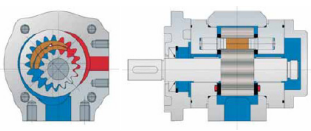
金聖泰實業股份有限公司
KINGSTONE COMPONENT INC.
ECKERLE VOITH
TOSHIBA MACHINE

SDP Servo Driving Pump

Servo Driving Pump System (For Injection Molding Especially)

TOSHIBA MACHINE

200V、400V Series



KINGSTONE COMPONENT INC. is the world's premier supplier of motion and control systems and solutions, with sales and manufacturing facilities throughout the world. For product information and details of your nearest KINGSTONE sales office, visit us at http://www.kstci.com.tw/ or service@kstci.com.tw or +886 2 8732-8566

Introduction

Thank you for choosing TOSHIBA highly functional servo motor hydraulic energy-saving system. This product makes use of the latest RISC CPU and ASIC electrical-current chips to control the speed and torque of the servo motor that further timely and accurately control the German-made high-performance internal-gear hydraulic pump.

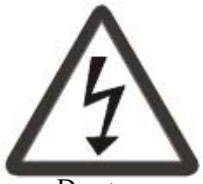
This manual is provided for users with instructions and things to be aware of g the installation, parameter settings, abnormality diagnosis and elimination, as well as daily maintenance of servo driver.Please be sure to read the instructions in the manual in detail before any installation is performed.

The servo motor driver is a sophisticated and delicate electric, electronic product, so for the safety of operators and mechanic equipment, please do allow professional electric-mechanical engineering staff to perform trial runs and adjust parameters. Read in detail where [Danger], [Warning] and [Attention] are noted in the manual, and in the event of any questions, please consult the authorized agents of our company where our professional staff would be more than happy to assist you.

Please comply with the following items as users install and operate the product

 Danger	**Danger**	This picture reminds you that there are crucial installation or operating instructions to be noted. Any negligence to them could potentially cause fire hazards, explosions, injuries or fatalities because of inductivity
 Warning	**Warning**	This picture reminds you that there are crucial installation or operating instructions to be noted. Any negligence to them could potentially cause damage to the product, injuries or fatalities.
 Attention	**Attention**	This picture reminds you that there are crucial installation or operating instructions to be noted. Any negligence to them could potentially cause damage to the product or personnel injuries.

Things to pay attention to regarding servo driver and motor



Danger

- This product may not be used, at any time, under the environment with combustible gases, firecrackers.
- The noncompliance to the above could potentially cause fire hazards, explosions, injuries or fatalities while using the product.
- Do not perform any wiring, installation and maintenance operation as long as the product is connected to a power source.
- The inside of the servo motor driver still contains high voltage and is extremely dangerous after the power source has been turned off, and the POWER and charge indicators are still on. Do not attempt to make contact with any internal circuitry and components, or attempt any repair.
- The CMOS IC on the circuit board inside the servo motor driver is very easily damaged by static, so please do not touch the circuit board before anti-static precautions are done.
- The servo motor driver and regenerative brake must be installed on materials capable of withstanding fire.Fire hazards could be caused by overheating if easily combustible materials are nearby.
- Terminal E of the servo motor driver must be properly grounded.

Warning

- Alternate current source must not be input to output terminals U/T1, V/T1 and W/T3 of the servo motor driver.
- Please do not perform pressure-tolerance test on the internal components of the servo motor driver, because the semiconductors used with alternate-current motor drivers are easily damaged and broken by high-pressure impacts.
- Even though the 3-phase servo motor is at the stop position, the main circuit terminals of the servo motor driver may still carry dangerously high voltage
- Only qualified professional electromechanical staff may install, perform wiring, repair and maintain servo motor driver.
- Under no circumstances can the internal components, wiring or circuitry of the servo motor driver be altered or modified.

Attention

- Please choose a safe area for the installation of the servo motor driver that prevents direct exposure to high temperatures and sunshine as well as avoids the spilling of moisture and water.
- Please comply with all the safety precautions when installing the servo motor driver. An uncertified usage environment may lead to fire hazards, gas combustions, incidents of inductivity, etc.
- Do not place any items in the oil pump; otherwise the internal components may be damaged during operation.
- Please note: the infrastructure of the electrical machine unit is in the status of high temperature during operation or after the cutoff of power source, so the use of hands or the human body to make contact with the infrastructure is prohibited to prevent burns.
- The product must not be used as staircases for the purpose of climbing up; neither can heavy materials be placed on top of it. Otherwise, the damage to the unit may be resulted or human injuries because of falling.

Things to pay attention to regarding hydraulic circuit

The installation of the oil tank

Attention

- The amount of oil in the oil tank is contingent on the working conditions of the equipment, but it should be at least 2 to 5 times of the amount of pump discharge (per minute (less oil amount is permitted concerning intermittent operations involving longer cooling stages). The cooling action on oil must be performed when necessary.
- Filtration devices and exhaust emission filtration devices must be installed on the oil inlets of the oil chamber
- The oil chamber must be thoroughly cleaned before the infusion of oil
- The paint/coating used on the oil chamber must be tolerant to oil.
- When designing the oil chamber, sufficient sedimentation must be assured between the suction and return of oil.Baffles are used during the passage of oil to separate air from oil.

The selection of hydraulic oil

注 意

- It is suggested that HLP brand-name hydraulic oil compliant with Sections 2 and 3 of DIN 51524 be used, with viscosity ISO 46-68. Please consult the original manufacturer when using other working fluids. Do not mix oil of different grades or from different manufacturers before testing on compatibility. Please consult relevant manufacturers or suppliers.
  - Working temperature
    The optimal working temperatures are between 40 and 60 degrees Celsius, the maximum working temperature is 70 degrees Celsius and can go up to 80 degrees Celsius at regular intervals.
  - Viscosity
    The minimum working viscosity 10 mm^2/s(cSt) / Optimal working viscosity 25-100 mm^2/s(cSt) Maximum allowable working viscosity 2000 mm^2/s(cSt) Attention must be paid in the choice of the viscosity of working fluid, in that the fluid should maintain allowable viscosity values at all times within the range of overall working temperatures

The filtration of hydraulic fluid

Attention

The premises of thorough filtration on hydraulic fluid are such that the action increases its usage lifespan, and the hydraulic system may be operated with no malfunctions. The levels of pollution are illustrated as follows:

- The maximum allowable level of pollution for working fluid:A. Satisfies level 8 of NAS1638 / B. Satisfies ISO4406 guidelines 19/17/14
- In order to ensure long usage lifespan, we suggest the following levels of pollution of working fluid:
  A. Satisfies level 7 of NAS1638 / B. Satisfies ISO4406 guidelines 19/17/14
- It is suggested that the filtration device with minimum filtration ratio β 10 > 100 be used.
- Filters should be regularly maintained and be replaced when necessary.
- Pollution-degree optical indicator (or electrical indicator) must be installed at the filtration device to monitor the functionality of the device.

Things to pay attention to regarding hydraulic circuit

Pump

Attention

- The installation and activation of oil pump can only be performed by trained staff or under the supervision of professional staff.
- The oil pump can only be operated within the technical specifications
- Before the activation of the oil pump section, the oil-pressure system must be under no-load conditions; e.g., the pressure circuit directly returns to the oil tank.
- All the air in the operating fluid must be discharged after making sure of the direction of rotation.
- If pre-pressure valve is installed > 1 bar, an air-discharge device must be in place in the circuit between the pump and pre-pressure valve
- Safety components must be connected, or preinstalled safety components must not be removed.
- Please pay attention to the tightness of all set screws , and tighten them with the prescribed torque when necessary.
- Please comply with all the safety and hazard-prevention guidelines.

System trial runs

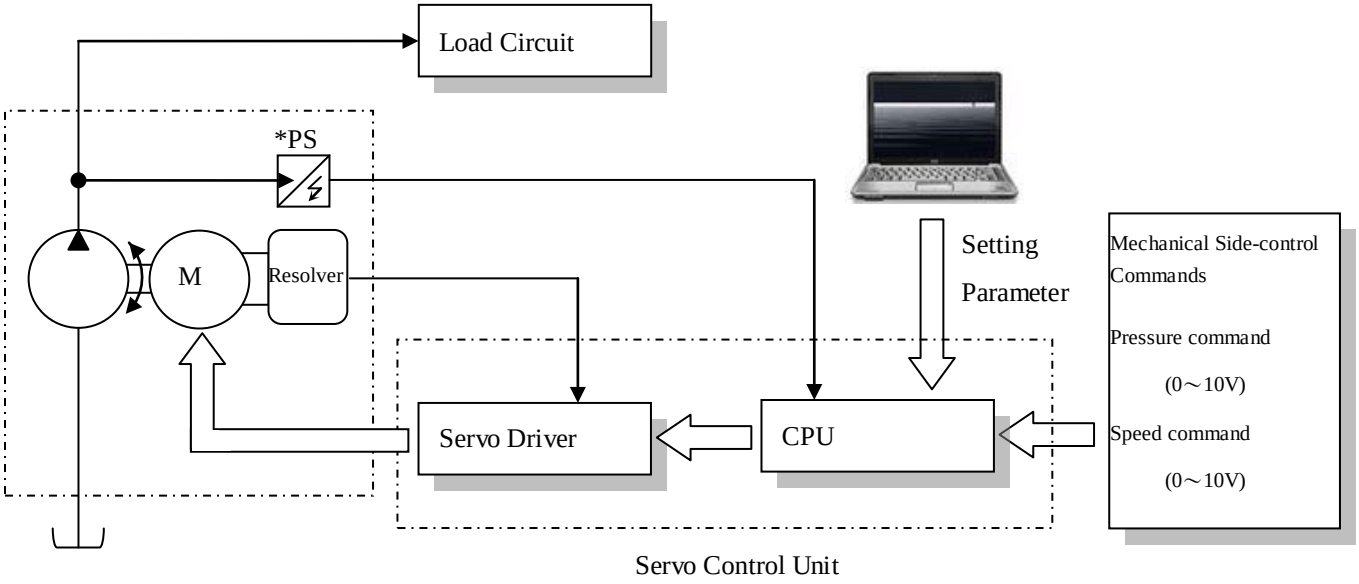
Special Attention

- The hydraulic equipment will produce substantial pollution after repairs or during first activation of the system. Therefore, the equipment should be operated under no-load conditions, and replace the filtration device after 100 hours of operation.
- Special attention must be made to the oil pressure as well as the cleanliness of the equipment and components when replacing oil pump.
- The actions of air discharge and infusion of oil at oil inlets should be performed before load running, and all the air within the oil circuit must be discharge to prevent air erosion and noise from taking place while pump is in operation.
- If the suction connector and oil level are both under the oil pump, caution must be made when discharging air. The oil level in the oil chamber must be kept above standard before the complete discharge of air; under no circumstances can the level fall below the minimum level.
- When the chattering sound or other noises are no longer heard, make sure that there are no bubbles at the oil-return end, and then the action of adding pressure of the oil-pump system can be performed.
- Pressure can be added to the set values after 10 to 15 minutes of operation.
- The oil pump cannot be operated when air-discharge crews are loosened, for the pump will be damage.
- Operate the oil pump in manual mode for a short while, until the pressure indicated by the system oil pressure gauge is on the rise.
- Please take the connector terminal off from A/D circuit board, and take off the motor resolver from CN5 of driver.
- If AL26 is displayed on LED, then please enter the motor number of UP02 after power source is connected, shut off the driver and reconnect the power source.

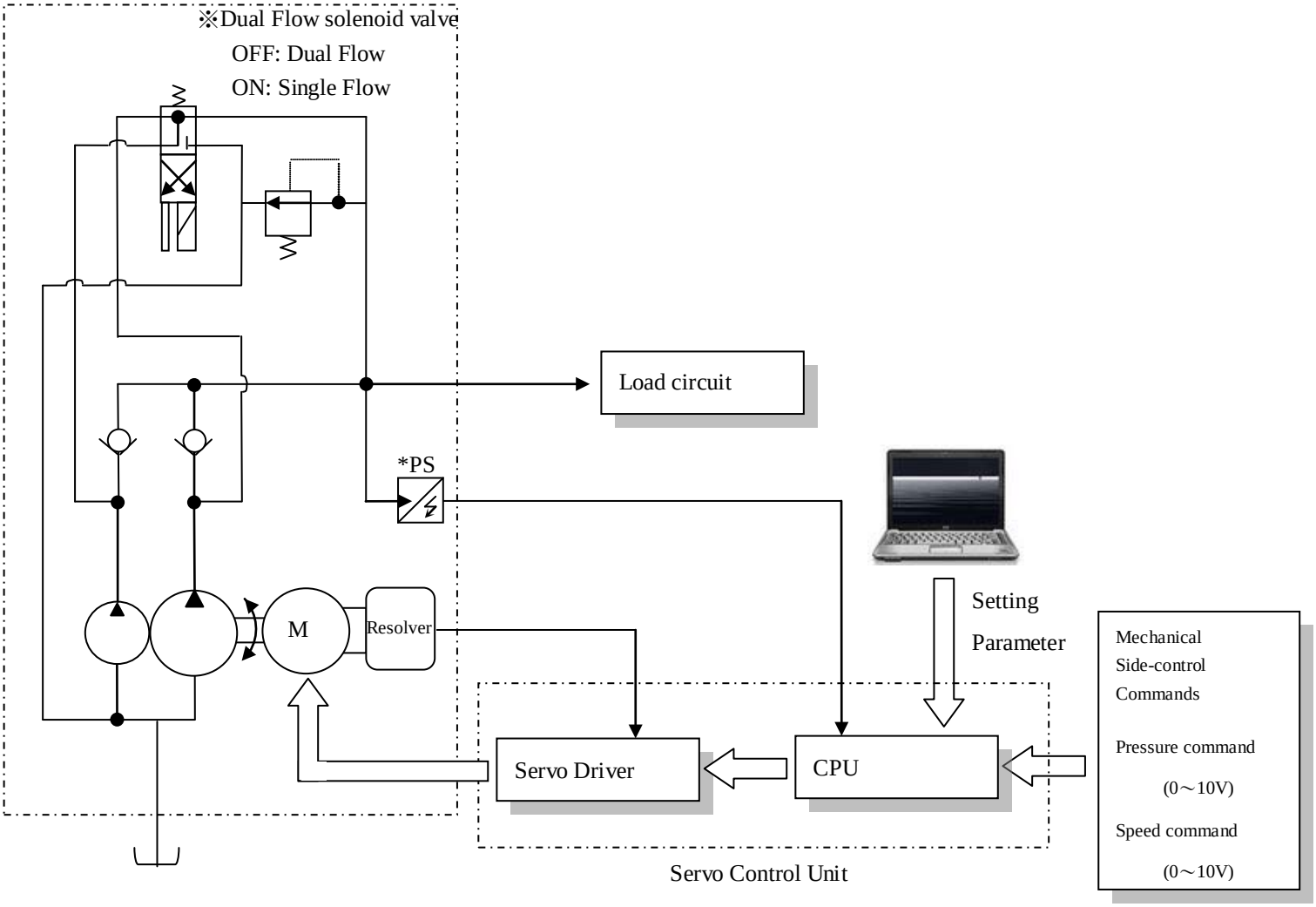
Table of content

The structure of energy-saving hydraulic control system

Single-pump Hydraulic Motor Combination



Dual-pump Hydraulic Motor Combination



Specifications of servo driver

Specifications for AC 200V Driver

型式 VL□□□-		070P3	100P3	200P3	320P3	199P3	271P3	325P3	398P3
Main power source		3 ϕ 200~240V (±10%) 50/60Hz							
Operating power source		1 ϕ 200~240V (±10%) 50/60Hz				DC24V (±10%) 1A			
Capacity of main power source [kVA]		5.4	8.0	18	35	38	52	64	78
Maximum output of motor [Kw]		3.4	5.0	11	20	22	30	37	45
Contiguous power output current [Arms]		18.4	28.3	56.6	99	88	120	144	176
Instantaneous maximum current [Arms]		49.5	71.0	141	226	140.8	192	230.4	281.6
PWM Frequency[Hz]						4	4	4	4
Reverse-current absorption circuit		Built-in servo driver							
Reverse current absorption resistance		Externally connected type (PA、JP1(JP2) terminal connection)				Externally connected type (PA/+、PB terminal connection)			
Minimum reverse current absorption resistance [Ω]		15	10	6	3	3.3	2.5	1.7	1.7
Maximum capacity of reverse current absorption [Kw]		0.08	0.1	0.18	0	1.76	1.76	2.2	2.2
Protective structure		IP10							
Cooling structure		Mandatory wind cooling							
Noise of cooling fan [dBA]		60	60	60	60	60	64	64	64
EMC FILTER		Built-in							
Direct current reactor		Built-in							
Calorific value of servo driver [W]						865	1140	1340	1570
Ventilation of mandatory cooling [m^3/min]						5	6.6	7.7	9
Exothermic area of enclosed collection tray [m^2]						17.3	22.8	26.8	31.4
Specifications of electric wires [mm^2]	RST、UVW	2	3.5	8	38	22	38	60	60
	R0、S0	1.25	1.25	1.25	1.25				
	Direct current reactor					22	38	60	60
	Reverse current absorption resistance	2	3.5	8	22	14	14	22	22
	Ground wire E	22	22	22	38	22	22	38	38
No-fuse circuit breaker		S33B20	S33B30	SA63B	SA203BA	NJ225FB	NJ225FB	NJ225FB	NJ225FB
Rated current of circuit breaker [A]		20	30	60	125	125	150	175	200
3ΦAC200V~240V		SC03	SC-4-1	SC-N2	SC-N5	C80J	C80J	LC1D115J	LC1D115J
Capacity of MC1 of electromagnetic contactor MC1 [kW/A]		XX/11	XX/22	XX/40	XX/105	18.5/80	18.5/80	22/115	22/115

Specifications for AC 400V Driver

Type VL□□H-		013P4	024P4	032P4	040P4	050P4	063P4	075P4
Main power source		3 ϕ 380~480V (±10%) 50/60Hz						
Operating power source		DC24V (±10%) 1A						
Capacity of main power source [kVA]		4.4	8	11	13	16.5	21	26
Maximum output of motor [Kw]		2.2	3.7	5.5	7.5	8.5	11	15
Contiguous power output current [Arms]		5.8	10.5	14.3	17.6	22.2	27.7	33
Instantaneous maximum current [Arms]		9.3	16.8	22.9	28.5	35.4	44.3	52.8
PWM Frequency[Hz]		4	4	4	4	4	4	4
Reverse-current absorption circuit		Built-in servo driver						
Reverse current absorption resistance		Externally connected type (PA/+、PB terminal connection)						
Minimum reverse current absorption resistance [Ω]		60	40	30	30	20	20	20
Maximum capacity of reverse current absorption [Kw]		0.12	0.12	0.12	0.44	0.66	0.66	0.88
Protective structure		IP10						
Cooling structure		Mandatory wind cooling						
Noise of cooling fan [dBA]		43	55	56	56	58	58	60
EMC FILTER		Built-in						
Direct current reactor		Built-in						
Calorific value of servo driver [W]		112	136	262	328	358	448	577
Ventilation of mandatory cooling [m^3/min]		0.64	0.78	1.5	1.9	2.1	2.6	3.3
Exothermic area of enclosed collection tray [m^2]		2.3	2.8	5.3	6.6	7.2	9.0	11.6
Specifications of electric wires [mm^2]	RST、UVW	2	2	2	3.5	5.5	5.5	8
	Direct current reactor	2	2	2	2	3.5	3.5	5.5
	Reverse current absorption resistance	2	2	2	2	2	2	2
	Ground wire E	3.5	3.5	3.5	3.5	5.5	5.5	8
No-fuse circuit breaker		GV2L16	GV2L20	GV2L32	GV2L32	NJ50FB	NJ50FB	NJ100FB
Rated current of circuit breaker [A]		14	18	32	32	50	50	60
3ΦAC200V~240V		LC1D096	LC1D096	LC1D126	LC1D186	LC1D256	LC1D256	LC1D326
Capacity of MC1 of electromagnetic contactor MC1 [kW/A]		4/9	4/9	5.5/12	7.5/18	11/25	11/25	15/32

Specifications for AC 400V Driver

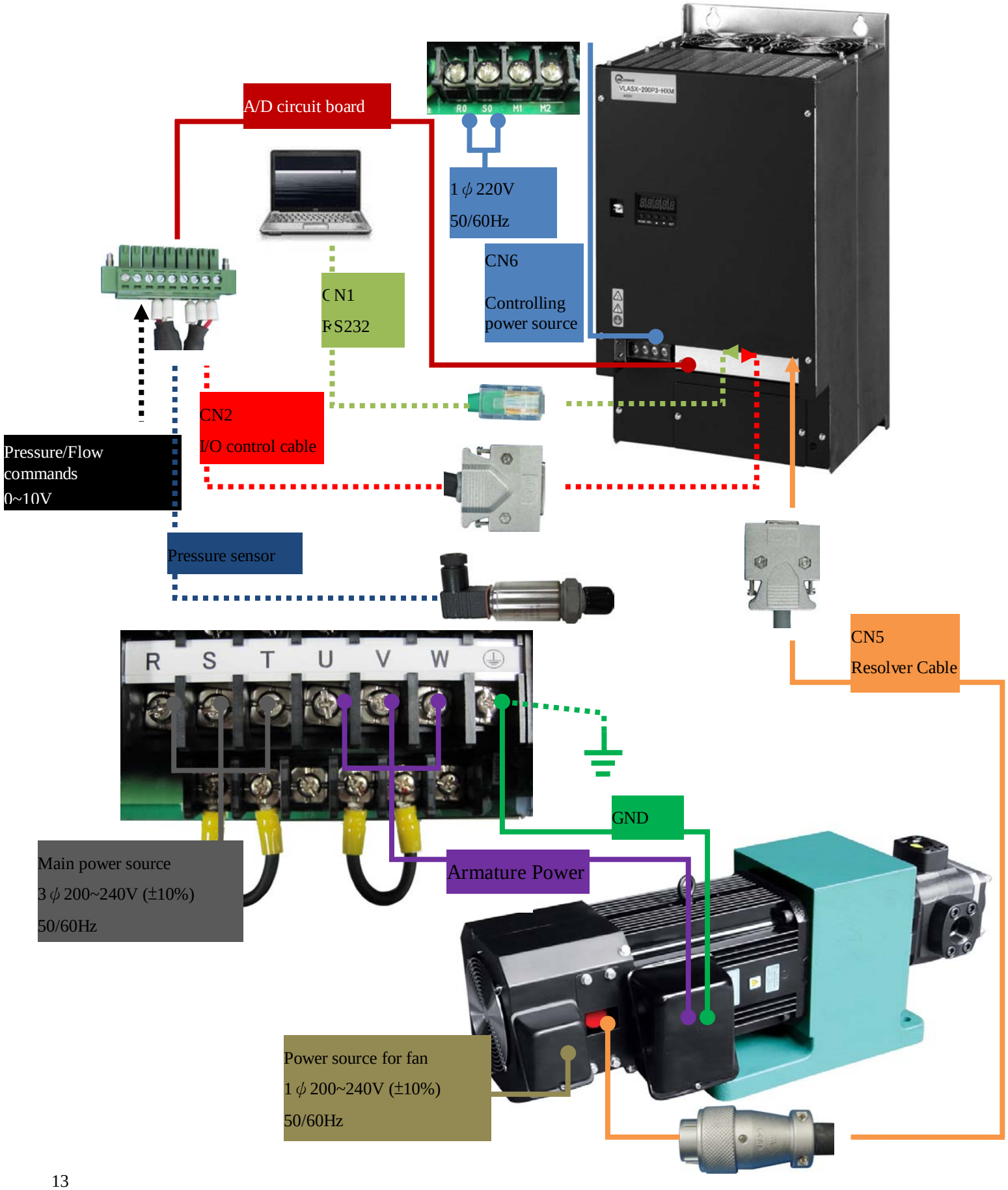
型式 VL□□H-		093P4	109P4	150P4	179P4	213P4	262P4	362P4
Main power source		3 ϕ 380~480V (±10%) 50/60Hz						
Operating power source		DC24V (±10%) 1A						
Capacity of main power source [kVA]		32	38	52	64	78	95	130
Maximum output of motor [Kw]		18.5	22	30	37	45	55	75
Contiguous power output current [Arms]		41	48	66	79	94	116	160
Instantaneous maximum current [Arms]		65.6	76.8	105.6	126.4	150.4	185.6	256
PWM Frequency[Hz]		4	4	4	2.5	2.5	2.5	2.5
Reverse-current absorption circuit		Built-in servo driver						
Reverse current absorption resistance		Externally connected type (PA/+、PB terminal connection)						
Minimum reverse current absorption resistance [Ω]		15	13.3	10	6.7	5	5	3.3
Maximum capacity of reverse current absorption [Kw]		0.88	1.76	1.76	1.76	1.76	1.76	1.76
Protective structure		IP10						
Cooling structure		Mandatory wind cooling						
Noise of cooling fan [dBA]		60	60	64	64	64	64	64
EMC FILTER		Built-in						
Direct current reactor		Built-in						
Calorific value of servo driver [W]		682	720	980	1180	1360	1560	2330
Ventilation of mandatory cooling [m^3/min]		3.9	4.2	5.6	6.8	7.8	9.0	13.4
Exothermic area of enclosed collection tray [m^2]		13.7	14.4	19.6	23.6	27.2	31.2	46.6
Specifications of electric wires [mm^2]	RST、UVW	8	8	14	22	38	38	60
	Direct current reactor	5.5	8	14	22	22	38	60
	Reverse current absorption resistance	5.5	5.5	5.5	14	14	14	14
	Ground wire E	8	8	14	22	22	22	38
No-fuse circuit breaker		NJ100FB	NJ100FB	NJ100FB	NJ100FB	NJ225FB	NJ225FB	NJ225FB
Rated current of circuit breaker [A]		60	60	100	100	125	150	200
3ΦAC200V~240V		LC1D326	LC1D326	C50J	C80J	C80J	C80J	LC1D115J
Capacity of MC1 of electromagnetic contactor MC1 [kW/A]		15/32	15/32	22/48	37/80	37/80	37/80	55/115

Usage Environment

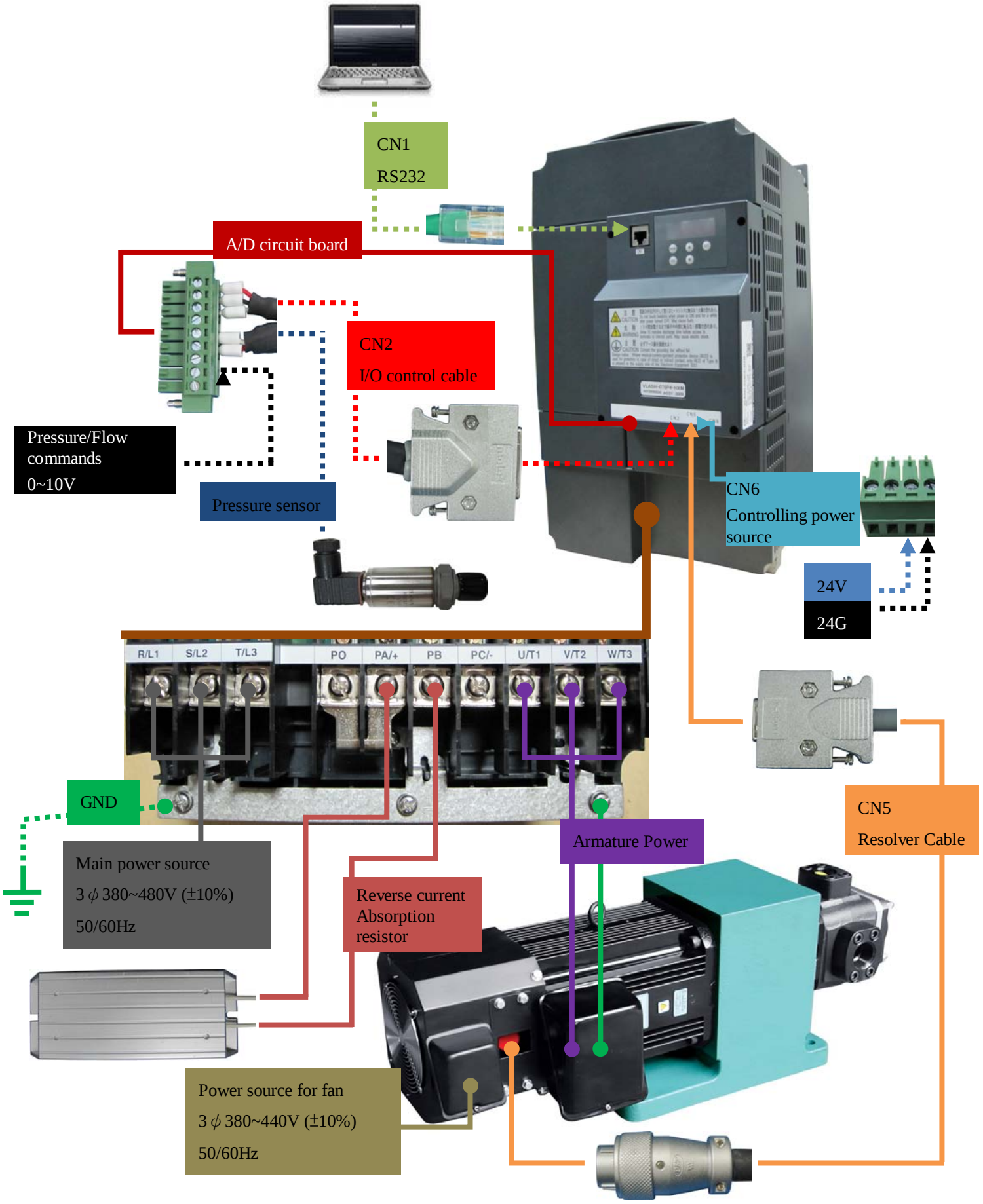
Item		Condition
Ambient conditions of usage	Environment	Indoors, with no direct sunshine
	Temperature	0~50℃（No icing），
	Humidity	35~90%（No dew formation）
	Air	No dust, metallic powder and erosive gases
	Height for installation	Below 1000m
Tolerance towards vibrations: Below 10~55Hz 0.6G (pursuant to JIS C60068-2-6)		
Ambient conditions for preservation	Temperature	-10~65℃（no icing）
	Humidity	35~90%（No dew formation）
	Air	No dust, metallic powder and erosive gases

Components of servo hydraulic system

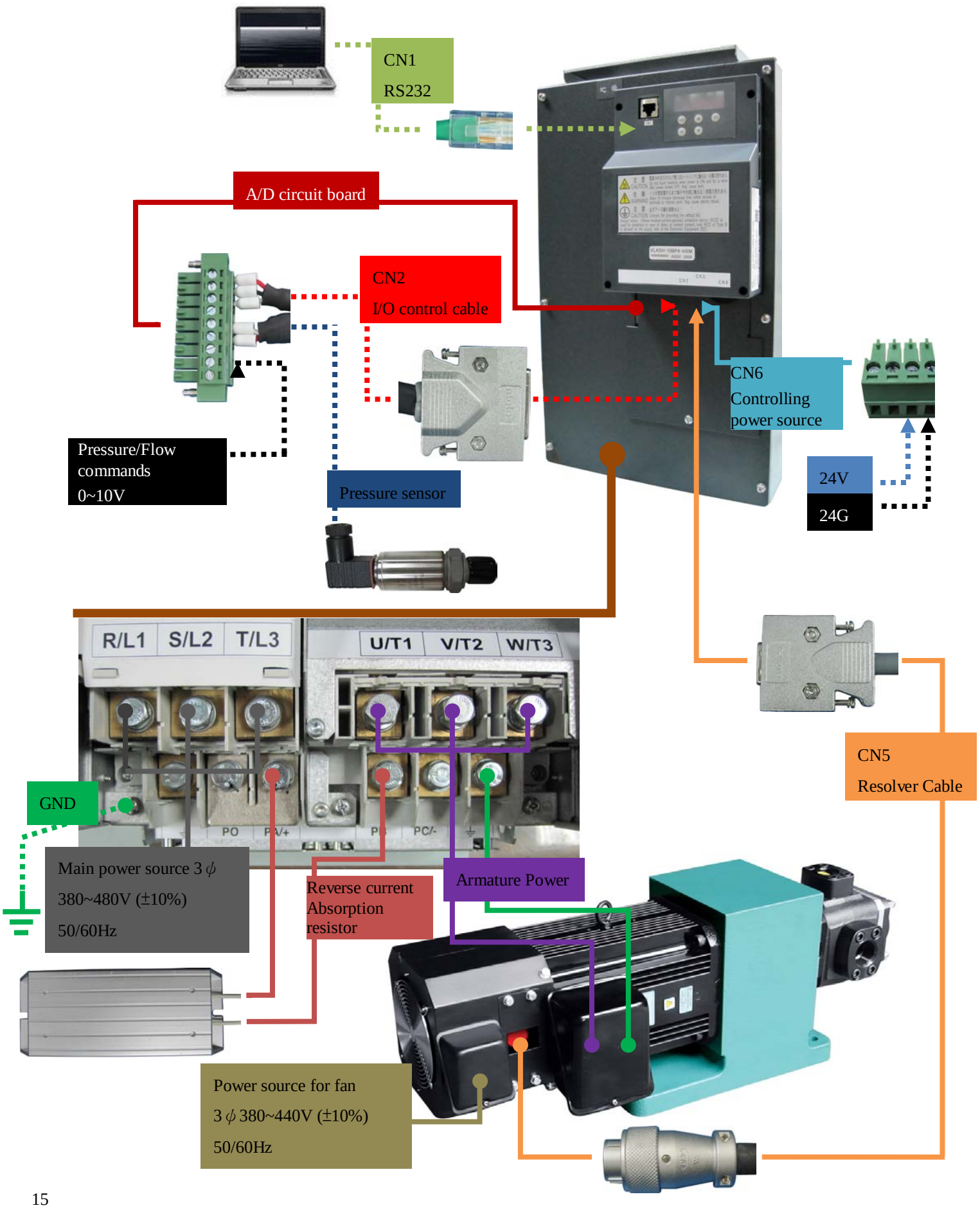
AC 200V Driver



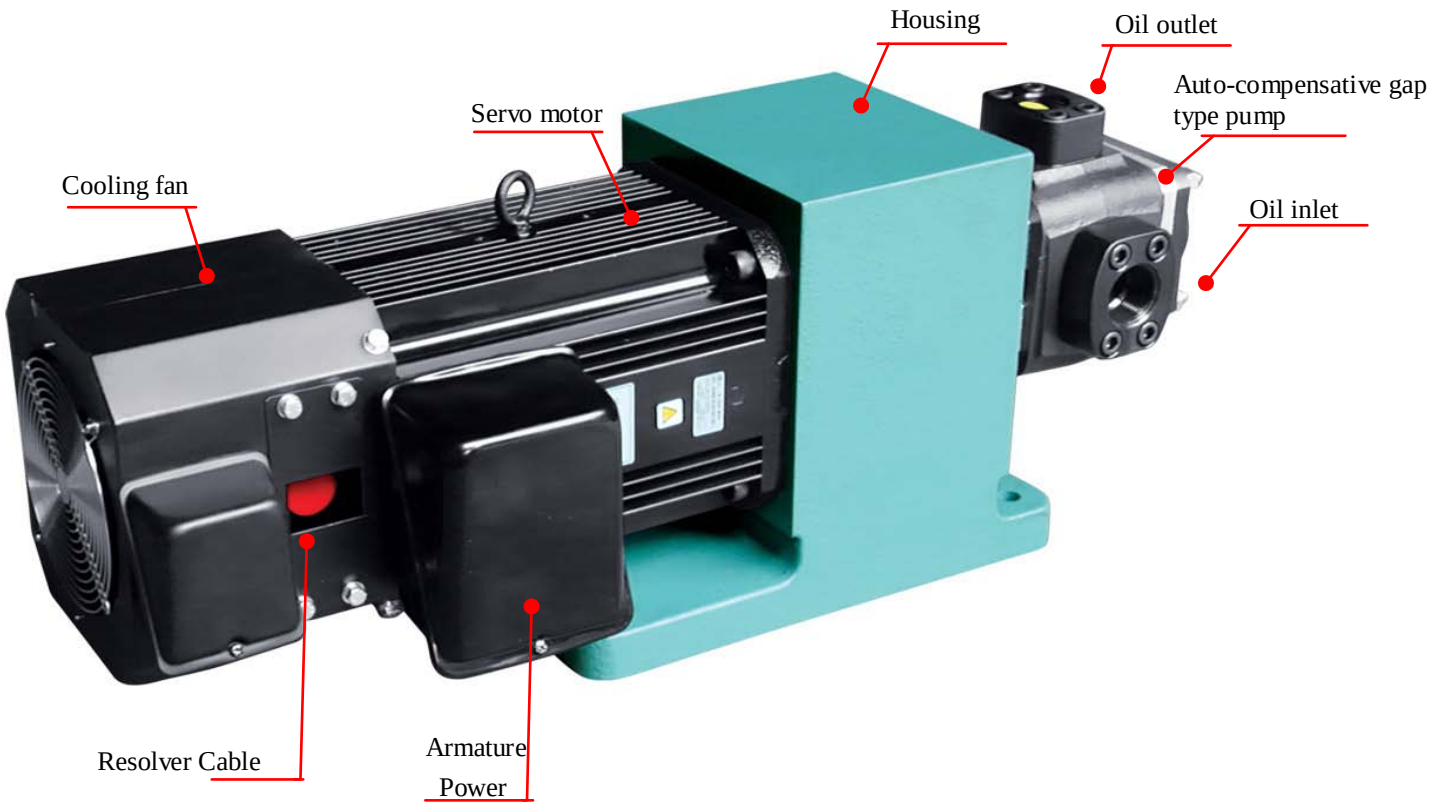
AC 400Vl Driver (0504 ~ 093P4)



AC 400V driver (109P4 ~ 362P4)



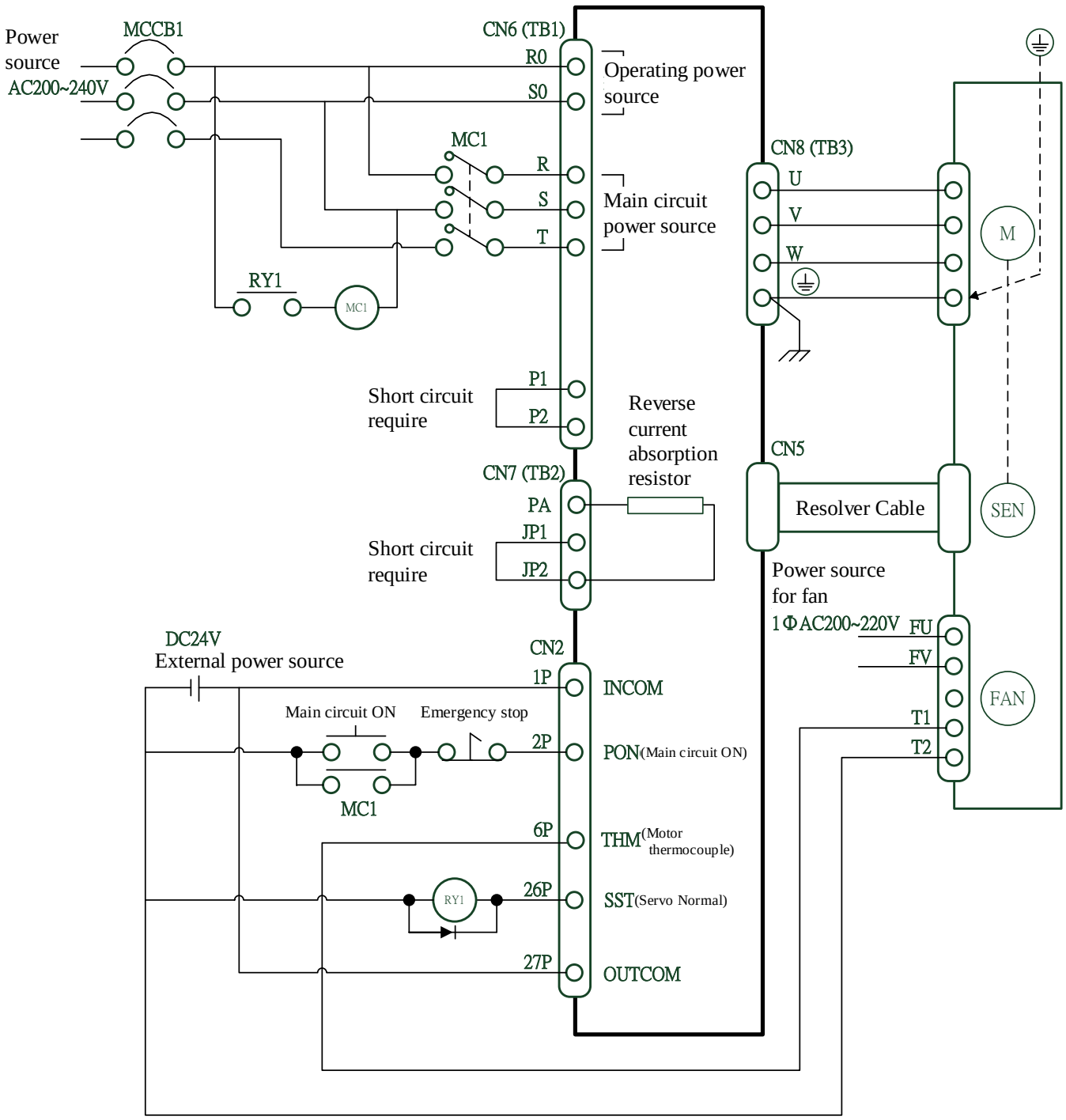
Combination of Servo Motor and Oil Pump



Instruction regarding the displacement of power source of driver

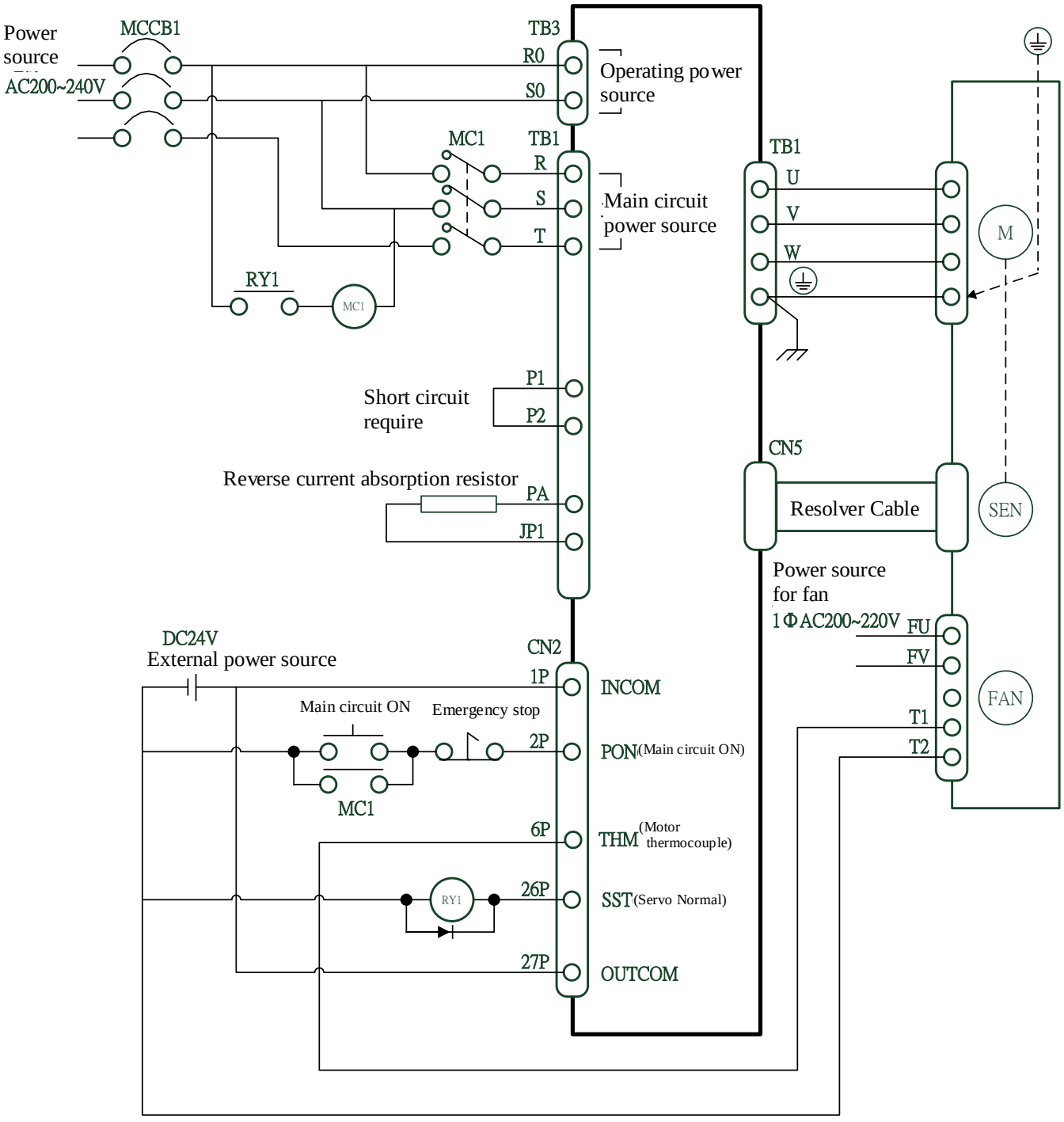
Control of Power Source for AC 200V Main circuit (070P3 ~ 200P3)

VLASX-□□□P□-□□□



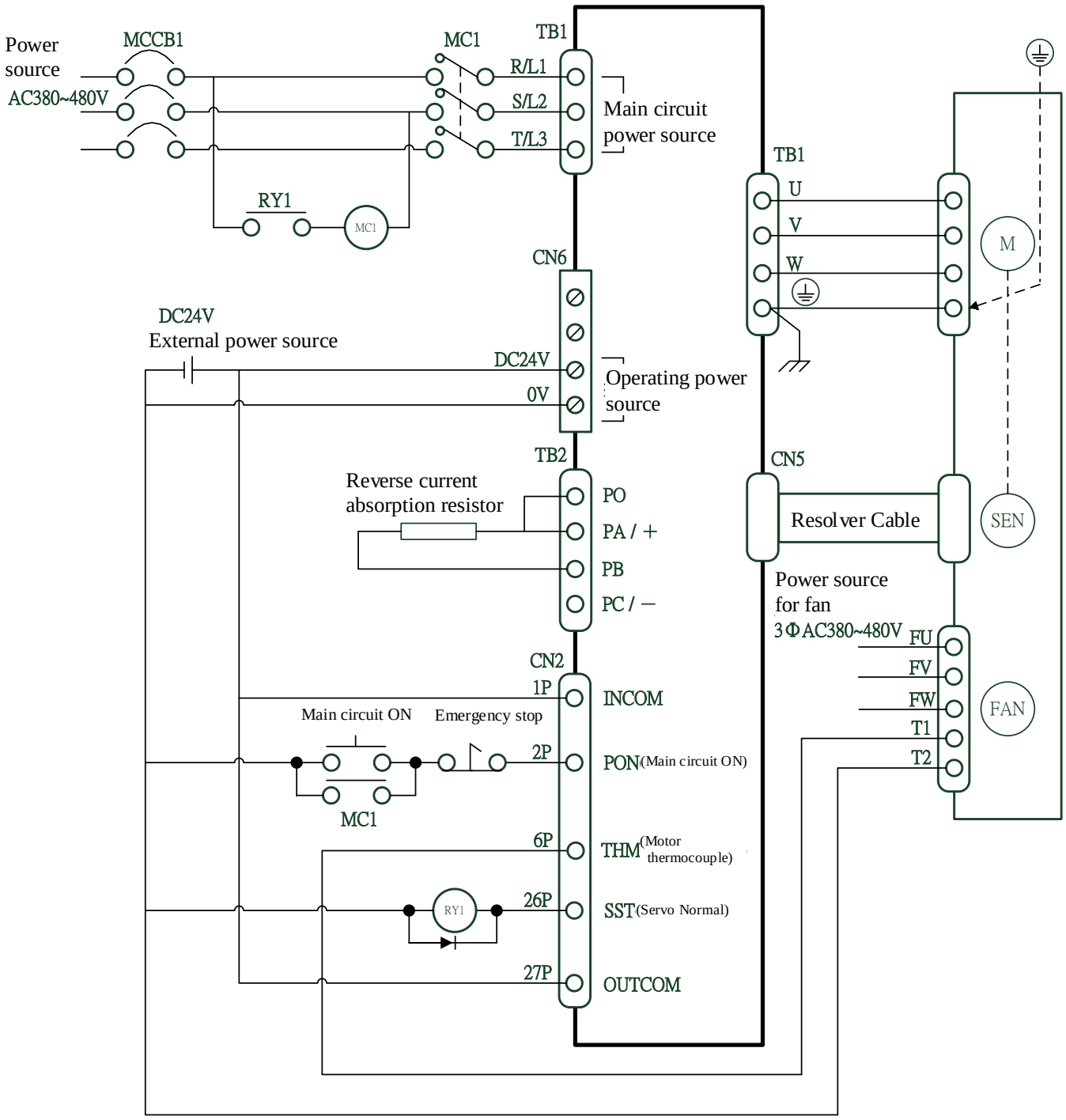
Control of Power Source for AC 200V Main circuit (320P3)

VLASX-320P□-□□□



Control of Power Source for AC 400V Main circuit

VLASH-□□□P□-□□□



Instructions on the Connection and Wiring of Terminal Block

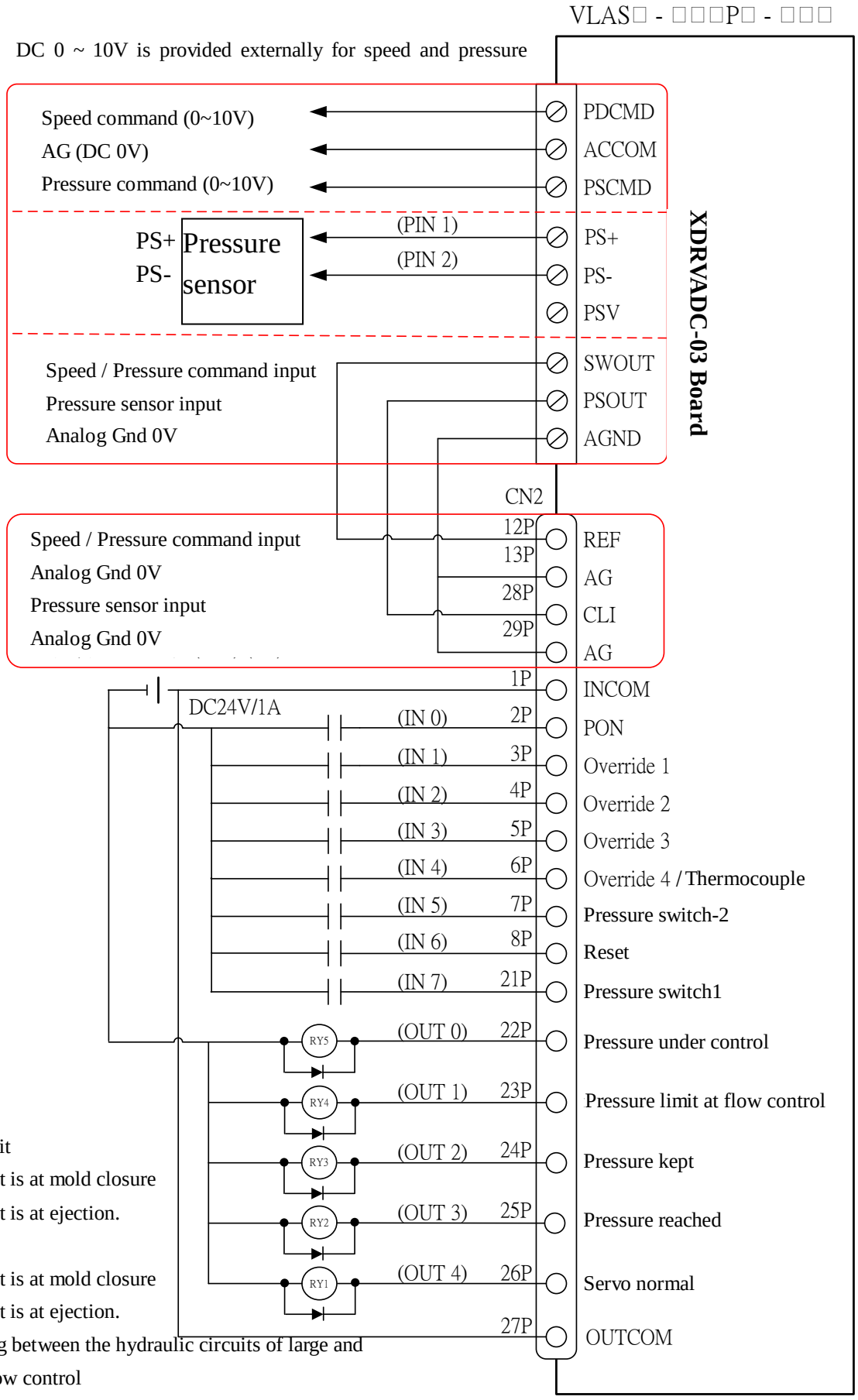
TB01~02

Terminal symbol	Terminal function	X series symbol
R/L1	With AC400V, the connection for the power source of main circuit is AC380V~AC480V (50Hz/60Hz) With AC200V, the connection for the power source of main circuit is AC200V~AC240V (50Hz/60Hz)	R
S/L2		S
T/L3		T
U/T1	Connection for armature power	U
V/T2		V
W/T3		W
Grounding symbol	The grounding terminal for the outer case of servo driver. There are 3 terminals connection to the power source for main circuit, power wire for motor and the grounding wires at 3 locations on the control tray	E
PA/+	The anode side terminal for the direct current source of the internal main circuit When the reclamation function of return current is used, return resistor is connected between PA/+ and PB When using common power mode, the anode side PA/+ of direct current source is connected If internal direct current is insufficient only because of reactor, reactor is connected between PO and PA/+	PA
PB	Reverse current absorption resistor is connected between PA/+ and PB	JP1
PC/-	The cathode side terminal for the direct current source of the internal main circuit When using common power mode, the cathode side PC/- of direct current source is connected	NA
PO	If internal direct current is insufficient only because of reactor, reactor is connected between PO and PA/+	P1(V)

CN6 (TB03)

Pin	Symbol	Name	Function	X series symbol
1	DC24G	Control power source 0V	With AC400 level, the connection for control power source is DC 24V	R0
2	DC24V	Control power source 24V	With AC200 level, the connection for control power source is 1ψ220V / R0, S0	S0
3	DM1	Control output for main circuit MC	Output for controlling purposes of main circuit MC	M1
4	DM2			M2

Instructions on driver control circuit



Note

※Single-pump hydraulic unit

7P(IN5) Control input point is at mold closure

21P(IN7) Control input point is at ejection.

※Dual-pump hydraulic unit

7P(IN5) Control input point is at mold closure

21P(IN7) Control input point is at ejection.

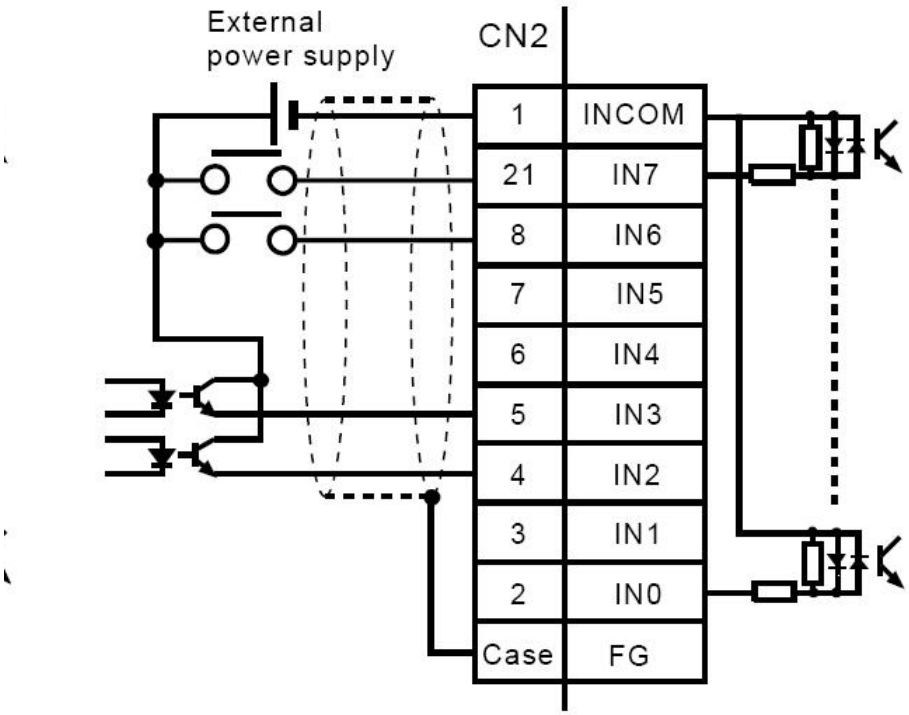
22P(OUT0) for the switching between the hydraulic circuits of large and small pumps at combined flow control

※Detection of motor temperature

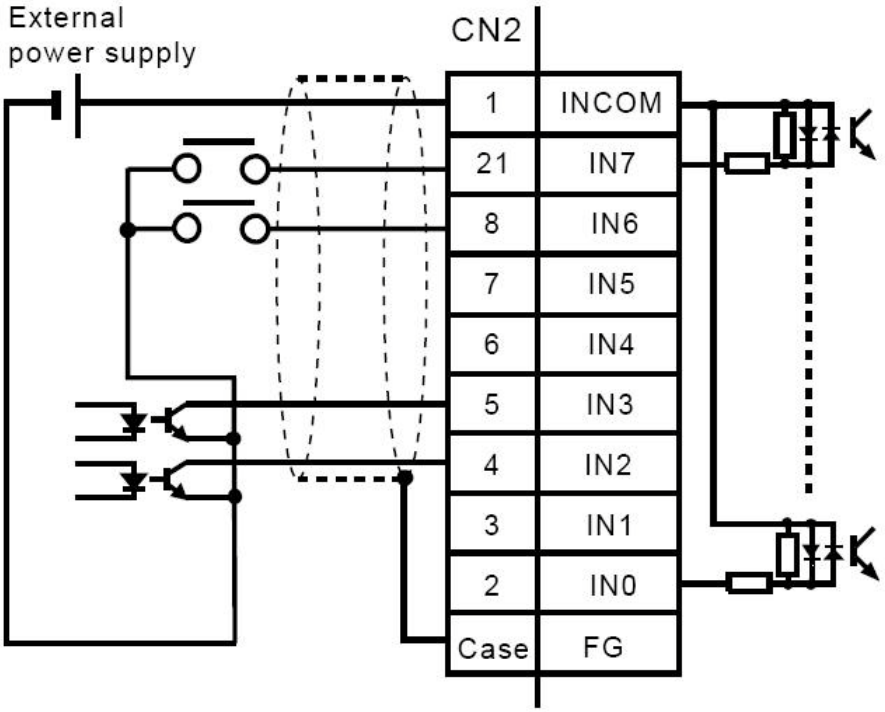
6P(IN4) Connected to T1/T2 of motor, which is normal closed contact.

I/O Input Wiring Type

Input (minus common)

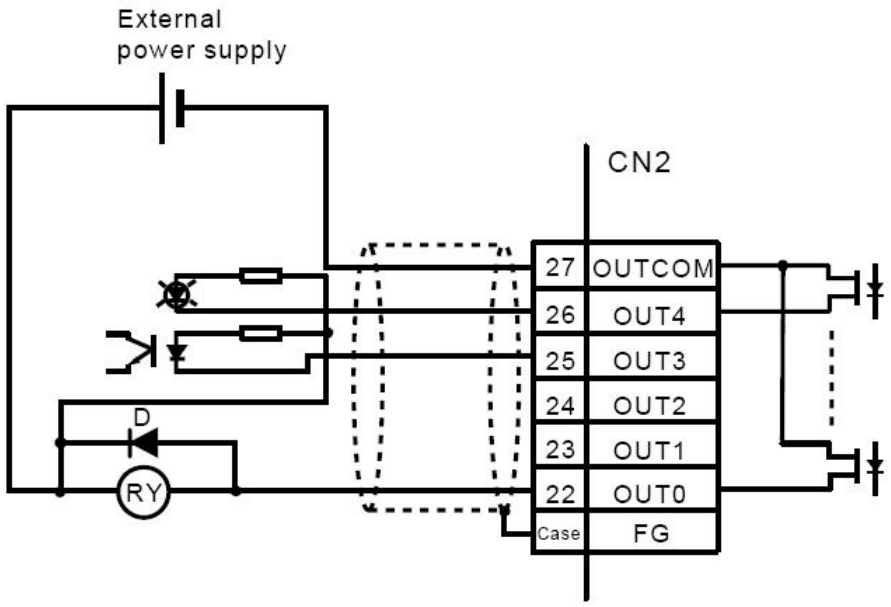


Input (plus common)

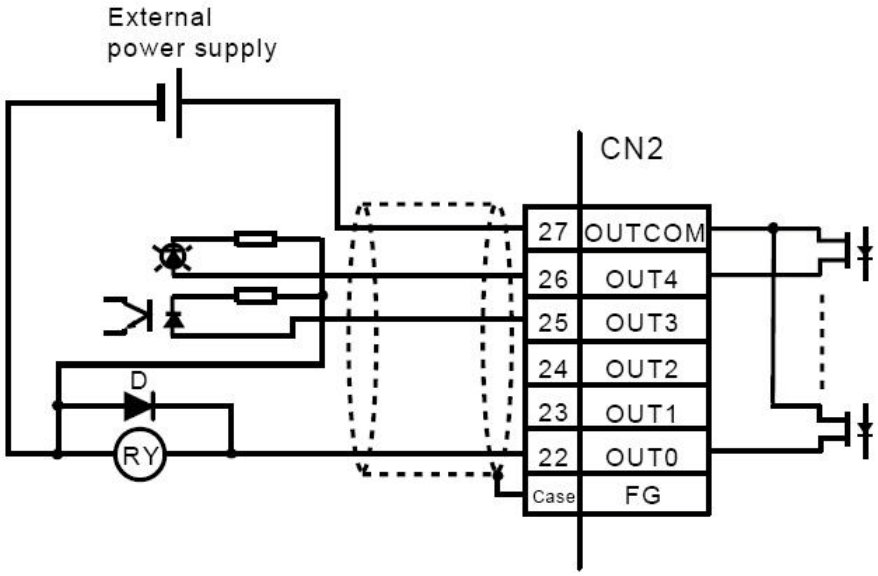


I/O Output Wiring Type

Output (minus common)



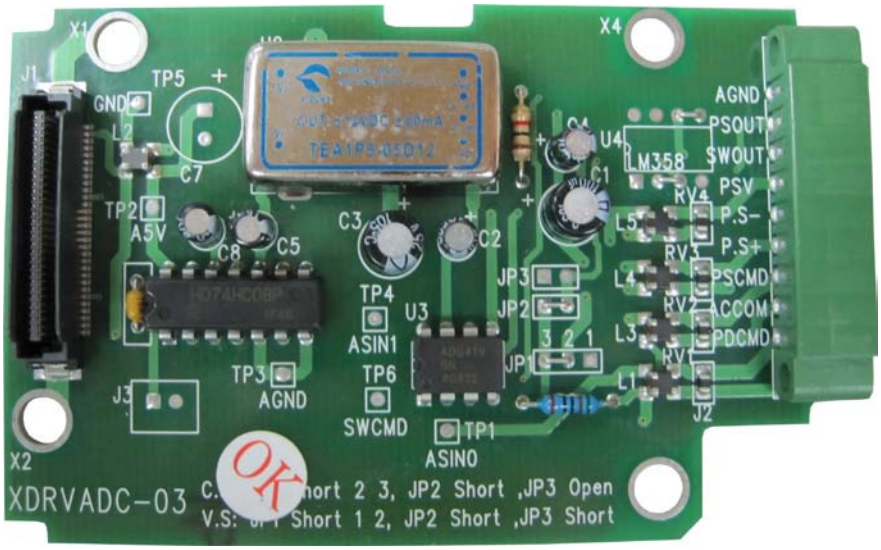
Output (plus common)



Instructions on I/O Functions

Type	Name	Terminal number	Function	Electrical Specification
Analogue input	Flow command/Pressure command (REF)	12P (REF)	Flow and pressure commands are input by the switching at selection port	Vin±11.5V (MAX) Input resistance 49Ω AD resolution ±2048 (when ±11.5V) ON voltage 19.2V ~ 26.4V OFF voltage 3V (MAX) ON current 6mA (TYP) Smallest ON/OFF cycle 1ms at 24V
		13P (AG)	The inputs of commands are 400 μS cycle switching, and the renewal cycle is 800 μS Zero adjustment is AP01, and scale adjustment is UP80 or UP90	
	Pressure feedback (CLI)	28P (CLI)	Input pressure feedback Zero adjustment is AP03, and scale adjustment is UP81	
		29P (AG)		
24V input	Pressure switching	21P (IN7)	<When setting UP71=0, 2> Signal ON, after the timer (UP85) for permitting the switching of pressure control has reached, and when the switching pressure (UP86) of pressure control has reached, switch to pressure control <When setting UP71=1,3> Signal ON, switch to pressure control	
	Reset	8P (IN6)	Driver reset. (30ms and above ON)	
	Pressure-keeping switching	7P (IN5)	<When setting UP71=2, 3> Switch to pressure-keeping control when ON	
	Speed adjustment selection 4/thermocouple for motor	6P (IN4)	<When setting UP120=0> when ON, the speed adjustment ratio has been set for the flow command at UP107 of analogue input to determine flow command <When setting UP120=1> when OFF (204.8 ms cycle at 2 contiguous OFF), emergency stop at AL-11	
	Speed adjustment selection 3	5P (IN3)	The selection function for the speed adjustment ratio of the attachable flow command When IN1 ~ IN4 ON, the flow command at analogue input assigns speed adjustment ratio at UP104~UP107 to determine the allocation amount of flow command	
	Speed adjustment selection 2	4P (IN2)		
	Speed adjustment selection 1	3P (IN1)		
	Main circuit + operation	2P (IN0)	MC output is ON, the solenoid contactor of main circuit is ON, the charging for PN power source is complete and the permission status for operation is complete (motor at excited state); when OFF, motor is not at excited state and the solenoid contact of main circuit is OFF, please include emergency stop circuit in design.	
24V output	Servo normal (SST)	26P (OUT4)	AC power source is turned on, and is at ON status in 3 seconds. It is at OFF status when alarms occur, and at ON when alarms are alleviated.	ON voltage 1.5V (MAX) at 50mA (MAX current) Instantaneous OFF current 1μA (MAX)
	Pressure reached	25P (OUT3)	ON when pressure feedback value is greater than the set value of UP100	
	Pressurization under control	24 (OUT2)	Smaller than pressure parameter set value at flow command, and is switched to pressurization maintenance control at ON. When OFF, switched to	
	Pressure limit at flow under control	23P (OUT1)	ON when, at flow under control, the pressure feedback value reaches the pressure command percentage assigned by UP94. When OFF, switch to flow under control or pressure under control. OFF when, at flow under control or pressure control, the pressure feedback value is smaller than the pressure command percentage assigned by UP96	
	Pressure under control	22P (OUT0)	When ON, switch to pressure control. When OFF, switch to flow control or pressurization under control OFF when the pressure feedback value is smaller than the pressure command percentage assigned by UP88	
Note: H series driver has no internal DC24V power source, so please use an external DC24V power source.				

A/D Circuit Board (XDRVADC-3)



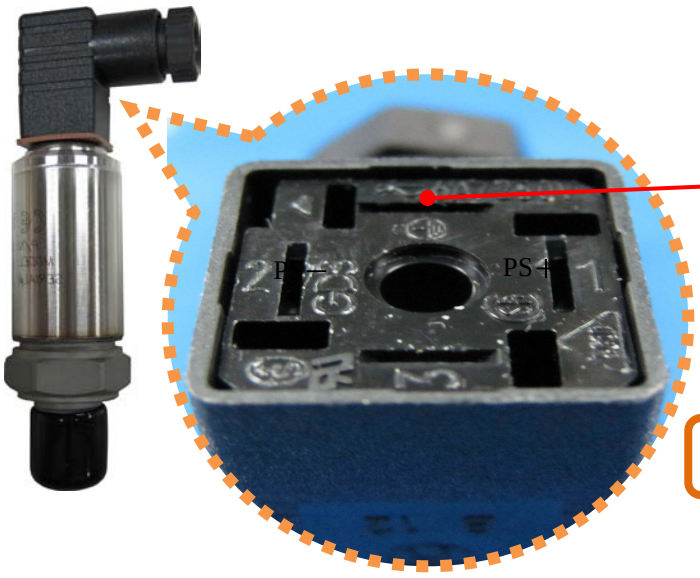
Note

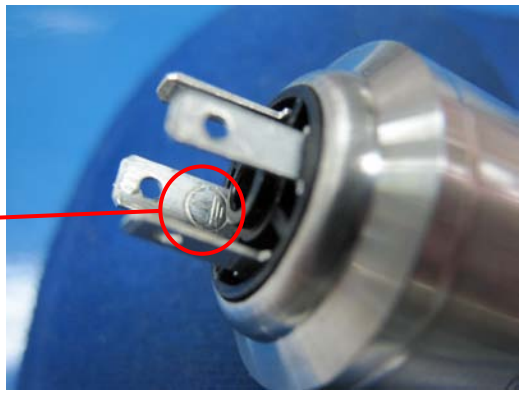
A/D circuit board is installed on the driver at delivery

Please ensure the correctness of wiring before the transmission power

After the transmission of power and before PON ON (IN0), please make sure that the C.C value of the driver is identical with that of UP-77

Pressure Sensor

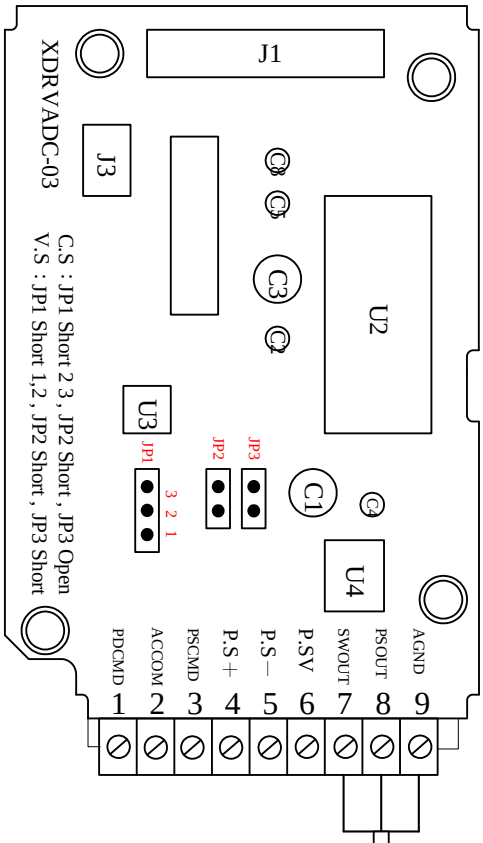


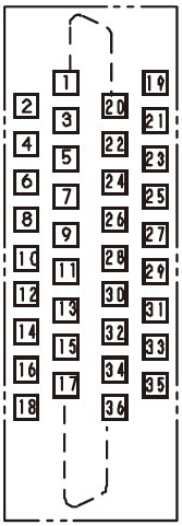


Note

※The signal socket of the sensor marked “1” is PS+.
※The signal socket of the sensor marked “2” is PS-
※When plugging into the sensor signal socket, the hole on the socket marked with the grounding symbol should be matched with the pin on the sensor marked with the same symbol for secure plugging.

The CN2 Wiring of Driver





CN2 36 pin

The rear view of the connector

CN2 connector
36 Pin

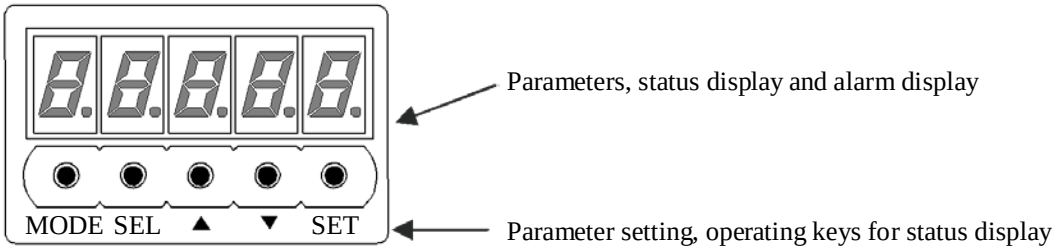
Insulation wire 3-corex25cm

XDRVADC-03 Pin of Board	Color	Pin of CN2
7	White	12
8	Black	28
9	Red	13 , 29

Color	Pin
Red	1P (INCOM)
White	2P (IN0)
Reserved	3P (IN1)
Yellow	4P (IN2)
Blue	5P (IN3)
Indigo	6P (IN4)
Black	7P (IN5)
Purple	8P (IN6)
Green	21P (IN7)
Navy	22P (OUT0)
Pink	23P (OUT1)
Brown	24P (OUT2)
Brown & Black	25P (OUT3)
Orange	26P (OUT4)
Grey	27P (OUTCOM)

Insulation wire 14-core

Instructions on the operation panel of driver



Operating Keys of Different Sections

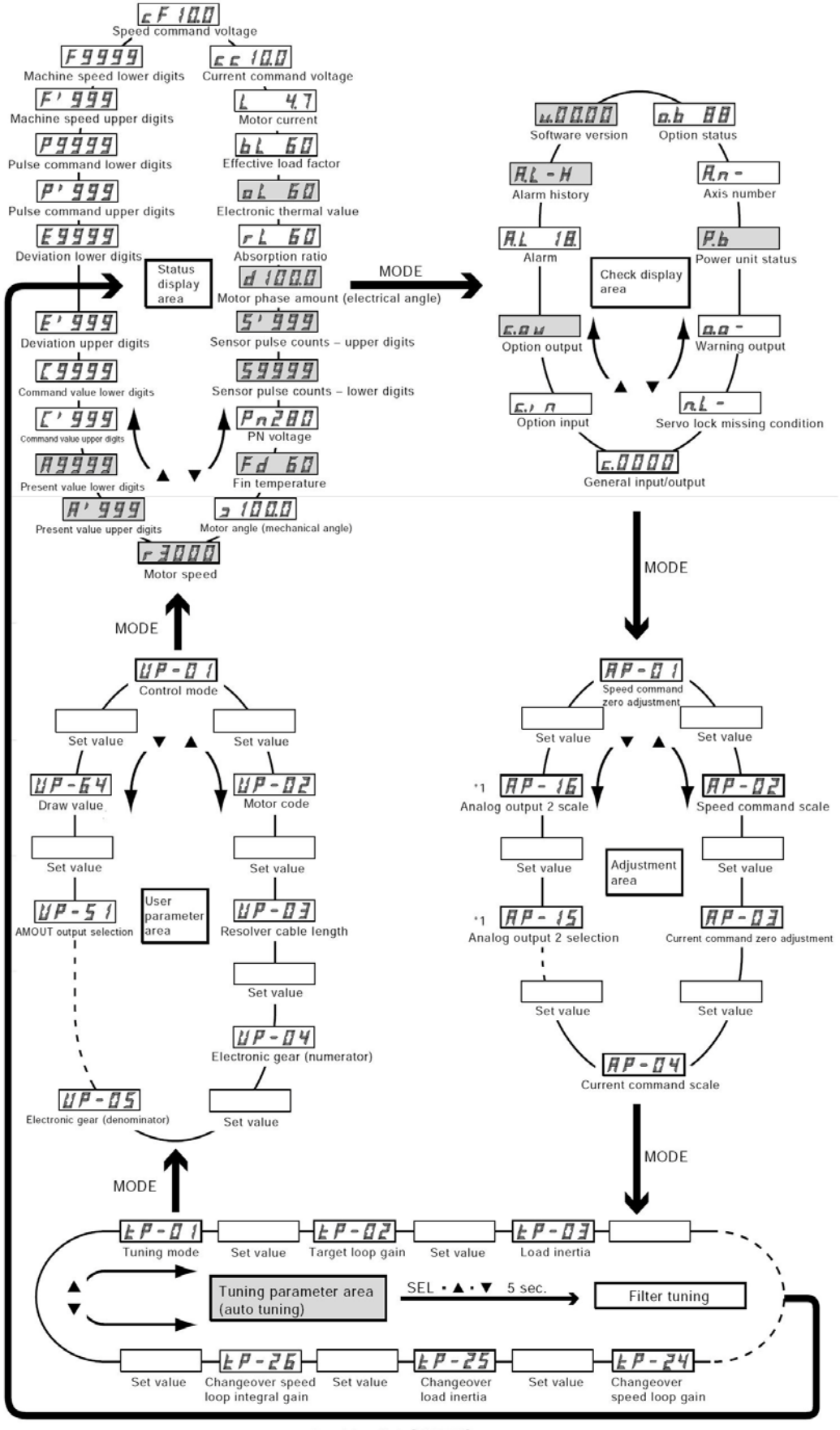
Illustrations on the functions of individual keys

Name	Function
MODE	Switching of functions for parameter and status displays. Please refer to the graphical presentation of the migration of status display
SEL	The switching of units, tens, hundreds and thousands digits when using parameter setting
▲	Switching between statuses displays when using the status display, incrementing digits when setting parameters
▼	Switching between statuses when using the status display, decrementing digits when setting parameters
SET	The Enter key after parameters have been set, use with resetting alarms

Illustrations of functions with 2-key combinations

Name	Function
SEL+SET	Use for writing parameter settings
▲+MODE	Use for fixating the rotational speed of motor and contiguous clockwise operation when performing motor trial runs
▼+MODE	Use for fixating the rotational speed of motor and contiguous counterclockwise operation when performing motor trial runs
SEL+▼	Use for the automatic zero-level adjustment
SEL+▲+▼	Use for entering the next status display when statuses are displayed during motor trial runs

The Operation and Migration of Parameters and Status Display



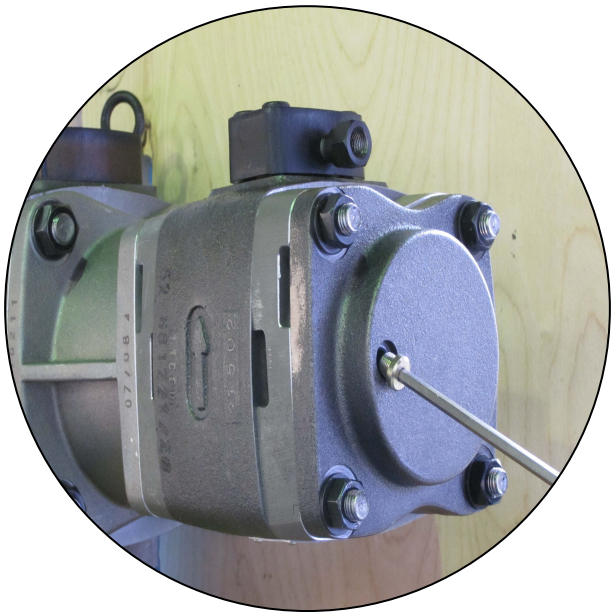
Double-click [MODE].

Instructions on LED Status Display

LED status display shows the rotational speed of motor, as well as the operational statuses of commands such as pressure and flow. Press MODE to switch the status display to rotational speed of motor, and use ▲ or ▼ key to toggle between statuses.

Status display	Symbol	Range/Unit	Content
Rotational speed of motor		±99999min^-1	Represents the rotational speed of motor, and the symbol flashes when the motor rotates in counterclockwise direction
Pressure command		kg/cm^2	Represents the entered value of pressure command
Pressure feedback		kg/cm^2	Represents the feedback pressure value
Voltage for pressure command		0.1V	Represents the voltage value of the pressure command signal entered
Flow command		r/min	Represents the value of the flow command entered
Voltage for flow command		0.1V	Represents the voltage value of the flow command signal entered
Voltage for pressure feedback		0.1V	Represents the voltage value of feedback pressure
Motor current		±0.0~ maximum A	Represents the output current of motor
Actual load ratio		0~255%	Represents the load ratio of the rated current of motor (output current/rated current)
Fan temperature		0~200℃	Represents the calculated fan temperature from input analogue values

Discharge of Air of Oil Pump



NOTE

When there is an air-discharge hole on the top of the oil pump

※Please complete the infusion of oil into the oil chamber located inside of the machine unit

※Regarding to the partial-discharge hole on top of the oil pump, please loosen the screw of the air-discharge hole.

※Tighten the screw of the air-discharge hole after the discharge of hydraulic oil.

NOTE

When there is no air-discharge hole on top of the oil pump

※Please complete the infusion of oil into the oil chamber located inside of the machine unit.

※Loosen the screw for the oil pipe of the oil outlet of the pump.

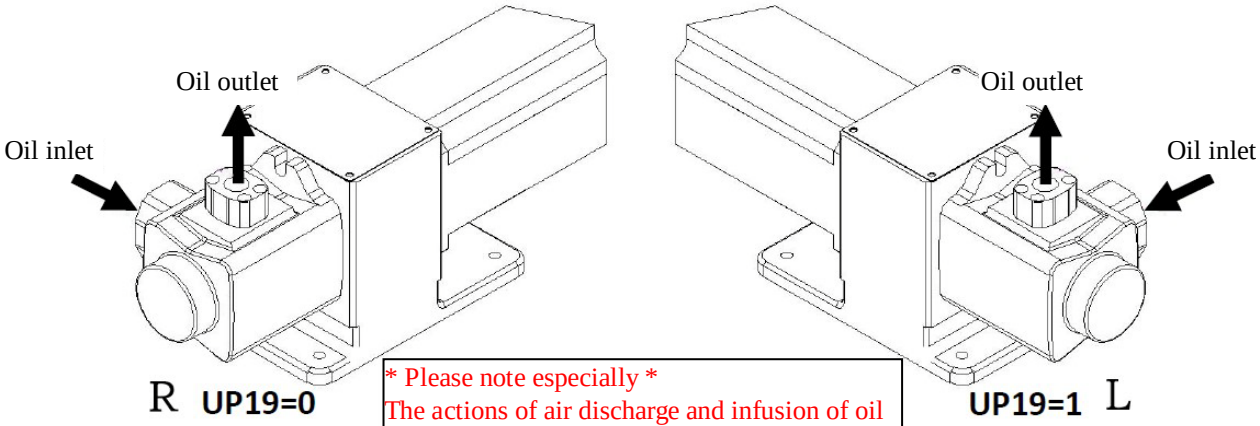
※Place a hex key wrench or Phillips screwdriver on the screw fixation hole of the coupling.

※Rotate the coupling according to the rotational direction of the oil pump till hydraulic oil begins being discharged from the oil outlet.

The Selection of Rotational Direction for Motor and Oil Pump

After the resolver of the motor has been taken off from CN5 of the driver, please turn on the power source of the driver, set the rotational direction of the oil pump according to the instruction labels on the hydraulic motor combination system, inspect whether or not the rotational direction of motor is correct, change the parameter value at UP-19 and turn off the power source of the driver. The ventilation direction for the cooling fan of motor must be ventilation from the end of the motor toward the oil pump.

Illustrations regarding the directions of the oil inlet/outlet of the PUMP



The Setting of Sensors

Please take off the connection terminal on the A/D circuit board, and the resolver of motor from CN5 of the driver before the transmission of electricity. After the transmission of electricity from the power source of driver, LED displays AL-19. Use MODE key and select " r □□□□" status,▲ or ▼key to toggle to cc (voltage for pressure feedback), and then set relevant parameter value in UP-77 according to cc content values.

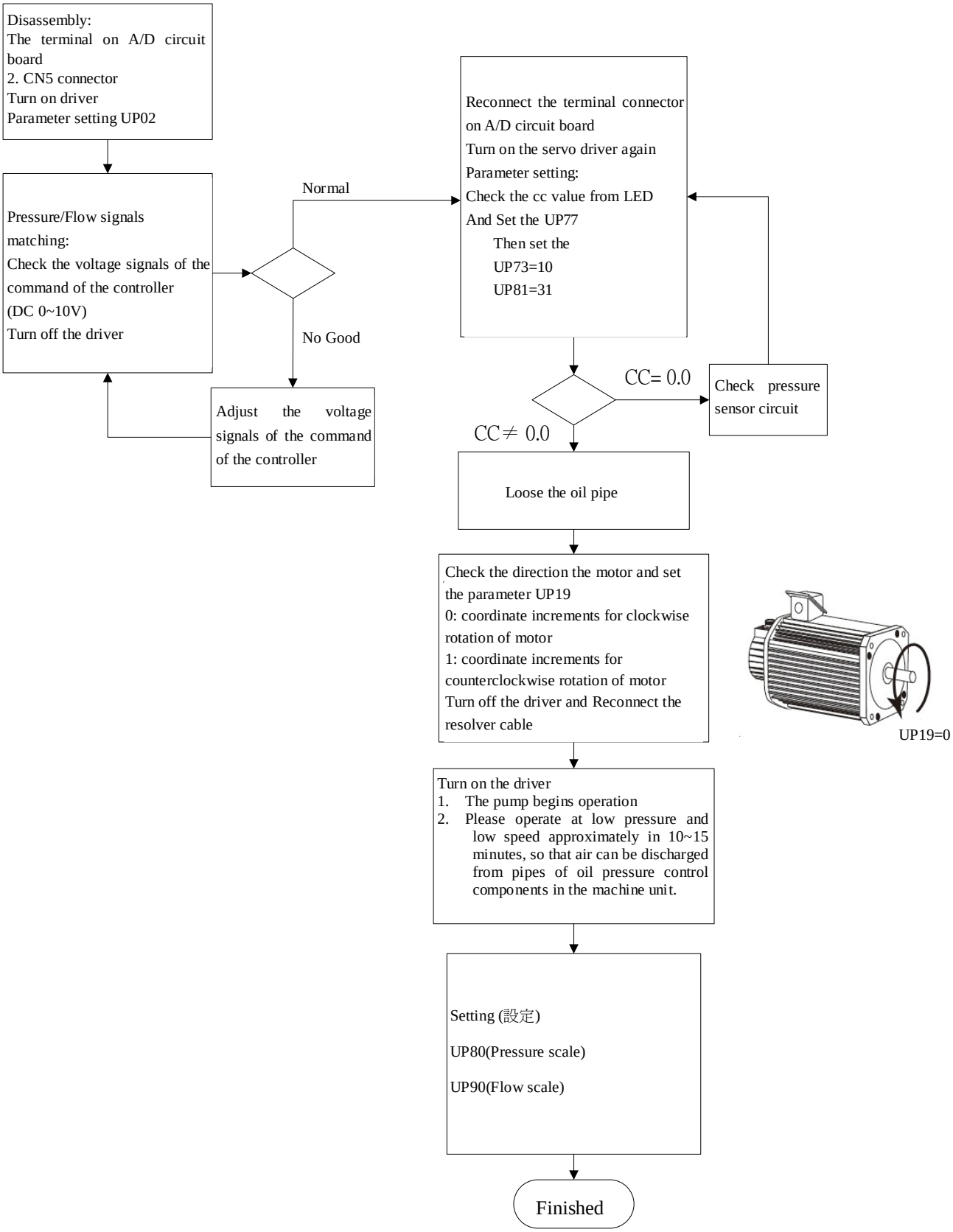
Matching between Pressure and Flow Signals

Before the matching with the pressure and flow signals of driver, the connector terminal on A/D circuit board should be taken off after shutting down the power source of driver in order to ensure system computer pressure and the pressure of flow signals not exceeding the rated current of driver, i.e. DC 10V, so the driver is not damaged.

Set the pressure and flow values at the system computer to maximum, and use an avometer to measure whether or not the maximum voltage value is DC 10V. Upon normal result of the testing, reconnect the connector terminal on A/D circuit board and turn on the power source of driver. Set the LED status display to Pc (pressure command) and use the system computer to send pressure signals to see if they are identical with the values on the driver. If they are not identical, please adjust the voltage of the pressure signals sent by the system computer, and when the adjustment is complete, set the LED status display to F (flow command), let the system computer send out flow signals, and follow the same steps of adjusting pressure to adjust the voltage of flow signals sent by the computer.

Regarding the results from the measurement of pressure by the oil meter, other factors can cause disparity between the results on the oil meter and the output pressure and flow on the system computer even after the matching between the pressure and flow signals of the system computer and those of the driver is complete. When such disparity occurs, please forego the above steps and perform direct matching between the system computer and oil meter regarding pressure and flow signals.

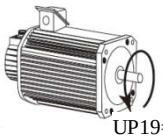
Flowchart for System Trial Runs



Instructions for driver parameters

Note

Parameters specially marked with a different are commonly used

<table>
<tr><th>Parameter</th><th>Name</th><th>Unit</th><th>Range</th><th>Factory value</th><th>Function</th></tr>
<tr><td>UP01</td><td>Control mode</td><td>None</td><td>0~7</td><td>7</td><td>Setting the control modes for servo driver. 7: flow and pressure control mode</td></tr>
<tr><td>＊ UP02</td><td>Motor code</td><td>None</td><td>0~
64999</td><td>0</td><td>
<table>
<tr><td colspan="5"><AC200V ></td></tr>
<tr><td>Code</td><td>Type of motor</td><td>UP66</td><td>UP67</td><td>Resolver</td></tr>
<tr><td>01216</td><td>VLBSV-ZA45012</td><td>0</td><td>0.00</td><td>2X</td></tr>
<tr><td>01217</td><td>VLBSV-ZA10K20</td><td>0</td><td>0.00</td><td>2X</td></tr>
<tr><td>01218</td><td>VLBSV-ZA33030</td><td>0</td><td>0.00</td><td>2X</td></tr>
<tr><td>08363</td><td>VLBSG-D11K15V2</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>01375</td><td>VLBSG-D16K20</td><td>18</td><td>80.00</td><td>2X</td></tr>
<tr><td>08367</td><td>VLBSG-D10K10V2</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>08364</td><td>VLBSG-D22K15V2</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>08376</td><td>VLBSG-D30K20V2</td><td>18</td><td>80.00</td><td>1X</td></tr>
</table>
<table>
<tr><td colspan="5"><AC400V ></td></tr>
<tr><td>Code</td><td>Type of motor</td><td>UP66</td><td>UP67</td><td>Resolver</td></tr>
<tr><td>01701</td><td>VLBSH-ZB45012</td><td>5</td><td>11.00</td><td>2X</td></tr>
<tr><td>01705</td><td>VLBSH-ZB75020</td><td>3</td><td>12.00</td><td>2X</td></tr>
<tr><td>01702</td><td>VLBSH-ZB10K20</td><td>5</td><td>18.00</td><td>2X</td></tr>
<tr><td>01703</td><td>VLBSH-D15K20</td><td>18</td><td>80.00</td><td>2X</td></tr>
<tr><td>01706</td><td>VLBSH-D16K20</td><td>18</td><td>80.00</td><td>2X</td></tr>
<tr><td>01704</td><td>VLBSH-D20K20</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>01707</td><td>VLBSH-D22K20</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>08708</td><td>VLBSH-D30K20V2</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>08709</td><td>VLBSG-D10K10V2</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>08710</td><td>VLBSH-D25K20</td><td>18</td><td>80.00</td><td>1X</td></tr>
<tr><td>08711</td><td>VLBSH-D37K20</td><td>18</td><td>80.00</td><td>1X</td></tr>
</table>
</td></tr>
<tr><td>UP08</td><td>Limit value for electric current</td><td>0.10%</td><td>0.0~
100.0</td><td>0</td><td>The limit value for electric current that sets the maximum matching percentage of electric current of motor
Set to 0.0 when flow, pressure control is used. Please use 4-quardrant electric current limit mode</td></tr>
<tr><td>＊ UP19</td><td>Polarity for position control</td><td>None</td><td>0~1</td><td>0</td><td>Setting the rotational direction of motor and relating direction for increments
0: coordinate increments for clockwise rotation of motor
1: coordinate increments for counterclockwise rotation of motor
 
UP19=0</td></tr>
<tr><td>＊UP21</td><td>Value for External reverse-current absorption resistor</td><td>0.1Ω</td><td>0.0~
100</td><td>0.0</td><td>Setting when external reverse–current absorption resistor is used
Set to 0.0 when internal external reverse–current absorption resistor is used (applicable to all modes)</td></tr>
<tr><td>＊UP22</td><td>The capacity of external reverse-current absorption resistor</td><td>0.01kw</td><td>0,00~
327.67</td><td>0.00</td><td>Setting the capacity of external reverse–current absorption resistor
Set to 0.00 when internal external reverse–current absorption resistor is used (applicable to all modes)</td></tr>
<tr><td>UP31</td><td>The test amount of rotation of motor</td><td>1min^ -1</td><td>1~
10000</td><td>50</td><td>Setting the rotational speed of test runs of motor (applicable to all modes)</td></tr>
</table>

UP34	Limit to switching methods	None	000~121	121	Setting the limiting methods for the electric current of 4 quadrants under flow, pressure control modes <Units digit> 1 is used under flow, pressure control mode <Tens digit> 2 is used under flow, pressure control mode <Hundreds digit> limit of electric current of 4 quadrants =0: the symbol switching of speed command =1: the symbol switching of speed detection
UP36	Forward drive current limit value	0.10%	0.0~100.0	100	Applicable when UP08=0.0 and the 4-quadrant limiting mode of electric current is selected , it limited the forward drive current.
UP37	orward rotation absorption current limit value	0.10%	0.0~100	100	Applicable when UP08=0.0 and the 4-quadrant limiting mode of electric current is selected , it limited the forward rotation absorption current.
UP38	Reverse drive current limit value	0.10%	0.0~100.0	100	Applicable when UP08=0.0 and the 4-quadrant limiting mode of electric current is selected , it limited the reverse drive current.
UP39	Reverse rotation absorption current limit value	0.10%	0.0~100	100	Applicable when UP08=0.0 and the 4-quadrant limiting mode of electric current is selected , it limited the reverse rotation absorption current.
UP44	Sequence input reversal	None	000~1FE	000	Setting the logic reversal of hexadecimal sequential input Setting individual bit: 0 as non-reversal, and 1 as reversal

Input pin	IN7	IN6	IN5	IN4	IN3	IN2	IN1	IN0	[0: non-inversion] [1: inversion]
Logical inversion	1/0	1/0	1/0	1/0	1/0	1/0	1/0	0	
Hex	0 ~ F				0 ~ F				
(Applicable to all modes)									

UP45	Sequence output reversal	None	00~FE	00	Setting the logic reversal of hexadecimal sequential input Setting individual bit: 0 as non-reversal, and 1 as reversal

Output pin	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1	OUT0	[0: non-inversion] [1: inversion]
Logic reversal	1/0	1/0	1/0	1/0	1/0	1/0	1/0	0	
Hex	0 ~ F				0 ~ F				
(Applicable to all modes)									

UP66	Gain of the electromechanical phase angle	None	0~1000	0	Change the gain of the electromechanical phase angle
UP67	electromechanical phase angle	0.01°	0.00~80.00	0	Change the electromechanical phase angle
UP70	Selection of flow/ pressure command form	None	0~1	0	Selecting the command form of flow and pressure commands 0: flow command … analogue command (REF input) pressure command … analogue command (REF input) *Switch REF input at 400us cycle flow command and pressure command 1: flow command … fixed parameter value (UP97) pressure command … fixed parameter value (UP89)

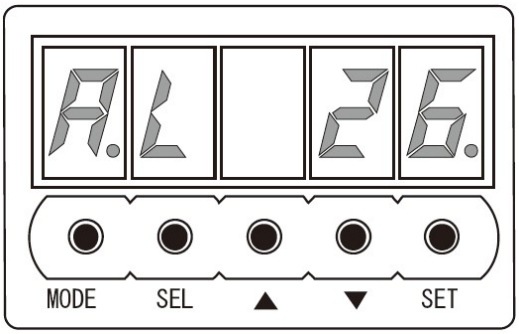
UP71	Selection of pressure control switching	None	0~1	0	Selecting the switching method from flow control to pressure control, and selecting between effective and ineffective of pressure under control 0: pressure switching signal and permission timer of pressure control, as well as the switching of pressure control when pressure control switches pressure signal switching of pressure kept at pressure under control is ineffective 1: the switching of pressure control at the switching of pressure signals signal switching of pressure kept at pressure under control is ineffective 2: pressure switching signal and permission timer of pressure control, as well as the switching of pressure control when pressure control switches pressure signal switching of pressure kept at pressure under control is effective 3: the switching of pressure control at the switching of pressure signals signal switching of pressure kept at pressure under control is effective
＊UP72	Rotational amount at 100% flow command	1r/min	1~3000	2000	Setting the amount of motor rotation when flow command is set at 100%
＊UP73	Pressure kept	0.1Kg/cm^2	0.0~300	2	Effective suspended pressurization function when the following conditions hold; pressurization is kept at assigned pressure (UP73)
UP74	flow command no working	1r/min	1~1000	10	(|flow command| < |UP74|) or (|pressure command < |UP75|)
＊UP75	pressure command stop working	0.1Kg/cm^2	0.0~300	10	Pressurization kept and OUT2 are ON. Also, UP101 can switch the limit to electric current for pressurization kept.
UP76	Gain of pressure kept mode	None	0~10000	100	Setting the pressure control increment at pressurization under control The following requested flow at pressurization under control is: Flow = (pressure command – pressure FB) * UP76 *Maximum flow is within ±UP72
＊UP77	Compensation amount of pressure feedback	0.01V	0.00~10.00	2.0	Able to set the compensation amount of pressure feedback when pressure command value is 0
UP78	Flow/Pressure command filter	1rad/s	0~20000	6000	Setting initial filter frequency for flow/pressure commands; unused when set to 0
UP79	Pressure feedback filter	1rad/s	0~20000	6000	Setting initial filter frequency for pressure feedback; unused when set to 0
＊UP80	Scale for pressure command	kg/cm^2/V or kg/cm^2/%	0.1~300	14	Setting the scale for pressure command (When analogue command: UP80=0) Setting pressure command 1V equals 14 when using 14kg/cm^2
＊UP81	Scale for pressure feedback	kg/cm^2/V	0.1~300	31.5	Setting the scale for pressure feedback (CLI input) Setting pressure feedback 1V equals 50 when using 50 kg/cm^2
＊UP82	P gain of the pressure control mode	None	0~10000	300	Setting P gain within pressure control mode
＊UP83	I Gain of the pressure control mode	rad/s	0~10000	20	Setting I gain within pressure control mode
UP85	Permission timer of pressure control switching	0.1ms	0.0~1000.0	5	At UP71=0, switching variable timing from flow control to pressure control

UP86	Switching pressure of pressure control	1%	0~100	85	Pressure switching signal ON→permission timer of pressure control switching(UP85) →(PA*100)/PS>=the pressure control of UP86 *PA=pressure feedback; PS=pressure command
UP87	Flow ratio at pressure control switching	1%	0~100	70	Setting the flow ratio at pressure control switching The following is the requested flow at switching: Flow = (flow command * UP87) / 100 *Maximum flow is within the range of ±flow command
UP88	Alleviate pressure of pressure control	1%	0~100	40	At pressure under control, and pressure FB falls below the assigned pressure command UP88%, switch flow control (pressure FB * 100) / pressure command <=the flow control of UP88
UP89	Fixed value of pressure command	0.1kg/cm^2	0.0~300.0	0	Setting fixed parameter value of pressure command *Effective when UP70=1 and IN5=ON
UP90	Scale of pressure command	1r/min/V	0.1~3276.7	200	Setting the scale for flow command (REF input) Setting flow command 1V equals 200 when using 200r/min
UP91	Pressure control increment of flow control	None	0~10000	300	Setting P control increment of pressure control function under flow control When the pressure feedback in flow control is greater than pressure command, the pressure command and feedback within flow command
UP92	Pressure control integral increment of flow control	Rad/s	0~10000	20	Setting PID compensated integral increment within the pressure control function of flow control
UP93	Pressure control differential increment of flow control	rad/s	0~10000	0	Setting PID compensated differential increment within the pressure control function of flow control
UP94	Pressure switching in the pressure control of flow control	1%	0~100	85	At flow under control, and pressure FB reaches the assigned pressure command UP94%, add pressure limit function (pressure FB * 100) / pressure command >= pressure control of at UP94
UP95	Flow ratio switching in the pressure control of flow control	1%	0~100	70	Setting the flow ratio at the switching of pressure control function in flow control The following is the requested flow at switching: Flow = (flow command * UP95) / 100 *flow is within the following range: flow command <= flow <= flow command
UP96	Alleviate pressure from pressure control	1%	0~100	40	At flow under control, and pressure FB falls below the assigned pressure command UP96%, stop pressure limit function (pressure FB * 100) / pressure command <= pressure control of at UP96
UP97	Fixed value of flow command	1r/min	0~32767	0	Setting the fixed parameter value for flow command *Effective when UP70=1 and IN5=ON
UP98	Soft start acceleration time 1	0.001s	0.000~65.535	0.08	When pressure switching signal is ON and linear acceleration can be added to flow command of flow control (ineffective when UP11≠0) UP98 is the acceleration time, the setting from 0 to UP72
UP99	Soft start acceleration time 1	0.001s	0.000~65.535	0.08	When pressure switching signal is OFF and linear acceleration can be added to flow command of flow control (ineffective when UP11≠0) UP99 is the acceleration time, the setting from 0 to UP72
UP100	Arrived value of pressure	0.1kg/cm^2	0.0~300.0	100	When pressure feedback value is greater than the set value of UP100, pressure arrival signal (OUT3) is ON

UP101	Limit value of electric current at pressure under control	0.10%	0.0~100.0	0	Setting the limit percentage of electric current at pressure under control regarding the maximum current of motor. If set to 0, 4-quadrant current limit mode is effective
UP102	The upper input limit value of pressure feedback	0.01V	-12.00~12.00	12.00	When pressure feedback is greater than UP102, AL.53 (pressure feedback offline alarm)
UP103	The upper input limit value of pressure feedback	0.01V	-12.00~12.00	1.00	When pressure feedback is greater than UP102, AL.53 (pressure feedback offline alarm)
UP104	Speed adjustment ratio selection 1 for flow command	1%	0~100	0	The speed adjustment ratio selection function attachable to flow command When IN1 input is ON, flow command = flow command × UP104 ÷ 100 (0% assigned, use 100%)
UP105	Speed adjustment ratio selection 2 for flow command	1%	0~100	0	The speed adjustment ratio selection function attachable to flow command When IN2 input is ON, flow command = flow command × UP105 ÷ 100 (0% assigned, use 100%)
UP106	Speed adjustment ratio selection 3 for flow command	1%	0~100	0	The speed adjustment ratio selection function attachable to flow command When IN3 input is ON, flow command = flow command × UP106 ÷ 100 (0% assigned, use 100%)
UP107	Speed adjustment ratio selection 4 for flow command	1%	0~100	0	The speed adjustment ratio selection function attachable to flow command When IN4 input is ON, flow command = flow command × UP107 ÷ 100 (0% assigned, use 100%)
UP108	Soft start acceleration time 1	0.001s	0.000~65.535	0.03	When pressure switching signal is ON and linear deceleration can be added to flow command of flow control (ineffective when UP11≠0) UP108 is the deceleration time, the setting from 0 to UP72
UP109	Soft start acceleration time 1	0.001s	0.000~65.535	0.03	When pressure switching signal is OFF and linear deceleration can be added to flow command of flow control (ineffective when UP11≠0) UP109 is the deceleration time, the setting from 0 to UP72
UP110	Command selection at pressurization under control	None	0~1	0	Permit/Prohibit the reverse rotation action of motor at pressurization under control 0: Permit the reverse rotation action of motor at pressurization under control 1:Prohibit the reverse rotation action of motor at pressurization under control
UP111	Lowest pressure command at pressure under control	0.1kg/cm^2	0	0	Setting the lower limit value of pressure command at pressure under control. When the parameter value is 0, the input pressure command remains in effect.
UP112	Lowest pressure command at flow control	0.1kg/cm^2	0	0	Setting the lower limit value of pressure command at flow control. When the parameter value is 0, the input pressure command remains in effect.
UP113	Largest rotational amount at suction of oil of flow command	1r/min	0~3000	0	Setting the largest rotational amount at oil suction action (reverse rotation) If the parameter setting is other than 0, then the upper limit value of rotational amount at oil suction action
UP114	Lowest flow command	1r/min	0~3000	0	Setting the lower limit value of flow command. When parameter value is 0, the input flow command remains in effect
UP115	Timer for relief from pressure control	0.1ms	0.0~1000.0	0	Because at the switching of pressurization under control at pressure control, the output value of flow command is 0, the parameter assigns the delayed time of timer
UP116	Timer for relief from pressure control at flow control	0.1ms	0.0~1000.0	0	Because at the switching of pressurization under control of pressure control at flow control, the output value of flow command is 0, the parameter assigns the delayed time of timer
UP117	Pressure control increment of pressure kept	None	0~10000	300	Setting the P control increment of pressure control function at pressure kept control. When pressure feedback is greater than pressure command at pressure kept control, flow command is at the difference between pressure command and feedback
UP118	Pressure control integral increment at pressure kept	rad/s	0~10000	20	Setting the PI compensated integral increment of pressure control function at pressure kept control

UP119	The pump output	cc	0~10000	0	When UP71 is set to 2 or 3, IN7 is ON and IN5 is OFF, switch from flow control to pressure control; the following is the change of limit value of electric current: UP119 × pressure command ÷ (2π ÷ 10 × 1.15) ÷ rated torque of motor
UP120	AL-11 function selection	None	00~11	00	AL-11 (protection mechanism for motor load and motor thermocouple function) effective / invalid selection Motor protection function (units digit) …0: ineffective 1: effective Motor thermocouple function (tens digit) …0: ineffective 1: effective
UP121	Timer of changing gain to pressure kept	0.1ms	0.0~1000.0	0.0	Delay of the pressure mode (gain =UP82)to pressure kept mode(gain=UP76)
UP124	SHHC sequential command reversal	None	0~0x0f	0	The sequential commands of electric current control circuit board of reversible H series driver. (the content matching of H series driver)
UP125	SHHC communication action setting	None	0~2	0	Setting the communication action of electric current control circuit board of H series driver. (the content matching of H series driver) 0: alarm detection mode 0 (2 contiguous abnormalities at AL.12) 1: alarm detection mode 1 (1 abnormality at AL.12) 2: alarm detection mode 2 (No detection at AL.12)
UP127	The boot mode selection of electric current control circuit board	None	0~1	0	Setting at the writing of firmware on electric current control circuit board of H series driver (content matching of H series) 0: the activation of normal mode of electric current control circuit board 1: the activation of boot mode of electric current control circuit board

Instructions for driver alarms



“A.L ” indicates an alarm generation and the lower two (2) digits show an alarm code. When an alarm is generated, the dot mark at the lowest of the extreme right column flickers.

Alarm	Alarm message	Detection Possible cause and remedy	Possible cause and remedy
AL01	Overcurrent	IPM of the power supply unit has detected the following error. (When the amplifier size is 008/012P, however, only error [1] or [3] is detected. When the amplifier size is 025/035P or 400P4, only error [1] is detected.) [1] Overcurrent [2] Overheat [3] Gate power drop	[1] The armature wire (U, V,W) is short-circuited. [2] The ambient temperature exceeds 55°C.If the cause does not fall under the above, contact us.
AL02	Overvoltage	The DC power (PN voltage) of the main circuit exceeds DC400 V. (For the amplifier size of 400P4, this error occurs when the DC power exceeds DC 800 V.)	[1] The motor speed exceeds the maximum speed. [2] When the motor revolves at a speed exceeding the maximum speed at the time of acceleration, the axis overruns. [3] JP1 or JP2 is disconnected. Or the external reverse-current absorption resistor is not connected or broken. [4] The input power exceeds the prescribed value.
AL03	PN voltage drop	The DC power (PN voltage) of the main circuit has dropped below DC170 V. (For the amplifier size of 400P4, this error occurs when the DC power has dropped below DC340 V.)	[1] The input power voltage has dropped. [2] Phase T of the input power supply is defective. (When the amplifier size is 035P3 ~ 500P3, 400P4.) [3] If this alarm occurs at motor acceleration, the input power supply capacity may be short.
AL06	Resolver cable breakage	The voltage of the resolver signal (between R1 and R2)has dropped to 0.35 V (AC) or less.	Make sure that the resolver cable is not broken. Measure the voltage between R1 and R2. (When the voltage is 0.35 V or over in the AC range, the cable is normal.)
AL07	Power status error	This alarm occurs when the size of the CPU amplifier could not be identified.	[1] The CPU software version is not identical with the unit structure. [2] The amplifier is defective. Contact us.
AL08	Servo amplifier overheat	The temperature of the radiator fin exceeds 90 ~ 100°C.	[1] The temperature in the control panel has risen. [2] The cooling fan incorporated in the amplifier is defective.
AL09	Reverse-current absorption resistor overheat	Overheating of the reverse-current absorption resistor is calculated by the software and detected.	The number of acceleration/ deceleration counts is large, or continuous absorption (minus "–" load) has been caused. Calculate the reverse-current energy and attach an external reverse-current absorption resistor, or increase the capacity.

AL10	Reverse-current absorption error	The reverse-current absorption transistor has turned on for more than 100 ms. Note 1: The recommended resistance differs with the amplifier model.	[1] Unless the external resistor is used, make sure that JP1 ~ JP2 on the terminal block is short-circuited. [2] When the external resistor is used, turn the power off and measure the resistance between PA and JP2 on the terminal block. If it is the recommended resistance (Note 1), there is no problem. If it exceeds this value, there is a fear that a wire in the resistor has been broken. When this happens, replace the resistor with a new one.
AL11	BA alarm	When setting UP120=□1, actual load used with overload protection over 140% detected When setting UP120=1□, OFF for IN4 detected	1.Motor output is greater than load 2.Motor capacity is shorter than rotational cycle 3.UP02 setting error 4.IN4 input short circuit or wrong action
AL12	SHHC communication abnormality	The communication abnormality of current control circuit board of H series driver detected	1.The switching of UP125 settings can detect condition 2. Interference occurs
AL15	Overcurrent detection	The motor current exceeds 120 % of the current limit value.	[1] The motor was locked mechanically during revolution. [2] Phase U, V or W of the motor is short-circuited. [3] Parameter UP02 (motor selection) was set illegally.
AL16	Speed amplifier saturation	The speed amplifier saturated and the maximum motor current has flowed for more than three (3) seconds.	[1] The motor was locked mechanically. [2] The load inertia is large and acceleration/ deceleration is sharp. [3] Parameter UP02 (motor selection) was set illegally.
AL17	Motor overload	Rise in temperature of the motor, which was calculated based on real load exceeds 110 %.	[1] The load is too heavy compared with the motor power. [2] The operation cycle is too short, compared with the motor capacity. [3] Parameter UP02 (motor selection) was set illegally. After removing the cause of the error, make sure that the motor temperature has dropped sufficiently. Then start the operation. If the operation has restarted soon, the motor may be burnt.
AL18	Instant thermal	The instant thermal actuates when the output current is 120 % or over of the rated motor current.	[1] The motor was locked mechanically. [2] The load is too heavy, compared with the motor power. [3] Parameter UP02 (motor selection) was set illegally.
AL19	Resolver phase error	Mis-counting of the resolver feedback counter.	[1] Contact failure of the resolver cable. [2] The resolver cable is near the motor drive cable and effected by noise. Examine the resolver cable. [3] The grounding wire between the motor and amplifier is broken.
AL20	Overspeed	The motor speed exceeds 120 % of the maximum speed.	[1] As servo adjustment is not appropriate, the axis overruns. Execute the auto tuning operation. [2] An excessively large command has been specified. [3] Contact failure of the resolver cable. [4] The resolver cable is near the motor drive cable and effected by noise. Examine the resolver cable. [5] The grounding wire between the motor and amplifier is broken.

AL21	Deviation counter over	Position error pulses (i.e., difference between the command value and actual value) of the deviation counter exceed the detection level shown below.	[1] The load is too heavy, compared with the motor power. [2] The load inertia is large and acceleration/deceleration is sharp. [3] The value of parameter TP02 (target loop gain) is too large. [4] The current limit is too low.
AL25	Option alarm	An alarm has occurred in the option board.	Contact us.
AL26	Parameter setting error	Parameter UP01 (control mode) or UP02 (motor selection) is not specified, or set illegally.	This alarm occurs when the power is turned on initially. Set the UP01 and UP02 parameters, turn the power off once and make sure that the display unit is turned off also. Then turn the power on again.
AL53	Pressure feedback offline	Pressure feedback is greater than UP102 (upper limit of pressure feedback) and lower than UP103 (lower limit of pressure feedback)	1.Please check for any pressure feedback offline 2.Please check the settings for UP102 and UP103

The maintenance and inspection on hydraulic circuit system

Inspection

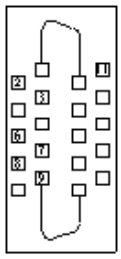
※The insulation of all connection components of piping.
※The tightness of all installed screws and bolts
※Settings of safety valve(s).
※Oil filtration: cleaning to the filtration device should be done according to the requirements of the manufacturer. Replace the filter if necessary.
※The quality of work fluid: the replacement of work fluid should be done according to work conditions and suggestions from the manufacturer.
※The intervals of maintenance tasks are determined according to work conditions.

Maintenance

※The oil pump provided is installed according to current design and component details, so any change or modification is strictly prohibited, as it will void the warranty.
※All maintenance tasks must be performed by personnel of the original manufacturer or authorized dealers or agents.
※The manufacturer is not responsible for any self-initiated maintenance or repairs.
※Please comply with all the general guidelines and rules regarding hazard prevention and safety.

Appendix

Resolver

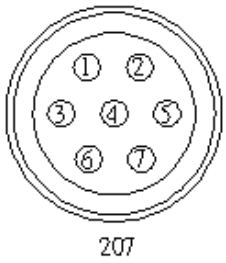


Connector rear view

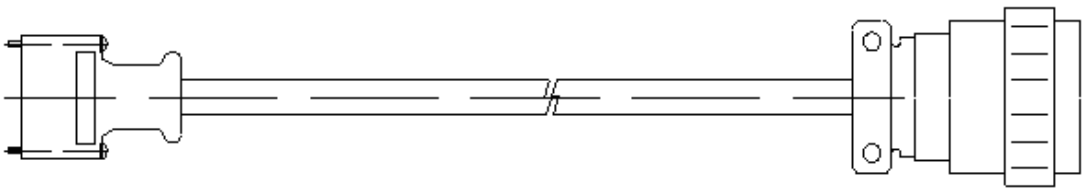
Pin	Name	Color
8	R1	Red/White
9	R2	Yellow/White
2	S1	Red
3	S3	Black
6	S2	Yellow
7	S4	Blue
11	AG	Shield

Color	Name	Pin
Red/White	R1	1
Yellow/White	R2	2
Red	S1	5
Black	S3	7
Yellow	S2	6
Blue	S4	3

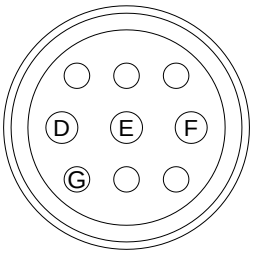
Resolver Cable



Connector rear view



Armature Cable

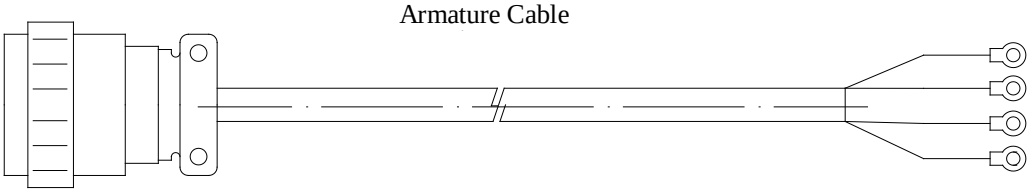


Connector rear view

Pin	Name	Green
D	U	Red
E	V	White
F	W	Black
G	G	Color

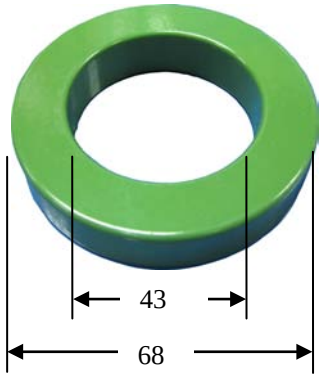
Color	Name	Pin
Red	U	1
White	V	2
Black	W	3
Green	G	4

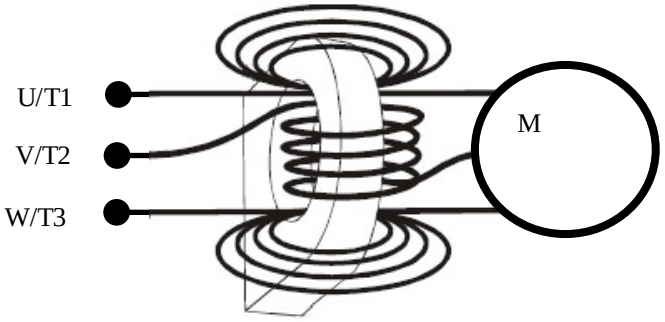
Armature Cable



Note: Motor power wires are different because of different motor specifications.

Outward Dimensions of Reactance Bond





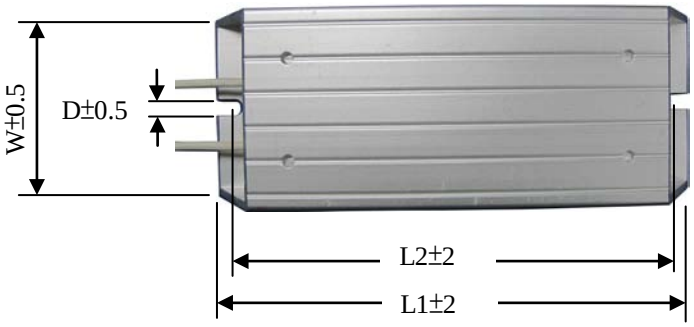
Illustrations

Reactance bonds are different depending on driver models. Certain driver models have them built-in and do not require additional installation.

Reactance bond should be installed the output side of servomotor and U/V/W motor of driver

Every wire passing through reactance bond must surround the bond 4 times.

The Outward Dimensions of Reverse current absorption Resistor



Specification	L1	L2	W	H	D
200W20Ω	165	150	60	30	5.3
400W15Ω	265	250	60	30	5.3

Note: Depending on driver specifications, certain models of driver

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