

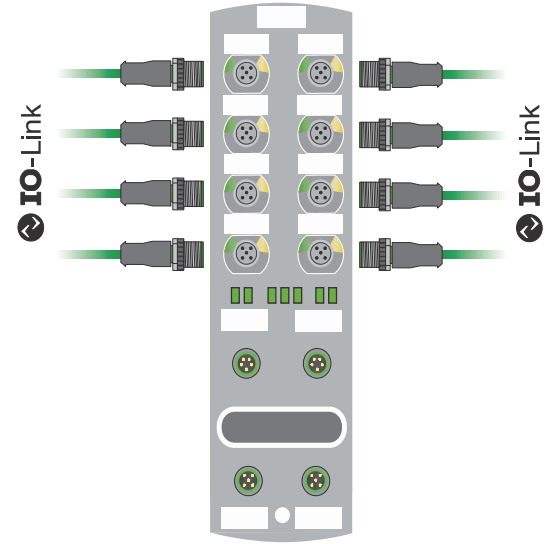
IO-Link Field I/O

IO-Link Overview

IO-Link is a standardized protocol that enables connection of intelligent devices (sensors and actuators) to an automation system.

Communication takes place between an IO-Link master and one or more IO-Link devices. IO-Link is a point-to-point communication system and is not a fieldbus. A master module has one or more ports and one device can be connected to each port.

The IO-Link master module is the interface between the controller and the IO-Link system, using EtherNet/IP or EtherCAT.



Features

- No field wiring is typically required. IO-Link devices plug into M12 ports.
- Rich sensor data can add diagnostics, history, and engineering units automatically, all delivered over one cable.
- Automatic device configuration can speed up and simplify field replacement.
- IO-Link Masters support daisy-chaining for easy installation of many devices.
- Premiere integration with Productivity PLC and BRX via EDS files

IO-Link Masters		
Part Number	Description	Price
SIOL-EI8B	STRIDE Basic EtherNet/IP IO-Link master, (8) IO-Link capable I/O points, up to (16) discrete I/O points, IO-Link v1.1, 8A, 1A/port, plastic housing, IP65 and IP67, -25 to 70 deg C.	\$05a48:
54631	Murrelektronik Premium EtherNet/IP IO-Link master, (8) IO-Link capable I/O points, up to (16) discrete I/O points, IO-Link v1.1, 16A, 2A/port, plastic housing, IP65 and IP67, -25 to 70 deg C.	\$05a49:
54632	Murrelektronik Premium EtherCAT IO-Link master, (8) IO-Link capable I/O points, up to (16) discrete I/O points, IO-Link v1.1, 16A, 2A/port, plastic housing, IP65 and IP67, -25 to 70 deg C.	\$,-06fdl:
BNI008M	Balluff EtherNet/IP IO-Link master, (8) IO-Link capable I/O points, up to (16) discrete I/O points, IO-Link v1.1.3, 9A, 2A/port, plastic housing, IP67, -5 to 70 deg C, multi-line LCD display.	\$,-06j[6:
BNI00HM	Balluff EtherNet/IP IO-Link master, (8) IO-Link capable I/O points, up to (16) discrete I/O points, IO-Link v1.1.3, 9A, 2A/port, die-cast zinc nickel-plated housing, IP67, -25 to 70 deg C.	\$,-06j[5:
BNI006A	Balluff EtherNet/IP IO-Link master, (8) IO-Link capable I/O points, up to (16) discrete I/O points, IO-Link v1.1.3, 9A, 2A/port, die-cast zinc nickel-plated housing, IP67, -5 to 70 deg C, multi-line LCD display.	\$,-06j[4:

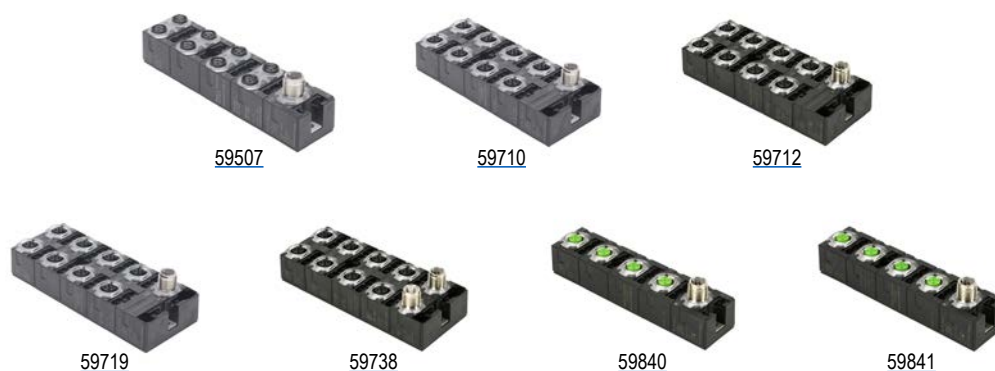
IO-Link Hubs		
Part Number	Description	Price
59507	Murrelektronik IO-Link hub, up to (8) discrete I/O points, (8) 3-pin M8 ports, 24 VDC, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class A Device, 4A, 0.5A/port, IP68. Requires IO-Link master.	\$05a4a:
59710	Murrelektronik IO-Link hub, up to (16) discrete input points, (8) 5-pin M12 A-coded ports, 24 VDC, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class A Device, IP68. Requires IO-Link master.	\$05a4b:
59712	Murrelektronik IO-Link hub, up to (16) discrete I/O points, (8) 5-pin M12 A-coded ports, 24 VDC, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class B Device, 4A, 2A/port, IP68. Requires IO-Link master.	\$,06fdn:
59719	Murrelektronik IO-Link hub, up to (16) discrete I/O points, (8) 5-pin M12 A-coded ports, 24 VDC, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class A Device, 4A, 0.5A/port, IP68. Requires IO-Link master.	\$05a4c:
59738	Murrelektronik IO-Link hub, up to (16) discrete I/O points, (8) 5-pin M12 A-coded ports, 24 VDC, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class A Device, 12A, 4A/port, IP68. Requires IO-Link master.	\$,06fdo:
59840	Murrelektronik IO-Link hub, up to (4) analog input channel(s), (4) 5-pin M12 A-coded port(s), current/voltage, 24-bit, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class A Device, IP65, IP67 and IP68. Requires IO-Link master.	\$05zuz:
59841	Murrelektronik IO-Link hub, up to (4) temperature input channel(s), (4) 5-pin M12 A-coded port(s), RTD, 24-bit, IO-Link v1.1.2 (compatible with v1.1.3), IO-Link Class A Device, IP65, IP67 and IP68. Requires IO-Link master.	\$,06fdx:
BNI00F4	Balluff IO-Link hub, up to (16) discrete I/O points, up to (16) discrete input points, (8) 5-pin M12 A-coded ports, 24 VDC, IO-Link v1.1, IO-Link Class A Device, 4A, 0.2A/port, IP67. Requires IO-Link master.	\$,-06j[7:
BNI00CP	Balluff IO-Link hub, up to (16) discrete I/O points, up to (16) discrete input points, (8) 5-pin M12 A-coded ports, 24 VDC, IO-Link v1.1, IO-Link Class A Device, 9A, 2A/port, IP67. Requires IO-Link master.	\$,-06j[8:
BNI00AJ	Balluff temperature/analog IO-Link hub, up to (8) analog input channel(s), current/voltage/RTD/thermocouple, 16-bit, input RTD type(s): Pt100 and Pt1000, input thermocouple type(s): J, K, IO-Link v1.1, IP67. Requires IO-Link master.	\$,-06j[b:

IO-Link Signal Converters		
Part Number	Description	Price
BNI00C6	Balluff temperature/analog combo converter, 1-channel, current/voltage/RTD/thermocouple, 16-bit, input RTD type(s): Pt100 and Pt1000, input thermocouple type(s): J, K, IO-Link v1.1, stainless steel housing, IP65 and IP67. Requires IO-Link master.	\$,-06j[3:

IO-Link Hubs

Features

- IO-Link V1.1.2 (compatible with IO-Link 1.1.3)
- 8 I/O ports (8 or 16 inputs/outputs) for digital modules
- 4 I/O ports (4 inputs) for analog modules
- IP68 rating
- M8 & M12 I/O ports
- M12 IO-Link port



IO-Link Hubs							
Part Number	59507	59710	59712	59719	59738	59840	59841
Housing	plastic, 30mm wide	plastic, 50mm wide				plastic, 30mm wide	
IO-Link	1 x M12 IO-Link Class A		1 x M12 IO-Link Class A/B (common GND)	1 x M12 IO-Link Class A			
Digital & Analog I/O	8 x M8 I/O ports	8 x M12 I/O ports				4 x M12 I/O ports	
	8 configurable digital inputs/outputs	16 digital inputs	16 configurable digital inputs/outputs			4 analog inputs (multi)	4 analog inputs (RTD)

Module Power Supply							
Part Number	59507	59710	59712	59719	59738	59840	59841
Operating voltage	24VDC						
Operating voltage range	18–30V						
Total current	≤4A at ≤50°C (see Derating)				≤6A at ≤40°C (see Derating)	50mA	
Current consumption when idling	≤40mA		≤50mA	≤40mA	≤75mA	≤50mA	
Galvanic isolation	No				Yes, UL1/UL2/IOL	No	

IO-Link							
Part Number	59507	59710	59712	59719	59738	59840	59841
Communication speed	COM3						
Transfer rate	230.4 kbit/s						
Bus protocol	IO-Link V1.1.2, compatible with IO-Link 1.1.3						
IO-Link cycle time	≥1 ms					≥1.6 ms	
VendorID	0x012F						
DeviceID	0x0C0005	0x0C000F	0x0C0013	0x0C0009	0x0C0018	0x0C0015	0x0C0016
Process data	2 byte (inputs), 2 byte (outputs)					10 byte (inputs), 5 byte (outputs)	

IO-Link Hubs

Sensor Power Supply							
Part Number	59507	59710	59712	59719	59738	59840	59841
Connector (female)	M8	M12					
Operating voltage	24VDC						N/A
Current supply	≤1A per 2 ports (X0+X1, X2+X3, X4+X5, X6+X7)	≤0.5 A per port				≤0.2 A per port	N/A

Input (DI/AI)							
Part Number	59507	59710	59712	59719	59738	59840	59841
Input Type	Digital					Analog (mixed)	Analog (RTD)
Connector (female)	M8	M12					
Cable cross section	≤0.75 mm ²						
Cable length	≤30m [98ft]						≤30m [98ft], shielded
Input characteristic	EN 61131-2: Type 1 + Type 3					N/A	
Input filter	1 ms					Interference frequency filter, 50/60Hz	

Output (DO)							
Part Number	59507	59710	59712	59719	59738	59840	59841
Connector (female)	M8	Not Applicable	M12			N/A	
Cable cross section	≤0.75 mm ²		≤0.75 mm ²				
Cable length	≤30m [98ft]		≤30m [98ft]				
Output current	≤0.5 A per pin		≤2 A per pin	≤0.5 A per pin	≤2 A per pin, ≤4 A per port		
Switching frequency (resistive load)	≤25 Hz		≤25 Hz				

Assembly data							
Part Number	59507	59710	59712	59719	59738	59840	59841
Weight (net)	129g [4.55 oz]	200g [7.05 oz]				150g [5.29 oz]	
Dimensions (L x W x H)	126 x 30 x 34.5 mm [4.96 x 1.2 x 1.36 in]	126 x 50 x 34.5 mm / [4.96 x 2.0 x 1.36 in]				126 x 30 x 34.3 mm [4.96 x 1.2 x 1.35 in]	
Drawing	PDF	PDF	PDF	PDF	PDF	PDF	PDF

Environmental	
Operating temperature	-25°C to +70°C [-13°F to +158°F]
Storage temperature	-40°C to +85°C [-40°F to +185°F]
Relative humidity	≤95%
Installation altitude	≤3000m above sea level

Mechanical	
Vibration test	EN 60068 Part 2-6: 5–500 Hz, constant amplitude 1mm, acceleration 15 g
Shock test	EN 60068 Part 2-27: 50 g, duration 11 ms

EMC Immunity	
Electrostatic discharge (housing)	EN 61000-4-2: ±4kV @ contact, ±8kV @ air
Electromagnetic high-frequency fields (housing)	EN 61000-4-3 RF field: 10V/m
Rapid transient electric disturbances (burst) DC inputs/outputs or AC inputs	EN 61000-4-4: ±2kV I/O supply, ±1kV data line, ±1kV I/O line, ±1kV AIN (5kHz, 100kHz)
Magnetic field	EN 61000-4-8: 30A/m @ 50 Hz (excluding 59738, 59840 and 59841)
Conducted interferences, high frequency fields	EN 61000-4-6, asymmetric: 10V

IO-Link Hubs

Electrical Safety

Protection degree	IP68
Protection class	III
Pollution degree	2

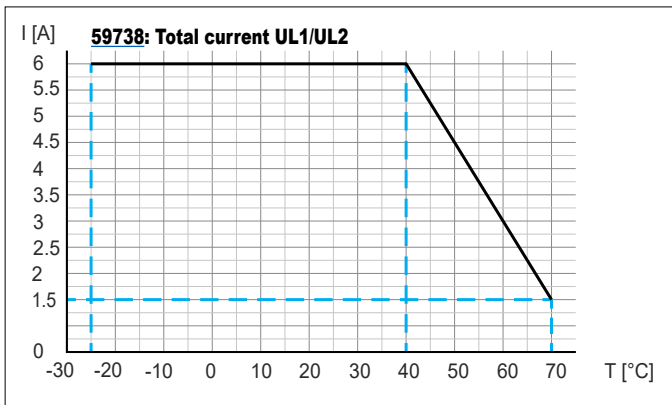
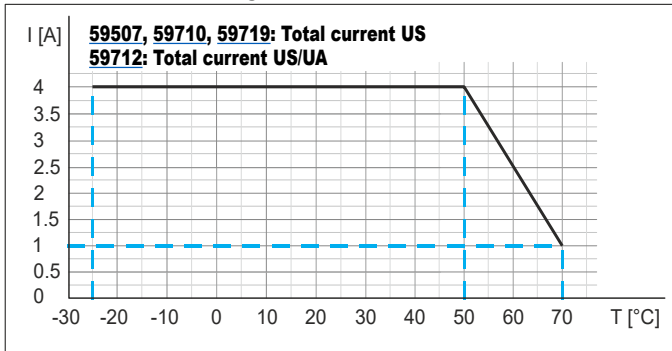
Electrical Interference

Radio interference field strength	Models 59840 and 59841: EN 61000-6-3 Emission QP: 42–35 dB μ V/m @30–230 MHz; QP: 42 dB μ V/m@230 MHz to 1 GHz; PK: 70 dB, AV: 50 dB @1–3 GHz; PK: 74 dB, AV: 54 dB @3–6 GHz
	All other models: EN 61000-6-4 Emission: QP: 40 dB μ V/m @ 30–230 MHz QP: 47 dB μ V/m @ 230–1000 MHz

Device Protection

Overvoltage protection	Yes
Overload protection module supply	Yes. To be ensured through load circuit monitoring
Reverse polarity protection of module supply	Yes
Short-circuit protection, sensor supply	Electronically (59841: N/A)
Short-circuit protection, output (DO)	Electronically (59840 and 59841: N/A)
Protective circuit for input	Suppressor diode, internal (59841: N/A)

Total Current Derating Chart



Conformity, Approvals

Product standard	EN 61131-2, Programmable logic controllers: Compliant
CE	2014/30/EU, 2011/65/EU: Compliant
UKCA	Compliant
EMC	2014/30/EU: Compliant
REACH	No. 1907/2006: SVHC List
WEEE	2012/19/EU: Compliant
ULus	E201820
RoHS	2011/65/EU & 2015/863: Exception 6c&7a&7c1
China RoHS	SJ/T 11364-2014, 25 EPUP

Hazardous Substances

	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Component part PCB	X	0	0	0	0	0
Connection Terminal/Screws	X	0	0	0	0	0
O: Indicates that the content of the harmful substance in all homogeneous materials of the component part is below the limit defined in GB/T 26572. X: Indicates that the content of the harmful substance in at least one homogeneous material of the component part exceeds the limit defined in GB/T 26572.						

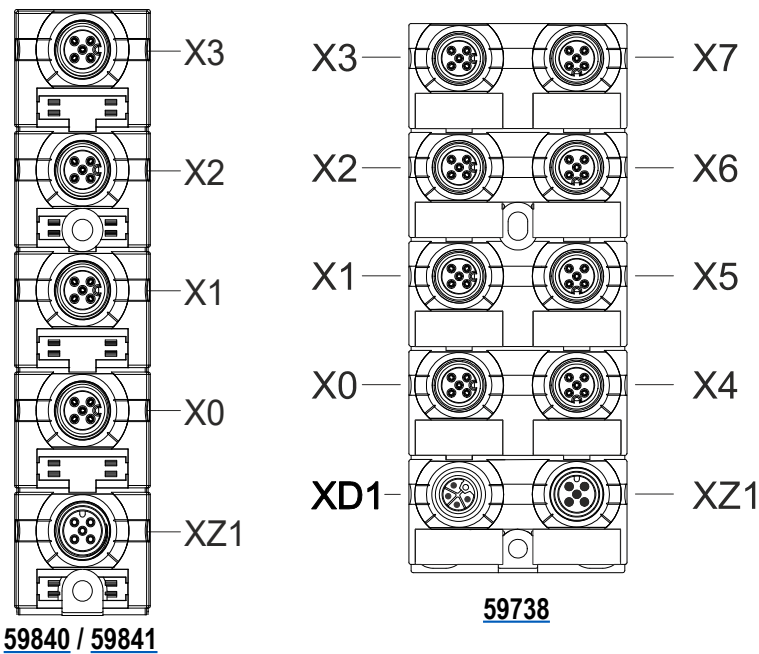
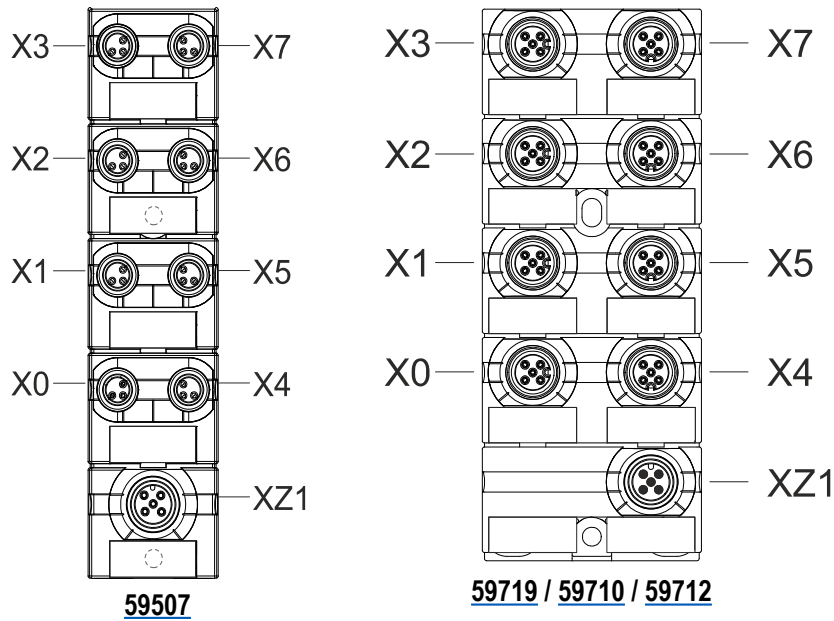
LED Indicators

The IO-Link hubs are equipped with separate LED indicators for I/O and IO-Link/sensor supply.

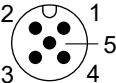
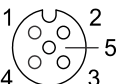
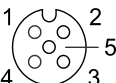
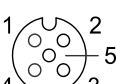
The IO-Link status LED (green) and sensor supply status LED (red) are combined. This can generate mixed green/red flashing or orange flashing codes in the case of overlapped signals.

IO-Link Hubs

Module Port Designations and Pinouts



Port Designations		
X0-X7	59507	Digital inputs and outputs, US
	59719	Digital inputs, US (common ground)
	59712	Digital outputs, UA
	59710	Digital inputs, US
X0-X3	59738	Digital inputs and outputs, UL2
	59840	Analog inputs, voltage or current
	59841	Analog inputs, RTD
X4-X7	59738	Digital inputs and outputs, UL1
XD1	59738	Power supply, I/O
XZ1		Module supply, IO-Link Class A

Pin Assignments			
IO-Link	XZ1 (M12 A-coded male connectors)		
	Pin 1	24VDC --- US (L+)	
	Pin 2	59712: UA (Actuator voltage) Others: n.c.	
	Pin 3	0V US (L-)	
	Pin 4	C/Q IO-Link	
	Pin 5	n.c.	
59507 DIO	X0-X7 (M8 A-coded female connectors)		
	Pin 1	24VDC --- US	
	Pin 2	0V US	
	Pin 3	DIO US	
59710 DI 59712 DIO 59719 DIO	X0-X7 (M12 A-coded female connectors)		
	Pin 1	24VDC --- US	
	Pin 2	59710: DI US Others: DIO US	
	Pin 3	0V US	
	Pin 4	59710: DI US 59712: DI US(common ground), DO UA Others: DIO US	
	Pin 5	FE	
59738 DIO	X0-X7 (M12 A-coded female connectors)		
		X0-X3	X4-X7
	Pin 1	24VDC --- UL2	24VDC --- UL1
	Pin 2	DIO UL2	DIO UL1
	Pin 3	0V UL2	0V UL1
	Pin 4	DIO UL2	DIO UL1
	Pin 5	FE	
59840 AI 59841 AI	X0-X3 (M12 A-coded female connectors)		
	Pin 1	59840: 24VDC --- US 59841: CH+	
	Pin 2	59840: Analog input (U/I) 59841: CH S+	
	Pin 3	59840: 0V US 59841: CH-	
	Pin 4	59840: n.c. 59841: CH S-	
	Pin 5	n.c.	
59738 I/O Power	XD1 (M12, L-coded connectors)		
	Pin 1	24VDC --- UL1	
	Pin 2	0V UL2	
	Pin 3	0V UL1	
	Pin 4	24VDC --- UL2	
	Pin 5	⏏	

IO-Link Hubs

IO-Link Object Directory

IO-Link Object Directory (DPP)						
ISDU index	DPP index	Object name	Access	Length in bytes	Meaning / default value	
Part Number				59507	59719	59710
Identification						
0x0000	0x00	MasterCommand	W	1		
	0x01	MasterCycleTime	R/W	1		
	0x02	MinCycleTime	R	1		
	0x03	M-sequenceCapability	R	1		
	0x04	RevisionID	R/W	1		
	0x05	ProcessDataIn	R	1		
	0x06	ProcessDataOut	R	1		
	0x07	VendorID 1 (MSB)	R	1	0x012F	
	0x08	VendorID 2 (MSB)	R	1		
	0x09	DeviceID 1 (octet 2, MSB)	R/W	1	0x0C	
	0x0A	DeviceID 1 (octet 1, MSB)		1	0x00	
	0x0B	DeviceID 1 (octet 0, LSB)		1	0x05	0x09
	0x0C	FunctionID 1 (MSB)	R	1		
	0x0D	FunctionID 2 (LSB)		1		
	0x0E	Reserved	R	1		
	0x0F	SystemCommand	W	1		
0x0002		SystemCommand	R	1		
0x0003		DataStorageIndex	R	variable		
0x000D		ProfileCharacteristic	R	variable		
0x000E		PDInputDescriptor	R	variable		
0x000F		PDOOutputDescriptor	R	variable		
0x0010		VendorName	R	64	Murrelektronik GmbH	
0x0011		VendorText	R	64	www.murrelektronik.com.	
0x0012		ProductName	R	64	MVP8-P3 DIO8 8xM8-3 IOLA12 B0	MVP12-P6 DIO16 8xM12A IO-LA12 B0
0x0013		ProductID	R	64	59507	59719
0x0014		ProductText	R	64	Digital I/O hub MVP8-P30 - IO-Link Class A DIO8 8xM8-3P Basic Firmware Edition: 2 bytes IN / 1 byte Out	Digital I/O hub, MVP12-P60 - IO-Link Class A DIO16 8xM12A Basic Firmware Edition: 2 bytes IN / 2 byte Out
					Digital I/O hub MVP12-P60 - IO-Link Class A DI16 8xM12A Basic Firmware Edition: 2 Byte IN / 0 Byte Out	
0x0015		SerialNumber	R	16	Running serial number set during production	
0x0016		HardwareRevision	R	64	e.g. "01.00"	
0x0017		FirmwareRevision	R	64	e.g. "V.1.00.00"	
0x0018		ApplicationSpecificTag	R	16–32	User-specific designation e.g. "System 3 / Port 4"	
0x0019		FunctionTag	R	32		
0x001A		LocationTag	R	32		
Diagnosis						
0x0020		Error Count	R	2		
0x0024		DeviceStatus	R	1	0: Device is operating properly 1: Maintenance Required 2: Out of Specification	3: Functional Check 4: Failure 5–255: Reserved
0x0025		DetailedDeviceStatus	R	variable	6 x (octet 1: EventQualifier octet 2,3: EventCode)	
0x0028		ProcessDataInput	R	PD length		
0x0029		ProcessDataOutput	R	PD length		
0x0031–0x003F		Reserved for profiles				

IO-Link Hubs

Pin-Based Bitmapping

Input Process Data	
Bit	Contact/Description
Byte 0 Inputs (X0–X7)	
0	Pin4_X0
1	Pin4_X1
2	Pin4_X2
3	Pin4_X3
4	Pin4_X4
5	Pin4_X5
6	Pin4_X6
7	Pin4_X7
Byte 1 Inputs (X0–X7)	
0	Pin2_X0
1	Pin2_X1
2	Pin2_X2
3	Pin2_X3
4	Pin2_X4
5	Pin2_X5
6	Pin2_X6
7	Pin2_X7
Byte 2 Diagnostics	
0	Error/Warning at power supply (too low or high)
1	Error/Warning because of temperature rating (threshold can be defined inside object)
2	Error/Warning at Input/Output (short-circuit or overload)
3	DIA at channel X
4	0 = channel 1
5	...
6	15 = channel 16
7	Global status 0 = no diagnostic 1 = fault detected
Byte 3 Module Identification	
0–7	User defined module identification bits, e. g. for tool change applications; 0 = not used 1–255 = ID value is read out from object

Output Process Data	
Bit	Contact
Byte 0 Outputs (X0–X3)	
0	Pin4_X0
1	Pin2_X0
2	Pin4_X1
3	Pin2_X1
4	Pin4_X2
5	Pin2_X2
6	Pin4_X3
7	Pin2_X3
Byte 1 Outputs (X4–X7)	
0	Pin4_X4
1	Pin2_X4
2	Pin4_X5
3	Pin2_X5
4	Pin4_X6
5	Pin2_X6
6	Pin4_X7
7	Pin2_X7

Diagnostic IO-Link Events



NOTE: In addition to the vendor-specific IO-Link events listed here, the standard events of the IO-Link specification also apply.

Vendor-Specific IO-Link Events		
Event Code	Event Type	Description
0x4000	Error	The device shows a temperature fault - overload.
0x4210	Warning	The device shows a temperature over-run.
0x4220	Warning	The device shows a temperature under-run.
0xFF91	Notification	The device requests a data storage upload from the master.
0x5100	Error	General power supply fault (US) - below shutdown voltage.
0x5110	Warning	Primary sensor supply voltage (US) is over-run.
0x5111	Warning	Primary sensor supply voltage (US) is under-run.
0x1830	Warning	Secondary sensor supply voltage (UA) is over-run.
0x1831	Warning	Secondary sensor supply voltage (UA) is under-run.
0x1832	Error	Secondary power supply fault (UA) - below shutdown voltage.
0x7710	Error	Short-circuit detected on a specific channel.
0x8CA0	Error	DIO pin current overload/ shortcircuit - Port 0 Pin 4.
0x8CA1	Error	DIO pin current overload/ shortcircuit - Port 0 Pin 2.
0x8CA2	Error	DIO pin current overload/ shortcircuit - Port 1 Pin 4.
0x8CA3	Error	DIO pin current overload/ shortcircuit - Port 1 Pin 2.
0x8CA4	Error	DIO pin current overload/ shortcircuit - Port 2 Pin 4.
0x8CA5	Error	DIO pin current overload/ shortcircuit - Port 2 Pin 2.
0x8CA6	Error	DIO pin current overload/ shortcircuit - Port 3 Pin 4.
0x8CA7	Error	DIO pin current overload/ shortcircuit - Port 3 Pin 2.
0x8CA8	Error	DIO pin current overload/ shortcircuit - Port 4 Pin 4.
0x8CA9	Error	DIO pin current overload/ shortcircuit - Port 4 Pin 2.
0x8CAA	Error	DIO pin current overload/ shortcircuit - Port 5 Pin 4.
0x8CAB	Error	DIO pin current overload/ shortcircuit - Port 5 Pin 2.
0x8CAC	Error	DIO pin current overload/ shortcircuit - Port 6 Pin 4.
0x8CAD	Error	DIO pin current overload/ shortcircuit - Port 6 Pin 2.
0x8CAE	Error	DIO pin current overload/ shortcircuit - Port 7 Pin 4.
0x8CAF	Error	DIO pin current overload/ shortcircuit - Port 7 Pin 2.
0x8CD0	Error	Power pin current overload/ shortcircuit - Port 0 Pin 1.
0x8CD1	Error	Power pin current overload/ shortcircuit - Port 1 Pin 1.
0x8CD2	Error	Power pin current overload/ shortcircuit - Port 2 Pin 1.
0x8CD3	Error	Power pin current overload/ shortcircuit - Port 3 Pin 1.
0x8CD4	Error	Power pin current overload/ shortcircuit - Port 4 Pin 1.
0x8CD5	Error	Power pin current overload/ shortcircuit - Port 5 Pin 1.
0x8CD6	Error	Power pin current overload/ shortcircuit - Port 6 Pin 1.
0x8CD7	Error	Power pin current overload/ shortcircuit - Port 7 Pin 1.