

Hi-Techno Pump

IX PROFIBUS converter

Instruction manual

Thank you for choosing our product.



Please read through this instruction manual before use.

This instruction manual describes important precautions and instructions for the product. Always keep it on hand for quick reference.

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Safety instructions

Read through this section before use. This section describes important information for you to prevent personal injury or property damage.

■ Pictorial indication

In this instruction manual, the estimated risk of degree caused by incorrect use is ranked with the following pictorial indications. First, fully understand information on the pictorial indications.



WARNING

Indicates mishandling could lead to a fatal or serious injury accident.



CAUTION

Indicates mishandling could lead to personal or property damage.

Pictorial indication accompanies each precaution, suggesting "Caution", "Prohibition" and "Requirement".

Caution marks



Caution



Electrical shock

Prohibition mark



Prohibition



Do not remodel

Requirement mark



Requirement



Wear protectors



Earthing



For exportation

Technology related to the use of goods in this instruction manual falls in the category of technology contained in the Foreign Exchange Order Attachment, which includes complementary export control of technology. Please be reminded that export license, which is issued by the Ministry of Economy, Trade, and Industry could be required, when this is exported or provided to someone even in Japan.

WARNING



Turn off power before work

Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before work.



Stop operation

On sensing any abnormality, suspend operation immediately and inspect/solve problems.



Do not use this product in anything other than a specified purpose

The use of this product in any purpose other than those clearly specified may result in personal injury or property damage. Use this product in a specified condition only.



Do not modify this product

Remodelling this product carries a high degree of risk. We are not responsible for any failure or injury results from unauthorized modification.



Wear protective clothing

Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a work cap during dismantlement, assembly or maintenance work.



Do not use this product in a flammable atmosphere.

Do not place dangerous or flammable goods near this product for your safety.

⚠ CAUTION

Requirement

A qualified operator only

This product must be handled or operated by a qualified person with a full understanding. Any person who is not familiar with this product should not take part in operation or management.



Prohibition

Do not wet electric parts or wiring

Risk of a fire or an electrical shock. Install this product free from liquid spill.



Prohibition

Do not install or store this product in the following places where...

- Under a flammable atmosphere or in a dusty/humid place.
- Ambient temperature exceeds 50°C or falls below 0°C.
- Under direct sunlight or wind & rain.



Prohibition

Do not use this product in a water place

This product is not totally waterproof. The use of this product in water or high humidity could lead to an electrical shock or a short circuit.



Requirement

Wear part replacement

Follow instructions in this manual for wear part replacement. Do not dismantle this product beyond the extent of the instructions.



Requirement

Disposal of a used product

Dispose of any used or damaged product in accordance with relevant regulations. Consult a licensed industrial waste products disposing company.

Precautions for use

- Electrical work should be performed by a qualified operator. Otherwise, personal injury or property damage may result.



- Do not install this product in the following places where...
 - Under a flammable atmosphere or in a dusty/humid place.
 - Under direct sunlight or wind & rain.
 - Ambient temperature exceeds 50 degrees Celsius or falls below 0 degrees Celsius.



- Select a level location where is free from vibration and where liquid can't stay. Fix this product with four M4 bolts.



- There should be sufficient space around this product for efficient and easy maintenance.



- Be careful not to drop this product onto the floor. A strong impact may adversely affect operation. Do not use a converter which has once damaged. Otherwise an electrical leak or shock may result.



- This product is not totally waterproof. Avoid a place where is subject to spillage of chemical liquid or rainwater.



- Risk of personal injury or property damage. Do not wet this product, or failure or an accident may result. Immediately wipe off liquid if the product has got wet.



- Do not clean the pump or a nameplate with a solvent such as benzine and thinner. This may discolour the product or erase printing. Use a dry cloth or a wet cloth with water or neutral detergent.



Outline

The information such as characteristics and features are described in this section.

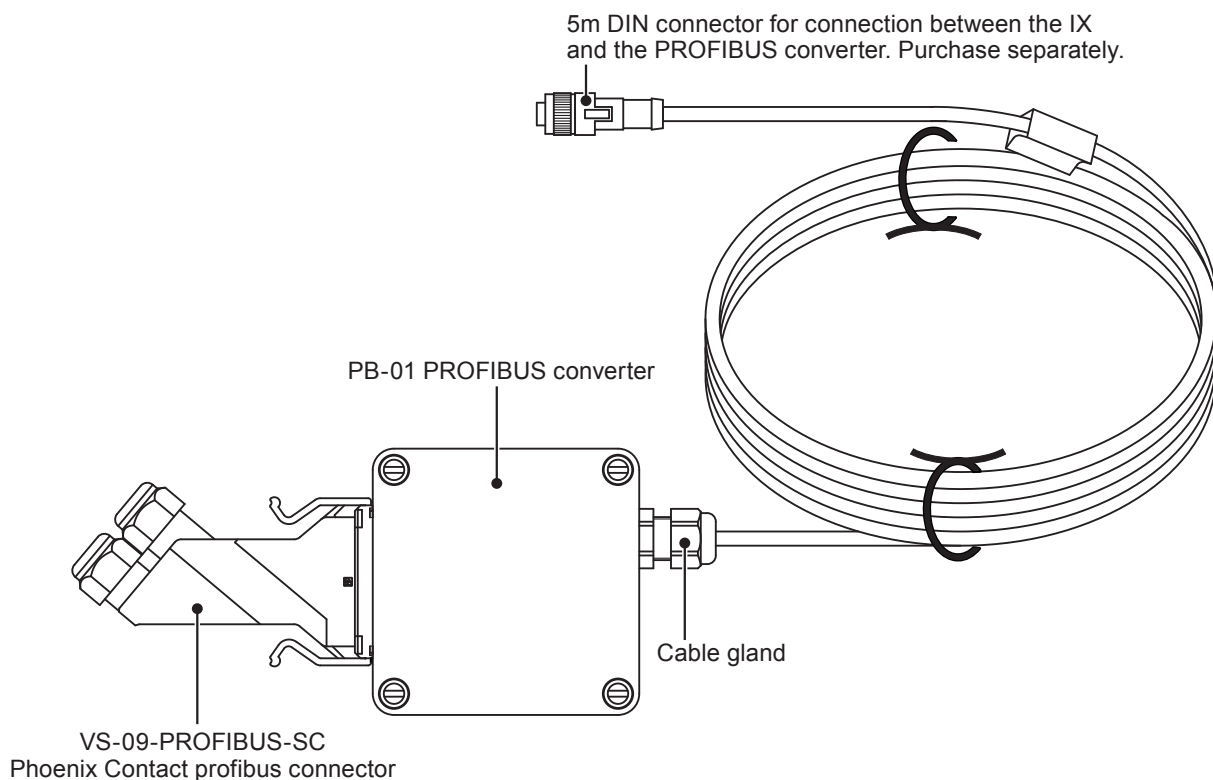
Introduction

Use this product with the IX series pumps in order to operate the pump in a PROFIBUS communication system.

GSD file

Obtain A GSD file of IWIXOCD6.gsd. The file is available through <http://www.profibus.com/>, or contact your nearest distributor.

Part names



Functions

This section describes features of the PROFIBUS converter.

From a slave (pump) to a master (User's PLC)

Start bite	Byte length	Items	Unit
0	2	Operating condition	Bit
2	4	Flow rate indication	Numeric value
6	2	Input information	Bit
		Output information	Bit
8	4	Calibration	Numeric value
12	2	Error	Bit
14	2	Others	Bit
16	4	Accumulated number of operating hours	Numeric value
20	4	Accumulated total flow	Numeric value
24	4	Operating hours	Numeric value
28	4	Number of turning on power	Numeric value
32	4	Controller type	Characters
36	2	Software version	Numeric value

From a master (User's PLC) to a slave (pump)

Start bite	Byte length	Items	Unit
38	2	Operation	Bit
40	4	Manual	Numeric value
44	2	Analogue	Bit
46	4	Pulse	Numeric value
50	4	Batch	Numeric value
54	2	Interval Batch control period	Numeric value
56	4	Interval Batch control behaviour	Numeric value
60	2	External input	Bit
		Others	Bit
62	2	ALM1	Bit
		ALM2	Bit
64	4	External input (AUX)	Numeric value
68	2	Clear error	Bit
70	2	Data log clear	Bit

Status

This section describes details info on the above features.

Note that things need set in big endian.

From a slave (pump) to a master (User's PLC)

■ Operating condition

Bit	Items	Description
15	Operation	0 : Stop 1 : Start
14	Operation mode	0 : Manual 1 : Analogue
13		2 : Pulse 3 : Batch
12		4 : Interval batch
11		
10	Diaphragm replacement	0 : OFF 1 : MAX IN
9		2 : MAX OUT
8 - 0		

■ Flow rate indication

Bit	Items	Description
long	Flow rate indication	C150 : 0-150000 (L/H × 0.001) *A decimal point is not shown.

■ Input information

Bit	Items	Description
15	STOP	0 : Active 1 : Inactive
14	PreSTOP	0 : Active 1 : Inactive
13	Interlock	0 : Active 1 : Inactive
12	Current	0 : Active 1 : Inactive
11	Pulse	0 : Active 1 : Inactive
10		
9		
8		

■ Output information

Bit	Items	Description
7	ALM2	0 : Active 1 : Inactive
6	ALM1	0 : Active 1 : Inactive
5		
4		
3		
2		
1		
0		

■ Calibration

Bit	Items	Description
long	Calibration	0-nnnnn (mL × 0.01) *A decimal point is not shown.

■ Error

Bit	Items	Description
15	Leak	0 : Active 1 : Inactive
14	Over Load	0 : Active 1 : Inactive
13	Driver	0 : Active 1 : Inactive
12 - 0		

■ Others

Bit	Items	Description
15	Suction speed	0 : 100% 1 : 75%
14		2 : 50% 3 : 25%
13	Anti-chattering	0 : 1 msec 1 : 2 msec
12		2 : 5 msec
11		
10		
9		
8		

■ Accumulated number of operating hours

Bit	Items	Description
long	Accumulated number of operating hours	0 - 999999 hours

■ Accumulated total flow

Bit	Items	Description
long	Accumulated total flow	0 - 99999999 liter

■ Operating hours

Bit	Items	Description
long	Accumulated number of operating hours	0 - 999999 hours

■ Number of turning on power

Bit	Items	Description
long	Number of turning on power	0 - 999999 times

■ Controller type

Bit	Items	Description
char	Controller type	

■ Software version

Bit	Items	Description
short	Software version	000-999 *A decimal point is not shown.

From a master (user's PLC) to a slave (pump)

■ Operation

Bit	Items	Description
15	Operation	0 : Stop 1 : Start
14	Operation mode	0 : Manual 1 : Analogue
13		2 : Pulse 3 : Batch
12		4 : Interval batch
11		
10	Diaphragm replacement	0 : OFF 1 : MAX IN
9		2 : MAX OUT
8 - 0		

■ Manual operation

Bit	Items	Description
long	Manual	C150 : 0-150000 (L/H × 0.001) *A decimal point is not shown.

*Always check pump spec. Do not set a flow rate over the maximum rate.

■ Analogue operation

Bit	Items	Description
15	Analogue	0 : 4-20 1 : 20-4
14		2 : 0-20 3 : 20-0
13 - 0		

■ Pulse

Bit	Items	Description
long	Unit	00001560-30000000 (ml × 0.00001)

■ Batch

Bit	Items	Description
long	Unit	00001560-30000000 (mL × 0.00001)

■ Interval batch control period

Bit	Items	Description
short	Date	0 - 9
	Hour	0 - 23
	Minute	0 - 59
		0-14399 (min)

■ Interval Batch control behaviour

Bit	Items	Description
long	Unit	00001560-30000000 (ml × 0.00001)

■ External input

Bit	Items	Description
15	STOP	0 : OFF 1 : ON
14	PreSTOP	0 : OFF 1 : ON
13	Interlock	0 : OFF 1 : ON
12	Leak	0 : OFF 1 : ON
11		
10		
9		
8		

■ Others

Bit	Items	Description
7	Suction speed	0 : 100% 1 : 75%
6		2 : 50% 3 : 25%
5	Anti-chattering	0 : 1msec 1 : 2msec
4		2 : 5msec
3		
2		
1		
0		

■ ALM1

Bit	Items	Description
15	STOP	0 : OFF 1 : ON
14	PreSTOP	0 : OFF 1 : ON
13	Interlock	0 : OFF 1 : ON
12	Leak	0 : OFF 1 : ON
11	Motor Over Load	0 : OFF 1 : ON
10		
9		
8		

■ ALM2

Bit	Items	Description
15	STOP	0 : OFF 1 : ON
14	PreSTOP	0 : OFF 1 : ON
13	Interlock	0 : OFF 1 : ON
12	Leak	0 : OFF 1 : ON
11	Motor Over Load	0 : OFF 1 : ON
10		
9		
8		

■ External input (AUX)

Bit	Items	Description
long		C150 : 0-150000 (L/H × 0.001) *A decimal point is not shown.

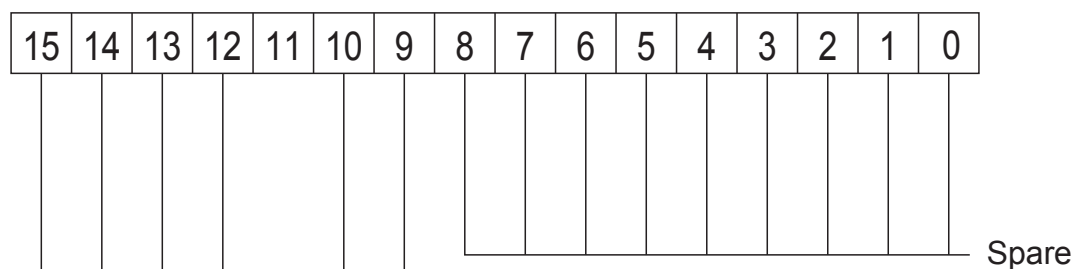
■ Error deletion

Bit	Items	Description
15	Leak	0 : Cancel 1 : Clear
14	Over Load	0 : Cancel 1 : Clear
13	Driver	0 : Cancel 1 : Clear
12 - 0		

■ Data log deletion

Bit	Items	Description	
15	Accumulated number of operating hours	0 : Cancel	1 : Clear
14	Accumulated total flow	0 : Cancel	1 : Clear
13	Operating hours	0 : Cancel	1 : Clear
12	Number of turning on power	0 : Cancel	1 : Clear
11 - 0			

See below for detail info about word for operating conditions.



Bit No.	Binary digit		Description
0	0	0	OFF
1	0	1	MAX IN
2	1	0	MAX OUT

Control mode

Bit No.	Binary digit			Description
0	0	0	0	Manual
1	0	0	1	Analogue
2	0	1	0	Pulse
3	0	1	1	Batch
4	1	0	0	Interval batch

Operating mode

Bit No.	Binary digit		Description
0	0		Stop
1	1		Start

Installation

This section describes the installation of the pump, piping and wiring. Read through this section before work.

! Points to be observed

Observe the following points when installing the product.

- Be sure to turn off power to stop the pump and related devices before work.
- Upon sensing abnormality or danger, stop work immediately. Remove problems before resuming work.
- Do not place dangerous or flammable goods near this product for your safety.
- Risk of an electrical leak or shock. Do not use a damaged pump.

Before installation

Select an installation location and mount the PROFIBUS converter.

Necessary tools

- Four M4 Phillips screws (fixing screws)

1 Select a suitable place.

Always fix this product on a flat floor free of vibrations. See page 6 for detail.

NOTE

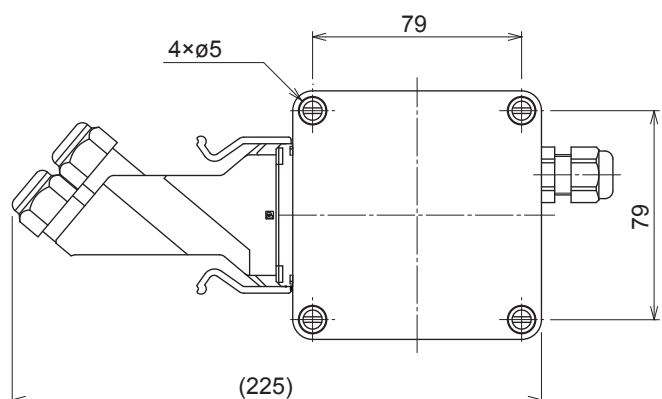
Keep a wide working area for wiring.

2 Open the cover.

Unscrew the cover by a flathead screw driver.

3 Anchor this product by four M4 screws.

Fit the converter on a mounting plate through four M4 screw holes located on its back face. Replace the cover after wiring in the converter has been completed.



Connect signal cables.

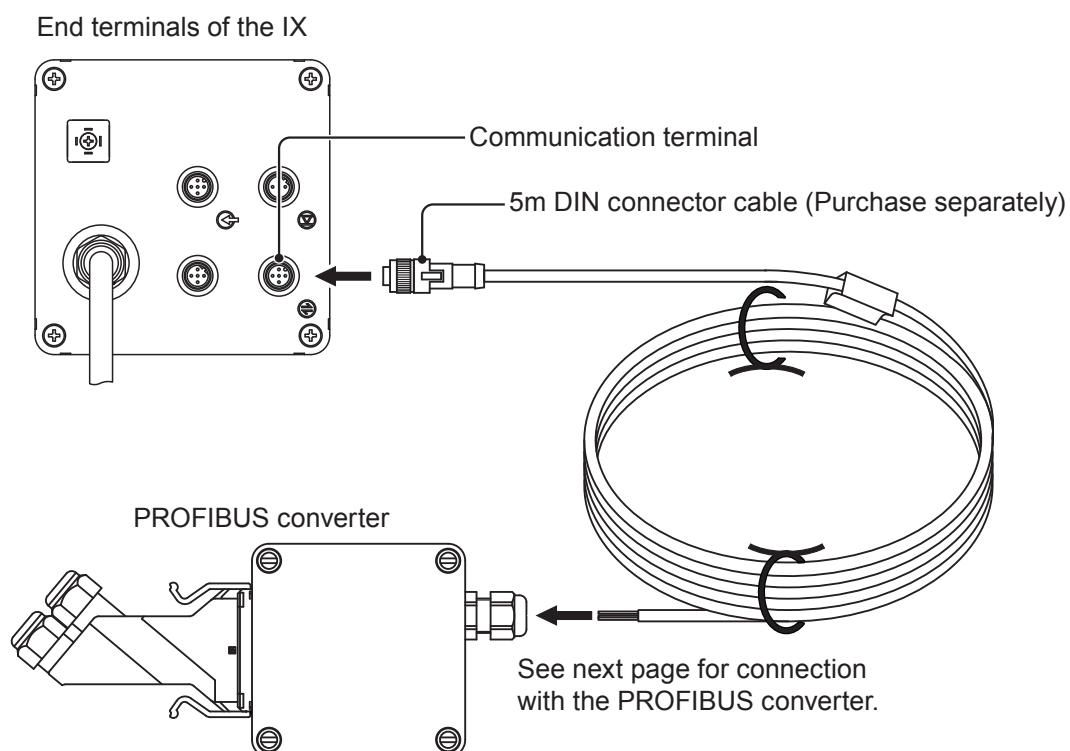
! Points to be observed

Observe the following points during wiring work.

- Electrical work should be performed by a qualified operator. Always observe applicable codes or regulations.
- Observe the rated voltage range. Otherwise, an electrical circuit may break.
- Do not perform wiring work while the power is on. Otherwise, an electrical shock or short circuit may result. Be sure to turn off power before wiring work.
- Be careful for the power not to be turned on during work.

Signal cable connection with the pump

See the following diagram for detail.

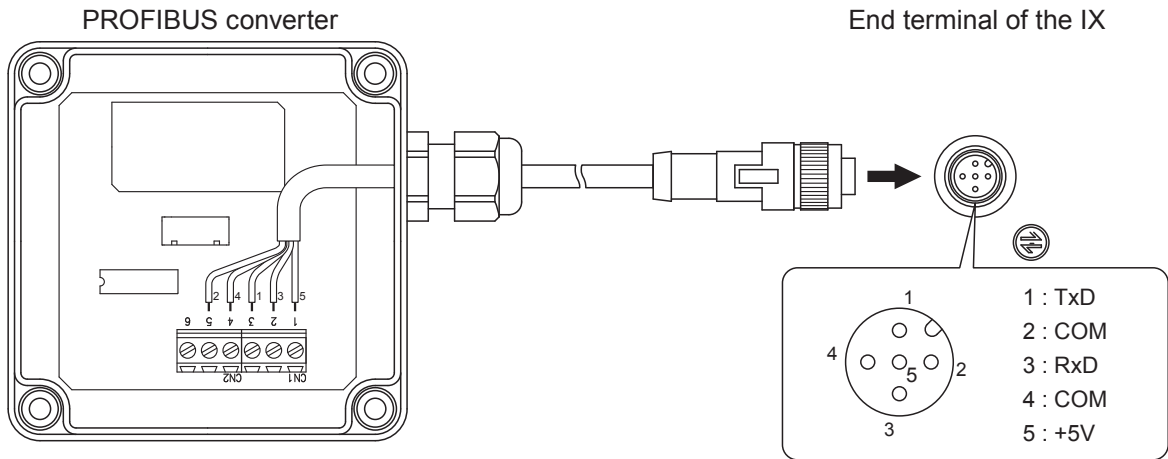


NOTE

- Use E04SR401938 split type ferrite cores (SEIWA ELECTRIC MFG. Co., Ltd.), RFC-20 Sleeve Ferrite Clamps (KITAGAWA INDUSTRIES CO.,LTD), or equivalent devices for the purpose of providing electromagnetic compatibility (EMC).
- Pass the 5m DIN connector cable and a PROFIBUS compliant cable separately through different cores (or clamps) twice. The cores (or the clamps) should be positioned close to the PROFIBUS converter.

■ DIN connector cable connection

See the following diagram for detail. Note screw clamps on the terminal block are closed at factory default. First open the clamps. Then fasten screws to catch and secure cables.



Terminal No.		Cable colour (when using our option cable)
PROFIBUS converter	Communication terminal	
1	5	Green
2	3	Blue
3	1	Brown
4	4	Black
5	2	White

NOTE

Always replace the cover and tighten the cable gland after wiring work.

Applicable cables

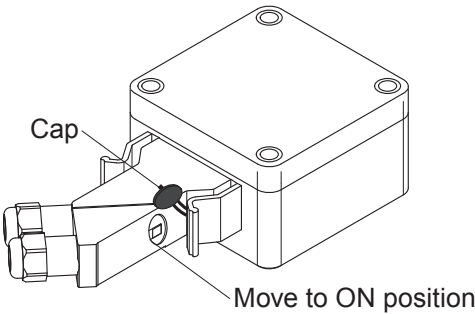
Use an optional Phoenix Contact DIN connector cable (Purchase separately) for connection between the IX and the PROFIBUS converter. Or use a combination of a commercially available cable and a Binder 713 series 5-pin DIN female plug (PN: 99-0436-10-05). Note cable length must be 5m or shorter.

PROFIBUS cable connection

Provide the PROFIBUS converter with PROFIBUS compliant cables. See manufacturer's manual (MNR, 0083061-00/21.07.07) or <http://www.profibus.com/> for wiring with Phoenix Contact connector. Always use a combination of a PROFIBUS compliant cable and a Phoenix Contact connector.

NOTE

For the last BUS participant connected to a PROFIBUS compliant cable, remove a cap and slide the switch to "ON" position. Refit the cap afterwards.



Operation

This section describes pump operation and programming.

PROFIBUS setting

Select "Profibus" through mode selection screen and enter an address. Turn on the IX and then go with the procedure below.

MAN/EXT selection

SELECT OPERATION
MAN ← EXT (ANALG)



MAIN MENU:
← Program EXT →



Program EXT:
← Analog →



Program EXT:
← Profibus →



Set Profibus
Address: 50



Program EXT:
← Profibus →

SELECT OPERATION
MAN ← EXT (Profi)

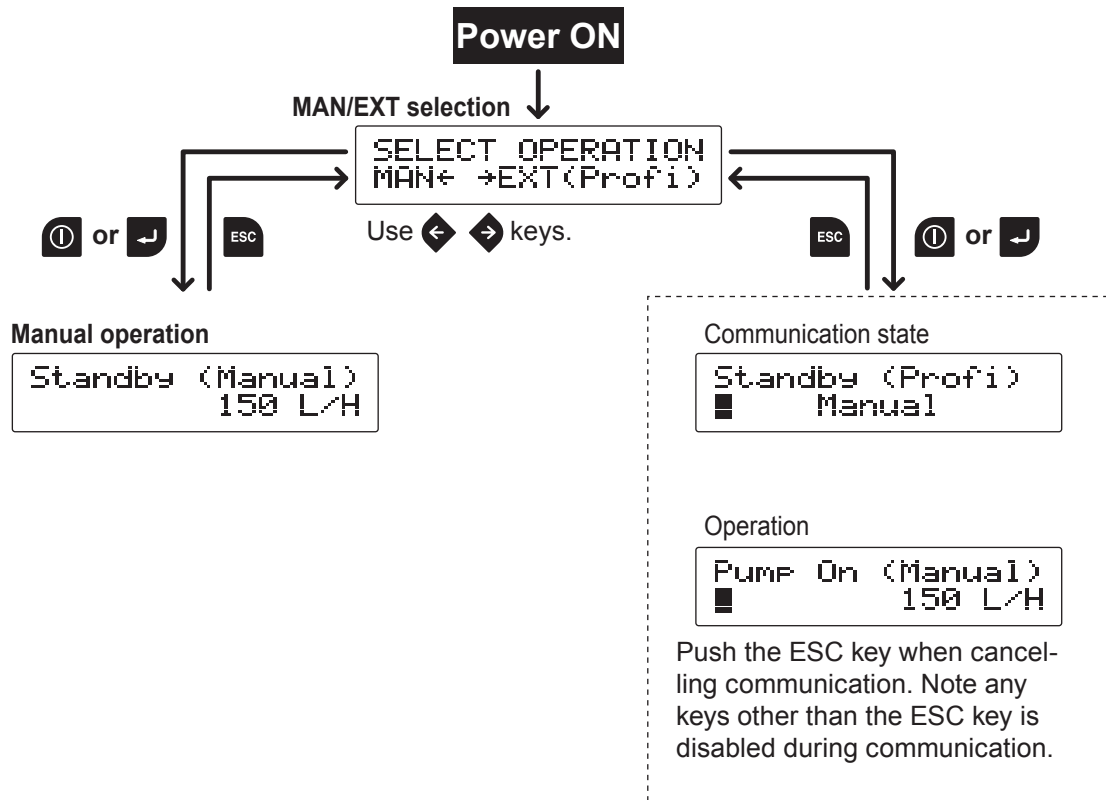
Select "Program EXT".

Push the right key 4 times to move from "Analog" to "Profibus".

Use the up and down keys and assign an address between 1-126. Push the Enter key to secure setting. Factory default setting is 50.

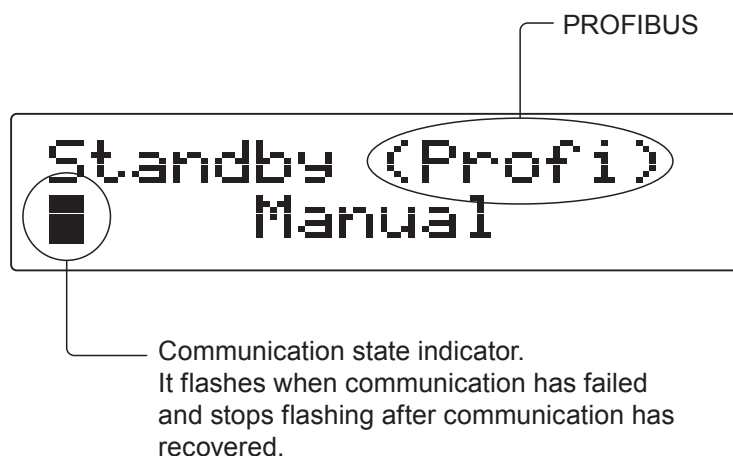
Pump operation

Place the IX into a PROFIBUS communication mode.



PROFIBUS communication mode display

The following display will appear while the IX is in a PROFIBUS communication mode.



NOTE

The pump stops operation once communication has failed. The indicator will flash in this case.

Maintenance

This section describes troubleshooting, inspection, and specification.

! Points to be observed

Observe the following points during maintenance work.

- Observe instructions in this manual for maintenance and inspection.
- Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a work cap during dismantlement, assembly or maintenance work.
- Turn off the pump and related devices before work. See below for detail.

Before unplugging the pump

Always stop the pump by key operation. And wait for three seconds before unplugging the pump. Otherwise, the last key operation to stop the pump may not be put in memory. In this case the pump unintentionally starts to run as powered on, discharging liquid.

NOTE

Contact us or your nearest distributor for repair or contact a manufacturer of the host machine which our product is built in.

Troubleshooting

First check the following points. If the following measures do not help remove problems, contact us or your nearest distributor.

States	Possible causes	Solutions
Communication failure (The indicator does not stop flashing.)	Faulty wiring/Disconnection	• Check connector connection. Refit as necessary. • Check D-sub connector wiring. • Replace as necessary.
	Address overlap	• Check an address. Reorient as necessary.
	The slide switch of the last BUS participant hasn't been changed to "ON" position.	• Change it to "ON" position.
The pump doesn't work as per setting.	Setting has been done in little endian.	• Reset in big endian.

Error messages

Follow steps as below when an error message appears on the pump screen. If the following measures do not help remove problems, contact us or your nearest distributor.

Displays	Possible causes	Measures
MOTOR OVERLOAD! ESC Key = Clear	An abnormal pressure is detected.	Push the ESC key on the pump to cancel communication. See the manual of the pump and remove problems. Cancel error recognition of a master before resuming communication.
LEAK DETECTED! ESC Key = Clear	A diaphragm has broken.	
DRIVE ERROR! ESC Key = Clear	A drive unit has failed.	

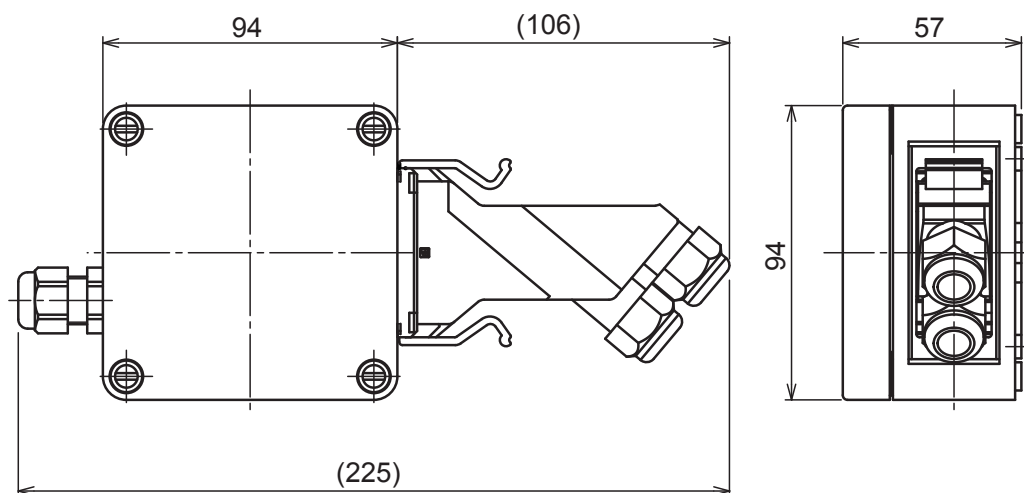
*It ends up with recurrence of error if communication is resumed without solving problems.

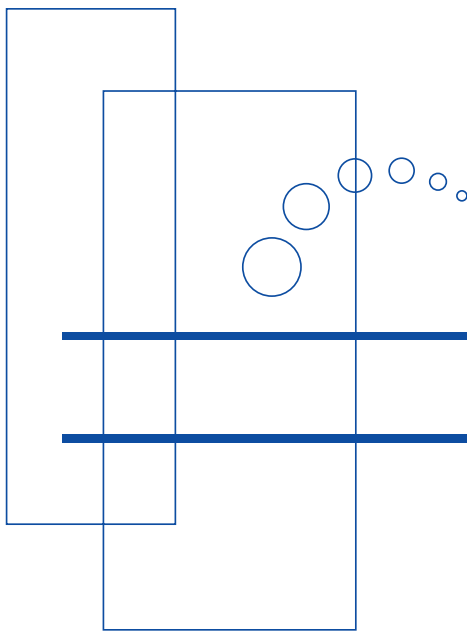
*Cancel error recognition of a master related to a slave before resuming communication.

Specification

Information in this section is subject to change without notice.

Communication protocol	PROFIBUS-DP 0V compliant
International standard	EN 50 170(IEC61158)
Physical layer electrical specification	RS-485 compliant
Applicable devices	Devices compliant to PROFIBUS-DP Master
Connection type	Bus connection
Transmission speed and range	9.6k bps → Max 1200m 19.2k bps → Max 1200m 45.45k bps → Max 1200m 93.75k bps → Max 1200m 187.5k bps → Max 1000m 500k bps → Max 400m 1.5M bps → Max 200m
Transmission procedure	Half duplex
Synchronous system	Asynchronous
Communication control	Polling/Selecting
Error correction	Frame Check Sequence
Data form	Start bit: 1bit Data: 8bit Parity check: 1bit (even) Stop bit: 1bit
Wiring connection	Terminal block (two wire system) Phoenix Contact connector
PROFIBUS cable	Shielded twisted pair cable
Number of nodes	A master and a slave Maximum 126 nodes (with repeaters) Maximum 32 nodes (with no repeater)
Communication speed setting	Automatically determined by transmit data from a master





<http://www.iwakipumps.jp>

()Country codes

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Austria	IWAKI (Austria) GmbH	TEL:(43)2236 33469	FAX: 2236 33469	Korea	IWAKI Korea Co.,Ltd.	TEL:(82)2 2630 4800	FAX: 2 2630 4801
Belgium	IWAKI Belgium n.v.	TEL:(32)1367 0200	FAX: 1367 2030	Malaysia	IWAKIm Sdn. Bhd.	TEL:(60)3 7803 8807	FAX: 3 7803 4800
China	IWAKI Pumps (Shanghai) Co., Ltd.	TEL:(86)21 6272 7502	FAX: 21 6272 6929	Norway	IWAKI Norge AS	TEL:(47)66 81 16 60	FAX: 66 81 16 61
China	IWAKI Pumps (Guandong) Co., Ltd.	TEL:(86)750 3866 228	FAX: 750 3866 278	Singapore	IWAKI Singapore Pte. Ltd.	TEL:(65)6316 2028	FAX: 6316 3221
China	GFTZIWAKI Engineering & Trading (Guangzhou)	TEL:(86)20 8435 0603	FAX: 20 8435 9181	Spain	IWAKI Iberica Pumps, S.A.	TEL:(34)943 630030	FAX: 943 628799
China	GFTZIWAKI Engineering & Trading (Beijing)	TEL:(86)10 6442 7713	FAX: 10 6442 7712	Sweden	IWAKI Sverige AB	TEL:(46)8 511 72900	FAX: 8 511 72922
Denmark	IWAKI Nordic A/S	TEL:(45)48 24 2345	FAX: 48 24 2346	Switzerland	IWAKI (Schweiz) AG	TEL:(41)26 674 9300	FAX: 26 674 9302
Finland	IWAKI Suomi Oy	TEL:(358)9 2745 810	FAX: 9 2742 715	Taiwan	IWAKI Pumps Taiwan Co., Ltd.	TEL:(886)2 8227 6900	FAX: 2 8227 6818
France	IWAKI France S.A.	TEL:(33)1 69 63 33 70	FAX: 1 64 49 92 73	Taiwan	IWAKI Pumps Taiwan (Hsin-chu) Co., Ltd.	TEL:(886)3 573 5797	FAX: (886)3 573 5798
Germany	IWAKI EUROPE GmbH	TEL:(49)2154 9254 0	FAX: 2154 9254 48	Thailand	IWAKI (Thailand) Co., Ltd.	TEL:(66)2 322 2471	FAX: 2 322 2477
Holland	IWAKI EUROPE NL Branch	TEL:(31)547 293 160	FAX: 547 292 332	U.K.	IWAKI Pumps (UK) LTD.	TEL:(44)1743 231363	FAX: 1743 366507
HongKong	IWAKI Pumps Co., Ltd.	TEL:(852)2 607 1168	FAX: 2 607 1000	U.S.A.	IWAKI AMERICA Inc.	TEL:(1)508 429 1440	FAX: 508 429 1386
Indonesia	IWAKI Singapore (Indonesia Branch)	TEL:(62)21 690 6606	FAX: 21 690 6612	Vietnam	IWAKI pumps Vietnam Co.,Ltd.	TEL:(84)613 933456	FAX: 613 933399