RHYMEBUS

AC MOTOR DRIVE for HVAC

RM6F5

Water Footprint Concept

Recording and reminding the consumption of every drop we use. Realize the concept of environmental care and emission reduction by HVAC inverter from Rhymebus. Providing precise pressure and adjustable flow while cut-off the use of energy.

Green Tech
Green Life

IATF16949:2016 ISO 9001:2015

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Energy Saving Solution for HVAC

RM6F5 is dedicated to HVAC applications, such as pumps, fans, cooling towers, and chiller units. Capable of stabilizing temperature, pressure, and flow. Allowing you to enjoy the highest product quality while saving energy.

Features

Smart Management

- Parallel control up to 8 pumps, PLC not required.
- Up to 8 types of sequence control pressure mode.
- Constant pressure mode could be disengaged manually for maintenance.
- Varied pump shift operation mode and minimum number of operations
- Automatic start/stop once detected pipe leakage.
- Friction loss auto compensation.

System protection

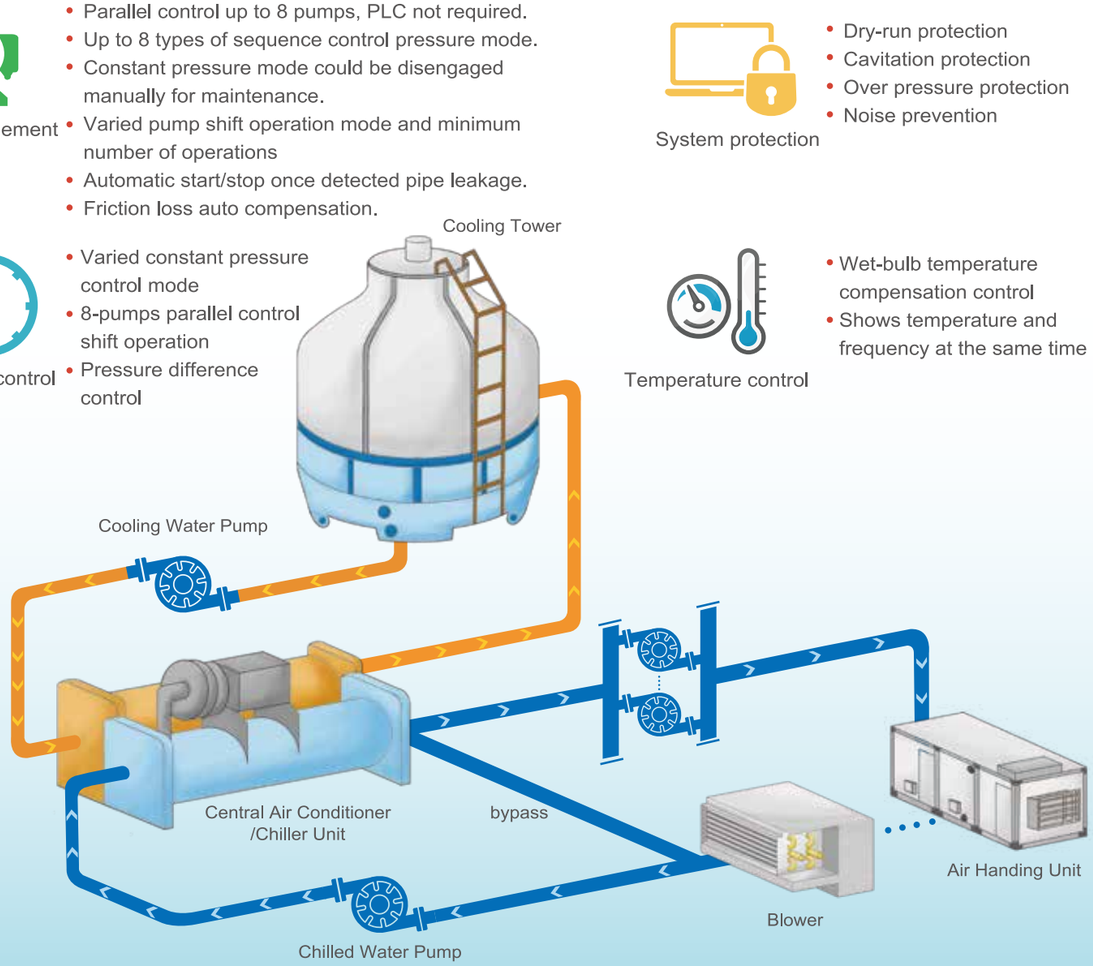
- Dry-run protection
- Cavitation protection
- Over pressure protection
- Noise prevention

Pressure control

- Varied constant pressure control mode
- 8-pumps parallel control shift operation
- Pressure difference control

Temperature control

- Wet-bulb temperature compensation control
- Shows temperature and frequency at the same time



Field Applications

Wet-bulb temperature signal

Outlet temperature signal

Internal communication

Smart multiple parallel temperature control

Cooling tower energy saving

Pressure signal

Internal communication

Smart multiple parallel constant pressure control

Multiple constant pressure control

Pressure difference signal

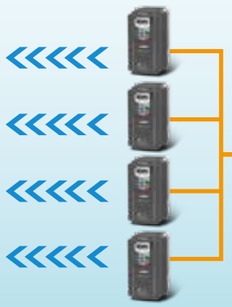
Internal communication

Smart multiple parallel pressure difference control

Area pump control

Temperature Signal

Air Handing Unit
Energy Saving Control



communication interface

Energy Saving for Cooling water, Chilled water and Chiller unit

HMI

Features for Pump

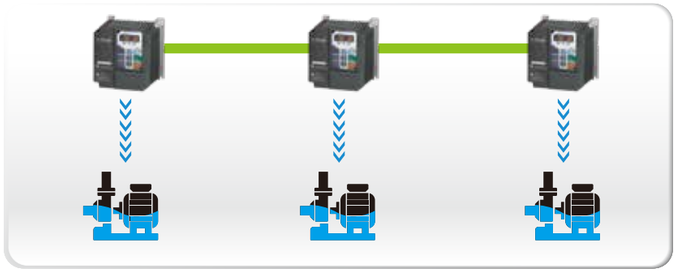
- Smart Hand On
  Smart manual constant pressure separation function.
  (Capable of obtaining system's constant pressure while pump disengages from operation for maintenance)
- Set up minimum number of operations to prevent system abnormality.
- Show setting pressure and practical value at the same time.

SV : setting value PV : practical value

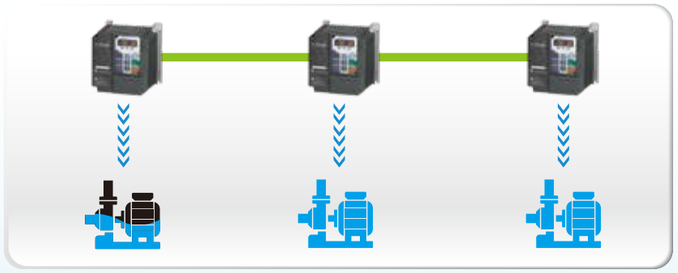
Constant pressure control mode

- Simple to set varied constant pressure control mode
- 8-pumps parallel control shift operation, maintains system stability
  Substitute assistant pump for main pump automatically when abnormal situation occurs.
  Master pump and slave pumps operate alternately, prevents slave pumps from idling for too long and cause abnormal situation.

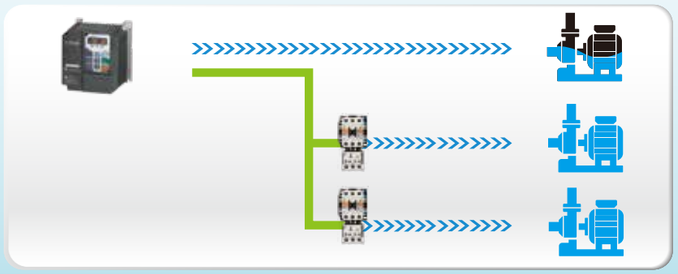
- E-mode
  Multiple pumps run at the same speed
  Flow rise rapidly. Steady pressure separation.
  For process cooling water



- F-mode
  One operates at controlled speed,
  others at full speed or standby
  Stabilizes pressure effectively

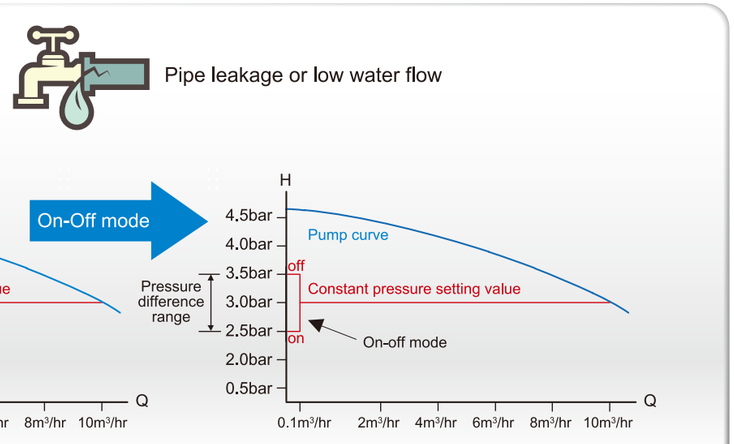


- S-mode
  One operates at controlled speed;
  others at full speed or standby,
  controlled by MS.
  Multiple pumps controlled with only
  one inverter.



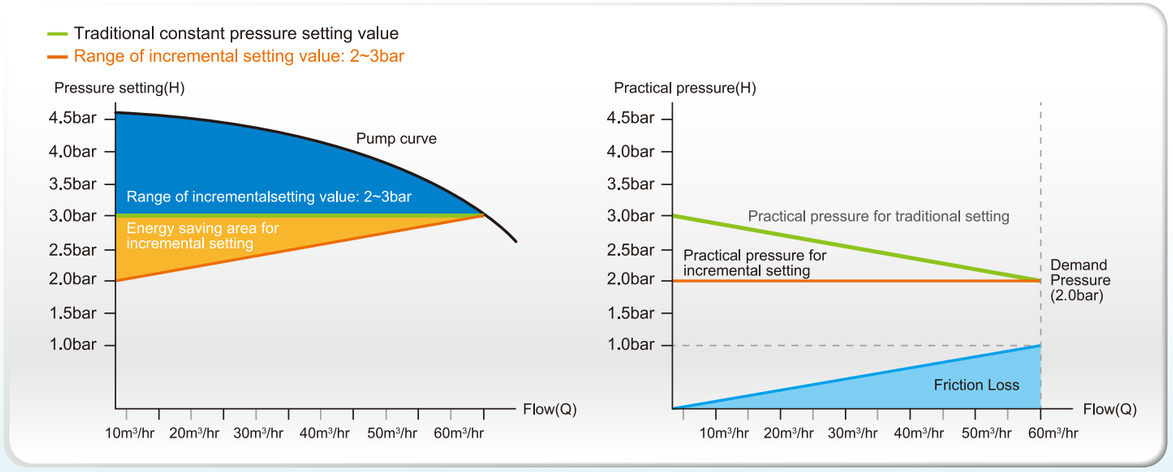
On-Off mode

- When pipe leakage is detected, the inverter automatically switches to on-off mode, prevents motor from starting repetitively, lowering noise.



Friction loss auto compensation.

- Calculate compensation amount based on actual motor load. Provide increasingly stable pressure. Provides more energy savings than common inverters.



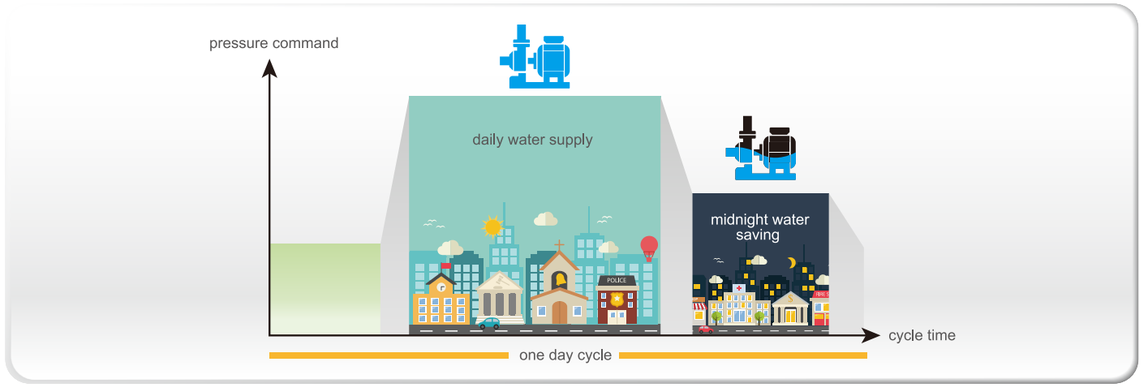
Proactive Pump System Protection

- Cavitation protection: To protect the pump from cavitation due to its operation outside the pump curve, the inverter will automatically stop and signal warnings.
- Dry-run protection: When inflow supply is insufficient, the inverter will automatically stop and signal warnings, avoiding dry-run.
- Noise prevention: To avoid noises during the pump's stopping process, activate this function.
- Auto restart function.
- Over pressure protection.

Features for Pump

Sequence control-pressurized water supply

- 8-sections of time sequence control. Set up water pressure according to users need. With permanent calendar to save energy efficiently (weekly/daily cycle record)

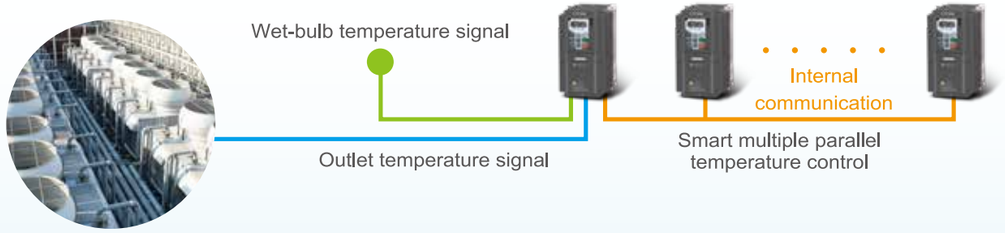


Features for Fan, Air Conditioner and Cooling Tower

- 8-pumps parallel control, does not require auxiliary controller or PLC.
- 8-pumps shift operation. (Can operate alternately between 8 pumps.)
- 8 stages of sequence control.
- Show temperature and frequency at the same time.
- Soft-start function. It limits the inrush current to improve stability of the power supply and reduce transient voltage drops.

Wet-bulb temperature compensation

- Wet-bulb temperature compensation



Cooling tower energy saving

Features for Inverter

- Automatic adjustment carrier frequency and speed by motor load from 800Hz to 16kHz.
- Set up auto-restart times and restart interval to prevent abnormal tripping.
- Cooling fan temperature control. (Cooling fan only operates when the temperature is over the setting value)
- Overheating protection: Set up overheats temperature warning and cut down carrier frequency or stop operating when overheat.
- Multiple energy-saving control modes
- Parameters are easy to copy, convenient for managing multi-machines)
- Compatible with HMI and computer interface.
- Frontal design in case5~case9 for easily fan replacement and maintenance.

Model Number Scheme

RM6F5 – 2 001

- A ▶ Product Series: for HVAC
- B ▶ Input Voltage
  2: AC 200~240V
  4: AC 380~480V
- C ▶ Model Number

Standard Specifications

Three-Phase 200V Series

Model name (RM6F5-□□□□)	2001	2002	2003	2005	2007	2010	2015	2020	2025	2030	2040	2050	2060	2075	2100	2125	2150	2200	2250
Maximum applicable motor (HP / kW)	1/0.75	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15	25/18.5	30/22	40/30	50/37	60/45	75/55	100/75	125/90	150/110	200/160	250/200
Rated output capability (kVA)	1.6	2.6	3.8	5.8	9.5	12	16	22	28	34	43	55	67	83	105	132	154	223	267
Rated output current (A)	4.2	6.8	10	15.2	25	31	42	58	74	90	112	144	175	218	275	346	405	585	700
Rated output voltage (V)	Three-Phase 200~240V																		
Range of output frequency (Hz)	0.1~120.0 Hz																		
Power source (ψ, V, Hz)	Three-Phase 200~240V 50/60Hz																		
Input current (A)	5	8	12	18	30	41	55	66	85	103	128	176	200	240	280	330	380	550	660
Permissible AC power source fluctuation	176~264V 50/60Hz / ±5%																		
Overload protection	120% of drive rated output current for 1 min																		
Cooling method	Nature cooling	Fan cooling																	
Protective structure	IP20												IP00 (IP20 OPTION)						
Weight / Mass(kg)	1.8	1.8	1.9	2	3	3	5.4	5.7	12.4	13.1	14.7	14.8	40	41	44	61	89	164	164

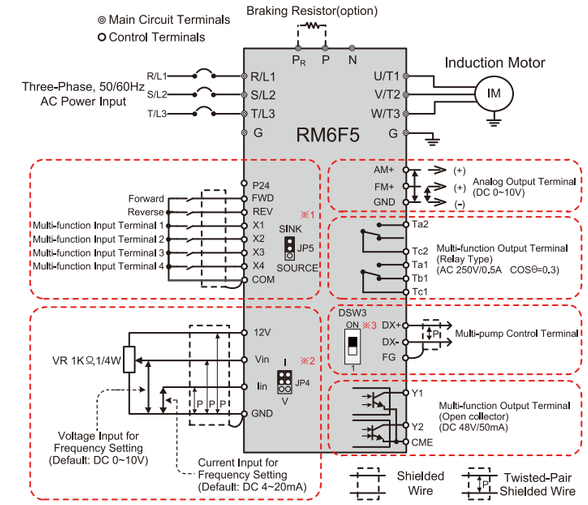
Three-Phase 400V Series

Model name (RM6F5-□□□□)	4001	4002	4003	4005	4007	4010	4015	4020	4025	4030	4040	4050	4060	4075	4100	4125	4150	4175	4200	4250	4300	4350	4420	4500	4600	4700
Maximum applicable motor (HP / kW)	1/0.75	2/1.5	3/2.2	5/3.7	7.5/5.5	10/7.5	15/11	20/15	25/18.5	30/22	40/30	50/37	60/45	75/55	100/75	125/90	150/110	175/132	200/160	250/200	300/220	350/250	420/315	500/375	600/450	700/500
Rated output capability (kVA)	1.9	2.7	3.7	6.1	8.4	13	17	23	28	34	43	56	66	82	105	134	160	193	232	287	316	366	396	533	655	732
Rated output current (A)	2.5	3.5	4.8	8	11	17	22	30	37	45	56	73	87	108	138	176	210	253	304	377	415	480	520	700	860	960
Rated output voltage (V)	Three-Phase 380~480V																									
Range of output frequency (Hz)	0.1~120.0Hz																									
Power source (ψ, V, Hz)	Three-Phase 380~480V 50/60Hz																									
Input current (A)	3	4.2	5.8	9.6	13	20	25	38	42	52	64	84	100	130	155	177	196	217	282	355	385	440	540	650	800	900
Permissible AC power source fluctuation	332~528V 50/60Hz / ±5%																									
Overload protection	120% of drive rated output current for 1 min																									
Cooling method	Nature cooling	Fan cooling																								
Protective structure	IP20														IP00 (IP20 OPTION)									IP00		
Weight / Mass(kg)	1.8	1.8	1.9	2	2	3.1	3.1	5.6	5.7	5.8	12.8	12.9	15	15.3	44	45	47	65	91	95	97	159	163	217	217	272

Common standard

Control Characteristics	Control method		・Voltage vector sinusoidal PWM control (V/F control). ・carrier frequency: 800Hz~16kHz.
	Range of frequency setting		0.1~120.0Hz
	Resolution of frequency setting		・Digital Keypad: 0.01Hz ・Analog signal: 0.06Hz / 60Hz
	Resolution of output frequency		0.01Hz
	Frequency setting signal		DC 0~10V、4~20mA
	Overload protection		120% of drive rated output current for 1 minute.
	DC braking		・Time of DC braking after start / before stop: 0~20.0sec ・DC braking frequency at stop: 0.1~60Hz ・DC baking level: 0~150% of rated current
	Braking torque		Approximately 20%(with the external braking resistor connected, braking torque is approximately 100%).
	Acceleration/ deceleration time		・0sec(coast to stop), 0.0~3200.0sec(independent setting of the acceleration / deceleration). ・The setting of accel/decel time from 0 to 60Hz is 0.015sec ~ 19,200,000sec(222 days).
	V/F pattern		・Linear, Square curve, 1.7th power curve, 1.5th power curve. ・V/F pattern (2 V/F points). ・V/F pattern can be adjusted by analog input (Variable voltage (V) adjustment of V/F pattern for acceleration / deceleration).
	Other functions		slip compensation, auto-torque compensation, auto-adjustment for output voltage stability, auto-adjustment of carrier frequency, restart after instantaneous power failure, speed tracing, overload detection, PID control, acceleration/deceleration switch, fan control, parameters copy, sequential control, communication control, over pressure protection, pump protection, ON/OFF mode.
Operation Characteristics	Input	Operation method	(FWD)/(REV) rotation control, 9 sets preset speed control, Communication control
		Multi-function inputs	4 sets programmable input terminals: X1~X4 Refer to the function setting description of F_052~F_055
		Analog inputs	・Vin – GND: DC 0~10V ・Iin – GND: DC 4~20mA / 2~10V or DC 0~20mA / 0~10V Refer to the function setting description of F_040, F_041, and F_126~F_128
	Output	Multi-function outputs	4 sets programmable output detection: Ta2–Tc2, Ta1–Tb1–Tc1, Y1–CME, Y2–CME Refer to the function setting description of F_058~F_061
		Analog outputs	・"FM+" – "M-"：DC 0~10V ・"AM+" – "M-"：DC 0~10V Refer to the function setting description of F_044, F_045, F_129, F_130
Display	Keypad (KP-605)		output frequency, frequency command, output voltage, DC bus voltage, output current, terminal status and heat sink temperature, actual / setting pressure.
	External indicator (DM-501)		Independent external display can be added for up to three sets(96mm * 48mm, 5 digits) to show output frequency, frequency command, output voltage, DC bus voltage, output current, terminal status and heat sink temperature.
Protections	Fault protection	Error trip messages of drive	EEPROM error(EEr), A/D converter error(AdEr), Fuse open(SC), Under voltage during operation(LE1), Drive over current(OC), Grounding fault (GF), Over voltage(OE), Drive overheating(OH), Motor overload(OL), Drive overload(OL1), System overload(OLO), External fault(thr), NTC thermistor sensor fault(ntCF), Keypad interruption during copy(PAdF)
		Error trip messages of drive for pressure control	PID feedback signal error(no Fb), Over pressure(OP), Water shortage(Fb Lo)
		Warning messages of drive	Power source under voltage(LE), Drive output interruption (bb), Coast to stop(Fr), Dynamic brake transistor over voltage(db), Software fault(PrEr), Drive overheating(Ht), Keypad cable trip before connecting(Err_00), Keypad cable trip during operation(Err_01), Over pressure(OP), FWD/REV command input simultaneously(dtF)、Different software version inter-copy(wrF)
	Cooling method		・Nature cooling: 2001, 4001, 4002 models. ・Fan cooling: Three fan control methods for cooling(forced air, operation air, temperature level setting) for other models.
Environment	Atmosphere		Non-corrosive or non-conductive, or non-explosive gas or liquid, and non-dusty
	Surrounding temperature		-10°C (14°F) ~ +40°C (104°F) (Non-freezing and non-condensing)
	Storage temperature		-20°C (-4°F) ~ +60°C (149°F)
	Relative humidity		90% RH or less (No-condensing atmosphere)
	Vibration		Less than 5.9m/sec² (0.6G)
	Altitude		Less than 1000m (3280 ft.)

Control Terminals Wiring Diagram

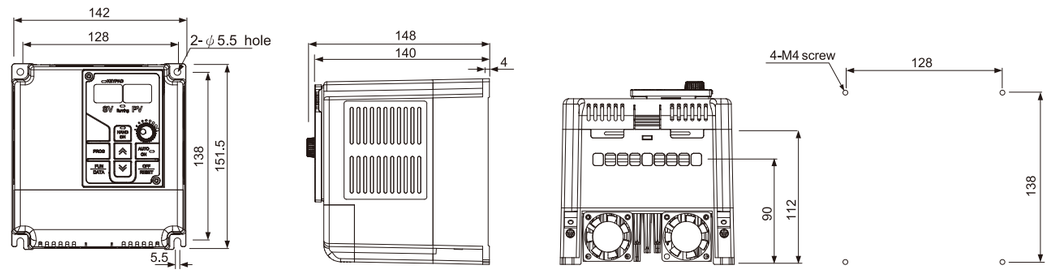


Control Terminals

Type		Symbol	Function	Description
Control circuit terminal	Control power	P24	Power terminal; Control device usage	Output DC+24V; Maximum supplied current is 50mA.
		P12/12V		Output DC+12V; Maximum supplied current is 20mA.
		GND	Common terminal for analog input control	Grounding terminal for control power (P12/12V,P24) and analog input terminal (Vin, Iin).
	Input terminals	FWD	Forward command terminal	Connect the FWD and COM terminals for forward operation. (F_001=0,1,2)
		REV	Reverse command terminal	Connect the REV and COM terminals for reverse operation. (F_001=0,1,2)
		X1	Multi-function input terminal 1	・Connect the X1 and COM terminals and set the function F_052.
		X2	Multi-function input terminal 2	・Connect the X2 and COM terminals and set the function F_053.
		X3	Multi-function input terminal 3	・Connect the X3 and COM terminals and set the function F_054.
		X4	Multi-function input terminal 4	・Connect the X4 and COM terminals and set the function F_055.
		COM	Input common terminal	The common of input control signal terminals. (FWD, REV and X1 ~ X4)
		Vin	Analog input terminal	Input range: DC 0~10V。
		Iin	Analog input terminal	・Input signal selection JP4: I position (current signal) JP4: V position (voltage signal) ・Input range: DC 4~20mA (2~10V) or DC 0~20mA (0~10V) ・The function is set by F_126.
	Output terminals	FM+ / AM+	Analog output terminal	・Voltage meter with 10V full scale spec. (meter impedance: 10KΩ above) ・Maximum output current: 1mA
		M-	Common of analog output terminals	Common of analog output terminals.
		Ta1	Multi-function output terminals (relay type)	・N.O (form a contact); The function is set by F_060 ・Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tb1		・N.C (form b contact); The function is set by F_060 ・Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tc1		Common terminal for Ta1,Tb1.
		Ta2		・N.O (form a contact); The function is set by F_061. ・Capacity: AC250V, 0.5AMax, cosθ=0.3
		Tc2		Common terminal for Ta2.
		Y1	Multi-function output terminals (open collector type)	・The function is set by F_058, F_059. ・Capacity: DC48V, 50mAMax
		Y2		
		CME		Common terminal of Y1, Y2.
		FG(A8)		Connect the shielded net to FG(A8) and avoid the reflective signal to interfere the signal.
		FM_P	Reserved	

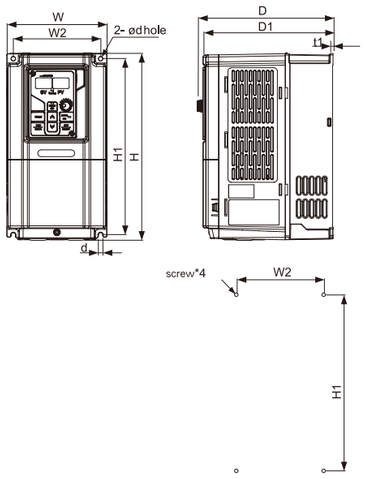
Outline Dimension

case1

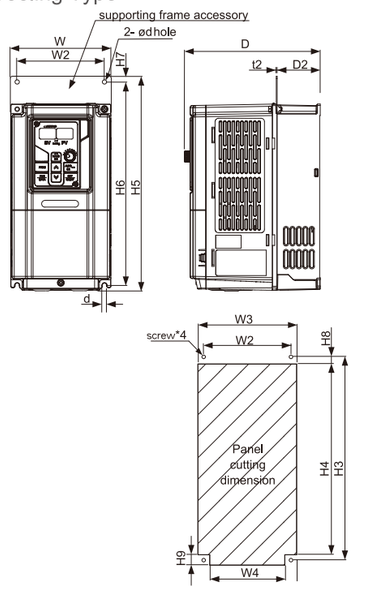


case 2~4

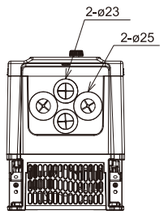
Internal Cooling Type



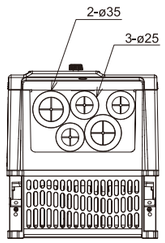
External Cooling Type



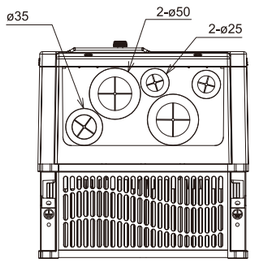
case 2



case 3

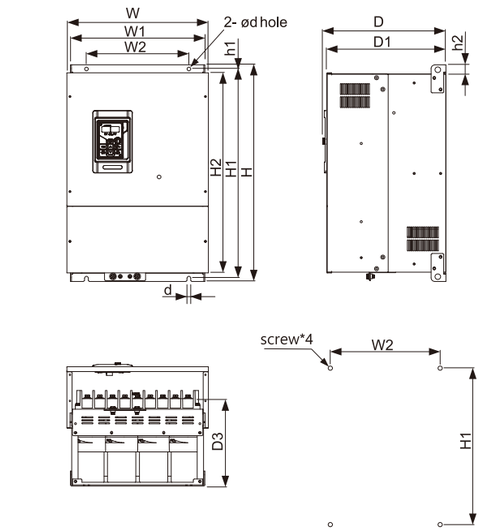


case 4

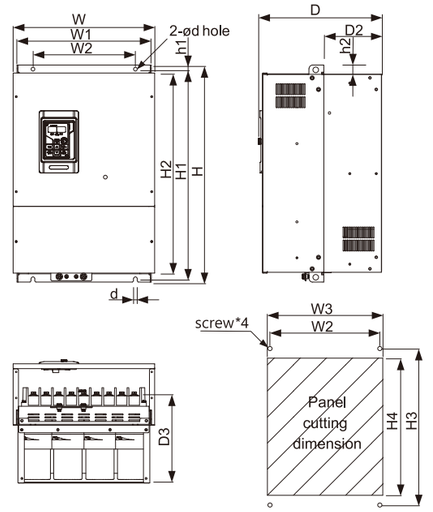


case 5~9

Internal Cooling Type



External Cooling Type



Outline Dimension

Case	Model number		Dimension(mm)																							Screw
	200V	400V	W	W1	W2	W3	W4	H	H1	H2	H3	H4	H5	H6	H7	H8	H9	h1	h2	t1	t2	D	D1	D2	D3	d	(mm)
CASE1	1~5HP	1~7.5HP	142	-	128	-	-	151.5	138	-	-	-	-	-	-	-	-	-	-	4	-	148	140	-	-	5.5	M4
CASE2	7.5~10HP	10~15HP	140	-	122	138	105	260	246	-	284	267	300	284	8	10	14.5	-	-	4.7	1.2	190	182	60	-	6	M5
CASE3	15~20HP	20~30HP	180	-	162	178	149	290	277	-	313	290	329	313	8	10	20	-	-	9	1.6	207	199	74	-	6.5	M5
CASE4	25~50HP	40~75HP	250	-	230	248	212	400	380	-	427	396	448	427	10	11.5	29	-	-	9.5	2	258	250	103	-	9	M8
CASE5	60~100HP	100~150HP	386	361	275	365	-	584	562	539	564	545	-	-	-	-	-	11	25	-	-	331	323	155	242	10	M8
CASE6	125HP	175~200HP	446	418	275	427	-	685	660	630	662	634	-	-	-	-	-	14	30	-	-	334	326	163	246	12	M10
CASE7	150HP	250~300HP	508	479	275	487	-	818	785	751	788	758	-	-	-	-	-	19	35	-	-	374	366	183	257	15	M12
CASE8	200HP	350~420HP	696	654	580	657	-	1000	974	929	978	936	-	-	-	-	-	15	39	-	-	413	405	182	294	15	
CASE9	-	500~700HP	992	954	710	985	-	1030	1003	963	1007	968	-	-	-	-	-	15	39	-	-	427	419	185	308	15	