

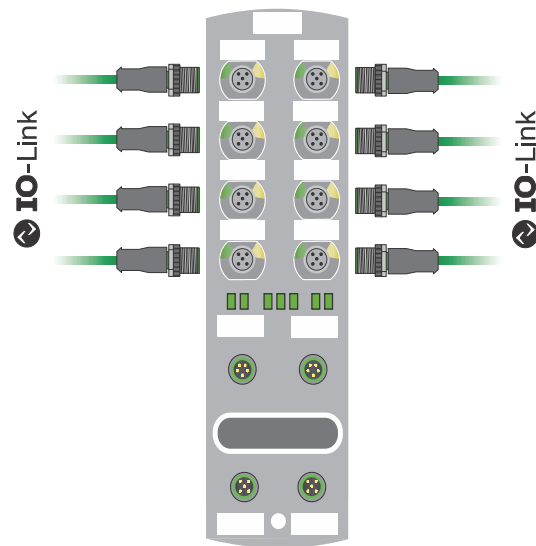
IO-Link Field I/O

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
<u>SIOL-EI8B</u>	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:
<u>54631</u>	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:
<u>54632</u>	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:
<u>BNI008M</u>	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:
<u>BNI00HM</u>	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:
<u>BNI006A</u>	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
<u>59507</u>	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:
<u>59710</u>	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:
<u>59712</u>	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:
<u>59719</u>	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:
<u>59738</u>	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:
<u>59840</u>	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:
<u>59841</u>	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:
<u>BNI00F4</u>	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:
<u>BNI00CP</u>	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:
<u>BNI00AJ</u>	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
<u>BNI00C6</u>	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 Masters

Features

- EtherNet/IP or EtherCAT Communication
- IP65 / IP67 rated
- Each port offers one dedicated digital I/O pin plus a second selectable pin for IO-Link, digital input or digital output.



SIOL-EI8B



54631



54632



IIoT Functions

Part Number	SIOL-EI8B	54631	54632*
Web Interface	Yes		
Energy monitoring	Yes, Current and voltage		
Temperature monitoring	Yes		
OPC UA	For IO-Link	No	Yes. Complies with Companion Specification Release 1.0 and Murrelektronik IO-Link diagnostic information model
	Transport	No	UA TCP, UA Secure Conversation, UA Binary Encoding
	Minimum release interval	No	100 ms
	Maximum sessions/clients	No	5
JSON	No	Yes, via REST API and MQTT	

*Requires an EtherCAT master with Ethernet over EtherCAT

Bus Data

Part Number	SIOL-EI8B	54631	54632
Fieldbus protocol	EtherNet/IP		EtherCAT
Transfer Rate	10/100 Mbit/s		100 Mbit/s
Addressing	BOOTP, DHCP, WebUI (Unsecure), Rotary encoder switch		Rotary encoder switch, EEPROM
Connection types	Exclusive Owner, Listen Only, Input Only		AoE, CoE, EoE, FoE
Device Level Ring (DLR)	Beacon-based		N/A
Connector	M12, 4-pin, D-coded		

IO-Link

IO-Link devices operating voltage	24VDC $\overline{---}$
IO-Link devices voltage range	20–30V
Transfer rate	4.8, 38.4 or 230.4 kbit/s
Standardized Master Interface (SMI)	IO-Link V1.1.3
Transfer rate recognition	Automatic

Supply

Operating voltage US	24VDC $\overline{---}$
Voltage range US	18–30V
	20.3–30V when using IO-Link
Operating voltage UA	24V
Voltage range UA	18–30V
Sensor current US	≤16A at ≤40°C (see Derating)
Actuator current UA	≤16A at ≤40°C (see Derating)
Current consumption	≤0.18 A at idle
Connector	M12, 5-pin, L-coded
Conductor cross-section	Current per supply ≤12 A: #14 AWG Current per supply >12 A: #12 AWG

Materials

Part Number	SIOL-EI8B	54631	54632
Housing material	Plastic		

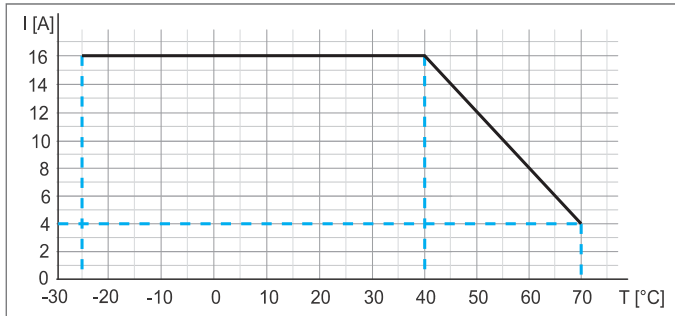
Assembly Data

Part Number	SIOL-EI8B	54631	54632
Weight (net)	470g [16.6 oz]		
Dimensions (L x W x H)	225.4 x 63 x 36 mm [8.874 x 2.5 x 1.4 in]		
Drawing	PDF	PDF	PDF

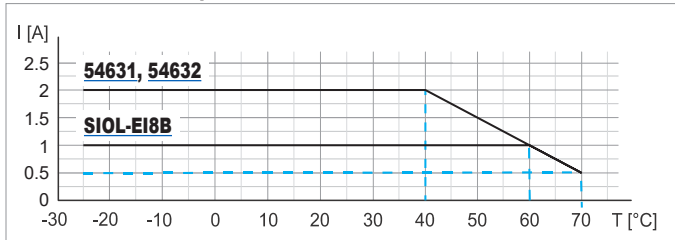
IO-Link Masters

Derating Charts

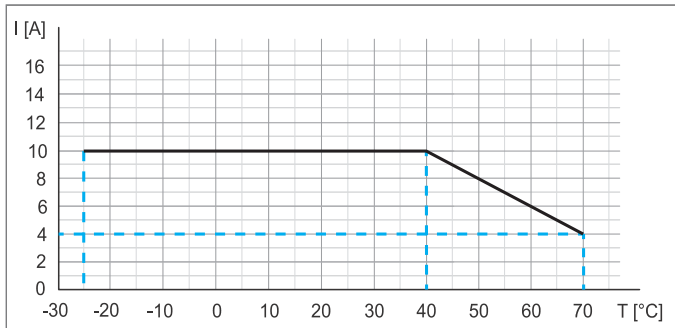
Supply Sensor Current US and Actuator Current UA



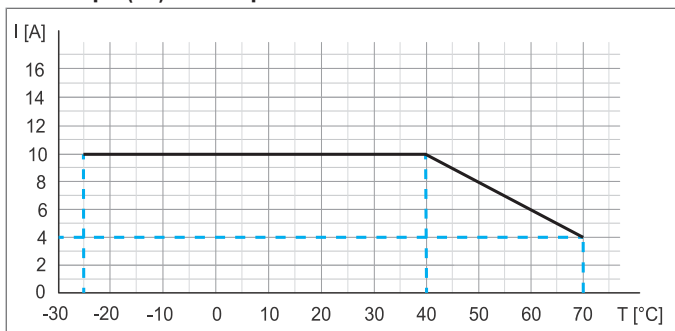
Current Per Sensor Power Supply
Current Per Output



Input (DI) Total Current Sensor Supply



Output (DO) Total Output Current



Input (DI)

Part Number	SIOL-EI8B	54631	54632
Sensor power supply (US) (see Derating)	≤1A load Automatic start, per port, at ≤60°C	≤2A load Automatic start, per port, at ≤40°C	
Total current sensor supply	≤10A at ≤40°C (see Derating)		
Filter time	0–15 ms + tcycle, adjustable		
Delay time for signal change	2–5 ms		
Input characteristic	EN 61131-2, Type 1 + Type 3		
Short-circuit protection, sensor supply	MOSFET with current measurement		
Connector	M12, 5-pin, A-coded		
Conductor cross-section	#18 AWG		
Conductor length	≤30m [98ft]		
Total current	≤2A per port	≤4A per port	

Output (DO)

Part Number	SIOL-EI8B	54631	54632
Output current DO (UA)	≤1A per channel at ≤60°C (see Derating)	≤2A per channel at ≤40°C (see Derating)	
Total output current	≤10A at ≤40°C (see Derating)		
Frequency	≤50 Hz		
Short-circuit protection actuator	MOSFET with current measurement		
Connector	M12, 5-pin, A-coded		
Conductor cross-section	#18 AWG		
Conductor length	≤30m [98ft]		
Total current	≤2A per port	≤4A per port	

Environmental

Operating temperature	-25°C to +70°C [-13°F to +158°F]
Storage & transport temperature	-25°C to +85°C [-13°F to +185°F] Provide acclimatization for commissioning
Relative humidity	≤95%
Installation altitude	≤3000m above sea level

Mechanical

Vibration test	EN 60068 Part 2-6: 10–58 Hz, Oscillation angle 0.35 mm, 58–150 Hz; 20 g
Shock test	EN 60068 Part 2-27: 50 g, duration 11 ms

Device Protection

Overvoltage protection	Yes
Overload protection module supply	Yes. To be ensured through load circuit monitoring
Reverse-polarity protection module supply US and UA	Yes
Short-circuit protection sensor supply	Electronically
Short-circuit protection output	Electronically
Protective circuit input	Suppressor diode, internal

Electrical Safety

Protection degree	EN 60529: IP67
Protection class	III, using a SELV- or PELV- power supply
Pollution degree	2

Electrical Interference

Radiated interference E-field enclosure	EN 55016-2-3
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EMC Immunity

Electrostatic discharge (ESD)	EN 61000-4-2
Electromagnetic RF fields	EN 61000-4-3
Fast transient burst	EN 61000-4-4
Surge AC	EN 61000-4-5
Conducted RF fields	EN 61000-4-6
Voltage dips	EN 61000-4-11

IO-Link Masters

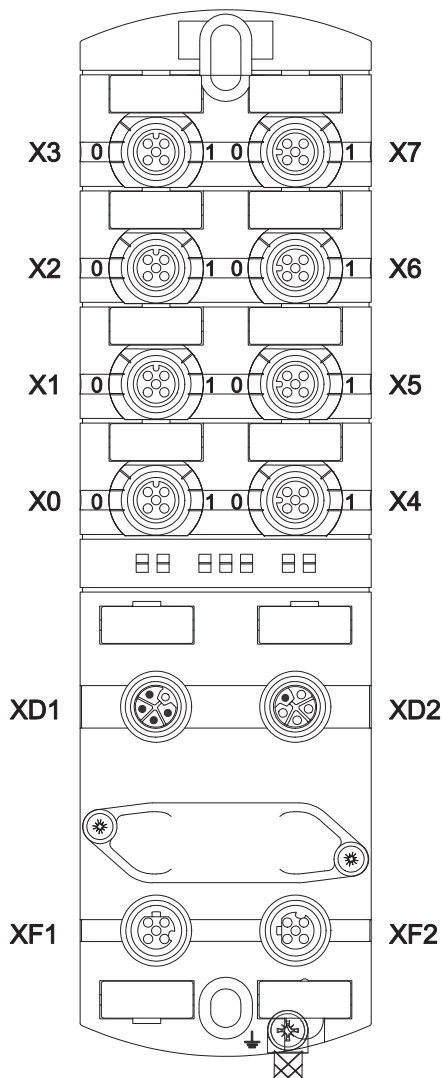
Conformity, Approvals	
Product standard	EN 61131-2, Programmable logic controllers
CE	2014/30/EU, 2011/65/EU
UKCA	Compliant
EMC	2014/30/EU
REACH	No. 1907/2006, SVHC List
WEEE	2012/19/EU, Category 5
cUL	CSA C22.2 NO. 61010-1, 3rd Ed., CSA C22.2 NO. 61010-2-201:18, 2nd Ed. E201820
ULus	UL 61010-1, 3rd Ed., UL 61010-2-201, 2nd Ed. E201820
China RoHS	GB/T 26572, 25 EPUP

Hazardous Substances		Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
	Part Name						
	Component part PCB	X	0	0	0	0	0
Connection Terminal/Screws		X	0	0	0	0	0

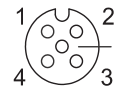
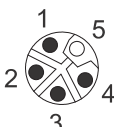
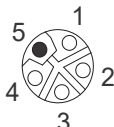
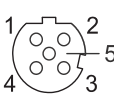
O: Indicates that the content of the harmful substance in all homogeneous materials of the component part is below the limit defined in GB/T 26572.

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.

Module Port Designations and Pinouts



Port Designations	
X0-X7	Digital inputs and outputs or IO-Link, M12, A-coded LED 0 corresponds to pin 4 LED 1 corresponds to pin 2
XD1	Power supply POWER IN, M12, L-coded, 5-pin
XD2	Power supply POWER OUT, M12, L-coded, 5-pin
XF1	Ethernet port 1, M12, D-coded
XF2	Ethernet port 2, M12, D-coded

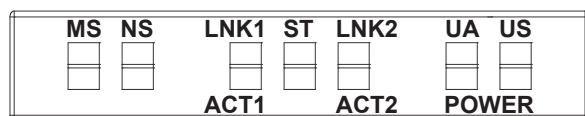
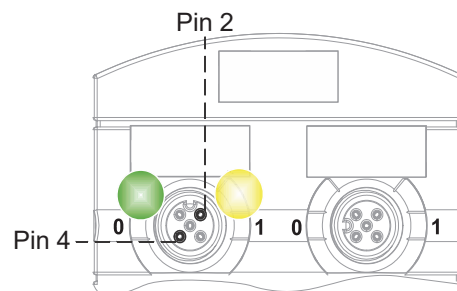
Pin Assignments	
X0-X7	M12 A-coded female connectors
	Pin 1 24VDC $\overline{\text{US}}$
	Pin 2 DI/DO
	Pin 3 0V
	Pin 4 DI/DO/IO-Link
	Pin 5 0V
XD1	M12, L-coded, Power IN
	Pin 1 24VDC $\overline{\text{US}}$ (operating voltage)
	Pin 2 0V UA (actuator voltage)
	Pin 3 0V US
	Pin 4 24VDC $\overline{\text{UA}}$
	Pin 5 GND
XD2	M12, L-coded, Power OUT
	Pin 1 24VDC $\overline{\text{US}}$ (operating voltage)
	Pin 2 0V UA (actuator voltage)
	Pin 3 0V US
	Pin 4 24VDC $\overline{\text{UA}}$
	Pin 5 GND
XF1/XF2	M12 female connector, D-coded, Ethernet
	Pin 1 TD +
	Pin 2 RD +
	Pin 3 TD -
	Pin 4 RD -
	Pin 5 n.c.

IO-Link Masters

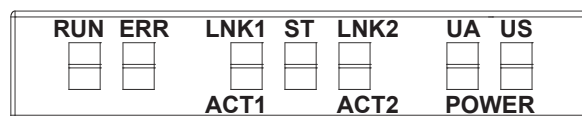
LED Indicators

The IO-Link master modules are equipped with the following separate LED indicators:

- an individual LED status indicator for each input and output pin
- NS (network status): indicates the state of the fieldbus system (models [SIOL-EI8B](#) and [54631](#))
- MS (module status): indicates the state of the module in the PLC configuration (models [SIOL-EI8B](#) and [54631](#))
- LNK/ACT (Link/Activity): indicate the state of EtherNet/IP or EtherCAT communications at each port
- RUN: indicates the device's operational mode (model [54632](#))
- ERR: indicates the device's error state (model [54632](#))
- ST: indicates the state of the overall module
- POWER UA: actuator voltage
- POWER US: operating voltage
- extended indications via blink patterns



[SIOL-EI8B, 54631](#)



[54632](#)

Web-based User Interface

The IO-Link master modules have a built-in web server for easy access to device status, configurations, and diagnostics.

BALLUFF IO-Link Masters

Features

- Secure web server
- Weld resistant casing
- Easy to use web interface
- Models with display for simplified configuration available



BNI008M



BNI00HM



BNI006A

 **IO-Link**
EtherNet/IP™



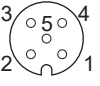
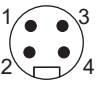
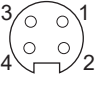
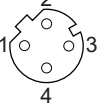
Interface	
Auxiliary interfaces	8x IO-Link
Digital inputs	16x PNP, Type 3
Digital outputs	16x PNP
IO-Link version	1.1.3
Interface	Ethernet/IP
Interface IIoT	REST API, MQTT
Port-class	Type A
Quick Connect	Class A

Electrical Connection	
Ethernet (COM 1)	(1) 4-pin M12 D-coded socket
Ethernet (COM 2)	(1) 4-pin M12 D-coded socket
Supply voltage IN	7/8" plug, 4-pin
Supply voltage OUT	7/8" socket, 4-pin
Connection slots	(8) 5-pin M12 A-coded socket
Contact, surface protection	Nickel-plated 2 µm/gold plated 0.4 µm

Electrical Data	
Address range	IPV4
Configurable inputs/outputs	Yes
Current sum UA, actuator	9A
Current sum US, sensor	9A
IO-Link function	Master
Input current max. at 24 V	130mA
Operating voltage Ub	18–30.2 VDC
Output current max.	2A short-circuit proof and overload-proof
Rated operating voltage Ue	24 VDC
Transfer rate	10/100 Mbit/s

Display & Indicators			
Part Number	<u>BNI008M</u>	<u>BNI00HM</u>	<u>BNI006A</u>
Text Display	Yes	No	Yes
Actuator supply UA indicator	Green LED		
IO-Link communication indicator	Green LED		
Sensor supply US indicator	Green LED		
Switching function display	Yellow LED		

BALLUFF IO-Link Masters

Pin Assignments		
IO-Link	M12 A-coded sockets	
	Pin 1	24 VDC $\overline{\text{US}}$, 2A
	Pin 2	Input/Output (2A)
	Pin 3	0V
	Pin 4	IO-Link/Input/Output 2A
	Pin 5	n.c.
Power IN	7/8" plug	
	Pin 1	24 VDC $\overline{\text{UA}}$ (actuator voltage)
	Pin 2	24 VDC $\overline{\text{US}}$ (sensor voltage)
	Pin 3	0V, GND (common ground)
	Pin 4	0V, GND (common ground)
Power OUT	7/8" socket	
	Pin 1	24 VDC $\overline{\text{UA}}$ (actuator voltage)
	Pin 2	24 VDC $\overline{\text{US}}$ (sensor voltage)
	Pin 3	0V, GND (common ground)
	Pin 4	0V, GND (common ground)
Ethernet	M12 D-coded socket	
	Pin 1	TX +
	Pin 2	RX +
	Pin 3	TX -
	Pin 4	RX -

Agency Approvals			
Part Number	BNIO08M	BNIO0HM	BNIO06A
CE	Yes		
WEEE	Yes		
UKCA	Yes		
KC	Yes	Yes	—
ODVA	Yes		
cULus	Yes		

Materials			
Part Number	BNIO08M	BNIO0HM	BNIO06A
Housing material	Plastic	Die-cast zinc, nickel-plated	
Gasket material	FKM 75		
Housing shield	No	Yes	
Surface protection	NA	Cu 15µm, Ni 15µm	

Environmental Conditions			
Part Number	BNIO08M	BNIO0HM	BNIO06A
Operating temperature	-5°C to +70°C [+23°F to +158°F]	-25°C to +70°C [-13°F to +158°F]	
Ambient temperature UL max.	50°C [122°F]	45°C [113°F]	
Storage temperature	-25°C to +70°C [-13°F to +158°F]		
EN 60068-2-6, Vibration	5–61 Hz, constant amplitude 1mm 61–500 Hz, constant acceleration 15 g		
IP rating	IP67, when threaded in		

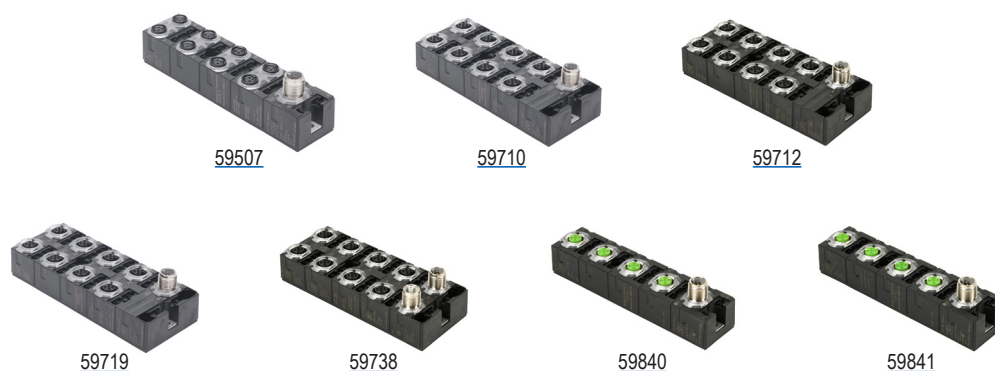
Functional Safety	
MTTF (40 °C)	49 years

Mechanical Data			
Part Number	BNIO08M	BNIO0HM	BNIO06A
Weight (net)	Approx. 560g [19.8 oz]		Approx. 670g [23.6 oz]
Dimensions (W x D x H)	68 x 42.9 x 226 mm [2.68 x 1.69 x 8.90 in]	68 x 37.9 x 224 mm [2.68 x 1.49 x 8.82 in]	
Mounting ground strap	M4		
Mount type	2-hole screw mount		
Drawing	PDF	PDF	PDF

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

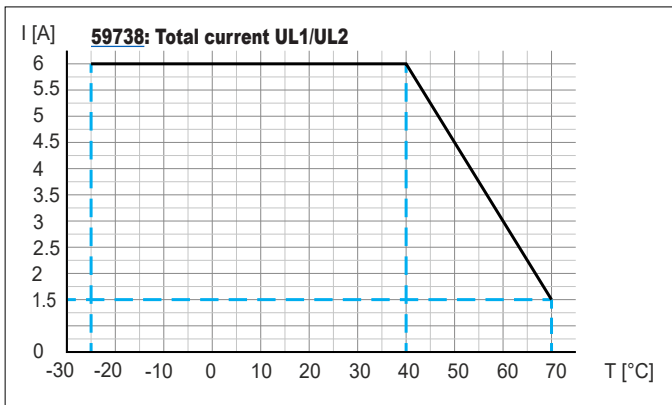
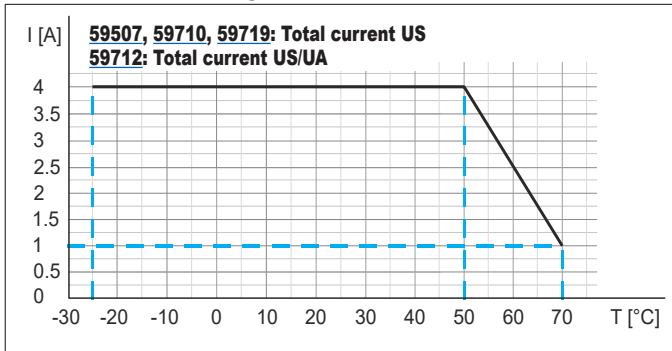
Electrical Interference

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

 Part Name	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
	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.						

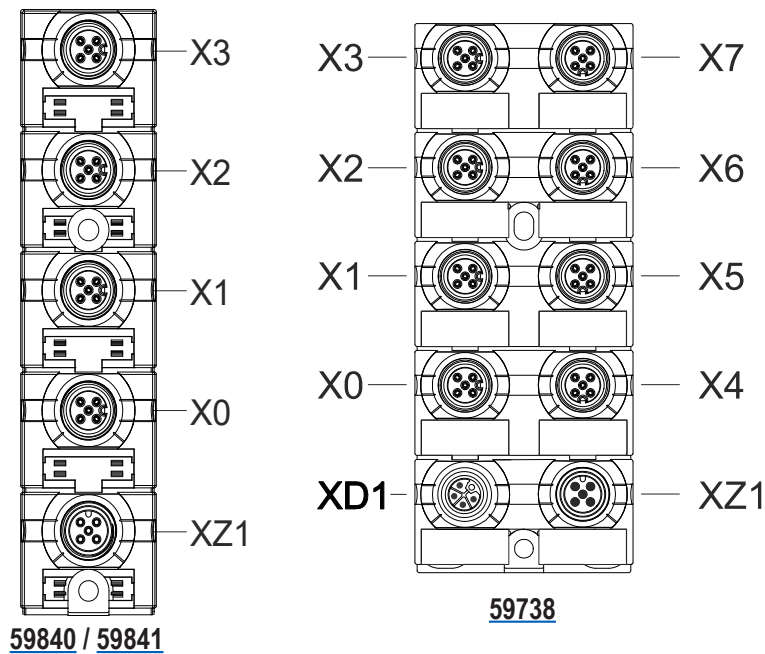
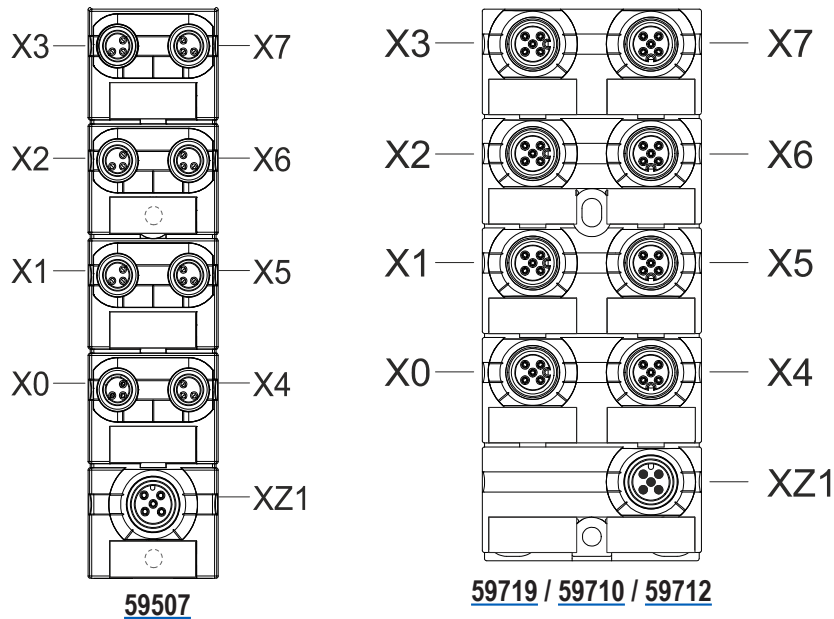
LED Indicators

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	0x0F
	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 IOLA12 B0	MVP12-P6 DI16 8xM12A IO-LA12 B0
0x0013		ProductID	R	64	59507	59719	59710
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.

BALLUFF IO-Link Hubs

Features

- Metal case for extreme environment
- New universal analog inputs
- Support for high current I/O devices



BNI00F4



BNI00CP



BNI00AJ

Interface

Part Number	BNI00F4	BNI00CP	BNI00AJ
Cycle time min.	5.6 ms		55 ms
Digital inputs	16x PNP, Type 3		NA
Digital outputs	16x PNP		NA
Analog inputs	NA		8x Analog, voltage/analog, current/analog, temperature (0–10V/–10–10V/0–5V/–5–5V/5–10V/4–20mA/0–20mA/Pt100/Pt1000/ Thermocouple Type J/ Thermocouple Type K)
Input resolution	NA		≤ 16 bit adjustable
Extension port	Yes		No
IO-Link version	1.1		
Interface	IO-Link 1.1		
Process data IN	6 bytes		22 bytes
Process data OUT	2 bytes		1 byte
Process data cycle min.	5.6 ms		55 ms
Single-channel monitoring	Yes		NA
Transfer rate	COM2 (38.4 kBaud)		

Electrical Connection

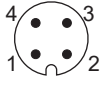
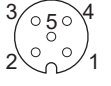
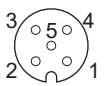
Part Number	BNI00F4	BNI00CP	BNI00AJ
Ethernet (COM 1)	(1) 4-pin M12 A-coded plug		
Supply voltage IN	NA	7/8" plug, 4-pin	NA
Connection slots	(8) 5-pin M12 A-coded socket		
Contact, surface protection	Nickel-plated 2 µm/gold plated 0.4 µm		

Electrical Data

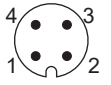
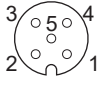
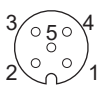
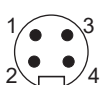
Part Number	BNI00F4	BNI00CP	BNI00AJ
Configurable inputs/outputs	Yes		NA
Current consumption without load, max.	50mA		80mA
Current sum UA, actuator	4A	9A	4A
Current sum US, sensor	4A	9A	4A
IO-Link function	Device		
IO-Link ports, number	1		
Operating voltage Ub	18–30.2 VDC		
Rated operating voltage Ue	24 VDC		
Switching current	16x 200mA	16x 2A	NA

BALLUFF IO-Link Hubs

BN100F4 Pin Assignments

IO-Link	M12 A-coded plug	
	Pin 1	24 VDC US1 (module voltage)
	Pin 2	24 VDC UA (actuator voltage)
	Pin 3	GND, reference potential
	Pin 4	C/Q, IO-Link data transmission channel
Digital I/O	M12 A-coded sockets	
	Pin 1	24 VDC, 200mA
	Pin 2	PNP Input 2 / PNP Output 2
	Pin 3	0V, GND
	Pin 4	PNP Input 1 / PNP Output 1
	Pin 5	FE
Extension Port	M12 A-coded socket	
	Pin 1	24 VDC US (sensor/module voltage), 2A
	Pin 2	24 VDC US (actuator voltage), 2A
	Pin 3	0V, GND
	Pin 4	Communication
	Pin 5	FE

BN100CP Pin Assignments

IO-Link	M12 A-coded plug	
	Pin 1	24 VDC US1 (module voltage), max 4A
	Pin 2	n.c.
	Pin 3	GND, reference potential
	Pin 4	C/Q, IO-Link data transmission channel
Digital I/O	M12 A-coded sockets	
	Pin 1	24 VDC, 200mA (powered by US2)
	Pin 2	PNP Input 2 / PNP Output 2 (2A)
	Pin 3	0V, GND
	Pin 4	PNP Input 1 / PNP Output 1 (2A)
	Pin 5	FE
Extension Port	M12 A-coded socket	
	Pin 1	24 VDC (sensor/module voltage), 2A
	Pin 2	24 VDC (actuator voltage), 2A
	Pin 3	0V, GND
	Pin 4	C/Q, IO-Link data transmission channel
	Pin 5	FE
Power IN	7/8" plug	
	Pin 1	24 VDC UA (actuator), max 9A
	Pin 2	24 VDC US2 (sensor), max 9A
	Pin 3	0V, GND (common ground)
	Pin 4	0V, GND (common ground)

BN100AJ Pin Assignments

IO-Link		M12 A-coded plug			
	Pin 1	24 VDC US1 (module voltage), 1.1 A			
	Pin 2	n.c.			
	Pin 3	GND, reference potential			
	Pin 4	C/Q, IO-Link data transmission channel			
Analog Input		M12 A-coded sockets			
		Voltage/Current	TC	RTD	
	Pin 1	24 VDC, 150mA	n.c.	Pt-	
	Pin 2	Input	TC+	Pt-	
	Pin 3	GND	TC-	Pt+	
	Pin 4	Input	n.c.	Pt+	
	Pin 5	n.c.			

Materials

Part Number	BN100F4	BN100CP	BN100AJ
Housing material	Die-cast zinc, nickel-plated		
Gasket material	FKM 75		
Housing shield	Yes		
Surface protection	Cu 15µm, Ni 15µm		

Environmental Conditions

Part Number	BN100F4	BN100CP	BN100AJ
Operating temperature	-5°C to +55°C [+23°F to +131°F]		-5°C to +70°C [+23°F to +158°F]
Ambient temperature UL max.	45°C [113°F]		
Storage temperature	-25°C to +70°C [-13°F to +158°F]		
EN 60068-2-6, Vibration	5-61 Hz, constant amplitude 1mm 61-500 Hz, constant acceleration 15 g		
IP rating	IP67, when threaded in		

Functional Safety

Part Number	BN100F4	BN100CP	BN100AJ
MTTF (40 °C)	38.7 years		31 years

Mechanical Data

Part Number	BN100F4	BN100CP	BN100AJ
Weight (net)	Approx. 530g [18.7 oz]	Approx. 540g [19.0 oz]	Approx. 500g [17.6 oz]
Dimensions (W x D x H)	68 x 31.8 x 181.5 mm [2.68 x 1.25 x 7.15 in]	68 x 32.4 x 181.5 mm [2.68 x 1.28 x 7.15 in]	68 x 31.8 x 181.5 mm [2.68 x 1.25 x 7.15 in]
Mounting ground strap	M4 internal thread		
Mount type	2-hole screw mount		
Drawing	PDF	PDF	PDF

Agency Approvals

Part Number	BN100F4	BN100CP	BN100AJ
CE	Yes	Yes	Yes
WEEE	Yes	Yes	Yes
UKCA	Yes	Yes	Yes
cULus	Yes	Yes	Yes

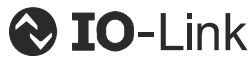
Display & Indicators

Part Number	BN100F4	BN100CP	BN100AJ
Actuator supply UA, indicator	Green LED		NA
IO-Link communication indicator	Green LED		
Module supply indicator	Green LED		
Sensor supply US indicator	Green LED		NA
Switching function display	Yellow LED		

BALLUFF IO-Link Analog Converter

Features

- Stainless steel designed for field mounting
- Support universal analog in or out



BNI00C6

Display & Indicators

Sensor/actuator supply US/UA	Green LED
IO-Link communication indicator	Green LED

Environmental Conditions

Operating temperature	-5°C to +70°C [+23°F to +158°F]
Storage temperature	-25°C to +70°C [-13°F to +158°F]
IP rating	IP67, when threaded in

Materials

Housing material	316L stainless steel, PTFE
Gasket material	FKM 75
Housing shield	Yes

Mechanical Data

Weight (net)	Approx. 105g [3.70 oz]
Dimensions (Dia x L)	18mm dia. x 135.5 mm
Mounting part	18mm diameter mounting clamps
Drawing	PDF

Functional Safety

MTTF (40 °C)	67 years
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Agency Approvals

CE	Yes
WEEE	Yes
UKCA	Yes
Ecolab	Yes

Interface	
Analog inputs	Analog, voltage/analog, current/analog, temperature (0–10V/–10–10V/0–5V/–5–5V/5–10V/4–20mA/0–20mA/Pt100/Pt1000/Thermocouple Type J/Thermocouple Type K)
Analog outputs	Analog, voltage/analog, current/analog (0–10V/–10–10V/0–5V/–5–5V/5–10V/4–20mA/0–20mA)
Resolution	≤ 16 bit adjustable
Cycle time min.	10 ms
IO-Link version	1.1
Interface	IO-Link 1.1
Process data IN	3 bytes
Process data OUT	2 bytes
Process data cycle min.	10 ms
Transfer rate	COM2 (38.4 kBaud)

Electrical Connection

IO-Link (COM 1)	(1) 4-pin M12 A-coded plug
Connection slots	(1) 5-pin M12 A-coded socket
Contact, surface protection	Nickel-plated 2 µm/gold plated 0.4 µm

Electrical Data

Configurable inputs/outputs	Yes
Current consumption without load, max.	60mA
Current sum UA, actuator	4A
Current sum US, sensor	4A
IO-Link function	Device
IO-Link ports, number	1
Operating voltage Ub	18–30.2 VDC
Rated operating voltage Ue	24 VDC

Pin Assignments

IO-Link		M12 A-coded plug			
	Pin 1	24 VDC US (controller), 260mA			
	Pin 2	24 VDC UA (outputs), 1.4 A			
	Pin 3	GND, reference potential			
	Pin 4	C/Q, IO-Link data transmission channel			
Analog Input		M12 A-coded sockets			
		V _I , mA Input	V _I , mA Output	TC	RTD
	Pin 1	24 VDC, 150mA	24 VDC, 1.4 A	n.c.	Pt-
	Pin 2	Input	Output	TC+	Pt-
	Pin 3	GND	GND	TC-	Pt+
	Pin 4	Input	Output	n.c.	Pt+
	Pin 5	n.c.			