Moduflex ⬡IO-Link Modules
P2M2HBVL12400xxx

USER MANUAL

Parker

Important !

Before carrying out any service work, ensure that the valve and manifold have been vented. Remove the primary supply air hose to ensure total disconnection of the air supply before dismantling valves or blank connection blocks.

NB !

All technical data in this catalogue is typical only.

The air quality is decisive for the valve life: see ISO 8573.

⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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Product general overview

Purpose of the Moduflex IO-Link Module

The Moduflex IO-Link module has been designed to be connected to either an IO-Link Master Class A or Class B
It can be used with either the Moduflex Valve System, H Micro or H ISO 15407-2 and 5599-2 Valves Series
It can controls up to 24 pilot solenoids valves depending on the valve series it is connected to, as shown on the illustration below:

IO-Link Class A

P2M2HBVL12400A13
P2M2HBVL12400A42
P2M2HBVL12400A43

IO-Link Class B

P2M2HBVL12400B25

Moduflex Valve
Up to 19 pilots
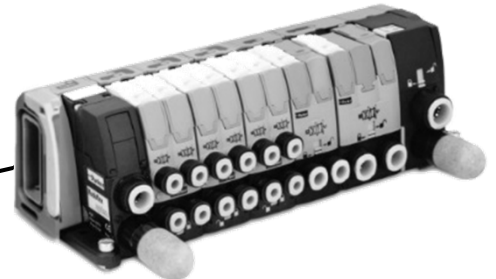
H Micro
Up to 24 pilots
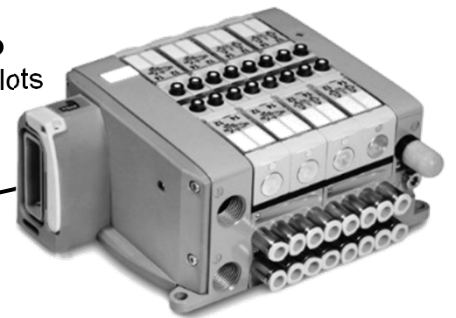
**H ISO 15407-2
Sizes 02 & 01**
Up to 24 pilots
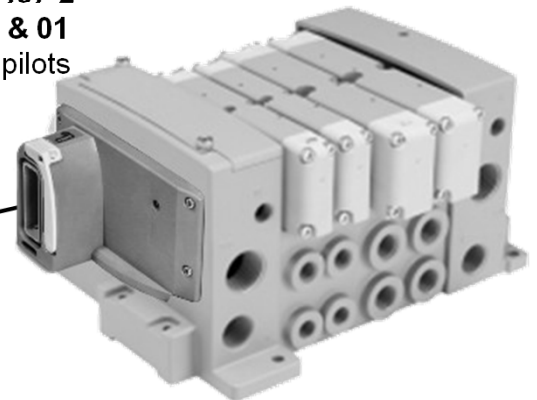
**H ISO 5599-2
Sizes 1, 2 & 3**
Up to 24 pilots
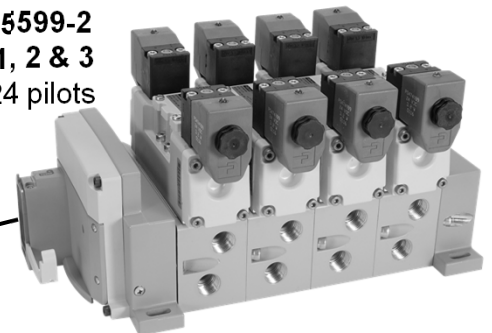
Module assembly / disassembly
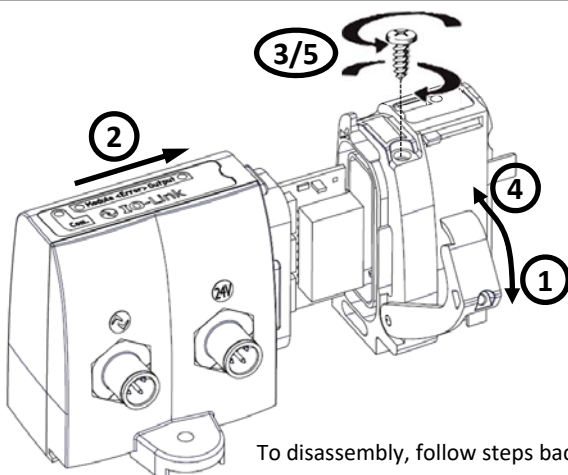
To disassembly, follow steps backward

For details on appropriate valve adaptor to use, please refer to the respective valve series technical catalogue and instruction sheets.

Technical Data

IO-Link module electrical specifications

Description	Value
IO-Link power supply	According to IO-Link standard
Speed communication	Com 2 – 38 kBd
Auxiliary power supply	20,4 Vdc to 26,4 Vdc
Current limit per channel	150 mA
Max. current limit	4 A
Polarity inversion protection	YES
Short circuit protection	YES
Operating temperature	0°C to +55°C
Storage temperature	-25°C to +70°C
Shock	According to IEC 60068-2-27:2008
Vibration	According to IEC 60068-2-6:2007
EMC	According to EN 55011 & EN 61000-4-2 up to -4-6

Auxiliary power consumption calculation

Depending on the valve range the module is connected to, pilot solenoids have not the same power consumption. In order to determine the minimum required power to supply, you can use the table below:

Valve Range	Number of Pilots simultaneously powered	Power	Total
Moduflex Valve System		x 40 mA	mA
H Micro		x 40 mA	mA
H ISO - 15407-2 - Sizes 02 & 01		x 40 mA	mA
H ISO - 5599-2 - Sizes 1, 2 & 3		x 133 mA	mA
		Total :	**mA**

Solenoid Pilots addressing and Process mapping

IO-Link Module addressing used with Moduflex Valve System

The Moduflex IO-Link module used with Moduflex Valve System can handle up to 19 pilot solenoid valves. Addressing will be done as shown below:
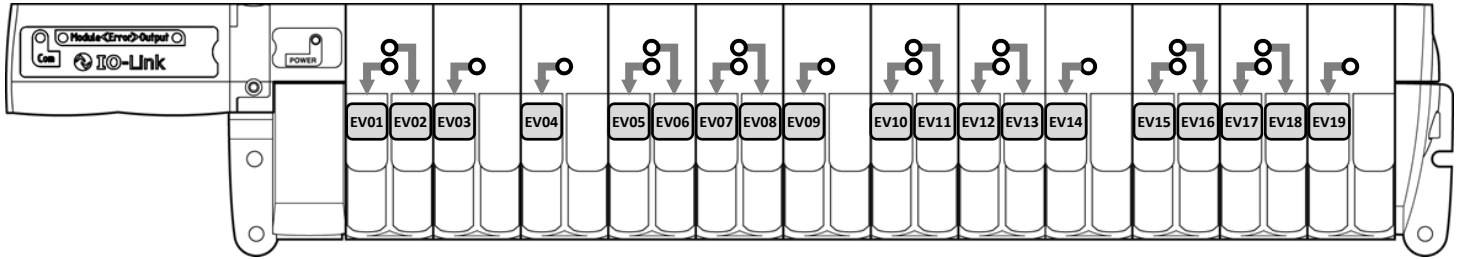
PLC Process outputs data mapping

	7 ...... 3 2 0
Byte 0	EV08 . . . . EV01
Byte 1	EV16 . . . . EV09
Byte 2*	EV24 . . . . . EV20 EV19 ... EV17

* Byte 2 / Bits 3 to 7 are not connected to valves with Moduflex Valve Range

IO-Link Module addressing used with H Micro Valve Series

The Moduflex IO-Link module used with H Micro Valve Series can handle up to 24 pilot solenoid valves. Addressing will be done as shown below:
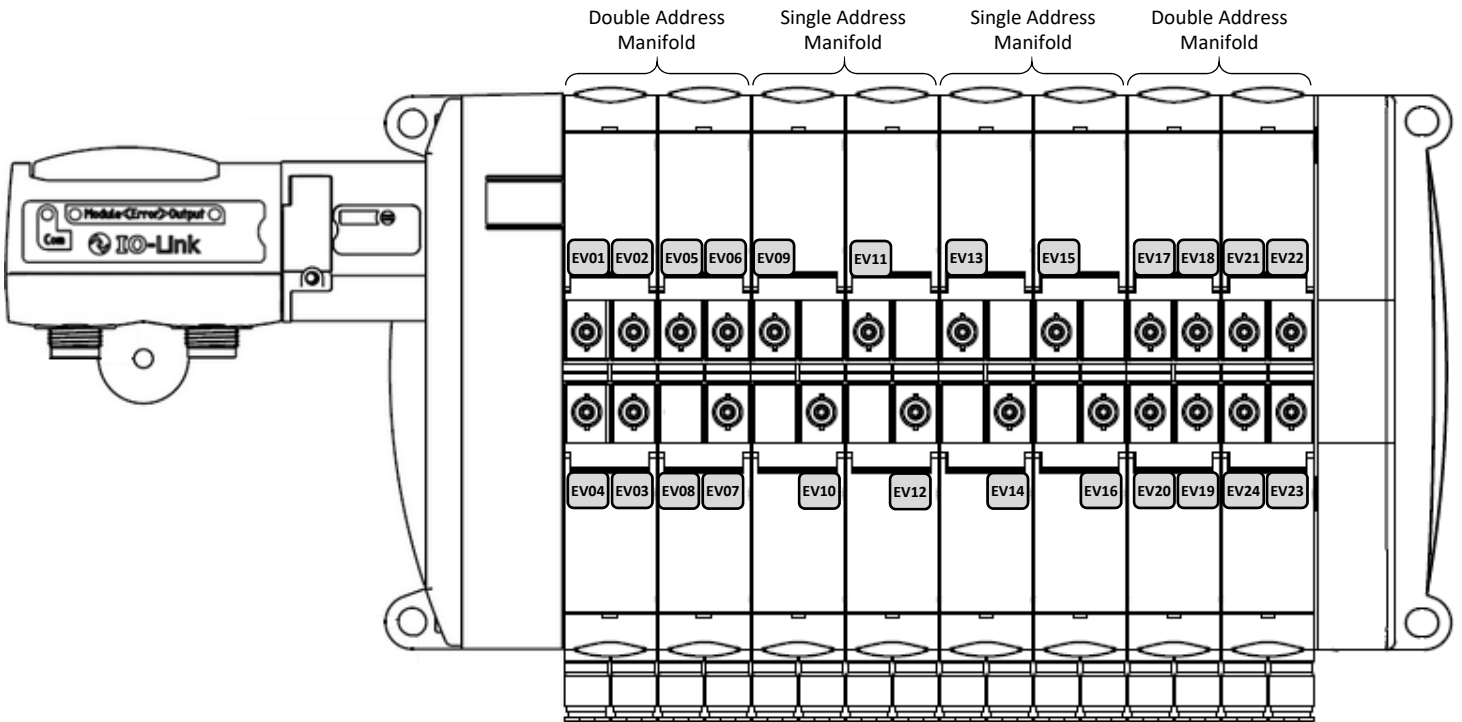
PLC Process outputs data mapping

	7 0
Byte 0	EV08 . . . . EV01
Byte 1	EV16 . . . . EV09
Byte 2	EV24 . . . . EV17

IO-Link Module addressing used with H ISO Series – 15407-2

The Moduflex IO-Link module used with H ISO Series – 15407-2 – sizes 02 & 01 – can handle up to 24 pilot solenoid valves. Addressing will be done as shown below:
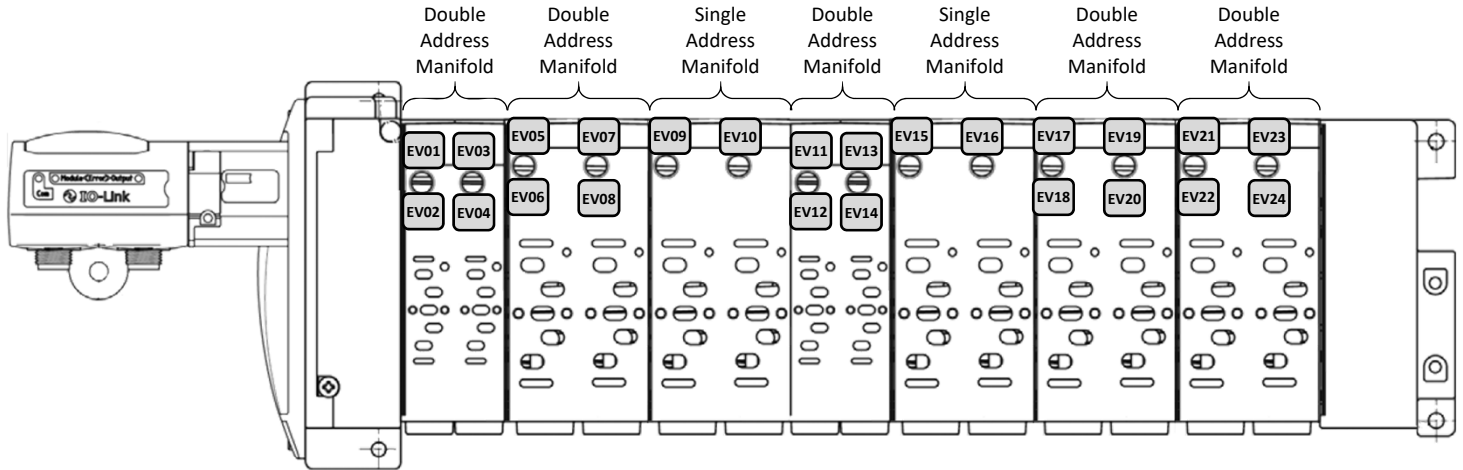
PLC Process outputs data mapping

	7 0
Byte 0	EV08 . . . . EV01
Byte 1	EV16 . . . . EV09
Byte 2	EV24 . . . . EV17

IO-Link Module addressing used with H ISO Series – 5599-2

The Moduflex IO-Link module used with H ISO Series – 5599-2 – sizes 1, 2 & 3 – can handle up to 24 pilot solenoid valves. Addressing will be done as shown below:

PLC Process outputs data mapping

	7 0
Byte 0	EV08 . . . . EV01
Byte 1	EV16 . . . . EV09
Byte 2	EV24 . . . . EV17

IO-Link module connection

IO-Link and Auxiliary power connection

Standard male M12 type A

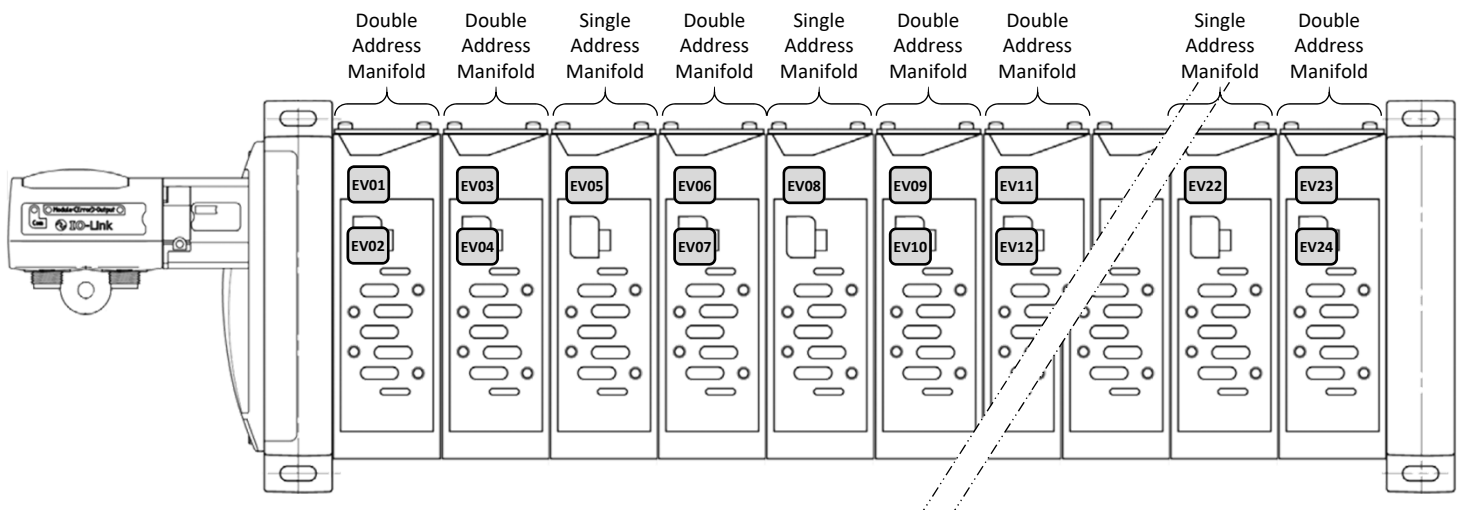Use of standard manufactured cables available from usual electrical supplier is recommended.

Notes:
- Auxiliary power for solenoids can be wired allowing to turn outputs OFF while communications remaining active.
- 3 Class A variants (…A13, …A42 & …A43) are available to follow different M12 supplier connections using standard cable.

Class B   **Class A**
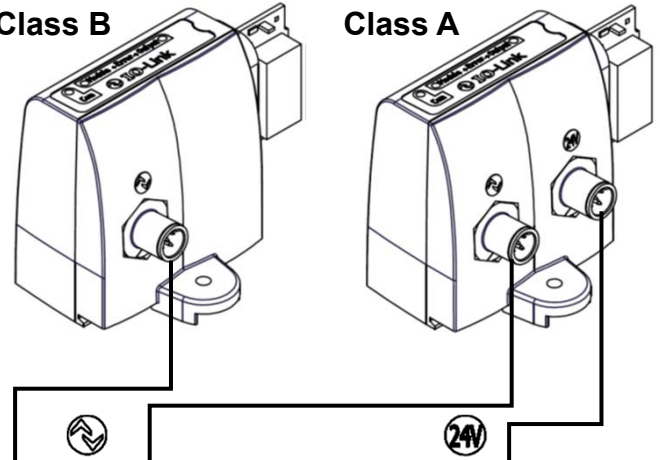
Legend

Symbol	Description
L+	IO-Link Power Supply "+"
L-	IO-Link Power Supply "-"
C/Q	IO-Link communication
Aux +	Auxiliary Power Supply 24 Vdc
Aux -	Auxiliary Power Supply 0 Vdc

Class B	Class A	M12 Pin's	Class A		
5 Pin's	3 Pin's		3 Pin's		5 Pin's
P2M…B..	P2M…A..		P2M…A13	P2M…A43	P2M…A42
L+	L+	1	Aux +	not used	not used
Aux +	-	2	-	-	Aux –
L-	L-	3	Aux –	Aux –	not used
C/Q	C/Q	4	not used	Aux +	Aux +
Aux -	-	5	-	-	not used

⬦SAFETY IO-Link module connected to SAFE power for valve control

The Moduflex IO-Link Module can be powered from a SAFE 24Vdc auxiliary source in PP or PM mode as grounds are isolated.

Class A
P2M2HBVL12400**A13**
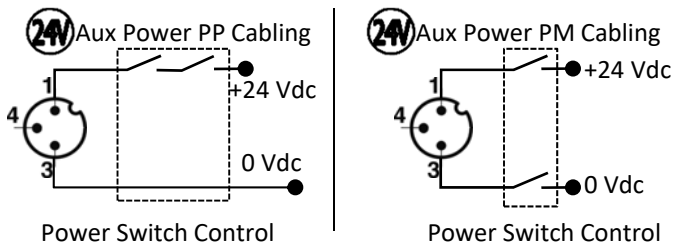
Aux Power PP Cabling — +24 Vdc / 0 Vdc — Power Switch Control

Aux Power PM Cabling — +24 Vdc / 0 Vdc — Power Switch Control

Class B
P2M2HBVL12400**B25**

Aux Power PP Cabling — +24 Vdc / 0 Vdc — Power Switch Control

Aux Power PM Cabling — +24 Vdc / 0 Vdc — Power Switch Control

Class A
P2M2HBVL12400**A43**

Aux Power PP Cabling — +24 Vdc / 0 Vdc — Power Switch Control

Aux Power PM Cabling — +24 Vdc / 0 Vdc — Power Switch Control

Class A
P2M2HBVL12400**A42**

Aux Power PP Cabling — 0 Vdc / +24 Vdc — Power Switch Control

Aux Power PM Cabling — 0 Vdc / +24 Vdc — Power Switch Control
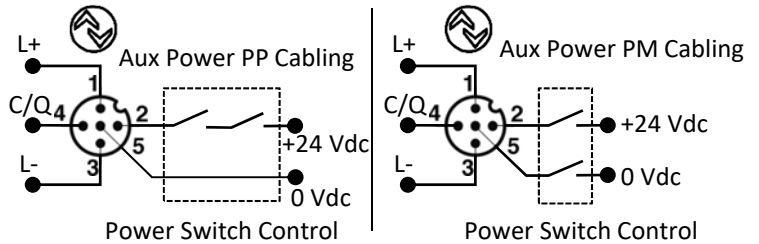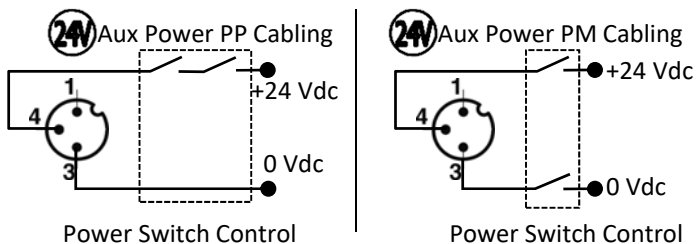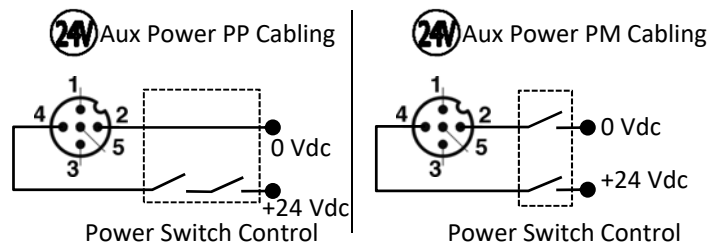
Note: Usage of this module with OSSD test pulsed as power source could not be possible unless the pulse can be adjusted to longer than 8ms. For additional guidance for this case of use, please contact your PARKER customer service.

Note : Please check max. power available from the source. Refer to the "*Auxiliary power consumption calculation*" section

Configuration IODD File

IODD file can be downloaded from IODD Finder or the Moduflex IO-Link web site:
- https://ioddfinder.io-link.com
- www.parker.com/pde/io-link

Diagnostic

Local diagnostic through LED:

The Moduflex IO-Link module offers a local diagnostic through 4 LED's status with interpretation described in the table below:

Com Green LED			Module ↔ Error Red LED			Error → Output Red LED			POWER Green LED		
LED Status	**Description**	**Solving**	**LED Status**	**Description**	**Solving**	**LED Status**	**Description**	**Solving**	**LED Status**	**Description**	**Solving**
OFF ○	IO-Link L+ / L- line not powered	Check IO-Link power supply from IO-Link Master (pin's 1 & 3)	OFF ○	Standard mode (No error active)	N/A	OFF ○	Standard mode (No error active)	N/A	OFF ○	Auxiliary power failure < 18V or > 28,5V	Check Auxiliary Power Supply
ON ●	IO-Link L+ / L- line powered IO-Link master port set as SIO mode	Set IO-Link master channel in IO-Link mode	ON ●	24 Vdc Auxiliary power missing or any active malfunction	Check Auxiliary power supply. If auxiliary power supply OK, module must be replaced	ON ●	Any outputs driver error (Auxiliary power error, overload, short circuit, over temperature, …)	If auxiliary power OK (see Power LED status), check error messages and related troubleshooting	ON ●	Standard mode (Auxiliary power within normal range 20,4V* to 26.4V*)	N/A
Blinking ✱ 90% 1s	IO-Link communication active	N/A							Blinking ✱ 50% 50% 1s	Auxiliary Power out of range (Warning level*)	Check Auxiliary Power Supply Check/reset adjusted values

IO-Link Communication

Module Diagnostic

Outputs (valves) Diagnostic
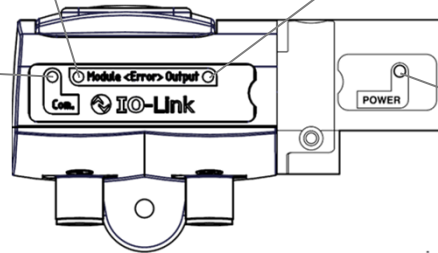
*): Warning level values could have been modified by the user! Default values can be restored at any time (please refer to "Aux power management" section)

Auxiliary Power Supply

Diagnostic through network via process inputs data:

The Moduflex IO-Link module offers diagnostic data transmitted to the PLC as inputs process data through the IO-Link master:

PLC Process input data mapping

	7 0	
Byte 0	Diag 7 . . . . Diag 0	
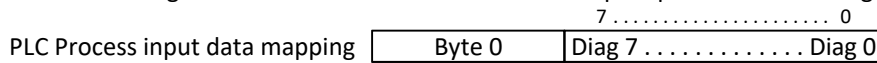
Diag bit	Error message	Detail
Diag 0	Fail-Safe Status	Acknowledgment Required
Diag 1	Auxiliary Voltage Warning	Auxiliary Voltage Out of range. Check Auxiliary Power line
Diag 2	Auxiliary Voltage failure	Auxiliary Voltage Out of order. Check Auxiliary Power source
Diag 3	Module Failure	Switch OFF / ON auxiliary power. If error message persists, replace the module
Diag 4	Module Over-Temperature	Switch OFF / ON auxiliary power. If error message persists, replace the module
Diag 5	Module Over-Load	Check overall Pilot Solenoid valves. If error message persists, replace the module
Diag 6	Pilot Solenoid(s) Short Circuit	Check faulty pilot solenoid valve(s), replace if necessary
Diag 7	Outputs Stage Failure	Switch OFF / ON auxiliary power. If error message persists, replace the module

Errors caused by solenoid(s) must be fixed first and then the error must be acknowledged:
- by switching OFF/ON Auxiliary power supply (once error is fixed)
- by sending the "Acknowledge" command:

Command	Name	Description
0xA0	Acknowledge	If no error is pending, the failsafe state on the device is left and the outputs are switched according to process data

IO-Link

Aux power management

Power supply diagnostic through LED

The Moduflex IO-Link module monitors the auxiliary power supply voltage and manages two levels of diagnostic; failure or out of normal range. The normal range can be modified through parameter data.

Auxiliary Power Supply

| POWER	**Green LED**	
LED Status	**Description**	**Solving**
OFF ○	Auxiliary power failure < 18V or > 28,5V	Check Auxiliary Power Supply
ON ●	Standard mode (Auxiliary power within normal range 20,4V* to 26.4V*)	N/A
Blinking ✳ 50% 50% ◄──► 1s	Auxiliary Power out of range (Warning level*)	Check Auxiliary Power Supply Check/reset adjusted values

*): Warning level values could have been modified by the user! Default values can be restored at any time (please refer to "Aux power management" section)

To restore default value (factory setting), please refer to "System Commands" section

LED function details:
- ''Auxiliary power'' error is active from 0 to 18 Vdc or > 28,5 Vdc
- When ''Auxiliary power error'' is active, ○**Module ←Error** LED is solid red

Power supply diagnostic thought IO-Link and process data mapping

	7 6 5 4 3 **2 1** 0
PLC mapping Process input	Byte 0	Diag 7 ……………………. Diag 0

- Diag 1 : Auxiliary Voltage out of range, Alarm. Range can be set via parameter data
- Diag 2 : Auxiliary Voltage failure. < 18 V or > 28,5 V. Acknowledge is required (Diag 0)

Default values

Normal auxiliary power supply range is set as   20,4V < Aux power supply < 26,4V

Auxiliary power supply range adjustment

Aux power supply range is adjustable using output parameters and value is available as parameter input.

Index	Sub index	Data Type	Bit length	Access	Name	Description
67	0	Uint16	16	Read	Current Aux. voltage value	Aux voltage, unit is mV
70	0	Record	32	Read / Write	Aux. voltage warning levels	Levels for AUX voltage warning Unit is mV First 16 bits: Low level value (default 20400) Second 16 bits: High level value (default 26400)

Restore default values

Default values can be sestored by using the system command below:

Commande	Nom	Description
0x82	Restore factory setting	Reset parameters to default values

Switching cycle counters management

The Moduflex IO-Link module manages 24 counters, one for each output, to provide solenoid's switching cycle. Those counters are automatically stored onto an EEPROM every 30 minutes.

In case of IO-Link power supply turned to OFF, the current counters' value will be lost and the latest stored values onto the EEPROM will be restored as current values at next start-up. To prevent this, before an IO-Link power off between two automatic savings, the command below allows to force the storage of the current counters' value

Command	Name	Description
0xA1	Store switching cycles	When this command is executed, the current values of the 24 switching cycle counters are stored into EEPROM.

Counters values are available through input parameters

Index	Sub index	Data Type	Bit length	Access	Name	Description
64	1 to 24	Array of Uint32	24 x 32 = 768	Read	Switching Cycles	Switching cycle counter: • Sub index 1 refers to cycle counter of the first output • Sub index 24 refers to the cycle counter of the 24th output

Counters values can be individually reset to 0

Index	Sub index	Data Type	Bit length	Access	Name	Description
65	0	Uint24	24	Write	Clear Switching Cycles	Clear the switching cycle counters. For every bits set in this parameter, the according counters are set to zero. The least significant bit refers to the first output (EV01) Values stored onto the EEPROM are automatically reset too

Over current or over temperature management

The Moduflex IO-Link module monitors the current & temperature values of the 24 outputs. As soon as a short circuit or over temperature is detected, the module switches to failsafe mode and all outputs are switched off.

Channel(s) responsible for this output error can be read in the input parameter.

Index	Sub index	Data Type	Bit length	Access	Name	Description
66	0	Uint32	32	Read	Channel Error	If an error occurred, this parameter shows which channel(s) caused the error. The least significant bit refers to the first output (EV01)

Errors caused by solenoid(s) must be fixed first and then the error must be acknowledged:
   • by switching OFF/ON Auxiliary power supply (once error is fixed)
   • by sending the "Acknowledge" command:

Command	Name	Description
0xA0	Acknowledge	If no error is pending, the failsafe state on the device is left and the outputs are switched according to process data

System Commands

Command	Name	Description
0xA0	Acknowledge	If no error is pending, the failsafe state on the device is left and the outputs are switched according to process data
0xA1	Store switching cycles	When this command is executed, the current values of the switching cycle counters are stored into EEPROM.
0x82	Restore factory setting	Reset parameters to default values. Cycles counters are not reset.

Events

Event Code	Name	Type	Description	Required user/PLC inter-action
0x4000	Temperature fault	Error	Outputs were switched off due to over temperature warning. Check the parameter Channel Error to see which output driver triggered this error.	Check load. Acknowledge required
0x5000	Output error	Error	This event occurs when controlling the outputs is not possible.	Switch OFF / ON auxiliary power. If event persists, replace the module
0x8CA0	Output driver channel Error	Error	Output drivers are switched off due to over current or over temperature of at least one channel. All outputs are switched off..	Check parameter to see which channel triggered this error. Fix solenoid issue. Acknowledge required
0x8CA1	Current overload	Error	Polyfuse of at least one out-put driver tripped.	Check parameter to see which channel triggered this error. Fix solenoid issue. Acknowledge required
0x8CA3	Module error	Error	Internal communication failed	Switch OFF / ON auxiliary power. If event persists, replace the module
0x8CA4	Aux power supply voltage warning	Warning	AUX voltage is out of range	Check power supply.
0x8CA5	Aux power supply voltage error	Error	AUX voltage failed	Check power supply. Acknowledge required

Notes: . . . .

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