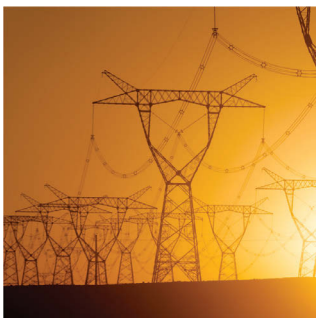




Smart solutions.
Strong relationships.



VSR SERIES DRIVES

Advanced solar pumping solutions
for optimal performance and reliability



murugappa

VSR series drives: Advanced solar pumping solutions for optimal performance and reliability



The VSR series drives deliver dependable, economical, and user-friendly performance tailored for solar pumping, with a soft start feature that prevents water hammering and enhances system longevity. The VSR series incorporates an advanced built-in MPPT algorithm, dynamically adjusting to ensure optimal power extraction and maximum water flow output with exceptional accuracy. VSR's compatibility with both AC and DC inputs provides users with the flexibility to optimize operations, enhancing overall reliability.

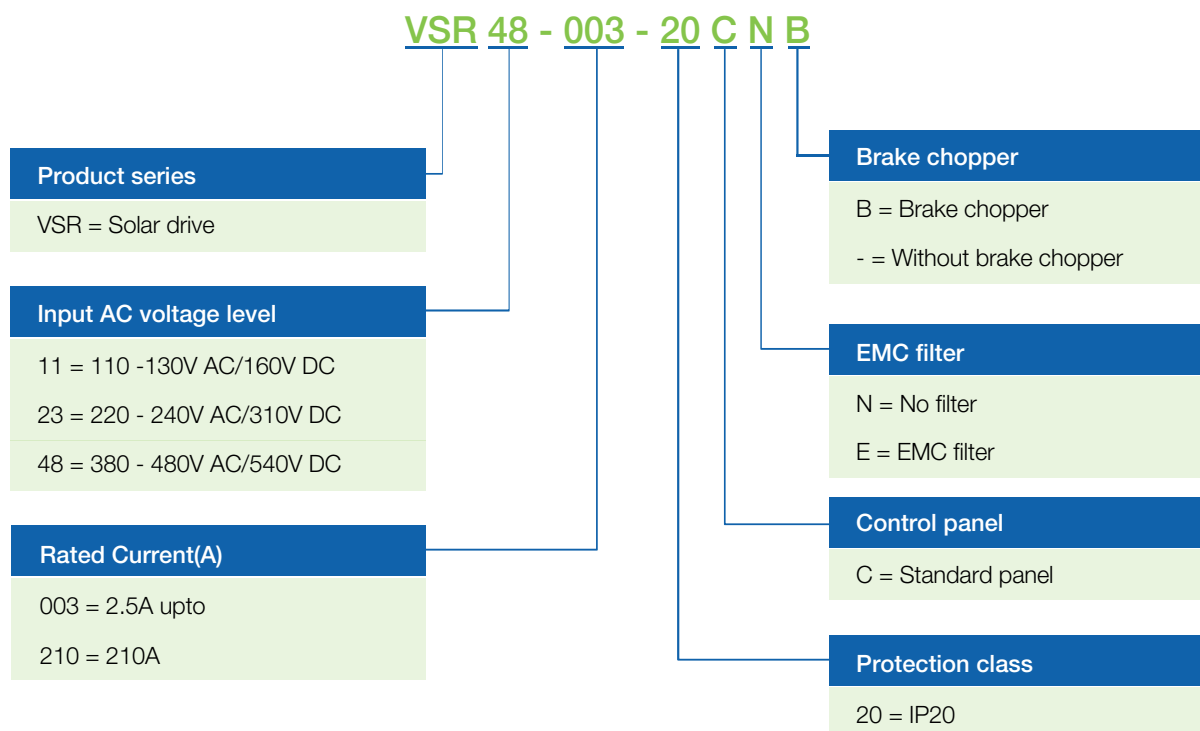
Main features:

- Supports over-current, over-voltage, phase loss, short-circuit, and over-temperature protection.
- Incorporates a self-adaptive high-accuracy maximum power point tracking (MPPT) algorithm, enhancing daily water delivery and productivity.
- Achieves a solar power tracking efficiency of up to 99%.
- Includes specialized features such as tank level control, specifically designed for water pumping applications.
- Operates seamlessly with both DC solar panels and AC grid power sources.
- Provides built-in dry run protection, safeguarding the pump from damage and reducing maintenance costs and downtime.
- The inverter automatically enters dormancy mode and awakens according to sunlight intensity.
- Compatible with any remote monitoring system via Modbus RTU protocol.
- Capable of operating both induction and permanent magnet synchronous motors.



Model explanation:

Model show on product nameplate contains information below.



Note: '-XS' suffix denotes drive with 7 segment LCD display

Types and ratings - VSR model:

Model no.	Recommended solar array power kWp (kilowatt peak)	Maximum input DC current	Output current	Motor	
		A	A	kW	HP
VSR48 series					
VSR48-003-20CNB	1.1	4.5	2.5	0.75	1
VSR48-004-20CNB	2.25	7.5	4.2	1.5	2
VSR48-006-20CNB	3.3	10	5.5	2.2	3
VSR48-009-20CNB	6	18	9.5	3.7, 4	5
VSR48-013-20CNB	8.25	20	13	5.5	7.5
VSR48-017-20CNB	11	30	17	7.5	10
VSR48-024-20CNB	16.5	31.7	25	11	15
VSR48-032-20CNB	22.5	42.2	32	15	20
VSR48-038-20CNB	27.5	52.8	37	18.5	25
VSR48-045-20CNB	33	63.4	45	22	30
VSR48-060-20CNB	45	95.0	60	30	40

VSR48-075-20CNB	55.5	116.2	75	37	50
VSR48-091-20CN-	67.5	137.3	91	45	60
VSR48-112-20CN-	82.5	169.0	112	55	70
<i>Larger rating available on request</i>					
VSRE48 series					
VSRE48-003-20CNB	1.1	4.5	2.5	0.75	1
VSRE48-004-20CNB	2.25	7.5	4.2	1.5	2
VSRE48-006-20CNB	3.3	10	5.5	2.2	3
VSRE48-009-20CNB	6	18	9.5	3.7, 4	5
VSR23 series					
VSR23-2p5-20CNB	0.6	4.5	2.5	0.37, 0.4	0.5
VSR23-4p2-20CNB	1.1	7.5	4.2	0.75	1
VSR23-7p5-20CNB	2.25	10	7.5	1.5	2
VSR23-9p5-20CNB	3.3	18	9.5	2.2	3
VSR23-XXX-D series					
VSR23-9p5-D	3.3	18	9.5	2.2	3
VSR11 series					
VSR11-9p5-20CNB	1.6	18	9.5	1.1	1.5

Note: VSR23-9p5-D: Economical VSR drive 310V DC input

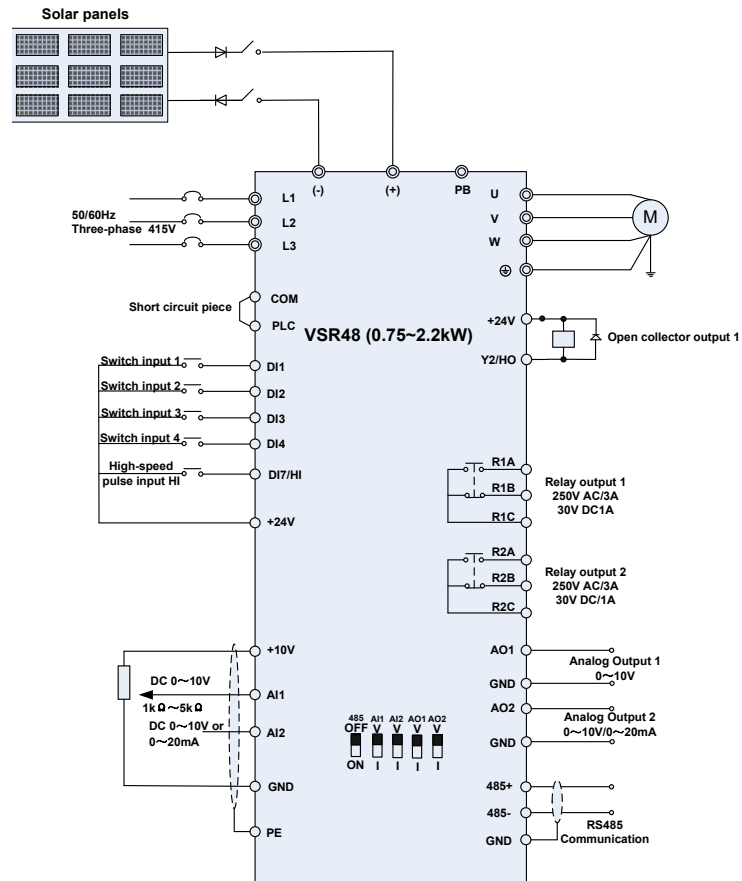


General specifications of VSR drives:

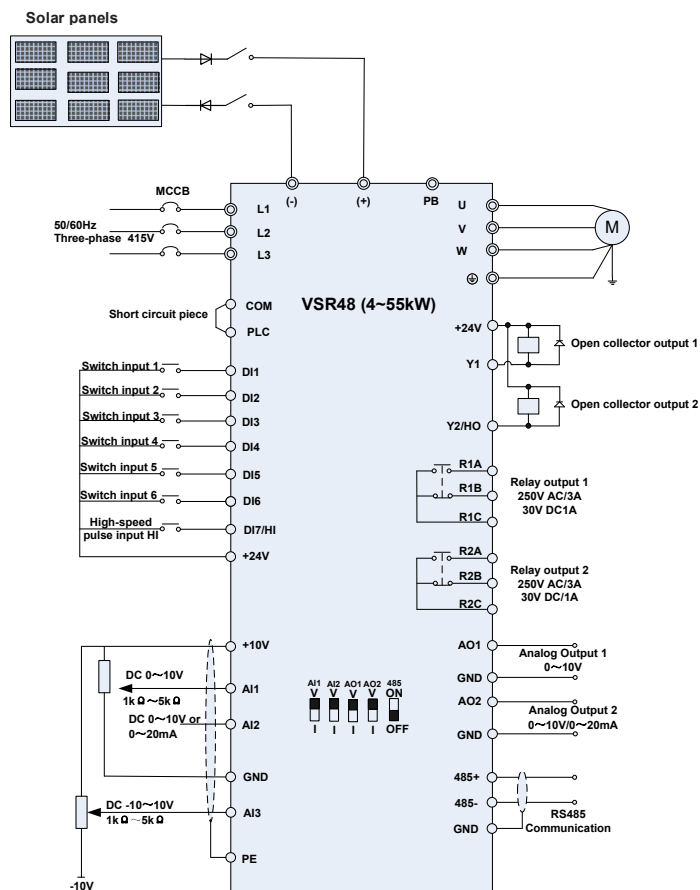
Model		VSR48/VSRE48 series	VSR23 series	VSR23-XXX-D series	VSR11 series
Maximum PV input DC voltage		800V DC	450V DC	450V DC	450V DC
Recommended Voc range		500 ~ 700V DC	320 ~ 370V DC	360 ~ 430V DC	150 ~ 430V DC
Recommended MPPT voltage range		450 ~ 600V DC	250 ~ 350V DC	250 ~ 350V DC	130 ~ 350V DC
Starting voltage range		230 ~ 800V DC	60 ~ 450V DC	60 ~ 450V DC	60 ~ 450V DC
Recommended input work voltage (V)		560V DC	310V DC	310V DC	155V DC
Grid or backup generator Input voltage (V)		Three phase 415V (-20% ~ 20%)	Single phase 220V (-20% ~ 20%)	-	Single phase 110V (-15% ~ 20%)
Rated output voltage		3-Ph 415V	3-Ph 220V	3-Ph 220V	3-Ph 110V
Output frequency		0 ~ 600Hz (default 0 ~ 50Hz)	0 ~ 600Hz (default: 0 ~ 50Hz)	0 ~ 600Hz (default: 0 ~ 50Hz)	0 ~ 600Hz (default: 0 ~ 50Hz)
Control characteristics	V/f patterns	V/f control Sensor-less vector control 1 and 2			
	Speed range	1:50 (V/f control) 1:100 (sensor-less vector control 1) 1:200 (sensor-less vector control 2)			
	Speed accuracy	±0.5% (V/f control) ±0.2% (sensor-less vector control 1 & 2)			
	Speed fluctuation	±0.3% (sensor-less vector control 1 & 2)			
	Torque response	< 10ms (sensor-less vector control 1 & 2)			
Basic function	Overload capability	150% rated current 60s, 180% rated current 10s, 200% rated current 1s.			
Environment	Place of operation	Indoors, no direct sunlight, free from dust, corrosive gases, flammable gases, oil mist, water vapour, water drop, salt, etc.			
	Altitude	0 ~ 2000m De-rate 1% for every 100m when the altitude is above 1000m			
	Ambient temperature	-10 °C ~ 50 °C			
	Relative humidity	5 ~ 95%, no condensation			
	Vibration	Less than 5.9m/s² (0.6g)			
	Storage temperature	-20 °C ~ +70 °C			
Built-in protection		Lightening protection, over-current, overvoltage, output phase-lose, under-load, under-voltage, short circuit, overheating, water pump dry run etc.			
Others	Efficiency	Rated power run ≥93%			
	Installation	Wall or rail mounting			
	IP grade	IP20			
	Cooling method	Forced air cooling			

Wiring diagram:

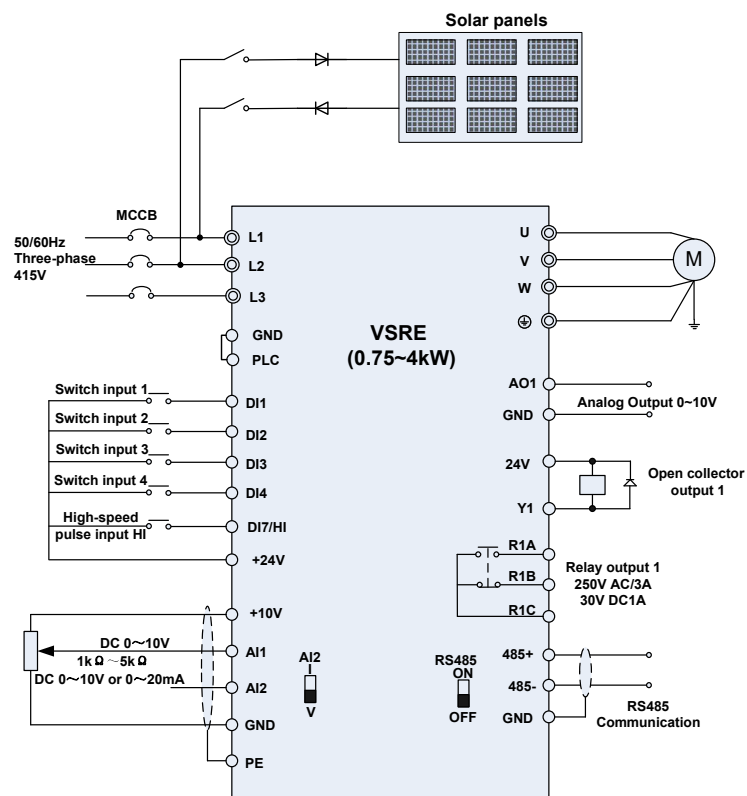
VSR48 (0.75~2.2kW)



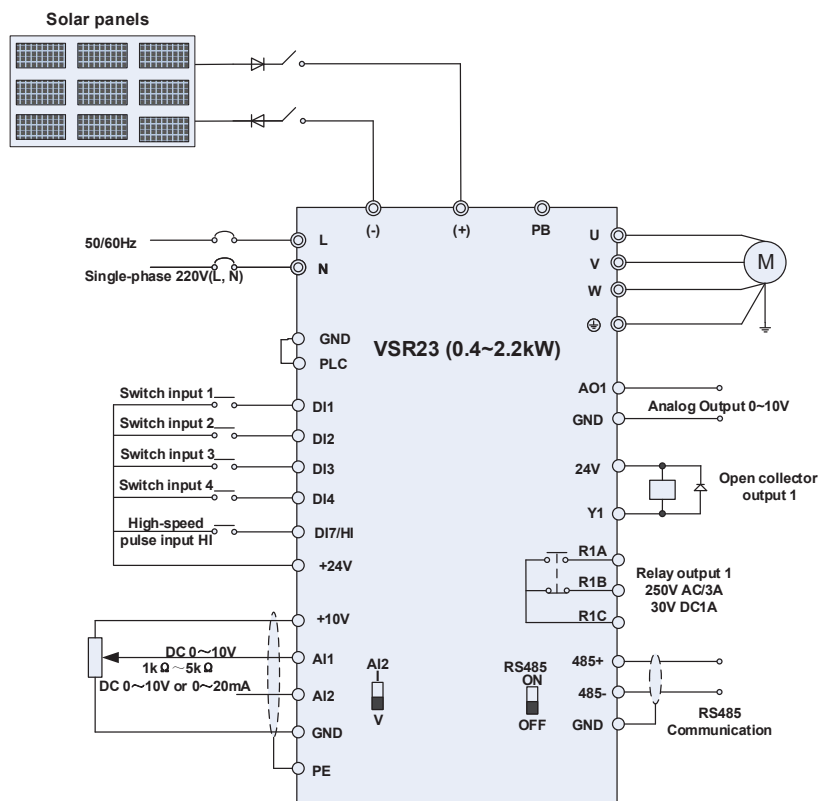
VSR48 (4~55kW)



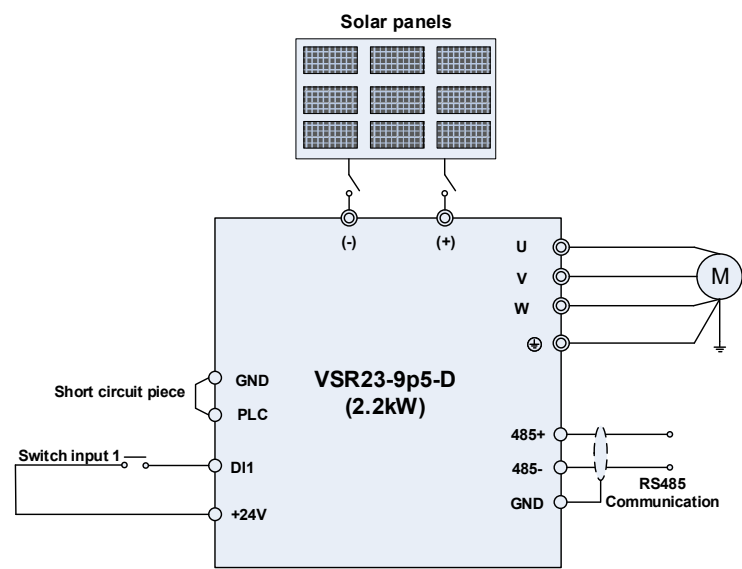
VSRE (0.75~4kW)



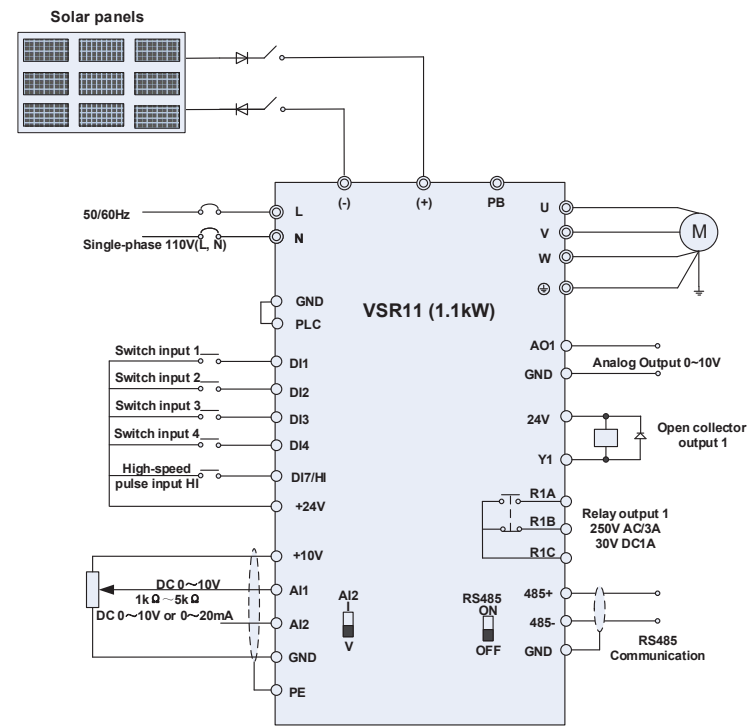
VSR23 (0.4~2.2kW)



VSR23-9p5-D (2.2kW)

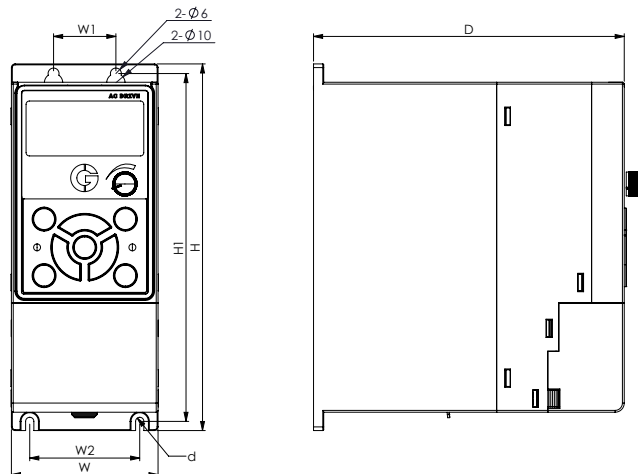


VSR11 (1.1kW)

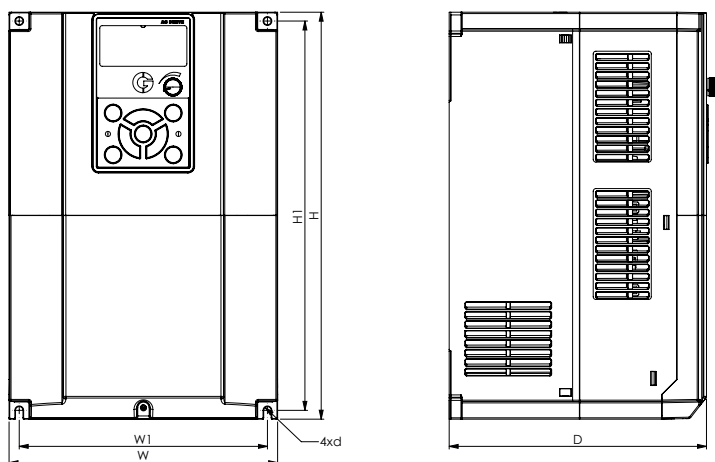


Model mounting & design:

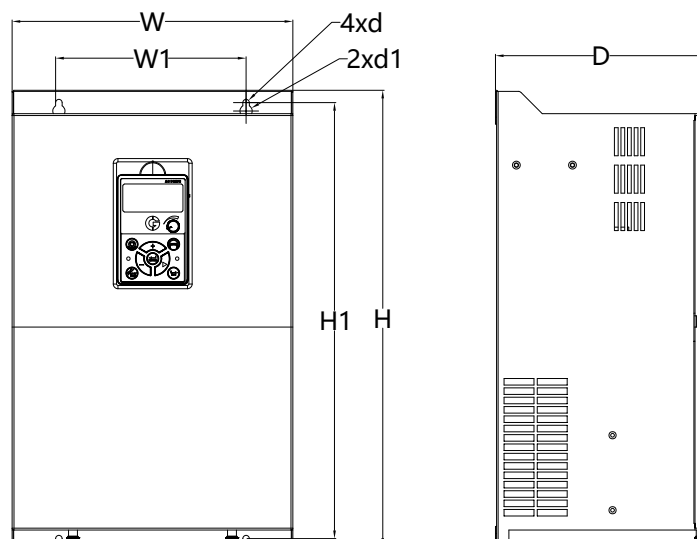
0.75 ~ 2.2kW dimensions and wall mounting dimensions



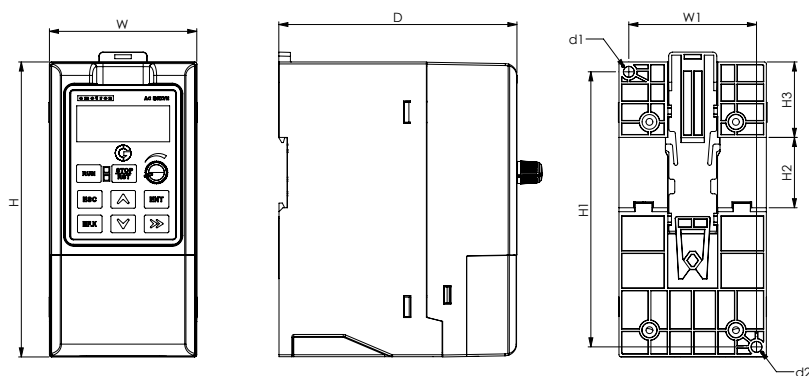
4 ~ 22kW dimensions and wall mounting dimensions



30 ~ 55kW dimensions and wall mounting dimensions



VSRE48/VS23/VS23-9p5-D/VS11 dimensions and wall mounting dimensions



Mechanical specifications for VSR model:

Model no.	External and installation dimensions (mm)								Weight (kg)	Air flow (CFM)
	W	H	D	W1	H1	W2	Install hole (d)	Install hole (d1)		
VSR48 series										
VSR48-003-20CNB	80	200	170	34	190	60	4.5	-	1.45	10
VSR48-004-20CNB										10
VSR48-006-20CNB										14
VSR48-009-20CNB	116.6	186.6	175	106.6	176.6	-	4.5	-	2.45	25
VSR48-013-20CNB									2.5	25
VSR48-017-20CNB	146	249	181.7	131	236	-	5.5	-	3.4	42
VSR48-024-20CNB									3.5	73
VSR48-032-20CNB	198	300	189.7	183	287	-	5.5	-	6.35	80
VSR48-038-20CNB									6.45	120
VSR48-045-20CNB									6.45	120
VSR48-060-20CNB	250	432	227	200	411	-	7.0	13	12.9	147
VSR48-075-20CNB										209
VSR48-091-20CN-	300	485	226	200	466	-	7.0	13	15.0	209
VSR48-112-20CN-										216

Note:

a) W1: Upside hole to hole width

b) W2: Downside hole-to-hole width

c) H1: Hole-to-hole height

Model no.	External and Install dimensions (mm)									Weight (kg)	Air flow (CFM)
	W	H	D	W1	H1	H2	H3	Install hole (d1)	Install hole (d2)		
VSRE48 series											
VSRE48-003-20CNB	75	150	120	65	140	35	38.5	4.5	4.5	0.95	10
VSRE48-004-20CNB											10
VSRE48-006-20CNB	93	171	130	82	160	35	39	4.5	4.5	1.45	15
VSRE48-009-20CNB											15
VSR23 series											
VSR23-2p5-20CNB	75	150	120	65	140	35	38.5	4.5	4.5	0.95	10
VSR23-4p2-20CNB											10
VSR23-7p5-20CNB	93	171	130	82	160	35	39	4.5	4.5	1.45	15
VSR23-9p5-20CNB											15
VSR23-XXX-D series											
VSR23-9p5-D	93	171	130	82	160	35	39	4.5	4.5	1.45	15
VSR11 series											
VSR11-9p5-20CNB	93	171	130	82	160	35	39	4.5	4.5	1.45	15



Recommended solar array configuration:

Model	Panel Voc=45V		Panel Voc=49V		Panel Voc=50V		Panel Voc=50.5V		Panel Voc=48.5V	
	Panel power (W)	Configuration (per string* strings)	Panel power (W)	Configuration (per string* strings)	Panel power (W)	Configuration (per string* strings)	Panel power (W)	Configuration (per string* strings)	Panel power (W)	Configuration (per string* strings)
VSR23-2p5	300	9*1	540	8*1	550	8*1	575	8*1	725	8*1
VSR23-4p2	300	9*1	540	8*1	550	8*1	575	8*1	725	8*1
VSR23-7p5	300	9*1	540	8*1	550	8*1	575	8*1	725	8*1
VSR23-9p5	300	9*1	540	8*1	550	8*1	575	8*1	725	8*1
VSR48-003	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSR48-004	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSR48-006	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSR48-009	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSR48-013	300	15*2	540	14*1	550	14*1	575	14*1	725	14*1
VSR48-017	300	15*2	540	13*2	550	13*2	575	13*2	725	15*1
VSR48-024	300	15*3	540	14*2	550	14*2	575	14*2	725	14*2
VSR48-032	300	15*4	540	16*2	550	13*3	575	13*3	725	15*2
VSR48-038	300	15*5	540	14*3	550	14*3	575	14*3	725	14*3
VSR48-045	300	15*6	540	14*4	550	14*4	575	13*4	725	14*3
VSR48-060	300	15*8	540	15*5	550	15*5	575	14*5	725	14*4
VSR48-075	300	15*9	540	15*6	550	15*6	575	15*6	725	14*5
VSR48-091	300	15*11	540	16*7	550	14*8	575	15*7	725	14*6
VSR48-112	300	15*14	540	15*9	550	15*9	575	15*9	725	15*7
VSRE48-003	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSRE48-004	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSRE48-006	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSRE48-009	300	15*1	540	14*1	550	13*1	575	13*1	725	14*1
VSR23-9p5-D	300	9*1	540	8*1	550	8*1	575	8*1	725	8*1
VSR11-9p5	300	9*1	540	8*1	550	8*1	575	8*1	725	8*1

Note: Please contact the CG technical team for the grid-sharing application.

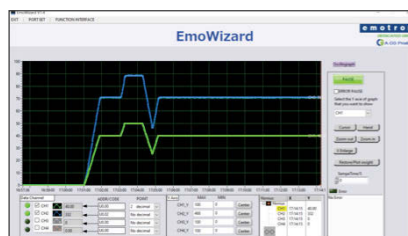
Accessories:

Standard option	Part no.	Description	Connection mode
Keypad - standard	S-PPU-VS	LCD display	RJ45
Keypad - graphic	G-PPU-VS	Graphical display	RJ45
Relay card*	VSOPT-RL	Multi-pump relay card	Terminal connection
Profibus card	VSPROFIBUS-DP	Profibus communication card	DB9
Profinet card*	VSPROFINET-2P	2- port profinet communication card	RJ45

*Available from $\geq 4.0\text{kW}$ rating

Application Software:

EmoWizard software helps in the easy commissioning and troubleshooting of VSR series drives, offering user-friendly tools for viewing, manipulation, and exchanging data with the drive. Statistics data can be plotted using the oscilloscope, and drive control with control panel.



0000: Motor speed

0001: Motor torque

0002: Motor current

0003: Motor voltage

0004: Motor power

0005: Motor frequency

0006: Motor temperature

0007: Motor position

0008: Motor position speed

0009: Motor position acceleration

0010: Motor position deceleration

0011: Motor position jerk

0012: Motor position jolt

0013: Motor position snap

0014: Motor position crackle

0015: Motor position pop

0016: Motor position bang

0017: Motor position boom

0018: Motor position crash

0019: Motor position burn

0020: Motor position scorch

0021: Motor position smoke

0022: Motor position fire

0023: Motor position explosion

0024: Motor position detonation

0025: Motor position shock

0026: Motor position impact

0027: Motor position collision

0028: Motor position contact

0029: Motor position proximity

0030: Motor position detection

0031: Motor position identification

0032: Motor position classification

0033: Motor position categorization

0034: Motor position quantification

0035: Motor position measurement

0036: Motor position estimation

0037: Motor position calculation

0038: Motor position determination

0039: Motor position diagnosis

0040: Motor position prognosis

0041: Motor position prediction

0042: Motor position projection

0043: Motor position forecast

0044: Motor position outlook

0045: Motor position perspective

0046: Motor position view

0047: Motor position vision

0048: Motor position sight

0049: Motor position gaze

0050: Motor position glance

0051: Motor position look

0052: Motor position stare

0053: Motor position eye

0054: Motor position eye

0055: Motor position eye

0056: Motor position eye

0057: Motor position eye

0058: Motor position eye

0059: Motor position eye

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0198: Motor position eye

0199: Motor position eye

0200: Motor position eye

0201: Motor position eye

0202: Motor position eye

0203: Motor position eye

0204: Motor position eye

0205: Motor position eye

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0049: Motor position gaze

0050: Motor position glance

0051: Motor position look

0052: Motor position stare

0053: Motor position eye

0054: Motor position eye

0055: Motor position eye

0056: Motor position eye

0057: Motor position eye

0058: Motor position eye

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0205: Motor position eye

0000: Motor speed

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0002: Motor current

0003: Motor voltage

0004: Motor power

0005: Motor frequency

0006: Motor temperature

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0041: Motor position prediction

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0043: Motor position forecast

0044: Motor position outlook

0045: Motor position perspective

0046: Motor position view

0047: Motor position vision

0048: Motor position sight

0049: Motor position gaze

0050: Motor position glance

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0047: Motor position vision

0048: Motor position sight

0049: Motor position gaze

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0051: Motor position look

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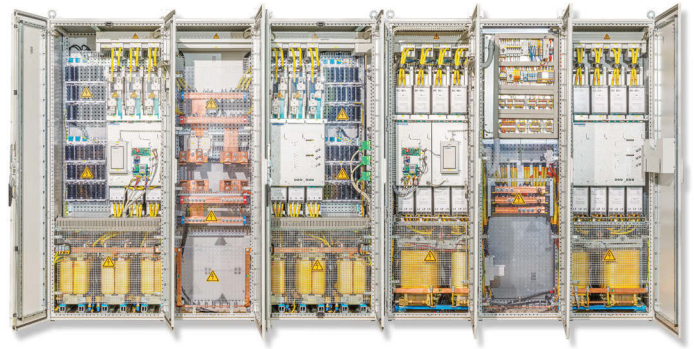
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Emotron FDU & VFX 2.1

Variable / Constant torque drive applications.

Rated power	0.55-4,000 kW
Supply voltage	230-690 V, 3-phase



Emotron Active Front End Drive (AFE)

Available as Low Harmonic or Regenerative version.

Rated power	55-2,200 kW (AC) / 200-4,000 kW
Supply voltage	380-690 V (AC) / 380-690 V, 3-phase



Emotron VSS & VSM

Optimized drive for smaller applications.

Rated power	VSS23: 0.37–2.2 kW, 1-phase
	VSM48: 0.75–4 kW, 3-phase
Supply voltage	230V 1-phase, 230-480V, 3-phase



Emotron VSX

Compact machinery drive with high functionality.

Rated power	VSX48: 0.75–55 kW, 3-phase
Supply voltage	380–480 V, 3-phase



Emotron TSA

Starts, stops and protects.

Rated power	5.5-1,000 kW
Supply voltage	230-690 V, 3-phase



Emotron M20

Shaft power monitors

Rated power	100-240/380-500/525-690 VAC
Supply voltage	Up to 999A via current transformer

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