IO-Link Hub

LKHA-16UP-M12G-AP4

----System Manual

IO-Link

1.1 Scope of this manual:

This manual applies to the ELCO IO-Link signal Hub (16-bit M12, Metal housing): LKHA-16UP-M12G-AP4.

Product overview:

1) LKHA-16UP-M12G-AP4

Supply Voltage 24VDC, self-consumption max.100mA;

8 x Port module for

16 x Digital Input (Input Supply 8 x 24VDC/200mA)

or

16 x Digital Output (8 x 24VDC/500mA, max. in total 8A)

You can see the datasheet in Section 2.1.

This product is specifically designed for industrial use and needs to be applied under specific conditions. This product serves as an IO-Link device and needs to be connected to the IO-Link master for use.

1.2 Basic knowledge requirements

Operators need to have basic knowledge in the fields of electrical and automation engineering. Any improper operation may cause harm to the equipment or human body.

This manual describes each component based on valid data at the time of release, and new components and parameter adjustments will be updated in the new version of the manual.

1.3 Guide:

This manual describes the hardware of IO-Link signal Hub.

Covered topics are:

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

1.4 Technical support:

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

Additional information about ELCO products is available:

Corporate name: Tianjin Elco Automation Co., Ltd

Company address: No. 12, 4th XEDA Branch Road, Xiqing Economic-Technological Development Area ,Tianjin China

Website: https://www.elcoautomation.com/en-us/

TEL: +86 22 23888288

1.5 Electrical installation:

WARNING

Danger due to electrical voltage!

An unqualified installation can affect the use of the equipment or lead to equipment damage!

- Only qualified electrical engineering personnel may install the modules.
- Only operate on 24 V DC voltage.
- Must be connected to limited power source (LPS).
- Use Copper Conductors Only. Use min. 22 AWG for IO-Link port connector and min. 26 AWG for Signal I/O connector.

ATTENTION

La tension pose un danger!

Une installation non conforme peut affecter l'utilisation de l'appareil ou causer des dommages à l'appareil!

- Seuls les ingénieurs électriciens qualifiés peuvent installer les modules.
- Fonctionne uniquement à 24 V DC.
- Doit être connecté à une alimentation électrique limitée (LPS).
- Utilisez uniquement des conducteurs en cuivre. Le connecteur de port IO-Link utilise un minimum de 22 AWG et le connecteur d'E / s de signal un minimum de 26 AWG.

ATTENTION

Damages due to open plugs and sockets!

Protection rating IP67 is only guaranteed if all connections are tightly sealed.

- Seal unused plugs and sockets with screw plugs or caps.

1.6 Disclaimer of liability:

- Only qualified personnel may perform installation, commissioning, modification, inspection and retrofitting activities.
- Follow the applicable regulations and standards in the operating instructions and manual.
- Follow the safety regulations of the Employers' Liability Insurance Association and electrical engineering.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. We assume no liability for product damage or subsequent damage arising from non-observance of the regulations or improper handling of the products.

2.1 Datasheet

LKHA-16UP-M12G-AP4

ARTICLE PROPERTIES

PRODUCT TYPE	IO-Link IP67 hub with auxiliary power supply
DESCRIPTION	16DI/DO, Class-A, 8*M12

ELECTRICAL CONNECTION

IO-LINK	1 × M12 A-code 4 pin, Male	**SIGNAL**	8 × M12 A-code 4 pin, Female
POWER SUPPLY	1 × 7/8'' 4 pin, Male		

ELECTRICAL PARAMETERS

INPUT CHANNELS	Max.16	**OUTPUT CHANNELS**	Max. 16
INPUT SUPPLY CURRENT	Max. 200 mA per channel, 1.6 A in total	**OUTPUT CURRENT**	Max. 2 A per channel, 8 A in total
INPUT TYPE	PNP sensors, mechanical switches, dry contacts, etc.	**OUTPUT TYPE**	Lamps, solenoidvalves, etc.
INPUT DELAY	1.6 ms	**OUTPUT FREQUENCY**	Resistive load 100 Hz Inductive load 5 Hz
MODULE COMMUNICATION INDICATOR	Green LED	**PROCESS DATA IN**	8 bytes
POWER SUPPLY INDICATOR	Green LED	**PROCESS DATA OUT**	2 bytes
SIGNAL STATUS INDICATOR	Green LED		

DIAGNOSTICS

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

FUNCTIONAL SAFETY

MTTF (40 °C)	50a

GENERAL DATA

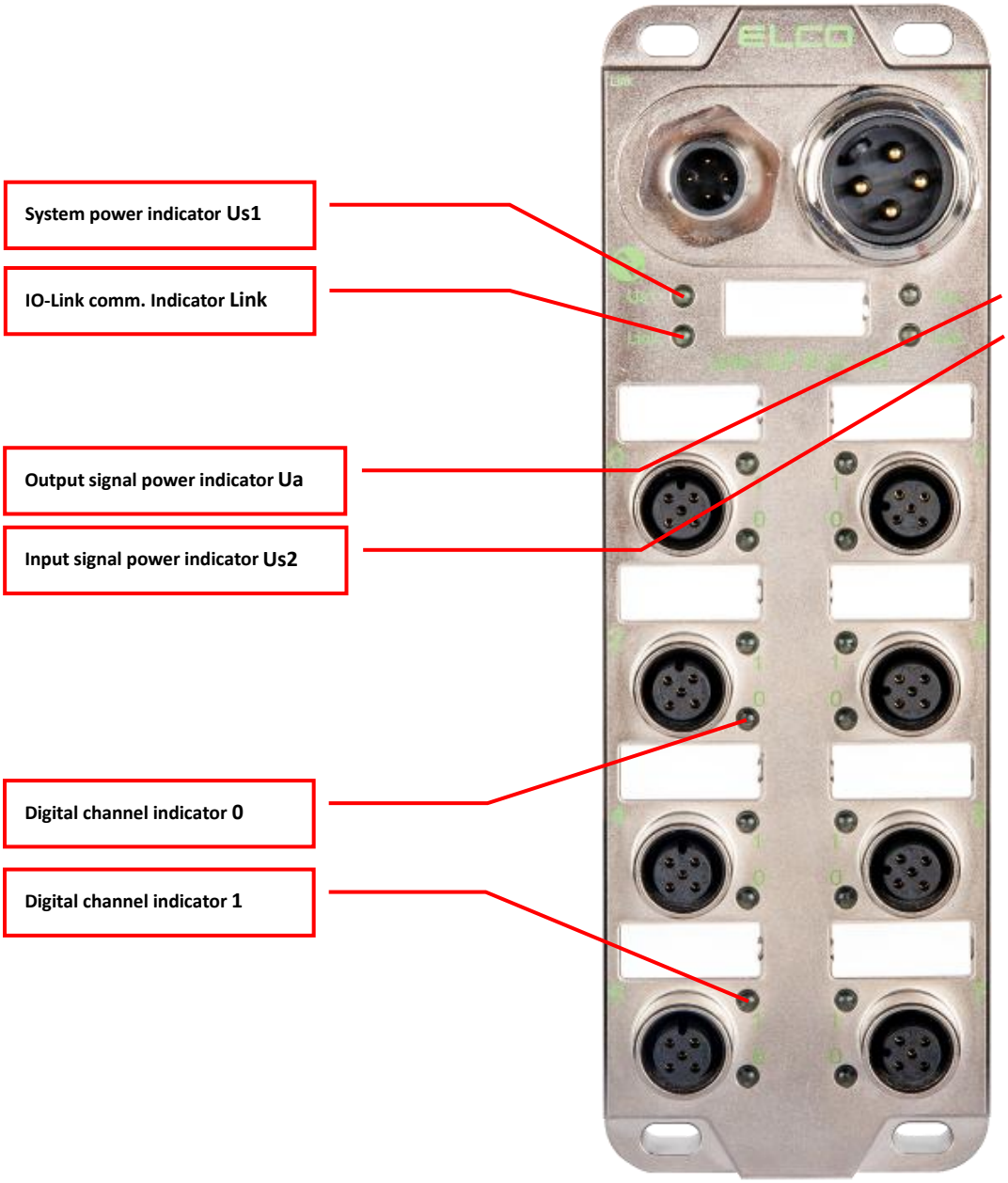
PROTECTION CLASS	IP67	**OPERATING TEMPERATURE**	-25 ... +70 °C
DIMENSIONS	55 × 170 × 37 mm	**STORAGE TEMPERATURE**	-40 ... +85 °C
WEIGHT	483.8 g	**HOUSING MATERIAL**	Casting zinc alloy

APPROVALS

CE

2.2 LED indicator

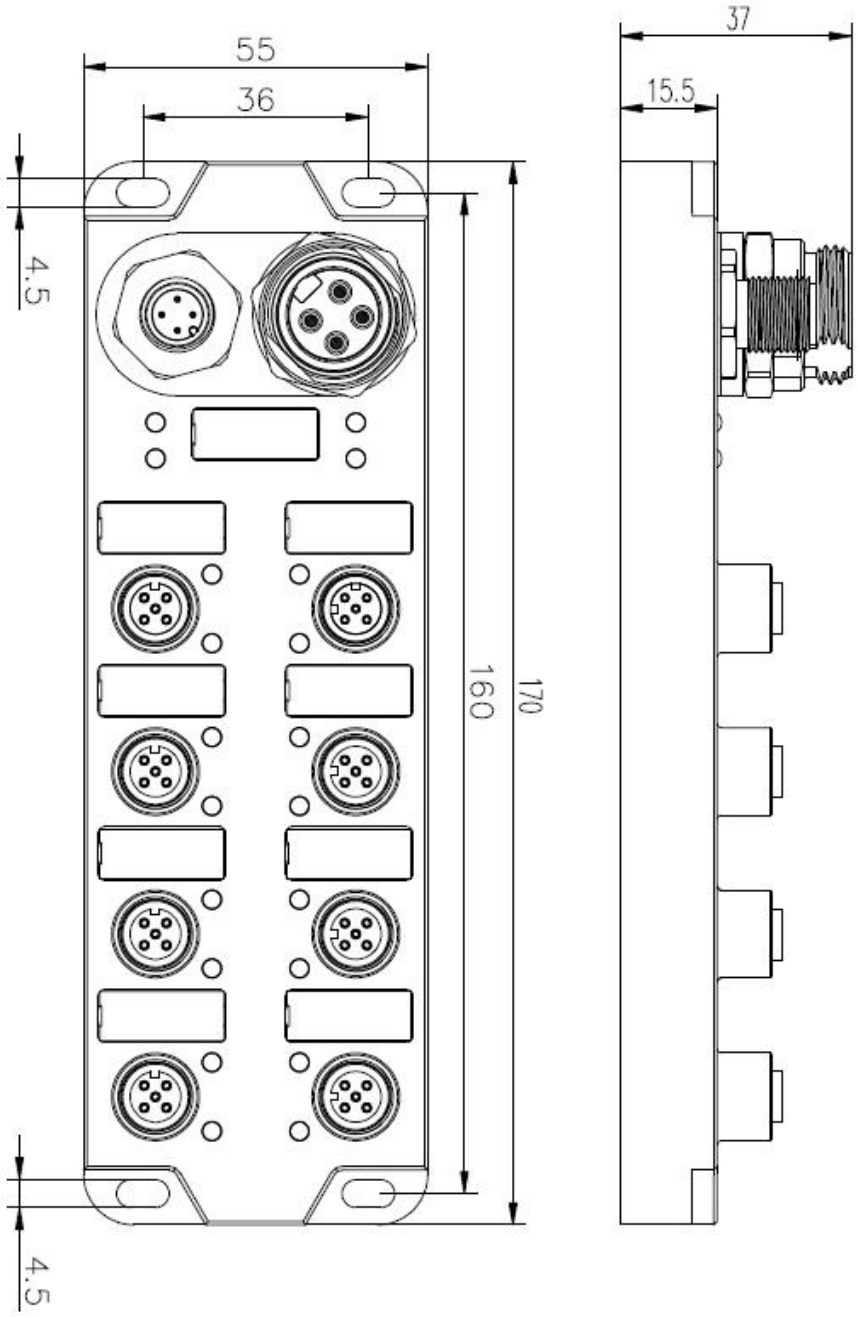
IO-Link signal hub indicator



2.3 IO-Link signal hub indicator

Name	Status	Meaning	Fault cause
Module communication Indicator Link	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
System Power supply Indicator Us1	Red	No Power or undervoltage	1.Power voltage < 18V 2.Expansion cable failure 3. Slave module is damaged
	Green	Power is OK	-
Input signal Power supply Indicator Us2	Red	No Power or undervoltage	1.Power voltage < 18V 2.Expansion cable failure 3. Slave module is damaged
	Green	Power is OK	-
Output signal Power supply Indicator Ua	Red	No Power or undervoltage	1.Power voltage < 18V 2.Expansion cable failure 3. Slave module is damaged
	Green	Power is OK	-
Signal / status Indicator	Red	Abnormal signal	1.Signal overload or short circuit 2.Slave module is damaged
	Green	Have signal	-
	Off	No signal	-

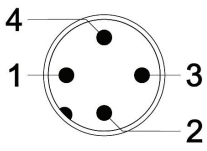
2.4 IO-Link signal hub dimensions



3.1 Wiring

Please make sure to cut off power supply when wiring to ensure safety.

1) IO-Link port connector (M12 A-Code 4-pin, Male)

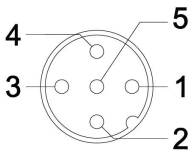


Terminal	Class-A
1	Power supply 24V+ (Us1)
2	--
3	Power supply GND
4	IO-Link C/Q

2) Auxiliary power connector (7/8” 4-pin, Male)

Terminal	7/8” connector
1	Output signal supply_Ua (+)
2	Input signal supply_Us2 (+)
3	Input signal supply_Us2 (-)
4	Output signal supply_Ua (-)

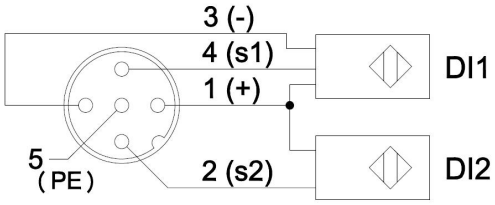
3) Signal I/O connector (M12 A-Code 5-pin, Female)



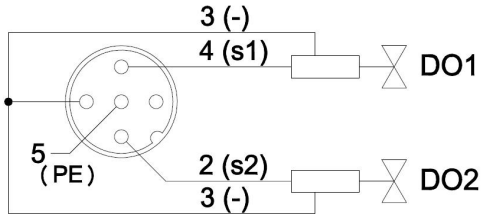
Terminal	M12 connector	
1	Power supply 24V+	
2	Signal input/output 1	2nd signal
3	Power supply GND	
4	Signal input/output 0	1st signal
5	Function grounding FE	

4) Wiring example

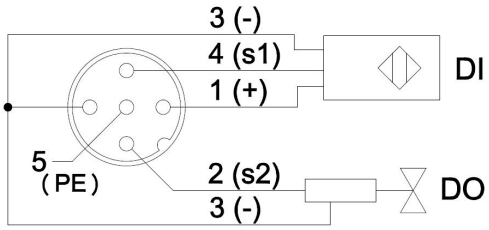
A) Double PNP input signal – 1 connector connects 2 DI, LKHA-16UP-M12G-AP4 support this connection.



B) Double PNP output signal – 1 connector connects 2 DO, LKHA-16UP-M12G-AP4 support this connection.



C) PNP Input and output signal – 1 connector connects 1 DI and 1 DO. LKHA-16UP-M12G-AP4 support this connection.



3.2 Signal address assignment

The LKHA-16UP-M12G-AP4 module is allocated 8 Byte Inputs and 2 Byte Outputs. Users can read the signal input and diagnostic status of the module through these datas, and control the signal output.

1) Process Data INPUT Mapping

A total of 8 bytes (Bytes 0-7) of input data are occupied.

INPUT	Description
Byte 0	Input signal data of Port 0~3
Byte 1	Input signal data of Port 4~7
Byte 2	Short Circuit Diagnosis of Port 0~7
Byte 3	Power Supply Diagnosis
Byte 4	Overload Diagnosis of Port 0~3
Byte 5	Overload Diagnosis of Port 4~7
Byte 6	Ouptut warning of Port 0~3
Byte 7	Ouptut warning of Port 4~7

For a detailed description of the INPUT, please refer to the following text:

Byte 0~1 (Input signal data of Port 0~7)

This section consists of 2 Bytes, used to represent the state when the signal port is connected to a switch signal.

Byte 0	Digital input status of port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
No.	3-1	3-0	2-1	2-0	1-1	1-0	0-1	0-0
Pin	Port3 Pin2	Port3 Pin4	Port2 Pin2	Port2 Pin4	Port1 Pin2	Port1 Pin4	Port0 Pin2	Port0 Pin4
Byte 1	Digital input status of port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
No.	7-1	7-0	6-1	6-0	5-1	5-0	4-1	4-0
Pin	Port7 Pin2	Port7 Pin4	Port6 Pin2	Port6 Pin4	Port5 Pin2	Port5 Pin4	Port4 Pin2	Port4 Pin4

Byte 2 (Short Circuit Diagnosis)

When a short circuit fault occurs between pins Pin1 and Pin3 of the signal port, the corresponding point indicates 1,

otherwise the point indicates 0.

Byte 2	Short Circuit Diagnosis of Port 0~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Port	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0

Byte 3 (Power Supply Diagnosis)

When there is an abnormality in the power supply of the module, according to the fault status of overvoltage and undervoltage of the voltage value, the corresponding point indication is 1, otherwise the point is 0.

Byte 3	Power Supply Diagnosis							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Mean	-	-	-	-	Ua_LL No voltage	Ua_L Low voltage	Us2_L Low voltage	Us1_L Low voltage

Byte 4~5 (Overload Diagnosis)

When an overload fault occurs between the signal port pins Pin4/Pin2 and Pin3, the corresponding point indicates 1, otherwise the point indicates 0.

Byte 4	Overload Diagnosis of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Pin	Port3 Pin2	Port3 Pin4	Port2 Pin2	Port2 Pin4	Port1 Pin2	Port1 Pin4	Port0 Pin2	Port0 Pin4
Byte 5	Overload Diagnosis of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Pin	Port7 Pin2	Port7 Pin4	Port6 Pin2	Port6 Pin4	Port5 Pin2	Port5 Pin4	Port4 Pin2	Port4 Pin4

Byte 6~7 (Ouptut warning)

When the output port is not activated, the PIN of the port reads the input signal or detects voltage being supplied, the corresponding point indicates 1, otherwise the point indicates 0.

Byte 6	Ouptut warning of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Pin	Port3	Port3	Port2	Port2	Port1	Port1	Port0	Port0

	Pin2	Pin4	Pin2	Pin4	Pin2	Pin4	Pin2	Pin4
Byte 7	Ouptut warning of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Pin	Port7 Pin2	Port7 Pin4	Port6 Pin2	Port6 Pin4	Port5 Pin2	Port5 Pin4	Port4 Pin2	Port4 Pin4

2) Process Data OUTPUT Mapping

A total of 2 bytes (Bytes 0-1) of output data are occupied.

INPUT	Description
Byte 0	Output signal data of Port 0~3
Byte 1	Output signal data of Port 4~7

For a detailed description of the OUTPUT, please refer to the following text:

Byte 0~1 (Output signal data of Port 0~7)

This section consists of 2 Bytes, used to represent the output of the signal port control switch signal.

Byte 0	Digital output status of port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
No.	3-1	3-0	2-1	2-0	1-1	1-0	0-1	0-0
Pin	Port3 Pin2	Port3 Pin4	Port2 Pin2	Port2 Pin4	Port1 Pin2	Port1 Pin4	Port0 Pin2	Port0 Pin4
Byte 1	Digital output status of port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
No.	7-1	7-0	6-1	6-0	5-1	5-0	4-1	4-0
Pin	Port7 Pin2	Port7 Pin4	Port6 Pin2	Port6 Pin4	Port5 Pin2	Port5 Pin4	Port4 Pin2	Port4 Pin4

3.3 ISDU parameter assignment

This section is for the ISDU parameter settings of IO-Link Signal Hub. Users can read and modify the configuration of the module by modifying the corresponding parameter values. Users need to modify these parameters through the IO-Link master and the specific method depends on the connected IO-Link master.

Index	Sub-	Parameter	Access	Data	Default Value

	index			Length	
16 (0x10)	0	Vendor Name	R	4 Byte	ELCO
17 (0x11)	0	Vendor text	R	20 Byte	www.elco-holding.com
18 (0x12)	0	Product name	R	14 Byte	LKHA-16UP-M12G-AP4
19 (0x13)	0	Product ID	R	8 Byte	FB330082
20 (0x14)	0	Product text	R	18 Byte	IO-Link Signal Hub
21 (0x15)	0	Serial number	R	8 Byte	00000000
22 (0x16)	0	Hardware Rev.	R	8 Byte	HW-V1.00
23 (0x17)	0	Firmware Rev.	R	8 Byte	FW-V1.00
24 (0x18)	0	Application Specific Tag	R	32 Byte	***
64 (0x40)	0 (1-16)	Input Inversion	R/W	2 Byte	0x0000
65 (0x41)	0 (1-16)	Port Direction	R/W	4 Byte	0xFFFFFFFF
66 (0x42)	0 (1-8)	Fault State Pin4	R/W	2 Byte	0x0000
67 (0x43)	0 (1-8)	Fault State Pin2	R/W	2 Byte	0x0000
80 (0x50)	1	Port Layout	R/W	1 Byte	0x01
81 (0x51)	1	Input Delay	R/W	1 Byte	0x04

1) Input Inversion (**Index: 0x40**)

Set whether the input signal is displayed normally.

“0”- not inverted;

“1”- inverted.

Byte 0	Input Inversion of Pin4							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	8	7	6	5	4	3	2	1
Pin	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
Byte 1	Input Inversion of Pin2							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	16	15	14	13	12	11	10	9
Pin	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2

2) Port Direction (**Index: 0x41**)

Set the signal direction of Pin4 & Pin2 for each port.

“0”- Input;

“1”- Output;

“3”- I/O Universal.

Byte 0	Port Direction of Pin4 of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	4		3		2		1	
Pin	Port3 Pin4		Port2 Pin4		Port1 Pin4		Port0 Pin4	
Byte1	Port Direction of Pin4 of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	8		7		6		5	
Pin	Port7 Pin4		Port6 Pin4		Port5 Pin4		Port4 Pin4	
Byte 2	Port Direction of Pin2 of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	12		11		10		9	
Pin	Port3 Pin2		Port2 Pin2		Port1 Pin2		Port0 Pin2	
Byte 3	Port Direction of Pin2 of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	16		15		14		13	
Pin	Port7 Pin2		Port6 Pin2		Port5 Pin2		Port4 Pin2	

3) Fault State Pin4 (**Index: 0x42**)

Set the safety status of Pin4 output when communication fault occurs.

“0”- Set to 0;

“1”- Set to 1;

“2”- Hold last value.

Byte 0	Fault State Pin4 of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	4		3		2		1	
Pin	Port3 Pin4		Port2 Pin4		Port1 Pin4		Port0 Pin4	
Byte1	Fault State Pin4 of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	8		7		6		5	
Pin	Port7		Port6		Port5		Port4	

	Pin4	Pin4	Pin4	Pin4

4) Fault State Pin2 (**Index: 0x43**)

Set the safety status of Pin2 output when communication fault occurs.

"0"- Set to 0;

"1"- Set to 1;

"2"- Hold last value.

Byte 0	Fault State Pin2 of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	4		3		2		1	
Pin	Port3 Pin2		Port2 Pin2		Port1 Pin2		Port0 Pin2	
Byte1	Fault State Pin2 of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	8		7		6		5	
Pin	Port7 Pin2		Port6 Pin2		Port5 Pin2		Port4 Pin2	

4) Fault State Pin2 (**Index: 0x43**)

Set the safety status of Pin2 output when communication fault occurs.

"0"- Set to 0;

"1"- Set to 1;

"2"- Hold last value.

Byte 0	Fault State Pin2 of Port 0~3							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	4		3		2		1	
Pin	Port3 Pin2		Port2 Pin2		Port1 Pin2		Port0 Pin2	
Byte1	Fault State Pin2 of Port 4~7							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex	8		7		6		5	
Pin	Port7 Pin2		Port6 Pin2		Port5 Pin2		Port4 Pin2	

5) Port Layout (**Index: 0x50**)

Set the address mapping order of the hub's switch input and output signals.

"1"- Port base (arranged by Port sequence);

"2"- Pin base (arranged by Pin4 and then Pin2).

Byte 0	Port Layout							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex							1	
Layout							Value	

6) Input Delay (**Index: 0x51**)

Set the filter time of the input signals. This time means that the signal needs to continuously exceed the set value in order to be detected

"0"- 0ms; "3"- 0.8ms; "4"- 1.6ms; "5"- 3.2ms; "7"- 20ms;

Byte 0	Input Delay							
Bit	Bit_7	Bit_6	Bit_5	Bit_4	Bit_3	Bit_2	Bit_1	Bit_0
Subindex						1		
Delay						Value		