

IO-Link Analog Hub LKHA-08UA-M12G

-----IO-Link System Manual



Preface

1. Scope of this manual:

This manual applies to the ELCO IO-Link analog hub.

The information in this manual enables you to run the IO-Link analog hub as IO-Link device connected to IO-Link master.

2. Basic knowledge requirements

This manual presumes a general knowledge in the field of automation engineering and describes the components based on the data valid at the time of its release. ELCO reserves the right of including a product information for each new component, and for each component of a later version.

3. Guide

This manual describes the hardware of the IO-Link analog hub.

Covered topics are:

- Installation and wiring
- Commissioning and diagnostics
- Components
- Article numbers
- Technical specifications

4. Technical support:

This manual describes the characteristics and the usage of IO-Link analog hub.

Please contact your local ELCO representative if you have any questions about the products described in this manual.

Additional information about ELCO products is available:

<https://www.elcoautomation.com/en-us/>

5. Disclaimer of liability:

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

1 Hardware parameters

ARTICLE PROPERTIES

PRODUCT TYPE	IO-Link analog signal hub	IO-LINK	Class-A: 1 × M12 A-code 4 pin, Male
DESCRIPTION	8 AI/AO, Class-A, 8*M12	POWER SUPPLY	Included in IO-Link interface
WORKING MODE	Current / voltage / TC / RTD signal type can be set	SIGNALS	8 × M12 A-code 5 pin, Female

ELECTRICAL DATA

INPUT CHANNELS	Max. 8	OUTPUT CHANNELS	Max. 8
INPUT SUPPLY CURRENT	Max. 200 mA per channel	OUTPUT TYPE	Current: 0 ... 20 mA, 4 ... 20 mA Voltage: 0 ... 10 V
INPUT TYPE	Current: 0 ... 20 mA, 4 ... 20 mA Voltage: 0 ... 10 V, Thermocouple: J, K, T, N, E type, PT100, PT1000	OUTPUT IMPEDANCE	Current: < 450 Ω Voltage: > 1 kΩ
INPUT IMPEDANCE	Current: 250 Ω Voltage: 1 MΩ	RESOLUTION	16 Bit
RESOLUTION	16 Bit	CONVERSION TIME	12 ms
CONVERSION TIME	Current, Voltage: 12 ms Thermocouple: 50 ms	ACCURACY	±0.3%
ACCURACY	±0.3%		

DIAGNOSTICS

COMMUNICATION INDICATION	LED indication, communication message	SHORT-CIRCUIT & OVERLOAD	Support, LED indication
VOLTAGE DETECTION	Support, low voltage alarm		

GENERAL DATA

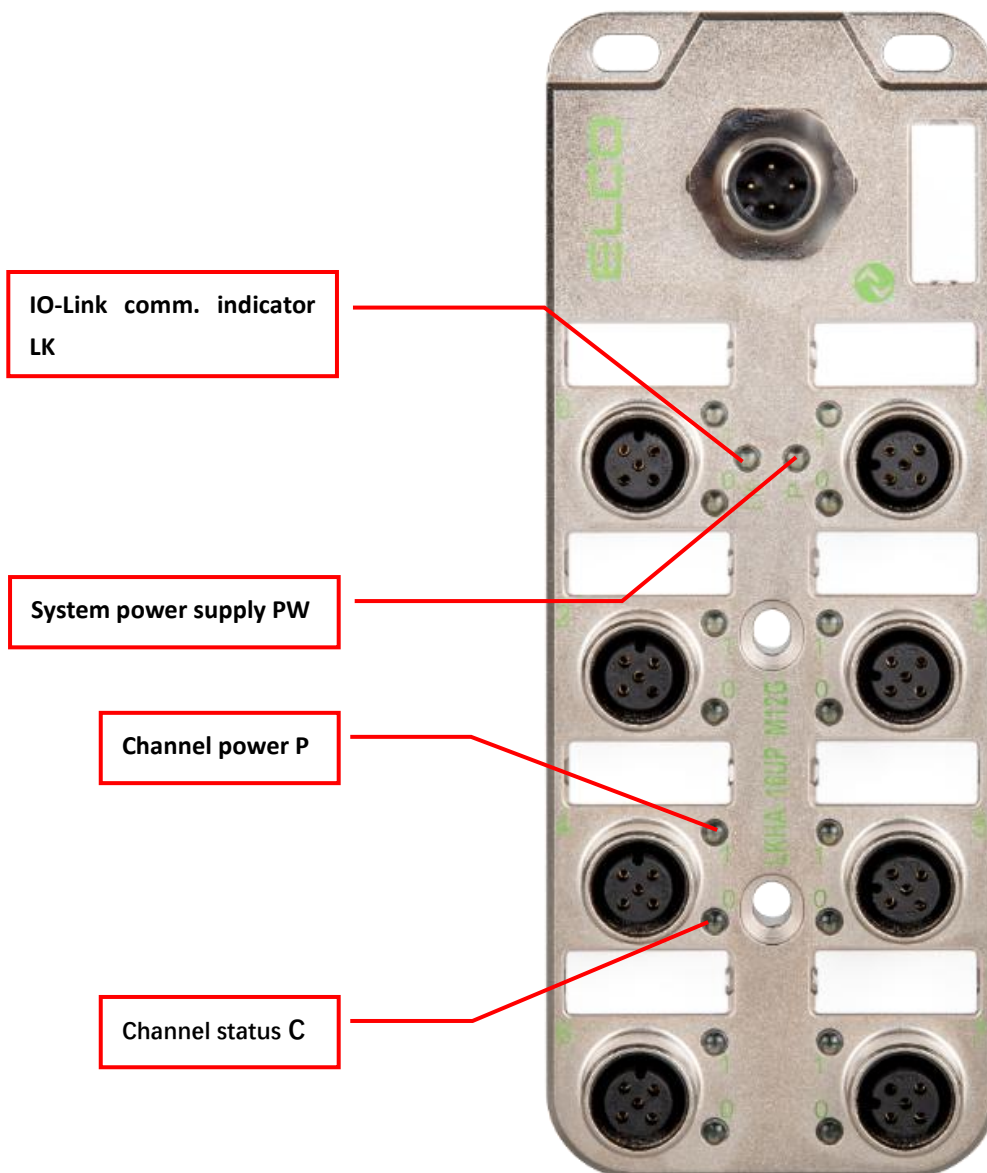
HOUSING MATERIAL	Casting zinc alloy	OPERATING TEMPERATURE	-25 ... +70 °C
PROTECTION	IP67	STORAGE TEMPERATURE	-40 ... +85 °C
RELATIVE HUMIDITY	≤ 95%	DIMENSIONS	55 × 145 × 27.5 mm

APPROVALS



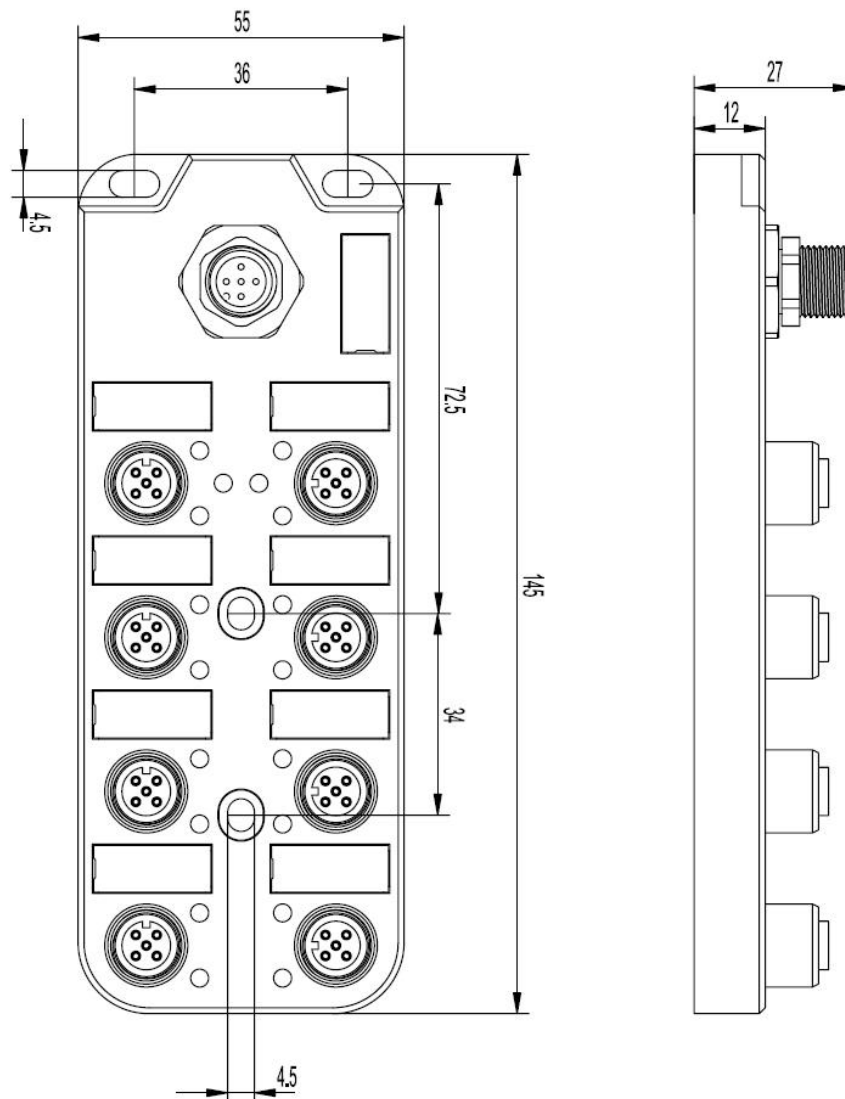
2 LED Indication

The operating status of the module can be clearly displayed by the LED indicator.

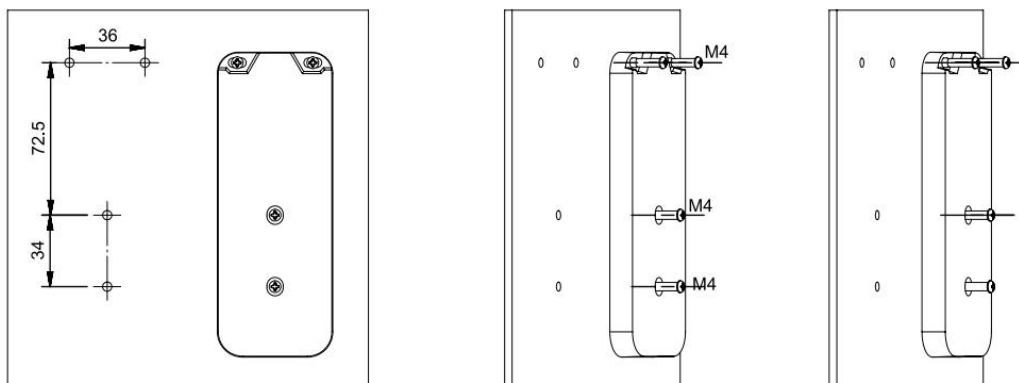


3 Dimensions and Installation Methods

3.1 Mounting dimensions(mm)



3.2 Mounting the module (mm)



3.3 Installation Location of the Cold Junction Compensation Device (When Using the Thermocouple Function)



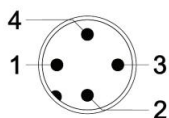
*If you want to use the thermocouple function, you need to use the "cold-end-M12" provided with the equipment. This accessory should be installed at PORT7 of the module and is used for the cold - end compensation of the thermocouple.

4 Analog module wiring guidance

Please follow basic electrical regulations for connection operations. For personal and equipment safety, we recommend disconnecting the power supply during wiring operations.

4.1 Communication connection

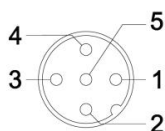
M12 A-Code IO-Link connector (4-Pin, Male)



Terminal	Class-A
1	Power supply 24V+
2	-
3	Power supply GND
4	IO-Link C/Q

4.2 Signal connection

M12 A-Code signal connector (5-Pin, Female)



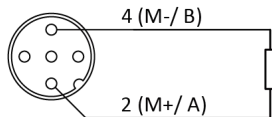
Terminals are defined as follows:

Terminal	Function	Remark
1	Sensor power supply 24V+	24V
2	Analog signal +	
3	Sensor power supply GND	0V
4	Analog signal -	
5	Protective earth PE	

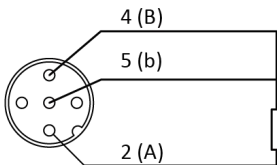
4.3 Analog signal wiring

a) Two-wire input --- One connector is used to connect one Two-wire RTD or TC input port, LKHA-08UA-M12G supports this connection.

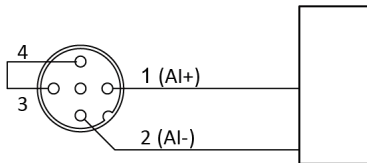
*If you want to use the thermocouple function, you need to use the "cold-end-M12" provided with the equipment. This accessory should be installed at PORT7 of the module and is used for the cold - end compensation of the thermocouple.



b) Three-wire input --- One connector is used to connect one Three-wire RTD input port, LKHA-08UA-M12G supports this connection.

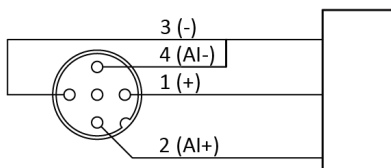


c) Two-wire input- One connector is used to connect one two-wire current input port, LKHA-08UA-M12G supports this connection.

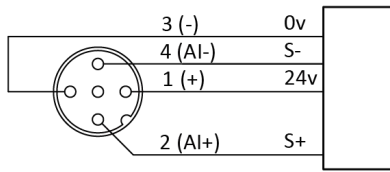


d) Three-wire input or output - One connector is used to connect one Three-wire current or voltage input or output port.

LKHA-08UA-M12G supports this connection.



- e) Four-wire input or output - One connector is used to connect one four-wire current or voltage input or output port. LKHA-08UA-M12G supports this connection.



5 LED fault indicator

Name	Status	Meaning	Fault cause
Module communication Indicator LK	Green flash	Receive IO-Link communication	-
	Off	No IO-Link signal received	1. Expansion cable failure 2. Master IO-Link port problem 3. Slave module is damaged
Module Power Indicator PW	Green	Work normally	-
	Off	Abnormal power supply	1. Power supply is abnormal 2. Module is damaged
Channel Power Indicator P	Green	Work normally	-
	Red	Channel power supply abnormality	1. Short circuit of signal line 2. Module is damaged
Signal status Indicator C	Green	Signal normality	-
	Red	Signal abnormally	1. Short circuit 2. Overvoltage or undervoltage
	Off	Channel deactivated	1. Set channel properties 2. Confirm if comm. is OK

6 Signal address assignment

Each IO-Link analog module has 8 connectors (Port0~Port7) for connecting signals, with 5 pins (Pin1~Pin5) inside each connector. The following list shows the signal status of each connector and the corresponding relationship between IO-Link transmission bytes by model.

LKHA-08UA-M12G takes 20 bytes Input and 16 bytes Output.

Byte	Byte	Channel	e.g
Input/Output Byte 0~15	Byte 0	Channel 0	IW 0
	Byte 1		QW 0
	Byte 2	Channel 1	IW 2
	Byte 3		QW 2
	Byte 4	Channel 2	IW 4
	Byte 5		QW 4
	Byte 6	Channel 3	IW 6
	Byte 7		QW 6
	Byte 8	Channel 4	IW 8
	Byte 9		QW 8
	Byte 10	Channel 5	IW 10
	Byte 11		QW 10
	Byte 12	Channel 6	IW 12
	Byte 13		QW 12
	Byte 14	Channel 7	IW 14
	Byte 15		QW 14
Diagnose Byte 16~19	Byte 16	Signal lower limit	IB 16
	Byte 17	Signal upper limit	IB 17
	Byte 18	Channel overload (Only voltage out)	IB 18
	Byte 19	Power supply error (Port short circuit)	IB 19

6.1 Instruction of Analog Value

PLC controller processes analog values in a binary system; the analog input module transfers analog process signals into digital signals; the analog output module transfers the digital output value into an analog signal.

Digital analog values are suitable to the same rated input and output value; each analog signal occupies 1 word PLC address, i. e. each analog signal corresponds to 16 bit. The symbol of analog is set on bit15: 0 represents '+'; 1 represents '1'. For the analog module with resolution less than 16 bits, the analog value is saved in the format of left justifying; the idle least significant bit is padded with '0'.

Example: analog value 18035 can be expressed in binary system as follows:

Resolution	Analog Value															
Bit No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16bit	0	1	0	0	0	1	1	0	0	1	1	1	0	0	1	1
14bit	0	1	0	0	0	1	1	0	0	1	1	1	0	0	0	0

Analog signal types can be divided into the following types:

Current unipolar value is 0~20mA and 4~20mA, voltage unipolar value is 0~10V.

Note: The current input and output ranges are completely consistent, but there are differences in the voltage input and output ranges. Please refer to the table below.

- Analog value within unipolar current input/output range:

System Value			Input/Output Range		
	Dec	Hex	0~20mA	4~20mA	
	32767	7FFF	> 21 mA	> 20.8 mA	Overflow, lock the maximum
104.999%	32767	7FFF	21 mA	20.8 mA	Overshoot range
	31208	79E8			
100%	31207	79E7	20 mA	20 mA	Rated range
75%	23405	5B6D	15 mA	16 mA	
0.0032%	1	1			
0%	0	0	0 mA	4 mA	
	-1	FFFF	-		Overshoot range
-6.25%	-1950	F862	-	3 mA	
	-32768	8000	-	< 3 mA	Underflow, lock the least value

- Analog value within unipolar voltage input range:

System Value			Input Range	
	Dec	Hex	0~10 V	
104.999%	32767	7FFF	-	Overflow, lock the maximum
	31208	79E8	-	
100%	31207	79E7	10 V	Rated range
75%	23405	5B6D	7.5 V	
0.0032%	1	1		
0%	0	0	0 V	
	-1	FFFF	-	
-104.999%	-32768	8000	-	Underflow, lock the least value

- Analog value within unipolar voltage output range:

System Value			Output Range	
	Dec		Dec	
104.999%	32767	7FFF	10.5V	Overflow, lock the maximum
	31208	79E8		
100%	31207	79E7	10 V	Rated range
75%	23405	5B6D	7.5 V	
0.0032%	1	1		
0%	0	0	0 V	
	-1	FFFF	-	
-104.999%	-32768	8000	-	Underflow, lock the least value

6.2 ISDU parameter description

The ISDU parameters of the analog module can be set through the IODD file.

Index	Sub index	Name	Access Rights	Default Value
16	0	Vendor Name	RO	ELCO
17	0	Vendor Text	RO	www.elco-holding.com
18	0	Product Name	RO	LKHA-08UA-M12G
19	0	Product ID	RO	FB330083
20	0	Product Text	RO	IO-Link Analog Input/Output Module IP67
21	0	Serial number	RO	00000000
22	0	Hardware Revision	RO	HW-V0.01
23	0	Firmware Revision	RO	FW-V0.01
24	0	Application Specific Tag	RO	***
64	0	Port0 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
65	0	Port1 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
66	0	Port2 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
67	0	Port3 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
68	0	Port4 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
69	0	Port5 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
70	0	Port6 Config	RW	0xFF, 0x06, 0x01, 0x00

	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01
71	0	Port7 Config	RW	0xFF, 0x06, 0x01, 0x00
	1	Range	RW	0xFF
	2	Filter Setting	RW	0x06
	3	Enable Diagnostic	RW	0x01

6.3 ISDU parameter modification

The following table lists the meanings represented by the parameter modification values of Index 64~71, which users can modify according to their needs.

Range	0x2F	Voltage In 0...10V	
	0x3F	Voltage Out 0...10V	
	0x4F	Current In 0...20mA	
	0x47	Current In 4...20mA	
	0x50	Current Out 0...20mA	
	0x51	Current Out 4...20mA	
	0xFF	Channel Deactive	
	0x70	Thermocouple J	
	0x71	Thermocouple K	PORT 7 Cold Junction Compensation
	0x72	Thermocouple T	
	0x73	Thermocouple N	
	0x74	Thermocouple E	
	0x80	RTD PT100 2-WIRE	
	0x81	RTD PT1000 2-WIRE	
	0x90	RTD PT100 3-WIRE	
	0x91	RTD PT1000 3-WIRE	

Filter	0x0	extremely weak
	0x3	weak
	0x6	medium
	0x9	strong
	0xC	extremely strong

Enable Diagnostic	0x0	Disabled
	0x1	Enabled

Instructions:

When the module is using the thermocouple measurement function, install the cold-junction compensation device supplied with the module at PORT7. At this time, the PORT7 range should be set to 0X71 (113) Cold Junction Compensation.