取扱説明書
Instruction Manual

Hybrid Hydraulic System

ECORICH R
エコリッチ R

Design #40 Series

EHU15R0700-40-03 / EHU15R0702-40 / EHU15R0703-40-03
EHU15R1000-40-03 / EHU15R1002-40 / EHU15R1003-40-03
EHU30R0700-40-03 / EHU30R0702-40 / EHU30R0703-40-03

DAIKIN INDUSTRIES, LTD.
Oil Hydraulic Division
Oil Hydraulic Equipment

PIM00587

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CHAPTER 1 SAFETY INSTRUCTIONS

1.1 For Safe Operation

In this manual, safety instructions are classified into four categories: "⚠ DANGER", "⚠ WARNING", "⚠ CAUTION" and "⚠ NOTICE".

⚠ **DANGER**	Improper handling without regard to this indication will cause an imminently hazardous condition that may result in death or serious injury.
⚠ **WARNING**	Improper handling without regard to this indication will cause a potentially hazardous condition that may result in death or serious injury.
⚠ **CAUTION**	Improper handling without regard to this indication will cause a potentially hazardous condition that may result in moderate or slight injury, or property damage.
⚠ **NOTICE**	Improper handling without regard to this indication will damage or shorten the life of equipment.

* Even an item indicated as "⚠ CAUTION" may result in a serious accident depending on the situation. Safety instructions given in this manual include important information regardless of their categories. Be sure to observe all of them.

In addition to the above, the following icons are also used.

	Indicates "prohibited" items that must not be done.
	Indicates "mandatory" items that must always be done.
	Indicates the reference destination for related information.

1.2 General Precautions

⚠ DANGER

- Ensure that transportation, installation, piping, wiring, running, operation, maintenance and inspection work are carried out by people with the required expertise.
- When working, wear the safety gear required for safe work (working clothes, helmet, safety shoes, gloves, etc.).
- Do not use this product outside the specifications stated in the catalog, the delivery specifications and elsewhere.

⚠ CAUTION

- Be sure to carry out daily inspections (as described in this manual or the accompanying documents).
- Do not apply any external force to this product, for example by climbing on it or striking it. Otherwise, there is a risk of injury and breakage.

1.3 Disclaimers

- DAIKIN shall not be responsible for any damage attributable to fire, earthquake, a third party's action or other accidents, or customers' intentional acts, misuse or use under abnormal conditions.
- DAIKIN shall not be responsible for any consequential damages (loss of business profits, business interruption) attributable to the use of this product, or the inability to use it.
- Daikin shall not be responsible for any accident or damage attributable to negligence in observing the instructions given in the instruction manual or delivery specifications.
- DAIKIN shall not be responsible for any damage attributable to malfunction, etc., resulting from the combination with connected equipment.
- Daikin shall not be responsible for any injury or accident incurred as a result of equipment operation or maintenance work performed by persons who do not meet the eligibility requirements in "1.4 Restrictions on Users".

1.4 Restrictions on Users

⚠ DANGER

- Please restrict the personnel responsible for operating or maintaining equipment to those who have received the necessary training on the handling of the product in advance, fully understand how to handle it safely, and are recognized as “qualified” by the person responsible for safety management at the customer. Electrical maintenance in particular must be restricted to those who have certain qualifications prescribed by law (e.g. licensed electrical engineers).
- Be sure to stipulate the above qualification conditions in the company regulations.

1.5 Restrictions on Applications

⚠ DANGER

- Do not use this product for special applications where human lives are at stake, for life-support equipment for example, or its associated systems, or for special applications including mobile structures that carry people, or for medical uses and nuclear power uses.
- This product has been manufactured under strict quality control, but when it is used with equipment where its failure, for example, can be anticipated to result in a serious accident or loss, install safety devices in the machinery.
- This product constitutes partly completed machinery in the sense of the EC Machinery Directive 2006/42/EC and respectively not usable. This product is exclusively intended for integration into a machine or system or for assembly with other components to form a machine or a system. The product may be commissioned only if it has been integrated into the machine or system for which it is designed and if the machine or system fully complies with the requirements of the EC Machinery Directive.

1.6 Precaution

- Regarding the hydraulic connections to this hydraulic unit, use hoses to prevent transmission of the vibration of the motor pump to the machine.
- This hydraulic unit is equipped with a fan to cool the hydraulic oil, controller and motor. To assure the air intake and exhaust for the fan, do not place any obstruction within 10 cm from the unit left and light. In addition, install the unit at a location with good ventilation so that hot air does not remain.
- Turning the power ON/OFF frequently significantly shortens the life of the controller. Run and stop this hydraulic unit by using start/stop digital inputs. Leave an interval of at least 5 minutes between stopping and running of the unit by turning the power ON/OFF. When stopping and running of the unit with start/stop signals, leave an interval of at least 0.5 seconds between the stop command and restarting.

- This hydraulic unit incorporates a safety valve, and its factory default pressure is set to the maximum operating pressure of the hydraulic unit + 0.5 MPa. Adjust the set pressure of the safety valve according to the application. The same applies when the surge pressure upon operation of actuators has to be kept to a minimum.

  See “12.11 Safety Valve Adjustment Instructions”.

  Note also that the set pressure of the safety valve may drop due to repeated protracted operation of the machine or contamination in the hydraulic oil. If the product is used continuously with the safety valve actuated, an alarm may occur due to temperature rise for example. In this case too, carry out readjustment.

- EHU15R** : Operation the unit less than 3L/min flow setting when the unit operates continuously at max. operation pressure.
  EHU30R** : Operation the unit less than 5L/min flow setting when the unit operates continuously at max. operation pressure.

- The pressure and flow rate can be set beyond the adjustment ranges stated above, but be sure to use the product within the operating pressure range and operating flow rate range stated above.

- Refer to the specification documents (External dimension sheet) for other specifications.

- This manual is subject to change in order to improve the usability of the user's manual and to change the specifications of the product. For the latest version and operation manual of the option with communication function and the option with analog input/output function, refer to our company Oil Machinery Business Internet Service (http://www.daikinpmc.com/).

1.6.1 Installation and wiring

⚠ DANGER

- The wiring work must be done by a qualified electrical engineer. Otherwise, there is a risk of electric shock or fire.
- Personnel doing wiring work must wear gloves and long sleeves and implement safety measures to avoid injuries such as grazes.
- Personnel doing wiring work must wear gloves and long sleeves and implement safety measures to prevent electric shocks and fire due to static electricity.
- Complete the installation before starting the wiring work. Otherwise, there is a risk of electric shock and fire.
- Check that the input power supply is OFF before starting the wiring work. Otherwise, there is a risk of electric shock.
- When carrying out wiring work again after the power has been ON, check that the motor is stopped, and wait at least 5 minutes after powering OFF before starting the work. Otherwise, there is a risk of electric shock.

⚠ DANGER

- Use an EN60947-2-compliant no-fuse breaker and earth leakage circuit breaker (with overcurrent protection). Otherwise, there is a risk of electric shock and fire.

  For the capacities of circuit breakers, refer to “8.3 Installation of the Breaker”.

- Ground the grounding terminals in accordance with the law in the country concerned. Otherwise, there is a risk of electric shock and fire. Make a direct connection without going through a circuit breaker.
- Make sure that no conductive foreign objects such as screws or metal scraps, or combustible foreign matter such as wood debris or oil, get inside the controller. Otherwise, there is a risk of electric shock, fire, and accidents.
- Never use the product in a location where water will get onto it, in a corrosive atmosphere, or an atmosphere containing inflammable gas, or near flammable materials. Otherwise, there is a risk of electric shock and fire.
- Do not damage harnesses, apply strong forces to them, rest heavy objects on them, trap them or bend them excessively. Otherwise, there is a risk of electric shock and breakage.
- To move this product, use the eye bolts. Hoisting it by the pump piping, for example, will pose a danger of the product falling or overturning.
- Do not install or run this product while it is damaged or has missing parts. Otherwise, there is a risk of accidents.

⚠ CAUTION

- Strictly follow the requirements for the installation environment. Otherwise, there is a risk of fire and accidents.
- Install it at a location that can bear its weight. Otherwise, there is a risk of accidents.
- Do not expose terminals or other parts to static electricity. Otherwise, there is a risk of failures.
- Check that the input power supply voltage is within the rated voltage range. Otherwise, there is a risk of fire and accidents.
- Check terminal pinouts and terminal codes, and make error-free connections.
- Carry out withstand voltage tests at DC2 kV or lower. Applying voltages higher than this may damage this product.
- Do not perform Megger testing on control circuits. Otherwise, there is a risk of damage.
- Take measures to ensure that sensors and devices in the vicinity do not malfunction due to electromagnetic noise. Otherwise, there is a risk of accidents.
- Do not subject this product to strong impacts. Otherwise, there is a risk of accidents.

⚠ CAUTION

Do not climb onto the product, or rest any heavy object on it. Otherwise, there is a risk of electric shock, accidents and breakage.

Ensure that this product's environment remains within the permissible ambient temperature and humidity ranges. Otherwise, there is a risk of failures and shortening of service life.

1.6.2 Operation

⚠ DANGER

While the product is powered up, do not change the wiring, or connect/disconnect terminals, etc. Otherwise, there is a risk of electric shock, accidents and damage.

Do not turn on and shut off the power frequently. Otherwise, there is a risk of failures.

⚠ CAUTION

Set the pressure and flow rate such that they do not exceed the permissible range for the machine. Otherwise, there is a risk of accidents.

Before running the product, set parameters appropriate for the machine. Otherwise, there is a risk of injury, and failures of the machine.

Before running the product, ensure that you will be able to effect an emergency stop at any time. Otherwise, there is a risk of injury, and failures of the machine.

When a power outage occurs, do not approach the machine since it is possible that it will suddenly resume motion after the power is restored. Otherwise, there is a risk of injury. It is advisable to set the start/stop signals to positive logic for starts to ensure safe restarting.

See "11.1 Parameter List".

While the product is powered up, and for some time after shutting the power off, the heat-radiating fins and electronic devices will be hot, so do not touch them. Otherwise, there is a risk of burns.

1.6.3 Maintenance inspections

⚠ DANGER

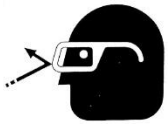
Maintenance inspections must be performed by an appropriately qualified technician. Otherwise, there is a risk of electric shock and injury.

Check that the input power supply is OFF before starting the work. Otherwise, there is a risk of electric shock.

⚠ DANGER

- Check that the motor is stopped, and wait at least 5 minutes after powering OFF before starting the work. Otherwise, there is a risk of electric shock.
- While the product is powered up, do not change the wiring, or connect/disconnect terminals, etc. Otherwise, there is a risk of electric shock, accidents and damage.
- Do not disassemble this product. Otherwise, there is a risk of electric shock and injury.

⚠ CAUTION



- Wear protective glasses and gloves for this work.
- Do not touch the controller board directly. Otherwise, it could be damaged by static electricity.
- Carry out withstand voltage tests at DC2 kV or lower. Applying voltages higher than this may damage this product.
- Do not perform Megger testing on control circuits. This could damage the product.

1.6.4 Disposal

⚠ CAUTION

When disposing of this product, entrust it to a specialist contractor as general industrial waste.

1.6.5 Warning plates

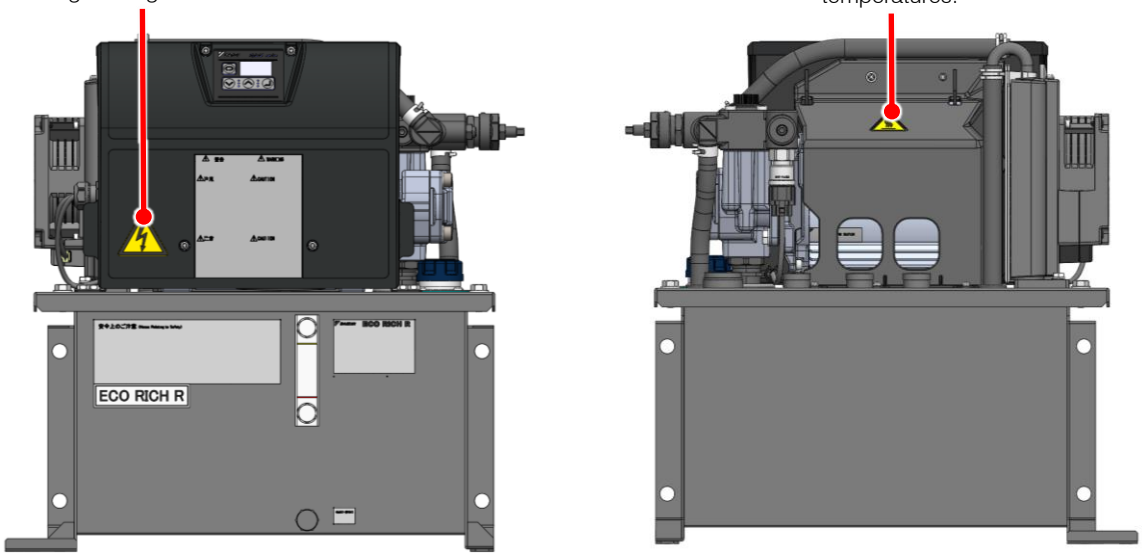
⚠ WARNING

The warning plates are very important, so do not damage or remove them.

If a warning plate becomes difficult to read through peeling or losses, contact Daikin immediately.

This is a warning plate that indicates a high voltage hazard.

This is a caution plate for high temperatures.



For Example : EHU15/30R02-40**

CHAPTER 2 PRODUCT SPECIFICATIONS AND CONDITIONS OF USE

⚠ CAUTION

Be sure to use the product within the specifications and observe the conditions of use.
Daikin shall not be responsible for any accident or loss attributable to failing to follow this instruction.

2.1 Product Specifications

Product Model	EHU15R07**-40**			EHU15R10**-40**			EHU30R07**-40**		
	00	02	03	00	02	03	00	02	03
Tank capacity (L)	0	18	33	0	18	33	0	18	33
Motor capacity (equivalent) (kW)	2.8								
Maximum operating pressure (MPa)	7.0			10.0			7.0		
Operating pressure adjustment range (MPa)	0.5 - 7.0			0.5 - 10.0			0.5 - 7.0		
Maximum flow rate (*1) (L/min) Maximum rotational speed (min^{-1})	15.2 3800						28.5 5000		
Operating flow rate adjustment range (*1) (L/min)	2.5 - 15.2						3.5 - 28.5		
Coating color	Black * Purchased parts, etc.: standard color of the equipment manufacturer								
Digital input (5 channels)	Photo coupler insulation, DC +24 V (max. 27 V) 5 mA, positive or negative common								
Digital output (2 channel)	Photo coupler insulation, open collector output, DC+24 V (max. 27 V) 50 mA max., positive or negative common								
Alarm output (1 channel)	Relay output, contact capacity: DC 30 V max. 1A, AL_A : open when abnormal/AL_B : closed when abnormal/AL_C : common								
Communications port (RS422/RS485 / RS232C)	Serial communications port * Can be used only with communications option (However, Hybrid-Win can be used even when the communication option is not selected.)								
Communications port	(UART): Communications port for service * For communications with a personal computer, a dedicated USB-UART communications converter is required.								

*1 The maximum flow rate is the theoretical value, not the guaranteed value

Nomenclature

EHU	* *	R	* *	* *	–	40	–	* *	* *	–	* * *
1	2	1	3	4		5		6	7		8

1 Model No.

EHUR: ECORICH R Series

2 Maximum flow rate

15: 15.2 L/min

30: 28.5 L/min

3 Maximum operating pressure

07: 7 MPa

10: 10 MPa

4 Tank capacity

00: Without tank

02: 18 L

03: 33 L

5 Design No.

Design 40 series
(Incremented at model changes)

6 Optional function (s) (up to 2 letters of the alphabet)

C: With RS422/485 / RS232C communications function

P: With analog input function

7 Optional hardware (a combination of those tabled below or codes 11 to 99 when combined)

Unit options

Tank capacity code			Description
00	02	03	
Code			
-	-	22	Controller cover
03	03	03	With flow control valve *
19	04	19	Power, control separation function
-	05	48	Water fill test compliant tank
-	06	53	Water leak test compliant tank

Tank capacity code			Description
00	02	03	
Code			
-	07	54	Level switch
-	08	55	Temperature switch
-	09	56	Thermometer
-	10	57	Micro separator

*Product models with a tank capacity of 00 / 03 are always selected.

See “2.5 Hydraulic Circuit

8 Non-standard control number (3-digit number)

2.2 Conditions of Use

Useable oil (Note 1)	• Abrasion-resistant hydraulic fluid *If the working pressure is 7 MPa or less, general hydraulic fluid (R & O) can be used (For the recommended brand, see our “DAIKIN OIL HYDRAULIC EQUIPMENT Catalog (HK196)”.) • Viscosity grade: ISO VG 32 to 68 - Contamination: Within NAS class 9, water content 0.1%vol max. *If the working pressure is 7 MPa or less, within NAS class 10, water content 0.1%vol max. • Dynamic viscosity range: 20 to 88 mm^2/s (recommended values), 15 to 400 mm^2/s (usable range) • Tank oil temperature range: 15 to 50°C (recommended values), 0 to 60°C (usable range) (Note 3)
Input power supply (Note 2)	• AC 3-phase, 200 - 220 V, 50/60 Hz (Permissible voltage fluctuation: ±10%)
Discharge port	Rubber hose connection
Operating ambient temperature	0 to 40 °C
Storage ambient temperature	–20 to 60 °C
Operating ambient humidity	85% RH maximum (no dew condensation)
Operating altitude	1,000 m maximum
Vibration resistance	X direction : 0.5G, Y direction : 0.5G, Z direction : 1.5G, 7.5 to 100 Hz, 2.5 hr
Installation site	Indoors (Be sure to secure with bolts, etc.)
Other	• Be sure to install no-fuse breakers at all poles (3 poles or 2 poles) at the main circuit power supply side (primary side). • Wire electrical connections so as to satisfy JIS B 9960-1 (European standard EN60204-1). • If operation is to be repeatedly started/stopped with an interval of shorter than 5 minutes, use start/stop signals. Note, however, that they must be used with an interval of at least 0.5 seconds between the stop command and restarting. • Be sure to ground ground terminals in accordance with the law in the country concerned.

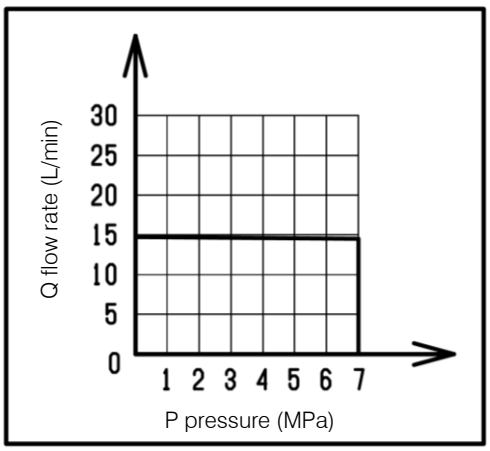
(Note 1) Hydraulic oil must be the mineral-base oil type (e.g. water-glycol can’t be used).

(Note 2) Note that if there is fluctuation on the plus side even if it is within the tolerance, an overvoltage alarm that stops operation may occur at the response, depending on the operating conditions of the main machine and the load conditions. Note that if there is fluctuation on the minus side even within the permissible fluctuation of the power supply voltage, it can adversely affect the output characteristics.

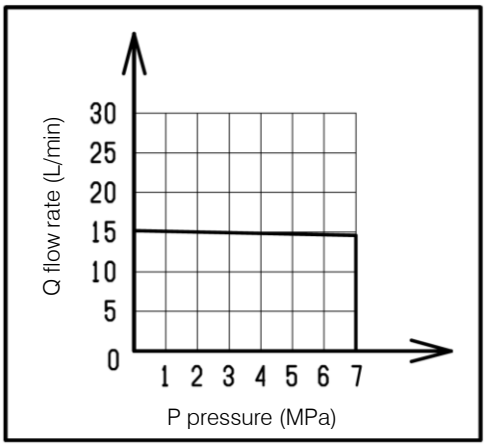
(Note 3) When using the product outside the recommended operating temperature range, the pressure pulsations may become large and the discharge rate may decrease, but this is not abnormal.

2.3 PQ Representative Characteristic Diagram

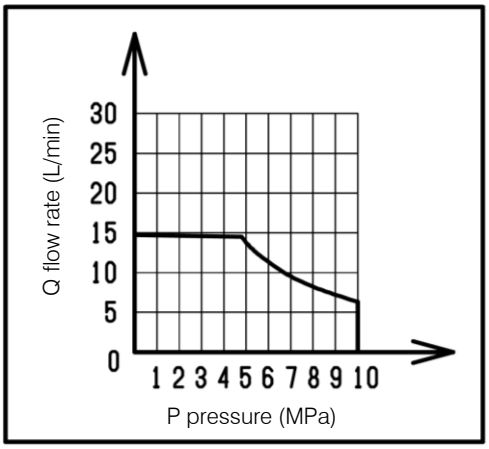
EHU15R0700-40-03
EHU15R0703-40-03



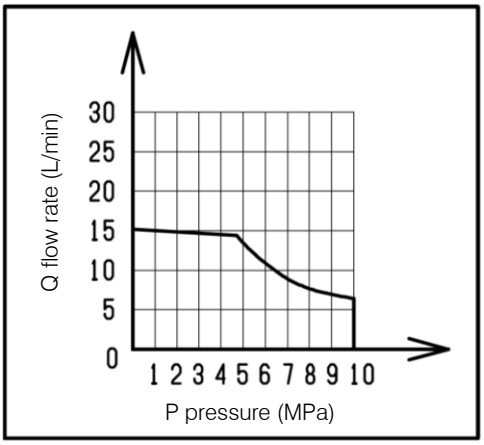
EHU15R0702-40



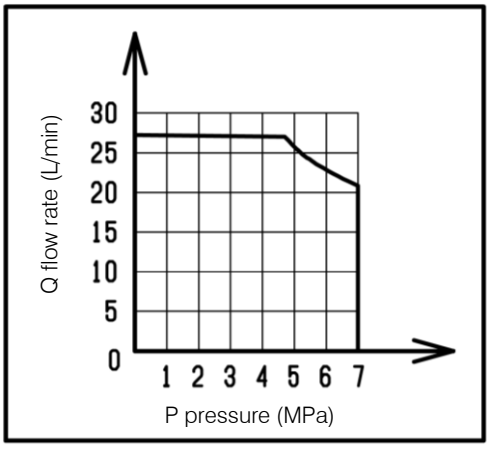
EHU15R1000-40-03
EHU15R1003-40-03



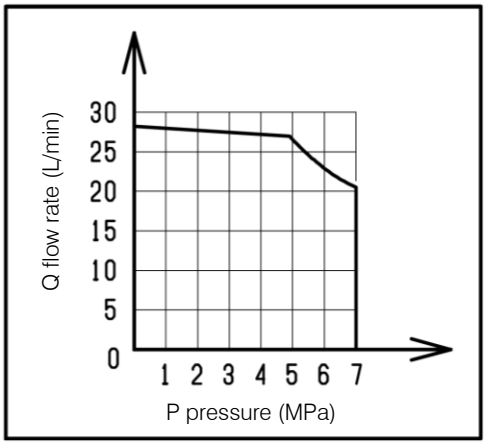
EHU15R1002-40



EHU30R0700-40-03
EHU30R0703-40-03



EHU30R0702-40



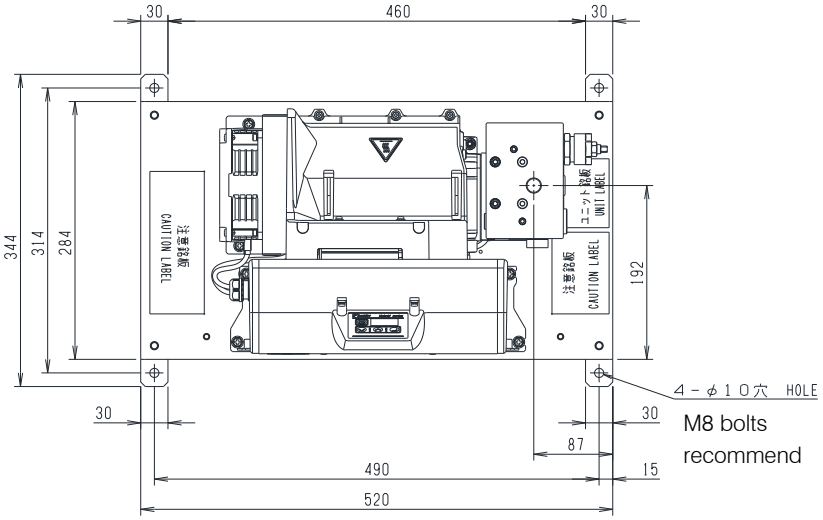
*1 The above are the representative characteristics with oil type VG32 and a temperature of 40°C

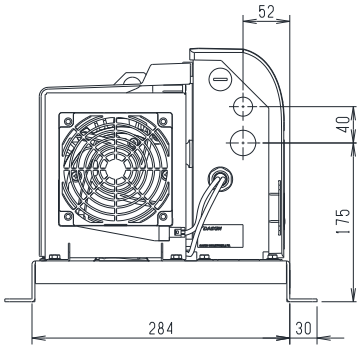
*2 The above PQ characteristics diagrams show the operating range in terms of actual flow rates.

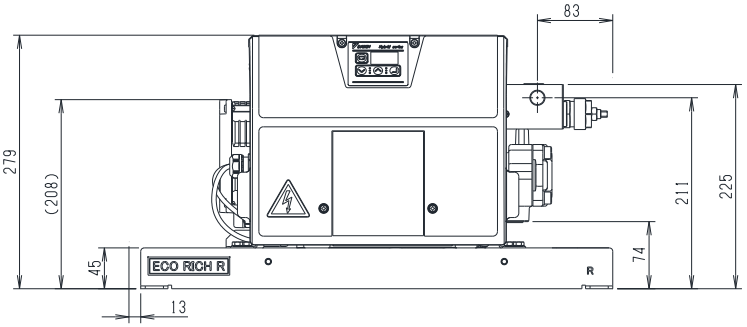
*3 Restrict the continuous discharge flow rate at the maximum operating pressure according to the model.
EHU15R** : 3 L/min or less
EHU30R** : 5 L/min or less

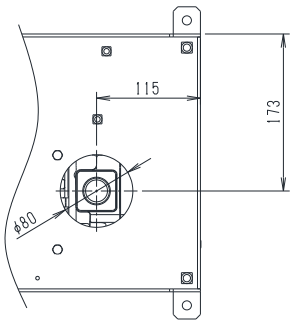
2.4 External Dimensions

■Motor pump type (EHU15/30R**00*-03)

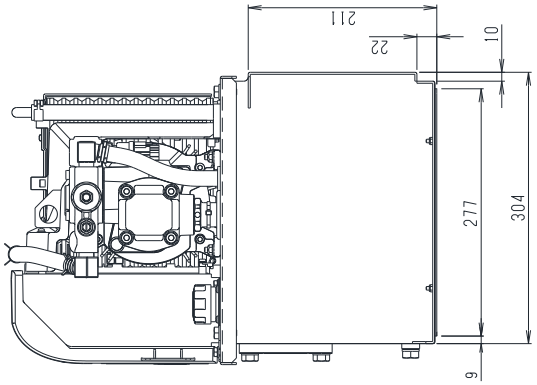


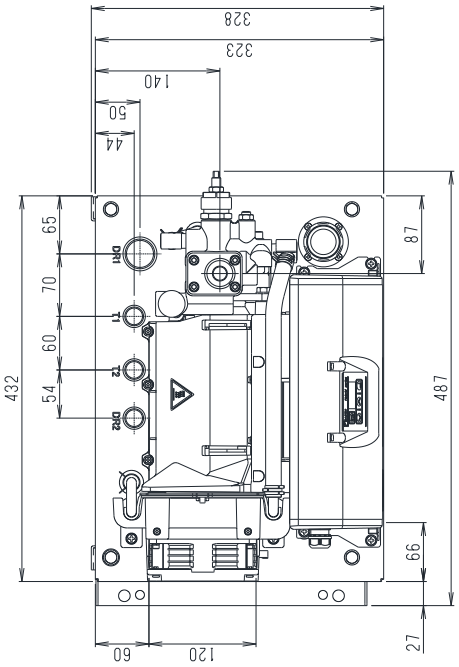


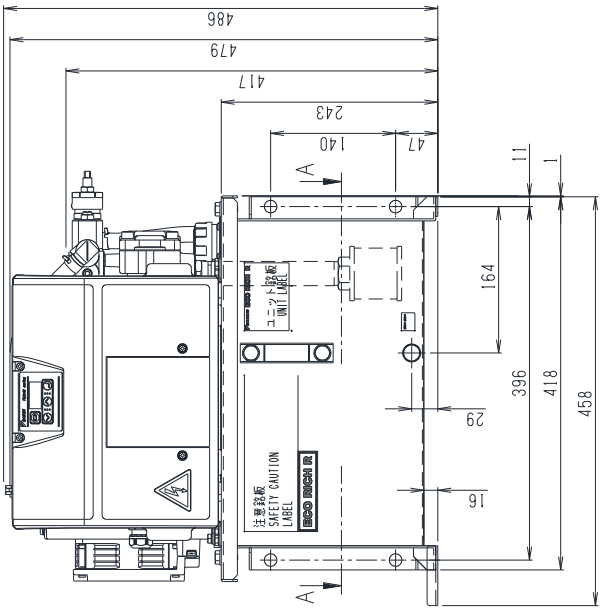


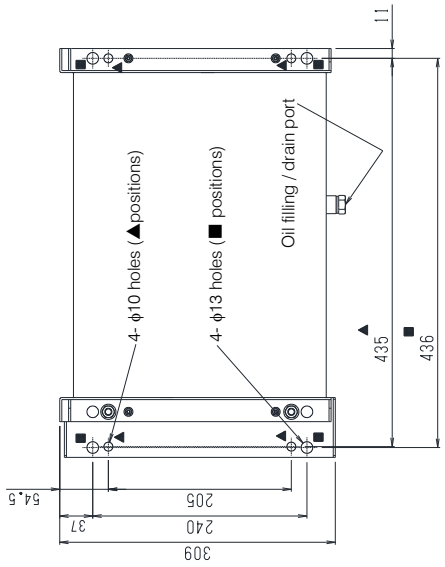


■20L tank unit type (EHU15/30R**02)

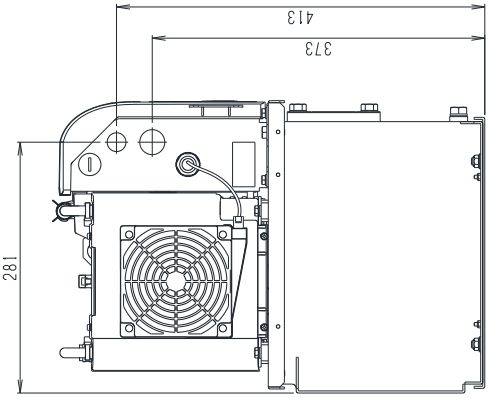




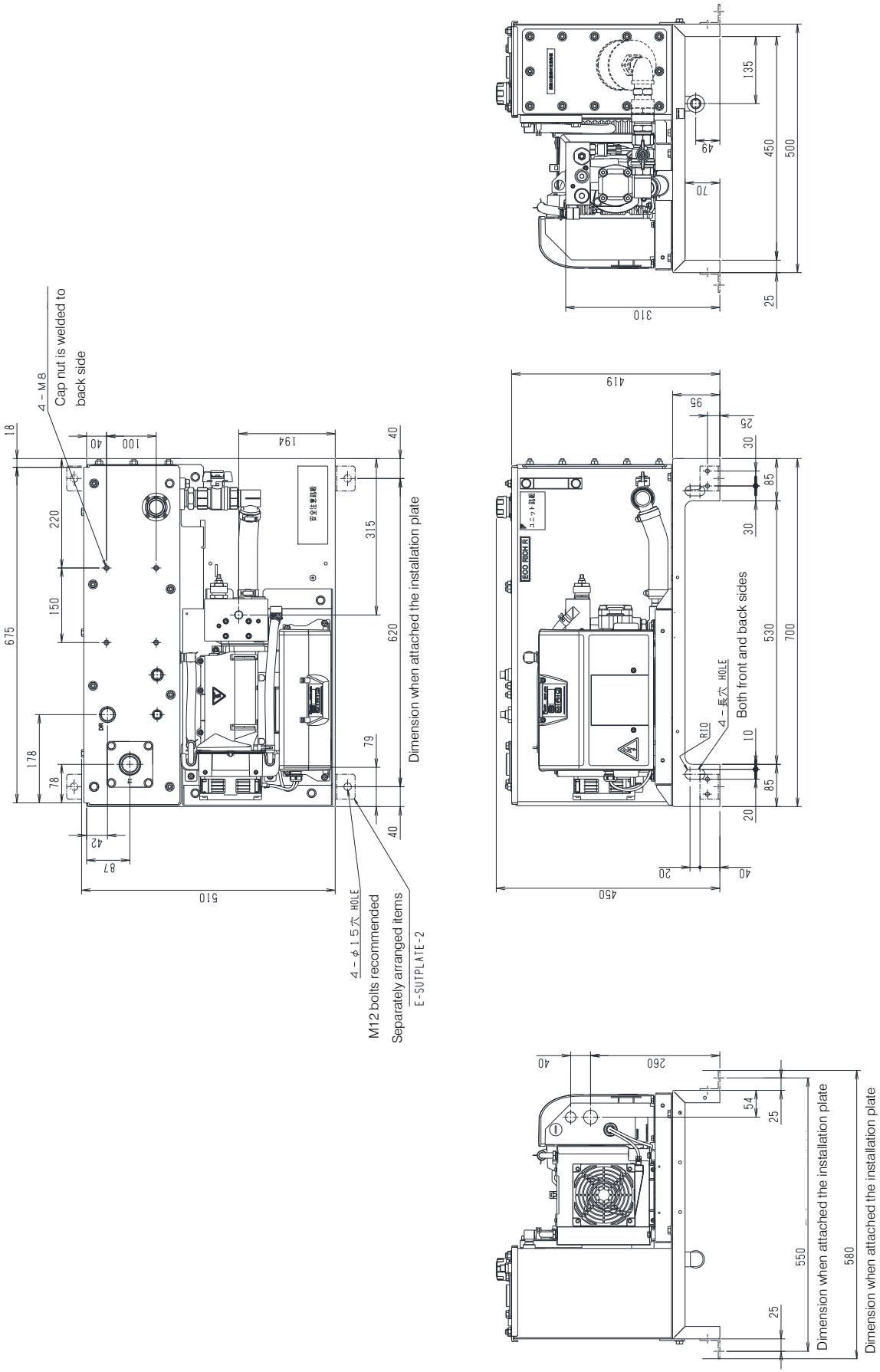




Section at A-A
(Dimensions of mounting holes for installation)

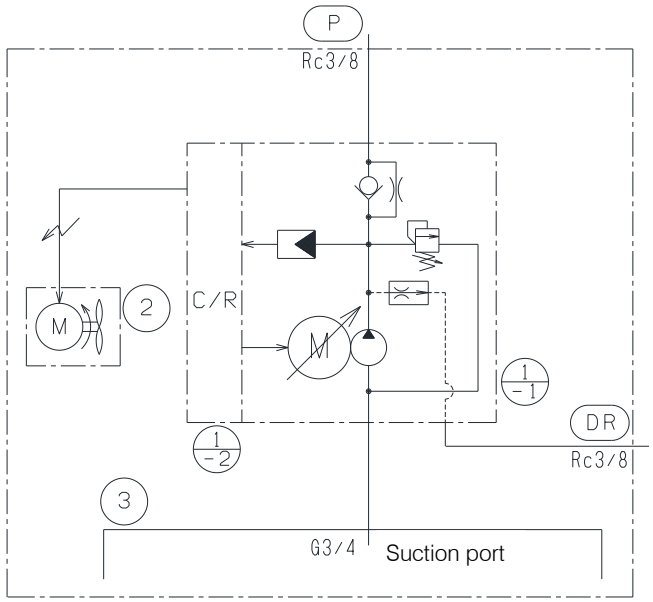


■30L tank unit type (EHU15/30R**03*-03)



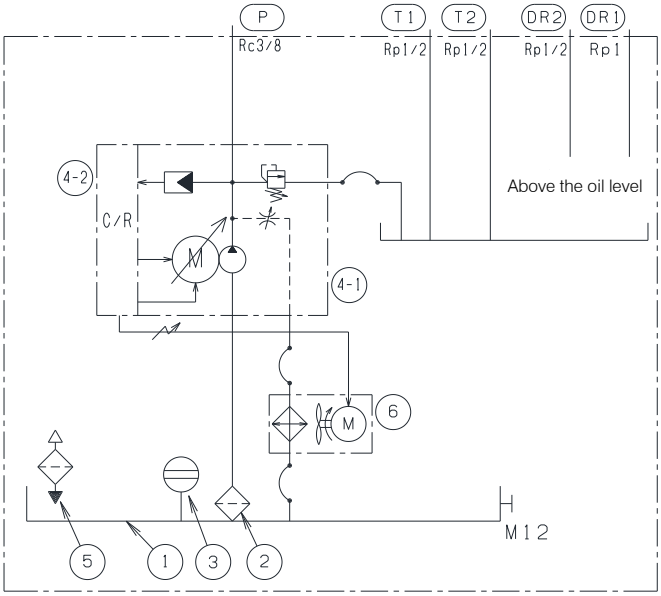
2.5 Hydraulic Circuit

■Motor pump type (EHU15/30R**00*-03)



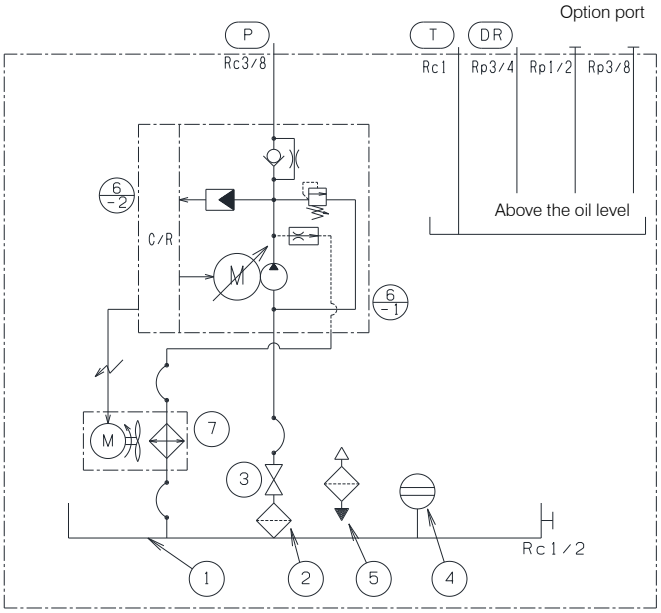
Part No.	Name
1-1	Inverter driven motor pump
1-2	Control unit
2	DC fan
3	Base

■20L tank unit type (EHU15/30R**02)



Part No.	Name
1	Oil tank (18L)
2	Suction strainer
3	Oil level gauge
4-1	Inverter driven motor pump
4-2	Control unit
5	Oil filler port cum air breather
6	Oil cooler

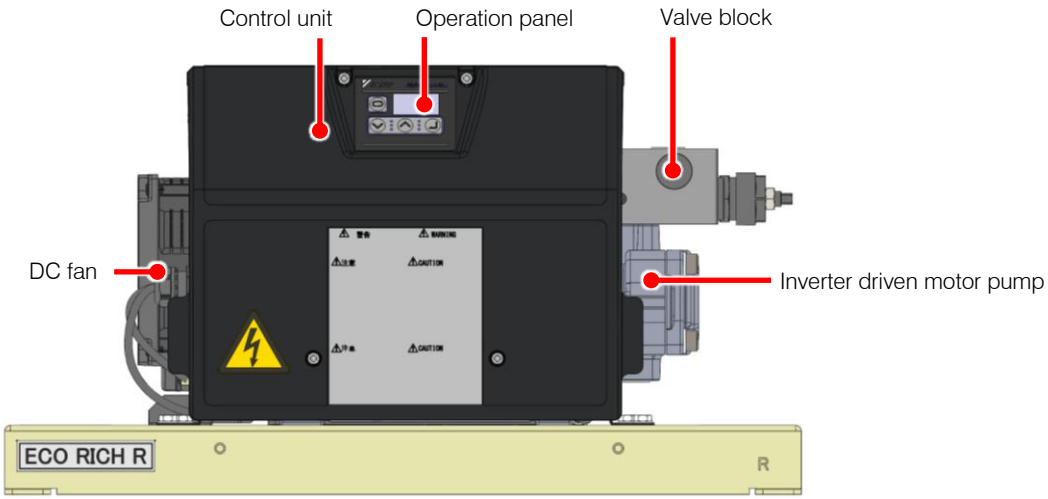
■30L tank unit type (EHU15/30R**03*-03)



Part No.	Name
1	Oil tank (33L)
2	Suction strainer
3	Stop valve
4	Oil level gauge
5	Oil filler port cum air breather
6-1	Inverter driven motor pump
6-1	Control unit
7	Oil cooler

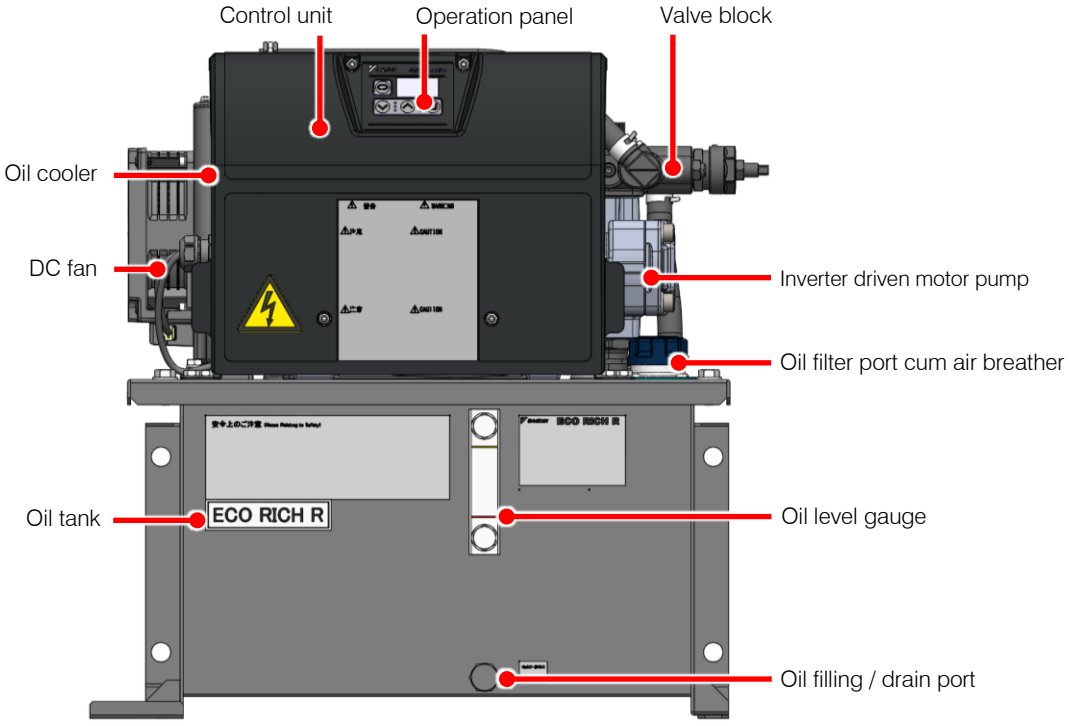
CHAPTER 3
COMPONENT PARTS AND PART NAMES

■Motor pump type (EHU15/30R**00*-03)



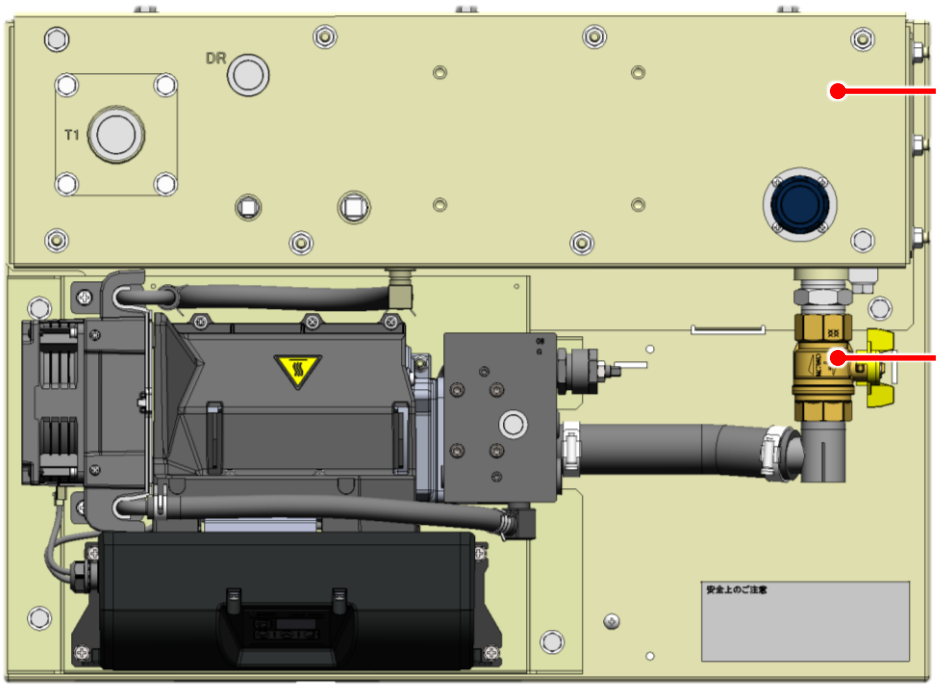
Front View of Unit

■20L tank unit type (EHU15/30R**02)

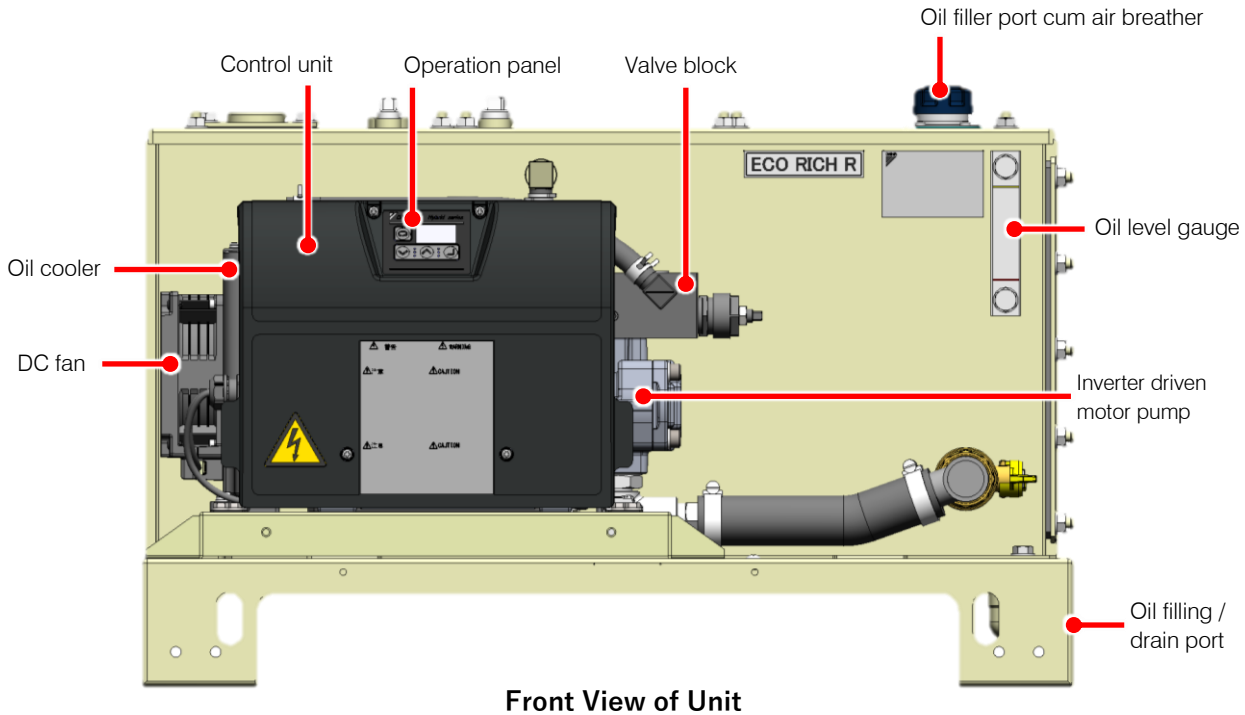


Front View of Unit

■30L tank unit type (EHU15/30R**03*-03)



Top View of Unit



Front View of Unit

CHAPTER 4 PROCEDURE FOR STARTING UP

The procedure for starting up the product is as follows.

1. Check

See " CHAPTER 5 CHECKS UPON RECEIVING THE PRODUCT".

2. Transportation / installation

See " CHAPTER 6 TRANSPORTATION/INSTALLATION".

3. Piping

See " CHAPTER 7 HYDRAULIC PIPING".

4. Wiring

See " CHAPTER 8 ELECTRIC ".

Be sure to check the following points before turning the power on.

- Is the product installed correctly?
- Has the piping been done correctly?
- Has hydraulic oil been supplied?
- Has the wiring been done correctly?
- Is the power supply voltage correct?

5. Powering on

See " CHAPTER 9 TRIAL RUNNING".

6. Operation check

Check the operation of the actuators.
Change the pressure/flow rate settings as necessary.

See "10.5 Setting Mode".

CHAPTER 5
CHECKS UPON RECEIVING THE PRODUCT

5.1 Check on the Contents of the Packaging

⚠ CAUTION

Check that the product is the right way up, then unpack it. Otherwise, there is a danger of falling and breakage.

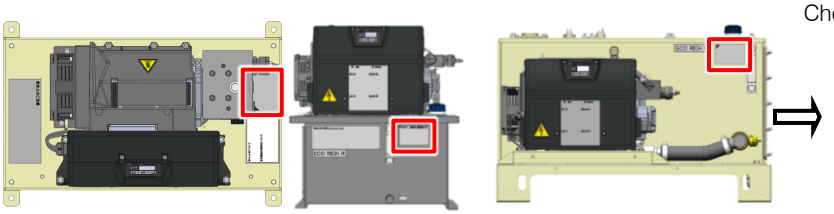
When the product has been unpacked, check that the following items are present.

- Hydraulic unit body 1 piece
- Instruction Manual 1 copy

5.2 Check on the Model

Check, with the product nameplates, that the actual item matches the ordered product.
The nameplate position of each product is shown in red in the figure below.

For details on model designations, see “2.1 Product Specifications”



Motor pump type | 20L tank unit type | 30L tank unit type

This is the model code of the product.
Check that it matches the ordered product.

<Example Product Nameplate>

CHAPTER 6 TRANSPORTATION/INSTALLATION

6.1 Transportation

6.1.1 Transportation in the packaged state

■20L tank unit type (EHU15/30R**02)

To transport the product in the packaged state, lift by using the handgrip openings in the cardboard, and transport it on a dolly, for example.
The weight in the packaged state is indicated on the label affixed to the side face.

■Motor pump type (EHU15/30R**00*-03) / 30L tank unit type (EHU15/30R**03*-03)

Use lift to haul this unit when it is under packing condition.
The weight in the packaged state is indicated on the label affixed to the side face.

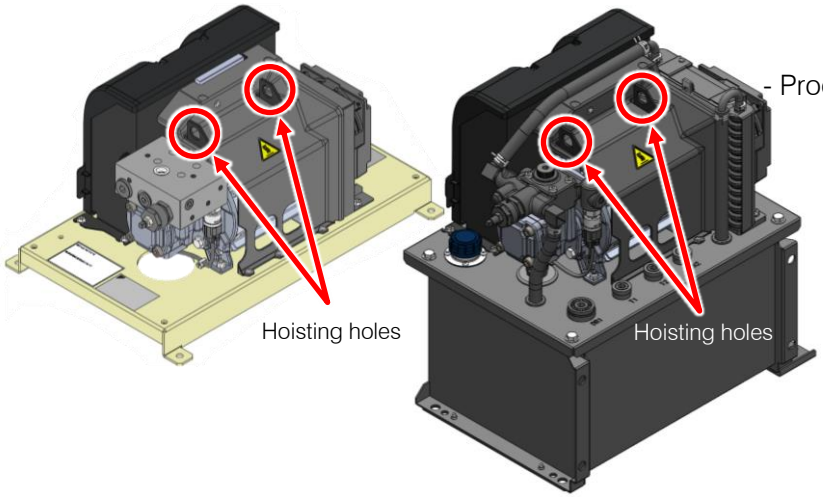
⚠ WARNING

- Transport the product with material handling equipment appropriate for the packaged state. Otherwise, there is a danger of falling or toppling over.
- This is a heavy item and should therefore not be lifted by one person alone.
- Check the product's weight and the position of its center of gravity before lifting it. Otherwise, there is a danger of it falling or toppling over.

6.1.2 Transportation of the product

■Motor pump type (EHU15/30R**00*-03) / 20L tank unit type (EHU15/30R**02)

When transporting the product, hoist it by using the holes provided for hooks at two locations. Using other locations will lead to a risk of falling/toppling over. Check the mass of the hydraulic unit, and make sure that the hoisting load is within the rated load of the hoisting equipment.

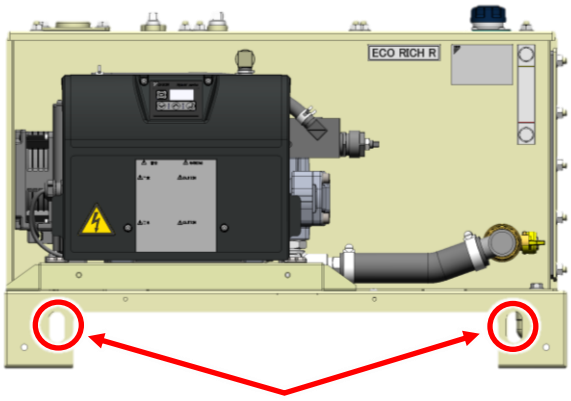


- Product Masses (Excluding Hydraulic Oil)

Product Model	Mass [kg]
EHU15/30R**00-40	26
EHU15/30R**02-40	30

■30L tank unit type(EHU15/30R**03*-03)

In the case of product transportation, use long for sling. In addition, lift equally at 4 points. Using other locations will lead to a risk of falling/toppling over. Check the mass of the hydraulic unit, and make sure that the hoisting load is within the rated load of the hoisting equipment.



Long hole for sling (4 points)

- Product Masses (Excluding Hydraulic Oil)

Product Model	Mass [kg]
EHU15/30R**03-40	59

⚠ WARNING

- Be sure to use the long for sling when lifting. If it is lifted by pump piping, etc., it may fall or tip over.
- Check the mass of the hydraulic unit in the table above, and ensure that the hoisting load is within the rated load of the hoisting equipment.

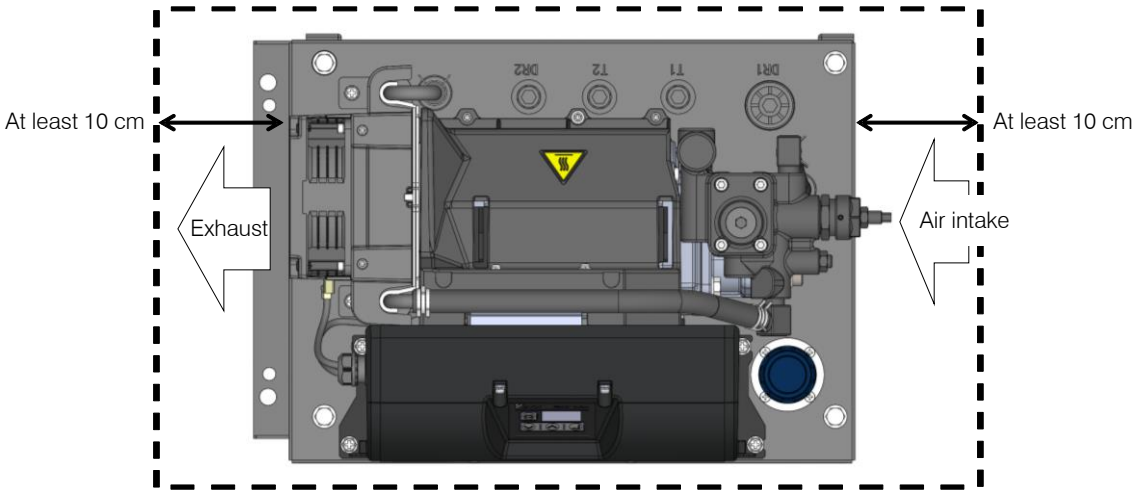
⚠ NOTICE

- Do not move the product while there is oil in the tank (this could cause malfunctions due to oil leakage or inclusion of air).
- This product is a precision instrument. Please do not shock or drop it. It may be damaged.
- During the transportation, please do not touch the harness, piping, and solenoid valve. There is a risk of accidents caused by falling or damage.
- Fix and make sure it can not be moved by external force or vibration during the transportation.

6.2 Installation

6.2.1 Secure the space for air intake/exhaust

Install the unit at a well-ventilated location where heat will not build up, and secure a space of 10 cm from the left and right end faces of the unit. Also take care that the temperature of the intake air complies with the stipulated ambient temperature (40°C max.).



For Example : EHU15/30R02-40**

⚠ WARNING

- If the intake air/exhaust spaces described above are not secured, the heat exchange function of the oil cooler/DC fan will deteriorate, and the oil temperature and temperature of the hydraulic devices will become abnormally high, posing a risk of fire. Be sure to secure the space for air intake /exhaust.
- Do not touch hot parts. It can cause burns.
- Provide sufficient maintenance space so that working postures will not be uncomfortable.

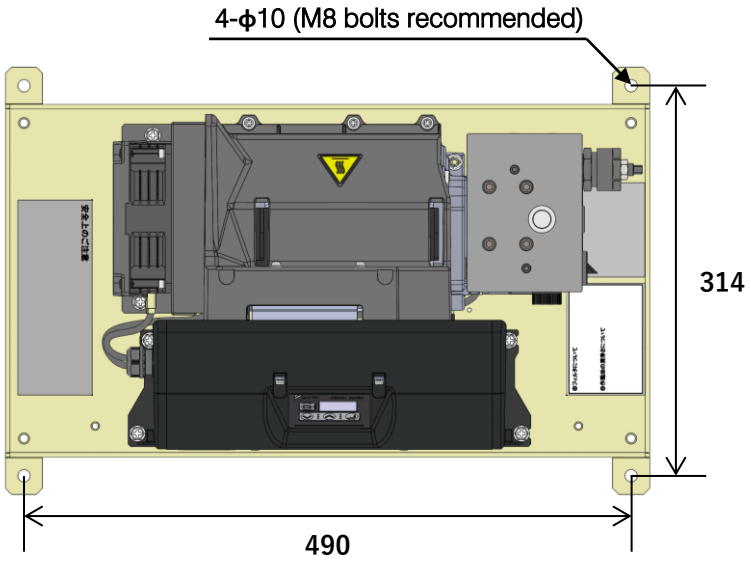
⚠ NOTICE

- If the intake air/exhaust spaces described above are not secured, the motor and controller will reach high temperatures and the lives of the devices will be significantly shortened. Be sure to secure the space for air intake /exhaust.
- If the intake air/exhaust spaces described above are not secured, the motor and controller will reach high temperatures, temperature protection will be actuated, and the product will stop running.
- Continuing to use the product while it is at a high temperature will result in trouble affecting, and shorten the lives of, the electrical components as described previously, but also hydraulic devices such as pumps and valves. It will also promote deterioration of the hydraulic oil, shortening the service life of the oil.

6.3 Securing the Hydraulic Unit

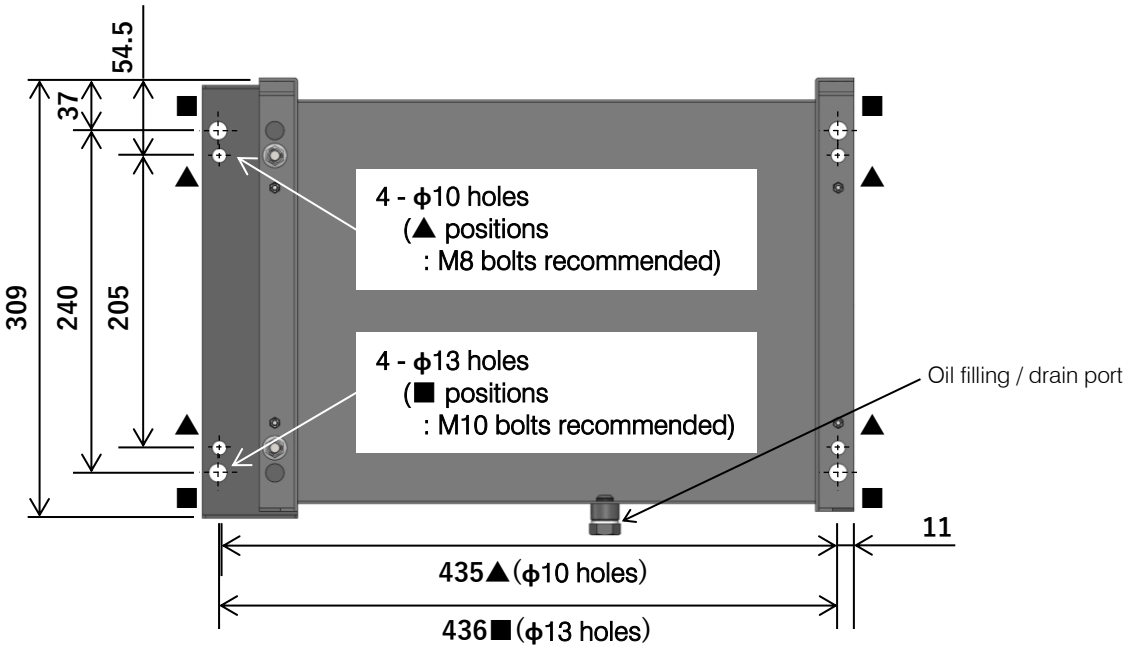
Secure the hydraulic unit on a level platform, or a floor, that will not be affected by the vibration of the main machine.
For details on the mounting method and position, refer to the Delivery Specification (outline drawing).

■Motor pump type (EHU15/30R**00*-03)



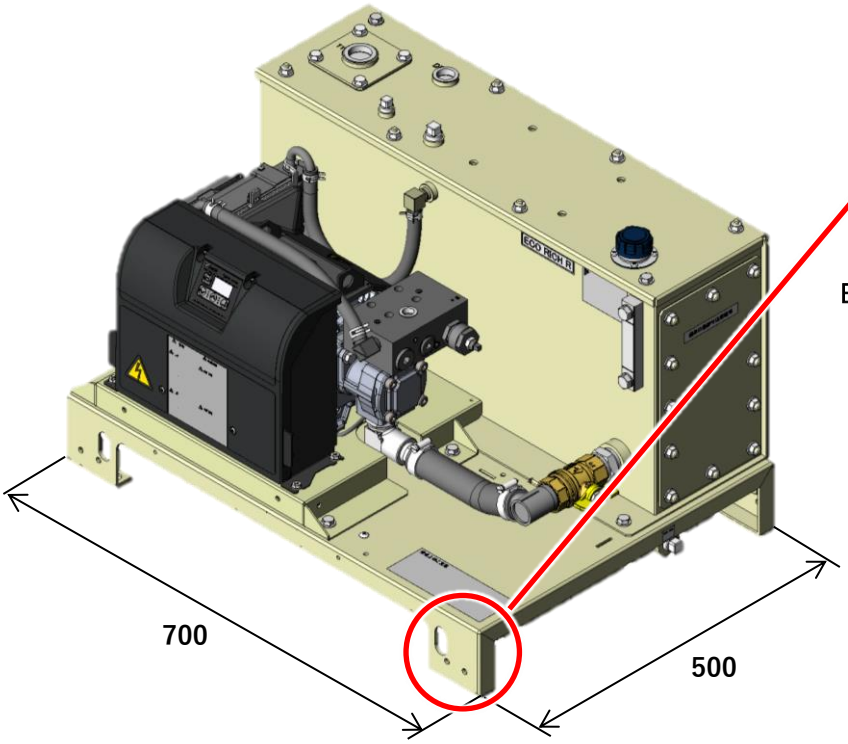
Installation Mounting Hole Dimensions

■20L tank unit type (EHU15/30R**02)

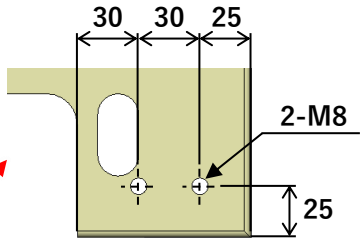


Installation Mounting Hole Dimensions

■30L tank unit type(EHU15/30R**03*-03)

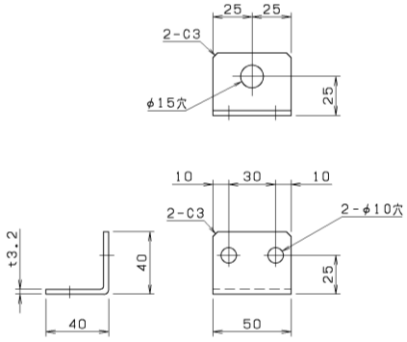


Installation Mounting Hole Dimensions



Enlarged view of the unit fixing part

Recommended fixing bracket
E-SUTPLATE-2(our optional)



⚠ WARNING

If the hydraulic unit is not secured, it may topple over or move as a result of reactions to the hydraulic pressure in the piping and so on, imposing a hazard. Be sure to secure it with bolts, etc.

⚠ NOTICE

Installing the product on a sloping surface may cause oil leakage and inclusion of air in the oil, leading to abnormal noises and shortening of equipment life. Be sure to install it on a level surface.

CHAPTER 7 HYDRAULIC PIPING

7.1 Piping

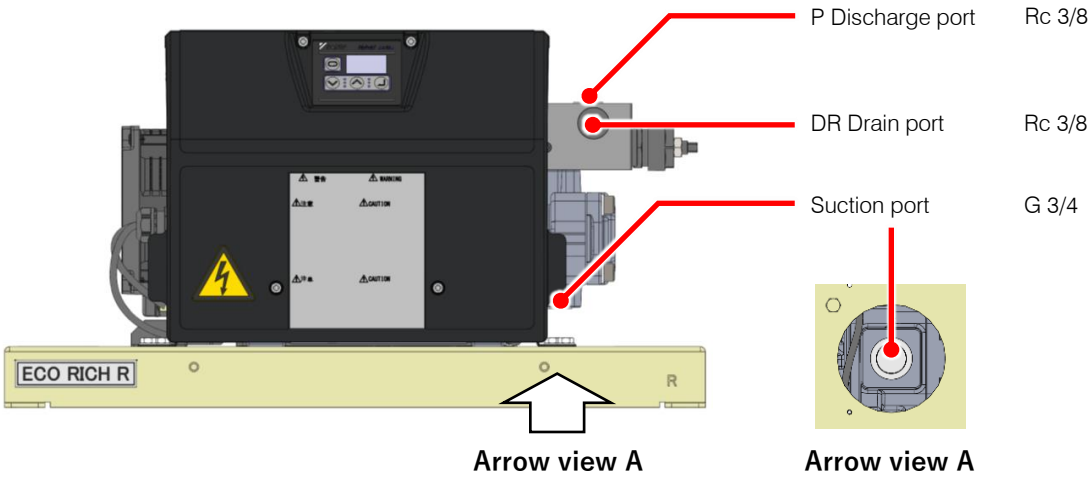
■Motor pump type (EHU15/30R**00*-03)

There are different port types below for motor pump type. Be sure to connect piping at the all ports. Details on the piping positions can be found in the outside view drawing. Use hoses for the piping work, and fasten them with sealing tape.

In addition, the motor pump type is not equipped with an oil cooler. Use the cooling equipment separately so that they can be used at an appropriate oil temperature.

<Piping Specifications>

Piping Port	Piping Size	Recommended Hose Withstand Pressure	At Shipment
P	Rc 3/8	EHU**R07 : 10.5 MPa EHU**R10 : 14.0 MPa	Vinyl cap
DR	Rc 3/8	1.5 MPa	
Suction port	G 3/4	1.5 MPa	



⚠ CAUTION

Make sure the suction pressure is under -0.02MPa. If it becomes more than -0.02MPa, the flow rate may reduce and the noise may become large.

- About the filter

  It is necessary to attach a filter to each of the suction side and the tank return line for this product.

⚠ CAUTION

- Attach the suction filter of 150 mesh to the suction side, and return filter of 10μm to the tank return line. (25μm or less for using under 7MPa)
- Keep the the degree of hydraulic fluid contamination under NAS9 class.

- Cleanliness of the hydraulic fluid

  In order to maintain the cleanliness of the hydraulic fluid, note the following matters.

⚠ CAUTION

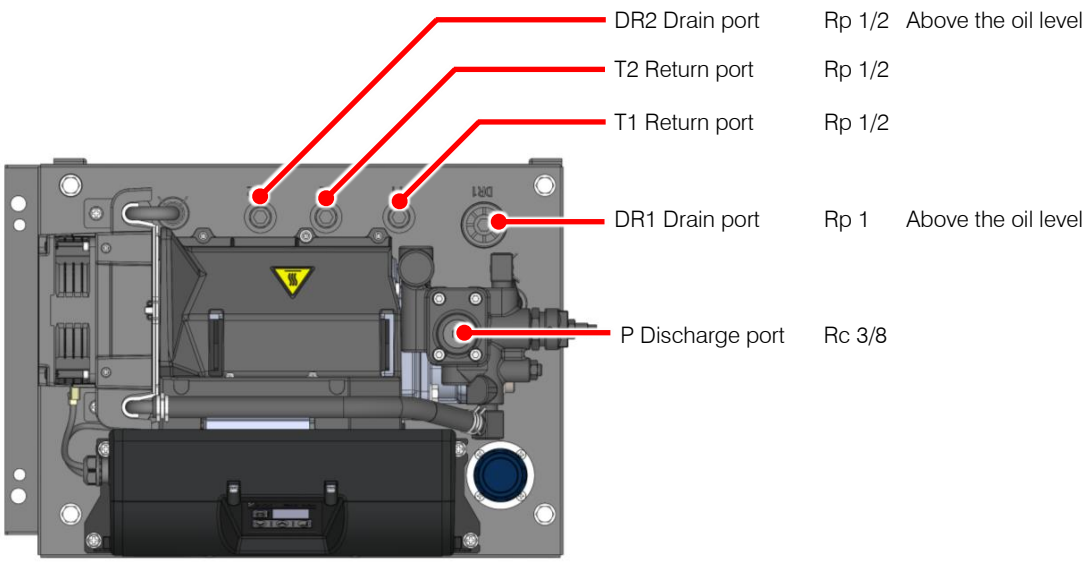
- Ensure the distance between the suction port and the tank bottom (10cm or more).
- Ensure the distance between the suction port and the return port. Or put a baffle plate (partition plate).
- Install a filter (40μm or less) to the air breather.
- Design the oil tank and make sure the waste can not enter it from the outside.

■20L tank unit type (EHU15/30R**02)

There are different port types below for 20L tank unit type. Be sure to connect piping at the “P Discharge port” and “T Return port” ports. Details on the piping positions can be found in the outside view drawing. Use hoses for the piping work, and fasten them with sealing tape.

<Piping Specifications>

Piping Port	Piping Size	Recommended Hose Withstand Pressure	At Shipment
P	Rc 3/8	EHU**R07：10.5 MPa EHU**R10：14.0 MPa	Plastic plug
DR1	Rp 1	1.5 MPa	
DR2 T1 T2	Rp 1/2	1.5 MPa	

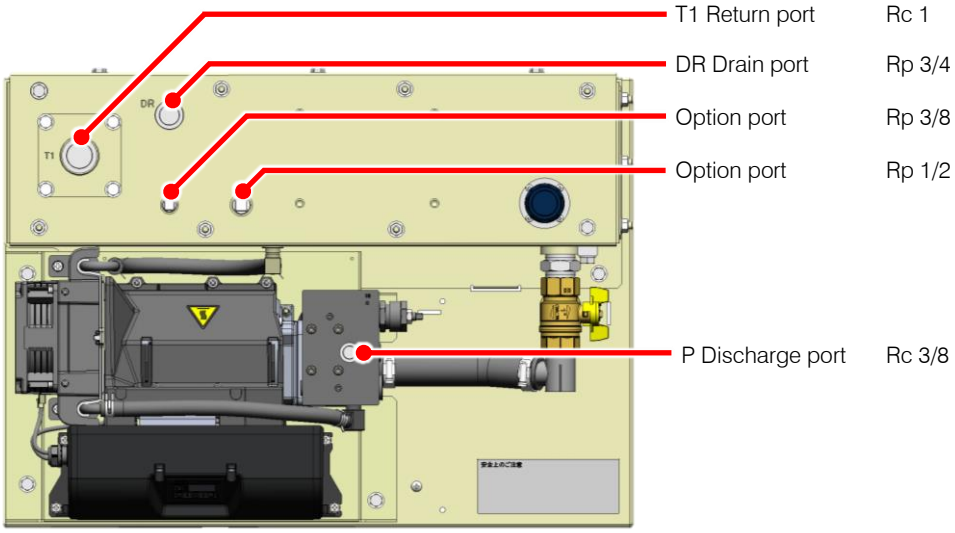


■30L tank unit type (EHU15/30R**03*-03)

There are different port types below for 30L tank unit type. Be sure to connect piping at the “P Discharge port” and “T1 Return port” ports. Details on the piping positions can be found in the outside view drawing. Use hoses for the piping work, and fasten them with sealing tape.

<Piping Specifications>

Piping Port	Piping Size	Recommended Hose Withstand Pressure	At Shipment
P	Rc 3/8	EHU**R07：10.5 MPa EHU**R10：14.0 MPa	Vinyl cap
DR	Rp 3/4	1.5 MPa	
T1	Rc 1	1.5 MPa	
Option port	Rp 3/8, Rp 1/2	1.5 MPa	Square head plug



⚠ DANGER

- When connecting hoses, allow at least the hydraulic hose manufacturer's recommended bend radius. Regarding the method for securing the hoses, fix them as recommended by the hose manufacturer.
- When doing the piping work, make the piping strong enough for the pressures to be used.

⚠ CAUTION

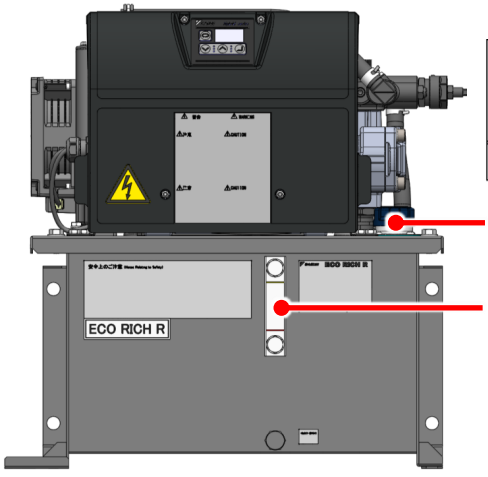
- Use hoses for the piping to this product.
- Connect the hoses without any twisting.
- In cases where excessive strain is likely to occur due to the weight of the hose, support the hose.

7.2 Filling with Hydraulic Oil (Tank Unit Type only)

- Remove the cap of the filler port cum air breather by turning it counterclockwise, then pour clean hydraulic oil (within NAS class 9) into the tank. The volume of oil should be that sufficient to bring the float to between the red line and yellow line.
- Use a hydraulic oil that conforms to the conditions described in "2.1 Product Specifications".

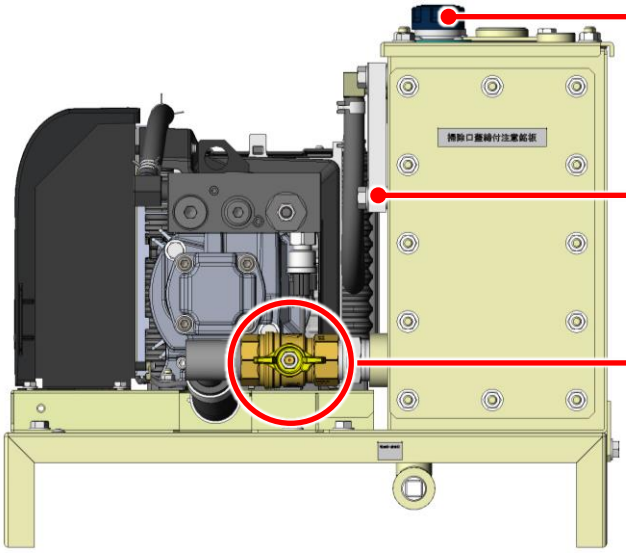
See "2.1 Product Specifications".

■20L tank unit type (EHU15/30R**02)



Oil tank capacity	Oil level range	
	Yellow line (Upper limit line)	Red line (Lower limit line)
18L	18L	13L

■30L tank unit type (EHU15/30R**03*-03)

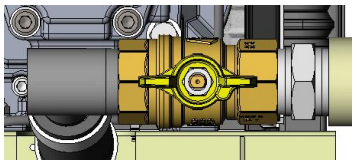


Oil filler port cum air breather

Oil tank capacity	Oil level range	
	Yellow line (Upper limit line)	Red line (Lower limit line)
33L	33L	25L

Oil level gauge

Stop valve
Open it when using
(Horizontal lever : Open, Vertical lever : Closed)



The stop valve is open

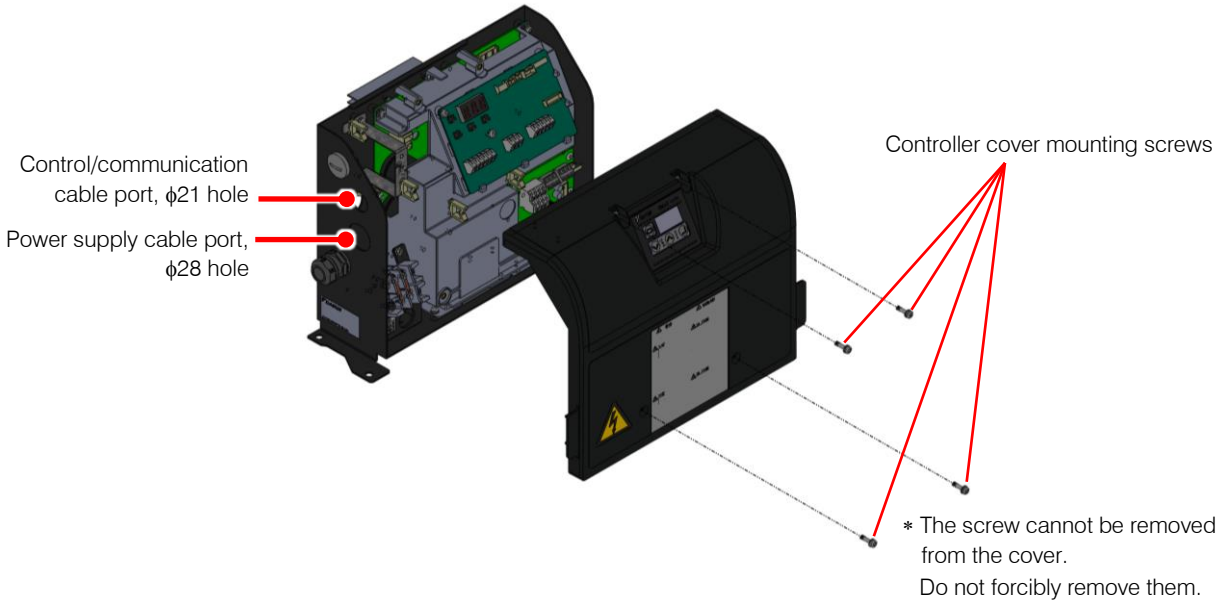
⚠ CAUTION

- Use a hydraulic oil that conforms to the conditions described in “6.1 Product Specifications”.
- Running the product while the tank is not filled with oil will cause seizure and/or wear of the pump, leading to breakage. Be sure to check the oil level.
- During the initial operation of the machine, oil is supplied to the hydraulic circuits at the machine side and the oil in the tank may decrease. Add oil to bring the height of the oil level to within the stipulated range.
- Depending on the volumetric capacity of the hydraulic circuits at the machine side, the fluctuations in oil level in the tank may become large, and oil may overflow from the tank or the oil level may drop. Adjust while watching the oil level gauge to achieve the optimum oil level.

CHAPTER 8 ELECTRIC WIRING

In order to run this product, the main power supply has to be connected. Also connect input/output signal cables as necessary.

- Connect the main power supply and input/output signal cables after removing the exterior cover. To remove this cover, unscrew the four M4 cross recessed screws. After completing the wiring work, mount the exterior cover before use.
  - ∗ The recommended tightening torque is 1.0 N·m.
- When wiring the main power supply and input/output signal cables, pass the cables through the specified cable ports.
- Fit a no-fuse breaker conforming to European standard EN60947-2 to the source power supply of the hydraulic unit in order to protect the electrical circuits against short circuits, overcurrents, etc., and to prevent electric shock.
- Use a power supply connection device that has a switch specification where the distance between contacts is at least 3 mm for all three poles when the switch is OFF.



⚠ DANGER

- The wiring work must be done by a qualified electrical engineer. Otherwise, there is a risk of electric shock or fire.
- Personnel doing wiring work must wear gloves and long sleeves and implement safety measures to avoid injuries such as grazes.
- Personnel doing wiring work must wear gloves and long sleeves and implement safety measures to prevent electric shocks and fire due to static electricity.
- Fit a safety device in the form of a no-fuse breaker conforming to European standard EN60947-2 to the source power supply of this product in order to protect the electrical circuits against short circuits, overcurrents, etc., and to prevent electric shock.

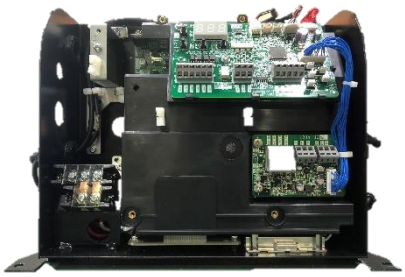
  For the capacity for each model, see “8.3 Installation of the Breaker”.Be sure to ground ground terminals in accordance with the law in the country concerned. Make a direct connection without going through a circuit breaker.

- Turn the breaker at the source power supply side OFF and wait at least 5 minutes before starting the wiring work. Otherwise, there is a risk of electric shock.
- Do not apply any excessive power supply voltage, beyond the power supply specifications of this product. This will damage the controller.
- Perform the wiring so as not to cause short circuit or ground faults between terminals and electric wires. Otherwise, there is a risk of electric shock and fire.
- When stripping electric wires, take care not to damage the conductors.
- For wiring, use multi-conductor cables and cable clamps, and do the work so as to satisfy protection class IP54 or better.

8.1 Procedure for Mounting Exterior Covers

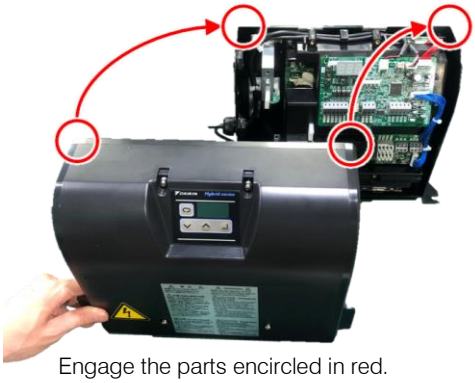
After connecting the main power supply and input/output signal cables, the exterior cover needs to be mounted. Mount it by following the procedure below.

Exterior cover



Controller box

1. **Engage the corners of the controller and corners of the cover together.**
2. **Close the cover.**



Engage the parts encircled in red.

3. **Holding the grips at the left and right of the cover, engage the cover with the bottom of the controller.**

Grips

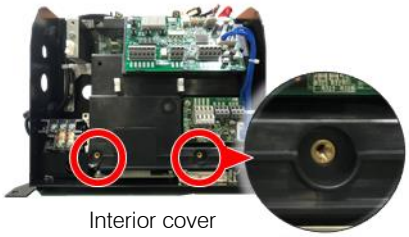
4. Press in the vicinity of the two screws at the bottom of the exterior cover to position it.

When pressing the vicinity of the screws, confirm that a clicking sound is heard as the projections on the exterior cover go into the mating parts on the interior cover.

Vicinity of screws

Exterior cover (back face)

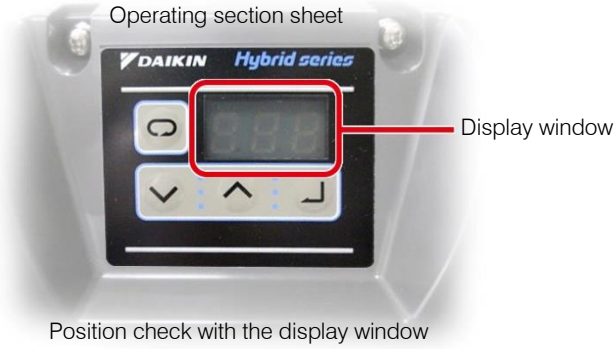
Projection



Interior cover

Mating part

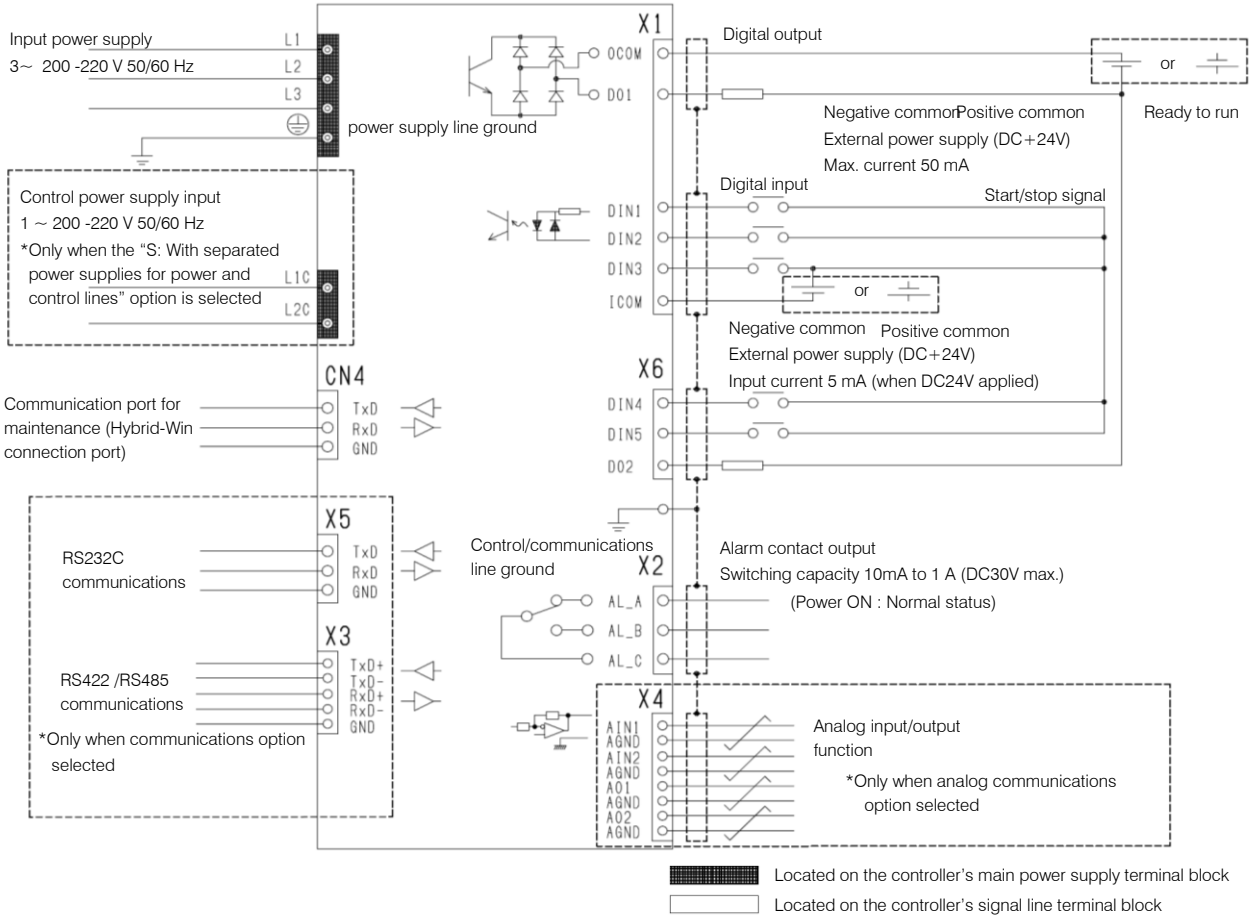
Check that the 7-segment display is located in the center of the display window in the operating section.



Position check with the display window

5. Tighten the two screws in the lower part of the cover, then tighten the two screws at the top.

8.2 Overall Wiring Diagram



8.3 Installation of the Breaker

In order to prevent power-supply-related accidents, be sure to use a no-fuse breaker conforming to EN60947-2 in the power supply connection line. The rated capacity of the breaker should be as indicated in the table below.

EHU15R07 : 10A

EHU15R10 : 10A

EHU30R07 : 15A

* There are no inrush currents with EcoRich R.

8.4 Connection of the Main Power Supply

1) Prepare the power supply cable, crimp terminals (ring-type crimp terminals with insulating cladding), and cable clamps.

Crimp the end of the cable using a dedicated tool.

<Recommended Items>

Models	Cable Specifications	Cable Size	Recommended Cable	Recommended Crimp Terminal	Recommended Cable Clamp
EHU15R07 EHU15R10 EHU30R07	CE	1.5 mm^2 or larger	CE362 1.5 mm^2 × 4 conductors (Kuramo Electric)	Ring-type (200 V specifications) RBC2-4 (J.S.T. Mfg.)	OA-W2213 (OHM ELECTRIC) Applicable cable outer diameter: ϕ9 to ϕ13
	VCT	2 mm^2 or larger	VCT362 2 mm^2 × 4 conductors (Kuramo Electric)		OA-W2216 (OHM ELECTRIC) Applicable cable outer diameter: ϕ13 to ϕ16

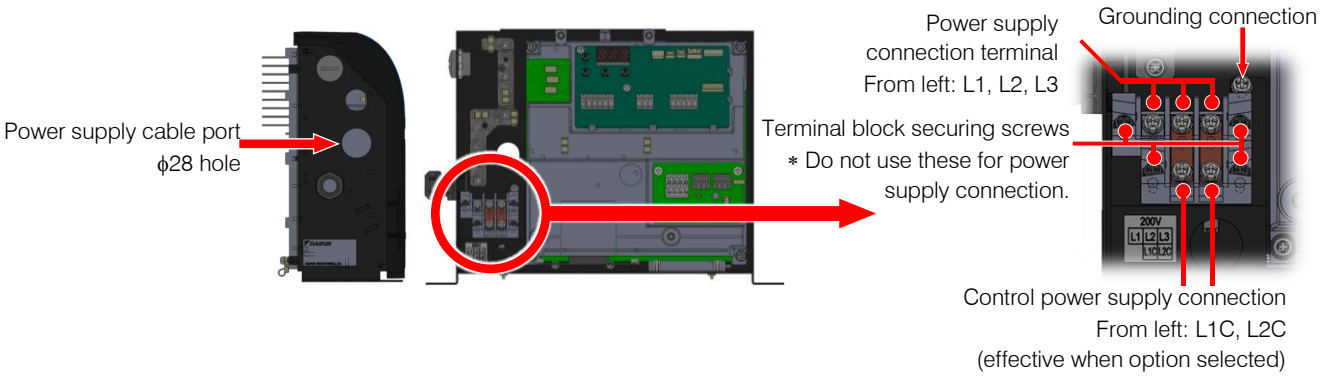
2) Use a ground cable the same size as the power cable or larger.

3) Connect the cables through the controller's cable port.

At the wiring port, use a cable clamp appropriate to ensure the port satisfies protection class IP54 or better.

4) Connect the power cable to the terminal block.

* The recommended tightening torque is 1.0 N·m. m.



The screw for connecting the 200 V specification power supply ground is different from those for the power supply cable connection terminals, so take care not to confuse them.

⚠ DANGER

- Use an AC power supply matching this product's power supply specifications.
- Use a cable appropriate for the power supply capacity.
- Connect the end of the cable by using a crimp terminal. Use a tool suited to crimp terminals. Faults may result in the cable coming loose during use, short-circuiting accidents, and burnout due to abnormal heat generation.
- Do not use anything other than the terminals provided with this product for connecting the power supply.
- Be sure to ground ground terminals in accordance with the law in the country concerned. Make a direct connection without going through a circuit breaker.
- Do not connect the power supply cable to the input/output signal terminals or ground terminal. This could cause an electric shock or equipment damage.

* This product incorporates an overcurrent protection function internally, so no thermal relay for overcurrent protection is necessary.

8.5 Connection of Input/Output Signal Cables

1. Prepare a cable and cable clamp.

<Recommended Items>

Cable Size	Recommended Cable	Recommended Cable Clamp
0.3 - 0.5 mm^2 (AWG22 - 20)	KVC-36SB 0.3 – 0.5 mm^2 (Kuramo Electric)	OA-W1611 (OHM ELECTRIC) Applicable cable outer diameter: ϕ9 – ϕ11

- If not using input/output signals, fit a blanking cap and ensure the protection class is satisfied.

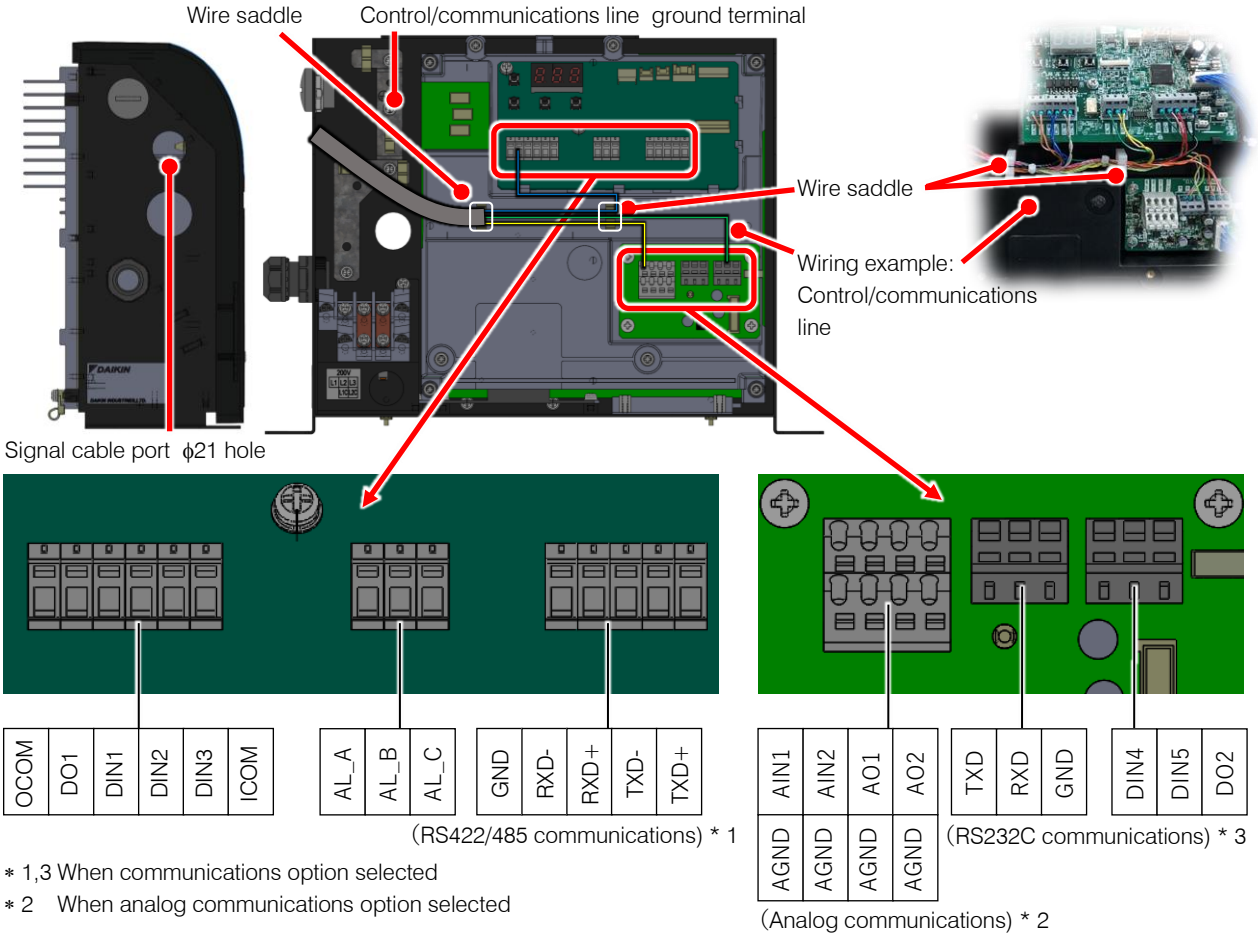
<Recommended Product> SANKEI MANUFACTURING CO. LTD. RPBG16

2. Connect the cables through the controller's cable port.

- At the cable port, use a cable clamp appropriate to ensure the port satisfies protection class IP54 or better.

3. Check the specifications of each signal before making the connections.

- Use a wire saddle as shown in the wiring example to prevent the wiring from falling apart.
- If measures against loose strands or corrosion at the end of the cable are required, use rod-type crimp terminals with insulating cladding.
  (Recommended crimp terminal: 216 – 322 (0.3 mm^2), 216 – 221 (0.5 mm^2), WAGO)
- You are recommended to ground at one side. When grounding inside the controller, crimp a ring-type crimp terminal with insulating cladding onto the end of the cable with a dedicated tool, and connect it with a control/signal cable grounding screw (M4).



* 1,3 When communications option selected
* 2 When analog communications option selected

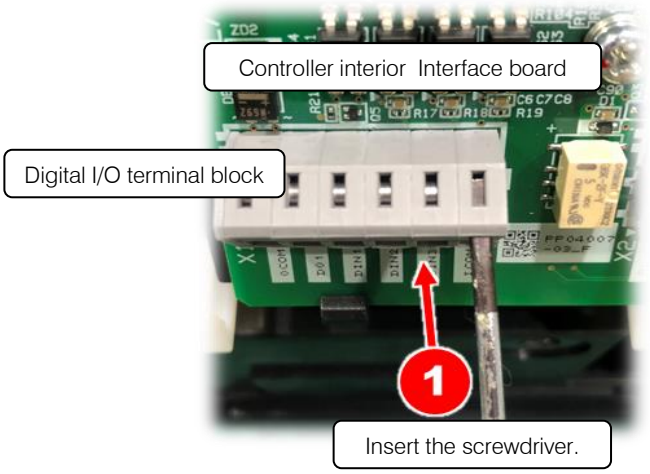
Terminal Code	Signal Name	Remarks
OCOM	Digital output common	See “8.5.2 Digital output”.
DO1	Digital output 1	
DO2	Digital output 2	
DIN1	Digital input 1	See “8.5.1 Digital input”.
DIN2	Digital input 2	
DIN3	Digital input 3	
DIN4	Digital input 4	
DIN5	Digital input 5	
ICOM	Digital input common	

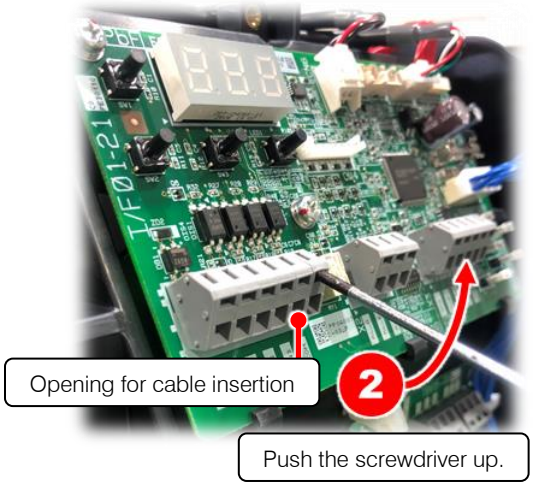
Terminal Code	Signal Name	Remarks
AL_A	Alarm output, NO contact	See “8.5.3 Contact output”.
AL_B	Alarm output, NC contact	
AL_C	Alarm output common	

<Method for Connecting to the Terminal Block>

1. Push on the spring with e.g. a screwdriver.

* Pushing the screwdriver up will open up the opening for insertion.





2. Check the stripped length of the wire, and insert it fully home without making any loose strands.

Cable stripping length : 6 mm

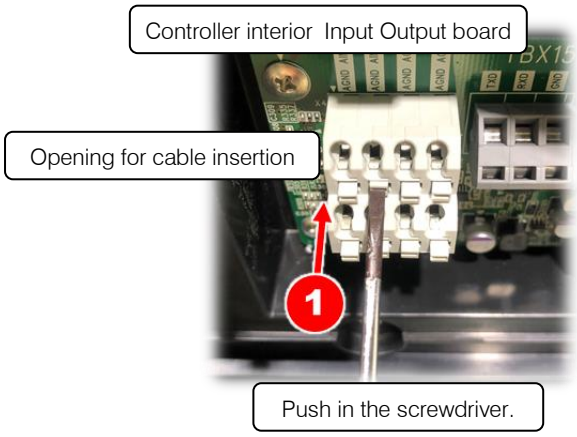
3. Remove the screwdriver or other tool from the lever.

4. Lightly pull the wire to check that it is securely connected.

<Method for Connecting to the Analog Communication Terminal Block>

1. Push on the spring with e.g. a screwdriver.

* Pushing in the screwdriver will open up the opening for insertion.



2. Check the stripped length of the wire, and insert it fully home without making any loose strands.

Cable stripping length : 6 mm

3. Remove the screwdriver or other tool from the lever.

4. Lightly pull the wire to check that it is securely connected.

⚠ CAUTION

- Check the specifications of each signal before making the connections.
- Be sure to terminate shielded cables, and connect them to the control/communications cable grounding terminal.
- If noise is not eliminated even when connected to the shielded cable grounding terminal, make a single-point grounding connection on your own equipment (disconnect the grounding at the unit).

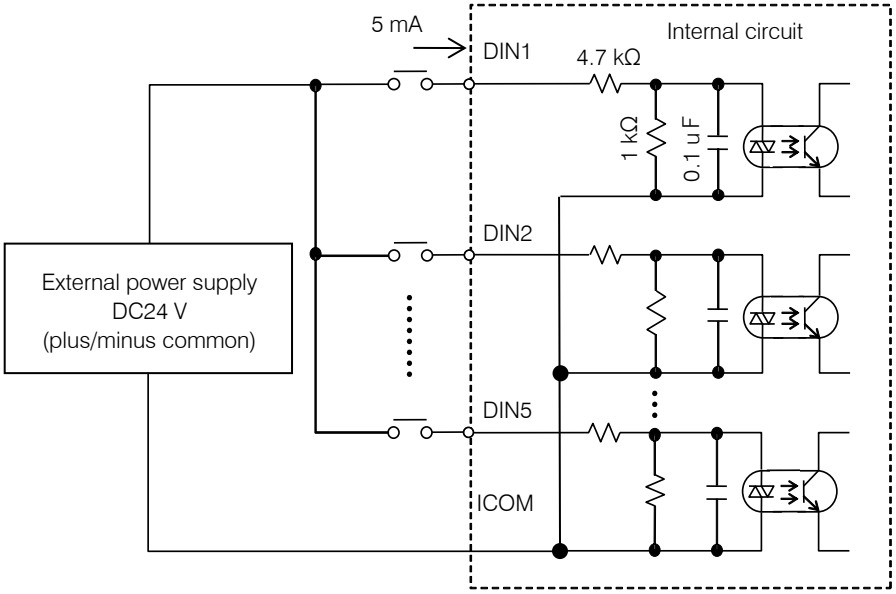
8.5.1 Digital input

These are sequence input signals that control the operations of this unit from an external device.
Connect them as necessary by following the information below.

Terminal Name	Signal Name	Remarks
ICOM	Digital input common	Can be either positive or negative
DIN1	Digital input 1	Start/stop signal (At shipment from factory: Start when OFF/stop when ON) With the start/stop signal switching parameter (Setting mode : [P00]), you can change the operation at signal input.
DIN2	Digital input 2	P - Q selection No. 0 to 15 can be selected depending on the combination of digital input status. Shown in the following table.
DIN3	Digital input 3	
DIN4	Digital input 4	
DIN5	Digital input 5	

When a stop command has been input via digital input 1, “STP” is displayed on the panel.

Set the time between unit stop and unit at 0.5 seconds or more.



P-Q selection No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Digital input 2	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Digital input 3	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Digital input 4	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Digital input 5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON

⚠ CAUTION

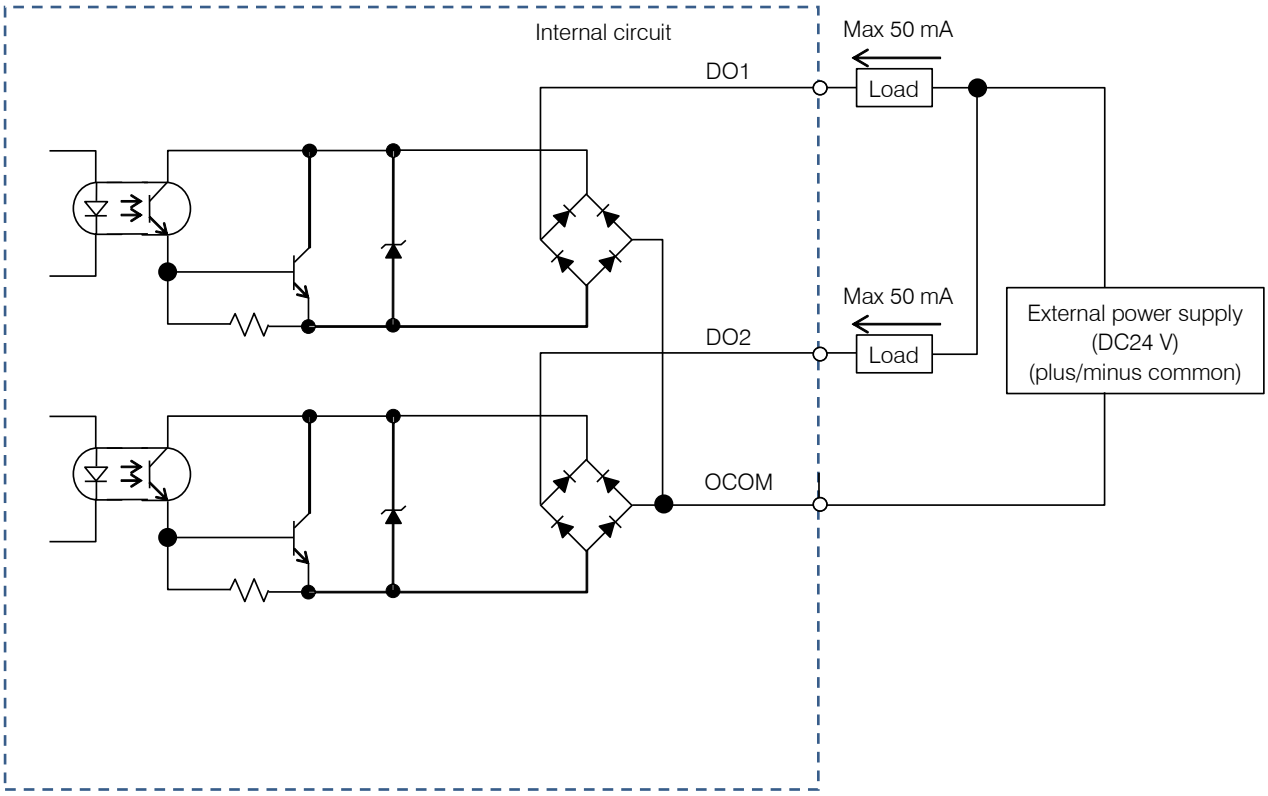
- Prepare an external power supply that is DC24 V ±10%/0.5 A minimum.
- It is not possible to supply power from this controller to external destinations.
- The current flowing to each input circuit is 5 mA (typ.). If a circuit is configured with contacts, etc., pay attention to the minimum current for those contacts, etc.

8.5.2 Digital output

These are the digital output signals that output this unit's warning status. Connect them in accordance with the instructions below as necessary.

Refer to the "11.5.3 Contact output and digital output selection" for changing the output contents.

Terminal Name	Signal Name	Output Content: factory default setting
DO1	Digital output 1	When switching the PQ number, it becomes ON if the pressure command, flow rate command has reached the goal.
DO2	Digital output 2	No output
OCOM	Digital output common	Can be either positive or negative



⚠ CAUTION

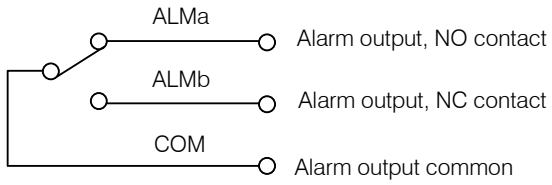
- Prepare a DC24 V ±10%/0.5 A power supply externally.
- It is not possible to supply power from this controller to external destinations.
- The maximum output current of the output circuit per circuit is 50 mA (resistance load). Note that driving a load exceeding the permissible current may damage the circuit.
- When driving inductive loads, implement surge protection measures.

8.5.3 Contact output

These are the contact output signals that output the alarm statuses of this unit. Connect them as necessary by following the information below.

Refer to the “11.5.3 Contact output and digital output selection” for changing the output contents.

Terminal Name	Signal Name	Output Content: factory default setting
AL_A	Alarm output, NO contact	Conducts with “Common” when the pressure switch is not activated and normal.
AL_B	Alarm output, NC contact	Conducts with “Common” when the pressure switch is activated or alarm occurs.
AL_C	Alarm output common	Can be either positive or negative



Power ON: Normal status

⚠ CAUTION

- The switching capacity of the contact outputs is DC30 V/0.5 A (at resistance load). Note that driving a load exceeding the permissible current may damage the contacts or other components.
- The minimum applicable load for the contact outputs is DC10 mV/10 μA (at resistance load), but this is only a guide to the lower limit where switching is possible with a minute load. The value varies depending on the switching frequency, environmental conditions, etc., so it is advisable to check the actual value.
- When driving inductive loads, implement surge protection measures.
- When an alarm signal is output, take action by referring to “12.3 Alarm Causes and Corrective Actions”.

CHAPTER 9 TRIAL RUNNING

⚠ CAUTION

- Ensure that the power can be shut off immediately in response to unforeseen events. Either incorporate an emergency stop switch or similar device, or configure a sequence circuit for the main machine for that purpose.
- Before running the unit, stop it temporarily and check for safety even in the event of unanticipated operation.

Check that all the preparations for running have been completed by referring to " CHAPTER 4 PROCEDURE FOR STARTING UP".

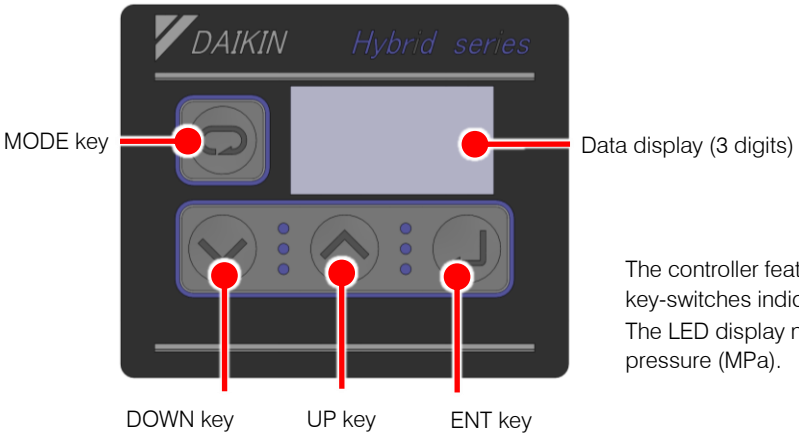
1. Powering on	Turn the switch on the control panel at the machine to "ON" to supply power to the hydraulic product. This unit starts in about 3 seconds after powering up. Check the following points: A. That the display on the controller's operation panel lights up B. That the DC fan for the oil cooler is running C. That the pressure indicated on the controller's operation panel display rises after the sound of the pump running
2. Flushing operation	When the starting check is completed, connect all the piping except for the actuators in a loop, then flush for about two hours by passing hydraulic oil through the return filter.
3. Changing the hydraulic oil	Turn the power off, drain all of the hydraulic oil in the tank out through the tank's oil drainage port, then pour in the stipulated volume of new hydraulic oil through the oil filler port cum air breather. Check the return filter's indicator, and if it is clogged, change the filter element.
4. Air bleeding	Thoroughly bleed air from inside the hydraulic circuit. If the air is not completely bled out, cylinders and other actuators may operate abnormally, and there may be abnormal noise from the pump, valves and so on.

⚠ CAUTION

- Wear protective glasses and gloves for this work.
  When bleeding the air, oil at high pressure and high temperature may gush out
- Wear ear plugs, ear muffs, or other protective equipment in accordance with local laws and regulations.

CHAPTER 10 PANEL OPERATIONS

10.1 Names and Main Functions of Each Part of the Operation Panel



The controller features the 3-digit data display and four key-switches indicated in the figure to the left.
The LED display normally shows the current actual pressure (MPa).

Name			Main Function
LED display			Displays monitor values for pressure, flow rate, etc., and the set values for each function. In the regular mode, it displays the current pressure.
MODE key			Used to select the regular mode or monitor mode.
Setting keys	DOWN key		Used to select monitor data, select parameter numbers and set parameter values. The UP key increments the value and the DOWN key decrements the value.
	UP key		
ENT key			Used to confirm selections for parameter numbers, parameter settings, etc.

10.2 Functions of the Operation Panel

10.2.1 Function overview

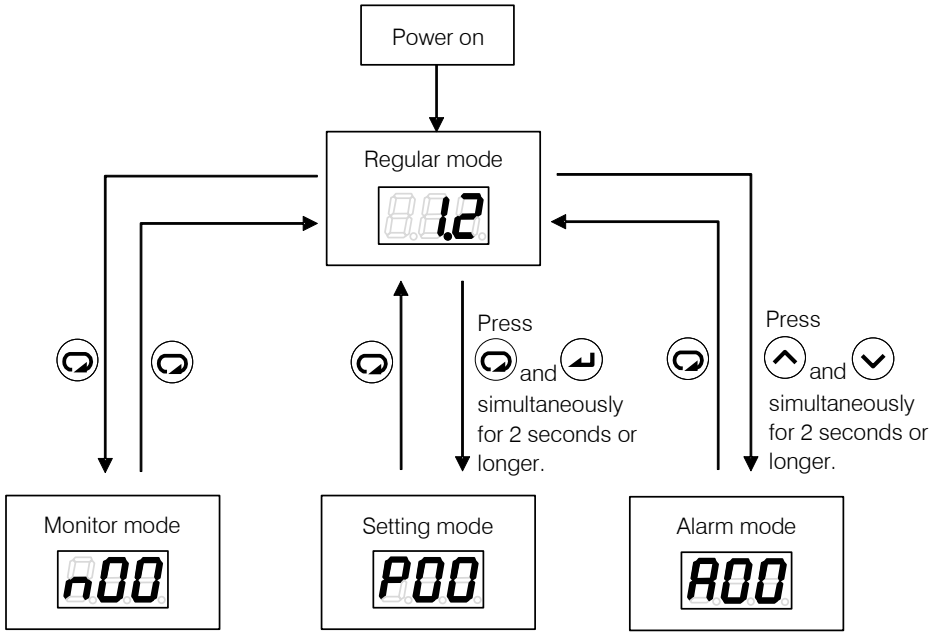
The operation panel has the following functions.

Mode	Details
Regular mode	Displays the current pressure. The unit at shipment is MPa.
Monitor mode	Enables checking of the pressure, command voltage and current value of the flow rate, etc.
Setting mode	Enables setting of the various parameters.
Alarm mode	Enables checking of the previous 10 alarms.

10.2.2 Switching among modes

Switch among the modes as shown in the figure below.

For details on the operations, refer to “10.4 Monitor Mode”, “10.5 Setting Mode” and “10.6 Alarm Mode Display”.



10.3 Regular Mode

In the regular mode, the display is as follows depending on the status at the time.

Status	Panel Indication	Details
Powering on	8.8.8.	At powering on, all the LEDs flash momentarily.
Normal	7.0	In the normal status, the current pressure is displayed.
Stopped	StP	Displayed when a stop command is in effect, and when the pressure is 0.15 MPa or lower.
AC failure	ACF	This is displayed flashing in the event of an AC failure (status where the power supply is shut off while charging the unit).
When alarms/warnings occur	E17	When an alarm/warning occurs, the corresponding alarm code or warning code is displayed.

10.4 Monitor Mode

10.4.1 List of display items in the monitor mode

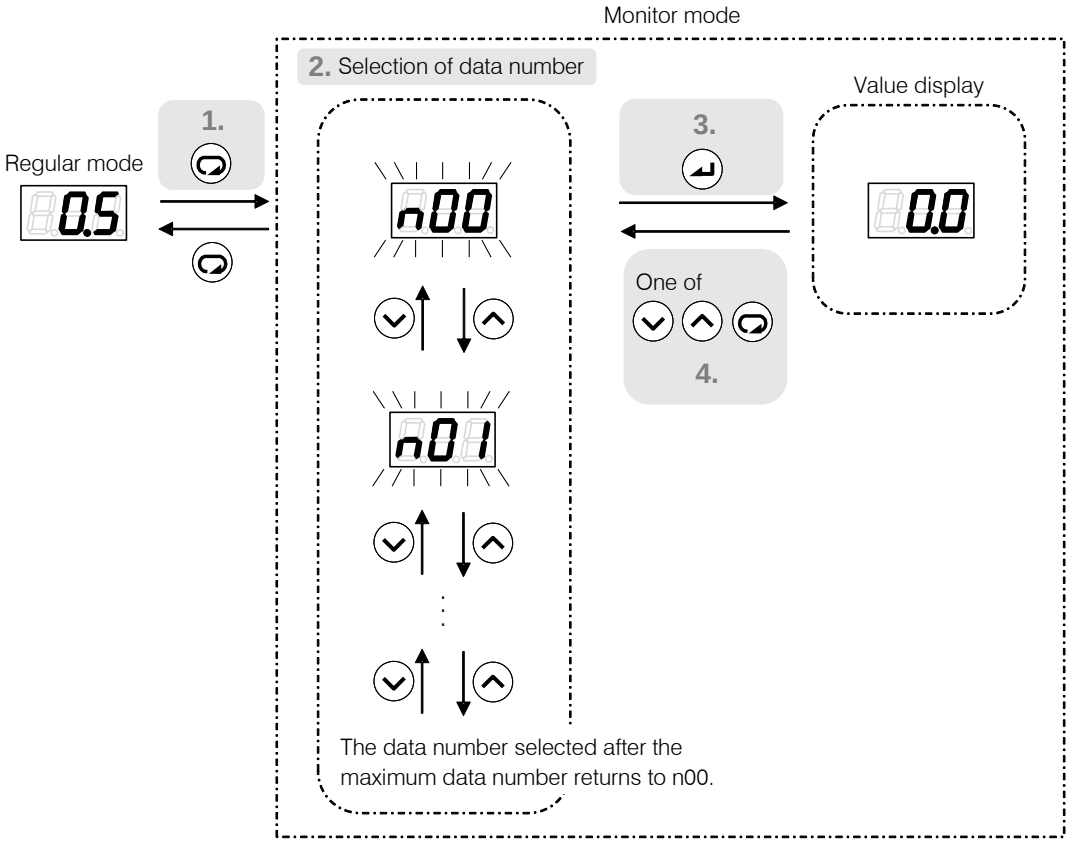
The monitor mode enables monitoring of the items listed in the table below by selection.

Monitor No.	Name	Unit	Details
n00	Pressure switch set value	MPa × 10 PSI	Displays the value set with the pressure switch.
n01	Pressure set value	MPa × 10 PSI	Displays the pressure setting value of the current P-Q selection number.
n02	Flow rate set value	L/min	Displays the flow rate setting value of the current P-Q selection number.
n03	Flow rate	L/min	Displays the current flow rate.
n04	Latest alarm code	–	Displays the alarm code for the alarm that occurred immediately previously. By pressing the (↵) key, the current power-on count can also be checked.
n05	Motor rotation speed	× 10 min^{-1}	Displays the current rotational speed of the motor.
n06	Running status display	–	Displays the P-Q selection number. "L" is a fixed sign. Example: L-0 PQ selection No. 0
n07	Reverse rpm at power-OFF	min^{-1}	Displays a motor reverse rpm due to counter-flow from the load when the unit power supply is turned OFF. This parameter is used to estimate the machine load volume.
n08	Regenerative load integration ratio	%	Displays the load integration ratio of the current regenerative braking resistance.
n09	(Reserved for the system)	–	Reserved for the system.
n10	Motor temperature	°C	Displays the motor temperature.
n11	Radiating fin temperature	°C	Displays the temperature of the radiating fins.
n12	Main circuit DC voltage	V	Displays the direct current voltage of the controller's main circuit. The voltage value is the supply power voltage multiplied by the square root of 2, and it varies depending on the running status.
n13	Analog input voltage 1	V	Displays the input voltage of the analog input terminal AIN1. Displayed only for models with the analog communications option (-P) in their model designation.
n14	Analog input voltage 2	V	Displays the input voltage of the analog input terminal AIN2. Displayed only for models with the analog communications option (-P) in their model designation.
n15	Analog output voltage 1	V	Displays the output voltage of the analog output terminal AO1. Displayed only for models with the analog communications option (-P) in their model designation.
n16	Analog output voltage 2	V	Displays the output voltage of the analog output terminal AO2. Displayed only for models with the analog communications option (-P) in their model designation.
n17 to n19	(Reserved for the system)	–	Displays "0".
n20	Power-on count (lower digits)	Times	Displays the number of times the unit has been powered on after shipment from the factory. (On exceeding a count of 9,999, the value is cleared to 0.)
n21	Power-on count (upper digits)	× 1000 times	

Monitor No.	Name	Unit	Details
n22	Total operation time (minutes)	min	Displays the total operation time after shipment from the factory (time the motor is energized).
n23	Total operation time (hours)	h	
n24	Total operation time (thousands of hours) (thousands of hours)	× 1,000 h	
n25	Power consumption	kW	Displays the current approximate power consumption.
n26	Interface PCB temperature	°C	Displays the current approximate temperature inside the controller.
n27	(Reserved for the system)	–	Displays “-99”.
n28 to n29	(Reserved for the system)	–	Displays “0”. Displayed only for models with the communications option (-C) in their model designation.
n30 to n44	Communication monitor		Displays the communication details. * Displayed only for models with the communications option (-C) in their model designation. For details on the communication function, see “PIM00562”.

When the power-up count displayed for “n04 : Latest alarm code” exceeds 999, it is cleared to 0.

10.4.2 Monitor mode operations

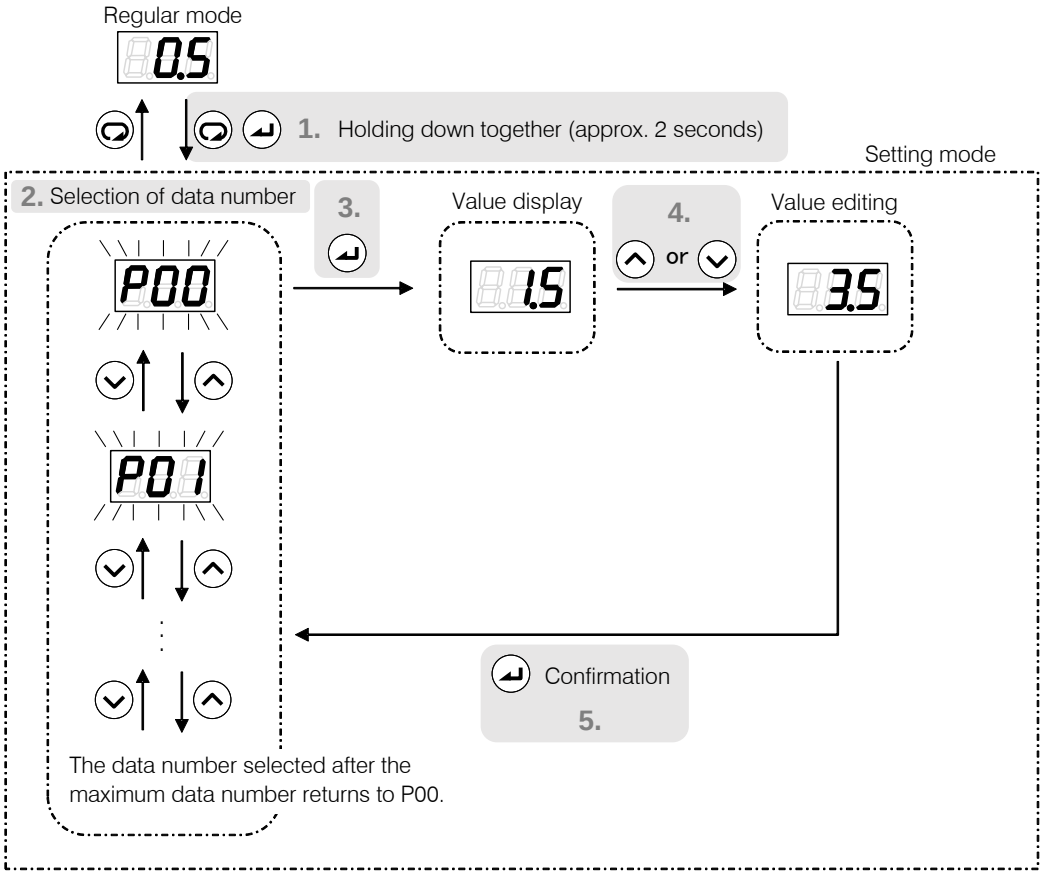


1. **Press the key in the regular mode. The mode will switch to the monitor mode.**
2. **Select the data number to be displayed by using the key or key.**
   During data number selection, the display will flash.
3. **Confirm the data number by pressing the key.**
   The value for the selected data number will be displayed.
4. **Press the , or key. This returns you to data number selection.**

10.5 Setting Mode

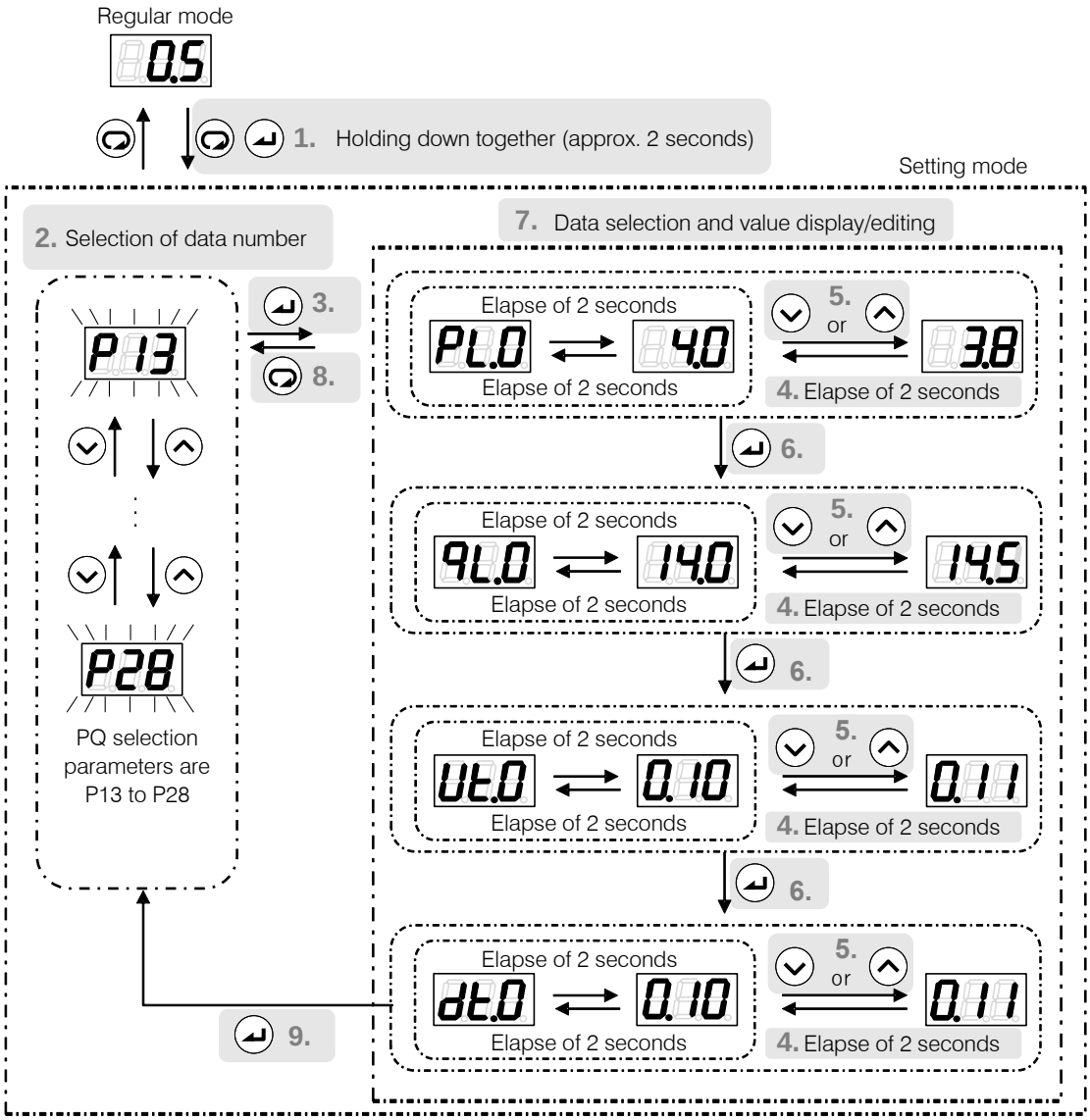
Parameter List for details of parameters relating to the setting mode, refer to “11.1 Parameter List”.

10.5.1 Setting mode operations



1. **Hold down the ⟲ and ↵ keys together in the regular mode. After about 2 seconds, the mode will switch to the setting mode.**
2. **Select the data number to be displayed by using the ∨ key or ∧ key. During data number selection, the display will flash.**
3. **Confirm the data number by pressing the ↵ key. The value for the selected data number will be displayed.**
4. **Change the set value by incrementing or decrementing it with the ∨ and ∧ keys.**
5. **Confirm the set value with the ↵ key. This returns you to data number selection.**

■ **PQ selection parameters**



1. **Hold down the ⟲ and ↵ keys together in the regular mode. After about 2 seconds, the mode will switch to the setting mode.**
2. **Select P13 to P28 (corresponding to PQ selection numbers 0 to 15) with the ∨ or ∧ key. During data number selection, the display will flash.**
3. **Confirm the data number by pressing the ↵ key. The value for the selected data number will be displayed.**
4. **The set values for pressure and flow rate in the PQ selection parameters will be displayed alternately at approximately 2-second intervals.**
5. **Change the set values by incrementing or decrementing them with the ∨ and ∧ keys. The data code will be displayed approximately 2 seconds after a set value has been changed.**
6. **Press the ↵ key. The set value will be confirmed and the next data code will be displayed.**
7. **Repeat steps 4, 5 and 6.**

8. **Press the key. The display switches to the data number selection screen. Parameters whose values have been changed up until that time will retain the changed values.**

9. **Setting the deceleration time setting "dt. *" will switch the display to the data number selection screen.**

■ **Relationship between data display and parameters**

Display Order	Display *	Parameter Name
1		Pressure setting
2		Flow rate setting
3		Acceleration time setting
4		Deceleration time setting

* The first digit displays the PQ selection number. It is displayed in hexadecimal (0 ~ F).

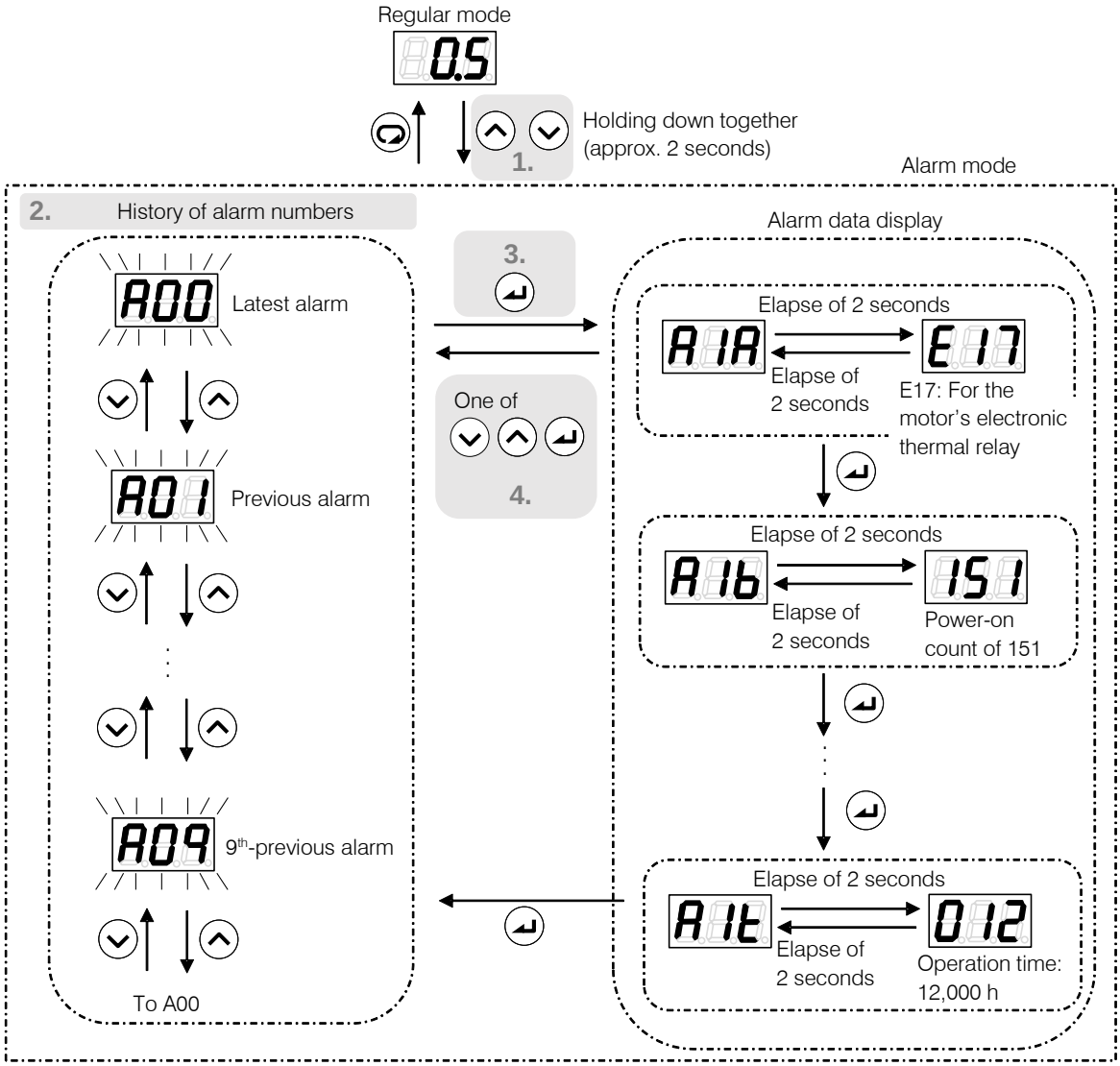
Product model	P13 to P28							
	Pressure : PL(MPa)		Flowrate : qL(L/min)		Acceleration time : Ut(s)		Deceleration time : dt(s)	
	Default value	Operation range	Default value	Operation range	Default value	Operation range	Default value	Operation range
EHU15R07**-40*	0.5	0.5~7.0	15.2	2.5~15.2	0.1	0.01~ 9.99	0.1	0.01~ 9.99
EHU15R10**-40*		0.5~10.0						
EHU30R07**-40*		0.5~7.0	28.5	3.5~28.5				

10.6 Alarm Mode Display

The alarm mode enables checking of up to 10 alarms in the history of alarms that have occurred in the past.

For details on the displayed alarm codes and their meanings, refer to “12.3 Alarm Causes and Corrective Actions”.

10.6.1 Alarm mode operations



1. **Hold down the ^ and v keys together in the regular mode.**
   After about 2 seconds, the mode will switch to the alarm mode.
2. **Select the alarm history number to be displayed by using the v key or ^ key. During alarm history number selection, the display will flash. A00 is the latest alarm, with older alarm displayed in sequence in this order: A01 → A02 →.**
3. **Confirm the alarm history number with the ↵ key. The corresponding alarm code and the following data upon occurrence of the alarm concerned will be displayed alternately.**

4. Press the ⌄, ⌃ or ↵ key. This returns you to the alarm history number.

No	Panel Indication	Item	Display Unit	Remarks
1	A ∗ A	Alarm details	–	Alarm details
2	A ∗ b	Power-on count	Number of times	Power-on count at occurrence of the alarm
3	A ∗ r	Motor speed at alarm occurrence	10 min^{-1}	Rotational speed of the motor at occurrence of the alarm
4	A ∗ E	Effective motor current value	Arms	Effective current value of the motor at occurrence of the alarm
5	A ∗ u	Main circuit DC voltage	V	DC voltage of the main circuit at occurrence of the alarm
6	A ∗ c	Radiating fin temperature	°C	Radiating fin temperature at occurrence of the alarm
7	A ∗ L	(Reserved for the system)	%	
8	A ∗ F	(Reserved for the system)	%	
9	A ∗ h	Operation time (minutes)	min	Operation time at occurrence of the alarm
10	A ∗ H	Operation time (hours)	h	
11	A ∗ t	Operation time (thousands of hours)	1000 h	

"∗" represents a numeric value from 0 to 9 indicating the alarm history.

- When the power-on count exceeds 999, it is cleared to 0.

- When the rotational speed at occurrence is a negative value, three dots light.

CHAPTER 11 PARAMETER ADJUSTMENT

11.1 Parameter List

The default value of the parameter P10, P13 to 28, and P31 is different, depending on the unit type.

Refer to page 63 “Table 1: Different default parameter values for different products” for the default value of the parameter P10 and P31.

Panel Indication	Code	Name	Operation Range	Default Value	Details
P00	DI_A	Start/stop signal switching	0: Runs at DIN0-ON 1: Runs at DIN0-OFF	1	DIN0: Sets the effective logic for the start/stop signal.
P01	SW_L	Pressure switch	0 - 35.0 [MPa]	0	Sets the actuation value of the pressure switch. If set to “0”, the pressure switch function is disabled. P08 : When AMIX = 2, it is in [%] units.
			0 to 507 [×10PSI]	0	
			0 to 350 [%]	0	
P02	T_SW	Pressure switch output delay time	0.00 to 9.99 [sec]	0.00	Sets the delay time from when the pressure falls below the set value for “P01: Pressure switch” to confirmation of the pressure drop.
P03	PSWH	Pressure switch indication retention setting	0 to 2	0	When the “L63: Pressure switch actuation” warning has occurred, the “L63” indication displayed on the operation panel can be retained. It is also possible to record the “L63: Pressure switch actuation” warning in the alarm history, although it is not usually recorded there.
P04	DS_P	Pressure unit selection setting*	0: MPa indication 1: PSI indication	0	Enables selection of the display unit for pressures displayed on the panel.
P05	K_RT	Load command rate at the time of regeneration	30 to 100 [%]	100	Set the deceleration torque during regenerative operation. If you decrease the value, the regeneration load rate will decrease, but the deceleration time will become longer.
P06	D_RT	Regenerative load ratio command at the time of deceleration	0 to 100 [%]	0	When you want to change the PQ selection, if the deceleration is more than 50% of the maximum flow, set the deceleration torque. If this value decreases, the regenerative load ratio will decrease, but the deceleration time will be longer. If the default setting is 0, this function will be disabled. At this time, it’s not necessary to change the setting.

Value	L63 Indication Retention	Recording in Alarm History
0	Not retained	No recorded
1	Retained	No recorded
2	Retained	Recorded

<table>
<tr><th>Panel Indication</th><th>Code</th><th>Name</th><th>Operation Range</th><th>Default Value</th><th>Details</th></tr>
<tr><td>P07</td><td>WN_M</td><td>Warning output level setting</td><td>0 to 2</td><td>0</td><td>Set the output signal at the time of warning occurrence. Refer to " P08: Alarm output mix " for more information.</td></tr>
<tr><td>P08</td><td>AMIX</td><td>Alarm output mix</td><td>0 : Individual output
1 : Integrated output
2 : Pressure switch function expansion</td><td>1</td><td>Select the output method and output terminal of the alarm signal, pressure switch signal and warning signal,
<table><tr><th>P08</th><th>P07</th><th>DO2</th><th>Contact output</th></tr><tr><td rowspan="3">0 or 2</td><td>0</td><td>ON : Normal
OFF : Alarm</td><td rowspan="3">Pressure switch</td></tr><tr><td>1</td><td>ON : Normal
OFF : Alarm
ON ⇔ OFF : Warning</td></tr><tr><td>2</td><td>ON : Normal
OFF : Alarm
or Warning</td></tr><tr><td rowspan="2">1</td><td>0</td><td rowspan="2">No output</td><td>Alarm or Pressure switch</td></tr><tr><td>1</td><td>Alarm or Pressure switch or warning</td></tr></table>The working pressure of the pressure switch, which is set in : “P01 : Pressure switch” can be selected as follows.
<table><tr><th>P08</th><th>Working pressure of “P01 : Pressure switch”</th><th>Unit</th></tr><tr><td>0 or 1</td><td>Fixed value</td><td>[MPa]</td></tr><tr><td>2</td><td>The ratio of the pressure setting of each PQ number</td><td>[%]</td></tr></table>*If you want to change the settings of “P01 : Pressure switch”, it will be enabled by turning on the power again.
Refer to “11.6 Function of the Pressure Switch” for more information.</td></tr>
<tr><td>P09</td><td>INIF</td><td>Initialize to defaults</td><td>0: Disable
1: Initialize P00 to P09
2: Initialize all parameters</td><td>0</td><td>Setting “1” or “2” then turning the power off and back on initializes parameters to their default values according to the setting made.</td></tr>
<tr><td>P10</td><td>L_TI</td><td>Response gain</td><td>5 to 999</td><td>*1</td><td>Decreasing the set value makes the response to pressure / flow rate increase / decrease faster, but the more surge pressure occurs. Enabled when “P59: NO_S PQ control method selection” is set to 0: Control A.</td></tr>
<tr><td>P11</td><td>M_VR</td><td>Acceleration response gain</td><td>0 to 500</td><td>200</td><td>Increasing the set value makes the response to pressure / flow rate increase / decrease faster, but the more surge pressure occurs.
“0” is an invalid value, which is equivalent to setting it to the maximum value.
Enabled when “P59: NO_S PQ control method selection” is set to 0: Control A.</td></tr>
</table>

Panel Indication	Code	Name	Operation Range		Default Value	Details
P12	W_TM	Solenoid valve response delay time	0.00 to 9.99 [sec]		0	After switching the PQ pattern, it will change the pressure command or the flow rate command after a delay determined by this parameter. It is used when you want to change the pressure flow rate while avoiding the unstable state of solenoid valve switching.
P13 to P28	PL.0 to PL.F	Pressure setting	7 MPa specifications	0.5 to 7.0 [MPa]	0.5	Sets the target pressure.
				7 to 101 [×10 PSI]	7	
			10 MPa specifications	0.5 to 10.0 [MPa]	0.5	
				7 to 145 [× 10 PSI]	7	
	qL.0 to qL.F	Flow rate setting	15 L specifications	2.5 to 15.2 [L/min]	15.2	Sets the target flow rate.
			30 L specifications	3.5 to 28.5 [L/min]	28.5	
	Ut.0 to Ut.F	Acceleration time setting	0.01 to 9.99	[sec/MPa]	0.1	Setting the change time, when the pressure command or flow rate command is increased at the time of switching the PQ pattern. ・ Pressure command: Increase 1MPa time. ・ Flow rate command: Increase 1000min^{-1} time.
				[sec/1000min^{-1}]	0.1	
	dt.0 to dt.F	Deceleration time setting	0.01 to 9.99	[sec/MPa]	0.1	Setting the change time, when the pressure command or flow rate command is decreased at the time of switching the PQ pattern. ・ Pressure command: Decrease 1MPa time. ・ Flow rate command: Decrease 1000min^{-1} time.
				[sec/1000min^{-1}]	0.1	
P29	-	Unused setting items	-		-	It does not affect the operation, but please do not change the setting.
P30	-	Unused setting items	-		-	It does not affect the operation, but please do not change the setting.
P31	P_SN	Pressure sensor rated value	1 to 35 [MPa]		*1	Sets the rated pressure of the pressure sensor. Normally, this setting does not need to be changed.
P32	S_TM	Surgeless start time	0.01 to 9.99 [sec]		0.50	Sets the start-up time for a start with the motor at a stop. Increasing the value makes the start-up smoother and can prevent start-up surge, but it lengthens the response time at start-up.
P33	L_IN	Motor start initial response gain	1 to 999		10	Sets the integration term(output magnitude) from motor stop to surgeless start. Decreasing the value makes the start-up smoother and can prevent start-up surge, but it lengthens the response time at start-up. Enabled when “P59: NO_S PQ control method selection” is set to 0: Control A.
P34	E_TM	Motor start-up abnormality judgement time	0.01 to 9.99 [sec]		2.00	Setting the judgement time of the alarm “E31 : Motor start-up abnormality”

Panel Indication	Code	Name	Operation Range	Default Value	Details
P35	DR_L	Dry operation judgment pressure	0.00 to 2.00 [MPa]	0.50	Sets the pressure condition for judging “E64: Dry operation error”.
			0 to 290 [PSI]	72	
P36	DR_T	Dry operation judgment time	0.01 to 9.99 [sec]	3.00	Sets the time for judging “E64: Dry operation error”.
P37	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P38	P_DF	Pressure switch output dead zone	0.00 to 1.00 [MPa]	0.50	Sets the threshold for detecting pressure recovery from actuation of the pressure switch. Set as a difference in the positive direction with respect to “P01: Pressure switch”.
			0 to 145 [PSI]	72	
P39	DO_S	Digital output selection	0 to 10	0	Sets the content of signals output from digital output DO1 and alarm output AL_A. 0 : PQ number switching completion output 1 : Motor running output 2 : Reserved for the system 3 : Reserved for the system 4 : Pressure and flow rate coincidence output 5 : Pressure coincidence output 6 : Flow rate coincidence output 7 : Fully charged 8 : Reserved for the system 9 : Fully charged and warning 10 : Warning output
P40	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P41	PCMW	Pressure coincidence detection range	0 to 99 [%]	5	Setting the pressure coincidence detection range. Enabled when “P39: DO_S Digital output selection” is set to 4 or 5.
P42	PCMM	The minimum value of pressure coincidence detection	0 to 99.9 [MPa]	0.1	Setting the minimum pressure of the pressure coincidence detection. Enabled when “P39: DO_S Digital output selection” is set to 4 or 5.
P43	QCMW	Flow rate coincidence detection range	0 to 99 [%]	5	Setting the flow rate coincidence detection range. Enabled when “P39: DO_S Digital output selection” is set to 4 or 6.
P44	QCMM	The minimum value of flow rate coincidence detection	0 to 99.9 [L/min]	0.2	Setting the minimum flow rate of the pressure coincidence detection. Enabled when “P39: DO_S Digital output selection” is set to 4 or 6.
P45	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P46	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P47	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P48	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.

Panel Indication	Code	Name	Operation Range	Default Value	Details
P49	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P50	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P51	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P52	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P53	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P54	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P55	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P56	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P57	-	Unused setting items	-	-	It does not affect the operation, but please do not change the setting.
P58	LVOL	Load volume setting	0 to 18	3	This is the control gain for adjusting the response of PQ control. The pressure response can be adjusted in accordance with the load capacity of e.g. a hose. It is enabled when “P59: NO_S PQ control method selection” is set to 1: Control B.
P59	NO_S	PQ control method selection	0: Control A 1: Control B	0	Switches the PQ control method. Control A: This is the specification for general use. Normally, select this option. Control B: This is the specification for case-by-case correspondence. Select this option when the pressure response needs to be adjusted in accordance with the hydraulic circuit. * The settings are brought into effect by turning the power off and then back on.

*1 : Check the value corresponding to the using product model.

Table 1 : Different default parameter values for different products

Panel Indication	Name	Product model		
		EHU15R07**-40*	EHU15R10**-40*	EHU30R07**-40*
P10	Response gain	20	25	15
P31	Pressure sensor rated value	10	35	10

* Models with a non-standard control number in the code may differ for parameter other than P10 and P31.

⚠ CAUTION

The “P04: Pressure unit selection setting” is set to indication in MPa units as the factory default. If it has been changed to indication in PSI units, implement some measure to make it apparent that it is in PSI units, such as affixing an indication sticker. Prepare this sticker yourself. Note, however, that using the unit in PSI units in Japan is an infringement of the Measurement Act.

11.2 Function of Setting the Pressure and Flow Rate

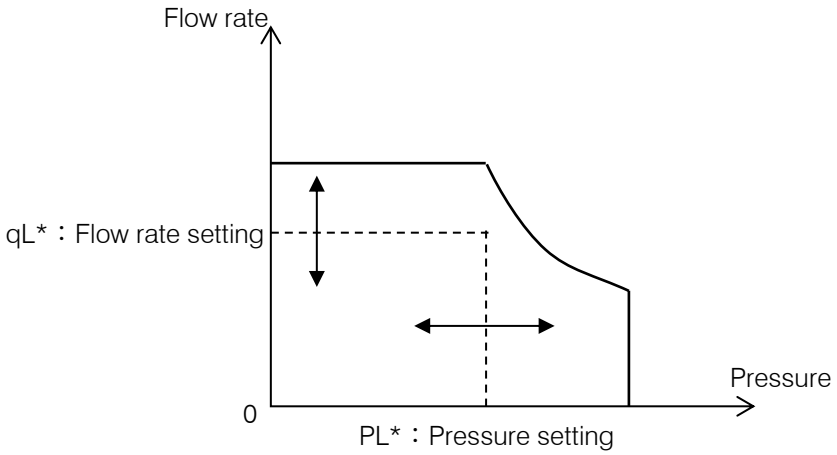
11.2.1 PQ selection parameter

This unit can set parameters for each PQ selection number, such as maximum pressure, maximum flow rate, and acceleration and deceleration time of pressure / flow rate at the time of switching PQ number.

Panel Indication	Code *	Name	Unit
"P13 : PQ selection 0" to "P28 : PQ selection 15"	PL*	Pressure setting	MPa
	qL*	Flow rate setting	L/min
	Ut*	Acceleration time setting	sec/MPa
	dt*	Deceleration time setting	sec/1000min^{-1}

* : The PQ selection number (hexadecimal) is displayed in the *.

Pressure and flow rate characteristic curve can be set by the parameter as shown in the figure below.



Pressure / flow rate characteristic curve

⚠ CAUTION

This pressure unit is equipped with a safety valve and it is set to use maximum pressure + 0.5 MPa. Adjust the setting pressure of the safety valve according to your use. Refer to the "12.11 Safety Valve Adjustment Instructions".

11.2.2 PQ selection

The PQ number can be selected by switching the digital input signal. The pressure command, the flow rate command which is set by the parameter in advance can be switched.

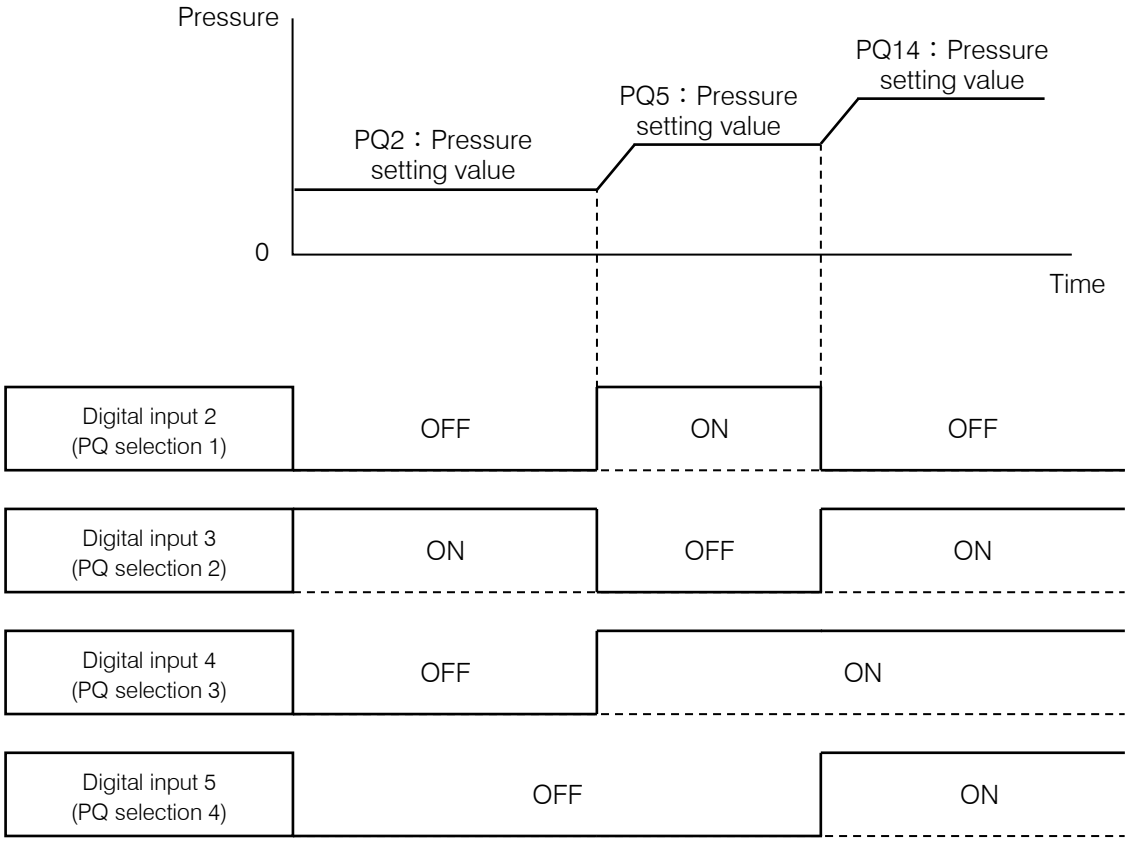
In addition, the acceleration / deceleration time of pressure and flow rate when switching the PQ number can be changed. Refer to the "■Pressure and flow rate change time when the PQ selection switches".

By combining DIN2 to DIN5, the pressure and flow rate command value can be selected, as shown in the following table.

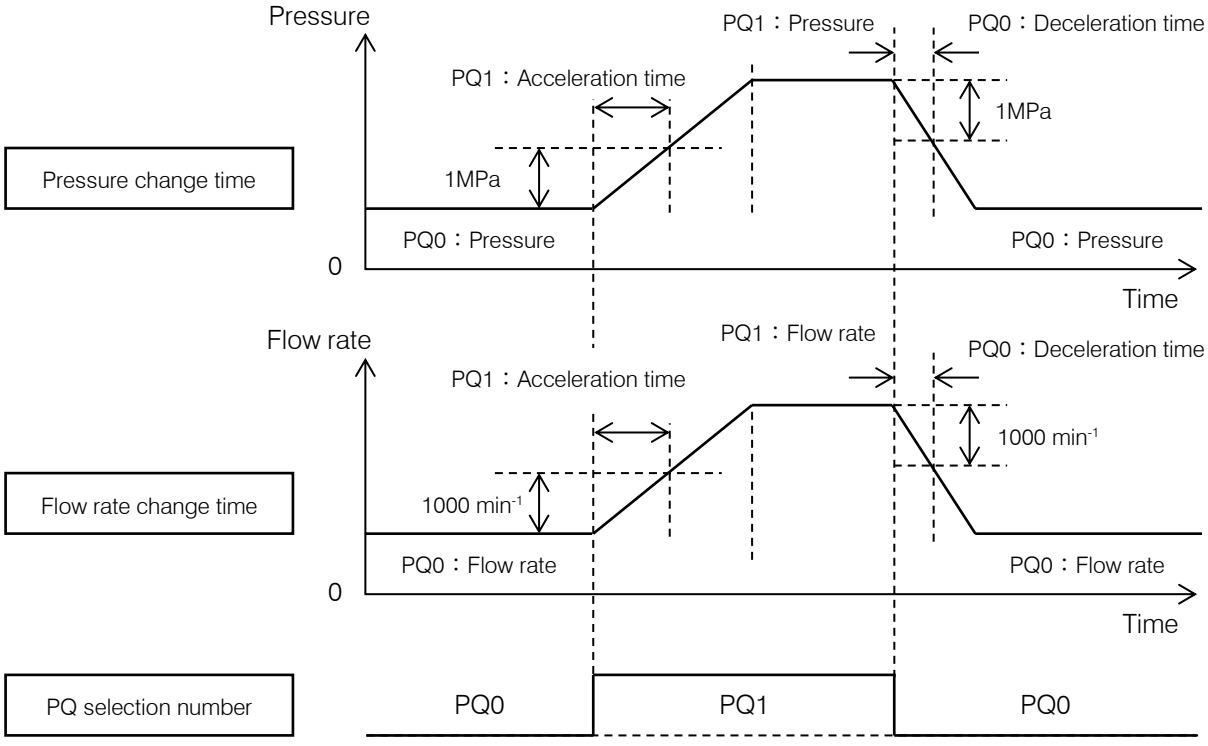
■Select the PQ selection number by digital input signal

PQ selection number	The parameters of the selected pressure and flow rate	Details			
		DIN2	DIN3	DIN4	DIN5
		Bit0	Bit1	Bit2	Bit3
0	P13	OFF	OFF	OFF	OFF
1	P14	ON	OFF	OFF	OFF
2	P15	OFF	ON	OFF	OFF
3	P16	ON	ON	OFF	OFF
4	P17	OFF	OFF	ON	OFF
5	P18	ON	OFF	ON	OFF
6	P19	OFF	ON	ON	OFF
7	P20	ON	ON	ON	OFF
8	P21	OFF	OFF	OFF	ON
9	P22	ON	OFF	OFF	ON
10	P23	OFF	ON	OFF	ON
11	P24	ON	ON	OFF	ON
12	P25	OFF	OFF	ON	ON
13	P26	ON	OFF	ON	ON
14	P27	OFF	ON	ON	ON
15	P28	ON	ON	ON	ON

■Example of the PQ selection switching

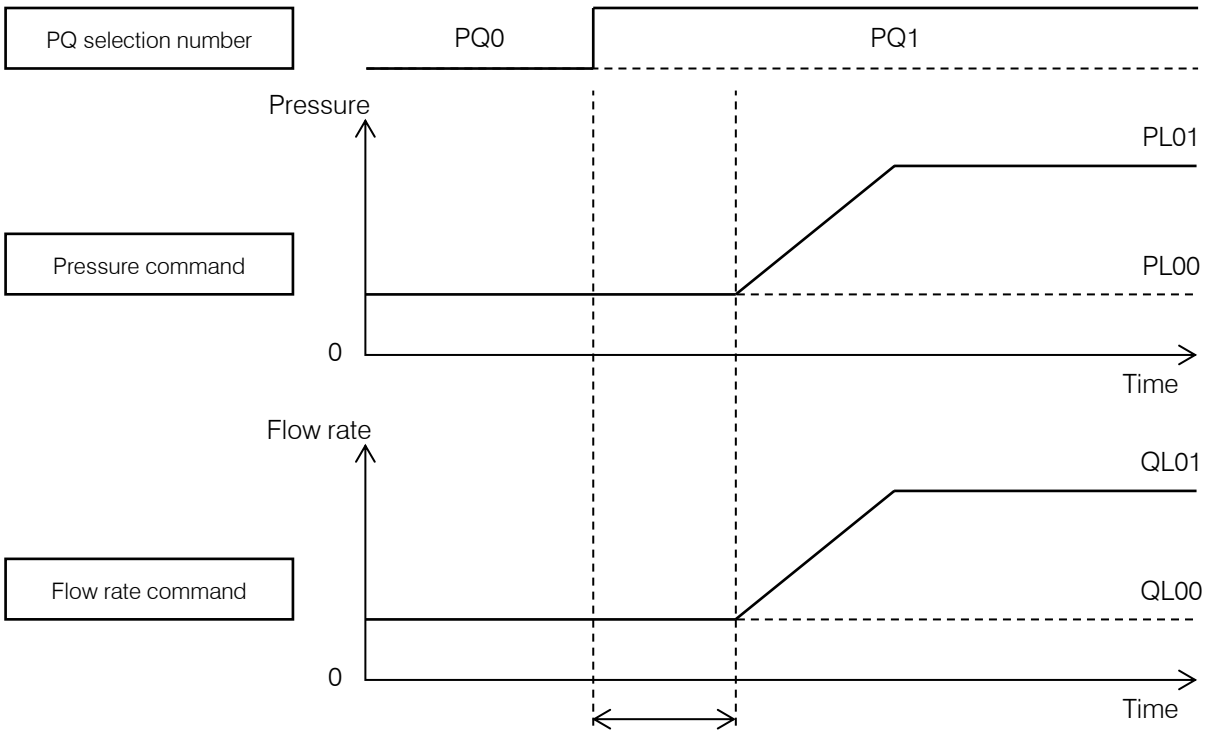


■Pressure and flow rate change time when the PQ selection switches



11.3 Solenoid valve response delay time at the time of switching PQ selection

After switching the PQ pattern, it will change the pressure command or the flow rate command after a delay determined by this parameter.
Adjust it, if you want to change pressure or flow rate, and avoid the instability in switching solenoid valve.

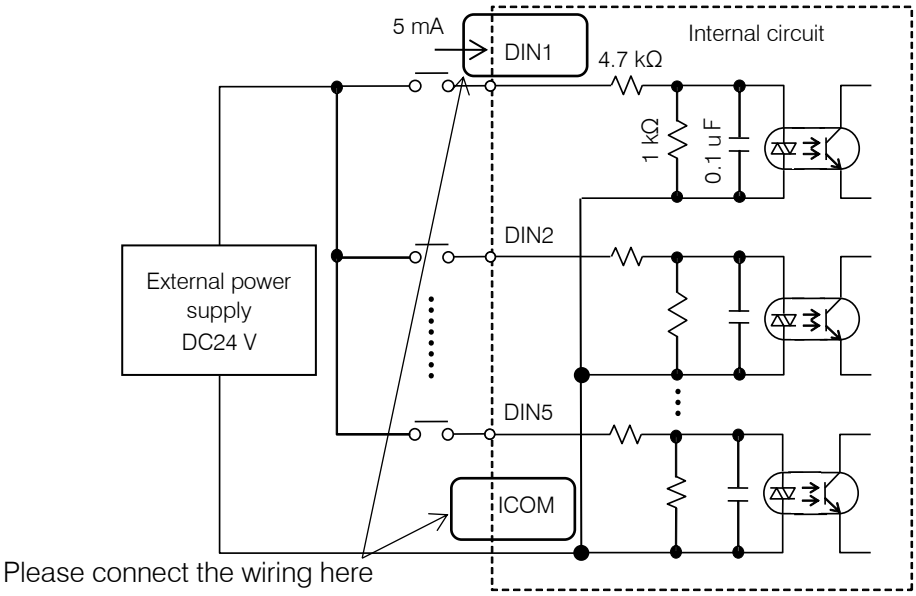


[P12：Solenoid valve response delay time]

Panel Indication	Code	Name	Operation Range	Default Value	Unit
P12	W_TM	Solenoid valve response delay time	0.00 to 9.99	0	sec

11.4 Function of Run / Stop of the Motor Pump

Turning the power ON/OFF frequently significantly shortens the life of the controller. By using this function, it will encourage longer life of the controller than power shutdown. A pump can be started / stopped by inputting a signal from the outside to the digital input terminal DIN1. Refer to the following internal circuit and connect the wiring.



Panel Indication	Name	Operation Range			Default Value	Unit
		Set Value	State of DIN1 terminal			
			OFF	ON		
P00	Start/stop signal switching	0	STOPS	RUNS	1	—
		1	RUNS	STOPS		

⚠ CAUTION

- Prepare a DC24 V ±10%/0.5 A power supply externally.
- It is not possible to supply power from this controller to external destinations.
- The current flowing to each input circuit is 5mA(typ.). If a circuit is configured with contacts, etc., pay attention to the minimum current for those contacts, etc.
- Please wait at least 0.5 seconds before starting restart from stop command.
- Frequently turning ON / OFF the power supply may damage the controller. Please turn ON / OFF the pump by this function except in an emergency.

11.5 Function of the Output of the Alarm Status and Warning Status

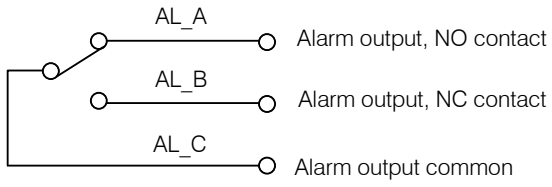
This unit can output alarms and warnings (abnormality prediction before abnormal stop due to an alarm) from the contact output and digital output.

■The parameters of the output signal

Panel Indication	Code	Name	Operation Range	Default Value	Unit
P07	WN_M	Warning output level	0 to 2	0	-
P08	AMIX	Alarm output mix	0 to 2	1	-
P39	DO_S	Digital output selection	0 to 10	0	-

11.5.1 Contact output

These are the contact output signals that output the alarm statuses of this unit. Connect them as necessary by following the information below. Refer to the “11.5.3 Contact output and digital output selection” for changing the output contents.



Power ON: Normal status

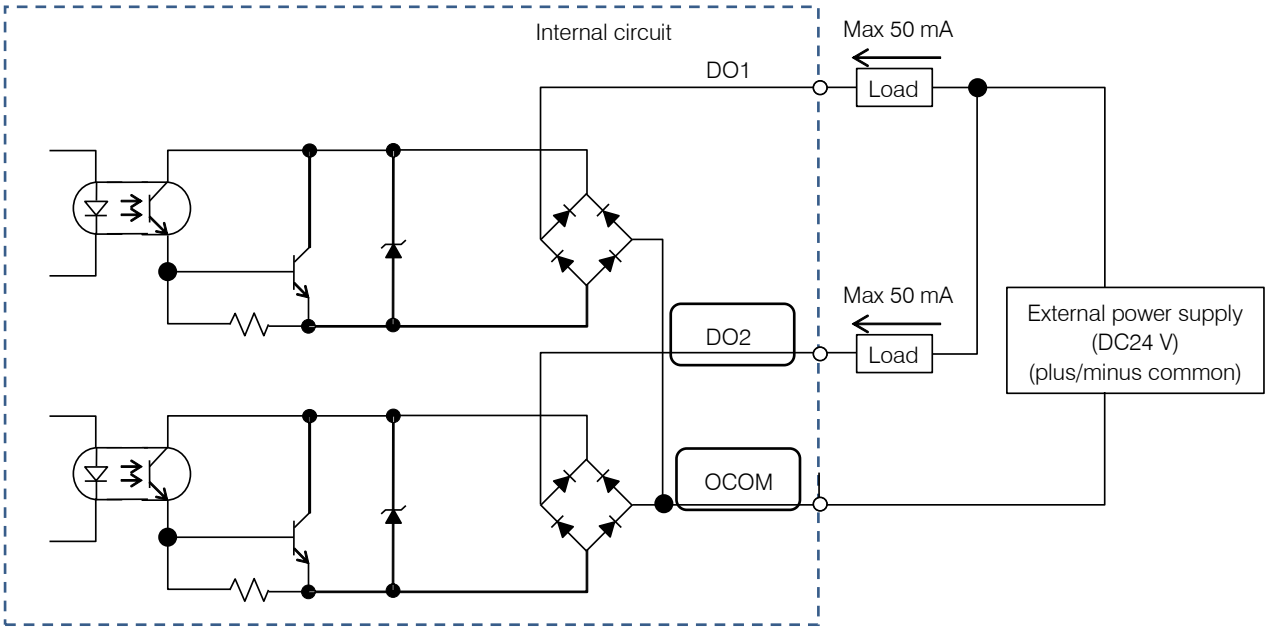
Terminal Name	Signal Name	Output Content: factory default setting
AL_A	Alarm output, NO contact	• Conduction between AL_A and AL_C when power supply turns ON and normal state. • Conduction between AL_B and AL_C when an alarm (E**) or a pressure switch is activated (L63).
AL_B	Alarm output, NC contact	
AL_C	Alarm output common	Can be either positive or negative

The NC contact is the inversion operation of the NO contact.

11.5.2 Digital output

Outputs the status of this unit as a digital signal. At the time of output(when turned ON), each digital output terminal (DO1,DO2) and common (OCOM) conduct.

Connect them in accordance with the instructions below as necessary.



Terminal Name	Signal Name	Output Content: factory default setting
DO1	Digital output 1	When switching the PQ number, it becomes ON if the pressure command, flow rate command has reached the goal.
DO2	Digital output 2	Outputs alarm status and warning status.
OCOM	Digital output common	Can be either positive or negative

11.5.3 Contact output and digital output selection

By changing the setting values of the parameters “P08: Alarm output mix” and “P07: Warning output level setting”, the output contents of digital output DO2 and contact output can be selected. In addition, the output content of digital output DO1 can be selected by changing the setting value of the parameter “P39: Digital output selection”. To output DO1, connect the wiring to DO1 in the “11.5.2 Digital output” circuit diagram.

■Digital output DO2 and contact output

Parameter		Output Signal	
P08 : Alarm output mix	**P07 : Warning output level setting**	**Digital output DO2**	**Contact output**
0 or 2	0	Alarm ON : Normal OFF : Alarm	Pressure switch
	1	Alarm or Warning ON : Normal OFF : Alarm ON ⇔ OFF : Warning*	
	2	Alarm or Warning ON : Normal OFF : Alarm or Warning	
1	0	No output	Alarm or Pressure switch
	1 or 2		Alarm or Pressure switch or Warning

*It changes every 0.5 seconds.

■Digital output DO1

P39 : Digital output selection	Function	Details
0	PQ number switching completion output	When switch the PQ selection number, if the pressure command, flow rate command reach the goal, it will become ON.
1	Motor running output	It will become ON when the motor power is on.
2	Reserved for the system	Reserved for the system
3	Reserved for the system	Reserved for the system
4	Pressure and flow rate coincidence output	It will become ON, when the flow rate or pressure match.
5	Pressure coincidence output	It will become ON, when the pressure matches.
6	Flow rate coincidence output	It will become ON, when the flow rate matches.
7	Fully charged	It will become ON, if the main circuit is charged fully.
8	Reserved for the system	Reserved for the system
9	Fully charged and warning	It will become ON, if the main circuit is charged fully and become OFF, when warning occurs.
10	Warning output	It will become ON, when warning occurs.

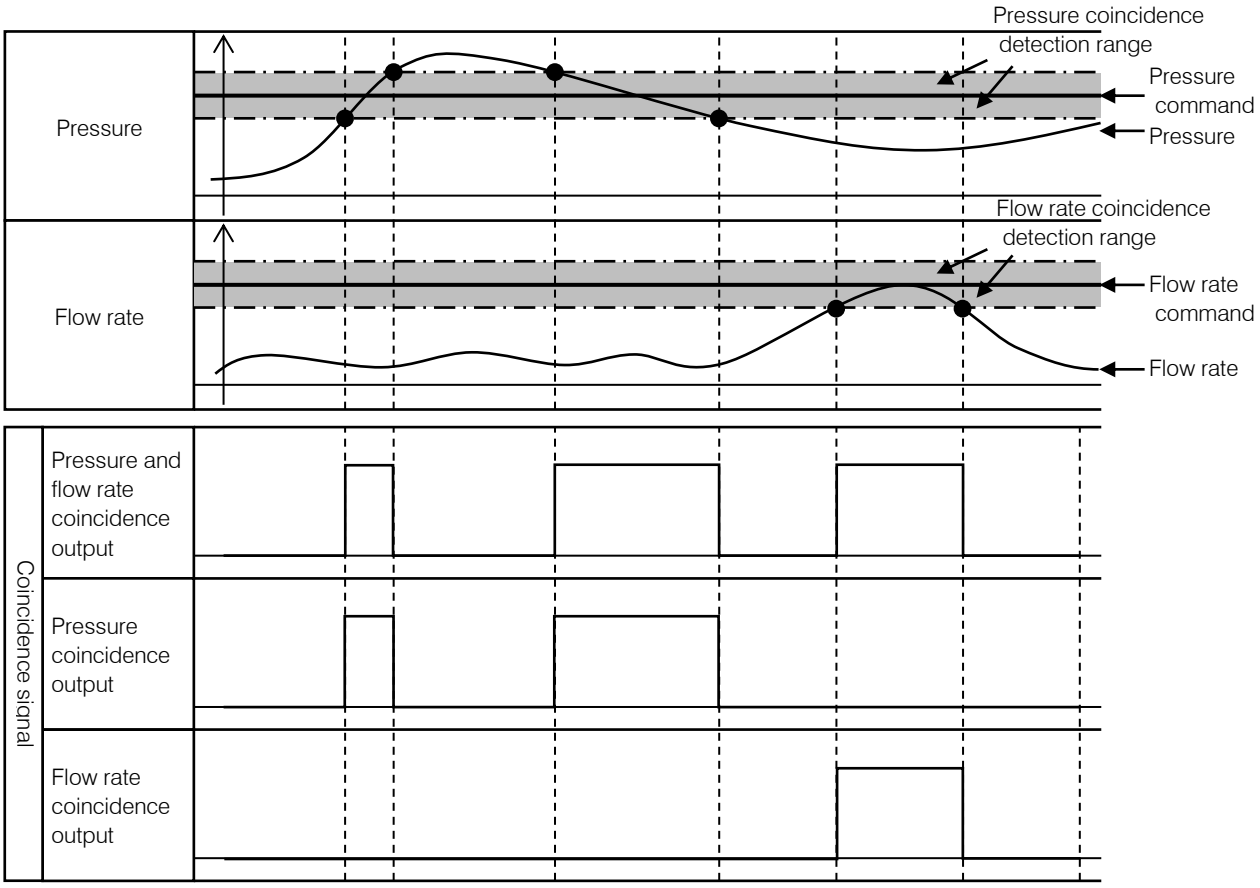
■Pressure coincidence / Flow rate coincidence detection

When the digital output selection is 4, 5 or 6, the current pressure and flow rate can be detected, if the pressure or flow rate command value is within a certain range.

The wider range of match detection range is selected by setting a percentage of the command value or anumerical value.

Panel Indication	Code	Name	Operation Range	Default Value	Unit
P41	PCMW	Pressure coincidence detection range	0 to 99	5	%
P42	PCMM	The minimum value of pressure coincidence detection	0 to 99.9	0.1	MPa
P43	QCMW	Flow rate coincidence detection range	0 to 99	5	%
P44	QCMM	The minimum value of flow rate coincidence detection	0 to 99.9	0.2	L/min

The output timing chart of the coincidence signal is shown in the figure below.



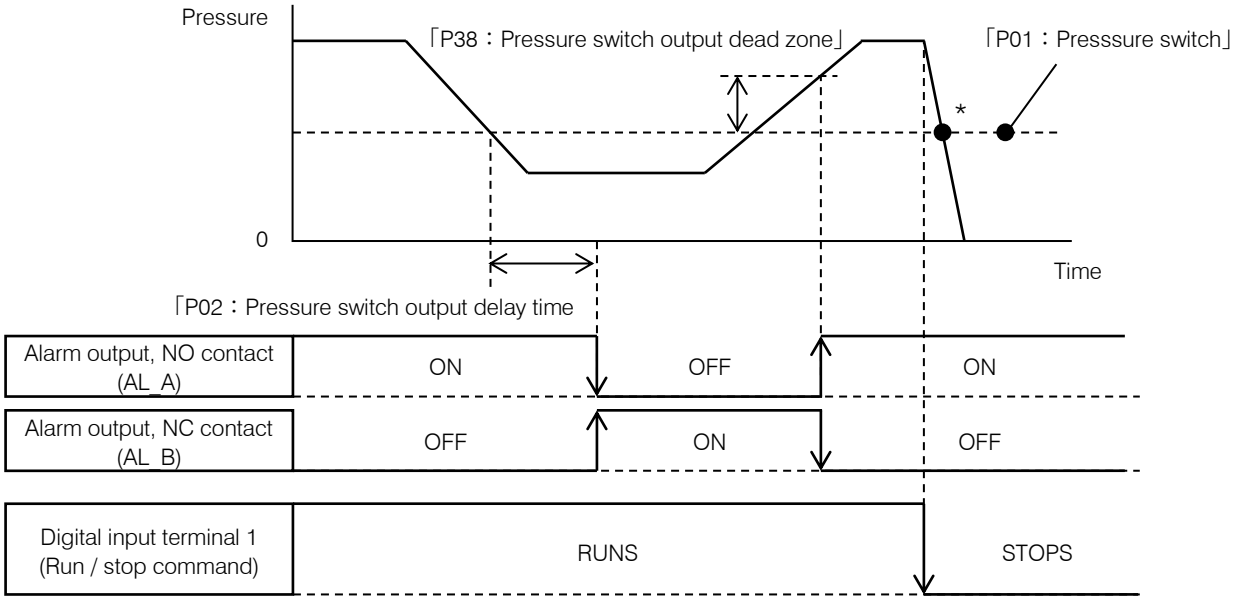
11.6 Function of the Pressure Switch

This unit monitors pressure and can detect pressure drop. When it falls below the set detection value, a signal is output from the alarm contact. Also, "L 63: Pressure switch operation warning" is displayed on the panel.
This function is not an alarm, but the operation of the pump is continued. Pressure switch setting can be set with the following parameters.

■The parameters for the detection.

Panel Indication	Name	Operation Range	Default Value	Unit	Description
P01	Pressure switch	0 to 35.0	0.0	MPa	Sets the actuation value of the pressure switch. （sets t “0”: disable） The setting unit for this parameter is set in the “P08:Alarm output mix”
		0 to 507	0.0	×10PSI	
P02	Pressure switch output delay time	0.00 to 9.99	0.00	sec	Sets the delay time from when the pressure falls below the set value for “P01: Pressure switch” to confirmation of the pressure drop.
P38	Pressure switch output dead zone	0.00 to 1.00	0.50	MPa	Sets the threshold for detecting pressure recovery from actuation of the pressure switch. Set as a difference in the positive direction with respect to “P01: Pressure switch”.
		0 to 145	72	PSI	

■The examples of the funtion.



* : Even if the pressure drops below the “Pressure switch” when the unit is stopped, it does not become an error(conduction between AL_B and AL_C)

■The parameters for the panel display.

By holding the panel display, people can recognize the detection. It is also possible to record in the alarm history.

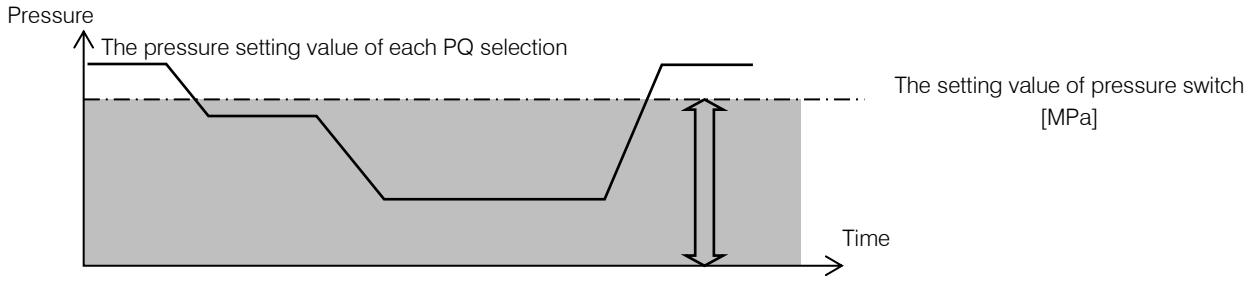
<table>
<tr><th>Panel Indication</th><th>Name</th><th>Operation Range</th><th>Default Value</th><th>Unit</th><th>Description</th></tr>
<tr><td>P03</td><td>Pressure switch indication retention setting</td><td><table><tr><th>Value</th><th>L63 Indication Retention</th><th>Recording in Alarm History</th></tr><tr><td>0</td><td>Not retained</td><td>No recorded</td></tr><tr><td>1</td><td>Retained</td><td>No recorded</td></tr><tr><td>2</td><td>Retained</td><td>Recorded</td></tr></table></td><td>0</td><td>-</td><td>Select the display of “L63:Pressure switch actuation” on the operation panel when the function is activated.

Select to record the “L63: Pressure switch actuation” warning in the alarm history.

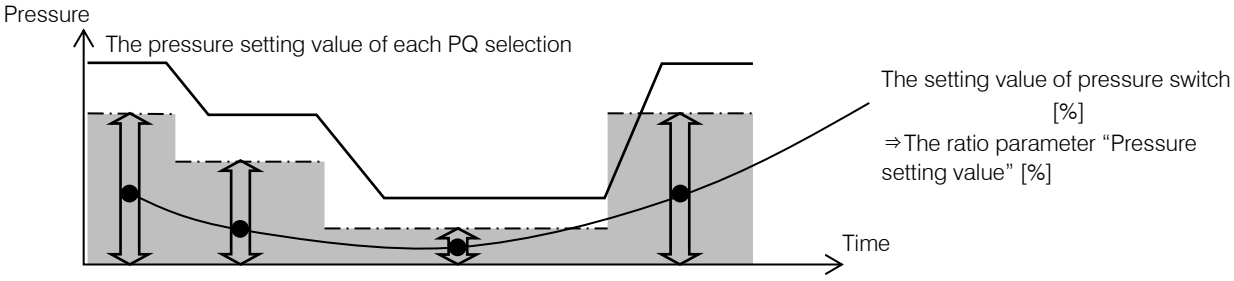
Press the ⏎ key to cancel the display.</td></tr>
<tr><td>P08</td><td>Alarm output mix</td><td>The setting unit of “P01:Pressure switch” can be selected, as shown in the following table.<table><tr><th>P08</th><th>Working pressure of “P01:Pressure switch”</th><th>Unit</th></tr><tr><td>0 or 1</td><td>Fixed value</td><td>MPa</td></tr><tr><td>2</td><td>The ratio of the pressure setting of each PQ number</td><td>%</td></tr></table></td><td>1</td><td>-</td><td>The setting unit of “P01:Pressure switch” can be selected.
*Changes to the pressure switch setting for this parameter will take effect when the power is turned on again.</td></tr>
</table>

■Changing the pressure switch unit by “P08 : Alarm output mix”.

- Pressure unit : the setting value of “P08 : Alarm output mix” is “0” or ”1”.



- Pressure unit : the setting value of “P08 : Alarm output mix” is “2”.



11.7 Pressure Retention Stability and Pressure Responsiveness Adjustment Function

If the parameter “P59: PQ control method selection” is set to “1” and “P58: Load volume setting” is changed, the Eco Rich R vibration during holding pressure will be improved or the pressure response will be faster.

11.7.1 Preparation

1. **Connect the hydraulic unit to the hydraulic circuit of the machine tool and close the discharge port.**
   - Close the circuit to minimize hydraulic circuit volume and leakage.
   - The pressure reducing valve near the discharge port of the hydraulic unit should be set to the minimum pressure.
2. **Set the parameter “P59: PQ control method selection” to 1(control B)**
3. **Set the parameter “P58: Load Volume Setting” to factory default value 3**
4. **Turn off the power supply of the hydraulic unit once, confirm that the display on the panel turns off, and turn the power on again.**
   - You can change the control by restarting the hydraulic unit.
5. **Confirm that the parameter “P59:PQ control method selection” is 1(control B).**
6. **Set the parameter “P58:load volume setting”. If the P58 value is large, the response will be quick, but if it is excessive, the hydraulic unit may vibrate. If the P58 value is small, the response will be slow, but the pressure at the time of holding pressure will be stable. Refer to the table below for a guideline of the value.**

11.7.2 The Criterion of P58:load volume setting

The total length of the discharge port. (size is 3/8)	The Criterion of P58 : load volume setting
2m than less	0 to 2
2m - 10m	2 to 7
10m over	5 to 18

The Parameters related to adjustment of pressure response are shown in the table below.

<table>
<tr><th>Panel Indication</th><th>Name</th><th>Operation Range</th><th>Default Value</th><th>Unit</th><th></th></tr>
<tr><td>P58</td><td>Load Volume Setting</td><td>0 - 18</td><td>3</td><td>-</td><td>This is the control gain for adjusting the response of PQ control. The pressure response can be adjusted in accordance with the load capacity of e.g. a hose. It is enabled when “P59: NO_S PQ control method selection” is set to 1: Control B.</td></tr>
<tr><td>P59</td><td>PQ control method selection</td><td>0 : control A
1 : control B</td><td>0 : control A</td><td>-</td><td>Switches the PQ control method.
<table>
<tr><td>Control A</td><td>This is the specification for general use. Normally, select this option.</td></tr>
<tr><td>Control B</td><td>This is the specification for case-by-case correspondence. Select this option when the pressure response needs to be adjusted in accordance with the hydraulic circuit.</td></tr>
</table>
* The settings are brought into effect by turning the power off and then back on.</td></tr>
</table>

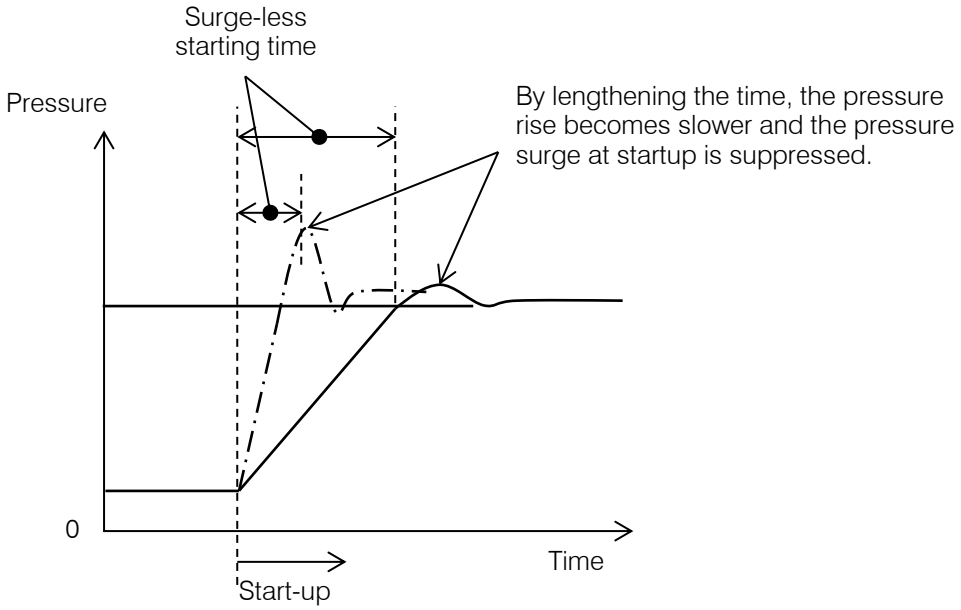
⚠ CAUTION

- It is necessary to turn the power on again after setting “P59: PQ control method selection” setting change.
- Be sure to set “P58: Load volume setting” to the factory default value before changing “P59: PQ control method selection” to control B. If it is set to an excessive value, the machine may vibrate.
- The proper value of each parameter affecting the response varies depending on the characteristics of the hose and the customer’s hydraulic circuit, so it may deviate from the criterion value.
- If parameter is set to an excessive value, pressure control becomes unstable and the machine vibrates. Adjust to the value which operates stably while checking vibration and pressure of hose.
- If the hose length from the discharge part of the hydraulic unit to the load is 1m or less, vibration may occur even if “P58: Load volume setting” is set to 0. In that case, increasing the volume of the hose, such as lengthening the hose, stabilizes the pressure.

11.8 Suppression of Pressure Surge at Startup

If the volume of the hydraulic circuit is small, pressure surge is likely to occur when the hydraulic unit starts up. By setting the surge-less starting time longer, it suppresses the occurrence of pressure surge.

Panel Indication	Code	Name	Operation Range	Default Value	Unit
P32	S_TM	Surge-less starting time	0.01 to 9.99	0.5	sec
P33	L_IN	Motor start initial response gain	1 to 999	10	-



11.9 Dry Operation Judgement

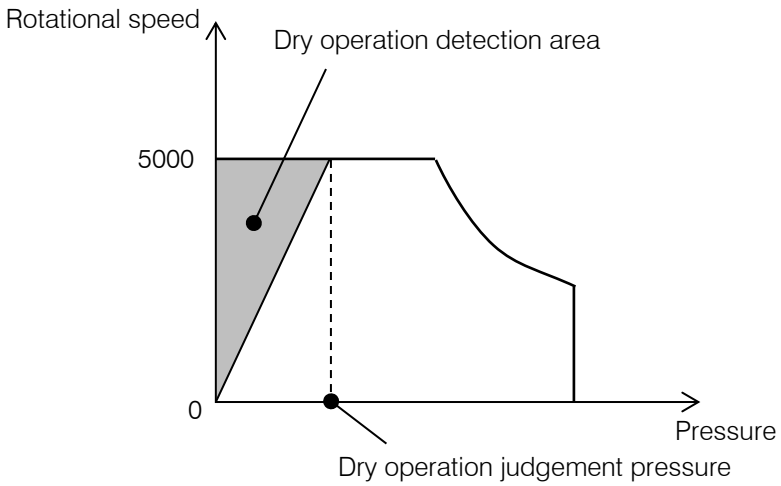
Dry operation is the operation in which the pump has sucked air for reasons such as low oil volume. This function protects the pump by avoiding dry operation and stopping with alarm. The parameters to adjust the judgement are as follows.

Panel Indication	Code	Name	Operation Range	Default Value	Unit
P35	DR_L	Dry operation judgment pressure	0.01 to 2.00	0.5	MPa
			0 to 290	72	PSI
P36	DR_T	Dry operation judgment time	0.01 to 99.9	3.00	sec

When the pressure / flow rate is in the dry operation detection area shown in the figure below and “P36 : Dry operation judgement time” continues, “E64 : Dry operation error” is detected

* If the pressure does not rise, such as when the discharge pipe is thick even though there is enough oil in the tank, "E64: Dry operation abnormality" may occur. In that case, make adjustments such as reducing "P35: Dry operation judgment pressure".

■Dry operation detection area



CHAPTER 12 MAINTENANCE

12.1 Output Signal of the Protection Function

The table below is output signal of the protection function, depending on the setting of parameter “P08 : Alarm output mix”.

○ : Circuit is conducting × : Circuit is not conducting

Status	P08 : Alarm output mix					
	0 : Individual output 2 : Pressure switch function expansion			1 : Integrated output		
	Relay output		Digital output DO2	Relay output		Digital output DO2
	A contact	B contact		A contact	B contact	
Power OFF	×	○	×	×	○	×
Power ON : Normal	○	×	○	○	×	×
Alarm occurs	*3	*3	×	×	○	×
L63 : Pressure switch operation	×	○	*2	×	○	*2
Warning occurs	○	×	*1	×	○	×

*1 It depends on the setting of “P07 : Warning output level setting”. Refer to “11.5.3 Contact output and digital output selection”.

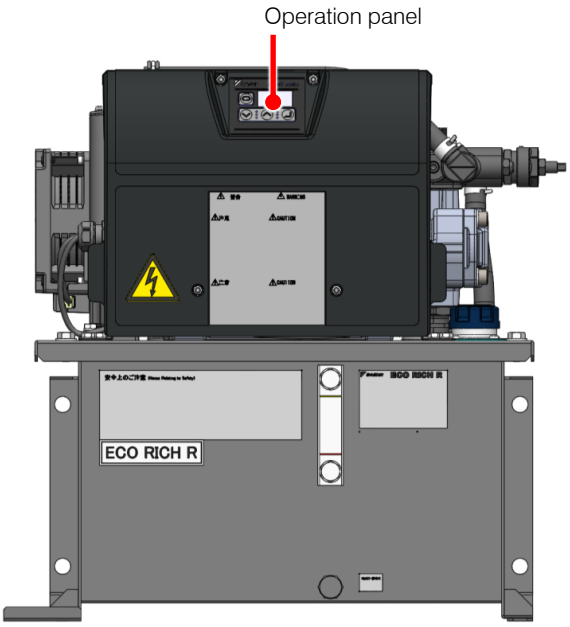
*2 Use the contact output signals to detect “L63 : Pressure switch actuation”. No output from digital output DO2.

*3 Depends on the state of the pressure switch signal immediately before the alarm occurs.

12.2 Display of Alarms

When the protection function is activated, the pump will stop, an alarm has occurred at the unit, the alarm number is displayed on the operation panel.

See “10.6 Alarm Mode Display”.



For Example：EHU15/30R**02-40

Take prompt action by referring to the table below.

⚠ WARNING

If the alarm does not recover or you are uncertain about how to deal with it, be sure to contact Daikin.

12.3 Alarm Causes and Corrective Actions

Alarm Code	Name	Cause	Corrective Action
E07	Charging circuit error	Low power supply voltage	Increase the voltage within the specified range
		Inrush current prevention circuit failure	Replace controller
E08	Regenerative circuit error	Regenerative resistence disconnection	Replace controller
		Regenerative switch device failure	
E10	Output device error	Motor control error	• Adjust the setting of the safety valve to the operating pressure + 0.5 MPa. • If there is a possibility of large hydraulic load due to deterioration of the oil, change the oil.
		Controller failure	Replace controller
		• Motor coil short circuit • Short circuit of the device output	Replace the motor or motor pump
	Overcurrent	Motor control error	Same as E10

Alarm Code	Name	Cause	Corrective Action
E11		• Motor coil short circuit • Short circuit of the device output	Replace the motor or motor pump
		Encoder failure	
E12	Overspeed	Hydraulic oil backflow	Reconfirmation of hydraulic circuit(Check valve insertion, etc.)
E13	Regenerative brake overcurrent	Regenerative resistance is short-circuited	Replace controller
E14	Regenerative brake overload	Power supply voltage is out of the specification range	Check the power supply voltage in monitor mode [n12 : main circuit voltage], and make it in the required range
		Hydraulic oil backflow	Reconfirmation of hydraulic circuit(Check valve insertion, etc.)
		There are many sudden deceleration operation	Increase the parameter value of “P13 to P28 : Acceleration time setting and deceleration time setting”
E15	Insufficient voltage	Low power supply voltage	Increase the voltage within the specified range
E16	Overvoltage	High power supply voltage	Reduce the voltage within the specified range
E17	Motor electronic thermal relay error	The load torque is larger than usual	Replace the motor or motor pump
		Sudden deceleration operation cycle is short	Increase the parameter value of “P13 to P28 : deceleration time setting”
		Encoder failure	Replace the motor or motor pump
E18	Magnetic pole detection error	Startup process failure	Turn on the power again
E20	Encoder disconnection	Disconnection or connection failure of the encoder harness	• Replace controller • Replace the motor or motor pump.
		Encoder connector is disconnected	Replace controller
		Damage of the encoder harness	Replace the motor or motor pump
		Encoder failure	
E21	Motor wiring disconnection	Motor wiring disconnection, connection fault	Replace the motor or motor pump
E24	Open phase in power supply	Voltage drop in one of the three phases	Check the power supply wiring.
E30	Pressure sensor system error	The pressure sensor value is abnormal	Check the pressure sensor harness.
E31	Motor start error	Load volume is large	Increase the parameter value "P34: Motor start-up abnormality judgment time"
E40	Motor thermistor disconnected/short circuited	Motor thermistor wiring is disconnected or short circuited	• Check the internal connection of the controller • Replace the motor or motor pump.

Alarm Code	Name	Cause	Corrective Action
E41	Abnormal rise in motor temperature	The motor cooling fan has stopped.	• Replace the fuse for the cooling fan. • Replace controller.
		Deterioration of cooling performance	Clean or replace the radiator or filter. Refer to the “12.7 Oil Cooler Maintenance Instructions (Only tank unit type)”.
		The motor rotation speed has risen.	• Check if the amount of oil leaking from the circuit at the main machine has increased. • Check, and re-set, the safety valve. Refer to the “12.11 Safety Valve Adjustment Instructions”. • Replace the motor or motor pump
		The ambient temperature is too high.	• Bring the ambient temperature to within the stipulation, by changing the installation location, cooling with a fan, etc.
E42	Radiating fin thermistor disconnection	Controller failure	Replace controller
E43	Abnormal temperature rise at a radiating fin	The motor cooling fan has stopped.	Same as “E41”
		Deterioration of cooling performance	
		The motor rotation speed has risen.	
		The ambient temperature is too high.	
E46	Board thermistor disconnection/short circuit	Controller interior Interface board failure	Replace controller interior Interface board.
E47	Abnormal temperature at board	The cooling fan has stopped.	Same as “E41”
		Deterioration of cooling performance	
		The ambient temperature is too high.	
E64	Dry operation error	The oil level is low.	Replenish the hydraulic oil.
		Stop valve is closed	Open the stop valve
		Oil intake takes time.	Change the values set for parameters “P35: Dry running judgment pressure” and “P36: Dry running judgment time”.
		Small pressure loss on the discharge pipe	Reduce the values set for parameters “P35: Dry running judgment pressure”
E90	Internal error	The software versions are inconsistent.	Replace controller.
		Bad connection of communication cable	Check the connection of the communication cable
E91	CPU error	The software processing load is excessive.	Turn the power off and back on
		CPU failure	Replace controller.
E93	EEPROM data error (1)	Parameter setting value out of range	Replace controller interior Interface board.
E94	EEPROM data error (2)		

Alarm Code	Name	Cause	Corrective Action
E95	Software consistency error	Hardware identification error	Replace controller.
		Mismatch between board and model parameters	
E96	Internal communication error	Controller internal communication error	Replace controller.

12.4 Warning Causes and Corrective Actions

Warning Code	Name	Cause	Corrective Action
L44	Motor abnormal temperature warning	The motor cooling fan has stopped.	• Replace the fuse for the cooling fan. • Replace controller.
		Deterioration of cooling performance	Clean or replace the radiator or filter. Refer to the “12.7 Oil Cooler Maintenance Instructions (Only tank unit type)”
		The motor rotation speed has risen.	• Check if the amount of oil leaking from the circuit at the main machine has increased. • Check, and re-set, the safety valve. Refer to the “12.11 Safety Valve Adjustment Instructions” • Replace the motor or motor pump.
		The ambient temperature is too high.	Bring the ambient temperature to within the stipulation, by changing the installation location, cooling with a fan, etc.
L45	Abnormal temperature at a radiating fin	The cooling fan has stopped.	Same as “L44”
		Deterioration of cooling performance	
		The motor rotation speed has risen.	
		The ambient temperature is too high.	
L48	Abnormal temperature at PCB	The cooling fan has stopped.	Same as “L44”
		Deterioration of cooling performance	
		The ambient temperature is too high.	
L49	Motor electronic thermal relay overload warning	The load torque is larger than usual due to wear of the pump, for example.	Replace the pump or motor pump.
		The motor magnets have demagnetized and the current has increased.	Replace the motor or motor pump.
L50	Power supply voltage drop	The input power supply voltage is low.	Improve the power supply environment.

Warning Code	Name	Cause	Corrective Action
L53	Controller cooling fan rotation speed drop warning	The cooling fan has stopped.	• Replace the cooling fan. • Replace controller.
		Foreign matter or dirt has become entrapped in the cooling fan.	Clean or replace the cooling fan. Refer to the “12.7 Oil Cooler Maintenance Instructions (Only tank unit type)”
L60	Pressure deviation abnormal warning	The power supply voltage is low	Check the power supply voltage in monitor mode [n12 : main circuit voltage], and make it in the required range.
		Pump failure	Replace the motor pump
L63	Pressure switch actuation	The pressure reached the value set for parameter “P01: Pressure switch” or lower.	If there is nothing abnormal in the operation of the main machine, review the set value for the pressure switch or the delay time.

12.5 Periodic Maintenance

⚠ WARNING

- Wear protective glasses and gloves for this work, and do it with the power OFF.
- When using air blow, take care to avoid getting foreign matter in your eyes.

⚠ CAUTION

- Note that oil will flow out from the piping during disassembly. Also, check that there is no residual pressure in the piping before starting the work.
- When the hydraulic oil in cylinders and piping is returned to the tank, the tank may overflow. Rather than returning the hydraulic oil in cylinders to the tank, collect it in a separate oil receiver.
- Check that there is no abnormal noise, abnormal vibration, or abnormal heat generation from this product.

Inspection Location/Item	Inspection Timing/Interval	Inspection Instructions
Hydraulic oil • Oil level check • Oil temperature check • Oil hue check	• As necessary • As necessary • Once every 6 months	• Check if there is a sufficient volume of oil. Also check that the hydraulic oil is not cloudy and does not include air bubbles. • Check that the oil temperature is no higher than 60°C. (Keep it within 15 to 50°C in normal use.) • Degradation of the hydraulic oil can be recognized based on its color. If the hydraulic oil color changes toward brown and reaches ASTM level L4: bright yellow, replace it. ☞ For the specifications of the hydraulic oil, refer to “2.2 Conditions of Use”.
Motor cooling fan Motor unit	• Once a month • Once a month • When a temperature alarm occurs	• Check that the motor cooling fan is rotating and check for dust accumulation. • Accumulated dust will lessen the cooling effect, so it should be cleaned. • Check if the ambient temperature has exceeded 40°C.
Control unit	• Once a month	• Check if the ambient temperature has exceeded 40°C.
Oil cooler	• Once every 6 months • When a temperature alarm occurs	• Accumulated dust will lessen the cooling effect, so it should be checked.
Oil cooler filter	• Once every 6 months • When a temperature alarm occurs	• Accumulated dust will lessen the cooling effect, so it should be checked.
Electric wiring	• Once every 6 months	• Check that there are no cracks or breaks in the sheathing of the wiring. • Check that the ground is properly grounded.
Gear pump	• As necessary	• In the event of an oil leak from the oil seal, the pump must be replaced. Leaked oil will be expelled through the motor’s oil grooves, so inspect for oil leakage.
Threads/piping Hose	• As necessary • As necessary	• Check that no threads or piping are loose or have oil leaks. • Check that there are no cracks or breaks, and that there is no damage.

12.6 Cleaning/Replacement Work

Inspection Location/Item	Work	Work Instructions
Oil tank / Replacing the oil	Once a year	Replace the hydraulic oil at regular intervals. Use for a long time without replacing the oil will adversely affect the operation and life of the hydraulic equipment.
Oil cooler / Cleaning the core	Once every 6 months	Disassemble and clean. See “12.7 Oil Cooler Maintenance Instructions (Only tank unit type)”.
Oil cooler filter/ Cleaning or Replacing the filter	Once every 6 months	Clean the filter or replace it with a new one. See “12.8 Oil Cooler Filter Maintenance Instructions”.
Oil filler port cum air breather	Once a year	Disassemble and clean. See “12.9 Oil Filler Port cum Air Breather Maintenance Instructions”.
Suction strainer	Once a year	Disassemble and clean. See “12.10 Suction Strainer Maintenance Instructions”.

⚠ DANGER

When touching the interior of the controller, abide by the following procedure to prevent electric shocks.

1. **Shut off the source power supply to the hydraulic unit.**

   (Set the power supply circuit breaker of the circuit that is supplying the power to “OFF”.)

   Hang a tag stating, for example, “Operation Prohibited (Work in Progress)” on the power supply circuit breaker or other device, preventing erroneous operation while the work is in progress.

2. **Wait at least 5 minutes before removing the cover, etc. from the controller.**

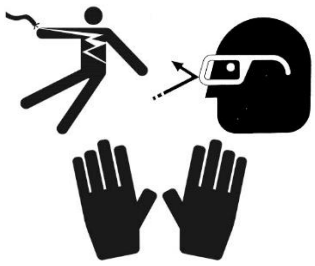
   A capacitor with a large capacity is used inside the controller, and working while the capacitor is charged poses a risk of electric shock and other hazards. Always wait at least 5 minutes (the time required to discharge the electric charge in the capacitor) before removing the cover.

Do not get close to or come into contact with rotating parts.

When running the unit, mount all the covers on the controller before turning the power on.

12.7 Oil Cooler Maintenance Instructions (Only tank unit type)

⚠ WARNING



- Before starting maintenance work, stop the unit running and shut off the source power supply.
- Wear protective glasses and gloves for this work.
  1) The oil cooler fins are sharp, so take care.
  2) When using air blow, take care to avoid getting foreign matter in your eyes.

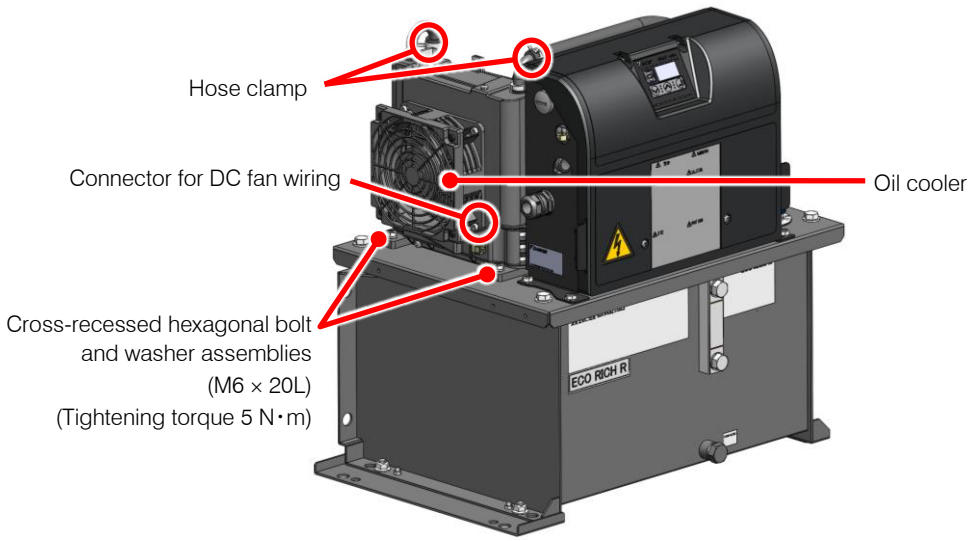
⚠ CAUTION

- Take care to ensure that no excessive forces are applied to the power cable or connector of the DC fan during the work.
- Note that oil will flow out from the piping and oil cooler during disassembly.

12.7.1 Removing the oil cooler

1. **Disconnect the connector for the DC fan wiring.**
2. **Remove the hose clamps (2 locations), and pull off the two hoses fitted to the oil cooler.**

   At this time, fit e.g. a blind plug to the hoses before starting further work since oil may leak due to reverse flow of oil from the tank.
3. **Remove two cross-recessed hexagonal bolt and washer assemblies (M6 × 20L) and remove the oil cooler.**

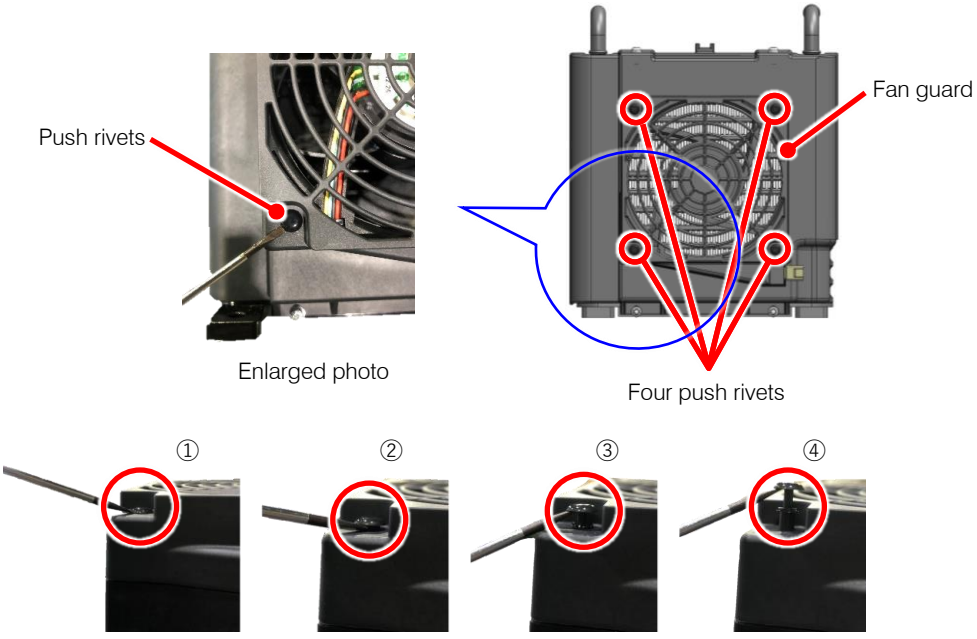


For Example：EHU15/30R02-40**

12.7.2 Disassembling the oil cooler

1. Remove four push rivets and separate the fan guard.

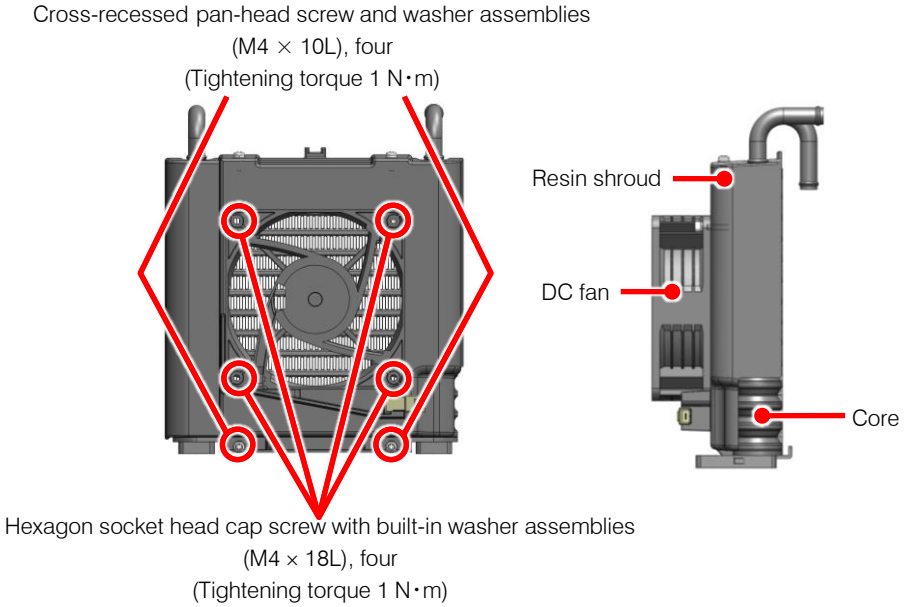
How to remove the push rivet



Use a small screwdriver, etc., and pull up as in ① to ④

2. Remove four hexagon socket head cap screw with built-in washer assemblies (M4 × 18L), and separate the DC fan.

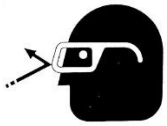
3. Remove four cross-recessed pan-head screw and washer assemblies (M4 × 10L), and separate the resin shroud and core.



12.7.3 Cleaning the core

Steam blow or air blow the core to blow dirt and contamination that has been deposited on or is adhering to the fins, making the fin section clean.

⚠ WARNING



When using air blow, wear protective glasses to avoid getting deposits and dirt in your eyes. core.

⚠ NOTICE

Take care to ensure that dirt or adhering material is not blown into the interior of the core.

12.7.4 Cleaning the DC fan

Using e.g. a rag, clean not just the fan blades and casing, but also the clearance between the fan blades and casing.

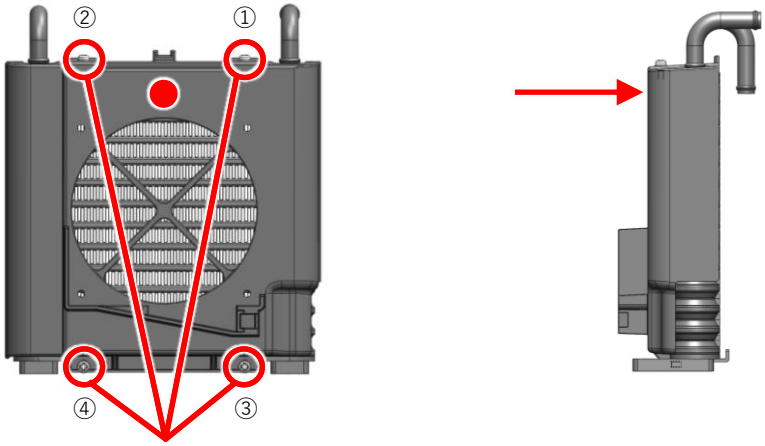
⚠ NOTICE

Never steam blow or air blow because foreign material will get inside the motor.

12.7.5 Reassembly

After completing the cleaning, reassemble to the original state.

When assembling the resin shroud and core, tighten the four pan head machine screws as shown in the figure below.



Cross-recessed pan-head screw and washer assemblies
(M4 × 10L), four
(Tightening torque 1 N・m)
While lightly pushing the red circle in the direction of the arrow,
tighten the pan head machine screws in the order of ① to ④

When installing the DC fan, be careful not to pinch the harness wire, etc., such as the fan cover

Take care not to confuse the directions of air intake/exhaust of the oil cooler.
(The wind blows from the unlabeled side to the labeled side.)

See “6.2.1 Secure the space for air intake/exhaust”.

After completion of reassembly, check that the unit runs normally by following the test run instructions.

See “ CHAPTER 9 TRIAL RUNNING”.

12.8 Oil Cooler Filter Maintenance Instructions

Remove it regularly and check for dust accumulation. If it is accumulated, replace it with a new one or clean it.

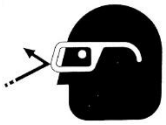
12.8.1 Removing the oil cooler filter

It can be easily removed by holding the protrusion (red circle in the figure) of the filter and pulling it up to the top of the unit.

12.8.2 Cleaning

Air blow the filter to remove dirt or dirt that may have accumulated / adhered to it.

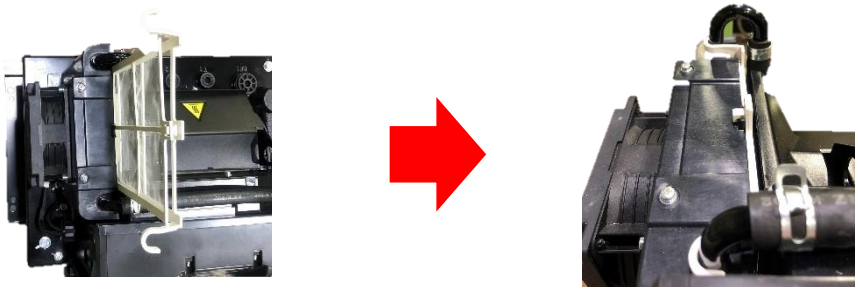
⚠ WARNING



When using air blow, wear protective glasses to avoid getting deposits and dirt in your eyes. core.

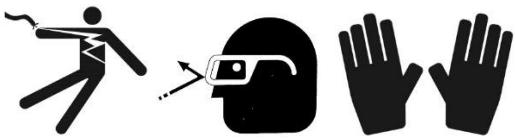
12.8.3 Cleaning

Attach the filter to the oil cooler as shown in the picture. After installation, check that the upper part of the oil cooler is attached as described in “12.8.1 Removing the oil cooler filter”



12.9 Oil Filler Port cum Air Breather Maintenance Instructions

⚠ WARNING



- Before starting maintenance work, stop the unit running and shut off the source power supply.
- Wear protective glasses and gloves for this work.

12.9.1 Removal/fitting

To remove it, turn the cap in the counterclockwise direction by hand.

To fit it, turn the cap in the clockwise direction by hand to the position where it stops.

12.9.2 Cleaning

Remove deposits and adhering material from inside the strainer's cylinder.

12.10 Suction Strainer Maintenance Instructions

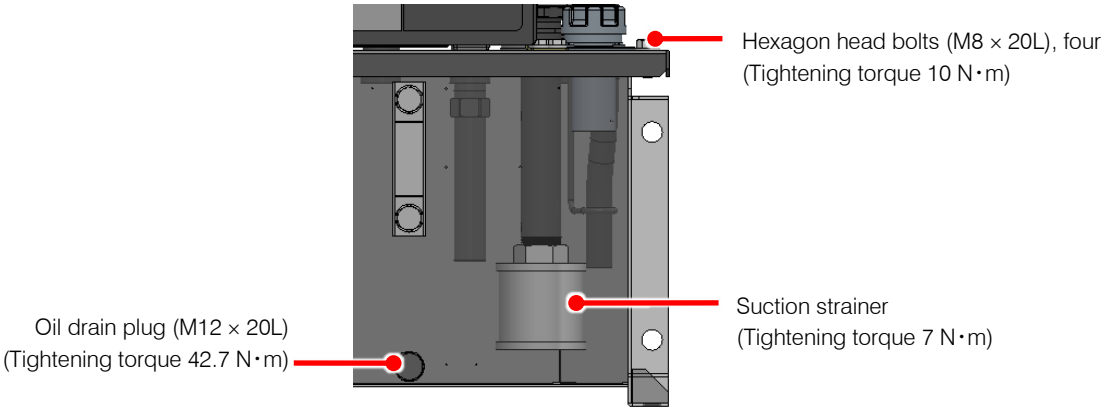
⚠ WARNING

- Before starting maintenance work, stop the unit running and shut off the source power supply.
- Wear protective glasses and gloves for this work.

12.10.1 Removal method

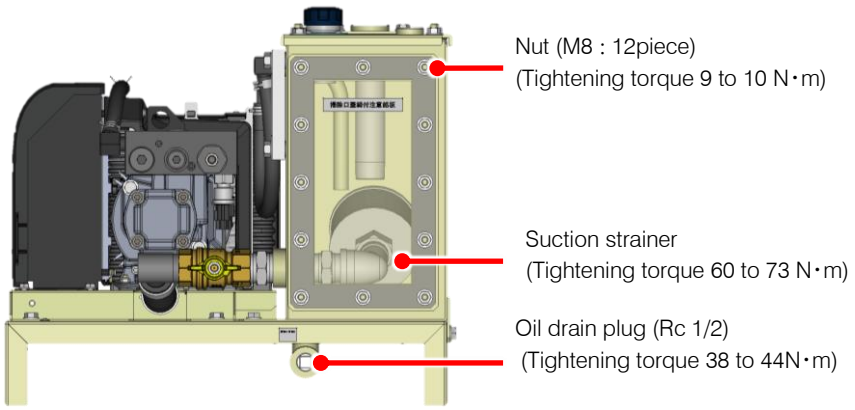
■20L tank unit type

1. **Set a drain oil receiver below the oil drainage port, open the oil drain plug (M12 × 20L), and drain out all of the hydraulic oil in the tank.**
2. **Remove the four hexagonal bolts (M8 × 20L) securing the top plate and tank, and hoist the strainer by its suspension plate to separate it from the tank.**
3. **This will reveal the suction strainer: loosen it with e.g. an adjustable wrench and remove it.**



■30L tank unit type

1. **Set a drain oil receiver below the oil drainage port, open the oil drain plug (Rc 1/2), and drain out all of the hydraulic oil in the tank.**
2. **After draining all the hydraulic oil in the tank, close the oil-drain plug again by seal tape. (Tightening torque : 38 to 44 N·m)**
3. **After draining hydraulic oil completely, remove the nuts (M8 : 12 pieces) from the cleaning door cover, and remove the cover from the cleaning door.**
4. **Loosen the suction strainer by monkey wrench, and remove it. (Hexagon nut, Width across flats: 41 mm)**

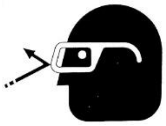


12.10.2 Cleaning

Air blow the suction strainer to blow off deposits and adhering material.

Also remove foreign matter inside the cylinder part of the strainer.

⚠ WARNING



When using air blow, wear protective glasses to avoid getting deposits and dirt in your eyes.

12.10.3 Reassembly

After completing the cleaning, reassemble by following the removal procedure in reverse.

After completing reassembly, check that the unit runs normally by following the test run instructions.

See “ CHAPTER 9 TRIAL RUNNING”.

12.11 Safety Valve Adjustment Instructions

If any of the three conditions below is applicable, readjust the safety valve by referring to the [Safety Valve Adjustment Instructions].

Usually, the safety valve is set so that it will not actuate even under use at the maximum operating pressure setting (except during transition period where the hydraulic circuit is blocked due to a stop of the main machine's hydraulic actuator, for example).

1) When the set pressure of the safety valve drops and it actuates even in the normal status due to repeated operation over a protracted period or contaminants in the hydraulic oil.

[Judgment method]

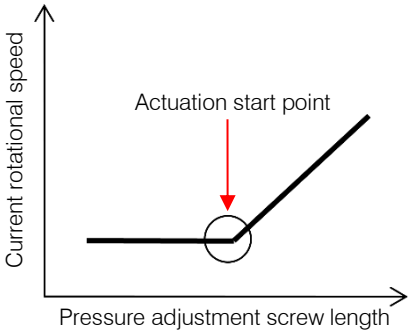
- When the oil temperature rise has become faster.
- When, in the pressure holding state with the motor speed displayed, turning the safety valve adjusting screw in the tightening direction lowers the motor speed.

2) When, for reasons such as the restricted withstand pressure of the hoses used, it is desired to as far as possible suppress surge pressures that greatly exceed the set value.

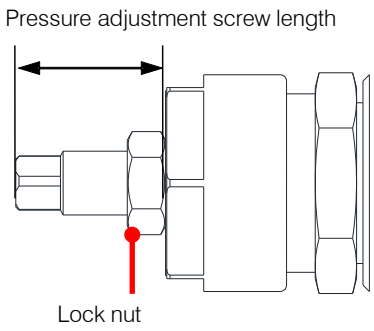
[Safety Valve Adjustment Instructions]

1. **Referring to the enlarged view of the safety valve on the next page, loosen the lock nut.**
   * Lock nut: M10, width across flats of 14 mm
2. **In accordance with the guidance diagram for the length of the pressure adjusting screw, bring the screw to about the length corresponding to the desired control pressure.**
   * The tip of the adjusting screw has four faces, with width across flats of 7 mm.
3. **Turn on the power to the hydraulic unit, establish the setting mode by panel key operation, and adjust the pressure setting to the desired pressure.**
4. **Press the mode key on the operation panel to switch the display mode to the monitor mode.**
5. **Press the setting keys and with the [n00] displayed to select [n05] (motor speed indication) to display the current motor speed.**
6. **Select [n05] (motor rotation speed indication) in the monitor mode by panel key operation to display the current motor rotation speed.**
7. **Adjust the pressure adjusting screw length in the longitudinal direction and find the actuation start point shown in the figure below.**
8. **Turn the pressure adjusting screw clockwise three fourths of a turn from the actuation start point.**
9. **Tighten the lock nut to complete the adjustment.**

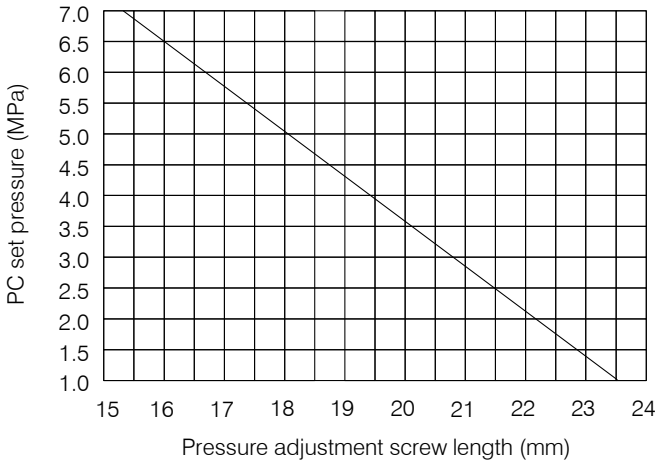
When tightening the lock nut, take care that the adjusting screw does not turn.



<Detail of Safety Valve>



<Rough Diagram>

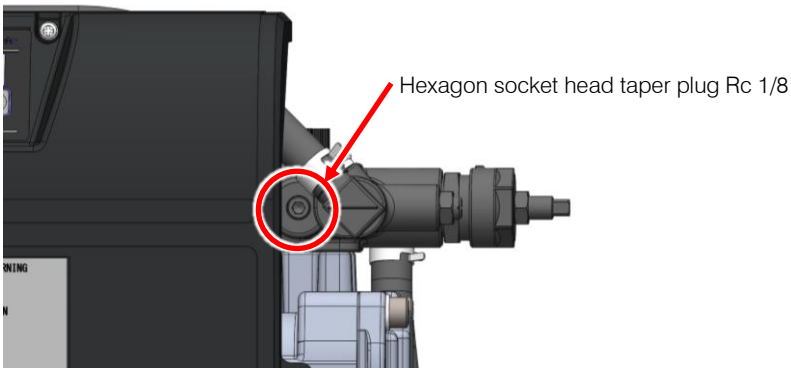


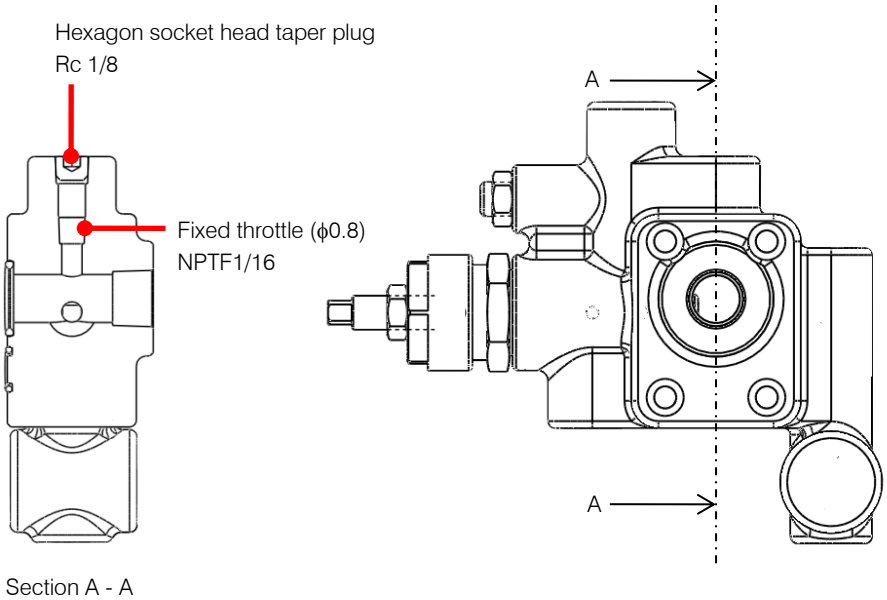
12.12 Fixed Throttle (ϕ0.8) Mounting Instructions (20L Tank Unit Type only)

When using the unit with a set pressure of 6 MPa or higher, if the pressure becomes unstable due to the effects of contaminants, etc., mount the fixed throttle (ϕ0.8) provided as an accessory.

Check that there is no residual pressure before mounting it.

1. **Remove the hexagon socket head plug (Rc 1/8).**
2. **Mount the fixed throttle (NPTF1/16 × ϕ0.8).**
3. **Wrap sealing tape around the hexagon socket head plug (Rc 1/8) and fit it as it was.**





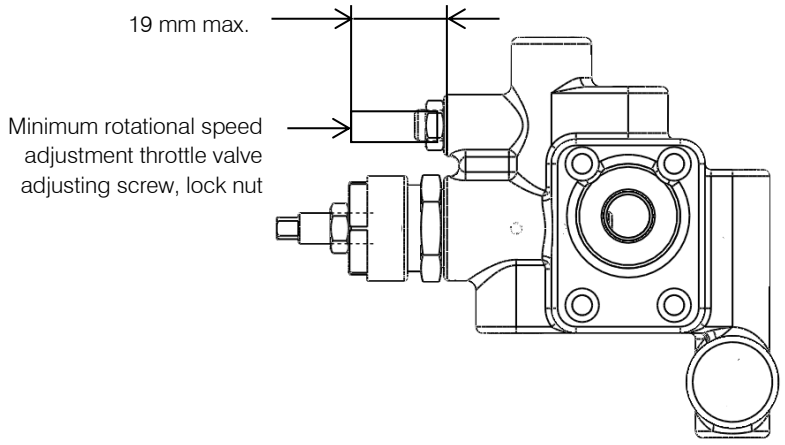
Section A - A

Mounting the fixed throttle will also change the rotational speed in the pressure holding status, so adjust to the appropriate speed (EHU**R07 : 350±30 min^{-1}, EHU**R10 : 480±30 min^{-1}).

Close the hydraulic unit's discharge port. If the adjustment is performed while connected to the main machine it will not be possible to adjust to the appropriate rotational speed due to the influence of leakage from the valves, actuators, etc.

If the pressure becomes oscillatory when the discharge port is closed, set the parameter “P59: NO_S PQ control method selection” to 0, then turn the power off and back on. If the parameter setting has been changed during adjustment, return it to the original value after adjustment.

1. **Press the mode key on the operation panel to switch the display mode to the monitor mode.**
2. **Press the setting keys and with the [n00] displayed to select [n05] (motor speed indication) to display the current motor speed.**
3. **Loosen the lock nut of the throttle valve for minimum rotational speed adjustment.**
4. **Adjust the throttle valve while monitoring the actual motor rotation speed displayed.**
   * The motor rotation speed decreases during clockwise rotation, and increases during counterclockwise rotation.
5. **Tighten the lock nut to complete the adjustment.**
6. **Press the mode key to switch to actual pressure indication.**



⚠ CAUTION

If the minimum rotational speed adjustment throttle valve adjusting screw is loosened to far it will come out and oil will spout out.

Ensure that the adjusting screw does not project beyond 19 mm from its mount.

CHAPTER 13 APPENDIX

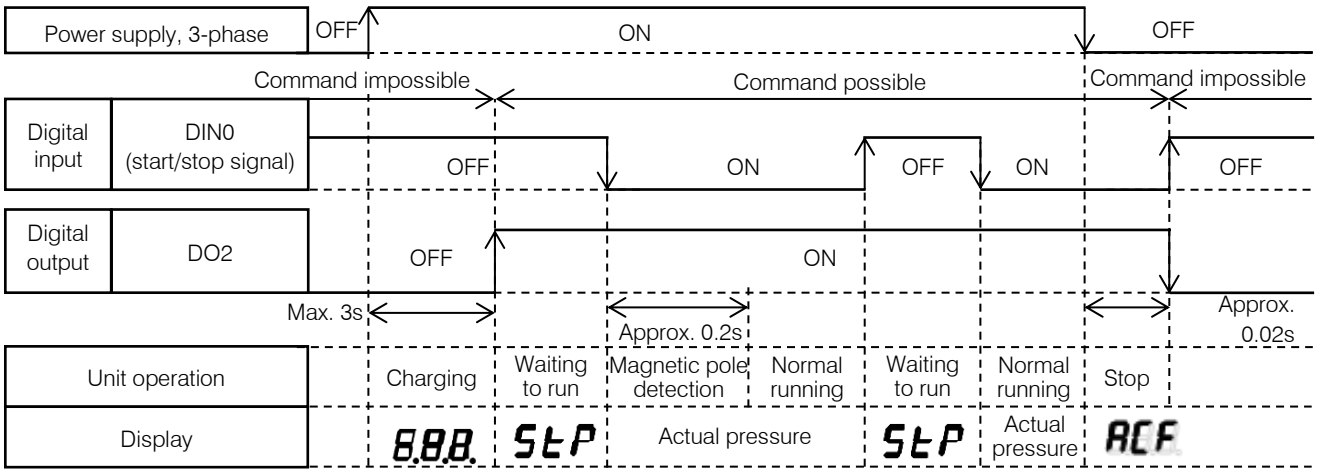
The start/stop signals (digital input 1) in the timing charts all assume that the value set for [P00: Start/stop signal switching] is “1” (default value).

When the value set for [P00: Start/stop signal switching] is “0”, the ON and OFF statuses of the start/stop signal (digital input 0) are inverted.

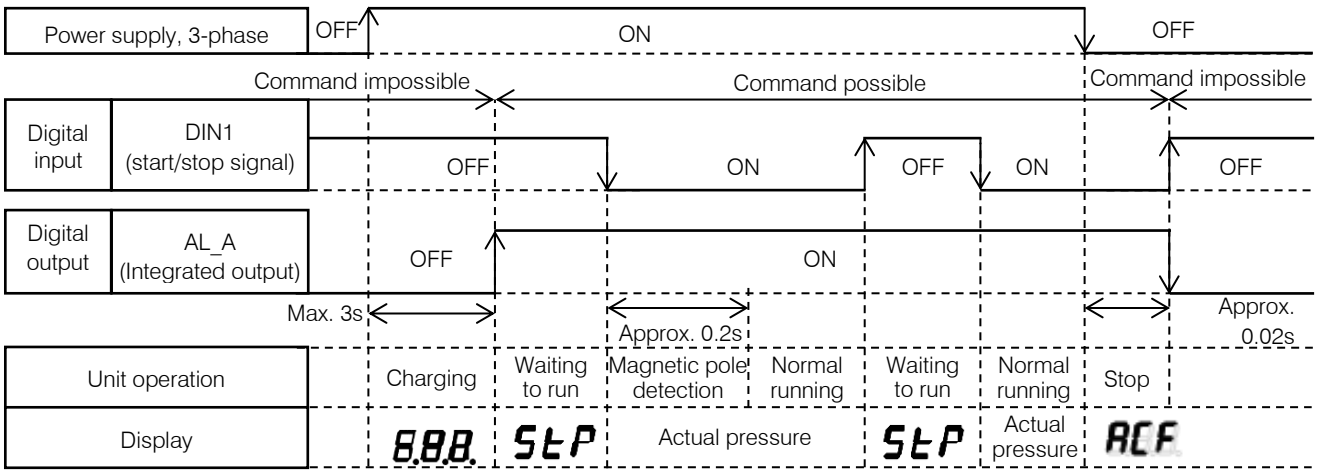
13.1 Timing Chart at Powering Up

The timing chart at powering up differs depending on the alarm output mix as shown below.

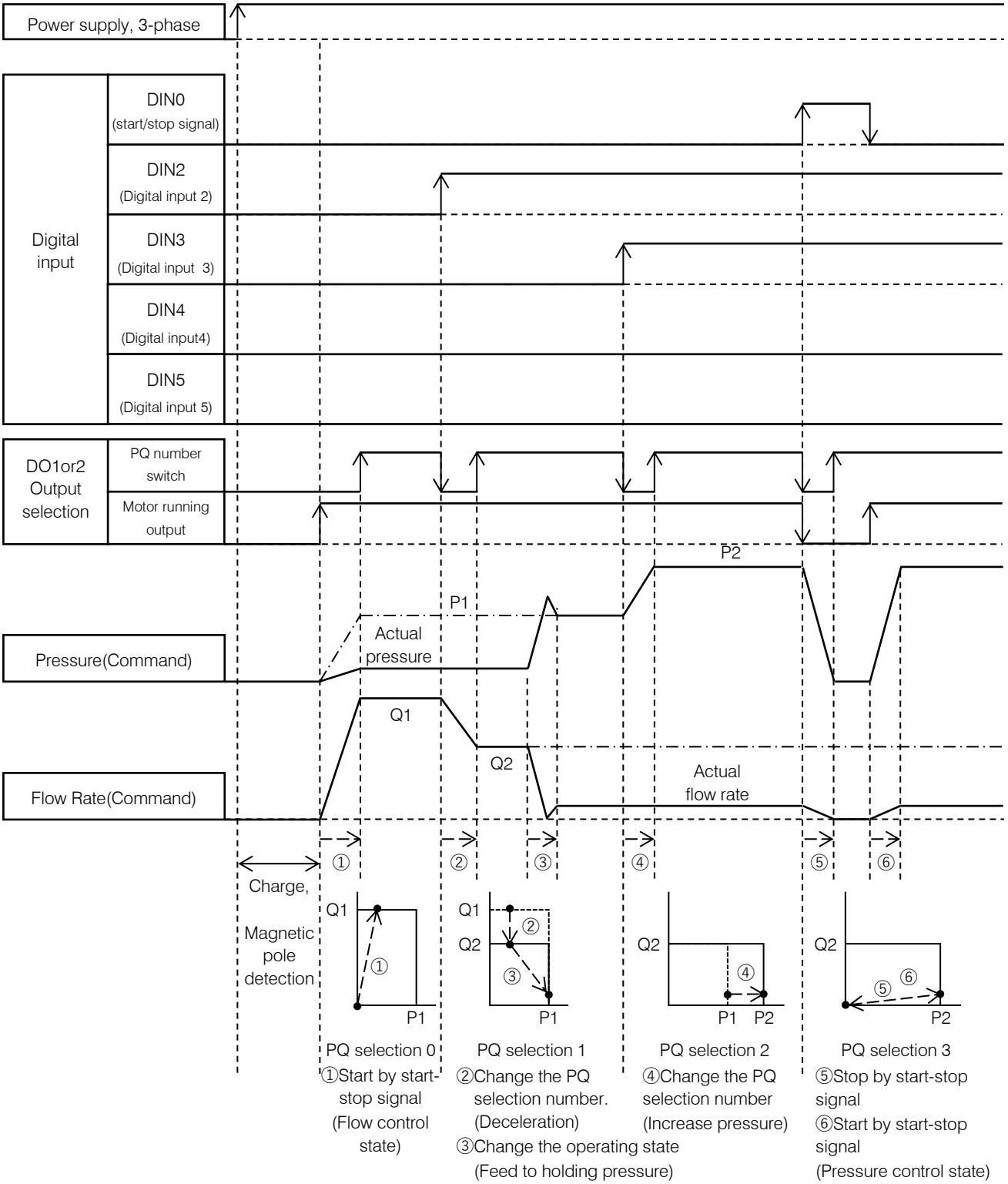
■ The setting value of “P08 : Alarm output mix” is “0” or ”2”



■ The setting value of “P08 : Alarm output mix” is “1”



13.2 Timing Chart of PQ Selection Switch



PQ selection	Pressure setting	Flow rate setting
0	P1	Q1
1	P1	Q2
2	P2	Q1
3	P2	Q2

13.3 About Hybrid-Win (Maintenance / Control Functions)

Hybrid-Win is a software tool for reading and controlling the information of a Daikin hybrid system (SuperUnit, EcoRich, Oilcon, etc.) on a personal computer. It makes it possible to set and monitor parameters efficiently from a Windows screen on the personal computer.

■ Main functions

1) Graph display

The pressure, flow rate, and other inverter internal data, can be monitored and displayed in graph form. This can speed up tasks such as checking operations during test running, adjusting parameters such as time constants, and investigating the cause when trouble occurs.

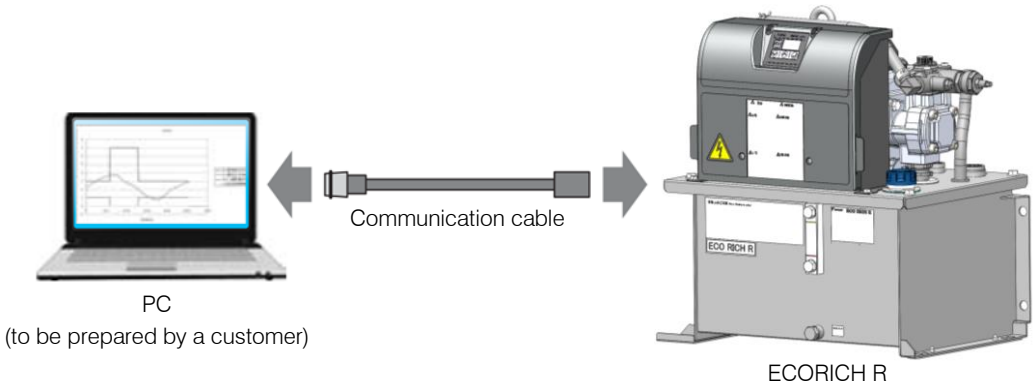
2) Reading, writing, editing and saving parameters

By editing parameters on a personal computer and batch writing them to the hybrid system, the time taken to set them can be shortened considerably. Reading and saving set values makes control easier.

3) Reading and saving the alarm history

This is useful for speeding up the identification of parts that need maintenance, and shortening stoppage times. It serves as a guide for determining the replacement of consumable parts based on "operating time", and maintenance intervals. Troubleshooting, including the diagnosis of the causes of alarm occurrences, and corrective actions, can be displayed.

* Hybrid-Win is a software tool for monitoring the internal status with a personal computer. The tool itself and its instruction manual can be downloaded free of charge after registering as a user in the website (http://www.daikinpmc.com/).
* The communication cable must be purchased separately.
* There are some models that require separate, model-specific monitor harnesses.
* It is possible to add a wireless module to connect to smart phones or a wireless LAN (available as an option). This helps with the users' daily inspections, maintenance and remote monitoring.



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