ASAHI SUNAC

Operation and Maintenance Manual

Flushable Gear Pump Unit

FGP15/30/45C

Ec'Coater™ エコーター

This manual contains important information on warnings and cautions.
Read the manual thoroughly before starting to operate the equipment, and follow the instructions.
Always keep the manual handy until such time as the product is no longer being used. If your manual is lost or worn badly, do not hesitate to contact our agency which is closest to you, or Asahi Sunac Corporation directly, and ask us to send you a new one.

1st Edition: November 15, 2022

Introduction

Dear Valued Customer, Thank you for buying our product, Flushable Gear Pump Unit. Please read this manual carefully before starting to operate the equipment.

In order to enable you to use the equipment for many years to come and always in the best condition, carefully read this instruction manual before use. Use the equipment appropriately and with care, following the various items, warnings, prohibitions and precautions in the specifications. We hope that by doing so you win benefit from use of the product over a long period of time.

The equipment is geared to industrial painting. It is for use only by those who are familiar with its workings and have undergone proper training; persons without such knowledge should not be allowed to operate the equipment.

Should you have any questions with regard to the manual, please give us the “Model Name” and “Serial Number” of your equipment, so that we may be able help you with your questions. You can reach us at any of the addresses, phone numbers and fax numbers shown on the back cover.

1st Edition: November 15, 2022

Contents

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1 For Your Safety

Fully familiarize yourself with the instructions provided in this instruction manual, and comply with the handling method.
Failure to do so may result in **personal injury and/or damage to property**.

This manual covers only minimum safety precautions and it does not suggest or imply that no other precautions are required. Of course, each enterprise must observe its own rules as well as the laws and regulations of the country or region in which it operates, in addition to the safety precautions in the manual.

Note that the safety precautions described below are minimum basic safety measures when using our products.

- **As shown below, safety precautions are classified into three categories based on the severity of hazards involved.**

⚠ **WARNING**	Alerts a hazardous situation which may result in personal injury, with instructions on how to avoid it.
⚠ **CAUTION**	Alerts a hazardous situation which may result in damage or breakage to equipment, with instructions on how to avoid it.
NOTE	Indicates an important method or helpful information.

* A hazardous situation classified into the CAUTION category could cause a serious accident depending on how things develop.
All the precautions in the manual convey significant information that you must observe such precautions in order to ensure your own safety and prevent equipment from failure.

⚠ WARNING

Danger due to incorrect use

<<General precautions about safety>>

- Replacing or altering any part of the equipment without permission may lead to a malfunction and is strictly prohibited.
- Periodically check the whole equipment, and repair or replace faulty parts if necessary.
- When performing spray work, always wear safety goggles, work clothes, and a mask recommended by the paint/solvent manufacturer. Other protective equipment may be required depending on the composition of the paint and the state of ventilation. Contact the paint/solvent manufacturer.
- Do not leave the site with the equipment running. In addition, keep children and people who do not fully understand the coating machine away from the equipment.

<<Compatibility of paints and solvents>>

Check whether the paints and solvents to be used are compatible with the “material of the pump in the area that comes into contact with liquids.” Before actually using paints and solvents in this pump, carefully investigate the specifications of their material manufacturers.

Risk of fires and explosions

<<Sources of ignition>>

Static electricity is generated when a paint flows through the pump and the hose.
If parts of the coating equipment are not appropriately grounded, static electricity may cause sparks.
These sparks may ignite the volatile contents of solvents, sprayed paint particles, floating dust, and other flammable substances, resulting in a fire or explosion that may cause serious injuries or damage to the equipment.

- Keep the surrounding area of spray work well-ventilated.
- Do not perform coating work in the vicinity of a place using flames, pilot lamps, and other objects that cause fires.
- When cleaning the system, be sure to detach the nozzle, direct the tip of the spray gun toward a grounded metallic paint can, bring part of the gun into contact with the paint can, and pull the trigger to clean
- Confirm that the coating machine and objects to be coated are grounded. If not, an electrostatic discharge or sparks may be generated, resulting in a fire or explosion.
- If you feel a static shock, even slightly, when handling the coating equipment, immediately stop coating work, and check the grounded state of each part. Do not restart the coating work until the cause is identified and action is taken.
- Be sure to keep fire extinguishers having a sufficient fire extinction capability ready to use in the spray coating area.

⚠ WARNING

<<Grounding>>

To prevent hazards due to static electricity, ground the pump, objects to be coated, and all other coating machines (and the surroundings when in use). If there is no appropriate grounding body, perform grounding work (equivalent to Class D grounding) in accordance with the grounding method specified in the Technical Standard for Electrical Equipment.
The method for grounding coating equipment is as follows:

- Grounding the motor
  Connect the grounding terminal (E) provided with the motor to a Class D grounding body.
- Grounding the air compressor
  Follow the manufacturer's instructions.
- Grounding the paint hose
  Use a thoroughly grounded hose. When using an extension hose, check whether it is thoroughly grounded.
- Grounding the spray gun
  A spray gun securely connected to a hose and a pump appropriately grounded is sufficiently grounded.
- Grounding objects to be coated
  Always keep hangers and grounding clips clean and grounded.
- Grounding paint containers
  Only paint containers made of conductive metals may be placed on a grounded floor or platform.
  For details, comply with local laws and regulations.
- Grounding cans of solvents to be used for cleaning
  Only solvent cans made of conductive metals are placed on a grounded floor or platform. Do not place them on non-conductive sheets, such as paper and corrugated fiberboard.
  When cleaning the pump or reducing pressure, support the metallic portion of the gun firmly on the edge of a grounded container, and then pull the trigger.

<<About solvents>>

- Do not use halogenated hydrocarbon solvents because they cause dangerous chemical reactions with the aluminum material used for the coating machine and its plated portions.
- Halogenated hydrocarbon solvents may cause an explosion in pressure vessels (pumps, heaters, filters, valves, guns, etc.) if they come into contact with aluminum parts or plated parts.
  This explosion is fatal to the human body.

<<Examples of halogenated hydrocarbon solvents>>

Chlorine-based	Trichloroethylene, tetrachloroethylene, ethylene chloride
Bromine-based	n-propyl bromide
Fluorine-based	HCFC-225, HFC-43-10mee, HFE-449s1 (HFE-7100)

(The examples shown above do not cover all halogenated hydrocarbons.
For details, contact the paint manufacturer.)

⚠ WARNING

Paint mist and spray atmospheres may cause breathing problems or organic solvent poisoning.

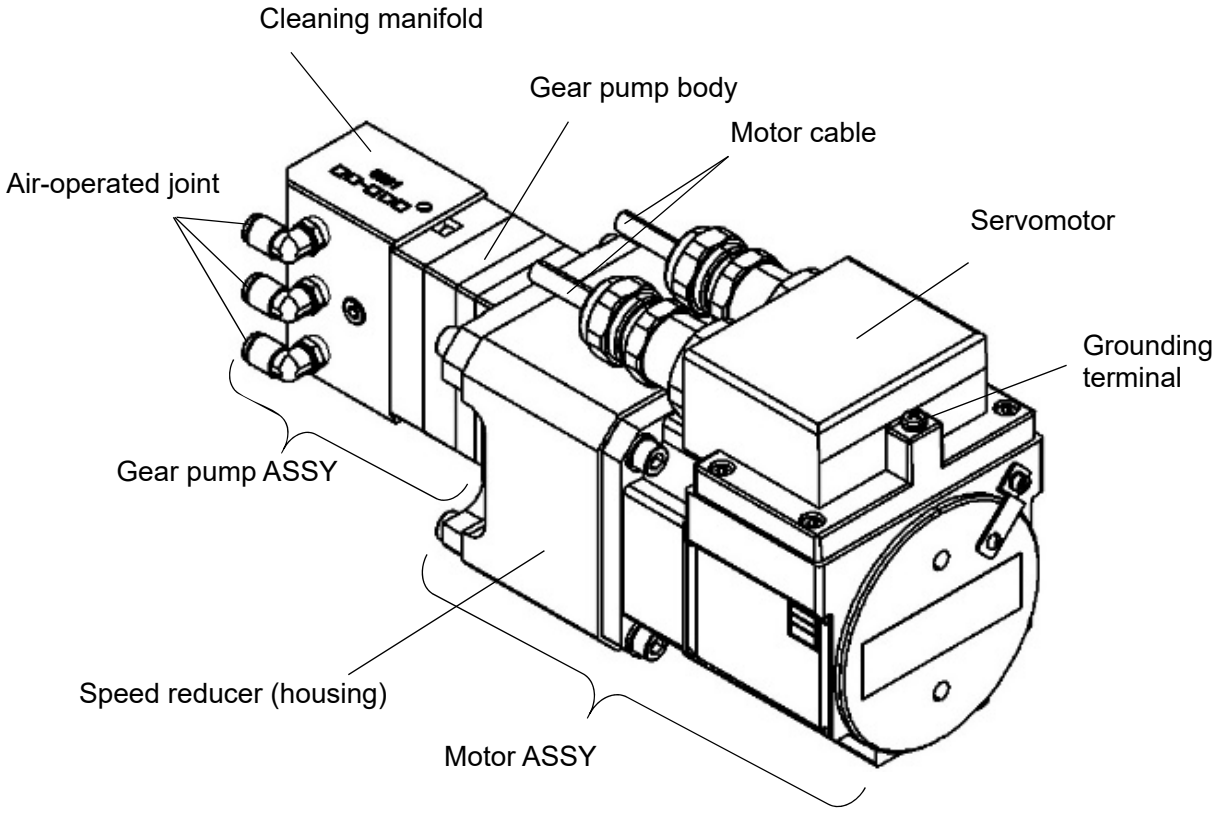
- Do not use the equipment in poorly-ventilated places, such as indoor places, tunnels, and inside the tanks.
  Pay close attention to the person using the equipment, as well as people and livestock, etc. nearby.

2 Overview of the Equipment

2.1 About the equipment

[1] The equipment is a self-suction gear pump unit capable of controlling the discharge of viscous fluid in proportion to the rotational speed.
[2] The rotation of this gear pump is controlled by a dedicated servo amplifier.
[3] It is possible to switch the discharge and cleaning bypass routes by controlling the opening/closing of the valve of the cleaning manifold.

2.2 Names of parts



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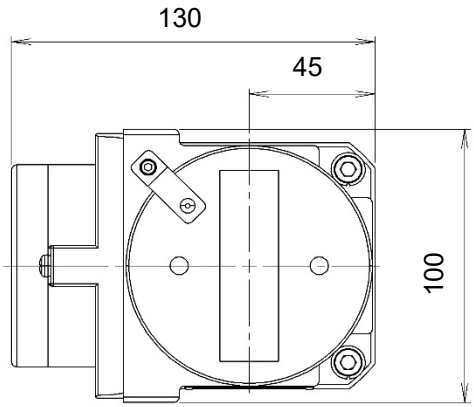
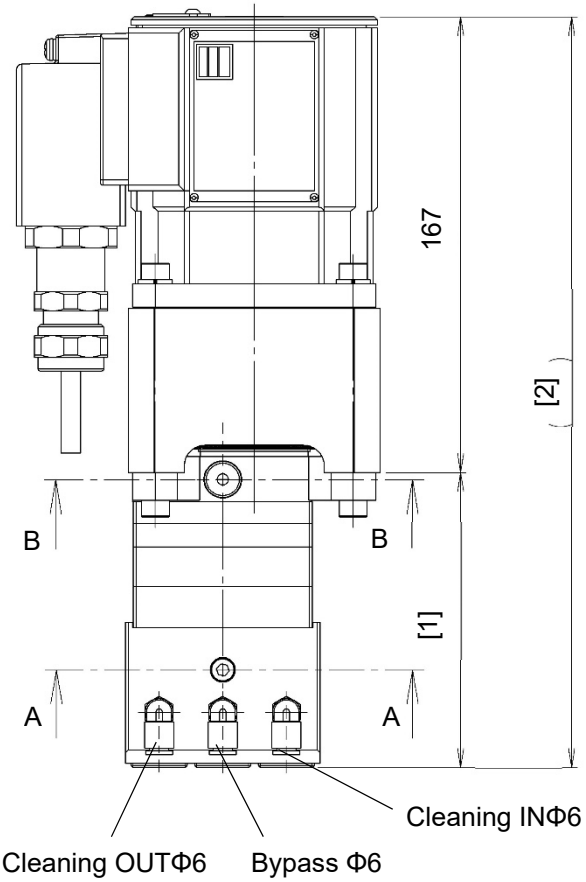
3 Specifications

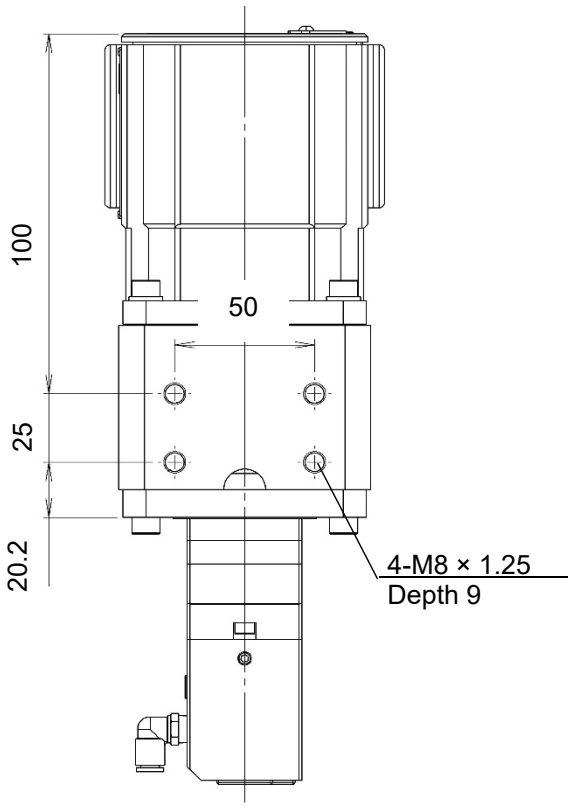
3.1 External (Mounting) Dimensions

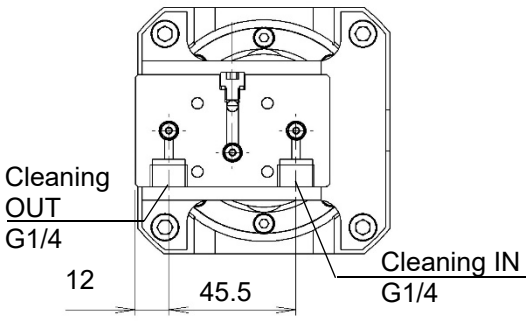


Model	FGP15C	FGP30C	FGP45C
Part No.	47507	47507-1	47507-2
[1]	108.2	116.7	125.2
[2]	275.2	283.7	292.2

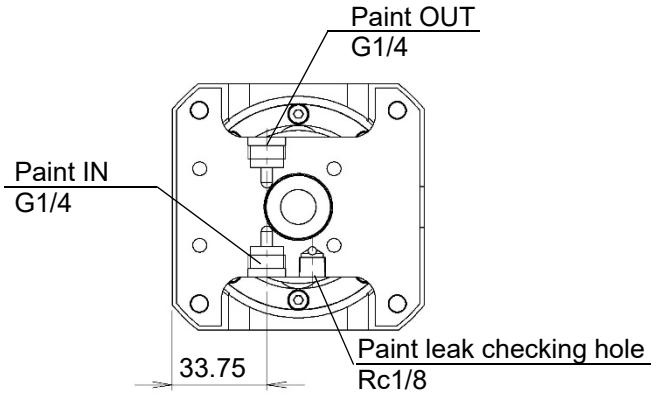
(Unit: mm)







Cross section A-A



Cross section B-B

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3.2 Equipment specifications

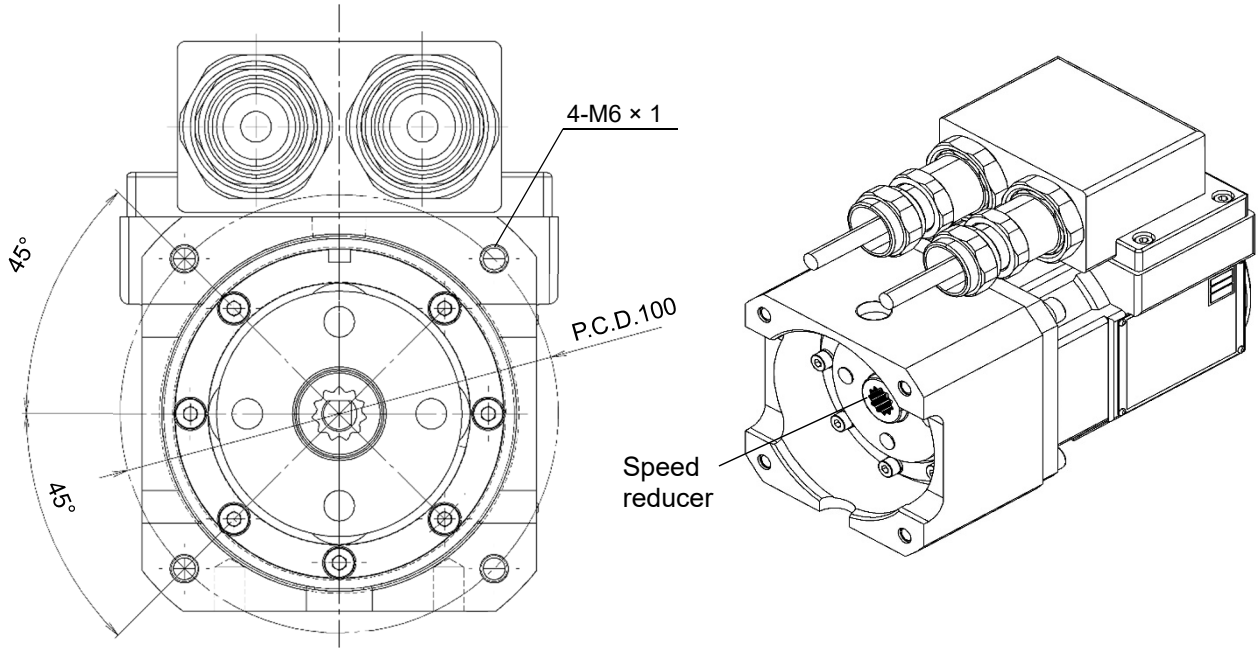
Model		FGP15C	FGP30C	FGP45C
Discharge rate (mL/rev)		1.5	3.0	4.5
Allowable speed (rpm)		150 (during cleaning for color changes) 200 (during paint discharge)		
Motor		Pressure-proof and explosion-proof AC servomotor Three-phase 200/240 V±10%, 50/60 Hz, 80 W		
Speed reducer	Name	Gearbox (part No.: 418-0067)		
	Gear ratio	1 : 3.714		
Applicable fluid	Viscosity (mPa・s)	20 to 150		
	Allowable pressure (MPa)	1.0 or less		
	Maximum temperature (°C)	40 (continuous)		
Paint inlet/outlet diameter		G1/4		
Air-operated joint diameter		Φ6		

*For the area for using discharge rates, see the instruction manual for the FGP (single unit).

3.3 Options and accessories

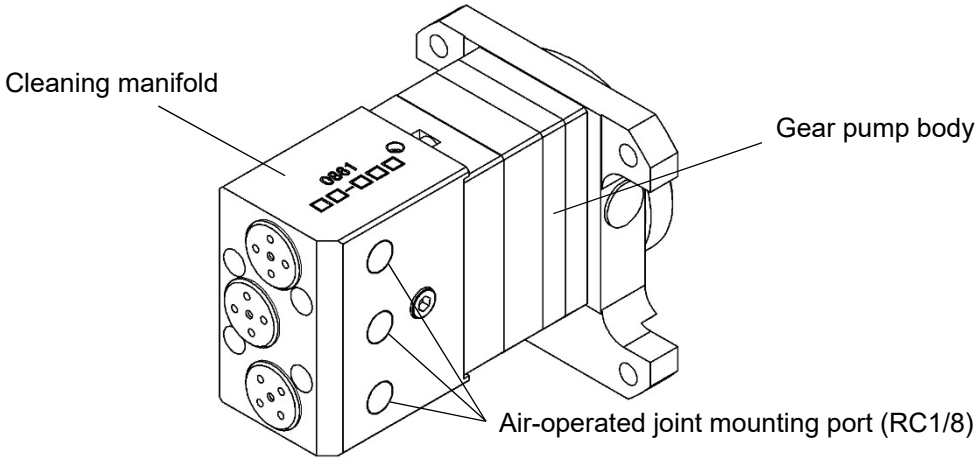
3.3.1 Motor ASSY

Part No.	47507-002



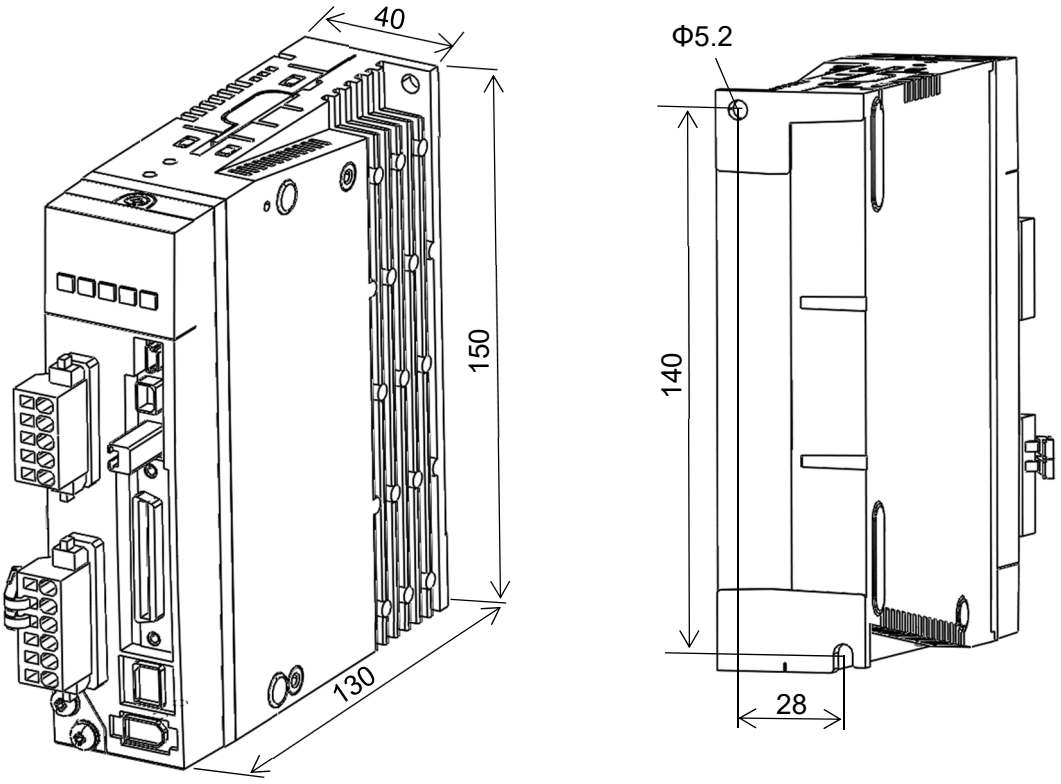
3.3.2 Gear pump ASSY

Model	FGP15C	FGP30C	FGP45C
Part No.	47507-001	47507-101	47507-201
Discharge rate (mL/rev)	1.5	3.0	4.5



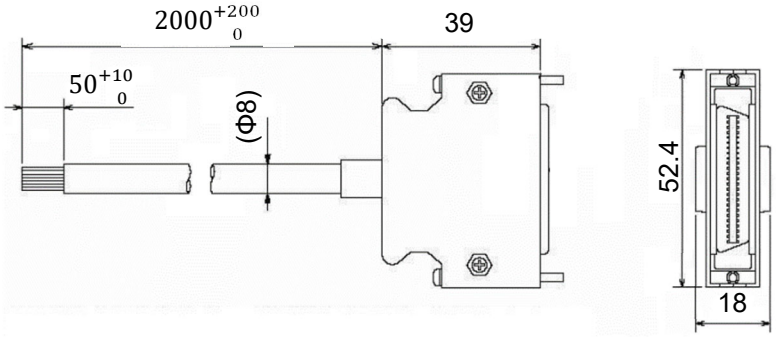
3.3.3 Servo amplifier

Part No.	418-0084



3.3.4 Input/Output (I/O) cable

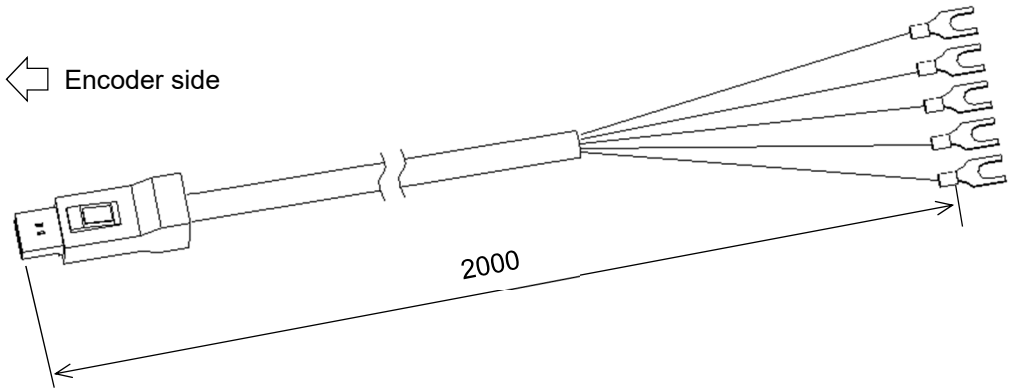
Part No.	406-0083



Servo amplifier side ⇒

3.3.5 Encoder cable

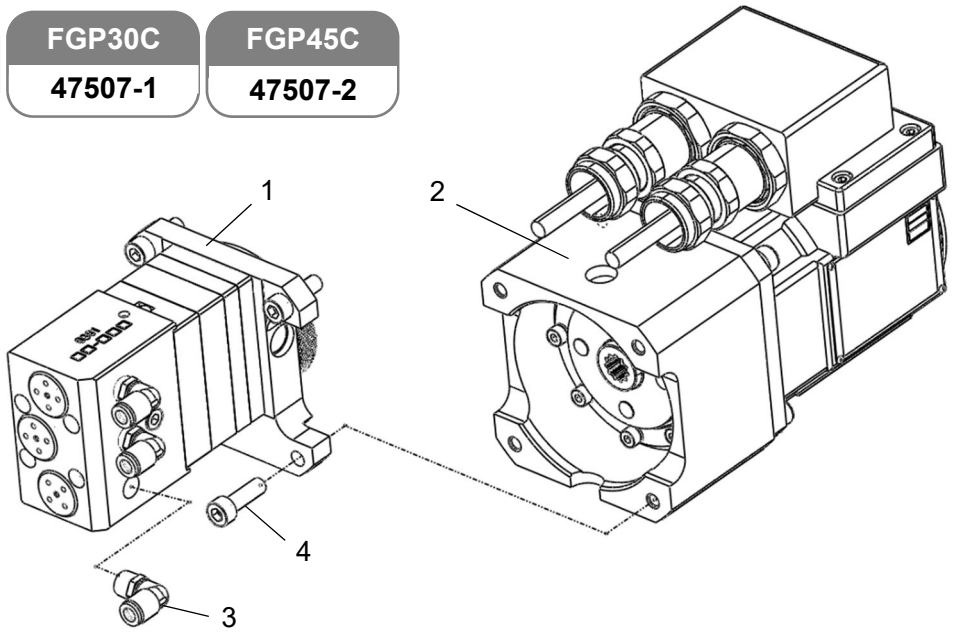
Part No.	6648-001



4 Components

- Gear pump unit

FGP15C	FGP30C	FGP45C
47507	47507-1	47507-2



Gear pump unit FGP15C (47507)

No.	Part No.	Part name	Qty	Remarks
1	47507-001	Gear pump ASSY	1	1.5 mL/rev
2	47507-002	Motor ASSY	1	
3	384-0601	Quick joint (elbow)	3	Φ6
4	03-80620	Hexagon socket head cap screw	4	

Gear pump unit FGP30C (47507-1)

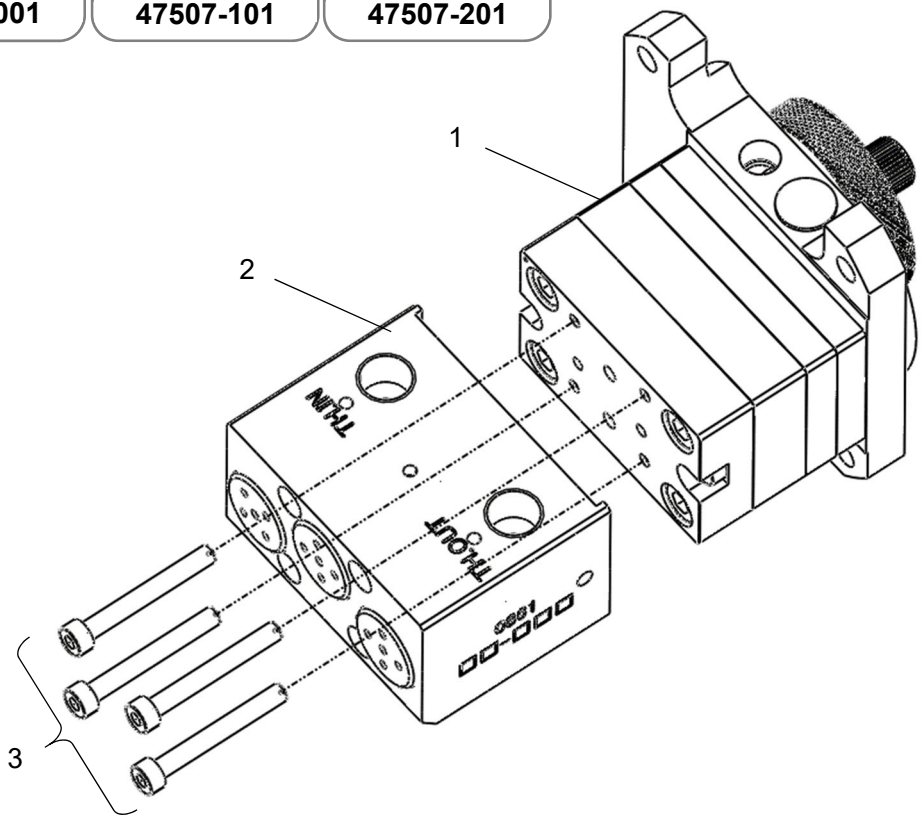
No.	Part No.	Part name	Qty	Remarks
1	47507-101	Gear pump ASSY	1	3.0 mL/rev
2	47507-002	Motor ASSY	1	
3	384-0601	Quick joint (elbow)	3	Φ6
4	03-80620	Hexagon socket head cap screw	4	

Gear pump unit FGP45C (47507-2)

No.	Part No.	Part name	Qty	Remarks
1	47507-201	Gear pump ASSY	1	4.5 mL/rev
2	47507-002	Motor ASSY	1	
3	384-0601	Quick joint (elbow)	3	Φ6
4	03-80620	Hexagon socket head cap screw	4	

- Gear pump ASSY

FGP15C	FGP30C	FGP45C
47507-001	47507-101	47507-201



Gear pump ASSY FGP15C (47507-001)

No.	Part No.	Part name	Qty	Remarks
1	3722-A	Gear pump	1	1.5 mL/rev
2	0861	Manifold	1	
3	03-80435	Hexagon socket head cap screw	4	

Gear pump ASSY FGP30C (47507-101)

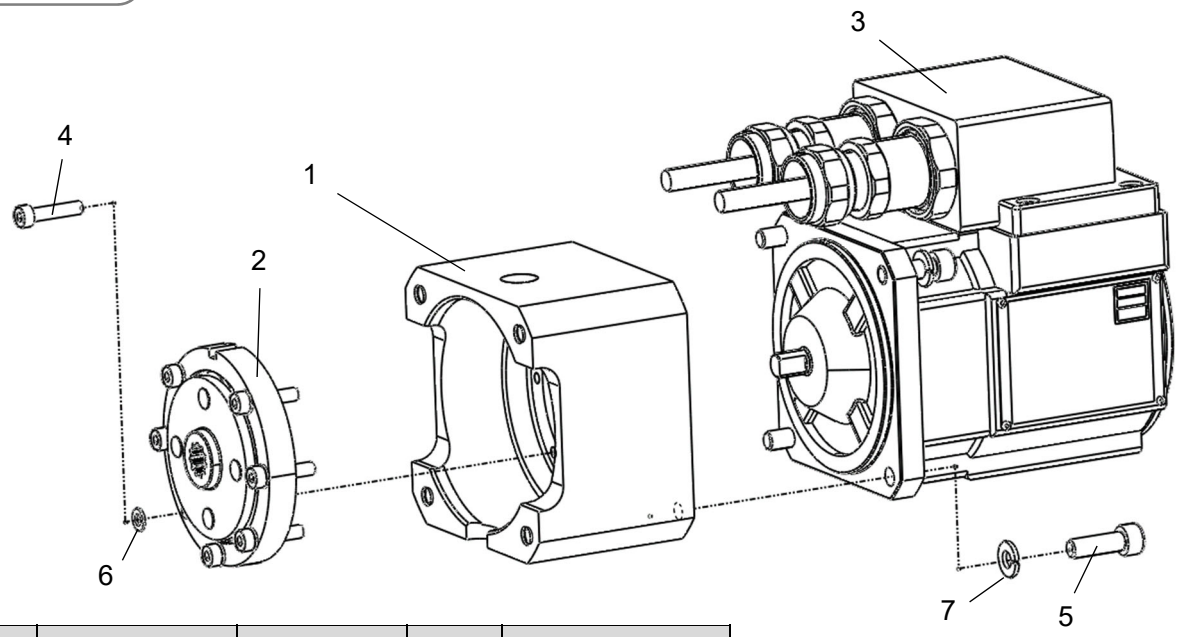
No.	Part No.	Part name	Qty	Remarks
1	3722-1A	Gear pump	1	3.0 mL/rev
2	0861	Manifold	1	
3	03-80435	Hexagon socket head cap screw	4	

Gear pump ASSY FGP45C (47507-201)

No.	Part No.	Part name	Qty	Remarks
1	3722-2A	Gear pump	1	4.5 mL/rev
2	0861	Manifold	1	
3	03-80435	Hexagon socket head cap screw	4	

Motor ASSY

47507-002

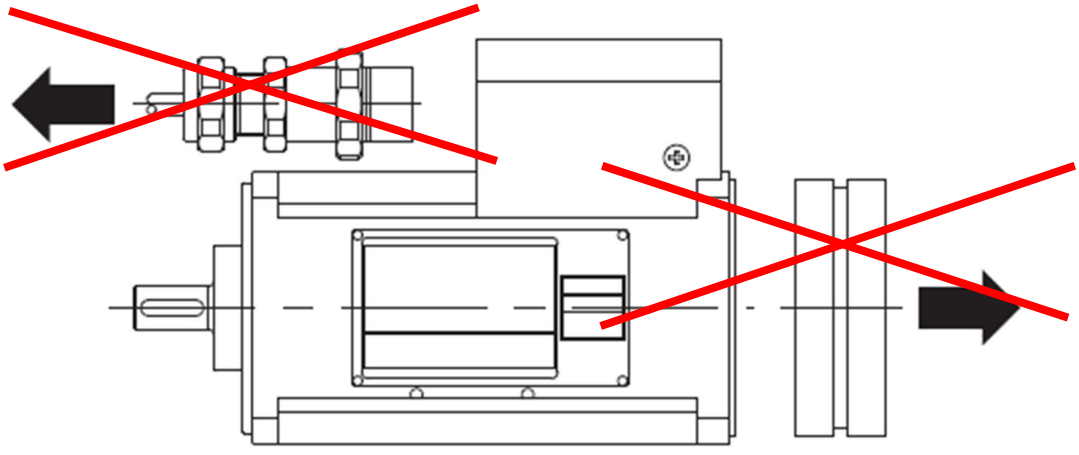


No.	Part No.	Part name	Qty	Remarks
1	3722-001	Housing	1	
2	418-0067	Gearbox	1	
3	47507-002-1	Servomotor	1	
4	03-80420	Hexagon socket head cap screw	7	
5	03-80620	Hexagon socket head cap screw	4	
6	41-80400	Spring washer	7	
7	41-80600	Spring washer	4	

⚠ WARNING

Paint mist and spray atmospheres may catch fire, or an equipment failure may occur.

- Do not open the motor case in a hazardous place where an explosive atmosphere exists.
- Personnel other than the manufacturer must not disassemble, repair, and replace the pressure-proof and explosion-proof joints, cable glands, and cables. When repairs and replacement are required, please consult us.



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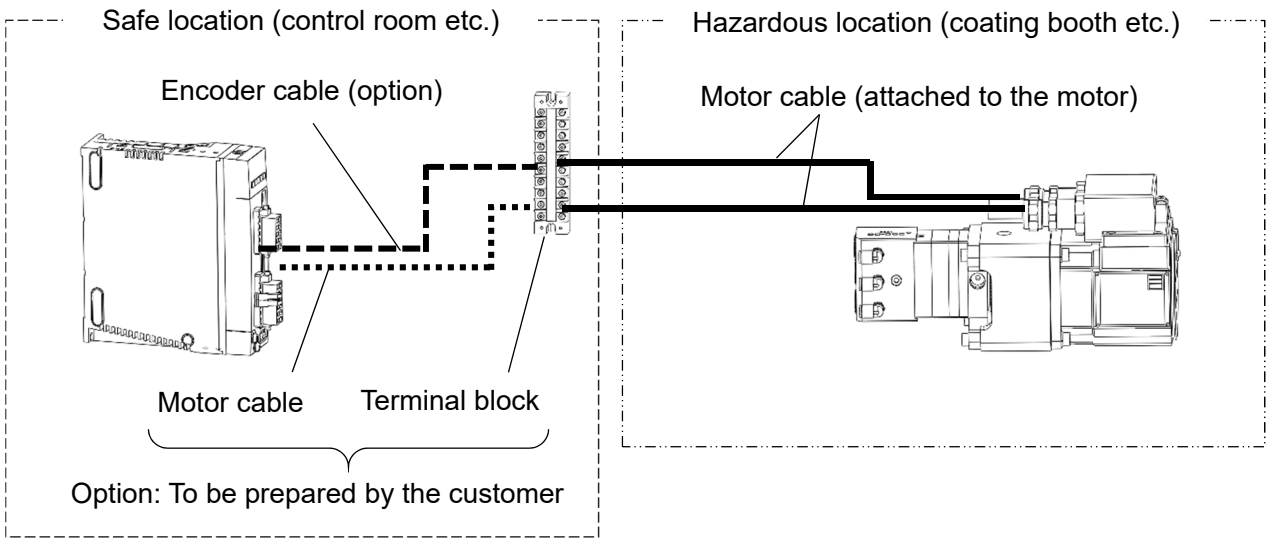
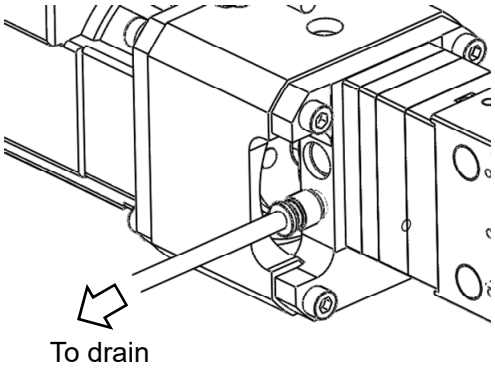
5 Installation of the Equipment

5.1 Location of installation

Check hazardous and safe locations, and install the equipment by referring to the example shown below.



5.2 Action for paint leak checking hole



⚠ CAUTION

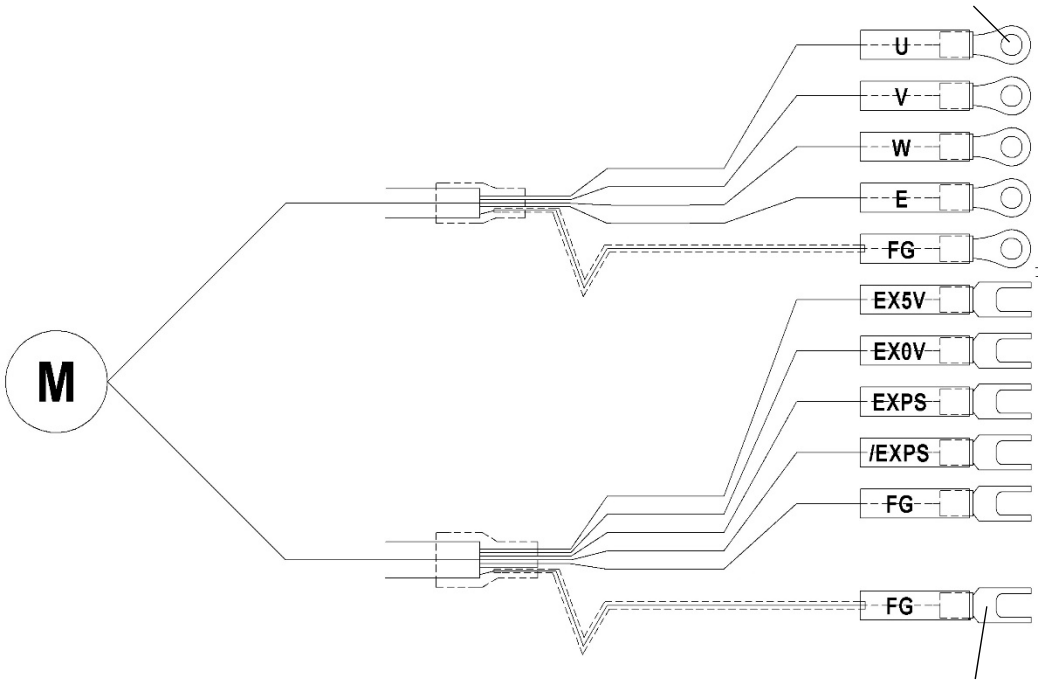
The floor and peripheral equipment may get dirty or damaged.

If the gear pump unit is mounted inside coating equipment or on a robot arm, the pain may leak and adhere to peripheral equipment. Thus, install the unit with a transparent paint hose connected to the drain so that leaks can be monitored at all times.

5.3 Wiring examples

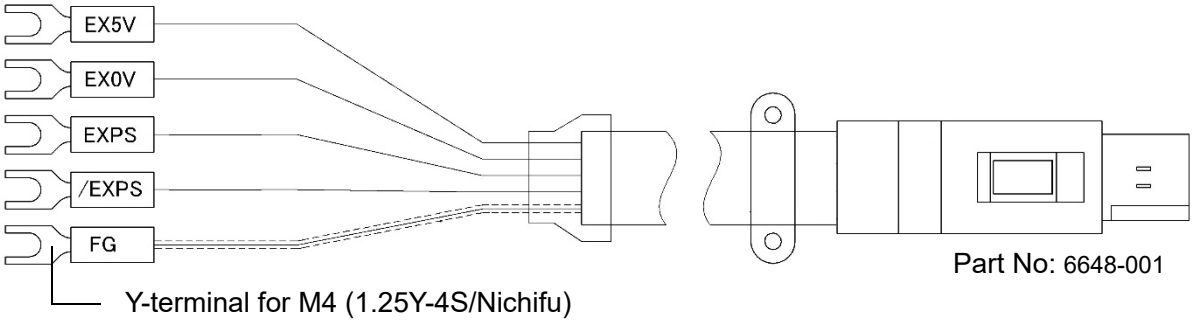
5.3.1 End treatment of the motor cable

Round terminal for M4 (R1.25-F4/Fuji Terminal Industry)



Y-terminal for M4 (1.25Y-4S/Nichifu)

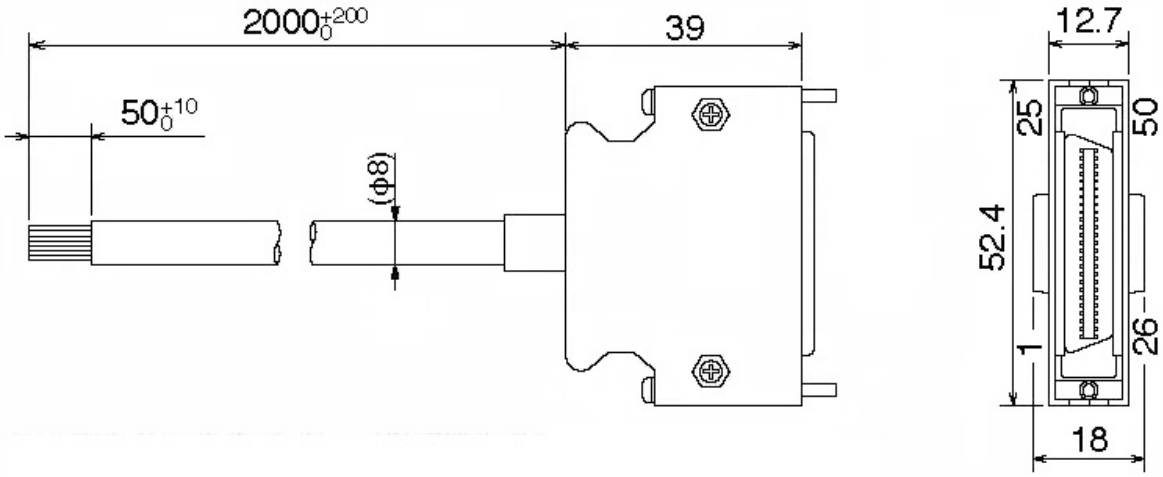
5.3.2 Encoder cable



Part No: 6648-001

Y-terminal for M4 (1.25Y-4S/Nichifu)

5.3.3 Input/Output (I/O) cable



Part No.: 406-0083

Pin No.	Core wire color	Pin No.	Core wire color	Pin No.	Core wire color	Pin No.	Core wire color	Pin No.	Core wire color
1	Orange (Red 1)	11	Orange (Black 2)	21	Orange (Red 3)	31	Orange (Red 4)	41	Orange (Red 5)
2	Orange (Black 1)	12	Yellow (Black 1)	22	Orange (Black 3)	32	Orange (Black 4)	42	Orange (Black 5)
3	Gray (Red 1)	13	Gray (Red 2)	23	Gray (Red 3)	33	Gray (Red 4)	43	Gray (Red 5)
4	Gray (Black 1)	14	Gray (Black 2)	24	Gray (Black 3)	34	White (Red 4)	44	White (Red 5)
5	White (Red 1)	15	White (Red 2)	25	White (Red 3)	35	White (Black 4)	45	White (Black 5)
6	White (Black 1)	16	Yellow (Red 2)	26	White (Black 3)	36	Yellow (Red 4)	46	Yellow (Red 5)
7	Yellow (Red 1)	17	Yellow (Black 2), Pink (Black 2)	27	Yellow (Red 3)	37	Yellow (Black 4)	47	Yellow (Black 5)
8	Pink (Red 1)	18	Pink (Red 2)	28	Yellow (Black 3)	38	Pink (Red 4)	48	Pink (Red 5)
9	Pink (Black 1)	19	White (Black 2)	29	Pink (Red 3)	39	Pink (Black 4)	49	Pink (Black 5)
10	Orange (Red 2)	20	-	30	Pink (Black 3)	40	Gray (Black 4)	50	Gray (Black 5)

5.4 Servo amplifier

5.4.1 Connectors

Power input connection connector: XA

05JFAT-SAXGGKK-A (J.S.T. MFG. Co., Ltd.)

Main power input terminal — L1, L2, L3

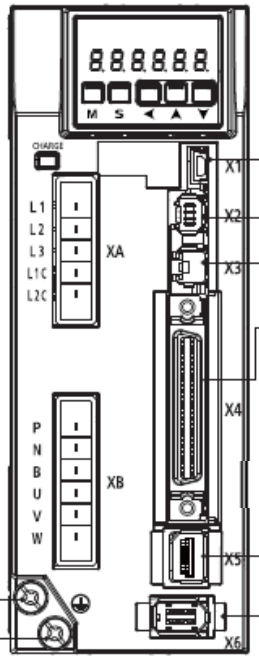
Control power input terminal — L1C, L2C

Regenerative resistance connection terminal — P, N, B

Motor connection terminal — U, V, W

Motor connection connector: XB

06JFAT-SAXGGKK-A (J.S.T. MFG. Co., Ltd.)



USB connector

For serial communication

Connector for safety function

Interface connector: X4

*Connect our input/output cable.

External scale connection connector: X5

*Connect our encoder cable.

Encoder Connection connector

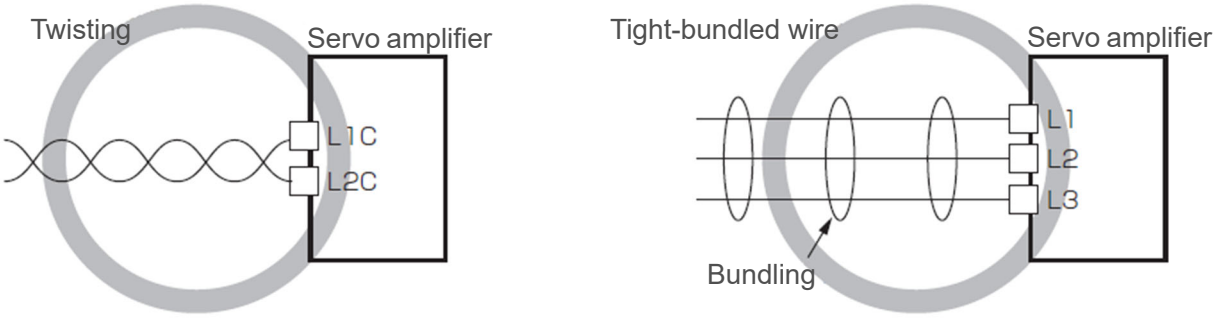
Grounding terminal (2 positions)

5.4.2 Power supply

Three-phase 200 to 240 V+10%, -15%, 50/60 Hz

⚠ CAUTION

- For the interface power supply, use an insulated type 12 to 24 V DC power supply conforming to the CE marking or EN standard (EN60950).
- For the power cable, use a sheathed wire, twisted wire, or tight-bundled wire.
- Connect the power and signal wires separately from each other.
Otherwise, it may cause equipment malfunction or failure.

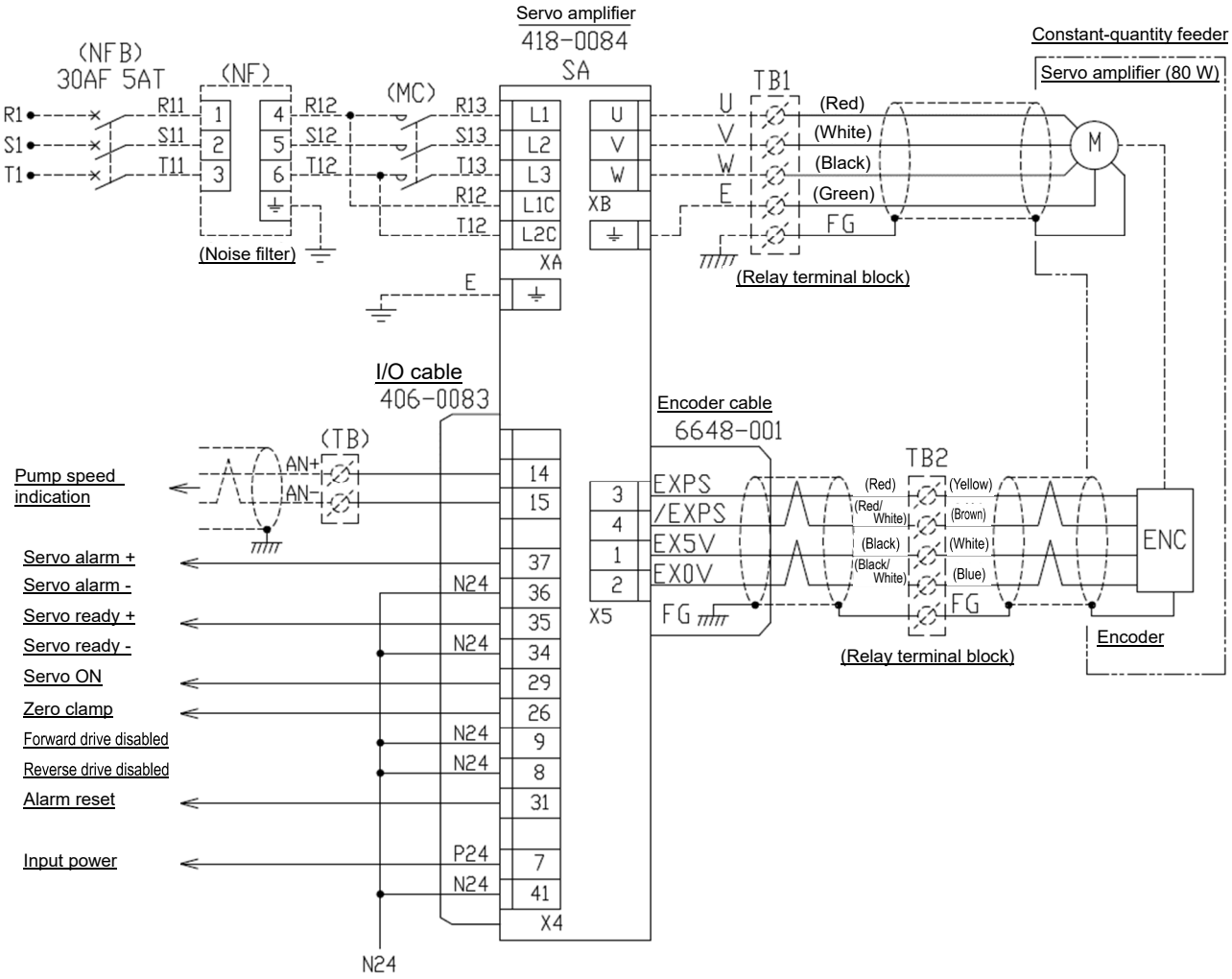


⚠ WARNING

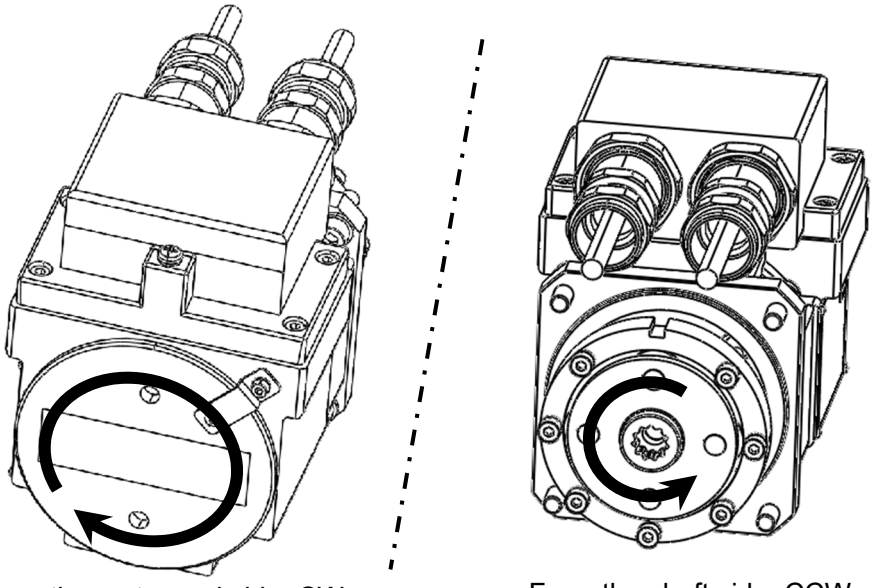
An electric shock may occur.

- Be sure to connect the grounding terminal of the amplifier (⏚) and the ground (PE) of the control panel.
- Do not fasten two or more terminals together to a single grounding terminal.

5.4.3 Circuit diagram (example)



5.4.4 Rotating (forward) direction (factory setting)



From the motor end side: CW

From the shaft side: CCW

5.4.5 Servo amplifier parameters (setting example)

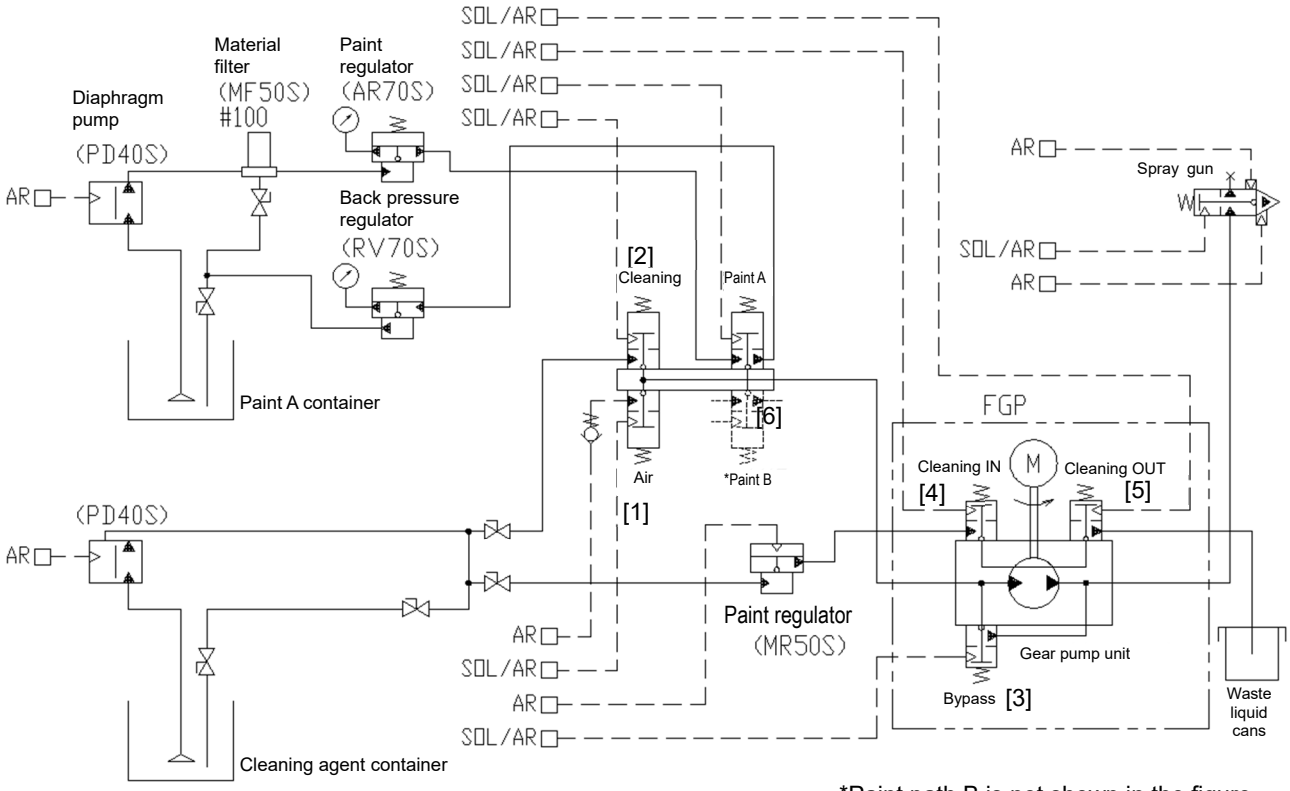
- When changing the settings, see the "AC Servomotor Amplifier MINAS A6 Series Instruction Manual (Panasonic)."

Classification	No.	Parameter	Recommended value	Factory-set value
00	001	Rotating direction setting	1*	1
00	004	Inertia ratio	0	551
03	000	Speed setting IN/OUT switching	0	3
03	012	Acceleration time setting	10	5000
03	013	Deceleration time setting	10	5000
03	015	Speed zero clamp function selection	1	0
04	000	SI1 input selection	0	37376

* During trial operation, confirm that the rotating direction of the motor (direction of paint suction/discharge) is correct.

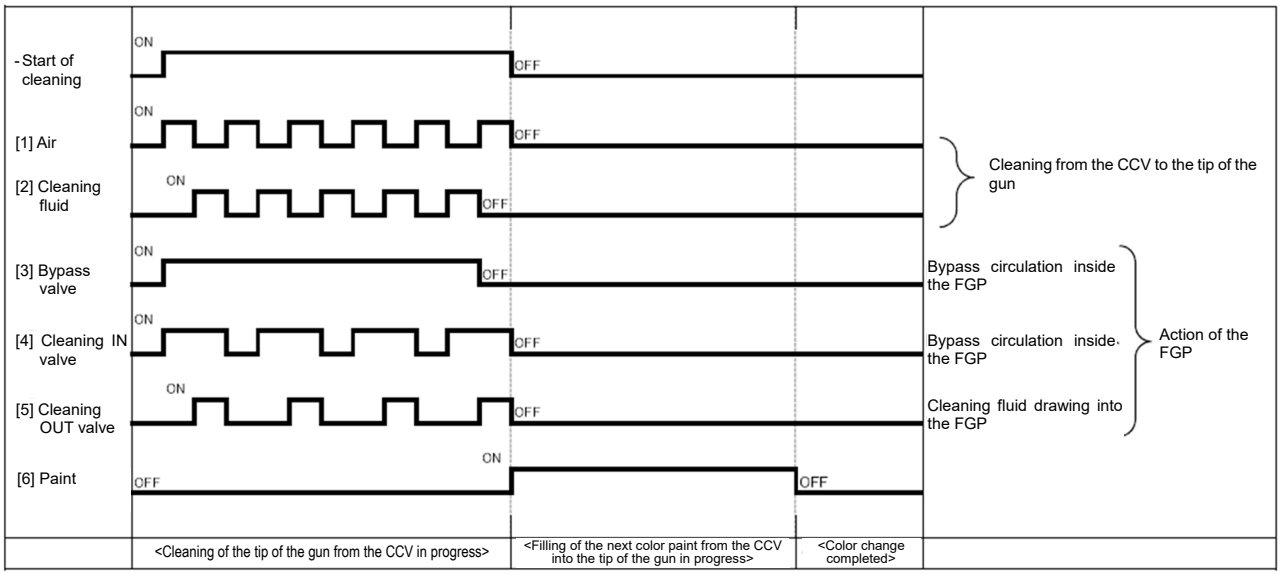
5.5 Cleaning sequence

- System configuration (example)

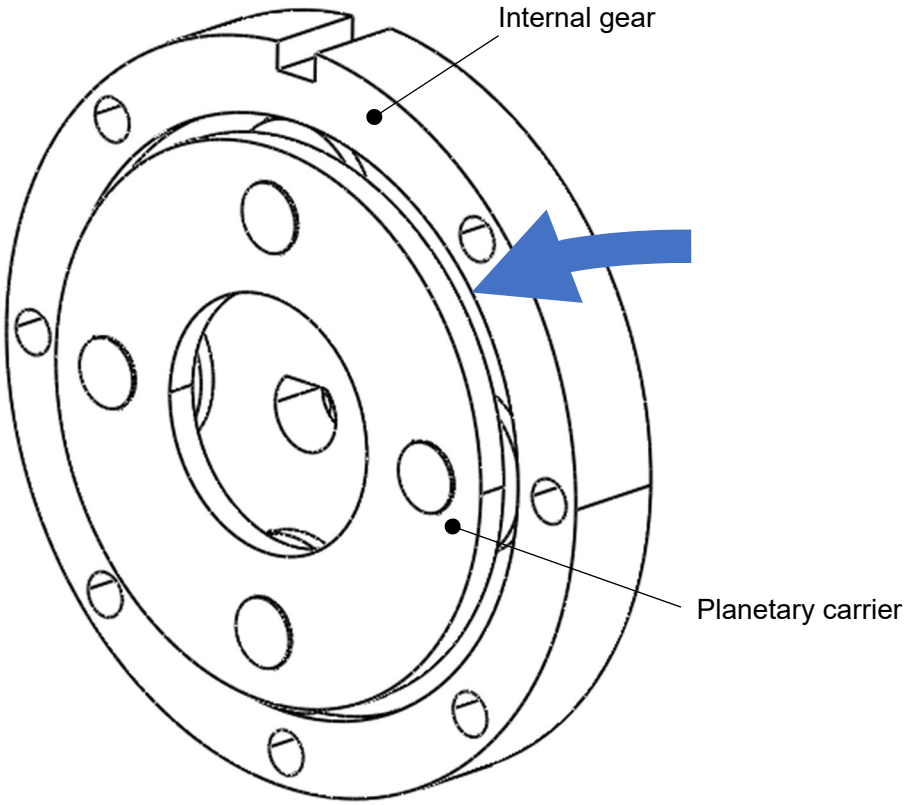


*Paint path B is not shown in the figure.

- Color change cleaning sequence (example)



- Drive gear
  - Method for applying grease -



Inject grease through the gap between the internal gear and the planetary carrier so that it spreads over inside of the drive gear.

- Recommended lubricants

Lubricant		Ambient temperature	Idemitsu Kosan	Cosmo Oil Lubricants	Shell Lubricants	ENEOS	EMG Lubricants (Mobile)
Grease	General-purpose	0 to 40°C	Daphne Eponex Grease SR No. 1	Dynamax No. 1	Alvania S No. 1	MULTINOC Grease No. 1	-
	Extreme-pressure type		Daphne Grease MP No. 1	Dynamax EP No. 1	Alvania EP No. 1	EPNOC Grease No. 1	Mobilux EP No. 1

7 Maintenance Log

Shown below is a maintenance log format of a kind we recommend you to keep. Each time that you conduct a maintenance service, such as replacement of a part, tear-down cleaning, post-failure repair, etc., record the details. In the long run, you will find that such a log is very valuable in keeping your equipment in a consistently good operating condition.

Equipment name			Flushable Gear Pump Unit		Purchase date:	
Date of service			Portion worked on	Description	Result	Who serviced
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
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						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac
						In-house / Dealer / Asahi Sunac

Note: Due to continuous improvements and modifications, the configurations specified herein are subject to change without prior notice.

8 Warranty

ASAHI SUNAC CORPORATION (the “Company”) shall provide the original purchaser (the “Purchaser”) with warranty service for a period of 6months from the date of purchase of the product, as follows:

- Should you find defects in design or workmanship with regard to parts, ship them back to the Company, with freight prepaid. The Company shall repair or replace the parts free of charge and reimburse the freight charges, provided that, as a result of an inspection and investigation of the parts conducted by the Company, the defects are deemed to be to attributable to the factors within the Company’s responsibility.

- In the following cases, free after-sales service is not provided.

  1. Failure resulting from an inappropriate method of installing this equipment.
  2. Failure resulting from a use method not conforming to this instruction manual or mishandling.
  3. Failure resulting from insufficient maintenance management of this equipment and incorrect handling such as non-conformance to the procedures specified in this instruction manual.
  4. Failure resulting from unauthorized alteration or structure change of this equipment without the Company’s consent.
  5. Failure due to force majeure such as earthquake, disaster, flood disaster or lightening.
  6. Warranty for consumables worn or deteriorated even in the case where this equipment is used correctly.
  7. Repair after the machine has been used outside Japan, and shipping cost.
  8. In addition to the above, failure due to circumstances beyond our control.

- As for items such as parts purchased by the Company from another manufacturer, the warranty of that manufacturer shall apply.

- As for any parts deemed to be defective, the Company shall not be held liable for any expenses beyond the provision of repair or replacement parts free of charge.

- The Company shall not be held liable for any damage to the Purchaser caused by factors not attributable to the Company, such as misuse of product, etc.

- When a transfer of title of this equipment takes place, please see to it that this Operation and Maintenance Manual is handed over to the new owner.
- This equipment is manufactured in compliance with the Laws and Regulations of Japan.
  In the rare eventuality of this equipment being used outside Japan, compliance with the safety standards of the relevant countries is of course mandatory.

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