

## Chapter 3 Product overview

### 3.1 What this chapter contains

The chapter briefly describes the operation principle, product characteristics, layout, name plate and type designation information.

### 3.2 Basic principles

Goodrive35 series VFDs are wall, floor and flange mountable devices for controlling asynchronous AC induction motors and permanent magnet synchronous motors. It supports wall, fange, and floor installation.

The diagram below shows the simplified main circuit diagram of the VFD. The rectifier converts three-phase AC voltage to DC voltage. The capacitor bank of the intermediate circuit stabilizes the DC voltage. The inverter transforms the DC voltage back to AC voltage for the AC motor. The brake pipe connects the external brake resistor to the intermediate DC circuit to consume the feedback energy when the voltage in the circuit exceeds its maximum limit.

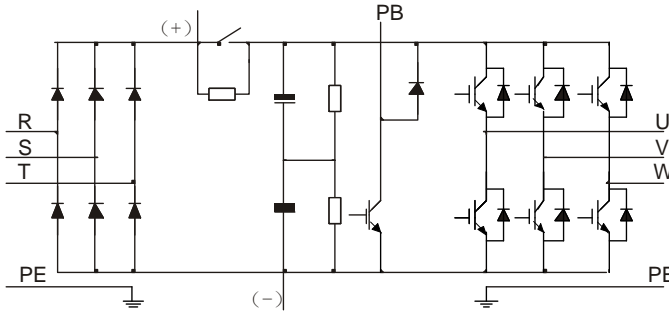


Figure 3-1 The simplified main circuit diagram (VFDs of 380 V≤30 kW)

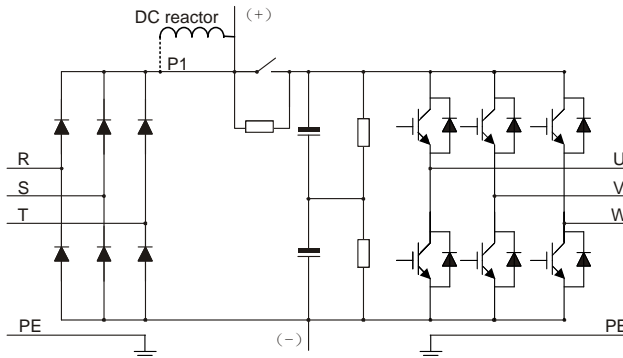


Figure 3-2 The simplified main circuit diagram (VFDs of 380 V≥37 kW)

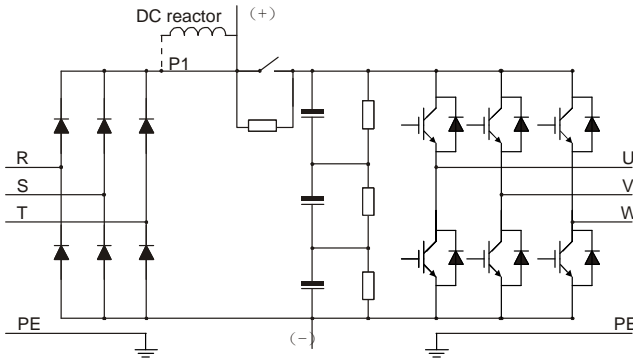


Figure 3-3 The simplified main circuit diagram (VFDs of 660 V)

**Note:**

- ✧ The VFDs of 380 V ( $\geq 37$  kW) supports external DC reactors and external brake units, but it is necessary to remove the copper tag between P1 and (+) before connecting. DC reactors and brake units are optional.
- ✧ The VFDs of 380 V ( $\leq 30$  kW) supports external brake resistors which are optional.
- ✧ The VFDs of 660 V supports external DC reactors and external brake units, but it is necessary to remove the copper tag between P1 and (+) before connecting. DC reactors and brake units are optional.

**3.3 Product specification**

Function		Specification
Power input	Input voltage (V)	AC 3PH 380 V (-15%)–440 V (+10%) Rated voltage: 380 V AC 3PH 520 V (-15%)–690 V (+10%) Rated voltage: 660 V
	Input current (A)	Refer to section 3.6 "Rated values"
	Input frequency (Hz)	50 Hz or 60 Hz Allowed range: 47–63 Hz
Power output	Output voltage (V)	0–input voltage
	Output current (A)	Refer to section 3.6 "Rated values"
	Output power (kW)	Refer to section 3.6 "Rated values"
	Output frequency (Hz)	0–400 Hz
Technical control feature	Control mode	SVPWM, SVC and VC
	Motor type	Asynchronous motor and permanent magnet synchronous motor
	Adjustable-speed ratio	Asynchronous motor 1: 200 (SVC) synchronous motor 1: 20 (SVC) 1: 1000 (VC)

Function		Specification
	Speed control accuracy	$\pm 0.2\%$ (SVC) $\pm 0.02\%$ (VC)
	Speed fluctuation	$\pm 0.3\%$ (SVC)
	Torque response	<20 ms (SVC), <10 ms (VC)
	Torque control accuracy	10% (SVC), 5% (VC)
	Starting torque	Asynchronous motor: 0.25 Hz/150% (SVC) Synchronous motor: 2.5 Hz/150% (SVC) 0 Hz/200% (VC)
	Overload capability	150% of rated current: 1 minute 180% of rated current: 10 seconds 200% of rated current: 1 second
Running control feature	Frequency setting method	Digital setting, analog setting, pulse frequency setting, multi-step speed running setting, simple PLC setting, PID setting, Modbus communication setting, and PROFIBUS communication setting. Switch between the combination and single setting channel
	Auto-adjustment of the voltage	Keep constant voltage automatically when the grid voltage transients
	Fault protection	Provide more than 30 fault protection functions: overcurrent, overvoltage, undervoltage, overheating, phase loss and overload, etc.
	Restart after rotating speed tracking	Smooth starting of the rotating motor <b>Note:</b> Only for the VFD $\geq$ 4 kW
Peripheral interface	Terminal analog input resolution	$\leq 20$ mV
	Terminal switch input resolution	$\leq 2$ ms
	Analog input	2 (AI1, AI2) 0–10 V/0–20 mA and 1 (AI3) -10–10 V
	Analog output	2 (AO1, AO2) 0–10 V/0–20 mA
	Digital input	8 common inputs, the Max frequency: 1 kHz, internal impedance: 3.3 k $\Omega$ ; 1 high speed input, the Max frequency: 50 kHz
	Digital output	1 high speed pulse output, the Max frequency: 50 kHz; 1 Y terminal open collector output
	Relay output	2 programmable relay outputs RO1A NO, RO1B NC, RO1C common terminal RO2A NO, RO2B NC, RO2C common terminal Contactor capability: 3 A/AC 250 V, 1 A/DC 30 V

Function		Specification
	Spindle stopping	For spindle positioning and control sequence Internal 7 scale marks and 4 zero marks
	Position reference	External zero-position detection switch positioning Encoder Z phase positioning
	Servo control	Pulse train reference: position control
	Frequency division output	Encoder frequency division output (H1 and H2 VFDs)
	Speed/position mode	Terminal shifting
	Encoder	C1 support 100 kHz, D1 support 500 kHz, H1 support 300 kHz and H2 support 400 kHz
	Positioning	Pulse Z and photoelectric switch positioning. Positioning is accurate without overmodulation.
Others	Mountable method	Wall, flange and floor mountable
	Temperature of the running environment	-10–50°C, if temperature is above 40°C, derate 1% for every additional 1°C.
	Average non-fault time	2 years (25°C ambient temperature)
	Protective degree	IP20
	Pollution level	Level 2
	Cooling	Air-cooling
	Brake unit	Built-in for VFDs of 380 V (≤30 kW) External for others
EMC filter	All products of the 380V series meet the IEC61800-3 C3 requirements. External filters that meet the IEC61800-3 C2 requirements are optional.	

### 3.4 Product nameplate

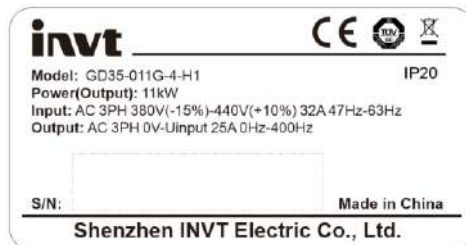


Figure 3-4 Product nameplate

**Note:** This is an example of the nameplate of standard Goodrive350 products. The CE/TUV/IP20 marking on the top right will be marked according to actual certification conditions.

### 3.5 Model code

The model code contains information on the VFD. The user can find the model code from the nameplate on the the VFD or from the simplified nameplate.

**GD35 – 5R5G – 4 – H1**

①                      ②                      ③                      ④

Figure 3-5 Model code

Key	Sign	Instruction	Content
<b>Abbreviation</b>	①	Abbreviation	Goodrive35: Goodrive35 close-loop vector control VFDs
<b>Rated power</b>	②	Power + Load	5R5-5.5 kW G—constant torque load
<b>Voltage degree</b>	③	Voltage degree	4: AC 3PH 380 V (-15%)–440 V (+10%) Rated voltage: 380 V 6: AC 3PH 520 V (-15%)–690 V (+10%) Rated voltage: 660 V
<b>Lot number</b>	④	Lot number	C1: Support 24 V incremental encoder D1: Support rotary transformer Optional PG cards with functions of pulse and direction pulse input reference H1: Support 5 V/12 V incremental encoder, differential, push-pull, and open collector signals; Pulse + direction pulse input reference H2: Support 5 V incremental encoder for high-speed differential signal processing; Pulse + direction pulse input reference (specific for machine tools) S1: Support sin/cos encoder, sin/cos (1 Vpp) eg Heidenhain ERN1387; support quadrature pulse input

### 3.6 Rated values

#### 3.6.1 Rated value of AC 3PH 380 V (-15%)–440 V (+10%)

Model	Output power (kW)	Input current (A)	Output current (A)	Carrier frequency (kHz)
GD35-1R5G-4-C1/D1/H1	1.5	5.0	3.7	1–15 (8)
GD35-2R2G-4-C1/D1/H1	2.2	5.8	5	1–15 (8)
GD35-004G-4-C1/D1/H1/H2/S1	4	13.5	9.5	1–15 (8)
GD35-5R5G-4-C1/D1/H1/H2/S1	5.5	19.5	14	1–15 (8)
GD35-7R5G-4-C1/D1/H1/H2/S1	7.5	25	18.5	1–15 (8)
GD35-011G-4-C1/D1/H1/H2/S1	11	32	25	1–15s (8)
GD35-015G-4-C1/D1/H1/H2/S1	15	40	32	1–15 (4)

Model	Output power (kW)	Input current (A)	Output current (A)	Carrier frequency (kHz)
GD35-018G-4-C1/D1/H1/H2/S1	18.5	47	38	1–15 (4)
GD35-022G-4-C1/D1/H1/H2/S1	22	56	45	1–15 (4)
GD35-030G-4-C1/D1/H1/H2/S1	30	70	60	1–15 (4)
GD35-037G-4-C1/D1/H1/S1	37	80	75	1–15 (4)
GD35-045G-4-C1/D1/H1/S1	45	94	92	1–15 (4)
GD35-055G-4-C1/D1/H1/S1	55	128	115	1–15 (4)
GD35-075G-4-C1/D1/H1/S1	75	160	150	1–15 (2)
GD35-090G-4-C1/D1/H1/S1	90	190	180	1–15 (2)
GD35-110G-4-C1/D1/H1/S1	110	225	215	1–15 (2)
GD35-132G-4-C1/D1/H1/S1	132	265	260	1–15 (2)
GD35-160G-4-C1/D1/H1/S1	160	310	305	1–15 (2)
GD35-185G-4-C1/D1/H1/S1	185	345	340	1–15 (2)
GD35-200G-4-C1/D1/H1/S1	200	385	380	1–15 (2)
GD35-220G-4-C1/D1/H1/S1	220	430	425	1–15 (2)
GD35-250G-4-C1/D1/H1/S1	250	485	480	1–15 (2)
GD35-280G-4-C1/D1/H1/S1	280	545	530	1–15 (2)
GD35-315G-4-C1/D1/H1/S1	315	610	600	1–15 (2)

**Note:**

- ✧ The input current of VFDs 1.5–315 kW is detected when the input voltage is 380 V and there is no DC reactors and input/output reactors.
- ✧ The rated output current is defined when the output voltage is 380 V.
- ✧ The output current cannot exceed the rated output current and the output power cannot exceed the rated output power in the voltage range.

**3.6.2 Rated value of AC 3PH 520 V (-15%)–690 V (+10%)**

Model	Output power (kW)	Input current (A)	Output current (A)	Carrier frequency (kHz)
GD35-022G-6-C1/D1/H1	22	35	27	1–15 (4)
GD35-030G-6-C1/D1/H1	30	40	34	1–15 (4)
GD35-037G-6-C1/D1/H1	37	47	42	1–15 (4)
GD35-045G-6-C1/D1/H1	45	52	54	1–15 (4)
GD35-055G-6-C1/D1/H1	55	65	62	1–15 (4)
GD35-075G-6-C1/D1/H1	75	85	86	1–15 (2)
GD35-090G-6-C1/D1/H1	90	95	95	1–15 (2)
GD35-110G-6-C1/D1/H1	110	118	131	1–15 (2)
GD35-132G-6-C1/D1/H1	132	145	147	1–15 (2)

Model	Output power (kW)	Input current (A)	Output current (A)	Carrier frequency (kHz)
GD35-160G-6-C1/D1/H1	160	165	163	1–15 (2)
GD35-185G-6-C1/D1/H1	185	190	198	1–15 (2)
GD35-200G-6-C1/D1/H1	200	210	216	1–15 (2)
GD35-220G-6-C1/D1/H1	220	230	240	1–15 (2)
GD35-250G-6-C1/D1/H1	250	255	274	1–15 (2)
GD35-280G-6-C1/D1/H1	280	286	300	1–15 (2)
GD35-315G-6-C1/D1/H1	315	334	328	1–15 (2)
GD35-350G-6-C1/D1/H1	350	360	380	1–15 (2)
GD35-400G-6-C1/D1/H1	400	411	426	1–15 (2)
GD35-500G-6-C1/D1/H1	500	518	540	1–15 (2)
GD35-560G-6-C1/D1/H1	560	578	600	1–15 (2)
GD35-630G-6-C1/D1/H1	630	655	680	1–15 (2)

**Note:**

- ✧ The input current of VFDs 22–350 kW is detected when the input voltage is 660 V and there is no DC reactors and input/output reactors.
- ✧ The input current of VFDs 400–630 kW is detected when the input voltage is 660 V and there are input reactors.
- ✧ The rated output current is defined when the output voltage is 660 V.
- ✧ The output current cannot exceed the rated output current and the output power cannot exceed the rated output power in the voltage range.

### 3.7 Structure diagram

The VFD layout is shown below (take 380 V 30 kW as an example).

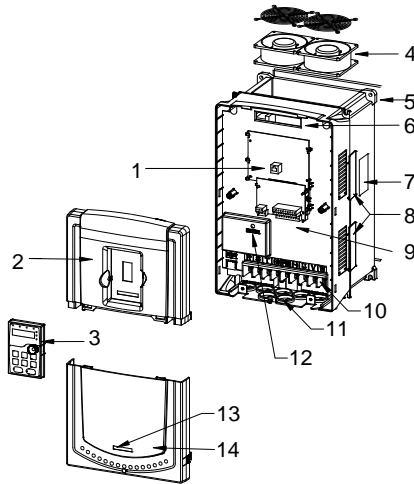


Fig 3-6 Structure diagram

Serial No.	Name	Illustration
1	Keypad interface	Connect the keypad
2	Upper cover plate	Protect the internal parts and components
3	Keypad	See Chapter 5 "Keypad operation procedures" for detailed information
4	Cooling fan	See Chapter 9 "Routine maintenance" for detailed information
5	Wiring interface	Connect to the control board and the drive board
6	Nameplate	See Chapter 3 "Product overview" for detailed information
7	Ventilation hole cover plate	Optional. The ventilation hole cover plate will increase the protection level as well as the internal temperature of the VFD, which requiring the VFD to be used under derating.
8	Control terminals	See Chapter 4 "Installation guide" for detailed information
9	Main circuit terminals	See Chapter 4 "Installation guide" for detailed information
10	Main circuit cable inlet	Fix the main circuit cable
11	POWER light	Power indicator
12	Simple nameplate	See section 3.5 "Model code" for detailed information
13	Lower cover plate	Protect the internal parts and components



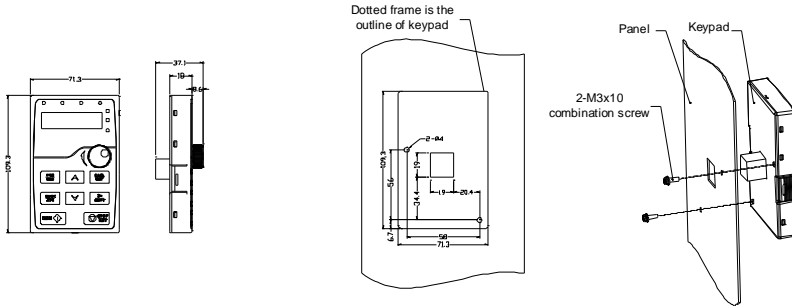
## Appendix C Dimension drawings

### C.1 What this chapter contains

Dimension drawings of the Goodrive35 are shown below. The dimensions are given in millimeters and inches.

### C.2 Keypad structure

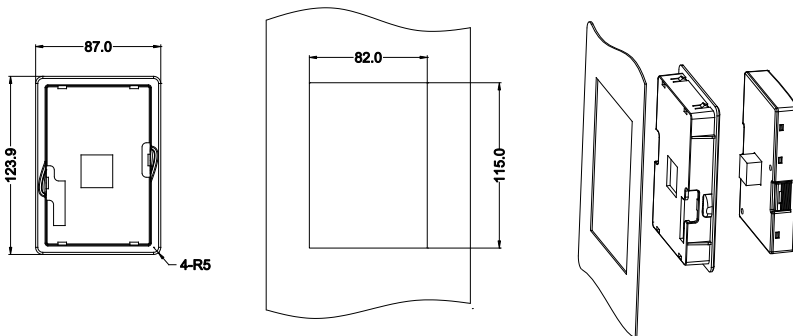
#### C.2.1 Structure chart



Hole dimension and diagram for keypad installation without bracket

#### C.2.2 Installation bracket

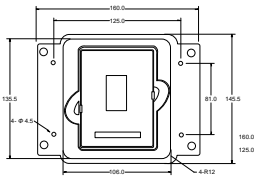
**Note:** The external keypad can be fix by M3 screws directly or the installation bracket. The installation bracket for VFDs of 380 V 1.5–30 kW is optional, the installation bracket for VFDs of 380 V 37–315 kW and 660 V 22–630 kW is optional or substitutive by the external standard one.



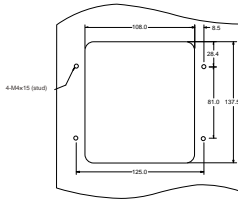
Keypad bracket

Customer installation dimension

Figure C-1 Installation bracket of the keypad (380 V 1.5–315 kW; 660 V 22–630 kW) (optional)



Keypad adapter bracket



Customer installation dimension

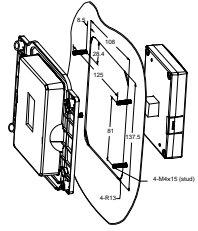
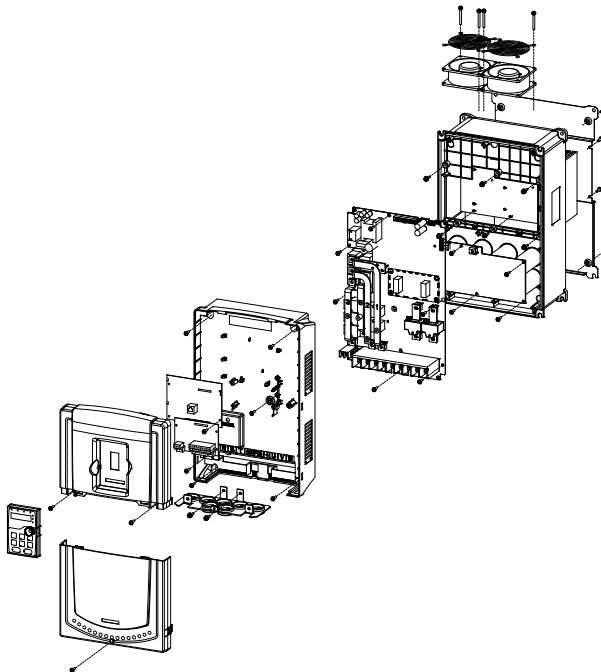


Figure C-2 Installation bracket of the keypad (380 V 37–315 kW; 660 V 22–630 kW) (standard)

### C.3 VFD structure



**C.4 Dimensions for VFDs of AC 3PH 380 V (-15%)–440 V (+10%)**

**C.4.1 Wall installation (unit: mm)**

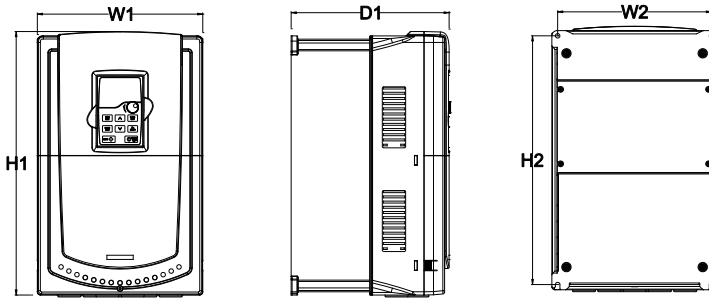


Figure C-3 Wall installation of 380 V 1.5-30 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
1.5 kW–2.2 kW	126	115	193	175	174.5	∅5	2
4 kW–5.5 kW	146	131	263	243.5	181	∅6	3.5
7.5 kW–11 kW	170	151	331.5	303.5	216	∅6	6
15 kW–18.5 kW	230	210	342	311	216	∅6	7.8
22 kW–30 kW	255	237	407	384	245	∅7	9.5

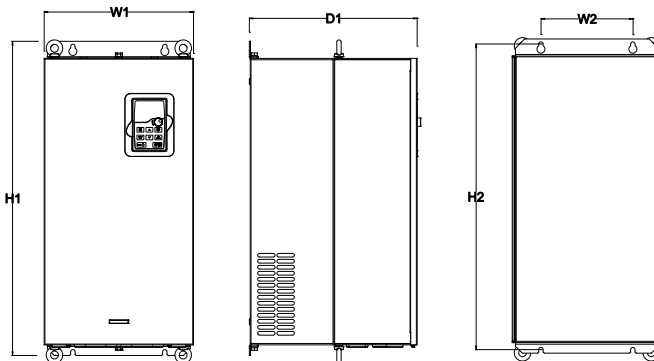


Figure C-4 Wall installation of 380 V 37-110 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
37 kW–55 kW	270	130	555	540	325	∅7	30
75 kW–110 kW	325	200	680	661	365	∅9.5	47

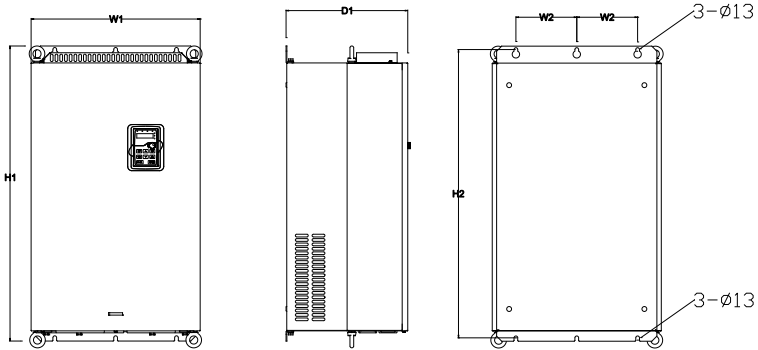


Figure C-5 Wall installation of 380 V 132-200 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
132 kW–200 kW	500	180	870	850	360	∅11	85

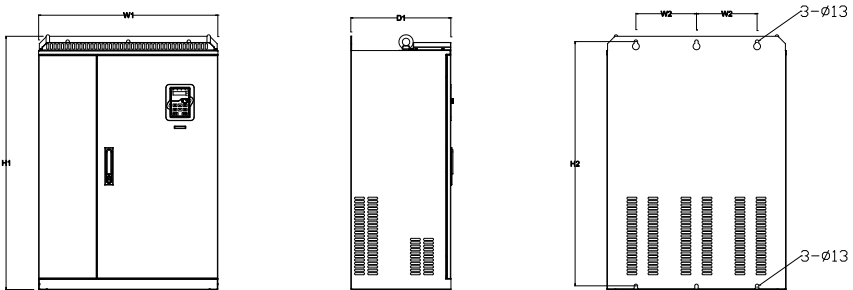


Figure C-6 Wall installation of 380 V 220-315 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
220 kW–280 kW	680	230	960	926	380	∅13	135
315 kW	680	230	960	926	380	∅13	137

C.4.2 Flange installation (unit: mm)

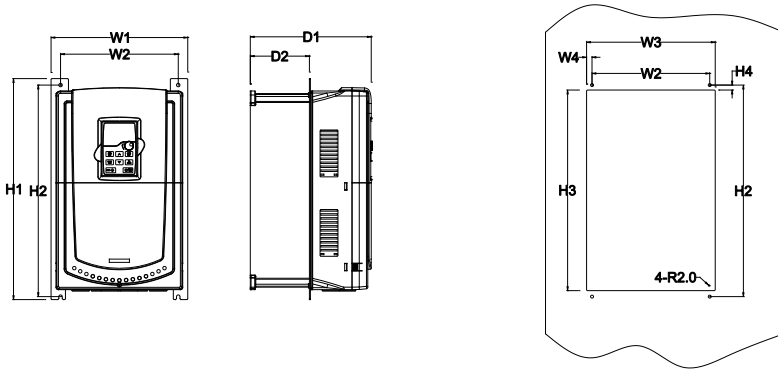


Figure C-7 Flange installation of 380 V 1.5-30 kW VFDs

Model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole	Weight (kg)
1.5 kW–2.2 kW	150	115	130	7.5	234	220	190	16.5	174.5	65.5	∅5	2
4 kW–5.5 kW	170	131	150	9.5	292	276	260	10	181	79.5	∅6	3.5
7.5 kW–11 kW	191	151	174	11.5	370	351	324	15	216.2	113	∅6	6
15 kW–18.5 kW	250	210	234	12	375	356	334	10	216	108	∅6	7.8
22 kW–30 kW	275	237	259	11	445	426	404	10	245	119	∅7	9.5

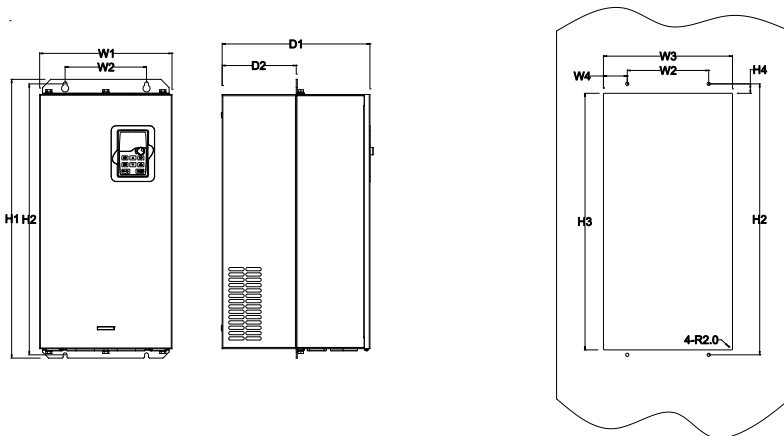


Figure C-8 Flange installation of 380 V 37-110 kW VFDs

Model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole	Weight (kg)
37 kW–55 kW	270	130	261	65.5	555	540	516	17	325	167	∅7	30
75 kW–110 kW	325	200	317	58.5	680	661	626	23	363	182	∅9.5	47

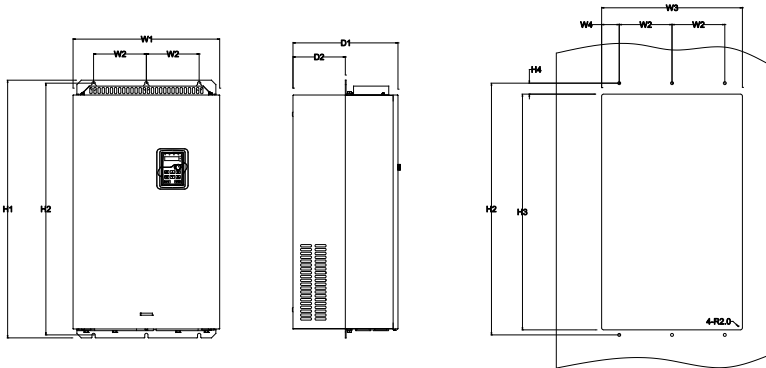


Figure C-9 Flange installation of 380 V 132-200 kW VFDs

Model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole	Weight (kg)
132 kW–200 kW	500	180	480	60	870	850	796	37	358	178.5	∅11	85

C.4.3 Floor installation (unit: mm)

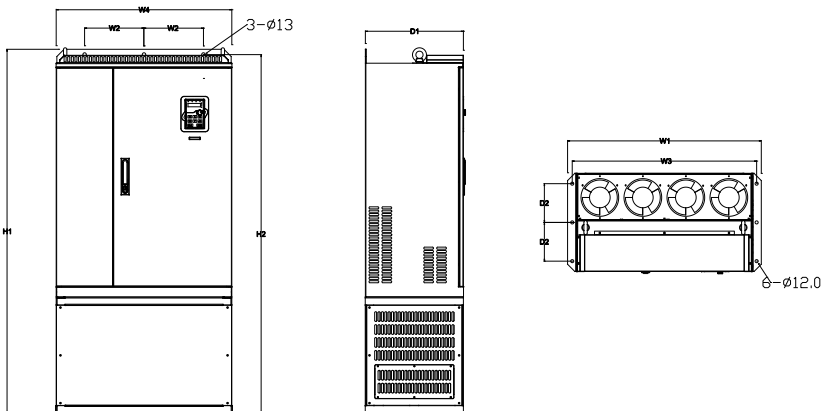


Figure C-10 Floor installation of 380 V 220-315 kW VFDs

Model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole	Weight (kg)
220 kW–280 kW	750	230	714	680	1410	1390	380	150	∅13/12	135
315 kW	750	230	714	680	1410	1390	380	150	∅13/12	137

**C.5 Dimensions for VFDs of AC 3PH 520 V (-15%)–690 V (+10%)**

**C.5.1 Wall installation (unit: mm)**

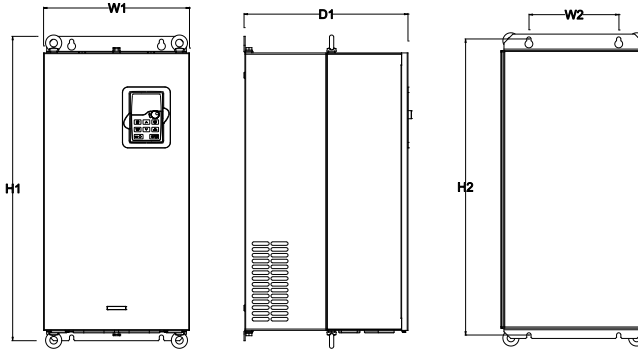


Figure C-11 Wall installation of 660 V 22-132 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
22 kW–45 kW	270	130	555	540	325	∅7	30
55 kW–132 kW	325	200	680	661	365	∅9.5	47
132 kW	325	200	680	661	365	∅9.5	85

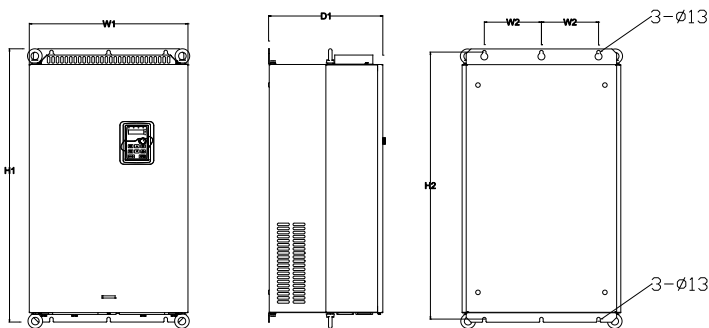


Figure C-12 Wall installation of 660 V 160-220 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
160 kW–220 kW	500	180	870	850	360	∅11	85

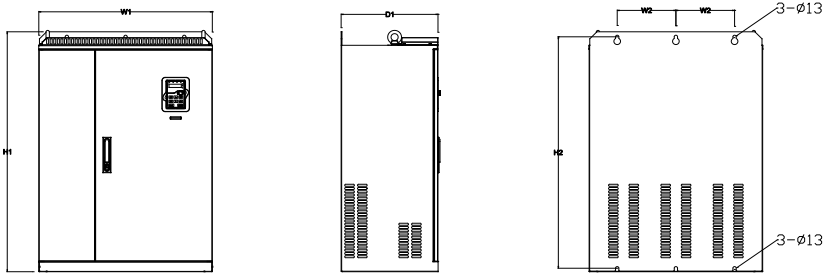


Figure C-13 Wall installation of 660 V 250-350 kW VFDs

Model	W1	W2	H1	H2	D1	Installation hole	Weight (kg)
250 kW–350 kW	680	230	960	926	380	ø13	135

C.5.2 Flange installation (unit: mm)

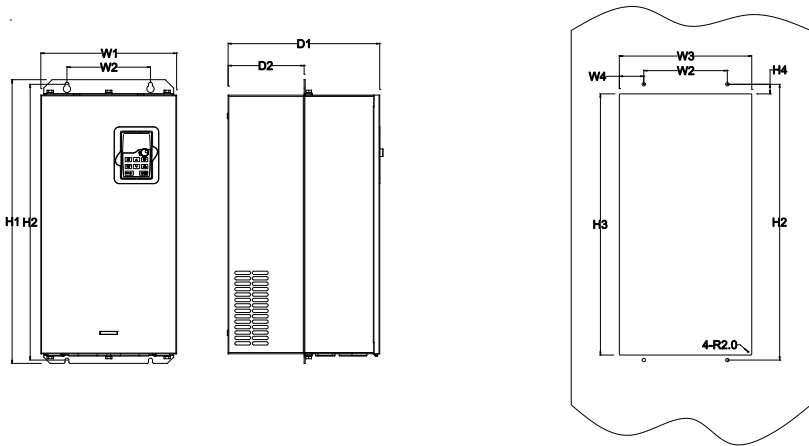


Figure C-14 Flange installation of 660 V 22-132 kW VFDs

Model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole	Weight (kg)
22 kW–45 kW	270	130	261	65.5	555	540	516	17	325	167	ø7	30
55 kW–110 kW	325	200	317	58.5	680	661	626	23	363	182	ø9.5	47
132 kW	325	200	317	58.5	680	661	626	23	363	182	ø9.5	85



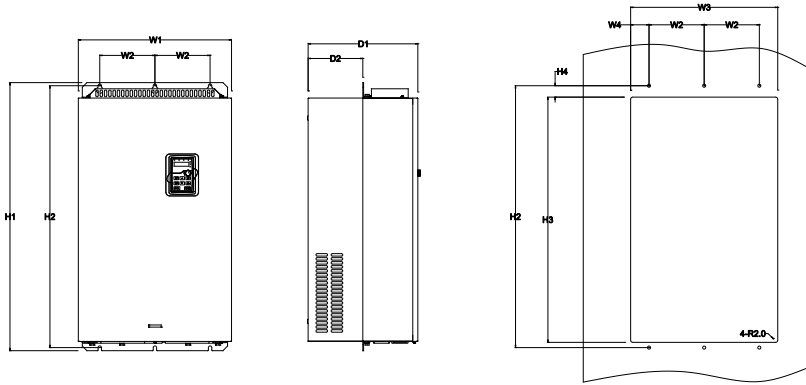


Figure C-15 Flange installation of 660 V 160-220 kW VFDs

Model	W1	W2	W3	W4	H1	H2	H3	H4	D1	D2	Installation hole	Weight (kg)
160 kW–220 kW	500	180	480	60	870	850	796	37	358	178.5	∅11	85

C.5.3 Floor installation (unit: mm)

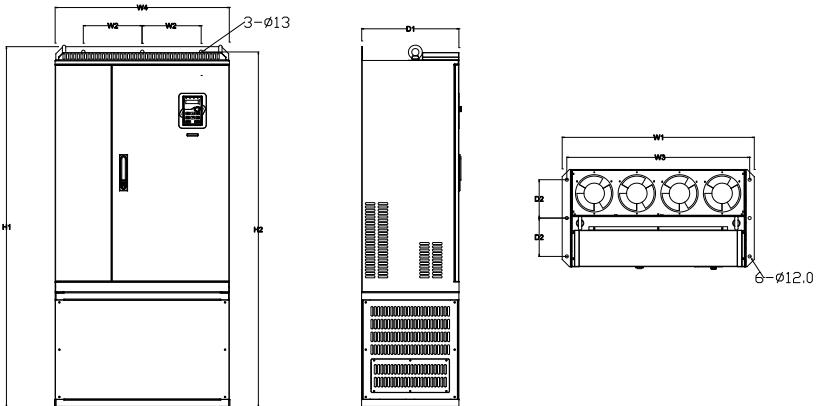


Figure C-16 Floor installation of 660 V 250-350 kW VFDs

Model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole	Weight (kg)
250 kW–350 kW	750	230	714	680	1410	1390	380	150	∅13/12	135

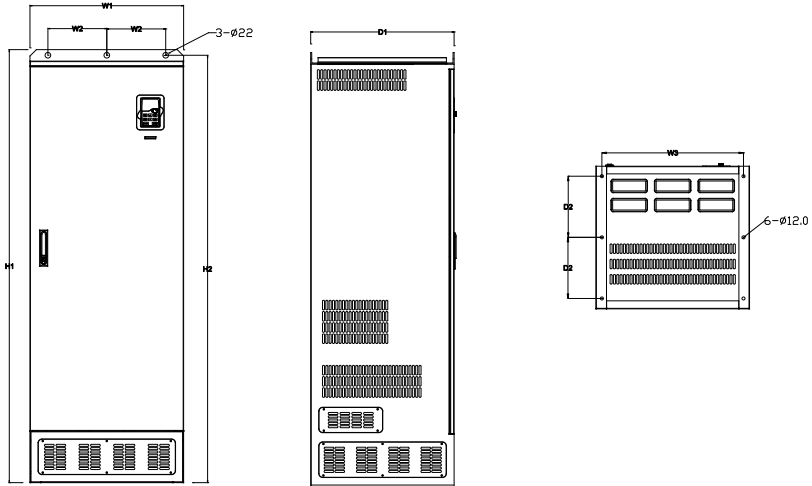


Figure C-17 Floor installation of 660 V 400-630 kW VFDs

Model	W1	W2	W3	W4	H1	H2	D1	D2	Installation hole	Weight (kg)
400 kW–630 kW	620	230	573	/	1700	1678	560	240	φ22/12	390

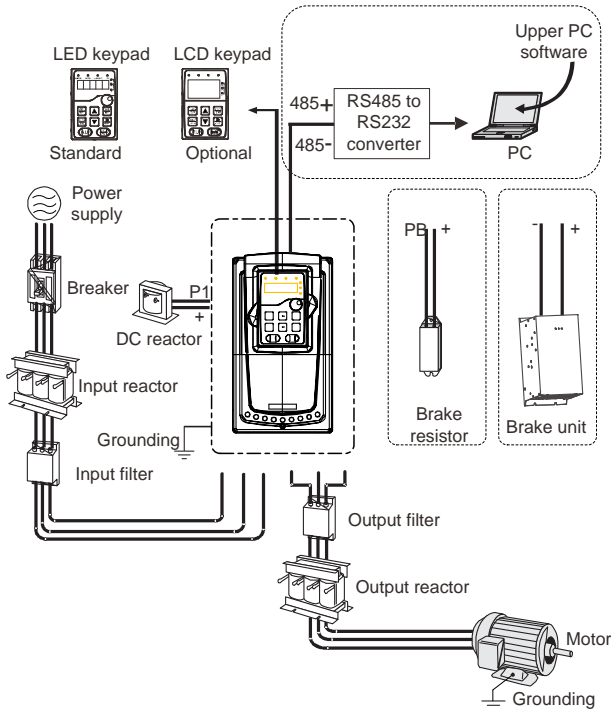
## Appendix D Optional peripheral accessories

### D.1 What this chapter contains

This chapter describes how to select the options and parts of Goodrive35 series.






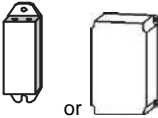


### D.2 Peripheral wiring

Below is the peripheral wiring of Goodrive35 series VFDs.




#### Note:

- ✧ Built-in braking unit is included for 380 V 30 kW and below models;
- ✧ P1 terminal is included for 380 V 37 kW and above models, which can be connected to external DC reactor directly;
- ✧ P1 terminal is included for 660 V and above models, which can be connected to external DC reactor directly;
- ✧ The braking units INVT's DBU series standard braking units. For details, see the DBU operation manual.

Pictures	Name	Descriptions
	Cables	Device to transfer the electronic signals
	Breaker	Prevent from electric shock and protect the power supply and the cables system from overcurrent when short circuits occur. (Please select the breaker with the function of reducing high order harmonic and the rated sensitive current to 1 VFD should be above 30mA).
	Input reactor	This device is used to improve the power factor of the input side of the VFD and control the higher harmonic current.
	DC reactor	The VFDs of 380 V ( $\geq 37$ kW) and of 660 V have external DC reactors.
	Input filter	Control the electromagnetic interference generated from the VFD, please install close to the input terminal side of the VFD. Accessory that restricts the electromagnetic interference generated by the VFD and transmitted to the public grid through the power cable. Try to install the input filter near the input terminal side of the VFD.
	Braking unit or braking resistors	Accessories used to consume the regenerative energy of the motor to reduce the deceleration time. VFDs of 380 V, 30 kW or lower need only to be configured with braking resistors, those of 380V, 37 kW or higher and 660 V series also need to be configured with braking units,.
	Output filter	Control the interference from the output side of the VFD and please install close to the output terminals of the VFD.
	Output reactor	Prolong the effective transmitting distance of the VFD to control the sudden high voltage when switching on/off the IGBT of the VFD.

### D.3 Power supply

Please refer to 3.6.1 "Rated value of AC 3PH 520 V (-15%)–690 V (+10%)".

	Check that the voltage degree of the VFD complies with that of the grid.
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