

SD1

Comprehensively specified inverters for AC motors 0.4kW - 11kW (0.5HP - 15HP)

- Single-phase up to 2.2kW (3HP)
- Three-phase up to 11kW (15HP)
- Torque vector control
- STO (Safe Torque OFF) feature
- Integral Modbus-RTU / RS485
- Multiple filter options



SD1 AC Inverter Drives

The SD1 range is the ultimate variable speed drive for you! Easy to set up, and comprehensively specified for use in virtually any application, the SD1 is IMO's first complete range of variable speed drives which offer STO (SIL2 / SIL3) dependent upon model, along with a huge range of enhanced features, normally found on much more expensive inverter drives.

A range of EMC filter options makes the SD1 suitable for virtually every industrial, commercial or domestic application.

- IP20 (NEMA1)
- Torque Vector Control
- Supports PM DC Motor Operation
- STO*1 (Safe Torque OFF) - SIL2 / SIL3
- Up to 150% Starting Torque
- Front Mounted RJ45 Socket ($\leq 2.2\text{kW}/3\text{HP}$)
- Din Rail Mountable ($\leq 2.2\text{kW}/3\text{HP}$)
- Fixed Keypad with Potentiometer ($\leq 2.2\text{kW}/3\text{HP}$)
- Detachable Keypad ($\geq 4\text{kW}/5.5\text{HP}$)
- HDI Input (Pulse)
- 1/2 Analogue Inputs
- 1/2 Analogue Outputs
- 2 C/O Output Relays
- Transistor Output
- 4/5 Digital Inputs
- Selectable PNP/NPN I/O
- Integral Modbus-RTU / RS485
- PID Control as Standard
- DC Injection Braking
- Integral Brake Chopper ($\leq 30\text{kW}/40\text{HP}$)
- Motor Auto-tune (Static & Dynamic)
- Conformal Coating as Standard
- Internal C3 Filter ($\geq 4\text{kW}/5.5\text{HP}$)
- Optional C3 Filter ($\leq 2.2\text{kW}/3\text{HP}$)
- Optional C1 & C2 Filter
- CE
- RoHS & Reach Compliant
- UL / cUL / TUV
- 2 Year Warranty
- RCM Approval

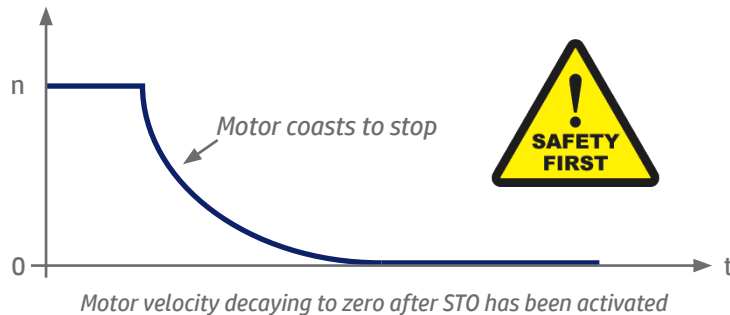
*1 See overleaf Features for specific model inclusion.

Safety As Standard

The SD1 is the entry level range of variable speed drives from IMO and includes Safe Torque OFF (STO) as standard on selected models. STO is a hugely important safety feature which could prevent industrial accidents and even save lives. But what exactly is STO?

The STO feature ensures that no torque-generating energy is put through the equipment. STO is used to bring the drive to a complete standstill, and also prevents any unexpected or unintentional starting of the motor or drive. It therefore enables safe working when for example, the protective door or cover is open or removed.

The advantage of an integrated STO functionality compared with standard safety solutions using electromechanical switchgear, is initially the elimination of multiple components and associated part failure and maintenance, but is also considerably quicker due to a shorter switching time than a conventional solution.



STO Benefits:

- Eliminates requirement for conventional solutions such as power cutting relay or contactor
- Reduces time and costs associated with wiring and maintenance

High Performance At Low Speeds

The SD1 range offers torque vector control across all models in the range. IMO is renowned for manufacturing market-leading variable speed drives and the Jaguar range has been long established with high-end features such as torque vector control. However, the SD1 range heralds a new era in feature rich inverter drives due to the sheer array of standard features you would normally expect to find in considerably more expensive models.

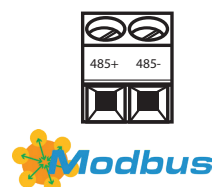
The SD1 range delivers stable torque output even at low speeds, allowing the SD1 to be used in an even wider range of applications including lifts and conveyor systems, and high-inertia loads that demand a higher starting torque.

Enhanced Control Functionality

As you would expect, a drive from IMO isn't your average run-of-the-mill product. We produce solutions which tick every box, every time, and the SD1 is no different. From offering motor auto-tune which minimises power losses, to PID control which allows motor operation whilst controlling temperature, pressure and flow rate without the use of an external device or controller, together with the inclusion of programmable logic functionality, the SD1 is so packed with features that you wouldn't believe they fit inside its compact and user-friendly form.

Connected For Communications

Every model in the SD1 range offers communication capability. The connection is completed by way of twisted-pair to the dedicated RS-485 terminals found on the control terminal block - see diagram overleaf. Communications are carried out using the Modbus-RTU protocol.



Features

Multi-function LED display & status

Keypad fitted as standard to SD1 models $\leq 2.2\text{kW}$ (3HP) and includes 5 digit LED display for quick commissioning and easy use. Removable keypad on models $> 2.2\text{kW}$ (3HP)

External keypad connection port

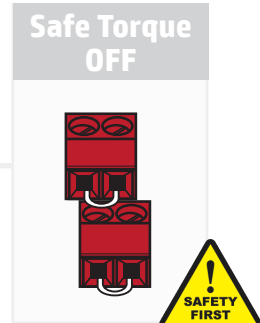
Analogue potentiometer

Connection terminals

EMC Filter



Safe Torque OFF (STO) is standard on all three phase models and single phase 230V models

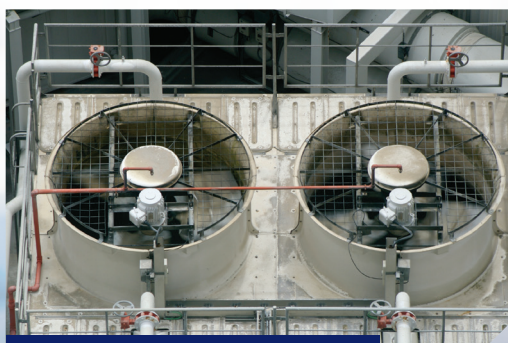


Shielded Barrier Strip on all models $\leq 4\text{kW}$ (5.5HP)



Application Examples

With the array of advanced features and filter options, the SD1 is suited for use in virtually any application, whether it be industrial, commercial or domestic. The following are examples of, but not limited to, the type of application where the SD1 can be employed:-



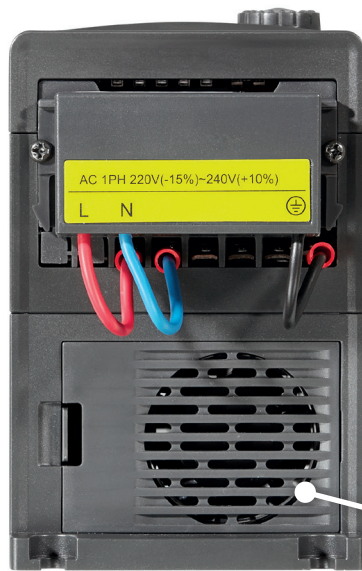
Fan Applications

- HVAC
- Water Treatment Plants
- Automatic Milking System



Pump Applications

- HVAC
- Waste Water
- Process Cooling



[Bottom View]

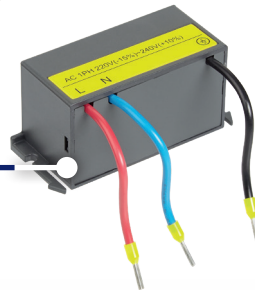
NOTE:
0.4kW - 2.2kW (0.5HP - 3HP)
External Filter
4kW - 11kW (5.5HP - 15HP)
Internal Filter

Fan hatch

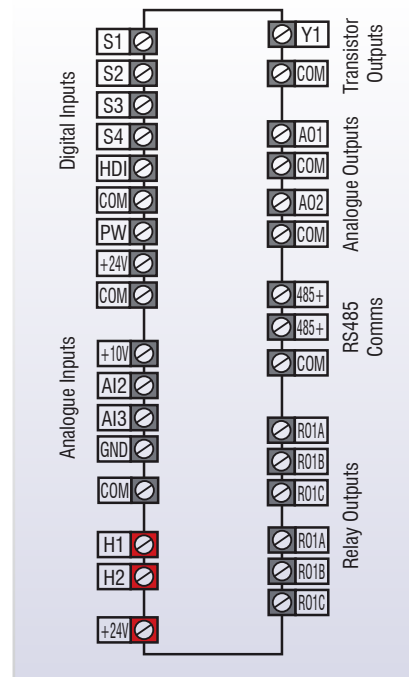
Replaceable fan



EMC Filter (optional)



Terminal Layout



Note: For a more detailed control connections diagram, please refer to the SD1 technical datasheet found at www.imopc.com



Conveyor Applications

- Mining & Metals
- Logistics
- Food Machinery



Hoist Applications

- Cranes & Lifts
- Material Handling

The versatile and feature-rich SD1 is ideal for hundreds of different applications in all segments of industry

Ratings & Specifications

Single Phase 110VAC (Output Voltage - 230VAC)					
Model	Frame Size	Output Power		Input Current	Output Current
SD1-2.5A-11	2	0.4kW	0.5HP	8.1A	2.5A
SD1-4.2A-11	2	0.75kW	1.0HP	15.1A	4.2A
SD1-5.8A-11	2	1.1kW	1.4HP	20.0A	5.8A

Single Phase 230VAC (STO As Standard)					
Model	Frame Size	Output Power		Input Current	Output Current
SD1-2.5A-21	1	0.4kW	0.5HP	6.5A	2.5A
SD1-4.2A-21	1	0.75kW	1.0HP	9.3A	4.2A
SD1-7.5A-21	2	1.5kW	2.0HP	15.7A	7.5A
SD1-10A-21	2	2.2kW	3.0HP	24.0A	10.0A

Three Phase 230VAC (STO As Standard)					
Model	Frame Size	Output Power		Input Current	Output Current
SD1-2.5A-23	2	0.4kW	0.5HP	3.7A	2.5A
SD1-4.2A-23	2	0.75kW	1.0HP	5.0A	4.2A
SD1-7.5A-23	3	1.5kW	2.0HP	7.7A	7.5A
SD1-10A-23	3	2.2kW	3.0HP	11.0A	10.0A

Three Phase 480VAC (STO As Standard)					
Model	Frame Size	Output Power		Input Current	Output Current
SD1-2.5A-43	2	0.75kW	1.0HP	3.4A	2.5A
SD1-4.2A-43	2	1.5kW	2.0HP	5.0A	4.2A
SD1-5.5A-43	2	2.2kW	3.0HP	5.8A	5.5A
SD1-9.5A-43	3	4.0kW	5.5HP	13.5A	9.5A
SD1-14A-43	3	5.5kW	7.5HP	19.5A	14.0A
SD1-18.5A-43	4	7.5kW	10.0HP	25.0A	18.5A
SD1-25A-43	4	11.0kW	15.0HP	32.0A	25.0A

Optional External EMC Filters

Single Phase 230VAC				
Model	C3 Filter / Current		C2 Filter / Current	
SD1-2.5A-21	SD1-RFC3-10	10A	SD1-RFC2-10	10A
SD1-4.2A-21	SD1-RFC3-10	10A	SD1-RFC2-10	10A
SD1-7.5A-21	SD1-RFC3-10	10A	SD1-RFC2-16	16A
SD1-10A-21	SD1-RFC3-10	10A	SD1-RFC2-16	16A

Three Phase 230VAC				
Model	C3 Filter / Current		C2 Filter / Current	
SD1-2.5A-21	SD1-RFC3-7	7A	SD1-RFC2-6	6A
SD1-4.2A-21	SD1-RFC3-7	7A	SD1-RFC2-6	6A
SD1-7.5A-21	Internal	-	SD1-RFC2-16	16A
SD1-10A-21	Internal	-	SD1-RFC2-16	16A

Options & Ordering Codes

SD1	-	2.5A	-	21	
Series Name		Output Current		Input Voltage & Phase	
				11	110V Single Phase
				21	230V Single Phase
				23	230V Three Phase
				43	480V Three Phase

Dimensions



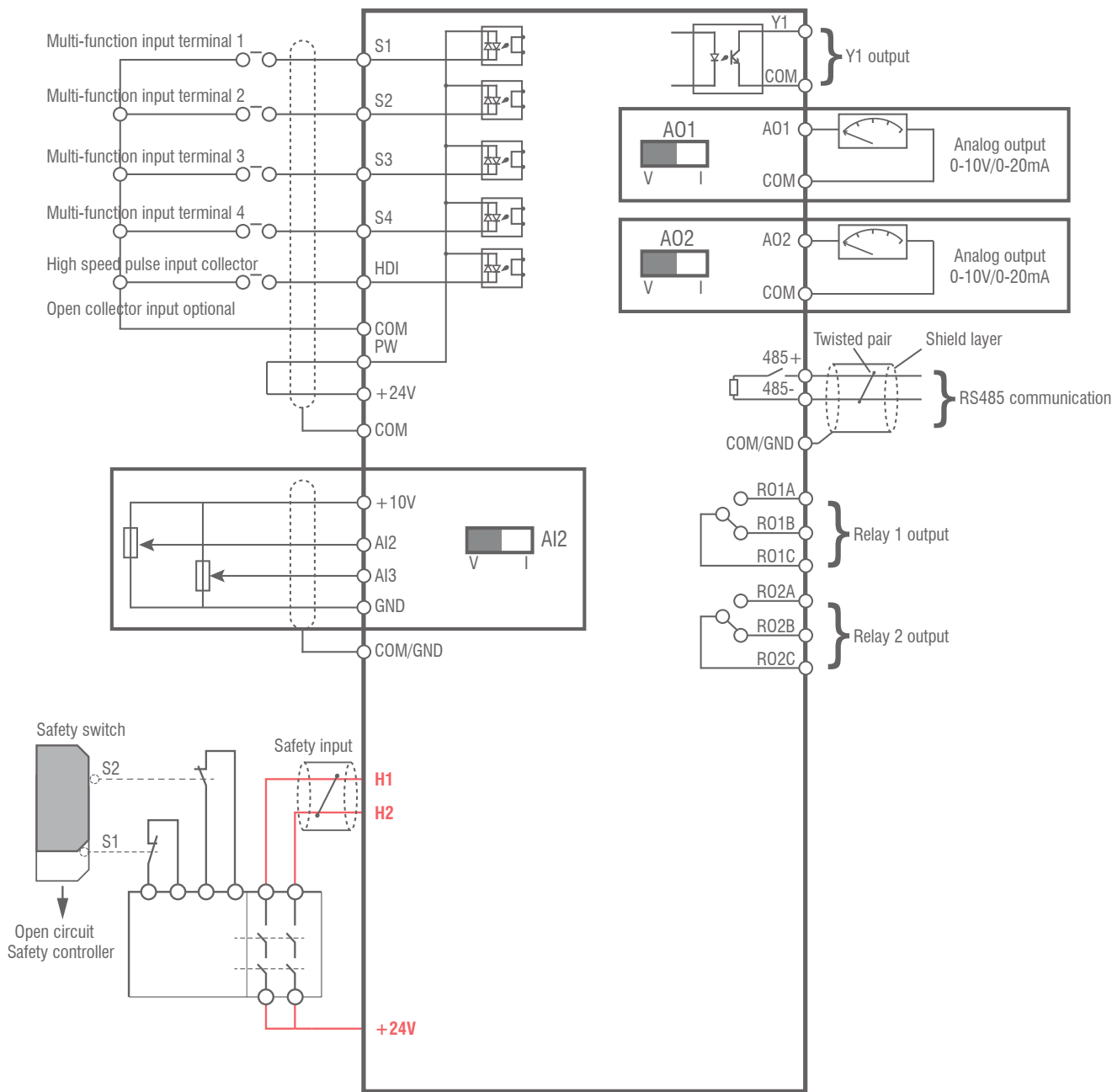
Frame Size 1		
Height	Width	Depth
160mm (6 1/4")	80mm (3 1/8")	123.5mm (4 7/8")

Frame Size 2		
Height	Width	Depth
185mm (7 1/4")	80mm (3 1/8")	140.5mm (5 1/2")

Frame Size 3		
Height	Width	Depth
256mm (10 1/4")	146mm (5 3/4")	167mm (6 5/8")

Frame Size 4		
Height	Width	Depth
320mm (12 5/8")	170mm (6 3/4")	196.3mm (7 3/4")

Power & Control Connections



NOTE: This is a typical circuit which, depending on the rating is subject to change. Please check the user manual for more details.

Accessories

Model	Description
SD1-KP	Remote Keypad
SD1-KP-CPY	Remote Keypad with Copy function
SD1-KP-MB	Keypad Mounting Bracket

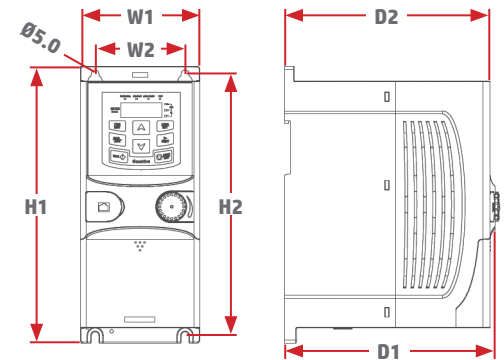


Technical Specifications

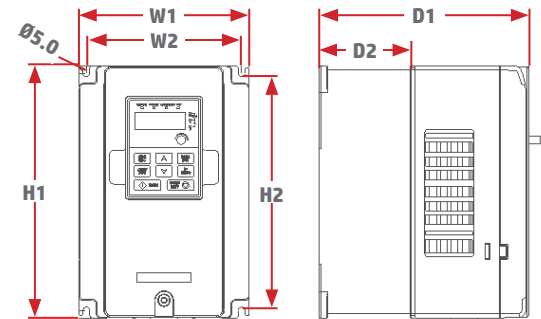
Function Description		Specification
Power Input	Input Voltage (V)	AC 1PH 110V (-15%) to 120V (+10%) AC 1PH 200V (-15%) to 240V (+10%) AC 3PH 200V (-15%) to 240V (+10%) AC 3PH 380V (-15%) to 460V (+10%)
	Input Current (A)	Refer to the rated value
	Input Frequency (Hz)	50Hz/60Hz, allowable range: 47-63Hz
Power Output	Output Voltage (V)	0-Input voltage (SD1-XXA-11 - AC 3ph 230VAC)
	Output Current (A)	Refer to the rated value
	Output Power (kW)	Refer to the rated value
	Output Frequency (Hz)	0-400Hz
Technical Control Performance	Control Mode	SVPWM control, SVC
	Motor Type	Asynchronous motor, Permanent magnet motor (optional)
	Speed Regulation Ratio	Asynchronous motor 1:100 (SVC)
	Speed Control Precision	±0.2% (SVC)
	Speed Fluctuation	±0.3% (SVC)
	Torque Response	<20ms (SVC)
	Torque Control Precision	10% (SVC)
	Starting Torque	0.5Hz / 150% (SVC)
Running Control Performance	Overload Capacity	150% of rated current: 1 minute 180% of rated current: 10 seconds 200% of rated current: 1 second
	Frequency Setup Mode	Digital, analog, pulse frequency, multi-step speed running, simple PLC, PID, Modbus communication. Shift between the set combination and set channel
	Auto-Adjustment of the Voltage	Automatic voltage regulation. Compensates for supply voltage transients
	Fault Protection Function	Provides comprehensive fault protection functions: Overcurrent; Overvoltage; Undervoltage; Overheating; Phase Loss; Overload etc.
Peripheral Interface	Speed Tracking Restart	Provides smooth ramping during start up
	Analog Input	1 (AI2) 0~10V / 0~20mA and 1 (AI3) -10~10V
	Analog Output	2 (AO1, AO2) 0~10V / 0~20mA
	Digital Input	4 standard inputs (max. frequency: 1kHz) 1 high speed input (max. frequency: 50kHz)
	Digital Output	1 Y1 terminal output
Other	Relay Output	2 programmable relay outputs R01A NO, R01B NC, R01C common terminal R02A NO, R02B NC, R02C common terminal Contact capacity: 3A/250VAC
	Mounting Method	Wall & rail mounting
	Ambient Operating Temperature	-10°C to +50°C (derating 1% for every additional 1°C when above 40°C)
	DC Reactor	Standard internal DC reactor for inverters (≥18.5kW)
	Installation Mode	Wall and rail installation of inverters (1PH/200V, 3PH/380V, ≤2.2kW and 3PH/200V, ≤0.75kW) Wall and flange installation of inverters (3PH/380V, ≥4kW and 3PH/200V, ≥1.5kW)
	Braking Unit	Standard for inverters ≤37kW, optional for inverters of 45~110kW
	Protection Level	IP20 Note: Plastic cased inverter should be installed in a metal distribution cabinet, which conforms to IP20 (top surface conforms to IP3X)
	Cooling	Fan cooling
	Braking Unit	Built-in
	EMC Filter	Internal C3 filters for inverters 3PH/380V, ≥4kW and 3PH/200V, ≥1.5kW. Optional external filters to meet the requirement of IEC61800-3 C2, IEC61800-3 C3 For drives >4kW, if internal C3 filter is required, fit supplied jumper link to EMC/J10 observing all safety precautions
	Safety	All SD1 inverters comply to safety standards and are marked accordingly. STO function to SIL level 2/3

Dimensions (mm)

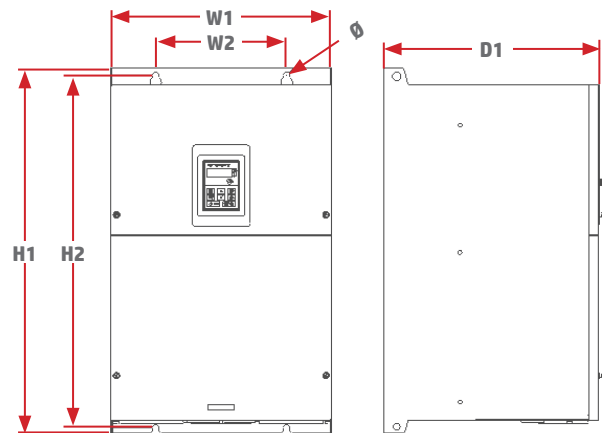
	Model	W1	W2	H1	H2	D1	D2
Single Phase 110V	SD1-2.5A-11	80	60	185	175	140.5	137.3
	SD1-4.2A-11	80	60	185	175	140.5	137.3
	SD1-5.8A-11	80	60	185	175	140.5	137.3
Single Phase 230V	SD1-2.5A-21	80	60	160	150	123.5	120.3
	SD1-4.2A-21	80	60	160	150	123.5	120.3
	SD1-7.5A-21	80	60	185	175	140.5	137.3
	SD1-10A-21	80	60	185	175	140.5	137.3
Three Phase 230V	SD1-2.5A-23	80	60	185	175	140.5	137.3
	SD1-4.2A-23	80	60	185	175	140.5	137.3
	SD1-7.5A-23	146	131	256	243.5	167	84.5
	SD1-10A-23	146	131	256	243.5	167	84.5
Three Phase 480V	SD1-2.5A-43	80	60	185	175	140.5	137.3
	SD1-4.2A-43	80	60	185	175	140.5	137.3
	SD1-5.5A-43	80	60	185	175	140.5	137.3
	SD1-9.5A-43	146	131	256	243.5	167	84.5
	SD1-14A-43	146	131	256	243.5	167	84.5
	SD1-18.5A-43	170	151	320	303.5	196.3	113
	SD1-25A-43	170	151	320	303.5	196.3	113



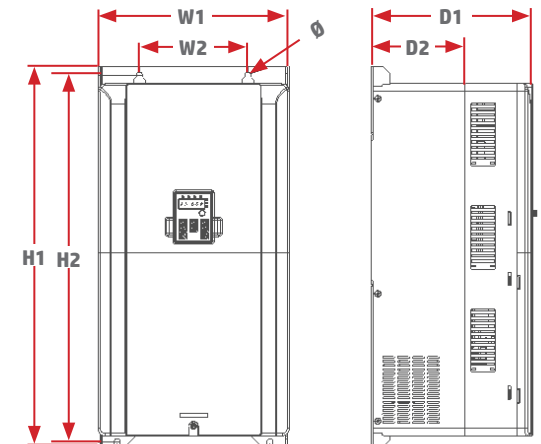
Wall mounting dimensions of 1PH 110V & 230V
0.4 to 2.2kW SD1 Inverter (unit: mm)



Wall mounting dimensions of 3PH 380V 0.4 to 37kW
& 3PH 220V 1.5 to 7.5kW SD1 Inverter (unit: mm)



Wall mounting dimensions of 3PH 380V 90 to
110kW SD1 Inverter (unit: mm)



Wall mounting dimensions of 3PH 45 to
75kW SD1 Inverter (unit: mm)