

Automation for a Changing World

Delta Hybrid Servo Drive VFD-VJ Series Servo Motor MSJ/MSO Series



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 **DELTA**
Smarter. Greener. Together.

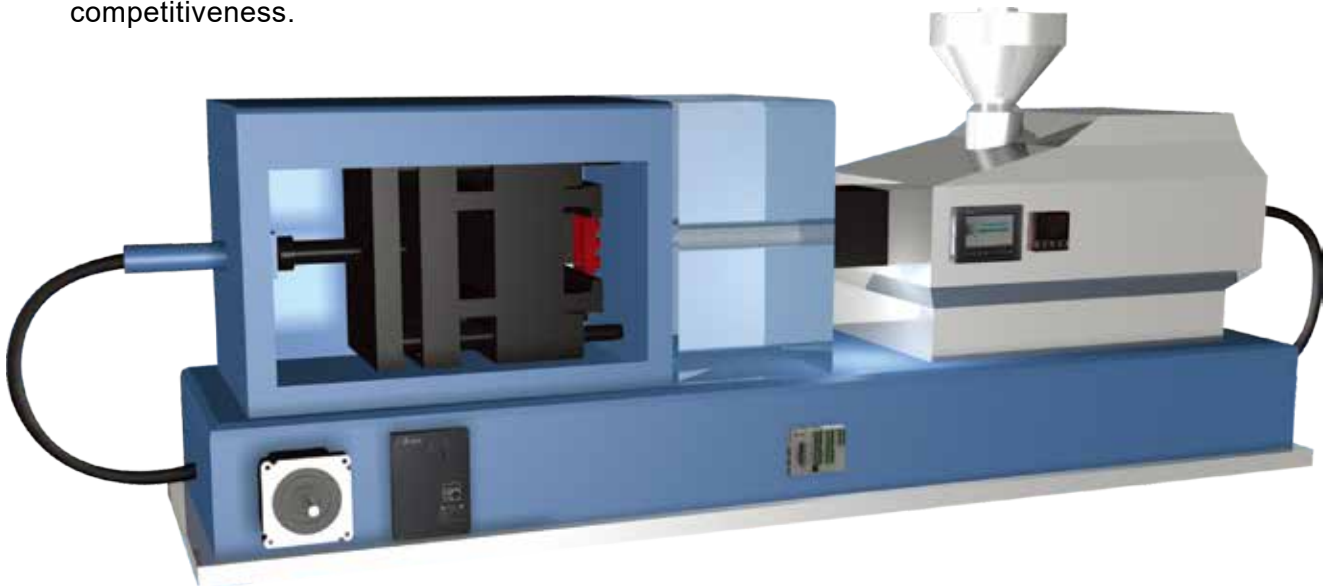


Introduction

With years of commitment to the plastic and rubber industries, Delta has developed the VFD-VJ-C Series hybrid servo drive that offers superior drive performance and system integration capabilities. For applications, the VFD-VJ-C Series provides fan-cooled and oil-cooled types, enabling stable operations for a variety of environments and conditions.

Hydraulic systems have been widely adopted as control systems for injection molding machinery, featuring high power density, excellent pressure and flow control, long service life design, easy maintenance and much more. A hydraulic system using an AC servo drive provides a fast response rate, higher duplication accuracy and constant torque to the system.

Delta offers the Hybrid Servo Drive VFD-VJ series with its excellent servo drive performance, which also features precise control of pressure and flow, lower energy loss and less energy waste. It is a green product that helps customers improve their system performance and enhance market competitiveness.





**Long
Pressure
Holding
Time**

**Easier
Communication
Integration**

**Low
System
Temperature**

**Good
Pressure
Response**

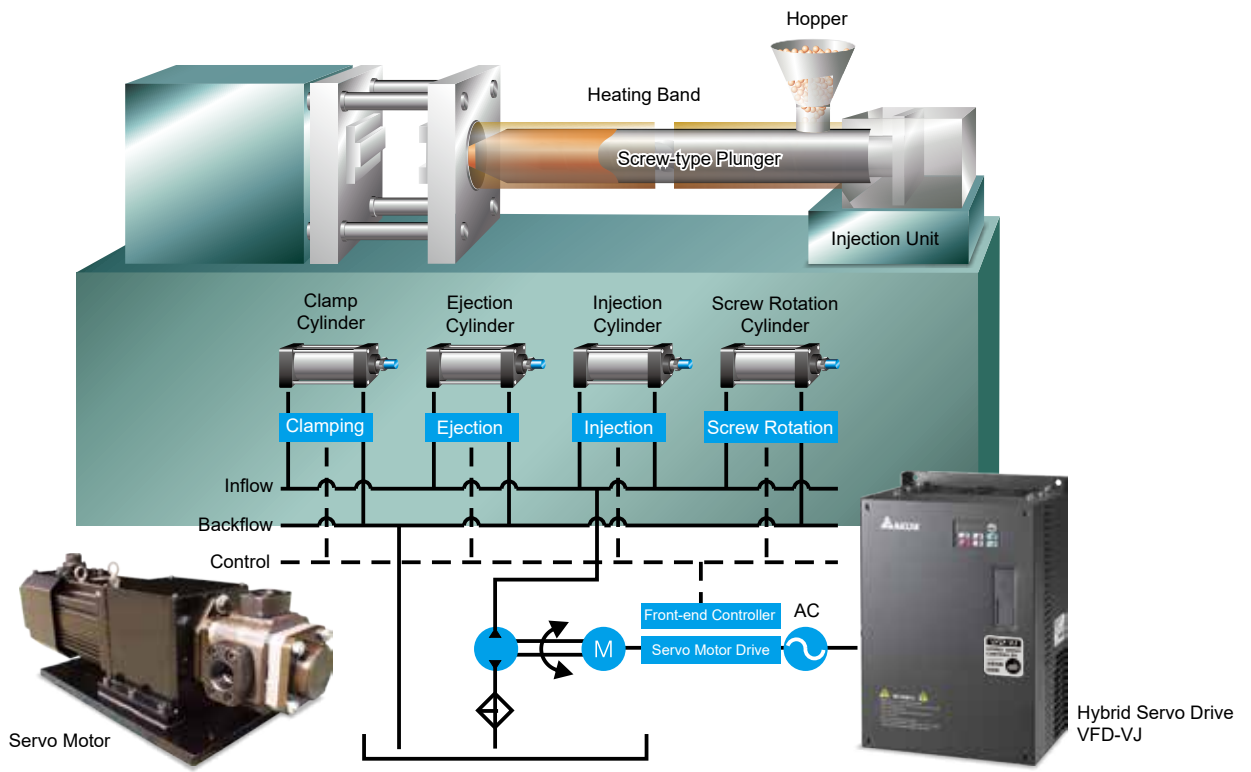
**Ultra
Energy-
Saving**

**High
Durability
*Oil-cooled type**

**Highly
Accurate
Repeatability**

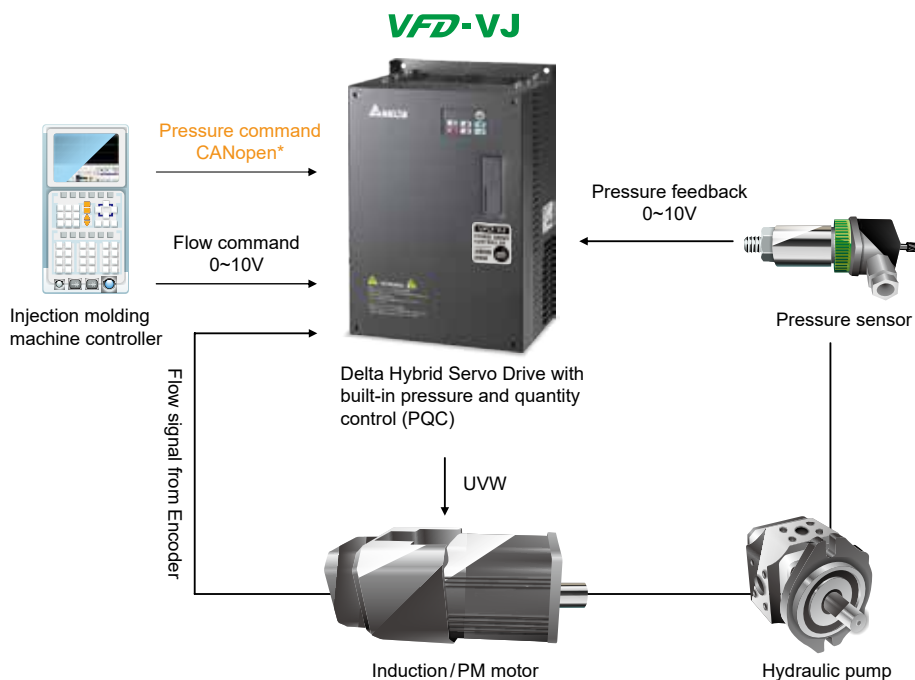


Injection Molding Machine with Hydraulic System



Structure of a Hybrid Servo System

After receiving pressure and flow commands from the injection molding machine controller, the VFD-VJ performs PID calculations with actual pressure and speed feedback to drive the servo motor and hydraulic pump with a quick response time and high repeatability.



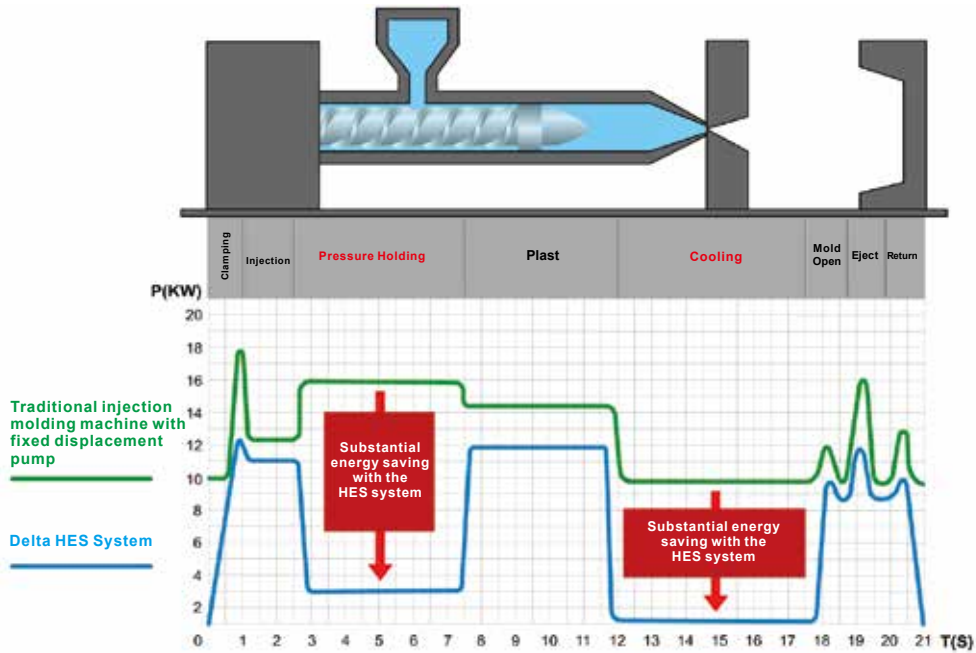
*For VFD-VJ-C Series only

Hybrid Energy System Features

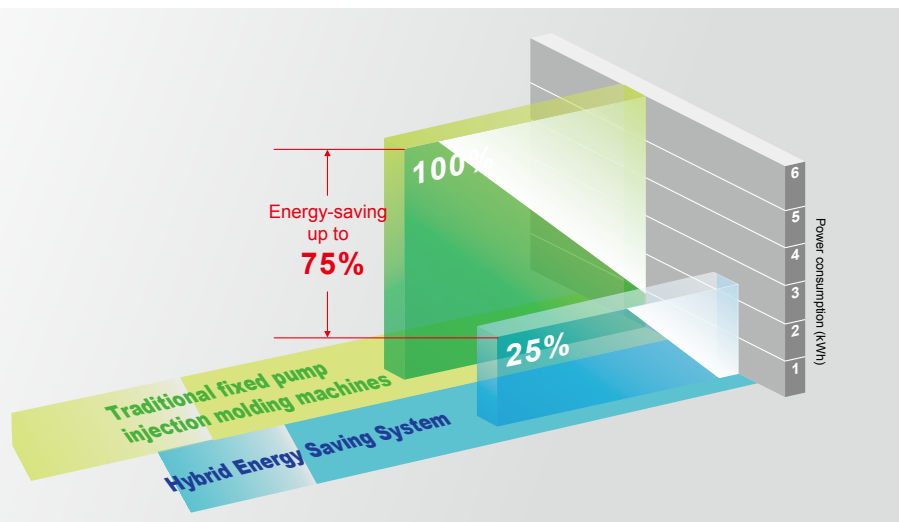
(1) Ultra energy-saving

- Saves up to **60%** electricity compared to traditional injection molding machines (fixed displacement pump) during pressure holding and cooling processes

Power-consumption curve during injection molding



- Traditional injection molding machine uses a relief valve or proportional valve to control the pressures and the flows during mold closing, injection, pressure holding and mold opening, while the Delta HES system enables automatic adjustment according to different injection conditions, reducing up to **75%** in power consumption.



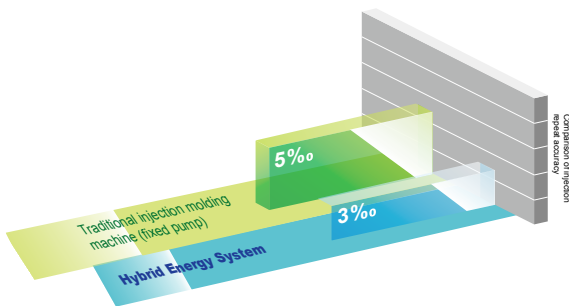
Hybrid Energy System Features

(2) Low system temperature

Lowers oil temperature by 5~10°C and saves costs on oil cooler

(3) Highly accurate repeatability

Precise flow and pressure control



(4) Long pressure holding time

Benefits of a thicker product

(5) Easier communication integration

Supports CANopen communication protocol for data transmission

(6) Fast frequency response

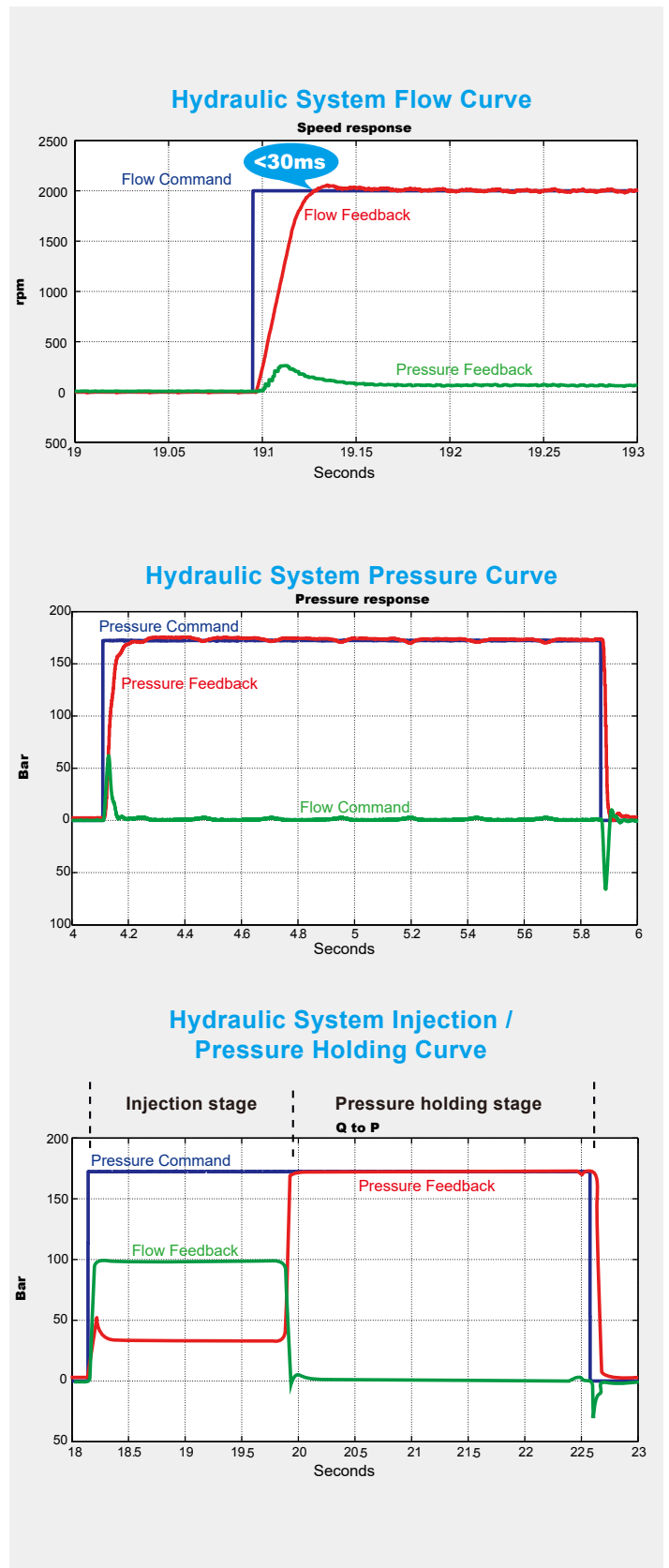
Frequency response rate up to 30ms, suitable for high-speed injection molding machines

(7) Good field-weakening control

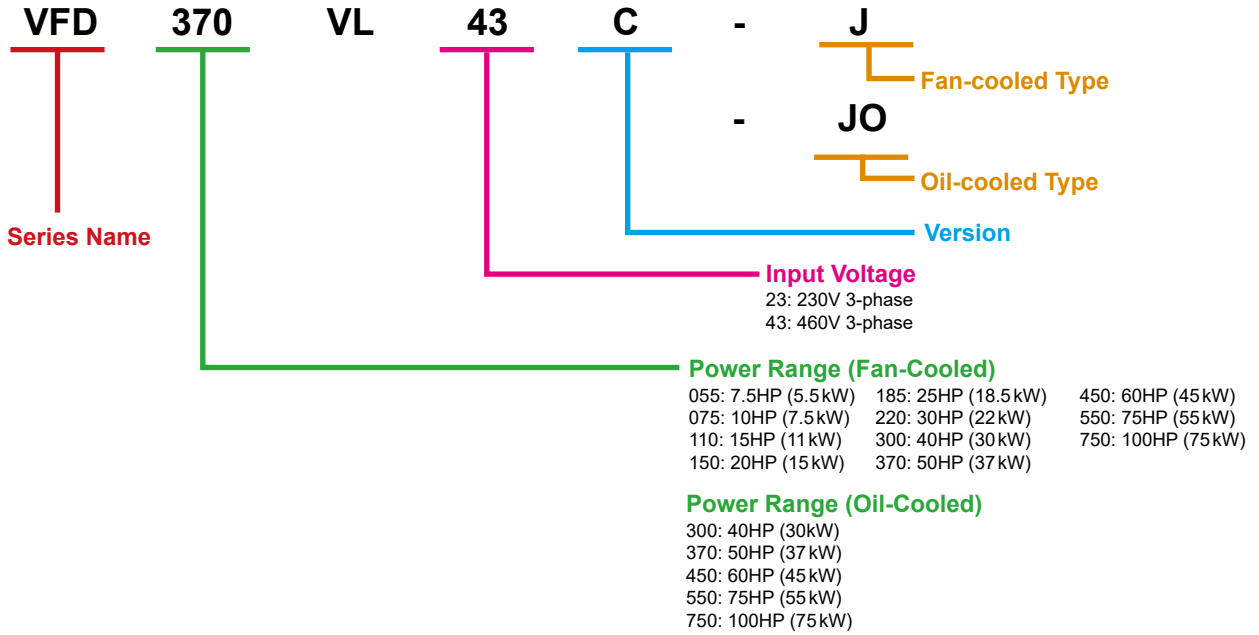
Increases output voltage, decreases output current and maintains sine wave output to reduce motor damage and vibration

(8) Easy to use (VFD-VJ-C Series)

Provides 5-digit LED keypad and left shiftbutton to increase operational convenience



Model Explanation of Hybrid Servo Drive



Specifications


Fan-Cooled Type (VFD-VJ-A / VFD-VJ-B Series)

230V									
Frame	C			D			E2		
Model Number VFD-__ VL23A-J	055 A	075 A	110 A	150 A	185 A	220 A	300 A	370 A	
Power (kW)	5.5	7.5	11	15	18.5	22	30	37	
Horsepower (HP)	7.5	10	15	20	25	30	40	50	
Output	Rated Output Current (A)	21.9	27.1	41.1	53	70	79	120	146
	Continuous Output Current (A) for 60 sec	33	46	62	90	119	119	180	248
	Continuous Output Current (A) for 20 sec	37	54	70	106	140	140	204	292
	Carrier Frequency (Hz)	5k/10k							
Power	Input Current (A)	23	30	47	56	73	90	120	146
	Rated Input Voltage (V)	3-phase 200 ~ 240VAC, 50/60Hz							
	Mains Voltage Tolerance	±10% (180 ~ 264V)							
	Mains Frequency Tolerance	±5% (47 ~ 63Hz)							
Weight (kg)	8	10		13			36		
Brake Unit	Built-in						External		

460V												
Frame	C					D		E0	E3	E2		
Model Number VFD__ VL43_-J	055 A	075 A	110 A	150 B	185 B	220 A	300 B	370 B	450 B	550 A	750 A	
Power (KW)	5.5	7.5	11	15	18.5	22	30	37	45	55	75	
Horsepower (HP)		10	15	20	25	30	40	50	60	75	100	
Output	Rated Output Current (A)	12.3	15.8	21	27	34	41	60	73	91	110	150
	Continuous Output Current (A) for 60 sec	21	27	36	46	58	62	102	124	155	187	255
	Continuous Output Current (A) for 20 sec	25	32	42	54	68	78	120	146	182	220	300
	Carrier Frequency (Hz)	5k/10k									5K	
Power	Input Current (A)	14	17	24	30	37	47	60	73	91	110	150
	Rated Input Voltage (V)	3-phase 380 ~ 480VAC, 50/60Hz										
	Mains Voltage Tolerance	±10% (342 ~ 528V)										
	Mains Frequency Tolerance	±5% (47 ~ 63Hz)										
Weight (kg)	8	10	10	10	10	13	13	36	36	50	50	
Brake Unit	Built-in							External				

*The production of VFD550VL43A-J, VFD750VL43A-J will discontinue in March 2018.

*The production of VFD300VL23A-J, VFD370VL23A-J will discontinue in March 2018.

General Specifications		
Control Method	SVPWM	
Speed Detector	Resolver / Incremental Encoder	
Speed Input Command	DC 0~10V, supports 3-point adjustment for analog inputs	
Pressure Input Command	DC 0~10V, supports 3-point adjustment for analog inputs	
Pressure Feedback Command	Voltage type DC 0 ~ 10V and current type 4 ~ 20mA (Firmware version V2.04 and the new I/O board are required. For detailed instructions, please refer to the user manual, parameter 03-12)	
General Input Signal	5 ch DC24V 8mA	
General Output Signal	2 ch DC24V 50mA ; 1 ch Relay output	
Analog Output Voltage	1 ch DC 0 ~ 10V	
Optional Accessories	Speed Feedback PG Card	Required (refer to appendix A-5)
	Brake Resistor	Required (refer to appendix A-1)
	Pressure Sensor	Required (compatible to pressure sensor with output signal 0 ~ 10V or 4 ~ 20mA. Please use parameter 03-10, 03-11, 03-12 for output signal settings and parameter 00-08 for max. pressure setting)
	EMC Filter	Optional (refer to Appendix A-7)
Protections	Motor Protection	Electronic thermal relay protection
	Over-current	300% of rated current
	Ground Leakage Current	Higher than 50% rated current
	Voltage Protection	Over-voltage level: VDC > 415/830V; Low-voltage Level: VDC < 180/360V
	Mains Input Over-Voltage	Varistor (MOV)
	Over-temperature	Built-in temperature sensor
Environment	Protection Level	NEMA 1/IP20
	Operation Temperature	-10 °C ~ 45 °C
	Storage Temperature	-20 °C ~ 60 °C
	Humidity	< 90% RH (non-condensing)
	Vibration	< 20Hz: 1.0; 20 to 60Hz: 0.6G
	Cooling System	Forced air cooling (Drive RUN: Fan ON, Drive STOP: Fan OFF)
	Installation Location	Altitude 1,000m or lower (keep away from corrosive gasses, liquid and dust)
Certifications		

* Delta reserves the right to revise specifications without prior notice.

Fan-Cooled Type (VFD-VJ-C Series)

230V		
Frame	E4	
Model Number VFD____ VL23_-J	300 C	370 C
Power (KW)	30	37
Horsepower (HP)	40	50
Output	Rated Output Current (A)	120
	Continuous Output Current (A) for 60 sec	204
	Continuous Output Current (A) for 20 sec	240
	Carrier Frequency (Hz)	4k~10k adjustable
Power	Input Current (A)	120
	Rated Input Voltage (V)	3-phase 200 ~ 240VAC, 50/60Hz
	Mains Voltage Tolerance	-15%, +10% (170 ~ 264V)
	Mains Frequency Tolerance	±5% (47 ~ 63Hz)
Weight (kg)	44	
Brake Unit	Built-in	


460V										
Frame	C				D		E4			
Model Number VFD____ VL43_-J	110 C	150 C	185 C	220 C	300 C	370 C	450 C	550 C	750 C	
Power (KW)	11	15	18.5	22	30	37	45	55	75	
Horsepower (HP)		20	25	30	40	50	60	75	100	
Output	Rated Output Current (A)	21	27	34	41	60	73	91	110	
	Continuous Output Current (A) for 60 sec	36	46	58	70	102	110	155	187	
	Continuous Output Current (A) for 20 sec	42	54	68	82	120	124	182	220	
	Carrier Frequency (Hz)	4k~10k adjustable								
Power	Input Current (A)	24	30	37	47	60	73	91	110	
	Rated Input Voltage (V)	3-phase 380 ~ 480VAC, 50/60Hz								
	Mains Voltage Tolerance	-15%, +10% (323 ~ 528V)								
	Mains Frequency Tolerance	±5% (47 ~ 63Hz)								
Weight (kg)	9				13		36	46		
Brake Unit	Built-in									

* VFDxxxVLxxC-J is expected to launch in March 2018. Delta reserves the right to modify specifications without prior notice.

Oil-Cooled Type (VFD-VJ-C Series)

460V						
Frame	E5					
Model Number VFD____ VL43C-JO	300 C	370 C	450 C	550 C	750 C	
Power (KW)	30	37	45	55	75	
Horsepower (HP)		50	60	75	100	
Output	Rated Output Current (A)	60	73	91	110	150
	Continuous Output Current (A) for 60 sec	102	124	155	187	255
	Continuous Output Current (A) for 20 sec	120	146	182	220	300
	Carrier Frequency (Hz)	4k ~ 10k adjustable				
Power	Input Current (A)	60	73	91	110	150
	Rated Input Voltage (V)	3-phase 380 ~ 480VAC, 50/60Hz				
	Mains Voltage Tolerance	-15%, +10% (323 ~ 528V)				
	Mains Frequency Tolerance	±5% (47 ~ 63Hz)				
Weight (kg)	40					
Cooling Methods	Force oil cooling (oil temperature 10 ~ 50 °C) Hydraulic oil HL-HLP DIN 51524 Part1/2 R68, R46					
Cooling Flow Requirement (L/Min.)	16				32	
Brake Unit	Built-in					

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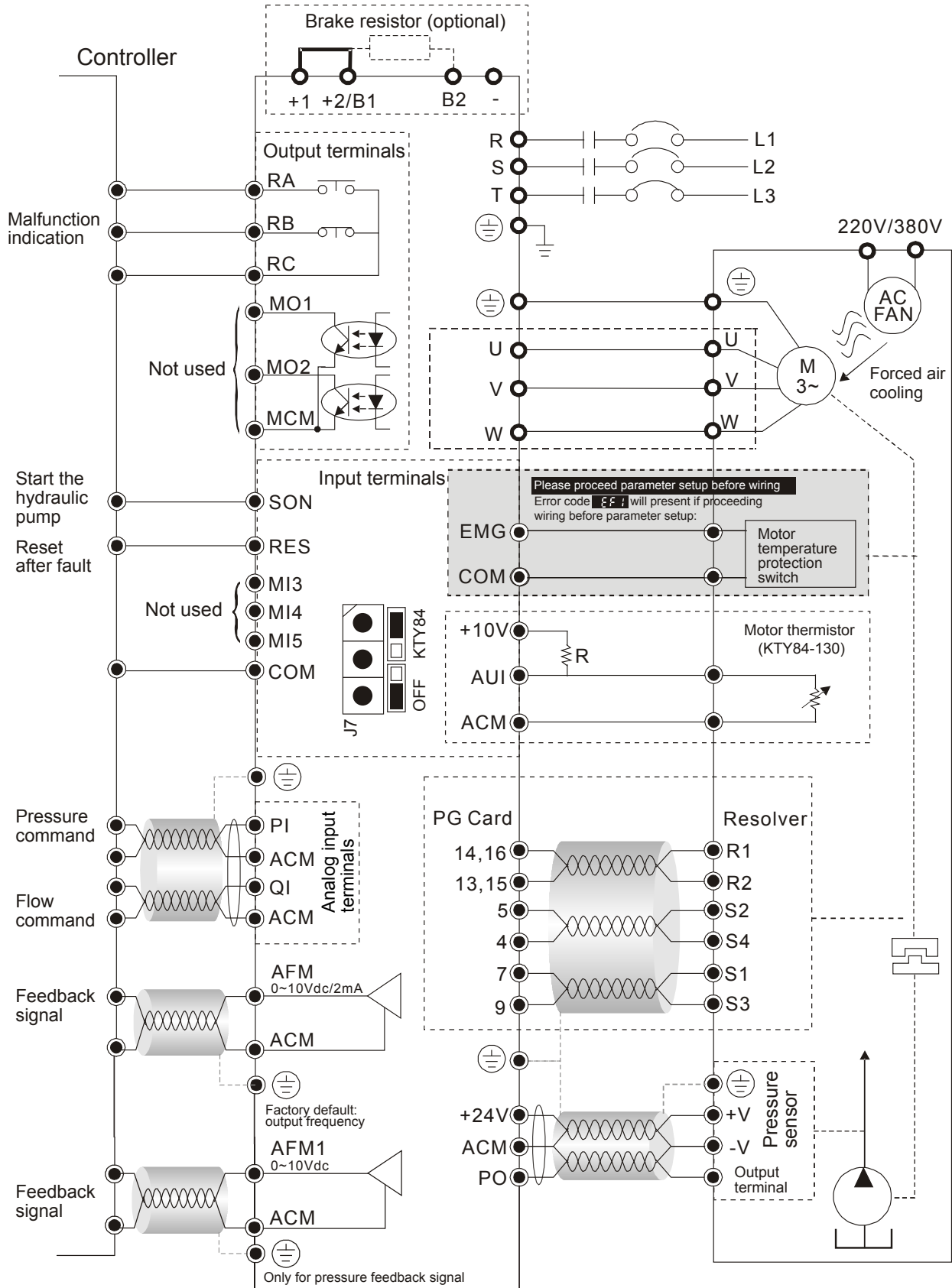
General Specifications		
Control Method	SVPWM	
Speed Detector	Resolver	
Speed Input Command	DC 0~10V, Supports 3-point adjustment for analog inputs	
Pressure Input Command	DC 0~10V, Supports 3-point adjustment for analog inputs	
Pressure Feedback Command	Voltage Type DC 0 ~ 10V and Current Type 4 ~ 20mA (Please refer to Pr. 03-12 for more details)	
General Input Signal	6 ch DC24V	
General Output Signal	2 ch DC 48V 50mA (max); 1 ch Relay output	
Analog Output Voltage	1ch DC 0 ~ 10V 及 -10 ~ 10V 2mA	
Communication Port	RJ45x2, USBx1	
Communication Protocol	CANopen and MODBUS (can be used at same time)	
Optional Accessories	Speed Feedback PG Card	Built-in
	Multiple Drives Convergent Flow Communication Card	Built-in
	Brake Resistor	Required (refer to Appendix A-1 of manual)
	Pressure Sensor	Required (compatible to pressure sensor with output signal 0 ~ 10V or 4 ~ 20mA. Please use parameter 03-10, 03-11, 03-12 for output signal settings and parameter 00-08 for max. pressure setting)
	EMC Filter	Optional (refer to Appendix A-7 of Manual)
Protections	Motor Protection	Real-time temperature monitoring and protection, electronic thermal relay protection (supports KTY84-130/ PTC/ temperature switch)
	Over-current	Over-current protection on output and braking
	Ground Leakage Current	Higher than 80% rated current
	Voltage Protection	Over-voltage level: VDC > 415/830V; low-voltage level: VDC < 180/360V
	Mains Input Over-voltage	Varistor (MOV)
	Over-temperature	Capacitor, IGBT, braking chopper, motor temperature
	Brake Resistor Protection	Alert issued when low resistor value or no value detected
Environment	Protection Level	NEMA 1/IP20
	Operation Temperature	-10 °C ~ 45 °C
	Storage Temperature	-20 °C ~ 60 °C
	Humidity	< 90% RH (non-condensing)
	Vibration	< 20Hz: 1.0G; 20 to 60Hz: 0.6G
	Installation Location	Altitude 1,000m or lower (keep away from corrosive gasses, liquid and dust)
Certifications		

* Delta reserves the right to modify specifications without prior notice.

* VFD-VJ-C series's UL mark is being applied for.

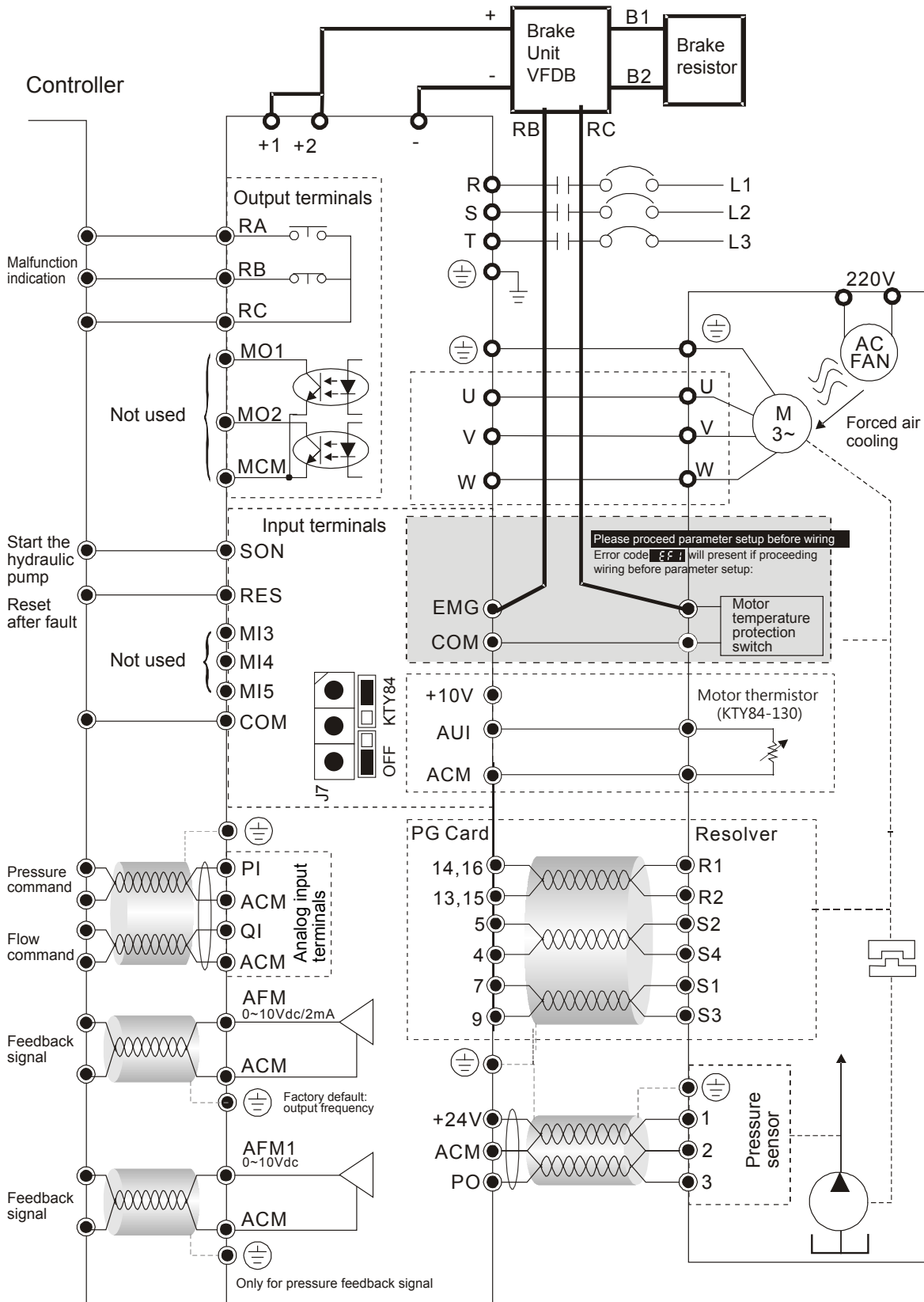
Wiring

Fan-Cooled Type with Built-in Brake Unit (VFD-VJ-A / VFD-VJ-B Series)



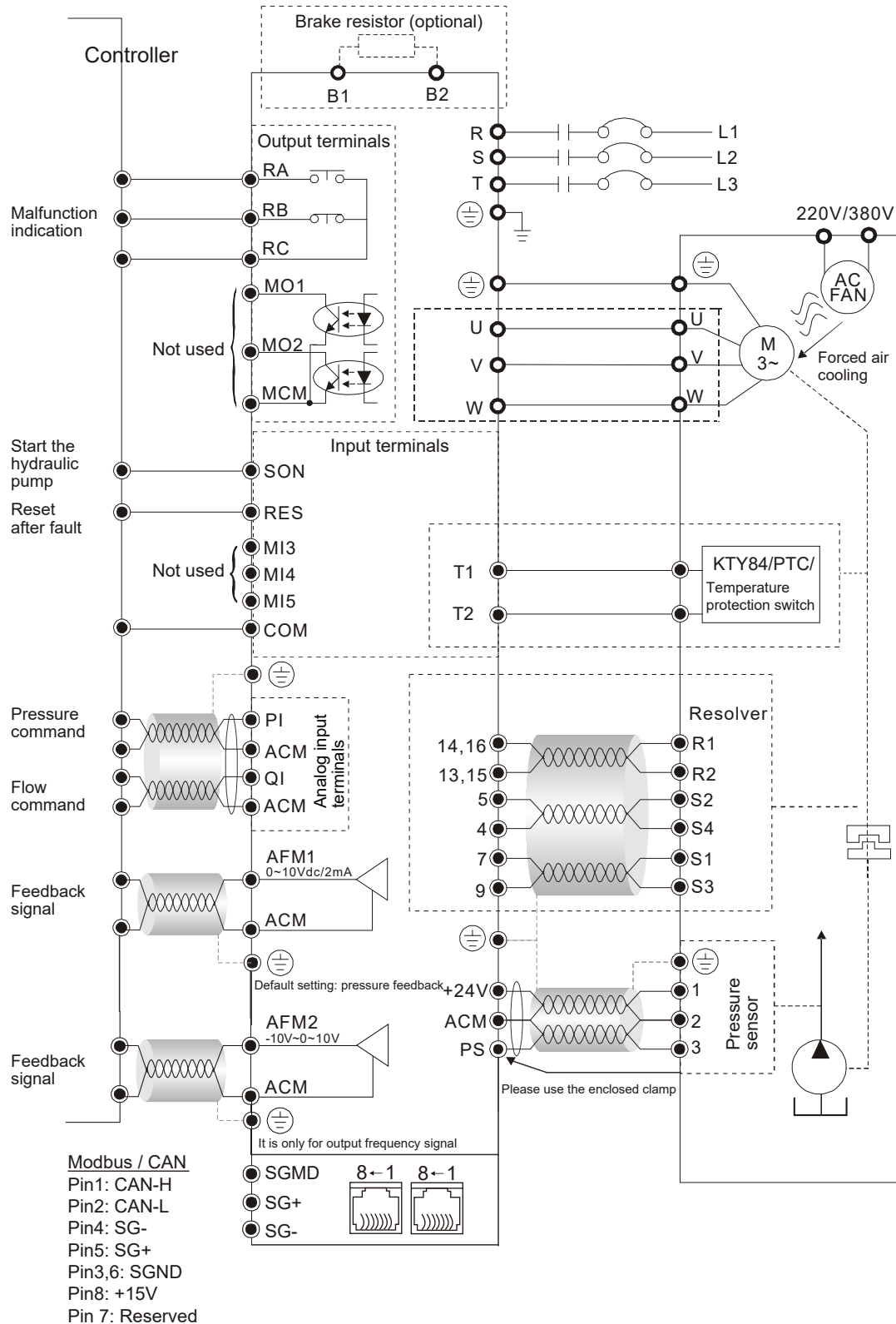
Wiring

Fan-Cooled Type with External Brake Unit (VFD-VJ-A / VFD-VJ-B Series)

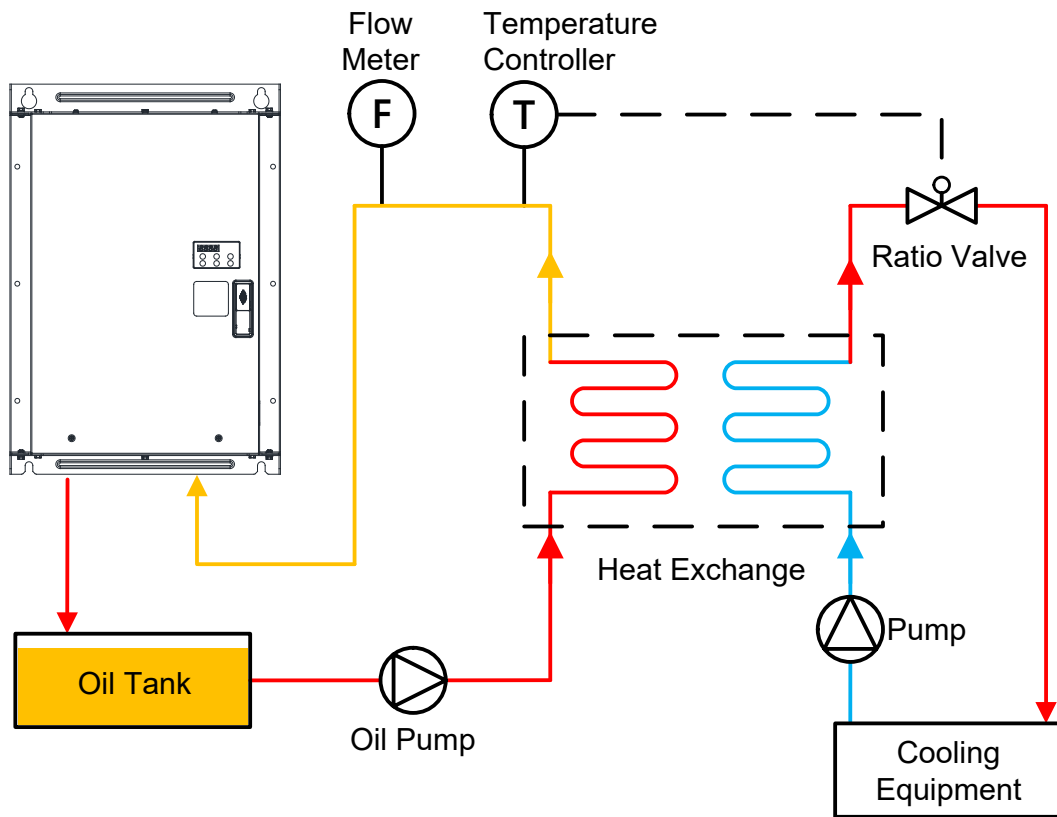


Wiring

Fan-Cooled / Oil-Cooled Types with Built-in Brake Unit (VFD-VJ-C Series)

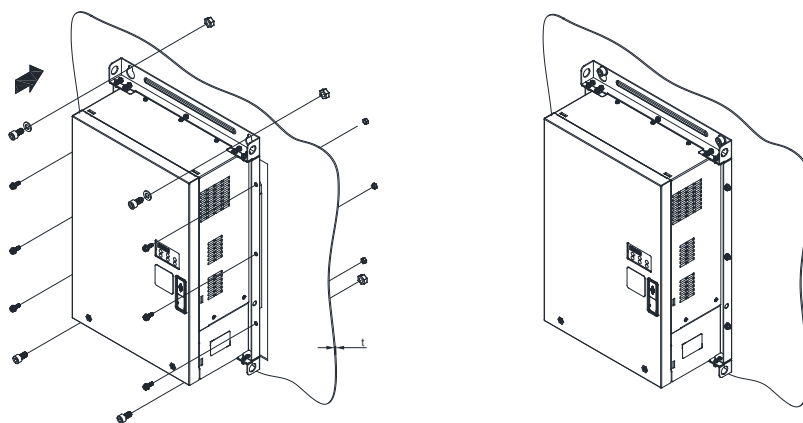


Suggested Cooling System (Oil-Cooled Type)



Installation (Oil-Cooled Type)

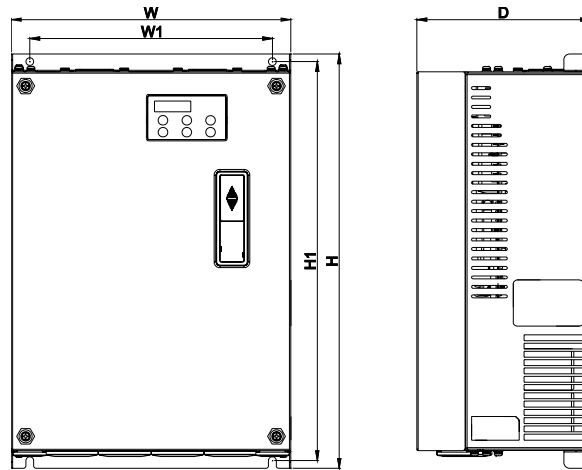
Through-wall mount



- You can install the drive through the wall and fix it with 4 pieces of M10 screw and 6 pieces of M6 screw with screw nuts
- Suggested length of M10 screw $L1 = \text{wall depth } t + 16\text{mm}$, torque: 200Kg-cm[173.4 lb-in.]
- Suggested length of M6 screw = wall depth $t + 12\text{mm}$, torque: 40Kg-cm[34.7 lb-in.]

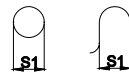
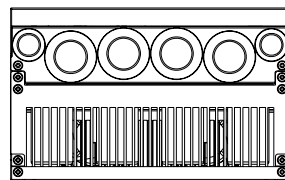
Dimensions

Frame C



MODEL

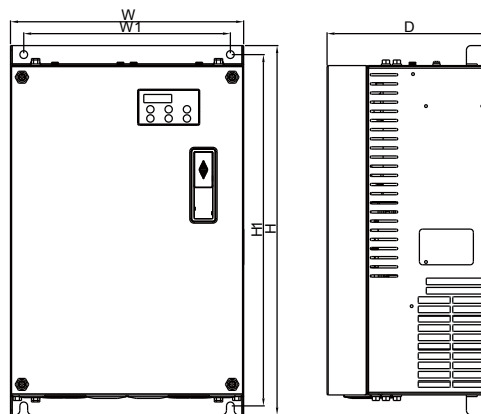
VFD055VL23A / 43A-J
 VFD075VL23A / 43A-J
 VFD110VL23A / 43A / 43C-J
 VFD150VL43B / 43C-J
 VFD185VL43B / 43C-J
 VFD220VL43C-J



Unit: mm/inch

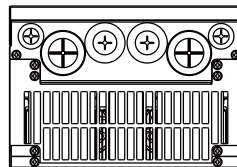
Frame	W	W1	H	H1	H2	H3	D	Ø	Ø1	Ø2	Ø3	
C	mm	235	204	350	337	320	-	146	6.5	-	34	22
	inch	9.25	8.03	13.78	13.27	13.60	-	5.35	0.26	-	1.34	0.87

Frame D



MODEL

VFD150VL23A-J
 VFD185VL23A-J
 VFD220VL23A / 43A-J
 VFD300VL43B / 43C-J
 VFD370VL43C-J

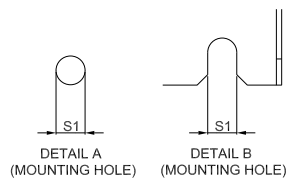
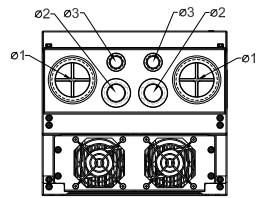
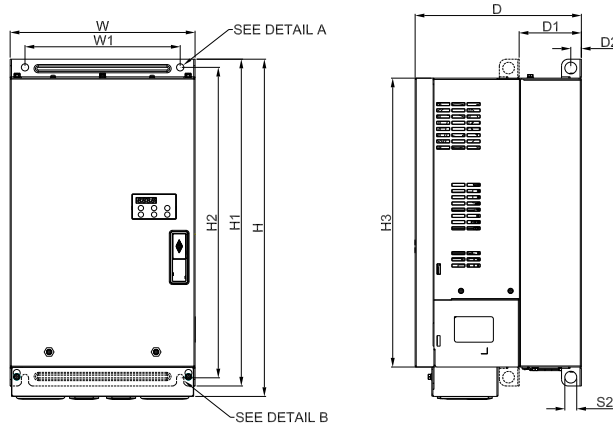


Unit: mm/inch

Frame	W	W1	H	H1	H2	H3	D	Ø	Ø1	Ø2	Ø3	
D	mm	255.0	226.0	403.8	384.0	360.0	21.9	168.0	8.5	44	34	22
	inch	10.04	8.90	15.90	15.12	14.17	0.86	6.61	0.33	1.73	1.34	0.87

Dimensions

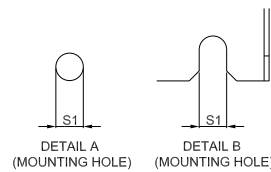
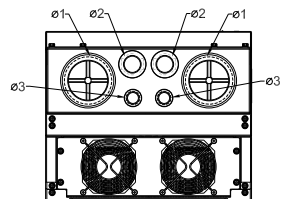
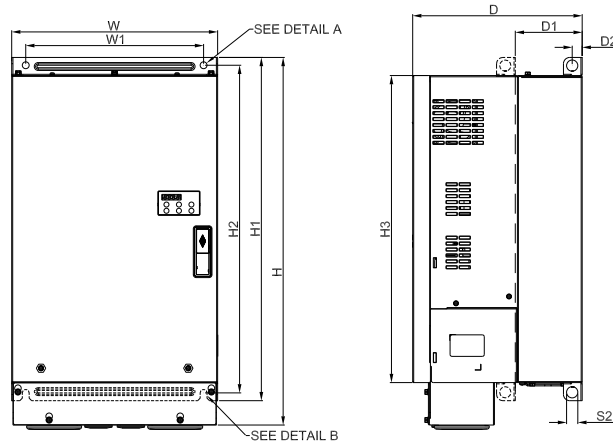
Frame E0



MODEL

VFD370VL43B-J

Frame E3



MODEL

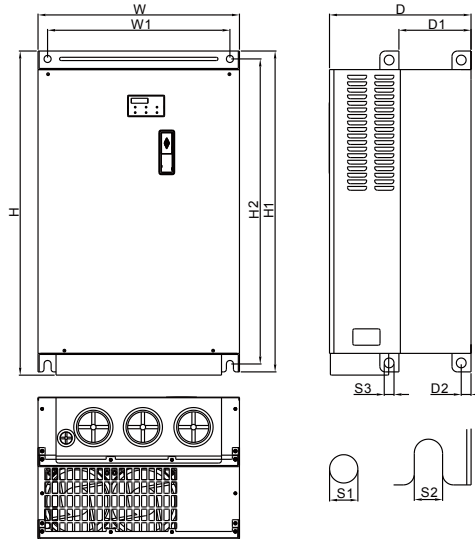
VFD450VL43B-J

Unit: mm/inch

Frame		W	W1	H	H1	H2	H3	D	D1*	D2	S1	S2	Ø1	Ø2	Ø3
E0	mm	280.0	235.0	516.0	500.0	475.0	442.0	251.7	94.2	16.0	11.0	18.0	62.7	34.0	22.0
	inch	11.02	9.25	20.31	19.69	18.70	17.40	9.91	3.71	0.63	0.43	0.71	2.47	1.34	0.87
E3	mm	330.0	285.0	589.0	550.0	525.0	492.0	271.6	107.2	16.0	11.0	18.0	76.2	34.0	22.0
	inch	12.99	11.22	23.19	21.65	20.67	19.37	10.69	4.22	0.63	0.43	0.71	3.00	1.34	0.87

Dimensions

Frame E1/E2

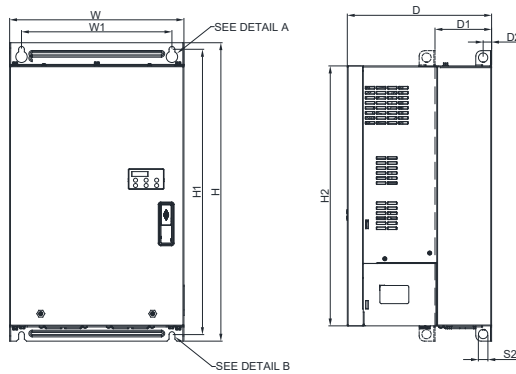


MODEL	MODEL
E1: VFD300VL43A-J VFD370VL43A-J VFD450VL43A-J	E2: VFD300VL23A-J VFD370VL23A-J VFD550VL43A-J VFD750VL43A-J

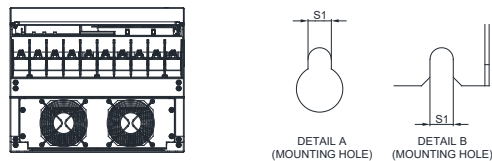
Unit: mm/inch

Frame		W	W1	H	H1	H2	D	D1	D2	S1	S2	S3
E1	mm	370.0	335.0	-	589.0	560.0	260.0	132.5	18.0	13.0	13.0	18.0
	inch	14.57	13.19	-	23.19	22.05	10.24	5.22	0.71	0.51	0.51	0.71
E2	mm	370.0	335.0	595.0	589.0	560.0	260.0	132.5	8.0	13.0	1300	18.0
	inch	14.57	13.19	23.43	23.19	22.05	10.24	5.22	0.71	0.51	0.51	0.71

Frame E4



MODEL
E4: VFD300VL23C-J VFD370VL23C-J VFD450VL43C-J VFD550VL43C-J VFD750VL43C-J

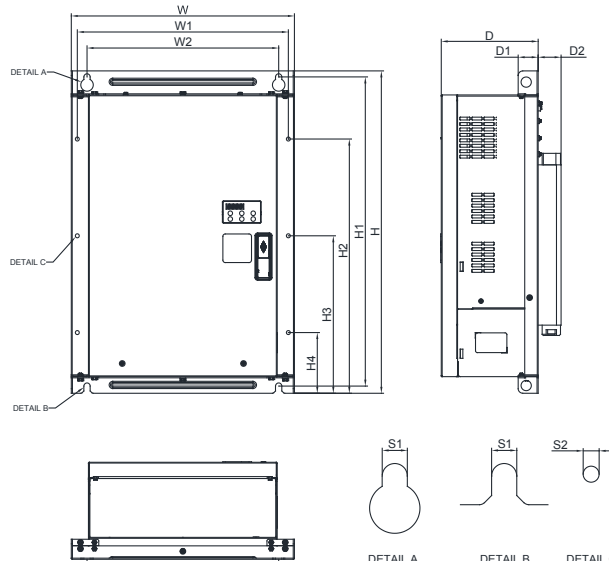


Unit: mm/inch

Frame		W	W1	H	H1	H2	D	D1*	D2	S1	S2
E4	mm	330.0	285.0	565.0	540.0	492.0	273.4	107.2	16.0	11.0	18.0
	inch	12.99	11.22	22.24	20.67	19.37	10.76	4.22	0.63	0.43	0.71

Dimensions

Frame E5



MODEL

E5:
 VFD300VL43C-JO
 VFD370VL43C-JO
 VFD450VL43C-JO
 VFD550VL43C-JO
 VFD750VL43C-JO

Unit: mm/inch

Frame	W	W1	W2	H	H1	H2	H3	H4	D	D1	D2	S1	S2	
E5	mm	390.0	368.8	335.0	563.0	540.0	444.0	275.0	106.0	209.4	35.0	40.0	11.0	7.0
	inch	15.35	14.52	13.19	22.17	21.26	17.48	10.83	4.17	8.24	1.38	1.57	0.43	0.28

How to Select the Right Hybrid Energy System

(1) Motor Power Selection

• Required torque (Nm)	$T = \frac{q \cdot \Delta p}{2\pi \cdot \eta_m}$	• Output power (kW)	$P = \frac{2\pi \cdot T \cdot N}{2\pi \cdot \eta_m} = \frac{T \cdot N}{9,550} = \frac{Q \cdot \Delta p}{60 \cdot \eta_t}$
------------------------	--	---------------------	---

q: Displacement (cc/rev)	n: Rotation speed	Δp : Valid pressure difference (MPa)
Q: Required flow (L/min)	η_m : Pump mechanical efficiency	η_t : Pump total efficiency

(2) Solution for Signal Interference

When the drive is installed at the control panel, protect against signal interference as follows:

- The wirings of main circuit and control circuit must be separate
- Proper grounding is required
- Use shielding cable for the control circuit
- Use metal pipe for the main power cable for the main circuit wiring

(3) How to Choose a Suitable Hybrid Servo Drive and Motor

In the field application, the selection of hybrid servo drive and motor will be different due to different oil systems. In the following examples, a flow rate of 64L/min and a max. holding pressure of 17.5MPa are used.

- **Displacement of hydraulic pumps:** get the displacement of hydraulic pump (cc/rev) from max. system flow (L/min)
Example: Assume that max. system flow is 64L/min. and max. motor speed is 2000rpm, the displacement of hydraulic pump will be $64/2000 \cdot 1000 = 32\text{cc/rev}$
- **Max. motor torque:** get the max. torque from max. pressure and the displacement of hydraulic pump
Example: Assume that the max. pressure is 17.5MPa and the displacement of the hydraulic pump is 32cc/rev. The torque will be $17.5 \cdot 32 \cdot 1.3 / (2p) = 116\text{Nm}$ (the factor 1.3 is for compensation of total system losses and it can be changed to 1.2-1.3 as required)
- **Rated motor torque and rated motor power:** The required torque for the holding pressure at the max. pressure should be double the rated motor torque or less (use the data provided from the motor manufacturer as the first priority). Note that the motor temperature in this situation may easily overheat. Assuming that we choose double of rated torque, the motor can be 9.1kW* with the rated speed 1500rpm when the rated motor torque is 58N-m.
 * Motor Power Formula: $P(W) = T(N-m) \cdot \omega(\text{rpm} \cdot 2\pi/60)$
- **Max. motor current:** If getting the torque constant k_t (Nm/A) = 3.31 in the motor specification, max. current is about $116/3.31 = 35\text{A}$ when the max. torque is 116N-m.
- **Select the right drive:** Please choose the right drive for the customers' requirement. Assume that the drive's overload is 150% for 60 seconds and 200% for 3 seconds. When the holding pressure is at max. pressure 17.5MPa with 32cc/rev hydraulic pump, the motor current it requires is 35A.

NOTE If none of the motors are suitable for your case, please choose motors with higher power range. Please contact Delta if you have any questions about the hybrid servo drive or integration with your current system.

- A. Using VFD075VL43A-J as an example: The rated current is 15.8A, and overload percentage is 220% ($35/15.8 \cdot 100\%$), and the system will shut down within 1 second.
- B. Using VFD110VL43A-J as an example: The rated current is 21A, and overload percentage is 166% ($35/21 \cdot 100\%$), and the system will shut down in 40~50 seconds.
- C. Using VFD150VL43A-J as an example: The rated current is 27A, and overload percentage is 130% ($35/27 \cdot 100\%$), and the system will shut down in 60 seconds.

(4) Select the Right Pressure Sensor

Optimum linearity with signal range 0~10V or 4~20mA.

(5) Select the Right Shaft Coupling

Select the shaft coupling diameter to match the motor shaft diameter with good alignment and no clearance. It is recommended that you choose a flexible coupling or a rigid coupling.

(6) Hydraulic Pumps

- Select the displacement for hydraulic pump that matches the required flow and motor speed
- If noise is the primary concern, a screw pump and an internal gear pump are both suitable for low-noise operation
- A piston pump fulfills the demand of high volumetric efficiency

• Commonly-used hydraulic pumps:

Hydraulic Pump Types	Volumetric Efficiency	Flow Pulsation	Speed	Noise
Internal Gear Pump	Low	Medium	Medium	Low
Piston Pump	High	Low	Low	High
Screw Pump	Medium	High	High	Medium

Accessories

(1) Brake Resistor (Compatibility List)

230V									
Compatible Model	125% Brake Torque 10% ED ^{*1}					Maximum Brake Torque			
Model Number	Brake Torque (kg-m)	Brake Unit VFDB ³	Compatible Brake Resistor Model ²		Brake Resistor Specification	Brake Current (A)	Minimum Resistor Limit (Ω)	Maximum Brake Current Limit (A)	Maximum Peak Power (kW)
VFD055VL23A-J	3.7	-	BR1K0W020 x 1		1000W20Ω	19	15.6	24.4	9.3
VFD075VL23A-J	5.1	-	BR1K5W013 x 1		1500W13Ω	29	11.5	33.0	12.5
VFD110VL23A-J	7.4	-	BR1K5W013 x 1		1500W13Ω	29	9.5	40.0	15.2
VFD150VL23A-J	10.2	-	BR1K0W4P3 x 2	2 SC	20000W8.6Ω	44	8.3	46.0	17.5
VFD185VL23A-J	12.2	-	BR1K2W3P9 x 2	2 SC	24000W7.8Ω	49	5.8	66.0	25.1
VFD220VL23A-J	14.9	-	BR1K5W3P3 x 2	2 SC	30000W6.6Ω	58	5.8	66.0	25.1
VFD300VL23A-J	20.3	2015 x 2	BR1K0W5P1 x 2	2 SC	40000W5.1Ω	75	4.8	80.0	30.4
VFD300VL23C-J		-	BR1K0W5P1 x 4	2 PC 2 SC					
VFD370VL23A-J	25.0	2022 x 2	BR1K2W3P9 x 2	2 SC	48000W3.9Ω	97	3.2	120.0	45.6
VFD370VL23C-J		-	BR1K2W3P9 x 4	2 PC 2 SC					

460V										
Compatible Model	125% Brake Torque 10% ED ^{*1}					Maximum Brake Torque				
HP	Brake Torque (kg-m)	Brake Unit VFDB ³	Compatible Brake Resistor Model ²		Brake Resistor Specification	Brake Current (A)	Minimum Resistor Limit (Ω)	Maximum Brake Current Limit (A)	Maximum Peak Power (kW)	
VFD055VL43A-J	3.7	-	BR1K0W075 x 1		1000W75Ω	10.2	48.4	15.7	11.9	
VFD075VL43A-J	5.1	-	BR1K5W043 x 1		1500W43Ω	17.6	39.4	19.3	14.7	
VFD110VL43A-J	7.4	-	BR1K5W043 x 1		1500W430Ω	17.6	30.8	24.7	18.8	
VFD150VL43B-J	10.2		BR1K0W016 x 2	2 SC	2000W32Ω	24	25.0	30.4	23.1	
VFD150VL43C-J										
VFD185VL43B-J	12.2		BR1K5W013 x 2		3000W26Ω	29	20.8	36.5	27.7	
VFD185VL43C-J										
VFD220VL43C-J	14.9		BR1K5W013 x 2	2 SC	3000W26Ω	29	19.0	40.0	30.4	
VFD300VL43B-J	20.3	-	BR1K0W016 x 4	2 PC 2 SC	4000W16Ω	47.5	14.1	54.0	41.0	
VFD300VL43C-J										
VFD300VL43C-JO								BR1K0W5P1 x 4		4 SC
VFD300VL43A-J	20.3	4030 x 1	BR1K0W5P1 x 4	4 SC	4000W20.4Ω	37	19.0	40.0	30.4	
VFD370VL43B-J	25.0	4045 x 1	BR1K2W015 x 4	2 PC 2 SC	4800W15Ω	50	12.7	60.0	45.6	
VFD370VL43C-J										54.0
VFD370VL43C-JO										60.0
VFD450VL43B-J		4045 x 1								
VFD450VL43C-J	30.5	-	BR1K5W013 x 4	2 PC 2 SC	6000W13Ω	59	12.7	60.0	45.6	
VFD450VL43C-JO										
VFD550VL43A-J	37.2	4030 x 2	BR1K0W5P1 x 4	4 SC	7200W10Ω	76	9.5	80.0	60.8	
VFD550VL43C-J				BR1K0W5P1 x 8	2 PC 4 SC					8000W 10.2Ω
VFD550VL43C-JO										
VFD750VL43A-J	50.8	4045 x 2	BR1K2W015 x 4	2 PC 2 SC	9600W7.5Ω	100	6.3	120.0	91.2	
VFD750VL43C-J				BR1K2W015 x 8						4 PC 2 SC
VFD750VL43C-JO										

*1. 125% Brake Torque comes from (kw)*125%*0.8. Because of the resistor consuming power limit, the longest operation time of 10% ED is 10 seconds (on: 10 seconds / off: 90 seconds)

*2. Resistors below 400W need to be fixed on the shelf for cooling purposes, and the surface temperature needs to be below 250 °C. Resistors above 1000W need to keep the surface temperature at below 350 °C.

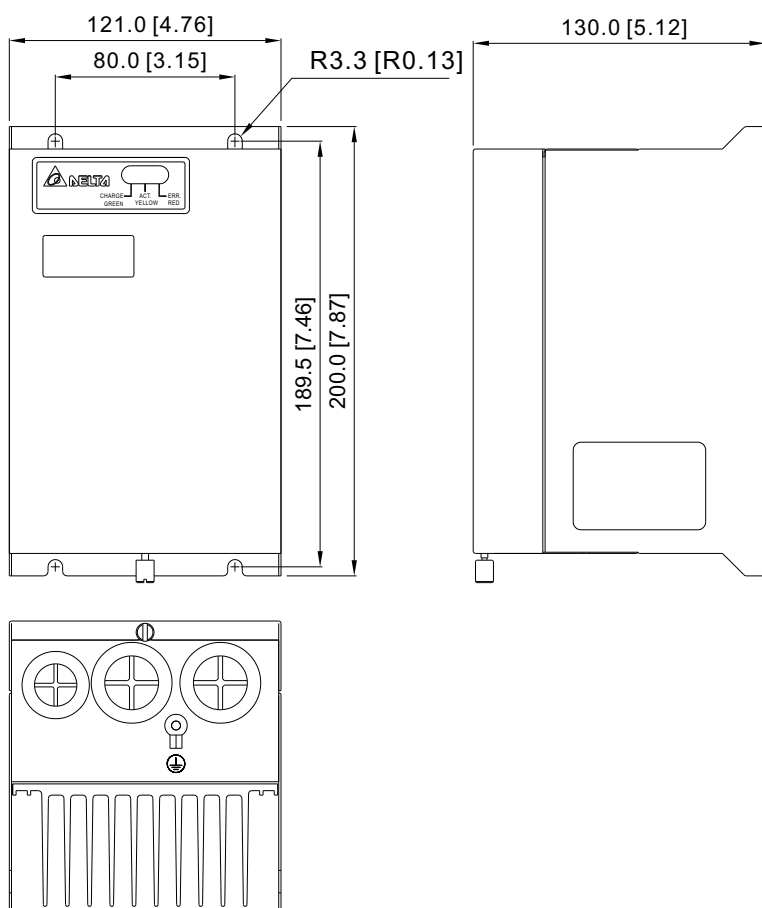
*3. Please refer to the user manual of VFD-VJ-B Brake Unit for more details.

*4. SC = Series Connection. PC = Parallel Connection.

Accessories

(2) VFD-VJ-B Brake Unit

Voltage Level		230V Series		460V Series		
Model VFDB- □□□□		2015	2022	4030	4045	4132
Max. Motor Capacity (kW)		15	22	30	45	132
Output Rating	Max. Discharge Current (I _{peak}) 10ED%	40	60	40	60	240
	Continuous Discharge Current (A)	15	20	15	18	75
	Braking Start-Up Voltage (DC)	330 / 345 / 360 / 380 / 400 / 415±3V		660 / 690 / 720 / 760 / 800 / 830±6V		618 / 642 / 667 / 690 / 725 / 750±6V
Input Rating	DC Voltage	200 ~ 400VDC		400 ~ 800VDC		480 ~ 750VDC
Protection	Heat Sink Overheat	Temperature over + 95 °C				
	Alarm Output	RELAY contact 5A 120VAC/28VDC (RA.RB.RC)				
	Power Charge Display	Blackout until bus (P-N) voltage is below 50 VDC				
Operating Environment	Installation Location	Indoor (no corrosive gases, metallic dust)				
	Operation Temperature	-10 °C ~ +50 °C				
	Storage Temperature	-20 °C ~ +60 °C				
	Humidity	90% RH Non-Condensing				
	Vibration	Below 20Hz 9.8m/S ² (1G) · 20 ~ 50Hz 2m/S ² (0.2G)				
Mechanical Configuration		Wall-mounted enclosed type IP50				



Accessories

(3) Reactor

	AC Input Reactor Specification											AC Output Reactor Specification																		
	460V, 50/60Hz, three-phase											230V, 50/60Hz, three-phase							460V, 50/60Hz, three-phase											
KW	5.5	7.5	11	15	18.5	22	30	37	45	55	75	5.5	7.5	11	15	18.5	22	30	37	5.5	7.5	11	15	18.5	22	30	37	45	55	75
HP	7.5	10	15	20	25	30	40	50	60	75	100	7.5	10	15	20	25	30	40	50	7.5	10	15	20	25	30	40	50	60	75	100
	12	18	25	35	35	45	55	80	80	100	130	25	35	55	80	80	100	130	160	18	18	25	35	45	45	80	80	100	130	160
	18	27	37.5	52.5	52.5	67.5	82.5	120	120	150	195	37.5	52.5	82.5	120	120	150	195	240	27	27	37.5	52.5	67.5	67.5	120	120	150	195	240
	2.5	1.5	1.2	0.8	0.8	0.7	0.5	0.4	0.4	0.3	0.2	0.5	0.4	0.25	0.2	0.2	0.15	0.1	0.075	1.5	1.5	1.2	0.8	0.7	0.7	0.4	0.4	0.3	0.2	0.15
	4.2	2.5	2	1.2	1.2	1.2	0.85	0.7	0.7	0.45	0.3	1.2	0.8	0.5	0.4	0.4	0.3	0.2	0.15	2.5	2.5	2	1.2	1.2	1.2	0.7	0.7	0.45	0.3	0.23

(4) Pulse Generator PG Card (VFD-VJ-A / VFD-VJ-B Series)



EMVJ-PG02R	Resolver Generator Card
EMVJ-PG01U	Linedriver (ABZ+UVW)

(5) Communication Card (VFD-VJ-A / VFD-VJ-B Series)




EMVJ-MF01

Terminal	Descriptions
⊕	Ground
SG-	RS-485 connections
SG+	
GND	Signal terminal

Accessories

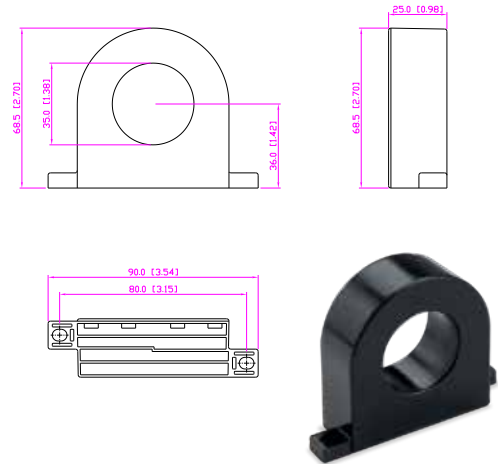
(6) EMC Filter

	230V 3-phase Model	Filter Model Name	Motor Cable Length(m)
230V	VFD055VL23A-J	KMF336A	50
	VFD075VL23A-J	KMF336A	50
	VFD110VL23A-J	KMF350A	50
	VFD150VL23A-J	KMF370A	50
	VFD185VL23A-J	KMF3100A	50
	VFD220VL23A-J	KMF3100A	50
	VFD300VL23A-J	KMF3150A	50
460V	VFD370VL23A-J	KMF3150A	50
	VFD055VL43A-J	KMF318A	50
	VFD075VL43A-J	KMF325A	50
	VFD110VL43A-J	KMF325A	50
	VFD150VL43A-J	KMF336A	50
	VFD185VL43A-J	KMF350A	50
	VFD220VL43A-J	KMF350A	50
	VFD300VL43A-J	KMF370A	50
	VFD370VL43A-J	KMF370A	50
	VFD450VL43A-J	KMF3100A	50
VFD550VL43A-J	KMF3150A	50	
VFD750VL43A-J	KMF3150A	50	



(7) Zero Phase Reactor

RF220X00A



(8) Magnetic Ring & Clip:

Magnetic Ring (Model: DMC684413A)
Clip (Model: CTC230836C)



(9) USB Connection Interface

IFD6500 RS485-to-USB converter



(10) Digital Keypad

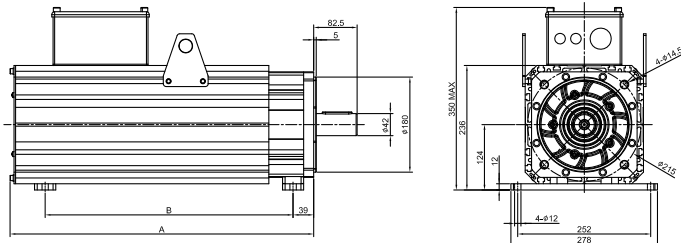
KPV-CE01



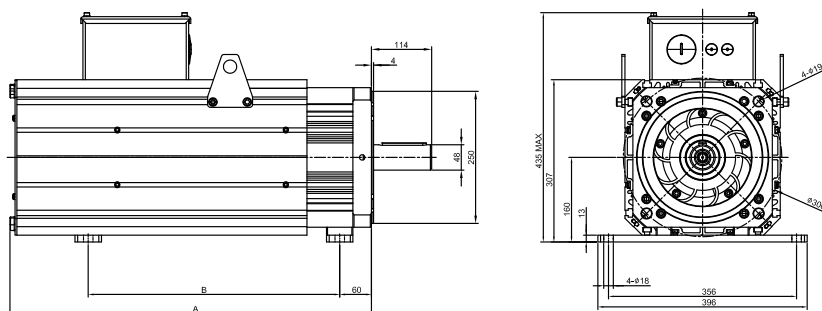
Servo Motor

Fan-Cooled Type

Frame 200 X 200



Frame 264 X 264



Motor Specifications

MSJ-_____C										
Model	IR20 1AE42	IR20 1EE42	IR20 1IE42	OR20 2DE42	LR20 2FE42	IR20 3CE42C	OR26 4FE48	IR26 5CE48	IR266IE48	
Frame (mm)	200 x 200					264 x 264				
Voltage	380V									
Rated Output Power (kW)	10	14	18	23	25	32	45	52	68	
No. of Poles	8									
Rated Torque (N-m)	58	83	103	120	159	180	240	295	385	
Maximum Torque (N-m)	112	155	208	215	336	320	365	455	695	
Rated Speed (r/min)	1700	1700	1700	1800	1500	1700	1800	1700	1700	
Maximum Speed (r/min)	2150	2150	2150	2250	1950	2150	2250	2150	1950	
Rated Current (A)	23	32.8	42.1	46.7	55.9	70	96.5	115	149	
Torque Constant (N-m/A)	2.52	2.53	2.45	2.57	2.85	2.6	2.49	2.57	2.58	
Voltage Constant (V / krpm)	171	171	180	171	192	177	175	195	190	
Phase Resistance(Ohm)	0.673	0.396	0.319	0.271	0.232	0.148	0.088	0.074	0.047	
Inductance (mH)	8.584	6.218	4.663	3.995	3.636	2.740	2.385	2.305	1.721	
Rotor Moment of Inertia (kg-m ²)	7.4 x 10 ⁻³	9.6 x 10 ⁻³	11.6 x 10 ⁻³	13.8 x 10 ⁻³	18.0 x 10 ⁻³	19.1 x 10 ⁻³	41.6 x 10 ⁻³	50.5 x 10 ⁻³	61.4 x 10 ⁻³	
Weight (kg)	46	53	59.5	67.5	83.6	85	134	152	171	
Dimension A (mm)	381	417	453	489	575	290	577	631	684	
Dimension B (mm)	285	310	350	395	470	470	370	423	476	
Insulation Class	Class F (Winding Class H)									
Protection Class	IP54									
Efficiency Class	IE3 / GB30253-2013									
Cooling Method	Forced air cooling AC Fan 220 VAC									
Encoder Type	Resolver 2 Poles									
Motor Temperature Protection	PTC temperature protection and KTY84-130 temperature sensor									
Operating Environment	Temperature -15 ~ 40°C Humidity 20 ~ 90% RH (non condensing) Altitude <1000m									
Installation Method	Flange / Foot									
Certifications	CE									

*2: Users are required to set up the parameter Pr.02-09 Temperature Alarm when using the KTY84-130 temperature sensor for motor overheating protection.

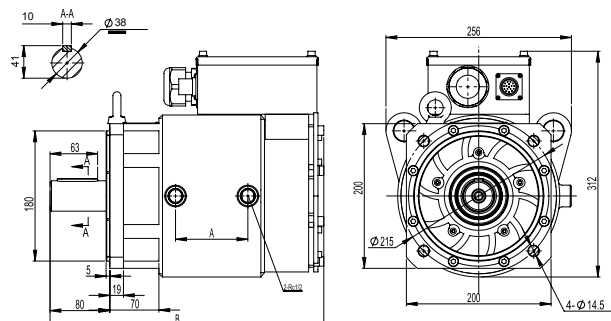
*3: Encoder cable (CBHE-E5M, 5m) is included in the motor package.

*4: Delta reserves the right to revise specifications without prior notice.

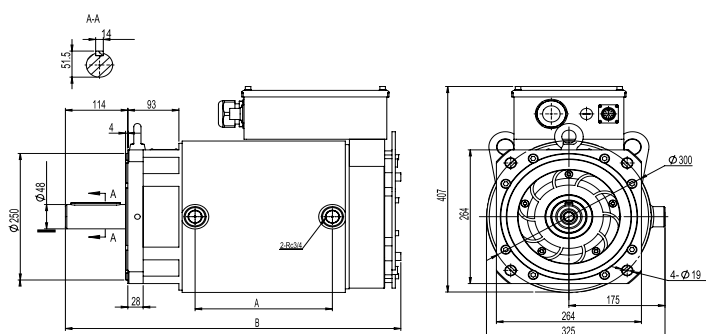
Servo Motor

Oil-Cooled Type

Frame 200 X 200



Frame 264 X 264



MSO-_____C					
Model	IR203AE42	IR263HE48	IR264HE48	IR265JE48	IR266IE48
Frame (mm)	200 x 200		264 x 264		
Voltage	380V				
Rated Output Power (kW)	30.4	37.9	47.4	59.3	68.5
No. of Poles	8				
Rated Torque (N-m)	170	213	266	333	385
Maximum Torque (N-m)	305	284	365	455	530
Rated Speed (r/min)	1700				
Maximum Speed (r/min)	2150				
Rated Current (A)	70.5	85	102	127	149
Torque Constant (N-m/A)	2.5	2.5	2.5	2.86	2.57
Voltage Constant (V / krpm)	179	183	190	186	190
Phase Resistance(Ohm)	0.143	0.11	0.077	0.054	0.047
Inductance (mH)	2.33	3.50	2.661	1.95	1.721
Rotor Moment of Inertia (kg-m ²)	18.0 x10 ⁻³	32.6 x10 ⁻³	41.6 x10 ⁻³	50.5 x10 ⁻³	58.8 x10 ⁻³
Weight (kg)	100	120	140	165	188
Dimension A (mm)	292	143	197	250	304
Dimension B (mm)	573	503	557	610	664
Insulation Class	Class F (Winding Class H)				
Protection Class	IP54				
Efficiency Class	IE3 / GB30253-2013				
Cooling Method	Forced air cooling AC Fan 220 VAC				
Encoder Type	Resolver 2 Poles				
Motor Temperature Protection	PTC temperature protection and KTY84-130 temperature sensor ^{*2}				
Operating Environment	Temperature -15 ~ 40°C Humidity 20 ~ 90% RH (non condensing) Altitude <1000m				
Installation Method	Flange				
Certifications	CE				

*1: This chart states the maximum operation speed of a motor with no field-weakening control. If field-weakening control is applied, the maximum operation speed of the motor is 2500rpm.

*2: Users are required to set the parameter Pr.02-09 Temperature Alarm when you use the KTY84-130 temperature sensor for motor overheating protection.

*3: Delta reserves the right to use revised specifications without prior notice.

*4: Encoder cable (CBHE-E5M, 5m) is included in the motor package.



Smarter. Greener. Together.

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