SOHO VD VECTOR INVERTER

Warning

1. Please read the manual before using the SOHO VD Vector Inverter for the safety.
2. Experts at the electric construction and wiring work must handle for the safety.

SEOHO DRIVES, LTD.
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Dealer

Vector Inverter SOHO VD Manual

SEOHO DRIVES

Vector Inverter

SOHO VD
Manual

- 3.7 ~ 132 kW / 200V
- 5.5 ~ 800 kW / 400V
- 30 ~ 630 kW / 690V
- 110 ~ 630 kW / 1140V

⚠ Safety

- For safe use, please read carefully “safety” and “General” before use.
- Put this manual in the place out of user’s range of vision.

SEOHO DRIVES

SAFETY

- Please read carefully Chapter 1, SAFETY, to prevent from accidents or jeopardizes.
- The meaning of signals is below.

= Caution to electric shock

= Caution to jeopardize

- Put this manual in the place out of user's range of vision.

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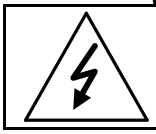
<2021-03-Rev.0 / SW.Ver.1.29>

<Appendix>

1. Safety

1. Safety



ONLY A COMPETENT ELECTRICIAN SHOULD CARRY OUT THE ELECTRICAL INSTALLATION.

1.1 Warning

1	Internal Components and circuit boards (excepting the isolated I/O terminals) apply an electric current when **SOHO VD inverter** is connected to the main voltage. This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.
2	When **SOHO-VD** is connected to the main power, the current is flowing in the motor connections (U, V, W), DC-Link (P, N) and Dynamic Brake Resistor Connections (R+, R-) even if the motor is not running.
3	If there is control power (220Vac) in **SOHO-VD inverter**, the current is flowing in the motor connections (U, V, W), DC-Link (P, N) and Dynamic Brake Resistor Connections (R+, R-). This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.
4	**SOHO-VD inverter** has a large capacitive leakage current.
5	The control I/O terminals are isolated from the main voltage but the relay outputs and other I/Os may have dangerous voltage connected even if the power is disconnected from the **SOHO-VD.**
6	If a **SOHO-VD inverter** is used as a part of the machine, the machine manufacturer is obliged to take care that the inverter has a main switch and power fuse in the machine.
7	Spare parts can be delivered only by SEOHO DRIVES, LTD.

1.2 Safety Instruction

	1	Do NOT make any connections when the **SOHO-VD** is connected to the main voltage.
	2	Do NOT make any measurements when the **SOHO VD** is connected to the main voltage.
	3	After disconnecting the main power, wait until the cooling fan stops and the indicator of keypad goes out. Wait a further 5 minutes before doing any work on **SOHO-VD** connections. Do NOT open even the cover within this time.
	4	Do NOT make any voltage withstand tests on any parts of the **SOHO-VD** inverter.
	5	Disconnect motor cables from **SOHO-VD** before making any measurements on the motor cables or motors.
	6	Do NOT touch the IC-circuits on the circuit boards. Static voltage discharge may destroy the components.
	7	Make sure that the cover of **SOHO-VD** inverter is closed before connecting the main voltage.

Ground

The ground terminal of **SOHO-VD** has to contact with ground wire. ⏚

Ground of SOHO-VD inverter prevents high voltage accidents that are caused by switching.

Warning Sign

Please be more cautious for the following warning signs for user's safety.

 = Dangerous Voltage

 = General Warning

1.3 Wiring

	1	Do not connect **SOHO VD Inverter** input terminal (L1, L2, and L3) power to output terminal (U, V, and W) power. It is caused to the damage of inverter.
	2	Do not supply more than the allowed voltage to **SOHO VD Inverter** input terminal (L1, L2, and L3). It is caused to the damage of inverter.
	3	Connect **SOHO VD Inverter** output terminal (U, V, and W) following accurate order.
	4	Do not connect contactor, condenser, and surge filter etc to **SOHO VD Inverter** output terminal (U, V, and W). It is caused to the malfunction and damage of inverter.
	5	Experts at the electric wiring work must handle for the safety.

1.4 Running the Motor

	1	Before running the motor, be cautious not to have any safety accident. Make sure that the motor is mounted properly. Check the parameters are set properly.
	2	Maximum motor speed (frequency) should always be set according to the motor and machine connected to the motor.
	3	Before reversing the rotation of the motor shaft, make sure that this can be done safely.

This manual describes the specification, installation, operation, function, and keeping and repair of SOHO VD Inverter, which is manual for the experienced users of inverter.

For safe use, please read carefully “safety” and “General” before use.

Put this manual in the place out of user’s range of vision.

Note

2. General

2. General

2.1 Receiving Product

This **SOHO-VD inverter** has been subjected to demanding factory tests before shipment. After unpacking, check if the device does not show any sign of damage and any missing parts. (Refer to the type designation code in table 2.1-1)

In the event of damage, please contact the insurance company involved or the supplier. If the delivery is not in compliance with the order, please contact the supplier immediately.

TYPE	**SOHO160VD4Y**	Inverter Model
Serial No.	**2120001D**	Serial Number
Power Rating	**160[kW]**	Inverter Nominal Power
Rated Current	**325[A]**	Inverter Rated Current
Max. Current	**473[A]**	Inverter Max, Current
Voltage	**380[V]~480[V]**	Inverter Input Voltage Range
SEOHO DRIVES, LTD.		SEOHO DRIVES Logo

Table 2.1-1 Inverter Label (This is attached to both sides of inverter.)

2.2 Inverter Type

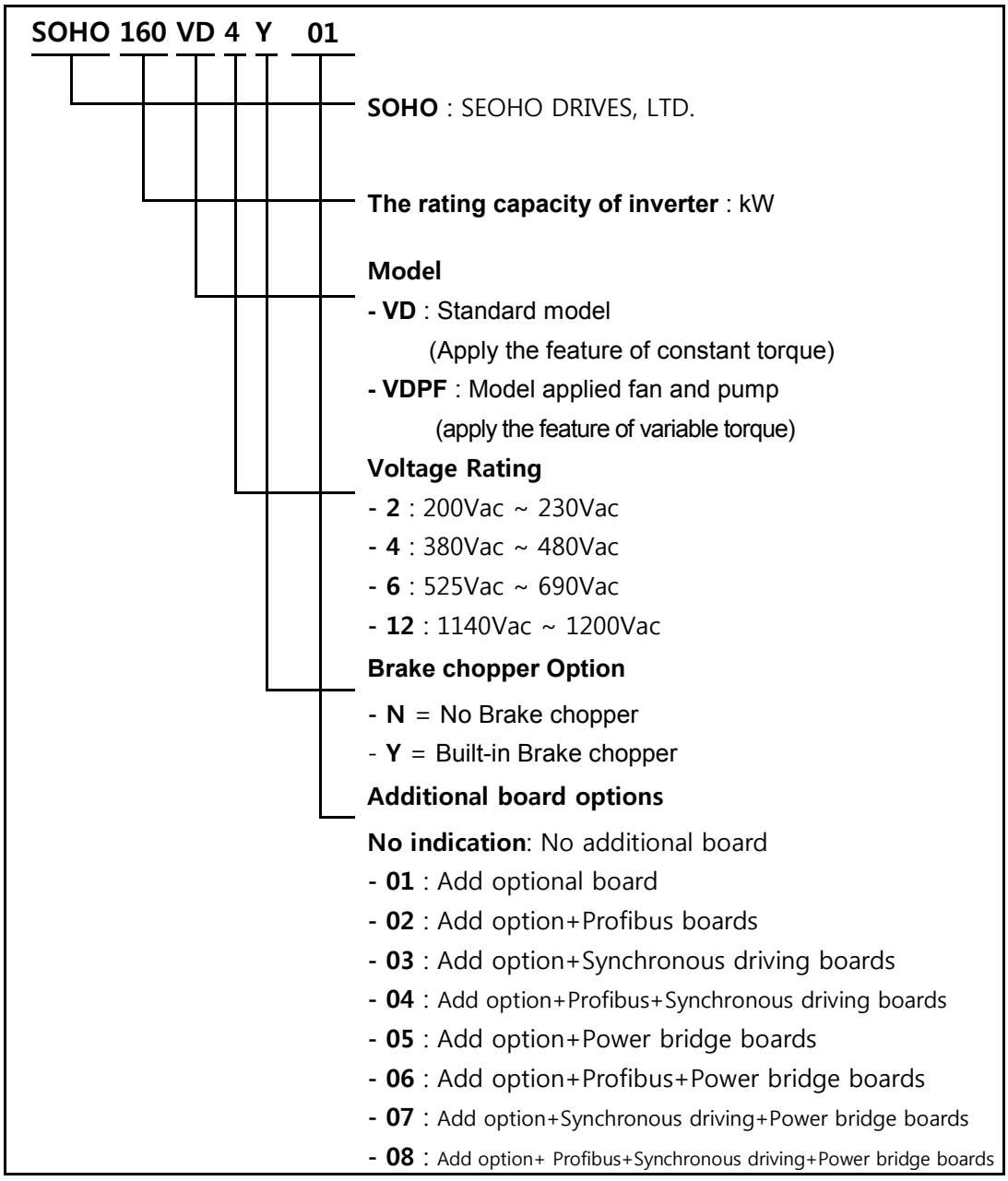


Table 2.2-1 Inverter Type

2.3 Storing and Warranty

Check the ambient conditions in the storage room before the first commissioning. (Temperature: -25℃ ~ +55℃, relative humidity < 95%, no condensation allowed).
SEOHO DRIVES, LTD. will not be responsible for the damage caused by ambient conditions.
The period of manufacturer's warranty is 12 months from the date of delivery.
The local distributor may have a different warranty period, which is specified in heir terms and conditions and warranty terms.
If any queries concerning the warranty arise, please contact your distributor.

2.4 Power Rating

2.4.1 200V Inverter output rating

I_{CT} = rated input and output current (constant torque load)

Overload 1.5 * I_{CT} (1 minute per 10 minutes, ambient temperature below 40 ℃)

Main Voltage 200V - 230V, 50/60Hz. VD Series					
Inverter Type	Rated Output Power and Rated Current		Size / IP	Dimension W×H×D(mm)	Weight (kg)
	P[kW]	I_{CT}[A]			
SOHO 3.7 VD2Y	3.7	15.8	D3 / IP00	195×220×176	5
SOHO 5.5 VD2Y	5.5	22	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 7.5 VD2Y	7.5	30	K3BD / IP00 D4 / IP00	195×368×279 195×240×176	13 6
SOHO 11 VD2Y	11	43	K3CD / IP00 D5 / IP00	195×460×300 195×420×200	18 10
SOHO 15 VD2_	15	57	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 18.5 VD2_	18.5	70	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 22 VD2_	22	83	K6 / IP00	253×640×300	32
SOHO 30 VD2_	30	113	M7 / IP00	260×850×335	42
SOHO 37 VD2_	37	139	M7 / IP00	260×850×335	42
SOHO 45 VD2_	45	165	M7 / IP00	260×850×335	42
SOHO 55 VD2-	55	200	M8B / IP00	496×860×435	91
SOHO 75 VD2_	75	270	M8B / IP00	496×860×435	91
SOHO 90 VD2_	90	325	M8B / IP00	496×860×435	91
SOHO 110 VD2_	110	400	M8B / IP00	496×860×435	91
SOHO 132 VD2N	132	477	K9B / IP00	554×1050×453	160

Table 2.4-1 200V Series Power ratings and dimensions

2.4.2 200V PF Inverter output rating

I_{VT} = rated input and output current (Variable torque load)

Overload 1.1 * I_{VT} (1 minute per 10 minutes, ambient temperature below 40 ℃)

Main Voltage 200V - 230V, 50/60Hz. VDPF Series					
Inverter Type	Rated Output Power and Rated Current		Size / IP	Dimension W×H×D(mm)	Weight (kg)
	P[kW]	I_{VT}[A]			
SOHO 7.5 VDPF2Y	7.5	30	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 11 VDPF2Y	11	43	K3BD / IP00 D4 / IP00	195×368×279 195×240×176	13 6
SOHO 15 VDPF2Y	15	57	K3CD / IP00 D5 / IP00	195×460×300 195×420×200	18 10
SOHO 18.5 VDPF2_	18.5	70	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 22 VDPF2_	22	83	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 30 VDPF2_	30	113	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 37 VDPF2_	37	139	M7 / IP00	260×850×335	42
SOHO 45 VDPF2_	45	165	M7 / IP00	260×850×335	42
SOHO 55 VDPF2-	55	200	M7 / IP00	260×850×335	42
SOHO 75 VDPF2_	75	270	M8B / IP00	496×860×435	91
SOHO 90 VDPF2_	90	325	M8B / IP00	496×860×435	91
SOHO 110 VDPF2_	110	400	M8B / IP00	496×860×435	91
SOHO 132 VDPF2_	132	477	M8B / IP00	496×860×435	91
SOHO 160 VDPF2N	160	596	K9B / IP00	554×1050×453	160

Table 2.4-2 200V PF(PUMP & FAN) Series Power ratings and dimensions

2.4.3 400V Inverter output rating

I_{CT} = rated input and output current (constant torque load)

Overload 1.5 * I_{CT} (1 minute per 10 minutes, ambient temperature below 40 ℃)

Main Voltage 380V - 480V, 50/60Hz. VD Series					
Inverter Type	Rated Output Power and Rated Current		Size / IP	Dimension W×H×D(mm)	Weight (kg)
	P[kW]	I_{CT}[A]			
SOHO 5.5 VD4Y	5.5	12	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 7.5 VD4Y	7.5	16	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 11 VD4Y	11	23.5	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 15 VD4Y	15	31	K3BD / IP00 D4 / IP00	195×368×279 195×240×176	13 6
SOHO 18.5 VD4Y	18.5	38	K3CD / IP00 D5 / IP00	195×460×300 195×420×200	18 10
SOHO 22 VD4Y	22	45	K3CD / IP00 D5 / IP00	195×460×300 195×420×200	18 10
SOHO 30 VD4_	30	61	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 37 VD4_	37	72	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 45 VD4_	45	88	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 55 VD4_	55	107	K5A / IP00 K6 / IP00 M7 / IP00	252x490x314 253×640×300 260×850×335	28 32 42
SOHO 75 VD4_	75	146	M7 / IP00	260×850×335	42
SOHO 90 VD4_	90	174	M7 / IP00	260×850×335	42
SOHO 110 VD4_	110	212	K7C / IP00 M8B / IP00	252×830×390 496×860×435	55 91
SOHO 132 VD4_	132	252	M8B / IP00	496×860×435	91
SOHO 160 VD4_	160	305	M8B / IP00	496×860×435	91
SOHO 200 VD4_	200	382	M8B / IP00	496×860×435	91
SOHO 250 VD4N	250	478	K9B / IP00	554×1050×453	160
SOHO 315 VD4N	315	596	K9B / IP00	554×1050×453	160
SOHO 400 VD4N	400	759	K10DL / IP00	795.5x1449x498	260
SOHO 400 VD4N	400	759	K10C / IP00	Refer to chapter 2.5	316

SOHO 500 VD4N	500	929	K10C / IP00	Refer to chapter 2.5	-
SOHO 710 VD4N	710	1319	K11 / IP00	Refer to chapter 2.5	553
SOHO 800 VD4N	800	1486	K11 / IP00	Refer to chapter 2.5	553

Table 2.4-3 400V Series Power ratings and dimensions

2.4.4 400V PF Inverter output rating

I_{VT} = rated input and output current (Variable torque load)

Overload 1.1 * I_{VT} (1 minute per 10 minutes, ambient temperature below 40 ℃)

Main Voltage 380V - 480V, 50/60Hz. VDPF Series					
Inverter Type	Rated Output Power and Rated Current		Size / IP	Dimension W×H×D(mm)	Weight (kg)
	P[kW]	I_{VT}[A]			
SOHO 7.5 VDPF4Y	7.5	16	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 11 VDPF4Y	11	23.5	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 15 VDPF4Y	15	31	K3AD / IP00 D3 / IP00	195×368×183 195×220×176	7 5
SOHO 18.5 VDPF4Y	18.5	38	K3BD / IP00 D4 / IP00	195×368×279 195×240×176	13 6
SOHO 22 VDPF4Y	22	45	K3CD / IP00 D5 / IP00	195×460×300 195×420×200	18 10
SOHO 30 VDPF4Y	30	61	K3CD / IP00 D5 / IP00	195×460×300 195×420×200	18 10
SOHO 37 VDPF4_	37	72	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 45 VDPF4_	45	88	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 55 VDPF4_	55	107	K5A / IP00 K6 / IP00	252x490x314 253×640×300	28 32
SOHO 75 VDPF4_	75	146	K5A / IP00 K6 / IP00 M7 / IP00	252x490x314 253×640×300 260×850×335	28 32 42
SOHO 90 VDPF4_	90	174	M7 / IP00	260×850×335	42
SOHO 110 VDPF4_	110	212	M7 / IP00 K7C / IP00	260×850×335 252×830×390	42 55
SOHO 132 VDPF4_	132	252	K7C / IP00 M8B / IP00	252×830×390 496×860×435	55 91
SOHO 160 VDPF4_	160	305	M8B / IP00	496×860×435	91
SOHO 200 VDPF4_	200	382	M8B / IP00	496×860×435	91

SOHO 250 VDPF4_	250	478	M8B / IP00	496×860×435	91
SOHO 315 VDPF4N	315	596	K9B / IP00	554×1050×453	160
SOHO 400 VDPF4N	400	759	K9B / IP00	554×1050×453	160
SOHO 500 VDPF4N	500	929	K10DL / IP00	795.5x1449x498	260
SOHO 560 VDPF4N	560	1092	K10DL / IP00	795.5x1449x498	260

Table 2.4-4 400V PF(PUMP & FAN) Series Power ratings and dimensions

2.4.5 690V Inverter output rating

I_{CT} = rated input and output current (constant torque load)

Main Voltage 525V - 690V, 50/60Hz VD Series						
Inverter Type	Rated Output Power And Rated Current			Size / IP	Dimension W×H×D(mm)	Weight (kg)
	P[kW]		I_{CT}[A]			
	525V*)	690V				
SOHO 30 VD6_	22	30	35	N5 / IP00	285×490×312	15
SOHO 37 VD6_	28	37	42	N6 / IP00	250×650×333	25
SOHO 45 VD6_	35	45	50	N6 / IP00	250×650×333	25
SOHO 55 VD6_	41	55	61	N6 / IP00	250×650×333	25
SOHO 75 VD6_	55	75	84	N7 / IP00	260×850×345	50
SOHO 90 VD6_	68	90	100	N7 / IP00	260×850×345	50
SOHO 110 VD6_	83	110	122	N7 / IP00	260×850×345	50
SOHO 132 VD6_	100	132	145	N9 / IP00	563×1000×435	100
SOHO 160 VD6_	121	160	175	N9 / IP00	563×1000×435	100
SOHO 200 VD6_	152	200	220	N9 / IP00	563×1000×435	100
SOHO 250 VD6_	190	250	275	N9 / IP00	563×1000×435	100
SOHO 315 VD6N	240	315	343	N10 / IP00	748×1400×432	290
SOHO 400 VD6N	305	400	435	N10 / IP00	Require to headquarter	-
SOHO 500 VD6N	380	500	544	N10 / IP00	Require to headquarter	-
SOHO 560 VD6N	425	560	610	N11 / IP00	Require N11 to headquarter	-
SOHO 630 VD6N	480	630	685	N11 / IP00	Require N11 to headquarter	-

***) If you are using a 660V ~ 690V voltage is not careful with the capacity selection**

Table 2.4-5 690V Series Power ratings and dimensions

2.4.6 1140V Inverter output rating

I_{CT} = rated input and output current (constant torque load)

Main Voltage 1140V~1200V, 50/60Hz. VD Series					
Inverter Type	Rated Output Power and Rated Current		Size / IP	Dimension*) W×H×D(mm)	Weight (kg)
	P[kW]	I_{CT}[A]			
SOHO 110 VD12N	110	73	L7B / IP00	425×935×431	70
SOHO 132 VD12N	132	82	L7B / IP00	425×935×431	70
SOHO 160 VD12N	160	103	L8 / IP00	877×836×362	100
SOHO 200 VD12N	200	128	L8 / IP00	877×836×362	100
SOHO 250 VD12N	250	160	L8 / IP00	877×836×362	100
SOHO 315 VD12N	315	202	L10 / IP00	668×1500×443	180
SOHO 400 VD12N	400	255	L10 / IP00	668×1500×443	180
SOHO 560 VD12N	560	359	L11 / IP00	Refer to chapter 2.5	256
SOHO 630 VD12N	630	403	L11 / IP00	Refer to chapter 2.5	256

***) 1140V model, please headquartered minutes of your order, so that the dimensional changes Depending on the intended use of the inverter**

Table 2.4-6 1140V Power ratings and dimensions

2.5 External Dimension

SOHO VD inverter should be mounted in a vertical position on the wall or on the back plane of a cubicle. Follow the requirement for cooling. See chapter 3.2 for dimensions.

To ensure a safe installation, make sure that the mounting surface is relatively flat.

Fixing is done with four or more screws or bolts depending on the size of the unit.
Refer to Figure 2.5-1 ~ 2.5-20.

2.5.1 K3AD & D3

Voltage	Model
400V	5.5 VD 4Y
	7.5 VD(PF) 4Y
	11 VD(PF) 4Y
	15 VDPF 4Y

Voltage	Model
200V	3.7 VD 2Y(D3)
	5.5 VD 2Y
	7.5 VDPF 2Y

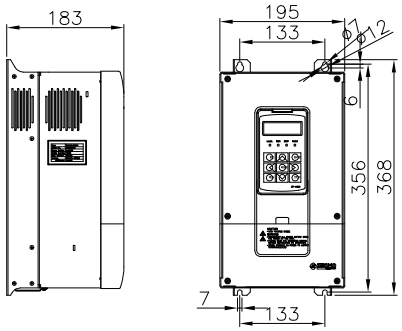


Figure 2.5-1 (a) K3AD External dimension

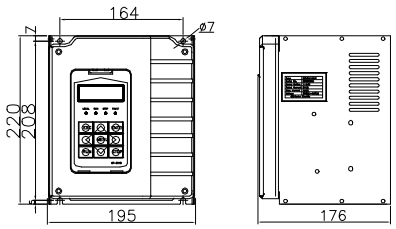


Figure 2.5-1(b) D3 External dimension

2.5.2 K3BD & D4

Voltage	Model
400V	15 VD 4Y
	18.5 VDPF 4Y

Voltage	Model
200V	7.5 VD 2Y
	11 VDPF 2Y

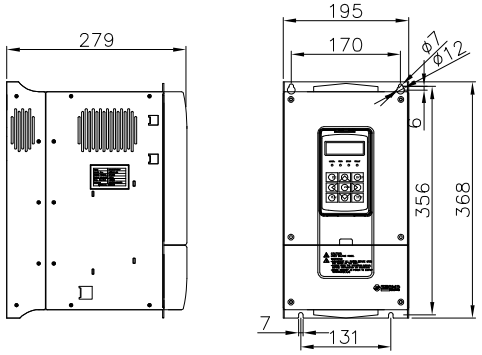


Figure 2.5-2(a) K3BD External dimension

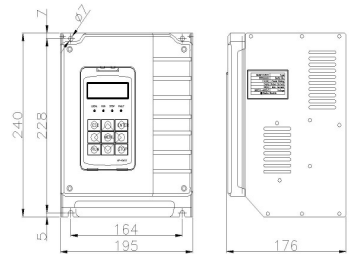


Figure 2.5-2(b) D4 External dimension

2.5.3 K3CD & D5

Voltage	Model
400V	18.5 VD 4Y
	22 VD(PF) 4Y
	30 VDPF 4Y

Voltage	Model
200V	11 VD 2Y
	15 VDPF 2Y

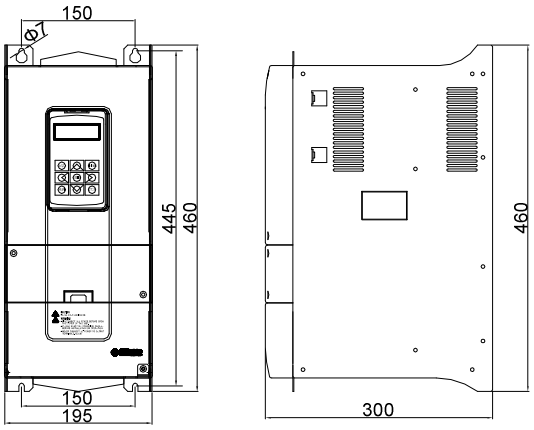


Figure 2.5-3(a) K3CD External dimension

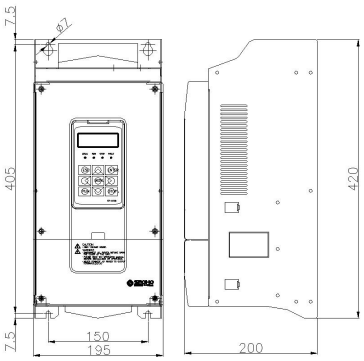


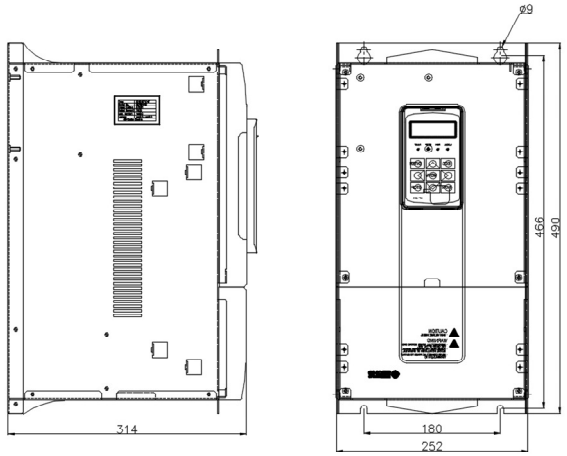
Figure 2.5-3(b) D5 External dimension

2.5.4 K5A & K6

(Please contact the main office K6-55VD4Y(N)_ order)

Voltage	Model
400V	30 VD 4Y(N)
	37 VD(PF) 4Y(N)
	45 VD(PF) 4Y(N)
	55 VD(PF) 4Y(N)
	75 VDPF 4Y(N)

Voltage	Model
200V	15 VD 2Y(N)
	18.5 VD(PF) 2Y(N)
	22 VD(PF) 2Y(N)
	30 VDPF 2Y(N)



Figute 2.5.-4(a) K5A External dimension

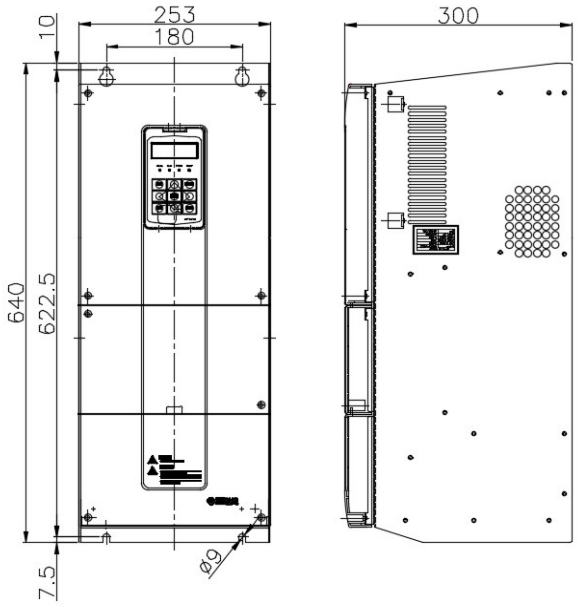


Figure 2.5-4(b) K6 External dimension

2.5.5 M7

Voltage	Model
400V	55 VD 4Y(N)
	75 VD(PF) 4Y(N)
	90 VD(PF) 4Y(N)
	110 VDPF 4Y(N)

Voltage	Model
200V	30 VD 2Y(N)
	37 VD(PF) 2Y(N)
	45 VD(PF) 2Y(N)
	55 VDPF 2Y(N)

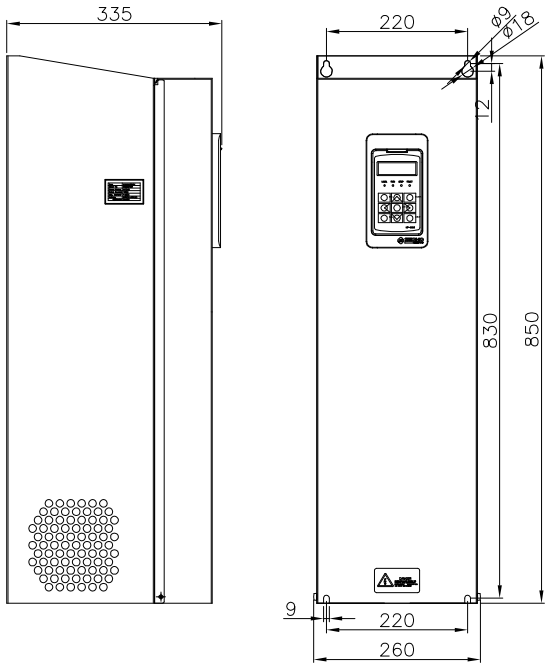


Figure 2.5-5 M7 External dimension

2.5.6 K7C

Voltage	Model
400V	110 VD(PF) 4Y(N)
	132 VD(PF) 4Y(N)

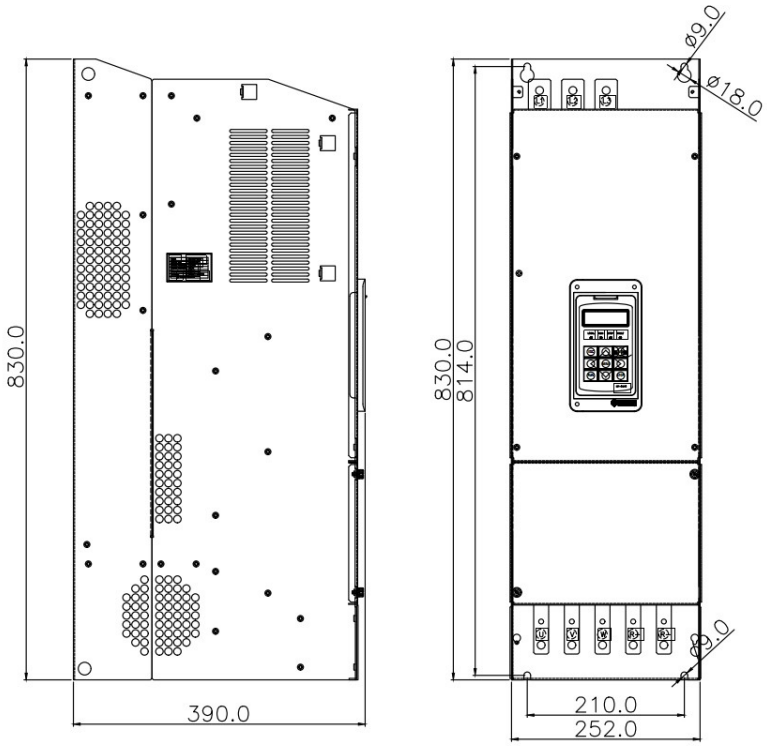


Figure 2.5-6 K7C External dimension

2.5.7 M8B

Voltage	Model
400V	110 VD 4Y(N)
	132 VD(PF) 4Y(N)
	160 VD(PF) 4Y(N)
	200 VD(PF) 4Y(N)
	250 VDPF 4Y(N)

Voltage	Model
200V	55 VD 2Y(N)
	75 VD(PF) 2Y(N)
	90 VD(PF) 2Y(N)
	110 VD(PF) 2Y(N)
	132 VDPF 2Y(N)

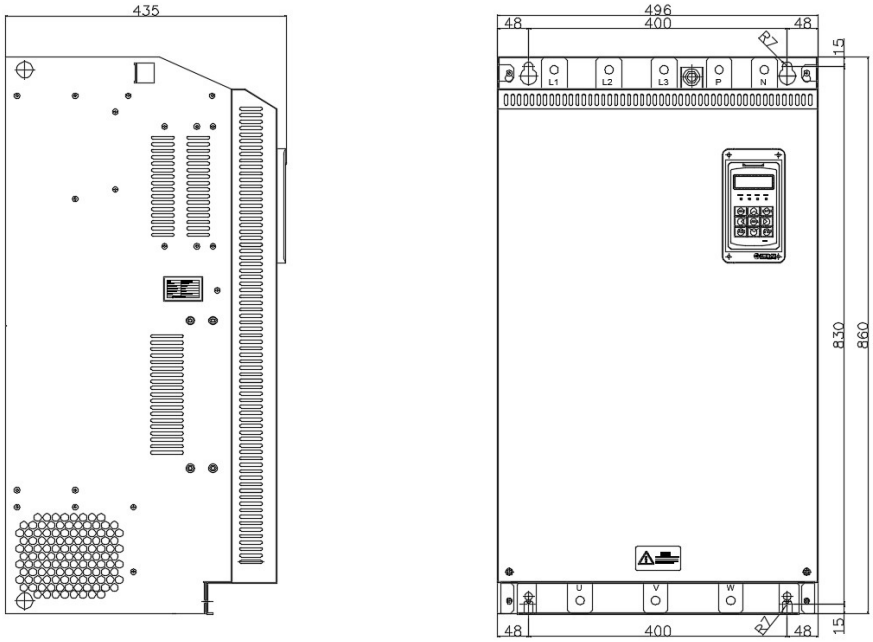


Figure 2.5-7 M8B External dimension

2.5.8 K9B

Voltage	Model
400V	250 VD 4N
	315 VD(PF) 4N
	400 VDPF 4N

Voltage	Model
200V	132 VD 2N
	160 VDPF 2N

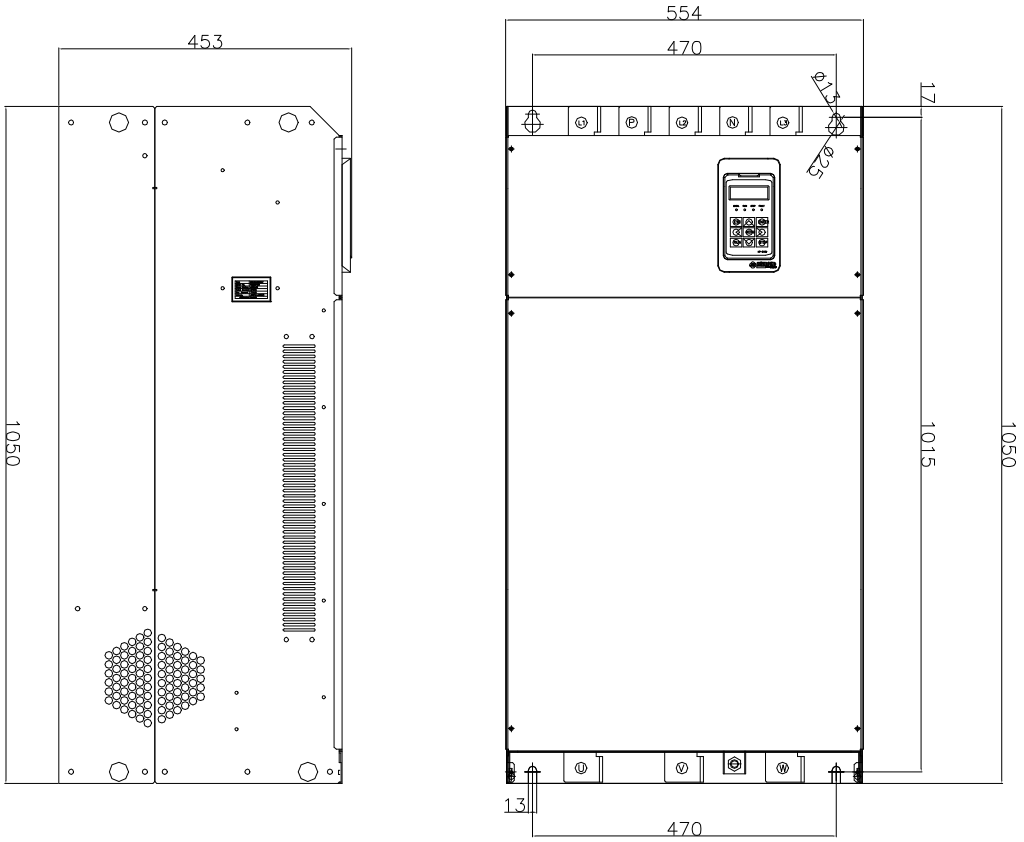


Figure 2.5-8 K9B External dimension

2.5.9 K10C (According to model or capacity, the external shape of rectifier units can be chosen.)

Voltage	Model
400V	400 VD 4N

Voltage	Model
400V	500 VD 4N

* Refer to Figure2.5-9(2) for rectifier unit of 400VD4Y and Figure2.5-9(3) for rectifier unit of 500VD4Y

<INVERTER UNIT>

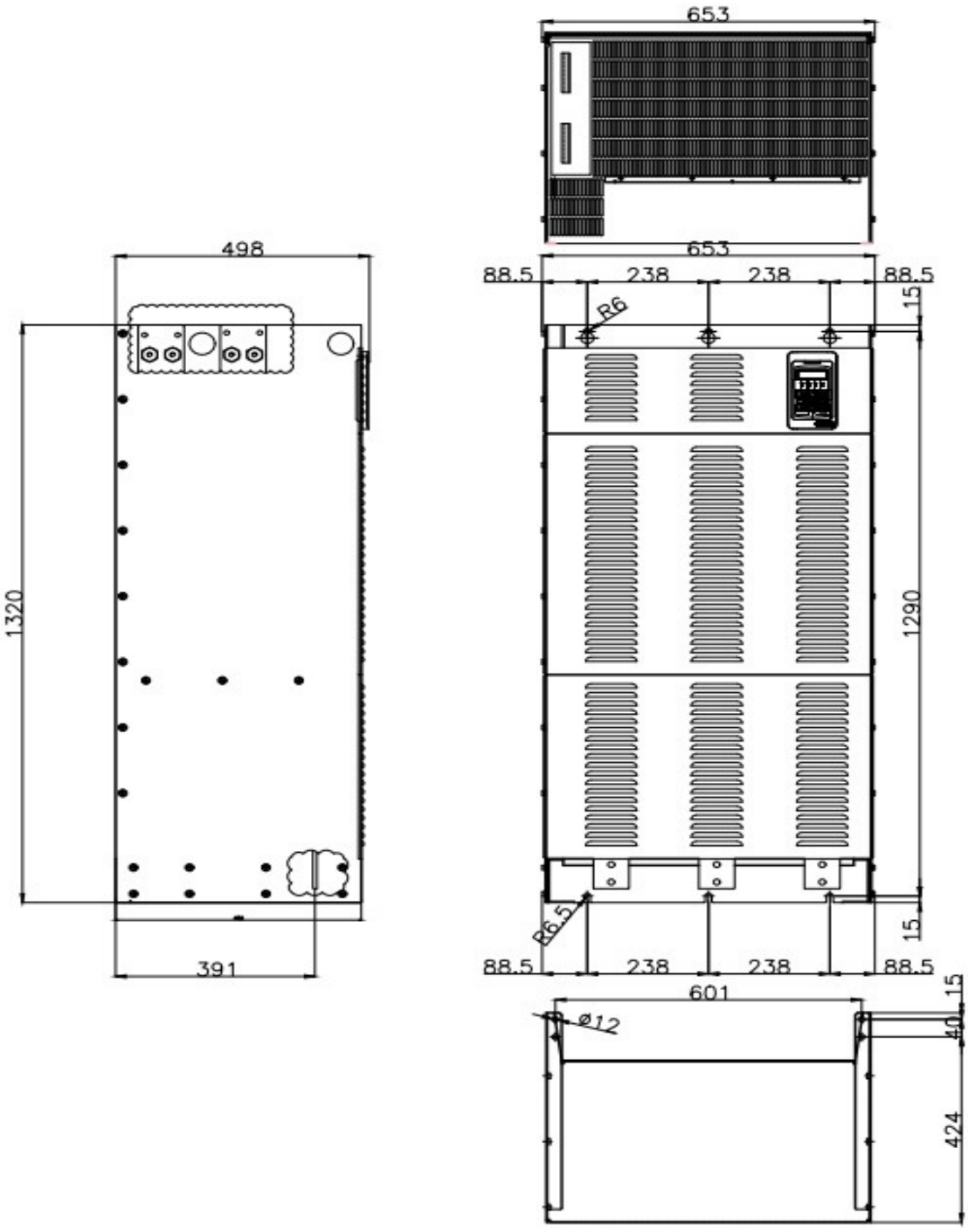


Figure 2.5-9(1) K10C Inverter unit external dimension
**) Refer to chapter 3.4 for installation*

<RECTIFIER UNIT>

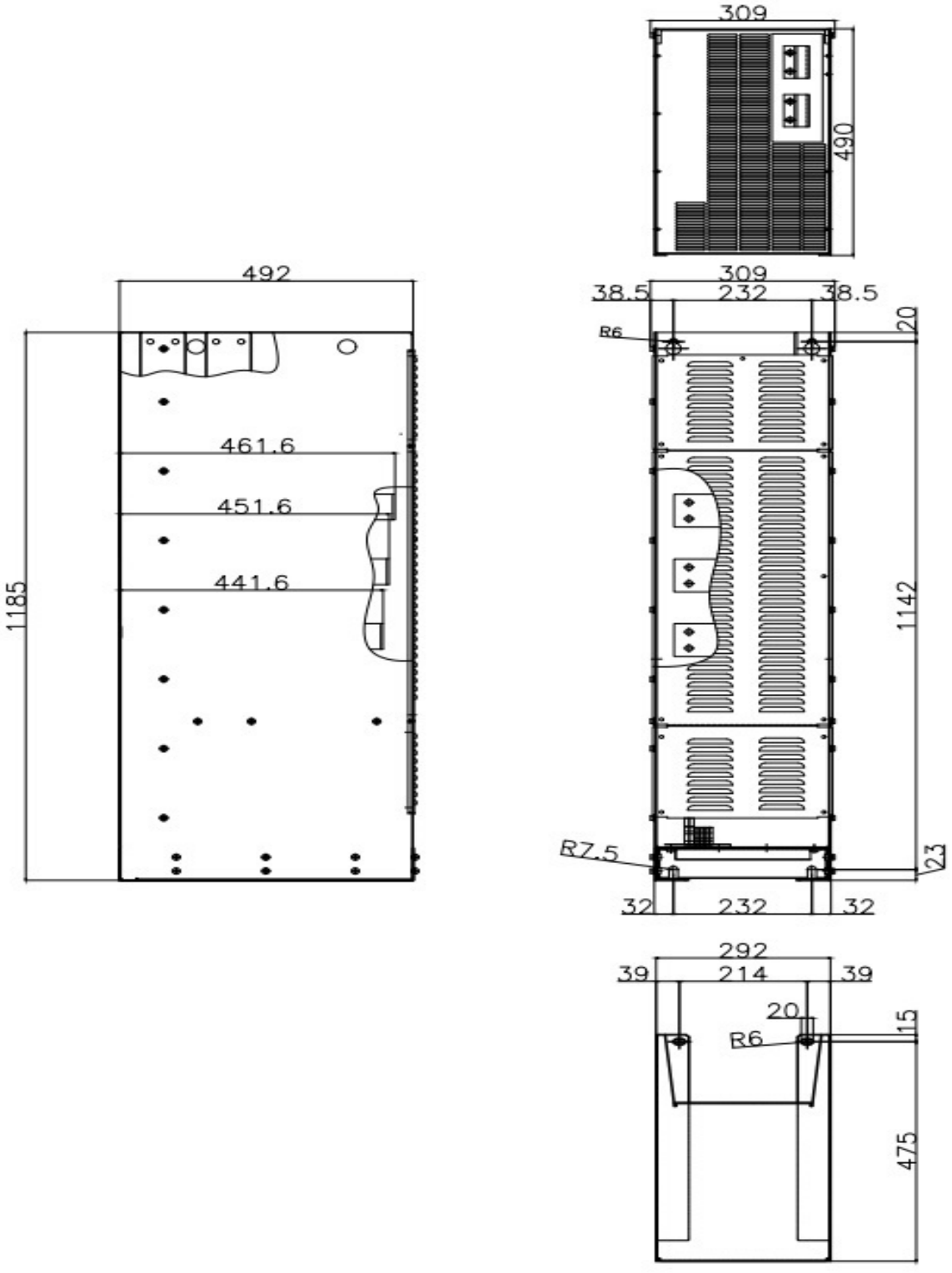


Figure 2.5-9(2) 400VD4N(K10C)Rectifier unit external dimension
**) Refer to chapter 3.4 for installation*

<RECTIFIER UNIT>

2

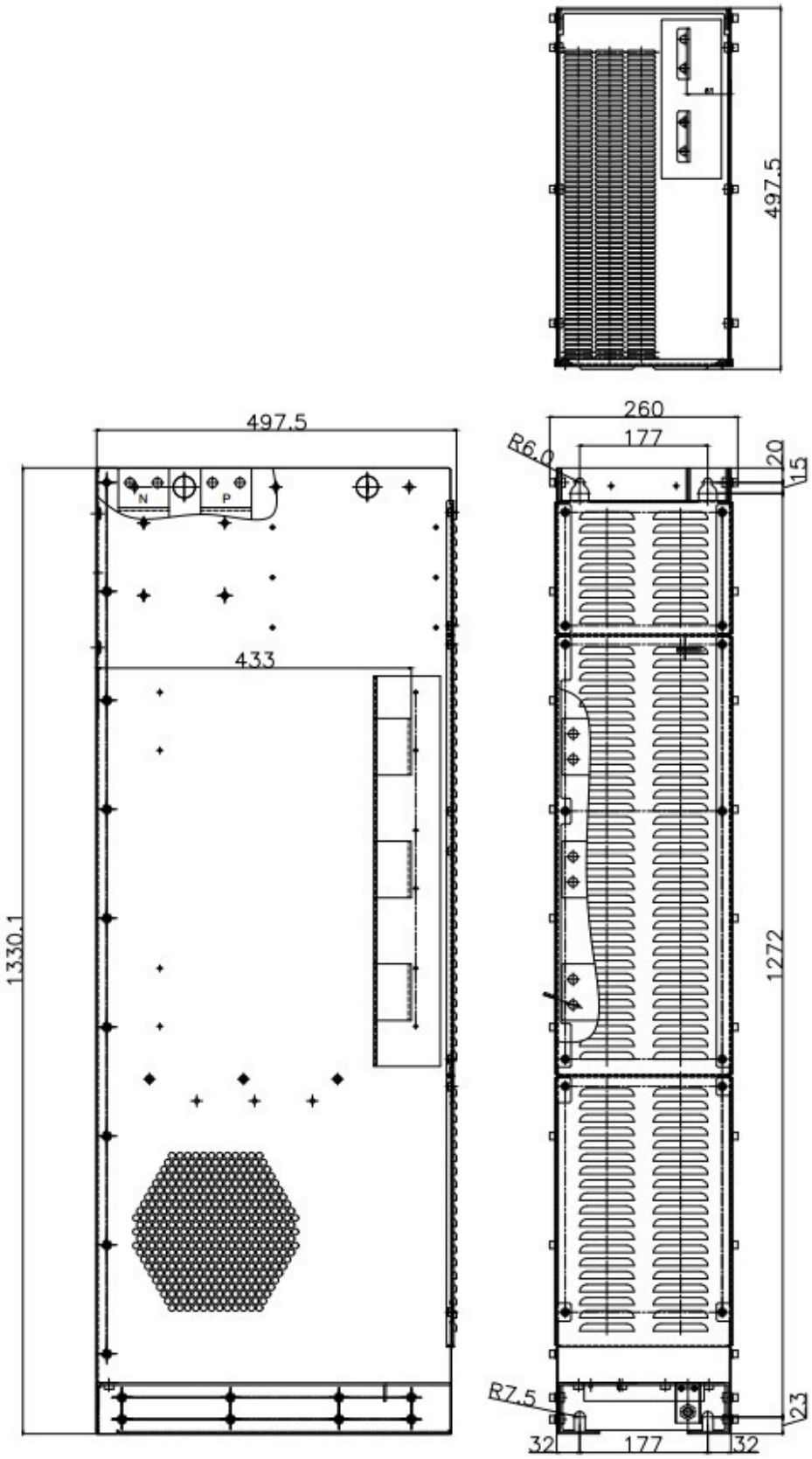


Figure 2.5-9(3) 500VD4N(K10C) Rectifier unit external dimension
**) Refer to chapter 3.4 for installation*

2.5.10 K10DL

Voltage	Model
400V	400 VD 4N
	500 VDPF 4N
	560 VDPF 4N

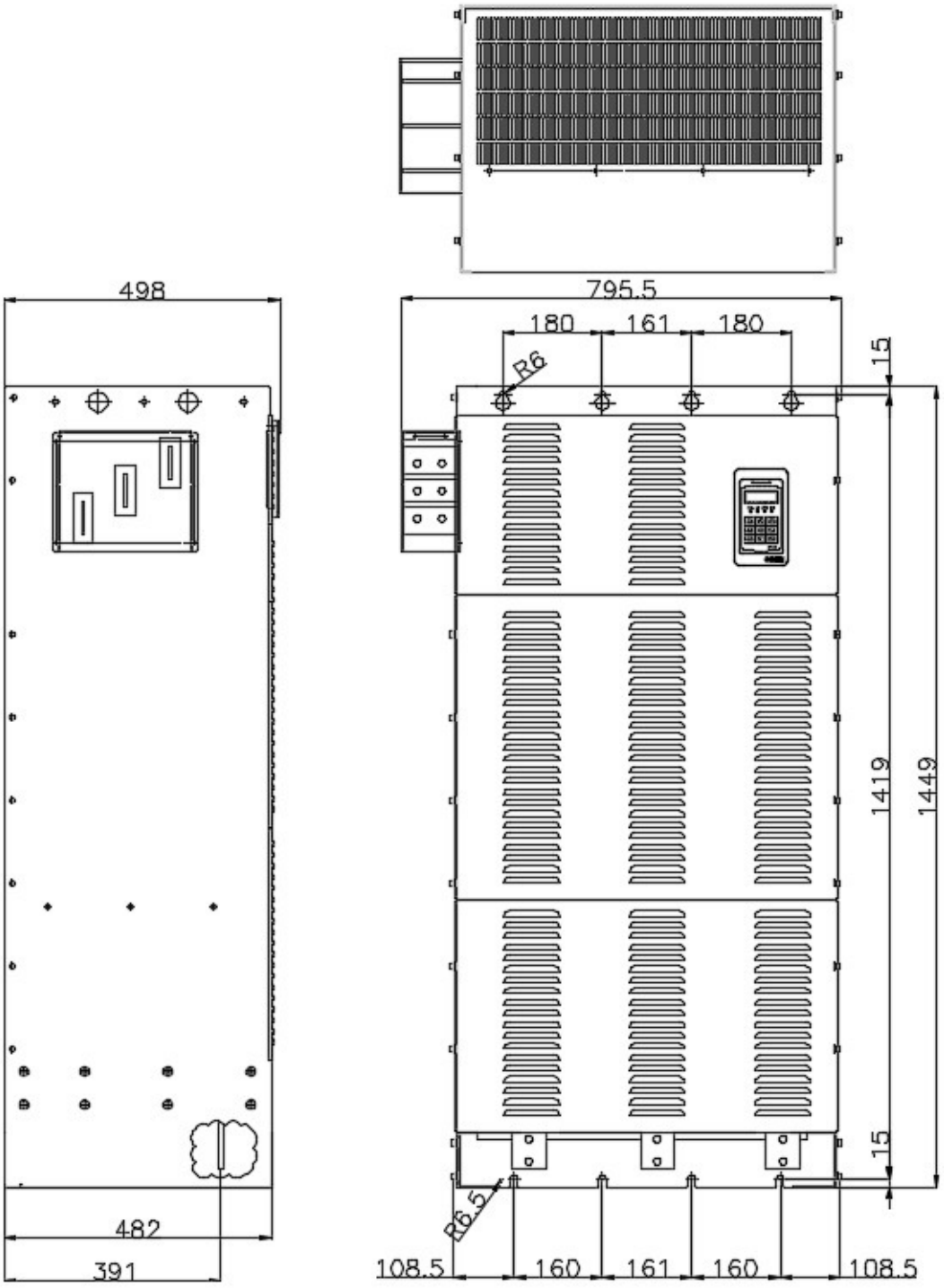


Figure 2.5-10 K10DL External dimension

2.5.11 K11

Voltage	Model
400V	710 VD 4N
	800 VD 4N

<INVERTER UNIT>

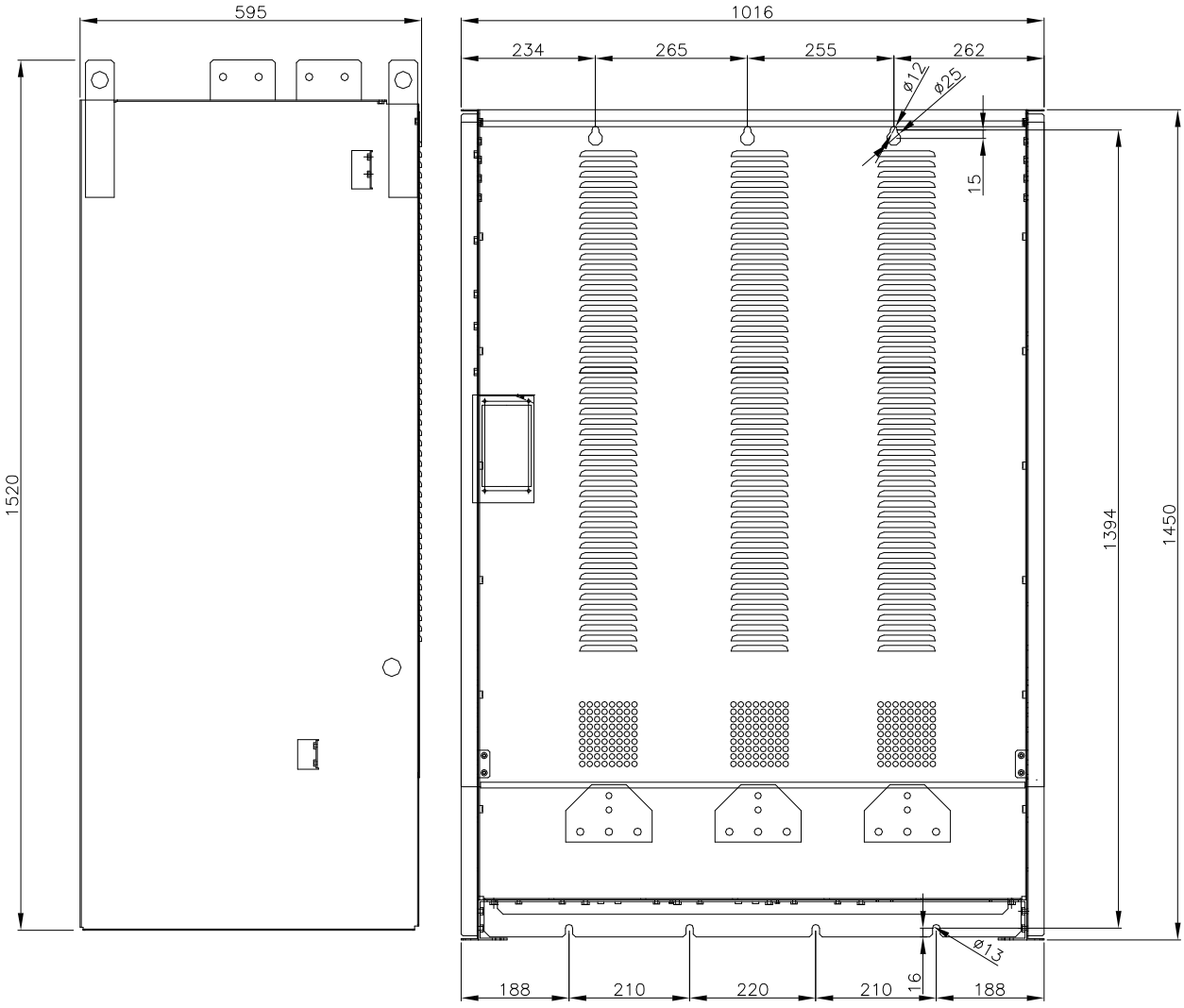


Figure 2.5-11(1)K11 Inverter unit external dimension
**) Refer to chapter 3.4 for installation*

<RECTIFIER UNIT>

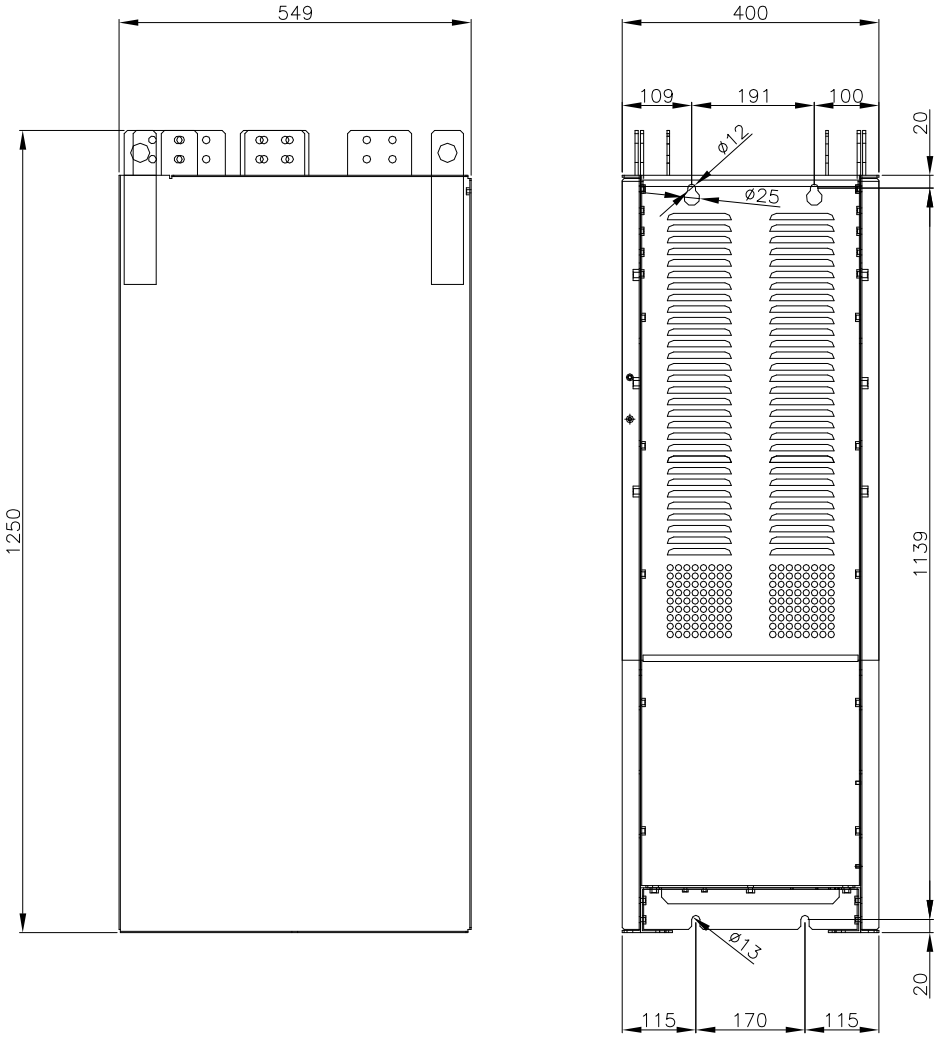


Figure 2.5-11(2)K11 Rectifier unit external dimension
**) Refer to chapter 3.4 for installation*

2.5.12 N5

Voltage	Model
690V	30 VD 6Y(N)

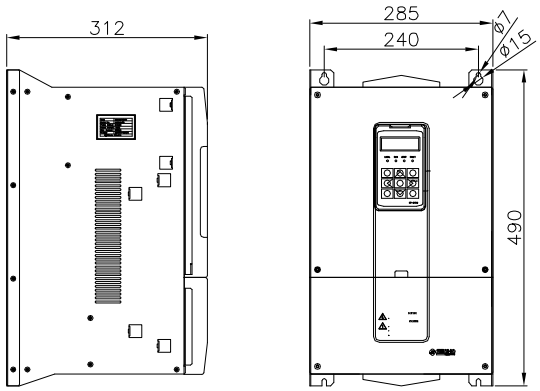


Figure 2.5-12 N5 External dimension

2.5.13 N6

Voltage	Model
690V	37 VD 6Y(N)
	45 VD 6Y(N)
	55 VD 6Y(N)

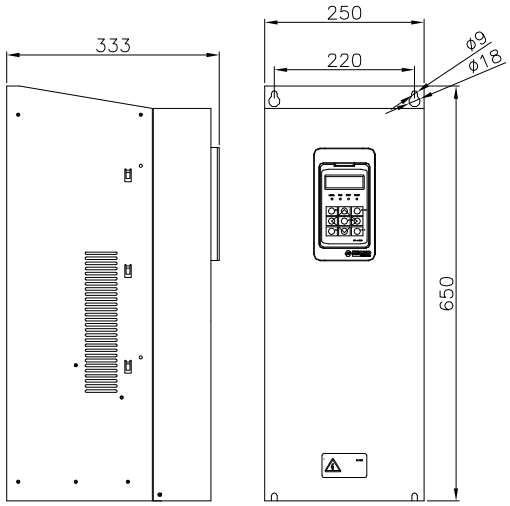


Figure 2.5-13 N6 External dimension

2.5.14 N7

Voltage	Model
690V	75 VD 6Y(N)
	90 VD 6Y(N)
	110 VD 6Y(N)

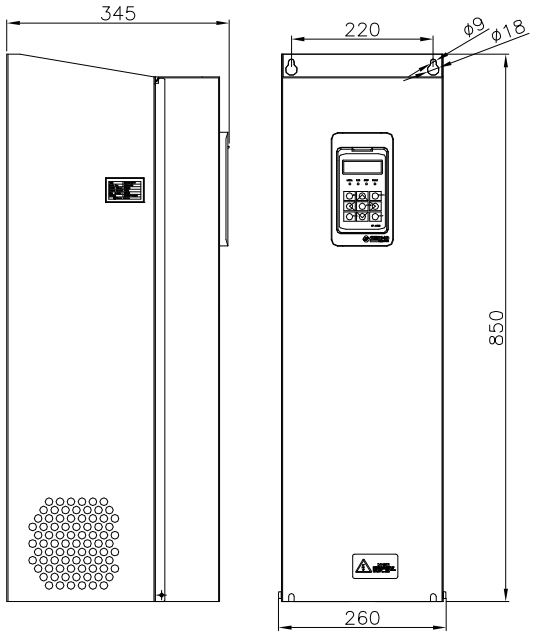


Figure 2.5-14 N7 External dimension

2.5.15 N9

Voltage	Model
690V	132 VD 6Y(N)
	160 VD 6Y(N)
	200 VD 6Y(N)
	250 VD 6Y(N)

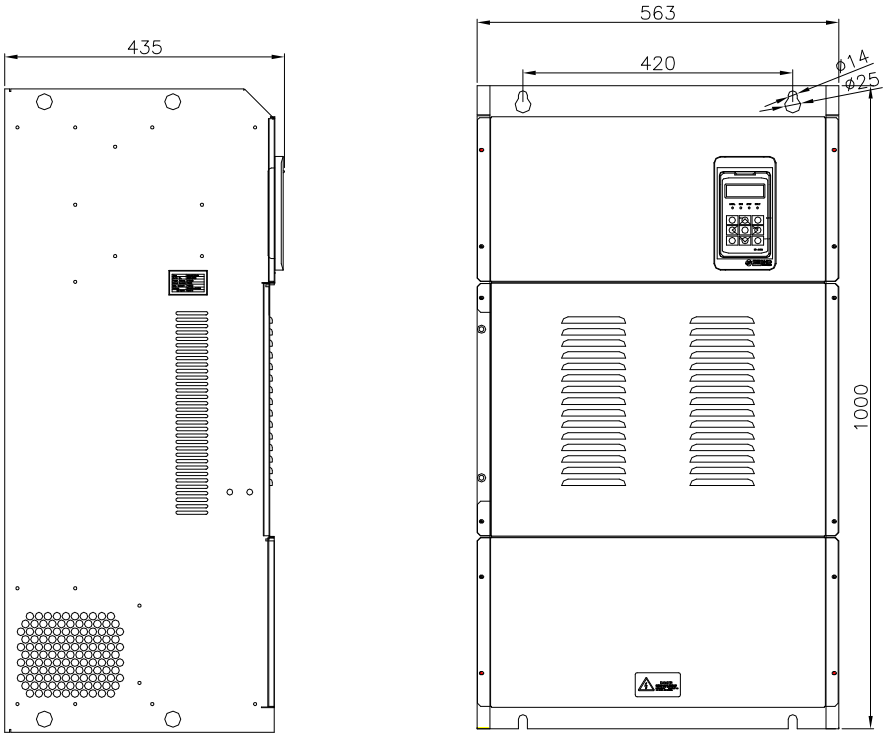


Figure 2.5-15 N9 External dimension

2.5.16 N10

Voltage	Model
690V	315 VD 6N
	400 VD 6N
	500 VD 6N

***)400VD6N, 500VD6N model, please headquartered minutes of your order, so that the dimensional changes Depending on the intended use of the inverter.**

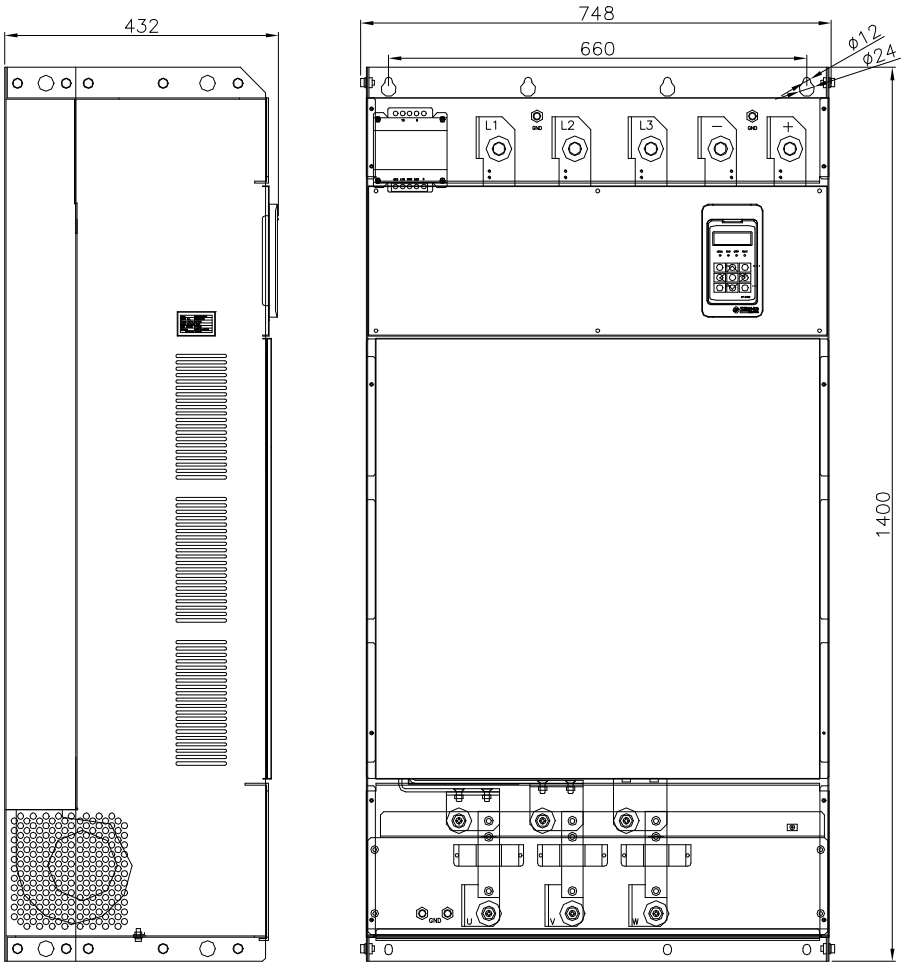


Figure 2.5-16 N10 External dimension

2.5.17 L7B

Voltage	Model
1140V	110 VD 12N
	132 VD 12N

***)1140V model, please headquartered minutes of your order, so that the dimensional changes Depending on the intended use of the inverter.**

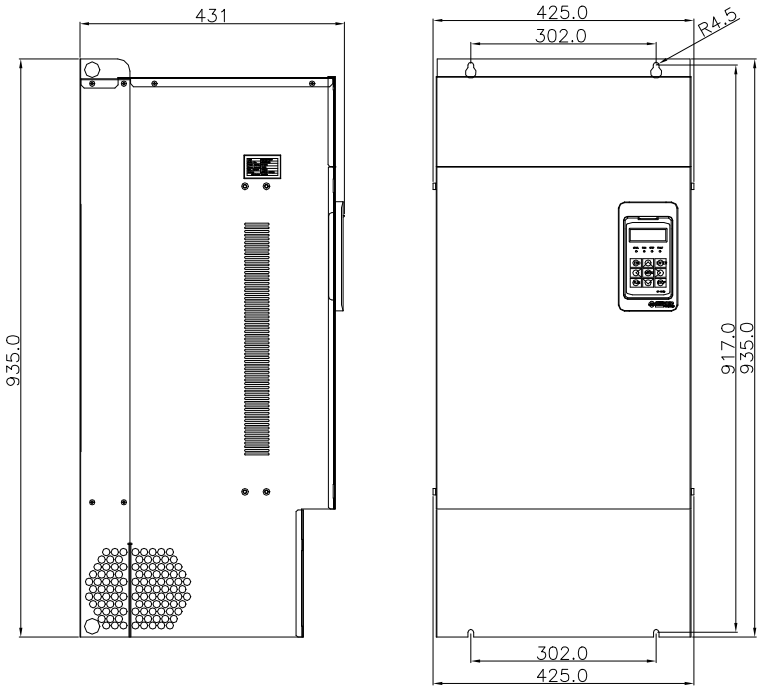


Figure 2.5-17 L7B External dimension

2.5.18 L8

Voltage	Model
1140V	160 VD 12N
	200 VD 12N
	250 VD 12N

***)1140V model, please headquartered minutes of your order, so that the dimensional changes Depending on the intended use of the inverter.**

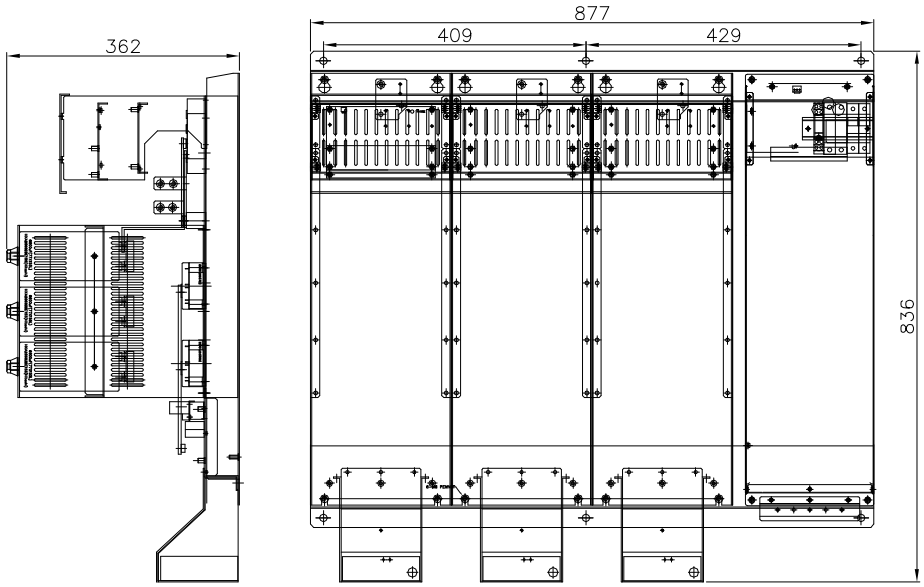


Figure 2.5-18 L8 External dimension

2.5.19 L10

Voltage	Model
1140V	315 VD 12N
	400 VD 12N

***)1140V model, please headquartered minutes of your order, so that the dimensional changes Depending on the intended use of the inverter.**

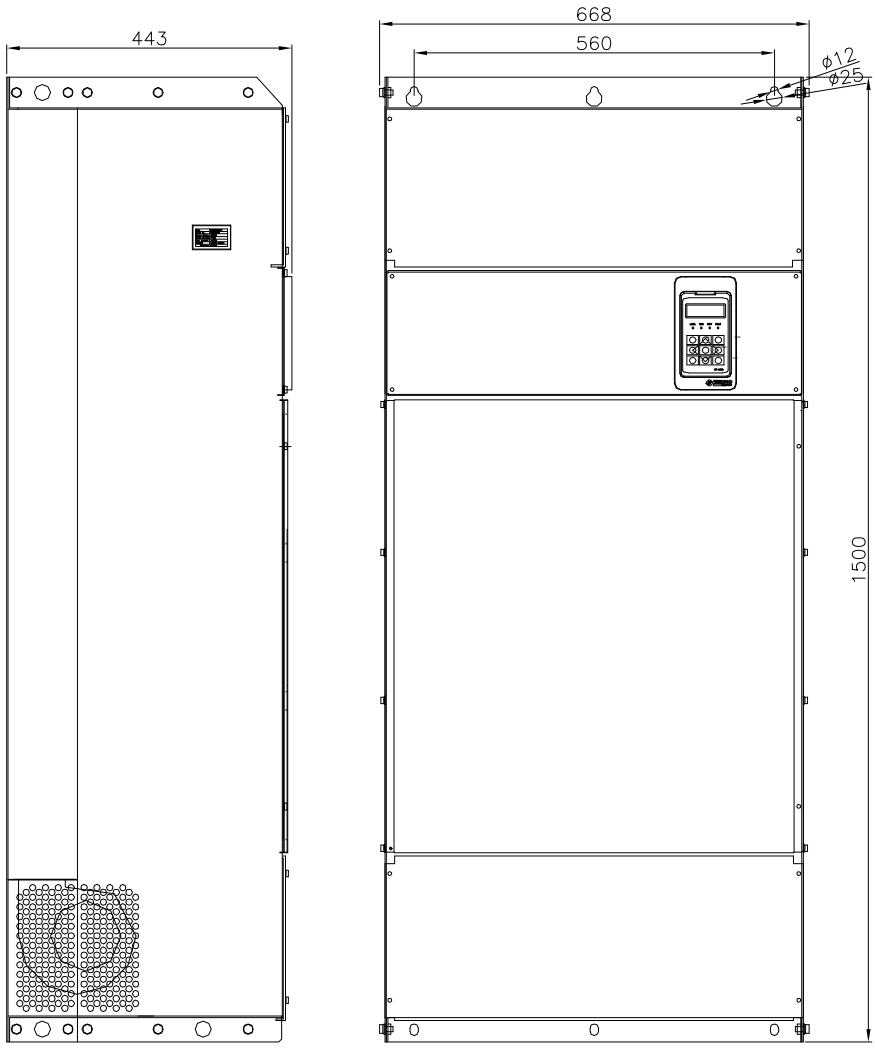


Figure 2.5-19 L10 External dimension

2.5.20 L11

Voltage	Model
1140V	500 VD 12N
	560 VD 12N
	630 VD 12N

***)1140V model, please headquartered minutes of your order, so that the dimensional changes Depending on the intended use of the inverter.**

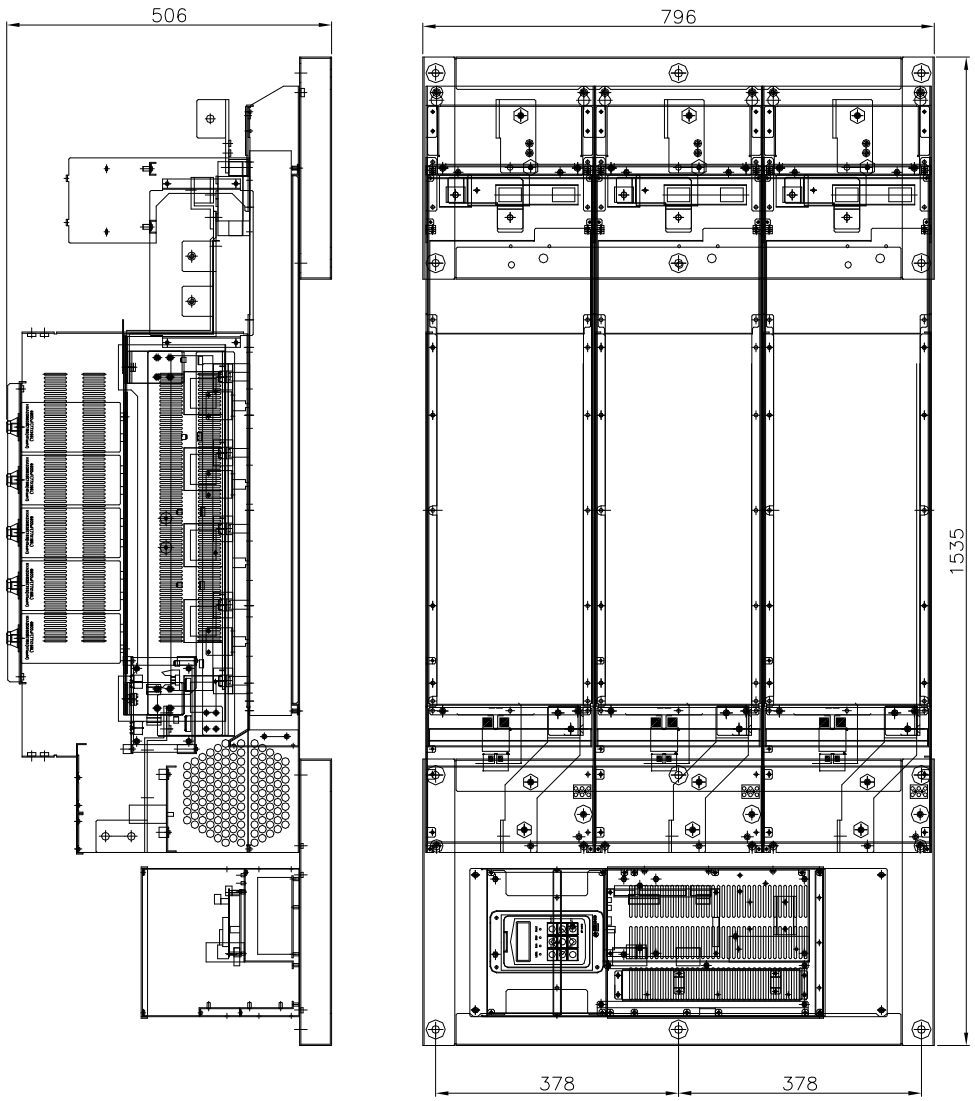


Figure 2.5-20 L11 External dimension

2.6 Specification

Main Connection	Input Voltage V_{in}		3 Phase $200V_{ac}$～$230V_{ac}$, $380V_{ac}$～$480V_{ac}$, $525V_{ac}$～$690V_{ac}$ 3 Phase $1140V_{ac}$	
	Input Frequency		50Hz～60Hz (±10%)	
	Connection to the Main		Don't turn on and off the inverter more than 1 times within 1 min.	
Rated Output	Output Voltage		0 ～ 95% of V_{in}	
	Continuous Output current		VD: I_{CT} : ambient max. +40℃ Over load $1.5 \times I_{CT}$ (1 minute per 10 minutes)	VDPF: I_{VT} : ambient max. +40℃ Over load $1.1 \times I_{VT}$ (1 minute per 10 minutes)
	Starting Torque		150%(0.5Hz) in Sensorless V/F Control 200% (0.3Hz) in Sensorless Vector Control 200% (0Hz) in Sensored Vector Control	
	Output Frequency/speed		Sensorless : 0.0～300.0[Hz] / 0.0～3000.0[Hz] Sensored : 0～8000 [rpm]	
	Frequency/speed resolution		Sensorless V/F : 0.01Hz / 0.1Hz Sensorless & Sensored Vector : 1[rpm]	
Control	Control Method		Sensorless V/F Frequency Control Sensorless V/F Speed Control Sensorless Vector Speed Control Sensorless Torque Control Sensored Vector Speed Control Sensored Torque Control	
	Switching Frequency		1.5 ～ 3.5[kHz]	400V 5.5kW ~ 90kW 200V 3.7kW ~ 45kW 690V 30kW ~ 55kW
			1.5 ~ 3.0[kHz]	400V 110kW ~ 250kW 200V 55kW ~ 90kW 690V 55kW ~ 250kW
			1.2 ~ 2.5[kHz]	400V 315kW ~
			Under 1.2kHz	690V 315kW ~ 1140V 110kW ~
	Frequency reference	Analog I/P	resolution 10bit, accuracy ±0.1%	
		Keypad	Resolution 0.01Hz / 0.1Hz	
	Field weakening point		Auto Tuning	
	Acceleration Time		V/F Control 0.5～3000.0[sec] Sensorless & Sensored Vector Control - 0.00～3000.00[sec]	
	Deceleration Time		V/F Control 0.5～3000.0[sec] Sensorless & Sensored Vector Control - 0.00～3000.00[sec]	

<next>

<Continued>

Environmental Limits	Surrounding Temperature		-10℃ ~ +40℃
	Relative Humidity		90%, no condensation allowed
Protection Function	Over Voltage, Over Current, Over Load, Zero Phase Current, Low Current, Low Voltage. Motor Over Speed, Out of Control, Initial Recharge Fault, External Fault Signal Detection, Signal Detection of Gate Drive Main Power and Wiring, Keypad Fault Detection, Auto Tuning Fault Detection, Software Default Detection.		
Control I/O Specification	Analog Input voltage		0V(-10V) ~ +10V_{DC}, resolution 10bit
	Analog Input current		0(4) ~ 20mA, resolution 10bit
	Digital Input		Negative Logic
	Aux. supply Voltage		+24V ±20%, Max. 100mA
	Analog Output		0 (or 4) ~ 20mA, R_L<500Ω, resolution 10bit
	Digital Output(DO3)		Multi-Function Output : 24Vdc, 50mA Recommendations : External relay 'OMRON MY2'
	Relay Output	DO1	Multi-Function Output : AC 250V/3.5A or DC 30V/3.5A
		DO2	Multi-Function Output : AC 250V/3.5A or DC 30V/3.5A

2.7 System Configuration

Figure 2-7.1 shows a block diagram of the SOHO VD inverter.

Diode Bridge produces the DC voltage for the IGBT inverter Bridge block.

The IGBT bridge produces a symmetrical three-phase PWM modulated AC voltage to the motor. The power drawn from the supply is almost entirely active power.

The Motor Control block is based on microprocessor software. The microprocessor controls the motor according to the saved software (V/F, vector) in Flash memory, measured signals, parameter value settings and commands from the Control I/O block and the Keypad. And it calculates the IGBT switching positions. Gate Drivers amplify these signals to drive the IGBT inverter bridge. If the over-current occurs at the IGBT, the gate driver breaks the IGBT gate signal and sends the fault signal to the microprocessor.

The Keypad is a link between the user and the inverter. With the Keypad or personal Computer, the user can set parameter values, read status data and give control commands. The Keypad is detachable and can be mounted externally and connected via a cable to the inverter.

The optional DBR information can be referenced from this manual.

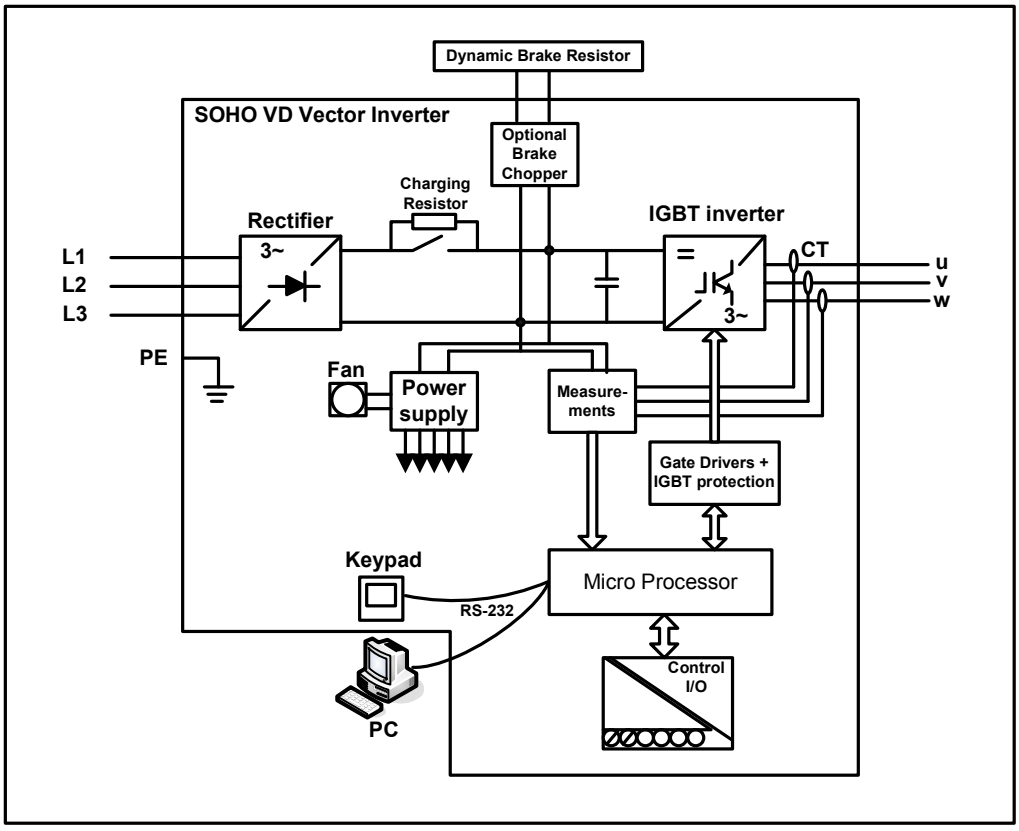


Figure 2.7-1 VD Inverter Block Diagram

3. Installation

3. Installation

3.1 Installation Condition

Please install the **SOHO-VD inverter** on the places satisfying the following conditions.

	1	Avoid rain, hot temperature and high humidity place.
	2	Avoid the direct sunlight.
	3	The place should be protected from dirt, metal dust, and welding flame.
	4	Install so as to be bearable to the vibration.
	5	Defective main power may cause the inverter damages. - Using the same power source with welding machine. - Using a generator as the power source. - Sudden changes in the main voltage.
	6	Keep away from flammables.
	7	Install on the nonflammable materials as street.

3.2 Cooling

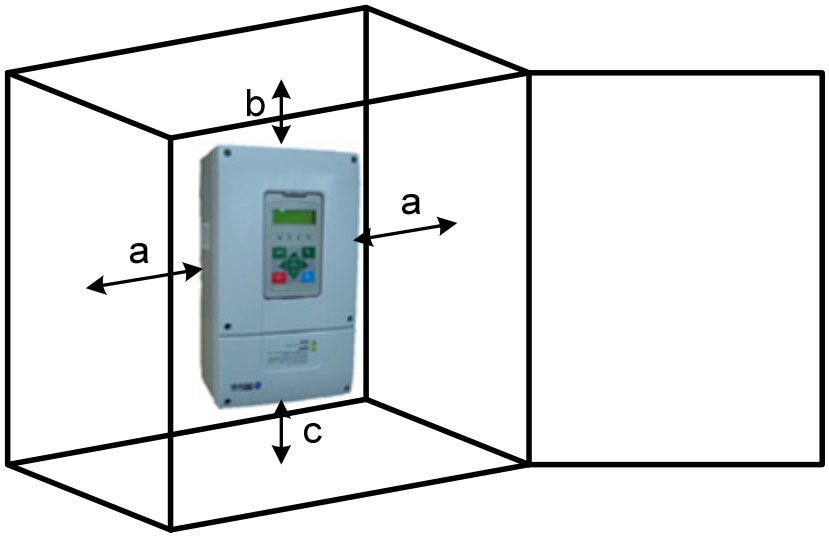


Figure 3.2-1 Installation space

The specified space around the **SOHO-VD** inverter unit ensures proper cooling air circulation. See table 3.2-1 for dimensions. If multiple units are to be installed above each other, the distance between the units must be b + c and air from the outlet of the lower unit must be directed away from the inlet of the upper unit.

SIZE	Dimension(mm)			
	a	a2	b	c
K3AD(D3)	20	10	150	50
K3BD(D4) / K3CD(D5)	20	10	150	60
K5A / K6 / N6	30	10	160	80
N7 / M7 / K7C	75	75	300	100
M8B / K9B / K10C / K10DL K11 / N9 / N10 / L10	250	75	300	-

Table 3.2-1 Installation space dimension a2 = distance from the inverter unit to other inverter unit

3.3 Installation of Keypad on the External Panel

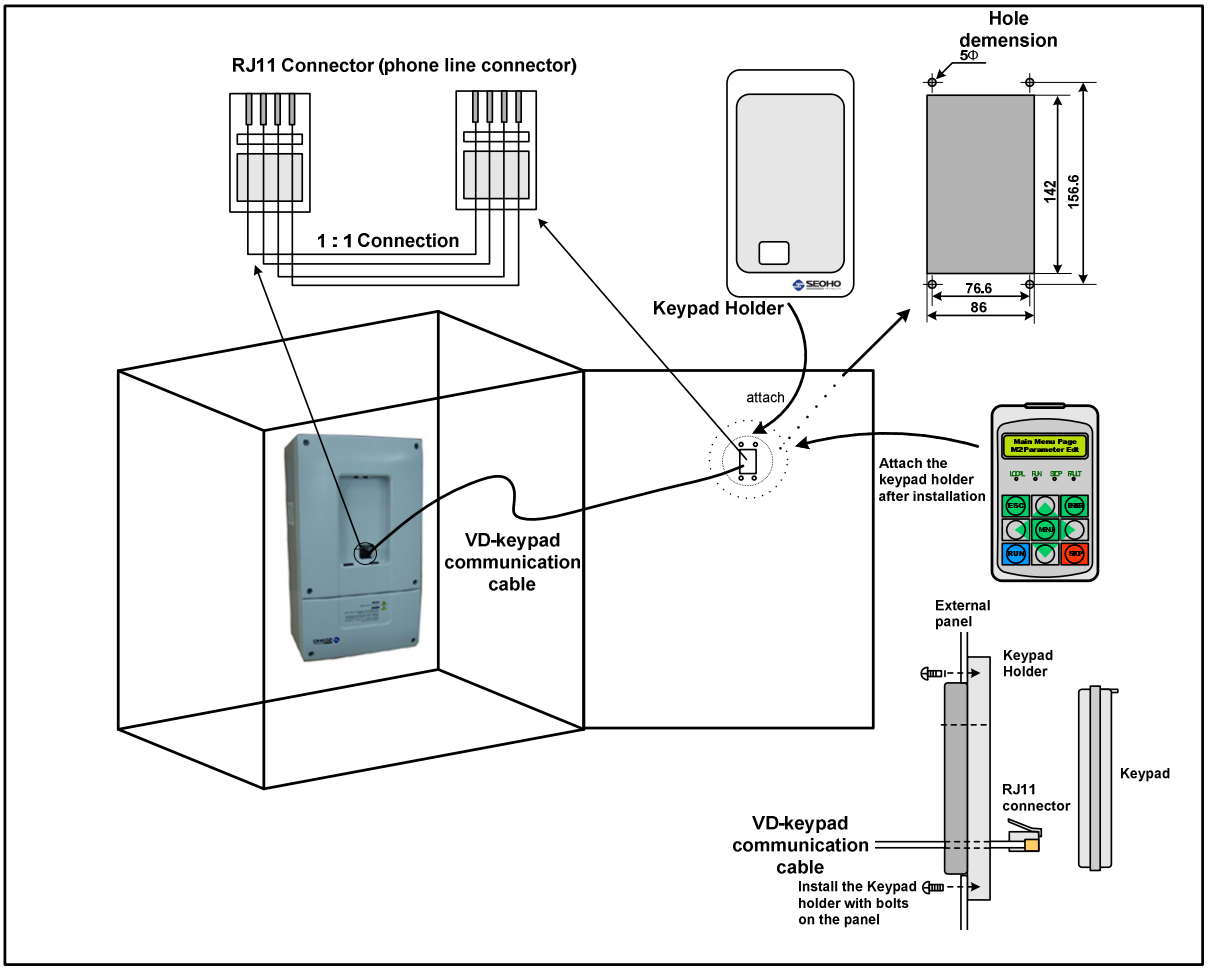


Figure 3.3-1 Installation of keypad on the external panel

When the **SOHO VD** Keypad is installed on the external panel, refer to the figure 3.3-1.

First, make holes on the spot of the panel as shown in the figure 3.3-1.

Then, install the keypad plate with bolts. The keypad that is installed on the external panel is connected by RS232 serial cable, which is 1:1 connection.

Refer to the figure 3.3-1.

3.4 Recommendation for Installation of K10C, K10DL and K11

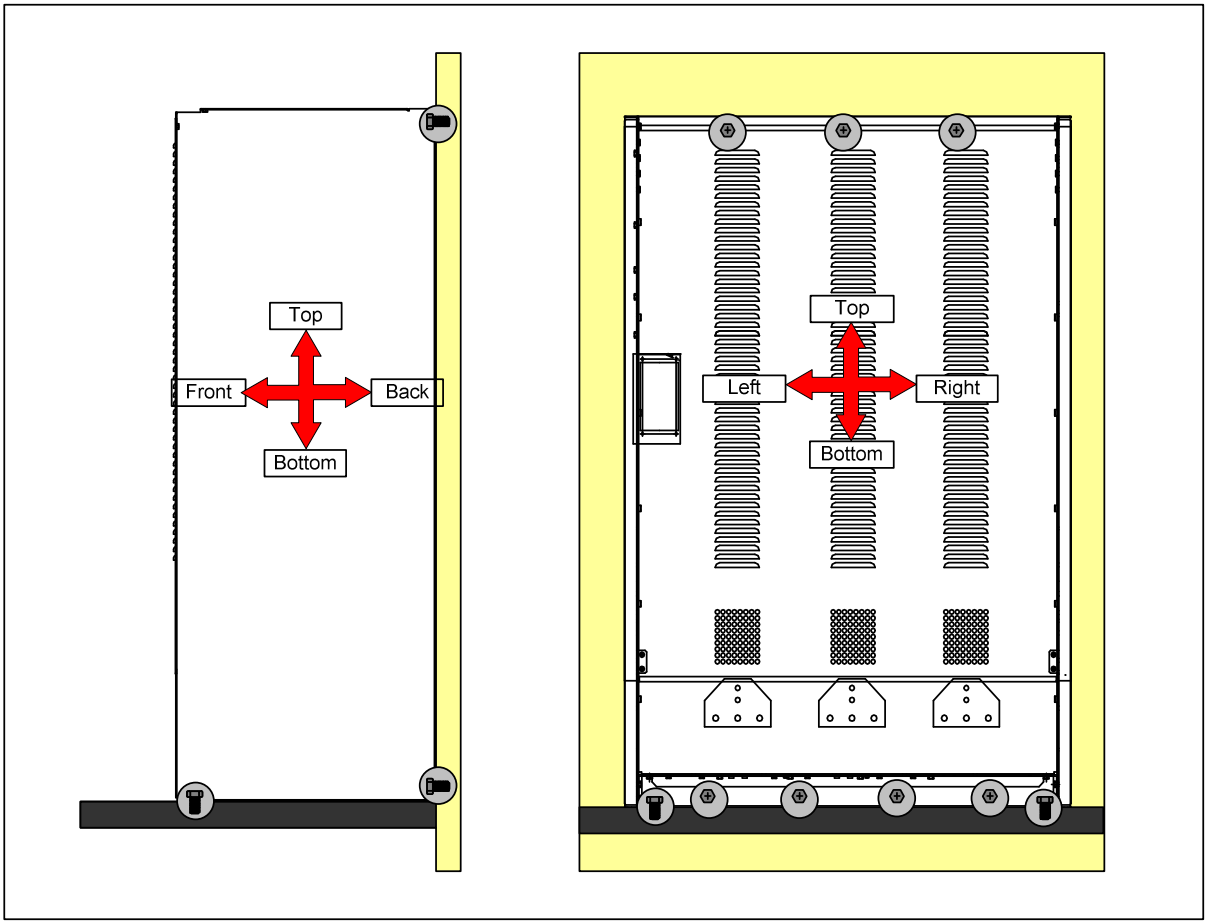
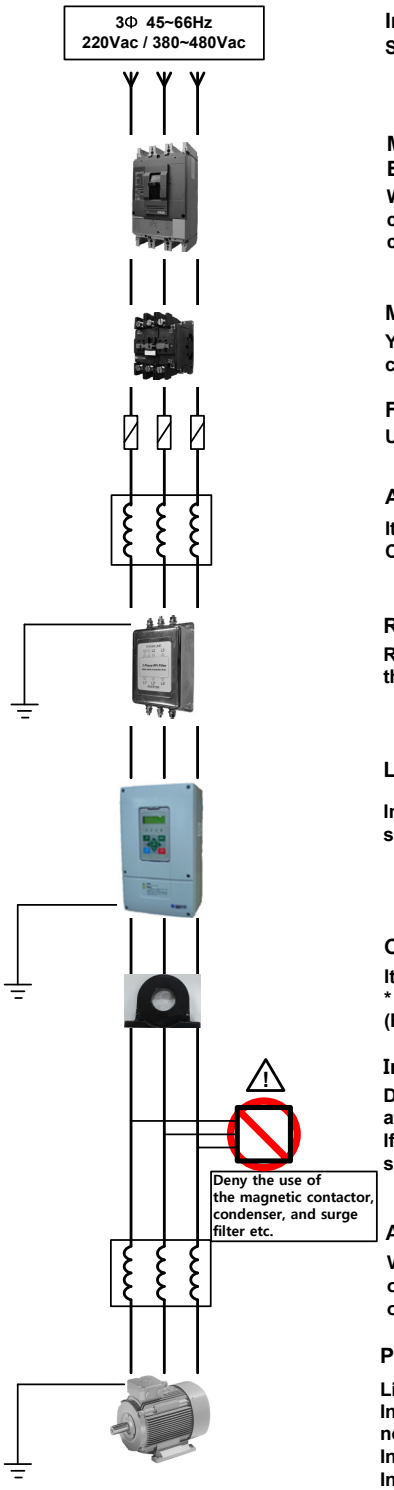


Figure 3.4-1 Installation of K10C, K10DL, K11

Heavy inverters, K10C, K10DL and K11, should be tightly fixed on the structure of back side and on the structure of bottom side like as figure 3.4-1. Otherwise, the structure of the inverter could be damaged by the vibration of long period.

3.5 Use of Auxiliary Equipment

When using a **SOHO VD Inverter,** it is recommended to use right auxiliary equipments. If the auxiliary equipments are not right for SOHO VD inverter, it can cause damage to the inverter. Therefore, follow the recommended specifications for configuration.



Input source
Should be used within rated source indicated on the manual.

Magnetic Circuit Braker (MCCB) and Electric Leakage Braker (ELB)
When the Main Power in On, Very big inrush current can be occurred, So, You should be care when you choose the spec. about this.

Magnetic Contactor
You should not run or stop the Driver using this contactor.

Fuse
Use the fuse to protect the Driver

AC Reactor
It improves the power factor and reduces the ripple current of inverter Capacitors.

RFI(Radio Frequency Interference) Filter
RFI reduce the noise copied at Input source Line, and can protect the malfunction of equipment.

Line Connection of Inverter
Inverter can be damaged because wrong connection. Signal Line should separate from Power Line and should be used the shield cables.

Output Choke
It reduces the electronic noise generated from the inverter.
* When using the shield cables, do not penetrate the shied part.
(Remove the shield part and penetrate.)

Inverter Output
Do not Connect the magnetic Contactor, Phase advance Capacitor, Surge Absorber at output of Inverter. It can be caused to malfunction and damage.
If users use the magnetic contactor to the output of Inverter, the magnetic contactor should be ON or OFF without the output of Inverter.

AC Output Reactor
When the length of cable is more than 50m or the number of motors is connected in parallel to one inverter, AC output reactor should be installed to output of inverter.

Place to Install
Life time of Inverter is definitely influenced by ambient temperature.
Inverter should be used at temperature, which the ambient temperature is not over the allowed range.
Inverter should be installed at the place where is well ventilated.
Inverter should not be installed at a airtight room.
A ventilating opening and cooling devices are the requirement.

Figure 3.5-1 auxiliary equipment

3.5.1 Input/Output Reactor

<60Hz – 200V, 400V>

Voltage	Capacity	Freq.	Input Reactor (V_D=2%)		Output Reactor		Note
			Current	Induct.	Current	Induct.	
400V	2.2kW	60Hz	7A	3.057mH	10A	1345uH	1. A permissible error of inductance- ±5% 2. An allowable inductance in over current - Keep inductance over 80% in 150% current. 3. A permissible temperature (100% load) - Reactor temperature below 100℃ in ambient temperature 40℃ 4. Switching frequency (only for output reactor) - 400V Class: 5kHz (Below 200kW) 2.5kHz(Above 250kW) - 200V Class: 5kHz (Below 90kW) 2.5kHz(Above 110kW) Caution.1) In table input reactor is suitable for inverter applied nominal torque operation like hoist and lift. The value of input reactor suited variable torque operation like fan, pump and etc., is calculated by the capacity of capacitor bank and the built-in of DC reactor so that input reactor should be selected carefully. Caution.2) It is necessary to use the output reactor, when the distance between inverter and motor is over 50m or over 2 motors are connected with one inverter. If the distance between inverter and motor is over 100m, the output reactor should be over 2 times of the inductance in left table.
	3.7kW	60Hz	10A	2.038mH	12A	897uH	
	5.5kW	60Hz	15A	1.411mH	14A	621uH	
	7.5kW	60Hz	18A	1.147mH	19A	505uH	
	11kW	60Hz	27A	0.765mH	28A	337uH	
	15kW	60Hz	35A	0.592mH	36A	261uH	
	18.5kW	60Hz	42A	0.483mH	44A	213uH	
	22kW	60Hz	50A	0.408mH	52A	180uH	
	30kW	60Hz	69A	0.296mH	71A	79uH	
	37kW	60Hz	81A	0.252mH	83A	67uH	
	45kW	60Hz	97A	0.209mH	102A	56uH	
	55kW	60Hz	119A	0.17mH	124A	45uH	
	75kW	60Hz	162A	0.125mH	168A	33uH	
	90kW	60Hz	192A	0.106mH	201A	28uH	
	110kW	60Hz	235A	0.087mH	244A	23uH	
	132kW	60Hz	279A	0.073mH	290A	20uH	
	160kW	60Hz	337A	0.06mH	351A	16uH	
	200kW	60Hz	422A	0.048mH	440A	13uH	
	250kW	60Hz	526A	0.039mH	550A	11uH	
	315kW	60Hz	656A	0.031mH	686A	9uH	
	400kW	60Hz	833A	0.025mH	870A	7uH	
	500kW	60Hz	1041A	0.02mH	1081A	6uH	
	710kW	60Hz	1478A	0.014mH	1545A	4uH	
	800kW	60Hz	1666A	0.013mH	1742A	4uH	
220V	2.2kW	60Hz	11A	1.062mH	12A	468uH	
	3.7kW	60Hz	18A	0.664mH	19A	292uH	
	5.5kW	60Hz	25A	0.483mH	26A	213uH	
	7.5kW	60Hz	31A	0.38mH	33A	167uH	
	11kW	60Hz	44A	0.266mH	46A	117uH	
	15kW	60Hz	59A	0.201mH	61A	53uH	
	18.5kW	60Hz	73A	0.161mH	76A	43uH	
	22kW	60Hz	86A	0.137mH	90A	36uH	
	30kW	60Hz	117A	0.101mH	122A	27uH	
	37kW	60Hz	138A	0.085mH	144A	23uH	
	45kW	60Hz	168A	0.07mH	175A	19uH	
	55kW	60Hz	205A	0.058mH	214A	16uH	
	75kW	60Hz	280A	0.042mH	293A	12uH	
	90kW	60Hz	332A	0.036mH	347A	10uH	
	110kW	60Hz	405A	0.029mH	424A	8uH	
	132kW	60Hz	480A	0.025mH	502A	7uH	

Table 3.5-1 200V-400V, 60Hz Input/output reactor

<60Hz – 690V, 1140V>

Voltage	Capacity	Freq.	Input Reactor (V_D=2%)		Output Reactor		Note
			Current	Induct.	Current	Induct.	
690V	30kW	60Hz	40A	0.89mH	42A	390uH	1. A permissible error of inductance- ±5% 2. An allowable inductance in over current - Keep inductance over 80% in 150% current. 3. A permissible temperature (100% load) - Reactor temperature below 100℃ in ambient temperature 40℃ 4. Switching frequency (only for output reactor) - 690V : 2.5kHz / 1140V : 1.2kHz Caution 1) For using input reactor, please refer the previous page. Caution 2) It is necessary to use the output reactor for 1140V class inverter. If the distance between inverter and motor is from 50m to 100m, the output reactor should be over 2 times of the inductance in left table. If the distance between inverter and motor is over 100m, should install additionally a micro surge filter. Contact to headquarter for more information.
	37kW	60Hz	47A	0.76mH	49A	334uH	
	45kW	60Hz	57A	0.63mH	59A	165uH	
	55kW	60Hz	69A	0.52mH	72A	136uH	
	75kW	60Hz	94A	0.38mH	98A	99uH	
	90kW	60Hz	112A	0.32mH	117A	84uH	
	110kW	60Hz	136A	0.26mH	142A	69uH	
	132kW	60Hz	161A	0.22mH	168A	58uH	
	160kW	60Hz	195A	0.18mH	204A	48uH	
	200kW	60Hz	244A	0.15mH	255A	39uH	
	250kW	60Hz	304A	0.12mH	318A	31uH	
	315kW	60Hz	379A	0.1mH	396A	25uH	
	400kW	60Hz	480A	0.08mH	502A	20uH	
	500kW	60Hz	600A	0.06mH	627A	16uH	
	630kW	60Hz	756A	0.05mH	791A	13uH	
1140V	110kW	60Hz	79A	0.78mH	82A	246uH	
	132kW	60Hz	94A	0.65mH	98A	206uH	
	160kW	60Hz	113A	0.54mH	118A	171uH	
	200kW	60Hz	141A	0.43mH	148A	137uH	
	250kW	60Hz	176A	0.35mH	184A	109uH	
	315kW	60Hz	219A	0.28mH	229A	88uH	
	400kW	60Hz	279A	0.22mH	291A	69uH	
	500kW	60Hz	348A	0.18mH	364A	56uH	
	560kW	60Hz	390A	0.16mH	408A	50uH	
	630kW	60Hz	438A	0.14mH	458A	44uH	

Table 3.5-2 1140V, 60Hz Input/output reactor

<50Hz – 200V, 400V>

Voltage	Capacity	Freq.	Input Reactor (V_D=2%)		Output Reactor		Note
			Current	Induct.	Current	Induct.	
400V	2.2kW	50Hz	7A	3.668mH	10A	1614uH	1. A permissible error of inductance- ±5% 2. An allowable inductance in over current - Keep inductance over 80% in 150% current. 3. A permissible temperature (100% load) - Reactor temperature below 100℃ in ambient temperature 40℃ 4. Switching frequency (only for output reactor) - 400V Class: 5kHz (Below 200kW) 2.5kHz(Above 250kW) - 200V Class: 5kHz (Below 90kW) 2.5kHz(Above 110kW) Caution.1) In table input reactor is suitable for inverter applied nominal torque operation like hoist and lift. The value of input reactor suited variable torque operation like fan, pump and etc., is calculated by the capacity of capacitor bank and the built-in of DC reactor so that input reactor should be selected carefully. Caution.2) It is necessary to use the output reactor, when the distance between inverter and motor is over 50m or over 2 motors are connected with one inverter. If the distance between inverter and motor is over 100m, the output reactor should be over 2 times of the inductance in left table.
	3.7kW	50Hz	10A	2.445mH	12A	1076uH	
	5.5kW	50Hz	15A	1.693mH	14A	745uH	
	7.5kW	50Hz	18A	1.376mH	19A	606uH	
	11kW	50Hz	27A	0.917mH	28A	404uH	
	15kW	50Hz	35A	0.71mH	36A	313uH	
	18.5kW	50Hz	42A	0.58mH	44A	255uH	
	22kW	50Hz	50A	0.489mH	52A	216uH	
	30kW	50Hz	69A	0.355mH	71A	94uH	
	37kW	50Hz	81A	0.302mH	83A	80uH	
	45kW	50Hz	97A	0.251mH	102A	67uH	
	55kW	50Hz	119A	0.204mH	124A	54uH	
	75kW	50Hz	162A	0.15mH	168A	40uH	
	90kW	50Hz	192A	0.127mH	201A	34uH	
	110kW	50Hz	235A	0.104mH	244A	28uH	
	132kW	50Hz	279A	0.087mH	290A	23uH	
	160kW	50Hz	337A	0.072mH	351A	19uH	
	200kW	50Hz	422A	0.058mH	440A	16uH	
	250kW	50Hz	526A	0.047mH	550A	13uH	
	315kW	50Hz	656A	0.037mH	686A	10uH	
	400kW	50Hz	833A	0.03mH	870A	8uH	
	500kW	50Hz	1041A	0.024mH	1081A	7uH	
	710kW	50Hz	1478A	0.017mH	1545A	5uH	
	800kW	50Hz	1666A	0.015mH	1742A	4uH	
220V	2.2kW	50Hz	11A	1.274mH	12A	561uH	
	3.7kW	50Hz	18A	0.797mH	19A	351uH	
	5.5kW	50Hz	25A	0.58mH	26A	255uH	
	7.5kW	50Hz	31A	0.455mH	33A	201uH	
	11kW	50Hz	44A	0.319mH	46A	141uH	
	15kW	50Hz	59A	0.241mH	61A	64uH	
	18.5kW	50Hz	73A	0.194mH	76A	51uH	
	22kW	50Hz	86A	0.164mH	90A	44uH	
	30kW	50Hz	117A	0.121mH	122A	32uH	
	37kW	50Hz	138A	0.102mH	144A	27uH	
	45kW	50Hz	168A	0.084mH	175A	23uH	
	55kW	50Hz	205A	0.069mH	214A	19uH	
	75kW	50Hz	280A	0.051mH	293A	14uH	
	90kW	50Hz	332A	0.043mH	347A	12uH	
	110kW	50Hz	405A	0.035mH	424A	10uH	
	132kW	50Hz	480A	0.03mH	502A	8uH	

Table 3.5-3 200V-400V, 50Hz Input/output reactor

<50Hz – 690V, 1140V>

Voltage	Capacity	Freq.	Input Reactor (V_D=2%)		Output Reactor		Note
			Current	Induct.	Current	Induct.	
690V	30kW	50Hz	40A	1.07mH	42A	468uH	1. A permissible error of inductance- ±5% 2. An allowable inductance in over current - Keep inductance over 80% in 150% current. 3. A permissible temperature (100% load) - Reactor temperature below 100℃ in ambient temperature 40℃ 4. Switching frequency (only for output reactor) - 690V : 2.5kHz / 1140V : 1.2kHz Caution 1) For using input reactor, please refer the previous page. Caution 2) It is necessary to use the output reactor for 1140V class inverter. If the distance between inverter and motor is from 50m to 100m, the output reactor should be over 2 times of the inductance in left table. If the distance between inverter and motor is over 100m, should install additionally a micro surge filter. Contact to headquarter for more information.
	37kW	50Hz	47A	0.91mH	49A	401uH	
	45kW	50Hz	57A	0.75mH	59A	198uH	
	55kW	50Hz	69A	0.62mH	72A	163uH	
	75kW	50Hz	94A	0.45mH	98A	119uH	
	90kW	50Hz	112A	0.38mH	117A	100uH	
	110kW	50Hz	136A	0.32mH	142A	83uH	
	132kW	50Hz	161A	0.27mH	168A	70uH	
	160kW	50Hz	195A	0.22mH	204A	58uH	
	200kW	50Hz	244A	0.18mH	255A	46uH	
	250kW	50Hz	304A	0.14mH	318A	37uH	
	315kW	50Hz	379A	0.12mH	396A	30uH	
	400kW	50Hz	480A	0.09mH	502A	24uH	
	500kW	50Hz	600A	0.08mH	627A	19uH	
	630kW	50Hz	756A	0.06mH	791A	15uH	
1140V	75kW	50Hz	54A	1.35mH	57A	593uH	
	90kW	50Hz	64A	1.14mH	67A	301uH	
	110kW	50Hz	79A	0.93mH	82A	246uH	
	132kW	50Hz	94A	0.78mH	98A	206uH	
	160kW	50Hz	113A	0.65mH	118A	171uH	
	200kW	50Hz	141A	0.52mH	148A	137uH	
	250kW	50Hz	176A	0.42mH	184A	109uH	
	315kW	50Hz	219A	0.34mH	229A	88uH	
	400kW	50Hz	279A	0.27mH	291A	69uH	
	500kW	50Hz	348A	0.21mH	364A	56uH	
	560kW	50Hz	390A	0.19mH	408A	50uH	
	630kW	50Hz	438A	0.17mH	458A	44uH	

Table 3.5-4 690V-1140V, 50Hz Input/output reactor

3.5.2 Dynamic Brake Resistor

See table 3.5-5 for the standard brake resistor of SOHO-VD.
Please, ask the factory or the head office for details on recommended DBR for vertical loads and equipments that have a high frequency in use.

Voltage	Model	DBR resistor [Ω]	DBR capacity[kW] 60%ED	DBR capacity[kW] 25%ED
400V	SOHO 5.5 VD 4Y	70.7	3.3	1.4
	SOHO 7.5 VD 4Y	51.9	4.5	1.9
	SOHO 11 VD 4Y	35.4	6.6	2.8
	SOHO 15 VD 4Y	24.2	9.0	3.8
	SOHO 18.5 VD 4Y	19.6	11.1	4.6
	SOHO 22VD 4Y	16.5	13.2	5.5
	SOHO 30 VD 4Y	12.1	18.0	7.5
	SOHO 37 VD 4Y	9.8	22.2	9.0
	SOHO 45VD 4Y	8.1	27.0	11.0
	SOHO 55 VD 4Y	6.6	33.0	14.0
	SOHO 75 VD 4Y	4.8	45.0	19.0
	SOHO 90 VD 4Y	4.0	54.0	23.0
	SOHO 110 VD 4Y	3.3	66.0	28.0
	SOHO 132 VD 4Y	2.7	79.2	33.0
	SOHO 160 VD 4Y	2.3	96.0	40.0
	SOHO 200 VD 4Y	1.8	120.0	50.0
200V	SOHO 3.7 VD 2Y	33	2.2	1
	SOHO 5.5 VD 2Y	18.1	3.3	1.4
	SOHO 7.5 VD 2Y	13.3	4.5	1.9
	SOHO 11 VD 2Y	9.0	6.6	2.8
	SOHO 15 VD 2Y	6.2	9.0	3.8
	SOHO 18.5 VD 2Y	5.0	11.1	4.6
	SOHO 22 VD 2Y	4.2	13.2	5.5
	SOHO 30 VD 2Y	3.1	18.0	7.5
	SOHO 37 VD 2Y	2.5	22.2	9.0
	SOHO 45 VD 2Y	2.1	27.0	11.0
	SOHO 55 VD 2Y	1.7	33.0	14.0
	SOHO 75 VD 2Y	1.2	45.0	19.0
	SOHO 90VD 2Y	1.0	54.0	23.0
	SOHO 110VD 2Y	1.0	66.0	27.0

Table 3.5-5 SOHO-VD: Standard Dynamic Brake Resistor

Caution!

1) DBU over 400V, 250kW, is the form of exterior.
Refer to SOHO DBU manual for the related item.
2) About 690V, please require to headquarter.
3) When SOHO-VD is connected with the brake resistor, SEOHO suggests installing fuse.
4) For more detail information about the selection of capacity of brake resistor,
Please require to headquarter.

3.6 Power Consumption

- The power consumption of models that supply control power (220Vac) and FAN power (220Vac) separately is shown in the table below.

Frame	Inverter Model(___VD4N)	220Vac [W]	Note
K9B	250	860	Refer to 4.2 Wiring Diagram
	315		
K10C	400	1575	Refer to 4.2 Wiring Diagram
	500	1750	
K10DL	400	1325	Refer to 4.2 Wiring Diagram
K11	710	1850	Refer to 4.2 Wiring Diagram
	800		

Table 3.6 Power Consumption by Inverter Model

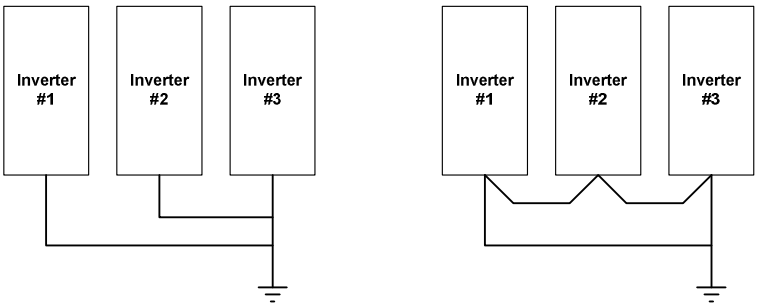
- **When using an external power unit (Transformer) referring to table 3.6, Power Consumption by Inverter Model, the design should be made in consideration of the power supply.**

Note

4. Wiring

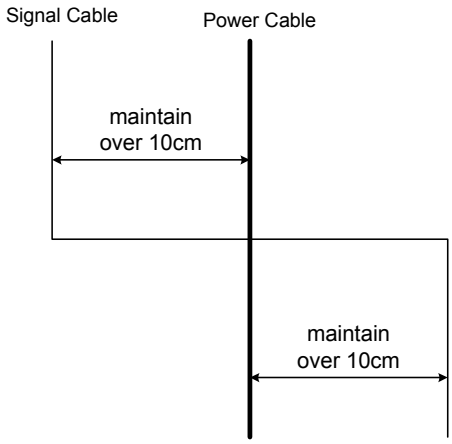
4. Wiring

4.1 Caution to wiring

1	Connect the ground cable surely. If multiple units are installed together, the ground does not make the loof. Refer to below picture.  *(a) Good* *b) NOT good*
2	Only a competent electrician should carry out the wiring.
3	Make sure that the input main voltage is switched off.
4	Do **NOT** connect AC power source to the output terminals (U, V, W).
5	In the case of installing an earth leakage breaker at the input (L1, L2, L3), Make inquiries to a competent electrician for the set-up of leakage current.
6	Power cables, the earth leakage breaker and a Magnetic contactor should be used with the rated capacity.
7	Attach surge filters to the Magnetic contactors that are installed around inverter.
8	Installing Static Condenser or Surge Suppressor on the output of Inverter is prohibited. In case of installed already, please remove.
9	Do **NOT** run or stop the inverter and/or the electric motor connected to it using Magnetic contactors [located at the main power input (L1, L2, L3) and/or output (U, V, W).
10	Fasten the terminal screws to the relevant torque value and make sure that there are not loose terminals.

<Next>

<Continued>

11	The length of wire connected output lines to motor should be within 50m. In case of multi connection with several motors by only one Inverter, the length of wire between Inverter and motors should be within 50m. If the length of all wires connected to each device is inevitably over 50m, install AC Reactor between output lines of Inverter and motors.
12	When several motors are running by one inverter, install a thermal relay for each.
13	Use twisted and shielded cable for signal cables. For encoder signal cables, use the shielded cable containing 6 wires in the cable. The wires in the cable should be twisted and shielded by twos. Although the encoder signal cables have a good quality, they could be affected by surrounding noises during wiring. It needs a special attention.
14	The signal cables must be isolated from the power cables. For an unavoidable case, install perpendicular to each other as shown below. 

4.2 Wiring Diagram (Require headquarter to purchase the 1140V level of products)

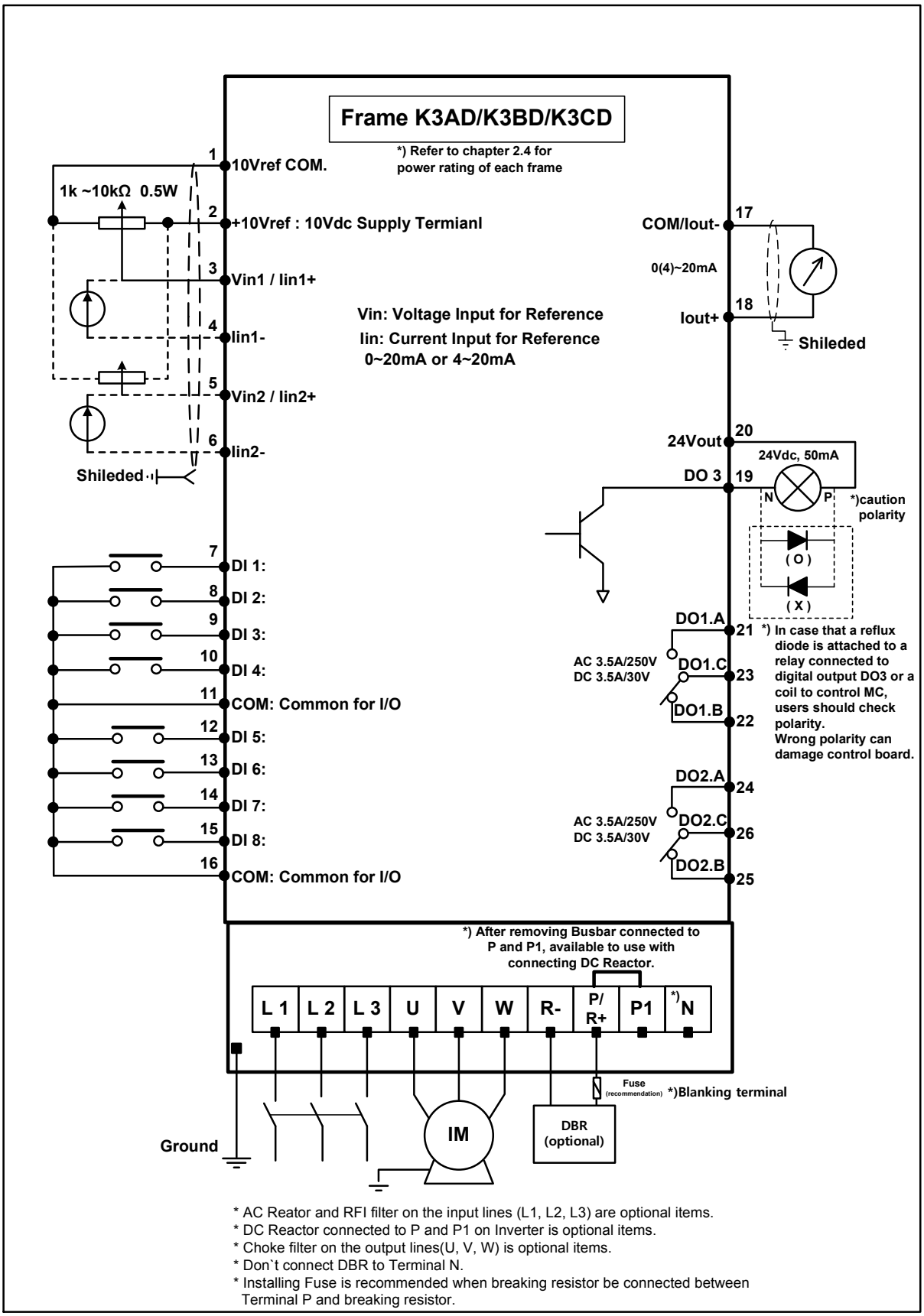


Figure 4.2-1 SOHO VD inverter Frame K3AD, K3BD, K3CD

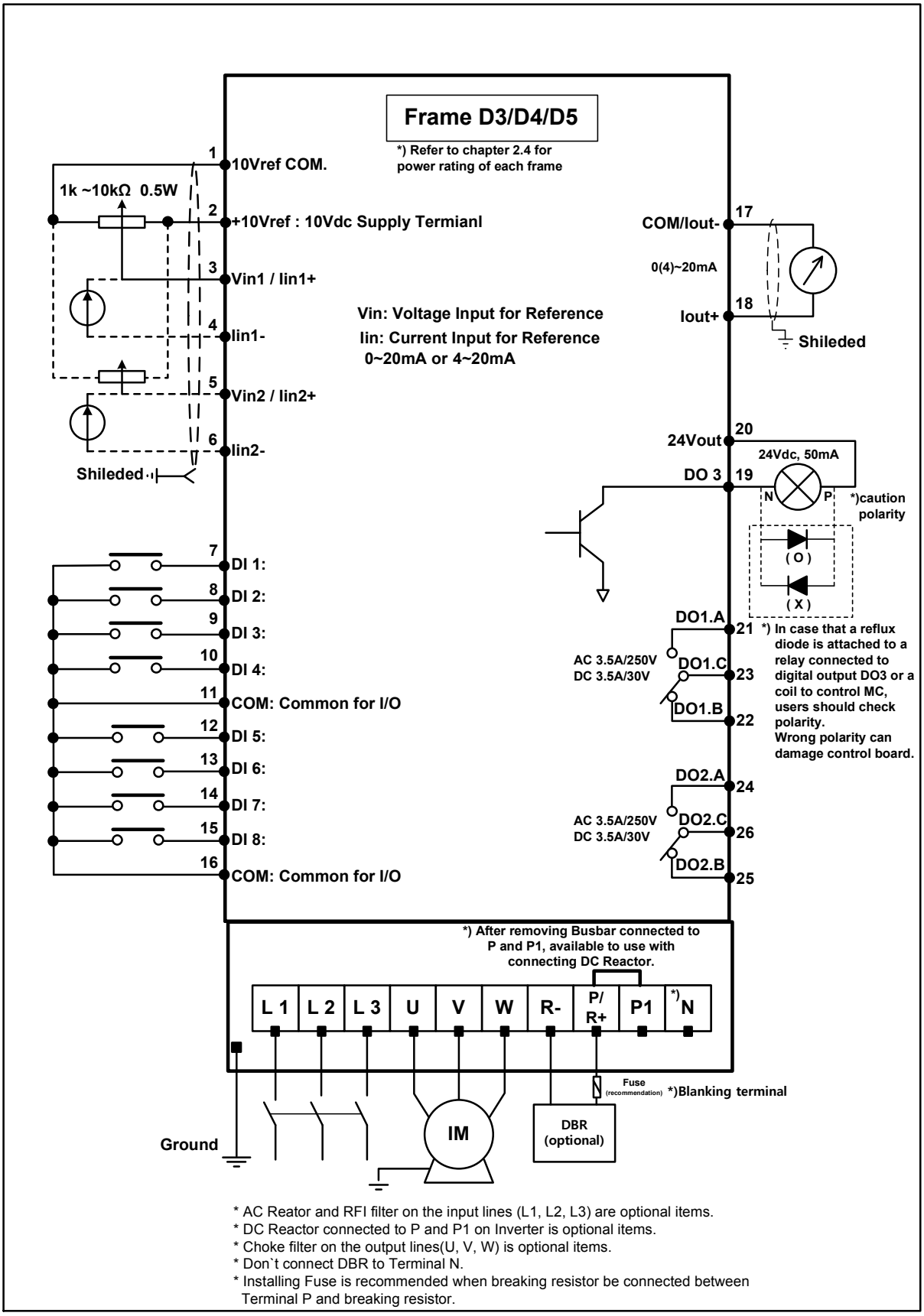
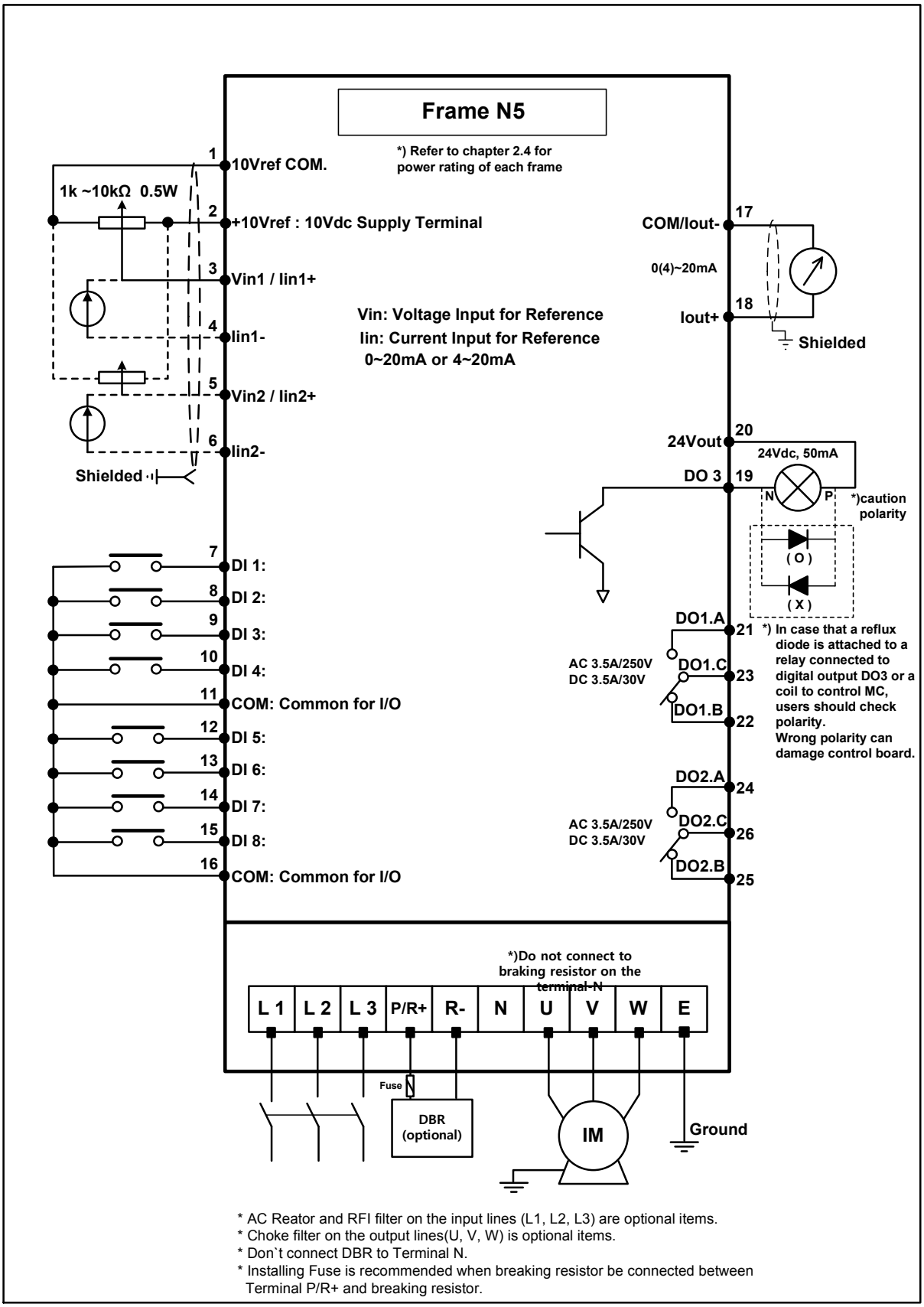
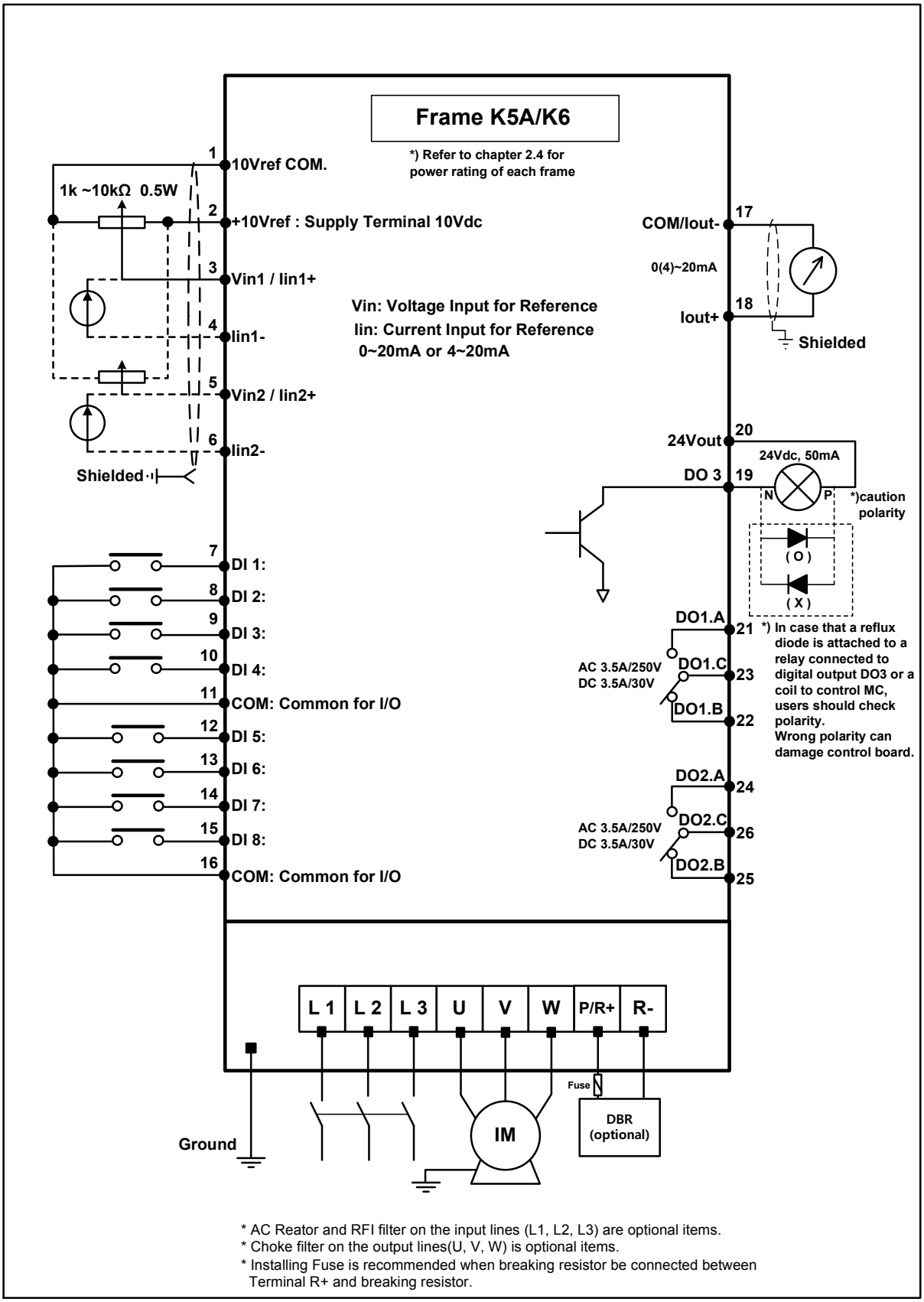


Figure 4.2-2 SOHO VD inverter Frame D3, D4, D5



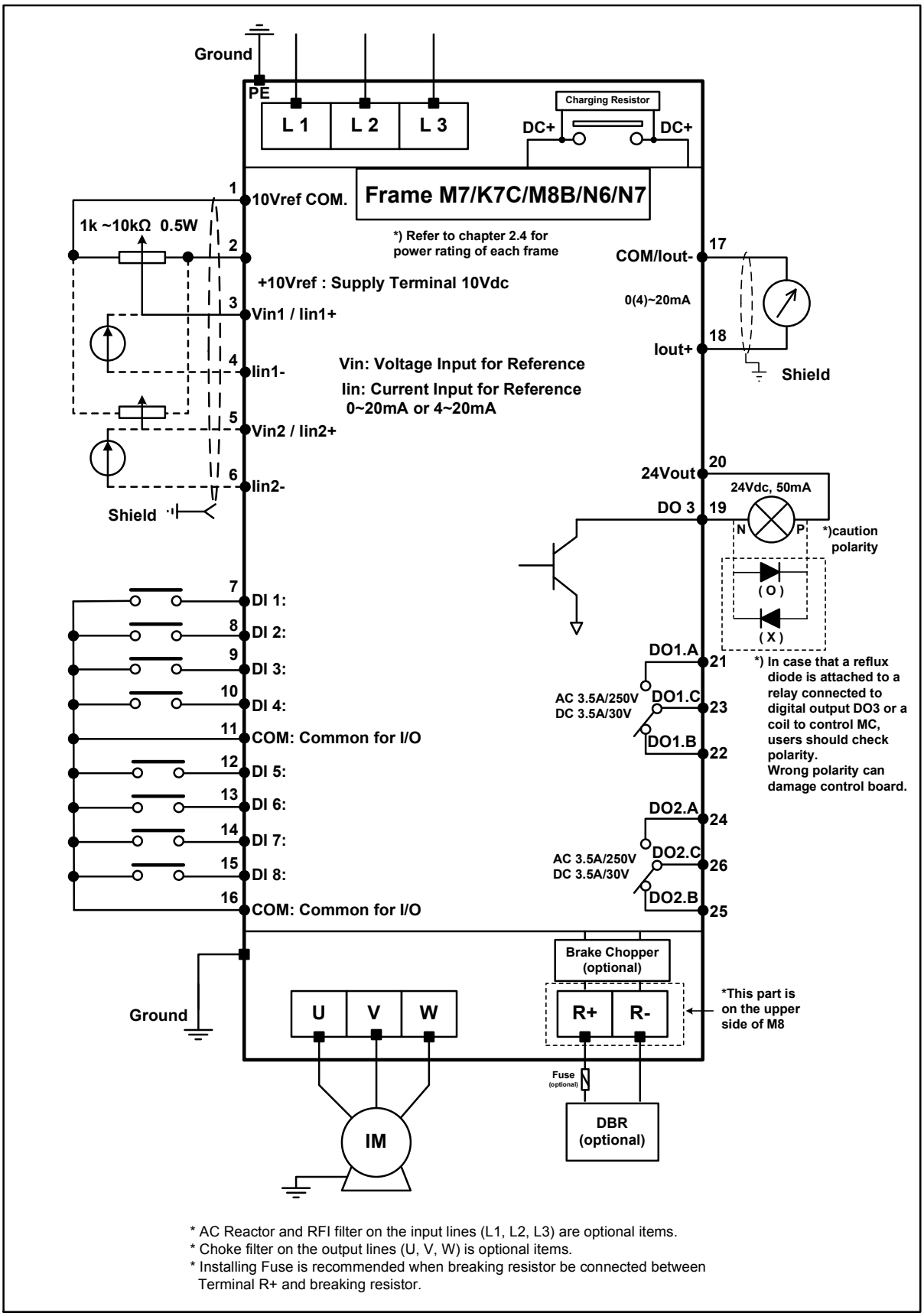
* AC Reator and RFI filter on the input lines (L1, L2, L3) are optional items.
* Choke filter on the output lines(U, V, W) is optional items.
* Don`t connect DBR to Terminal N.
* Installing Fuse is recommended when breaking resistor be connected between Terminal P/R+ and breaking resistor.

Figure 4.2-3 SOHO VD inverter Frame N5



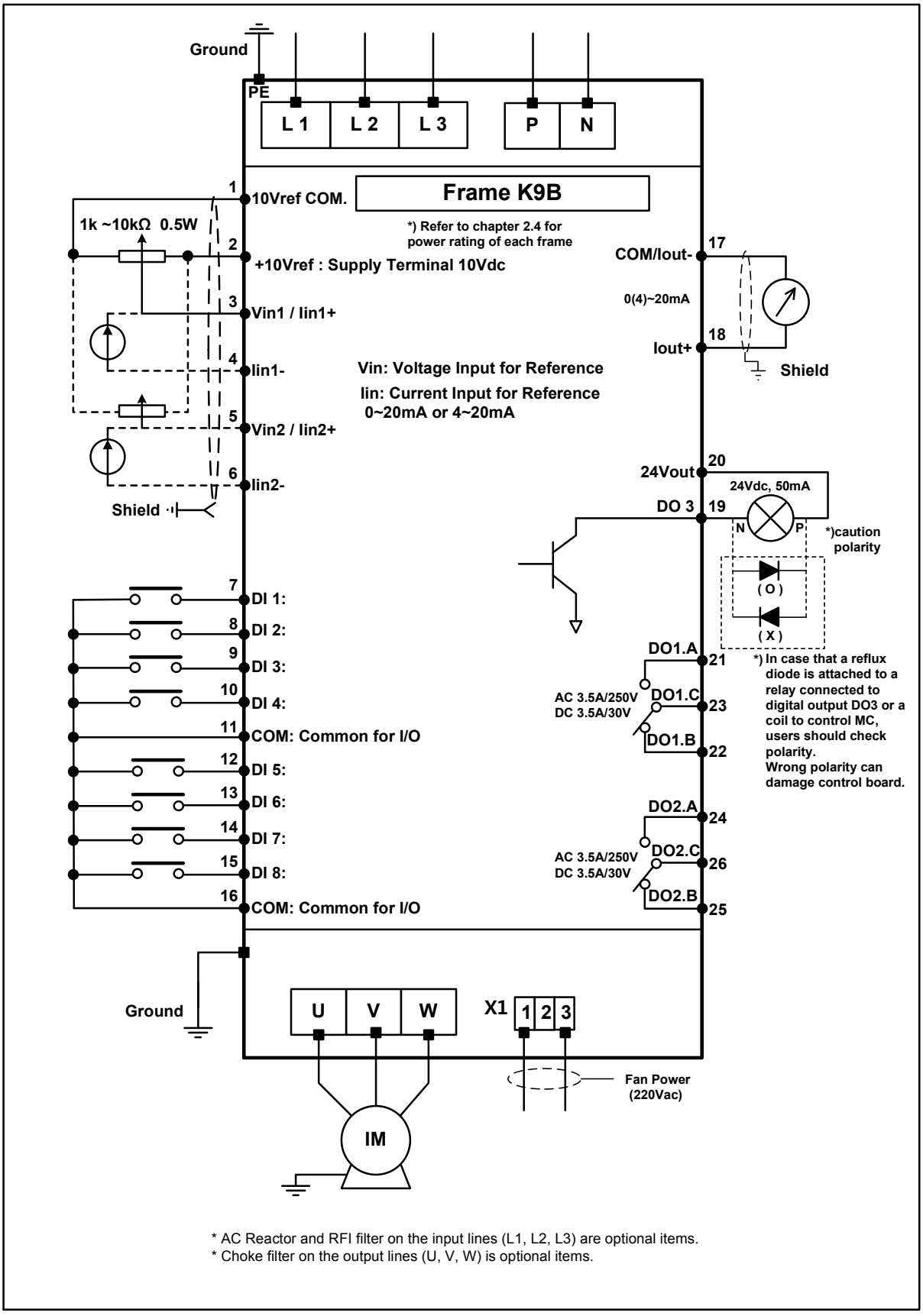
* AC Reator and RFI filter on the input lines (L1, L2, L3) are optional items.
* Choke filter on the output lines(U, V, W) is optional items.
* Installing Fuse is recommended when breaking resistor be connected between Terminal R+ and breaking resistor.

Figure 4.2-4 SOHO VD inverter Frame K5A, K6



* AC Reactor and RFI filter on the input lines (L1, L2, L3) are optional items.
* Choke filter on the output lines (U, V, W) is optional items.
* Installing Fuse is recommended when breaking resistor be connected between Terminal R+ and breaking resistor.

Figure 4.2-5 SOHO VD inverter Frame M7, K7C, M8B, N6, N7



* AC Reactor and RFI filter on the input lines (L1, L2, L3) are optional items.
* Choke filter on the output lines (U, V, W) is optional items.

Figure 4.2-6 SOHO VD inverter Frame K9B

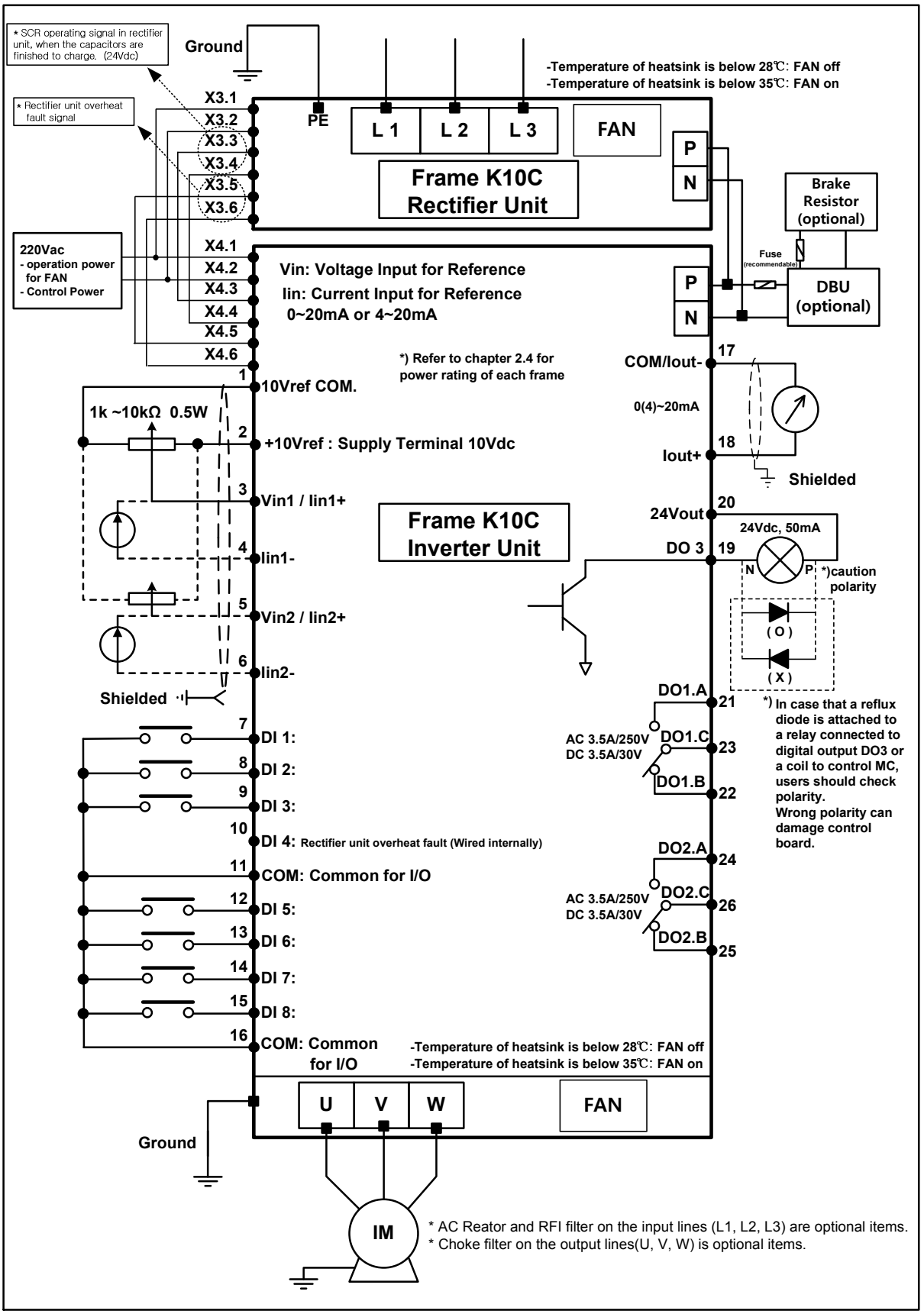
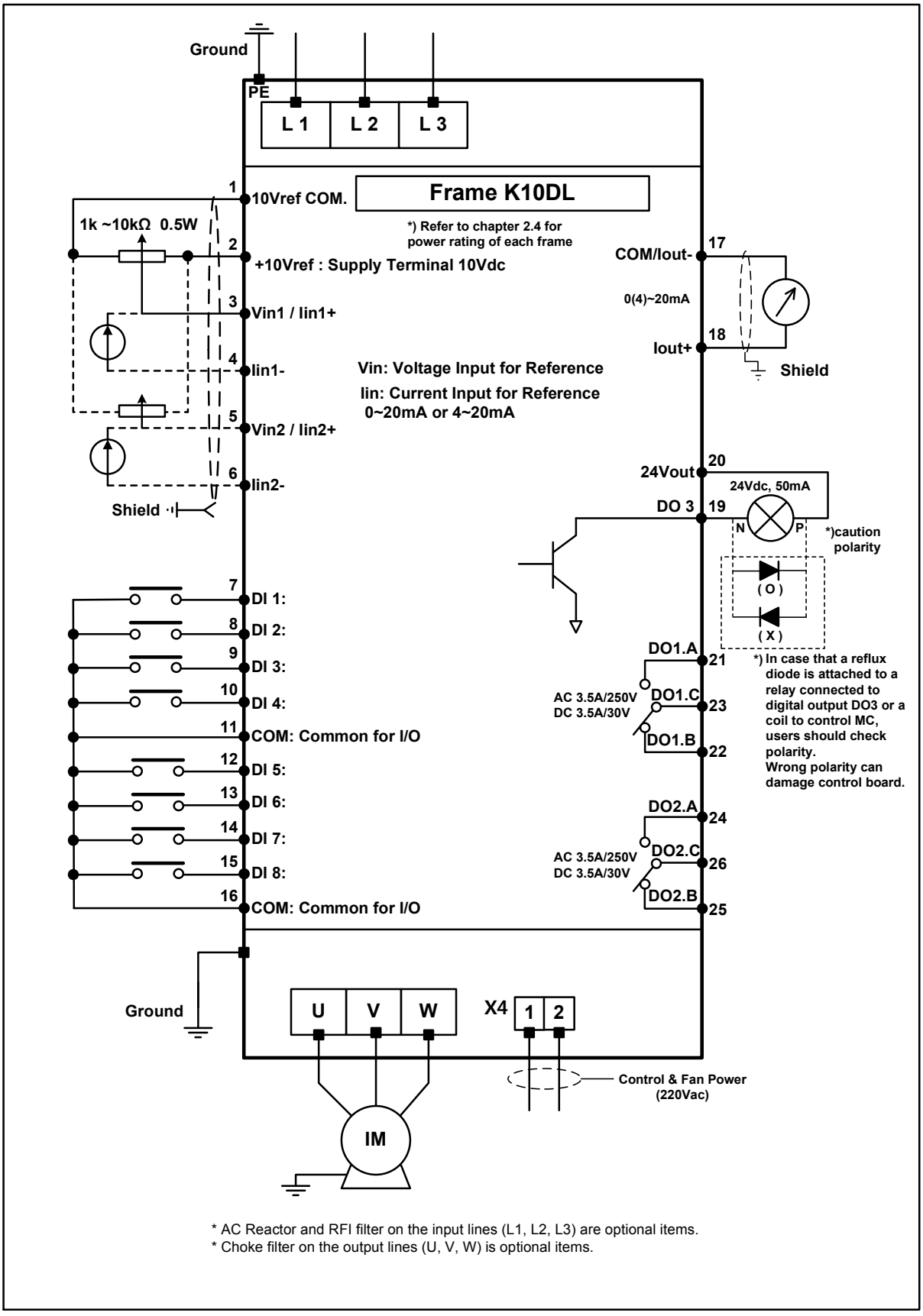


Figure 4.2-7 SOHO VD inverter Frame K10C



* AC Reactor and RFI filter on the input lines (L1, L2, L3) are optional items.
* Choke filter on the output lines (U, V, W) is optional items.

Figure 4.2-8 SOHO VD inverter Frame K10DL

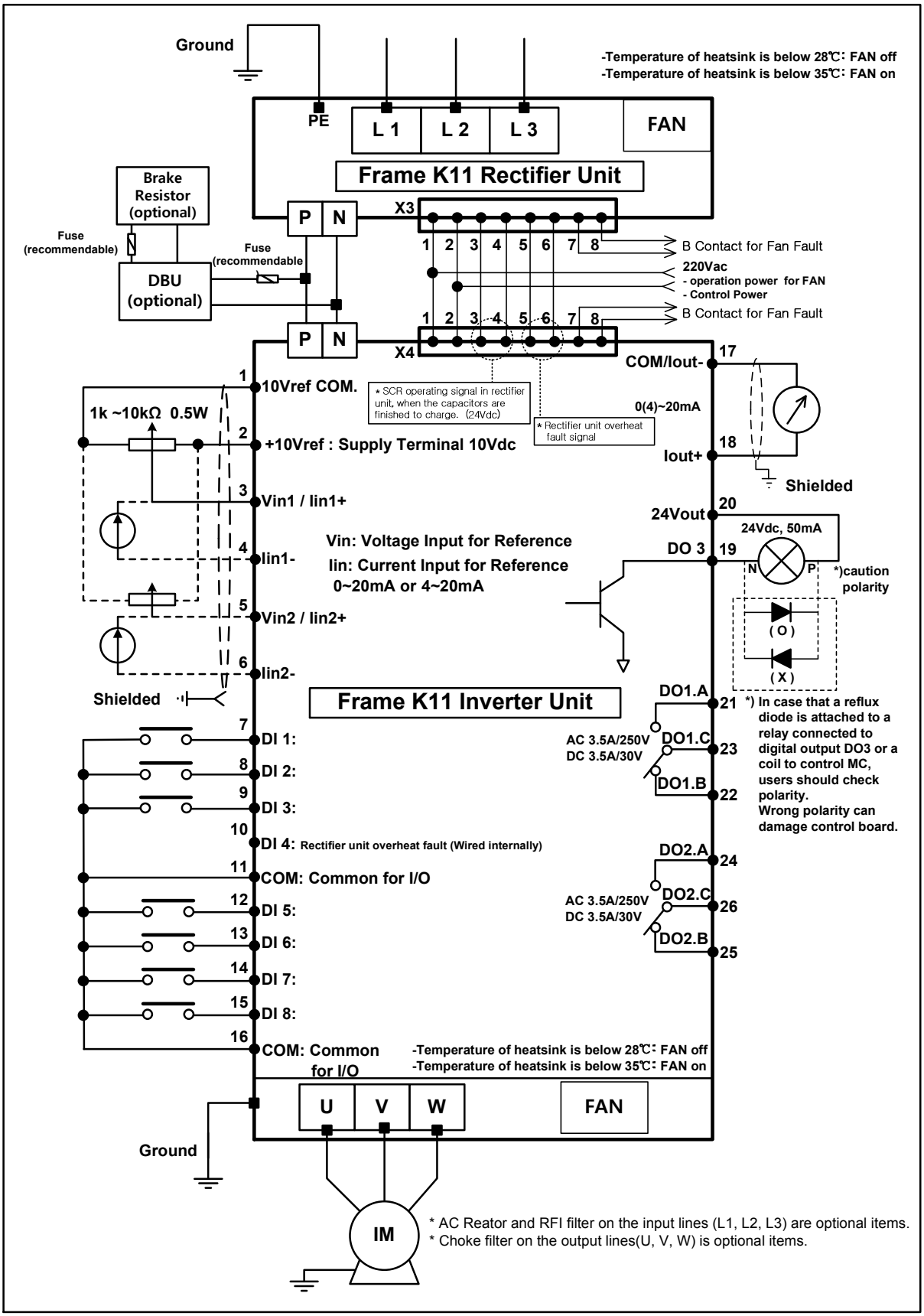
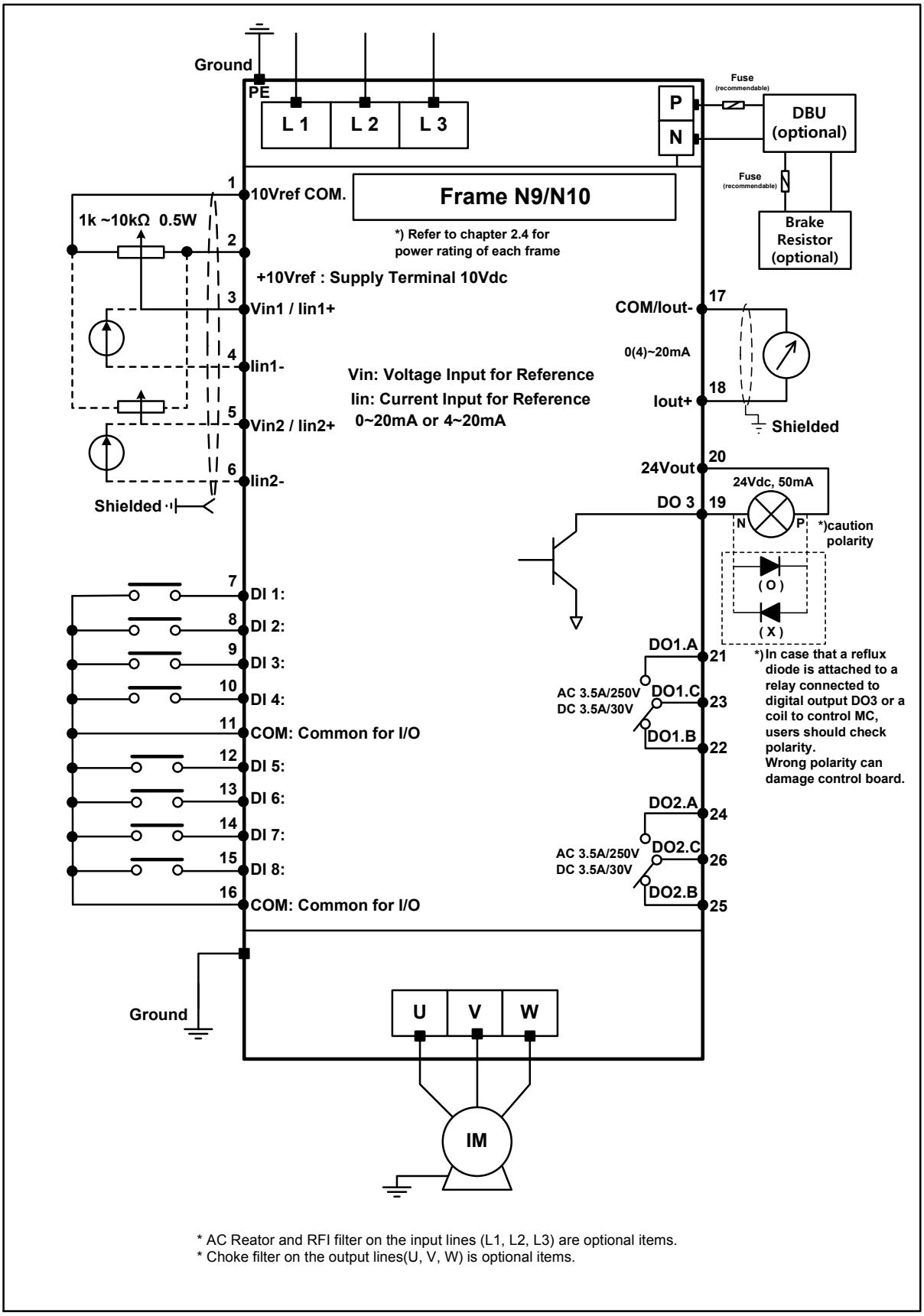


Figure 4.2-9 SOHO VD inverter Frame K11



* AC Reator and RFI filter on the input lines (L1, L2, L3) are optional items.
* Choke filter on the output lines(U, V, W) is optional items.

Figure 4.2-10 SOHO VD inverter Frame N9, N10

4.3 Terminal and Bolt Classified by External Dimension

4.3.1 200V-400V Model

Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
200V / 400V	K3A D3	Stationary 	11mm	M4	1.5~2	M4	External	1.5~2
	K3BD K3CD D4 D5	Stationary 	13mm	M4	1.5~2	M4	External	1.5~2
	K5A K6	Separately 	10mm	No head bolt (use a 5mm wrench)	10~11	M6	External	4~5
	M7	Separately 	14mm	No head bolt (use a 5mm wrench)	14~15	M6	External	4~5

Figure 4.3-1(1) Terminal and bolt classified by external on 200V-400V model

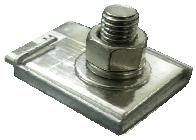
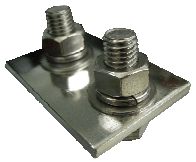
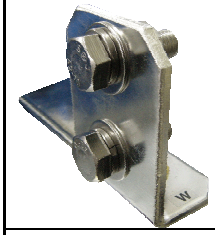
Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
200V / 400V	K7C	Bus-Bar 	20mm	M10	10~11	M6	External	4~5
	M8B	Bus-bar 	40mm	M12	32~40	M12	External	32~40
	K9B	Bus-bar 	IN 50mm	M12*2	32~40	M10	External	18~23
		Bus-bar 	OUT 75mm					
		Bus-bar 	P/N 40mm					

Figure 4.3-1(2) Terminal and bolt classified by external on 200V-400V model

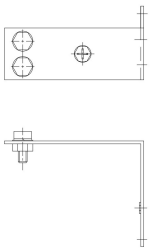
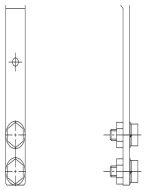
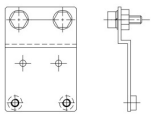
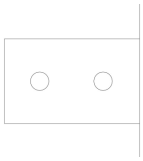
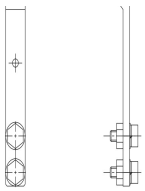
Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
200V / 400V	K10C	Bus-bar 	IN 35mm	M12*2	32~40	M10	External	18~23
		Bus-bar 	OUT 40mm	M12*2				
		Bus-bar 	P/N 55mm	M12*2				
	K10DL	Bus-bar 	IN 60[mm]	M12*2	32~40	M10	External	18~23
		Bus-bar 	OUT 40[mm]	M12*2				

Figure 4.3-1(3) Terminal and bolt classified by external on 200V-400V model

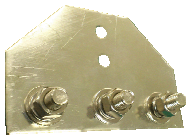
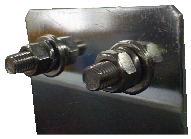
Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
200V / 400V	K11	Bus-bar 	IN 100mm	M12*4	32~40	M10	External	18~23
		Bus-bar 	OUT 150mm	M12*3				
		Bus-bar 	P/N 113mm	M12*2				

Figure 4.3-1(4) Terminal and bolt classified by external on 200V-400V model

4.3.2 690V Model

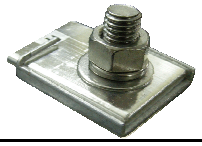
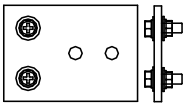
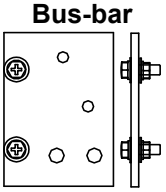
Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
690V	N5	Assembly 	14mm	M6	M6	M6	Terminal	4~5
	N6	Separately 	10mm	No head bolt (use a 5mm wrench)	10~11	M6	External	4~5
	N7	Separately 	14mm	No head bolt (use a 5mm wrench)	14~15	M6	External	4~5
	N9	Bus-bar 	40mm	M12	32~40	M12	External	32~40
	N10(B)	Bus-bar 	85mm	M12*2	32~40	M10	External	18~23
	N11	Bus-bar 	OUT 85mm	M8*2	9~10			
		Bus-bar 	P/N 125mm	M8*2	9~10			

Figure 4.3-2 Terminal and bolt classified by external on 690V model

4.3.3 1140V Model

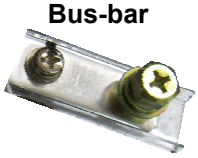
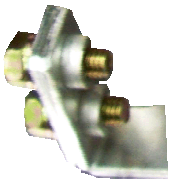
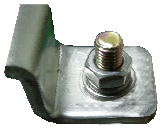
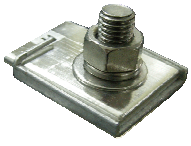
Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
1140V	L7	Separately 	14mm	No head bolt (use a 5mm wrench)	14~15	M6	External	4~5
	L8	Bus-bar 	IN 48mm	M8	9~10	M6	External	4~5
		Bus-bar 	OUT 18mm	M8				
		Bus-bar 	P/N 20mm	M8*2				
	L10	Bus-bar 	IN 35mm	M10	18~23	M10	External	18~23
		Bus-bar 	OUT 85mm	M12*2	32~40			
		Bus-bar 	P/N 40mm	M12				

Figure 4.3-3(1) Terminal and bolt classified by external on 1140V model

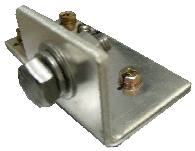
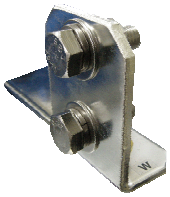
Voltage	Frame	Input-Output Wiring				Ground Wiring		
		Terminal	Terminal width (internal)	Bolt size	Torque for tightened (N•m)	Bolt size	Place for the tightened	Torque for tightened (N•m)
1140V	L11	Bus-bar 	IN 45mm	M12	32~40			
		Bus-bar 	IN 45mm	M12				
		Bus-bar 	OUT 75mm	M12*2				

Figure 4.3-3(2) Terminal and bolt classified by external on 1140V model

4.4 Connection of Power Cable and Fuse

Use heat-resistant cables (600V, +70℃ or higher). The Power cables and the fuses have to be dimensioned in accordance with the rated output current of the unit and the size of the cables. The minimum dimensions for the Cu-cables and corresponding fuses are given in the table 4.4-1.The fuses have been selected so that they will also function as an overload protection for the cables.

If more than 3 cables are used in parallel, please be cautious for that every cable must have its own overload protection.

These instructions concern the cases about that there is one motor and one cable connection from the inverter to the motor.

For other cases, ask the factory for more information.

4.4.1 Installation Instruction

	1	**Place the motor cables further away from the other cables.** - Avoid long parallel runs with other signal cables. - **The maximum motor cable is 50m.** - The motor cable should cross other signal cables at a right angle of 90 degrees if inevitable.
	2	See chapter 4.5.2 for cable insulation check.
	3	**Connecting cables:** -Remove the cover of the motor and power cables. -**Open the cover of SOHO-VD inverter** -Connect the motor and control cables to the correct terminals. (refer to Figure 4.2-1 ~ 4.2-10) -Check if control cables do not make any contacts with electrical components in the device. -Connect the brake resistor cable (optional). -Ensure the earth cable is connected to the terminal of the inverter and motor. -Connect the separate shield of power cables to motor, supply panel and the protective earth of the inverter. -Ensure that the external control cable or internal wirings are not trapped between the cover and the body of the unit.

4.4.2 Specification of Wire and Fuse

Voltage	400V			200V			690V		
Capacity [kW]	I/O Cable [mm²]	Ground cable [mm²]	FUSE (500V) [A]	I/O Cable [mm²]	Ground cable [mm²]	FUSE (500V) [A]	I/O Cable [mm²]	Ground cable [mm²]	FUSE (1000V) [A]
3.7				2.5	2.5	25			
5.5	2.5	2.5	20	4	4	40			
7.5	2.5	2.5	25	6	6	50			
11	4	4	40	10	10	80			
15	6	6	50	16	16	100			
18.5	10	10	63	25	16	125			
22	16	16	80	35	16	160			
30	16	16	100	35	16	200	16	10	60
37	25	16	125	50	25	250	16	10	80
45	25	16	160	70	35	315	25	16	80
55	35	16	200	95	50	350	25	16	100
75	50	25	250	95	70	450	50	50	160
90	70	35	315	120	95	500	50	50	160
110	95	50	350	150	95	630	70	50	200
132	95	70	450	95*(2)	150	800	70	50	250
160	120	95	500				70	70	315
200	150	95	630				95	70	400
250	95*(2)	150	800				120	95	500
315	120*(2)	150	1000				95*(2)	150	630
400	185*(2)	150	1250				120*(2)	150	800
500	240*(2)	150	800*(2)				120*(2)	150	900
630							185*(2)	150	1000
710	185*(3)	185	1000(2)						
800	240*(3)	240	1250(2)						

Table4.4-1 Cable and Fuse classified by capacity (Revised January 13, 2021)

Caution

1) Copper cable, 600V, 75℃, should be used.
   If applied to the level of 690V, user should use wire, 600V, 75℃.
2) High Speed Fuse is recommendable.
3) Require SEOHO headquarter to purchase 1140V.

4.4.3 Cable and Motor Insulation Check

Order	Checking Item
Check 1	**Motor Cable Insulation Check**
	Disconnect the motor cables from the output terminals (U, V and W). Measure the insulation resistance of the motor cable between each phase conductor, and measure between each phase conductor and the protective ground conductor. The insulation resistance must be ≥ 1MΩ
Check 2	**Main power cable Insulation Check**
	Disconnect the main power cables from the terminals L1, L2 and L3. Measure the insulation resistance of the main power cables between each phase conductor, and measure between each phase conductor and the protective ground conductor. The insulation resistance must be ≥ 1MΩ
Check 3	**Motor Insulation Check**
	Disconnect the motor cables from the motor. Measure the insulation resistance of each motor winding. The measurement voltage has to be at least equal to the main voltage but not exceed 1000V. The insulation resistance must be ≥ 1MΩ

4.5 Control Connection

Basic connection diagram is shown in figure 4.2-1 ~ 4.2-10.

4.5.1 Control Cable

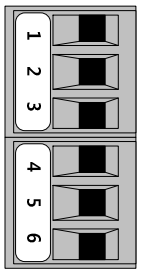
The control cables should be at least 0.5 mm^2 shielded cables. The maximum wire size fitting in the terminals is 2.5 mm^2.

4.5.2 Encoder Cable

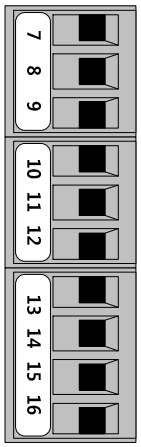
For the encoder cable, use the shielded cable containing 6 wires. The wires in the cable should be shielded by two each. See Figure 4.5-1. Pay attention to the cable installation in order to isolate from the main power cable and noise environment.

Figure 4.5-1 Encoder Cable

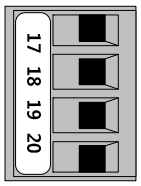
4.5.3 Control Terminal Description



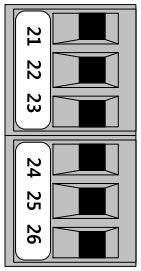
No	Terminal	Signal	Note
1	Vref. COM	voltage order common terminal	Ground about the signal of voltage velocity
2	Vref. +10V	Supply +10Vdc for voltage order	+10Vdc output
3	AI 1. P	Vref(+) input / Iref(+) input	Input voltage 1 / current 1 order Signal range : 0(-10Vdc) ~ +10Vdc Signal range : 0(4) ~ 20mA
4	AI 1. N	Iref(-) input	
5	AI 2. P	Vref(+) input / Iref(+) input	Input voltage 2 / current 2 order Signal range : 0(-10Vdc) ~ +10Vdc Signal range : 0(4) ~ 20mA
6	AI 2. N	Iref(-) input	



7	DI. 01	Contact point input 1	Forward Run	User adjustable
8	DI. 02	Contact point input 2	Reverse Run	
9	DI. 03	Contact point input 3	User adjustable (refer to parameter set)	
10	DI. 04	Contact point input 4	User adjustable (refer to parameter set)	
11	DI. COM	Contact point input common terminal		
12	DI. 05	Contact point input 5	User adjustable (refer to parameter set)	
13	DI. 06	Contact point input 6	User adjustable (refer to parameter set)	
14	DI. 07	Contact point input 7	User adjustable (refer to parameter set)	
15	DI. 08	Contact point input 8	User adjustable (refer to parameter set)	
16	DI. COM	Contact point input common terminal		



17	AO 1. N	Analogue output(-)	Analogue output (user adjustable) 0 ~ 20mA / 4 ~ 20mA
18	AO 1. P	Analogue output(+)	
19	DO3. OC	Contact point output 3	Open collector output (50mA)
20	DO3. +24V	Supply terminal +24Vdc	+24Vdc output (for DO3 open collector output terminal)



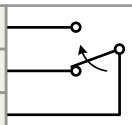
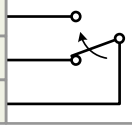
21	DO1. A	Contact point output 1 (a-contact)		Relay output 1 (user adjustable) 250Vac – 3.5A / 30Vdc – 3.5A
22	DO1. B	Contact point output 1 (b-contact)		
23	DO1. C	Contact point output 1 (common terminal)		
24	DO2. A	Contact point output 2 (a-contact)		Relay output 2 (user adjustable) 250Vac – 3.5A / 30Vdc – 3.5A
25	DO2. B	Contact point output 1 (b-contact)		
26	DO2. C	Contact point output 2 (common terminal)		

Figure 4.5-1 Control terminal description

Note

5. Consistence of Operation of Main Menu

5. Consistence of Operation of Main Menu

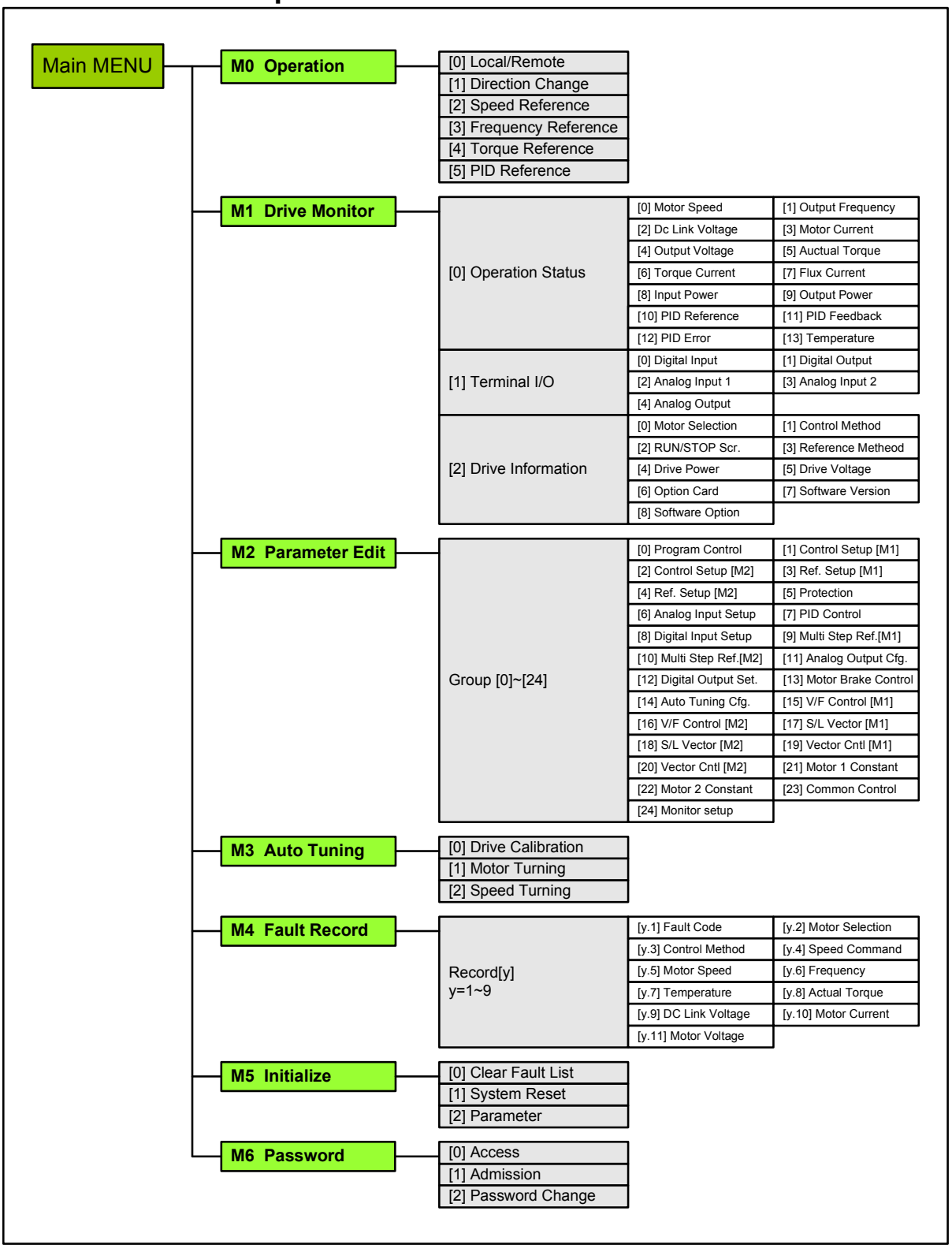


Figure 5-1 Consistence of Inverter main menu

Note

6. Keypad

6. Keypad

6.1 Keypad Description

The keypad of SOHO-VD inverter is composed with 9 keys, (ESC, ENTER, RUN, STOP, MENU, Left, Right, UP and Down scroll key). Users can set up parameters and monitor the operation status and start/ stop the motor with keypad, etc. See figure 6.1-1

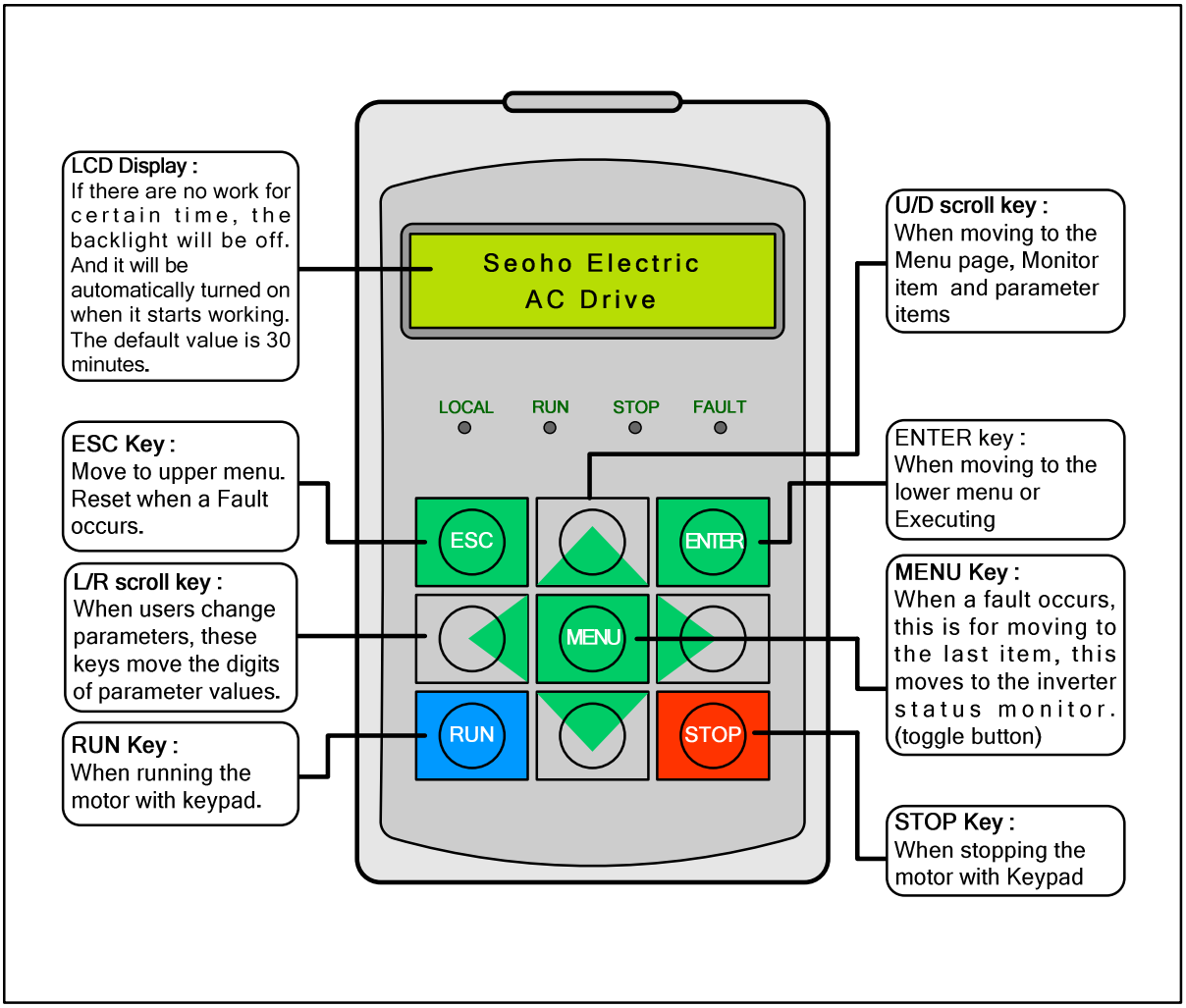
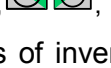


Figure 6.1-1 KEYPAD

6.2 Keypad Operation

The data of KEYPAD is composed with Main Menu and low-level sub-Menu as Figure 6.2-1. Push the button, **ENTER** to move from Main Menu to low-level sub-menu. And Push the button, **ESC**, to escape from low-level sub-Menu to Main Menu. Use the buttons,  , to Increase or decrease the data value. Use the button,  , to move cursors when setting-up parameters. When monitoring/checking the status of inverter and listing the Error/Fault, use the button, **MENU**. When operating by KEYPAD, users can start/stop the motor with the buttons, **RUN** and **STOP.** The detailed usage can be referred from chapter 6.2.1 ~ 6.2.8.

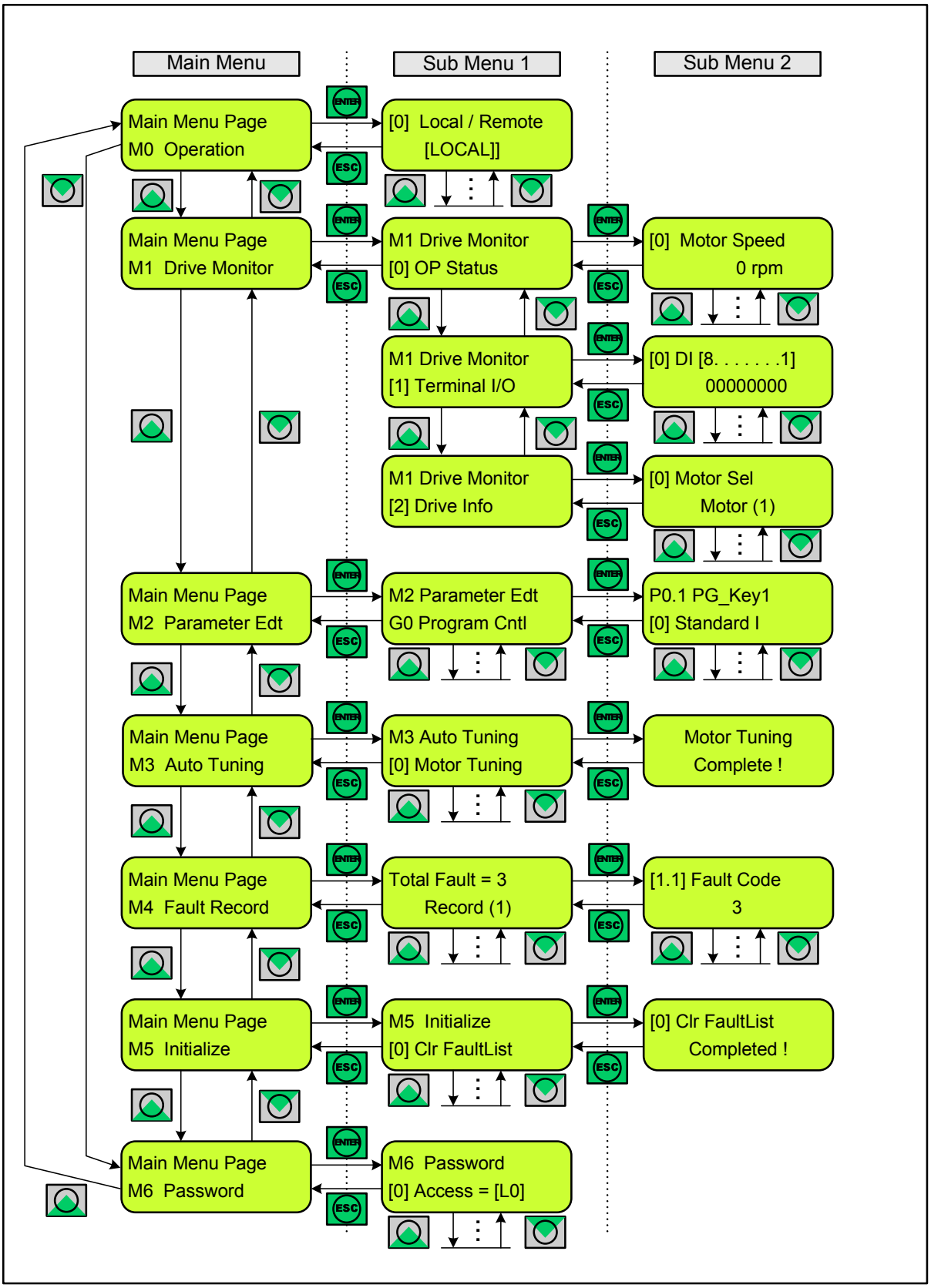


Figure 6.2-1 KEYPAD usage

6.2.1 Main Menu Page[0] Operation

In M0 operation page, when operating motor that is connected to the SOHO-VD inverter with keypad without any I/O terminal connections, it allows to set up the rotating direction, speed, frequency, torque reference and PID reference. Refer to Figure 6.2-2. When operating (start or stop) the motor by KEYPAD or [0] Local/Remote has to be set to “Local”, use the button, **RUN** / **STOP**. And Parameter P3. 0 and P3. 1 have to be set for KEYPAD. Refer to the parameter description for the setting instruction.

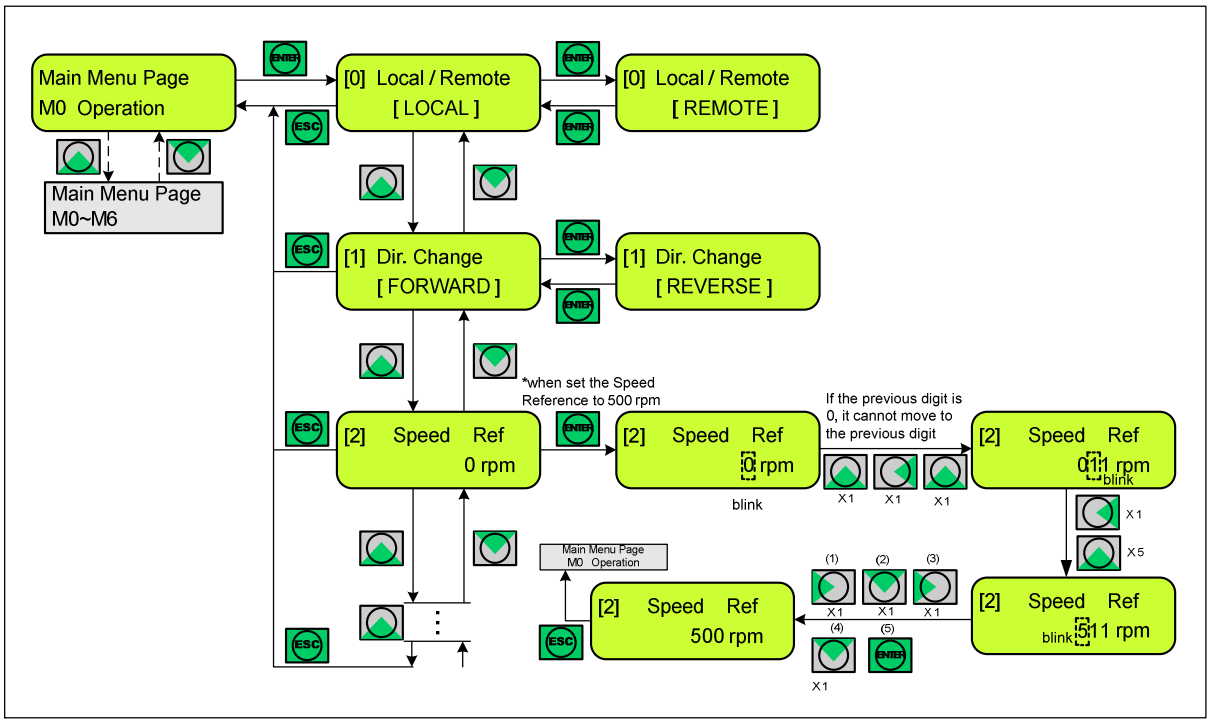
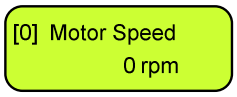
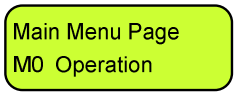
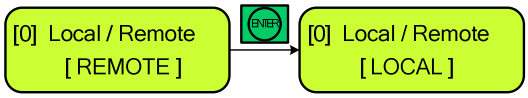
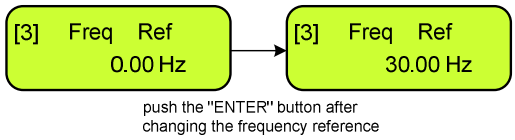
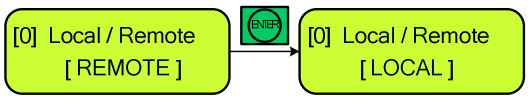
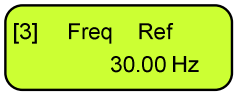
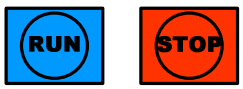


Figure 6.2-2 “M0 Operation” Menu Page usage

No	M0 Operation		Unit	Description
[0]	Local / Remote			When changing the source of RUN/STOP reference from terminals or communication to Keypad.
	LOCAL	REMOTE		
[1]	Direction Change			When KEYPAD operation, this sets the direction of rotation of motor whenever users push the button, **ENTER**
	FORWARD	REVERSE		
[2]	Speed Reference		rpm	This sets the speed reference if the Control Method is S/L Vector Speed or Vector Speed control.
[3]	Frequency Reference		Hz	This sets the frequency reference if the Control Method is V/F Frequency or V/F Speed control.
[4]	Torque Reference		Nm	This sets the torque reference if the Control Method is S/L Vector Torque or Vector Torque control.
[5]	PID Reference		%	This sets the reference for PID process control.

※ Use of Keypad for Short Time.

STEPS		DESCRIPTION
1	Input the main voltage	Caution! There should be no “RUN” signal at the same time of inputting the main voltage.
2		This is the initial screen when the inverter is ready to operate after it is turned on.
3		Move to “M0 -Operation Menu Page”
4		“**[LOCAL]**” should be set to use keypad. When it is set to “**[Remote]**”, keypad cannot be used instead the inverter is operated by the I/O terminals.
5		Go to the frequency reference screen to change the reference when using keypad for operating. Push the **ENTER** key after changing the value.
6		The inverter can be operated (RUN/STOP) by the following buttons. **RUN** / **STOP**
7	Turn off the main voltage	Be sure to turn off the main voltage after stopping the inverter operation.
8	Input the main voltage again	Caution! There should be no “RUN” signal at the same time of inputting the main voltage.
9		M0-[0] Local/Remote item gets back to the default value which is [REMOTE] when the main voltage is inputted again after it is turned off. Therefore, it should be set to [LOCAL] again to use keypad operation.
10		Go back to the frequency reference screen operating by keypad. Users can check that the old value is stored. The reference can be changed to the desired value again.
11		If [LOCAL] is set at M0-[0] Local/Remote item in step 9, the inverter can be operated (RUN/STOP) by **RUN** / **STOP** keys.

※ Continuous Use of Keypad.

	STEPS	DESCRIPTION
1	Input the main voltage	Caution! There should be no “RUN” signal at the same time of inputting the main voltage.
2	[0] Motor Speed 0 rpm	This is the initial screen when the inverter is ready to operate after it is turned on.
3	Main Menu Page M2 Parameter Edt	Move to M2 Parameter Edit Page. Then, set the followings: P3. 0 (RUN/STOP Method) = [1]Keypad P3. 1 (Reference Method) = [1]Keypad
4	Main Menu Page M0 Operation	Move to M0-Operation Menu Page
5	[3] Freq Ref 0.00 Hz → [3] Freq Ref 30.00 Hz push the "ENTER" button after changing the frequency reference	Go to the frequency reference screen to change the reference when using keypad for operating. Push the **ENTER** key after changing the value.
6	RUN STOP	The inverter can be operated (RUN/STOP) by the following buttons. **RUN** / **STOP**
7	Turn off the main voltage	Be sure to turn off the main voltage after stopping the inverter operation.
8	Input the main voltage again	Caution! There should be no “RUN” signal at the same time of inputting the main voltage.
9	RUN STOP	The inverter can be operated (RUN/STOP) by the following buttons. **RUN** / **STOP**. At this time, the frequency reference is the value that was set in step 5. If it needs to be changed again, go back to the step 5. Then, follow the description.

6.2.2 Main Menu Page [1] Drive Monitor

In M1 Drive Monitor Page, it allows to monitor the operation status of inverter, I/O reference status and setting information. Refer to Figure 6.2-3 for the setting instruction and usage of KEYPAD.

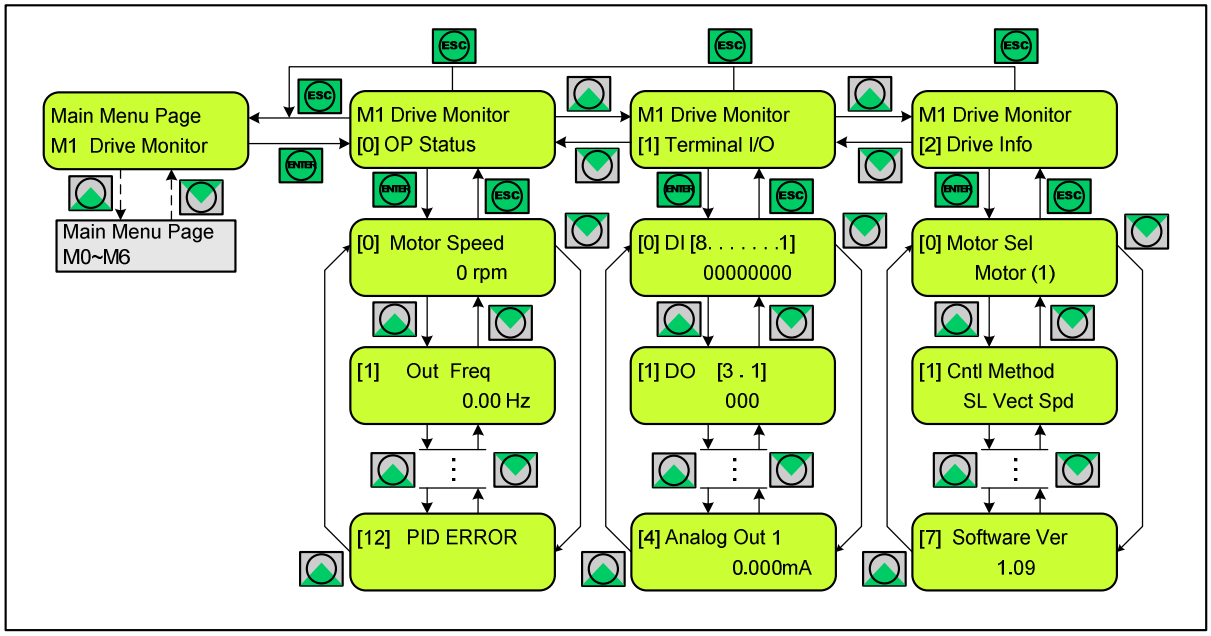


Figure 6.2-3 "M1 Drive Monitor" Menu Page

M1 Drive Monitor Menu Page			
Sub Menu	**Item**	**Unit**	**Description**
[0] Operation Status	[0] Motor Speed	rpm	Indication of motor speed
	[1] Output Frequency	Hz	Indication of output frequency
	[2] DC Link Voltage	Vdc	Indication of DC Link Voltage
	[3] Motor Current	Arms	Indication of Motor Current
	[4] Output Voltage	Vrms	Indication of Output Voltage
	[5] Actual Torque	Nm	Indication of motor Torque
	[6] Torque Current	A	Indication of Torque current
	[7] Flux Current	A	Indication of Flux current
	[8] Input Power	kW	Indication of Input Power
	[9] Output Power	kW	Indication of Output Power
	[10] PID Reference		
	[11] PID Feedback		
	[12] PID Error		
	[13] Temperaure	℃	Indication of the inverter temperature (inside) or temperature of heat sink. (Only K3AD, K3BD, K3CD, D3, D4, D5, K9B display the actual temperature.)

<Next>

<Continued>

M1 Drive Monitor Menu Page			
Sub Menu	**Item**	**Unit**	**Description**
[1] Terminal I/O	[0] Digital Input		Indication of status for digital input. Refer to Figure 5.2-3(a)
	[1] Digital Output		Indication of status for digital output. Refer to Figure 5.2-3(b)
	[2] Analog Input 1	V or mA	Indication of Analog Voltage(0[-10]~10V) or Analog Current (0[4]~20mA) for AI 1 port
	[3] Analog Input 2	V or mA	Indication of AI 2 Analog Voltage(0[-10]~10V) or Analog Current (0[4]~20mA) for AI 2 port
	[4] Analog Output	mA	Indication of Analog output current (0[4]~20mA)
[2] Drive Information	[0] Motor Sel		Indication of selected motor if multi-motor control.
	[1] Control Method		Indication of Motor Control Method
	[2] RUN/STOP Source		Indication of the source where start/stop signal for the motor comes from. (KEYPAD, I/O Terminal, communication, etc.)
	[3] Reference Method		Indication of the source where frequency, speed and torque Reference are supplied from (KEYPAD, I/O Terminal, communication, etc.)
	[4] Drive Power	kW	Indication of the inverter rated power
	[5] Drive Voltage	V	Indication of the inverter Voltage Range Ex) 400 : 400V class inverter
	[6] Option Card		Indication of option card number (0: not installed / over 1 : number of the installed option card)
	[7] Software Version		Indication of the inverter program version
	[8] Software Option		Indication of the option program that is installed to the inverter. (0: standard VD Program / over 1 : the installed option program)

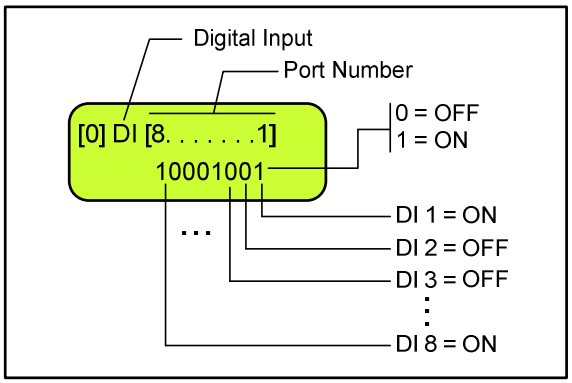


Figure 6.2-3(a) Status of Digital input

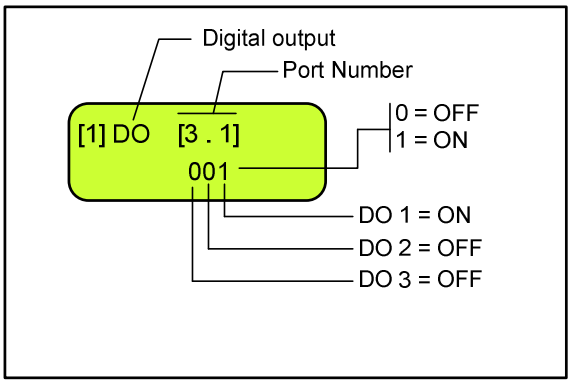


Figure 6.2-3(b) Status of Digital Output

6.2.3 Main Menu Page [2] Parameter Edit

In M2 Parameter Edit Page, The parameter can be set depending on the motor spec., control method and external I/O reference method, etc. The user-prohibited parameter groups or items would be skipped without any indication. Refer to the parameter description of Appendix D for parameter groups and items

After finishing the set-up for parameters, move to the indicating screen that shows “Main Menu Page” so the changed parameters would be saved. Then, the inverter would keep the saved parameters after the main power is off. If a user turns off the main power at the parameter item indicating screen, parameters will be returned to the old data when the main power is back again. Refer to Figure 6.2-4 for KEYPAD usage and the setting instruction in M2 Parameter Edit page.

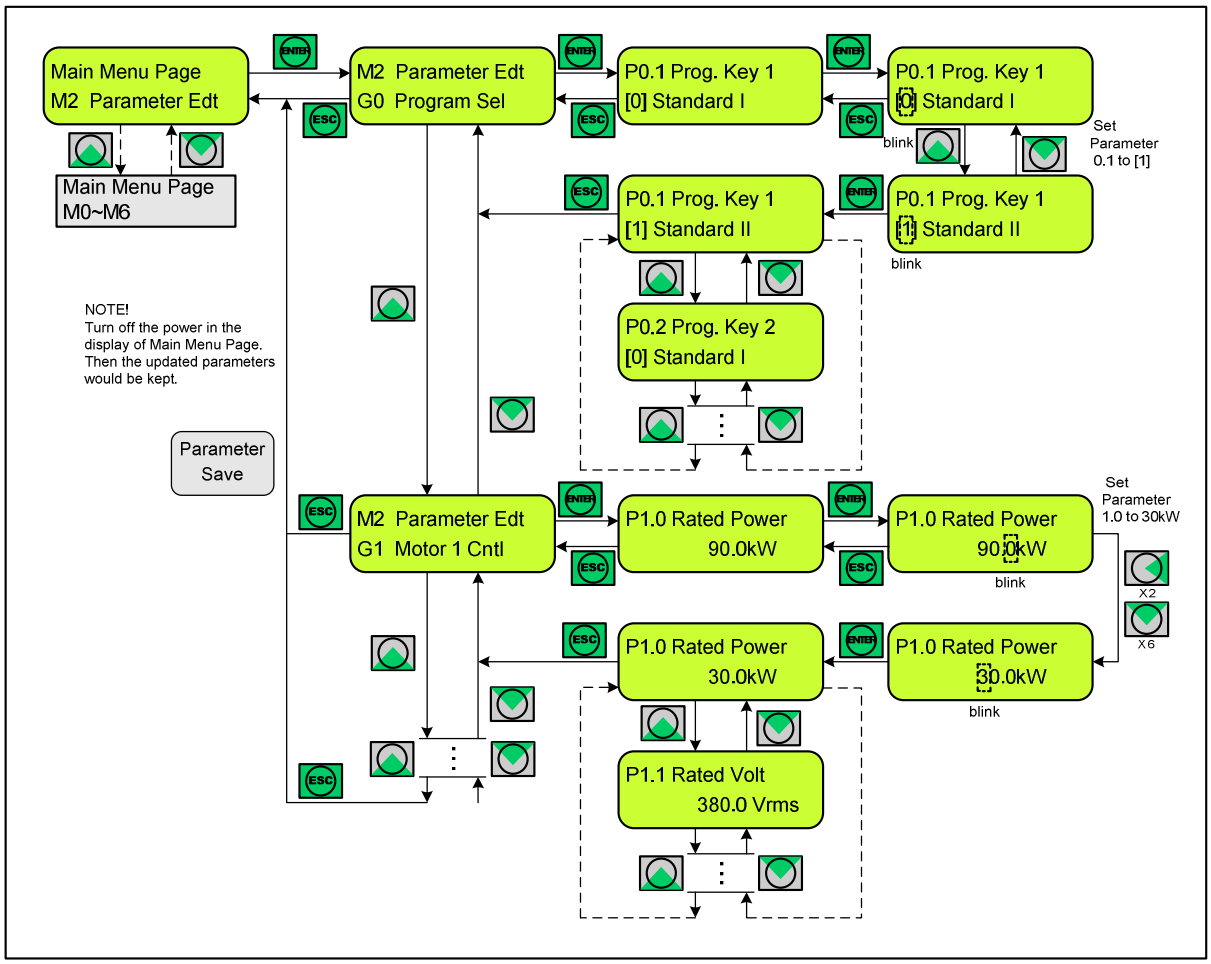


Figure 6.2-4 “M2 Parameter” Menu Page

6.2.4 Main Menu Page [3] Auto Tuning

In M3 Auto Tuning Page, in the case of using speed control or torque control for motor, users can use Auto Tuning to find parameter values that are not easy to find for users and gain value of speed control loop or torque control loop.

The usage of Auto Tuning is restricted by installed environment and condition of motor and parameters for motor control method (par.1.6).

Even if the motor is not running, the output of inverter is still generating so please be more careful. Carry out the process after certainly knowing the method of Auto Tuning first at chapter 7.3. Refer to Figure 6.2-5 for KEYPAD usage and the setting instruction for Auto Tuning.

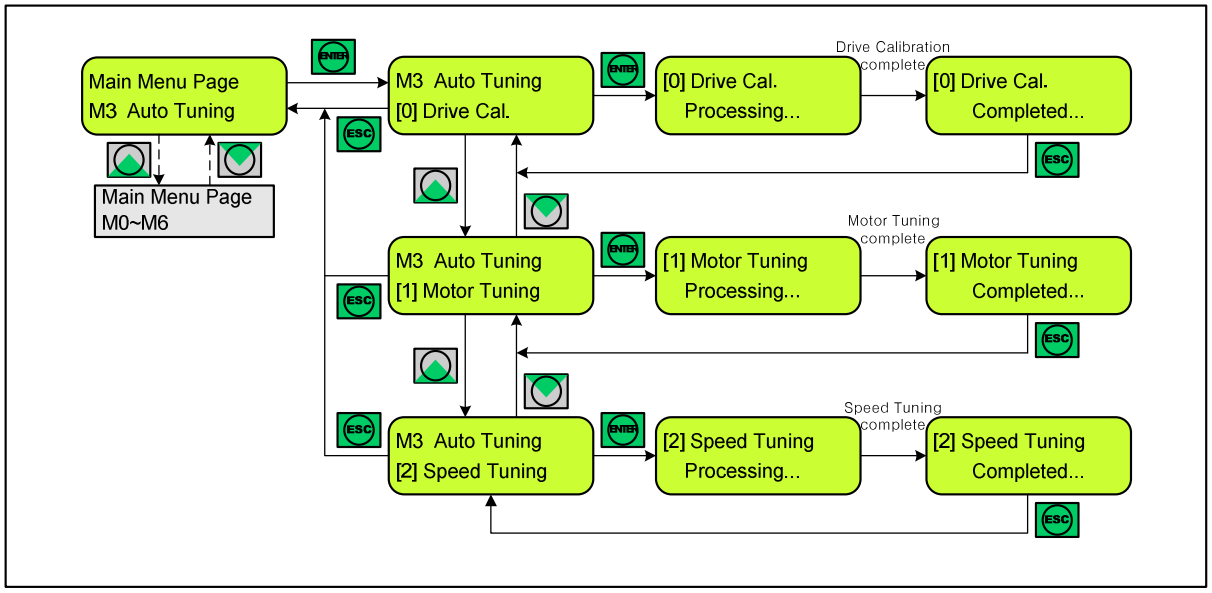


Figure 6.2-5 "M3 Auto Tuning" Menu Page

No	M3 Auto Tuning	Description
[0]	Drive Calibration	Adjust automatically sensor-related parameters of Drive after initializing parameters or changing the switching frequency of the inverter.
[1]	Motor Tuning	Recognize the parameter value of motor and set the related parameters automatically.
[2]	Speed Tuning	Set the related parameter automatically after finding the gain value of speed control loop Carry out this motor tuning when using S/L Vector Speed Control or Vector Speed Control No need to use this when using V/F Frequency Control or V/F Speed control method.

6.2.5 Main Menu Page [4] Fault Record

In M4 Fault record page, users can monitor the number of Faults, Fault code and operation status when it occurs. Total 9 Faults are saved from Record (1) to the last occurred Fault If Faults are occurred more than 9, the oldest Fault record is erased. Refer to Figure 6.2-6 for KEYPAD usage and the setting instruction.

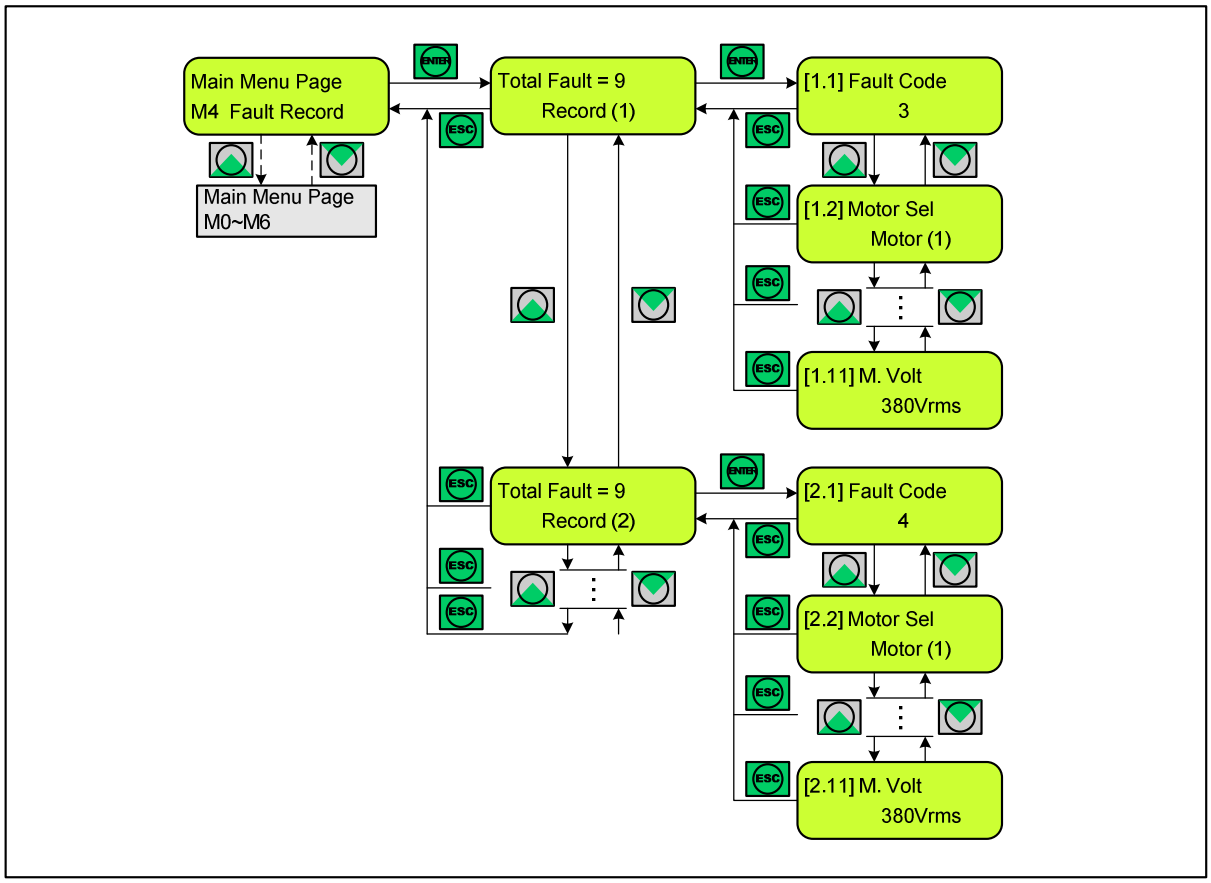


Figure 6.2-6 "M4 Fault Record" Menu Page

M4 Fault Record	No	Unit	Description
Total = x (x : Total occurred Faults number) Record (y) y : occurred order y=1~9 1 = the newst occurred Fault	[y.1] Fault Code		Fault details (Refer to the Fault Code table)
	[y.2] Motor Selection		Indication of the used motor.
	[y.3] Control Method		Indication of control method when Faults occur
	[y.4] Speed command	rpm	Indication of speed command when Faults
	[y.5] Motor Speed	rpm	Indication of Motor Speed when Faults occur
	[y.6] Frequency	Hz	Indication of output frequency when Faults
	[y.7] Termerature	℃	Indication of Torque command when Faults
	[y.8] Actual Torque	Nm	Indication of output torque when Faults occur
	[y.9] DC Link Voltage	Vdc	Indication of DC link voltage when Faults occur
	[y.10] Motor Current	Arms	Indication of Motor Current when Faults occur
	[y.11] Motor Voltage	Vrms	Indication of Motor Voltage when Faults occur

6.2.6 Main Menu Page[5] Initialize

In M5 Initialize page, users can remove of the recorded Fault list, reset the system of inverter Drive and return to the default parameter values. Refer to Figure 6.2-7 for KEYPAD usage and the setting instruction.

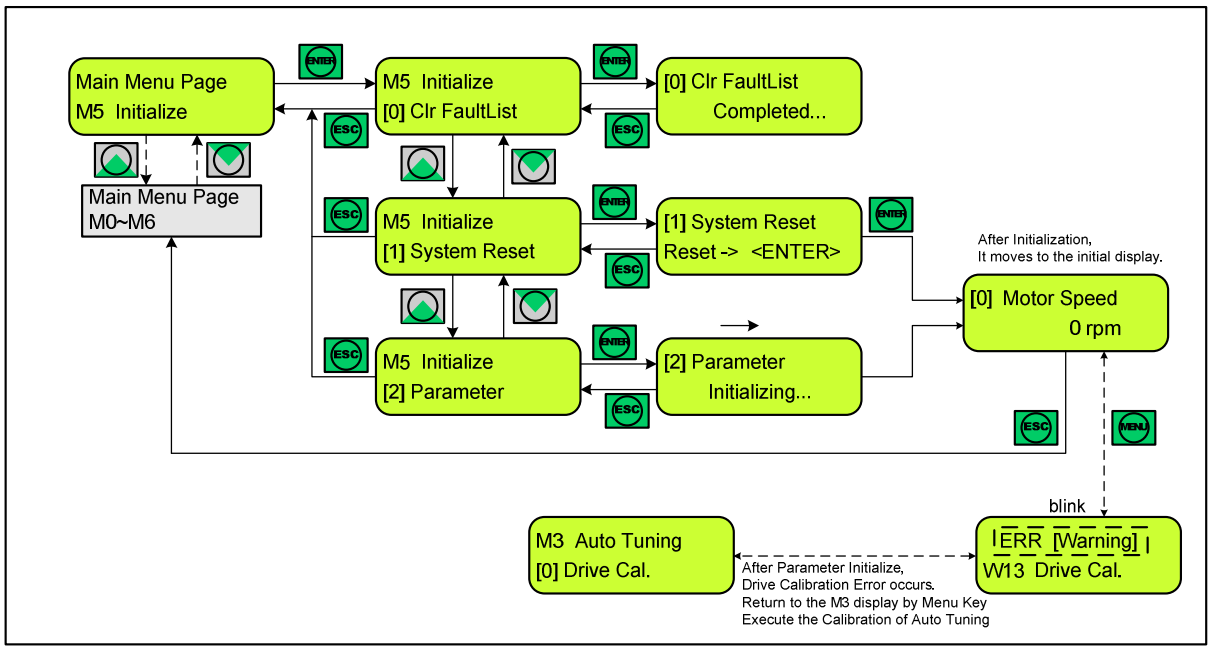


Figure 6.2-7" M5 Initialize" Menu Page

No	M5 Initialize	Description
[0]	Clear Fault List	remove the recorded fault details
[1]	System Reset	reset the system of the inverter (Same effect to give the main power back again after turn off the inverter.)
[2]	Parameter	return all the parameters to the default value If Drive Calibration Warning (W14) occurs, this carries out the Drive Calibration function of Auto Tuning[0] of Main Menu Page[3]

6.2.7 Main Menu Page[6] Password

In M6 password Page, users can check what access level of parameters can be edited. If a user wants to change the inverter parameters for more professional level, the user must be certified for higher level access. Certifying the higher level access can be done at "Admission" with the relevant password for each level. Then, the parameters of the higher level can be accessed. It is recommended to use Access level from 0 to 1 for normal users (L[0] ~ L[1]). If users want higher level, please contact the head office. If users are certified higher than L[1], it will be returned to L[0] automatically after 1 hour passes. Refer to Figure 6.2-8 for KEYPAD usage and the setting instruction.

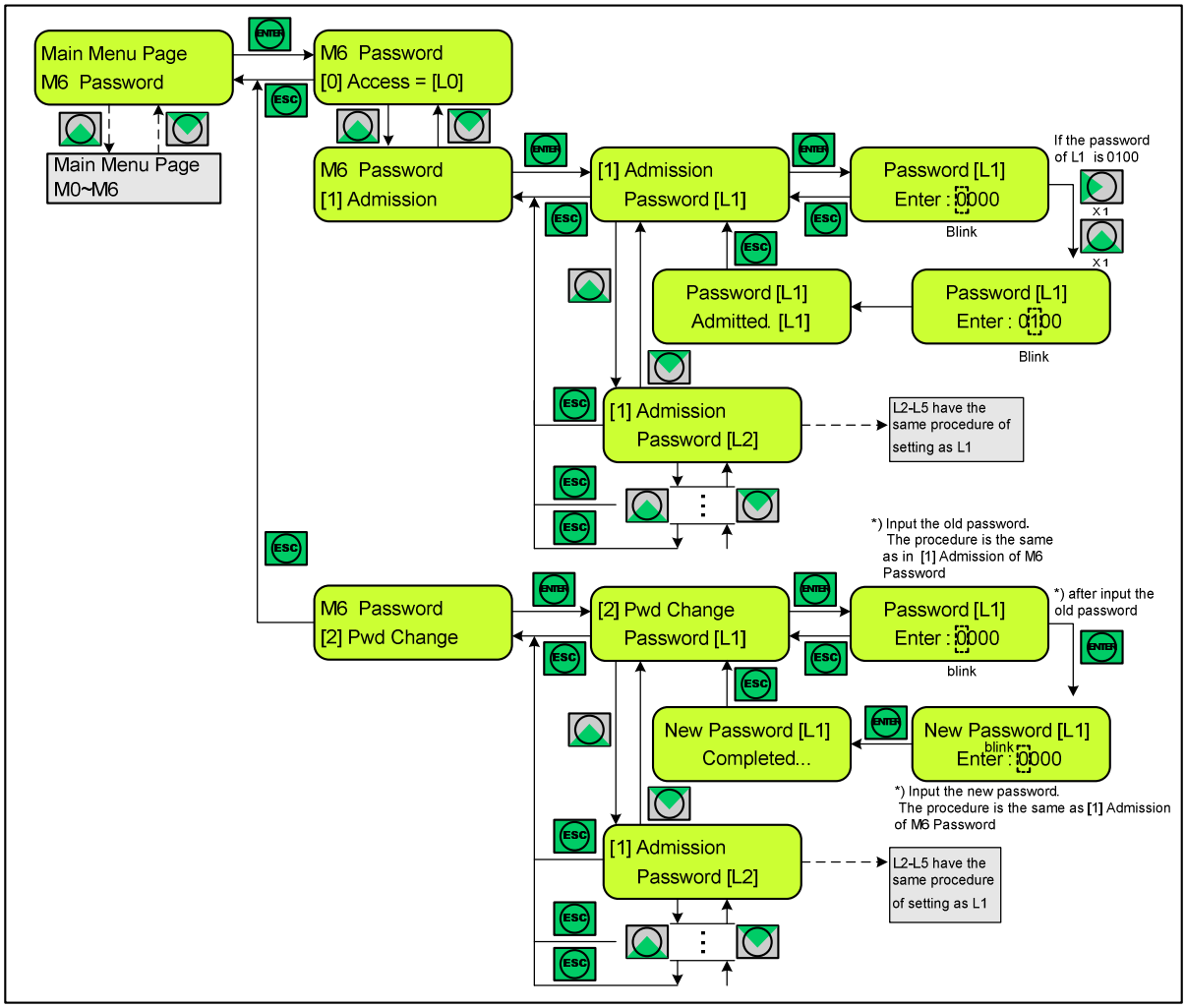


Figure 6.2-8 "M6 Password" Menu Page

No	M6 Password	Description
[0]	Access Level	Indication of certified Access level
[1]	Admission	L[1] : Password 0 0 0 0
		L[2] ~ L[5] : Contact the head office
[2]	Password Change	Change the password for the certified level (users can directly change the password)

6.2.8 The Use of MENU Key (Error, Warning occurrence and inverter status)

MENU key is used to return to the normal screen when error or warning occurs. And it is also used to indicate the current status of the inverter. Refer to Figure 6.2-9.

In cases of error or warning, the source of the trouble is indicated.
Push the "MENU" button, **MENU** and return to the normal screen then correct the relevant parameters or remove the occurrence source by checking the status of inverter.

If the occurrence source is not removed, the error or warning sign appears every 10 seconds while operating KEYPAD. In this case, hit the "MENU" button, **MENU** and then it will return to the last setting screen. Refer to Figure 6.2-9 for KEYPAD operation.

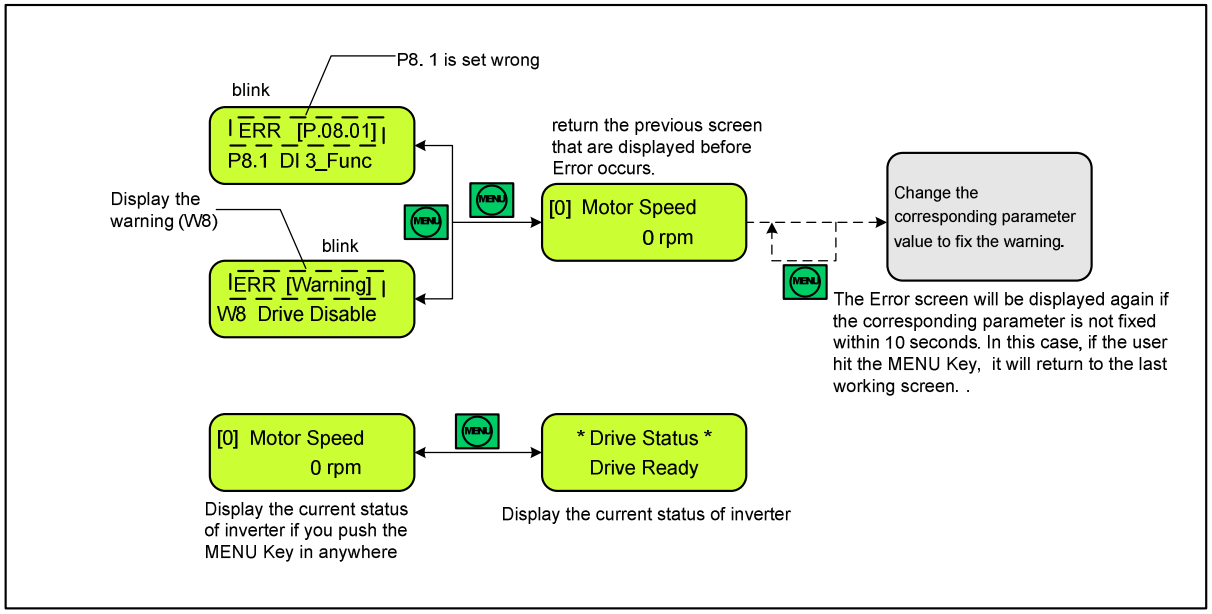


Figure 6.2-9 Checking Error, Warning and inverter status by using Menu key

Note

7. Operation

7. Operation

7.1 Inverter Turning-on Procedure

In order to connect a main voltage to an inverter, as Figure 7.1-1, check the main voltage to connect the inverter, motor, DBR(Dynamic Brake Resister), and etc. If a brake is connected to the motor, the brake should be opened forcedly or a device that can control the brake to be opened or closed.

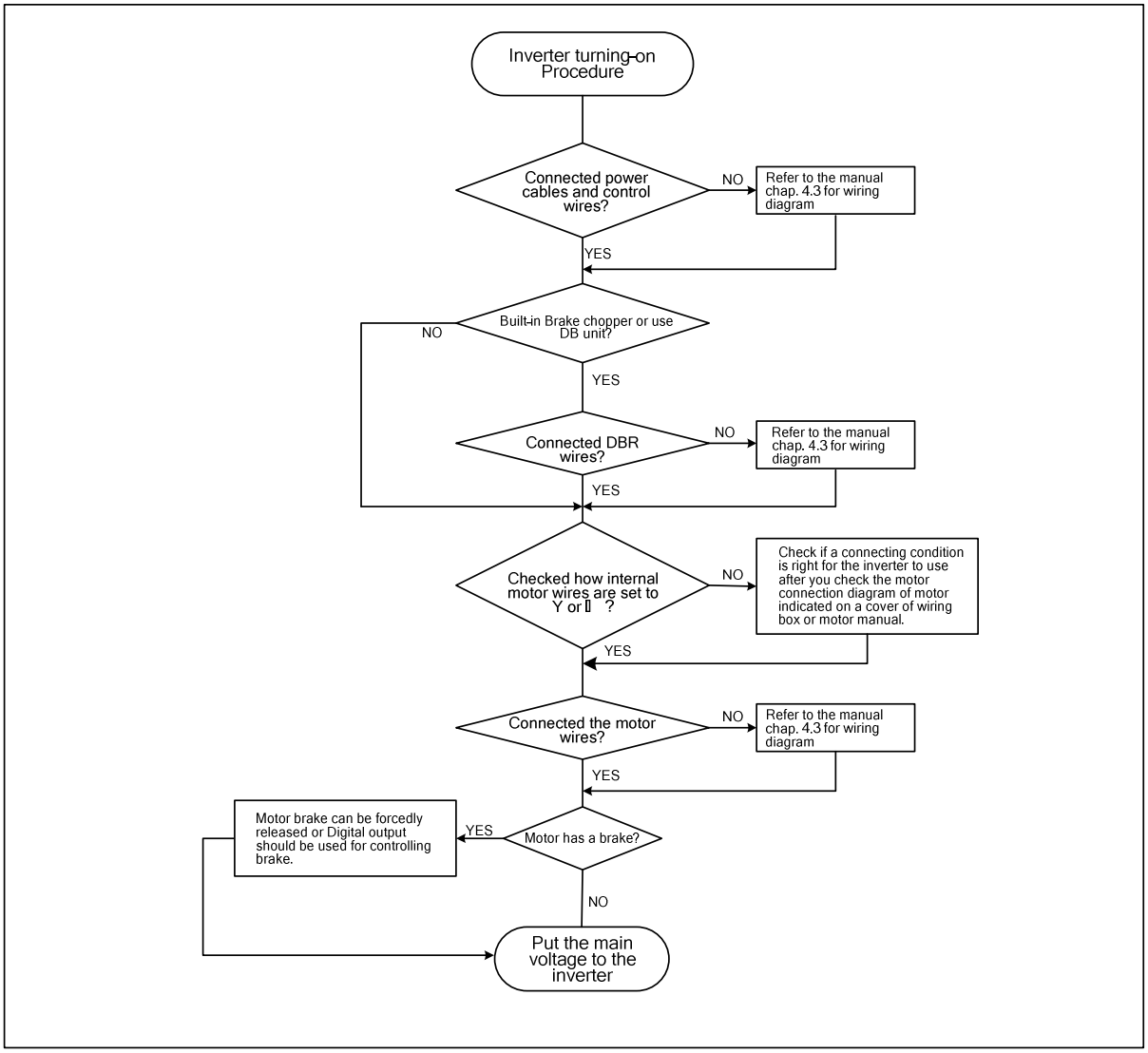


Figure 7.1-1 The processing flowchart of turning on the inverter

7.2 Inverter Operation Procedure (setup for the control method)

If you finish with preparation for connecting the main voltage to the inverter, you can operate the motor after setting a control method as Figure 7.2-1. There are control methods, which are V/F Frequency & Speed Control, Open loop control of S/L Vector speed & torque control, and closed loop control of Vector speed & Torque control. Except for the V/F Frequency control method, the rest of control methods will work only when you operate Auto Tuning. Refer to the chapter 7.3 for Auto Tuning.

7.2.1 Open Loop Control Procedure

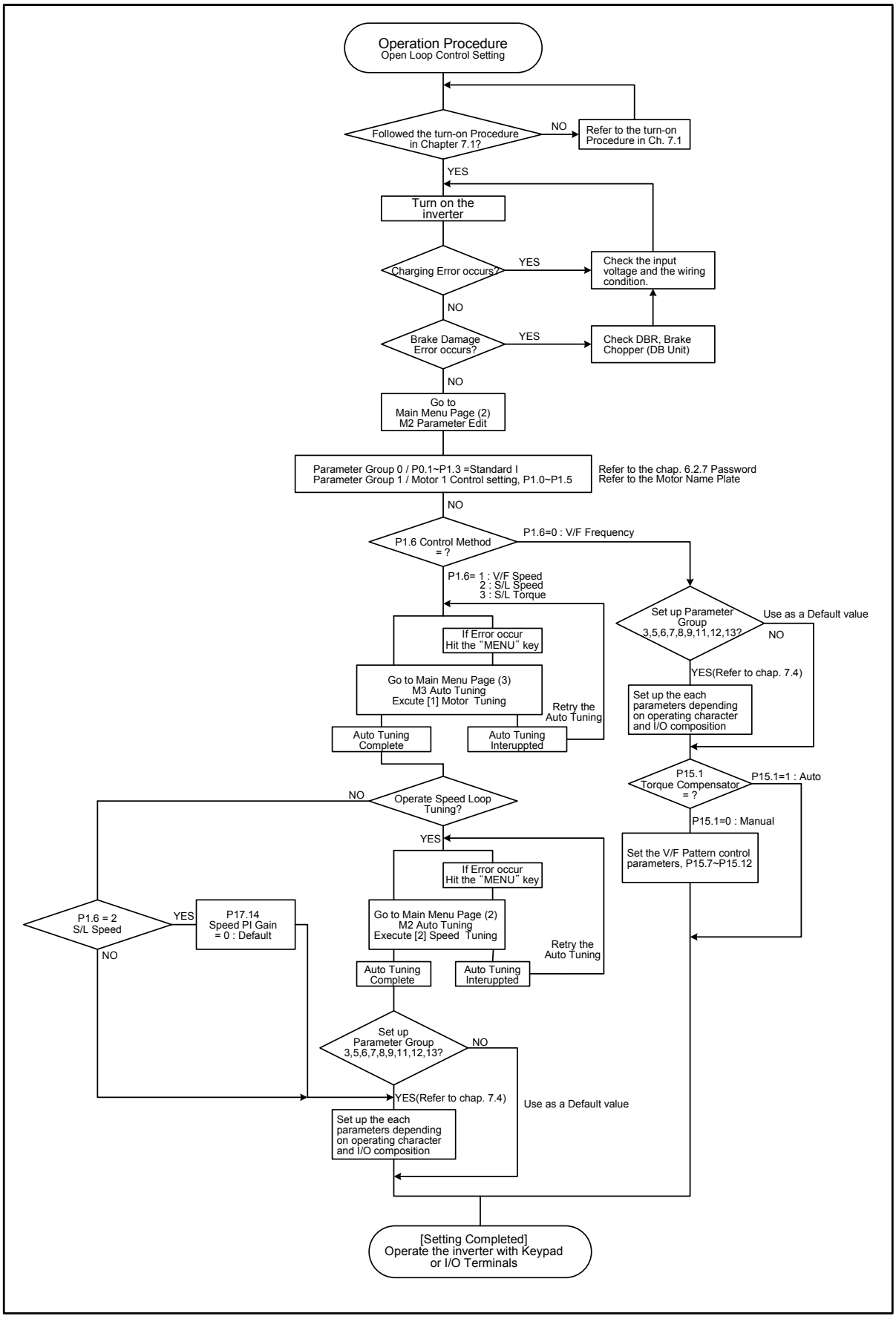


Figure 7.2-1 The processing flowchart of Open Loop Control operation

7.2.2 Closed Loop Control Procedure

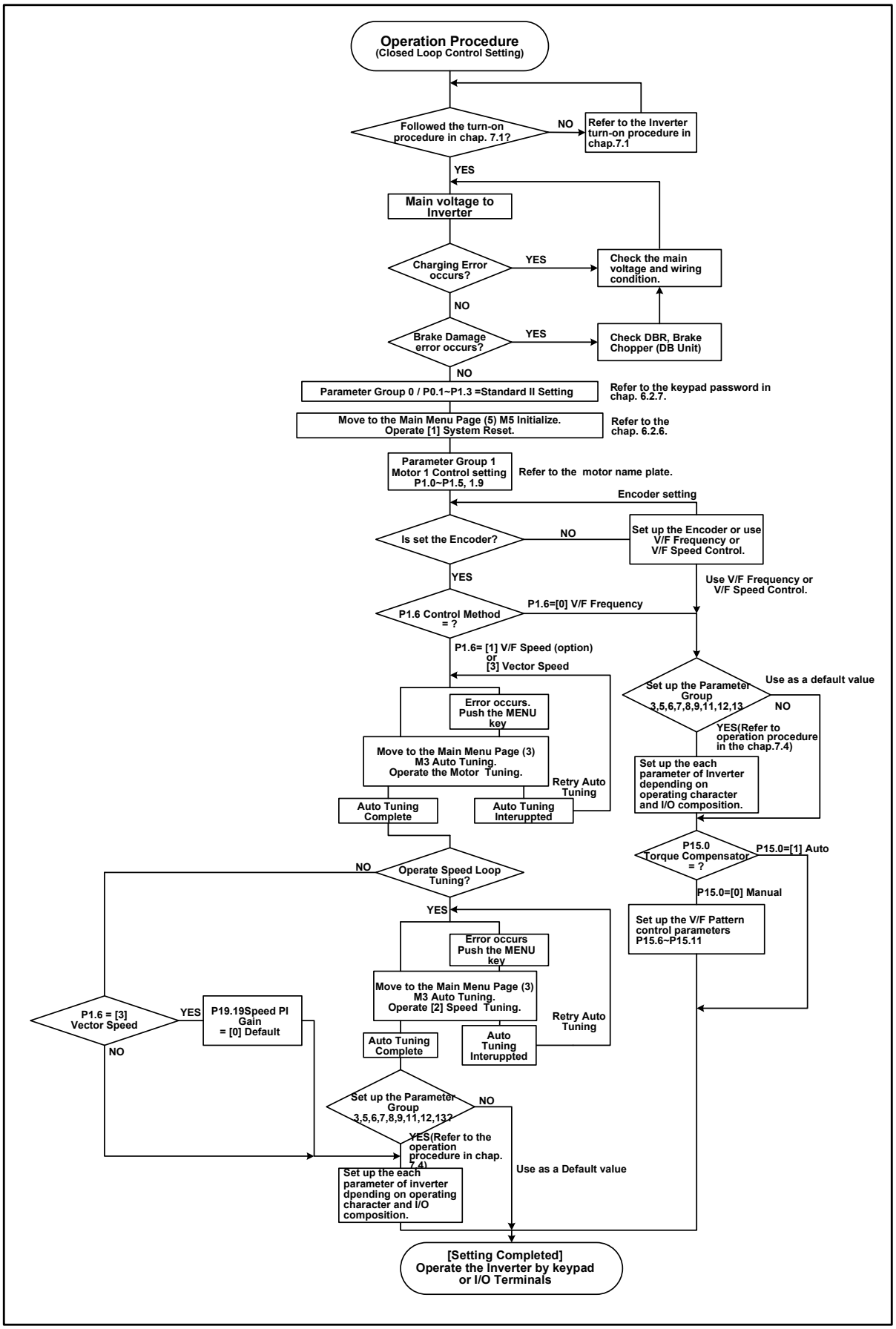


Figure 7.2-2 The processing flowchart of Closed Loop Control operation

7.3 Auto-Tuning Procedure

7.3.1 Checking Point before Auto Tuning

Step	Checklist
Check 1	**Is a motor Shaft connected to the other machine?**
	In a process of Auto Tuning the motor can rotate up to about 5% of the rated speed. In this case, if the motor is connected to a processing line or other machine, check out whether or not there is any effect from the motor rotation. If there is a possibility of causing a fatal problem, you need to operate Auto Tuning after you separate the motor from other device. If it is difficult to separate you need to make a condition for operation that will not cause any problem even if the motor rotates. The best condition of Auto Tuning is when there is no load of the motor and mechanical devices are connected as they are. Especially in Speed Tuning, you can get more exact result when the entire mechanical devices are connected.
Check 2	**Does the motor have any load or is it connected to a Mechanical Brake?**
	If the Brake is installed to the motor, it should possibly be released during the Auto-Tuning process. You can release the Brake by your hands or connect the Brake Control Circuit to the Digital Output terminal of the inverter. If the Brake can be released, check if P14.0=0(free). After it is released, if the load that is more than 50% of the rated load is impressed, Auto tuning may not be smooth. **If you are in a situation that you have to operate Auto Tuning while the Brake is closed, you need to set up P14.0=1(Locked). And only Motor Tuning is possible to operate, but not a Speed Tuning.** If the Speed Tuning does not operate, set P17.14, P18.14, P19.19, P20.19 to 0(Default) and then use. In this case, you use the factory-setting values for a speed controller.
Check 3	**Is there a big difference between the motor power and the inverter power?**
	Auto Tuning may not operate well if power of the motor to connect to the inverter is too small in comparison with that of the inverter. The motor power should be at least over 1/5 of the inverter power.
Check 4	**Did you input the motor specification in Parameter Group1?**
	Set up the rated power, voltage, current, speed, and number of poles of the motor to the parameter items that are conformed to the Parameter Group 1. Refer to the rating plate information on the motor.
Check 5	**Is an encoder connected to the motor?**
	In case of using Vector Control, an encoder should be installed to the motor. But without installing it, V/F Control or S/L Vector Control can operate Auto Tuning.

7.3.2 Auto Tuning Operation & Completion

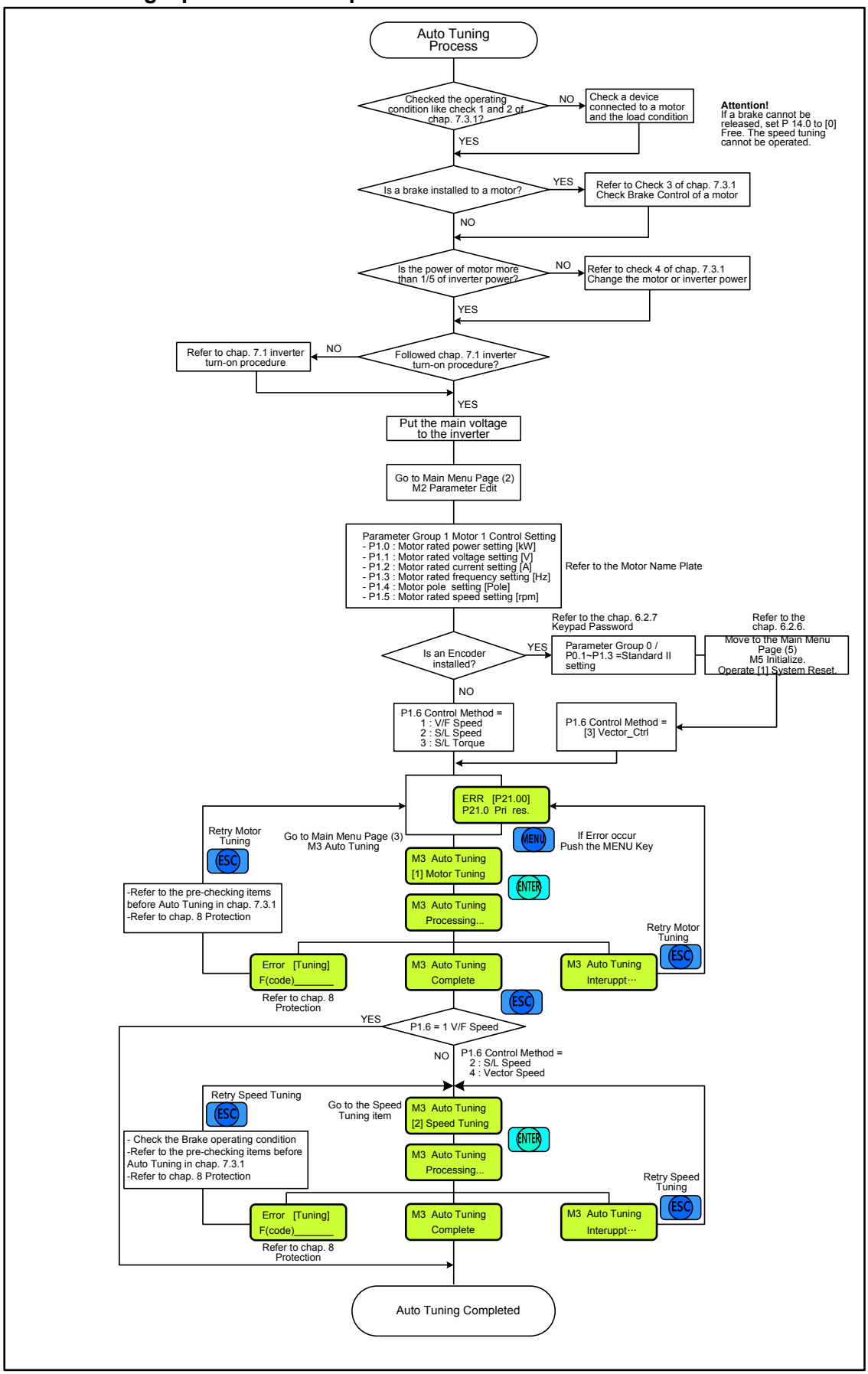


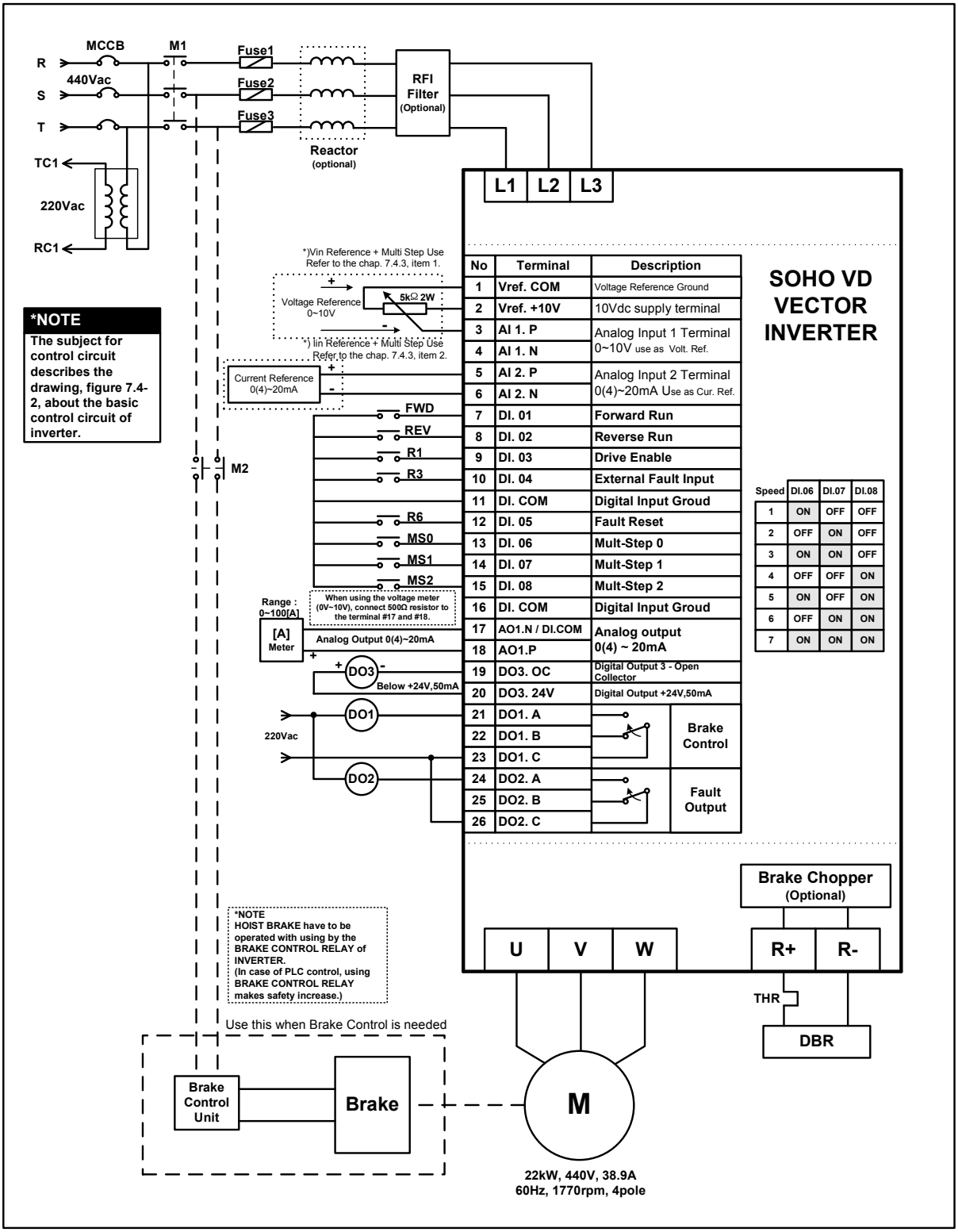
Figure 7.3-1 The processing flowchart of Auto Tuning

7.4 Basic Open Loop Control Operation Procedure

The chapter 7.4 explains the most basic application method for operating the inverter with Open Loop Control.

7.4.1 Basic Design

The following design allows you to use all the basic I/O functions when you use SOHO VD inverter. You can adjust it depending on the given condition on the field.



No	Terminal	Description
1	Vref. COM	Voltage Reference Ground
2	Vref. +10V	10Vdc supply terminal
3	AI 1. P	Analog Input 1 Terminal 0~10V use as Volt. Ref.
4	AI 1. N	
5	AI 2. P	Analog Input 2 Terminal 0(4)~20mA Use as Cur. Ref.
6	AI 2. N	
7	DI. 01	Forward Run
8	DI. 02	Reverse Run
9	DI. 03	Drive Enable
10	DI. 04	External Fault Input
11	DI. COM	Digital Input Groud
12	DI. 05	Fault Reset
13	DI. 06	Mult-Step 0
14	DI. 07	Mult-Step 1
15	DI. 08	Mult-Step 2
16	DI. COM	Digital Input Groud
17	AO1.N / DI.COM	Analog output 0(4) ~ 20mA
18	AO1.P	
19	DO3. OC	Digital Output 3 - Open Collector
20	DO3. 24V	Digital Output +24V,50mA
21	DO1. A	
22	DO1. B	
23	DO1. C	
24	DO2. A	
25	DO2. B	
26	DO2. C	

Speed	DI.06	DI.07	DI.08
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
5	ON	OFF	ON
6	OFF	ON	ON
7	ON	ON	ON

Figure 7.4-1 Basic Diagram for Inverter Use

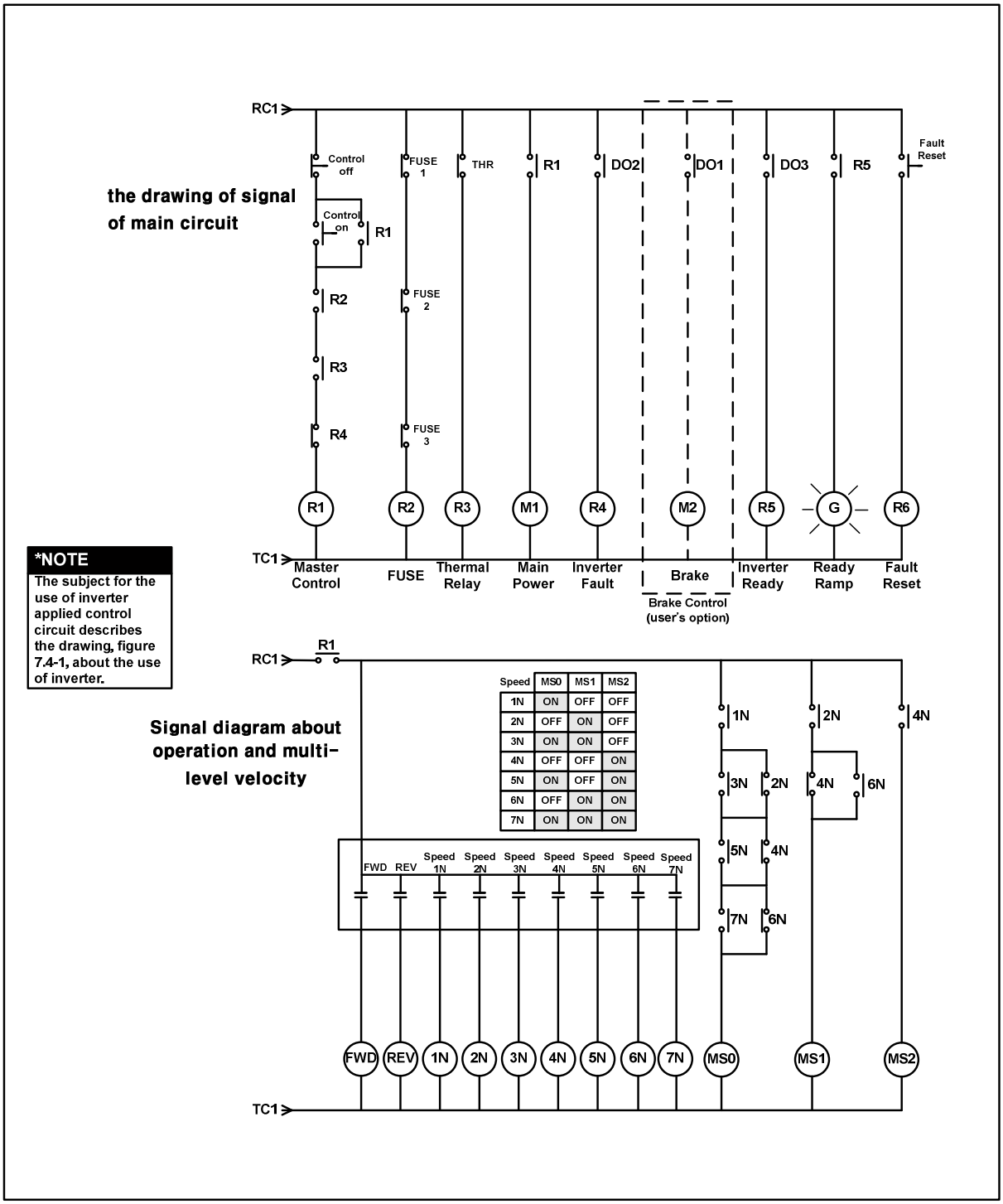


Figure 7.4-2 Basic Diagram for Inverter control circuit

7.4.2 Motor Specification & Open Loop Control Method Setting

This is how you set up a parameter for the motor specification and Open Loop Control method when you use the same motor specification as below.

The rated specification of the motor to be used for the inverter system					
Power	22 kW	Current	38.9 A	Speed	1770 rpm
Voltage	440 V	Frequency	60 Hz	Pole	4 pole

(1) Parameter setting for motor specification

Order	Parameter Group1: Control Setup [Motor 1]			
	Code	Parameter Name	Set Value	Explanation
1	P1. 0	Motor Rated Power	22 kW	Rated power of motor (*)When more 2 motor are connected in parallel, the sum of rated capacity of motor is input.
2	P1. 1	Motor Rated Voltage	440 V	Rated voltage of motor
3	P1. 2	Motor Rated Current	38.9 A	Rated current of motor (*)When more 2 motor are connected in parallel, the sum of rated capacity of motor is input.
4	P1. 3	Motor Rated Frequency	60 Hz	Rated frequency of motor
5	P1. 4	Number of Poles	4 Pole	Number of poles of motor
6	P1. 5	Motor Rated Speed	1770 rpm	Rated speed of motor

(2) Motor Control Setting

① V/F Frequency Control Setting

► Incase of using Automatic Torque Compensation (recommendable)

Order	Parameter Group1: Control Setup [Motor 1]			
	Code	Parameter Name	Set Value	Explanation
1	P1. 6	Control Method	[0] V/F Freq	V/F Frequency Control
	Parameter Group 15 : V/F Control Motor 1			
2	P15. 0	Torque Compensation	[1] Auto	Automatic Torque Compensation (recommendable)

Refer to the Speed or Frequency reference and Digital Input Setting, Chapter 7.4.3 → *Page 7-10*

► Refer to Figure 7.4-3 if you want to adjust the output rated voltage (V) or the rated frequency (F) of your own accord

Order	Parameter Group 15 : V/F Control [Motor 1] : Set of frequency of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P15. 0	Torque Compensation	[0] Manual	Users can adjust the amount of compensation
2	P15. 6	V/F Pattern	[2] User	Users can adjust the V/F curve
3	P15. 7	Zero Frequency Voltage	1.5 %	100% = 440V (P1. 1 set value)
4	P15. 8	Mid. Frequency	5 Hz	Mid-point frequency
5	P15. 9	Mid. Frequency Voltage	10 %	Output voltage at mid-point frequency(P15. 8) 100% = 440V (P1. 1 set value)
6	P15. 10	Max. Voltage Frequency	60 Hz	Frequency at maximum output voltage

<next>

<Continued>

Order	Parameter Group 15 : V/F Control [Motor 1] : Set of frequency of motor1			
	Code	Parameter Name	Set Value	Explanation
7	P15. 11	Max. Output Voltage	100 %	Output Voltage at mid-point frequency(P15. 10) 100% = 440V (P1. 1 set value)

Refer to the Speed or Frequency reference and Digital Input Setting, Chapter 7.4.3 → Page 7-10

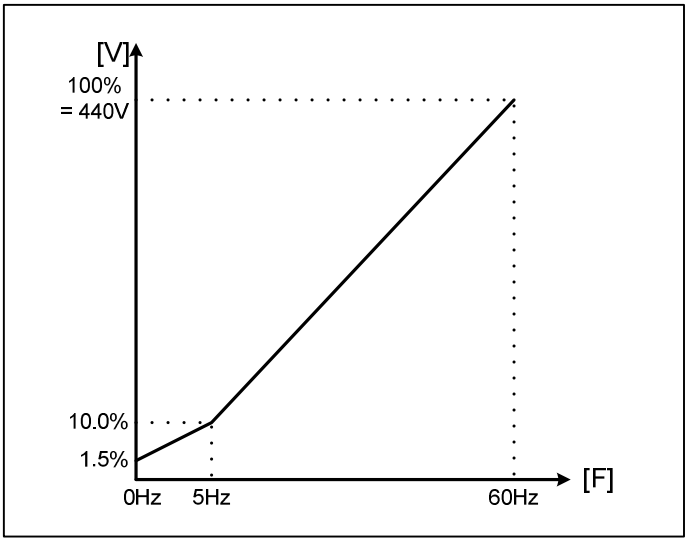


Figure 7.4-3 V/F pattern user setting example

② V/F Speed Control Setting

Order	Parameter Group 15: Motor 1 Control			
	Code	Parameter Name	Set Value	Explanation
1	P1. 6	Control Method	[1] V/F Speed	V/F Speed Control
	Parameter Group 14 : Auto Tuning Configuration : Auto tuning set			
2	P14. 0	Brake Condition	[0] Free	When a Brake is not installed to a motor, or can be released during Auto Tuning. (caution: motor should be on no load)
			[1] Locked	When a Brake is installed to a motor, and it cannot be released during Auto Tuning
	Main Menu Page[3] Auto Tuning			
3	M3-[1]	"Motor Tuning: operation (refer to chapter 7.3)		

Refer to the Speed or Frequency reference and Digital Input Setting, Chapter 7.4.3 → Page 7-10

③ S/L Speed Control Setting

► In case that a Brake is not installed to a motor or can be released during Auto Tuning

Order	Parameter Group 1 : Control Setup[Motor 1] : Set of frequency of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P1. 6	Control Method	[2] S/L_Vector	Sensor less Speed Control

<Next>

<Continued>

Order	Parameter Group 14 : Auto Tuning Configuration : Auto tuning set			
	Code	Parameter Name	Set Value	Explanation
2	P14. 0	Motor Tuning Condition	[0] Free	No Stall
	Parameter Group 17 : Sensor less Vector Control			
3	P17. 14	Speed Control PI Gain	[1] Auto Tuning	Speed control PI Gain Auto Tuning
	Main Menu Page[3] Auto Tuning			
4	M3-[1]	"Motor Tuning" (refer to chapter 7.3)		
5	M3-[2]	"Speed Tuning" (refer to chapter 7.3)		

Refer to the Speed or Frequency reference and Digital Input Setting, Chapter 7.4.3→↓↓below

► In case that motor brake is installed and can not be opened

("M3 Auto Tuning" = [2] Speed Tuning is unavailable.)

Order	Parameter Group 1 : Control Setup[Motor 1] : Set of frequency of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P1. 6	Control Method	[2] S/L_Vector	Sensor less Speed Control
	Parameter Group 14 : Auto Tuning Configuration : Auto tuning set			
2	P14. 0	Motor Tuning Condition	[1] Locked	Stall
	Main Menu Page[3] Auto Tuning			
3	M3-[1]	"Motor Tuning" (Refer to chapter 7.3)		
	Parameter Group 17 : Sensor less Vector Control			
4	P17. 14	Speed Control PI Gain	[0] Default	The value of PI Gain Speed is the same as that of factory shipping. P17.18 and P17.19 are adjustable.

Refer to the Speed or Frequency reference and Digital Input Setting, Chapter 7.4.3→↓below

7.4.3 Speed or Frequency Reference & Digital Input Setting

This is a parameter setting when you configure Reference and I/O with Analog Input and Digital Input as the Figure 7.4-1. When there is no Multi-Step Digital Input, analog Inputs are automatically recognized as speed or frequency references. The Multi-Step references are automatically recognized if there is more than one Digital Input related to Multi-Step signals.

(1) Parameter Setting for Speed or Frequency Reference + Multi Step (0[-10] ~ 10V)

Order	Parameter Group 3 : Reference Setup 1 : Set of speed and frequency reference of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P3. 0	RUN/STOP Method	[0] Terminal	RUN/STOP with DI.01 & DI.02
2	P3. 1	Reference Method	[0] Terminal	Use Analog input and Multi Step for speed or frequency reference

<Next>

<Continued>

Order	Parameter Group 6 : Analog Input Setup : Set of analogue input			
	Code	Parameter Name	Set Value	Explanation
3	P6. 0	Analog Reference Source	AI 1	Use only r1 for Analog Input **(Input analogue signal to the #3 and #4 terminals)**
4	P6. 1	Analog Input 1 Function	AI 1	Use Analog Input 1.
5	P6. 2	Analog Input 1 Type	[0] 0~10V	Use Voltage Input(0~10V) for Speed Reference
	Parameter Group 8 : Digital Input Setup : Digital input setting			
6	P8. 0	RUN/STOP	[0] 1.FWD / 2.REV	Set Digital Inputs for RUN/STOP **(Connect to #7 and #8 terminals.)**
7	P8. 1	DI.03 Function	[1] Drive En.	Set DI.03 Function to “Drive Enable” **(Connect #9 terminal.)**
8	P8. 2	DI.04 Function	[10] Ext Fault A	Set DI.04 Function to “External Fault” (A contact) **(Connect #10 terminal.)**
9	P8. 3	DI.05 Function	[6] Fault Reset	Set DI.05 Function to “Fault Reset” **(Connect #11 terminal.)**
10	P8. 4	DI.06 Function	[2] MultiStep.0	Set DI.06 Function to “Multi Step 0” **(Connect #13 terminal.)**
11	P8. 5	DI.07 Function	[3] MultiStep.1	Set DI.07 Function to “Multi Step 1” **(Connect #14 terminal.)**
12	P8. 6	DI.08 Function	[4] MultiStep.2	Set DI.08 Function to “Multi Step 2” **(Connect #15 terminal.)**

“Digital & Analog Output Setting”, the Chapter 7.4.4→ Page 7-12

(2) Parameter Setting for Current (0[4] ~ 20mA) Input Reference + Multi Step

Order	Parameter Group 3 : Reference Setup 1 : Set of speed and frequency reference of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P3. 0	RUN/STOP Method	[0] Terminal	RUN/STOP with DI.01 and DI.02
2	P3. 1	Ramp Function Input Source	[0] Terminal	Use Analog input and Multi Step for Reference
	Parameter Group 6 : Analog Input Setup : Set of analogue input			
3	P6. 0	Analog Reference Source	[2] AI 2	Use only r1 for Analog Input **(Connect to #5 and #6 terminals.)**
4	P6. 15	Analog Input 2 Function	[1] AI	Use Analog Input 1
5	P6. 16	Analog Input 2 Type	[2] 4~20mA	Use Current Input 4~20mA
			[3] 0~20mA	Use Current Input 0~20mA
	Parameter Group 8 : Digital Input Setup : Set of digital input			
6	P8. 0	RUN/STOP	[0] 1.FWD / 2.REV	Use Digital Input for RUN/STOP **(Connect to #7 and #8 terminals.)**
7	P8. 1	DI.03 Function	[1] Drive En.	Set DI.03 Function to Drive Enable **(Connect to #9 terminal.)**

<Next>

<Continue>

Order	Parameter Group 8 : Digital Input Setup : Set of digital input			
	Code	Parameter Name	Set Value	Explanation
8	P8. 2	DI.04 Function	[10] Ext Fault A	Set DI.04 Function to “External Fault (A contact)” **(Connect to #10 terminal.)**
9	P8. 3	DI.05 Function	[6] Fault Reset	Set DI.05 Function to “Fault Reset” **(Connect to #11 terminal.)**
	Parameter Group 8 : Digital Input Setup : Set of digital input			
10	P8. 4	DI.06 Function	[2] MultiStep.0	Set DI.06 Function to “Multi Step 0” **(Connect to #13 terminal.)**
11	P8. 5	DI.07 Function	[3] MultiStep.1	Set DI.07 Function to “Multi Step 1” **(Connect to #14 terminal.)**
12	P8. 6	DI.08 Function	[4] MultiStep.2	Set DI.08 Function to “Multi Step 2” **(Connect to #15 terminal.)**

Refer to Digital & Analog Output Setting, the Chapter 7.4.4

7.4.4 Digital and Analog Output Setting

This is a parameter setting for configuring with Digital Output as Figure 7.4-1 Basic Design.

Order	Parameter Group 11 : Analog Output Configuration : Set of analogue output			
	Code	Parameter Name	Set Value	Explanation
1	P11. 0	AO 1 Output Selection	[2] Current	In parameter setting, set Analog Output to Motor Current **(Connect to #17, #18, and #19 terminals.)**
2	P11. 1	AO 1 Output Type	[0] 0~20mA	A range of Analog output is 0~20mA
			[1] 4~20mA	A range of Analog output is 4~20mA
3	P11. 5	AO 1 Output at 20mA	257%	When the set value of motor’s rating current, P1. 2, is 100% and the output of analogue is 20mA, the output value is set. (Current meter can display up to 100A so that P11.5 should be as 100A / P1.2 (38.9A)] X 100%=257%
	Parameter Group 12 : Digital Output Setup : Set of digital input			
4	P12. 0	DO 1 Function	[4] Motor Brake	Set Digital Output Function to Magnetic Brake of Motor. (When you use Motor Brake Control, refer to the Chapter 7.4.6 Brake Control Setting) **(Connect to #21, #22, and #23 terminals.)**
5	P12. 1	DO 2 Function	[2] Fault Out A	When Fault occurs, set Digital Output Function to work (A contact) **(Connect to #24, #25, and #26 terminals.)**
6	P12. 2	DO 3 Function	[1] Drive Ready	Operate when the inverter is ready **(Connect to #19 terminal.)**

Refer to the Operation Pattern Setting, the Chapter 7.4.5 → Page 7-13

7.4.5 Operation Pattern Setting

It explains parameter settings when you set the Operation Pattern as Figure 7.4-3 and 7.4-4. The Figure 7.4-1 shows the basic input method.

(1) In case that you use V/F Frequency and V/F Speed Control

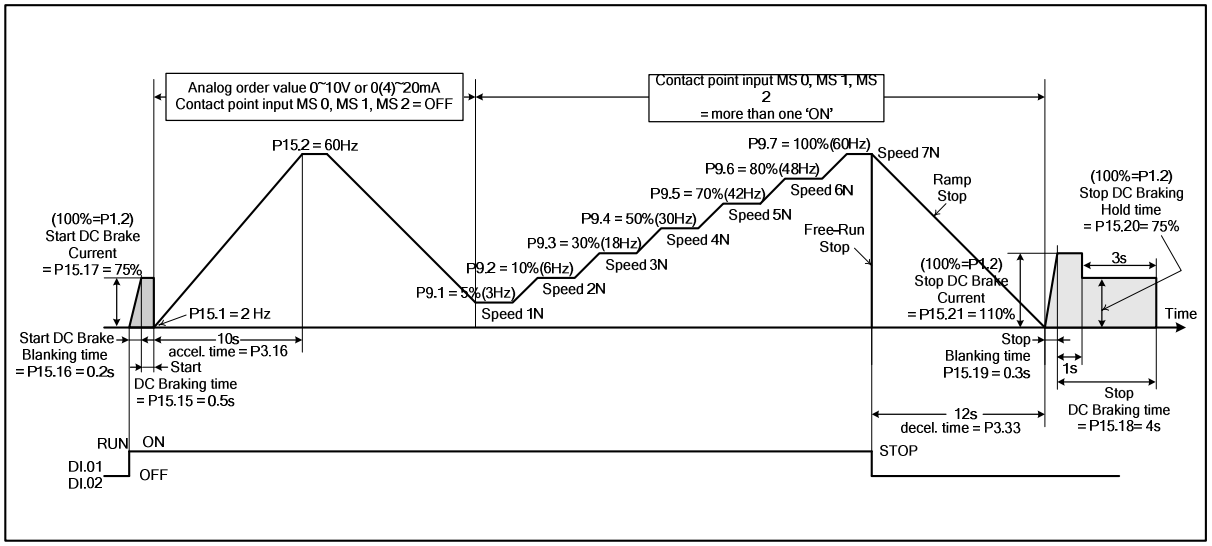


Figure 7.4-4 Operation Pattern Setting of V/F Frequency and V/F Speed Control

① Reference Setup

Order	Parameter Group 3 : Reference Setup			
	Code	Parameter Name	Set Value	Explanation
1	P3. 3	STOP Mode	[0] Ramp STOP	When Run-Input signal is turned OFF, inverter stops after Decel Time
			[1] Free-Run STOP	When Run-Input Signal is turned OFF, Inverter output is also turned OFF immediately.
2	P3. 9	Accel.Switching Ref[1-2]	Initial value=100%	100% = Rated Speed (P1. 5)or Rated Frequency(P1. 3) of Motor
3	P3. 16	Acceleration Time I. 1	10s	It is the accelerated time from 0 to the time that is set on P3. 26.
4	P3. 26	Decel.Switching Ref[1-2]	Initial value=100%	100% = Rated Speed (P1. 5)or Rated Frequency(P1. 3) of Motor
5	P3. 33	Deceleration Time I. 1	12s	It is the decelerated time from the time that is set on P3. 26.

② Multi Step Reference Setting

Order	Parameter Group 9 : Multi-Step Reference [Motor1] (100% = Rated Speed or Rated Frequency of Motor)			
	Code	Parameter Name	Set Value	Explanation
1	P9. 1	Multi Step 1 Reference	5%	60Hz X 5% = 3Hz
2	P9. 2	Multi Step 2 Reference	10%	60Hz X 10% = 6Hz
3	P9. 3	Multi Step 3 Reference	30%	60Hz X 30% = 18Hz

<Next>

<Continued>

Order	Parameter Group 9 : Multi-Step Reference [Motor1] (100% = Rated Speed or Rated Frequency of Motor)			
	Code	Parameter Name	Set Value	Explanation
4	P9. 4	Multi Step 4 Reference	50%	60Hz X 50% = 30Hz
5	P9. 5	Multi Step 5 Reference	70%	60Hz X 70% = 42Hz
6	P9. 6	Multi Step 6 Reference	80%	60Hz X 80% = 48Hz
7	P9. 7	Multi Step 7 Reference	100%	60Hz X 100% = 60Hz

③ Parameter Setting for V/F Frequency or V/F Speed Control

Order	Parameter Group 15 : V/F Control [Motor 1] : Set of frequency control of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P15. 1	Minimum Frequency	2 Hz	Set up for Minimum Output Frequency
2	P15. 2	Maximum Frequency	60 Hz	Set up for Maximum Output Frequency
3	P15. 15	Start DC Brake Time	0.5s	Operating time of DC Brake while running
4	P15. 16	Start DC Brake Blanking Time	0.2s	When starting, Accel time for DC Brake current
5	P15. 17	Start DC Brake Current	75%	When starting, DC Brake current
6	P15. 18	Stop DC Brake Time	4s	Operating time of DC Brake while stopping. The sum of occurring time of P15. 20 and P15. 21(1S).
7	P15. 19	Stop DC Brake Blanking Time	0.3s	Ramp time increases up to the amount of current of DC brake (P15. 21) when motor stops.
8	P15. 20	Stop DC Brake Hold Current	75%	The amounts of current of DC brake after DC brake(P15. 21) current for 1sec when motor stops.
9	P15. 21	Stop DC Brake Current	110%	The amounts of current of DC brake when motor stops. (100%=P1. 2)

<Inverter Setting completed!> *When you use the Brake Control of Motor go to "The Chapter 7.4.6. Brake Control Setting using Digital Output" → Page 7-16

(2) When you use S/L Vector Speed Control

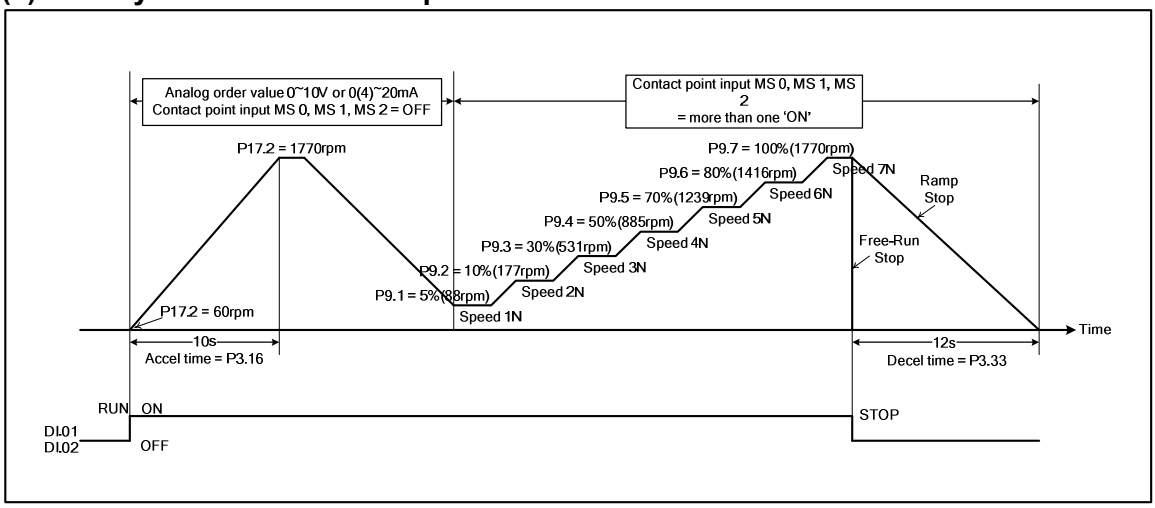


Figure 7.4-5 Operation Pattern Setting of S/L Vector Speed Control

① Reference Setup Setting

Order	Parameter Group 3 : Reference Setup 1			
	Code	Parameter Name	Set Value	Explanation
1	P3. 3	STOP Mode	[0] Ramp STOP	When Run-Input signal is turned OFF, inverter stops after Decel Time
			[1] Free-Run STOP	When Run-Input signal is turned OFF, inverter output also is turned OFF immediately.
2	P3. 9	Accel.Switching Ref[1-2]	Initial value=100%	100% = rating frequency of motor(P1. 3) or rating speed(P1. 5)
3	P3. 16	Acceleration Time I. 1	10s	Accel.Time Region 1 -Refer to the explanation of parameter
4	P3. 26	Decel.Switching Ref[1-2]	Initial value=100%	100% = Rated Speed(P1. 5) or Rated Frequency of Motor (P1. 3)
5	P3. 33	Deceleration Time I. 1	12s	Decel.Time Region 1 –Refer to the explanation of parameter

② Multi Step Reference Setting

Order	Parameter Group 9 : Multi Step Reference (100% = Rated Speed or Rated Frequency of Motor)			
	Code	Parameter Name	Set Value	Explanation
1	P9. 1	Multi Step 1 Reference	5%	1770rpm X 5% = 88rpm
2	P9. 2	Multi Step 2 Reference	10%	1770rpm X 10% = 177rpm
3	P9. 3	Multi Step 3 Reference	30%	1770rpm X 30% = 531rpm
4	P9. 4	Multi Step 4 Reference	50%	1770rpm X 50% = 885rpm
5	P9. 5	Multi Step 5 Reference	70%	1770rpm X 70% = 1239rpm
6	P9. 6	Multi Step 6 Reference	80%	1770rpm X 80% = 1416rpm
7	P9. 7	Multi Step 7 Reference	100%	1770rpm X 100% = 1770rpm
8	P9. 16	Unit Selection	[0] Percent[%]	The unit of speed is %

③ Operation Pattern Setting for Using S/L Speed Control

Order	Parameter Group 17 : Sensor less Speed Control			
	Code	Parameter Name	Set Value	Explanation
1	P17. 1	Minimum Speed	60 rpm	Set up for minimum speed.
2	P17. 2	Maximum Speed	100%	Set up for mini speed. (100%=P1. 5's set value=1770rpm)
3	P17. 3	Over Speed Limit	125%	Set speed limit. (P1. 5X125%=2212rpm)

<Completed Inverter Setup!> *When you use the Brake Control of Motor go to the Chapter 7.4.6. " Brake Control Setting using Digital Output" → Page 7-16

7.4.6 Brake Control Parameter Setting Using Digital Output

This explains a parameter setting when you control the Brake that is connected to a motor as Figure 7.4-1, using Digital Output as Figure 7.4-6 and Figure 7.4-7

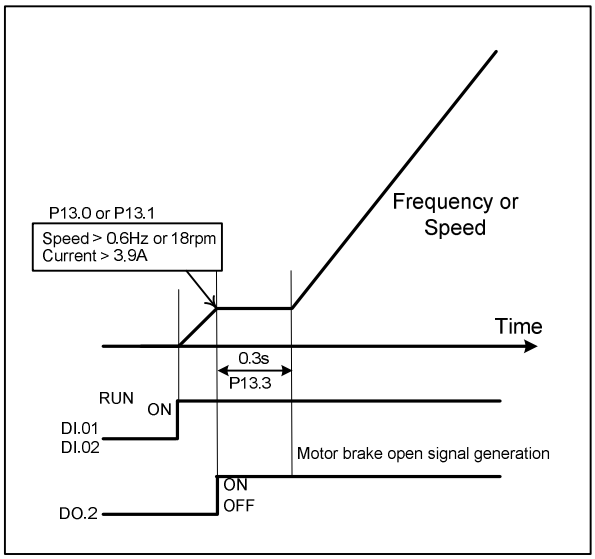


Figure 7.4-6 Mechanical Brake Releasing Signal

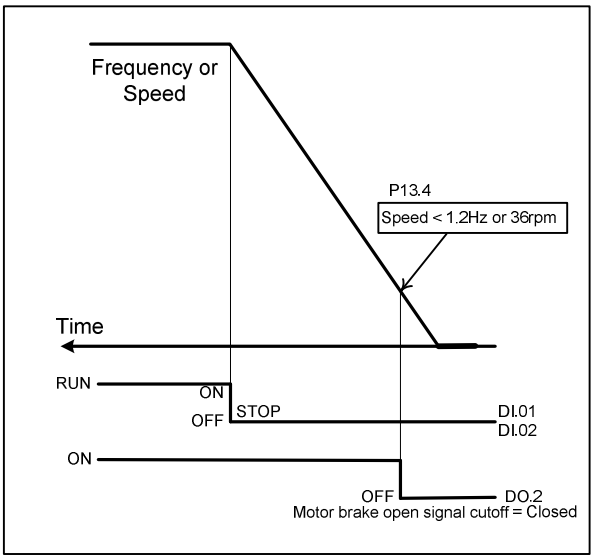


Figure 7.4-7 Mechanical Brake Closing Signal

Order	Parameter Group 12 : Digital Output Setup : Set of digital output			
	Code	Parameter Name	Set Value	Explanation
1	P12. 1	DO.2 Function	[4] Motor Brake	Set DO.2 for Brake Control
	Parameter Group 13 : Magnetic Brake Control : Set of motor brake control			
2	P13. 0	M1 Locked state Up_Ref	1%	Digital Output ON for Frequency or Speed Reference (60Hz,1770rpm) X 1% = 0.6Hz, 18rpm
3	P13. 1	M1 Locked state Down_Ref	1%	
4	P13. 2	M1 Brake Open Current	10%	Current of Digital Output ON 38.9A X 10% = 3.9A After inputting operating signal, set time should be passed until set time of P13. 5.
5	P13. 3	M1 Start Delay Time	0.3s	Set up for the time that passes until the Brake is completely opened after Digital Output is ON. The speed or frequency reference is maintained for the M1 Open Response Time.
6	P13. 4	M1 Brake Close Speed Set	2%	Frequency of Digital Output OFF & Speed Reference (60Hz,1770rpm) X 2% = 1.2Hz, 36rpm
7	P13. 5	M1 Brake Open Torque Build Time	0.2s	This is delay time until contact point output is turned into 'on', after inputting the operating signal. At this time, output current must be more than set value in P13. 2

< Digital Output Setting for Brake Control Completed!>

8. Parameter

8. Parameter

8.1 Parameter table

Parameter Group 0: Program Control

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P0. 1	Program Boot_Key1 Prog. Key 1		0	[0] Standard I [1] Standard II [2] Standard III	1		
P0. 2	Program Boot_Key2 Prog. Key 2		0	[0] Standard I [1] Standard II [2] Standard III	1		
P0. 3	Program Boot_Key3 Prog. Key 3		0	[0] Standard I [1] Standard II [2] Standard III	1		
P0. 12	Initialization_ Permission_Key ParIni_Key	[hex]	0	0 ~ 39321	1		
P0. 13	Drive Voltage Class Volt_Class		0	[0] 200V / 400V / 500V Class [1] 600V Class	1		
P0. 14	Norminal_Frequency Class Freq_Class		1	[0] 50 Hz Class [1] 60 Hz Class	1		
P0. 15	Thermal_Monitor Class ThermalMon		1	[0] Thermal_State_Relay [1] NTC_Thermistor	1		

Parameter Group 1: Control Setup [Motor 1] *) Default value is different depending model capacity of inverter.

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P1. 0	Rated Power M1_Rtd_Pwr	kW	0	0 ~ 1000	0		
P1. 1	Rated Voltage M1_Rtd_Volt	Vrms	0	0 ~ 1500	0		
P1. 2	Rated Current M1_Rtd_Curr	Arms	0	0 ~ 2000	0		
P1. 3	Rated Frequency M1_Rtd_Freq	Hz	0	0 ~ 3000	0		
P1. 4	Number of Poles M1_Pole	pole	0	0 ~ 24	0		
P1. 5	Rated Speed M1_Rtd_Spd	rpm	1800	0 ~ 60000	0		
P1. 6	Control Method M1_Control		0	[0] V/F Freq_Ctrl [1] V/F Spd_Ctrl [2] S/L Vector_Ctrl [3] Vector_Ctrl [4] PWM Regen_Converter	0		
P1. 7	PWM Frequency M1_PWM_Freq	kHz	2.5	1.2 ~ 10	1		
P1. 9	Supply voltage Supply_Volt	Vrms	0	0 ~ 1500	0		

Parameter Group 2: Control Setup [Motor 2]

*) Default value is different depending model capacity of inverter.

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P2. 0	Rated Power M2_Rtd_Pwr	kW	0	0 ~ 1000	2		
P2. 1	Rated Voltage M2_Rtd_Volt	Vrms	0	0 ~ 1500	2		
P2. 2	Rated Current M2_Rtd_Curr	Arms	0	0 ~ 2000	2		
P2. 3	Rated Frequency M2_Rtd_Freq	Hz	0	0 ~ 3000	2		
P2. 4	Number of Poles M2_Pole	pole	0	0 ~ 24	2		
P2. 5	Rated Speed M2_Rtd_Spd	rpm	0	0 ~ 60000	2		
P2. 6	Control Method M2_Control		0	[0] V/F Freq_Ctrl [1] V/F Spd_Ctrl [2] Vector_Ctrl [3] S/L Vector_Ctrl [4] PWM Regen_Converter	2		
P2. 7	PWM Frequency M2_PWM_Freq	kHz	2.5	0.8 ~ 10	2		
P2. 9	Supply voltage Supply_Volt	Vrms	0	0 ~ 1500	2		

Parameter Group 3: Reference Setup [Motor1]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P3. 0	RUN/STOP Method RUN/STOP		0	[0] Terminal [1] Operator (RS 232C) [2] Synchronous_Ctrl [3] Fieldbus (Profibus,Modbus, CANbus) [4] Free Function Logic	0		
P3. 1	RampFunc_Input_Src Ramp_Input		0	[0] Terminal (Digital, Analog) [1] Operator (RS 232C) [2] Synchronous_Ctrl [3] Free Function	0		
P3. 2	Stop Command Detection Time STOP Detec.	S	0.00	0 ~ 10	0		
P3. 3	STOP Mode STOP Mode		0	[0] Ramp STOP [1] Free-Run STOP [2] Mixed STOP	0		
P3. 4	STOP Hold Time StopHold Tm	s	0.00	0 ~ 300	0		
P3. 5	Output Off Hold Time Out_off Tm	s	1.00	0.1 ~ 30	0		
P3. 6	Mixed-mode STOP Reference Out_off Ref	%	20.0	0 ~ 500	0		
P3. 7	Acc/Dec Ramp Function Acc/Dec_En		1	[0] Disabled [1] Enabled	0		
P3. 8	Acceleration Time Range		0	[0] 0 ~ 300s [1] 0 ~ 3000s	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	AccTm_Range						
P3. 9	Acc Switching Ref 1-2 AccSw 1-2	%	100.0	0 ~ 300	0		
P3. 10	Acc Switching Ref 2-3 AccSw 2-3	%	150	0 ~ 300	0		
P3. 11	Acc Switching Ref 3-4 AccSw 3-4	%	200	0 ~ 300	0		
P3. 12	Acc Switching Ref 4-5 AccSw 4-5	%	225	0 ~ 300	0		
P3. 13	Acc Switching Ref 5-6 AccSw 5-6	%	250	0 ~ 300	0		
P3. 14	Acc Switching Ref 6-7 AccSw 6-7	%	275	0 ~ 300	0		
P3. 15	Acc Switching Ref 7-8 AccSw 7-8	%	300	0 ~ 300	0		
P3. 16	Acc Time I.1 AccTm I.1	s	5	0.01 ~ 300	0		
P3. 17	Acc Time I.2 AccTm I.2	s	5	0.01 ~ 300	0		
P3. 18	Acc Time I.3 AccTm I.3	s	5	0.01 ~ 300	0		
P3. 19	Acc Time I.4 AccTm I.3	s	5	0.01 ~ 300	0		
P3. 20	Acc Time I.5 AccTm I.3	s	5	0.01 ~ 300	0		
P3. 21	Acc Time I.6 AccTm I.3	s	5	0.01 ~ 300	0		
P3. 22	Acc Time I.7 AccTm I.3	s	5	0.01 ~ 300	0		
P3. 23	Acc Time I.8 AccTm I.3	s	5	0.01 ~ 300	0		
P3. 24	Acc Time II Acc_Tm II	s	10	0 ~ 300	0		
P3. 25	Decel Time Range DecTm_Rng		0	[0] 0 ~ 300s [1] 0 ~ 3000s	0		
P3. 26	Dec Switching Ref 1-2 DecSw 1-2	%	100	0 ~ 300	0		
P3. 27	Dec Switching Ref 2-3 DecSw 2-3	%	150	0 ~ 300	0		
P3. 28	Dec Switching Ref 3-4 DecSw 3-4	%	200	0 ~ 300	0		
P3. 29	Dec Switching Ref 4-5 DecSw 4-5	%	225	0 ~ 300	0		
P3. 30	Dec Switching Ref 5-6 DecSw 5-6	%	250	0 ~ 300	0		
P3. 31	Dec Switching Ref 6-7 DecSw 6-7	%	275	0 ~ 300	0		
P3. 32	Dec Switching Ref 7-8 DecSw 7-8	%	300	0 ~ 300	0		
P3. 33	Decel Time I.1 DecTm I.1	s	5	0 ~ 300	0		
P3. 34	Decel Time I.2 DecTm I.2	s	5	0 ~ 300	0		
P3. 35	Decel Time I.3 DecTm I.3	s	5	0.01 ~ 300	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P3. 36	Decel Time I.4 DecTm I.4	s	5	0.01 ~ 300	0		
P3. 37	Decel Time I.5 DecTm I.5	s	5	0.01 ~ 300	0		
P3. 38	Decel Time I.6 DecTm I.6	s	5	0.01 ~ 300	0		
P3. 39	Decel Time I.7 DecTm I.7	s	5	0.01 ~ 300	0		
P3. 40	Decel Time I.8 DecTm I.8	s	5	0.01 ~ 300	0		
P3. 41	Decel Time II Dec_Tm II	s	10	0 ~ 300	0		
P3. 42	Counter Deceleration Ramp Function C_Decel_En		0	[0] Disabled [1] Enabled	0		
P3. 43	Counter Deceleration Time C_Decel_Tm	s	5	0 ~ 300	0		
P3. 49	Emergemcy_STOP MODE ES_Mode		0	[0] Ramp STOP [1] Free-Run STOP [2] Mixed STOP	0		
P3. 50	Emergemcy_STOP Decel_Time ES_DecTime	s	1	0.001 ~ 30	0		
P3. 51	Continuous OP Mode CONTINU_OP		1	[0] Disabled [1] Enabled	0		
P3. 52	Reverse_DIR_ Operation Rev_Dir_EN		1	[0] Disabled [1] Enabled	0		

Parameter Group 4: Reference Setup [Motor 2]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P4. 0	RUN/STOP Method RUN/STOP		0	[0] Terminal [1] Operator (RS 232C) [2] Synchronous_Ctrl [3] Fieldbus (Profibus,Modbus, CANbus) [4] Free Function Logic	2		
P4. 1	RampFunc_Input_Src Ramp_Input		0	[0] Terminal (Digital, Analog) [1] Operator (RS 232C) [2] Synchronous_Ctrl [3] Free Function	2		
P4. 2	Stop Cmd Detection Time STOP Detec.	s	0.00	0 ~ 10	2		
P4. 3	STOP Mode STOP Mode		0	[0] Ramp STOP [1] Free-Run STOP [2] Mixed STOP	2		
P4. 4	STOP Hold-Time StopHold Tm	s	0.00	0 ~ 300	2		
P4. 5	Output OFF Hold-Time Out_off Tm	s	1.00	0.1 ~ 30	2		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P4. 6	Mixed-Mode STOP Reference Out_off Ref	%	20.0	0 ~ 500	2		
P4. 7	Acc/Dec Ramp Enable Acc/Dec_En		1	[0] Disabled [1] Enabled	2		
P4. 8	Accel_Time Range AccTm_Range		0	[0] 0 ~ 300s [1] 0 ~ 3000s	2		
P4. 9	Acc Switching Ref 1-2 AccSw 1-2	%	100.0	0 ~ 300	2		
P4. 10	Acc Switching Ref 2-3 AccSw 2-3	%	150.0	0 ~ 300	2		
P4. 11	Acc Switching Ref 3-4 AccSw 3-4	%	200.0	0 ~ 300	2		
P4. 12	Acc Switching Ref 4-5 AccSw 4-5	%	225.0	0 ~ 300	2		
P4. 13	Acc Switching Ref 5-6 AccSw 5-6	%	250.0	0 ~ 300	2		
P4. 14	Acc Switching Ref 6-7 AccSw 6-7	%	275.0	0 ~ 300	2		
P4. 15	Acc Switching Ref 7-8 AccSw 7-8	%	300.0	0 ~ 300	2		
P4. 16	Acc Time I.1 AccTm I.1	s	5.00	0.01 ~ 300	2		
P4. 17	Acc Time I.2 AccTm I.2	s	5.00	0.01 ~ 300	2		
P4. 18	Acc Time I.3 AccTm I.3	s	5.00	0.01 ~ 300	2		
P4. 19	Acc Time I.4 AccTm I.4	s	5.00	0.01 ~ 300	2		
P4. 20	Acc Time I.5 AccTm I.5	s	5.00	0.01 ~ 300	2		
P4. 21	Acc Time I.6 AccTm I.6	s	5.00	0.01 ~ 300	2		
P4. 22	Acc Time I.7 AccTm I.7	s	5.00	0.01 ~ 300	2		
P4. 23	Acc Time I.8 AccTm I.8	s	5.00	0.01 ~ 300	2		
P4. 24	Acc Time II Acc_Tm II	s	10.00	0.01 ~ 300	2		
P4. 25	Decel Time Range DecTm_Rng		0	[0] 0 ~ 300s [1] 0 ~ 3000s	2		
P4. 26	Dec Switching Ref 1-2 DecSw 1-2	%	100.0	0 ~ 300	2		
P4. 27	Dec Switching Ref 2-3 DecSw 2-3	%	150.0	0 ~ 300	2		
P4. 28	Dec Switching Ref 3-4 DecSw 3-4	%	200.0	0 ~ 300	2		
P4. 29	Dec Switching Ref 4-5 DecSw 4-5	%	225.0	0 ~ 300	2		
P4. 30	Dec Switching Ref 5-6 DecSw 5-6	%	250.0	0 ~ 300	2		
P4. 31	Dec Switching Ref 6-7 DecSw 6-7	%	275.0	0 ~ 300	2		
P4. 32	Dec Switching Ref 7-8 DecSw 7-8	%	300.0	0 ~ 300	2		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P4. 33	Decel Time I.1 DecTm I.1	s	5.00	0.01 ~ 300	2		
P4. 34	Decel Time I.2 DecTm I.2	s	5.00	0.01 ~ 300	2		
P4. 35	Decel Time I.3 DecTm I.3	s	5.00	0.01 ~ 300	2		
P4. 36	Decel Time I.4 DecTm I.4	s	5.00	0.01 ~ 300	2		
P4. 37	Decel Time I.5 DecTm I.5	s	5.00	0.01 ~ 300	2		
P4. 38	Decel Time I.6 DecTm I.6	s	5.00	0.01 ~ 300	2		
P4. 39	Decel Time I.7 DecTm I.7	s	5.00	0.01 ~ 300	2		
P4. 40	Decel Time I.8 DecTm I.8	s	5.00	0.01 ~ 300	2		
P4. 41	Decel Time II Dec_Tm II	s	10.00	0.01 ~ 300	2		
P4. 42	Counter Deceleration Ramp Function C_Decel_En		0	[0] Disabled [1] Enabled	2		
P4. 43	Counter Deceleration Time C_Decel_Tm	s	5.00	0 ~ 300	2		
P4. 49	Emergency_STOP Mode ES_Mode		0	[0] Ramp STOP [1] Free-RUN STOP [2] Mixed STOP	2		
P4. 50	Emergency_STOP Decel_Time ES_DecTime	s	1.00	0.01 ~ 10	2		
P4. 51	Continuous OP_Mode CONTINU_OP		1	[0] Disabled [1] Enabled	2		
P4. 52	Reverse_DIR_ Operation Rev_Dir_EN		1	[0] Disabled [1] Enabled	2		

Parameter Group 5: Protection] *) Default value is different depending model capacity of inverter.

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P5. 0	Current Limit [Motor1] I_Lmt[M1]	%	145.0		1		
P5. 1	Current Limit [Motor2] I_Lmt[M2]	%	130.0		2		
P5. 7	Max. Continuous Current MaxCon_Curr	%	95.0	0 ~ 250	1		
P5. 8	Over-Load current Over_Load	%	135.0	0 ~ 250	1		
P5. 9	Over-Load Time OL_TimeOver	s	60.00	0 ~ 300	1		
P5. 10	Over-Load Fault [Action] OL_Action		0	[0] STOP [1] E_STOP [2] Ctrl_OFF	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
				[3] IGNORE			
P5. 11	Over-Current Trip [motor1] OC_Trip_M1	%	220.0	0 ~ 350	2		
P5. 12	Zero-sequence Current Trip ZC_Trip	%	15.0	0 ~ 100	2		
P5. 13	Over-Voltage Limiting Function OV_Ltd_Fn		0	[0] Disabled [1] Enabled	1		
P5. 14	Over Voltage Limit OV Limit	V	670	0 ~ 850	1		
P5. 15	Over Voltage trip OV Trip	V	780	0 ~ 900	2		
P5. 16	UV compensation _Voltage UV_Comp_Fn		1	[0] Disabled [1] Enabled	1		
P5. 17	UV compensation_ Voltage UV_Comp_V	V	450	0 ~ 1000	1		
P5. 18	Under Voltage Trip UV_Trip	V	360	0 ~ 1000	2		
P5. 19	Open Phase Protection OP_Ph_Trip		1	[0] Disabled [1] Enabled	0		
P5. 20	Supply Frequency Input_Freq	Hz	60.0	0 ~ 100	0		
P5. 21	Built-in Dynamic Brake Blt-in_DB		1	[0] Disabled [1] Enabled_RUN [2] En_RUN_STOP	0		
P5. 23	DB Start DB_Start_V	V	690	300 ~ 850	1		
P5. 24	DB Full Voltage DB_Full_V	V	710.0	300 ~ 850			
P5. 25	Over-Temperature Trip [Action] OT_Action		2	[0] STOP [1] E_STOP [2] CTRL_OFF [3] IGNORE [4] SPEED_DOWN	1		
P5. 30	Auto Restart Count RestartCnt		0	0 ~ 10	1		
P5. 31	Retry Delay Time Retry_Dly	s	1.5	0 ~ 100	1		
P5. 32	Auto Reset (OC) A.Rst_OC		0	[0] Disabled [1] Enabled	1		
P5. 33	Auto Reset (OV) A.Rst_OV		0	[0] Disabled [1] Enabled	1		
P5. 34	Auto Reset (UV) A.Rst_UV		0	[0] Disabled [1] Enabled	1		
P5. 37	Out of Control Auto-Reset A.Rst_CnEr		0	[0] Disabled [1] Enabled	1		
P5. 38	Out of Control Time CntlErr_Tm	s	5.0	0.1 ~ 1000	1		
P5. 39	Out of Control Current	%	90.0	50 ~ 97.5	1		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	Ctrl_Err_I						
P5. 40	Over Temperature Over_Temp	deg	75.0	20 ~ 85			
P5. 41	Over-Current Trip[II] OC_Trip_M2	%	200	0 ~ 800	3		

Parameter Group 6: Analog Input

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P6. 0	Analog Reference Source AI_Ref_Src		1	[0] Disabled [1] AI 1 [2] AI 2	0		
P6. 1	AI.1 Function AI1 Func.		1	[0] Disabled [1] AI	0		
P6. 2	AI.1_Type AI1 Type		0	[0] 0 ~ 10(5)V [1] -10 ~ 10V [2] 4 ~ 20mA [3] 0 ~ 20mA	0		
P6. 4	AI.1 Filter Time Const AI1 Tm_Ct	ms	25	1 ~ 2000	0		
P6. 5	AI.1 Offset AI1 Offset	mA/ mV	0.000	-10 ~ 10	0		
P6. 6	AI.1 min Voltage AI1 Min_V	V	0.00	0 ~ 9	0		
P6. 7	AI.1 min Current AI1 Min_mA	mA	0.00	0 ~ 18	0		
P6. 8	AI.1 Minimum AI1 Min.	%	0.0	0 ~ 500	0		
P6. 9	AI.1 Max Voltage AI1 Max_V	V	10.00	1 ~ 10	0		
P6. 10	AI.1 max Current AI1 Mx_mA	mA	20.00	2 ~ 20	0		
P6. 11	AI.1 Maximum AI1 Max.	%	100.0	0 ~ 500	0		
P6. 12	AI.1 Inversion AI1 Inv.		0	[0] Disabled [1] Enabled	0		
P6. 13	AI.1 Discreteness AI1 D_Step		0	[0] Disabled [1] 128 Steps [2] 64 Steps [3] 32 Steps [4] 16 Steps [5] 8 Steps	0		
P6. 14	AI. 1 Dead-Zone AI1 Dead-Z		0	[0] Disabled [1] Enabled	0		
P6. 15	AI.2 Function AI2 Func.		1	[0] Disabled [1] AI	0		
P6. 16	AI.2 Type AI2 Type		3	[0] 0 ~ 10(5)V [1] -10 ~ 10V [2] 4 ~ 20mA [3] 0 ~ 20mA	0		
P6. 18	AI.2 Filter Time Const AI2 Tm_Ct	ms	25	1 ~ 2000	0		
P6. 19	AI.2 Offset AI2 Offset	mA/ mV	0.000	-10 ~ 10	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P6. 20	AI.2 Min Voltage AI2 Min_V	V	0.00	0 ~ 9	0		
P6. 21	AI.2 Min Current AI2 Min_mA	mA	0.00	0 ~ 18	0		
P6. 22	AI.2 Minimum AI2 Min.	%	0.0	0 ~ 500	0		
P6. 23	AI.2 Max Voltage AI2 Max_V	V	10.00	1 ~ 10	0		
P6. 24	AI.2 Max Current AI2 Mx_mA	mA	20.00	2 ~ 20	0		
P6. 25	AI.2 Maximum AI2 Max.	%	100.0	0 ~ 500	0		
P6. 26	AI.2 Inversion AI2 Inv.		0	[0] Disabled [1] Enabled	0		
P6. 27	AI.2 Discreteness AI2 D_Step		0	[0] Disabled [1] 128 Steps [2] 64 Steps [3] 32 Steps [4] 16 Steps [5] 8 Steps	0		
P6. 28	AI. 2 Dead-Zone AI2 Dead-Z		0	[0] Disabled [1] Enabled	0		
P6. 29	AI.3 Function AI3 Func.		0	[0] Disabled [1] AI	2		
P6. 30	AI.3 Type AI3 Type		0	[0] 0 ~ 10V [1] -10 ~ 10V [2] 4 ~ 20mA [3] 0 ~ 20mA	2		
P6. 32	AI.3 Filter Time Const AI3 Tm_Ct	ms	25	1 ~ 2000	2		
P6. 33	AI.3 Offset AI3 Offset	mA/ mV	0.000	-10 ~ 10	2		
P6. 34	AI.3 Min Voltage AI3 Min_V	V	0.00	0 ~ 9	2		
P6. 35	AI.3 Min Current AI3 Min_mA	mA	0.00	0 ~ 18	2		
P6. 36	AI.3 Minimum AI3 Min.	%	0.0	0 ~ 500	2		
P6. 37	AI.3 Max Voltage AI3 Max_V	V	10.00	1 ~ 10	2		
P6. 38	AI.3 Max Current AI3 Mx_mA	mA	20.00	2 ~ 20	2		
P6. 39	AI.3 Maximum AI3 Max.	%	100.0	0 ~ 500	2		
P6. 40	AI.3 Inversion AI3 Inv.		0	[0] Disabled [1] Enabled	2		
P6. 41	AI.3 Discreteness AI3 D_Step		0	[0] Disabled [1] 128 Steps [2] 64 Steps [3] 32 Steps [4] 16 Steps [5] 8 Steps	2		
P6. 42	AI. 3 Dead-Zone		0	[0] Disabled	2		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	AI3 Dead-Z			[1] Enabled			
P6. 43	AI.4 Function AI4 Func.		0	[0] Disabled [1] AI	2		
P6. 44	AI.4 Type AI4 Type		0	[0] 0 ~10(5)V [1] -10 ~ 10V [2] 4 ~ 20mA [3] 0 ~ 20mA	2		
P6. 46	AI.4 Filter Time Const AI4 Tm_Ct	ms	25	1 ~ 2000	2		
P6. 47	AI.4 Offset AI4 Offset	mA/ mV	0.000	-10 ~ 10	2		
P6. 48	AI.4 Min Voltage AI4 Min_V	V	0.00	0 ~ 9	2		
P6. 49	AI.4 Min Current AI4 Min_mA	mA	0.00	0 ~ 18	2		
P6. 50	AI.4 Minimum AI4 Min.	%	0.0	0 ~ 500	2		
P6. 51	AI.4 Max Voltage AI4 Max_V	V	10.00	1 ~ 10	2		
P6. 52	AI.4 Max Current AI4 Mx_mA	mA	20.00	2 ~ 20	2		
P6. 53	AI.4 Maximum AI4 Max.	%	100.0	0 ~ 500	2		
P6. 54	AI.4 Inversion AI4 Inv.		0	[0] Disabled [1] Enabled	2		
P6. 55	AI.4 Discreteness AI4 D_Step		0	[0] Disabled [1] 128 Steps [2] 64 Steps [3] 32 Steps [4] 16 Steps [5] 8 Steps	2		
P6. 56	AI. 4 Dead-Zone AI4 Dead-Z		0	[0] Disabled [1] Enabled	2		
P6. 57	AI.5 Function AI5 Func.		0	[0] Disabled [1] AI	2		
P6. 58	AI.5 Type AI5 Type		0	[0] 0 ~ 10(5)V [1] -10 ~ 10V [2] 4 ~ 20mA [3] 0 ~ 20mA	2		
P6. 60	AI.5 Filter Time Const AI5 Tm_Ct	ms	25	1 ~ 2000	2		
P6. 61	AI.5 Offset AI5 Offset	mA/ mV	0.000	-10 ~ 10	2		
P6. 62	AI.5 Min Voltage AI5 Min_V	V	0.00	0 ~ 9	2		
P6. 63	AI.5 Min Current AI5 Min_mA	mA	0.00	0 ~ 18	2		
P6. 64	AI.5 Minimum AI5 Min.	%	0.0	0 ~ 500	2		
P6. 65	AI.5 Max Voltage AI5 Max_V	V	10.00	1 ~ 10	2		
P6. 66	AI.5 Max Current AI5 Mx_mA	mA	20.00	2 ~ 20	2		
P6. 67	AI.5 Maximum	%	100.0	0 ~ 500	2		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	AI5 Max.						
P6. 68	AI.5 Inversion AI5 Inv.		0	[0] Disabled [1] Enabled	2		
P6. 69	AI.5 Discreteness AI5 D_Step		0	[0] Disabled [1] 128 Steps [2] 64 Steps [3] 32 Steps [4] 16 Steps [5] 8 Steps	2		
P6. 70	AI.5 Dead-Zone AI5 Dead-Z		0	[0] Disabled [1] Enabled	2		

Parameter Group 7: PID Control

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P7. 0	Control Mode PID Mode		0	[0] Disabled [1] Process PID Control [2] Compensation PID Control [3] Free_Function PID	0		
P7. 1	Reference_Src Ref. Mode		2	[0] Operator(Keypad) [1] Fixed value by parametersetting [2] AI 1 [3] AI 2 [4] Free-Function	0		
P7. 2	Fixed Set-Point Set Value	%	0.0	0 ~ 400	0		
P7. 3	Feedback_Src Feedback		1	[0] AI 1 [1] AI 2 [2] Free Function	0		
P7. 4	Reference Sign Change REF_Sgn_Neg		0	[0] Disabled [1] Enabled	0		
P7. 5	Feedback Sign Change FB_Sng_Neg		0	[0] Disabled [1] Enabled	0		
P7. 6	Control Period (Scan_time) Cntl Period	ms	10	1 ~ 1000	0		
P7. 7	Proportional Gain P-Gain	%	5.0	0 ~ 3000	0		
P7. 8	Integration Time Integ_Time	s	30.00	0 ~ 300	0		
P7. 9	Differentiator Time Constant Diff_Time	ms	0	0 ~ 30000	0		
P7. 10	Feedforward Gain FF-Gain	%	0.0	0 ~ 200	0		
P7. 11	Zero-Shift Factor 1 ZERO_Adj 1	%	100.0	5 ~ 100	0		
P7. 12	Proportional Gain 2 P-Gain 2	%	5.0	0 ~ 1000	0		
P7. 13	Integration Time 2 Int_Time 2	s	30.00	0 ~ 300	0		
P7. 14	Differentiator Time	ms	0	0 ~ 30000	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	Constant 2 Dif_Time 2						
P7. 15	Feed-Forward Gain 2 FF-Gain 2	%	0.0	0 ~ 200	0		
P7. 16	Zero-Shift Factor 2 ZERO_Adj 2	%	100.0	5 ~ 100	0		
P7. 17	Output Inversion Output_INV		0	[0] Disabled [1] Enabled	0		
P7. 18	Integrator Lower Limit Int_Lo_Lmt	%	0.0	-300 ~ 300	0		
P7. 19	Integrator Upper Limit Int_Up_Lmt	%	100.0	-300 ~ 300	0		
P7. 20	Output Lower Limit Out_Lo_Lmt	%	0.0	-300 ~ 300	0		
P7. 21	Output Upper Limit Out_Up_Lmt	%	100.0	-300 ~ 300	0		
P7. 22	Output_Scale Func_Src Out_Scale		0	[0] Null Data (0)	0		
P7. 23	Integrator_Ini_Value Int_St_Val		0	[0] Null Data (0)	0		
P7. 24	AUTO RUN/STOP Auto_RN_ST		0	[0] Disabled [1] Enabled	0		
P7. 25	Auto Stop Delay Time AutoSt_Dly	s	0.0	0 ~ 3000	0		
P7. 26	Auto Start Error Condition AutoSt_Err	%	10.0	0 ~ 50	0		
P7. 27	Set_Pt Func_Src Ref_Fn_Src		0	[0] Null Data (0)	0		
P7. 28	Feedback Func_Src Fbk_Fn_Src		0	[0] Null Data (0)	0		

Parameter Group 8: Digital Input Setup

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P8. 0	Run/Stop Control RUN/STOP		0	[0] 1.FWD / 2.REV [1] 1.RUN / 2.DIR	0		
P8. 1	DI 3 Function DI.3 Func.		0	[0] None [1] Drive ENABLE. [2] MULTI-STEP bit.0 [3] MULTI-STEP bit.1 [4] MULTI-STEP bit.2 [5] MULTI-STEP bit.3 [6] Fault Reset [7] JOG [8] AI_REF_ACTIVE [9] AI_LOCAL/REMOTE [10] Ext Fault A [11] Ext Fault B [12] Motor Sel. [13] MB BRAKE STATE [14] Accel/Decel SWITCHING [15] Ref_Tuning [INC] [16] Ref_Tuning [DEC]	0		
P8. 2	DI 4 Function DI.4 Func.		10				
P8. 3	DI 5 Function DI.5 Func.		6				
P8. 4	DI 6 Function DI.6 Func.		2				
P8. 5	DI 7 Function DI.7 Func.		3				
P8. 6	DI 8 Function DI.8 Func.		4				

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P8. 7	DI 9 Function DI.9 Func.		0	[17] Acc/Dec_Byp [18] PID Cntl_ENABLE [19] AUTO PID MODE [20] PID GAIN Selection [21] PID Integrator_Reset [22] Trq_Ref_Opt_Bypass [23] Torque_Sign [24] Torque_Output_Zero [25] Timer_ RUN Enable [26] Slave_RUN Status [27]Sync_Ctrl_Option_Bypass [28] Flying_Start [29] Disable Profibus	2		
P8. 8	DI 10 Function DI.10 Func.		0				
P8. 9	DI 11 Function DI.11 Func.		0				
P8. 10	DI 12 Function DI.12 Func		0				
P8. 15	Blank Time after M.C. Blank	s	0.50	0.1 ~ 2	0		
P8. 16	Ref. Up/Down Time Ref. UP/DN	s	50.00	1 ~ 30	0		
P8. 17	Flying Start Fly_start		0	[0] Disabled [1] Enable	0		
P8. 18	“RUN” Delay Time RUN_Delay	s	0.00	0 ~ 5	0		
P8. 19	Tmr_RUN Time Tmr_RUN_Time	s	0.00	0 ~ 30	0		

Parameter Group 9: Multi-Step Reference [Motor 1]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P9. 0	JOG Set JOG_Ref	%	20.0	0 ~ 100	0		
P9. 1	Step [1] Set M_Step 1	%	15.0	0 ~ 300	0		
P9. 2	Step [2] Set M_Step 2	%	30.0	0 ~ 300	0		
P9. 3	Step [3] Set M_Step 3	%	50.0	0 ~ 300	0		
P9. 4	Step [4] Set M_Step 4	%	100.0	0 ~ 300	0		
P9. 5	Step [5] Set M_Step 5	%	100.0	0 ~ 300	0		
P9. 6	Step [6] Set M_Step 6	%	100.0	0 ~ 300	0		
P9. 7	Step [7] Set M_Step 7	%	100.0	0 ~ 300	0		
P9. 8	Step [8] Set M_Step 8	%	100.0	0 ~ 300	0		
P9. 9	Step [9] Set M_Step 9	%	100.0	0 ~ 300	0		
P9. 10	Step [10] Set M_Step 10	%	100.0	0 ~ 300	0		
P9. 11	Step [11] Set M_Step 11	%	100.0	0 ~ 300	0		
P9. 12	Step [12] Set M_Step 12	%	100.0	0 ~ 300	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P9. 13	Step [13] Set M_Step 13	%	100.0	0 ~ 300	0		
P9. 14	Step [14] Set M_Step 14	%	100.0	0 ~ 300	0		
P9. 15	Step [15] Set M_Step 15	%	100.0	0 ~ 300	0		
P9. 16	Unit Selecting Unit [%/Hz]		0	[0] Percent [%] [1] Frequency [Hz]	0		

Parameter Group 10: Multi-Step Reference [Motor 2]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P10. 0	JOG Reference JOG_Ref	%	20.0	0 ~ 300	3		
P10. 1	Step [1] Set M_Step 1	%	15.0	0 ~ 300	3		
P10. 2	Step [2] Set M_Step 2	%	30.0	0 ~ 300	3		
P10. 3	Step [3] Set M_Step 3	%	50.0	0 ~ 300	3		
P10. 4	Step [4] Set M_Step 4	%	100.0	0 ~ 300	3		
P10. 5	Step [5] Set M_Step 5	%	100.0	0 ~ 300	3		
P10. 6	Step [6] Set M_Step 6	%	100.0	0 ~ 300	3		
P10. 7	Step [7] Set M_Step 7	%	100.0	0 ~ 300	3		
P10. 8	Step [8] Set M_Step 8	%	100.0	0 ~ 300	3		
P10. 9	Step [9] Set M_Step 9	%	100.0	0 ~ 300	3		
P10. 10	Step [10] Set M_Step 10	%	100.0	0 ~ 300	3		
P10. 11	Step [11] Set M_Step 11	%	100.0	0 ~ 300	3		
P10. 12	Step [12] Set M_Step 12	%	100.0	0 ~ 300	3		
P10. 13	Step [13] Set M_Step 13	%	100.0	0 ~ 300	3		
P10. 14	Step [14] Set M_Step 14	%	100.0	0 ~ 300	3		
P10. 15	Step [15] Set M_Step 15	%	100.0	0 ~ 300	3		
P10. 16	Unit Selection Unit [%/Hz]		0	[0] Percent [%] [1] Frequency [Hz]	0		

Parameter Group 11: Analog Output Configuration

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P11. 0	AO.1 output Selection AO1 Sel		1	[0] Output Frequency [1] Motor Speed [2] Output Current [3] Drive Output Voltage [4] Actual Torque [5] Output Power [6] DC-Link Volt [7] Free_Func Output [8] Trim 0 mA [9] Trim 4 mA [10] Trim 20 mA	0		
P11. 1	AO.1 Type AO1 Type		0	[0] 0 ~ 20mA [1] 4 ~ 20mA	0		
P11. 2	AO.1 Adjustment [0mA] AO1 Tr_0	p·u	0.0530	0 ~ 0.2	0		
P11. 3	AO.1 Adjustment [4mA] AO1 Tr_4	p·u	0.2143	0.15 ~ 0.3	0		
P11. 4	AO.1 Adjustment [20mA] AO1 Tr_20	p·u	0.856	0.5 ~ 1	0		
P11. 5	AO.1 Max_Output AO1 Scale	%	100	0 ~ 300	0		
P11. 6	AO.1 Inversion AO1 Inv.		0	[0] Disabled [1] Enabled	0		

Parameter Group 12: Digital Output Setup

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P12. 0	DO 1 Function DO.1 Func.		2	[0] Disabled/Aux_SW_Ctrl [1] Drive Ready [2] Fault Out [A] [3] Fault Out [B] [4] MOTOR BRAKE [5] RUN/STOP STATUS [6] WARNING STATUS [7] DIRECTION [8] JOG INPUT STATE [9] OV/OC/UV LIMITING FUNCTION [10] Free Function	0		
P12. 1	DO 2 Function DO.2 Func.		5				
P12. 2	DO 3 Function DO.3 Func.		1				
P12. 3	DO 4 Function DO.4 Func.		0		2		
P12. 4	DO 5 Function DO.5 Func.		0				
P12. 5	DO 6 Function DO.6 Func.		0				
P12. 6	DO 7 Function DO.7 Func.		0				
P12. 7	DO 8 Function DO.8 Func.		0				

Parameter Group 13: Motor Brake Control

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P13. 0	M1 Locked State Up_Spd_Set M1_OP_RefU	%	4.0	-100 ~ 100	0		
P13. 1	M1 Locked State Down_Spd_Set M1_OP_RefD	%	0.0	-10 ~ 10	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P13. 2	M1_Brk Open Current M1_OP_Curr	%	25.0	0 ~ 150	0		
P13. 3	M1 START Delay_ Time MB1_OP_Tm	s	0.00	0 ~ 5	0		
P13. 4	M1 Brk_Close Spd_Set M1_CL_Spd	%	1.0	0 ~ 100	0		
P13. 5	M1_Brk_OPEN_Torque_Build_Time B1_Trq_Tm	s	0.2	0 ~ 1	0		
P13. 6	M2 Locked State UP_Spd_Set M2_OP_RefU	%	4.0	-10 ~ 10	3		
P13. 7	M2 Locked State DOWN_Spd_Set M2_OP_RefD	%	0.0	-10 ~ 10	3		
P13. 8	M2 OPEN Current M2_OP_Curr	%	25.0	0 ~ 150	3		
P13. 9	M2 START Delay_ Time MB2_OP_Tm	S	0.00	0 ~ 2	3		
P13. 10	M2_Brk CLOSE Spd_Set M2_CL_Spd	s	1.0	0 ~ 100	3		
P13. 11	M2_Brk_OPEN Torque_Build_Time B2_Trq_Tm	s	0.2	0 ~ 1	3		

Parameter Group 14: Auto Tuning Configuration

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P14. 0	Motor tuning Condition Tuning_Con		1	[0] Free Rotor [1] Locked Rotor	0		
P14. 1	Excitation Slip Frequency Excit_Slip	%	100.0	20 ~ 200	1		
P14. 2	Min. Tuning Speed Tune_Spd_L	rpm	75	-3000 ~ 3000	1		
P14. 3	Max. Tuning Speed Tune_Spd_H	rpm	200	-3000 ~ 3000	1		
P14. 4	High-Freq Excitation Frequency HFI_Freq	%	30	10 ~ 100	0		
P14. 5	High-Freq Excitation Current HFI_Curr	%	75	10 ~ 100	0		
P14. 6	Starting Excitation Current Exc_St Curr	%	75	0 ~ 100	0		
P14. 7	Low Speed Excitation Flux Excit_Flix	%	95	0 ~ 110	0		

Parameter Group 15: V/F Control [Motor 1]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P15. 0	Torque Compensation Torq_Comp		0	[0] Manual Compensation [1] Auto Compensation	0		
P15. 1	Min. output Freqency Min_Freq	Hz	0.0	0 ~ 3000	0		
P15. 2	Max output Frequency Max_Freq	Hz	60.0	0 ~ 3000	0		
P15. 3	Torque Compensation Flux Current FLux_Curr	%	50.0	0 ~ 100	0		
P15. 4	Torque Compensation Time Constant TC_TmConst	ms	500.0	20 ~ 3000	0		
P15. 5	Speed Detection Time Constant Spd_Det_Tm	ms	100.0	20 ~ 3000	0		
P15. 6	VVVF Pattern V/F Curve		0	[0] Linear V/F Curve [1] Square V/F Curve [2] Custom V/F Curve [3] Free Function	0		
P15. 7	Zero Frequency Voltage Zr_Freq_Vt	%	1.5	0 ~ 150	0		
P15. 8	Mid. Frequency Mid_Freq	Hz	6.0	1 ~ 3000	0		
P15. 9	Mid. Frequency Voltage Mid_Volt	%	11.0	0 ~ 100	0		
P15. 10	Max Voltage Frequency Max_V_Frq	%	99.0	0 ~ 300	0		
P15. 11	Max. Output Voltage Max_Volt	%	100.0	0 ~ 150	0		
P15. 12	Max. Voltage Limiter Max_V_Ltd		0	[0] Disabled [1] Enabled	0		
P15. 14	Sq_Crv Voltage Compensation Sq_crv_v	%	25.0	0 ~ 100	0		
P15. 15	DC-Brake Time [START] St_Brk_Tm	s	0.0	0 ~ 30	0		
P15. 16	DC-Brake Blanking Time [START] St_Brk_B	s	0.00	0 ~ 30	0		
P15. 17	DC-Brake Current [START] St_Brk_I	%	75.0	0 ~ 150	0		
P15. 18	DC-Brake Time [STOP] Sp_Brk_Tm	s	0.0	0 ~ 30	0		
P15. 19	DC-Brake Blanking Time [STOP]	s	0.00	0 ~ 30	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	Sp_Brk_B						
P15. 20	DC-Brake Hold_Current [STOP] Stp_Brk_I	%	75.0	0 ~ 150	0		
P15. 21	DC-Brake Starting_Current [STOP] Stp_Brk_f	%	90.0	0 ~ 150	0		
P15. 22	Current Ctrl Proportional-Gain CC P-Gain	%	100.0	0 ~ 1000	0		
P15. 23	Current Ctrl Integral-Gain CC I-Gain	%	100.0	0 ~ 1000	0		
P15. 24	Stabilization Time Constant StbT_Cons	ms	0.8	0.8 ~ 10	0		
P15. 25	Stabilization Gain Stb_Gain	%	10.0	0 ~ 50	0		
P15. 26	Stabilization Limit Stb_Limit	%	0.70	0 ~ 2	0		
P15. 27	High_Speed Unity_Current_Range U_Curr_f	%	300.0	100 ~ 500	0		
P15. 28	Accel_OC_Protection Ctrl_Gain Acc_OC_Gn	%	100	0 ~ 3000	0		

Parameter Group 16: V/F Control [Motor 2]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P16. 0	Torque Compensation Mode Torq_Comp		0	[0] Manual Compensation [1] Auto	3		
P16. 1	Min. Output Freqency Min_Freq	Hz	0.0	0 ~ 3000	3		
P16. 2	Max.Output Frequency Max_Freq	Hz	60.0	0 ~ 3000	3		
P16. 3	Torque Compensation Flux Current FLux_Curr	%	50.0	10 ~ 100	3		
P16. 6	VVVF Pattern V/F Curve		0	[0] Linear V/F Curve [1] Square V/F Curve [2] Custom V/F Curve [3] Free Function	3		
P16. 7	Zero Frequency Voltage Zr_Freq_Vt	%	1.5	0 ~ 150	3		
P16. 8	Mid. Frequency Mid_Freq	%	6.0	1 ~ 3000	3		
P16. 9	Mid. Frequency Voltage Mid_Volt	%	11.0	0 ~ 100	3		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P16. 10	Max Voltage Frequency Max_V_Frq	%	99.0	0 ~ 3000	3		
P16. 11	Max output Voltage Max_Volt	%	100.0	0 ~ 150	3		
P16. 12	Voltage Limiter Max_V_Ltd		0	[0] Disabled [1] Enabled	3		
P16. 14	Sq_Crv Voltage Compensation Sq_crv_v	%	25.0	0 ~ 100	3		
P16. 15	DC-Brake Time [START] St_Brk_Tm	S	0.0	0 ~ 30	3		
P16. 16	DC-Brake Blanking Time [START] St_Brk_B	S	0.00	0 ~ 30	3		
P16. 17	DC-Brake Current [START] St_Brk_I	%	75.0	0 ~ 150	3		
P16. 18	DC-Brake Time [STOP] Sp_Brk_Tm	S	0.0	0 ~ 30	3		
P16. 19	DC-Brake Blanking Time [STOP] Sp_Brk_B	S	0.00	0 ~ 30	3		
P16. 20	DC-Brake Hold_Current [STOP] Stp_Brk_I	%	75.0	0 ~ 150	3		
P16. 21	DC-Brake Starting_Current [STOP] Stp_Brk_f	%	90.0	0 ~ 150	3		
P16. 22	Current Ctrl Proportional-Gain CC P-Gain	%	100.0	0 ~ 1000	4		
P16. 23	Current Ctrl Integral-Gain CC I-Gain	%	100.0	0 ~ 1000	4		
P16. 24	Stabilization Time Constant StbT_Cons	Ms	0.8	0.8 ~ 10	3		
P16. 25	Stabilization Gain Stb_Gain	%	10.0	0 ~ 50	3		
P16. 26	Stabilization Limit Stb_Limit	%	0.7	0 ~ 2	3		
P16. 27	High_Speed Unity_Current_Range U_Curr_f	%	300.0	100 ~ 500	3		
P16. 28	Accel_OC_Protection Ctrl_Gain Acc_OC_Gn	%	100.0	0 ~ 1000	3		

Parameter Group 17: Sensor less Vector Control [Motor 1]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P17. 0	Speed Detection time _constant Spd_Dt_Tm	ms	5.0	5 ~ 20	0		
P17. 1	Min. Speed Min. Speed	rpm	50	0 ~ 30000	0		
P17. 2	Max. Speed Max. Speed	%	100	0 ~ 300	0		
P17. 3	Over Speed Limit OS_Limit	%	125	0 ~ 300	0		
P17. 5	Starting Flux Start_Flux	%	125	50 ~ 140	0		
P17. 6	Base Flux Base Flux	%	100.0	50 ~ 140	0		
P17. 7	Start Flux-END Speed SF_End_Spd	%	5.0	0 ~ 50	0		
P17. 8	Base Flux-START Speed BF_St_Spd	%	25.0	0 ~ 120	0		
P17. 9	Field_ Weakening Voltage FW_Voltage	%	99.00	50 ~ 150	0		
P17. 10	Field_ Weakening Time Constant FW_Tm_Con	ms	10.0	1 ~ 1000	0		
P17. 11	Current Ctrl Proportional-Gain CC P-Gain	%	100.0	0 ~ 1000	0		
P17. 12	Current_Ctrl Integral -Gain CC_I-Gain	%	100.0	0 ~ 1000	0		
P17. 14	Speed_Ctrl PI Gain Spd_Gain		0	[0] Default Setting [1] Result by Auto-Tuning	0		
P17. 15	Load Observer Activation Load_Comp		0	[0] Disabled [1] Enabled	0		
P17. 16	Load Observer Time Constant LC_Tm_Con	ms	100.0	50 ~ 1000	0		
P17. 17	Load Compensation Start Frequency LC_Freq	Hz	0.0	0 ~ 300	0		
P17. 18	Spd_Ctrl Proportional -Gain SC P-Gain	%	100.0	0 ~ 1000	0		
P17. 19	Spd_Ctrl Integral-Gain SC I-Gain	%	100.0	0 ~ 1000	0		
P17. 20	Spd_Ctrl Ref_Weight_ Factor SC Zero_S	%	99.9	10 ~ 99.9	0		
P17. 25	Max_Delta_Lambda_ Coeff		0.05	0 ~ 0.05			

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P17. 26	Max_Delta_Theta_ Coeff		0.05	0 ~ 0.05			
P17. 29	Zero_Spd_Range Integral_Gain_Scale Zr_Hold_G	%	100	0 ~ 500	0		
P17. 30	Zero_Spd_Region [0 ~ Freqeuncy] Zr_Hold_F	Hz	0.0	0 ~ 10	0		
P17. 31	Zero Spd STOP_Holding_Flux Brk_Flux	%	100.0	50 ~ 100	0		
P17. 32	Speed Ctrl Gain Schedule Source SC_G_Adj		0	[0] Disable [1] AI 2 [2] Free Function	0		
P17. 33	Torque Set_Value Source Trq_R_Src		0	[0] Speed_Ctrl_Out [1] AI 2 [2] Operator (Keypad,Laptop) [3] SyncCtrl_CommBus [4] Free Function	0		
P17. 34	Torque Offset Source Trq_Os_Src		0	[0] Disable [1] AI 2 [2] Free Function	0		
P17. 35	Torque Limit Source Trq_L_Src		0	[0] Internal Limit [1] AI 2 [2] SyncCtrl_CommBus [3] Free Function	0		
P17. 36	Speed_Limiting_Ctrl Limit_Src Spd_Limit		1	[0] Max. Speed (Parameter) [1] Ext_Speed Set_Value [2] Free Function	0		
P17. 37	Speed Limit Control Action S_Ltd_Act		0	[0] Trq -> Nullify [1] Spd_Regulation [2] Free Function	0		
P17. 38	Spd_Limiting Ctrl_Offset Spd_Ltd_off	rpm	43	0 ~ 3000	0		
P17. 39	Speed Limiting Control Gain Spd_Ltd_G	%	100	0 ~ 500	0		
P17. 40	Trq_Err Compensation Trq_Comp		0	[0] Disable [1] Enable	0		
P17. 41	Torque Feedback_Src Trq_F_Src		0	[0] AI 2 [1] Free Function	0		
P17. 42	Trq Comp Proportional_Gain TC_P_Gain	%	0	0 ~ 1000	0		
P17. 43	Trq_Comp Err_ Integration_Time TC_I_Time	ms	0	0 ~ 100	0		
P17. 44	Trq_Comp Output _Limit TC_OutLmt	%	0	0 ~ 100	0		
P17. 48	Spd_Accel/Decel		0.0	[0] Disabled	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	Trq_Compensation Inner_Trq						
P17. 49	Inertia_Comp Dfferentiation_Time InerDif_T	ms	100.0	2 ~ 3000	0		

Parameter Group 18: Sensor less Vector Control [Motor 2]

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P18. 0	Speed Detection time constant Spd_Dt_Tm	ms	10.0	5 ~ 20	3		
P18. 1	Min. Speed Min. Speed	rpm	50	0 ~ 30000	3		
P18. 2	Max. Speed Max. Speed	%	100	0 ~ 300	3		
P18. 3	Over-Speed Limit OS_Limit	%	125	0 ~ 300	3		
P18. 5	Starting Flux Start_Flux	%	125	50 ~ 140	3		
P18. 6	Base Flux Base Flux	%	100.0	50 ~ 140	3		
P18. 7	Start Flux END Speed SF_End_Spd	%	5.0	0 ~ 50	3		
P18. 8	Base Flux START Speed BF_St_Spd	%	25.0	0 ~ 120	3		
P18. 9	Field_ Weakening Voltage FW_Voltage	%	99.00	50 ~ 150	3		
P18. 10	Field_Weakening Time_Constant FW_Tm_Con	Ms	10.0	10 ~ 500	3		
P18. 11	Current Ctrl Proportional-Gain CC P-Gain	%	100.0	0 ~ 1000	3		
P18. 12	Current_Ctrl Integral -Gain CC_I-Gain	%	100.0	0 ~ 1000	3		
P18. 14	Speed_Ctrl PI Gain Spd_Gain		0	[0] Default Setting [1] Result by Auto-Tuning	3		
P18. 15	Load Observer Activation Load_Comp		0	[0] Disabled [1] Enabled	3		
P18. 16	Load Observer Time Constant LC_Tm_Con	Ms	100.0	50 ~ 1000	3		
P18. 17	Load Compensation Start Frequency LC_Freq	Hz	0	0 ~ 300	3		
P18. 18	Spd_Ctrl Proportional -Gain SC P-Gain	%	100.0	0 ~ 1000	3		
P18. 19	Spd_Ctrl Integral-Gain	%	100.0	0 ~ 1000	3		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	SC I-Gain						
P18. 20	Spd_Ctrl Ref_Weight_ Factor SC Zero_S	%	99.0	10 ~ 100	3		
P18. 29	Zero_Spd_Range Integral_Gain_Scale Zr_Hold_G	%	100	0 ~ 500	3		
P18. 30	Zero_Spd_Region [0 ~ Freqeuncy] Zr_Hold_F	Hz	0	0 ~ 10	3		
P18. 32	Speed Ctrl Gain Schedule Source SC_G_Adj		0	[0] Disable [1] AI 2 [2] Free Function	3		
P18. 33	Torque Set_Value Source Trq_R_Src		0	[0] Speed_Ctrl_Out [1] AI 2 [2] Operator (Keypad,Laptop) [3] Sync_CommBus [4] Free Function	3		
P18. 34	Torque Offset Source Trq_Os_Src		0	[0] Disable [1] AI 2 [2] Free Function	3		
P18. 35	Torque Limit Source Trq_L_Src		0	[0] Internal Limit [1] AI 2 [2] Sync_CommBus [3] Free Function	3		
P18. 36	Speed_Limiting_Ctrl Limit_Src Spd_Limit		1	[0] Max. Speed (Parameter) [1] Ext_Speed Set_Value [2] Free Function	3		
P18. 37	Speed Limit Control Action S_Ltd_Act		0	[0] Trq -> Nullify [1] Spd_Regulation [2] Free Function	3		
P18. 38	Spd_Limiting Ctrl_Offset Spd_Ltd_off	rpm	43	0 ~ 3000	3		
P18. 39	Speed Limiting Control Gain Spd_Ltd_G		100	0 ~ 500	3		
P18. 40	Trq_Err Compensation Trq_Comp		0	[0] Disable [1] Enable	3		
P18. 41	Torque Feedback_Src Trq_F_Src		0	[0] AI2 [1] Free Function	3		
P18. 42	Trq Comp Proportional_Gain TC_P_Gain	%	0	0 ~ 1000	3		
P18. 43	Trq_Comp Err_ Integration_Time TC_I_Time	ms	0	0 ~ 100	3		
P18. 44	Trq_Comp Output _Limit TC_OutLmt	%	0	0 ~ 100	3		
P18. 48	Spd_Accel/Decel Trq_Compensation Inner_Trq		0	[0] Disabled	3		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P18. 49	Inertia_Comp Differentiation_Time InerDif_T	%	100.0	2 ~ 3000	3		

Parameter Group 19: Vector Control 1

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P19. 0	Number of Encoder Pulses N_PG_Pulse	ppr	1024	0 ~ 3000	0		
P19. 1	Inversion of PG Direction PG_DIR_Inv		0	[0] Disabled [1] Enabled	2		
P19. 2	Speed Detection Time_Constant Spd_Det_tm	ms	3.0	1 ~ 100	0		
P19. 3	Min. Speed Min_Speed	rpm	0	0 ~ 10000	0		
P19. 4	Max. Speed Max_Speed	%	100	0 ~ 300	0		
P19. 5	Over-Speed Limit OS_Limit	%	125	0 ~ 320	0		
P19. 7	Starting Flux Start_Flux	%	105.0	30 ~ 150	0		
P19. 8	Base Flux Base_Flux	%	100.0	30 ~ 150	0		
P19. 9	Start Flux END Speed SF_E_Spd	%	5.0	0 ~ 50	0		
P19. 10	Base Flux START Speed BF_St_Spd	%	25.0	10 ~ 120	0		
P19. 11	Field_Weakening Voltage FW_Volt	%	95.00	50 ~ 120	0		
P19. 12	Flux Profile Time Constant FW_Tm_Con	ms	5	2 ~ 200	0		
P19. 13	Current Ctrl Proportional-Gain CC P-Gain	%	100.0	0 ~ 1000	0		
P19. 14	Current_Ctrl Integral -Gain CC_I-Gain	%	100.0	0 ~ 1000	0		
P19. 15	Current_Ctrl Ref -Weight_Factor CC Zero_S	%	99.9	10 ~ 99.9	0		
P19. 16	Fluxt Ctrl Proportional-Gain FC_P-Gain	%	100.0	0 ~ 1000	0		
P19. 17	Fluxt_Ctrl Integral -Gain FC_I-Gain	%	100.0	0 ~ 1000	0		
P19. 18	Max Field Current MxField_I	%	100.0	20 ~ 150	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P19. 19	Speed_Ctrl PI-Gain Selection Spd_Gain		0	[0] Default Setting [1] Result by Auto-Tuning	0		
P19. 20	Load Observer Activation Load_Comp		0	[0] Disabled [1] Enabled	0		
P19. 21	Load Observer Time Constant LC_Tm_Con	ms	75.0	20 ~ 1000	0		
P19. 22	Spd_Ctrl Proportional -Gain SC P-Gain	%	100.0	0 ~ 1000	0		
P19. 23	Spd_Ctrl Integral-Gain SC I-Gain	%	100.0	0 ~ 1000	0		
P19. 24	Spd_Ctrl Ref_Weight _Factor SC Zero_S	%	99.9	10 ~ 99.9	0		
P19. 25	Speed Ctrl Gain Schedule Src SC_G_Adj		0	[0] Disable [1] AI 2 [2] Free Function	0		
P19. 26	Torque Set_Value Source Trq_R_Src		0	[0] Speed_Ctrl_Out [1] AI 2 [2] Operator (Keypad,Laptop) [3] Sync_CommBus [4] Free Function	0		
P19. 27	Torque Offset Source Trq_Os_Src		0	[0] Disable [1] AI 2 [2] Free Function	0		
P19. 28	Torque Limit Source Trq_L_Src		0	[0] Internal Limit [1] AI 2 [2] Sync_CommBus [3] Free Function	0		
P19. 29	Speed_Limiting_Ctrl Limit_Src Spd_Limit		1	[0] Max. Speed (Parameter) [1] Ext_Speed Set_Value [2] Free Function	0		
P19. 30	Speed Limit Control Action S_Ltd_Act		0	[0] Trq -> Nullify [1] Spd_Regulation [2] Free Function	0		
P19. 31	Spd_Limiting Ctrl_Offset Spd_Ltd_off	rpm	43	0 ~ 3000	0		
P19. 32	Speed Limiting Control Gain Spd_Ltd_G	%	100	0 ~ 500	0		
P19. 33	Trq_Err Compensation Trq_Comp		0	[0] Disabled [1] Enable	0		
P19. 34	Torque Feedback_Src Trq_F_Src		0	[0] AI2 [1] Free Function	0		
P19. 35	Trq Comp Proportional_Gain TC_P_Gain	%	0	0 ~ 1000	0		
P19. 36	Trq_Comp Err_	ms	0	0 ~ 100	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	Integration_Time TC_I_Time						
P19. 37	Trq_Comp Output _Limit TC_OutLmt	%	0	0 ~ 100	0		
P19. 38	Spd_Accel/Decel Trq_Compensation Inner_Trq		0	[0] Disabled [1] Enable	0		
P19. 39	Inertia_Comp Differentiation_Time InerDif_T		100	2 ~ 3000	0		
P19. 40	Rotor Adaptive_Ctrl Adap_Ctrl		0	[0] Disabled [1] Enable	0		
P19. 41	Rotor Adaptive_Ctrl Start_Spd Adpa_Spd	%	100	0 ~ 1000	0		

Parameter Group 20: Vector Control 2

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P20. 0	Number of Encoder Pulses N_PG_Pulse	ppr	1024	100 ~ 3000	3		
P20. 1	Inversion of PG Direction PG_DIR_Inv		0	[0] Disabled [1] Enabled	0		
P20. 2	Speed Detection Time_Constant Spd_Det_tm	ms	3	1 ~ 100	3		
P20. 3	Min. Speed Min_Speed	rpm	0	0 ~ 10000	3		
P20. 4	Max. Speed Max_Speed	%	100	0 ~ 300	3		
P20. 5	Over-Speed Limit OS_Limit	%	125	0 ~ 320	3		
P20. 7	Starting Flux Start_Flux	%	105	30 ~ 150	3		
P20. 8	Base Flux Base_Flux	%	100.0	30 ~ 150	3		
P20. 9	Start Flux END Speed SF_E_Spd	%	5	0 ~ 50	3		
P20. 10	Base Flux START Speed BF_St_Spd	%	25	10 ~ 120	3		
P20. 11	Field_Weakening Voltage FW_Volt	%	95.00	50 ~ 120	3		
P20. 12	Flux Profile Time Constant FW_Tm_Con	ms	5	2 ~ 200	3		
P20. 13	Current Ctrl Proportional-Gain CC P-Gain	%	100.0	0 ~ 1000	3		
P20. 14	Current_Ctrl Integral	%	100.0	0 ~ 1000	3		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	-Gain CC_I-Gain						
P20. 15	Current_Ctrl Ref -Weight_Factor CC Zero_S	%	99.9	10 ~ 99.9	3		
P20. 16	Flux Ctrl Proportional-Gain FC_P-Gain	%	100.0	0 ~ 1000	3		
P20. 17	Flux_Ctrl Integral -Gain FC_I-Gain	%	100.0	0 ~ 1000	3		
P20. 18	Max Field Current MxField_I	%	100	20 ~ 130	3		
P20. 19	Speed_Ctrl PI-Gain Selection Spd_Gain		0	[0] Default Setting [1] Result by Auto-Tuning	3		
P20. 20	Load Observer Activation Load_Comp		0	[0] Disabled [1] Enabled	3		
P20. 21	Load Observer Time Constant LC_Tm_Con	ms	75.0	25 ~ 1000	3		
P20. 22	Spd_Ctrl Proportional -Gain SC P-Gain	%	100	0 ~ 1000	3		
P20. 23	Spd_Ctrl Integral-Gain SC I-Gain	%	100	0 ~ 1000	3		
P20. 24	Spd_Ctrl Ref_Weight _Factor SC Zero_S	%	99.9	10 ~ 99.9	3		
P20. 25	Speed Ctrl Gain Schedule Src SC_G_Adj		0	[0] Disable [1] AI 2 [2] Free Function	0		
P20. 26	Torque Set_Value Source Trq_R_Src		0	[0] Speed_Ctrl_Out [1] AI 2 [2] Operator (Keypad,Laptop) [3] Sync_CommBus [4] Free Function	3		
P20. 27	Torque Offset Source Trq_Os_Src		0	[0] Disable [1] AI 2 [2] Free Function	0		
P20. 28	Torque Limit Source Trq_L_Src		0	[0] Internal Limit [1] AI 2 [2] Sync_CommBus [3] Free Function	3		
P20. 29	Speed_Limiting_Ctrl Limit_Src Spd_Limit		1	[0] Max. Speed (Parameter) [1] Ext_Speed Set_Value [2] Free Function	3		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P20. 30	Speed Limit Control Action S_Ltd_Act		0	[0] Trq -> Nullify [1] Spd_Regulation [2] Free Function	3		
P20. 31	Spd_Limiting Ctrl_Offset Spd_Ltd_off	rpm	43	0 ~ 3000	3		
P20. 32	Speed Limiting Control Gain Spd_Ltd_G	%	100	0 ~ 500	3		
P20. 33	Trq_Err Compensation Trq_Comp		0	[0] Disabled [1] Enable	3		
P20. 34	Torque Feedback_Src Trq_F_Src		0	[0] AI2 [1] Free Function	3		
P20. 35	Trq Comp Proportional_Gain TC_P_Gain	%	0	0 ~ 1000	3		
P20. 36	Trq_Comp Err_ Integration_Time TC_I_Time	ms	0	0 ~ 100	3		
P20. 37	Trq_Comp Output _Limit TC_OutLmt	%	0	0 ~ 100	3		
P20. 38	Spd_Accel/Decel Trq_Compensation Inner_Trq		0	[0] Disabled [1] Enable	3		
P20. 39	Inertia_Comp Differentiation_Time InerDif_T	ms	100	2 ~ 3000	3		
P20. 40	Rotor Adaptive_Ctrl Adap_Ctrl		0	[0] Disabled [1] Enable	3		
P20. 41	Rotor Adaptive_Ctrl Start_Spd Adpa_Spd	%	100	0 ~ 1000	3		

Parameter Group 21: Motor 1 Constant

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P21. 0	Stator Resistance 1 Pri_Res 0	mΩ	0	0 ~ 5000	1		
P21. 1	Stator Resistance 2 Pri_Res 1	mΩ	0	0 ~ 5000	1		
P21. 2	Rotator Resistance Sec_Res	mΩ	0	0 ~ 5000	1		
P21. 3	Stator Inductance Stator_Ind	mH	0	0 ~ 10000	1		
P21. 4	Rotor Inductance Rotor_Ind	mH	0	0 ~ 10000	1		
P21. 5	Leakage Inductance Lkg_Ind	mH	0	0 ~ 1000	1		
P21. 6	Inertia Time Constant (IC) Inertia_Tm	s	0.5	0.01 ~ 300	1		
P21. 7	Iron Loss Compensation Iron_Loss	%	0.0	0 ~ 300	1		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P21. 8	Biscos Damping Bis_Damp	%	0.0	-150 ~ 150	1		

Parameter Group 22: Motor 2 Constant

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P22. 0	Stator Inductance 1 (IC) Pri_Res 0	mΩ	0	0 ~ 5000	2		
P22. 1	Stator Resistance 2 (IC) Pri_Res 1	mΩ	0	0 ~ 5000	2		
P22. 2	Rotor Resistance (IC) Sec_Res	mΩ	0	0 ~ 5000	2		
P22. 3	Stator Inductance (IC) Stator_Ind	mH	0	0 ~ 10000	2		
P22. 4	Rotor Inductance (IC) Rotor_Ind	mH	0	0 ~ 10000	2		
P22. 5	Leakage Inductance (IC) Lkg_Ind	mH	0	0 ~ 10000	2		
P22. 6	Inertia Time Constant (IC) Inertia_Tm	s	0.5	0.01 ~ 300	2		
P22. 7	Iron Loss Compensation Iron_Loss	%	0	0 ~ 300	2		
P22. 8	Biscos Damping efficient Bis_Damp	%	0	-150 ~ 150	2		

Parameter Group 24: Monitor Setup

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
P24. 0	LCD Idle Time Keypad_Idl	min	20	1 ~ 250	0		
P24. 1	LCD Contrast LCD_Ctrst		5	0 ~ 10	0		
P24. 2	Key Repetition Time Key_Rpt_Tm	s	0.5	0 ~ 2	0		
P24. 3	Speed Monitor Method Spd_M_Sel		0	[0] Calculation [1] Pulse Generator	0		
P24. 4	Speed Detection time _Const Spd_Det_Tm	ms	20.0	1 ~ 1000	0		
P24. 5	Monitor Filter_Time _Const Mon_Tm_Con	ms	100.0	1 ~ 1000	0		
P24. 6	Previous_RUN _Direction DIRECTION		0	[0] Forward (Upward) [1] Reverse (Downward)	0		
P24. 7	Previous_Speed Set_Pt Speed_Set	Rpm	0	0 ~ 32000	0		
P24. 8	Previous_Freqeuncy Set_Pt	Hz	0	0 ~ 300	0		

Par. NO	Parameter Name LCD Display	Unit	Default	Range	Access Level	Note	Ref. Page
	Freq_Set						
P24. 9	Previous_Torque Set_Pt Trq_Set	%	0	-300 ~ 300	0		
P24. 10	Previous_PID Set_Pt PID_Ref	%	0	-300 ~ 300	0		
P24. 11	Reactive_I_Set_Pt	%	0	-100 ~ 100			
P24. 12	Default Monitor Item Ini_Mon		0	[0] Motor Speed [1] Output Frequency [2] DC-Bus Voltage [3] Motor Current [4] Motor Voltage [5] Motor Torque [6] Torque_Current [7] Flux_Current [8] Input Power [9] Output Power [10] PID Set_Point [11] PID Feedback [12] PID Error	0		
P24. 13	Left/Right Button Spd_Set [Hz] L/R_Hz	Hz	0.5	0.01 ~ 100	0		
P24. 14	Left/Right Button Spd_Set [rpm] L/R_rpm	rpm	10	1 ~ 2000	0		
P24. 16	RS485 Station ID RS 485_ID		1	0 ~ 63	0		

8.2. Parameter Description

Parameter Access Level description

Level 0: readable / writable
Level 1: readable /not writable (have to be authorized to write)
Level 2-5: not readable /not writable (have to be authorized to read and write)

8.2.0 Parameter Group 0 : Program Control

P0. 1 Program Key1
P0. 2 Program Key2
P0. 3 Program Key3

Select software to use operations. Program Key 1, 2, 3 should have the same software package. After setting up the software, reset the system in Main Menu Page[5](=initialize). Then, the selected software will be applied.
The setting procedure is followed.
Set P0. 1 Program Key 1 → Set P0. 2 Program Key 2 as P0. 1 → P0. 3 Program Key 3 as P0. 1 → Move to Main Menu Page[5] Initialize → Execute the [1]"System Reset". Normally, the software is set up at the factory.

[0] Standard Ⅰ :
※ V/F Frequency Control
This controls the motor output voltage and output frequency.
Refer to P1. 6 and P2. 6 for setting the control mode.
Related Parameters: Parameter Group 1, 2, 15, 16

※ V/F Speed Control
In this control method, the motor speed corresponds to the set value of frequency reference. Refer to the Parameter 1.6 and Parameter 2.6 for setting the control method.
Related Parameters: Parameter Group 1, 2, 15, 16

※ Sensor less Vector Speed Control
In this control method, it controls a motor with no rotation speed feedback of the motor. Magnetic flux and torque current are controlled respectively. This control can be used when there should be enough torque, or there is a sharp fluctuation in load at start-up or low speed. Related Parameter s: Parameter Group 1, 2, 14, 17, 18, 21, 22. And Auto-Tuning is necessary. The related parameters to Auto-Tuning are Parameter Group 1, 2, 14, 21, 22. The parameters in Group 21 or 22 are automatically generated by Auto-Tuning.

[1] Standard Ⅱ :
※ V/F Frequency Control
※ V/F Speed Control
Refer to [0] Standard Ⅰ

※ Vector Speed Control
This control method carries out the high special quality and high accuracy performance in speed control. Magnetic flux and torque current are controlled respectively. This control can be used when there should be enough torque, or there is a sharp fluctuation in load at start-up or low speed.
Related Parameters Group is 1, 2, 14, 19, 20, 21 and 22. And Auto-Tuning is necessary.

The related parameters to Auto-Tuning are Parameter Group 1, 2, 14, 21, 22. The parameters in Group 21 or 22 are automatically generated by Auto-Tuning.

P0. 12 Initialization Permission Key
P0. 13 Drive Voltage Class
[0] 200V / 400V / 500V Class
[1] 600V Class

P0. 14 Nominal Frquency Class
[0] 50Hz Class
[1] 60Hz Class

P0. 15 Thermal Monitor Class
[0] Thermal_State_Relay
[1] NTC_Thermistor

8.2.1 Parameter Group 1 : Control Setup [Motor 1]

P1. 0 Rated Power
Set up the rated power of a motor. Refer to the rating plate on the motor.

P1. 1 Rated Voltage
Set up the rated voltage of a motor. Refer to the rating plate on the motor.

P1. 2 Rated Current
Set up the rated current of a motor. Refer to the rating plate on the motor.

P1. 3 Rated Frequency
Set up the rated frequency of a motor. Refer to the rating plate on the motor.

P1. 4 Number of Poles
Set up number of poles of a motor. Refer to the rating plate on the motor.

P1. 5 Rated Speed
Set up the rated speed of a motor. Refer to the rating plate on the motor.

P1. 6 Control Method
[0] V/F Freq_Ctrl (V/F Frequency Control)
This can be used when Standard I or Standard II is used for Program Key. .
[1] V/F Spd_Ctrl (V/F Speed Control)
This can be used when Standard I or Standard II is used for Program Key.
[2] S/L Vector_Ctrl (Sensorless Vector Speed Control)
This can be used when Standard I is used for Program Key.
[3] Vector_Ctrl (Sensor Vector Speed Control)
This can be used when Standard II is used for Program Key.
[4]PWM Regen_Converter

※ When Standard I is used in P0. 1 ~ P0. 3 Program Keys
One of the following control methods can be selected for a control mode.
[0] V/F Freq (V/F Frequency Control)
[2] S/L Vector(Sensorless Vector Speed Control)

※ When Standard II is used in P0. 1 ~ P0. 3 Program Keys
One of the following control methods can be selected for a control mode.

[0] V/F Freq (V/F Frequency Control)
[1] V/F Speed (V/F Speed Control)
[3] Vector_Ctrl (Sensor Vector Speed Control)

P1. 7 PWM Frequency

Set up the switching frequency for the internal switching part of the inverter. If the switching frequency low, the noise signal from inverter gets reduced and the leakage current gets smaller, but the noise sounds become loud.
If it does not bother with high temperature and noise sound, set the switching frequency low. If this parameter is changed, execute [0] Drive Calibration in Main Menu page [3] Auto Tuning.

P1. 9 Supply Voltage

Set up the amount of 3 phase voltage connected to Inverter.

8.2.2 Parameter Group 2 : Control Setup [Motor 2]

These parameters are used when switching to the other motor (motor 2) from one motor (motor 1). In this case, the two motors usually use the different setup values. In Parameter Group 8, Digital Input Setup, Motor 1 or 2 can be selected by setting the Digital Input Function to [11] Motor Selection. It should be careful to establish the external circuit not to interrupt each other when switching motors.

P2. 0 Rated Power
P2. 1 Rated Voltage
P2. 2 Rated Current
P2. 3 Rated Frequency
P2. 4 Number of Poles
P2. 5 Rated Speed
P2. 6 Control Method
P2. 7 PWM Frequency
P2. 9 Supply Voltage

Refer to the parameter group 1.

8.2.3 Parameter Group 3 : Reference Setup [Motor 1]

These parameters are applied when using Motor 1.

P3. 0 RUN/STOP Method

This selects the input method of Run and Stop signal.

[0] Terminal
Use I/O terminals (DI1, DI2 etc.) for the method of inputting the command signals for operation.
[1] Operator (Keypad, PC)
Use Keypad for the method of inputting the command signals for operation.
[2] Syncrous Communication
[3] Fieldbus (Profibus)
Use serial communication through PC or Profibus for the method of inputting the command signals for operation.
[4] Free Function Logic

P3. 1 Ramp Function Input Mode

Set the method of inputting the speed or frequency reference. The reference is displayed

by frequency [Hz] for V/F Frequency Control and by speed [RPM] for speed control.

[0] Terminal

Command the speed or frequency by I/O terminals. The reference sources are selected from Voltage, current or multi-steps.

[1] Operator

Command the speed or frequency reference by Keypad.

[2] Sync_Comm (Syncrous Communication)

High speed synchronous communication

[3] Free Function

P3. 2 STOP Command Detection Time

The VD inverter executes the stop mode after elapse of the set time in this parameter. Refer to the figure D 3.1

P3. 3 STOP Mode

This figures how the motor decrease the speed of motor after the stop mode is executed. Refer to the figure D 3.1

[0] Ramp Stop

The speed of motor decreases to 0 within the deceleration time

[1] Free-Run Stop

The inverter cuts off the output immediately as soon as the stop mode is executed.

[2] Mixed STOP

This is the mode that is combined Ramp Stop and Free-Run Stop.

On Ramp Stop, if the speed of motor goes down under the reference set by P3. 6, this mode is changed to Free-Run Stop.

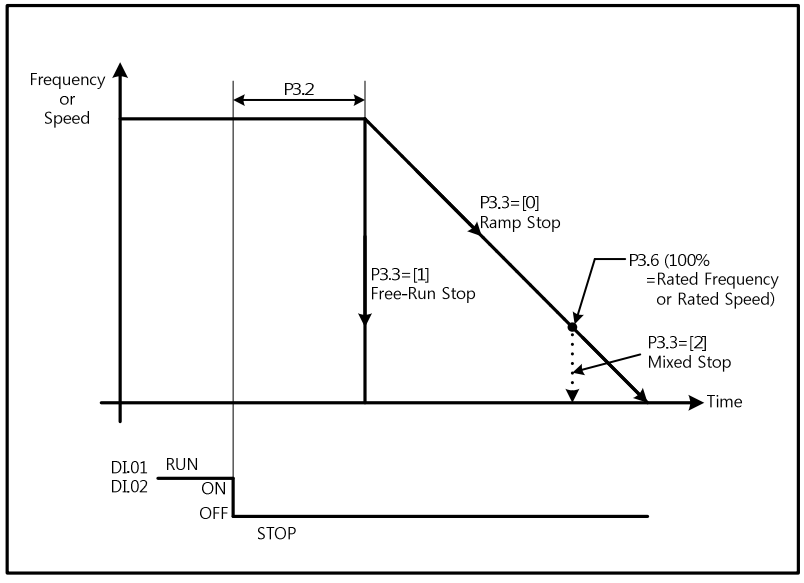


Figure 8.2.1- Inverter Stop Function

P3. 4 STOP Hold Time

The inverter maintains the operation mode for the set time in parameter even though the speed of motor is 0. And when set time is passed out, Inverter is changed to Stop mode.

This function is only applied when P3. 3 Stop mode is set up [0] Ramp STOP. Refer to the Figure 8.2-2

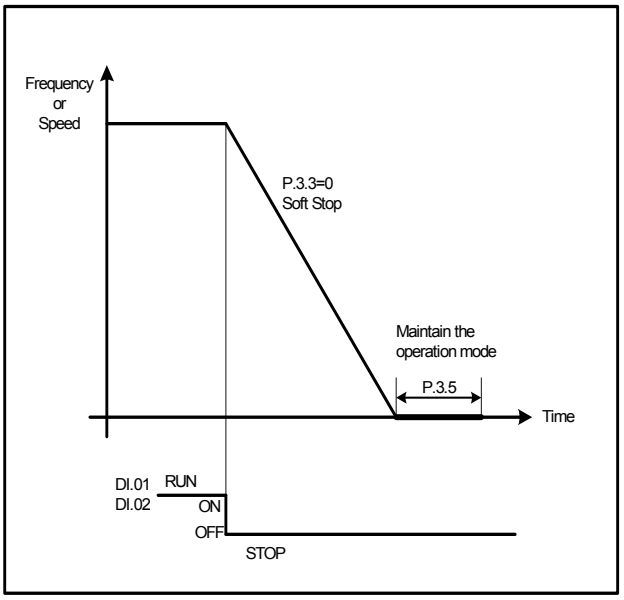


Figure 8.2-2 Stop Hold Time

P3. 5 Output Off Hold Time

This sets the time from the moment that the inverter is stopped until the inverter generates the output again in operation mode. After stopped motor, Inverter doesn't generate output even though the operation signal comes in the Inverter within the time set by parameter.

Refer to the Figure 8.2-3

This function is only applicable Free-Run Stop.

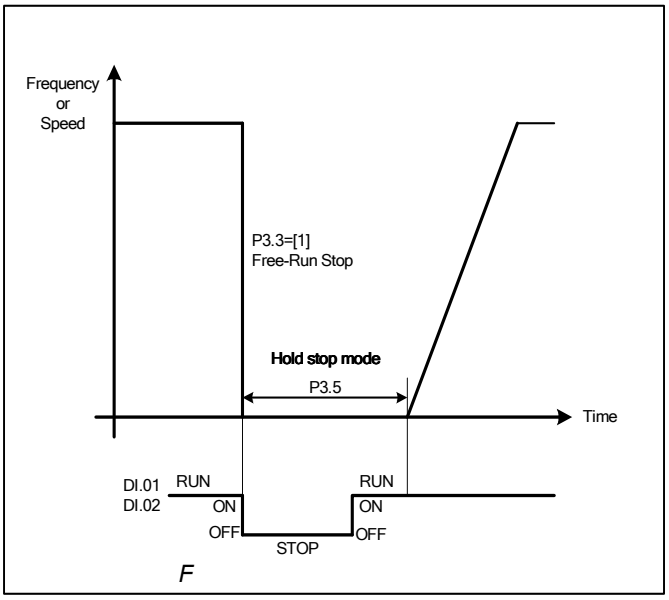


Figure 8.2-3 Output Off Hold Time

P3. 6 Mixed-mode STOP Reference

This sets the speed reference that converts Ramp Stop to Free-Run Stop when the stop mode is the Mixed Stop. Refer to the Figure 8.2-1.

P3. 7 Acc/Dec Ramp Function

[0] Disabled

There is no Acceleration. / Deceleration time.

[1] Enabled

The speed of motor is accelerated or decelerated by the set value of Acceleration / Deceleration time.

P3. 8 Acceleration Time Range

[0] X 1 sec

Use this option when the acceleration time is between 0 and 300 [s].

[1] X 10 sec

Use this option when the acceleration time is over 300 and goes up to 3000 [s]. (The acceleration time should be over 300.)

P3. 9 Acceleration Switch Ref 1-2

This is the frequency or speed reference that determines “acceleration range 1”
Refer to the figure 8.2-4

P3. 10 Acceleration Switch Ref 2-3

This is the frequency or speed reference that determines “acceleration range 2”
Refer to the figure 8.2-4

P3. 11 Acceleration Switch Ref 3-4
P3. 12 Acceleration Switch Ref 4-5
P3. 13 Acceleration Switch Ref 5-6
P3. 14 Acceleration Switch Ref 6-7
P3. 15 Acceleration Switch Ref 7-8

P3. 16 Acceleration Time Ⅰ.1

This is the acceleration time from 0 to P3. 9. (Acceleration range 1)
Refer to the figure 8.2-4.

P3. 17 Acceleration Time Ⅰ.2 (Acceleration range 2 in acceleration section 1)

This is the acceleration time from P3. 9 to P3. 10.
(From Acceleration range 1 to Acceleration range 2)
Refer to the figure 8.2-4

P3. 18 Acceleration Time Ⅰ.3 (Acceleration range 3 in acceleration section 1)

This is the acceleration time from P3.10 to the maximum reference.
(Acceleration range 3) Refer to the figure 8.2-4

P3. 19 Acceleration Time Ⅰ.4 (Acceleration range 2 in acceleration section 1)
P3. 20 Acceleration Time Ⅰ.5 (Acceleration range 2 in acceleration section 1)
P3. 21 Acceleration Time Ⅰ.6 (Acceleration range 2 in acceleration section 1)
P3. 22 Acceleration Time Ⅰ.7 (Acceleration range 2 in acceleration section 1)
P3. 23 Acceleration Time Ⅰ.8 (Acceleration range 2 in acceleration section 1)

Refer to the following figure 8.2-4 for detailed setting instructions.

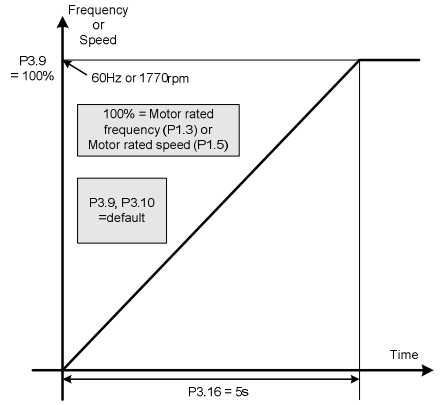
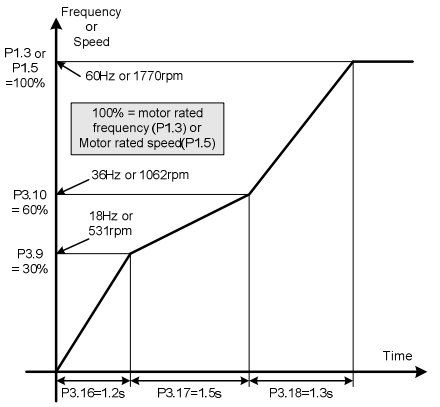
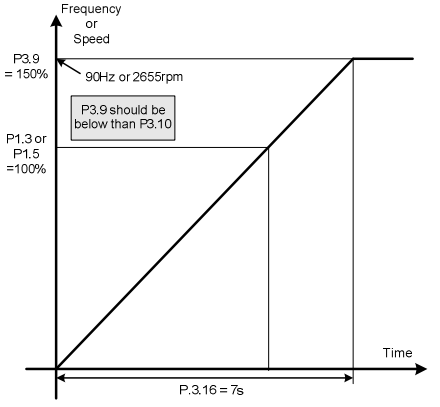
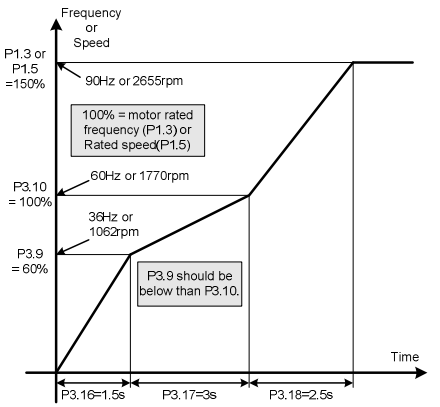
Condition	#Speed or Frequency reference:0 ~ 10V #motor rated frequency or speed : 60Hz, 1770rpm		
Operation Up to the Motor rated Frequency Or Motor rated speed (operation up to 100%)	**When there is Only one range**		P1.3 = 60Hz (motor rated freq.) P1.5=1770rpm (motor rated spd) **P3.9 = 100% (default)** **P3.10 = 200% (default)** **P3.16 = 5s** P3.17, P3.18 = not used P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0 % (AI 1 Min. Scale) P6.9 = 10.00V (AI 1 Max. Volt) P6.11 = 100 % (AI 1 Max. Scale) P15.2 = 60 Hz (Max. Freq.) P17.2 = 1770 rpm (Max. Speed) P19.4 = 1770 rpm (Max. Speed)
	When the operation range is divided.		P1.3 = 60Hz (motor rated freq.) P1.5=1770rpm (motor rated spd) **P3.9 = 30%** **P3.10 = 60%** **P3.16 = 1.2 s** **P3.17 = 1.5s** **P3.18 = 1.3s** P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0 % (AI 1 Min. Scale) P6.9 = 10.00V (AI 1 Max. Volt) P6.11 = 100 % (AI 1 Max. Scale) P15.2 = 60 Hz (Max. Freq.) P17.2 = 1770 rpm (Max. Speed) P19.4 = 1770 rpm (Max. Speed)
Operation over the Motor rated Frequency Or Motor rated speed (Over 100%, Operate 150%)	**When there is Only one range**		P1.3 = 60Hz (motor rated freq.) P1.5=1770rpm (motor rated spd) **P3.9 = 150%** **P3.10 = 200% (default)** **P3.16 = 7 s** P3.17, P3.18 = not used P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0% (AI 1 Min. Scale) P6.9 = 10.00V (AI 1 Max. Volt) **P6.11 = 150% (AI 1 Max. Scale)** **P15.2 = 90 Hz (Max. Freq.)** **P17.2 = 2655 rpm (Max. Speed)** **P19.4 = 2655 rpm (Max. Speed)**
	When the operation range is divided.		P1.3 = 60Hz (motor rated freq.) P1.5=1770rpm (motor rated spd **P3.9 = 60%** **P3.10 = 100%** **P3.16 = 1.5 s** **P3.17 = 3.0 s** **P3.18 = 2.5 s** P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0% (AI 1 Min. Scale) P6.9 = 10.00V (AI 1 Max.Volt) **P6.11 = 150% (AI 1 Max. Scale)** **P15.2 = 90 Hz (Max. Freq.)** **P17.2 = 2655 rpm (Max. Speed)** **P19.4 = 2655 rpm (Max. Speed)**

Figure 8.2-4 setting for Acceleration time and range.

P3. 24 Acceleration Time II

When DI Function is set to [14] Acc./Dec Switching, the value of Acceleration Time II is applied to the Acceleration time from zero speed (or frequency) to the rated speed (or frequency) as DI receives the switching signal.

P3. 25 Deceleration Time Range

[0] X 1sec

Use this option when the deceleration time is between 0 and 300 [s].

[1] X 10 sec

Use this option when the deceleration time is over 300 and goes up to 3000 [s]. (The deceleration time should be over 300.)

P3. 26 Deceleration Switch Ref 1-2

This is the frequency or speed reference that determines “deceleration range 1”
Refer to the figure 8.2-5

P3. 27 Deceleration Switch Ref 2-3

This is the frequency or speed reference that determines “deceleration range 2”
Refer to the figure 8.2-5

P3. 28 Deceleration Switch Ref 3-4
P3. 29 Deceleration Switch Ref 4-5
P3. 30 Deceleration Switch Ref 5-6
P3. 31 Deceleration Switch Ref 6-7
P3. 32 Deceleration Switch Ref 7-8

P3. 33 Deceleration Time Ⅰ.1 (Acceleration range 1 in acceleration section 1)

This is the deceleration time from Max. reference to P3. 27. (Deceleration range 3)
Refer to the figure 8.2-5

P3. 34 Deceleration Time Ⅰ.2 (Acceleration range 2 in acceleration section 1)

This is the deceleration time from P3. 27 to P3. 26. (Deceleration range 2)
Refer to the figure 8.2-5

P3. 35 Deceleration Time Ⅰ.3 (Acceleration range 3 in acceleration section 1)

This is the deceleration time from P3. 26 to 0. (Deceleration range 1)
Refer to the figure 8.2-5

P3. 36 Deceleration Time Ⅰ.4 (Acceleration range 3 in acceleration section 1)
P3. 37 Deceleration Time Ⅰ.5 (Acceleration range 3 in acceleration section 1)
P3. 38 Deceleration Time Ⅰ.6 (Acceleration range 3 in acceleration section 1)
P3. 39 Deceleration Time Ⅰ.7 (Acceleration range 3 in acceleration section 1)
P3. 40 Deceleration Time Ⅰ.8 (Acceleration range 3 in acceleration section 1)

Refer to the following figure 8.2-5 for detailed setting instructions.

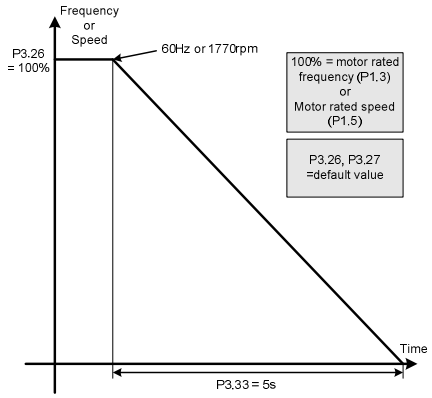
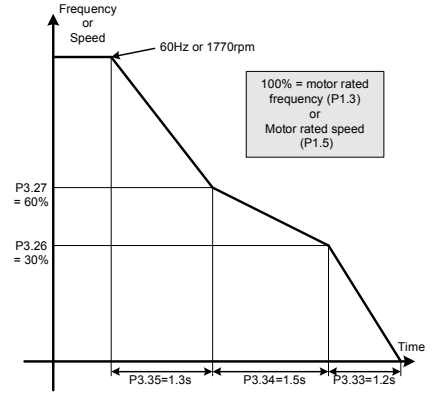
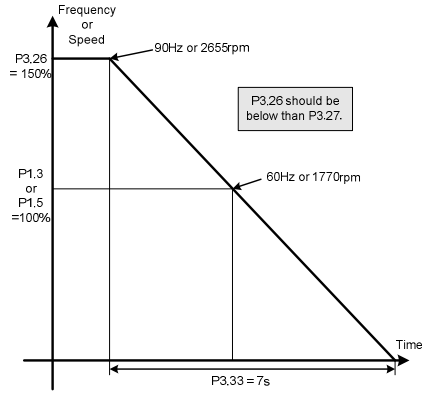
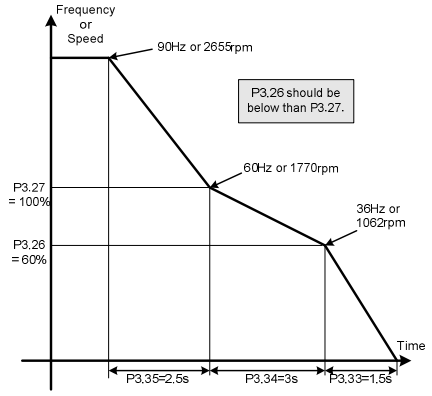
Condition	#Speed or Frequency reference:0 ~ 10V #motor rated frequency or speed : 60Hz, 1770rpm		
Operation Up to the Motor rated Frequency Or Motor rated speed (operation up to 100%)	**When there is Only one range**		P1.3 = 60Hz (motor rated freq.) P1.5 = 1770rpm (motor rated spd) **P3.26 = 100% (default-)** **P3.27 = 200% (default)** **P3.33 = 5s** P3.34, P3.35 = not used P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0 % (AI 1 Min.Scale) P6.9 = 10.00V (AI 1 Max. Volt) P6.11 = 100 % (AI 1 Max.Scale) P15.2 = 60 Hz (Max. Freq.) P17.2 = 1770 rpm (Max. Speed) P19.4 = 1770 rpm (Max. Speed)
	When the operation range is divided.		P1.3 = 60Hz (motor rated freq.) P1.5 = 1770rpm (motor rated spd) **P3.26 = 30%** **P3.27 = 60%** **P3.33 = 1.2 s** **P3.34 = 1.5s** **P3.35 = 1.3s** P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0 % (AI 1 Min.Scale) P6.9 = 10.00V (AI 1 Max. Volt) P6.11 = 100 % (AI 1 Max.Scale) P15.2 = 60 Hz (Max. Freq.) P17.2 = 1770 rpm (Max. Speed) P19.4 = 1770 rpm (Max. Speed)
Operation over the Motor rated Frequency Or Motor rated speed (Over 100%, Operate 150%)	**When there is Only one range**		P1.3 = 60Hz (motor rated freq.) P1.5 = 1770rpm (motor rated spd) **P3.26 = 150%** **P3.27 = 200% (default)** **P3.33 = 7 s** P3.17, P3.18 = not used P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0% (AI 1 Min.Scale) P6.9 = 10.00V (AI 1 Max. Volt) **P6.11 = 150% (AI 1 Max.Scale)** **P15.2 = 90 Hz (Max. Freq.)** **P17.2 = 2655 rpm (Max. Speed)** **P19.4 = 2655 rpm (Max.Speed)**
	When the operation range is divided.		P1.3 = 60Hz (motor rated freq.) P1.5 = 1770rpm (motor rated spd) **P3.26 = 60%** **P3.27 = 100%** **P3.33 = 1.5 s** **P3.34 = 3.0 s** **P3.35 = 2.5 s** P6.6 = 0.00V (AI 1 Min. Volt) P6.8 = 0% (AI 1 Min.Scale) P6.9 = 10.00V (AI 1 Max. Volt) **P6.11 = 150% (AI 1 Max.Scale)** **P15.2 = 90 Hz (Max. Freq.)** **P17.2 = 2655 rpm (Max. Speed)** **P19.4 = 2655 rpm (Max.Speed)**

Figure 8.2-5 setting for Deceleration time and range.

P3. 41 Deceleration Time II

When DI Function is set to [14] Acc./Dec Switching, the value of Deceleration Time II is applied to the Deceleration time from the rated speed (or frequency) to zero speed (or frequency) as DI receives the switching signal.

P3. 42 Counter Deceleration Function

This selects whether the inverter uses the counter deceleration function or not.

P3. 43 Counter Deceleration

This sets the counter deceleration time.

P3. 49 Emergency Stop Mode

When digital input function of parameter group 8 is set to [1] Drive Enable, Emergency Stop Mode stops the motor as Enable signal is removed while the operating. Digital Input Function should be set to [1] Drive Enable.

Refer to the STOP Mode, P3. 3.

[0] Ramp STOP
[1] Free-Run STOP
[2] Mixed STOP

P3. 50 Emergency Stop Deceleration Time

Emergency Stop Mode sets the deceleration time for stopping as Enable signal is removed while the operating. Digital Input Function should be set to [1] Drive Enable.

This is only applied when the stop mode is the Ramp stop mode, P3. 49.

P3. 51 Continuous OP Mode

Select the operation mode.

[0] Disabled

While the inverter is stopping, the inverter runs again after the complete stop even though the inverter gets run signal.

[1] Enabled

While the inverter is stopping, the inverter runs immediately if it gets the run signal.

P3. 52 Reverse Direction Operation

[0] Disabled
[1] Enabled

8.2.4 Parameter Group 4 : Reference Setup [motor 2]

Set up in case that one inverter make two motors work. In parameter group 8 “Digital Input Setup”, available to choose Motor 1 or 2 as setting the function of contact point inputting to [12] Motor Sel..
Install carefully the external circuit not to interrupt each motor while they are working.

P4. 0 RUN/STOP Method
P4. 1 Ramp Function Input Mode
P4. 2 STOP Command Detection Time
P4. 3 STOP Mode
P4. 4 STOP Hold Time
P4. 5 Output Off Hold Time
P4. 6 Mixed mode STOP Reference
P4. 7 Acceleration/Deceleration Enable
P4. 8 Acceleration Time Range
P4. 9 Acceleration Switch Ref 1-2
P4. 10 Acceleration Switch Ref 2-3
P4. 11 Acceleration Switch Ref 3-4
P4. 12 Acceleration Switch Ref 4-5
P4. 13 Acceleration Switch Ref 5-6
P4. 14 Acceleration Switch Ref 6-7
P4. 15 Acceleration Switch Ref 7-8
P4. 16 Acceleration Time Ⅰ.1
P4. 17 Acceleration Time Ⅰ.2
P4. 18 Acceleration Time Ⅰ.3
P4. 19 Acceleration Time Ⅰ.4
P4. 20 Acceleration Time Ⅰ.5
P4. 21 Acceleration Time Ⅰ.6
P4. 22 Acceleration Time Ⅰ.7
P4. 23 Acceleration Time Ⅰ.8
P4. 24 Acceleration Time Ⅱ
P4. 25 Deceleration Time Range
P4. 26 Deceleration Switch Ref 1-2
P4. 27 Deceleration Switch Ref 2-3
P4. 28 Deceleration Switch Ref 3-4
P4. 29 Deceleration Switch Ref 4-5
P4. 30 Deceleration Switch Ref 5-6
P4. 31 Deceleration Switch Ref 6-7
P4. 32 Deceleration Switch Ref 7-8
P4. 33 Deceleration Time Ⅰ.1
P4. 34 Deceleration Time Ⅰ.2
P4. 35 Deceleration Time Ⅰ.3
P4. 36 Deceleration Time Ⅰ.4
P4. 37 Deceleration Time Ⅰ.5
P4. 38 Deceleration Time Ⅰ.6
P4. 39 Deceleration Time Ⅰ.7
P4. 40 Deceleration Time Ⅰ.8
P4. 41 Deceleration Time Ⅱ
P4. 42 Counter Deceleration Function
P4. 43 Counter Deceleration Time
P4. 49 Emergency Stop Mode
P4. 50 Emergency Stop Deceleration Time
P4. 51 Continuous OP Mode
P4. 52 Reverse Direction Operation

Refer to the parameter group 3

8.2.5 Parameter Group 5 : Protection

P5. 0 Current Limit [Motor 1]
P5. 1 Current Limit [Motor 2]

Limit to flow over current that can be caused problems to Inverter or motors. Set up the value of parameter following rated motor current connected to Inverter.
(100% = the set value of rated motor current, P1. 2, P2. 2)

P5. 7 Maximum Continuous Current

Set the maximum current for the possible continuous operation.
(100%= the value of rated motor current, P1. 2, P2. 2) Refer to the figure 8.2-7.

P5. 8 Over-Load Current
P5. 9 Over-Load Time-over

The protection function stars working when output current with the current value set in P5. 8 is exceeded to the time set in P5. 9.
Also, the protection function stars working when the output current is over P5. 7 or under P5. 8 in above the time set in P5. 9. Refer to the figure 8.2-6.

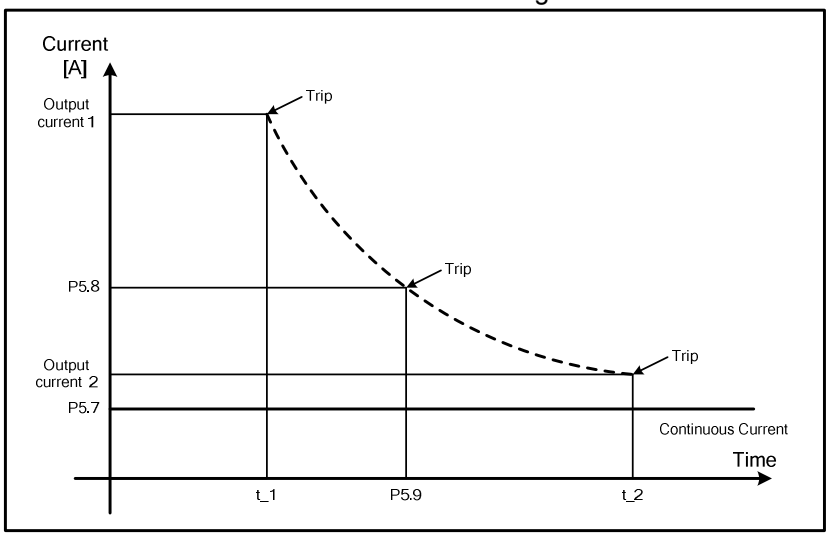


Figure 8.2-6 Set up overload

P5. 10 Over Load Fault [Action]

Select Stop function when Over Load Fault occurs.
[0] Normal Stop : Stopping Inverter in the mode set in P3. 3 or P4. 3.
[1] E-STOP
[2] Ctrl_OFF : when inverter is continuously operated, warning is occurred.
[3] IGNORE

P5. 11 Over Current Trip

The Fault occurs when the output exceeds the Over Current trip level.
(100%= the value of rated motor current, P1. 2, P2. 2)

P5. 12 Zero-sequence Current trip

If the current addition of the three phases is over than the set value, the protection starts working.

P5. 13 Over Voltage Limiting Function

Select whether it uses the Over Voltage Limiting Function or not.
[0] Disable: Not use the over voltage limiting function
[1] Enable: Use the over voltage limiting function

P5. 14 Over Voltage Limit

Set the output voltage that controls the Over Voltage Limiting Function in normal status. This operates as only setting in P5.13=”[1] Enable”. If the Over Voltage Limiting Function is working on deceleration, the deceleration time gets slower than the set value.

P5. 15 Over Voltage Trip

Determine when to start the Over Voltage Function.

P5. 16 Under Voltage Compensation

Determines whether it compensate or not for the Under Voltage case.

[0] Disable : Not use the under voltage compensation function.

[1] Enable : Use the under voltage compensation function.

P5. 17 Under Voltage Compensation Limit

Determine the level of compensation for the Under Voltage case.

This operates as only setting in P5.16=”[1] Enable”.

When DC Link current is under the set value of the parameter, it prevents that the set value of DC Link current is under the set value due to automatically adjusting output frequency or speed.

P5. 18 Under Voltage trip

Fault occurs if the inverter input voltage is below the Under Voltage Trip level.

P5. 19 Open Phase Protection

The inverter generates a fault when the open phase happens.

[0] Disable : Not use the open phase protection function

[1] Enable : Use the open phase protection function

P5. 20 Supply Frequency

The frequency of Input Voltage

P5. 21 Built-in DB(Dynamic Brake)

Select whether using brake chopper or not inside of Inverter. Unless the brake chopper is installed, set up “[0] Disabled”

[0] Disabled

[1] Enabled

[2] Enabled [RUN/STOP]

P5. 23 DB Start

P5. 24 DB Full Voltage

P5. 25 Over-Heating Fault[Action]

Select the Over Heat Function when the fault conditions occur.

[0] STOP: Stopping Inverter in the mode set in P3. 3 or P4. 3.

[1] E-STOP

[2] Ctrl_Off: Stopping Free-Run.

[3] IGNORE: Keeping operation of Inverter – Warning.

[4] SPEED_DOWN

P5. 30 Auto-Restart Count

This is for the case when users want to keep operating even though a protection is still working. After the output is broke, the inverter starts again automatically if the condition

for restarting is qualified. This parameter sets the numbers how many times the inverter allows to restart. Refer to the figure 8.2-8.

P5. 31 Retry Delay Time

This sets the minimum stand-by time until restarting even though cancellation conditions are qualified after a fault occurs. Refer to the figure 8.2-7.

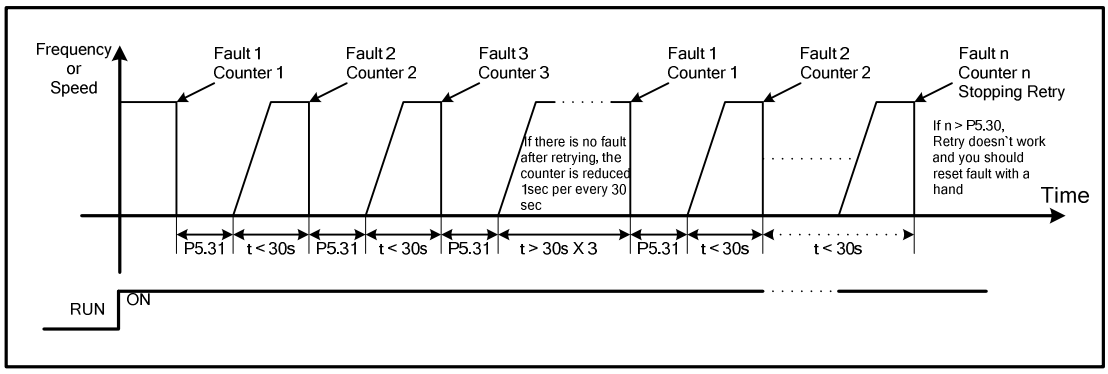


Figure 8.2-7 Auto Retry Function.

P5. 32 Auto Reset (Over Current)

In case that over current protection is working, determines whether the inverter uses the Auto-Reset function

[0] Disabled
[1] Enabled

P5. 33 Auto Reset (Over Voltage)

In case that over voltage fault is working, determines whether the inverter uses the Auto-Reset function

[0] Disabled
[1] Enabled

P5. 34 Auto Reset (Under Voltage)

In case that lower voltage fault is working, determines whether the inverter uses the Auto-Reset function

[0] Disabled
[1] Enabled

P5. 37 Out of Control Auto Reset

In case that out-of-control fault is working, determines whether the inverter uses the Auto-Reset function

P5. 38 Out of Control Time

The inverter gives a fault when the time value of P5. 39 is elapsed in out-of-control status.

P5. 39 Out of Control Current [Motor1]

It is revised the amount of current in the state of out of control of Inverter.

100% of this parameter is the set value of Current Limit in P5. 0 or P5. 1

As an example, when the set value of the rated motor current is 50[A] and the set value of Current Limit is 180%, the current value is (50[A]x180%)x95%=
85.5[A] with setting in P5. 38 as 95% in the state of the out of control of Inverter.

※In case that P1. 6 Control Mode is [0] V/F Freq or [1]V/F Speed.

If the output frequency is fewer than 5% of the rated motor frequency and the output

current is generated over the value set in P5. 38 and these conditions are continued over the set time, Control Disable Fault occurs.

※In case that P1. 6 Control Mode is S/L or Vector Control.

If the standard value of speed and real value of speed have a difference, the output current is generated over the value set in P5. 38 and this condition is continued over the time set in P5. 37, Control Disable Fault occurs.

P5. 40 Over Temperature Trip

If output frequency of inverter exceeds by 45Hz while operating, overheat fault occurs when temperature on the heat sink is evaluated over set value in P5. 40.

If output frequency of inverter is less than 45Hz, the overheated detection temperature of inverter can be changed as output current and output frequency in P5. 40.

P5. 41 Over Current Trip

8.2.6 Parameter Group 6 : Analog Input

P6. 0 Analog Reference Source

This parameter is applied when setting Analog Function= "[1] AI of P6. 1(AI.1), P6. 15(AI.2), P6. 29(AI.3), P6. 43(AI.4), and P6. 57(AI.5).

[0] Disabled

Not use the Analog Input Terminals.

[1] AI 1

When Analog Input Function is set to [1] AI 1 in P6. 1, the order value which is input to analog input terminal is used as operation order signal.

[2] AI 2

When Analog Input Function is set to [1] AI 2 in P6. 1, the order value which is input to analog input terminal is used as operation order signal.

P6. 1 Analog Input 1 Function (Analog Input Function)

Selects the function of AI.1

[0] Disabled

[1] AI 1

P6. 2 Analog Input 1 Type

Select the signal that is connected to AI.1 in analog input terminals.

[0] 0 – 10V

[1] -10 – +10V: The direction of rotation is determined by polarity.

[2] 4 – 20mA

[3] 0 – 20mA

P6. 4 Analog Input 1 Filter Time Constant

Set the filtering time constant of the Analog Input reference. (For AI.1)

P6. 5 Analog Input 1 Offset adjustment

Set the Offset value of the Analog Input reference. (For AI.1)

P6. 6 Analog Input 1 min Voltage
P6. 7 Analog Input 1 min Current
P6. 8 Analog Input 1 Minimum
P6. 9 Analog Input 1 max. Voltage

P6. 10 Analog Input 1 max. Current
P6. 11 Analog Input 1 Maximum

Refer to the Figure 8.2-8.

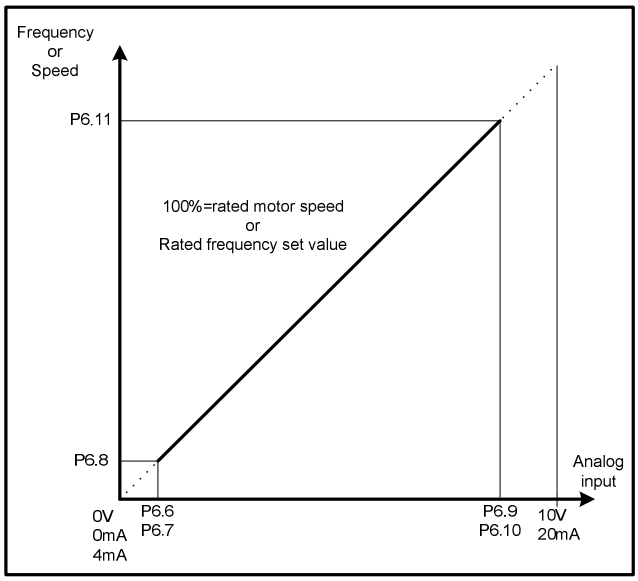


Figure 8.2-8 Setting the Analog Input Scale

P6. 12 Analog Input 1 Inversion

Determine whether the Analog Input reference from AI.1 is inverted or not.

[0] Disabled
[1] Enabled

P6. 13 Analog Input 1 Discreteness

Divide steps up to the maximum frequency, and they have same output in the same steps. Overall, it is non-continuous, but it can have the same output in the same step.

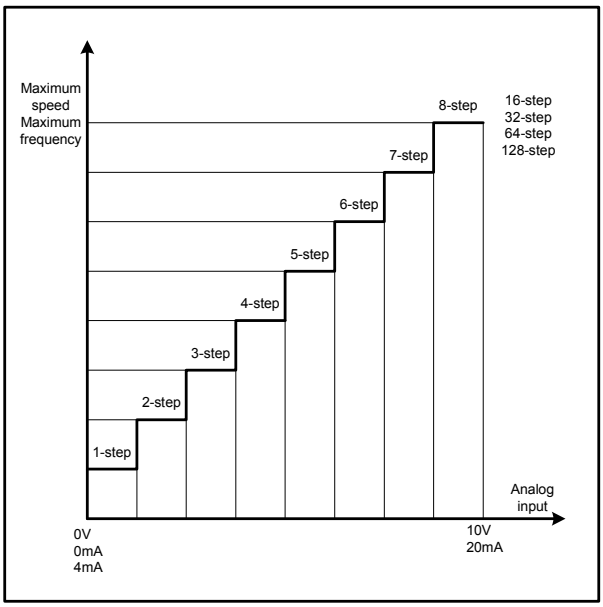


Figure 8.2-9 Setting the Analog Input Step

P6. 14 Analog Input 1 Dead-Zone

This is the zone that the inverter is not operating. If the analog input reference is smaller than the value of P6. 6 or P6. 7, the inverter does not generate the output even though the “RUN” signal comes in. Refer to the figure 8.2-10.

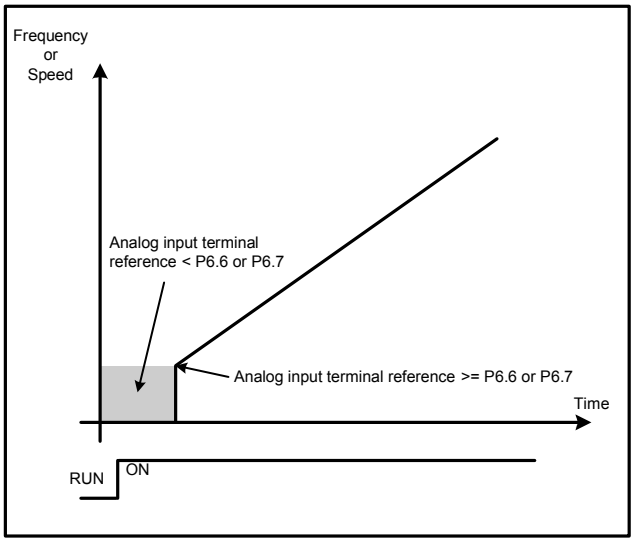


Figure 8.2-10 The Dead-Zone of Analog Input.

P6. 15 Analog Input 2 Function
P6. 16 Analog Input 2 Type
P6. 18 Analog Input 2 Filter Time Const
P6. 19 Analog Input 2 Offset adjustment
P6. 20 Analog Input 2 min Voltage
P6. 21 Analog Input 2 min Current
P6. 22 Analog Input 2 Minimum
P6. 23 Analog Input 2 max. Voltage
P6. 24 Analog Input 2 max. Current
P6. 25 Analog Input 2 Maximum
P6. 26 Analog Input 2 Inversion
P6. 27 Analog Input 2 Discreteness
P6. 28 Analog Input 2 Dead-Zone

Refer to the parameters from P6. 1 to P6. 14

P6. 29 Analog Input 3 Function
P6. 30 Analog Input 3 Type
P6. 32 Analog Input 3 Filter Time Const
P6. 33 Analog Input 3 Offset adjustment
P6. 34 Analog Input 3 min Voltage
P6. 35 Analog Input 3 min Current
P6. 36 Analog Input 3 Minimum
P6. 37 Analog Input 3 max. Voltage
P6. 38 Analog Input 3 max. Current
P6. 39 Analog Input 3 Maximum
P6. 40 Analog Input 3 Inversion
P6. 41 Analog Input 3 Discreteness
P6. 42 Analog Input 3 Dead-Zone

Set the parameters when the option card is installed to your inverter.
Refer to the parameters from P6. 1 to P6. 14

P6. 43 Analog Input 4 Function
P6. 44 Analog Input 4 Type
P6. 46 Analog Input 4 Time Const
P6. 47 Analog Input 4 Offset Adjustment
P6. 48 Analog Input 4 min Voltage

P6. 49 Analog Input 4 min Current
P6. 50 Analog Input 4 Minimum
P6. 51 Analog Input 4 max. Voltage
P6. 52 Analog Input 4 max. Current
P6. 53 Analog Input 4 Maximum
P6. 54 Analog Input 4 Inversion
P6. 55 Analog Input 4 Discreteness
P6. 56 Analog Input 4 Dead-Zone

Set the parameters when the option card is installed to your inverter.
Refer to the parameters from P6. 1 to P6. 14

P6. 57 Analog Input 5 Function
P6. 58 Analog Input 5 Type
P6. 60 Analog Input 5 Filter Time Const
P6. 61 Analog Input 5 Offset Adjustment
P6. 62 Analog Input 5 min Voltage
P6. 63 Analog Input 5 min Current
P6. 64 Analog Input 5 Minimum
P6. 65 Analog Input 5 max. Voltage
P6. 66 Analog Input 5 max. Current
P6. 67 Analog Input 5 Maximum
P6. 68 Analog Input 5 Inversion
P6. 69 Analog Input 5 Discreteness
P6. 70 Analog Input 5 Dead-Zone

Set the parameters when the option card is installed to your inverter.
Refer to the parameters from P6. 1 to P6. 14

8.2.7 Parameter Group 7 : PID Control

PID can control processes by the amount of flowing water, airflow, pressure and etc.
PID Process Controller is added to the outside of speed control loop, so it can realize multi-functions without using separate PID Controller or PLC.

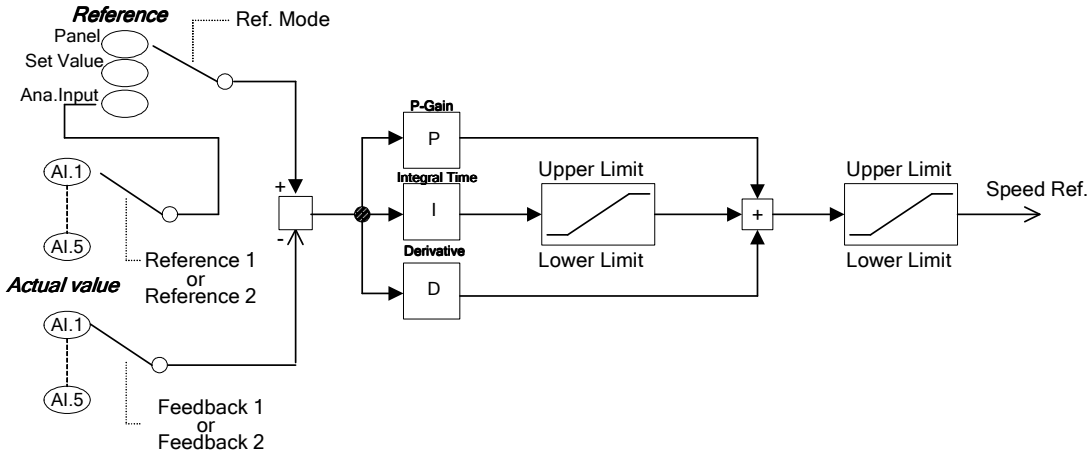


Figure 8.2-11 PID Control.

P7. 0 PID Control Mode

[0] Disabled
NOT use PID Function

[1] Process PID Control
This applies to the systems that are controlled by temperature, pressure, amount of water, height of water, amount of wind and etc. Only forward operation is available in this control mode.

[2] Compensation PID Control

This is a PID Control for general purposes. In this mode, forward and reverse operations are available.

[3] Free-Function PID

P7. 1 Reference Mode

Selects a reference input method when PID operation is used.

[0] Keypad

Set the reference of Process PID Controller by KEYPAD.

The range is from -100% to +100%.

[1] Fixed Value by Parameter Setting

[2] Analog Input Ref1

The reference of Process PID Controller uses the analog input value.

Use "[1] Reference 1(r1) set in the analog input function of the parameter group 6.

[3] Analog Input Ref2

Use "[2] Reference 2(r2) set in the analog input function of the parameter group 6.

[4] Free Function

P7. 2 Fixed Set-Point [Parameter]

The value in [1] of P7. 1

P7. 3 Feedback Mode

Set the Analog input terminals of Feed back.

AI.1 and AI.2 can be selected by user's convenience. The input range is 0-10[V] or 0-20[mA] or 4-20[mA]. A option card is needed to use AI.3 through AI.5.

[0] AI1

Parameter Group 6.0: When [4] Feedback 1 of Analog Input function is set, F1 is only used for Feed back signal.

[1] AI 2

Parameter Group 6.0: When [5] Feedback 2 of Analog Input function is set, F2 is only used for Feed back signal.

[2] Free Function

P7. 4 Reference Sign Change

P7. 5 Feedback Sign Change

Change to opposite sign for reference of PID and feedback signal. (+ → - and - → +)

P7. 6 Control Period

Set the PID control Periods.

P7. 7 Proportional Gain

Set the proportional Gain for the PID Controller.

P7. 8 Integration Time

Set the integration Time for PID Controller.

The integrator is effective to remove the errors for the steady input, but it makes the whole system unstable. To make the system stable, use the Proportion and Integration controller. If a user increases the proportional gain, and decreases the integration time, the response gets faster, but the system is unstable. . If a user decreases the proportional gain, and increases the integration time, the response get slower. This is the time that takes to the 100% output level when there is 100% error between reference and the

actual value.

P7. 9 Differential Time Constant
Set the differential time constant.

P7. 10 Feed-forward Gain
Set the gain that generates proportional output to the setting value.

P7. 11 Zero-Shift Factor 1
This is used to reduce the over shoot in transient response of PID output. If this parameter is 100%, there could be over shoot for the PID Gain. In that case, reduce the value of this parameter to reduce the over shoot.

P7. 12 Proportional Gain 2
P7. 13 Integration Time 2
P7. 14 Differentiator Time Constant 2
P7. 15 Feed-Forward Gain 2
P7. 16 Zero-Shift Factor 2
Refer to the P7. 7 to P7. 11

P7. 17 Output Inversion
This reverses the PID Output.
P7. 18 Integrator Lower Limit
P7. 19 Integrator Upper Limit
Set the lower and upper limit of the integrator.

P7. 20 Output Lower Limit
Set the lower limit of Integrator output and PID Controller output.
Set in percentage (%) of the maximum operating speed.

P7. 21 Output Upper Limit
Set the Upper limit of Integrator output and PID Controller output.
Set in percentage (%) of the maximum operating speed.

P7. 22 Output Scale
Adjust the output scale of the PID output.

P7. 23 Intergrator Ini Value
[0] Speed Set Value
[1] Tourqe Set Value
[2] Tourqe Offset
[3] Tourqe Limit

P7. 24 Auto RUN/STOP
When the Auto Stop Delay time is elapsed with the condition of that PID output is below the Output Lower Limit (P7. 20), the inverter stops automatically.

P7. 25 Auto STOP Delay Time
When output value is kept for the time that is set in P7. 20 under output lower limit (P7. 20), the inverter is automatically stopped.

P7. 26 Auto START Error Condition
When the number of PID errors that is set in P7. 25 “Auto Start Error condition” is occurred, the inverter restarts automatically.

P7. 27 Set Point Function
P7. 28 Feedback Function

8.2.8 Parameter Group 8 : Digital Input (Digital Input)

Refer to the chapter 4 for the location of terminals.

P8. 0 Run/Stop Control

Set the function of DI1 and DI2.

[0] 1. FWD/2. REV

DI 1 → FWD, DI 2 → REV

DI 1 : Run signal & Forward

DI 2 : Run signal & Reverse

The first entering signal will have the priority.

[1] 1. RUN/2. DIR

DI 1 →RUN, DI 2 → DIR

DI 1 : Run signal.

DI 2 : Open – Forward

Close – Reverse

P8. 1 DI 3 Function (Terminal number 9)
P8. 2 DI 4 Function (Terminal number 10)
P8. 3 DI 5 Function (Terminal number 12)
P8. 4 DI 6 Function (Terminal number 13)
P8. 5 DI 7 Function (Terminal number 14)
P8. 6 DI 8 Function (Terminal number 15)

It sets the Functions for Digital Input Terminals.

[0] None

Using the contact point input terminal is prohibited or is not.

[1] Drive En. (Drive Enable)

The signal is used for inverter operation ready.

* The activating of “RUN” signal has to be delayed 15ms after the activating of “Drive Enable” signal.

[2] MultiStep.0

Use the signal for Multi-Step 0.

[3] MultiStep.1

Use the signal for Multi-Step 1.

[4] Multi-Step 2

Use the signal for Multi-Step 2.

[5] Multi-Step 3

Use the signal for Multi-Step 3.

[6] Fault Reset

Use the signal for releasing the faults.

[7] JOG

Use the signal for JOG run

[8] AI_REF_Active

In case of taking the Analog input signal from DI terminal, the Analog input signal is disregarded when the signal [7] is taken in the set terminal.

[9] AI_Loc_REMOTE (AI_Local / Remote)

Use the signal for Local or Remote selection.

[10] Ext. Fault A (External Fault A)

Use the signal for external fault input.

[11] Ext. Fault B (External Fault B)

Use the signal for external fault input.

[12] Motor Sel. (Motor Selection)

Use the signal for motor selection.
Open = Select motor 1
Close = Select motor 2

[13] MB BRAKE STATE
Use the signal for activating the external Magnetic Brake.

[14] Accel/Decel (Acceleration/Deceleration Switching)
Use the signal for selecting the Acc. / Dec. time 1 or 2.

[15] Ref_ Tuning [INC] (Reference Increment)

[16] Ref_ Tuning [DEC] (Reference Decrement)
If a signal enters to the terminal, the reference value is increased or decreased. And then, if there is no signal, the speed is continued. If a signal reenters to the terminal, the reference value is increased or decreased. The speed re-operated after stopped is same speed as before stopped. If the power is turned off and then turned on again, the speed is back the initial reference speed.

[17] Acc/Dec_Byp (Accel/Decel Bypass)
If a signal enters to the terminal, controller ignores the Acc. / Dec. time.

[18] PID Cntl_Enable (PID Control Enable)
This decides whether PID is used or not by the terminal. This option can be used when P7. 0(PID Control Mode) is selected.
If PID is not used, the inverter receives references by the set condition of P3.0 and P3.1

[19]AUTO_PID (AUTO PID Mode)
This is the same as P7.23, and this is set by terminals.

[20]PID_Gain (PID Gain Selection)
If this terminal is activated, The gain constants of P7. 7 ~ P7. 10 are used.
If the terminal is not activated, the gain constants of P7. 12 ~ P7. 15 are used.

[21] RST_PID_INT (PID Integrator Reset)
This makes the output of integrator to zero.

[22] Trq_Ref Opt_Bypass
[23] Torque_Sign
[24] Torque_Output_Zero
[25] Timer_ RUN Enable
[26] Slave_RUN Status
[27] Sync_Ctrl_Option_Bypass
[28] Flying_Start
[29] Disable Profibus

P8. 7 DI 9 Function
P8. 8 DI 10 Function
P8. 9 DI 11 Function
P8. 10 DI 12 Function
P8. 11 DI 13 Function
P8. 12 DI 14 Function
P8. 13 DI 15 Function
P8. 14 DI 16 Function
This is only used as installing option board. Refer to P8. 1 ~ P8. 6.

P8. 15 Blank Time after Motor change
This is a waiting time when the motor is changed from Motor 1 to Motor 2 or from Motor 2 to Motor 1 by the terminal function of [12] Motor Selection.

P8. 16 Ref. Up/Down Time
This is the Acc. / Dec. time for the terminal function of [15] Reference Increment and [16]

Reference decrement.

P8. 17 Start Delayed JOG Detection

Set up the time that is delayed to recognize the JOG signal to run the Inverter. After recognizing JOG signal, the operation is delayed as set time.

P8. 18 "RUN" Delay Time

Set up he time that is delayed to recognize the RUN signal to run the Inverter.
After recognizing RUN signal, the operation is delayed as set time.

P8. 19 Tmr_RUN Time

8.2.9 Parameter Group 9 : Multi-Step Reference [Motor 1]

These parameters set the multi-step speed and jogging speed for Motor 1.

P9. 0 JOG Reference

Set the Jogging reference in percentage of the motor rated speed.

P9. 1 ~ P9. 15 : Multi Step.1 Ref ~ Multi Step.15 Ref

These parameters are used for the speed reference when the multi-step operation is used. If P9. 16 is [0]Hz, set the demanded frequency as each step.
If P9. 16 is [1]%, set the percentage(%) for the rated motor speed(frequency).
If there is no any multi-stage speed signal, the motor is operated with the reference of the analog or the minimum speed

STEP / INPUT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mult Step 0	ON	X	ON	X	ON	X	ON	X	ON	X	ON	X	ON	X	ON
Mult Step 1	X	ON	ON	X	X	ON	ON	X	X	ON	ON	X	X	ON	ON
Mult Step 2	X	X	X	ON	ON	ON	ON	X	X	X	X	ON	ON	ON	ON
Mult Step 3	X	X	X	X	X	X	X	ON	ON	ON	ON	ON	ON	ON	ON

P9. 16 Unit Selection
[0] Percent [%]
[1] Frequency [Hz]

8.2.10 Parameter Group 10 : Multi-Step Reference [Motor 2]

Set in case of operating two motors with one Inverter. Select Motor 1 or 2 with setting the contact function to "[12] Motor Sel." in Group 8 "Digital Input Setup".
Install carefully external circuit to prevent that Motor 1 and 2 are not interrupted each other.

P10. 0 JOG Reference
P10. 1 ~ P10. 15 : Multi Step.1 Ref ~ Multi Step.7 Ref
P10. 16 Unit Selection

Refer to the parameter group 9.

8.2.11 Parameter Group 11 : Analog Output Configuration

These parameters are related to Analog Output.

P11. 0 Analog Output 1 selection

Select the range of output signal from Analog output 1 terminal. (Terminal number 17 and

18)
[0] Frequency (Output Frequency)
[1] Motor Speed
[2] Output Current (Motor Current)
[3] Drive Output Voltage
[4] Torque (Actual Torque)
[5] Power Out (Output Power)
[6] DC_L Volt (DC_Link Voltage)
[7] Free_Func Output
[8] Trim 0 mA
[9] Trim 4 mA
[10] Trim 20 mA

P11. 1 Analog Output 1 Type
Select the range of output signal from Analog output 1 terminal.
[0] 0 ~ 20mA
[1] 4 ~ 20mA

P11. 2 Analog Output 1 Adjustment 0 mA
First set P11. 0 to [7] Trim 0mA, and then, adjust the value of this parameter until the output current becomes 0mA. This is for fine tuning.

P11. 3 Analog Output 1 Adjustment 4 mA
First set P11. 0 to [8] Trim 4mA, and then, adjust the value of this parameter until the output current becomes 4mA. This is for fine tuning.

P11. 4 Analog Output 1 Adjustment 20 mA
First set P11. 0 to [9] Trim 20mA, and then, adjust the value of this parameter until the output current becomes 20mA. This is for fine tuning.

P11. 5 Analog Output 1 Output at 20mA
Set the value of Analog output selection of P11. 0 when the analog output is 20mA.
[0] Output Frequency = 100% = P1. 3
[1] Motor Speed = 100% = P1. 5
[2] Motor Current = 100% = P1. 2
[3] Motor Voltage = 100% = P1. 1
[4] Torque
[5] Power Output = 100% = P1. 0
[6] DC Link Voltage

P11. 6 Analog Output 1 Inversion
[0] Disabled
[1] Enabled

Use only when a option board is installed. This is about parameter related to analog output 2, 3 (AO2, AO3). Refer to P11. 0 to P11. 6

8.2.12 Parameter Group 12 : Digital Output

P12. 0 DO 1 Function
P12. 1 DO 2 Function
P12. 2 DO 3 Function
Select the Function of Digital Output.

[0] Disabled / Aux_SW_Ctrl
Not use the Digital Output Function.
[1] Drive Ready

It is activated when the inverter operation is ready.
[2] Fault Out [A]
It is activated when a fault occurs. (A – Contact)
[3] Fault Out [B]
It is activated when a fault occurs. (B – Contact)
[4] DM_Brake (Motor Brake)
If the conditions of Brake control of Motor 1 meet the requirements, it is activated or inactivated.
[5] RUN / STOP STATUS
It is activated when inverter is operating.
[6] WARNING (Warning Status)
It is activated when a warning occurs.
[7] Direction
It is activated when reverse signal enters.
[8] JOG State (Jog Input State)
It is activated when Jogging signal enters.
[9] OV/OC/UV Limit (OV/OC/UV Limiting Function)
It is activated when Over Voltage limiting function or Over Current limiting Function is running.
[10] Free Function

P12. 3 DO 4 Function
P12. 4 DO 5 Function
P12. 5 DO 6 Function
P12. 6 DO 7 Function
P12. 7 DO 8 Function
Refer to P12. 0 ~ P12. 2
Option Board is needed to use these extra terminals.

8.2.13 Parameter Group 13 : Motor Brake Control

Set up the condition for controlling a brake, when the brake is installed to a motor.
Use the contact output terminal set in "[4] Motor Brake" in the contact output function of the parameter 12.

P13. 0 M1 Locked State UP_ Reference
P13. 1 M1 Locked State DOWN_Reference
P13. 2 M1 Brake OPEN Current
P13. 3 M1 Start Delay Time
P13. 4 M1 Brake Close Speed Set
P13. 5 M1 Brake Open Torque Build Time
- Output Speed (Frequency) > P13. 0(forward), P13. 1(reverse)
- Output Current > P13. 2
- Taking time after inputting RUN signal > P13. 5

It is the taking time of which a brake is physically opened completely after entering a signal that opens the brake. Apply an approximate value because this value is not correct in general.
If an output speed (frequency) is below the set value of this parameter, the contact output signal for controlling the brake is off, and it lets the brake be closed.

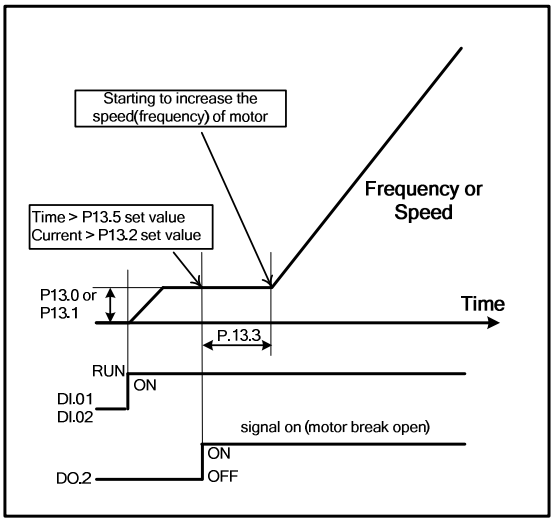


Figure 8.2-12 Motor Brake On-signal

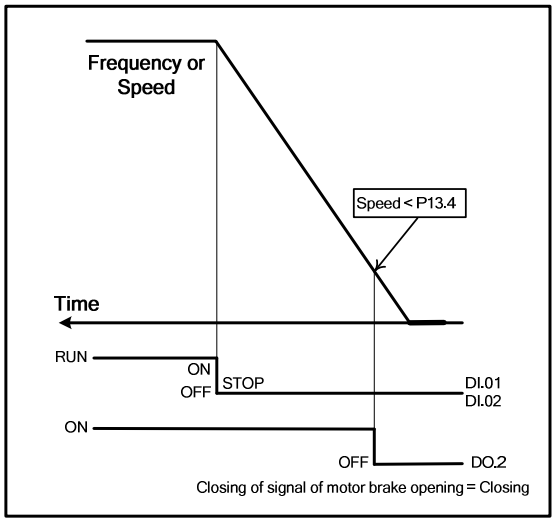


Figure 8.2-13 Motor Brake Off-signal

P13. 6 M2 Locked State UP_ Reference
P13. 7 M2 Locked State DOWN_Reference
P13. 8 M2 Brake OPEN Current
P13. 9 M2 Start Delay Time
P13. 10 M2 Brake Close Speed Set
P13. 11 M2 Brake Open Torque Build Time

It is the parameter when motor 2 is applied. Refer to P13. 0 ~ P13. 4

8.2.14 Parameter Group 14 : Auto Tuning Configuration

It is the parameter that sets necessary details for Auto Tuning.

P14. 0 Motor tuning Condition

It is a precondition for auto tuning a motor.

[1] Free Rotor: In the state that the motor has no any load or motor is available to open.

[2] Locked Rotor: In the state that the motor has a load or motor is unavailable to open.

P14. 1 Excitation Slip Frequency

Set up a slip frequency for motor tuning while the motor is stalled. Mark this with the percentage of a rated slip frequency.

P14. 2 Min. Tuning Speed

Set up the minimum tuning speed in case of operating Speed Tuning

P14. 3 Max. Tuning Speed

Set up the maximum tuning speed in case of operating Speed Tuning

P14. 4 High Frequency Excitation Frequency
P14. 5 High Frequency Excitation Current
P14. 6 Starting Excitation Current
P14. 7 Low Speed Excitation Flux

8.2.15 Parameter Group 15 : V/F Control [Motor 1]

These are the V/F Control parameters for Motor 1

P15. 0 Torque Compensation

When V/F Control is used, generating torque could be weak. This parameter sets up the Torque Compensation Method to in low frequency range for Motor 1.

[0] Manual

Manual Torque compensation selection

The output voltage is generated for compensation depending on the following parameters: P15. 6, P15. 7, P15. 8, P15. 9, P15. 10, and P15. 11

[1] Auto

Automatic Torque Compensation selection (Recommended)

The output voltage for compensating torque is generated automatically depending on the load. In this case, only excitation current is generated. The output current is increased if the load is increased. The parameters that are related to the Manual torque compensation would be ignored excepting P15. 11 Maximum output voltage.

P15. 1 Min. Output Frequency

Set the minimum operating frequency

P15. 2 Max. Output Frequency

Set the maximum operating frequency

P15. 3 Torque Compensation Flux Current

Set up the Flux Current at DC(0 Hz) if P1. 6=[1] V/F Speed Control or P15. 0=[1] Auto Compensation is used

P15. 4 Torque Compensation Time Const

Sets up the Torque compensation time constant if P1. 6=[1] V/F Speed Control or P15. 0=[1] Auto Compensation is used

P15. 5 Speed Detection Time Constant

Sets up the time constant for detecting a motor speed if P1. 6=[1] V/F Speed Control is used.

P15. 6 V/F Pattern

Set up the output voltage curve for the inverter output frequency

[0] Linear V/F Curve

It is used for the application of a constant torque. The inverter output voltage, from the speed of zero to the field weakening point, changes in proportion to the output frequency. Refer to the Figure 8.2-14.

[1] Square V/F Curve

The output voltage, from the speed of zero to the field weakening point, changes into a square-law reduced curve for the output frequency. It is used for the square-law reduced load like a fan or pump and etc. Refer to the Figure 8.2-14.

[2] Custom V/F Curve

The user's random curve can make a V/F curve appointing three points by user's own desire. Refer to the Figure 8.2-14.

[3] Free Function

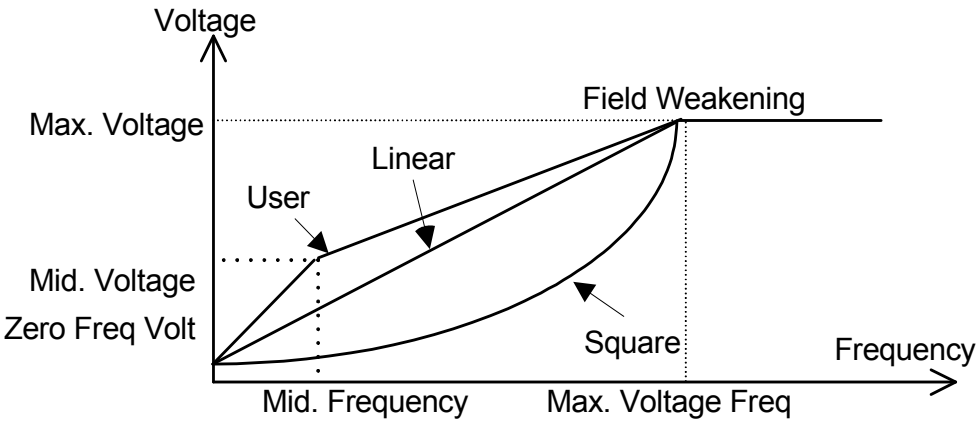


Figure 8.2-14 V/F Pattern

P15. 7 Zero Frequency Voltage

Set up the output voltage at 0 Hz.

You can use it only when a manual torque compensation (P15. 0 = [0]) or the V/F Frequency Control mode (P1. 6 = [0]).

P15. 8 Mid Frequency

Set up the mid-point frequency when using a user's random curve

You can use it only when a manual torque compensation (P15. 0 = [0]) or the V/F Frequency Control mode (P1. 6 = [0]).

P15. 9 Mid Frequency Voltage

Set up the output voltage at the mid point frequency when using the user's random curve. You can use it only when a manual torque compensation (P15. 0 = [0]) or the V/F Frequency Control mode (P1. 6 = [0]).

P15. 10 Max Voltage Frequency

Set up the frequency of which the maximum voltage is generated.

You can use it only when a manual torque compensation (P15. 0 = [0]) or the V/F Frequency Control mode (P1. 6 = [0]).

P15. 11 Max Output Voltage

Set up the inverter output voltage in a frequency range of field weakening operation.

You can use it only when a manual torque compensation (P15. 0 = [0]) or the V/F Frequency Control mode (P1. 6 = [0]).

P15. 12 Voltage Limiter

If this is disabled,

If this is enabled, the output voltage is limited by the value of P15. 11

[0] Disable

The output voltage can be generated as long as the output voltage allows the input voltage. Limit is eliminated.

[1] Enable

The output voltage does not generate output more than the value set in P15. 11 Max Output Voltage.

P15. 14 Square Curve Voltage Compensation

Compensate the output voltage to the percentage of the rated voltage on decelerating.

P15. 15 Start DC Brake [Time]

Set up the time that generates braking current when starting

When this parameter is set to 0, there will be no braking current when starting.

P15. 16 Start DC Brake [Blank time]

Set up the acceleration time of braking current when starting.

In case that there is braking current during the high-speed rotation, inverter can generate the excitation current without an inverter trip for the set time.

P15. 17 Start DC Brake Current [START]

Set up the amount of braking current to output when starting. (100% = P1. 2)

P15. 18 Stop DC Brake Time [STOP]

Set up the time that generates the braking current when stopping.

The set time is the sum total of 1 sec. for DC brake starting and time for DC brake hold.

If the time sets less than 1 sec, only P15. 21 occurs.

There will be no braking current if this is set to 0.

P15. 19 Stop DC Brake Blanking Time [STOP]

Set up the acceleration time of the braking current when stopping

In case that the braking current is generated during the high-speed rotation, inverter can generate the excitation current without an inverter trip during the set time.

P15. 20 Stop DC Brake Hold Current [STOP]

DC brake current occurs and set up the amount of DC braking current to output when stopping in P15. 21.

P15. 21 Stop DC Brake Starting Current [STOP]

Set up the amount of the DC braking current when stopping. (100% = P1. 2)

Occur for 1 second after the speed(frequence) order value of inverter is zero.

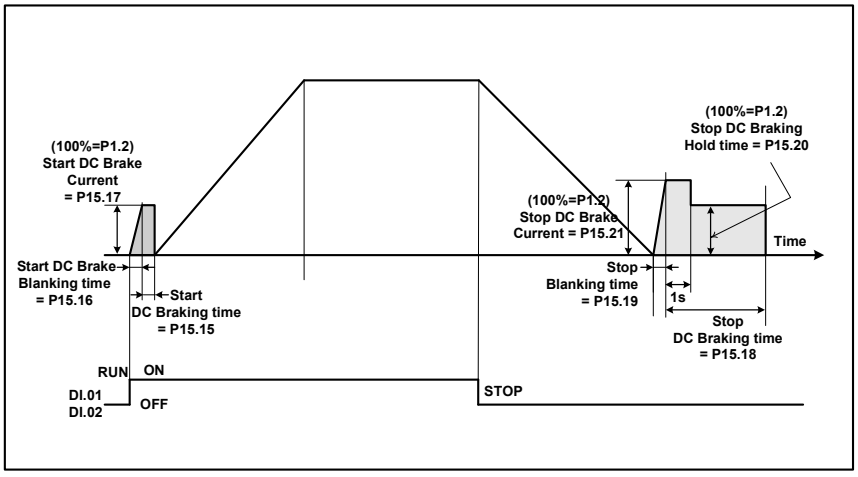


Figure 8.2-15 Set up DC Brake

P15. 22 CC Proportional-Gain

Set up the Proportional Gain that is used for the current controller.

P15. 23 CC Integral-Gain Scale

Set up the Integral Gain that is used for the current controller.

P15. 24 Stabilization Time Const

Set up the stabilization time constant for the stabilization controller.
The stabilization controller can reduce the resonance of motor or other unstable problems, which is automatically detected by the stabilization controller.

P15. 25 Stabilization Gain

Set up the Gain of the stabilization controller

P15. 26 Stabilization Limit

This sets the upper limit of control output for the stabilization controller. If the resonance of motor or other unstable problems is not reduced, increase this value to remove the problems.

P15. 27 Unity Current Range: Freq

Set up the frequency of which the current controller starts to change in the range of filed weakening operation. It is set automatically if you operate the auto-tuning function. This is used when the operation is in high speed over the rated frequency, and this parameter is for controlling smooth current in high speed range.

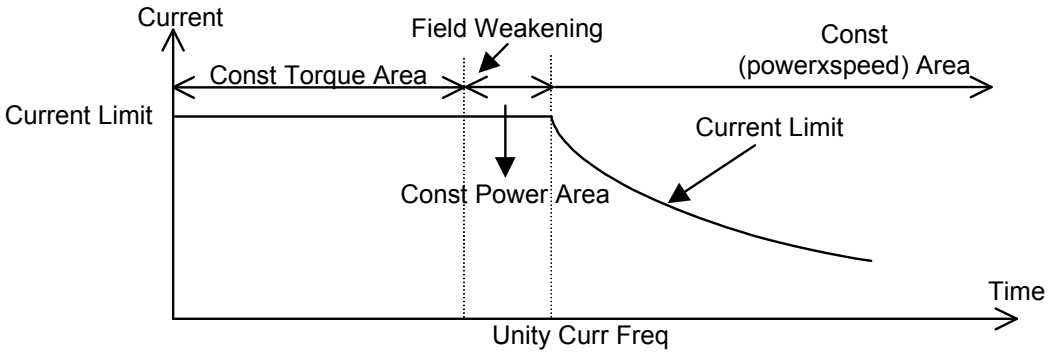


Figure 8.2-16 Operating unite current range

P15. 28 Over Current Control Gain(Accelation)

P15. 29 Over Current Control Gain(Decelation)

This is applied when the motor is decelerating.
The controller reduces the frequency a little bit if the output current exceeds the current limit while accelerating or decelerating or in constant speed. Then, it keeps increasing the output frequency trying not to exceed the current limit. P15. 28 and P15. 29 determine the slope when the controller lowers the current.

8.2.16 Parameter Group 16 : V/F Control [Motor 2]

These are the V/F Control parameters for **Motor 2.**

P16. 0 Torque Compensation
P16. 1 Min. Output Frequency
P16. 2 Max. Output Frequency
P16. 3 Torque Compensation Flux Current
P16. 6 V/F Pattern
P16. 7 Zero Frequency Voltage
P16. 8 Mid. Frequency
P16. 9 Mid. Frequency Voltage
P16. 10 Max Voltage Frequency
P16. 11 Max output Voltage
P16. 12 Voltage Limiter

P16. 14 Square Curve Voltage Compensation
P16. 15 Start DC Brake Time
P16. 16 Start DC Brake Blank time
P16. 17 Start DC Brake Current
P16. 18 Stop DC Brake Time
P16. 19 Stop DC Brake Blank Time
P16. 20 Stop DC Brake Current
P16. 21 Stop DC Brake Frequency
P16. 22 CC P-Gain
P16. 23 CC I-Gain Scale
P16. 24 Stabilization Time Const
P16. 25 Stabilization Gain
P16. 26 Stabilization Limit
P16. 27 Unity Current Range: Freq
P16. 28 Over Current Control Gain(Acceleration)
Refer to the Parameter Group 15

8.2.17 Parameter Group 17 : Sensor less Vector Control [Motor 1]

These are **Motor 1**-parameters for operation of S/L Vector control.

P17. 0 Speed Detection time
Set up the time constant for speed detection

P17. 1 Min. Speed
Set up the minimum operation speed

P17. 2 Max. Speed
Set up the maximum operation speed

P17. 3 Over Speed Limit
In case that the estimated motor rotational speed exceeds the set value, the inverter output is immediately cut off and display the fault signal.

P17. 5 Starting Flux
Set up the amount of flux to be applied from the speed of zero to the speed of Par.17. 7

P17. 6 Base Flux
Set up the amount of flux to be used from the speed of Par.17. 8

P17. 7 Start Flux-END Speed
The flux of Par.17. 5 is applied to the speed from zero to Par.17. 7.
The start flux-end speed is set in the percentage of the maximum speed. (Par.17. 2)

P17. 8 Base Flux-START Speed
Set up the speed of which the flux of Par.17. 6 starts to be applied
The base flux-start speed is set in the percentage of the maximum speed. (Par.17. 2)

P17. 9 FW Voltage
This parameter sets the electromotive Force (EMF). If this value is too high, the output voltage becomes increased in the field weakening area, and if the value is too low, the output voltage becomes decreased in the field weakening area. If this value is over than 100%, the condition of torque control cannot be good because there might be not enough voltage for operating the current controller. In that case, reduce the value if the motor cannot run up to the maximum set speed.

P17. 10 FW Profile Time Const (Field Weakening Time Constance)

Set up the time constant for the flux changes in the field weakening operation.

P17. 11 CC P-Gain Scale

Set up the scale in percentage of P-Gain of the current controller that is gained from auto tuning.

P17. 12 CC I-Gain Scale

Set up the scale in percentage of I-Gain of the current controller that is gained from auto tuning.

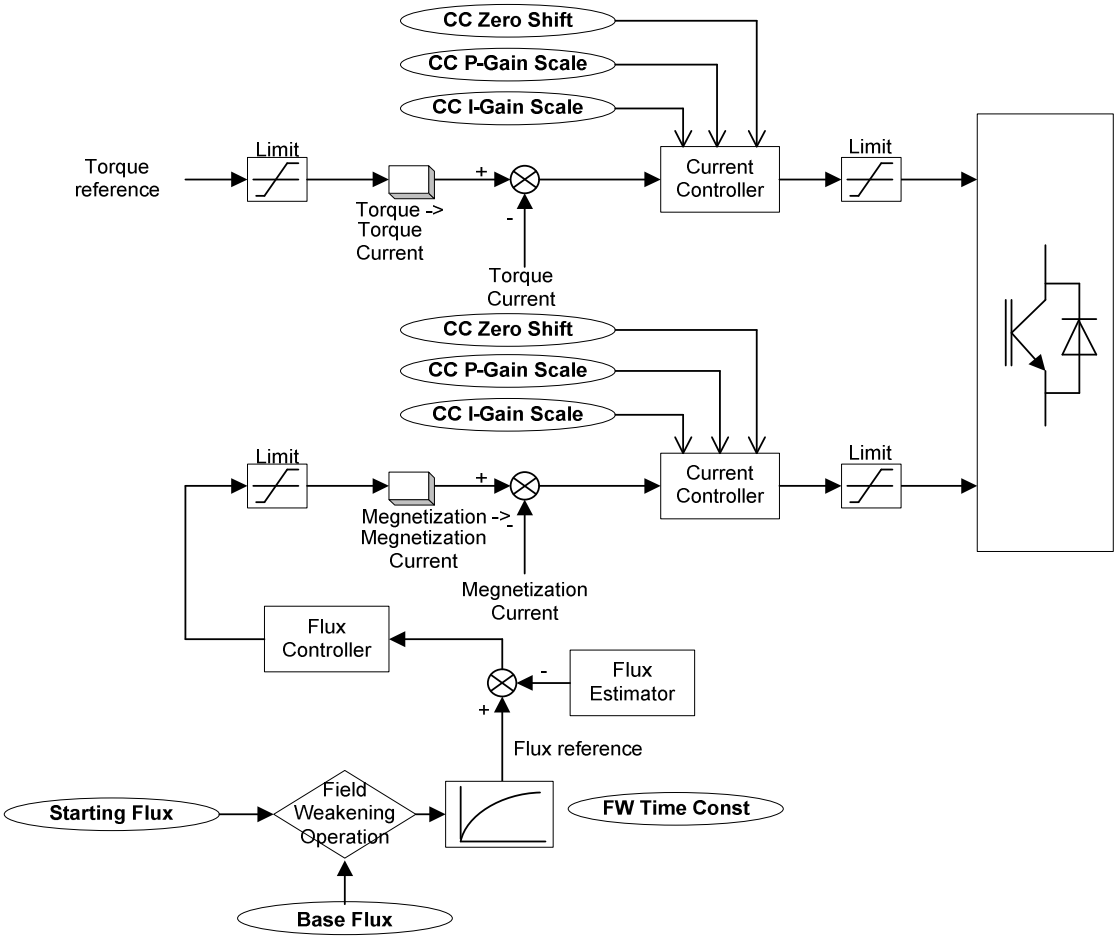


Figure 8.2-17 sensorless vector control block

P17. 14 Speed PI Gain

In order to set the PI Gain to be used for the speed controller, apply the set gain as a fixed value or use the gain that is set automatically by auto tuning.

[0] Default (Default Gain)

[1] Result by Auto-Tuning (Auto-Tuning Gain)

P17. 15 Load Observer Activation

Decides the usage of Load Observer.

P17. 16 Load Observer Time Constant

Set up the time constant of Load Observer.

P17. 17 Load Compensation Start Frequency

Set up the starting Frequency of Load Observer.

P17. 18 SC P-Gain

Set up the P-Gain of speed controller by auto tuning in percentage.

P17. 19 SC I-Gain

Set up the I-Gain of speed controller by auto tuning in percentage.

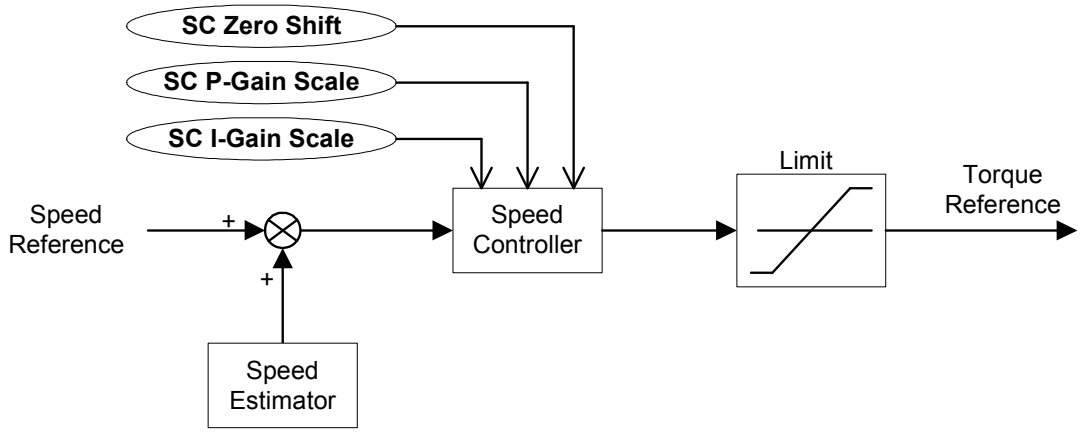


Figure 8.2-18 Speed Control Block

P17. 20 SC Ref Weight Factor

It moves a point of zero of PI controller in speed controller to the high frequency band, and reduces the speed overshoot.

P17. 29~P17. 49

Don't change anything users own option. If you need to change things, please contact us. Please refer to "Appendix B" about setting parameters for "Torque Control Application"

8.2.18 Parameter Group 18 : Sensor less Vector Control [Motor 2]

Theses are the parameters for Sensor Less operation of **Motor 2**

P18. 0 Spd Detect time Constant
P18. 1 Min. Speed
P18. 2 Max. Speed
P18. 3 Over Speed Limit
P18. 5 Starting Flux
P18. 6 Base Flux
P18. 7 Start Flux-END Speed
P18. 8 Base Flux-START Speed
P18. 9 FW Voltage
P18. 10 Profile Time Const (Field Weakening Time Constant)
P18. 11 CC P-Gain Scale
P18. 12 CC I-Gain Scale
P18. 14 Speed PI Gain
P18. 15 Load Observer Activation
P18. 16 Load Observer Time Constant
P18. 17 Load Compensation Start Frequency
P18. 18 SC P-Gain
P18. 19 SC I-Gain
P18. 20 SC Ref Weight Factor
P18. 29 ~ P18. 49

Refer to the Parameter Group 17.

8.2.19 Parameter Group 19 : Vector Control [Motor 1]

These are **Motor 1**- parameters for **sensor** vector control operation.

P19. 0 Number of Encoder Pulse

Set up the number of encoder pulse that is attached to an electric motor

P19. 1 Inversion of PG Direction

When a motor is running forward, this function makes the A or B phase go in advance. If the connection of A and B phase is switched, or U, V and W phase are switched, this parameter can change the order of phase in software without disconnect the real wires.

P19. 2 Speed Detect time Constant

Set up the time constant for detecting the motor rotation speed from encoder

P19. 3 Min. Speed

Set up the minimum operation speed

P19. 4 Max. Speed

Set up the maximum operation speed

P19. 5 Over speed Limit

In case that the motor rotation speed measured from encoder exceeds the set point, the inverter output is immediately cut off and display a fault signal.

P19. 7 Starting Flux

Set up the amount of flux to be applied from the speed of zero to the speed set in Par.19.9

P19. 8 Base Flux

Set up the amount of flux to be applied from the speed set in Par.19. 10

P19. 9 Start Flux-END Speed

The flux set in Par.19. 7 is applied from the speed of zero to the speed set in Par.19. 9. Set the start flux-end speed in percentage of the maximum operation speed. (P19. 4)

P19. 10 Base Flux-START Speed

Set up the speed that the flux of Par.19. 8 starts to be applied
Set the base flux-start speed in percentage of the maximum operation speed

P19. 11 FW Voltage

This parameter sets the electromotive Force (EMF). If this value is too high, the output voltage becomes increased in the field weakening area, and if the value is too low, the output voltage becomes decreased in the field weakening area. If this value is over than 100%, the condition of torque control cannot be good because there might be not enough voltage for operating the current controller. In that case, reduce the value if the motor cannot run up to the maximum set speed.

P19. 12 FW Profile Time Constant

Set up the time constant for the flux change in the range of field weakening operation.

P19. 13 CC P-Gain (Current Control)

Set up the P-Gain of current controller by auto tuning in the percentage

P19. 14 CC I-Gain (Current Control)

Set up the I-Gain of current controller by auto tuning in the percentage

P19. 15 CC Ref Weight Factor(Current Control)

It moves a point of zero of PI controller in current controller to the high frequency band, and reduces the overshoot of output current.

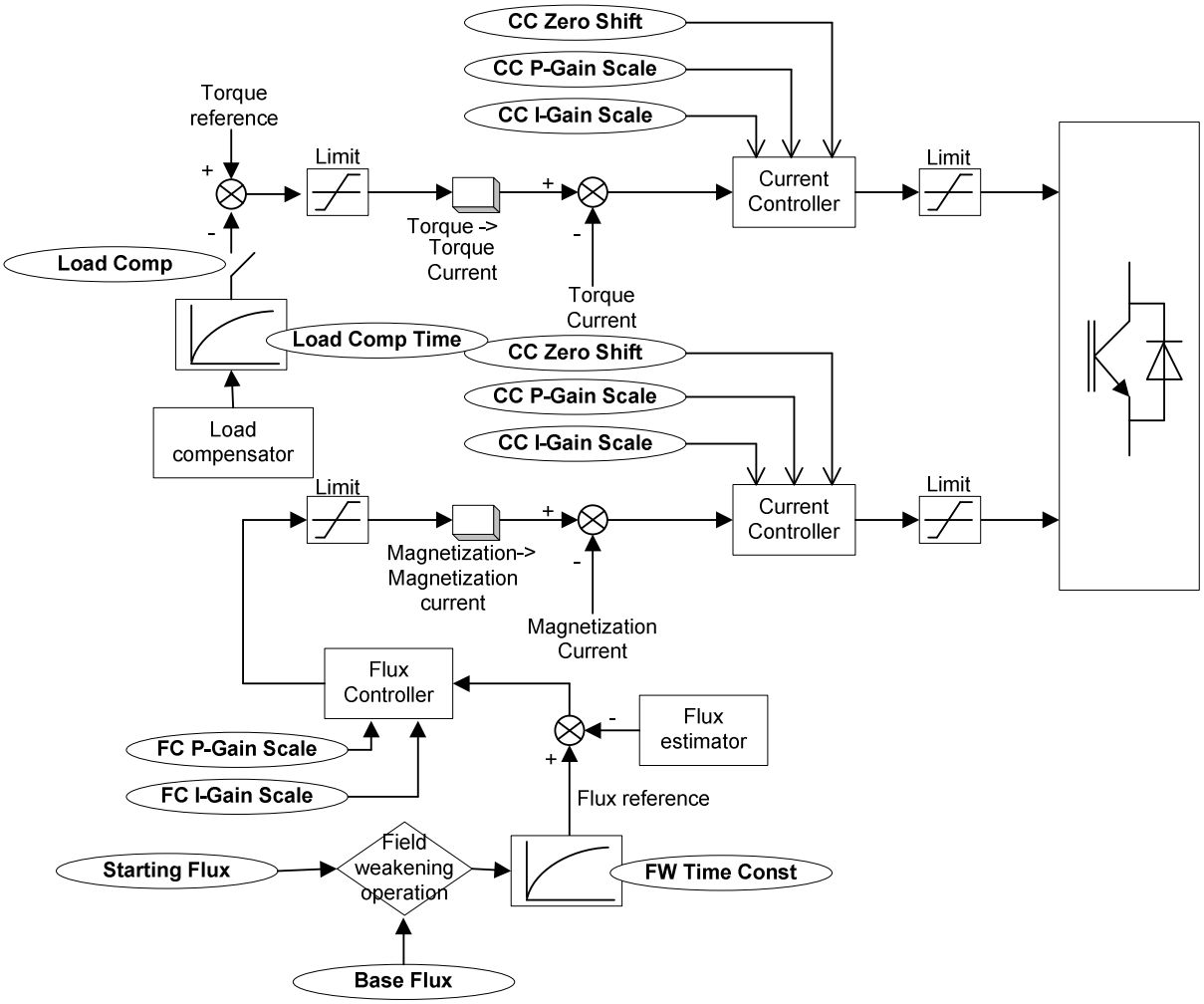


Figure 8.2-19 vector control block

P19. 16 FC P-gain (Flux Control)

Set up the P-Gain of flux controller by auto tuning in percentage

P19. 17 FC I-Gain (Flux Control)

Set up the I-Gain of flux controller by auto tuning in percentage

P19. 18 Max. Field Current

Set up the limit for the maximum field current when starting

P19. 19 Speed PI Gain Selection

You can set up auto tuning in order to get PI Gain automatically to be used for speed controller

[0] Default Setting

[1] Result by Auto-Tuning

P19. 20 Load Observer

Set up the existence of torque compensation for a rapid load change

[0] Disabled

[1] Enable

P19. 21 Load Observer Time Constant

Set up the time constant for the torque compensation when there is a load change

P19. 22 SC Proportional Gain (Speed Control)

Set up the P-Gain of speed controller by auto tuning in percentage

P19. 23 SC Integral Gain (Speed Control)

Set up the I-Gain of speed controller by auto tuning in percentage

P19. 24 SC Ref Weight Factor(Speed Control)

It moves a point of zero of PI controller in speed controller to the high frequency band, and reduces the speed overshoot.

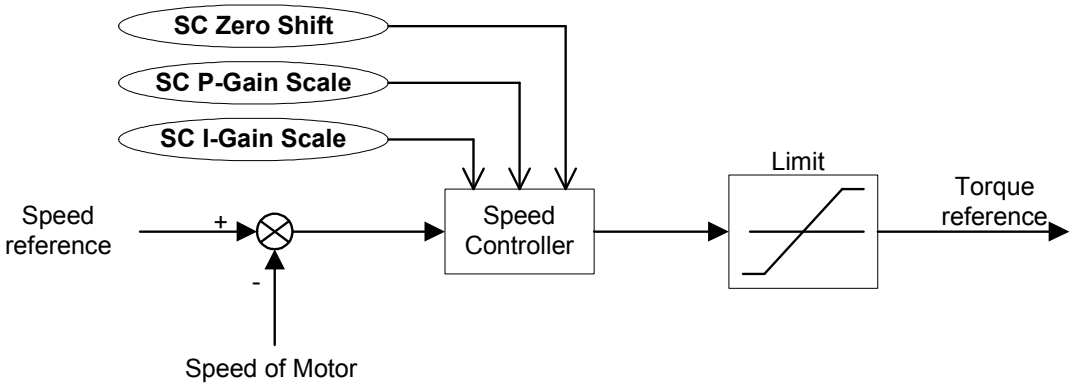


Figure 8.2-20 speed vector control block

P19. 25 ~ P19. 41

Don't change anything users own option. If you need to change things, please contact us.

8.2.20 Parameter Group 20 : Vector Control [Motor 2]

These are **Motor 2**- parameters for sensor vector control operation.

P20. 0 Number of Encoder Pulse
P20. 1 Inversion of PG Direction
P20. 2 Speed Detect time Constant
P20. 3 Min. Speed
P20. 4 Max. Speed
P20. 5 Over speed Limit
P20. 6 Flux Excitation Time
P20. 7 Starting Flux
P20. 8 Base Flux
P20. 9 Start Flux-END Speed
P20. 10 Base Flux-START Speed
P20. 11 FW Voltage
P20. 12 FW Profile Time Const
P20. 13 CC Proportional Gain (Current Control)
P20. 14 CC Integral Gain (Current Control)
P20. 15 CC Ref Weight Factor (Current Control)

P20. 16 FC P-gain (Flux Control)
P20. 17 FC I-Gain (Flux Control)
P20. 18 Max. Field Current
P20. 19 Speed PI Gain Selection
P20. 20 Load Observer Activation
P20. 21 Load Observer Time Constant
P20. 22 SC P-Gain (Speed Control)
P20. 23 SC I-Gain (Speed Control)
P20. 24 SC Ref Weight Factor (Speed Control)
P20. 25 ~ P20. 41
Refer to the Parameter Group 19.

8.2.21 Parameter Group 21 : Motor 1 Parameter

This parameter is automatically set by Motor 1 Auto-Tuning.

P21. 0 Stator Resistance 1
Set up the stator resistance 1 of a motor

P21. 1 Stator Resistance 2
Set up the stator resistance 2 of a motor

P21. 2 Rotator Resistance
Set up the rotator resistance of a motor

P21. 3 Stator Inductance
Set up the stator inductance of a motor

P21. 4 Rotor Inductance
Set up the rotor inductance of a motor

P21. 5 Leakage Inductance
Set up the leakage inductance of a motor

P21. 6 Inertia Time Constant
Set up the rotational inertia of a motor

P21. 7 Iron Loss Compensation
An iron loss impacts on the efficiency of control in the high-speed section. It can reduce controlling efficiency due to the compensation for excessive loss or lack of loss. You can improve its function through adjusting the amount of iron compensation.

P21. 8 Biscos Damping Efficient

8.2.22 Parameter Group 22 : Motor 2 Parameter

These are the parameters that are automatically formed by Motor 2 auto-tuning.

P22. 0 Stator Resistance 1
P22. 1 Stator Resistance 2
P22. 2 Rotator Resistance
P22. 3 Stator Inductance
P22. 4 Rotor Inductance

P22. 5 Leakage Inductance
P22. 6 Inertia Time Constant
P22. 7 Iron Loss Compensation
P22. 8 Biscos Damping Efficient
Refer to the Parameter Group 21

8.2.24 Parameter Group 24 : Monitor Setup

P24. 0 LCD Idle Time
A power of a keypad's backlight is cut off in case of the passage of a set time

P24. 1 LCD Contrast
Adjust the luminosity of a keypad's window

P24. 2 Key Repetition Time
The reaction time of a keypad's button

P24. 3 Speed Monitor Selection
[0] Calculation
The motor rotation speed that is displayed on a keypad indicates the calculated speed.
[1] Pulse Gernerator
The motor rotation speed that is displayed on a keypad indicates the actual rotation speed gained from encoder.

P24. 4 Speed Detection time Constant
In case of that the Speed Monitor Selection is set to Encoder, and this sets up the filtering time when measuring a motor speed from encoder.

P24. 5 Monitor Filter Time Constant
Set the Filtering Time for the Keypad display values

P24. 6 Previous Run Direction
[0] Forward (Upward)
[1] Reverse (Downward)

P24. 7 Previous Speed Set
P24. 8 Previous Frequency Set
P24. 9 Previous Torque Set
P24. 10 Previous PID Set
P24. 12 Default Monitor Item
When inputting the main power to the Inverter, set the monitor items displayed initially on the keypad.

[0] Motor Speed
[1] Output Frequency
[2] DC-Bus Voltage
[3] Motor Current
[4] Motor Voltage
[5] Motor Torque
[6] Torque_Current
[7] Flux_Current
[8] Input Power
[9] Output Power
[10] PID Set_Point

[11] PID Feedback
[12] PID Error

P24. 13 Left/Right Button Speed Set [Hz]
P24. 14 Left/Right Button Speed Set [rpm]
P24. 16 RS485 Station ID

Note

9. Protection

9. Protection

9.1 Warning

State	Indication	Type	Specification
Warning **ERR [Warning]**	W1 Under Volt.	Under Voltage	If DC_Link Voltage is lower than the "Under-Voltage limit" (P5. 17), the warning occurs.
	W2 Over Volt [S]	Over Voltage1	If DC_Link Voltage exceeds the Over-Voltage limit (P5. 15), the warning occurs (Software manages).
	W3 Over Volt [H]	Over Voltage2	It occurs when there is a detection of Over Voltage by hardware.
	W4 Sensor Error	Sensor Error	It occurs when there is a problem of current sensor & circuit..
	W5 Over Load	Over Load	It occurs if the output current satisfies the over-load condition of P5. 8 and P5. 9. If P5. 10=[2] ignore, it doesn't occur.
	W6 ZeroSeq. Curr	Zero sequence current	There is a detection of current leakage that exceeds P15. 12 (ZC Trip).
	W7 Over_Temp	Over Temperature	It occurs when the VD heat sink temperature exceeds the set value of P5. 40.
	W8 Device_Short	Device Short	It occurs when there is a problem with a switching device of inverter.
	W9 Drv. Disable	VD Drive Disable	It occurs if there is no "Enable" input signal from the digital input terminal when Digital Input function is set to "Drive Enable".
	W10 AR1 Disable	Analog Reference 1 Disable	Analog Reference is not chosen in the Analog Input Function of P6. 1, P6. 15 and P6. 29.
	W11 AR2 Disable	Analog Reference 2 Disable	Analog Reference 2 is not chosen in the Analog Input Function of P6. 1, P6. 15 and P6. 29.
	W12 Pre-Charging	Analog Feedback 1 Disable	Analog Feedback 1 is not chosen in the Analog Input Function of P6. 1, P6. 15 and P6. 29.
	W13 Reserv VD_13	Analog Feedback 2 Disable	Analog Feedback 2 is not chosen in the Analog Input Function of P6. 1, P6. 15 and P6. 29.
	W14 Drive Cal.	Drive Calibration Disorder	It occurs after parameter initialization of changing switching Frequency. Execute by [0] Drive Calibration of Auto Tuning.
	W15 ReservVD_15	Analog Reference 3 Disable	Analog Reference 3 is not chosen in the Analog Input Function of P6. 1, P6. 15 and P6. 29.

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State	Indication	Type	Specification
Warning **ERR [Warning]** ***)** VDC PWM Converter only Applicable	W16 Drv_Cooling	Drive Cooling	Once the inverter gets over-heated, the controller waits until the temperature goes down below 75℃. Then, it continues operating.
	W17 Tuning _Stop	Auto Tuning Failure	This means that "Auto-tuning is not completed well. Any operation cannot be used with this warning. Turn-off the main power and then, turn it on again to use the operation that does not need auto-tuning (etc. V/F). The drive Calibration must be executed. Reset the system to operate again.
	W18 M_Brk_not_Op	Motor Brake not open	When motor brake is used, this warning tells that the condition for opening the motor brake is not qualified. In this case, the speed is not accelerated.
	W19 Ext_Fault	External Fault	This tells that inverter gets the external fault signal when it is stopped.
	W20 Acc/Dec_Byp	V/F Accel / Decel Bypass Error	Acceleration and deceleration time can be prohibited when V/F control is used. Over-Current Fault can be caused. If [17] Accel/Decel Bypass, the terminal function, is used and V/F control is used, this warning can be generated. In V/F control, If frequency is changed without Accel.or Decel slop, the over-current can occur.
	W21 Low_OV_Limit	Over Voltage Limit	It occurs when there is a setting error in OV limit value.
	W22 Sync_Com_Err	Synchronous Com Err	It occurs when there is an error in synchronous communication.
	W23 Slave Error	Slave Error	It occurs when there is an error from slaves.
	*) W24 Line_Seq_Err	Line Sequence Err	Line sequence error of VDC PWM converter
	*) W25 Line_UV	Line Under Voltage	It occurs when there is Under Voltage.
	*)W26 Line_ Disconnection	Line Unbalance	It occurs when there is Unbalance input
	*) W27 Line Over-Voltage	Line Connection Test No fulfillment	It occurs when there is Test No fulfillment.
	W28 Line Unbalance		
	W29 Line_Connection Check		

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State	Indication	Type	Specification
Warning **ERR [Warning]**	W30 Profibus Error		
	W31 UV Limiting		
	W32 OV Limiting		
	W33 OC Limiting		
	W34 OT Limiting		
	W35 Warning Logic 1		
	W36 Warning Logic 2		
	W37 Warning Logic 3		

9.2 Parameter Error

State	Indication	Type	Specification
Parameter Err **ERR[Pxx.xx]** Parameter Combination Err **ERR[Parameter]**	Par Corruption	Parameter Damage	A flash memory of parameter is damaged.
	kW/V/A Mismatch	Output power, Voltage Setting Err	Setting error of rated output, rated voltage, and rated current of the motor
	Hz/rpm Mismatch	Frequency Setting Err	Setting error of Frequency, Speed, and number of poles of the motor
	Jumper Setting	VD Capacity Setting Err	Setting error of checking inverter power
	ERR [Pxx.xx]	Parameter Setting Err	A number of the parameter is indicated when there is a parameter setting error (Example: ERR[P2.1])

9.3 Parameter Fault

State	Indication	Type	Specification
Control Fault **ERR[Control]**	F1 Over Load	Over Load	It occurs when output current of inverter meets Over Load condition of P5. 7, P5. 8.
	F2 Over Curr.	Over Current [S]	It occurs when output current of inverter exceeds the set value of P5. 9. (Software manages.)
	F3 Over Curr.(H)	Over Current [H]	A state of Over Current by hardware

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State	Indication	Type	Specification
Control Fault **ERR[Control]**	F4 ZeroSeq Curr.	Zero-sequence current [S]	It occurs when Zero-phase-sequence current exceeds the set value of P5.12.
	F5 ZeroSeq Curr.(H)	Zero-sequence current [H]	A detection of Zero-phase-sequence current by hardware
	F6 Under Current	Under Current	It occurs when output current of inverter meets the condition of P5. 5, P5. 6 and so the current is unusually low.
	F7 Over_Volt	Over Voltage [S]	It occurs when DC_Link voltage of the inside of inverter exceeds the set value of P5. 15. (Software manages.)
	F8 Over_Volt(H)	Over Voltage [H]	It occurs when there is a detection of Over Voltage by hardware.
	F9 Under_Volt	Under Voltage	It occurs when DC_Link voltage of the inside of inverter is lower than the set value of P5. 18. In case of using S/L Vector Control, it also happens when the connections between motor and inverter are cut.
	F10 Over Speed	Over-speeding Motor	It occurs when the motor's rotating speed exceeds the speed that is set to P17. 2(P18. 2, P19. 4, P20. 4).
	F11 Out of Ctrl.	Out of Control	It occurs when a control condition is not good due to internal and external factors; when a brake is not released; when a load is extremely big; when an input signal does not go into the encoder.
	F21 Over_Temp	Overheated Inverter	If the output frequency exceeds by 45Hz and the heat sink exceeds temperature by set in P5. 40, the fault occurs. If the output frequency is less than 45Hz, overheat detection value of inverter is changed by the output current and output frequency. It's necessary to keep watching the output frequency, current and temperature when a fault occurs.
	F22 Device_Short	IGBT/MOTOR Device_Short	It occurs when there is a problem with a switching device of inverter.
	F23 Charging Err	Initial Charge Fault	It occurs when you fail in charging the DC_link after you turn on the power.

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State	Indication	Type	Specification
Control Fault **ERR[Control]**	F24 Gate Drive Power Fail	Dynamic Brake Chopper (DBR) Damage	It occurs when DC_link voltage does not go up due to a problem of built-in Brake Chopper after you turn on the power. And it also happens when over current occurs or a device is damaged while Brake Chopper is at work.
	F25 Ext_Fault	Signal Input of External Fault	It occurs when a Fault signal is inputted from external device.
	F26 Zero_Current	Fault Connection Error of gate drive voltage	It occurs when time passes the set time of P5. 3 with no current in the condition that P5. 2=Enabled.
Drive Fault **ERR[Operation]**	F27 Open Phase	Open phase Fault	It occurs when one of phases is broken or cut.
	F28 Motor Lock	Capacitor Bank Damage	It occurs when there is a fault in capacitor bank.
	F29 Keypad_Error	Keypad Error	It occurs when keypad is not connected well.
	F30 Sync_Com_Err	Synchronous Com. Error	It occurs when synchronous communication has an error.
	*) F31 Line_UV	Line Under Voltage	It occurs when input is low.
	*) F32 Line_Open	Line Unbalance	It occurs when input is not stable.
	*) F33 Line Sequence Change	Line Over Voltage	It occurs when input is over the rated voltage.
	F34 Line Over Voltage		
	F35 Line Unbalance		
	F36 Profibus Error		
	F37 Fault_Logic 1		
	F38 Fault_Logic 2		
	F39 Master_ Emergency		

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State	Indication	Type	Specification
Auto Tuning Fault **ERR[Tuning]**	F41 Wrong Conn.	Motor Connection Fault	It occurs when a connection between inverter and motor is separated.
	F42 High_Freq Res	Motor Tuning Error 1	It occurs when the gained value from a process of Motor Tuning has errors.
	F43 High_Freq Ind	Motor Tuning Error 2	It occurs when the gained value from a process of Motor Tuning has errors.
	F44 Stator Res [Rs]	Motor Tuning Error 3	It occurs when the gained value from a process of Motor Tuning has errors.
	F45 Rotor Res [Rs]	Motor Tuning Error 4	It occurs when the gained value from a process of Motor Tuning has errors.
	F46 Stator Ind [Ls]	Motor Tuning Error 5	It occurs when the gained value from a process of Motor Tuning has errors.
	F47 Rotor Lnd [Lr]	Motor Tuning Error 6	It occurs when the gained value from a process of Motor Tuning has errors.
	F48 Inertia [Jm]	Motor Tuning Error 7	It occurs when the gained value from a process of Motor Tuning has errors.
	F49 Motor Stall	Motor is in a stall status	Auto Tuning fails because a motor is stalled.
	F50 Tn_Time_Over	Auto Tuning Time Over	It occurs when Auto Tuning time is over.

10. Troubleshooting

10. Troubleshooting

10.1 Troubleshooting

Condition		Check items	Management
When there is no rotation of motor	Inverter output does not occur.	Does the input voltage of inverter work properly?	Check the input voltage of inverter (L1, L2, L3)
		Is the KEYPAD of inverter on?	Call an agent when inverter does not get turned on, even though a contact of KEY PAD is OK
		Is the operation mode & Reference of inverter properly set?	Check a set value of parameter
		Is an operation signal inputted to the inverter?	Check if an operation signal is properly inputted
		Is a speed signal 0?	Check the connection of speed signal and the change of the signals at the terminal
		Did several warnings or faults occur?	Rerun after you release warnings and faults
	Inverter output occurs.	Is a motor properly connected?	Connect the inverter output U, V, and W to the motor input U, V, and W for each phase
		Is a motor stalled or is a load big?	Release or reduce a load
		Check if a Brake properly works when it is attached to a motor	Open a Brake and then operate
When there is no rotation of motor	Inverter output does not occur.	Check if an open-phase occurred to a motor	Connect the inverter output U, V, and W to the motor input U, V, and W for each phase
		Is an output current of inverter equal to, or bigger than a set limit of current?	Check if a parameter setting is right and then increase speed by extending accelerating time
When a motor rotates in the opposite direction		Is an inverter output of U, V, and W in its right place respectively?	Change the terminal location of V phase and W phase
		Are the forward and reverse operating signals connected properly?	Change the location of the forward and reverse operating signals.
A speed does not increase		Isn't a load big?	Release or reduce a load Extend an accelerating time
A speed does not decelerate smoothly		Is a resistor connected to inverter?	Connect a resistor to inverter
		Isn't a deceleration smooth even though a resistor is connected?	Extend a decelerating time
		Isn't a load big?	Release or reduce a load
		When a load is big, isn't the Main Input voltage getting reduced?	Check the input voltage of the inverter

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Condition	Check items	Management
	Is there any factor that stalls motor?	Get rid of stall factor
	Is an Auto-Tuning properly operated?	Rerun Auto-Tuning
	Does a current of motor resonate?	Reset a parameter
	Is a load unsettled?	Recalculate the power
	Does a speed signal change?	Settle a speed signal

10.2 Maintenance and Inspection

- Regular inspections are recommended every year.

Checking part	Check list	Checking item	Checking period		Checking method	Criterion
			Daily	Regular interval		
General matter	Surroundings	Check a temperature around you, humidity, dust, harmful gas, oil remnants, and etc.	○		Check with your eyes, taste, thermometer and hygrometer	The surrounding temperature should be –10～40℃. There should be no dewdrops in 20～90% RH of the surrounding humidity. (No condensation allowed)
	General device	Unusual vibration and sound	○		Check with your eyes and ears	There should be no problem.
	Power supply voltage	Check if a voltage changes or is low	○		Check the input voltage of the inverter	It should not exceed ±10% of the rated voltage.
Main Circuit	General matters	Insulation resistance		○	Use 500V-mega(insulation tester) between main circuit terminal and earth terminal	There should be no problem.
		Check if a screw is loose		○	Check with your eyes	
		Check if there is a mark of overheating		○	Check with your eyes	
	Terminal Block	Damage		○	Check with your eyes	There should be no damage.
	Smoothing Condenser	Liquid leakage, Deformation	○		Check with you eyes and ears	

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Checking part	Check list	Checking item	Checking period		Checking method	Criterion
			Daily	Regular interval		
Main Circuit	Relay	Tremble		○	Check with your ears	
	Resistor	Crack, Discoloration		○	Check with your eyes	
	Cooling Fan	Vibration, abnormal sound	○		Check with your ears	
	Cooling Water System	Dust, dirt		○	Check with your eyes	
	Wire	Deformed, stripped		○	Check with your eyes	
	Inverter Output	The 3 phase-output		○	Multi-meter Voltmeter	The 3-phase output has to be equal for each phase.
	Motor	Vibration	○		Tightening	It should be fine.
					Output Current of inverter	The 3-phase output has to be equal for each phase.
		Overheating	○		Cooling FAN condition	There should be no disorder.
Control Circuit	Operation	Protective circuit		○	Operate of your own accord	There should be no problem.
	Connection	Tightening		○	Check with your eyes and hands	There should be no problem.
	KEYPAD	Indication, working condition		○	Check with your eyes and hands	There should be no problem.

Note

< Appendix>

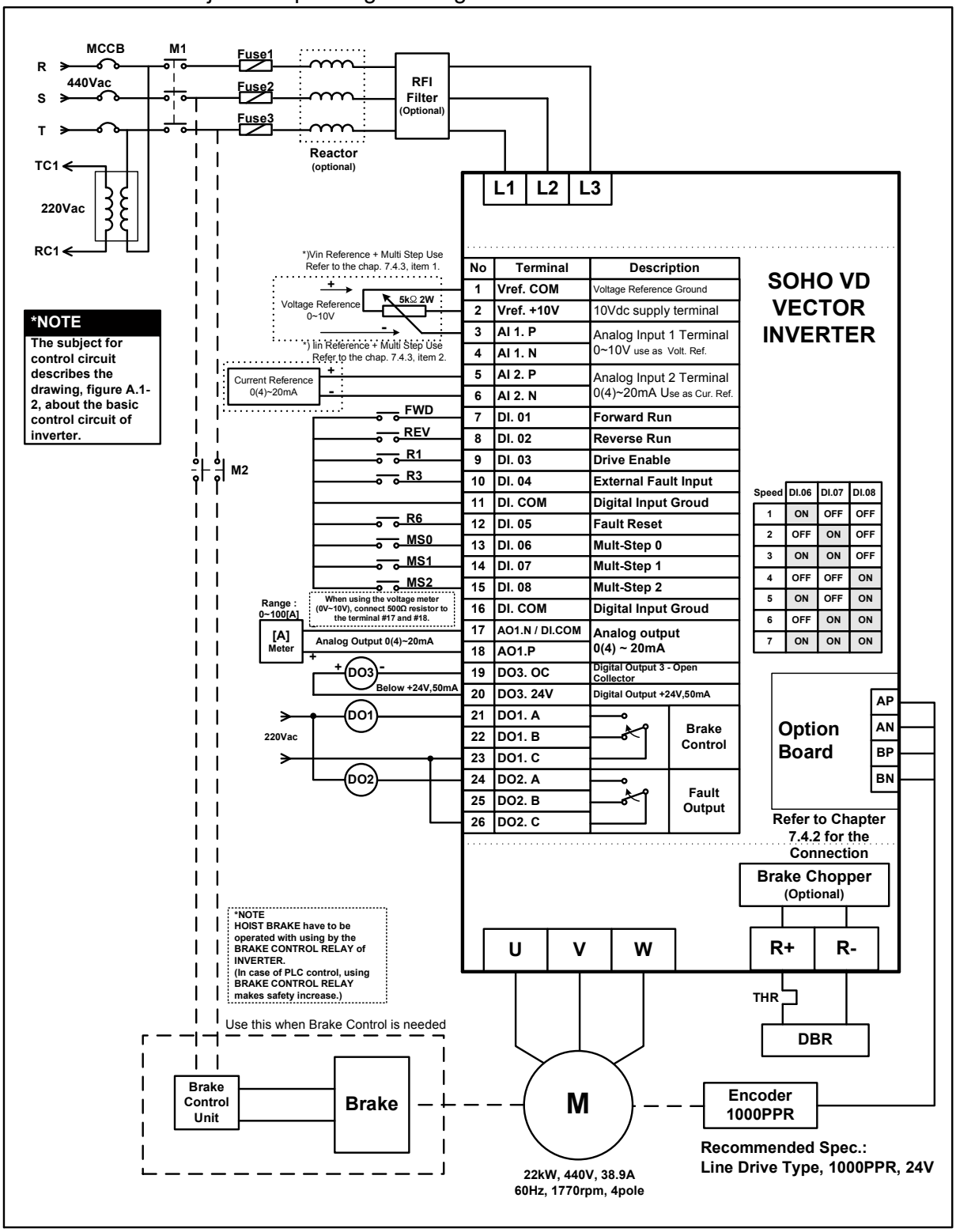
A. Closed Loop Application (Vector Control) Operation Procedure

A. Closed Loop Application (Vector Control) Operation Procedure

The chapter 7.4 explains the most basic application method for operating the inverter with Close Loop Control.

A.1 Basic Design

The following design allows you to use all the basic I/O functions when you use SOHO VD inverter. You can adjust it depending on the given condition on the field.



No	Terminal	Description
1	Vref. COM	Voltage Reference Ground
2	Vref. +10V	10Vdc supply terminal
3	AI 1. P	Analog Input 1 Terminal 0~10V use as Volt. Ref.
4	AI 1. N	
5	AI 2. P	Analog Input 2 Terminal 0(4)~20mA Use as Cur. Ref.
6	AI 2. N	
7	DI. 01	Forward Run
8	DI. 02	Reverse Run
9	DI. 03	Drive Enable
10	DI. 04	External Fault Input
11	DI. COM	Digital Input Groud
12	DI. 05	Fault Reset
13	DI. 06	Mult-Step 0
14	DI. 07	Mult-Step 1
15	DI. 08	Mult-Step 2
16	DI. COM	Digital Input Groud
17	AO1.N / DI.COM	Analog output 0(4) ~ 20mA
18	AO1.P	
19	DO3. OC	Digital Output 3 - Open Collector
20	DO3. 24V	Digital Output +24V,50mA
21	DO1. A	Brake Control
22	DO1. B	
23	DO1. C	
24	DO2. A	Fault Output
25	DO2. B	
26	DO2. C	

Speed	DI.06	DI.07	DI.08
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
5	ON	OFF	ON
6	OFF	ON	ON
7	ON	ON	ON

Figure A-1-1 Basic Design for Inverter Use - Sequence

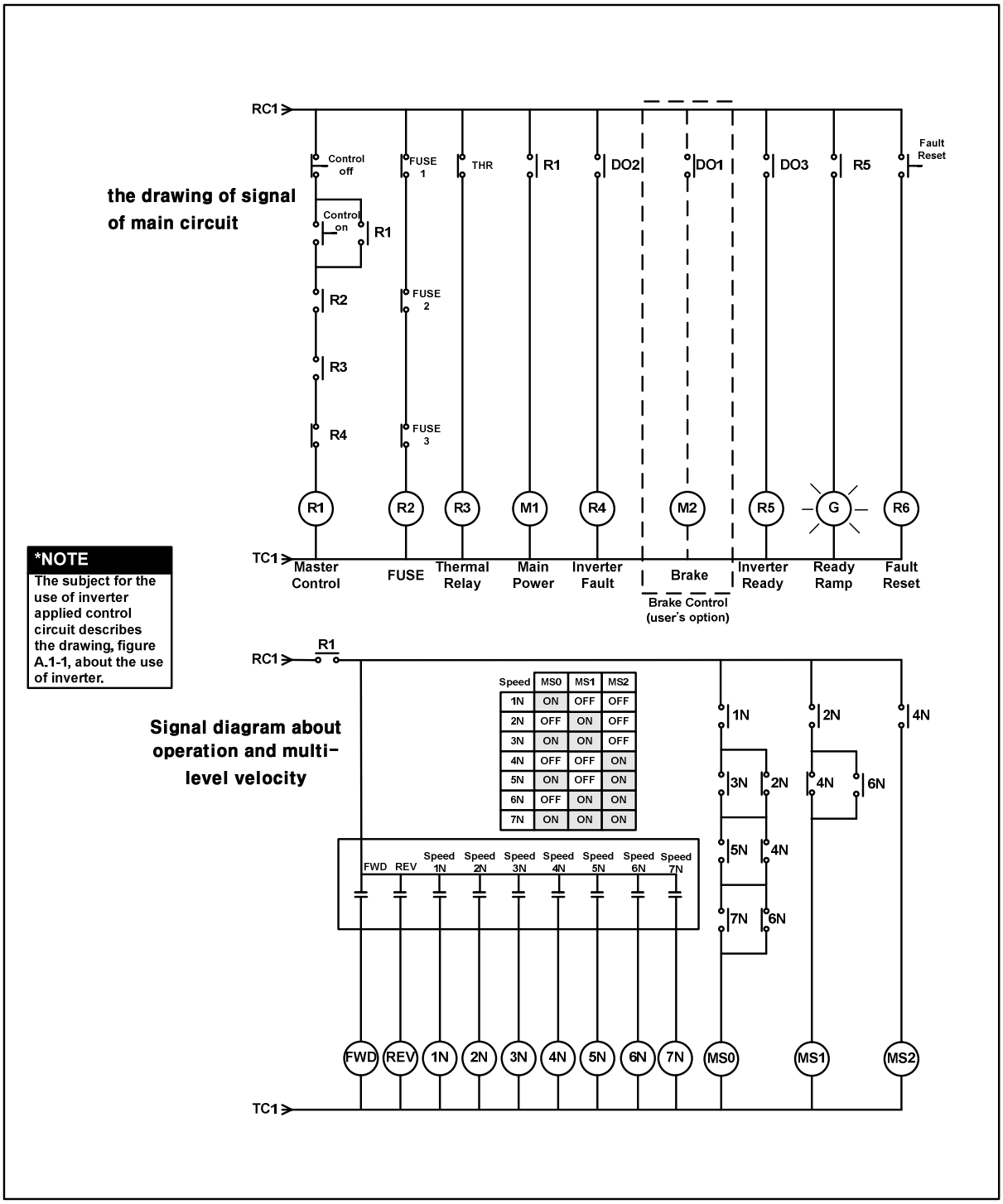


Figure A-1-2Basic Design for Inverter Use - Sequence

A.2 Connecting Encoder to Option Board

"S1" Dip-Switch can set the supply voltage of option board (5V, 15V, 24V).

Encoder Output Voltage	Terminal		S1 Dip-Switch Setting				S1 Dip-Switch Setting
	P	N	1	2	3	4	
24V	P24	G	OFF	OFF	OFF	OFF	
	#111	#110					
15V	P15	G	ON	OFF	ON	OFF	
	#112	#110					
5V	P5	G	ON	ON	ON	ON	
	#113	#110					

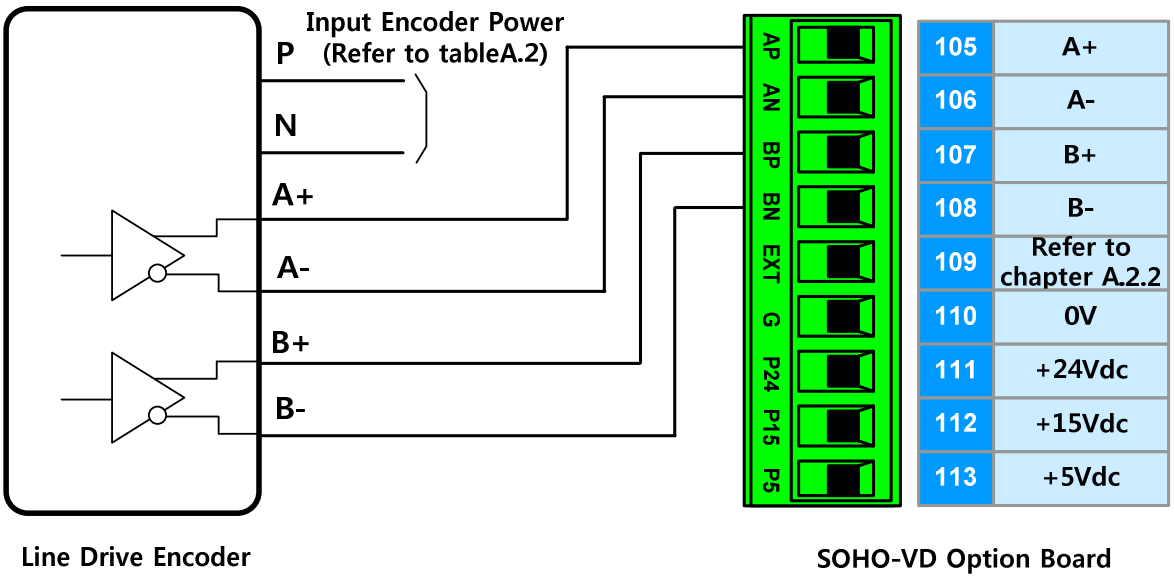
Table A-2 Dip-switch setting for supply voltage of option board

S1 Dip-Switch should be set by amount of output voltage of encoder. The method to connect an encoder to option board is different depending on the kinds of encoder. Refer to the following figure.

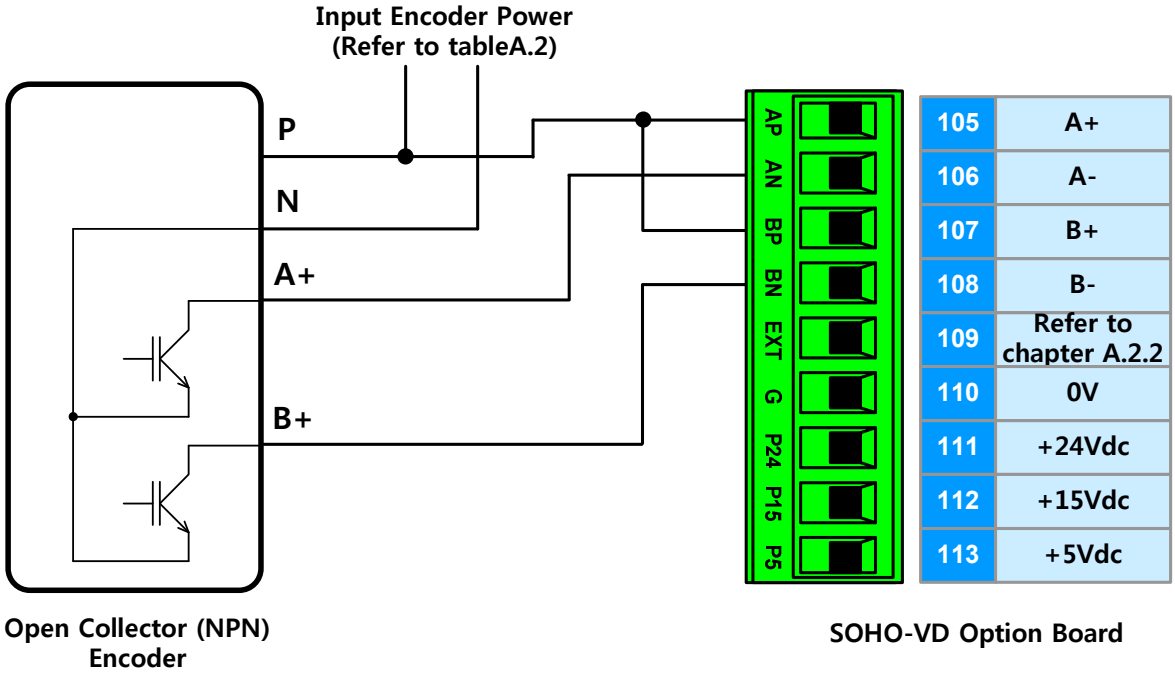
A.2.1 Connection of Encoder

(1) Line Drive Encoder

For Line Drive Encoder, over 1024PPR is recommended. (24V)

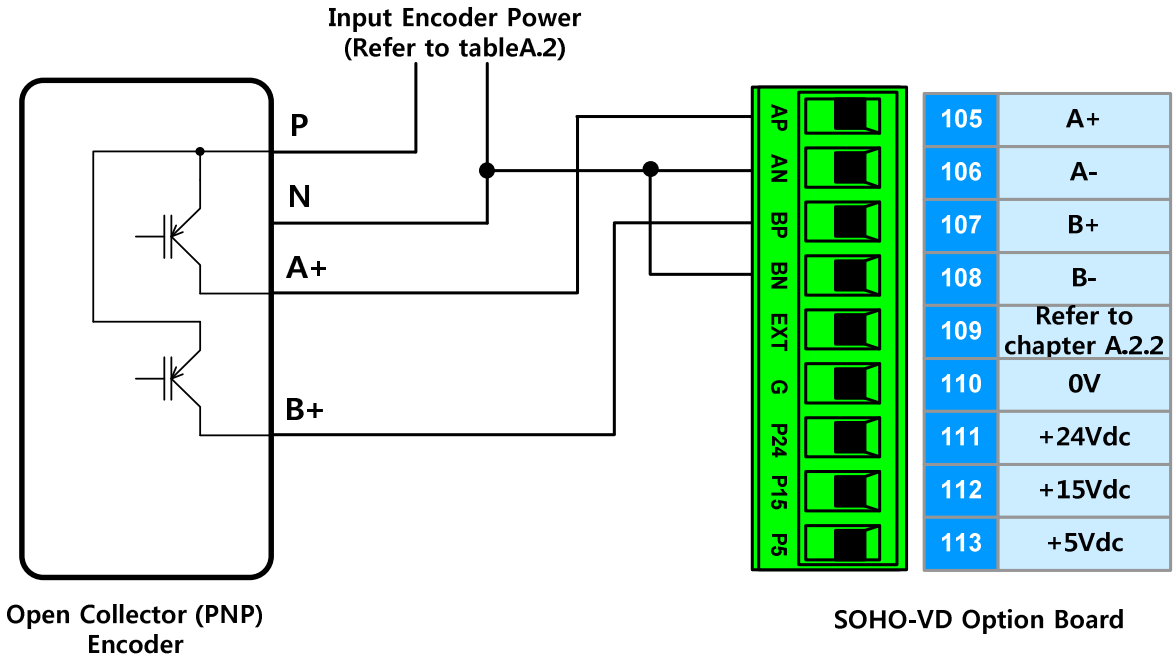


(2) Open Collector (NPN) Encoder

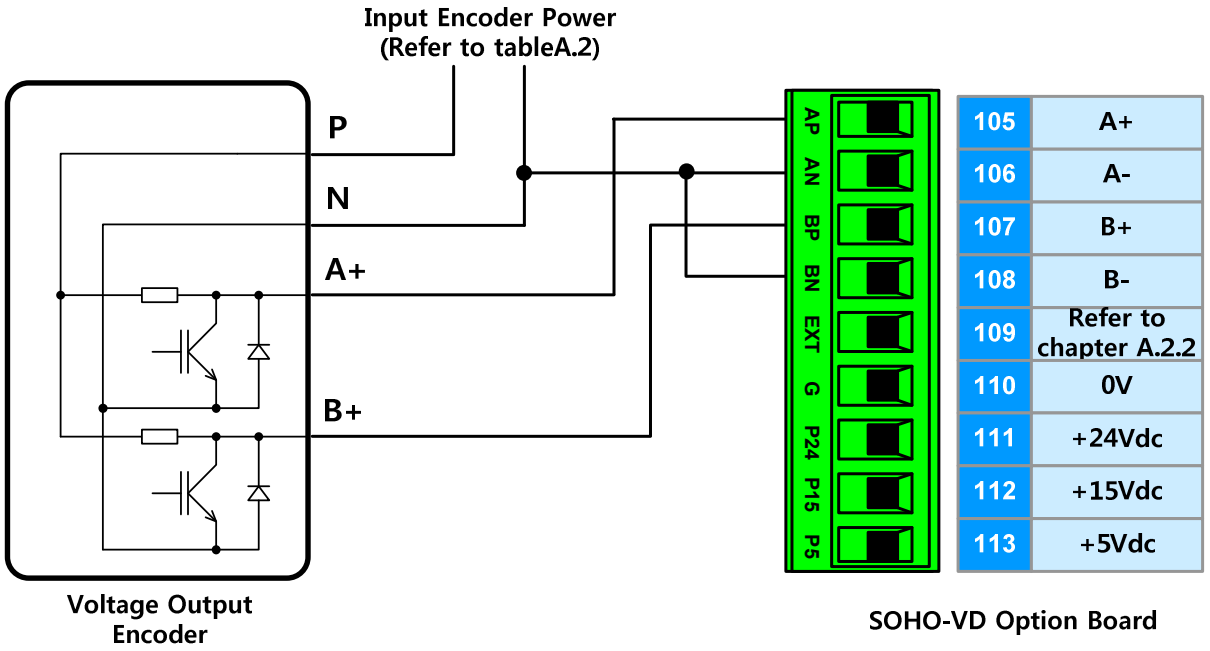


A

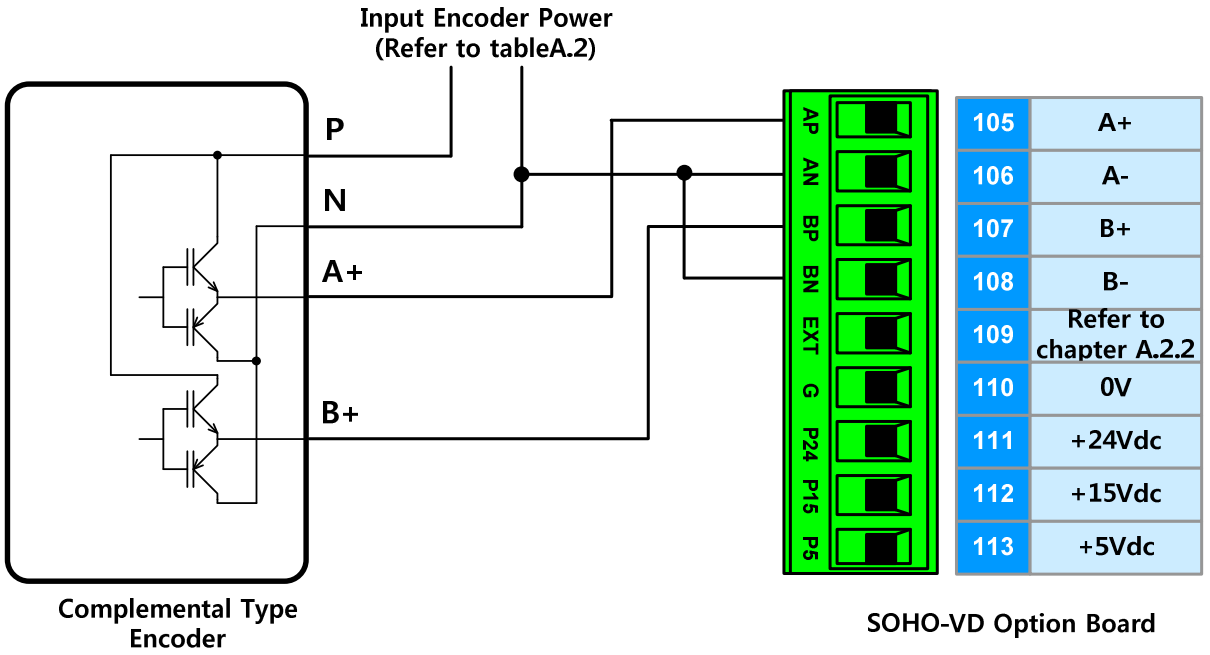
(3) Open Collector (PNP) Encoder



(4) Voltage Output Encoder



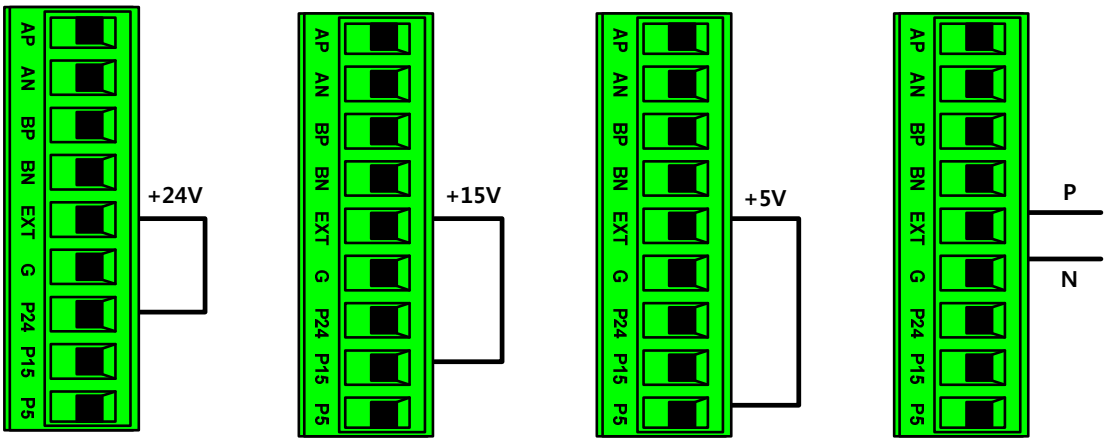
(5) Complemental Type Encoder



A

A.2.2 Connection of EXT Terminal of Option Board

If EXT terminal of option board is used, even though occurring over voltage by abnormal factors such as surge, voltage supplied encoder can limit the amount of encoder pulse voltage to voltage set in S1 Dip-Switch. Refer to below for connection.

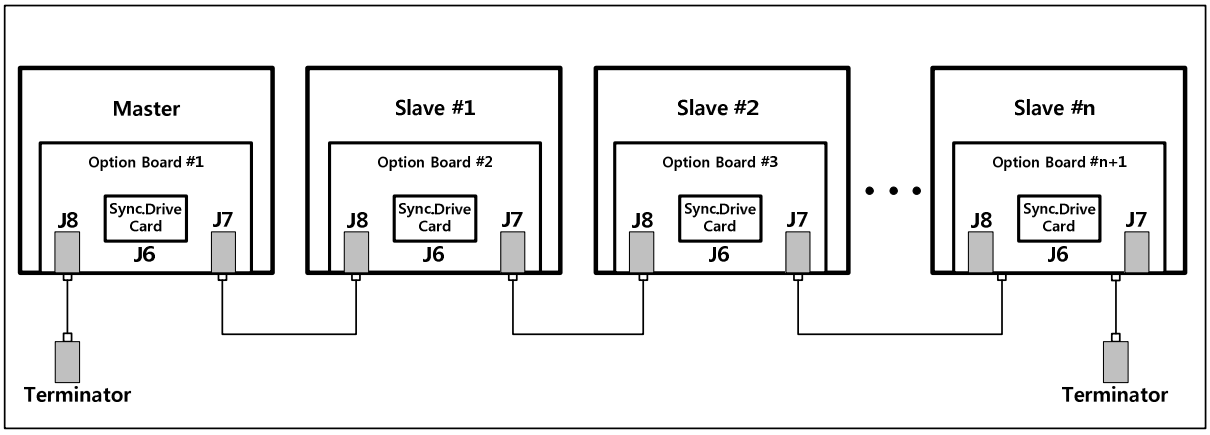


(a) use +24V output voltage (b) use +15V output voltage (c) use +5V output voltage (d) use external power

NOTE!	1. S1 Dip-Switch should be set, depending on output voltage of encoder. 2. No matter how EXT terminal is connected, the use of encoder is available.

<Supplementary Description> How to connect VD Inverter synchronized operation.

By using synchronized operation card, which is installed on option board, SOHO VD Inverter can control the speed of the number of inverters.



A.3 Motor Spec. and Setting of Closed Loop Control

The following is the example method of setting parameters for Open Loop Control. % An Encoder should be attached to the motor.

Rated specification of the motor					
Rated Power	22 kW	Rated Current	38.9 A	Rated Speed	1770 rpm
Rated Voltage	440 V	Rated Frequency	60 Hz	Pole	4 pole

(1) Selecting Program

Setting order	Parameter Group D : Program Control			
	Par.Number	Parameter name	Set Value	Description
1	P1. 0	Program Boot Key 1	[1] Standard II	Selecting software
2	P1. 1	Program Boot Key 2	[1] Standard II	Selecting software
3	P1. 2	Program Boot Key 3	[1] Standard II	Selecting software
	Main Page [5] Initialize			
4	M[5]-[1]	"System Reset"		Reset the inverter system

(2) Setting parameters for motor spec.

Setting order	Parameter Group 1 : Control Setup[Motor 1]			
	Par.Number	Parameter name	Set Value	Description
1	P1. 0	Motor Rated Power	22 kW	Rated power of motor (*)When more 2 motor are connected in parallel, the sum of rated capacity of motor is input.
2	P1. 1	Motor Rated Voltage	440 V	Rated voltage of motor
3	P1. 2	Motor Rated Current	38.9 A	Rated current of motor (*)When more 2 motor are connected in parallel, the sum of rated capacity of motor is input.
4	P1. 3	Motor Rated Frequency	60 Hz	Rated Frequency of motor
5	P1. 4	Number of Poles	4 Pole	Number of Pole
6	P1. 5	Motor Rated Speed	1770 rpm	Rated Speed of motor

(3) Setting of motor Control Method (An encoder should be installed to the motor)

► In case that a Brake is not installed to the motor or it can be released while auto-tuning

Setting order	Parameter Group 1 : Control Setup[Motor 1] : Control setting for motor 1			
	Par.Number	Parameter name	Set Value	Description
1	P1. 6	Control Method	[3] Vector_Ctrl	Vector Speed Control
	Parameter Group 14 : Auto Tuning Configuration : Setting of Auto-Tuning			
2	P14. 0	Motor Tuning Condition	[0] Free	Motor is not in stall condition. (caution: motor should be on no load)
	Parameter Group 19 : Vector Control 1			
3	P19. 19	Speed Control PI Gain Selection	[1] Result by Auto Tuning	Use speed control PI Gain with the value of Auto tuning.
	Main Menu Page[3] Auto Tuning			
4	M3-[1]	Execute the "Motor Tuning" (Refer to chapter 7.3)		
5	M3-[2]	Execute the "Speed Tuning" (Refer to chapter 7.3)		

Move to "Chapter A.4 Speed reference and setting of Digital input." → ↓↓below

► **In case that a brake is installed to the motor and it cannot be opened while auto-tuning**
(Auto Tuning = [2] Speed Tuning cannot be executed in this case)

Setting order	Parameter Group 1 : Control Setup[Motor 1] : control Setting for motor 1			
	Par.Number	**Parameter Name**	**Set Value**	**Description**
1	P1. 6	Control Method	[3] Vector_Ctrl	Vector Speed Control
	Parameter Group 14 : Auto Tuning Configuration : Auto-Tuning Setting			
2	P14. 0	Motor Tuning Condition	[1] Locked	Motor is in stall condition
	Main Menu Page[3] Auto Tuning			
3	M3-[1]	Execute the “Motor Tuning” (Refer to the chapter 7.3)		
	Parameter Group 19 : Vector Control [Motor 1]			
4	P19. 19	Speed PI Gain	[0] Default	Use Default values for PI Gain of Speed Control Loop P19. 22, P19. 23 can be adjusted for user’s desire.

Move to the “chapter A.4 speed reference and setting of Digital input” → ↓ Below

A.4 Speed Reference and Setting of Digital Input

This is the setting method to compose the system using analog input and Digital input like figure A-1 Basic Design. In this case, SOHO VD inverter recognizes the Analog input as a speed reference if the multi-step digital input is not detected. If there is one or more multi-step digital input is detected, the inverter automatically recognizes it as the speed reference.

(1) Parameter setting for Voltage (0[-10]~10V) reference + Multi-Step speed reference

Setting order	Parameter Group 3 : Reference Setup 1 : Speed or Frequency reference for motor 1			
	Par.Number	**Parameter Name**	**Set Value**	**Description**
1	P3. 0	RUN/STOP Method	[0] Terminal	RUN/STOP with DI.01 and DI.02
2	P3. 1	Reference Method	[0] Terminal	Use Analog or Digital input for speed or frequency reference.
	Parameter Group 6 : Analog Input Setup : Setting for Analog input			
	Par.Number	**Parameter Name**	**Set Value**	**Description**
3	P6. 0	Analog Reference Source	AI 1	Use only r1 for Analog Input **(Input analogue signal to the #3 and #4 terminals)**
4	P6. 1	Analog Input 1 Function	AI 1	Use r1 for AI1
5	P6. 2	Analog Input 1 Type	[0] 0~10V	The type of speed reference Use 0 ~ 10 V
	Parameter Group 8 : Digital Input Setup : Setting for Digital input			
6	P8. 0	RUN/STOP	[0] 1.FWD / 2.REV	Set Digital Inputs for RUN/STOP **(Connect to #7 and #8 terminals.)**
7	P8. 1	DI.03 Function	[1] Drive En.	Set DI.03 Function to “Drive Enable” **(Connect #9 terminal.)**
8	P8. 2	DI.04 Function	[10] Ext Fault A	Set DI.04 Function to “External Fault” (A contact) **(Connect #10 terminal.)**
9	P8. 3	DI.05 Function	[6] Fault Reset	Set DI.05 Function to “Fault Reset” **(Connect #11 terminal.)**
10	P8. 4	DI.06 Function	[2] MultiStep.0	Set DI.06 Function to “Multi Step 0” **(Connect #13 terminal.)**
11	P8. 5	DI.07 Function	[3] MultiStep.1	Set DI.07 Function to “Multi Step 1”

				(Connect #14 terminal.)
12	P8. 6	DI.08 Function	[4] MultiStep.2	Set DI.08 Function to “Multi Step 2” (Connect #15 terminal.)

Move to “chapter A.5 Setting of Digital output and Analog output” → Page A-10

(2) Parameter setting for current (0[4]~20mA) input reference + Multi-step reference

Order	Parameter Group 3 : Reference Setup 1 : Set of speed and frequency reference of motor1			
	Code	Parameter Name	Set Value	Explanation
1	P3. 0	RUN/STOP Method	[0] Terminal	RUN/STOP with DI.01 & DI.02
2	P3. 1	Ramp Function Input Source	[0] Terminal	Use Analog input and Multi Step for speed or frequency reference
	Parameter Group 6 : Analog Input Setup : Set of analogue input			
3	P6. 0	Analog Reference Source	[2] AI 2	Use the terminal of Analog Input 2 for analog input (Terminal No. #5, #6)
4	P6. 15	Analog Input 2 Function	[1] AI	Use Analog Input 1.
5	P6. 16	Analog Input 2 Type	[2] 4~20mA	Use 4~20mA for input
			[3] 0~20mA	Use 0~20mA for input
	Parameter Group 8 : Digital Input Setup : Digital input setting			
6	P8. 0	RUN/STOP	[0] 1.FWD / 2.REV	Set Digital Inputs for RUN/STOP (Connect to #7 and #8 terminals.)
7	P8. 1	DI.03 Function	[1] Drive En.	Set DI.03 Function to “Drive Enable” (Connect #9 terminal.)
	Parameter Group 8 : Digital Input Setup : Digital input setting			
	Code	Parameter Name	Set Value	Explanation
8	P8. 2	DI.04 Function	[10] Ext Fault A	Set DI.04 Function to “External Fault” (A contact) (Connect #10 terminal.)
9	P8. 3	DI.05 Function	[6] Fault Reset	Set DI.05 Function to “Fault Reset” (Connect #11 terminal.)
	Parameter Group 8 : Digital Input Setup : Digital input setting			
10	P8. 4	DI.06 Function	[2] MultiStep.0	Set DI.06 Function to “Multi Step 0” (Connect #13 terminal.)
11	P8. 5	DI.07 Function	[3] MultiStep.1	Set DI.07 Function to “Multi Step 1” (Connect #14 terminal.)
12	P8. 6	DI.08 Function	[4] MultiStep.2	Set DI.08 Function to “Multi Step 2” (Connect #15 terminal.)

Move to the chapter “A.5 Setting of Digital output and analog output” →↓Below

A.5 Setting of Digital Output and Analog Output

Figure A-1 This is the setting method for digital output composition like basic design.

Order	Parameter Group 11 : Analog Output Configuration : Set of analogue output			
	Code	Parameter Name	Set Value	Explanation
1	P11. 0	AO 1 Output Selection	[2] Current	In parameter setting, set Analog Output to Motor Current (Connect to #17, #18, and #19 terminals.)
2	P11. 1	AO 1 Output Type	[0] 0~20mA	A range of Analog output is 0~20mA
			[1] 4~20mA	A range of Analog output is 4~20mA
3	P11. 5	AO 1 Output at 20mA	257%	When the set value of motor’s rating

				current, P1. 2, is 100% and the output of analogue is 20mA, the output value is set. (Current meter can display up to 100A so that P11. 5 should be as 100A / P1. 2 (38.9A)] X 100%=257%
	Parameter Group 12 : Digital Output Setup : Set of digital input			
4	P12. 0	DO 1 Function	[4] Motor Brake	Set Digital Output Function to Magnetic Brake of Motor. (When you use Motor Brake Control, refer to the Chapter 7.4.6 Brake Control Setting) **(Connect to #21, #22, and #23 terminals.)**
5	P12. 1	DO 2 Function	[2] Fault Out A	When Fault occurs, set Digital Output Function to work (A contact) **(Connect to #24, #25, and #26 terminals.)**
6	P12. 2	DO 3 Function	[1] Drive Ready	Operate when the inverter is ready **(Connect to #19 terminal.)**

Move to "chapter A.6 Setting of operation pattern" → Page A-11

A.6 Setting of Operation Pattern

This explains the parameter setting for the following operation pattern as Figure A-2.
The basic input method is figure A-1.

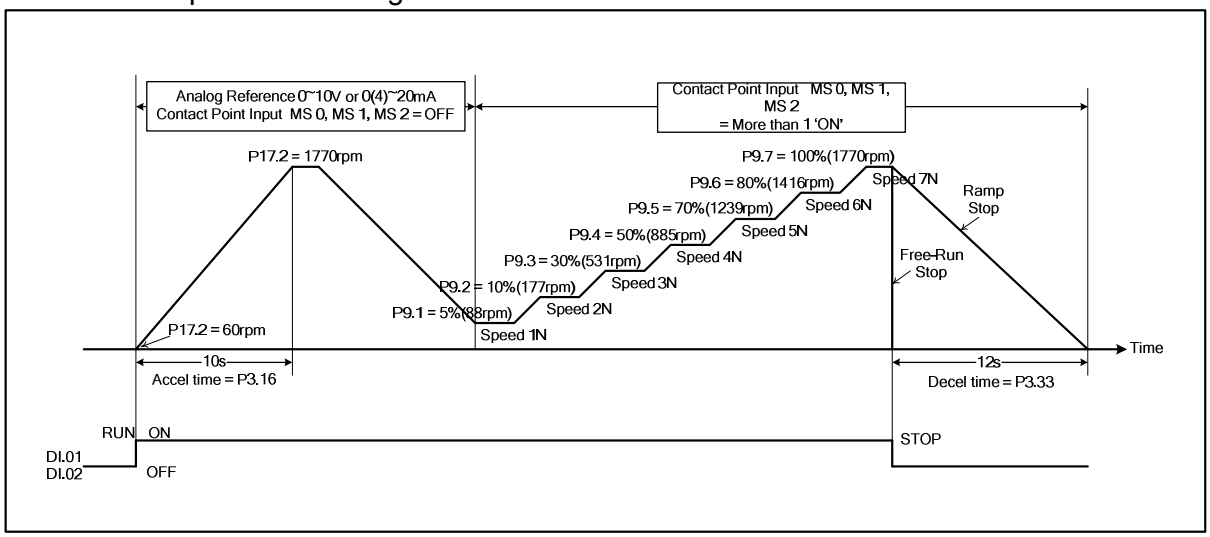


Figure A.6-1 Example of "Vector Speed Control" – operation pattern.

① Setting of Reference Setup

Order	Parameter Group 3 : Reference Setup			
	Code	**Parameter Name**	**Set Value**	**Explanation**
1	P3. 3	STOP Mode	[0] Ramp STOP	When Run-Input signal is turned OFF, inverter stops after Decel Time
			[1] Free-Run STOP	When Run-Input Signal is turned OFF, Inverter output is also turned OFF immediately.
2	P3. 9	Accel.Switching Ref[1-2]	Factory default =100%	100% = Rated Speed (P1. 5)or Rated Frequency(P1. 3) of Motor
3	P3. 16	Acceleration Time I. 1	10s	It is the accelerated time from 0 to the time that is set on P3. 26.
4	P3. 26	Decel.Switching Ref[1-2]	Factory default	100% = Rated Speed (P1. 5)or

			=100%	Rated Frequency(P1. 3) of Motor
5	P3. 33	Deceleration Time I. 1	12s	It is the decelerated time from the time that is set on P3. 26.

② Setting for Multi Step Reference

Order	Parameter Group 9 : Multi-Step Reference [Motor1] (100% = Rated Speed or Rated Frequency of Motor)			
	Code	Parameter Name	Set Value	Explanation
1	P9. 1	Multi Step 1 Reference	5%	60Hz X 5% = 3Hz
2	P9. 2	Multi Step 2 Reference	10%	60Hz X 10% = 6Hz
3	P9. 3	Multi Step 3 Reference	30%	60Hz X 30% = 18Hz
4	P9. 4	Multi Step 4 Reference	50%	60Hz X 50% = 30Hz
5	P9. 5	Multi Step 5 Reference	70%	60Hz X 70% = 42Hz
6	P9. 6	Multi Step 6 Reference	80%	60Hz X 80% = 48Hz
7	P9. 7	Multi Step 7 Reference	100%	60Hz X 100% = 60Hz

③ Operation pattern setting for Vector Control

Setting order	Par.Number			
	Par.Number	Parameter Name	Set Value	Description
1	P19. 3	Minimum Speed	60 rpm	Setting for Min. speed
2	P19. 4	Maximum Speed	100%	Setting for Max. speed (100%=P1. 5 set value=1770rpm)
3	P19. 5	Over Speed Limit	100%	Setting for Limit for over speed (P1. 5X125%=2212rpm)

<Setting completed!> If Brake control is used, refer to A.7 → Page A-13

A

A.7 Setting the Brake Control Parameters Using Digital Output

This explains the related parameters when the brake is controlled using digital output as figure A-3 and A-4 like the basic design of Figure A-1.

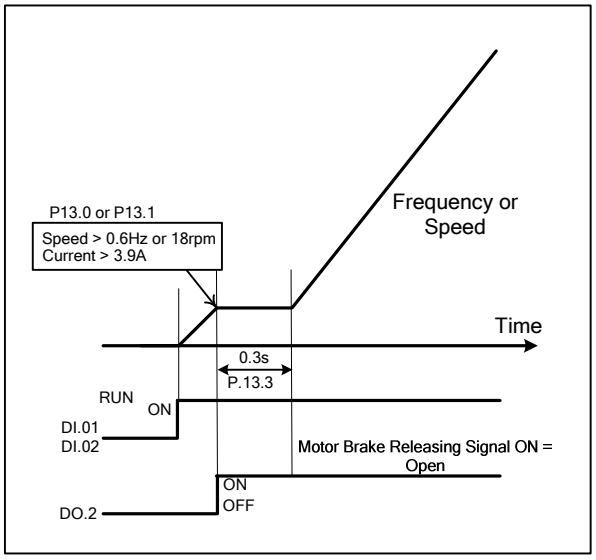


Figure A.7-1 Brake open signal

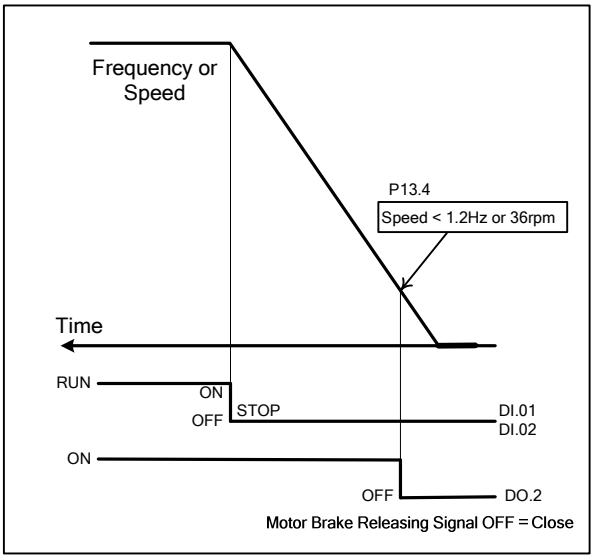


Figure A.7-2 Brake close signal

Setting order	Parameter Group 12 : Digital Output Setup : setting for Digital Output			
	Par.Number	Parameter Name	Set Value	Description
1	P12. 1	DO.2 Function	[4] Motor Brake	Set DO.2 to “motor brake”
	Parameter Group 13 : Magnetic Brake Control : setting for motor brake control			
2	P13. 0	M1 Locked state Up_Ref	1%	Speed or frequency reference when digital output is ON. (60Hz,1770rpm) X 1% = 0.6Hz, 18rpm
3	P13. 1	M1 Locked state Down_Ref	1%	
4	P13. 2	M1 Brake Open Current	10%	The amount of current when digital output is ON. 38.9A X 10% = 3.9A
5	P13. 3	M1 Start Delay Time	0.3s	The speed or frequency reference is kept for the set value of time. The time should be set depending on the elapsed time until the brake is opened completely after digital output is ON.
6	P13. 4	M1 Brake Close Speed Set	2%	Speed or frequency reference when digital output is OFF. (60Hz,1770rpm) X 2% = 1.2Hz, 36rpm
7	P13. 5	M1 Brake Open Torque Build Time	0.2s	This is delay time until contact point output is turned into ‘on’, after inputting the operating signal. At this time, output current must be more than set value in P13. 2

<Digital output setting is completed for brake control>

A

A.8 Vector Inverter System Order Code by a General Drawing (by Figure A-1)

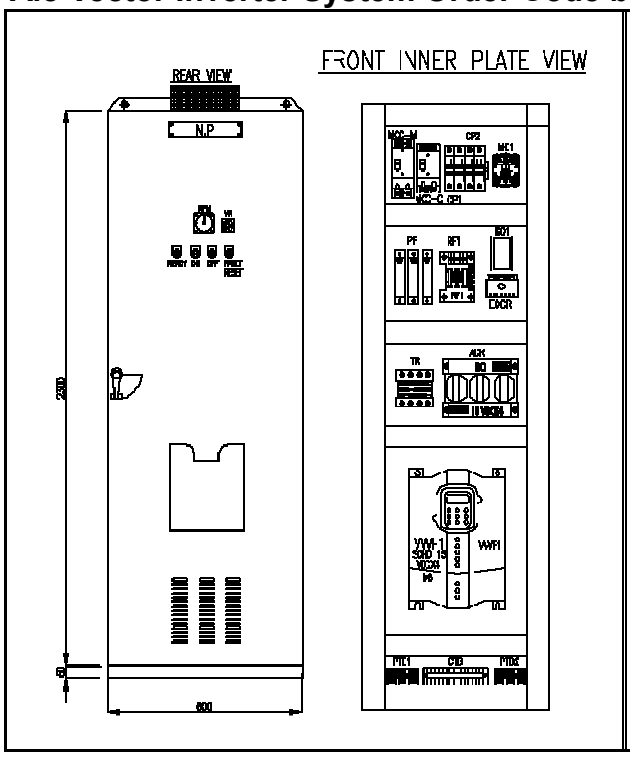


Figure A.8-1 In case of one Inverter

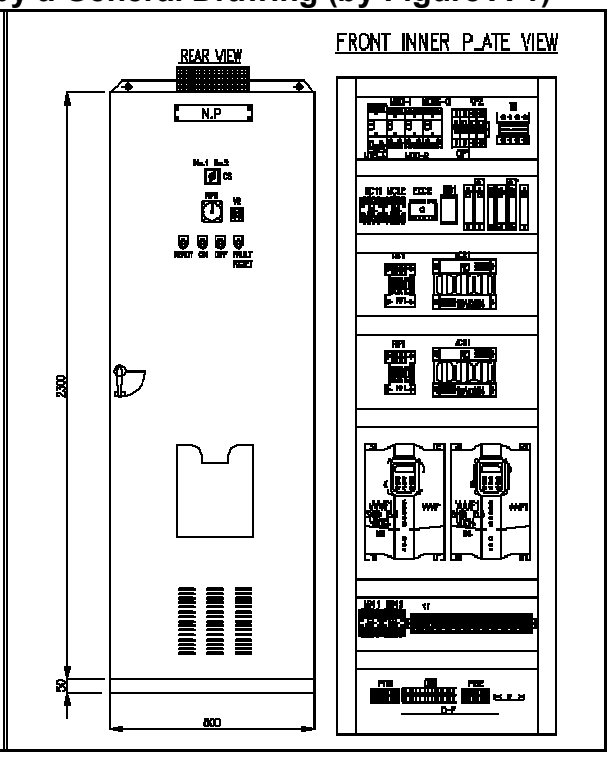


Figure A.9-2 In case of two Inverters

In case of consistence of SOHO-VD based on the basic drawing of the Figure A-1, Order Code is as below.

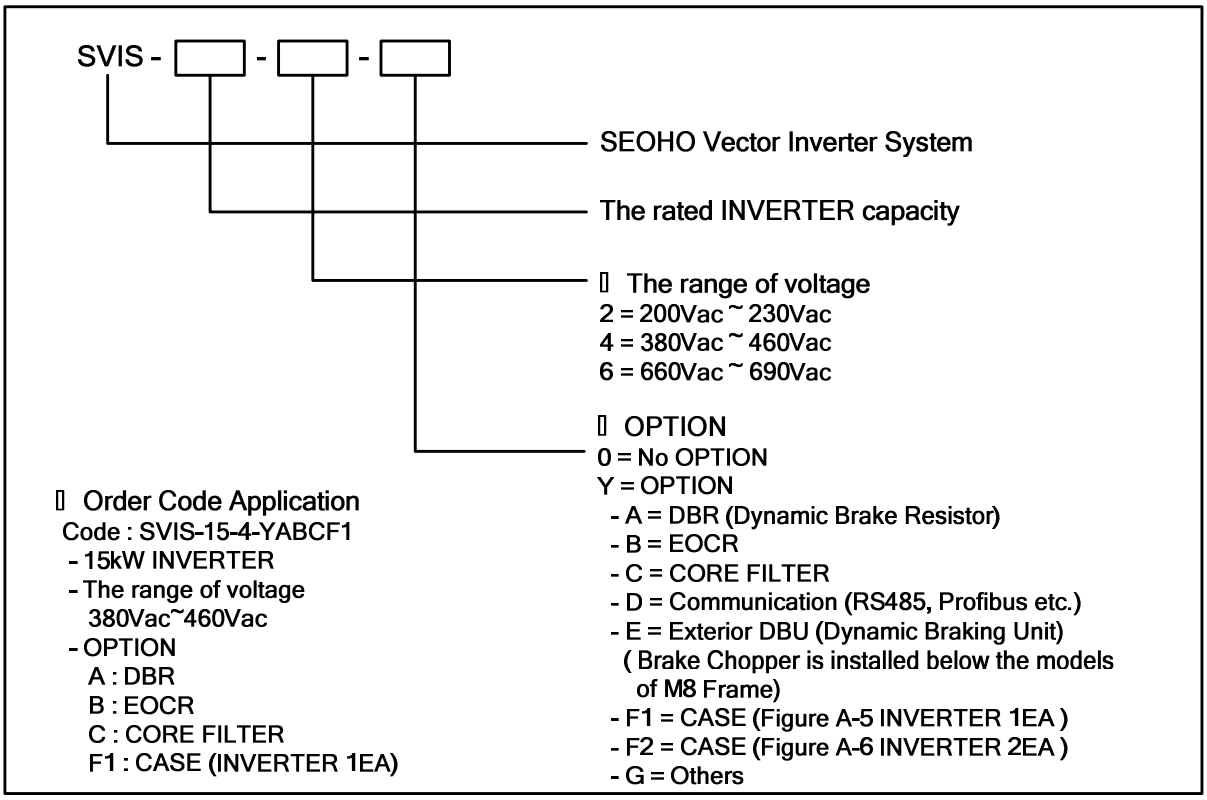


Figure A.8-3 Order Code of the vector Inverter System.

A

SVIS Installed Items

No	Item	Application	Note
1	Inverter	Motor Speed Control	
2	Main MCCB	Blocking for inputting the main power	
3	BKM	Blocking for Sequency, Fan power	
4	Reactor	Safe for the output of Inverter Motor	
5	RFI Filter	Reducing for Radio Noise	
6	M/C	For the input terminal of Inverter	
7	Relay	For Sequency Control	
8	Fan	Ventilation for inner space	
9	Transformer	For the supply of control main power	

Figure A.8-1 Installed items

Note

< Appendix>

B. Torque Control Application Operation Procedure

B. Torque Control Application Operation Procedure

B.1 Motor Specification & Control Method Setting

B.1.1 Basic Setting

Make the procedure of motor tuning and speed tuning.
Refer to chapter 7.4 and appendix A for the motor tuning and the speed tuning.

B.1.2 Motor Control Method Setting

(1) "S/L Vector Control" Setting

Order	Parameter Group 1 : Control Setup[Motor 1]			
	Code	**Parameter Name**	**Set Value**	**Explanation**
1	P1. 6	Control Method	[2] S/L_Vector	S/L Vector Control
	Parameter Group 17 : Sensor less Vector Control			
3	P17. 33	Torque Set_Value Source	~~[0] Speed_Ctrl_Out~~	If this value is [0], can not be operated with Torque Control
			[1] AI 2	Use Analog Input 2 for the torque reference
			[2] Operator	Use Keypad(Laptop) for the torque reference Set the value in M0-[4] Torque_Set
			[3] SyncCtrl_CommBus	Synchronous control for multiple motors. Master inverter makes and sends the torque reference to slaves.
4	P17. 35	Torque Limit Source	[0] Internal Limit	Use internal torque limit
			[1] AI 2	Use Analog Input 2 for the torque limit
			[2] SyncCtrl_CommBus	Synchronous control for multiple motors. Master inverter makes and sends the torque reference to slaves.
5	P17. 36	Speed Limiting_Ctrl Limit_Src	[0] Max. Speed (P17. 2)	When P17. 37 is [1], choose the source for speed limit
			[1] Ext_Speed Set_Value	
6	P17. 37	Speed Limit Control Action	[0] Trq->Nullify	Not use speed limit
			[1] Spd_Regulation	Use speed limit Set the source in P17. 36

(2) "Vector Control" Setting

Order	Parameter Group 1 : Control Setup[Motor 1]			
	Code	**Parameter Name**	**Set Value**	**Explanation**
1	P1. 6	Control Method	[3] Vector Control	Vector Control
	Parameter Group 17 : Sensor less Vector Control			
3	P19. 26	Torque Set_Value Source	~~[0] Speed_Ctrl_Out~~	If this value is [0], can not be operated with Torque Control
			[1] AI 2	Use Analog Input 2 for the torque reference
			[2] Operator	Use Keypad(Laptop) for the torque reference Set the value in M0-[4] Torque_ Set
			[3] SyncCtrl_CommBus	Synchronous control for multiple motors. Master inverter makes and sends the torque reference to slaves.
4	P19. 28	Torque Limit Source	[0] Internal Limit	Use internal torque limit
			[1] AI 2	Use Analog Input 2 for the torque limit
			[2] SyncCtrl_CommBus	Synchronous control for multiple motors. Master inverter makes and sends the torque reference to slaves.
5	P19. 29	Speed Limiting_Ctrl Limit_Src	[0] Max. Speed (P19. 2)	When P19. 37 is [1], choose the source for speed limit
			[1] Ext_Speed Set_Value	
6	P19. 30	Speed Limit Control Action	[0] Trq->Nullify	Not use speed limit
			[1] Spd_Regulation	Use speed limit Set the source in P19. 36

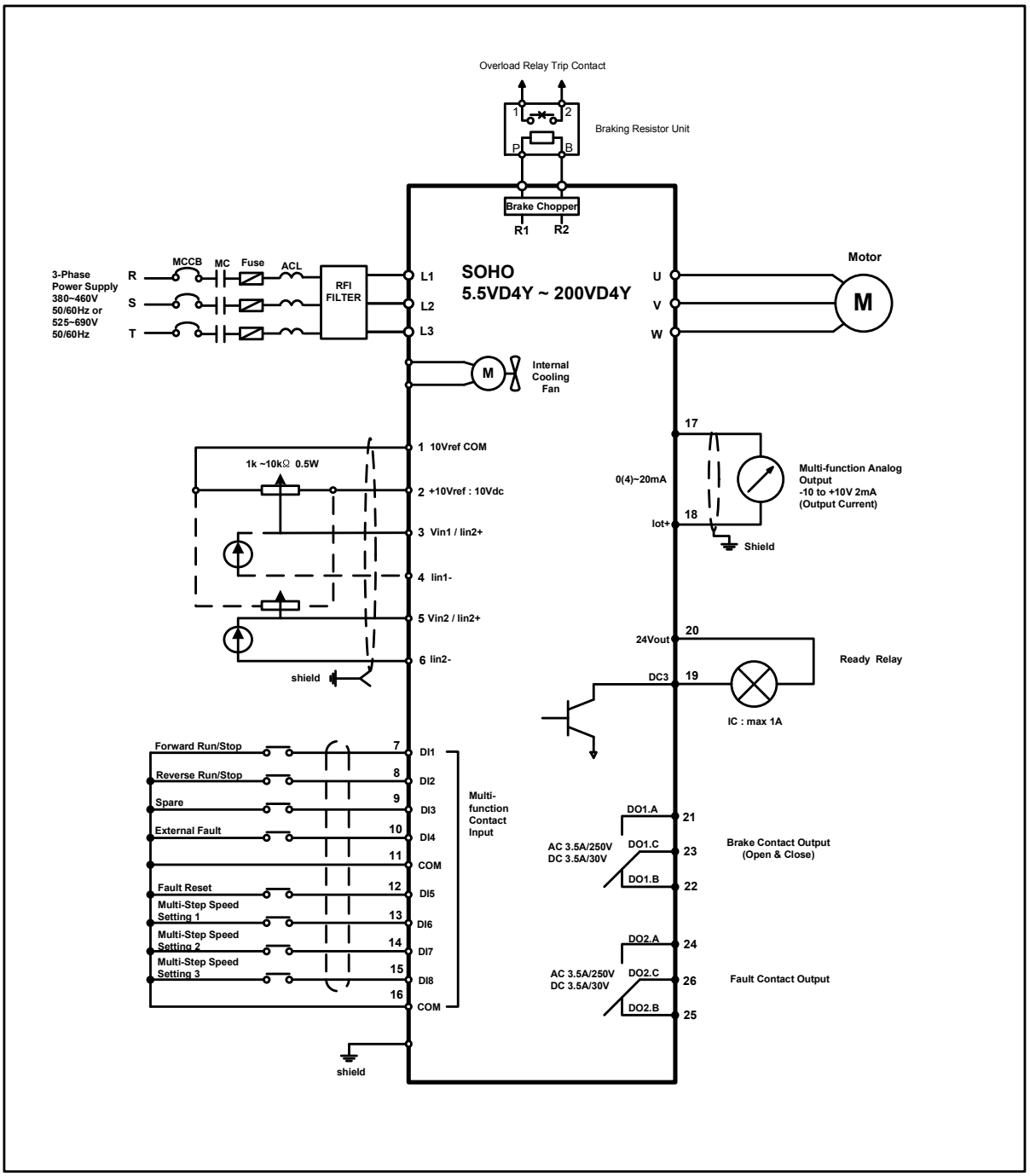
B

< Appendix>

C. I/O Control and Wiring Diagram for VD Inverter Applied Crane

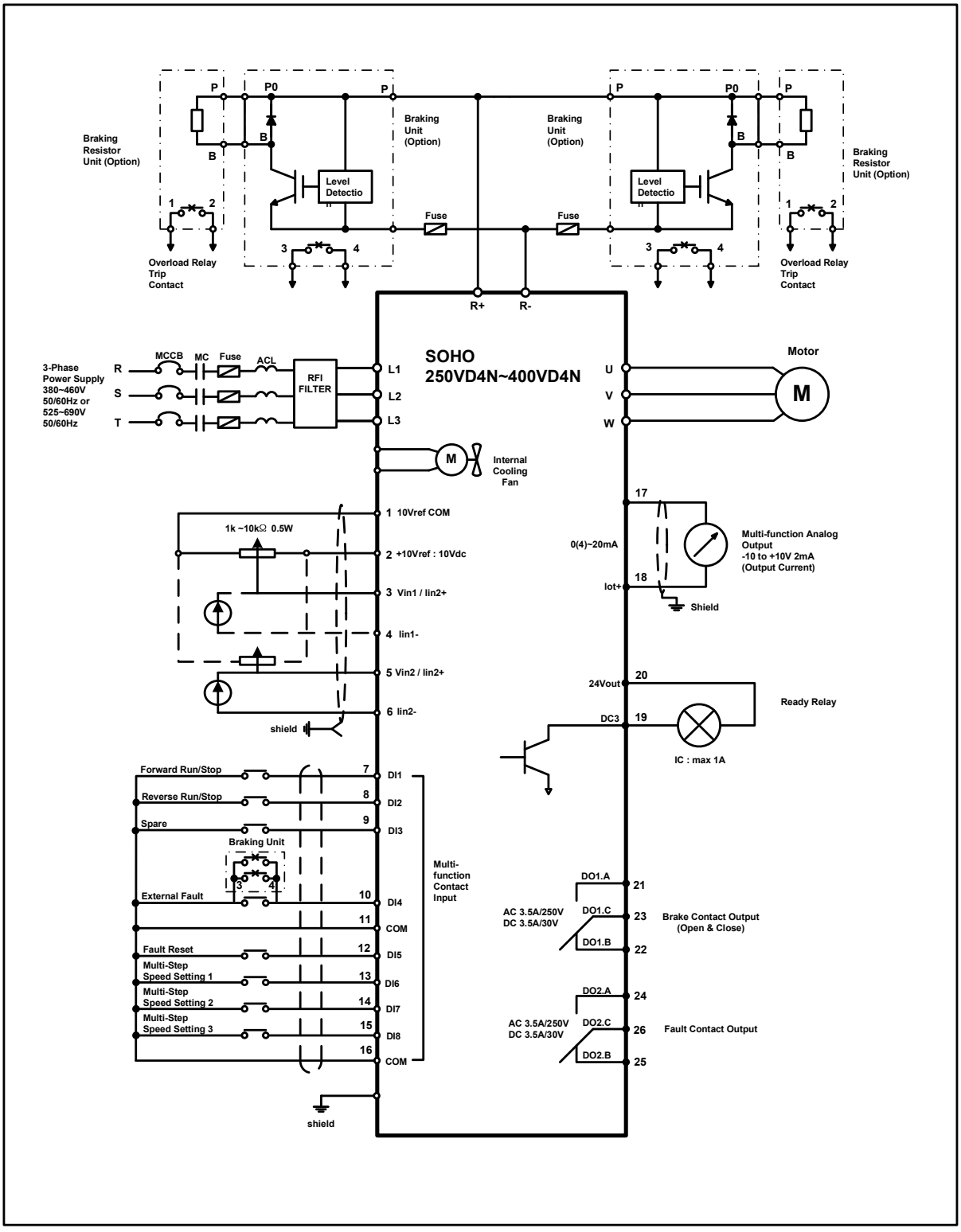
C. I/O Control and Wiring Diagram for VD Inverter Applied Crane

C.1 Hoist Motion (380V~480V / 5.5~200kW)



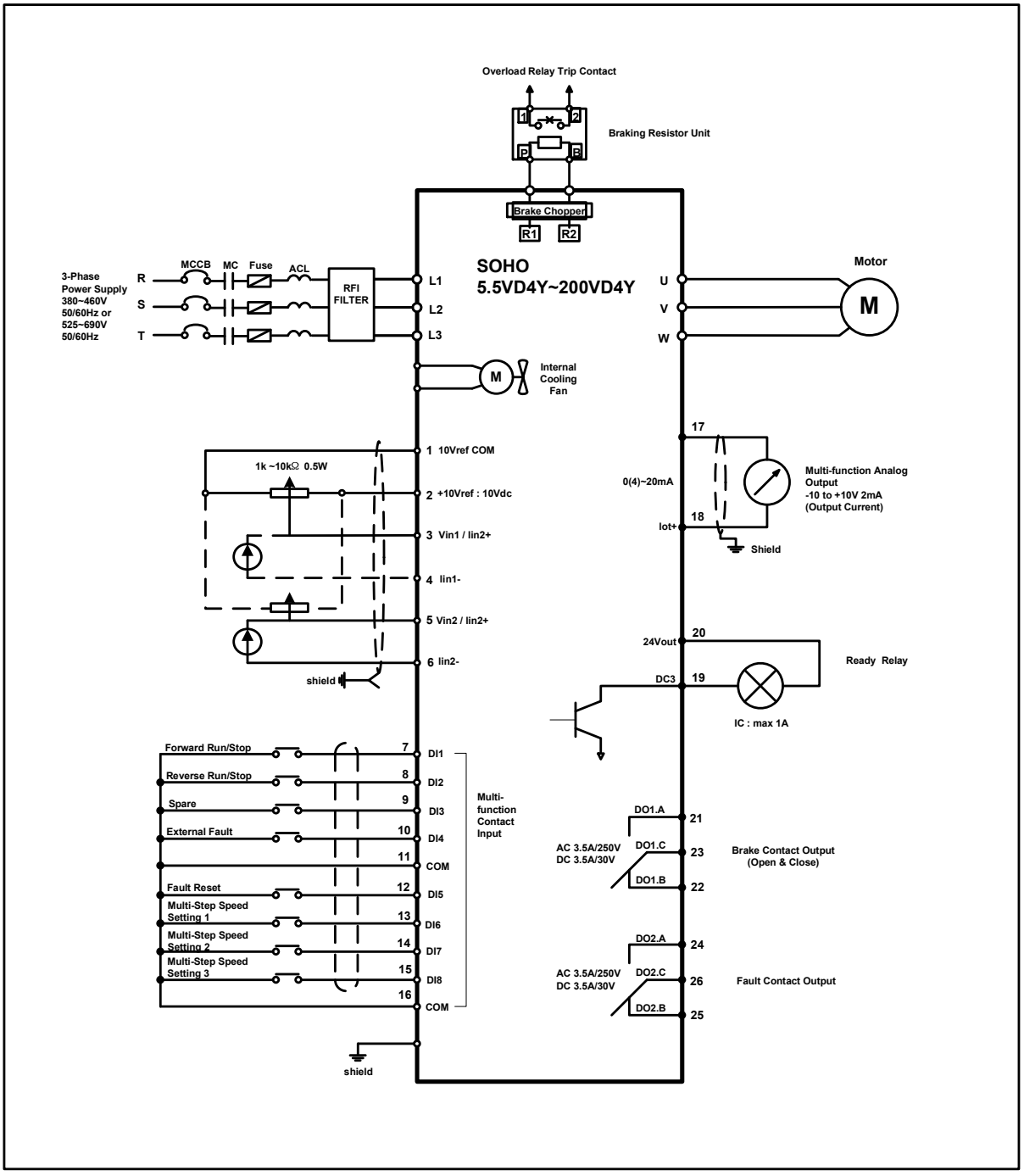
C

C.2 Hoist Motion (380V~480V / 250~400kW)



C

C.3 Traversing & Traveling Motion (380V~480V / 5.5~200kW)



Note

< Appendix>

D. Stopped or Special Products Information

Require headquarter to purchase of products in "Appendix C" because they are stopped or special products.

D.1 Power rating for stopped or special products

D1.1 200V Inverter output rating

I_{CT} = rated input and output current (constant torque load)

Main Voltage 200V - 230V, 50/60Hz. VD Series					
Inverter Type	Rated Output Power and Rated Current		Size	Dimension W×H×D(mm)	Weight (kg)
	P[kW]	I_{CT}[A]			
SOHO 5.5 VD2Y	5.5	22	K3A(1)	195x368x183	7
SOHO 7.5 VD2Y	7.5	30	K3B(2)	195x368x279	13
SOHO 11 VD2Y	11	43	K3C(3)	195x460x300	18
SOHO 55 VD2*	55	200	K8A(4)	368x965x380	-
SOHO 75 VD2*	75	270			
SOHO 90 VD2*	90	325	K8B(4)	400x1040x417	-

(1) Require headquarter to purchase of K3A because it has been substituted with K3AD from June/30/2020.

(2) Require headquarter to purchase of K3B because it has been substituted with K3BD from June/30/2020.

(3) Require headquarter to purchase of K3C because it has been substituted with K3CD from June/30/2020.

(4) Require headquarter to purchase of K8A and K8B.

Table D.1-1 200V Series stopped or special products of power ratings and dimensions

D.1.2 400V Inverter output rating

I_{CT} = rated input and output current (constant torque load)

Main Voltage 380V - 480V, 50/60Hz. VD Series					
Inverter Type	Rated Output Power and Rated Current		Size	Dimension W×H×D(mm)	Weight (kg)
	P[kW]	I_{CT}[A]			
SOHO 5.5 VD4Y	5.5	12	K3A(1)	195×368×183	7
SOHO 7.5 VD4Y	7.5	16			
SOHO 11 VD4Y	11	23.5			
SOHO 15 VD4Y	15	31	K3B(2)	195×368×279	13
SOHO 18.5 VD4Y	18.5	38	K3C(3)	195×460×300	18
SOHO 22 VD4Y	22	45			
SOHO 110 VD4*	110	212	K8A(4)	496×860×435	-
SOHO 132 VD4*	132	252			
SOHO 160 VD4*	160	305	K8B(4)	404×1040×424	-
SOHO 200 VD4*	200	382			
SOHO 250 VD4N	250	478	K9(5)	404×1380×557	150
SOHO 315 VD4N	315	596			
SOHO 400 VD4N	400	759	K10(6)	Refer to chapter D.2	192
SOHO 400 VD4N	400	759	K10B(7)	Refer to chapter D.2	352
SOHO 500 VD4N	500	929			375

(1) Require headquarter to purchase of K3A because it has been substituted with K3AD from June/30/2020.
(2) Require headquarter to purchase of K3B because it has been substituted with K3BD from June/30/2020.
(3) Require headquarter to purchase of K3C because it has been substituted with K3CD from June/30/2020.
(4) Require headquarter to purchase of K8A and K8B.
(5) Require headquarter to purchase of K9 because it has been substituted with K9B from Mar/30/2010.
(6) Require headquarter to purchase of K10 because it has been substituted with K10B from Mar/15/2011.
(7) Require headquarter to purchase of K10B because it has been substituted with K10C from Dec/15/2016.

Table D.1-2 400V Series stopped or special products of power ratings and dimensions

D.2 External Dimension

D.2.1 K3A

*** Require headquarter to purchase of K3A because it has been substituted with K3AD from June/30/2020.**

Voltage	Model
400V	5.5 VD 4Y
	7.5 VD 4Y
	11 VD 4Y

Voltage	Model
200V	5.5 VD 2Y

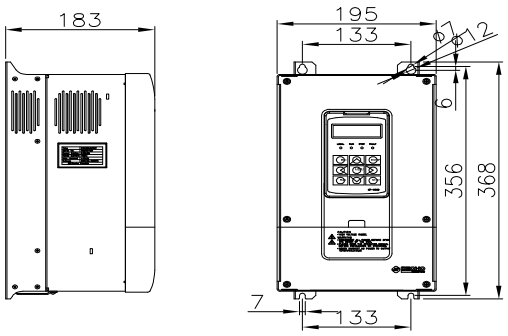


Figure D.2-1 K3A External dimension

D.2.2 K3B

*** Require headquarter to purchase of K3B because it has been substituted with K3BD from June/30/2020.**

Voltage	Model
400V	15 VD 4Y

Voltage	Model
200V	7.5 VD 2Y

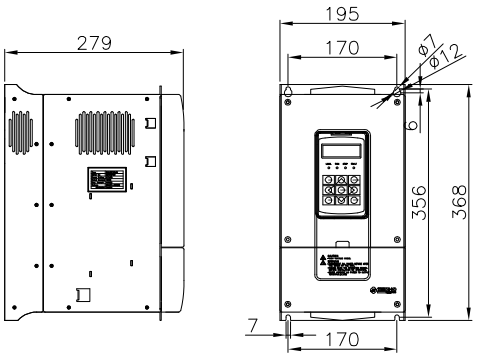


Figure D.2-2 K3B External dimension

D.2.3 K3C

*** Require headquarter to purchase of K3C because it has been substituted with K3CD from June/30/2020.**

Voltage	Model
400V	18.5 VD 4Y
	22 VD 4Y

Voltage	Model
200V	11 VD 2Y

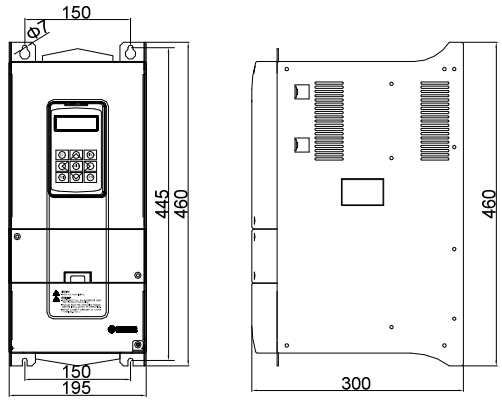


Figure D.2-3 K3C External dimension

D.2.4 K8A

*** Require headquarter to purchase of K8A**

Voltage	Model
400V	110 VD 4Y(N)
	132 VD 4Y(N)

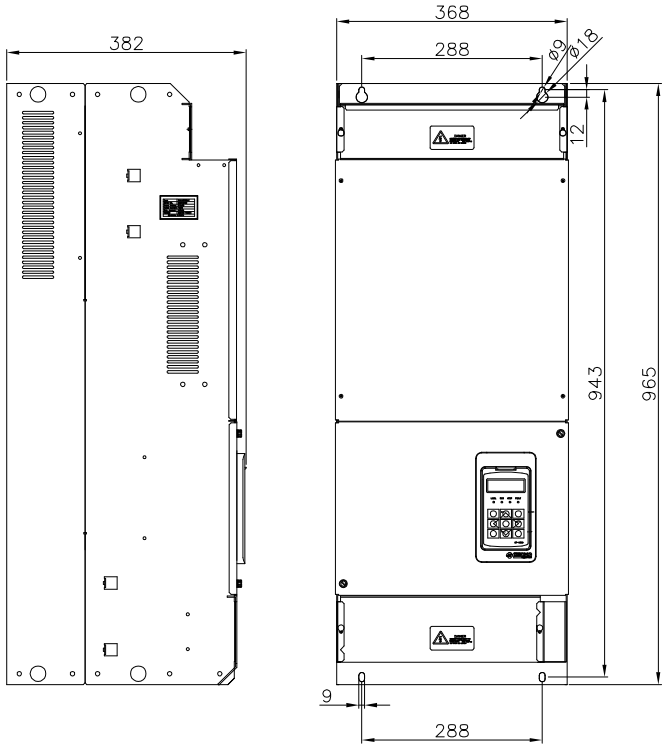


Figure D.2-4 K8A External dimension

D.2.5 K8B

*** Require headquarter to purchase of K8B**

Voltage	Model
400V	160 VD 4Y(N)
	200 VD 4Y(N)

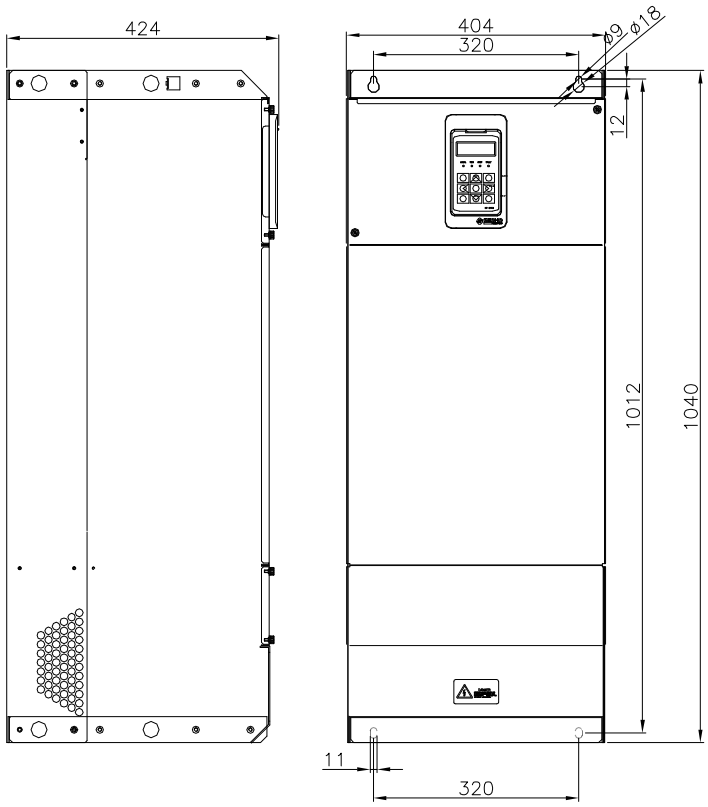


Figure D.2-5 K8B External dimension

D.2.6 K9

*** Require headquarter to purchase of K9 because it has been substituted with K9B from Mar/30/2010.**

Voltage	Model
400V	250 VD 4N
	315 VD 4N

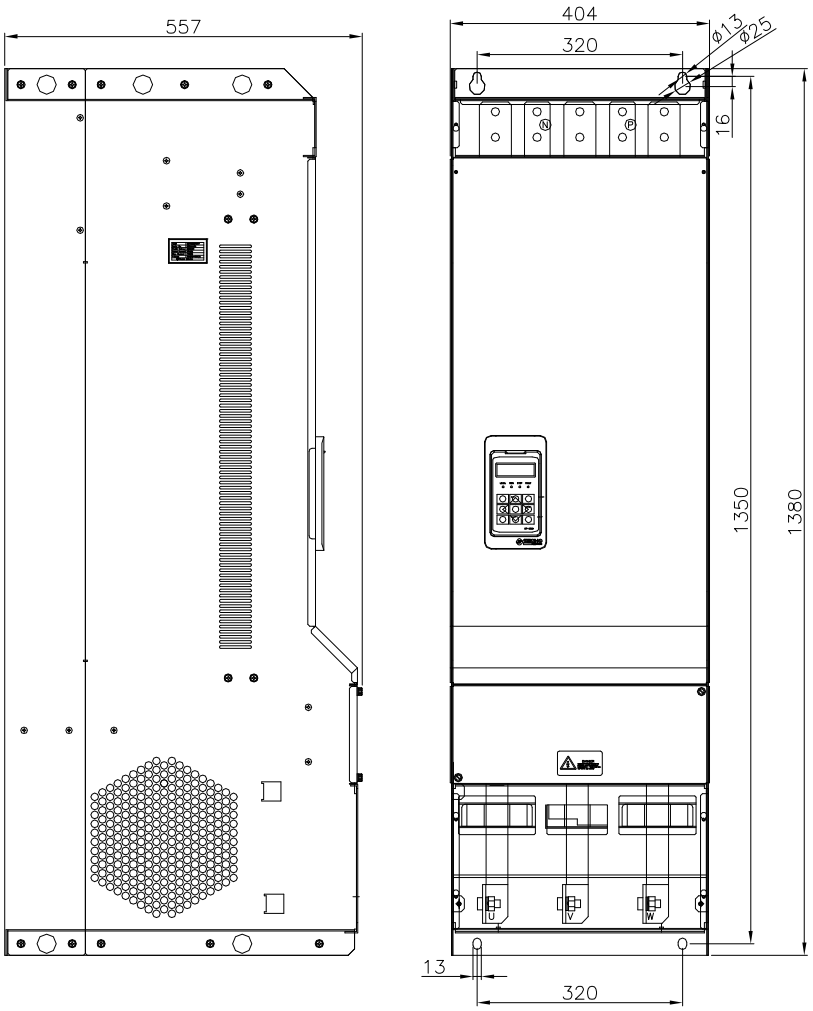


Figure D.2-6 K9 External dimension

D.2.7 K10

*** Require headquarter to purchase of K10 because it has been substituted with K10B from Mar/15/2011.**

Voltage	Model
400V	400 VD 4N

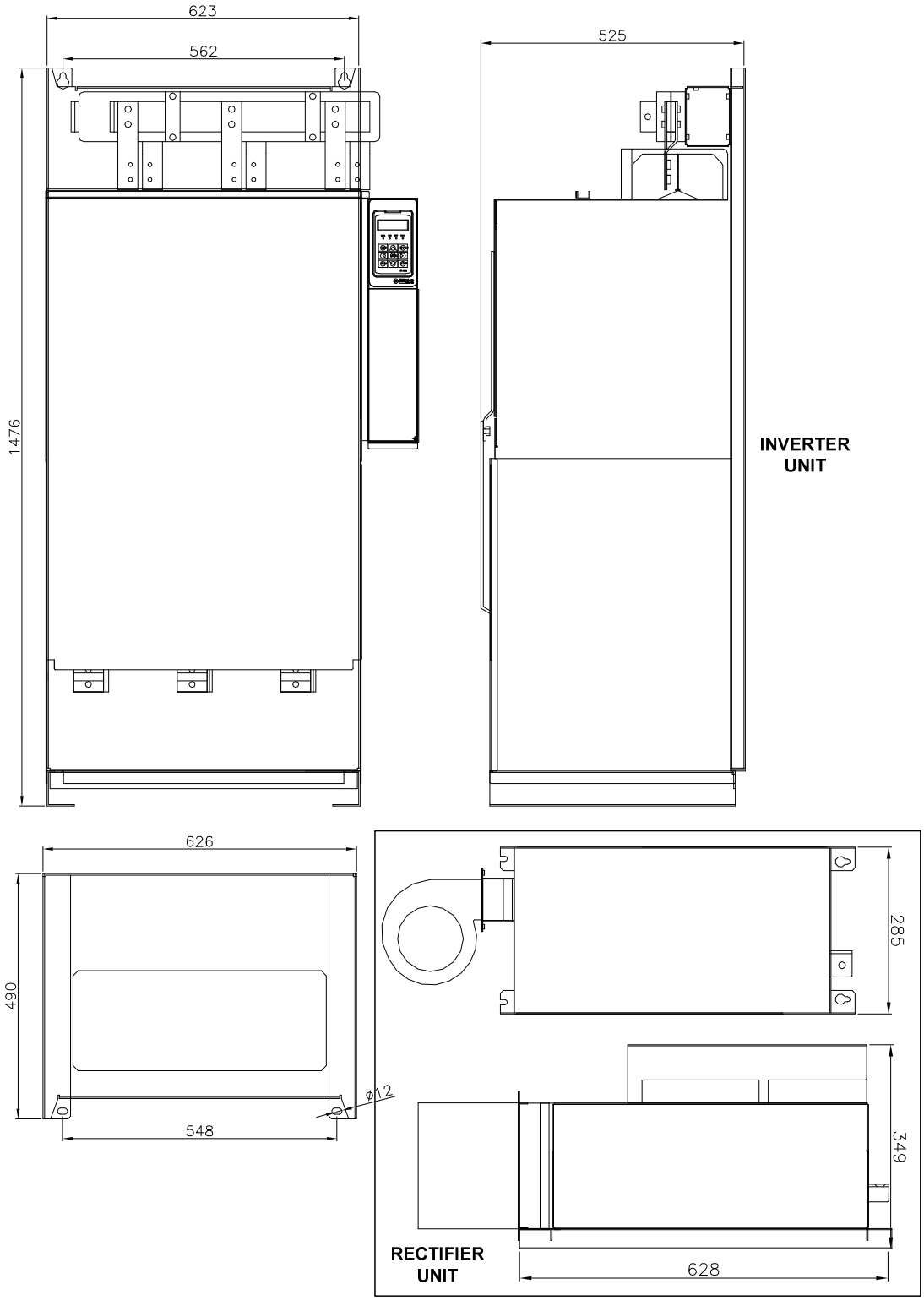


Figure D.2-7 K10 External dimension

D.2.8 K10B

*** Require headquarter to purchase of K10B because it has been substituted with K10C from Dec/15/2016.**

Voltage	Model
400V	400 VD 4N

Voltage	Model
400V	500 VD 4N

* Refer to FigureD.2-8(2) for rectifier unit of 400VD4Y and FigureD.2-8(3) for rectifier unit of 500VD4Y

<INVERTER UNIT>

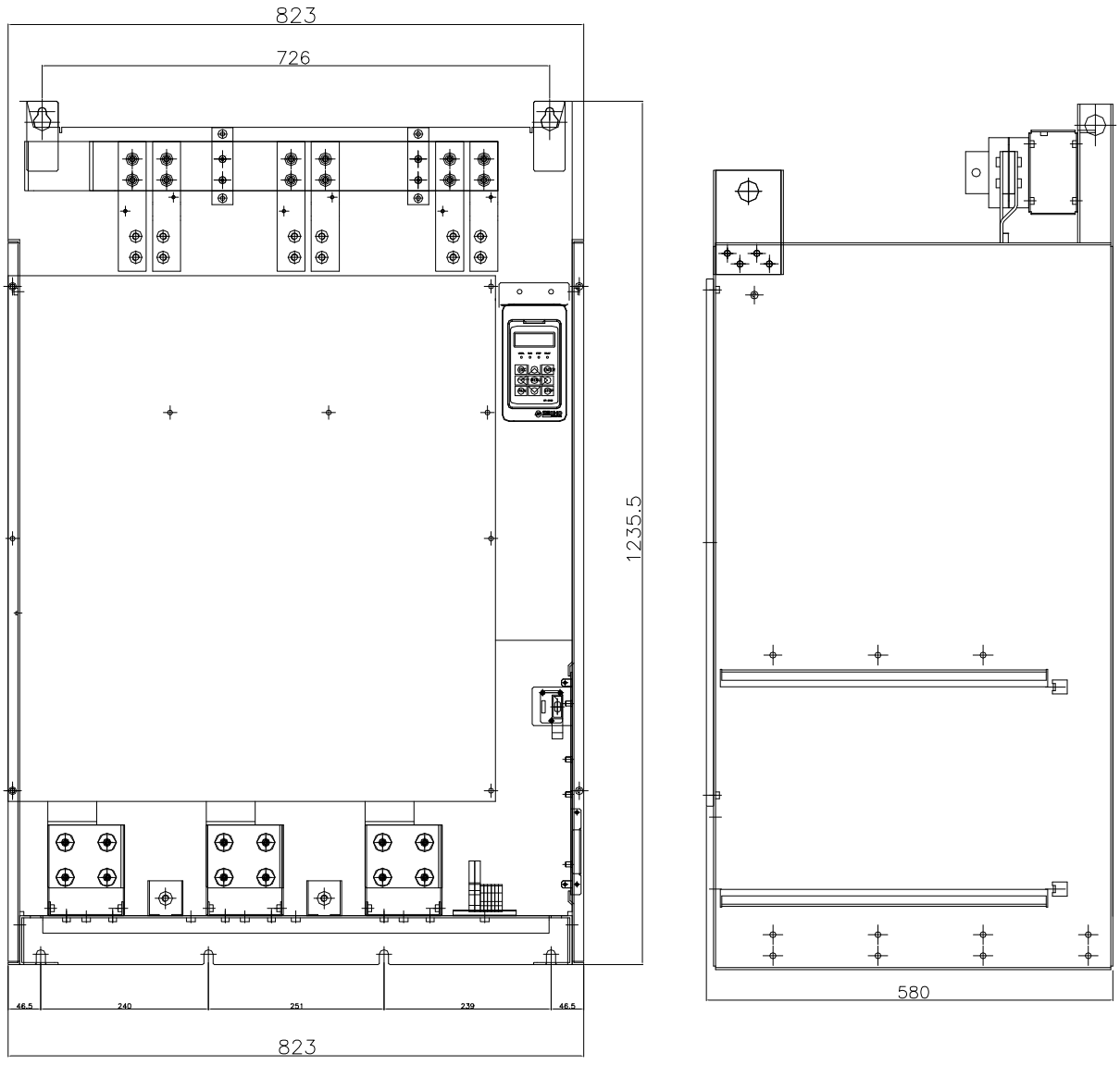


Figure D.2-8(1) K10B Inverter unit external dimension

<RECTIFIER UNIT>

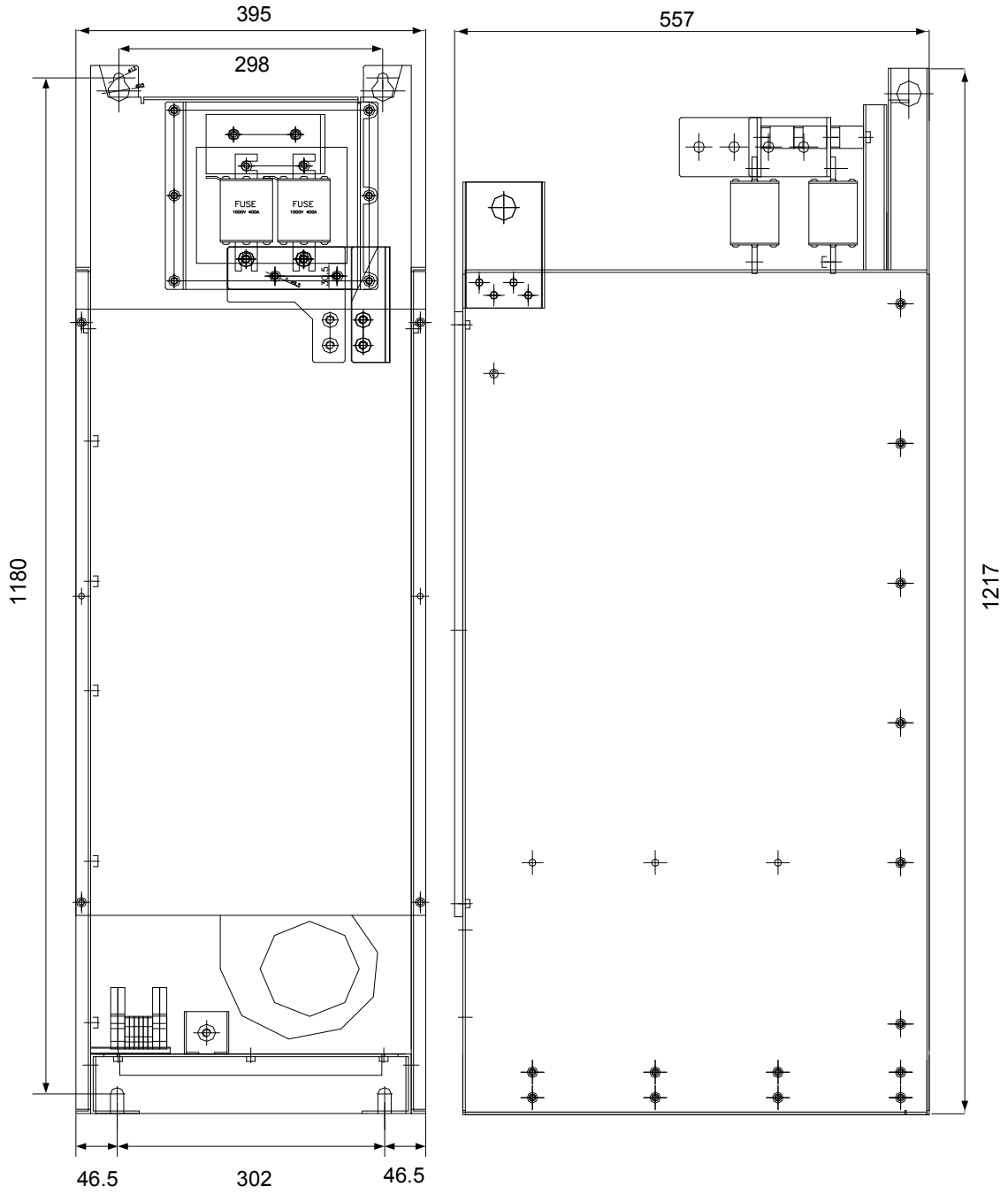


Figure D.2-8(2) 400VD4N(K10B)Rectifier unit external dimension

<RECTIFIER UNIT>

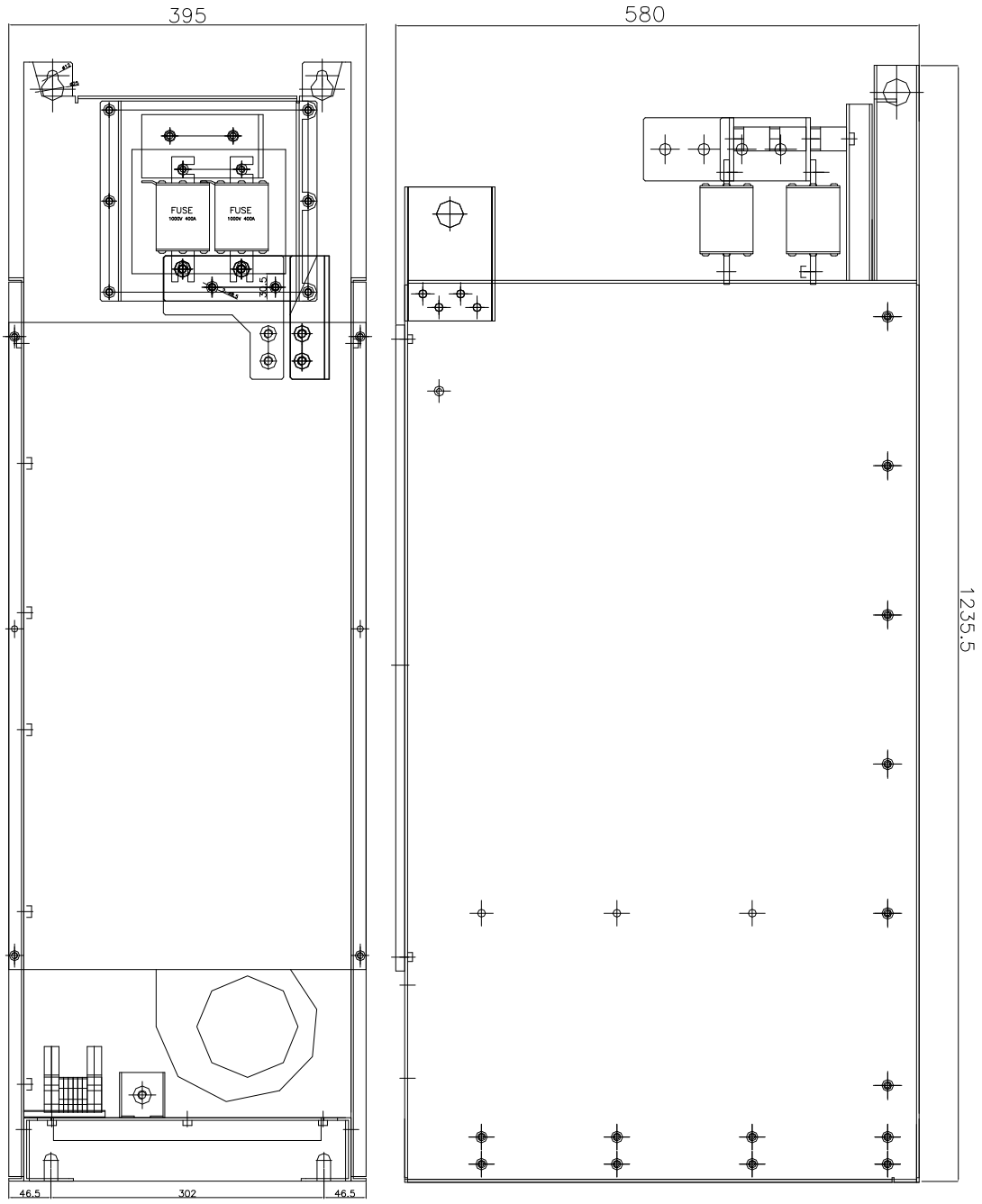


Figure D.2-8(3) 500VD4N(K10B) Rectifier unit external dimension

D

D.3 Wiring Diagram

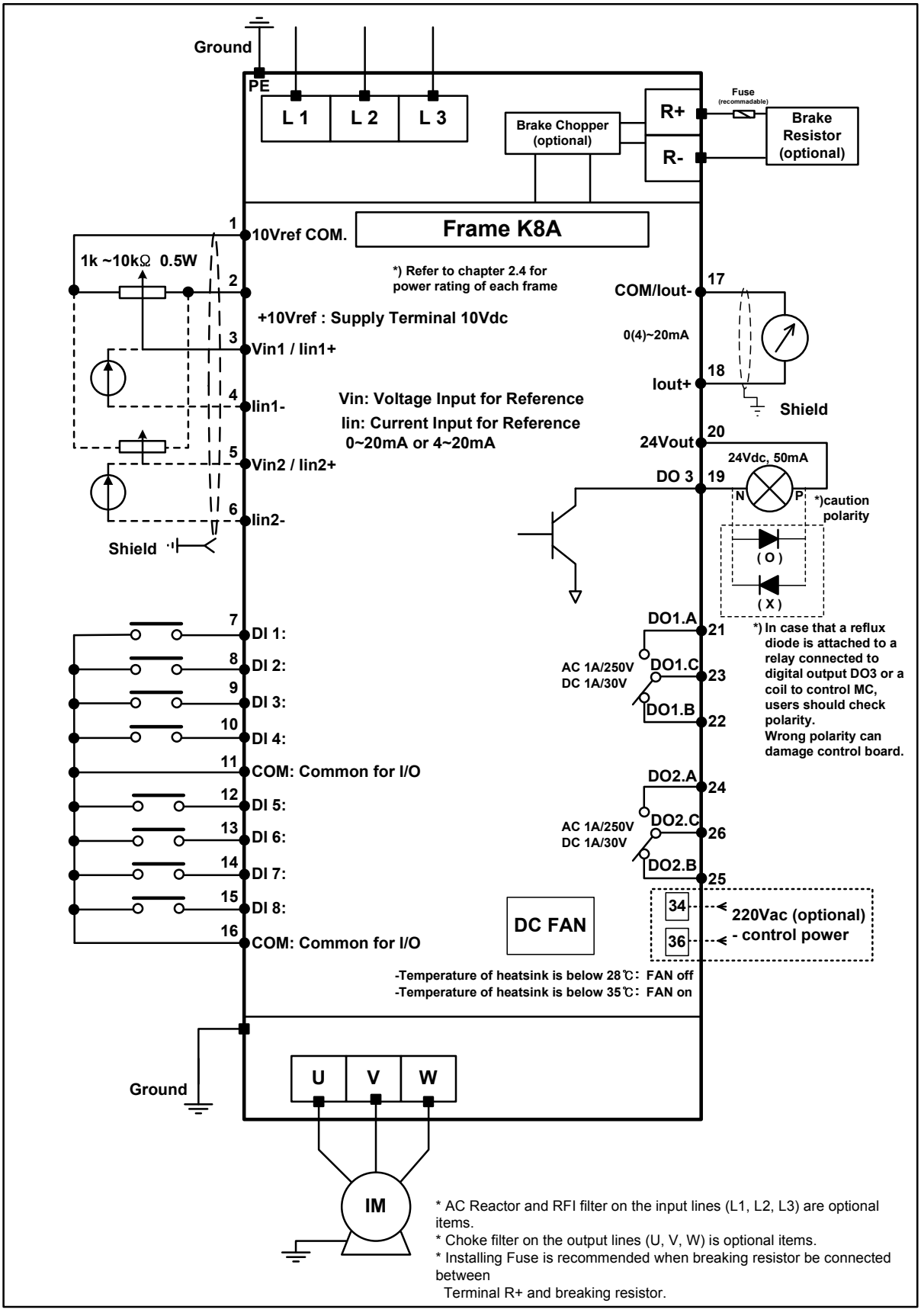


Figure D.3-1 SOHO VD inverter Frame K8A

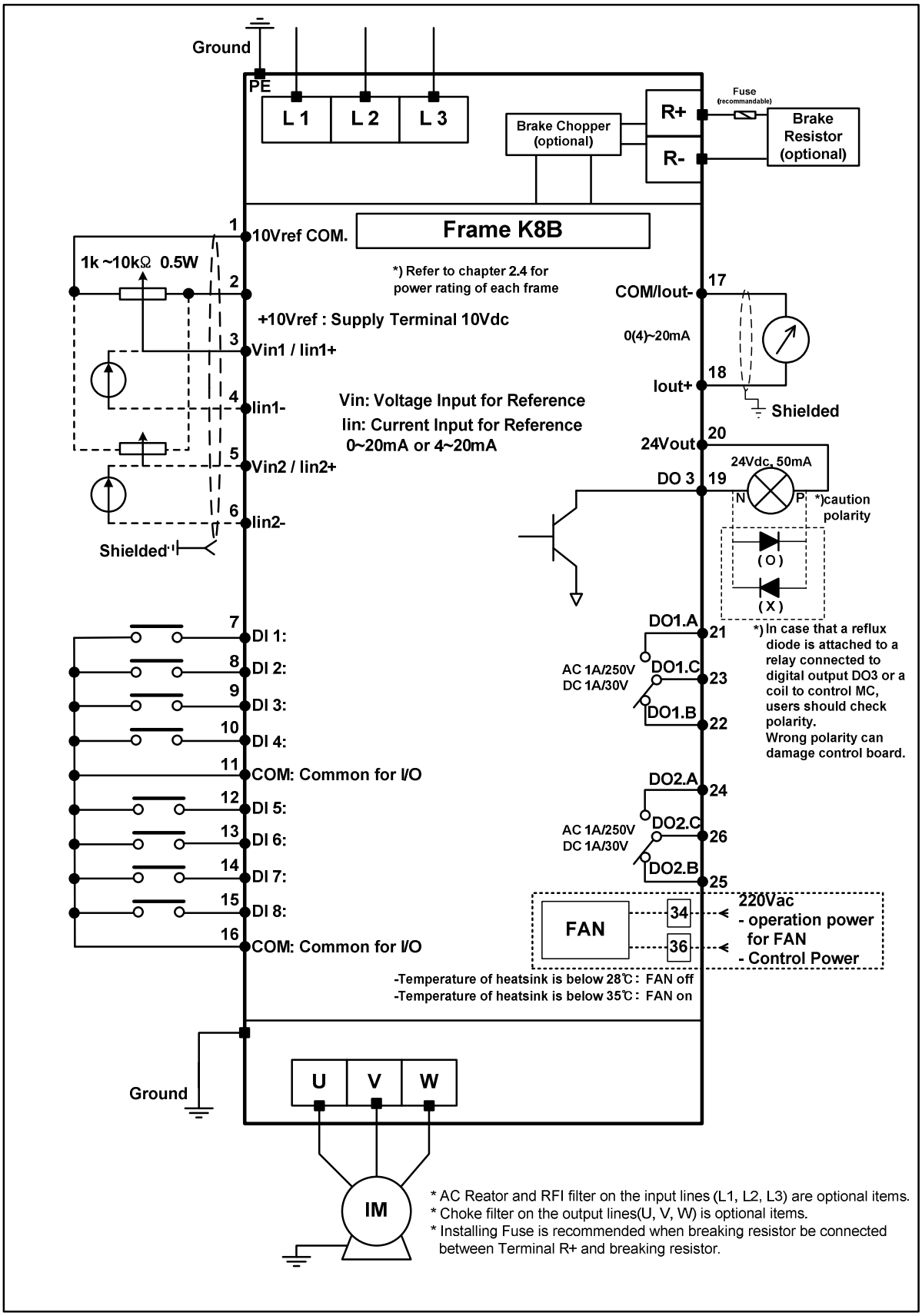


Figure D.3-2 SOHO VD inverter Frame K8B

D

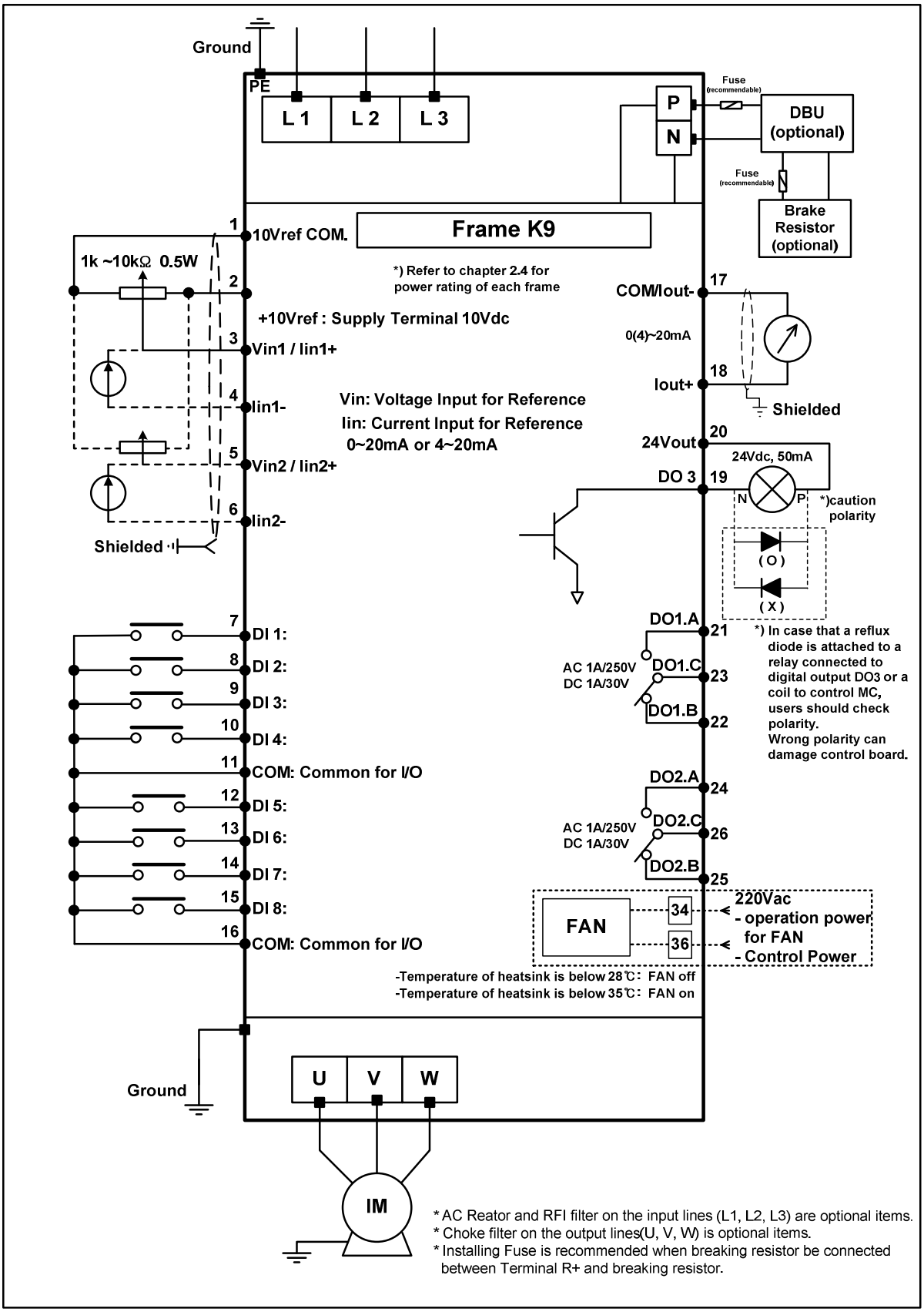


Figure D.3-3 SOHO VD inverter Frame K9

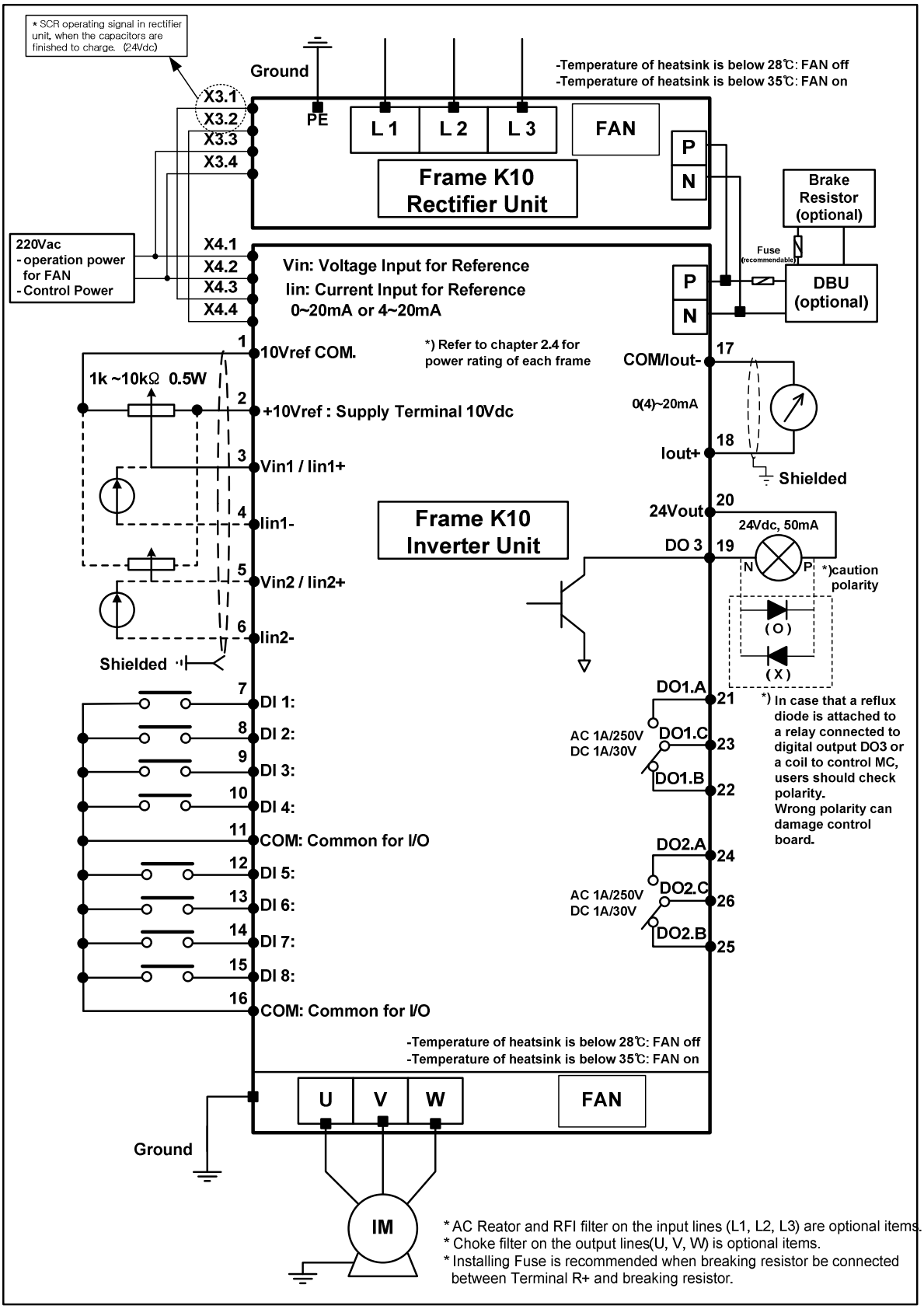


Figure D.3-4 SOHO VD inverter Frame K10

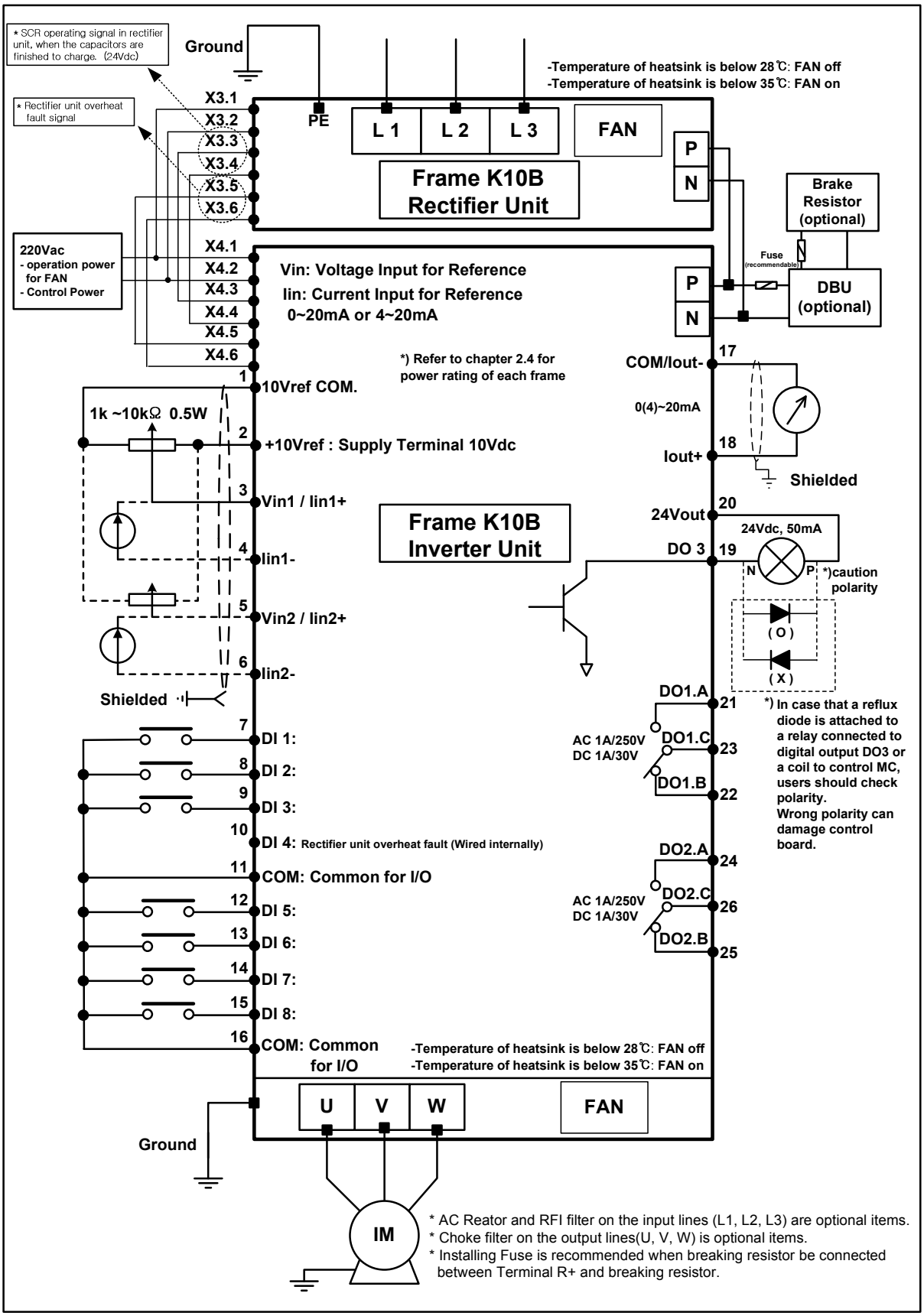


Figure D.3-5 SOHO VD inverter Frame K10B