Operation Manual

Goodrive Series
VFDs in Parallel Connection

SHENZHEN INVT ELECTRIC CO., LTD.

Preface

Implementing a large-power parallel connection solution on the Goodrive series universal products can extend the product power range to 3000kW, meeting market demand.

This manual applies to Goodrive series variable-frequency drives (VFDs).

If the product is ultimately used for military affairs or weapon manufacture, comply with the export control regulations in the Foreign Trade Law of the People's Republic of China and complete related formalities.

The manual is subject to change without prior notice.

Contents

1 Product overview

Goodrive series VFDs in parallel connection are only designed for power expansion, and their functions and performance are completely consistent with the corresponding series VFDs.

1.1 Product model

Power (kW)	380V parallel VFD model		660V parallel VFD model	
	Power (kW)	Qty	Power (kW)	Qty
560	280	2	-	-
630	315	2	-	-
710	355	2	355	2
800	400	2	400	2
1000	500	2	500	2
1200	400	3	630	2
1500	500	3	500	3
2000	500	4	500	4
2500	500	5	630	4
3000	500	6	630	5

1.2 Product ratings

1.2.1 Ratings of AC 3PH 380V(-15%)–440V(+10%)

Rating output power (kW)	Rated input current (A)	Rated output current (A)
560	1090	1060
630	1220	1200
710	1250	1300
800	1430	1440
1000	1780	1720
1200	2145	2160
1500	2670	2580
2000	3560	3440
2500	4450	4300
3000	5340	5160

1.2.2 Ratings of AC 3PH 520V(-15%)–690V(+10%)

Rating output power (kW)	Rated input current (A)	Rated output current (A)
710	720	760
800	822	860
1000	1036	1080
1200	1310	1360

Rating output power (kW)	Rated input current (A)	Rated output current (A)
1500	1554	1620
2000	2072	2160
2500	2620	2720
3000	3275	3400

1.3 Product dimensions and weight

1.3.1 Dimensions and weight of AC 3PH 380V(-15%)–440V(+10%)

<table>
<tr><th>Power (kW)</th><th>Outline dimensions W×H×D (mm)</th><th>Package dimensions W×H×D (mm)</th><th>Standard weight (kg)</th><th>Gross weight (kg)</th></tr>
<tr><td>560</td><td rowspan="2">1447×1419.9×442.5</td><td rowspan="2">845×605×1625</td><td>432</td><td>492</td></tr>
<tr><td>630</td><td>462</td><td>522</td></tr>
<tr><td>710</td><td rowspan="3">1323×1900×636.3</td><td rowspan="8">855×795×2130</td><td>814</td><td>928</td></tr>
<tr><td>800</td><td>814</td><td>928</td></tr>
<tr><td>1000</td><td>820</td><td>934</td></tr>
<tr><td>1200</td><td rowspan="2">1956×1900×636.3</td><td>1221</td><td>1392</td></tr>
<tr><td>1500</td><td>1230</td><td>1401</td></tr>
<tr><td>2000</td><td>2589×1900×636.3</td><td>1640</td><td>1868</td></tr>
<tr><td>2500</td><td>3222×1900×636.3</td><td>2050</td><td>2335</td></tr>
<tr><td>3000</td><td>3855×1900×636.3</td><td>2460</td><td>2802</td></tr>
</table>

1.3.2 Dimensions and weight of AC 3PH 520V(-15%)–690V(+10%)

<table>
<tr><th>Power (kW)</th><th>Outline dimensions W×H×D (mm)</th><th>Package dimensions W×H×D (mm)</th><th>Standard weight (kg)</th><th>Gross weight (kg)</th></tr>
<tr><td>710</td><td>1447×1419.9×442.5</td><td>845×605×1625</td><td>450</td><td>510</td></tr>
<tr><td>800</td><td rowspan="3">1323×1900×636.3</td><td rowspan="7">855×795×2130</td><td>820</td><td>934</td></tr>
<tr><td>1000</td><td>820</td><td>934</td></tr>
<tr><td>1200</td><td>820</td><td>934</td></tr>
<tr><td>1500</td><td>1956×1900×636.3</td><td>1230</td><td>1401</td></tr>
<tr><td>2000</td><td rowspan="2">2589×1900×636.3</td><td>1640</td><td>1868</td></tr>
<tr><td>2500</td><td>1640</td><td>1868</td></tr>
<tr><td>3000</td><td>3222×1900×636.3</td><td>2050</td><td>2335</td></tr>
</table>

2 Dimension drawings

2.1 Installation dimension of single VFD

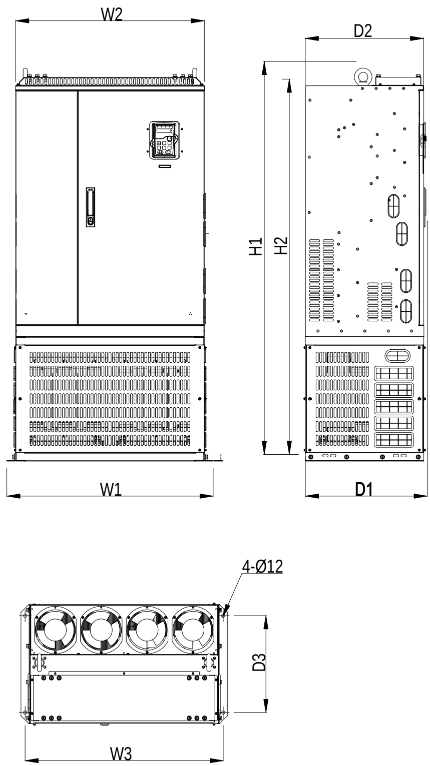


Figure 2-1 Single-unit installation dimension for 380V 280–315kW and 660V 355 kW models

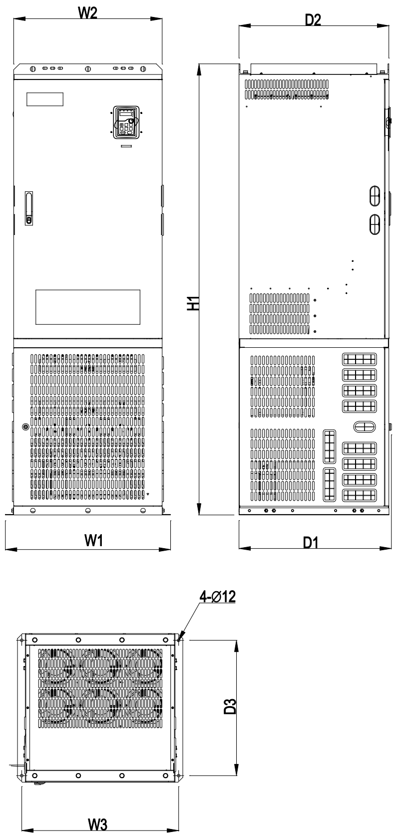


Figure 2-2 Single-unit installation dimension for 380V 355–500kW and 660V 400–630kW models

Power (kW)	380V single VFD (unit: mm)								
	W1	W2	W3	H1	H2	D1	D2	D3	Hole diameter
280–315	749	685	719	1419.9	1356	442.5	429.5	350	Ø 12
355–500	690	620	655	1900	-	636.3	625.5	570	Ø 12

Power (kW)	660V single VFD (unit: mm)								
	W1	W2	W3	H1	H2	D1	D2	D3	Hole diameter
355	749	685	719	1419.9	1356	442.5	429.5	350	Ø 12
400–630	690	620	655	1900	-	636.3	625.5	570	Ø 12

2.2 Installation dimension of VFDs in parallel connection (recommended)

Note: The recommended parallel installation method facilitates air intake inside the product and dissipates heat better, but requires a relatively large installation space.

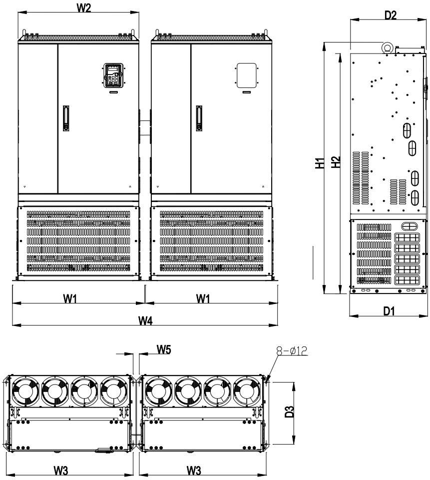


Figure 2-3 Parallel installation dimension for 380V 560–630kW and 660V 710kW models

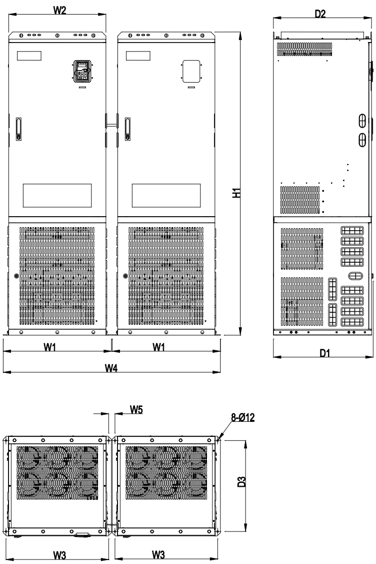


Figure 2-4 Parallel installation dimension for 380V 710–3000kW and 660V 800–3000kW models

Power (kW)	380V VFDs in parallel (recommended) (unit: mm)										
	W1	W2	W3	W4	W5	H1	H2	D1	D2	D3	Installation hole
560–630	749	685	719	1503	35	1419.9	1356	442.5	429.5	350	Ø 12
710–1000	690	620	655	1385	40	1900	-	636.3	625.5	570	Ø 12
1200–1500	690	620	655	2080	40	1900	-	636.3	625.5	570	Ø 12
2000	690	620	655	2775	40	1900	-	636.3	625.5	570	Ø 12
2500	690	620	655	3470	40	1900	-	636.3	625.5	570	Ø 12
3000	690	620	655	4165	40	1900	-	636.3	625.5	570	Ø 12

Power (kW)	660V VFDs in parallel (recommended) (unit: mm)										
	W1	W2	W3	W4	W5	H1	H2	D1	D2	D3	Installation hole
710	749	685	719	1503	35	1419.9	1356	442.5	429.5	350	Ø 12
800–1200	690	620	655	1385	40	1900	-	636.3	625.5	570	Ø 12
1500	690	620	655	2080	40	1900	-	636.3	625.5	570	Ø 12
2000–2500	690	620	655	2775	40	1900	-	636.3	625.5	570	Ø 12
3000	690	620	655	3470	40	1900	-	636.3	625.5	570	Ø 12

2.3 Installation dimension of VFDs in parallel connection (installed closely)

Note: The closely installed method of VFD parallel connection has a smaller installation dimension, which may affect the product's internal air intake but meet the product's heat dissipation.

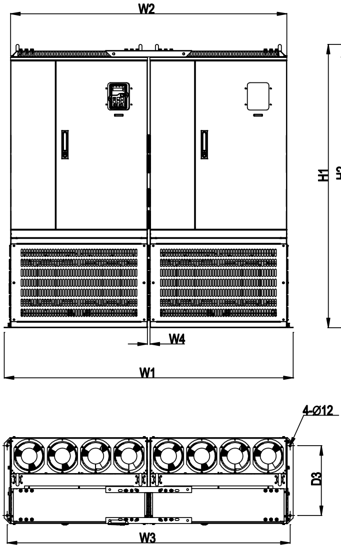


Figure 2-5 Parallel installation dimension for 380V 560–630kW and 660V 710kW models

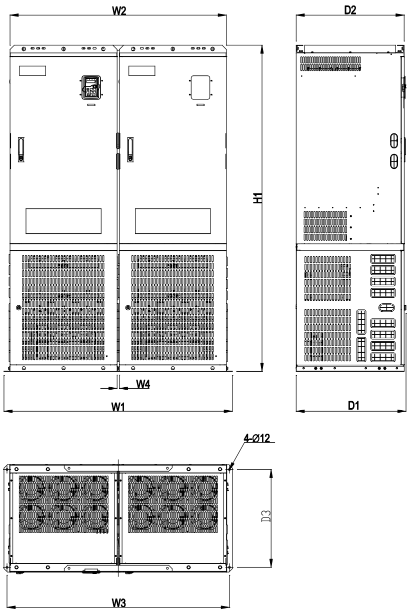


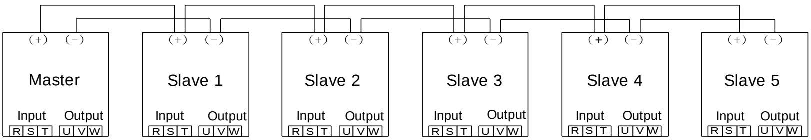
Figure 2-6 Parallel installation dimension for 380V 710–3000kW and 660V 800–3000kW models

Power (kW)	380V VFDs in parallel (installed closely) (unit: mm)									
	W1	**W2**	**W3**	**W4**	**H1**	**H2**	**D1**	**D2**	**D3**	**Installation hole**
560–630	1447	1383	1417	13	1419.9	1356	442.5	429.5	350	Ø 12
710–1000	1323	1253	1288	13	1900	-	636.3	625.5	570	Ø 12
1200–1500	1956	1886	1921	13	1900	-	636.3	625.5	570	Ø 12
2000	2589	2519	2554	13	1900	-	636.3	625.5	570	Ø 12
2500	3222	3152	3187	13	1900	-	636.3	625.5	570	Ø 12
3000	3855	3785	3820	13	1900	-	636.3	625.5	570	Ø 12

Power (kW)	660V VFDs in parallel (installed closely) (unit: mm)									
	W1	**W2**	**W3**	**W4**	**H1**	**H2**	**D1**	**D2**	**D3**	**Installation hole**
710	1447	1383	1417	13	1419.9	1356	442.5	429.5	350	Ø 12
800–1200	1323	1253	1288	13	1900	-	636.3	625.5	570	Ø 12
1500	1956	1886	1921	13	1900	-	636.3	625.5	570	Ø 12
2000–2500	2589	2519	2554	13	1900	-	636.3	625.5	570	Ø 12
3000	3222	3152	3187	13	1900	-	636.3	625.5	570	Ø 12

3 Wiring diagram

3.1 Wiring diagram of the main circuit



	Master–Slave 1	Slave 1–Slave 2	Slave 2–Slave 3	Slave 3–Slave 4	Slave 4–Slave 5
(+) bus length	≈1700mm	≈1700mm	≈1700mm	≈1700mm	≈1700mm
(-) bus length	≈1700mm	≈1700mm	≈1700mm	≈1700mm	≈1700mm

Note:

- The number of VFDs in parallel connection depends on the actual power. A maximum of 6 VFDs are supported in parallel connection.
- Both the input and output terminals of the master and slaves need to be connected with parallel cables of equal length.

3.1.1 Wiring between the master and a slave (560kW–630kW)

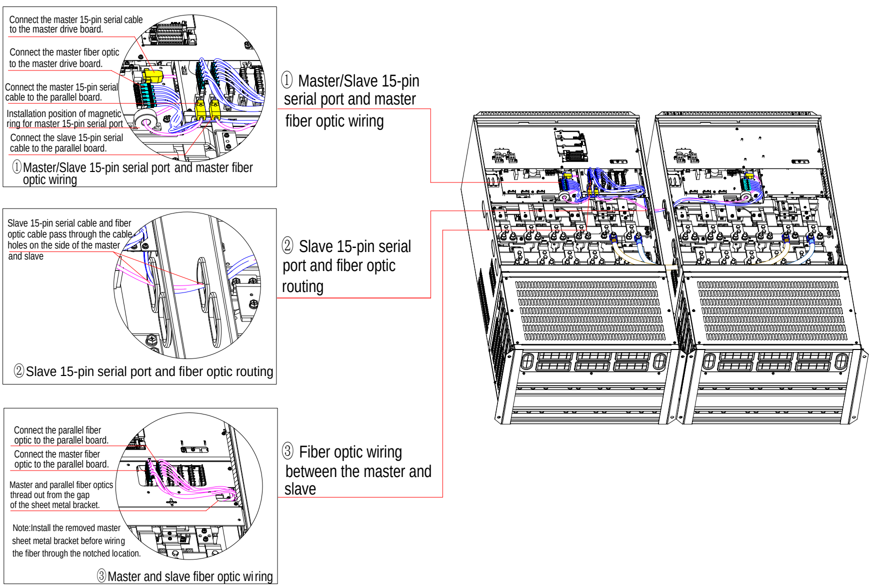


Figure 3-1 Master/slave connection diagram 1 (560kW–630kW)

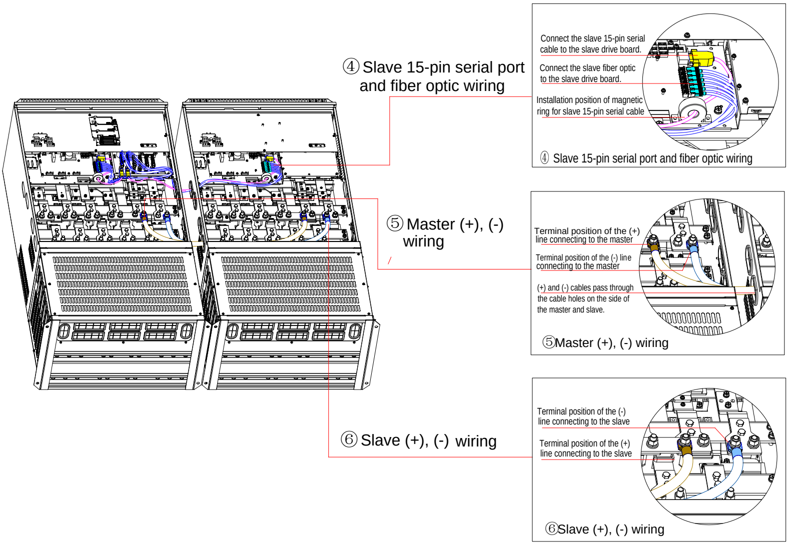


Figure 3-2 Master/slave connection diagram 2 (560kW–630kW)

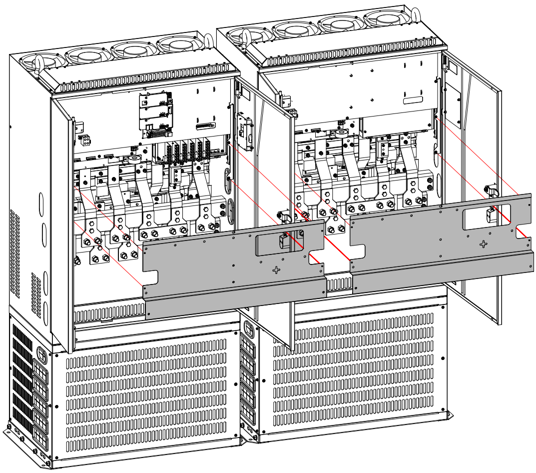


Figure 3-3 Removing the sheet metal bracket

3.1.2 Wiring between the master and a slave (710kW–3000kW)

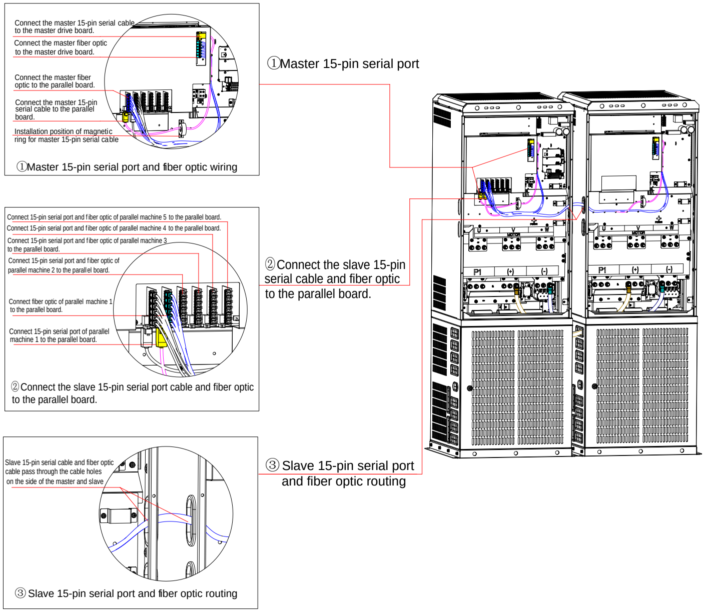


Figure 3-4 Master-slave connection diagram 1 (710kW–3000kW)

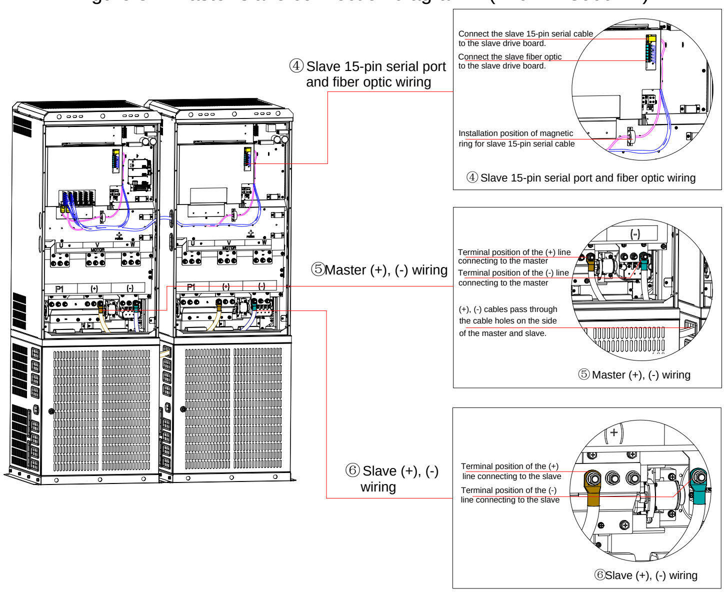


Figure 3-5 Master-slave connection diagram 2 (710kW–3000kW)

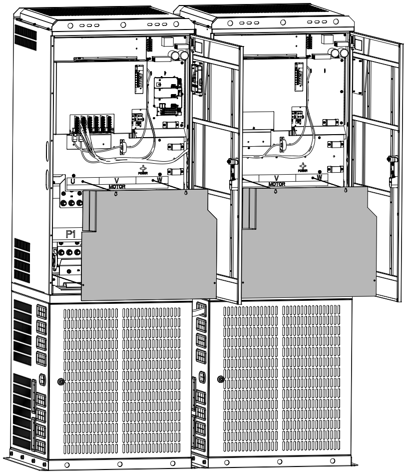


Figure 3-6 Removing the transparent terminal cover

3.2 Wiring diagram of control circuit

	Master	**Master–Slave 1**	**Master–Slave 2**	**Master–Slave 3**	**Master–Slave 4**	**Master–Slave 5**
15-core serial port cable length	≈960mm	≈1910mm	≈3220mm	≈3220mm	≈4740mm	≈4740mm
Fiber optic length	≈1010mm	≈2100mm	≈3420mm	≈3420mm	≈4940mm	≈4940mm

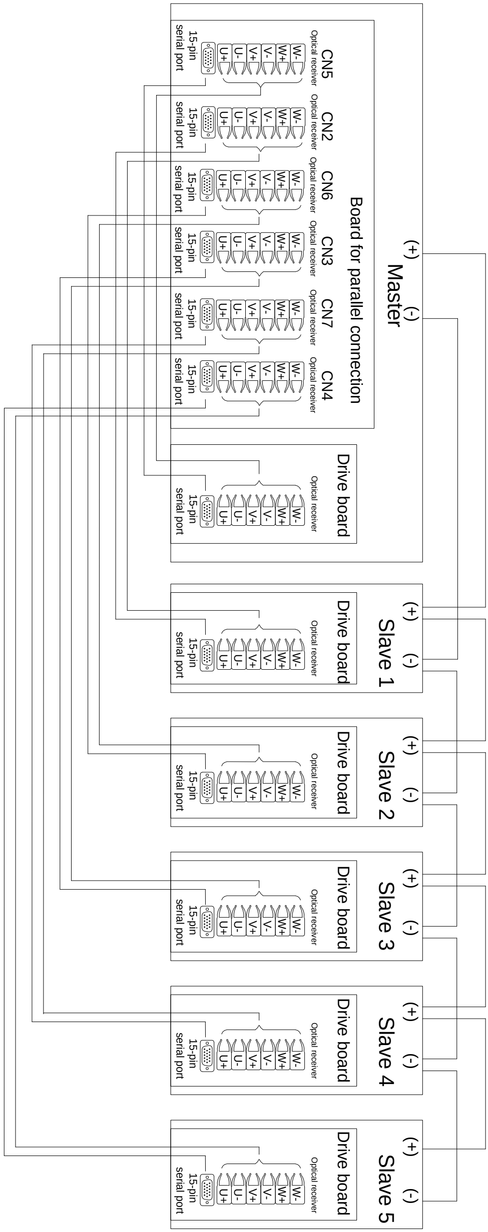


Figure 3-7 Internal control circuit diagram

4 Daily inspection

Note

No.	Check item	Status
Check before power-on		
1	The 15-pin serial port cables of the master and slave are tightly connected to the parallel board and drive board. **Note: The screws on the serial port cable need to be tightened.**	☐
2	The 15-pin serial port cables are properly connected to the parallel board and drive board.	☐
3	The fiber optic interface between the master and slave is reliably connected to the fiber optic receiver.	☐
4	The fiber optic connection position and sequence between the master and slave are correct.	☐
5	The (+) and (-) buses of the master and slave are connected.	☐
6	The (+) and (-) buses of the master and slave are properly connected. **Note: Do not connect the master (+) to the slave (-).**	☐
7	The (+) and (-) bus screws of the master and slave are tightened.	☐
Note: Before power-on inspection, please connect the wires correctly according to Figure 3-7.		
Check the VFD running without load		
1	Check that the fan is running normally after the VFD is running.	☐
2	The interface positions of the drive board and parallel board optical fibers are illuminated.	☐
3	Use a multimeter to measure that the three-phase output voltage of U, V, and W is balanced (use a multimeter to measure that the output voltage is balanced, and the displayed value of the multimeter may be higher or lower than the actual value).	☐
Check the VFD running with load		
1	The lengths of the R, S, and T input connection cables of the master and slave are equal (R1, S1, T1, R2, S2, T2 input cables need to be equal in length. If not, the error must be within 5%.)	☐
2	The lengths of the U, V, and W output connection cables of the master and slave are equal (U1, V1, W1, U2, V2, W2 output cables need to be equal in length. If not, the error must be within 5%.)	☐

Appendix A Optional peripheral accessories

A.1 Cable

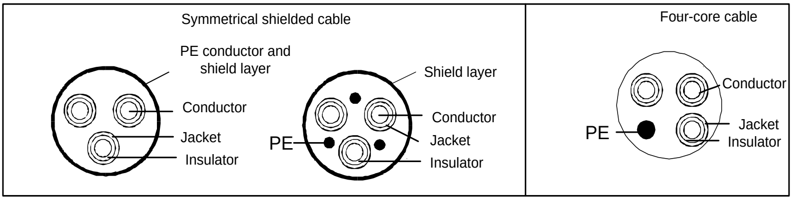
A.1.1 Power cable

The sizes of the input power cables and motor cables must comply with local regulations.

- The input power cables and motor cables must be able to carry the corresponding load currents.
- The maximum temperature margin of the motor cables in continuous operation cannot be lower than 70°C.

The conductivity of the PE grounding conductor is the same as that of the phase conductor, that is, the cross-sectional areas are the same. To meet the EMC requirements stipulated in the CE standards, you must use symmetrical shielded cables as motor cables (as shown in the following figure).

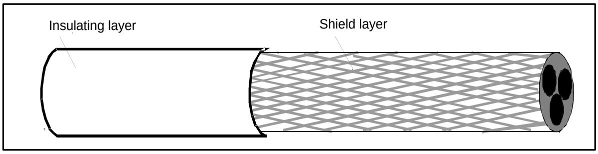
Four-core cables can be used as input cables, but symmetrical shielded cables are recommended. Compared with four-core cables, symmetrical shielded cables can reduce electromagnetic radiation as well as the current and loss of the motor cables.



Note: If the electrical conductivity of the motor cable shield layer does not meet the requirements, a separate PE conductor must be used.

To protect the conductors, the cross-sectional area of the shielded cables must be the same as that of the phase conductors if the cable and conductor are made of materials of the same type. This reduces grounding resistance, and thus improves impedance continuity.

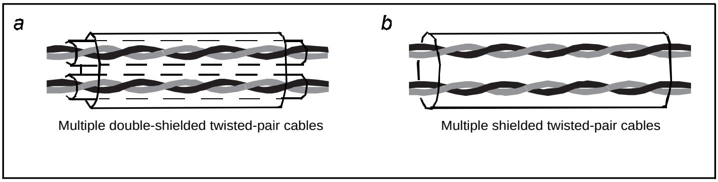
To effectively restrict the emission and conduction of radio frequency (RF) interference, the conductivity of the shielded cable must at least be 1/10 of the conductivity of the phase conductor. This requirement can be well met by a copper or aluminum shield layer. The following figure shows the minimum requirement on motor cables of a VFD. The cable must consist of a layer of spiral-shaped copper strips. The denser the shield layer is, the more effectively the electromagnetic interference is restricted.



Cross-section of the cable

A.1.2 Control cable

All analog control cables and cables used for frequency input must be shielded cables. Analog signal cables need to be double-shielded twisted-pair cables (as shown in figure a). Use one separate shielded twisted pair for each signal. Do not use the same ground wire for different analog signals.



A.1.3 Power cable routing

For low-voltage digital signals, double-shielded cables are recommended, but shielded or unshielded twisted pairs (as shown in figure b) also can be used. For frequency signals, however, only shielded cables can be used.

Relay cables need to be those with metal braided shield layers.

Keypads need to be connected by using network cables. In complicated electromagnetic environments, shielded network cables are recommended.

Note: Analog signals and digital signals cannot use the same cables, and their cables must be arranged separately.

Dielectric withstand tests have been performed between the main circuit and housing of each VFD before delivery. In addition, the VFD has the internal voltage limiting circuit, which can automatically cut off the test voltage. Do not perform any voltage withstand or insulation resistance tests, such as high-voltage insulation tests or using a megameter to measure the insulation resistance, on the VFD or its components.

Note: Before connecting the input power cable of the VFD, check the insulation conditions of the cable according to local regulations.

A.1.3.1 AC 3PH 380V(-15%) – 440V(+10%)

Power (kW)	380V parallel VFD model		Recommended cable size of single VFD (mm²)		
	Power (kW)	Qty	RST UVW	PE	(+)(-)
560	280	2	2×150	150	2×150
630	315	2	2×150	150	2×150
710	355	2	2×185	185	2×185
800	400	2	3×150	2×120	3×150
1000	500	2	3×185	2×150	3×185
1200	400	3	3×150	2×120	3×150
1500	500	3	3×185	2×150	3×185
2000	500	4	3×185	2×150	3×185
2500	500	5	3×185	2×150	3×185
3000	500	6	3×185	2×150	3×185

A.1.3.2 AC 3PH 520V(-15%)–690V(+10%)

Power (kW)	660V parallel VFD model		Recommended cable size of single VFD (mm²)		
	Power (kW)	Qty	RST UVW	PE	(+)(-)
710	355	2	185	95	185
800	400	2	2×70	70	2×70
1000	500	2	2×120	120	2×120
1200	630	2	2×150	150	2×150
1500	500	3	2×120	120	2×120
2000	500	4	2×120	120	2×120
2500	630	4	2×150	150	2×150
3000	630	5	2×150	150	2×150

Note:

- The cables recommended for the main circuit need to be used in scenarios where the ambient temperature is lower than 40°C, the wiring distance is shorter than 100m, and the current is the rated current.
- The terminals P1, (+), PB, and (-) are used to connect to DC reactors and braking accessories.

A.1.4 Cable configuration

	Master	Slave 1	Slave 2	Slave 3	Slave 4	Slave 5
RST input cables	Prepared by the user	Prepared by the user	Prepared by the user	Prepared by the user	Prepared by the user	Prepared by the user
UVW output cables	Prepared by the user	Prepared by the user	Prepared by the user	Prepared by the user	Prepared by the user	Prepared by the user

	Master	Master–Slave 1	Slave 1–Slave 2	Slave 2–Slave 3	Slave 3–Slave 4	Slave 4–Slave 5
(+), (-) bus cable for parallel connection	-	Standard	Standard	Standard	Standard	Standard

	Master	Master–Slave 1	Master–Slave 2	Master–Slave 3	Master–Slave 4	Master–Slave 5
Optical fiber for parallel connection	Standard	Standard	Standard	Standard	Standard	Standard
15-core serial port cable for parallel connection	Standard	Standard	Standard	Standard	Standard	Standard

A.2 Breaker and electromagnetic contactor

The circuit breaker is mainly used to prevent electric shock accidents and short circuits to the ground that may cause leakage current fire. The electromagnetic contactor is mainly used to control the main circuit power on and off, which can effectively cut off the input power of the VFD in case of system failure to ensure safety.

According to the working principle and structure of breakers, if the manufacturer's regulation is not followed, hot ionized gases may escape from the breaker enclosure when a short-circuit occurs. To ensure safe use, exercise caution when installing and placing the breaker, and follow the manufacturer's instructions for operation.

A.2.1 AC 3PH 380V(-15%)–440V(+10%)

The following table is the fuse and breaker model selection for a single VFD. The capacity of the fuse/breaker for a parallel product is twice the rated current of the parallel product. (For details about the rated current of each parallel product, see 1.2 Product ratings.)

Power (kW)	Fuse (A)	Circuit breaker (A)	Contactor rated current (A)
280	1000	800	630
315	1000	1000	800
355	1000	1000	800
400	1200	1000	1000
500	1400	1250	1000

Note: The accessory specifications described in the preceding table are ideal values. You can select accessories based on the actual market conditions, but try not to use those with lower values.

A.2.2 AC 3PH 520V(-15%)–690V(+10%)

The following table is the fuse and breaker model selection for a single VFD. The capacity of the fuse/breaker for a parallel product is twice the rated current of the parallel product. (For details about the rated current of each parallel product, see 1.2 Product ratings.)

Power (kW)	Fuse (A)	Circuit breaker (A)	Contactor rated current (A)
355	600	500	500
400	700	630	500
500	900	800	630
630	1000	1000	800

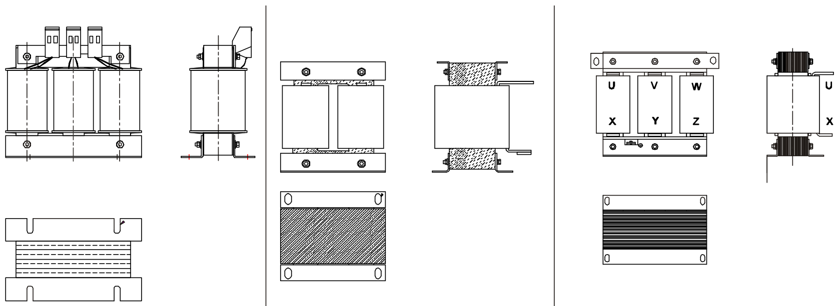
Note: The accessory specifications described in the preceding table are ideal values. You can select accessories based on the actual market conditions, but try not to use those with lower values.

A.3 Reactor

When the voltage of the grid is high, the large current that flows into the input power circuit may damage rectifier components. You need to configure an AC reactor on the input side, which can also improve the current adjustment coefficient on the input side.

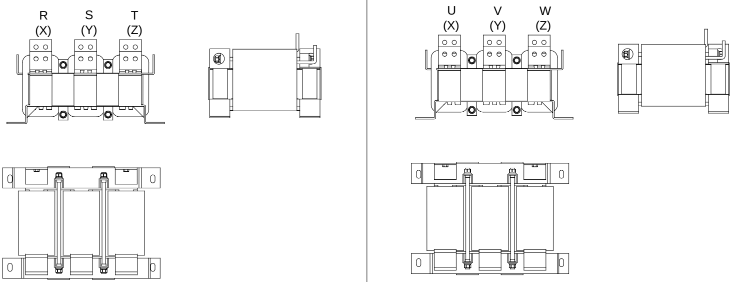
When the distance between the VFD and motor is longer than 50m, leakage current is excessive due to parasitic capacitive effect of the long cable to ground, and overcurrent protection of the VFD may be frequently triggered. To prevent this from happening and avoid damage to the motor insulator, compensation must be made by adding an output reactor.

DC reactors can be directly connected to the VFDs of 380V, 660V models in large-power parallel connection. DC reactors can improve the power factor, avoid damage to bridge rectifiers caused due to large input current of the VFD when large-capacity transformers are connected, and also avoid damage to the rectification circuit caused due to harmonics generated by grid voltage transients or phase-control loads.



Input reactor DC reactor Output reactor

Figure A-1 Vertical reactor diagram for 380V 315kW and lower models, 660V 355kW and lower models



Input reactor

Output reactor

Figure A-2 Horizontal reactor diagram for 380V 355–500kW and 660V 400–630kW models

A.3.1 Reactors for AC 3PH 380V(-15%)–440V(+10%)

The following table is the reactor selection table for a single VFD.

Power (kW)	Input reactor	DC reactor	Output reactor
280	ACL2-280-4 (optional)	DCL2-280-4 (optional)	OCL2-280-4 (optional)
315	ACL2-315-4 (optional)	DCL2-315-4 (optional)	OCL2-315-4 (optional)
355	ACL2-350-4 (optional)	DCL2-400-4 (optional)	OCL2-350-4 (optional)
400	ACL2-400-4 (optional)	DCL2-400-4 (optional)	OCL2-400-4 (optional)
500	ACL2-500-4 (optional)	DCL2-500-4 (optional)	OCL2-500-4 (optional)

Note:

- The rated input voltage drop of input reactor is designed to 2%.
- The current adjustment coefficient on the input side of the VFD is higher than 90% after a DC reactor is configured.
- The rated output voltage drop of output reactor is designed to 1%.
- The DC reactor is an external accessory. You need to specify whether external or built-in accessories are needed in your purchase order.

A.3.2 Reactors for AC 3PH 520V(-15%)–690V(+10%)

The following table is the reactor selection table for a single VFD.

Power (kW)	Input reactor	DC reactor	Output reactor
355	ACL2-350G-6 (optional)	DCL2-350G-6 (optional)	OCL2-350G-6 (optional)
400	ACL2-400G-6 (optional)	DCL2-400G-6 (optional)	OCL2-400G-6 (optional)
500	ACL2-560G-6 (optional)	DCL2-560G-6 (optional)	OCL2-560G-6 (optional)
630	ACL2-630G-6 (optional)	DCL2-630G-6 (optional)	OCL2-630G-6 (optional)

Note:

- The rated input voltage drop of input reactor is designed to 2%.
- The current adjustment coefficient on the input side of the VFD is higher than 90% after a DC reactor is configured.
- The rated output voltage drop of output reactor is designed to 1%.
- The DC reactor is an external accessory. You need to specify whether external or built-in accessories are needed in your purchase order.

A.4 Filter

J10 is not connected in factory for the 380V 110kW and lower VFD models. Connect the J10 packaged with the manual if the requirements of level C3 need to be met. J10 is connected in factory for the 380V 132kW and higher VFD models, all of which meet the requirements of level C3.

Note:

- Do not connect C3 filters in IT power systems.
- Disconnect J10 in the following situations:

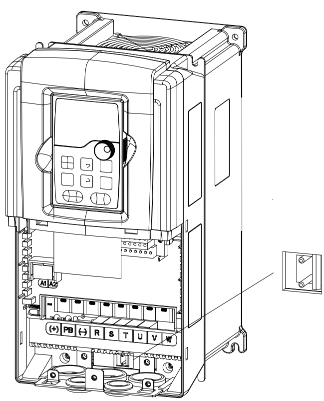
  1) The EMC filter is applicable to the neutral-grounded grid system. If it is used for the IT grid system (that is, non-neutral grounded grid system), disconnect J10.

  2) If leakage protection occurs during configuration of a residual-current circuit breaker, disconnect J10.

Interference filters on the input side can reduce the VFD interference on the surrounding devices.

Noise filters on the output side can decrease the radio noise caused by the cables between VFDs and motors and the leakage current of conducting wires.

We provide some of the filters for you to choose.



A.4.1 Filter model description

FLT	-	P	04	045	L	-	B
A		B	C	D	E		F

Field	Description
A	FLT: VFD filter series
B	Filter type P: Power input filter L: Output filter
C	Voltage class 04: AC 3PH 380V (-15%)–440V (+10%) 06: AC 3PH 520V (-15%)–690V (+10%)
D	3-digit code indicating the rated current. For example, 015 indicates 15 A.
E	Filter performance L: General H: High-performance
F	Filter application environment A: First environment (IEC61800-3), category C1 (EN 61800-3) B: First environment (IEC61800-3), category C2 (EN 61800-3) C: Second environment (IEC61800-3), category C3 (EN 61800-3)

A.4.2 Filter model selection for AC 3PH 380V(-15%)–440V(+10%)

The following table is the filter selection table for a single VFD.

Power (kW)	Input filter	Output filter
280	FLT-P04600L-B	FLT-L04600L-B
315	FLT-P04800L-B	FLT-L04800L-B
355		
400		
500	FLT-P041000L-B	FLT-L041000L-B

A.4.3 Filter model selection for AC 3PH 520V(-15%)–690V(+10%)

The following table is the filter selection table for a single VFD.

Power (kW)	Input filter	Output filter
355	FLT-P06400H-B	FLT-L06400H-B
400	FLT-P061000H-B	FLT-P061000H-B
500		
630		

Note:

- The input EMI meets the C2 requirements after an input filter is configured.
- The preceding table describes external accessories. You need to specify the ones you choose when purchasing accessories.
- For the filter model selection for parallel products, please refer to the above filter selection table for a single VFD.

A.5 Braking system

A.5.1 Braking component selection

When the VFD driving a high-inertia load decelerates or needs to decelerate abruptly, the motor runs in the power generation state and transmits the load-carrying energy to the DC circuit of the VFD, causing the bus voltage of the VFD to rise. If the bus voltage exceeds a specific value, the VFD reports an overvoltage fault. To prevent this from happening, you need to configure braking components.

	● The design, installation, commissioning, and operation of the device must be performed by trained and qualified professionals. ● Follow all the "Warning" instructions during the operation. Otherwise, major physical injuries or property loss may be caused. ● Only qualified electricians are allowed to perform the wiring. Otherwise, damage to the VFD or braking components may be caused. ● Read the braking resistor or unit instructions carefully before connecting them to the VFD. ● Connect braking resistors only to the terminals PB and (+), and braking units only to the terminals (+) and (-). Do not connect them to other terminals. Otherwise, damage to the braking circuit and VFD and fire may be caused.
	● Connect the braking components to the VFD according to the wiring diagram. If the wiring is not properly performed, damage to the VFD or other devices may be caused.

A.5.2 Braking units for AC 3PH 380V(-15%)–440V(+10%)

An external braking unit is required for the Goodrive series 380V large-power parallel VFD. Select braking resistors according to the specific requirements (such as the braking torque and braking usage) on site.

The following table is the braking unit selection table for a single VFD.

Power (kW)	Braking unit model	Resistance applicable for 100% braking torque (Ω)	Braking resistor dissipation power (kW) (10% braking usage)	Braking resistor dissipation power (kW) (50% braking usage)	Braking resistor dissipation power (kW) (80% braking usage)	Min. allowed braking resistance (Ω)
280	Quantity: Two DBU100H-320-4	3.6*2	21*2	105*2	168*2	2.2 *2
315		3.2*2	24*2	118*2	189*2	
355		2.8*2	27*2	132*2	210*2	
400		2.4*2	30*2	150*2	240*2	
500	Quantity: Two DBU100H-400-4	2*2	38*2	186*2	300*2	1.8*2

Note:

- Select braking resistors according to the resistance and power data provided by INVT.
- The braking resistor may increase the braking torque of the VFD. The preceding table describes the resistance and power for 100% braking torque, 10% braking usage, 50% braking usage, and 80% braking usage. You can select the braking system based on the actual operation conditions.
- When using an external braking unit, set the brake voltage class of the braking unit properly by referring to the manual of the dynamic braking unit. If the voltage class is set incorrectly, the VFD may not run properly.

⚡	Do not use braking resistors whose resistance is lower than the specified minimum resistance. The VFD does not provide protection against overcurrent caused by resistors with low resistance.
⚠	In scenarios where braking is frequently implemented, that is, the braking usage is greater than 10%, you need to select a braking resistor with higher power as required by the operation conditions according to the preceding table.

A.5.3 Braking units for AC 3PH 520V(-15%)–690V(+10%)

An external braking unit is required for the Goodrive series 660V large-power parallel connection solution. Select braking resistors according to the specific requirements (such as the braking torque and braking usage) on site.

The following table is the braking unit selection table for a single VFD.

Power (kW)	Braking unit model	Resistance applicable for 100% braking torque (Ω)	Braking resistor dissipation power (kW) (10% braking usage)	Braking resistor dissipation power (kW) (50% braking usage)	Braking resistor dissipation power (kW) (80% braking usage)	Min. allowed braking resistance (Ω)
355	DBU100H-320-6	3.5	53	263	420	3.4
400	DBU100H-400-6	3.0	60	300	480	2.8
500	Two sets of DBU100H-320-6	4.8*2	38*2	188*2	300*2	3.4*2
630		3.8*2	47*2	236*2	378*2	

Note:

- Select braking resistors according to the resistance and power data provided by INVT.
- The braking resistor may increase the braking torque of the VFD. The preceding table describes the resistance and power for 100% braking torque, 10% braking usage, 50% braking usage, and 80% braking usage. You can select the braking system based on the actual operation conditions.
- When using an external braking unit, set the brake voltage class of the braking unit properly by referring to the manual of the dynamic braking unit. If the voltage class is set incorrectly, the VFD may not run properly.

	Do not use braking resistors whose resistance is lower than the specified minimum resistance. The VFD does not provide protection against overcurrent caused by resistors with low resistance.
	In scenarios where braking is frequently implemented, that is, the braking usage is greater than 10%, you need to select a braking resistor with higher power as required by the operation conditions according to the preceding table.

A.5.4 Braking resistor cable selection

Braking resistor cables should be shielded cables.

A.5.5 Braking resistor installation

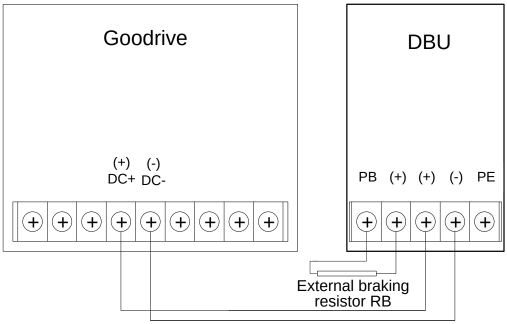
All resistors must be installed in places with good cooling conditions.

	The materials near the braking resistor or braking unit must be flame resistant. Since the surface temperature of the resistor is high and air flowing from the resistor is of hundreds of degrees Celsius, it is necessary to prevent any materials from coming into contact with the resistor.

Braking unit installation

	● An external braking unit is required for the Goodrive large-power parallel connection solution. ● (+) and (-) are the terminals for connecting braking units. ● The connection cable length between the (+) and (-) terminals of the VFD and those of a braking unit must be shorter than 5m, and the connection cable length between the BR1 and BR2 terminals of a braking unit and the terminals of a braking resistor must be shorter than 10m.

The following figure shows the connection of one VFD to a dynamic braking unit.



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