

**RIO7B1600CN**

**IO-Link HUB Hub**

**User Manual**

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# 1 Product Overview

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## 1.1 Product Introduction

IO-Link is the world's first standardized cross-vendor IO technology (IEC 61131-9), an open standard serial communication protocol. The RIO7B1600CN Signal Hub (hereinafter referred to as "HUB") supports IO-Link communication, and can support up to 16 channels of digital input or 16 channels of digital output. As an IO-Link slave, it can connect to any brand of IO-Link master, fulfilling the user's needs for process data, diagnostics, and configuration data transmission.

## 1.2 Product Features

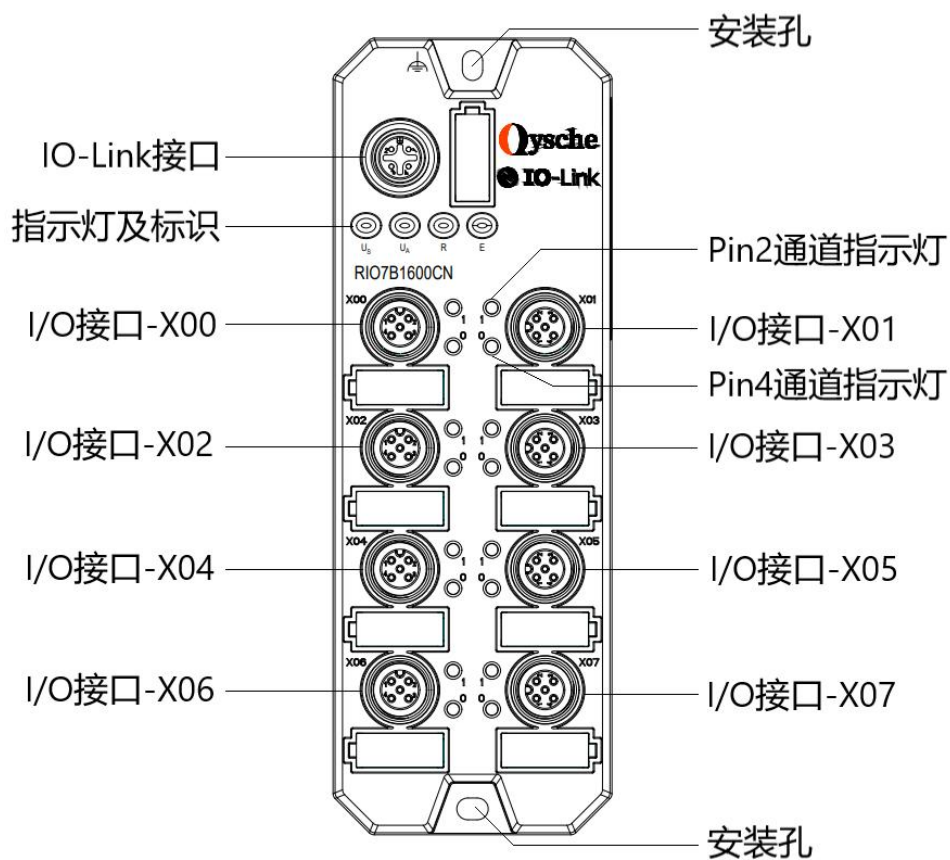
- Up to IP67 protection level, suitable for harsh industrial environments
- Wiring is simple and quick, while achieving power supply and data transmission
- Designed according to IO-Link v1.1 specification
- Can connect various IO-Link standard devices and standard binary signals
- LED status display, channel protection, and diagnostics

This manual mainly introduces the structure, product parameters, and main functions of the RIO7B1600CN hub.

# 2 Panel

## 2.1 Hub Structure

### Names of various parts of the product



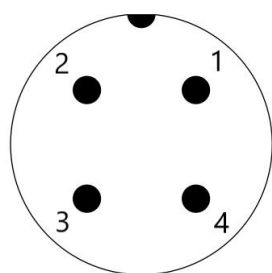
## 2.2 Indicator Light Function

Identification	Color	Status	Status Description
Power Indicator US	Green	On	Power supply is normal
		Extinguish	Product is not powered on or power supply is abnormal
Power indicator light UA	Green	On	Auxiliary power or external power supply is normal
		Extinguish	Product is not powered on or auxiliary/external power supply is abnormal
Communication indicator light R	Green	On	Communication is abnormal
		Flashing	Communication is normal
		Extinguish	Power supply is abnormal
Input channel indicator light	Green	On	PNP type, channel signal input high
		Extinguish	PNP type, channel signal input low
Output channel indicator light	Green	On	PNP type, channel signal output high
		Extinguish	PNP type, channel signal output low
Fault indicator light E	Red	On	Abnormal conditions such as over temperature, low voltage, over voltage, channel over current or overload, short circuit faults, and device operation anomalies have occurred; in input mode, the channel line is disconnected.
		Extinguish	No Abnormalities

## 2.3 IO-Link Interface Definition

**IO - Link Interface Connection View (Class - A Port, Pin End)**

**Definition Description**

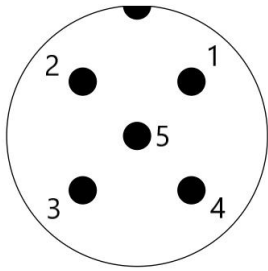


P in	Function
1	Supply Voltage, + 24 V
2	NC
3	0 V, Power Supply GND
4	C/Q, IO -Link Data Transmission Channel

Note: For Class-A interfaces, the master station connection supports output from RIO7B1600CN, which can meet higher driving capacity by configuring Pin2 to output a high level, or Pin 2 can be left unconnected, with Pin1 directly providing driving capacity. The supply voltage of Pin2 and Pin1 uses a common ground. It is not recommended to connect RIO7B1600CN to Class-B master stations, prohibit Class-A master station Pin2 from outputting low level.

**IO - Link Interface Connection View (Class - B Port, Pin Side)**

**Definition Description**

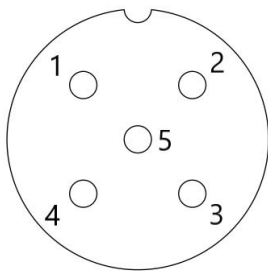


P in	Function
1	Supply Voltage, + 24 V
2	Auxiliary Power P24
3	0 V, Power Supply GND
4	C/Q, IO -Link Data Transmission Channel
5	Auxiliary Power N24

**2.4 I/O Interface Definition**

**I/ O Interface Connection View (M 12, Socket Side)**

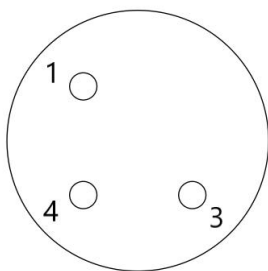
**Definition Description**



P in	Function
1	Supply Voltage, + 24 V
2	DI/ DO 1, Signal Input/Output 1
3	0 V, Power Supply GND
4	DI/ DO 0, Signal Input/Output 0
5	NC

**I/ O Interface Connection View (M 8, Socket Side)**

**Definition Description**



P in	Function
1	Supply Voltage, + 24 V
3	0 V, Power Supply GND
4	DI/ DO, Signal Input/Output

# 3 Product Parameters

## 3.1 General Parameters

<b>Communication Parameters</b>	
Product Model	RIO7B1600CN
DeviceID	2401003 (0x24A2EB)
IO-Link Version	V1.1
Communication Rate	COM2 ( 38.4kbps )
Minimum Cycle Time	4.5ms
Process Data Length	2 Bytes Input / Output
Interface Type	M12-A, 4 P in, Pin End
Cable Length	≤ 20m (Between HUB and Master Station)
<b>Electrical Parameters</b>	
Operating Voltage ( V )	24 VDC (18V ~ 30V)
Current Consumption ( mA )	No Load: 15mA
Input and Output Configurable	Yes
Input and Output Interface	M12-A, 5 P in, Socket End
Number of Input Channels	Max 1 6
Input Current	4mA
Input Channel Type	PNP
Input Filtering	Configurable
Digital Input Short Circuit Protection	Supported



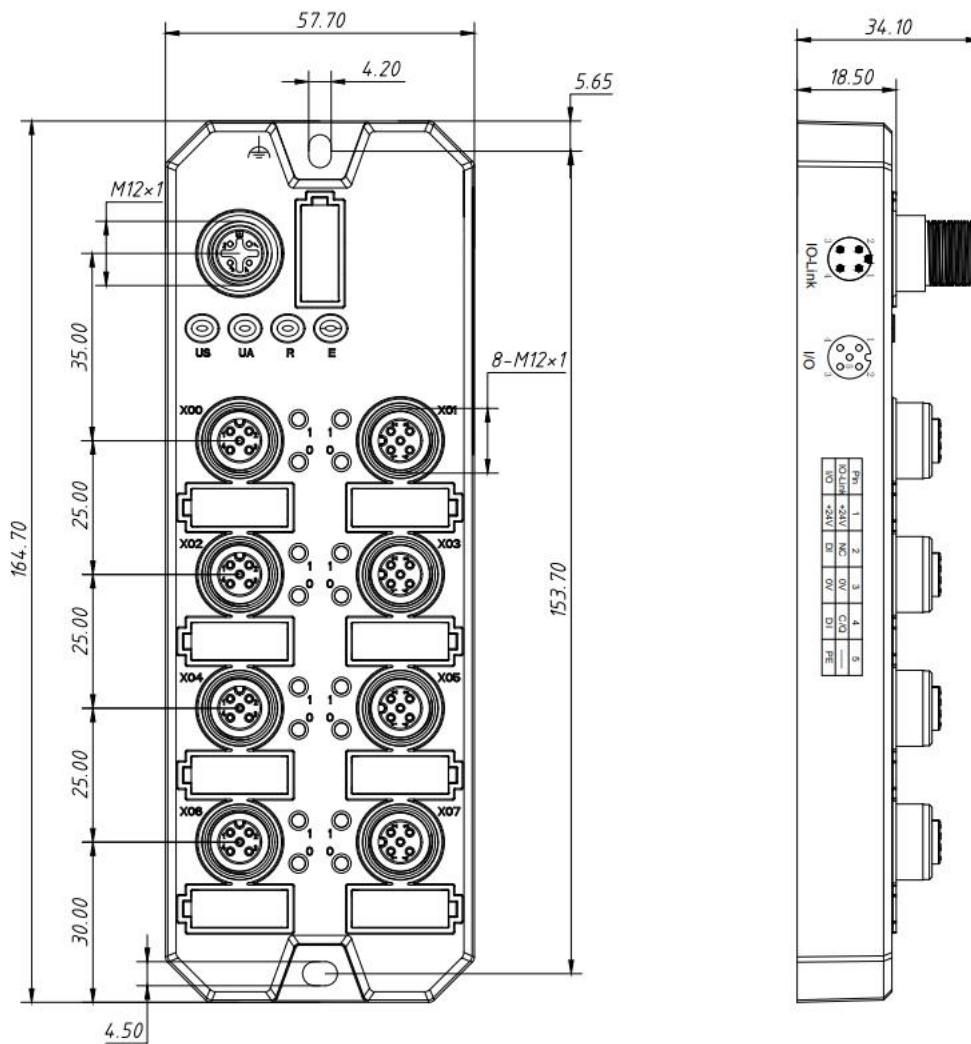
Number of Output Channels	Max 16
Maximum Output Current per Channel	0.5 A
Total Output Current	Maximum 2 A
Output Channel Type	PNP

## 3.2 Technical Parameters

<b>Diagnostics</b>	
Communication Status	LED Indication
Supply Voltage Monitoring	Supported
Temperature Detection	Supported
Short Circuit and Overload Protection	Supported
<b>Operating Environment</b>	
Specifications and Dimensions	1 64.7 × 57.7 × 34.1 mm
Weight	2 60 g
Operating Temperature	- 25 °C~+ 70 °C
Storage Temperature	-40°C ~ +85°C
Relative Humidity	95%, no condensation
Protection Level	IP67
<b>Others</b>	
Firmware Upgrade	Supported
Data Storage	Supported

# 4 Wiring Instructions

## 4.1 Dimensions Diagram



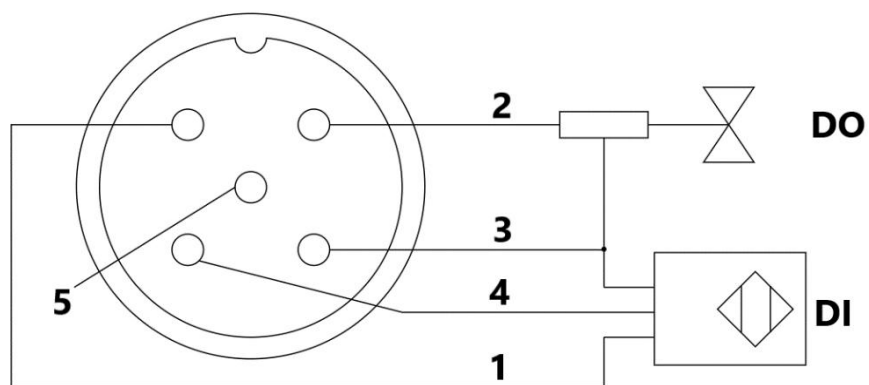
## 4.2 Wiring Instructions

- For personal and equipment safety, it is recommended to disconnect the power supply when performing wiring operations.
- IO-Link Master Interface: Connect the IO-Link Hub to any IO-Link Master product using standardized three-core or four-core cables.
- I/O Interface: Connect the IO-Link Hub to sensors or other devices using standardized five-core cables.

## 4.3 Wiring Examples

### PNP Configurable Input/Output Signal

1 connector can be configured to connect 1 digital input and 1 digital output signal, 2 digital input signals, or 2 digital output signals.



# 5 Function Description

## 5.1 Process Data Mapping

Input Data:

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Bit Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pin	X0 3 -Pin2	X0 3 -Pin4	X0 2 -Pin2	X0 2 -Pin4	X0 1 -Pin2	X0 1 -Pin4	X0 0 -Pin2	X0 0 -Pin4	X0 7 -Pin2	X0 7 -Pin4	X0 6 -Pin2	X0 6 -Pin4	X0 5 -Pin2	X0 5 -Pin4	X0 4 -Pin2	X0 4 -Pin4

Output Data:

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Bit Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pin																

## 5.2 ISDU Parameters

ISDU		Name	Permissions	Data Type	Description
Index	Sub-index				
0x0010	0x00	Vendor Name	R	64 String	
0x0011	0x00	Vendor Information	R	64 String	
0x0012	0x00	Product Name	R	64 String	
0x0013	0x00	Product ID	R	64 String	
0x0014	0x00	Product Information	R	64 String	I/O-H UB
0x0015	0x00	Serial Number	R	64 String	-
0x0016	0x00	Hardware Version	R	64 String	-
0x0017	0x00	Firmware Version	R	64 String	-
0x0018	0x00	Application Identifier	R/W	32 String	Application Identifier: ***
0x0019	0x00	Specific Function Identifier	R/W	32 String	Specific Function Identifier: ***
0x001a	0x00	Device Location Identifier	R/W	32 String	Device Location Description: ***
0x0024	0x00	Device Status	R	1 UIntegerT	Note 1
0x0025	0x00	Device Detailed Status	R	ArrayT of OctetStringT3	Note 2

Note 1: Device Status Definition, 0: Device Normal; 1: Device Needs Maintenance; 2: Device Out of Limits; 3: Device Needs Functional Check; 4: Device Malfunction, Default 0

Note 2: Default 8\*3 bytes, Default 0x0, 0x0, 0x0

## 5.3 System Command

Index	Value	Function	Description
0x0002	0x80(128)	Device Reset	Device Executing Reset
	0x81(129)	Application Reset	Application Executing Reset
	0x82(130)	Restore Factory Settings	Restore Factory Settings, all parameters reset to default values
	0x83(131)	Restore Original Delivery Settings	Device will restore parameters to original delivery values

## 5.4 Configure Parameters

Index	Sub-index	Configure Function Name	Permissions	Data Type	Description
0x0041	0x00	Input Conversion	R/W	2 Unsigned	0: No Reversal; 1: Reversal; Default 0x0000
0x0042	0x00	Configure Port Direction	R/W	2 Unsigned	0: Input; 1: Output; Default 0xFFFF
0x0044	0x00	Short Circuit Recovery	R/W	2 Unsigned	0: Automatic Recovery; 1: Manual Reset Recovery; Default 0x0000
0x0045	0x00	Output Failure Protection	R/W	16 Unsigned	0: Output 0V; 1: Output 24V; 2: Output Maintain Original State, Default All 0
0x0046	0x00	Range Settings	R/W	1 Unsigned	0 Single Independent Setting; 1 Overall Setting; 2 Group Setting, Default 0
0x0047	0x00	Overall Function Settings	R/W	See 6.5.6	See 6.5.6
0x0048	0x00	Grouping Function Settings	R/W	See 6.5.7	See 6.5.7
0x0049	0x00	Input Filtering Time	R/W	16 Unsigned	See 6.5.8
0x004A	0x00	Input Hold Time	R/W	16 Unsigned	See 6.5.9

## 5.5 Function Parameter Mapping

### 5.5.1 Input Conversion ( 0x0041)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Bit Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pin	X03 -Pin2	X03 -Pin4	X02 -Pin2	X02 -Pin4	X01 -Pin2	X01 -Pin4	X00 -Pin2	X00 -Pin4	X07 -Pin2	X07 -Pin4	X06 -Pin2	X06 -Pin4	X05 -Pin2	X05 -Pin4	X04 -Pin2	X04 -Pin4

Note: b ' 0 No Inversion, Default Value

b ' 1 Inversion

## 5.5.2 Configure Port Direction ( 0x0042)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Bit Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pin	X03 -Pin2	X03 -Pin4	X02 -Pin2	X02 -Pin4	X01 -Pin2	X01 -Pin4	X00 -Pin2	X00 -Pin4	X07 -Pin2	X07 -Pin4	X06 -Pin2	X06 -Pin4	X05 -Pin2	X05 -Pin4	X04 -Pin2	X04 -Pin4

Note: b ' 0 Input

b ' 1 Output, Default Value

## 5.5.3 Short Circuit Recovery ( 0x0044)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Bit Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pin	X03 -Pin2	X03 -Pin4	X02 -Pin2	X02 -Pin4	X01 -Pin2	X01 -Pin4	X00 -Pin2	X00 -Pin4	X07 -Pin2	X07 -Pin4	X06 -Pin2	X06 -Pin4	X05 -Pin2	X05 -Pin4	X04 -Pin2	X04 -Pin4

Note: b ' 0 Automatic Recovery, Default Value

b ' 1 Manual Reset Recovery

## 5.5.4 Output Failure Protection ( 0x0045 )

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	1								2							
Bit Offset	120								112							
Pin	X00-Pin 4								X00-Pin 2							

Bytes	2								3							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	3								4							
Bit Offset	104								96							
Pin	X01-Pin 4								X01-Pin 2							

Bytes	4								5							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	5								6							



Bit Offset	88	80
Pin	X02-Pin 4	X02-Pin 2

Bytes	6								7							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	7								8							
Bit Offset	72								64							
Pin	X03-Pin 4								X03-Pin 2							

Bytes	8								9							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	9								10							
Bit Offset	56								48							
Pin	X04-Pin 4								X04-Pin 2							

Bytes	10								11							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	11								12							
Bit Offset	40								32							
Pin	X05-Pin 4								X05-Pin 2							

Bytes	12								13							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	13								14							
Bit Offset	24								16							
Pin	X06-Pin 4								X06-Pin 2							

Bytes	14								15							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	15								16							
Bit Offset	8								0							
Pin	X07-Pin 4								X07-Pin 2							

Note: 0 Communication Failure Outputs 0V Low Level, Default Value

1 Communication Failure Outputs 24V High Level

2 Communication Failure Outputs Maintain Original State

### 5.5.5 Range Settings ( 0x0046 )

Parameter Configuration	Meaning	Description
0	Individual	Each Port Independently Set
1	Collective	All Ports Overall Set
2	Grouped	Group Settings. Group One (X 00 , X 01 , X 02 , X 03) ; Group Two ( X 04 , X 05 , X 06 , X 07)

Note: 1. Each time changing from Independent Settings to Overall Settings, all ports will be adjusted based on Parameter 0x0047 (Overall Settings).

2. Each time the setting changes from independent to grouped, all ports will be adjusted according to parameter 0x0048 (grouped setting).

### 5.5.6 Overall Function Setting ( 0x0047 )

Model RIO7B1600CN (3 bytes)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	1								2							
Bit Offset	16								8							
Description	Input Filtering Time Setting Value 0~10 (corresponding to 0~20ms, 2ms unit), 10: 20ms; 0: off, default off								Output Failure Protection, 0: Output 0V; 1: Output 24V ; 2: Output retains original state, default 0							
Bytes	2															
Bits	7	6	5	4	3	2	1	0								
Sub-index						3	4	5								
Bit Offset						2	1	0								
Description						Short Circuit Recovery, 0: Automatic Recovery; 1: Manual Reset Recovery, default 0	Input Conversion, 0: Input Not Inverted; 1: Input Inverted, default 0	Configure Port Direction, 0: Input; 1: Output, default 1								

### 5.5.7 Grouping Function Settings ( 0x0048 )

RIO7B1600CN Model (5 bytes)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	1								2							
Bit Offset	32								24							
Description	Group 2 Input Filtering Time Setting Value 0~10 (corresponding to 0~20ms, 2ms unit), 10: 20ms; 0: off, default off								Group 2 Output Failure Protection, 0: Output 0V; 1: Output 24V ; 2: Output retains original state, default 0							

Bytes	2								3							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	3								4							
Bit Offset	16								8							
Description	Group 1 Input Filtering Time Setting Value 0~10 (corresponding to 0~20ms, 2ms unit), 10: 20ms; 0: off, default off								Group 1 Output Failure Protection, 0: Output 0V; 1: Output 24V ; 2: Output retains original state, default 0							

Bytes	4							
Bits	7	6	5	4	3	2	1	0
Sub-index			5	6	7	8	9	10
Bit Offset			5	4	3	2	1	0
Description			Group 2 Short Circuit Recovery, 0: Automatic Recovery; 1: Manual Reset Recovery, default 0	Group 2 Input Conversio n, 0: Input Not Inverted; 1: Input Inverted, default 0	Group 2 Configure Port Direction, 0: Input; 1: Output, default 1	Group 1 Short Circuit Recovery, 0: Automatic Recovery; 1: Manual Reset Recovery, default 0	Group 1 Input Conversio n, 0: Input Not Inverted; 1: Input Inverted, default 0	Group 1 Configure Port Direction, 0: Input; 1: Output, default 1

### 5.5.8 Input Filtering Time (0x0049)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	1								2							
Bit Offset	120								112							
Pin	X00-Pin 4								X00-Pin 2							

<b>Bytes</b>	<b>2</b>								<b>3</b>							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	3								4							
Bit Offset	104								96							
Pin	X01-Pin 4								X01-Pin 2							

<b>Bytes</b>	<b>4</b>								<b>5</b>							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	5								6							
Bit Offset	88								80							
Pin	X02-Pin 4								X02-Pin 2							

<b>Bytes</b>	<b>6</b>								<b>7</b>							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	7								8							
Bit Offset	72								64							
Pin	X03-Pin 4								X03-Pin 2							

<b>Bytes</b>	<b>8</b>								<b>9</b>							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	9								10							
Bit Offset	56								48							
Pin	X04-Pin 4								X04-Pin 2							

Bytes	10								11							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	11								12							
Bit Offset	40								32							
Pin	X05-Pin 4								X05-Pin 2							

Bytes	12								13							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	13								14							
Bit Offset	24								16							
Pin	X06-Pin 4								X06-Pin 2							

Bytes	14								15							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	15								16							
Bit Offset	8								0							
Pin	X07-Pin 4								X07-Pin 2							

Note: For the RIO7B1600CN model, the input filtering time definition, 1 0: 20 ms; 0: off, default off.

### 5.5.9 Input Hold Time (0x004A)

Bytes	0								1							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	1								2							
Bit Offset	120								112							
Pin	X00-Pin 4								X00-Pin 2							

Bytes	2								3							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	3								4							
Bit Offset	104								96							
Pin	X01-Pin 4								X01-Pin 2							

Bytes	4								5							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	5								6							
Bit Offset	88								80							
Pin	X02-Pin 4								X02-Pin 2							

Bytes	6								7							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	7								8							
Bit Offset	72								64							
Pin	X03-Pin 4								X03-Pin 2							

Bytes	8								9							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	9								10							
Bit Offset	56								48							
Pin	X04-Pin 4								X04-Pin 2							

Bytes	10								11							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	11								12							
Bit Offset	40								32							
Pin	X05-Pin 4								X05-Pin 2							

Bytes	12								13							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	13								14							
Bit Offset	24								16							
Pin	X06-Pin 4								X06-Pin 2							

Bytes	14								15							
Bits	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub-index	15								16							
Bit Offset	8								0							
Pin	X07-Pin 4								X07-Pin 2							

## 5.6 Diagnostic Event

Level/Limit			Event Qualifier	Index	Device Status Value	Description	Resolve
Mode	Fault Type	For example					
0xC0	0x30	0x04	0xF4 Occurred	0x4000	4	Overload/Overtemperature Event	Turn off power and check load
0x80	0x30	0x04	0xB4 Not Occurred	0x4000	0		
0xC0	0x20	0x04	0xE4 Occurred	0x5110	2	Main Power Overvoltage Event	Check Supply

0x80	0x20	0x04	0xA4 Not Occurred	0x5110	0		Voltage
0xC0	0x20	0x04	0xE4 Occurred	0x5111	2	Main Power Undervoltage Event	
0x80	0x20	0x04	0xA4 Not Occurred	0x5111	0		