Shihlin

# SF3
Series


Fan/Pump Vector Control Type

# SF3 Series AC Drive

www.seec.com.tw

# Fan/Pump Vector Control
# AC Motor Drive

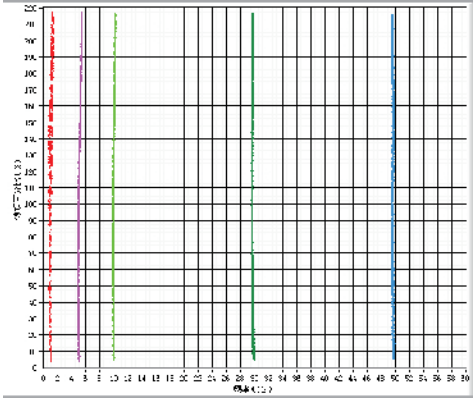
## Product Range

| Modle | KW (HP) | 3.7 (5) | 5.5 (7.5) | 7.5 (10) | 11 (15) | 15 (20) | 18.5 (25) | 22 (30) | 30 (40) | 37 (50) | 45 (60) | 55 (75) | 75 (100) | 90 (120) | 110 (150) | 132 (175) | 160 (215) | 185 (250) | 220 (300) | 250 (335) | 280 (375) | 315 (420) | 355 (475) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SF3-043 | 3-Phase 440V | | | | | | | | | | | | | | | | | | | | | | |

## Product Features

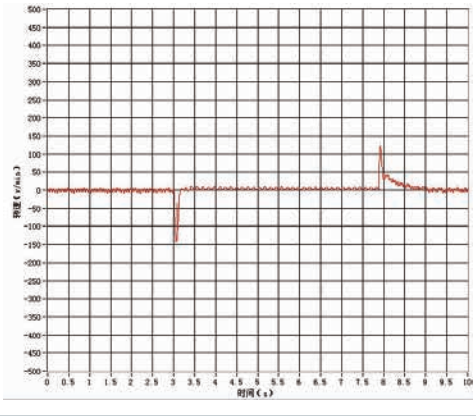
### High Performance Vector Control Technology

- SF3 series can output 150% starting torque at 0.5Hz (SVC) for stable and precise control.



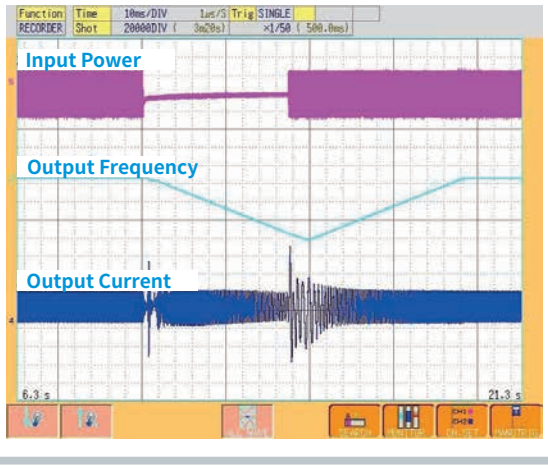
### High Response Performance

- Speed accuracy: less than 1% with 0 to 100% load variation
- For applications with sudden load changes.



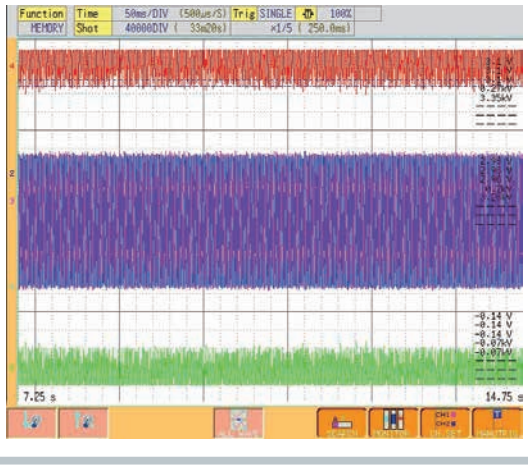
### Safe Motor Stop

- Control output frequency to maintain DC bus voltage and decelerate the motor until stop when an unexpected power failure occurs to protect mechanism.
- The drive will accelerate the motor to its previous speed when power resumes.
- Suitable for idle running prohibited equipment.




### Low-noise Carrier Wave Control (Soft-PWM)

- Motor noise is controlled so that the metallic sound is transformed into a more pleasing buzz.
- Low noise operations to reduce the interference exerted upon external radio frequencies.



SF3

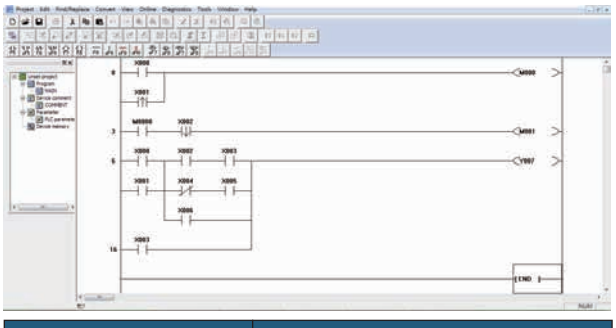
# Product Features

## High Performance synchronous Motor Control Technology

- Supports induction motor (IM) and permanent magnet synchronous motor (IPM and SPM) control.
- Supports open loop synchronous motor control.


## Built-in PLC Functions

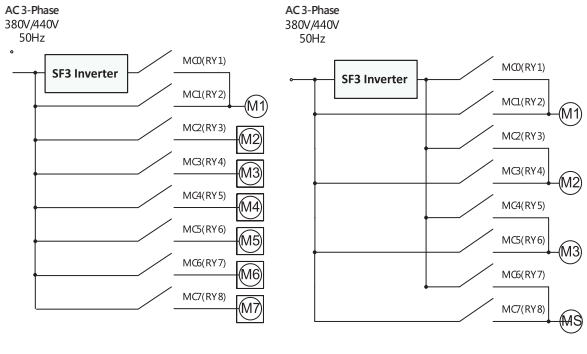
- Provides PLC programming software, easy for editing.
- Applicable for programming small number of points, and support multiple functions.



| Item | | SF3 PLC functions |
|---|---|---|
| Programming Language | | Ladder diagram + Command |
| Basic commands | | 21 |
| Accicable comments | | 14 |
| Processing speed | Basic commands | 1μs |
| | Applicable commands | 10μs |
| Hoden program capacity | | 400 stes (0-399 stes) |
| I/Oconfiguration | Input (X) | 22 pointsXO-X25 |
| | Output(Y) | 20 points (YO-Y23. octal) |
| Supporting electric relay (M) | General | 160 points, MO-M159 |
| | Battery backed | 80 points, M160-1239 |
| | Special | 64 points, M8000-M8063 |
| Timer(T) | 100ms | 8 points, 00-C7, counting range: 0-65535 |
| Counter(C) | | 8 points, TO-T7 timer range: 0-6553.5 seconds |
| Data register | General | General 32 points, DO-D31 |
| | Battery backed | 16 points, D32-047 |
| | Special | 64 points, D8000-D8063 |

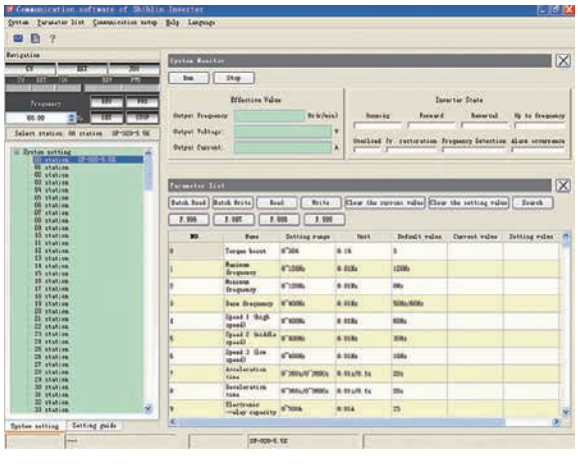
## Multi-Pump Control

- Multi-Pump Control (with EB308R), with multiple timed patrol to support pump control. Controlling maximum of 7 pumps at the same time for 1 inverter.




## PC Communication Software

- This provides remote control of multiple frequency AC drive for parameters setup, copy and monitoring.

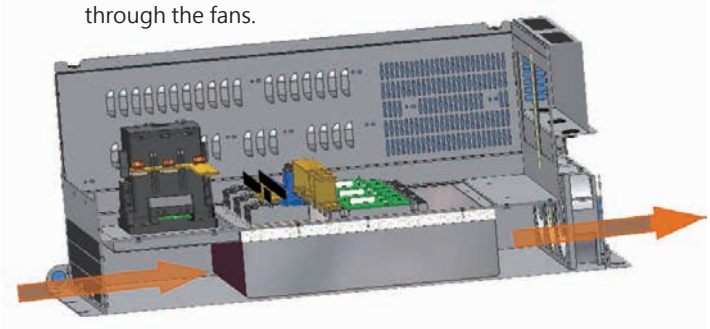


# SF3 Series

## Fan/Pump Vector Control AC Motor Drive

## 1. Isolated Air Channel

- Ventilation (air flow path) is isolated from the surface of thermal dissipation units and electrical parts. Dust will not be able to infiltrate the interior of the inverter through the fans.



Note: Even though the cooling duct is complete isolated, but if the inverter is installed at the environment where lots of dust or oil gas with out protection, the duct will still pass into inverter.

# Product

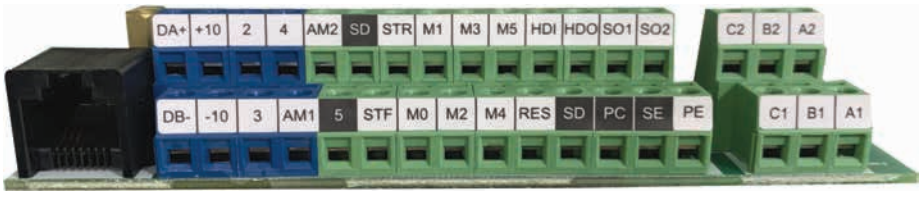

## 2. Enhanced PCB Coating

- Protect drive and ensure its operation safety and stability.
- Compliance with international standards IEC 60721-3-3 class 3C2.

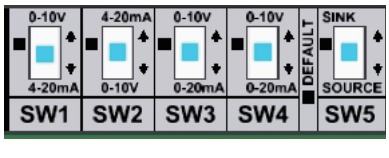
Moisture proof
Corrosion proof
Dust proof

## 3. Terminal Block for Quick Wiring

- Standard RJ45 internet connection with DA+, DB- Euroblock, easy connection for multi-machine communication.
- Support maximum 100kHz pulse input(HDI) and output(HDI) signal.




Quick switch for application needs



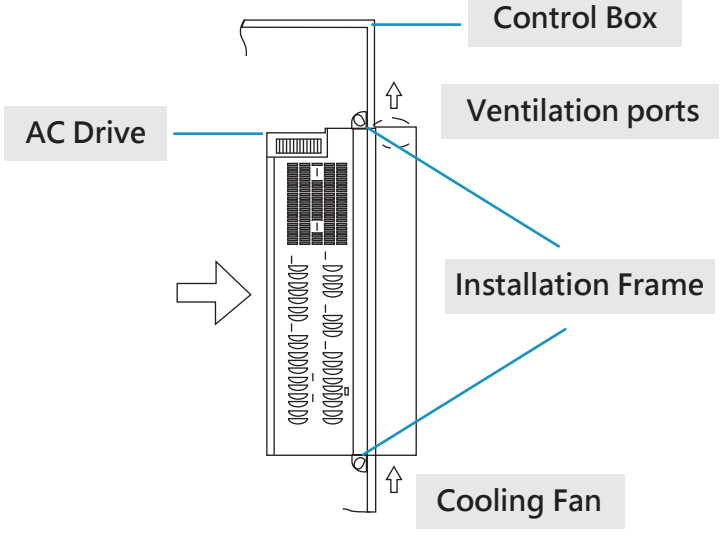
# Features


## 4. LCD Operation Interface

- Supports 2 display styles.
- Able to simultaneously display 6 sets of operational data.
- Calendar support.
- Offers both English and Chinese language interfaces.
- Capable of storing 3 sets of parameters.
- Supports shuttle settings.

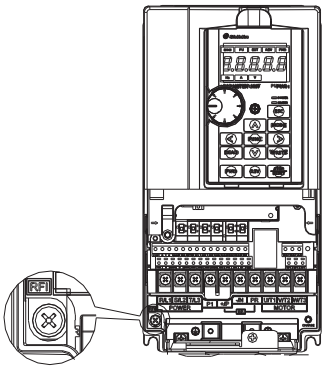

## 5. Through-the-Wall Installation Support Provided for the Entire Series

- Improve heat dissipation, reduce heat generation within the cabinet, and improve protection for the cabinet contents.




## 6. Built-in RFI Filter

- Reduces electromagnetic interference.



# SF3 Series

Fan/Pump Vector Control
AC Motor Drive

## Electrical Specifications

### 440V three-phase

| Frame | | | A | | B | | | C | | | | D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SF3-043-□K□KG | | | 5.5/3.7 | 7.5/5.5 | 11/7.5 | 15/11 | 18.5/15 | 22/18.5 | 30/22 | 37/30 | 45/37 | 55/45 | 75/55 | 90/75 |
| Output | ND | Rated output capacity(KVA) | 10 | 14 | 18 | 25 | 29 | 34 | 46 | 56 | 69 | 84 | 114 | 137 |
| | | Rated output current(A) | 13 | 18 | 24 | 32 | 38 | 45 | 60 | 73 | 91 | 110 | 150 | 180 |
| | | Applicable motor capacity (HP) | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 | 120 |
| | | Applicable motor capacity (kW) | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 |
| | | Overload current rating | 120% 60seconds (inverse time characteristics) | | | | | | | | | | | |
| | | Carrier frequency (kHz) | 1 ~ 15kHz | | | | | 1~10kHz | | | | | | |
| | HD | Rated output capacity (kVA) | 6.9 | 10 | 14 | 18 | 25 | 29 | 34 | 46 | 56 | 69 | 84 | 114 |
| | | Rated output current (A) | 9 | 13 | 18 | 24 | 32 | 38 | 45 | 60 | 73 | 91 | 110 | 150 |
| | | Applicable motor capacity (HP) | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 100 |
| | | Applicable motor capacity (kW) | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 |
| | | Overload current rating | 150% 60seconds (inverse time characteristics) | | | | | | | | | | | |
| | | Carrier frequency (kHz) | 1~15kHz | | | | | | | | | | | |
| | Maximum output voltage | | Three-phase 380-480V | | | | | | | | | | | |
| Power supply | Rated power voltage | | Three-phase 380-480V 50Hz/60Hz | | | | | | | | | | | |
| | Allowable fluctuating range of power voltage | | Three-phase 342-528V 50Hz/60Hz | | | | | | | | | | | |
| | Allowable fluctuating range of power frequency | | ± 5% | | | | | | | | | | | |
| | Power capacity (kVA) | | 10.4 | 11.5 | 16 | 20 | 27 | 32 | 41 | 52 | 65 | 79 | 100 | 110 |
| Cooling method | | | Forced air cooling | | | | | | | | | | | |
| Weight (kg) | | | 3 | 3 | 6 | 6 | 6 | 10 | 10 | 10 | 11 | 25 | 26 | 30 |

| Frame | | | E | | F | | G | | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model SF3-043-□K□KG | | | 110/90 | 132/110 | 160/132 | 185/160 | 220/185 | 250/220 | 280/250 | 315/280 | 355/315 |
| Output | ND | Rated output capacity(KVA) | 168 | 198 | 236 | 295 | 367 | 402 | 438 | 491 | 544 |
| | | Rated output current(A) | 220 | 260 | 310 | 340 | 425 | 480 | 530 | 620 | 683 |
| | | Applicable motor capacity (HP) | 150 | 175 | 215 | 250 | 300 | 335 | 375 | 420 | 475 |
| | | Applicable motor capacity (kW) | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | 355 |
| | | Overload current rating | 120% 60seconds (inverse time characteristics) | | | | | | | | |
| | | Carrier frequency (kHz) | 1~9kHz | | | | | | | | |
| | HD | Rated output capacity (kVA) | 137 | 168 | 198 | 236 | 295 | 367 | 402 | 438 | 491 |
| | | Rated output current (A) | 180 | 220 | 260 | 310 | 340 | 425 | 480 | 530 | 620 |
| | | Applicable motor capacity (HP) | 120 | 150 | 175 | 215 | 250 | 300 | 335 | 375 | 420 |
| | | Applicable motor capacity (kW) | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 |
| | | Overload current rating | 150% 60seconds (inverse time characteristics) | | | | | | | | |
| | | Carrier frequency (kHz) | 1~10kHz | | | | | | | | |
| | Maximum output voltage | | Three-phase 380-480V | | | | | | | | |
| Power supply | Rated power voltage | | Three-phase 380-480V 50Hz/60Hz | | | | | | | | |
| | Allowable fluctuating range of power voltage | | Three-phase 342-528V 50Hz/60Hz | | | | | | | | |
| | Allowable fluctuating range of power frequency | | ±5% | | | | | | | | |
| | Power capacity (kVA) | | 137 | 165 | 198 | 247 | 295 | 367 | 402 | 438 | 491 |
| Cooling method | | | Forced air cooling | | | | | | | | |
| Weight (kg) | | | 38 | 39 | 56 | 56 | 93 | 93 | 93 | 120 | 120 |

Note: The test conditions of rated output current, rated output capacity and inverter power consumption are: carrier frequency (P.72) is default setting; inverter output voltage is at 440V; output frequency is at 60Hz, and surrounding temperature is 40℃.

# Common Specifications

| | | |
|---|---|---|
| Control method | | SVPWM, V/F, general flux vector control, sensorless vector control (SVC). |
| Output frequency range | | 0~650Hz |
| Frequency setting resolution | Digital setting | The resolution is 0.01 Hz when the frequency is set within 100 Hz;<br>The resolution is 0.1 Hz when the frequency is set at above 100 Hz. |
| | Analog setting | 11bit, DC 0~±5V or 4~20mA signal setting; 12bit, DC 0~±10V signal setting |
| Output frequency accuracy | Digital setting | Maximum target frequency+0.01%. |
| | Analog setting | Maximum target frequency+0.1%. |
| Speed control range | | IM: When SVC, 1:200 , PM: When SVC,1:20. |
| Start torque | | 150% 0.5Hz (SVC)。 |
| V/F characteristics | | Constant torque curve, variable torque curve, five-point curve, VF separation. |
| Acceleration / deceleration curve characteristics | | Linear acceleration /deceleration curve, S pattern acceleration /deceleration curve1 & 2 & 3. |
| Drive motor | | Induction motor(IM), permanent magnet synchronous motor(SPM, IPM). |
| Current stall protection | | The stall protection level can be set to 0~200%(06-01(P.22)). The default value is 120%(HD )/150%(ND). |
| Target frequency setting | | Keypad setting, DC 0~5V/10V signal, DC -10~+10V signal, DC 4~20 mA signal, multi- speed stage level setting, communication setting, HDI setting. |
| PID control | | Please refer to SF3 user manual. |
| Built-in simple PLC | | Supports 21 basic instructions and 14 application instructions, including PC editing software please refer to manual at build-in PLC chapter. |
| Operation panel | Operation monitoring | Output frequency, output current, output voltage, PN voltage, output torque, electronic thermal accumulation rate, temperature rising accumulation rate, output power, analog value input signal, external terminal status...; at most 12 groups of alarm records, the last group of alarm message is recorded. |
| | LED indication lamp (8) | Forward rotation indicator, reverse rotation indicator, frequency monitoring indicator, voltage monitoring indicator, current monitoring indicator, mode switch indicator, PU control indicator and external terminal control indicator. |
| Communication | | RS-485 communication, can select Shihlin/Modbus communication protocol, communication speed up to 115200bps, CanOpen protocol (with optional CP301 expanded board). |
| Protection mechanism / alarm function | | Output short circuit protection, over-current protection, over-voltage protection, under-voltage protection, motor over-heat protection (06-00(P.9)), IGBT module over-heat protection, communication abnormality protection, PTC temperature protection etc. Capacitor overheat, input and output phase loss, to-earth(ground) current leakage protection, circuit error detection... |
| Environment | Ambient temperature | -10 ~ +40℃ (non-freezing) Set "fixed rated current, reduce carrier frequency with increasing temperature" or "fixed carrier frequency, reduce rated current with increasing carrier frequency". |
| | Ambient humidity | Below 90%Rh (non-condensing). |
| | Storage temperature | -20 ~ +65℃。 |
| | Surrounding environment | Indoor, no corrosive gas, no flammable gas, no flammable powder. |
| | Altitude | Altitude below 2000 meters, but when altitude is above 1,000 m, 2% of the rated current needs to be decreased per 1000 rising |
| | Vibration | Vibration below 5.9m/s2 (0.6G). |
| | Grade of protection | IP20 for frames A, B and C, IP00 for frame D and above (IP20 accessories shall be optional) |
| | The degree of environmental pollution | 2 |
| | Class of protection | Class I |
| International certification | | CE |

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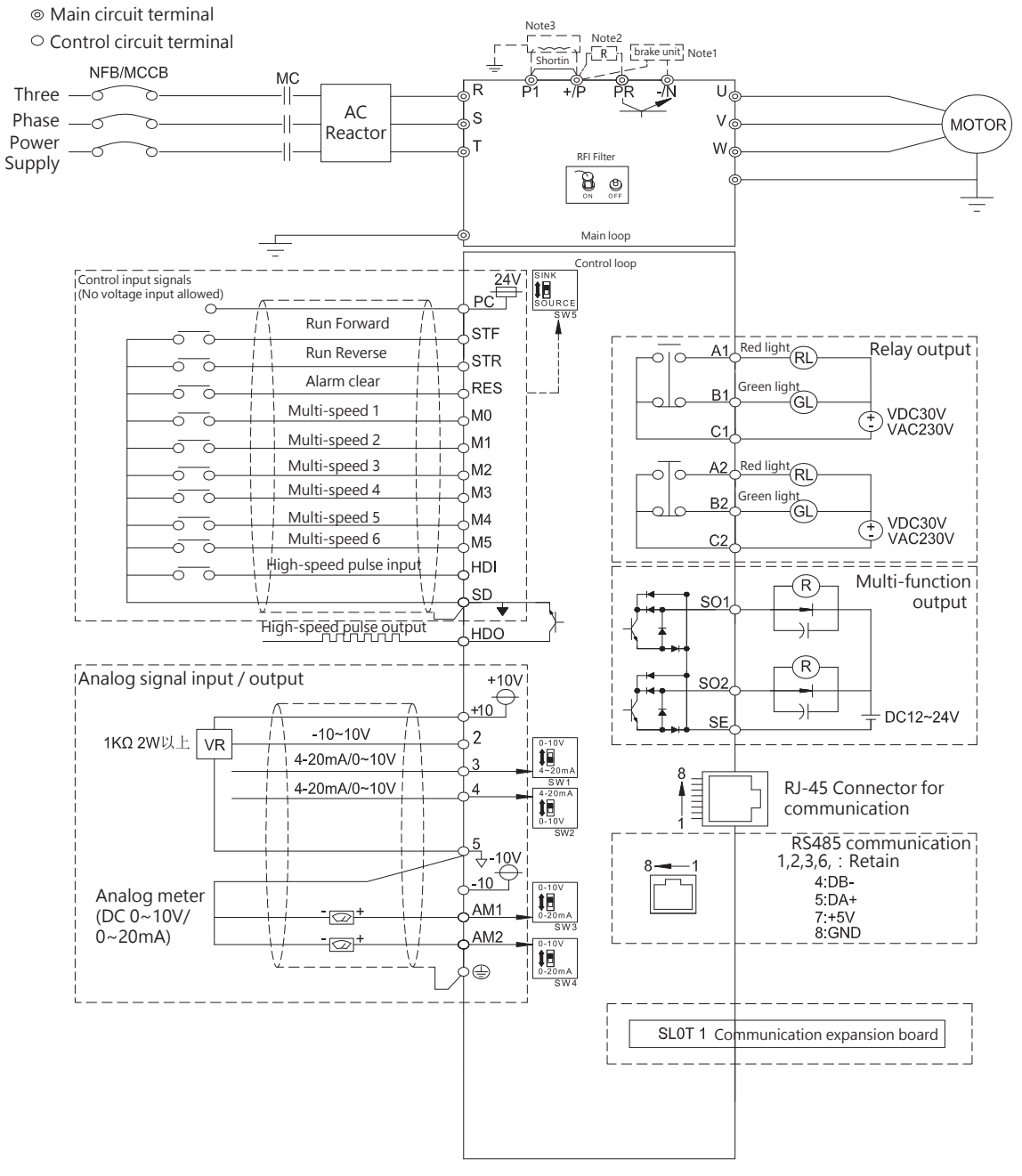
Fan/Pump Vector Control
AC Motor Drive

## Wiring Diagram

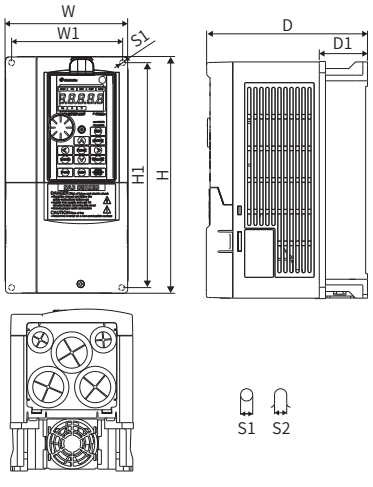



**NOTE**

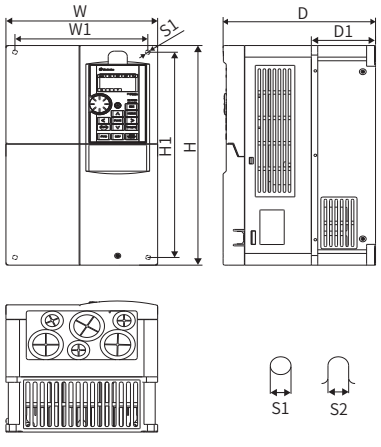
1. Braking resistor wiring method between +/P and PR is only for frame A, B and C. For frame D, E, G and H, the braking resistor is connect between (+/P)-(-N).
2. DC reactor can be added between +/P and P1. When DC reactor is not in used, shorted those terminal.
3. When adding DC reactor, the jumper between +/P and P1 must be removed.

# Dimensions

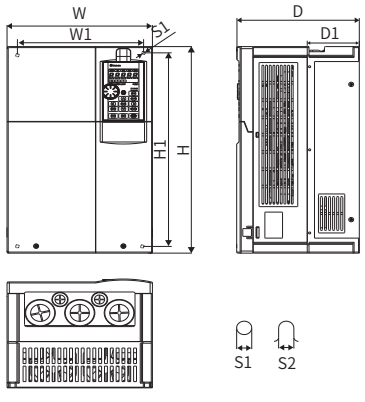
## Frame A



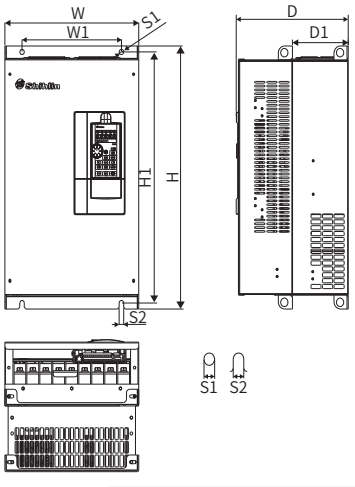

## Frame B



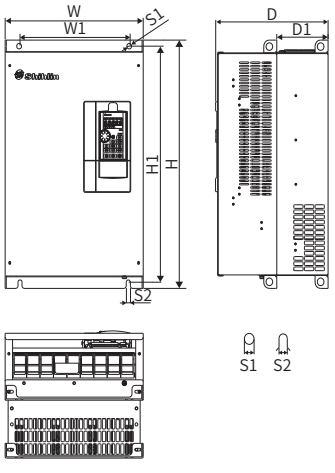

## Frame C




## Frame D




## Frame E




Unit : mm

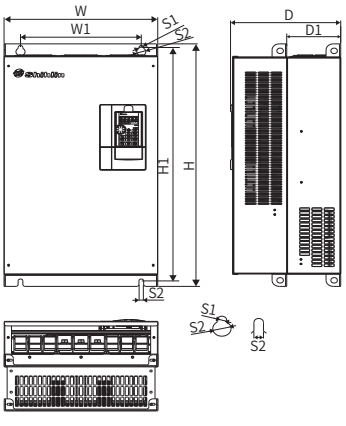
| | Model type | W (mm) | W1 (mm) | H (mm) | H1 (mm) | D (mm) | D1 (mm) | S1 (mm) | S2 (mm) |
|---|---|---|---|---|---|---|---|---|---|
| FrameA | SF3-043-5.5K/3.7KG | 130.0 | 116.0 | 250.0 | 236.0 | 170.0 | 51.3 | 6.2 | 6.2 |
| | SF3-043-7.5K/5.5KG | | | | | | | | |
| FrameB | SF3-043-11K/7.5KG | 190.0 | 173.0 | 320.0 | 303.0 | 190.0 | 80.5 | 8.5 | 8.5 |
| | SF3-043-15K/11KG | | | | | | | | |
| | SF3-043-18.5K/15KG | | | | | | | | |
| FrameC | SF3-043-22K/18.5KG | 250.0 | 231.0 | 400.0 | 381.0 | 210.0 | 89.5 | 8.5 | 8.5 |
| | SF3-043-30K/22KG | | | | | | | | |
| | SF3-043-37K/30KG | | | | | | | | |
| | SF3-043-45K/37KG | | | | | | | | |
| FrameD | SF3-043-55K/45KG | 330.0 | 245.0 | 550.0 | 525.0 | 275.0 | 137.5 | 11.0 | 11.0 |
| | SF3-043-75K/55KG | | | | | | | | |
| | SF3-043-90K/75KG | | | | | | | | |
| FrameE | SF3-043-110K/90KG | 370.0 | 295.0 | 589.0 | 560.0 | 300.0 | 137.5 | 11.0 | 11.0 |
| | SF3-043-132K/110KG | | | | | | | | |

# SF3 Series

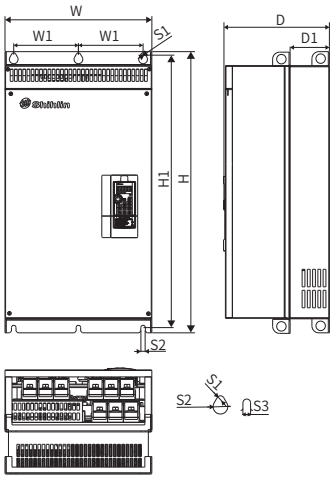
Fan/Pump Vector Control
AC Motor Drive

## Dimensions

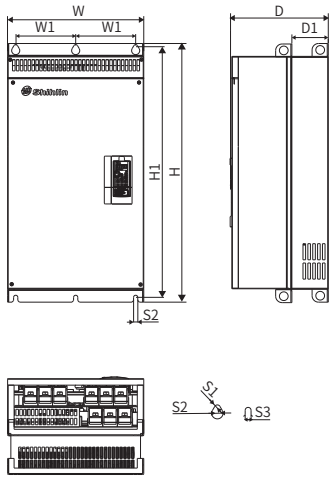
### Frame F




### Frame G




### Frame H

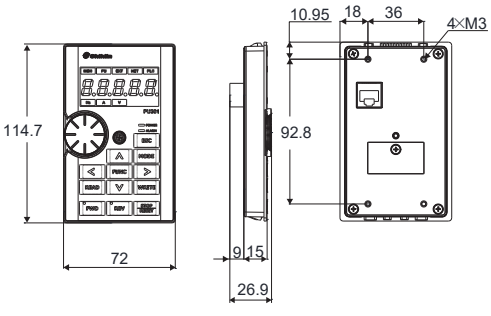



Unit : mm

| | Model type | W (mm) | W1 (mm) | H (mm) | H1 (mm) | D (mm) | D1 (mm) | S1 (mm) | S2 (mm) | S3 (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Frame F | SF3-043-160K/132KG | 420.0 | 330.0 | 800.0 | 770.0 | 300.0 | 145.5 | 13.0 | 25.0 | 13.0 |
| | SF3-043-185K/160KG | | | | | | | | | |
| Frame G | SF3-043-220K/185KG | 500.0 | 180.0 | 870.0 | 850.0 | 360.0 | 150.0 | 13.0 | 25.0 | 13.0 |
| | SF3-043-250K/220KG | | | | | | | | | |
| | SF3-043-280K/250KG | | | | | | | | | |
| Frame H | SF3-043-315K/280KG | 600.0 | 230.0 | 1000.0 | 980.0 | 400.0 | 181.5 | 13.0 | 25.0 | 13.0 |
| | SF3-043-355K/315KG | | | | | | | | | |

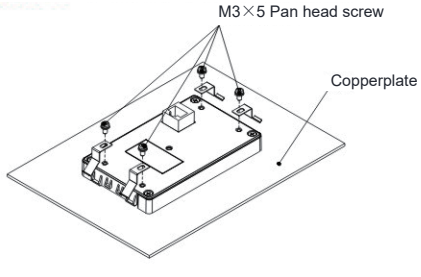
### Keypad Dimensions

PU301、PU301C




### Flat Spring Installation

SMK301 (PU301. PU301C Mounting kit)



# Optional Equipment

## Expansion Board

**PD302**
Profibus communication expansion board

**DN301**
DeviceNet communication expansion board

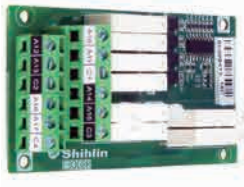
**CP301**
CANopen communication expansion board

**EP301**
Ethernet communication expansion board

**EC301**
EtherCAT communication expansion board

**EB362R**
I/O expansion board

**EB308R**
I/O expansion board



## Keypad

**PU301**

**PU301C**

## Others Equipment

**Transmission Cable SS-CBL01/03/05T**

**Braking Resistor**

**AC/DC Reactor**

**Braking Unit (BKU series)**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