Subindex 0x00	READ: Returns user-defined string up to 32 characters
	WRITE: Rewrites application specific tag with user-defined data. Argument data must be 32 bytes or less in length.
Error Count (READ ONLY) Index 0x0020 (32d), Subindex 0x00	READ: Returns 16-bit error counter in Big Endian format.

3.8.2 Product-specific ISDU

Fault State Configuration (Read/Write) Index 0x0060 (96d)	READ	SubIndex 0xFF (255d) Returns 8 bytes of Fault State configuration.
	READ	Subindex 0x00 - 0x1F (0d..32d) Returns 1 byte of Fault State configuration for a particular channel; the subindex is the number of the channel. The state of output stage on Fault Condition is encoded in the two least significant bits.
	WRITE	Subindex 0xFF (255d) Update Fault State Configuration for all the channels (Argument data MUST be 8 bytes in length.)
	WRITE	Subindex 0x00 - 0x1F (0d..32d) Update Fault State Configuration for partcular channel; the subindex is the number of the channel. (Argument data MUST be 1 byte in length.)
		The fault condition state of each output stage is encoded by two bits. ..00.. - De-energize corresponding output (OFF). ..01.. - Energize the corresponding output (ON). ..10.. - Keep the last state ..11.. - Reserved

Below is the data mapping for the fault state configuration data:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0:	OUT_03_b1	OUT_03_b0	OUT_02_b1	OUT_02_b0	OUT_01_b1	OUT_01_b0	OUT_00_b1	OUT_00_b0
Byte 1:	OUT_03_b1	OUT_03_b0	OUT_06_b1	OUT_06_b0	OUT_05_b1	OUT_05_b0	OUT_04_b1	OUT_04_b0
Byte 2:	OUT_11_b1	OUT_11_b0	OUT_10_b1	OUT_10_b0	OUT_09_b1	OUT_09_b0	OUT_08_b1	OUT_08_b0
Byte 3:	OUT_15_b1	OUT_15_b0	OUT_14_b1	OUT_14_b0	OUT_13_b1	OUT_13_b0	OUT_12_b1	OUT_12_b0
Byte 4:	OUT_19_b1	OUT_19_b0	OUT_18_b1	OUT_18_b0	OUT_17_b1	OUT_17_b0	OUT_16_b1	OUT_16_b0
Byte 5:	OUT_23_b1	OUT_23_b0	OUT_22_b1	OUT_22_b0	OUT_21_b1	OUT_21_b0	OUT_20_b1	OUT_20_b0
Byte 6:	OUT_27_b1	OUT_27_b0	OUT_26_b1	OUT_26_b0	OUT_25_b1	OUT_25_b0	OUT_24_b1	OUT_24_b0
Byte 7:	OUT_31_b1	OUT_31_b0	OUT_30_b1	OUT_30_b0	OUT_29_b1	OUT_29_b0	OUT_28_b1	OUT_28_b0

Auxiliary Configuration Index 0x0061 (97dec)	READ: Returns 2 bytes of Auxiliary Configuration data
	WRITE: Update Auxiliary Configuration data
	The following parameters are available:
	SL: Shorted Loads (1-bit) 1 - Include Shorted Loads Status data (4-bytes) in PD_IN 0 - Do not include Shorted Loads status data
	OL: Open Loads (1-bit) 1 - Include Open Loads Status data (4-bytes) in PD_IN 0 - Do not include Open Loads status data
	XS: Extended Status (1-bit) 1 - Include Extended Status data (2-bytes) in PD_IN 0 - Do not include Extended Status data
	Note: if values SL, OL and XS are all set to zero, PD_IN will not be sent.
	ST0 - ST2: Manifold self-test (3-bit) ..000.. - Do not self-test (normal operation) ..001.. - Energize and de-energize all outputs individually in sequence ..010.. - Energize all outputs in Gray code sequence ..011.. - Energize all outputs in sequence in groups of two ..100.. - Toggle all outputs on/off at once ..101.. - Reserved ..110.. - Reserved ..111.. – Reserved

Below is the data mapping for the Auxiliary configuration data:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0:	(Reserved)	ST2	ST1	ST0	(Reserved)	XS	OL	SL
Byte 1:	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)	(Reserved)

Format of data PD_IN:
Bytes 0 - 1: Extended status data
Bit 0: Valve power voltage below threshold
Bit 1: At least one shorted output detected
Bit 2: At least one open output detected
Bits 3 - 15: Reserved
Bytes 2 - 5: Open loads status data (see "Channels with Open Loads")
Bytes 6 - 9: Shorted loads status data (see "Channels with Shorted Loads")

Channel Cycle Counters Index 0x0062 (98d), Subindex 0x00 - 0x1F (0d - 31d)	READ	Returns 32-bit big-endian cycle counter for the particular channel. The subindex is the number of the channel. Transition from channel OFF to channel ON is considered one cycle.
	WRITE	Writing the four octets [0x52,0x45,0x53,0x21] (Literally: "RES!") will reset the corresponding Channel Cycle Counter. The subindex is the number of the channel.
Cycle Counters update increment Index 0x0063 (99d), Subindex 0x00 (0d)	READ	Returns 16-bit number (big endian) of cycles counted between successive logging of Cycle Counters to the non-volatile memory. Serves as a maximum number of cycles which could be not accounted for in case of power loss or hardware fault.
	WRITE	Re-assigns the Cycle Counters update increment value. Default value is 256. Note: A greater value leads to less frequent logging of statistics and a longer expected life of the embedded EEPROM.
Uptime Counter Index 0x0064 (100d), Subindex 0x00	READ	Returns 32-bit (big endian) number of uptime seconds for the Device.
	WRITE	Writing the value [0x52,0x45,0x53,0x21] (literally - "RES!") will reset the uptime counter.
Uptime Counter update increment Index 0x0065 (101d), Subindex 0x00	READ	Returns a 16-bit (big endian) maximum number of seconds between updates of Uptime Counter to the non-volatile memory and represents the maximum number of seconds which could be lost between data logging events. Note: The Uptime Counter is also updated with each channel Cycle Counter update.
	WRITE	Re-assigns the Uptime Counter update increment. Minimum practical value considered 3600 seconds or one hour (default).
Connected Channels Index 0x0068 (104d) Subindex 0x00	READ	Returns a 4-byte bitmap of Channels which were *not* detected as open on the Device *startup*. Each "0" represents a channel which has been detected as having no load. ***Open Channels are excluded from diagnostics data and are not controlled during runtime.***
	WRITE	Allows for override of the Connected Channels configuration.

Below is the data mapping for the connected channels data:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0:	OUT_07_OK	OUT_06_OK	OUT_05_OK	OUT_04_OK	OUT_03_OK	OUT_02_OK	OUT_01_OK	OUT_00_OK
Byte 1:	OUT_15_OK	OUT_14_OK	OUT_13_OK	OUT_12_OK	OUT_11_OK	OUT_10_OK	OUT_09_OK	OUT_08_OK
Byte 2:	OUT_23_OK	OUT_22_OK	OUT_21_OK	OUT_20_OK	OUT_19_OK	OUT_18_OK	OUT_17_OK	OUT_16_OK
Byte 3:	OUT_31_OK	OUT_30_OK	OUT_29_OK	OUT_28_OK	OUT_27_OK	OUT_26_OK	OUT_25_OK	OUT_24_OK

Channels with Open Loads	Read only: Returns a 4-byte bitmap of Channels which are detected as OPEN during runtime. Each "1" represents a channel which has been detected as one having a missing load while it was OFF.

Below is the data mapping for the channels with open loads data:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0:	CH_07_OPEN	CH_06_OPEN	CH_05_OPEN	CH_04_OPEN	CH_03_OPEN	CH_02_OPEN	CH_01_OPEN	CH_00_OPEN
Byte 1:	CH_15_OPEN	CH_14_OPEN	CH_13_OPEN	CH_12_OPEN	CH_11_OPEN	CH_10_OPEN	CH_09_OPEN	CH_08_OPEN
Byte 2:	CH_23_OPEN	CH_22_OPEN	CH_21_OPEN	CH_20_OPEN	CH_19_OPEN	CH_18_OPEN	CH_17_OPEN	CH_16_OPEN
Byte 3:	CH_31_OPEN	CH_30_OPEN	CH_29_OPEN	CH_28_OPEN	CH_27_OPEN	CH_26_OPEN	CH_25_OPEN	CH_24_OPEN

Channels with Shorted Loads	Read only: Returns a 4-byte bitmap of Channels which are detected as SHORTED (over-current) during runtime. Each "1" represents a channel which has been detected as one having an short circuit / over-current load while it was ON.

Below is the data mapping for the channels with shorted loads data:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0:	CH_07_SHRT	CH_06_SHRT	CH_05_SHRT	CH_04_SHRT	CH_03_SHRT	CH_02_SHRT	CH_01_SHRT	CH_00_SHRT
Byte 1:	CH_15_SHRT	CH_14_SHRT	CH_13_SHRT	CH_12_SHRT	CH_11_SHRT	CH_10_SHRT	CH_09_SHRT	CH_08_SHRT
Byte 2:	CH_23_SHRT	CH_22_SHRT	CH_21_SHRT	CH_20_SHRT	CH_19_SHRT	CH_18_SHRT	CH_17_SHRT	CH_16_SHRT
Byte 3:	CH_31_SHRT	CH_30_SHRT	CH_29_SHRT	CH_28_SHRT	CH_27_SHRT	CH_26_SHRT	CH_25_SHRT	CH_24_SHRT

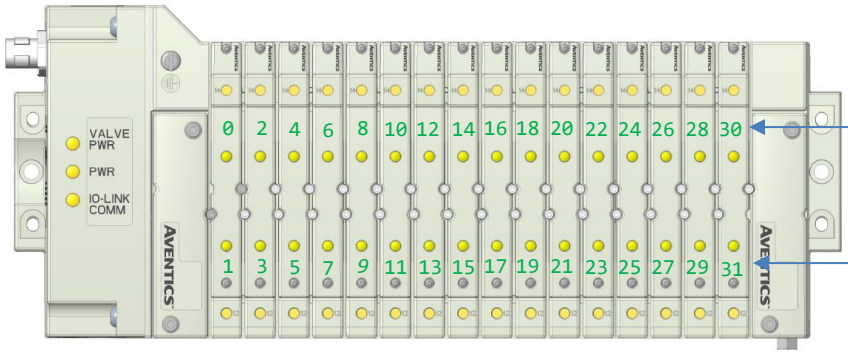
3.8.3 Event Data

Secondary PSU voltage fault Event Code 0x5112	Sent with APPEARS attribute when Secondary (actuator) power supply voltage drops below approx. 20.8 volt. Sent with DISAPPEARS attribute when aforementioned condition ends.
Wire Break of a subordinate device Event Code 0x7700	Sent with APPEARS attribute when any channel is detected as Open Circuited during runtime. Sent with DISAPPEARS attribute when aforementioned condition ends.
Short Circuit Detected Event Code 0x7710	Sent with APPEARS attribute when any channel is detected as Short Circuited during runtime. Sent with DISAPPEARS attribute when aforementioned condition ends.

4. I/O Mapping Examples

The following examples describe IO mapping for 500 series and 2035 valve manifolds.

500 Series



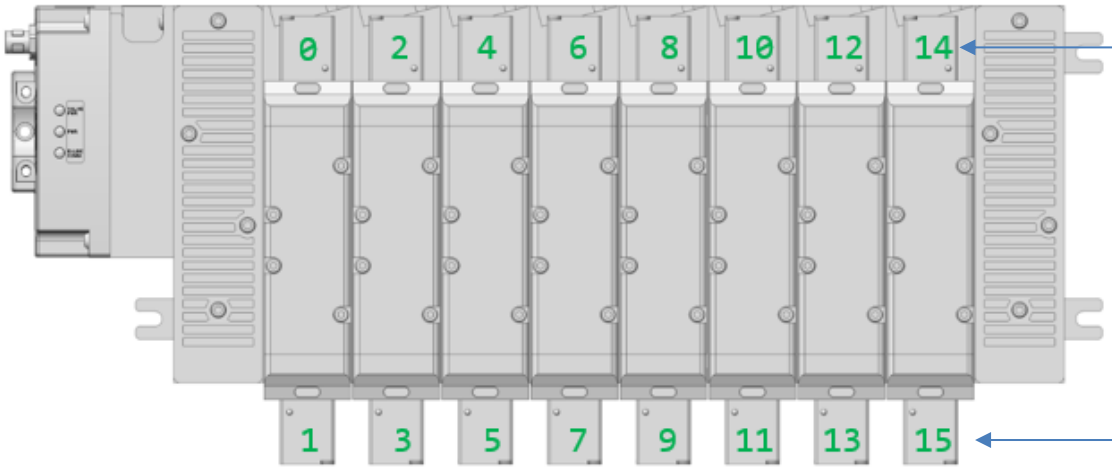
4.1 Coil Output Mapping – 500 Series

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8
2	Valve Coil No. 23	Valve Coil No. 22	Valve Coil No. 21	Valve Coil No. 20	Valve Coil No. 19	Valve Coil No. 18	Valve Coil No. 17	Valve Coil No. 16
3	Valve Coil No. 31	Valve Coil No. 30	Valve Coil No. 29	Valve Coil No. 28	Valve Coil No. 27	Valve Coil No. 26	Valve Coil No. 25	Valve Coil No. 24

4.2 Coil Status Mapping – 500 Series

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Open Coil Status	Shorted Coil Status	Valve Power Status
2	Open Coil Status, Coil No. 7	Open Coil Status, Coil No. 6	Open Coil Status, Coil No. 5	Open Coil Status, Coil No. 4	Open Coil Status, Coil No. 3	Open Coil Status, Coil No. 2	Open Coil Status, Coil No. 1	Open Coil Status, Coil No. 0
3	Open Coil Status, Coil No. 15	Open Coil Status, Coil No. 14	Open Coil Status, Coil No. 13	Open Coil Status, Coil No. 12	Open Coil Status, Coil No. 11	Open Coil Status, Coil No. 10	Open Coil Status, Coil No. 9	Open Coil Status, Coil No. 8
4	Open Coil Status, Coil No. 23	Open Coil Status, Coil No. 22	Open Coil Status, Coil No. 21	Open Coil Status, Coil No. 20	Open Coil Status, Coil No. 19	Open Coil Status, Coil No. 18	Open Coil Status, Coil No. 17	Open Coil Status, Coil No. 16
5	Open Coil Status, Coil No. 31	Open Coil Status, Coil No. 30	Open Coil Status, Coil No. 29	Open Coil Status, Coil No. 28	Open Coil Status, Coil No. 27	Open Coil Status, Coil No. 26	Open Coil Status, Coil No. 25	Open Coil Status, Coil No. 24
6	Shorted Coil Status Coil No. 7	Shorted Coil Status, Coil No. 6	Shorted Coil Status, Coil No. 5	Shorted Coil Status, Coil No. 4	Shorted Coil Status, Coil No. 3	Shorted Coil Status, Coil No. 2	Shorted Coil Status, Coil No. 1	Shorted Coil Status, Coil No. 0
7	Shorted Coil Status, Coil No. 15	Shorted Coil Status, Coil No. 14	Shorted Coil Status, Coil No. 13	Shorted Coil Status, Coil No. 12	Shorted Coil Status, Coil No. 11	Shorted Coil Status, Coil No. 10	Shorted Coil Status, Coil No. 9	Shorted Coil Status, Coil No. 8
8	Shorted Coil Status, Coil No. 23	Shorted Coil Status, Coil No. 22	Shorted Coil Status, Coil No. 21	Shorted Coil Status, Coil No. 20	Shorted Coil Status, Coil No. 19	Shorted Coil Status, Coil No. 18	Shorted Coil Status, Coil No. 17	Shorted Coil Status, Coil No. 16
9	Shorted Coil Status, Coil No. 31	Shorted Coil Status, Coil No. 30	Shorted Coil Status, Coil No. 29	Shorted Coil Status, Coil No. 28	Shorted Coil Status, Coil No. 27	Shorted Coil Status, Coil No. 26	Shorted Coil Status, Coil No. 25	Shorted Coil Status, Coil No. 24

2035 Series



When the **14** End Solenoid is energized, the **4** port is pressurized

When the 12 End Solenoid is energized, the 2 port is pressurized

4.3 Coil Output Mapping – 2035 Series

Output Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Valve Coil No. 7	Valve Coil No. 6	Valve Coil No. 5	Valve Coil No. 4	Valve Coil No. 3	Valve Coil No. 2	Valve Coil No. 1	Valve Coil No. 0
1	Valve Coil No. 15	Valve Coil No. 14	Valve Coil No. 13	Valve Coil No. 12	Valve Coil No. 11	Valve Coil No. 10	Valve Coil No. 9	Valve Coil No. 8

4.4 Coil Status Mapping – 2035 Series

Input Table								
BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved
1	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Allocated and Reserved	Open Coil Status	Shorted Coil Status	Valve Power Status
2	Open Coil Status, Coil No. 7	Open Coil Status, Coil No. 6	Open Coil Status, Coil No. 5	Open Coil Status, Coil No. 4	Open Coil Status, Coil No. 3	Open Coil Status, Coil No. 2	Open Coil Status, Coil No. 1	Open Coil Status, Coil No. 0
3	Open Coil Status, Coil No. 15	Open Coil Status, Coil No. 14	Open Coil Status, Coil No. 13	Open Coil Status, Coil No. 12	Open Coil Status, Coil No. 11	Open Coil Status, Coil No. 10	Open Coil Status, Coil No. 9	Open Coil Status, Coil No. 8
4	Shorted Coil Status Coil No. 7	Shorted Coil Status, Coil No. 6	Shorted Coil Status, Coil No. 5	Shorted Coil Status, Coil No. 4	Shorted Coil Status, Coil No. 3	Shorted Coil Status, Coil No. 2	Shorted Coil Status, Coil No. 1	Shorted Coil Status, Coil No. 0
5	Shorted Coil Status, Coil No. 15	Shorted Coil Status, Coil No. 14	Shorted Coil Status, Coil No. 13	Shorted Coil Status, Coil No. 12	Shorted Coil Status, Coil No. 11	Shorted Coil Status, Coil No. 10	Shorted Coil Status, Coil No. 9	Shorted Coil Status, Coil No. 8

5. Configuration Example - Balluff Master

Example configuration with Balluff BNI EIP-508-105-Z015 IO-Link™ master and RSLogix 5000.

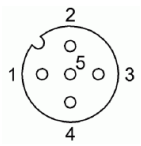
5.1 Connect the Aventics 580 IO-Link™ manifold

Connect the Aventics 580 IO-Link™ Module to one of the 8 Balluff module IO-Link™ ports. In this example; port 1 is connected using a 4 pin I/O cable.

580 IO-Link™ Node (Port Type A) – 500 Series Valves

Balluff BNI EIP-508-105-Z015 IO-Link master

M12, A-coded, female



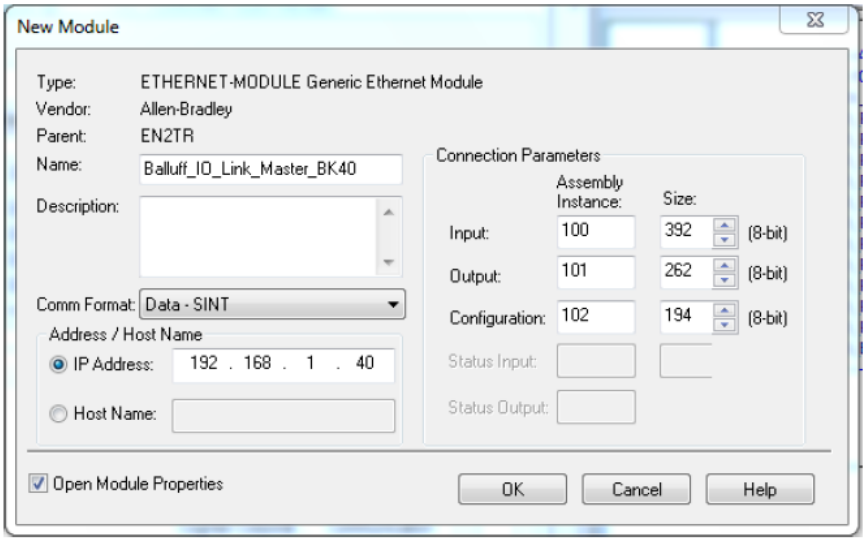
Pin	Function
1	+24V, 1.6 A
2	Input / Output 2 A
3	GND
4	IO-Link / Input / Output 1.6 A
5	n.c.

NOTE!

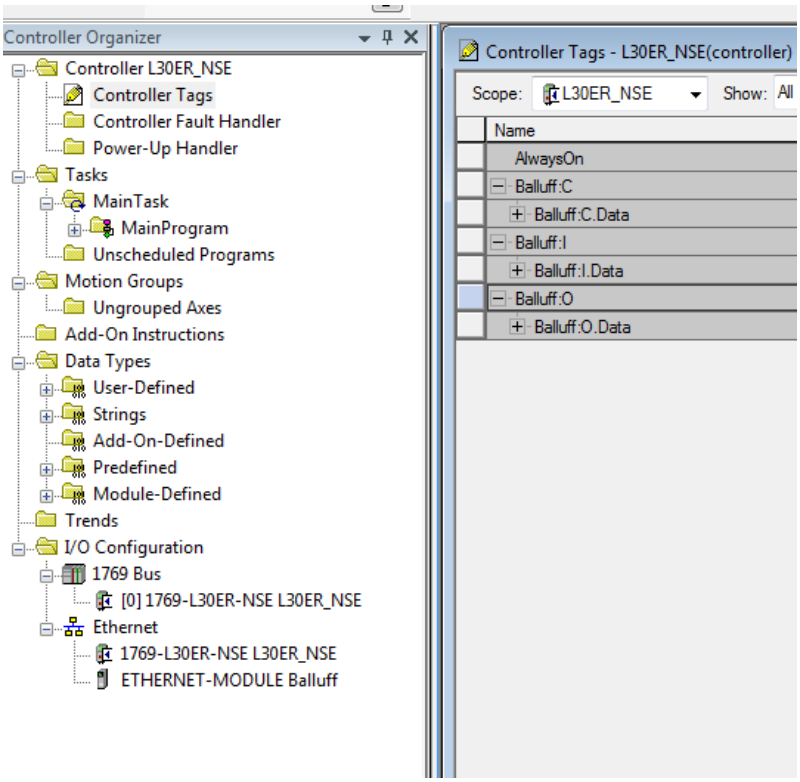
- *Pin 2 (Output) provides Valve Power to the Aventics 580 IO-Link manifold.*
- *Pin 4 (I/O Link) Provides I/O Link communication to the Aventics 580 IO-Link manifold.*

5.2 Controller Tags (RSLogix 5000)

The following configuration example assumes the Balluff BNI EIP-508-105-Z015 IO-Link™ master has been configured using the Generic Ethernet Module as shown.



Once the Balluff IO-Link™ master module is configured in RSLogix 5000; open the modules' associated controller tags. In this example the module name is "Balluff".



5.3 Configure Port for IO-Link™

In the example below; the Balluff master uses the Balluff:C Data table to configure the function of each port based on the following table.

Byte	Slot	Module part	Description
0…1	1	Module	General configuration for the whole module
2…25	2	IO-Link port 0	Configuration for the IO-Link port 0
26…49	3	IO-Link port 1	Configuration for the IO-Link port 1
50…73	4	IO-Link port 2	Configuration for the IO-Link port 2
74…97	5	IO-Link port 3	Configuration for the IO-Link port 3
98…121	6	IO-Link port 4	Configuration for the IO-Link port 4
122…145	7	IO-Link port 5	Configuration for the IO-Link port 5
146…169	8	IO-Link port 6	Configuration for the IO-Link port 6
170…193	9	IO-Link port 7	Configuration for the IO-Link port 7

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
0	P3		P2		P1		P0		Port function *0x00: Standard I/O* *0x01: IO-Link*
1	P7		P6		P5		P4		

Set Bit 0 of Byte 0 to configure Port 0 for IO-Link™ communication

5.4 Enable valve power

In the example below; the Balluff master uses the Balluff:O Data table to turn on the output of Pin 2 to supply valve power to the Aventics 580 IO-Link™ module.

Byte	Module part	Description
0…5	Standard I/O ports	Process data outputs on standard Inputs
6…37	IO-Link port 0	Process data outputs on IO-Link port 0
38…69	IO-Link port 1	Process data outputs on IO-Link port 1
70…101	IO-Link port 2	Process data outputs on IO-Link port 2
102…133	IO-Link port 3	Process data outputs on IO-Link port 3
134…165	IO-Link port 4	Process data outputs on IO-Link port 4
166…197	IO-Link port 5	Process data outputs on IO-Link port 5
198…229	IO-Link port 6	Process data outputs on IO-Link port 6
230…261	IO-Link port 7	Process data outputs on IO-Link port 7

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
0	O32	O34	O22	O24	O12	O14	O02	O04	Output data *O04 → Output on port 0 pin 4* *To use this function on a IO-Link port the port must be configured as an output (see 0- Module configuration)*
1	O72	O74	O62	O64	O52	O54	O42	O44	

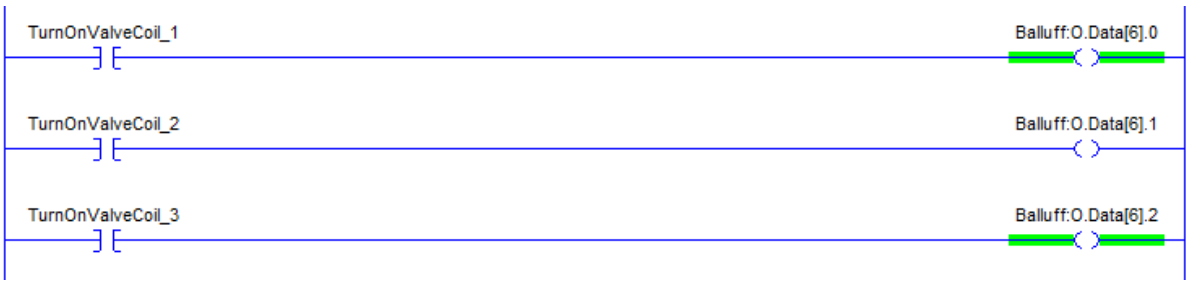
Set Bit 1 of Byte 0 to turn on Output 2 which supplies 24v valve power to the Aventics 580 manifold connected to port 1.

5.5 Control valve coil outputs

In the example below; the Balluff master uses the Balluff:O Data table to control the Aventics valve coils over IO-Link™. The 32 Valve coils are mapped from Byte 6 thru Byte 9.

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
6…37									IO-Link port 0 output data
…	The data of the other IO-Link ports has the same structure and follows here								

Set Bit 0, 1 & 2 of Byte 6 to turn on the valve coils 1, 2 & 3 on the Aventics 580 manifold connected to port 1. This is accomplished using IO-Link™ communication.



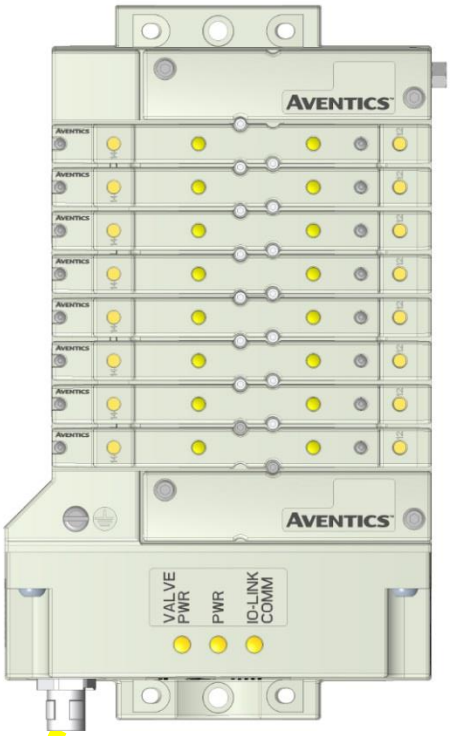
6. Configuration Example - IFM Master

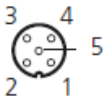
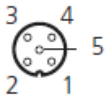
Example configuration with IFM AL 1020 IO-Link™ master and RSLogix 5000.

6.1 Connect the Aventics 580 IO-Link™ manifold

Connect the Aventics 580 IO-Link™ Module to one of the IFM module IO-Link™ ports. In this example; port #7 is connected using a 5 pin I/O cable.

580 IO-Link™ Node (Port Type B) – 500 Series	IFM AL 1020 IO-Link™ master

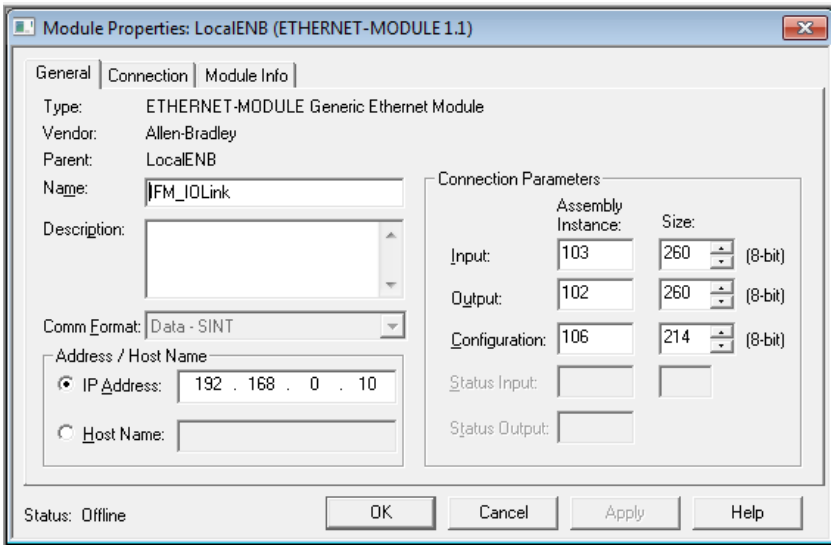


	IO-Link A ports (X01...X04) 1: 24 V DC (L+) 2: DI 3: GND (L-) 4: C/Q IO-Link data transfer channel 5: not connected		IO-Link B ports (X05...X08) 1: 24 V DC (L+) 2: 24 V DC (U_A) 3: GND (L-) 4: C/Q IO-Link data transfer channel 5: GND (U_A)

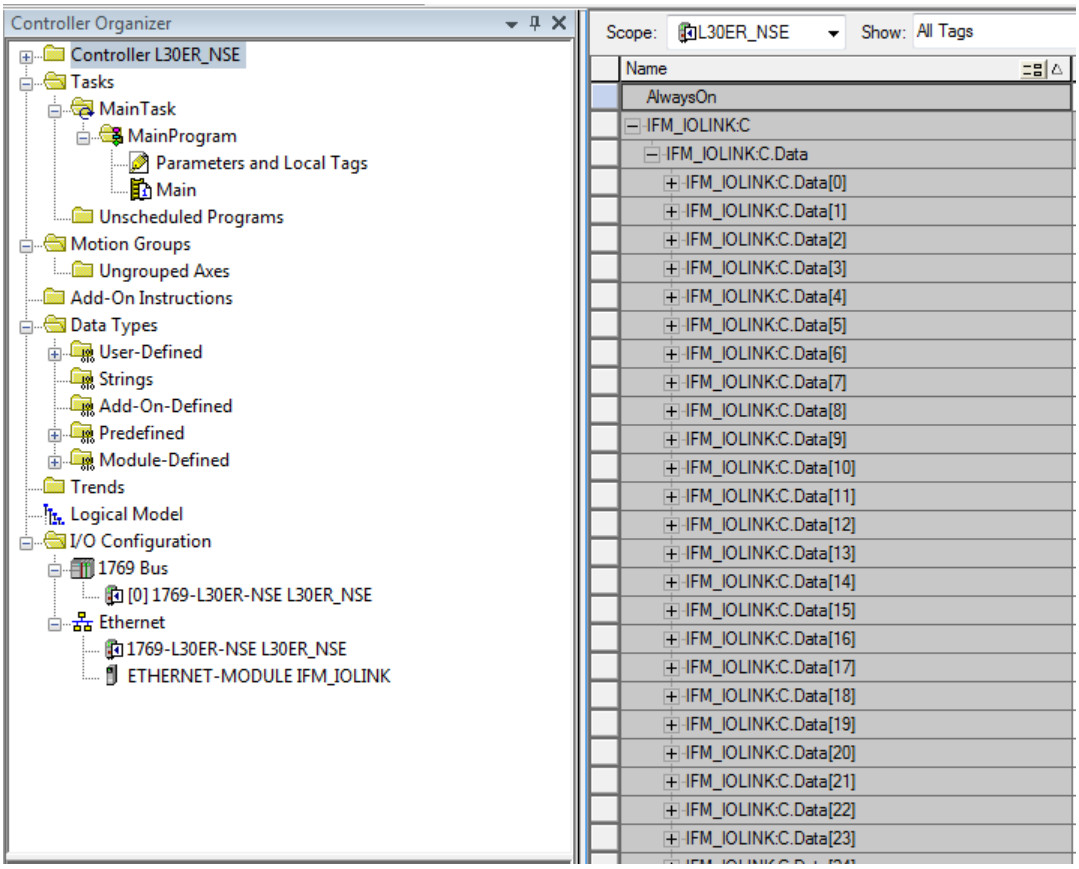
- *Pin 2 (Output) provides Valve Power to the Aventics 580 IO-Link™ manifold.*
- *Pin 3 provides 0v valve power common.*
- *Pin 4 (I/O Link) Provides I/O Link communication*

6.2 Controller tags (RSLogix 5000)

The following configuration example assumes the IFM AL 1020 IO-Link™ master has been configured using the Generic Ethernet Module as shown.



Once the IFM IO-Link™ master module is configured in RSLogix 5000; open the modules' associated controller tags. In this example, the module name is "IFM_IOLink".



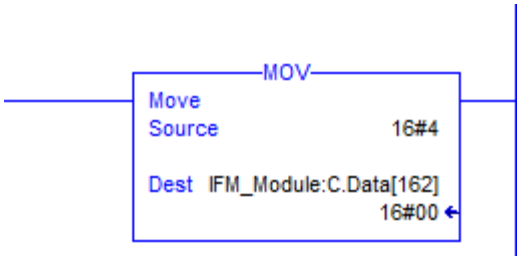
6.3 Configure port for IO-Link™

In the example below; the IFM master uses the IFM_IOLink:C Data table to configure the function of each port. The sixth byte of each ports 26 byte parameter group is used to control the port mode. Setting the sixth byte to a value of 4 enables the port for IO-Link™ functionality

Assembly instance 106

Byte	Data type	Function
0	UINT8	= reserved
1	UINT8	= reserved
2	UINT8	Fail-safe mode
3	UINT8	Fail-safe pattern DO pin 4
4	UINT8	= reserved
5	UINT8	= reserved
6	UINT8	Port mode port 1
7...8	UINT16	Vendor ID port 1
9...12	UINT32	Device ID port 1
13	UINT8	Data storage port 1
14	UINT8	IO-Link fail- safe mode port 1
15	UINT8	Enable direct parameter port 1
16...31	Array of 16 x UINT8	Direct parameter page 2 port 1
32...213	...	26 parameter bytes per port

For example, to configure Port 7 for IO-Link™ communication. Set Byte 162 of the parameter table defined by assembly instance 106 to the value 4. For more information refer to the IFM IO master documentation.



6.4 Control valve coil outputs

Assembly Instance 102

Byte	Function	Description
0…3	Control Byte	IO-Link™ master control bytes
4…35	IO-Link™ port 1 OUT	32 byte IO-Link™ output process data
36…67	IO-Link™ port 2 OUT	32 byte IO-Link™ output process data
68…99	IO-Link™ port 3 OUT	32 byte IO-Link™ output process data
100…131	IO-Link™ port 4 OUT	32 byte IO-Link™ output process data
132…163	IO-Link™ port 5 OUT	32 byte IO-Link™ output process data
164…195	IO-Link™ port 6 OUT	32 byte IO-Link™ output process data
196…227	IO-Link™ port 7 OUT	32 byte IO-Link™ output process data
228…259	IO-Link™ port 8 OUT	32 byte IO-Link™ output process data

Set Bit 0 of Byte 196 in IFM_IOLINK DATA(196).0 to turn on Aventics 580 manifold valve coil #1.

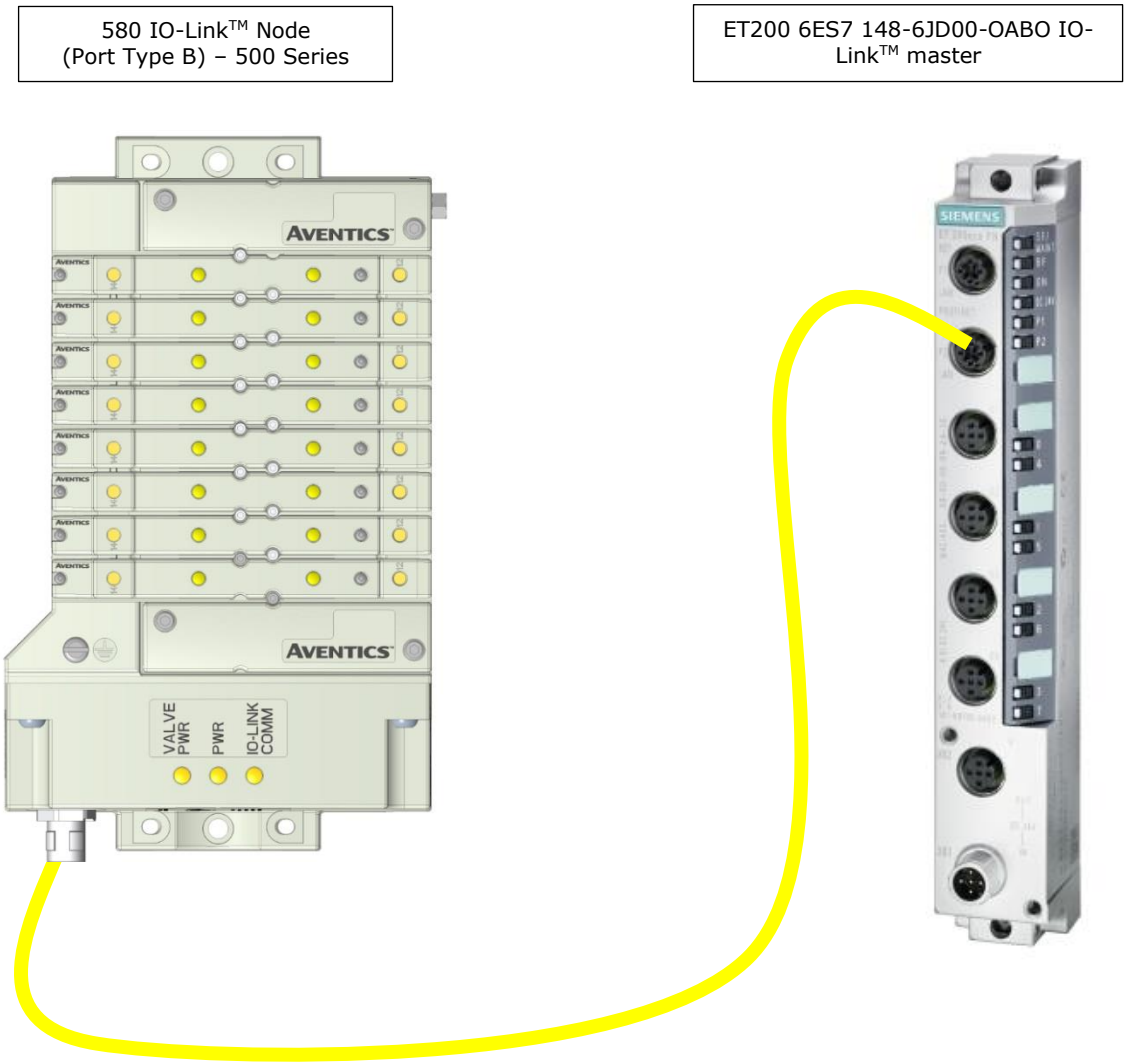
IFM_IOLINK:O.Data[196]	1		Decimal	SINT	Byte 0 of Chan 7
IFM_IOLINK:O.Data[196].0	1		Decimal	BOOL	Byte 0 of Chan 7
IFM_IOLINK:O.Data[196].1	0		Decimal	BOOL	Byte 0 of Chan 7

7. Configuration Example - Siemens Master

Example configuration for Siemens ET200 6ES7 148-6JD00-OABO IO-Link™ master and TIA Portal V13 (SP1 Update 9)
The Aventics 580 IODD file is required to complete the configuration.
Download the IODD file at;
http://www.asco.com/en-us/Pages/fieldbus-technical-document-search.aspx

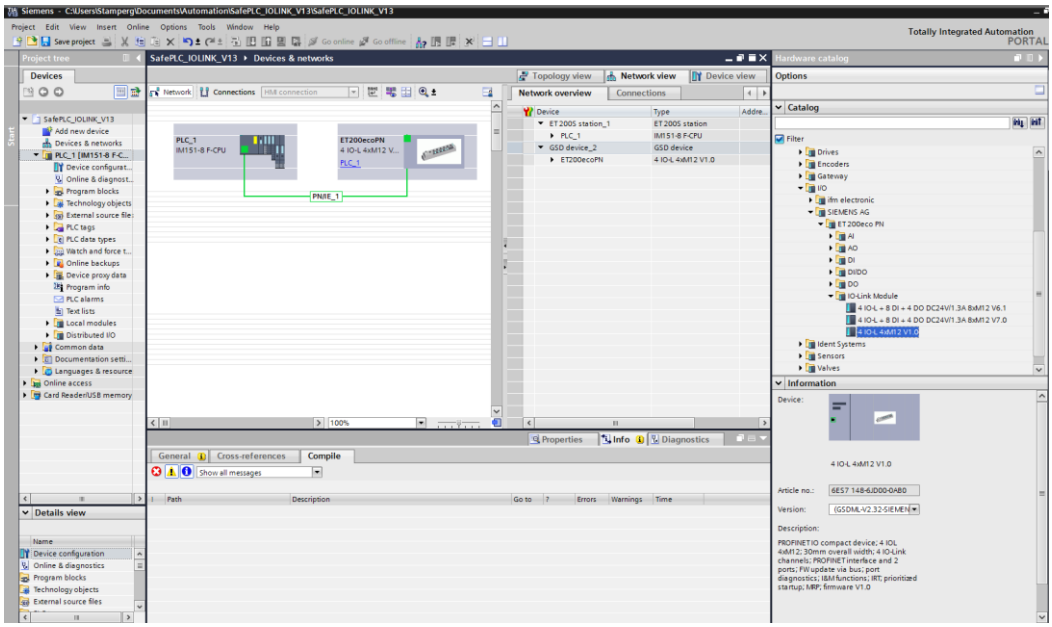
7.1 Connect the Aventics 580 IO-Link™ manifold

Connect the Aventics 580 IO-Link™ Module to the Siemens ET200 IO Link Master. In this example; port #1 is connected to a Type B IO link port using a 5 pin I/O cable.

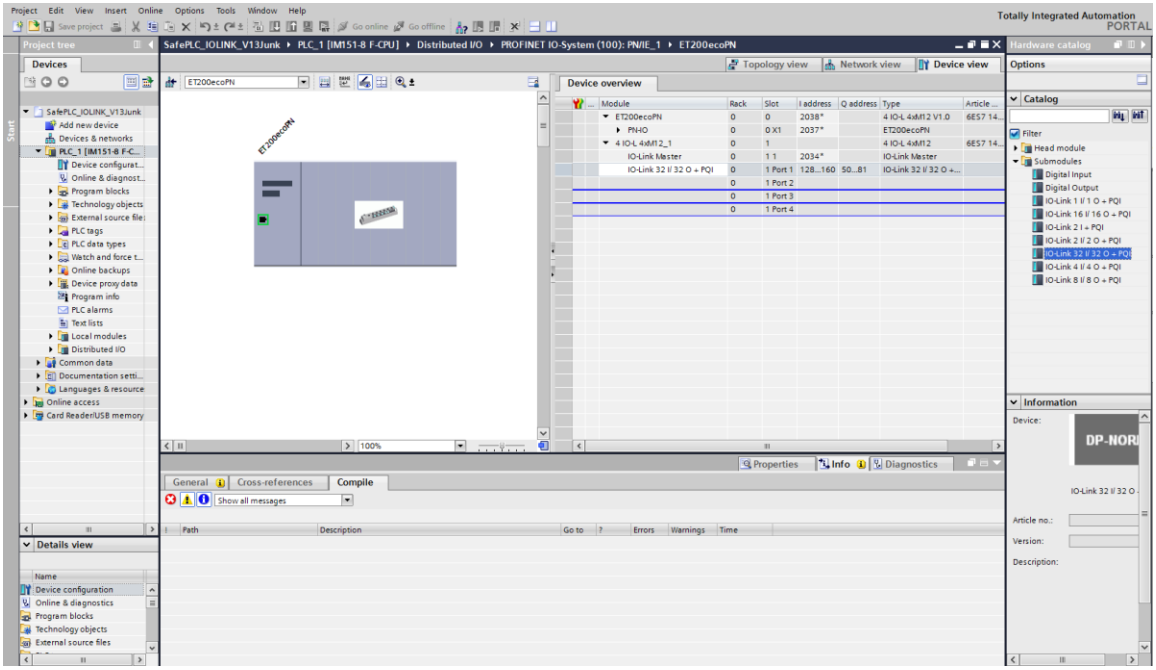


7.2 Create the PLC hardware configuration for the Siemens ET200 IO Link master.

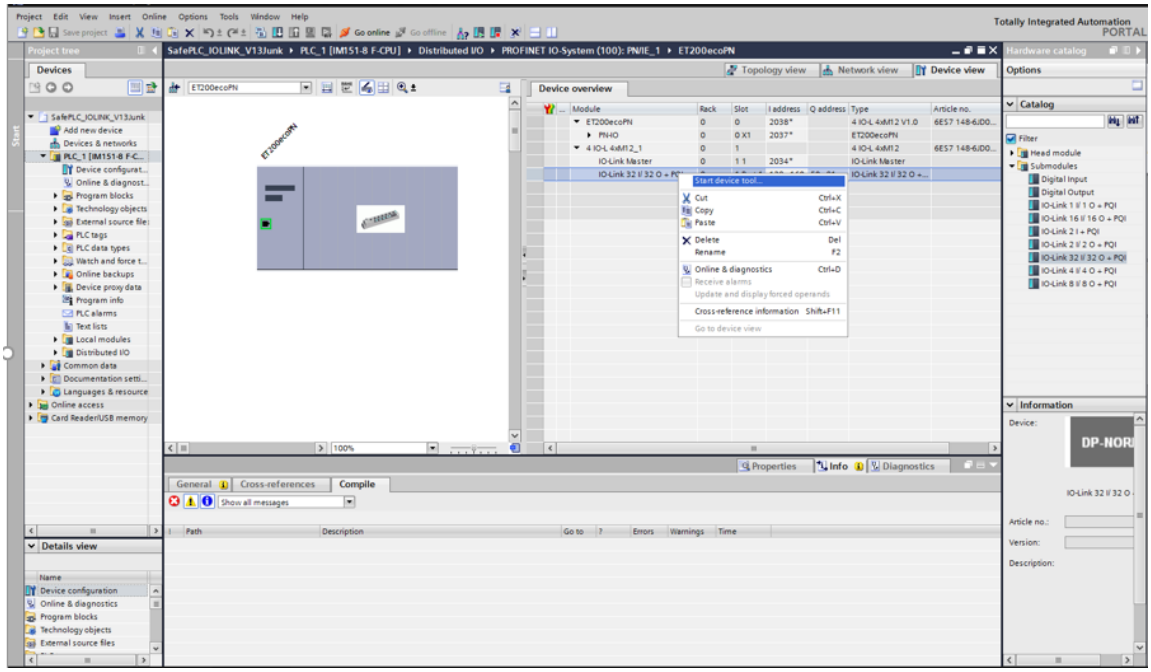
From the PLC hardware configuration select the Siemens ET200 IO link Master Module and connect it to the PLC Profinet port



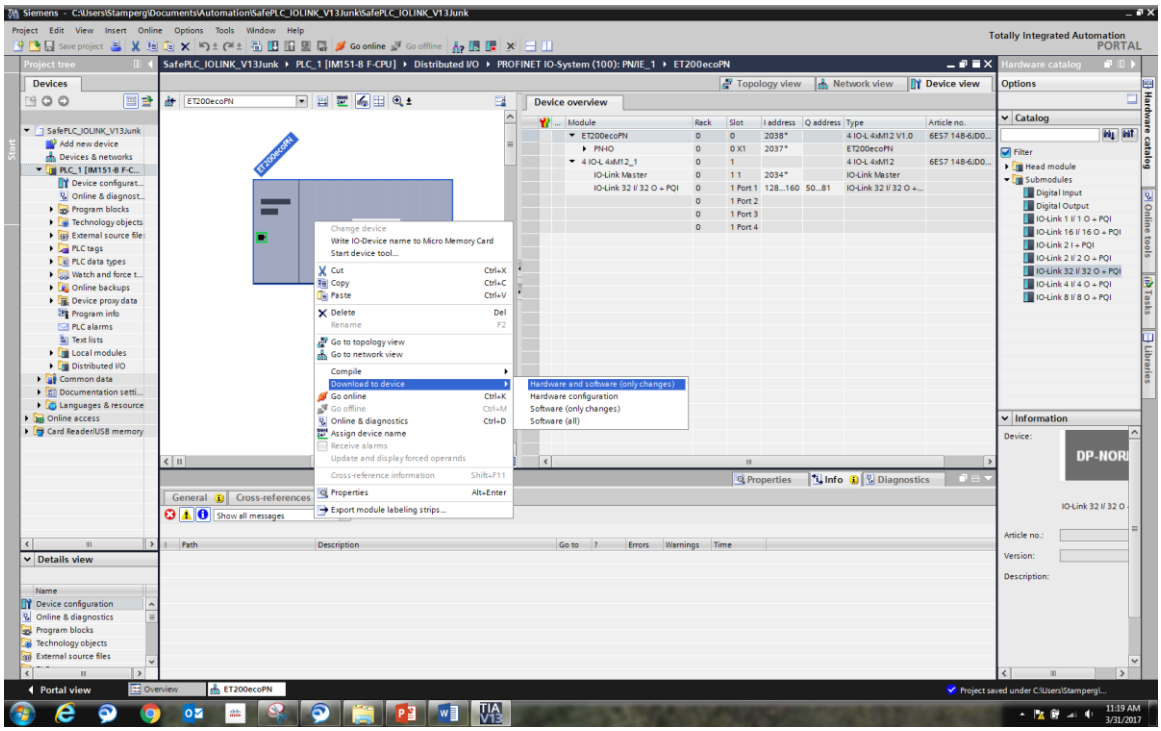
Open the ET200 Module and select IO-Link™ 32I/32O +PQI for the port that is connected to Aventics 580 manifold. Modify the input and output address ranges as necessary.



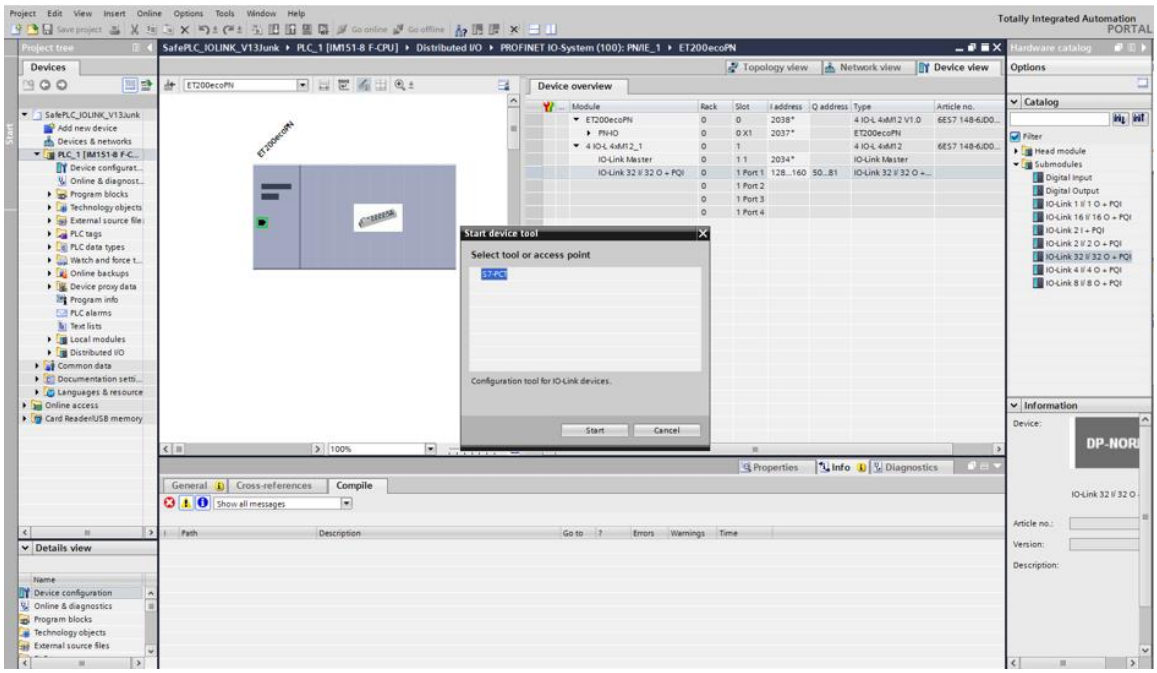
Select Port 1 (in this example) and right click. Select “Start device tool”.



Save and download the configuration to the Siemens controller.

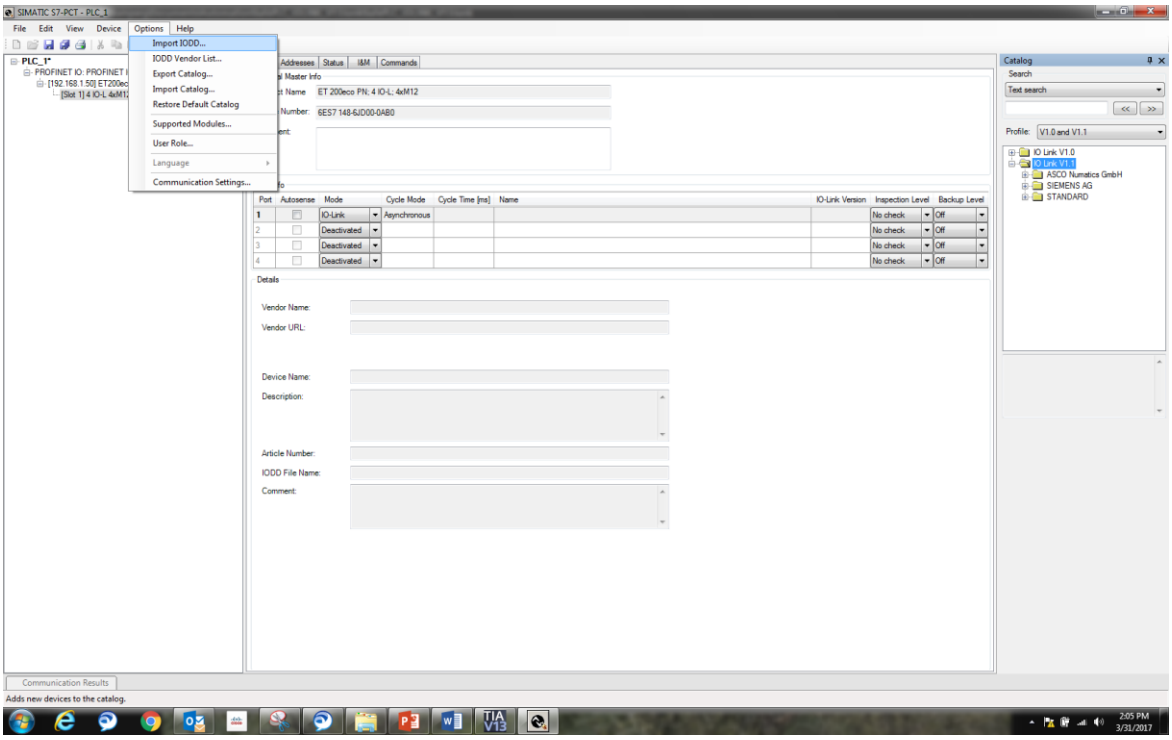


Select “S7PCT” to run the S7 Configuration Tool.

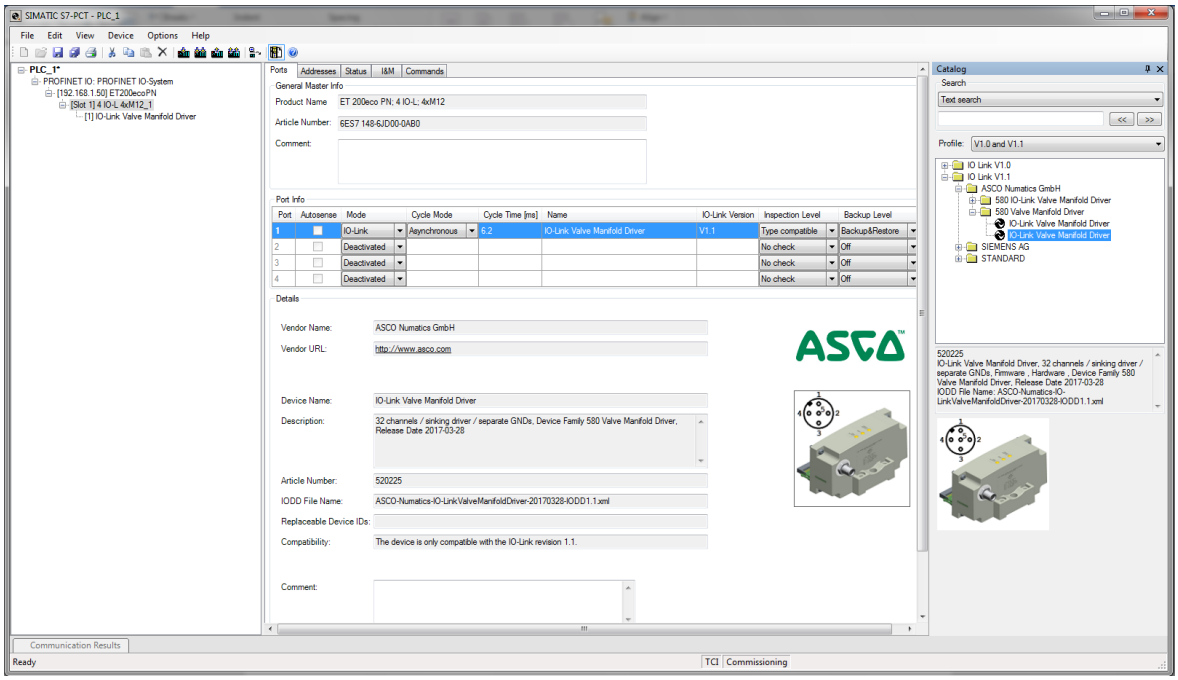


7.3 Install the Aventics 580 IO-Link™ IODD file.

The IODD file for the Aventics 580 I-O link manifold can be found at;
Under the options tab select import IODD file

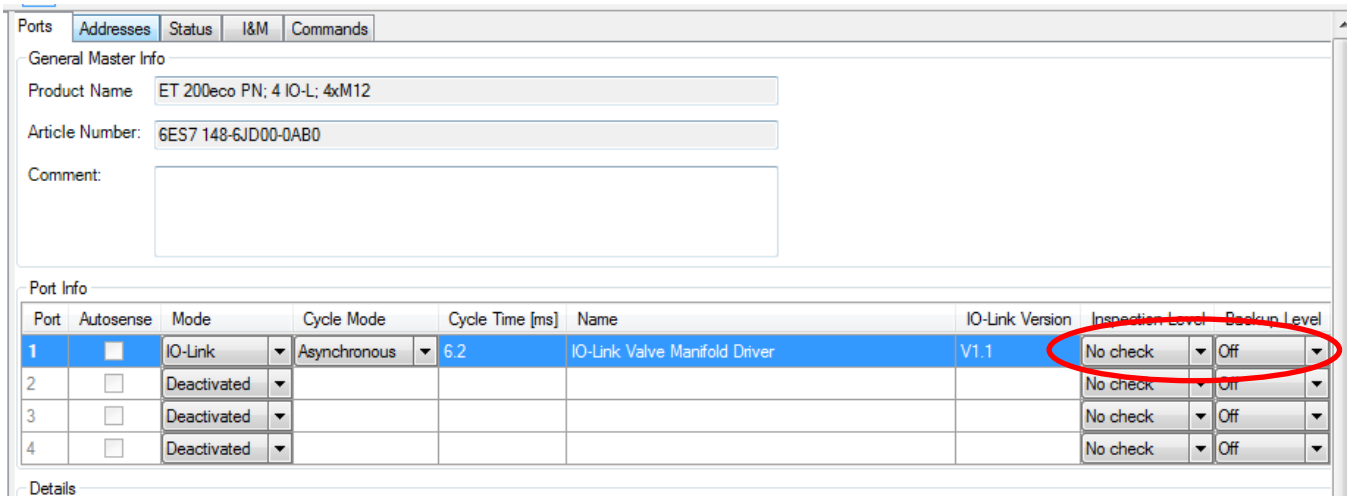


Once the IODD file is installed; select the Aventics 580 IO-Link™ Module from the IO-Link™ V1.1 folder

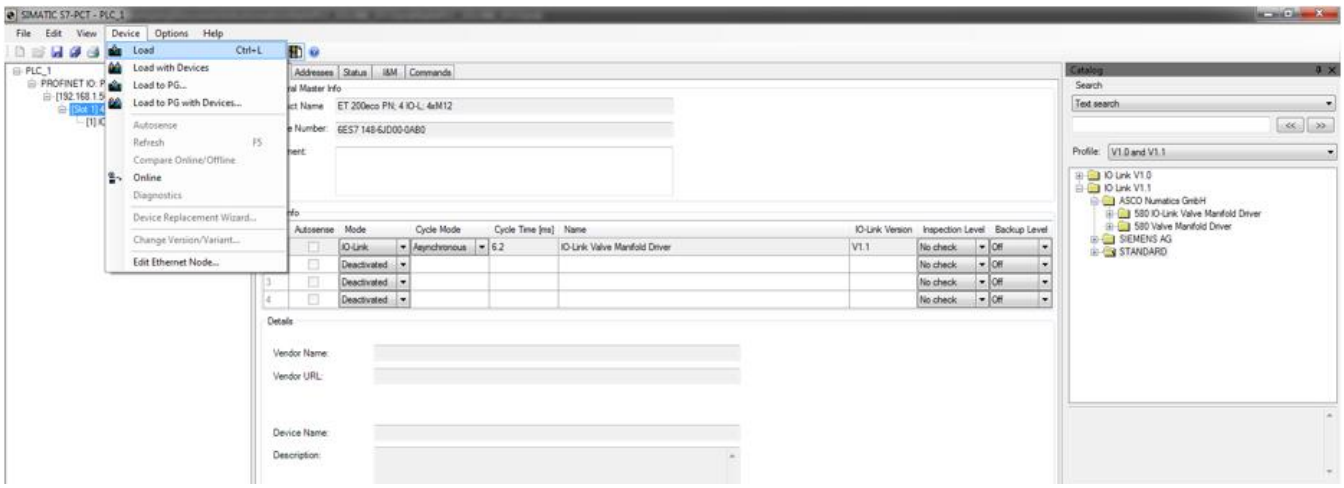


In this example the Type B (5 pin connection) was selected.

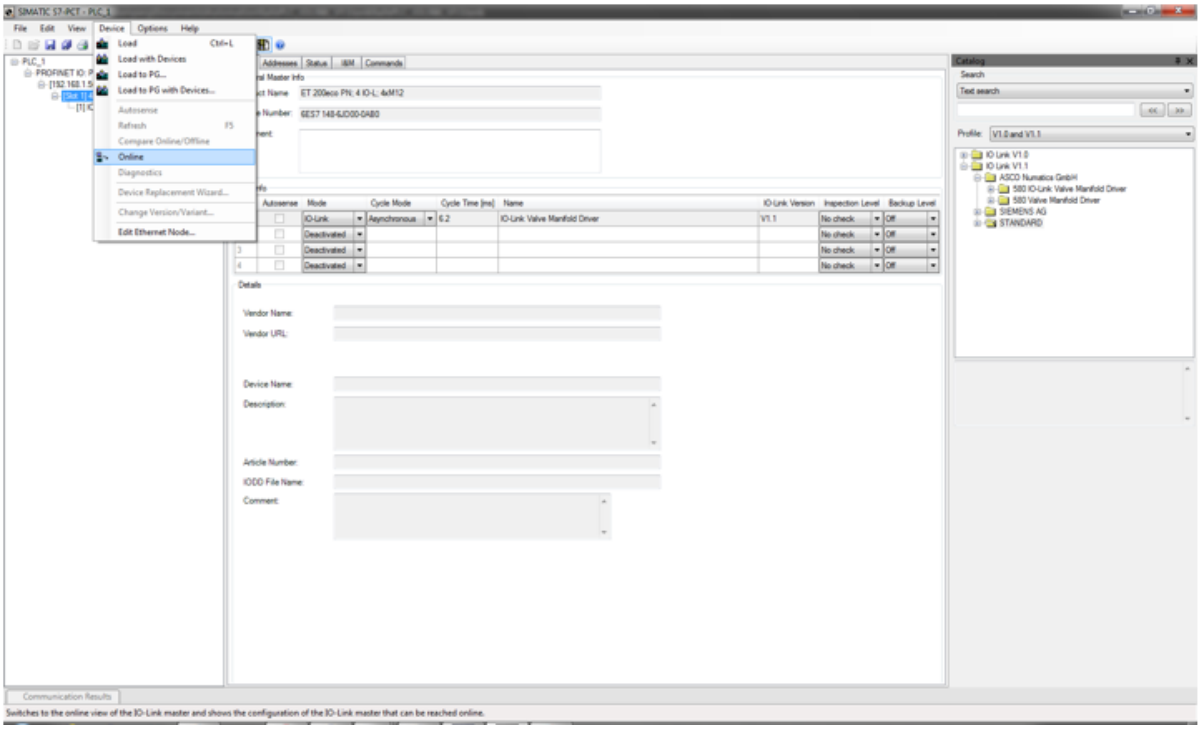
Change the "Type Compatible" and "Backup Procedure" attributes as shown



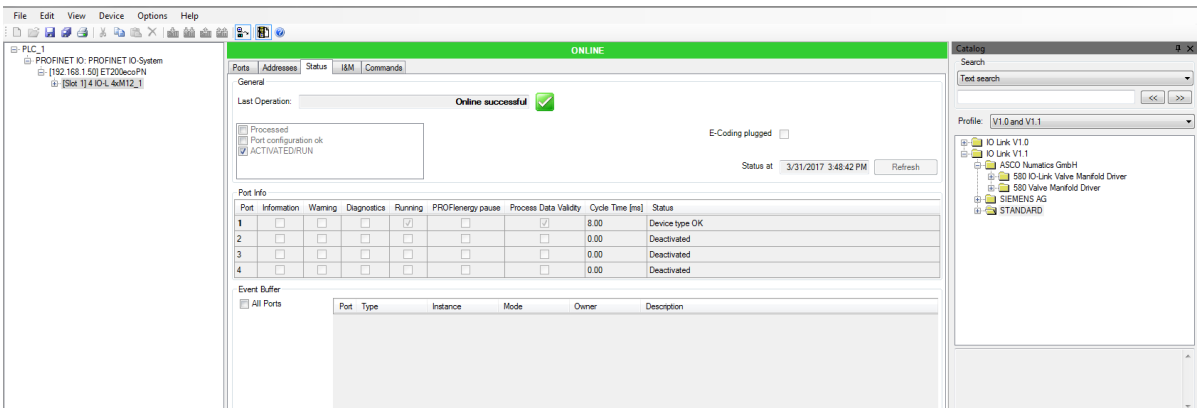
Select "Load" to download the configuration to the Siemens I-O Link master



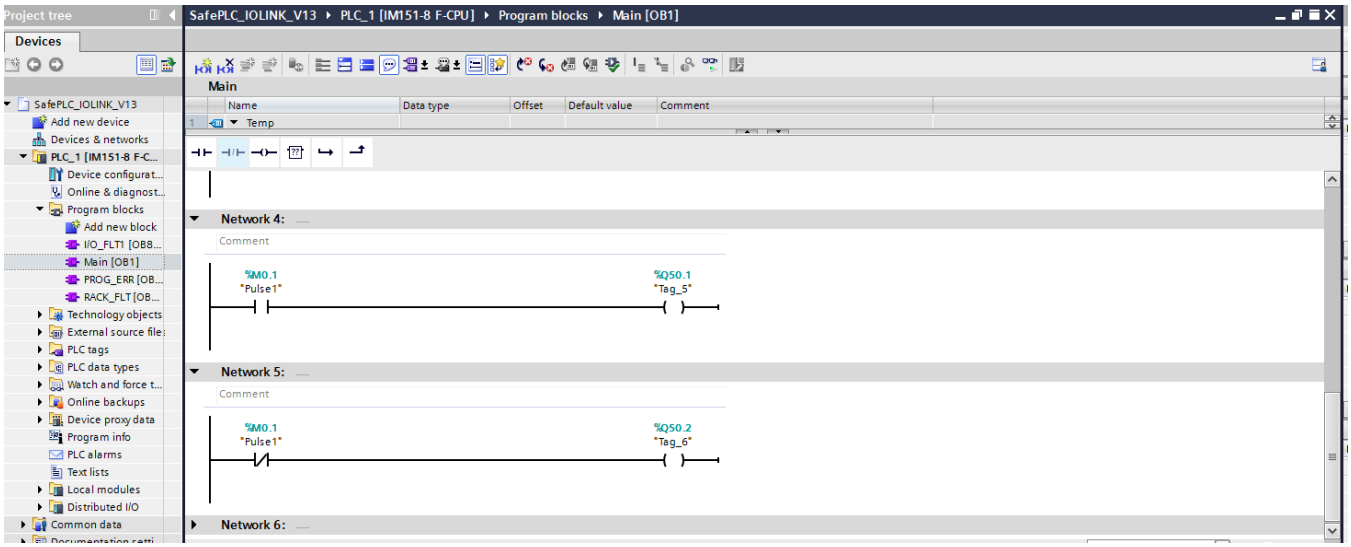
Select "Online" to see the module status



Siemens master module status



The module configuration is complete. The Aventics 580 valve outputs can be tested with PLC logic using the configured output addresses.



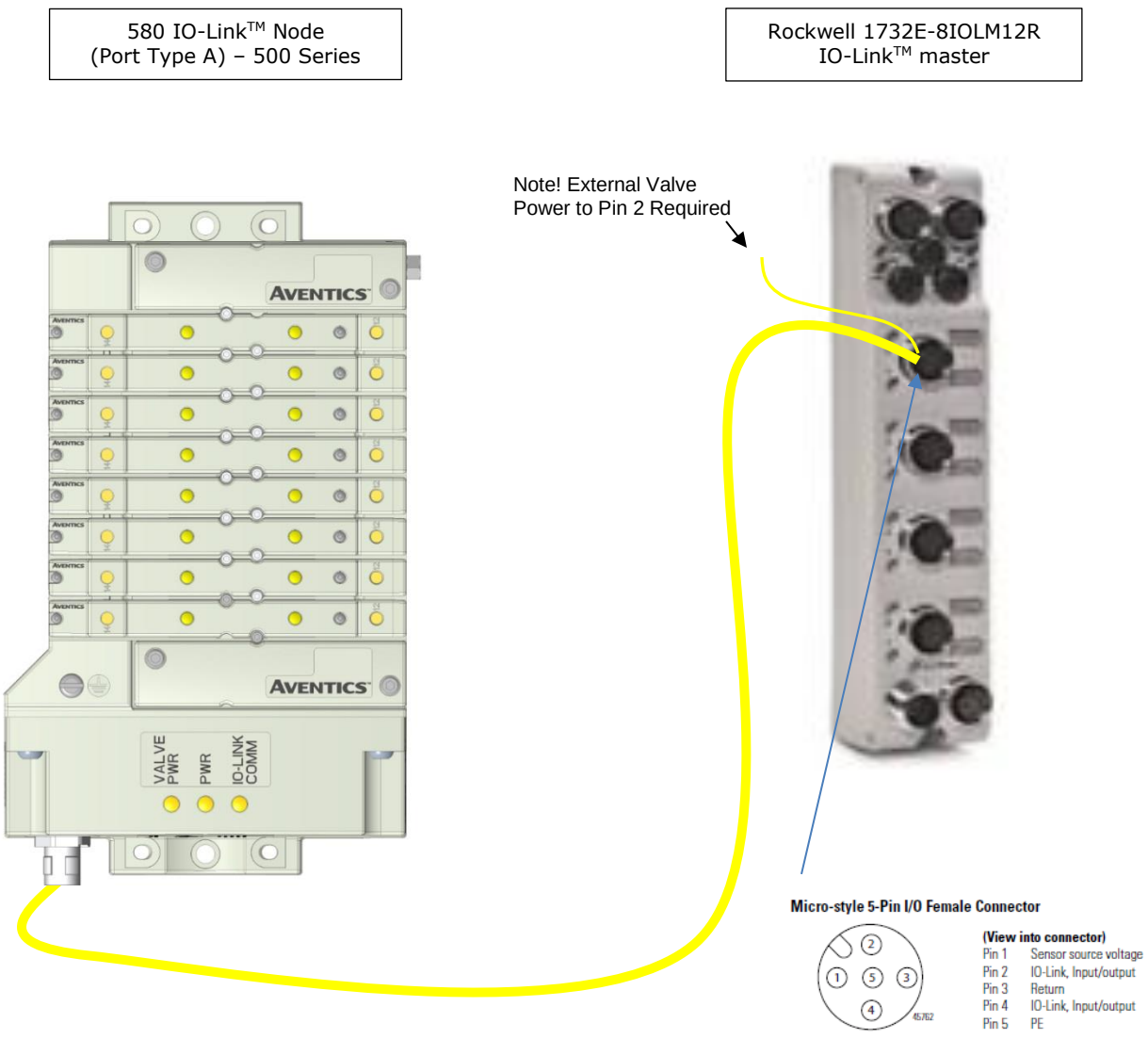
8. Configuration Example - Rockwell Master

Example configuration for Rockwell 1732E-8IOLM12R IO-Link™ master and Rockwell Studio 5000 (v30)

8.1 Connect the Aventics 580 IO-Link™ manifold

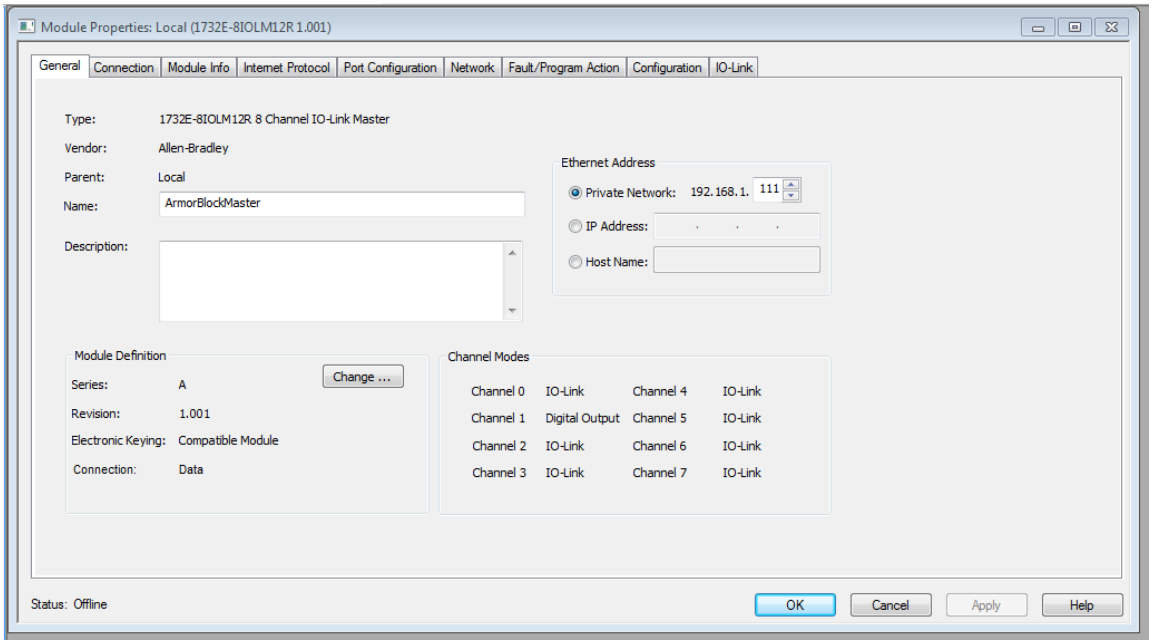
Connect the Aventics 580 IO-Link™ Module to the Rockwell IO Link Master. In this example; Channel 0 is connected to a Type A IO link port using a 4 pin I/O cable.

NOTE!
It is necessary to supply the 580 Valve Power (pin 2) externally since the Rockwell IO Link port's digital output (pin 2) is limited to 150ma max.

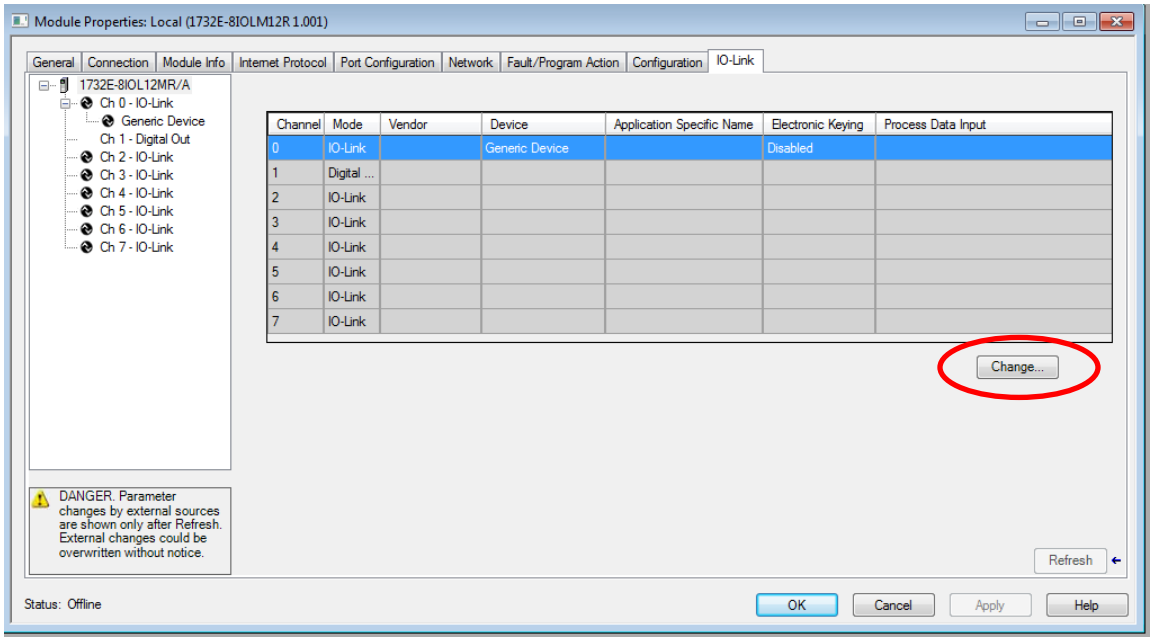


8.2 Create the PLC hardware configuration for the Rockwell 1732E-8IOLM12R IO Link™ master

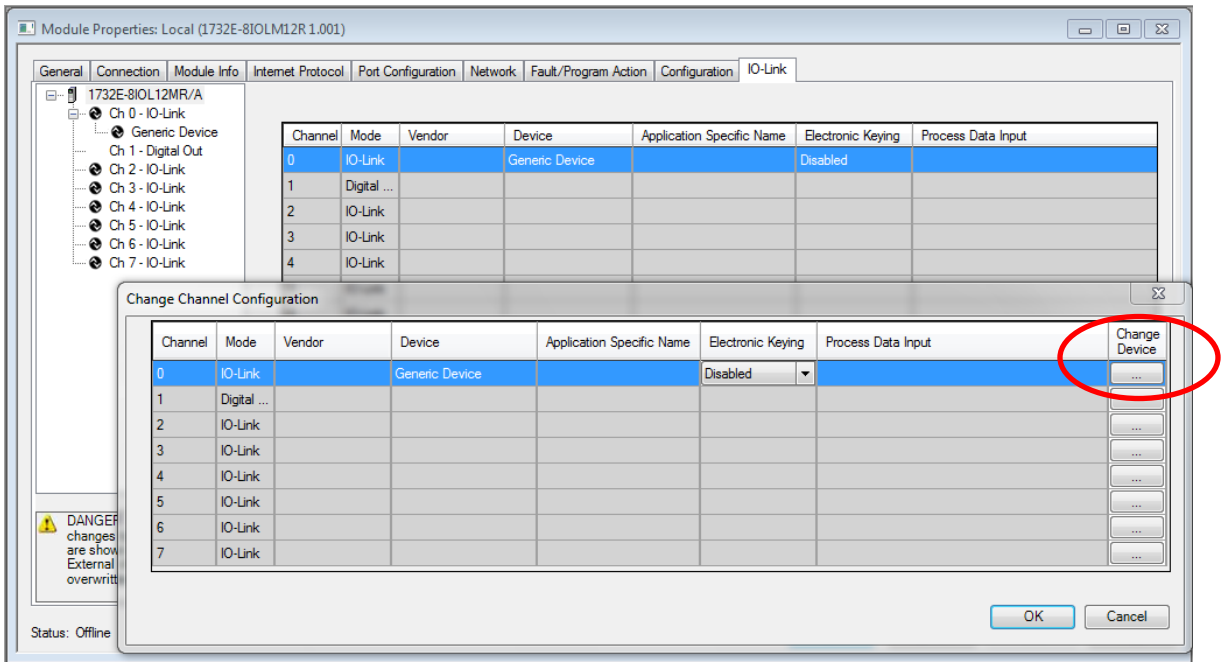
Select the IO Link™ Master's Module Properties select the IO-Link Tab.



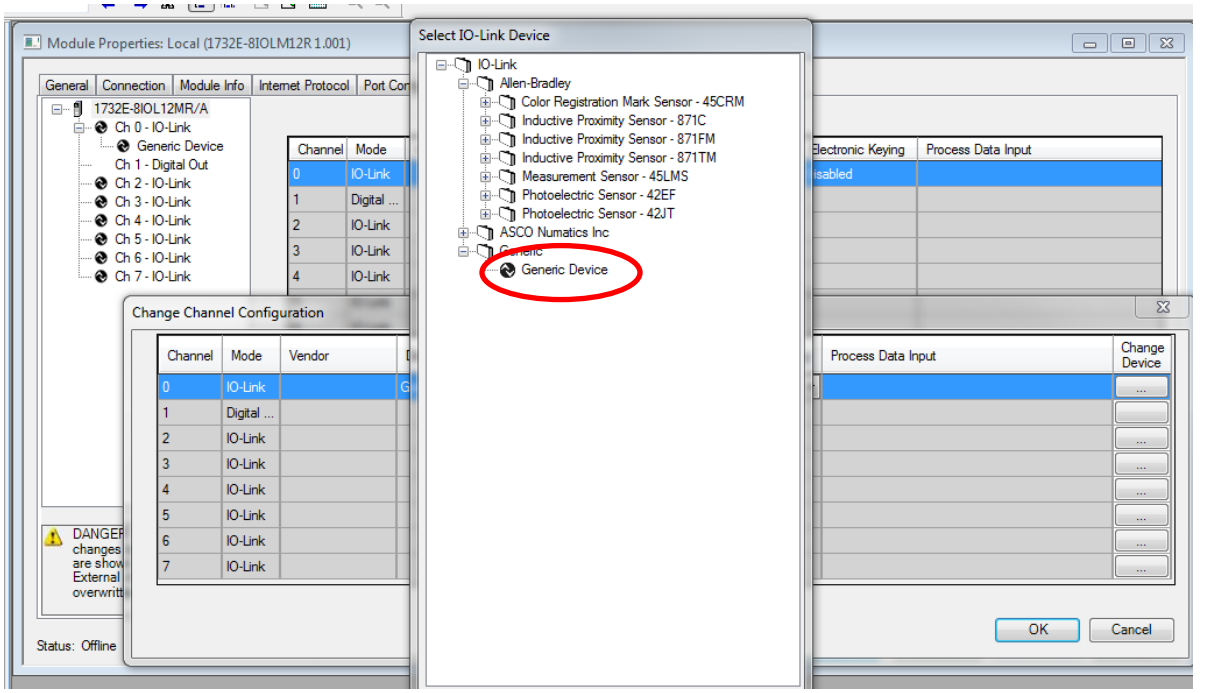
Select Change/Select IO-Link Tab



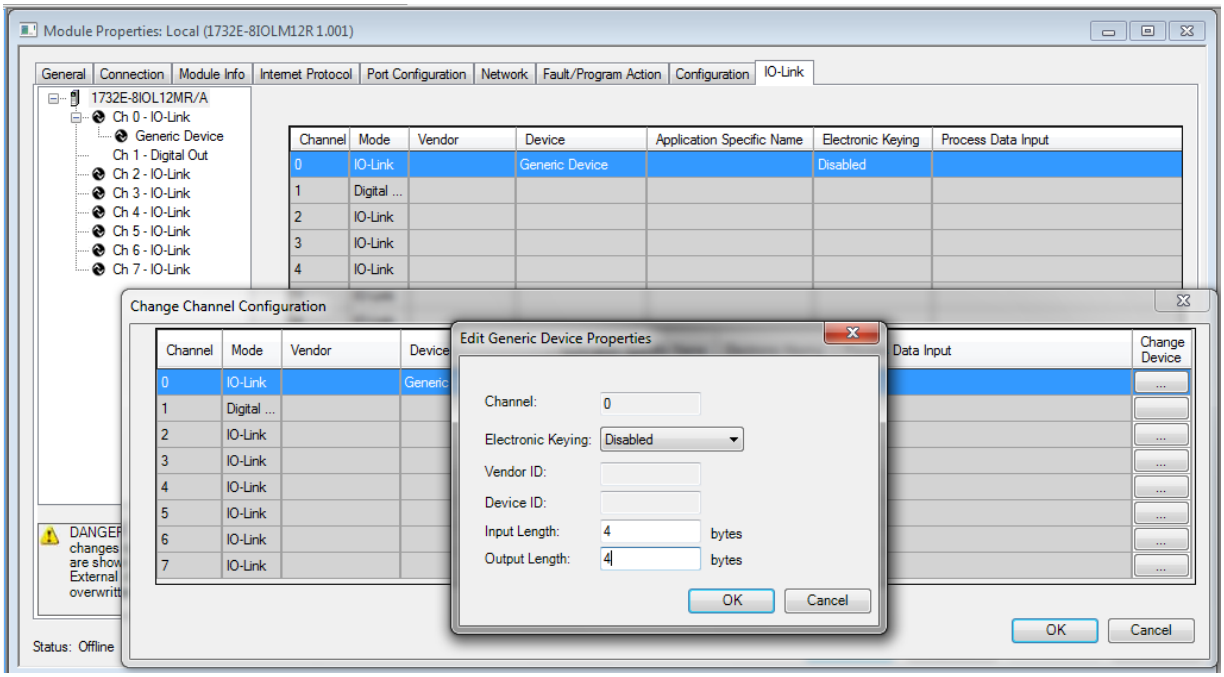
Select Change Device button for Channel 0



Select Generic Device



Select Electronic Keying to Disabled, Set Input and Output Length to 4 Bytes each. Save and download the configuration to the Rockwell controller.



The Armor Block Master's controller tags now identify four bytes of output data to control up to 32 coils on the 580 IO link manifold connected to Channel 0

ArmorBlockMaster:O.Ch0Data			SINT[4]
ArmorBlockMaster:O.Ch0Data[0]			SINT
ArmorBlockMaster:O.Ch0Data[1]			SINT
ArmorBlockMaster:O.Ch0Data[2]			SINT
ArmorBlockMaster:O.Ch0Data[3]			SINT

9. Appendix

9.1 System Specifications

Electrical	
Supply Voltage	Valves (501, 502, 503): 24 VDC + 10%, -15% Node: 24 VDC ± 10%
Current	Total current on the Power Connector ("Valves" and "Node" Pins) must not exceed 4 Amps.
Reverse Polarity	Reverse polarity is protection is provided on both Node and Valve power.
Recommended External Fuse	External fuses should be chosen depending upon manifold configuration. Please refer to power consumption chart on page 3-15 for additional fuse sizing information.
Spike Suppression	Output spike suppression is internally provided for valve outputs.
Valve Solenoid Coil Output Drivers	Maximum 0.5 Amps per output. All output points are short circuit protected and have internal spike suppression.
Operating Temperature for Electronic Components	-10 to 115°F (-23 to 46°C)

9.2 Troubleshooting Communication Node

Symptom	*Possible Cause*	*Solution*
The wrong valve solenoid coils are being energized.	Z-Board™ type mismatch. Single Z-Board™ present where double Z-Board™ expected or vice versa.	Check that correct Z-Board™ types are installed.
Valve outputs do not energize.	Output power not present or connected improperly on Power connector.	Check for 24VDC on the +24 VDC (Valves) pin of the M12 Power connector of the 580 Node.

9.3 Technical Support

For technical support, contact your local Aventics distributor. If further information is required, please call Aventics. Technical Support Department at (248) 596-3300.

Issues relating to network setup, PLC programming, sequencing, software related functions, etc. should be handled with the appropriate product vendor.

Information on device files, technical manuals, local distributors, and other Aventics, Inc. products and support issues can be found on the Aventics website at www.emerson.com