MOTOR CONTROL

REGAL

MARATHON DRIVES
MD100P PUMP / FLOW
VARIABLE SPEED DRIVES

marathon™ Drives

REGAL

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The Marathon Drives' MD100P series has been specifically designed and created to provide competitive solutions for fan and pump applications

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Specialised Functions for Fan and Pump

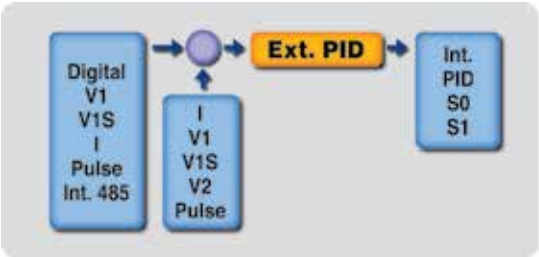
The MD100P, specifically designed for HVAC application, provides stable and cost-effective system performance.

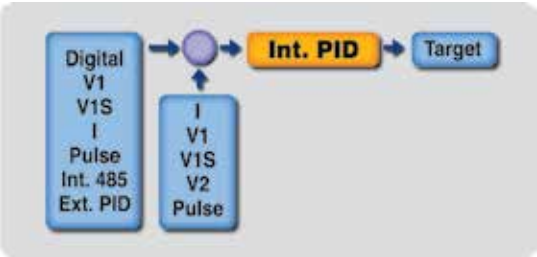
PID control

In the centrifugal fan and pump field, PID control is provided as a standard function in order to maintain a constant control of pressure, flow and oil level. This function includes Pre-PID, Sleep and Wake up and output inverse subfunctions.

Dual PID

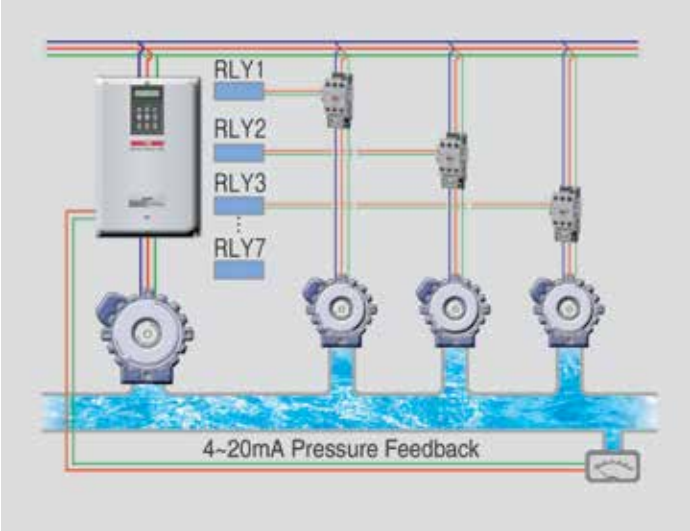
Where external or cascaded PID control is required, the built-in dual PID algorithm of the MD100P can be utilized to satisfy various system requirements.





Multi motor control (5.5 to 450kW)

The MD100P MMC function provides cost-effective, simultaneous control of up to eight motors, without requiring external controllers.



Marine type certification from DNV

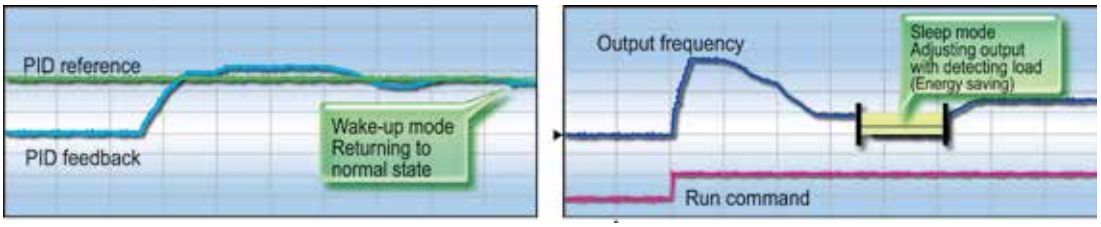
The MD100P has been tested and certified by DNV to comply with International Marine requirements

Energy Saving and High Efficiency

The MD100P, specifically designed for fan and pump applications, guarantees energy savings by optimizing the system.

Sleep and wake-up function

Energy savings are obtained through the Sleep and Wake-Up functions of the MD100P, which enable the drive to automatically switch off during user-programmed low-load conditions and then to start up again when process demand increases.



Pre heating function

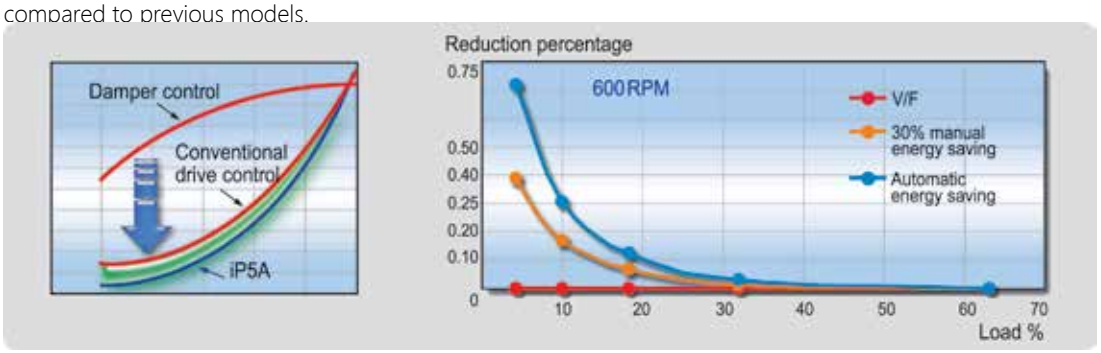
When using the drive in damp conditions, this function protects both the motor and the drive's output.

Flying start function

When 2 or more fans, or a high inertia load are connected to the drive, the MD100P detects the motor speed after a momentary power failure, enabling the motors to be smoothly reaccelerated without mechanical and electrical shockloading to the system.

Automatic energy saving

Load change may incur energy losses but the optimized flux control of MD100P results in more outstanding energy saving compared to previous models.



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Intelligent Control

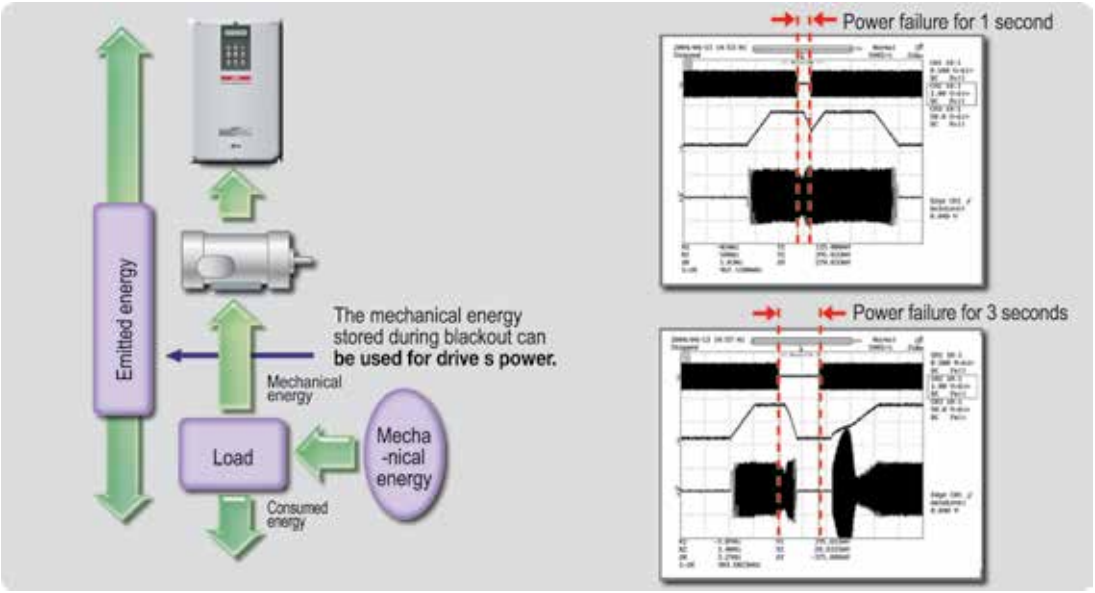
Because of effectual functions and protection algorithms, the MD100P provides constant performance, in spite of external power fluctuations.

Constant and stable performance

In spite of external voltage fluctuations and lightning surges, the MD100P optimizes motor performance.

Improved system management during power dips and momentary power outages

Drive capable of quick reliable smooth restarts into bi-directional rotating loads.

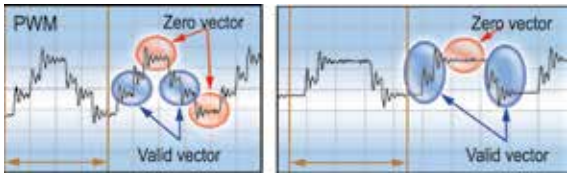


Safety stop

During unexpected power failure conditions, the MD100P can bring the load to a controlled stop, by utilizing the inertial energy. This can prevent further process problems or accidents.

Current leakage reduction algorithm

Under damp conditions, leakage currents can occur when using drives. These currents can cause a system failure. The MD100P low-leakage PWM algorithm reduces these leakage currents to ensure reliability of operation.



Flux braking algorithm

This algorithm reduces deceleration time, thereby improving system efficiency.

Automatic carrier frequency change

By taking ambient temperature into account, the MD100P can automatically adjust the Carrier (Modulation) Frequency.

Protection

The MD100P has optimized protective functions, such as safety stop and pre-excitation of the motor, amongst others.

User-friendly Keypad & Easy Maintenance

The MD100P construction allows for easy maintenance, with ease-of-access to all components.

1 NPN/PNP input

MP100P has both NPN and PNP input, and you can select one of them easily.

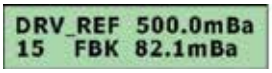
2 Abundant I/O suggestion

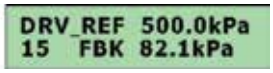
MD100P serves abundant I/O.

Digital input / output	8 points / 4 points
Analog input (voltage + current)/ouptut	(1+1) points/4 points
Pulse input	1 point
NTC/PTC input	1 point

3 Various units of I/O display

The iP5A display can be calibrated in many different types of process units.





4 Built-in RS485 and Optional Communication

The built-In RS485 allows for communication without external option. However, the optional communication boards enable the iP5A to talk to BMS and most Industrial Systems.

5 Long-life Condenser and Simple Framework

P5A adopts long-life condenser and enables easy maintenance in simple framework.

6 Consumption Time Display

iP5A displays consumption time of components so that users can replace them in time.

7 Others

- Removable terminal board
- External fan available
- Cooling fan on/off control

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Standard I/O

Motor Rating	380-480V Class
5.5kW	MDLV055100P-4NE
7.5kW	MDLV075100P-4NE
11kW	MDLV110100P-4NE
15kW	MDLV150100P-4OL
18.5kW	MDLV185100P-4OL
22kW	MDLV220100P-4OL
30kW	MDLV300100P-4OL
37kW	MDLV370100P-4OL
45kW	MDLV450100P-4OL
55kW	MDLV550100P-4OL
75kW	MDLV750100P-4OL
90kW	MDLV900100P-4OL
110kW	MDLV1100100P-4OL
132kW	MDLV1320100P-4OL
160kW	MDLV1600100P-4OL
220kW	MDLV2200100P-4OL
280kW	MDLV2800100P-4OL
315kW	MDLV3150100P-4O
375kW	MDLV3750100P-4O
450kW	MDLV4500100P-4O

Model Number Identification

MDLV — Marathon Drive Low Voltage

0055 — Motor rating (kW)
0055 - 4500
5.5kW - 450kW

100P — Series Name Pump / Flow

-

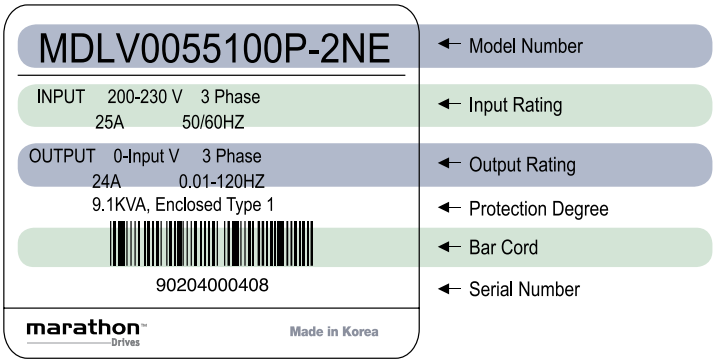
2 — Input Voltage
2: 3-phase 200-240V
4: 3 phase 380-480V

N — Loader
None: Loader
N: Non Loader

O — Enclosure Type
O: IP00
E: IP20/21
L: Built-in DC reactor

L — DCR
None: Not available
L: DC reactor

(CLASS) — Certificate
(CLASS): DNV



Marine Approved Drives require additional ordering.

3-Phase 380-480V (5.5 to 90kW) Specifications

MD□□□□100P-4□□□□		0055	0075	0110	0150	0185	0220	0300	0370	0450	0550	0750	0900
Motor rating [1] (Fan/Pump)	kW	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
	Current A	12	16	24	30	39	45	61	75	91	110	152	183
	(110% overload)	Normal duty: 110% for 1 minute											
Motor rating (General Load)	kW	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
	Current (Non DCR/ DCR) A	8.8	12	16	22/24	28/30	34/39	44/45	61	75	91	110	152
	(150% overload)	Heavy duty: 150% for 1 minute											
Output rating	kVa [2]	9.6	12.7	19.1	23.9	31.1	35.9	48.6	59.8	72.5	87.6	121.1	145.8
	Voltage	3-phase 380 - 480V [3]											
	Frequency Hz	0.01 - 120Hz											
Input rating	Voltage	3-phase 380 - 480V (-15% - +10%)											
	Frequency Hz	50 - 60Hz (±5%)											
Protection degree		IP00 / UL Open [4]											
Weight kg	Non DCR type	4.9	6	6	12.5	13	20	20	27	27	29	42	43
	Built-in DCR type	-	-	-	19.5	19.5	26.5	26.5	39	40	42	67	68

3-Phase 380-480V (110 to 450kW) Specifications

MD□□□□100P-4□□□□		1100	1320	1600	2200	2800	3150	3750	4500
Motor rating [1] (Fan/Pump)	kW	110	132	160	220	280	315	375	450
	Current A	223	264	325	432	547	613	731	877
	(110% overload)	Normal duty: 110% for 1 minute							
Motor rating (General Load)	kW	90	110	132	160	220	280	315	375
	Current (Non DCR/ DCR) A	183	223	264	325	432	547	613	731
	(150% overload)	Heavy duty: 150% for 1 minute							
Output rating	kVa [2]	178	210	259	344	436	488	582	699
	Voltage	3-phase 380 - 480V [3]							
	Frequency Hz	0.01 - 120Hz							
Input rating	Voltage	3-phase 380 - 480V (-15% - +10%)							
	Frequency Hz	50 - 60Hz (±5%)							
Protection degree		IP00 / UL Open [4]							
Weight kg	Non DCR type	-	-	-	-	-	243	280	380
	Built-in DCR type	101	101	114	200	200	-	-	-

1) Indicates the maximum applicable capacity when using a 4-Pole motor.
2) Rated capacity (v 3□□V□□I) is based on 220V for 200V class and 460V for 400V class.
3) Maximum output voltage will not exceed the input voltage. An output voltage less than the input voltage may be programmed if necessary.
4) IP20/UL Type1 with optional conduit, it can be modified to UL Type1.

Control Specifications

Cooling method	Forced air cooling (Self-cooling for below 1.5kW-2, 2.2kW-4)
Control method	V/F, Sensorless Vector, Slip Compensation, Easy Start Selectable
Frequency setting resolution	Digital Reference: 0.01 Hz (Below 100 Hz), 0.1 Hz (Over 100 Hz) Analog Reference: 0.01 Hz / 60 Hz
Frequency accuracy	Digital : 0.01% of the max frequency Analog : 0.1% of the max frequency
V/f pattern	Linear, Squared Pattern, User V/F
Overload capacity	110 % per 1 min, 120% per 1 min Note5)
Torque boost	Manual Torque Boost (0 to 15 %), Auto Torque Boost

Operation Specifications

Operation mode		Keypad / Terminal / Communication Operation
Frequency setting		Analog: 0 to 12V / -12V to 12V / 0to20mA/ Pulse / Ext-PID Digital: Keypad
Operation function		DC Braking, Frequency Limit, Frequency Jump, 2nd Function, Slip Compensation, Reverse Rotation Prevention, Auto Restart, Invert By-Pass Auto-Tuning PID Control Start Stop Braking leakage Pre-PID Dual-PID MMC Start Prer By Pass, Auto Tuning, Control, Flying Start, Safety Stop, Flux Braking, Low leakage, Pre PID, Dual PID, MMC, Easy Start, e-heater
Input	Start signal	Forward, Reverse
	Multi-step	Up to 18 Speeds can be set including Jog (Use Programmable Digital Input Terminal,Including Jog/Dwell)
	Multi-step accel/decel time	0.1to 6,000 sec, Max 4 types can be set via Multi- Function Terminal. Accel/Decel Pattern: Linear, U-Curve, S-Curve Selectable
	Emergency stop	Interrupts the Output of Drive
	Jog	Jog Operation
	Fault reset	Fault Reset
Output	Operating status	Frequency Detection Level, Overload Alarm, Stalling, Over Voltage, Low Voltage, Drive Overheating/ Running/ Stopping/ Const ant running, Drive By-Pass, Speed Searching
	Fault output	Contact Output (3A, 3C, 3B) - AC 250V 1A, DC 30V 1A
	Indicator	Choose 2 from Output Frequency, Output Current, Output Voltage, DC Link Voltage (Output Voltage: 0 to 10V)

Protective Function Specifications

Drive trip	Over Voltage, Low Voltage, Over Current, Ground Fault, Drive Overheat, Motor Overheat, Output Phase Open, Overload Protection, External Fault 1, 2, Communication Error, Loss of Speed Command, Hardware Fault, Option Fault etc
Drive alarm	Stall Prevention, Overload Alarm, Thermal Sensor Fault

Display Specifications

Keypad	Operation information	Output Frequency, Output Current, Output Voltage, Frequency Set Value, Operating Speed, DC Voltage, Integrating Wattmeter, Fan ON time, Run-time, Last Trip Time
	Trip information	Trips Indication when the Protection Function activates. Max. 5 Faults are saved. Last Trip Time.

Environment Specifications

Ambient temperature	-10°C to 50°C (14°C to 122°C) Decrease 2% of rated current for every 1°C increase in above 40°C
Storage temperature	-20°C - 65°C (14°C to 149°C)
Ambient humidity	Below 90 % RH Max. (Non-Condensing)
Altitude-vibration	Below 1,000m (3,300ft), Below 5.9m/sec2 (0.6g)
Application site	Pollution degree 2, No Corrosive Gas, Combustible Gas, Oil Mist, or Dust

1) Rated capacity (√3×V×I) is based on 220V for 200V class and 460V for 400V class.
2) Indicates the maximum applicable capacity when using a 4-Pole standard motor.
3) IP20 or UL Enclosed Type1 can be provided by the option.
4) IP20 or UL Enclosed Type1 is not provided.
5) Overload rating 120%, 1 min is based on ambient 25°C

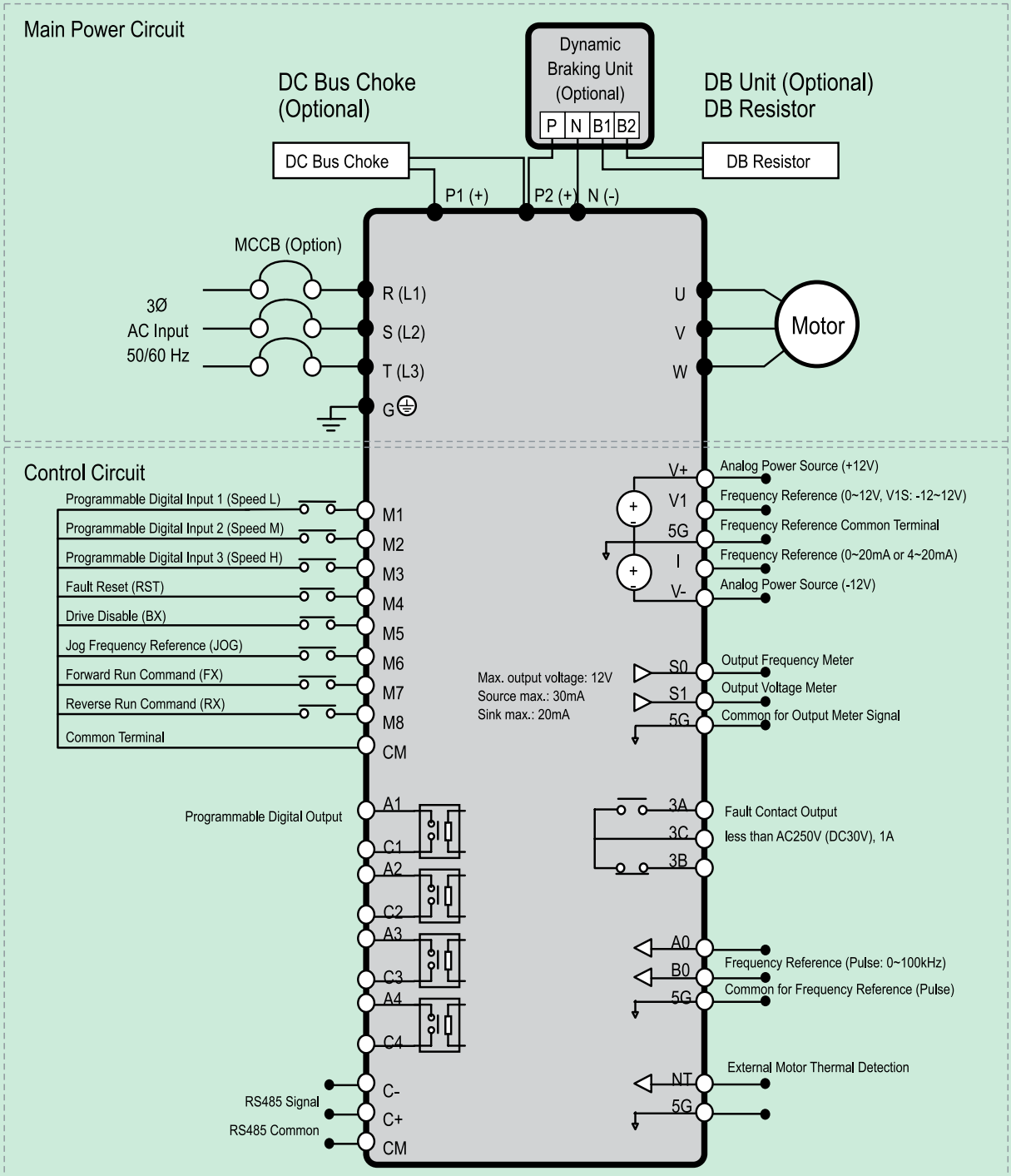
Standard Specifications

Common specification (external)

Keypad	LCD	32 character display keypad. Download and upload available	All units
Remote	Remote cable	2m, 3m and 5m long keypad cable enables users to control the drive from a distant area	Optional
Dynamic braking	DB resistor	To enhance the regenerative braking performance, it makes the drive to accelerate/decelerate rapidly	According to drive capacity
	DB unit	If it need a regenerative braking, it is used with DB resistor	
Conduit option	Conduit for NEMA Type 1	Install it to fit for NEMA Type 1 enclosure or IP20	15-90kW
Communication option card	DEVICENET	DEVICENET optional communication card	All series
	PROFIBUS	PROFIBUS optional communication card	All series
	LS485/MODBUS_ RTU	LS485/MODBUS_RTU optional communication card	All series
	LonWorks	Lonworks optional communication card	All series
	BACNet	BACNet optional communication card	All series
	MODBUS_TCP	MODBUS_TCP optional communication card	All series
	Metasys/N2	Metasys_N2 optional communication card	All series
	CCLink	CCLink optional communication card	All series
	CANopen	CANopen optional communication card	All series

Wiring

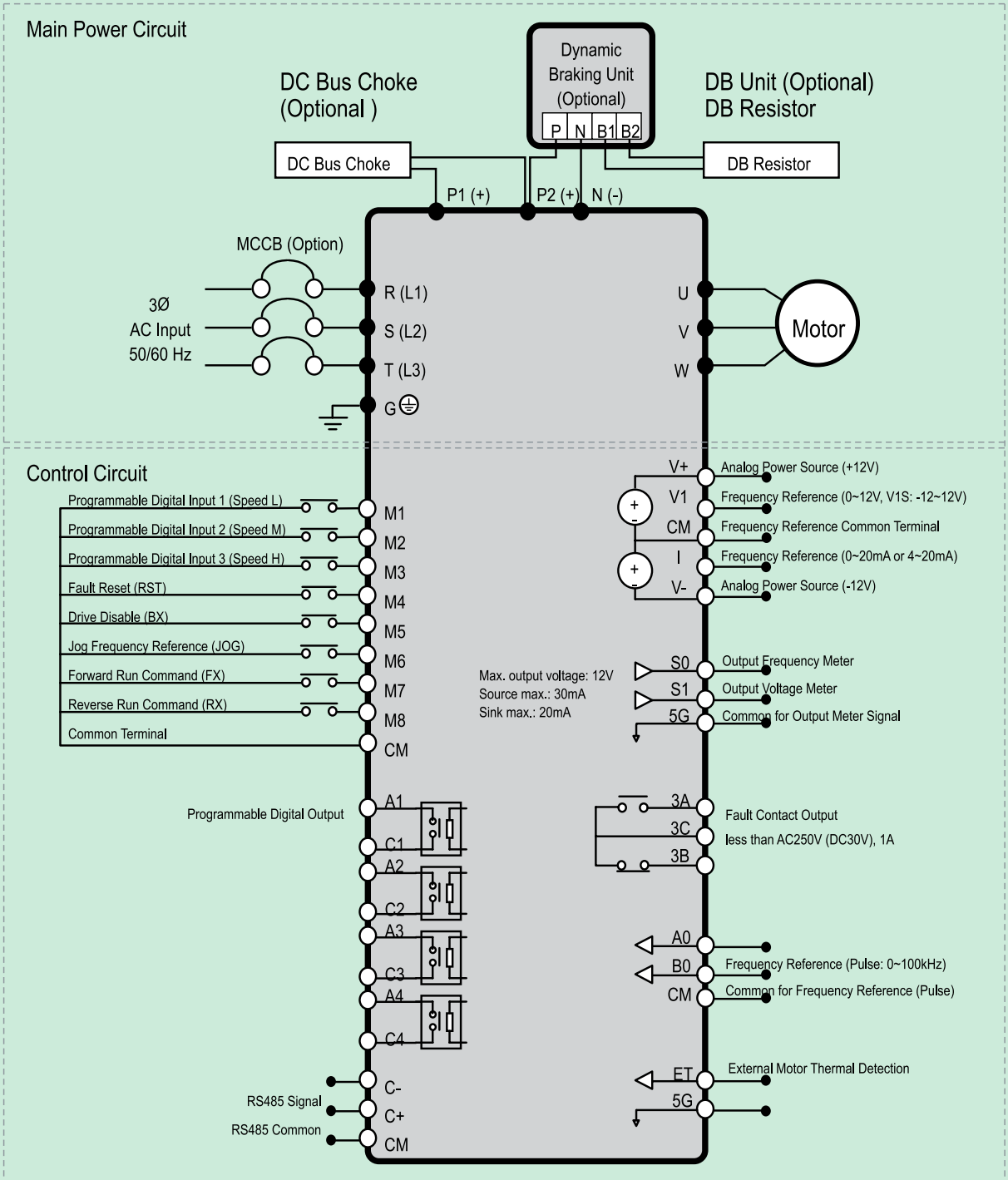
5.5 to 30kW



1) 5G is Common Ground for Analog Input / Output.
2) Use terminal V1 for V1, V1S (0 to 12V, -12 to 12V) input.

Wiring

37 to 90kW / 315 to 450kW



1) 5G is Common Ground for Analog Meter Output (SO, S1) and External motor thermal detection (ET).
2) Use terminal V1 for V1, V1S (0 to 12V, -12 to 12V) input.
3) DC Reactor is built basically in drives for 15 to 280kW.

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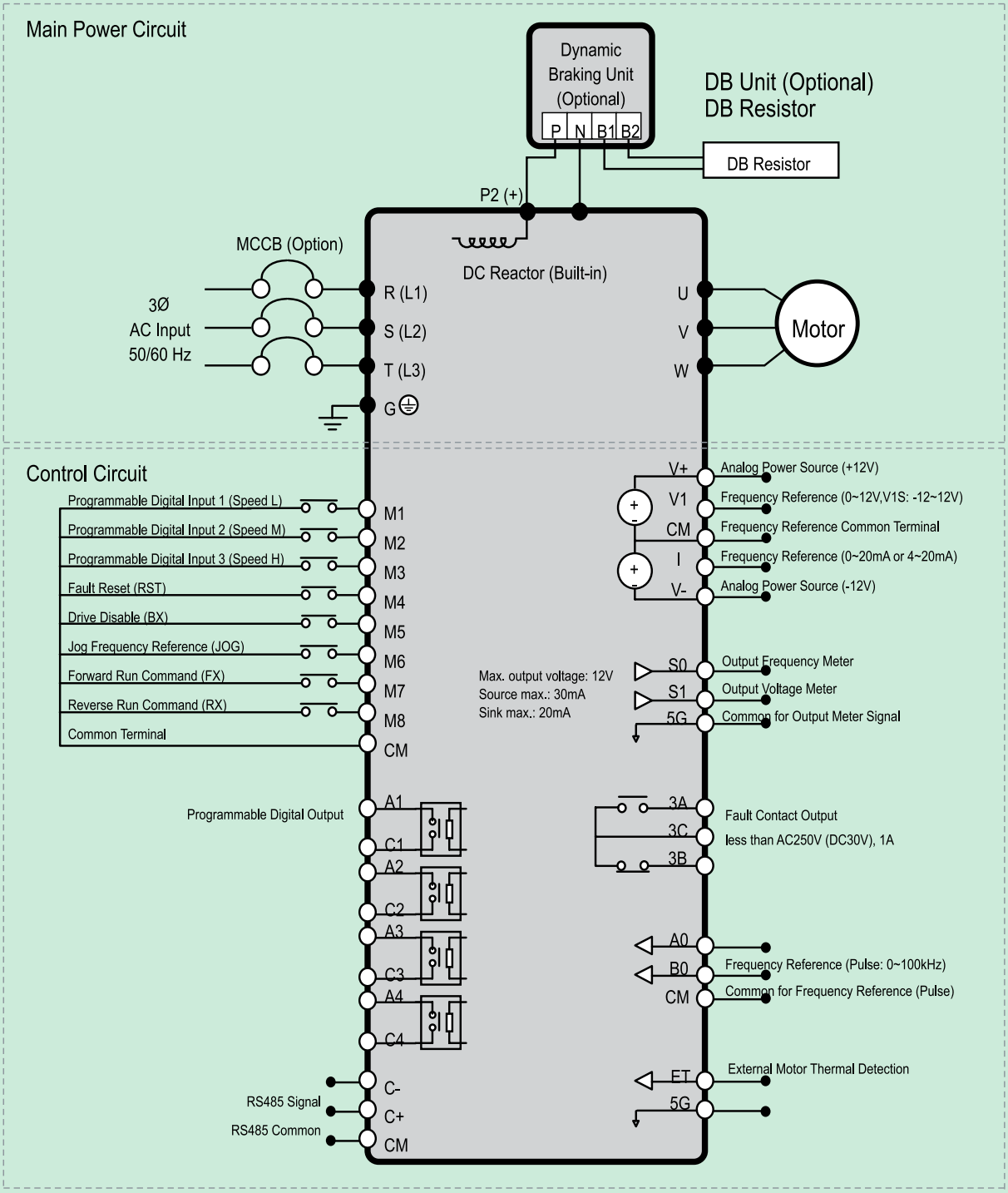
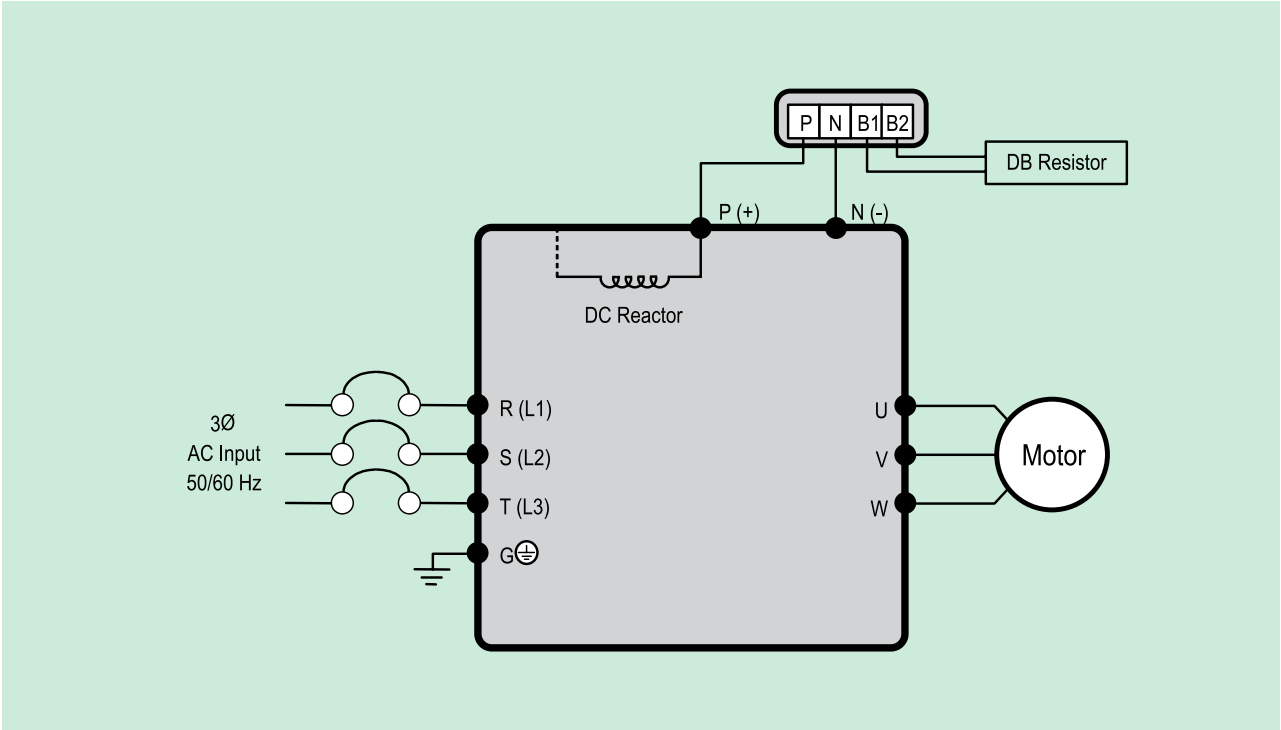
Wiring

110 to 280kW

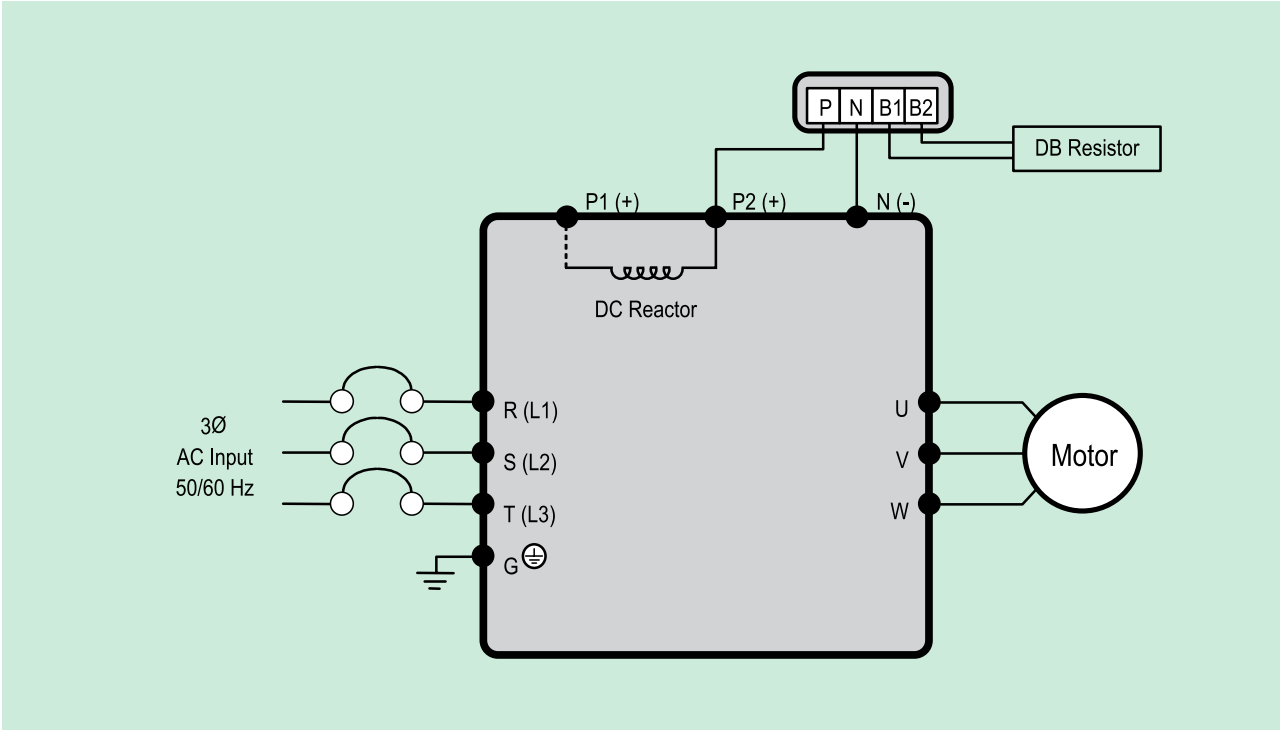


Wiring

15 to 30kW Built-in DCL type



37 to 90kW Built-in DCL type



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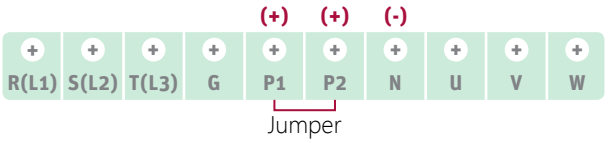
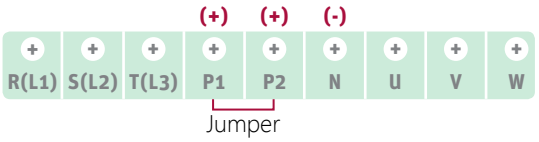
Terminal Configuration (Power Circuit Terminal)

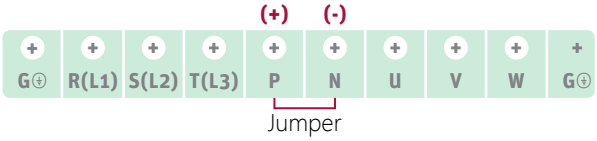
5.5 to 30kW (200V/400V Class)



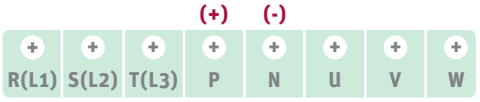
37 to 90kW / 315 to 450kW (400V/600V Class)



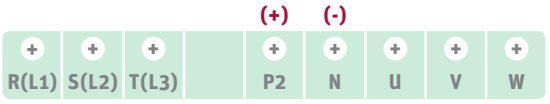
15 to 18.5kW (Built-in DC Reactor Type, 400V Class)



22~30kW (Built-in DC Reactor Type, 400V Class)



37~90kW / 110 ~280kW (Built-in DC Reactor Type, 400V Class)



Note: P1 (+) is not provided for wiring.

Symbol	Description
R, S, T (L1, L2, L3)	AC Line Voltage Input
G	Earth Ground
P1 (+), P2 (+)	External DC Reactor [P1 (+)-P2 (+)] Connection Terminals (Jumper must be removed)
P2 (+), N (-) or P (+), N (-)	DB Unit [P2 (+)-N (-)] Connection Terminals
U, V, W	3 Phase Power Output Terminals to Motor

Terminal Configuration (Power Circuit Terminal)

Grounding

Drive Capacity	Grounding wire sizes, kcmil (mm^2)
kW	400V Class
5.5 to 7.5kW	4
11 to 15kW	10
18.5 to 30kW	16
37 to 55kW	25
75 to 90kW	35
110 to132kW	70
160 - 280kW	95
315 - 375kW	150
450kW	240

Wires & Terminal lugs

Refer to below for wires, terminal lugs and screws used to connect the drive power input and ouput.

Drive Capacity		Terminal Screw Size	Screw Torque Kgf • cm	Wire Size			
				R(L1), S(L2), T(L3)		U, V, W	
				mm^2	AWG or kcmil	mm^2	AWG or kcmil
400V Class	5.5kW	M4	7.1 to 12.2	3.5	12	3.5	12
	7.5kW	M4		3.5	12	3.5	12
	11kW	M4		5.5	10	5.5	10
	15kW	M6	30.6 to 38.2	8	8	8	8
	18.5kW	M6		14	6	14	6
	22 to 30kW	M8	61.2 to 91.8	22	4	22	4
	37 to 55kW	M8		38	2	38	2
	75 to 90kW	M10	89.7 to 122.0	60	1/0	600	1/0
	110 - 132kW	M12	182.4 - 215.0	100	4/0	100	4/0
	160kW	M12		150	300	150	300
	220kW	M12		200	400	200	400
	280kW	M12		250	500	250	500
	315kW	M12		325	700	325	700
	375kW	M12		2 x 200	2 x 400	2 x 200	2 x 400
	450kW	M12		2 x 250	2 x 500	2 x 250	2 x 500

* Apply the rated torque to terminal screws.
* Loose screws can cause of short circuit or malfunction. Tightening the screw too much can damage the terminals and cause a short circuit or malfunction.
* For 7.5 to 11kW 240V type drives, R(L1), S(L2), T(L3) and U, V, W terminals are only for use with insulated ring type connector.

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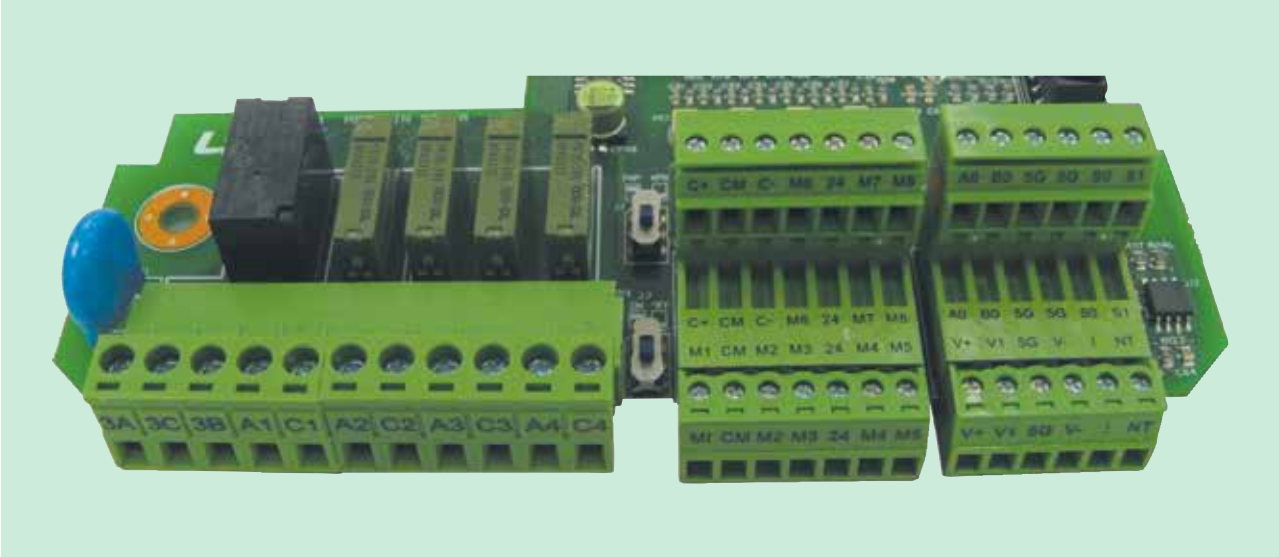
Terminal Configurations (Control Circuit Terminal)

5.5 to 30kW (200V/400V Class)



3A	3C	3B	A1	C1

A2	C2	A3	C3	A4	C4

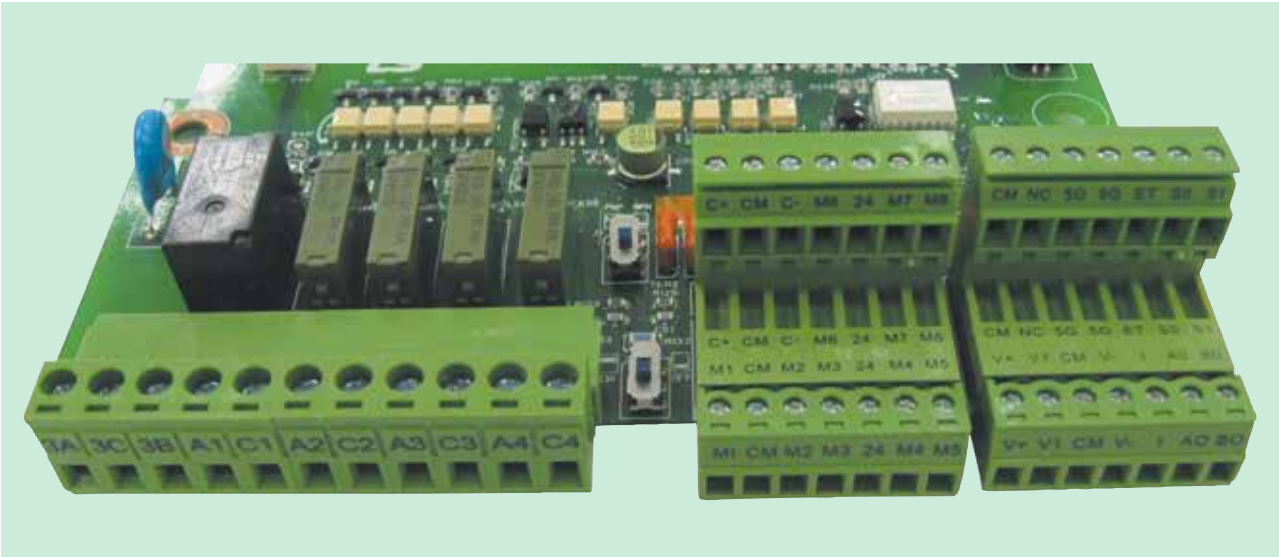
C+	CM	C-	M6	24	M7	M8

A0	B0	5G	5G	S0	S1

M1	CM	M2	M3	24	M4	M5

V+	V1	5G	V-	I	NT

37 to 450kW (400V Class)



3A	3C	3B	A1	C1

A2	C2	A3	C3	A4	C4

C+	CM	C-	M6	24	M7	M8

CM	NC	5G	5G	ET	S0	S1

M1	CM	M2	M3	24	M4	M5

V+	V1	CM	V-	1	A0	B0

Terminal Configurations (Control Circuit Terminal)

Type		Symbol	Name	Description
Input Signal	Starting Contact Function Select	M1, M2, M3	Programmable Digital Input 1, 2, 3	Defines programmable digital inputs (Factory setting : Multi-step frequency 1,2,3)
		FX [M7]	Forward Run Command	Forward run when closed and stopped when open
		RX [M8]	Reverse Run Command	Reverse run when closed and stopped when open
		JOG [M6]	Jog Frequency Reference	Runs at jog frequency when the jog signal is on. The direction is set by the FX (or RX) signal
		BX [M5]	Emergency Stop	When the BX signal is ON, the output of the drive is turned off. When motor uses an electrical brake to stop, BX is used to turned off the output signal. Take caution when BX signal is off (Not turned off by latching) and FX signal (or RX signal) is on. Under these conditions, the motor will run!
		RST [M4]	Fault Reset	Used for fault reset.
		CM	Sequence Common (NPN)	Common terminal for NPN contact
		24	Sequence Common (PNP)	Common 24V terminal for PNP contact input. Maximum output : +24V, 100mA
	Analog Frequency Setting	V+, V-	Analog Power Source (+12V,-12V)	Power supply for analog frequency setting. Maximum output : +12V, 100mA, -12V, 100mA
		V1	Frequency Reference (Voltage)	Used by a DC 0~12V or -12~12V input to set the frequency reference. (Input impedance is 20kΩ)
		I	Frequency Reference (Current)	Used by a 0-20mA input to set the frequency reference. (Input impedance is 249Ω)
		A0, B0	Frequency Reference (Pulse)	Used by a pulse input to set the frequency reference.
		5G (~30kW) CM (37kW~)	Frequency Reference Common Terminal	Common terminal for analog frequency reference signal
	External Motor Thermal Detection	NT (~30kW) ET (37kW~)	External Motor Thermal Detection	Motor thermal sensor input. Used to prevent motor from overheating by using a NTC or PTC thermal sensor.
		5G	Common for NT (or ET)	Common terminal for external motor thermal detection
Built-in RS485 Terminal		C+, C-	RS485 signal High, Low	RS485 signal (See RS485 communication in manual for more details.)
		CM	RS485 common	Common ground. Terminal for RS485 interface.
Output Signal	Analog Output	S0, S1	Programmable Voltage Ouptut	Voltage output for one of the following : Output frequency, output current, output voltage, DC link voltage. Default is set to output frequency. (Maximum output voltage and output current are 0-12V and 1mA)
		5G	Analog Common Terminal	Common terminal for analog output (S0, S1)
	Contact	3A, 3C, 3B	Fault Contact Output	Energizes when a fault is present. (AC250V, 1A; DC30V, 1A) Fault : 3A-3C closed (3B-3C open) Normal : 3B-3C Closed (3A-3C open)
		A1-4, C1-4	Programmable Digital Output	Defined by programmable digital output terminal settings (AC250V, 1A or less; DC30V, 1A or less)

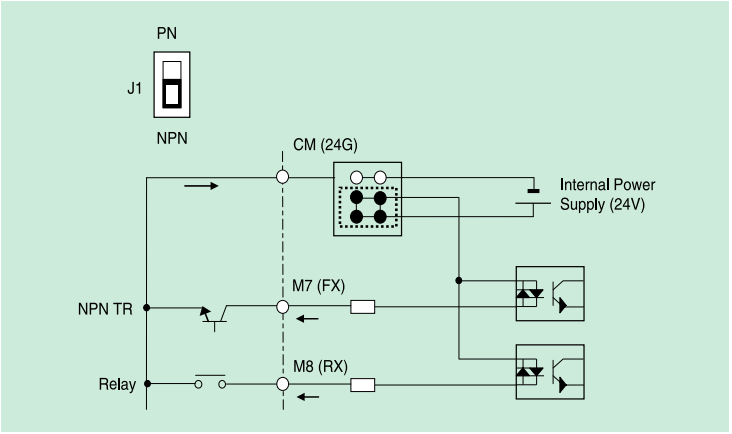
Note: NC terminal is unavailable.

Terminal Configurations (Control Circuit Terminal)

MD100P provides Sink/Source (NPN/PNP) modes for sequence input terminal on the control circuit. The logic of the input terminal is settable to Sink mode (NPN mode)/Source mode (NPN mode) by using the J1 switch. Connection method is shown below.

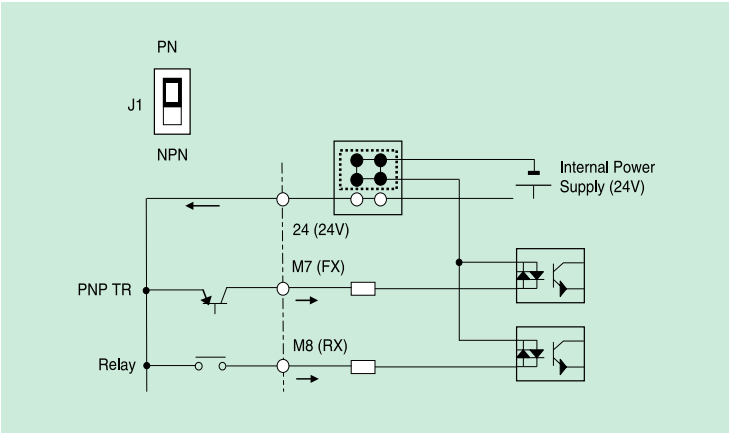
Sink mode (NPN mode)

- Put J1 switch down to set to Sink mode (NPN mode). CM terminal (24V GND) is common terminal for contact signal input.
- The factory default is Sink mode (NPN mode).



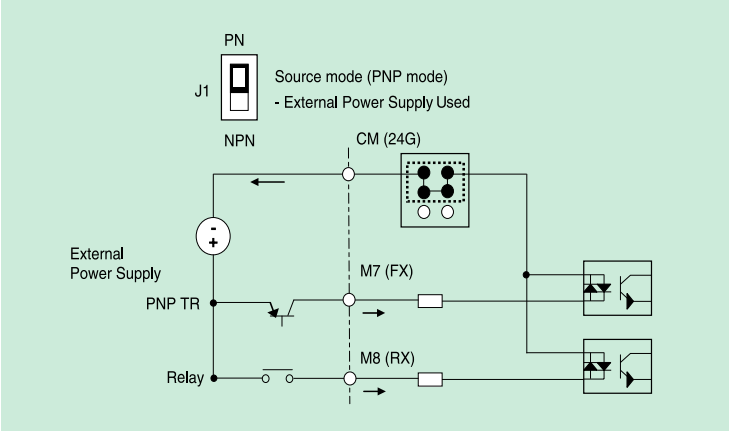
Source mode (PNP mode) Internal Power Supply Used

- Put J1 switch up to set to Source mode (PNP mode). Terminal 24 (24V Power Supply) is common terminal for contact input signal.



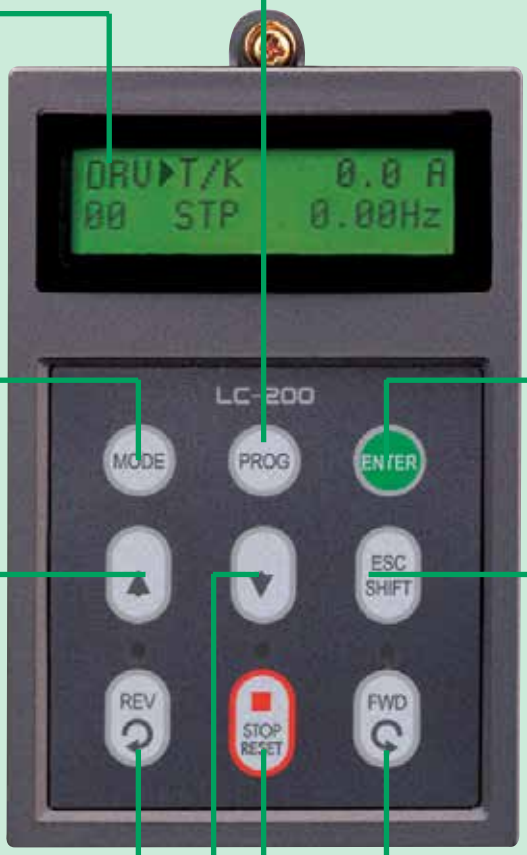
Source mode (PNP mode) External Power Supply Used

- Put J1 switch up to set to Source mode (PNP mode).
- To use external 24V Power Supply, make a sequence between external Power Supply (-) terminal and CM (24V GND) terminal.



Programming Keypad

LCD Loader



32 character, background light, LCD display. Background tone is adjustable.

- Data set up start

- Shift between function groups
- Shifting from group code to the upper code

- Data set up completion

- Shift to function code
- Shift to next function code
- Data is increased in set up mode

- Decimal point shift
- Only available in case of data setup

- Reverse run command key
- Only available with loader operation
- LED is turned ON with reverse run
- Blinks during Acc/Deceleration of reverse run

- Forward run command key
- Only available with loader operation
- LED is turned ON with forward run
- Blinks during Acc/Deceleration of forward run

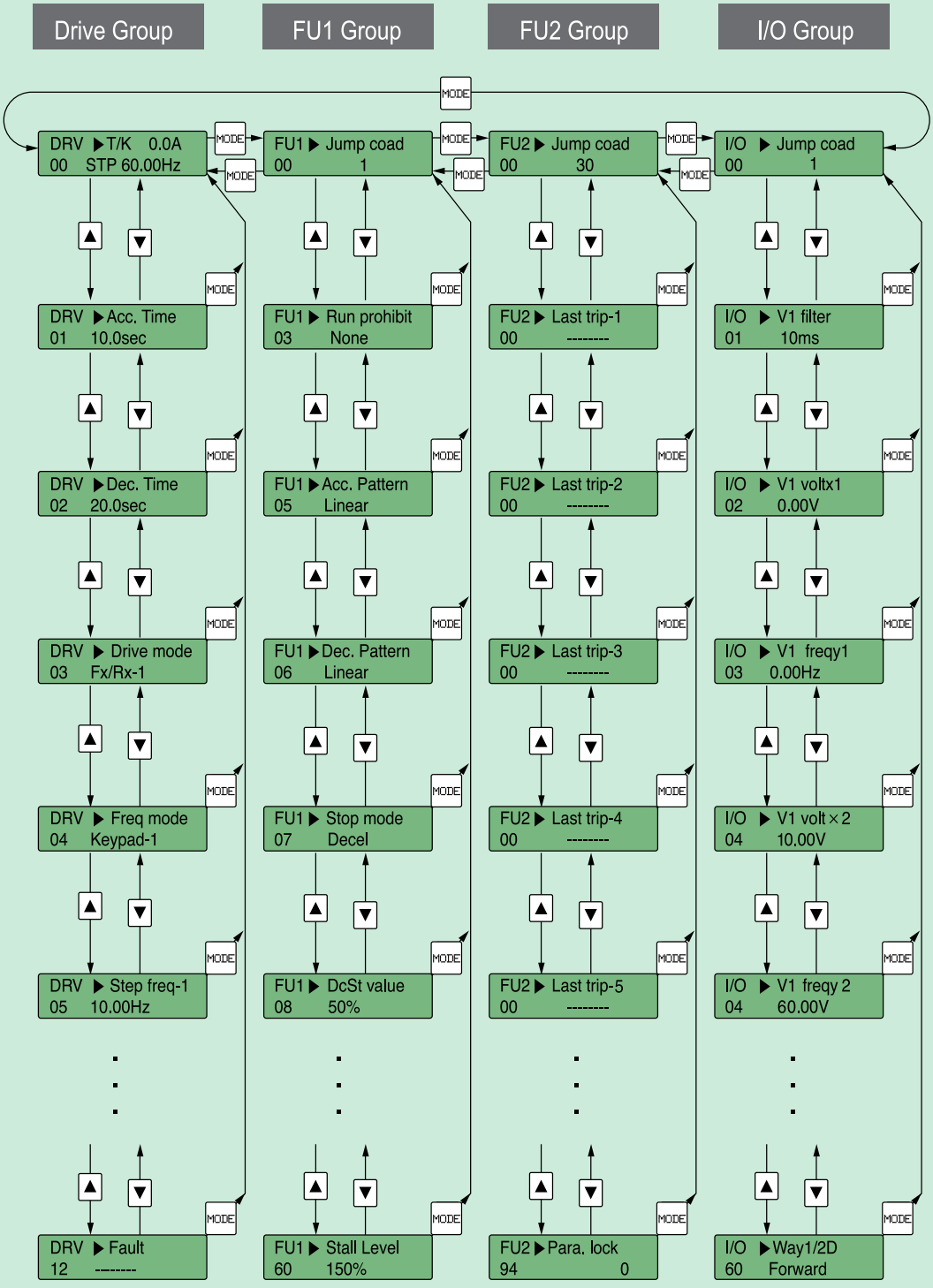
- Shift to function code
- Shift to previous code
- Data is decreased in set up mode

- Stop command
- Available with the loader operation
- LED is turned on when drive stops its operation
- Blinks when fault occurs
- Reset
- Fault reset

marathon™ Drives

Programming Keypad (Parameter Navigation)

Parameter group moves directly to DRV group by pressing [SHIFT] key in any parameter code.



Parameter Description

DRV Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
DRV-00 [1]	9100	Command Frequency (Output Frequency during motor run, Reference Frequency during motor stop), Output Current (LCD)	Cmd. freq	0 to FU1-30[Hz]	0 [Hz]	○
DRV-01	9101	Acceleration Time: 5.5 to 90kW / 110 to 450kW	Acc. Time	0 to 6000 (sec)	20 (sec) / 60 (sec)	○
DRV-02	9102	Deceleration Time: 5.5 to 90kW / 110 - 450kW	Dec. Time	0 to 6000 (sec)	30 (sec) / 90 (sec)	○
DRV-03	9103	Drive Mode (Run/Stop Method)	Drive Mode	0 (Keypad) 1 (Fx/Rx-1) 2 (Fx/Rx-2) 3 (Int. 485)	1 (Fx/Rx-1)	X
DRV-04	9104	Frequency Mode (Frequency setting method)	Freq. Mode	0 (Keypad-1) 1 (Keypad-2) 2 (V1) 3 (V1S) 4 (I) 5 (V1+I) 6 (Pulse) 7 (Int. 485) 8 (Ext. PID)	0 (Keypad-1)	X
DRV-05	9105	Step Frequency 1	Step freq-1	0 to FU1-30 (Hz)	10 (Hz)	○
DRV-06	9106	Step Frequency 2	Step freq-2		20 (Hz)	○
DRV-07	9107	Step Frequency 3	Step freq-3		30 (Hz)	○
DRV-08	9108	Output Current	Current	* (A)	* (A)	*
DRV-09	9109	Motor Speed	Speed	* (rpm)	* (rpm)	*
DRV-10	910A	DC link Voltage	DC link Vtg	* (V)	* (V)	*
DRV-11	910B	User Display Selection	User disp.		Output voltage(V)	*
DRV-12	910C	Current Trip Display	Fault	*	*	*
DRV-14 [2]	910E	Target/Output Frequency Display	Tar. Out. Freq.	* (Hz)	* (Hz)	*
DRV-15 [2]	910F	Reference/Feedback Frequency Display	Ref. Fbk. Freq.	* (Hz)	* (Hz)	*
DRV-16	9110	Speed Unit Selection	Hz/Rpm Disp	Hz or Rpm	Hz	○
DRV-18 [2]	9112	PID Parameter	R T F O	* (Hz)	* (Hz)	X
DRV-19	9113	AD Parameter	V1 V2 V1S I	*	*	X
DRV-20 [3]	9114	EXT-PID Parameter	R T F O	%	%	X
DRV-22	9116	Local/Remote Key	Local/RemKey	1 (Cntl&RefStop) 2 (Control Stop) 3 (Ref Only) 4 (Cntl&Ref Run) 5 (Control Run) 6 (Disable)	Cntl&RefStop	○
DRV-23	9117	Keypad Mode Key	Ref Mode	1 (Minimum Spd) 2 (Last Spd) 3 (Preset Spd 1) 4 (Stop) 5 (Fault) 6 (Disable)	Disable	○
DRV-91 [4]	915B	Drive Mode 2	Drive Mode2	0 (Keypad) 1 (Fx/Rx-1) 2 (Fx//Rx-2)	1 (Fx/Rx-1)	X
DRV-92	915C	Frequency Mode 2	Freq Mode2	0 (Keypad-1) 1 (Keypad-2) 2 (V1) 3 (V1S) 4 (I) 5 (V1+I) 6 (Pulse)	0 (Keypad-1)	X

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

1) The speed unit is changed from [Hz] to [%] when DRV-16 is set to [Rpm]. Only User Unit will be displayed when APP-02 is set to [Yes] and when APP-06 is set to either I, V1 or Pulse and when one of I/O-86~ I/O-88 is set to either [Speed] (Hz or Rpm), [Percent], [Bar], [mBar], [kPa] or [Pa]. **Output Frequency (Hz or Rpm; Unit of outupt speed) is displayed in DRV-00 during the Drive is running. User Unit reference (Unit of PID controller selected) is displayed in DRV-00 during the Drive is not running.** 2) DRV-15, DRV-18 will appear when APP-02 [Process PI Mode] is set to Yes. Also User Unit is displayed when one of I/O-86~ I/O-88 is set to either [Speed](Hz or Rpm), [Percent], [Bar], [mBar], [kPa] or [Pa]. 3) DRV-20 will appear when APP-80 [ExtProcess PI Mode] is set to Yes. 4) DRV-91/92 will appear only when DRV-22 is set to [2nd Source].

Parameter Description

FU1 Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
FU1-00	9200	Jump to Desired Code #	Jump Code	1 to 74 (Use only LCD Keypad)	1	○
FU1-01	9201	Run Prevention	Run Prevent	0 (None) 1 (Fwd prev) 2 (Rev prev)	0 (None)	X
FU1-02	9202	Acceleration Pattern	Acc. Pattern	0 (Linear) 1 (S-curve) 2 (U-curve)	0 (Linear)	X
FU1-03	9203	Deceleration Pattern	Dec. Pattern	0 (Linear) 1 (S-curve) 2 (U-curve)	0 (Linear)	X
FU1-04 [5]	9204	Start Curve for S-Curve Accel/Decel Pattern	Start Curve	0 to 100 (%)	50 (%)	X
FU1-05	9205	End Curve for S-Curve Accel/Decel Pattern	End Curve	0 to 100 (%)	50 (%)	X
FU1-10	920A	Pre-Heat	Pre-Heat Mode	0 (No) 1 (Yes)	0 (No)	X
FU1-11	920B	Pre-Heat Valve	Pre-Heat level	1 to 50 (%)	30 (%)	X
FU1-12	920C	Pre-Heat Duty	Pre-Heat Perc	1 to 100 (%)	50 (%)	X
FU1-20	9214	Start Mode	Start Mode	0 (Accel) 1 (Dc-start) 2 (Flying-start)	0 (Accel)	X
FU1-21 [6]	9215	Starting DC Injection Braking Time	DcSt Time	0 to 60 (sec)	0.1 (sec)	X
FU1-22	9216	Starting DC Injection Braking Value	DcSt Value	o to 150 (%)	50 (%)	X
FU1-23	9217	Stop Mode	Stop Mode	0 (Decel) 1 (Dc-brake) 2 (Free-run) 3 (Flux-brake)	0 (Decel)	X
FU1-24 [7]	9218	DC Injection Braking On-delay Time	DcBlk Time	0.1 to 60 (sec)	0.1 (sec)	X
FU1-25	9219	DC Injection Braking Frequency	DcBrk freq	0.1 to 60 (Hz)	0.1 to 60 (Hz)	X
FU1-26	921A	DC Injecton Braking Time	DcBr time	0 to 60 (sec)	1 (sec)	X
FU1-27	921B	DC Injection Braking Value	DcBr value	o to 200 (%)	50 (%)	X
FU1-28	921C	Safety Stop	Safety Stop	0 (No) 1 (Yes)	0 (No)	X
FU1-29	921D	Power Source Freq	Line Freq	40 to 120 (Hz)	60.00 (Hz)	X
FU1-30	921F	Maximum Frequence	Max Freq	40 to 120 (Hz)	60.00 (Hz)	X
FU1-31	9220	Base Frequency	Base Freq	30 to 120 (Hz)	60.00 (Hz)	X
FU1-32	9220	Starting Frequency	Start Freq	0.01 to 10 (Hz)	0.50 (Hz)	X
FU1-33	9221	Frequency Limit Selection	Freq Limit			
FU1-33	9221	Frequency Limit Selection	Freq Limit	0 (No) 1 (Yes)	0 (No)	X
FU1-34 [8]	9222	Freq Lower Limit	Lim Lo Freq	0 - FU1-35	0.50 (Hz)	○
FU1-35	9223	Freq Upper Limit	Lim Hi Freq FU	1-34 - FU1-30	60.00 (Hz)	X
FU1-40	9228	Volts / Hz - Pattern	V/f Pattern	0 (Linear) 1 (Square) 2 (User V/f)	0 (Linear)	X

Parameter Description

FU1 Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
FU1-41 [9]	9229	User V/f - Frequency 1	User freq 1	0 to FU1-30	15.00 (Hz)	X
FU1-42	922A	User V/f - Voltage 1	User volt 1	0 to 100 (%)	25 (%)	X
FU1-43	922B	User V/f - Frequency 2	User freq 2	0 to FU1-30	30.00 (Hz)	X
FU1-44	922C	User V/f - Voltage 2	User volt 2	0 to 100 (%)	50 (%)	X
FU1-45	922D	User V/f - Frequency 3	User freq 3	0 to FU1-30	45.00 (Hz)	X
FU1-46	922E	User V/f - Voltage 3	User volt 3	0 to 100 (%)	75 (%)	X
FU1-47	922F	User V/f - Frequency 4	User freq 4	0 to FU1-30	60.00 (Hz)	X
FU1-48	9230	User V/f - Voltage 4	User volt 4	0 to 100 (%) 1	00(%)	X
FU1-49	9231	Input voltage adjustment	VAC 380.0V	73 to 115.0 (%)	86.4 (%)	X
FU1-50	9232	Motor Rated Voltage	Motor Volt	0 to 600 (V)	380 (V)	X
FU1-51	9233	Energy Save	Energy save	0 (None) 1 (Manual) 2 (Auto)	0 (None)	X
FU1-52 [10]	9234	Energy Save %	Manual save%			O
FU1-54	9236	Integrating Wattmeter	KiloWattHour	M kWh	*	X
FU1-55	9237	Drive Temperature	Inv. Temp.	0 to 160 (degree)	*	X
FU1-56	9238	Motor Temperature	Motor Temp.	0 to 160 (degree)	*	X
FU1-57	9239	No Motor Selection	No Motor Sel	0 (No) 1 (Yes)	0 (No)	X
FU1-58	923A	Trip Current Level	No Motor Level	5 to 100 (%)	5 (%)	X
FU1-59	923B	Trip Time Setting	No Motor Time	0.5 to 10.0 (sec)	3.0 (sec)	X
FU1-60	923C	Electronic Thermal Selection	ETH select	0 (No) 1 (Yes)	1 (Yes)	O
FU1-61	923D	Electronic Thermal Level for 1 minute	ETH 1min	FU1-62 to 200 (%)	150 (%)	O
FU1-62	923E	Electric Thermal Level for Continuous	ETH Cont	50 to FU1-61 (Maximum 150%)	120 (%)	O
FU1-63	923F	Characteristic Selection (Motor Type)	Motor type	0 (Self-cool) 1 (Forced-cool)	0 (Self-cool)	O
FU1-64	9240	Overload Warning Level	OL level	30 to 110 (%)	110 (%)	O
FU1-65	9241	Overload Warning Time	OL time	0 to 30 (sec)	10 (sec)	O
FU1-66	9242	Overload Trip Selection	OLT select	0 (No) 1 (Yes)	0 (No)	O
FU1-67 [11]	9243	Overload Trip Level	OLT level	30 to 150 (%)	120(%)	O
FU1-68	9244	Overload Trip Delay Time	OLT time	0 to 60 (sec)	60 (sec)	O
FU1-69	9245	Input/Output Phase Loss Protection	Trip select	000 to 111 (Bit Set)	100	O
FU1-70	9246	Stall Prevention Selection	Stall Mode.	No/Yes	No	X
FU1-71	9247	Stall Prevention Level	Stall level	30 to 200 [%]	120(%)	O
FU1-72	9248	Accel/Decel Change Frequency	Acc/Dec ch F	0 to FU1-30	0 (Hz)	X
FU1-73	9249	Reference Frequency for Accel and Decel	Acc/Dec freq	0 (Max freq) 1 (Delta freq)	0 (Max freq)	X
FU1-74	924A	Accel/Decel Time Scale	Time scale	0 (0.01 sec) 1 (0.1 sec) 2 (1 sec)	1 (0.1 sec)	O
FU1-75	924B	Up Down Save Mode	UpDnSaveMode	0 (No) 1 (Yes)	0 (No)	X
FU1-76 [31]	924C	Up Down Save Freq	UpDnSaveFreq	0 to 120(Hz)	0.00Hz	O

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.
9) FU1-41~48 only displayed when FU1-40 is set to 'User V/F'.
10) Only displayed when FU1-51 is set to 'Manual'.
11) Only displayed when FU1-66 is set to 'Yes'.
31) Only displayed when FU1-75 is set to 'Yes'.

Parameter Description

FU2 Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
FU2-00	9300	Jump to desired code #	Jump code	1 to 95 (Use Only LCD Keypad)	40	O
FU2-01	9301	Last trip 1	Last trip-1	By pressing [ENTER]	0 (None)	X
FU2-02	9302	Last trip 2	Last trip-2	and [SEL] key, the	0 (None)	X
FU2-03	9303	Last trip 3	Last trip-3	frequency, current,	0 (None)	X
FU2-04	9304	Last trip 4	Last trip-4	and operational status	0 (None)	X
FU2-05	9305	Last trip 5	Last trip-5	at the time of fault can be seen.	0 (None)	X
FU2-06	9306	Erase trips	Erase trips	0 (No) 1 (Yes)	0 (No)	O
FU2-07	9307	Dwell Frequency	Dwell time	0 to 10 [sec]	0 [sec]	X
FU2-08 12)	9308	Dwell Frequency	Dwell freq	FU1-32 to FU1-30	5.00[Hz]	X
FU2-10	930A	Frequency Jump Selection	Jump Freq	0 (No) 1 (Yes)	0 (No)	O
FU2-11 13)	930B	Jump Frequency 1 Low	jump lo 1	0 to FU2-12	10.00[Hz]	O
FU2-12	930C	Jump Frequency 1 High	jump Hi 1	FU2-11 to FU1-30	15.00[Hz]	O
FU2-13	930D	Jump Frequency 2 Low	jump lo 2	0 to FU2-14	20.00[Hz]	O
FU2-14	930E	Jump Frequency 2 High	jump Hi 2	FU2-13 to FU1-30	25.00[Hz]	O
FU2-15	930F	Jump Frequency 3 Low	jump lo 3	0 to FU2-16	30.00[Hz]	O
FU2-16	9310	Jump Frequency 3 High	jump Hi 3	FU2-15 to FU1-30	35.00[Hz]	O
FU2-20	9314	Power ON Start Selection	Power-on run RST restart	0 (No) 1 (Yes)	0 (No)	O
FU2-21	9315	Restart after Fault Reset	RST restart	0 (No) 1 (Yes)	0 (No)	O
FU2-22	9316	Start After Interrupt Power	IPF Mode Fault Selection	0 (No) 1 (Yes)	0 (No)	X
FU2-23	9317	Speed Search Type Selection	Search Type	Estimated SS Real SS	estmated SS	O
FU2-24	9318	Selection of Auto Retry	Retry Mode	No Yes	No	O
FU2-25	9319	Number of Auto Retry	Retry number	0 to 10	0	O
FU2-26	931A	Delay Time Before Auto Retry	Retry delay	0 to 60 [sec]	1 [sec]	X
FU2-27	931B	Speed Search Current Limit	Flying Perc	30 to 160	70%	X
FU2-40	9328	Rated Motor Selection for drive (0.75~450kW)	Motor select	0 (0.75kW) 1 (1.5kW) 2 (2.2kW) 3 (3.7kW) 4 (5.5kW) 5 (7.5kW) 6 (11.0kW) 7 (15.0kW) 8 (18.5kW) 9 (22.0kW) 10 (30.0kW) 11 (37.0kW) 12 (45.0kW) 13 (55.0kW) 14 (75.0kW) 15 (90.0kW) 16 (110.0kW) 17 (132.0 kW) 18 (160.0 kW) 19 (220.0 kW) 20 (280.0 kW) 21 (315.0 kW) 22 (375.0 kW) 23 (450.0 kW)	* Depending on the drive capacity	X
		* A motor rating same as drive capacity is automatically set. If different, set the correct value.				
FU2-41	9329	Number of Motor Poles	Pole number	2 to 12	4	X
FU2-42	932A	Rated Motor Slip	Rate-Slip	0 to 10 [Hz]	Depending on the motor capacity	X
FU2-43	932B	Rated Motor Current (RMS)	Rated-Curr	1.0 to 999.9 [A]		X

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

12) Only displayed when FU2-07 is set to [1~10 sec].
13) FU2-11 is displayed when FU2-10 is set to [Yes]..
14) FU2-26 is displayed when FU2-25 [Retry number] is set to [1~10].
15) FU2-64 is displayed when FU2-60 is set to [Sensorless].

Parameter Description

FU2 Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
FU2-44	932C	No Load Motor Current(rms)	Noload-Curr	0.1 to 999.9 [A]	Depending on the motor capacity	X
FU2-46	932E	Load Inertia	Inertia rate	0 to 40	10	X
FU2-47	932F	Gain for Motor Speed Display	RPM DisplayGn	1 to 1000 [%]	100 [%]	O
FU2-48	9330	Carrier Frequency	Carrier freq	0.75~22kW 0.7~15[kHz] 30kW 0.7~10[kHz] 37~75kW 0.7~4[kHz] 90~280kW 0.7~3[kHz] 315~450kW 0.7~2[kHz]	5.0 [kHz] 4.0 [kHz] 3.0 [kHz] 2.0 [kHz]	O
FU2-49	9331	PWM Type Selection	PWM Select	0 (0) Normal 1 (1) Low leakage	0 (Normal)	X
FU2-52	9334	Safety Stop Dec. Rate	Dec Rate	1.0 to 100.0 [sec]	100.0 [sec]	
FU2-53	9335	Safety Stop Output Dec. Rate	safety_perc	2 to 500	21	
FU2-60	933C	Control Mode Selection	Control Mode	0 (V/F) 1 (Slip compen) 2 (Sensorless)	0 (V/F)	X
FU2-61	933D	Auto Tuning Selection	Auto Tuning	0 (No) 1 (Static)	0 (No)	X
FU2-62	933E	Stator Resistance of Motor	%Rs	0.01 to 20 [%]	4[%]	X
FU2-63	933F	Leakage Inductance of Motor	%Lsigma	0.01 to 100 [%]	12[%]	X
FU2-64 16)	9340	Pre-excitation Time	PreEx time	0 to 60 [sec]	1 [sec]	X
FU2-67	9343	Manual/Auto Torque Boost Selection	Torque boost	0 (Manual) 1 (Auto)	0 (Manual)	X
FU2-68	9344	Torque Boost in Forward Direction	Fwd boost	0.75~90kW 0 to 15 [%] 110~450kW	2.0 [%] 1.0 [%]	X
FU2-69	9345	Torque Boost in Reverse Direction	Rev boost	0.75~90kW 0 to 15 [%] 110~450kW	2.0 [%] 1.0 [%]	X
FU2-80	9350	Power On display	PowerOn Disp	0 to 12	0	O
FU2-81	9351	User Select	User Disp	Voltage Watt	Voltage	O
FU2-82	9352	Software Version	MD100P S/W Ver	Ver X.X Ver	X.X	*
FU2-83	9353	Last Trip Time	LastTripTime	X:XX:XX:XX:XX:X	*	X
FU2-84	9354	Power On Time	On-time	X:XX:XX:XX:XX:X	*	X
FU2-85	9355	Run-time	Run-time	X:XX:XX:XX:XX:X	*	X
FU2-87	9357	Power Set	Power Set	0.01 to 400 [%]	100	X
FU2-90	935A	Parameter Display	Para. disp	0 Default 1 (All Para) 2 (Diff Para)	0 (Default)	X
FU2-92	935C	Write Parameter	Para. Write	0 (No) 1 (Yes)	0 (No)	X
FU2-92	935C	Write Parameter	Para. Write	0 (No) 1 (Yes)	0 (No)	X
FU2-93	935D	Initialize Parameters	Para. Init	0 (No) 1 (All Groups) 2 (BAS) 3 (DRV) 4 (FU1) 5 (FU2) 6 (I/O) 7 (EXT) 8 (COM) 9 (APP)	0 (No)	X
FU2-94	935E	Parameter Write Protection	Para. Lock	0 to 9999	0	O
FU2-95	935F	Parameter Save	Para. Save	0 (No) 1 (Yes)	No	X

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.
16) FU2-64 is displayed when FU2-60 is set to [Sensorless].
Table 1) Switching frequency and fatory default value for each drive capacity

Drive Capacity	Setting Range	Factory Default
0.75 ~ 22kW	0.7 ~ 15 [kHz]	5.0 [kHz]
30 kW	0.7 ~ 10 [kHz]	
37 ~ 75 kW	0.7 ~ 4 [kHz]	4.0 [kHz]
90 ~ 280 kW	0.7 ~ 3 [kHz]	3.0 [kHz]
315 ~ 450 kW	0.7 ~ 2 [kHz]	2.0 [kHz]

Parameter Description

I/O Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
I/O-00	9400	Jump to Desired Code #	Jump code	1 to 98	1	O
I/O-01 17)	9401	Filtering Time Constant for V1 Signal Input	V1 Filter	0 to 9999 [msec]	10 [msec]	O
I/O-02	9402	V1 Input Minimum Voltage	V1 volt x1	0 to 12[V]	0.00 [V]	O
I/O-03	9403	Frequency Corresponding to V1 Input Minimum Voltage	V1 Freq y1	0 to FU1-30 [Hz] 0 to 100.00 [**] 18)	0.00 [Hz]	O
I/O-04	9404	V1 Input Minimum Voltage	V1 volt x2	0 to 12[V]	10 [V]	O
I/O-05	9405	V1 Input Maximum Voltage	V1 Freq y2	0 to FU1-30 [Hz] 0 to 100.00 [**] 18)	60.00 [Hz]	O
I/O-06	9406	Filtering Time Constant for I Signal Input	I Filter	0 to 9999 [msec]	10 [msec]	O
I/O-07	9407	I Input Minimum Current	I curr x1	0 to 20 [mA]	4 [mA]	O
I/O-08	9408	Frequency Corresponding to I Input Minimum Current	I Freq y1	0 to FU1-30 [Hz] 0 to 100.00 [**] 18)	0.00 [Hz]	O
I/O-09	9409	Filtering Time Constant for I Signal Input	I curr x2	0 to 20 [mA]	20 [mA]	O
I/O-10	940A	Frequency Corresponding to I Input Maximum Current	I Freq y2	0 to FU1-30 [Hz] 0 to 100.00 [**] 18)	60.00 [Hz]	O
I/O-11	940B	Pulse Input Method	P Pulse set	0 (A+B) 1 (A)	1 (A)	O
I/O-12	940C	Pulse Input Filter	P filter	0 to 9999 [msec]	10 [msec]	O
I/O-13	940D	Pulse Input Minimum Frequency	P pulse x1	0 to 10 [kHz]	0 [kHz]	O
I/O-14	940E	Frequency Corresponding to I/O-13 Pulse Input Minimum Frequency	P freq y1	0 to FU1-30 [Hz] 0 to 100.00 [**] 18)	0 [Hz]	O
I/O-15	940F	Pulse Input Maximum Frequency	P pulse x2	0 to 100 [kHz]	10 [kHz]	O
I/O-16	9410	Frequency Corresponding to I/O-15 Pulse Input Maximum Frequency	P freq y2	0 to FU1-30 [Hz] 0 to 100.00 [**] 18)	60.00 [Hz]	O
I/O-17	9411	Criteria for Analog Input Signal Loss	Wire broken	0 (None) 1 (half of x1) 2 (below x1)	0 (None)	O
I/O-18	9412	Operating selection at Loss of Freq. Reference	Lost command	0 (None) 1 (FreeRun) 2 (Stop) 3 (Protection)	0 (None)	O
I/O-19	9413	Waiting Time after Loss of Freq. Reference	Time out	0.1 to 120 [sec]	1.0 [sec]	O
I/O-20	9414	Programmable Digital Input Terminal 'M1' Define	M1 Define	(Speed-L) (Speed-M) (Speed-H) (XCEL-L) (XCEL-M) (XCEL-H) (Dc-brake) (2nd Func) (Exchange) (- Reserved -) (Up) (Down) (Ext Trip)	0 (Speed-L)	O

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

17) When DRV-04 is set to either V1, V1S, I or V1+I or Pulse, only selected item codes are displayed in I/O-1~I/O-19.

18) I/O-3,5,8,10,14,16 is displayed 0~100.00 [**] when App-02 is set to [proc PI mode] or APP-80 is set to [Ext PImode] and APP-06 PID Feedback Signal Selection is set to one of I, VI, Pulse, after then, one of I/O-86 ~I/O-88 is set to percentage, Bar, mBar, kPa, Pa except for Speed. Unit will be changed to selected unit. Only user unit displayed when APP-02 or APP-80 is set to [Yes], after APP-06 is set to one of I, V, Pulse, after then one of I/O-86 ~I/O-88 is set to either speed, percentage, Bar, mBar, kPa, Pa.

Parameter Description

I/O Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
I/O-20	9414	Programmable Digital Input Terminal 'M1' Define	M1 Define	14 (Pre-Heat) 15 (iTerm Clear) 16 (Open-loop) 17 (LOC/REM) 18 (Analog hold) 19 (XCEL stop) 20 (P Gain2) 21 -Reserved- 22 (Interlock1) 23 (Interlock2) 24 (Interlock3) 25 (Interlock4) 26 (Speed_X) 27 (RST) 28 (BX) 29 (JOG) 30 (FX) 31 (RX) 32 (ANA_CHG) 33 (Pre-Excite) 34 (Ext PID Run) 35 (Up/Dn Clr)	0 (Speed-L)	O
I/O-21	9415	Programmable Digital Input Terminal 'M2' Define	M2 define	Same as I/O-20	1 (Speed-M)	O
I/O-22	9416	Programmable Digital Input Terminal 'M3' Define	M3 define	Same as I/O-20	2 (Speed-H)	O
I/O-23	9417	Programmable Digital Input Terminal 'M4' Define	M4 define	Same as I/O-20	27 (RST)	O
I/O-24	9418	Programmable Digital Input Terminal 'M5' Define	M5 define	Same as I/O-20	12 (Stop/3-wire)	O
I/O-25	9418	Programmable Digital Input Terminal 'M6' Define	M6 define	Same as I/O-20	29 (JOG)	O
I/O-26	941A	Programmable Digital Input Terminal 'M7' Define	M7 define	Same as I/O-20	30 (FX)	O
I/O-27	941B	Programmable Digital Input Terminal 'M8' Define	M8 define	Same as I/O-20	31 (RX)	O
I/O-28	941C	Terminal Input Status	In status	00000000000/11111111111	00000000000	*
I/O-29	941D	Filtering Time Constant for Programmable Digital Input Terminals	Ti Filt Num	2 to 1000 [msec]	15	O
I/O-30 [19]	941E	Jog Frequency Setting	Jog Freq	0 to FU1-30	10 [Hz]	O
I/O-31	941F	Step Frequency 4	Step Freq-4		40 [Hz]	O
I/O-32	9420	Step Frequency 5	Step Freq-5		50 [Hz]	O
I/O-33	9421	Step Frequency 6	Step Freq -6		40 [Hz]	O
I/O-34	9422	Step Frequency 7	Step Freq-7		30 [Hz]	O
I/O-35	9423	Step Frequency 8	Step Freq -8		20 [Hz]	O
I/O-36	9424	Step Frequency 9	Step Freq -9		10 [Hz]	O
I/O-37	9425	Step Frequency 10	Step Freq -10		20 [Hz]	O
I/O-38	9426	Step Frequency 11	Step Freq -11		30 [Hz]	O

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

19) I/O-30 ~ I/O-34 displayed only when one of I/O-20 ~ I/O-27 is set to either JOG, Speed_L, Speed_M, Speed_H. I/O-35 ~ I/O-42 displayed only when one of I/O-20 ~ I/O-27 is set to Speed_X.



Parameter Description

I/O Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
I/O-39	9427	Step Frequency 12	Step Freq-12	0 to FU1-30	40 [Hz]	O
I/O-40	9428	Step Frequency 13	Step Freq-13		50 [Hz]	O
I/O-41	9429	Step Frequency 14	Step Freq-14		40 [Hz]	O
I/O-42	942A	Step Frequency 15	Step Freq-15		30 [Hz]	O
I/O-50	9432	Acceleration Time 1 (for Step speed)	Acc time-1	0 to 6000 [sec]	20 [sec]	O
I/O-51	9433	Deceleration Time 1 (for Step speed)	Dec time-1	0 to 6000 [sec]	20 [sec]	O
I/O-52 [20]	9434	Acceleration Time 1 (for Step speed)	Acc time-2	0 to 6000 [sec]	30 [sec]	O
I/O-53	9435	Deceleration Time 2	Dec time-2	0 to 6000 [sec]	30 [sec]	O
I/O-54	9436	Acceleration Time 3	Acc time-3	0 to 6000 [sec]	40 [sec]	O
I/O-55	9437	Deceleration Time 3	Dec time-3	0 to 6000 [sec]	40 [sec]	O
I/O-56	9438	Acceleration Time 4	Acc time-4	0 to 6000 [sec]	50 [sec]	O
I/O-57	9439	Deceleration Time 4	Dec time-4	0 to 6000 [sec]	50 [sec]	O
I/O-58	943A	Acceleration Time 5	Acc time-5	0 to 6000 [sec]	40 [sec]	O
I/O-59	943B	Deceleration Time 5	Dec time-5	0 to 6000 [sec]	40 [sec]	O
I/O-60	943C	Acceleration Time 6	Acc time-6	0 to 6000 [sec]	30 [sec]	O
I/O-61	943D	Deceleration Time 6	Dec time-6	0 to 6000 [sec]	30 [sec]	O
I/O-62	943E	Acceleration Time 7	Acc time-7	0 to 6000 [sec]	20 [sec]	O
I/O-63	943F	Deceleration Time 7	Dec time-7	0 to 6000 [sec]	20 [sec]	O
I/O-70	9446	S0 Output Selection	S0 mode	0 (Frequency) 1 (Current) 2 (Voltage) 3 (DC link Vtg) 4 (Ext PID Out)	0 (Frequency)	O
I/O-71	9447	S0 Output Adjustment	S0 adjust	10 to 200 [%]	100 [%]	O
I/O-72	9448	S1 Output Selection	S1 mode	Same as I/O-70	2 (Voltage)	O
I/O-73	9449	S1 Output Adjustment	S1 adjust	10 to 200 [%]	100 [%]	O
I/O-74	944A	Frequency Detection Level	FDT freq	0 to FU1-30 [Hz]	30.00 [Hz]	O
I/O-75	944B	Frequency Detection Bandwidth	FDT band	0 to FU1-30 [Hz]	10.00 [Hz]	O
I/O-76	944C	Programmable Digital Output Terminal Define (Aux terminal)	Aux Mode1	0 (NONE) 1 (FDT-1) 2 (FDT-2) 3 (FDT-3) 4 (FDT-4) 5 (FDT-5) 6 (OL) 7 (IOL) 8 (Stall) 9 (OV) 10 (LV) 11 (OH) 12 (Lost Command) 13 (Run) 14 (Stop) 15 (Steady)	0 (Frequency)	O

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

19) I/O-30 ~ I/O-34 displayed only when one of I/O-20 ~ I/O-27 is set to either JOG, Speed_L, Speed_M, Speed_H. I/O-35 ~ I/O-42 displayed only when one of I/O-20 ~ I/O-27 is set to Speed_X.

Parameter Description

I/O Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
I/O-76	944C	Output Terminal Define	Aux Mode1	16 (INV line) 17 (COMM line) 18 (SpeedSearch) 19 (Ready) 20 (MMC) 21 (CriticalTrip)	0 (NONE)	O
I/O-77	944D	Programmable Digital Output Terminal Define	Aux mode2	Same as I/O-76	0 (NONE)	O
I/O-78	944E	Programmable Digital Output Terminal Define	Aux mode3	Same as I/O-76	0 (NONE)	O
I/O-79	944F	Programmable Digital Output Terminal Define	Aux mode4	Same as I/O-76	0 (NONE)	O
I/O-80	9450	Fault Output Relay Setting (3A, 3B, 3C)	Relay mode	000 to 111 [bit]	010 [bit]	O
I/O-81	9451	Terminal Output Status	Out status	00000000/11111111	00000000	*
I/O-82	9452	Waiting Time after Fault Output Relay On	Relay On	0 to 9999	0	X
I/O-83	9453	Waiting Time after Fault Output Relay Off	Relay Off	0 to 9999	0	X
I/O-84	9454	Fan Con Sel (37 ~ 90kW)	Fan Con. Sel	0 (Power On Fan) 1 (Run Fan) 2 (Temper-Fan)	0 (Power On Fan)	X
I/O-85	9455	Fan Temp (37 ~ 90kW)	Fan Temp	0 to 70 [°C]	70 [°C]	O
I/O-86	9456	Input User Unit Selection	Unit Sel	0 (Percent) 1 (Bar) 2 (mBar) 3 (kPa) 4 (PSI) 5 (Pa)	0 (Percent)	X
I/O-87	9457	Unit Maximum Selection	Unit Max Val	1.0 to 999.9[%]	100[%]	X
I/O-90	945A	Drive Number	Inv No.	1 to 250	1	O
I/O-91 [22]	945B	Baud Rate Selection	Baud rate	0 (1200 bps) 1 (2400 bps) 2 (4800 bps) 3 (9600 bps) 4 (19200 bps) 5 (38400 bps)	3 (9600 bps)	O
I/O-92 [23]	945C	Operating Method at Loss of Freq. Reference	COM Lost Cmd	0 (None) 1 (FreeRun) 2 (Stop)	0 (None)	O
I/O-93	945D	Waiting Time after Loss of Freq. Reference	COM Time Out	0.1 to 120 [sec]	1.0 [sec]	O
I/O-94	945E	Communication Response Delay time	Delay Time	2 to 1000 [msec]	5 [msec]	O
I/O-95	945F	A or B contact	In No/Nc Set	00000000000/11111111111	00000000000	X
I/O-96	9460	Input time	In CheckTime	1 to 1000	1 [msec]	X
I/O-97	9461	Overheat Trip Selection	OH Trip Sel	000 to 111 [bit]	010 [bit]	X
I/O-98	9462	Motor Overheat Trip Temperature	MO Trip Temp	0 to 255 [°C]	110 [°C]	X

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.
22) 38400 bps can be set only when the external communication option card is installed.
23) Only I/O-92 ~ I/O-93 displayed when DRV-03/04 is set to [int485].

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Parameter Description

APP Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
APP-00	9700	Jump to Desired Code #	Jump code	1 to 80	1	O
APP-01	9701	Application Mode Selection	App mode	0 (None) 1 (MMC)	0 (None)	X
APP-02	9702	PID Operation Selection	Proc PI mode	0 (No) 1 (Yes)	0 (No)	X
APP-03 [25]	9703	PID F Gain Selection	PID F-Gain	0 to 999.9[%]	0.0 [%]	O
APP-04 [26]	9704	PID Auxiliary Reference Mode Selection	Aux Ref Enbl	0 (No) 1 (Yes)	0 (No)	X
APP-05 [27]	9705	PID Auxiliary Reference Signal Selection	Aux Ref Sel	0 (Keypad-1) 1 (Keypad-2) 2 (V1) 3 (V1S) 4 (I) 5 (V1+I) 6 (Pulse) 7 (Int. 485) 8 (Ext. PID)	2 (V1)	X
APP-06	9706	PID Feedback Signal Selection	PID F/B	0 (I) 1 (V1) 2 (Pulse)	0 (I)	X
APP-07	9707	Meter I Maximum Value	Meter I Max	0 to 20.00 mA	20.00 mA	O
APP-08	9708	Meter V Maximum Value	Meter V Max	0 to 12.00 V	10.00V	O
APP-09	9709	Meter P Maximum Value	Meter P Max	0 to 100.0kHz	100.0kHz	O
APP-11	970B	P Gain for PID Control	PID P Gain	0 to 999.9 [%]	1.0 [%]	O
APP-12	970C	I Time for PID Control	PID I Time	0 to 32.0 [sec]	10.0 [sec]	O
APP-13	970D	D Time for PID Control	PID D Time	0 to 100 [msec]	0.0 [msec]	O
APP-14	970E	High Limit Frequency for PID Control	PID Hi Limit	0.00 to FN1-30	60 .00[Hz]	O
APP-15	970F	Low Limit Frequency for PID Control	PID LowLimit	FN1-32 to APP-10	0.5 [Hz]	O
APP-16	9710	PID Output Gain	PID OutScale	0.0 to 999.9 [%]	100.0 [%]	X
APP-17	9711	PID P2 Gain	PID P2 Gain	0.0 to 999.9 [%]	100.0 [%]	X
APP-18	9712	P Gain Scale	P Gain Scale	0.0 to 100.0 [%]	100.0 [%]	X
APP-19	9713	PID Output Inverse	PID OutInv.	0 (No) 1 (Yes)	0 (No)	X
APP-20	9714	PID U Curve Feedback Select	PID U Fbk	0 (No) 1 (Yes)	0 (No)	X
APP-23	9717	PrePID Reference Frequency	PrePID Freq	0 to FU1-30	0	O
APP-24	9718	PrePID Exit Level	PrePID Exit	0 to 100.0%	0	O
APP-25	9719	PrePID Stop delay	PrePID Dly	0 to 9999	600	O
APP-26	971A	Pipe Broken	Pipe Broken	0 (No) 1 (Yes)	0 (No)	X
APP-27	971B	Sleep Delay Time	Sleep Delay	0.0 to 9999 [sec]	60.0 [sec]	O
APP-28	971C	Sleep Frequency	Sleep Freq	0 to FU1-30 [Hz]	0.00 [Hz]	O
APP-29	971D	Wake-Up Level	WakeUp level	0.0 to 100.0 [%]	2 .0[%]	O
APP-30 [28]	971E	2nd Acceleration Time	2nd Acc Time	0 to 6000 [sec]	5 [sec]	O
APP-31	971F	2nd Deceleration Time	2nd Dec Time	0 to 6000 [sec]	10 [sec]	O
APP-32	9720	2nd Base Frequency	2nd BaseFreq	30 to FN1-30 [Hz]	60 [Hz]	X
APP-33	9721	2nd V/F Pattern	2nd V/F	0 (Linear) 1 (Square) 2 (User V/F)	0 (Linear)	X
APP-34	9722	2nd Forward Torque Boost	2nd F-Boost	0.0 to 15.0 [%]	2.0 [%]	X
APP-35	9723	2nd Reverse Torque Boost	2nd R-Boost	0.0 to 15.0 [%]	2.0 [%]	X
APP-36	9724	2nd Stall Prevention Level	2nd Stall	30 to 150 [%]	100 [%]	X
APP-37	9725	2nd Electronic Thermal Level for 1 Minute	2nd ETH 1min	FU2-28 to 200 [%]	130[%]	O

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

25) Only APP-03 ~ APP-17 displayed when APP-02 is set to [Yes]. Only APP-03 ~ APP-17 and APP-63 ~ APP-65 displayed when APP-2 is set to [Yes].

26) If APP-04 Aux Ref Mode is no set, DRV-04 setting will be reference of process PID. And APP -05 setting will be ignored

27) If APP-04 is set, APP-04 will appear. And APP -05 setting value will be reference of process PID, DRV-04 setting will be ignored.

28) Only APP-20 ~ APP-29 displayed only when one of I/O-20 ~ I/O-27 is set to either □□2nd Func□□.

Parameter Description

APP Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
APP-38	9726	2nd Electronic Thermal Level for Continuous	2nd ETH Cont	50 to FU2-27 (Max 150%)	120[%]	O
APP-39	9727	2nd Rated Motor Current	2nd R-Curr	1 to 200 [A]	3.6[A]	X
APP-40 29)	9728	Number of Auxiliary Motor Run Display	Aux Mot Run	*	*	*
APP-41	9729	Aux. Motor Start Selection	Starting Aux	1 to 4	1	O
APP-42	972A	Operation Time Display on Auto Change	Auto Op Time	*	*	*
APP-43	972B	The Number of Aux Motor	Nbr Aux`s	0 to 7	4	O
APP-44	972C	Aux. Motor Stop Sequence	F-in L-Out	0 (No) 1 (Yes)	1 (Yes)	X
APP-45	972D	How to stop Aux. Motor	ALL Stop	0 (No) 1 (Yes)	1 (Yes)	X
APP-47	972F	Start Frequency of Aux. Motor 1	Start freq 1	0 to FU1-30	49.99 [Hz]	O
APP-48	9730	Start Frequency of Aux. Motor 2	Start freq 2	0 to FU1-30	49.99 [Hz]	O
APP-49	9731	Start Frequency of Aux. Motor 3	Start freq 3	0 to FU1-30	49.99 [Hz]	O
APP-50	9732	Start Frequency of Aux. Motor 4	Start freq 4	0 to FU1-30	49.99 [Hz]	O
APP-51	9733	Stop Frequency of Aux. Motor 1	Stop freq 1	0 to FU1-30	20.00 [Hz]	O
APP-52	9734	Stop Frequency of Aux. Motor 2	Stop freq 2	0 to FU1-30	20.00 [Hz]	O
APP-53	9735	Stop Frequency of Aux. Motor 3	Stop freq 3	0 to FU1-30	20.00 [Hz]	O
APP-54	9736	Stop Frequency of Aux. Motor 4	Stop freq 4	0 to FU1-30	20.00 [Hz]	O
APP-58	973A	Delay Time before Operating Aux Motor	Aux start DT	0.0 to 999.9 [sec]	5.0 [sec]	O
APP-59	973B	Delay Time before Stopping Aux Motor	Aux stop DT	0.0 to 999.9 [sec]	5.0 [sec]	O
APP-60	973C	Accel Time when the Number of Pump Decreases	Pid AccTime	0 to 600.0 [sec]	2.0 [sec]	O
APP-61	973D	Decel Time when the Number of Pump Increases	Pid DecTime	0 to 600.0 [sec]	2.0 [sec]	O
APP-62	973E	PID Bypass Selection	Regul Bypass	0 (No) 1 (Yes)	0 (No)	X
APP-66	9742	Auto Change Mode Selection	AutoCh_Mode	0 (EXCH_NONE), 1 (AUX_EXCH), 2 (MAIN_ EXCH)	0(EXCH_NONE)	O
APP-67	9743	Auto Change Time	AutoEx-intv	00:00 to 99:00	72:00	O
APP-68	9744	Auto Change Freq	AutoEx-Freq	FN1-32 to FN1-30[Hz]	20.0 [Hz]	O
APP-69	9745	Inter-Lock Selection	Inter-lock	0 (No)	0 (No)	O
APP-71	9747	Pressure difference for Aux motor Start	Aux Stt Diff	0 to 100%	2[%]	O
APP-72	9748	Pressure difference for Aux motor Stop	Aux Stp Diff	0 to 100%	2[%]	O
APP-80	9750	Ext PID Operation Selection	Ext PI Mode	0 (No) 1 (Yes)	0 (No)	X
APP-81 30)	9751	Ext PID Reference Signal Selection	ExtPI RefSel	0 (I) 1 (V1) 2 (Pulse) 3 (Keypad)	3(Keypad)	X
APP-82	9752	Ext PID Reference Level	Ext PI Ref %	0 to 100.00 [%]	50.00 [%]	X
APP-83	9753	Ext PID Feedback Signal Selection	ExtPI FbkSel	0 (I) 1 (V1) 2 (Pulse)	0 (I)	X
APP-85	9755	P Gain for ExtPID	ExtPID Pgain	0 to 999.9 [%]	1.0 [%]	X
APP-86	9756	I Time for ExtPID	ExtPID Itime	0 to 32.0 [sec]	10.0 [sec]	X
APP-87	9757	D Time for ExtPID	ExtPID Dtime	0 to 2000 [msec]	0 [msec]	X
APP-88	9758	High Limit Frequency for ExtPID Control	ExtPID Lmt-H	0 to 100.00 [%]	100.00 [%]	X
APP-89	9759	Low Limit Frequency for ExtPID Control	ExtPID Lmt-L	0 to 30.00 [%]	0 [%]	X
APP-90	975A	ExtPID Output Scale	ExtPID Scale	0 to 999.9	100.0 [%]	X
APP-91	975B	ExtPID P2 Gain	ExtPI P2Gain	0 to 999.9	100.0 [%]	X
APP-92	975C	ExtPID P Gain Scale	ExtPI PScale	0 to 100.0	100.0 [%]	X
APP-93	975D	ExtPID F Gain	ExtPID F-gain	0 to 999.9 [%]	0.0 [%]	O
APP-95	975F	ExtPID Output Inverse	ExtPI OutInv	0 (No) 1 (Yes)	0 (No)	X
APP-97	9761	ExtPID Loop Time	ExtPI LoopTm	50 to 200 [msec]	100 [msec]	X

The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.
29) Only APP-40 ~ APP-71 displayed when APP-01 is set to [MMC].
30) Only APP-81 ~ APP-97 displayed when APP-80 Ext PI mode is set to [Yes].

Parameter Description

EXT Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
EXT-00	9500	Jump to Desired Code #	Jump code	1 to 45	1	O
EXT-01	9501	Type of SUB Board	Sub B/D	Sub-E Frequency Current	*	*
EXT-40	9528	Current Output Terminal 1(CO1) Selection	AM1 mode	Voltage DC link Vtg Ext PID Out	Frequency	O
EXT-41	9529	Adjust Gain of Current Output Terminal 1(CO1)	AM1 adjust	10-200 [%]	100 [%]	O
EXT-42	952A	Adjust Offset of Current Output Terminal 1(CO1)	AM1 Offset	0-100 [%] Frequency Current	0 [%]	O
EXT-43	952B	Current Output Terminal 2(CO2) Selection	AM2 mode	Voltage DC link Vtg Ext PID Out	DC link Vtg	O
EXT-44	952C	Adjust Gain of Current Output Terminal 2(CO2)	AM2 adjust	10-200 [%]	100 [%]	O
EXT-45	952D	Adjust Offset of Current Output Terminal 2(CO2)	AM2 Offset	0-100 [%]	0 [%]	O

* Only the above EXT group displayed when the corresponding option board is installed.
* Refer to the SUB board option manual for details.

COM Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
COM-00	9600	Jump to Desired Code #	Jump code	1 to 60	1	O
COM-01	9601	Type of SUB Board	Opt B/D	RS485 DeviceNet Profibus BACnet LonWork	*	*
COM-02	9602	Option Mode	Opt mode	None Command Freq Cmd + Freq	None	X
COM-03	9603	Option Version	Opt Version	Ver X.X	Ver X.X	*
COM-13	960D	Device Net Input Instance	In Instance	70 71 110 111	70	X
COM-17	9611	PLC Station ID	Station ID	0 to 63	1	O
COM-20	9614	Profi MAC ID	Profi MAC ID	1 to 127	1	O
COM-30	961E	Output Num	Output Num	0 to 8	3	O
COM-31	961F	Output 1	Output 1	0000-FFFF (HEX)	000A(HEX)	O
COM-32	9620	Output 2	Output 2	0000-FFFF (HEX)	000E(HEX)	O
COM-33	9621	Output 3	Output 3	0000-FFFF (HEX)	000E(HEX)	O
COM-34	9622	Output 4	Output 4	0000-FFFF (HEX)	000E(HEX)	O
COM-35	9623	Output 5	Output 5	0000-FFFF (HEX)	000E(HEX)	O
COM-36	9624	Output 6	Output 6	0000-FFFF (HEX)	000E(HEX)	O
COM-37	9625	Output 7	Output 7	0000-FFFF (HEX)	000E(HEX)	O
COM-38	9626	Output 8	Output 8	0000-FFFF (HEX)	000E(HEX)	O
COM-40	9628	Input Num	Input Num	0 - 8	2	O
COM-41	9629	Input 1	Input 1	0000-FFFF (HEX)	000E(HEX)	O
COM-42	962A	Input 2	Input 2	0000-FFFF (HEX)	000E(HEX)	O
COM-43	962B	Input 3	Input 3	0000-FFFF (HEX)	000E(HEX)	O
COM-44	962C	Input 4	Input 4	0000-FFFF (HEX)	000E(HEX)	O
COM-45	962D	Input 6	Input 6	0000-FFFF (HEX)	000E(HEX)	O
COM-47	962F	Input 7	Input 7	0000-FFFF (HEX)	000E(HEX)	O
COM-48	9630	Input 8	Input 8	0000-FFFF (HEX)	000E(HEX)	O

Parameter Description

COM Group

CODE	Comm. Addr	Description	LCD Keypad Display	Setting Range	Factory Default	Adj. During Run
COM-60	963C	Parity/Stop	Parity/Stop 8	None/1Stop 8None/2Stop 8Even/1Stop 8Odd/1Stop	8None/1Stop	O
COM-61	963D	Opt Para-1	Opt Para-1	0 to FFFF	0	O
COM-62	963E	Opt Para-2	Opt Para-2	0 to FFFF	0	O
COM-63	963F	Opt Para-3	Opt Para-3	0 to FFFF	0	O
COM-64	9640	Opt Para-4	Opt Para-4	0 to FFFF	0	O
COM-65	9641	Opt Para-5	Opt Para-5	0 to FFFF	0	O
COM-66	9742	Opt Para-6	Opt Para-6	0 to FFFF	0	O
COM-67	9743	Comm UpDate	Comm UpDate	(No) (Yes)	0 (No)	X

* Only the above COM group displayed when the corresponding option board is installed.
* COM-61~66 parameter is used to LonWorks and BACnet communication.

Trial Run

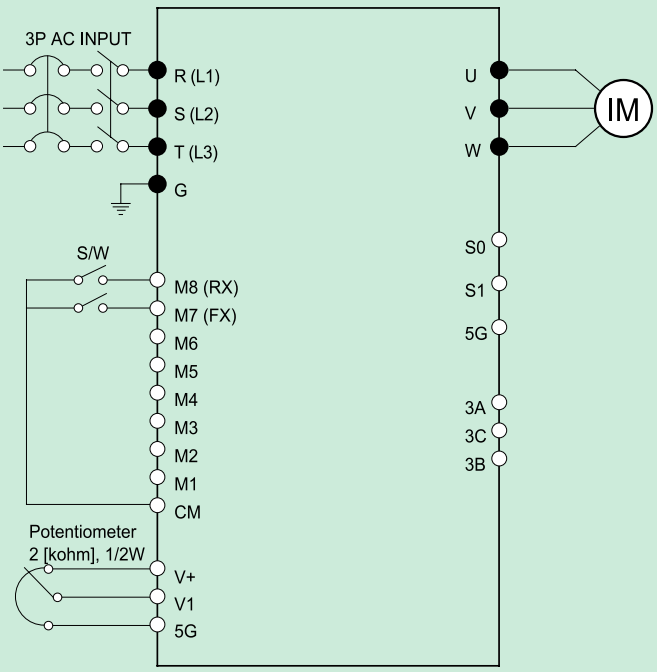
Operation example (1)

V/F Control + Analog Voltage Input (V1) + Operation via Terminal (FX/RX)

Operation condition

- Control mode: V/F control
- Frequency command: 50 [Hz] analog input via V1 terminal
- Accel/Decel time: Accel -15 [sec], Decel -25 [sec]
- Drive mode: Run/Stop via FX/RX terminal, Control terminal: NPN mode

Wiring



Step	Parameter setting	Code	Description
1	Control Mode Selection	FU2-60	Set it to 0 (V/f).
2	Drive Mode	DRV-3	Set it to Fx/Rx-1.
3	Frequency Mode	DRV-4	Set V1 Analog input value in frequency mode.
4	50 [Hz] Freq Command Setting	DRV-0	Set freq command 50 [Hz] via V1 (Potentiometer).
5	Accel/Decel Time	DRV-1 DRV-2	Set Accel time to 15 [sec] in DRV-2. Set Decel time to 25 [sec] in DRV-3.
6	Terminal FX	I/O-26	Motor starts to rotate in forward direction at 50Hz with Accel time 15 [sec] when FX terminal is turned ON. Motor decelerates to stop with Decel time 25 [sec] when FX terminal is turned OFF.
7	Terminal RX	I/O-27	When RX terminal is turned ON motor starts to rotate in Reverse direction at 50 [Hz] with Accel time 15 [sec]. When it is OFF, motor decelerates to stop with Decel time 25 [sec].

Trial Run

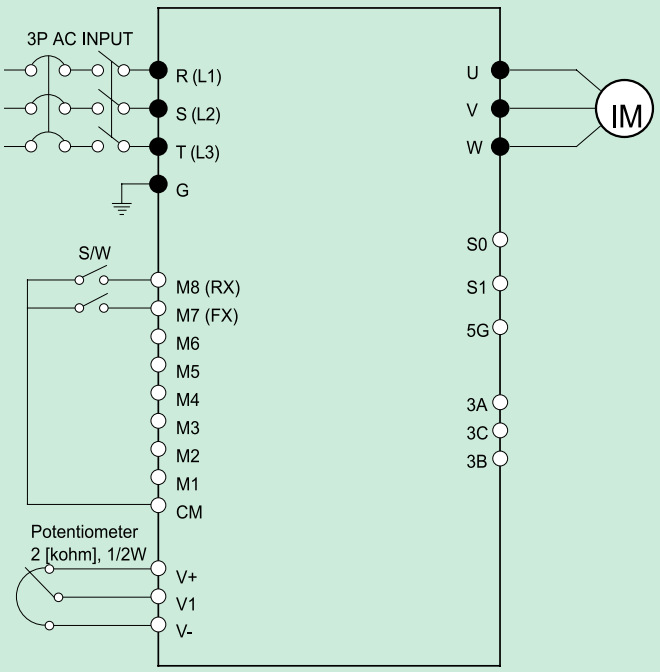
Operation example (2)

V/F Control + Analog input (V1S) + Operation via terminal FX/RX

Operation condition

- Control mode: V/F control
- Frequency command: Setting 50 [Hz] via Analog input (V1S)
- Accel/Decel time: Accel time 15 [sec], Decel time 25 [sec]
- Drive mode: Run/Stop via FX/RX, Control terminal: NPN mode

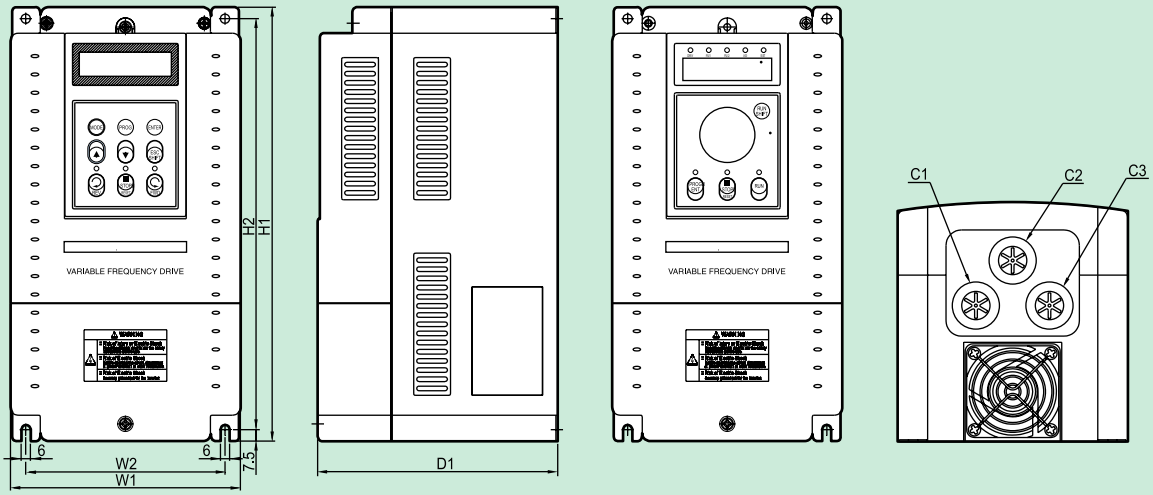
Wiring



Step	Parameter setting	Code	Description
1	Control Mode Selection	FU2-60	Set it to 0 (V/f).
2	Drive Mode	DRV-3	Set it to 1 (Fx/Rx-1).
3	Frequency Mode	DRV-4	Set it to 3 (V1S).
4	Operating Frequency Command 50 [Hz] Setting	DRV-0	Set 50 [Hz] via potentiometer (V1S).
5	Accel/Decel Time Setting	DRV-1 DRV-2	Set accel time to 15 [sec] in DRV-1 with decal time to 25 [sec] in DRV-2.
6	FX Terminal (M7)	IO-26	When FX terminal is turned ON, motor rotating in forward direction starts running at 50 [Hz] for 15 [sec]. When FX terminal is turned OFF, motor decelerates to stop for 25 [sec].
7	RX Terminal (M8)	IO-27	When RX terminal is turned ON, motor rotating in reverse direction starts running at 50 [Hz] for 15 [sec]. When RX terminal is turned OFF, motor decelerates to stop for 25 [sec].

marathon™ Drives

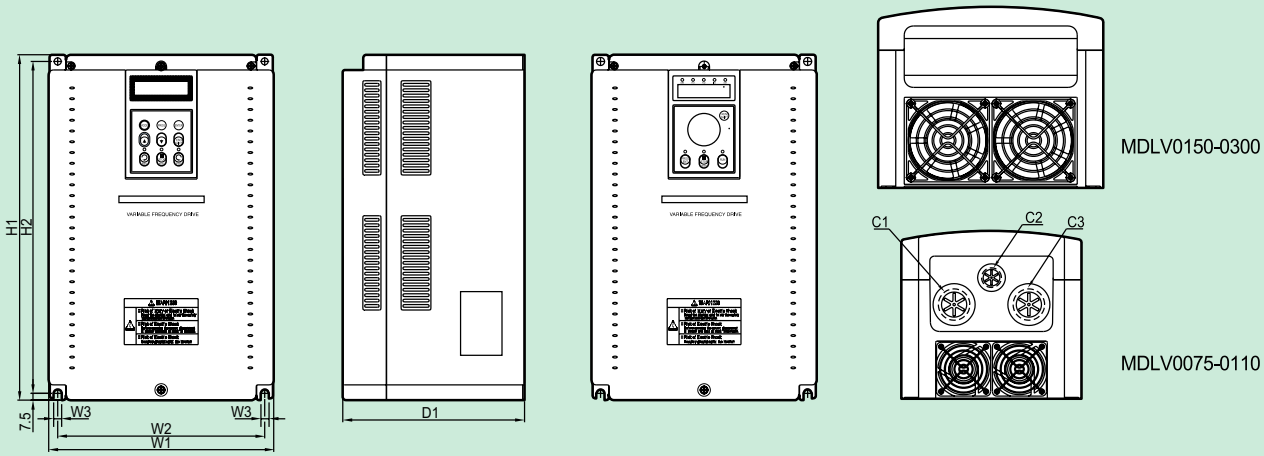
MDLV0055100P-4 Dimensions



Unit: mm

Part Number	W1	W2	H1	H2	D1	C1	C2	C3	Enclosure Type
MDLV0055100P-4	150	130	284	269	156.5	24	24	24	IP20 UL Type 1

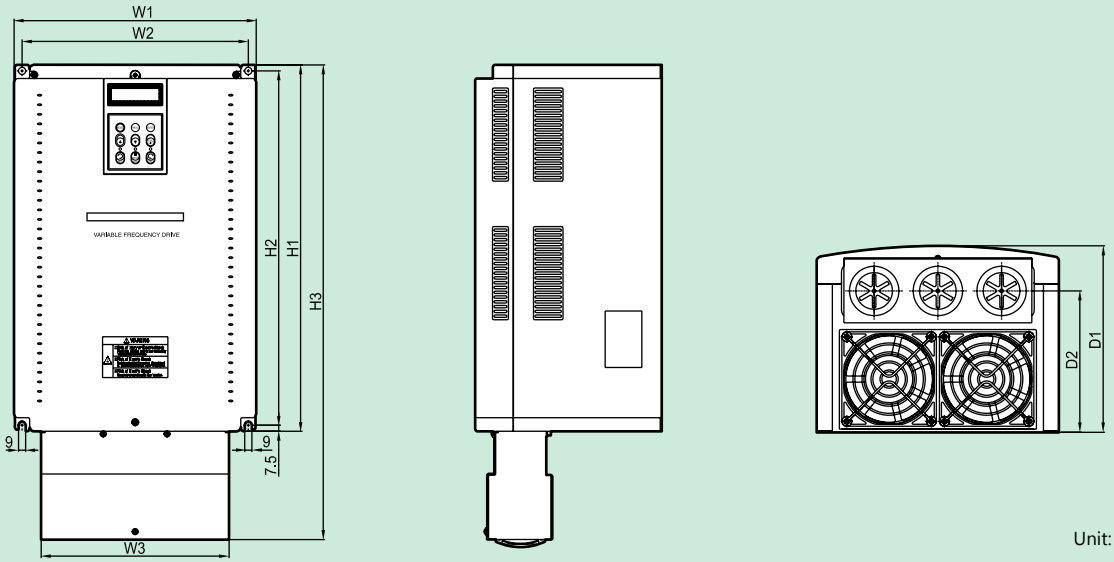
MDLV0075100P to MDLV0300100P-4 Dimensions



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	C1	C2	C3	Enclosure Type
MDLV0075100P-4	200	180	6	284	269	182	35	24	35	IP20 UL Type 1
MDLV0110100P-4	200	180	6	284	269	182	35	24	35	IP20 UL Type 1
MDLV0150100P-4	250	230	9	385	370	201	-	-	-	IP00 UL Open
MDLV0185100P-4	250	230	9	385	370	201	-	-	-	IP00 UL Open
MDLV0220100P-4	304	284	9	460	445	234	-	-	-	IP00 UL Open
MDLV0300100P-4	304	284	9	460	445	234	-	-	-	IP00 UL Open

MDLV0150100P to MDLV0300100P-4 (UL Type 1 or UL Open Type with Conduit Option) Dimensions

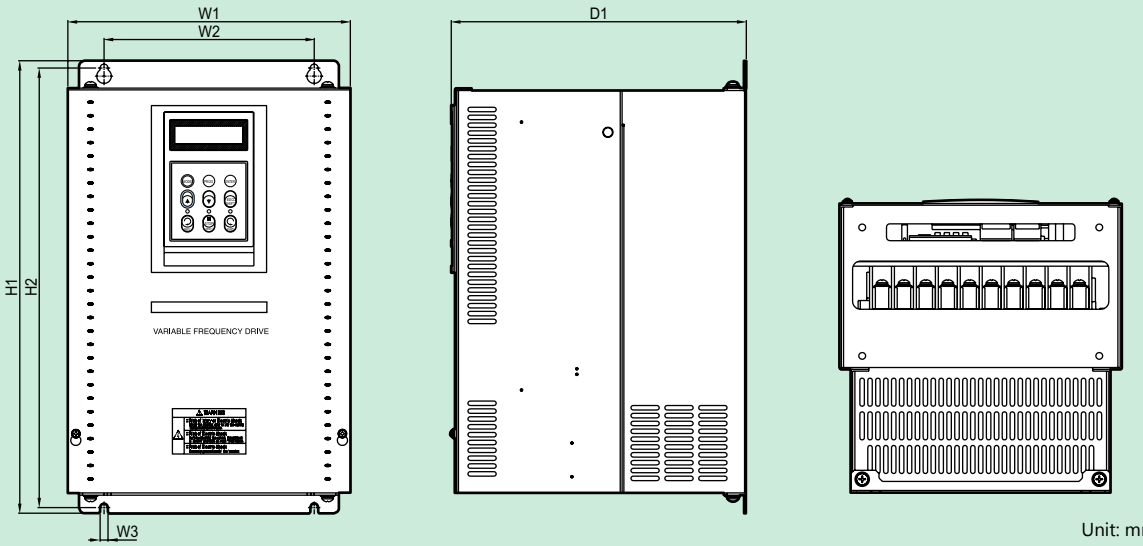


Unit: mm

Part Number	W1	W2	H1	H2	H3	D1	D2	C3	Enclosure Type
MDLV0150100P-4	250	230	200.8	385	370	454.2	201	146	IP20 UL Type 1
MDLV0185100P-4	250	230	200.8	385	370	454.2	201	146	IP20 UL Type 1
MDLV0220100P-4	304	284	236	460	445	599.2	234	177.5	IP20 UL Type 1
MDLV0300100P-4	304	284	236	460	445	599.2	234	177.5	IP20 UL Type 1

Note: Mounting NEMA 1 conduit option to the 15~90kW Open Type meets NEMA 1 but does not comply with UL Enclosed Type 1. To that end, please purchase UL Type 1 product.

MDLV0150100P to MDLV0300100P-4 (Built-in DCL Type) Dimensions

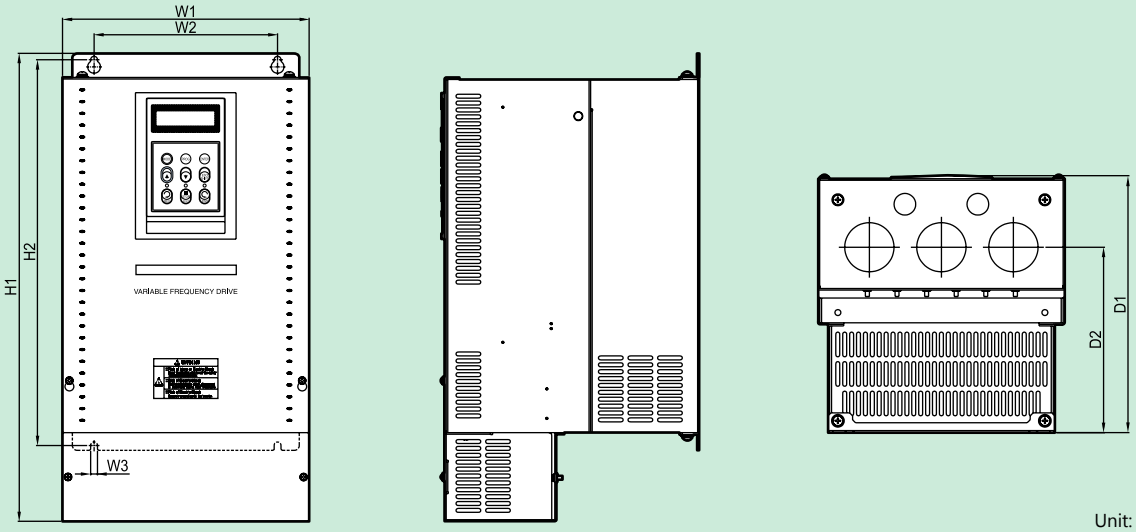


Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	Enclosure Type
MDLV0150100P-4	250	186	7	403.5	392	261.2	IP00 UL Type 1
MDLV0185100P-4	250	186	7	403.5	392	261.2	IP00 UL Type 1
MDLV0220100P-4	260	220	7	480	468.5	268.6	IP20 UL Type 2
MDLV0300100P-4	260	220	7	480	468.5	268.6	IP20 UL Type 2

marathon™ Drives

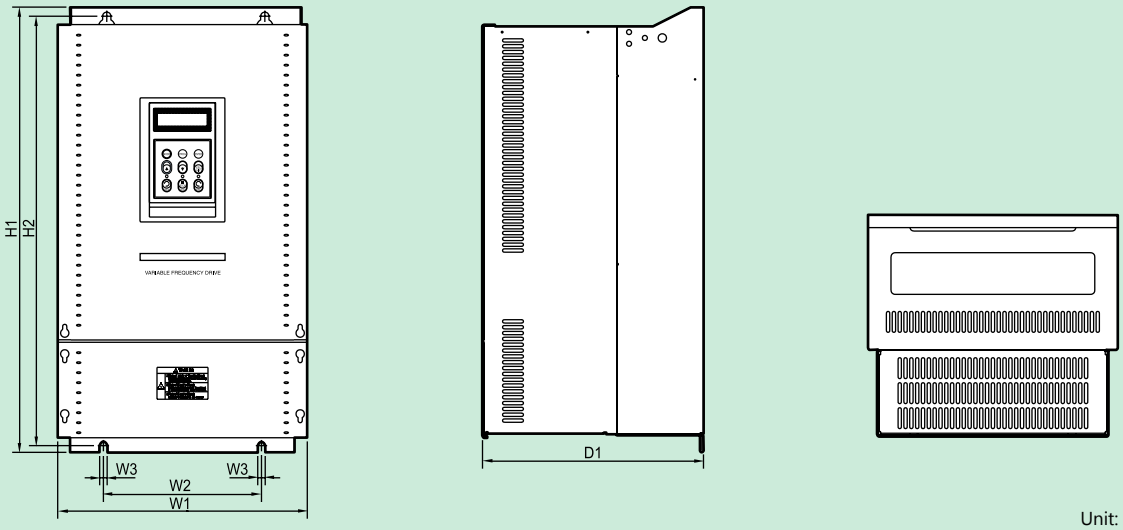
MDLV015010OP to MDLV0300-4 (Built-in DCL Type, UL Type 1 or UL Open Type with Conduit Option) Dim.



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	D2	Enclosure Type
MDLV0150, 0185100P-4	250	186	7	475.5	392	261.2	188.4	IP20 UL Type 1
MDLV0220, 0300100P-4	260	220	7	552	468.5	268.6	188.8	IP20 UL Type 1

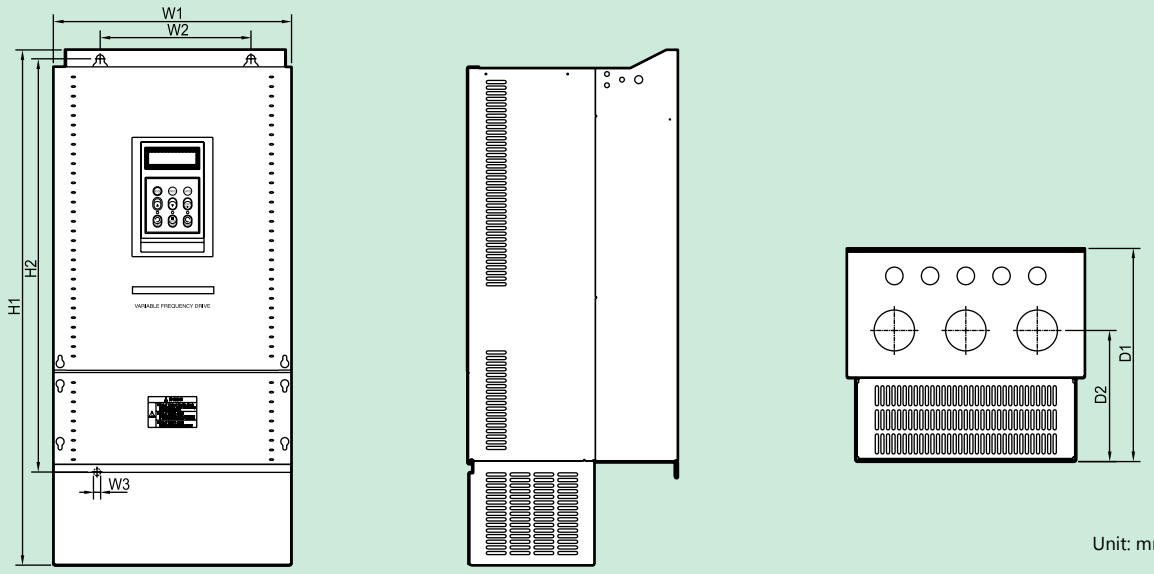
MDLV037010OP to MDLV055O-4 Dimensions



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	Enclosure Type
MDLV0370, 0450100P-4	300	190	9	534	515	265.6	IP00 UL Open
MDLV0550100P-4	300	190	9	534	515	292.6	IP00 UL Open
MDLV0370, 0450100P-4 (Built-in DCL Type)	300	190	9	684	665	265.6	IP00 UL Open
MDLV0550100P-4 (Built-in DCL Type)	300	190	9	684	665	292.6	IP00 UL Open

MDLV0370100P to 0550100P-4 (UL Type 1 or UL Open Type with Conduit Option) Dimensions

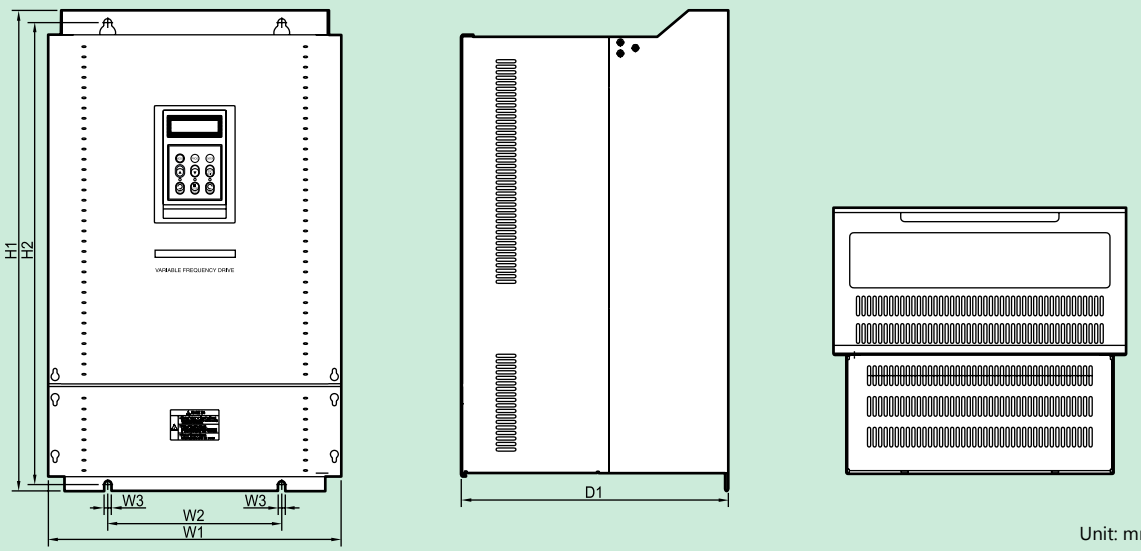


Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	D2	Enclosure Type
MDLV0370, 0450100P-4	300	190	9	642	515	265.6	163.4	IP20 UL Type 1
MDLV0550100P-4	300	190	9	642	515	292.6	190.4	IP20 UL Type 1
MDLV0370, 0450100P-4L	300	190	9	792	665	265.6	163.4	IP20 UL Type 1
MDLV0550100P-4L	300	190	9	792	665	292.6	190.4	IP20 UL Type 1

Note: Mounting NEMA 1 conduit option to the 15~90kW Open Type meets NEMA 1 but does not comply with UL Enclosed Type 1. To that end, please purchase UL Type 1 product.

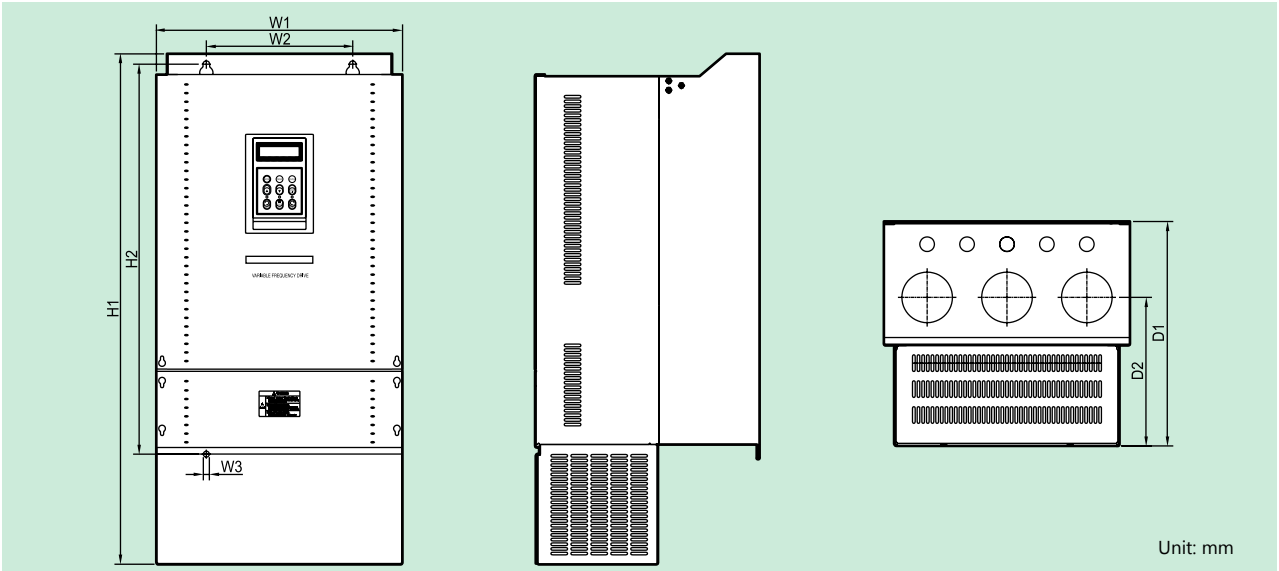
MDLV0750100P to 0900100P-4 Dimensions



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	Enclosure Type
MDLV0750, 0900100P-4	370	220	9	610	586.5	337.6	IP00 UL Open
MDLV0750, 0900100P-4L (Built-in DCL Type)	370	220	9	760	736.6	337.6	IP00 UL Open

MDLV0750100P, MDLV0900100P-4 (UL Type 1 or UL Open Type with Conduit Option) Dimensions

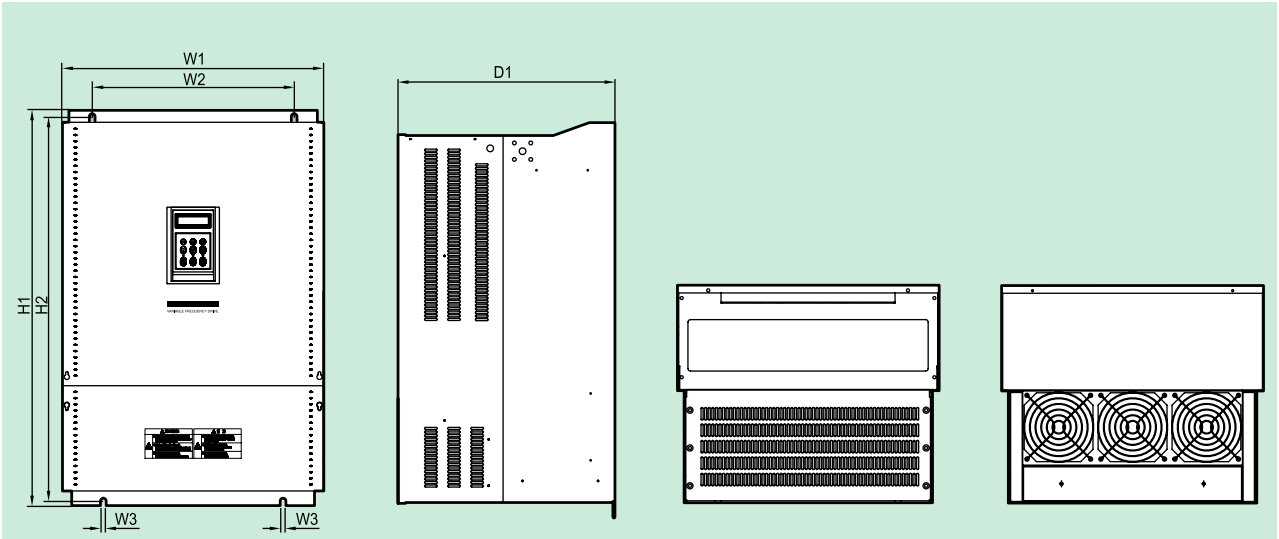


Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	D2	Enclosure Type
MDLV0750, 0900100P-4	370	220	9	767.5	586.5	337.6	223.4	IP20 UL Type 1
MDLV0750, 0900100P-4L (Built-in DCL Type)	370	220	9	917.5	736.5	337.6	223.4	IP20 UL Type 1

Note: Mounting NEMA 1 conduit option to the 15~90kW Open Type meets NEMA 1 but does not comply with UL Enclosed Type 1. To that end, please purchase UL Type 1 product.

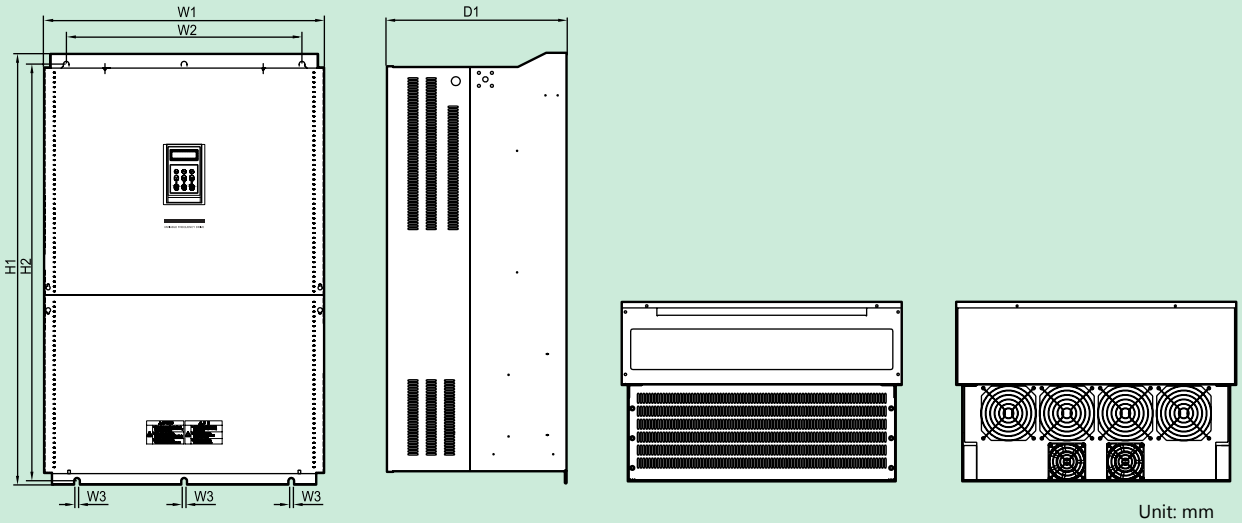
MDLV1100100P, MDLV1600100P-4 Dimensions



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	Enclosure Type
MDLV1100, 1320100P-4L	510	381	11	783.5	759	422.6	IP00 UL Open
MDLV1600100P-4L	510	381	11	861	836.5	422.6	IP00 UL Open

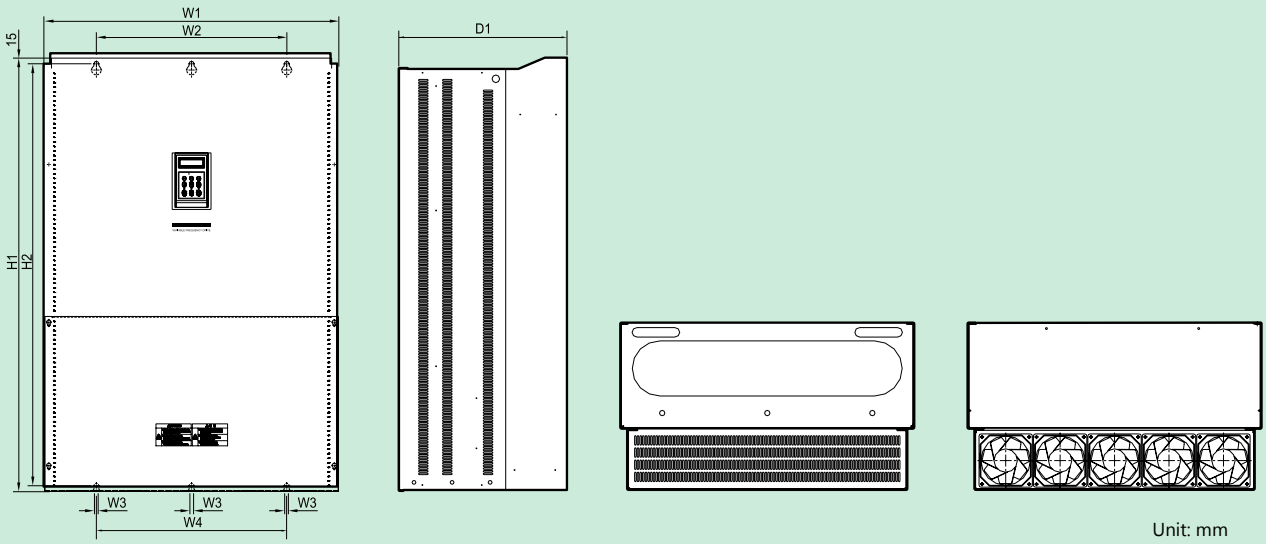
MDLV2200100P, MDLV2800100P-4 Dimensions



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	Enclosure Type
MDLV2200, 2800100P-4L	690	581	14	1063	1043.5	449.6	IP00 UL Open

MDLV3150100P to MDLV4500100P-4 Dimensions



Unit: mm

Part Number	W1	W2	W3	H1	H2	D1	Enclosure Type
MDLV3150, 3750100P-4L	772	500	13	1140.5	1110	442	IP00 UL Open
MDLV4500100P-4L	922	580	14	1302.5	1271.5	495	IP00 UL Open

DB (Dynamic Braking) Unit

DBU Models

UL	Drive	Applicable motor rating	DB Unit	Dimensions
Non UL type	400V class	11 - 15kW	SV0150DBU-4	Group 1.
		18.5 - 22kW	SV0220DBU-4	
		30 - 37kW	SV0037DBH-4	Group 2.
		45 - 55kW	SV0075DBH-4	
		75kW		
UL Type	400V class	11 - 15kW	SV0150DBU-4U	Group 3.
		18.5 - 22kW	SV0220DBU-4U	
		30 - 37kW	SV0370DBU-4U	
		45 - 55kW	SV0550DBU-4U	
		75kW	SV0750DBU-4U	
		90 - 110kW	SV0550DBU-4, 2set	
		132 - 160kW	SV0750DBU-4, 2set	
		220kW	SV0750DBU-4, 3set	
		280 - 315kW	-	
		375 - 450kW	-	

Terminal Configuration

Group 1

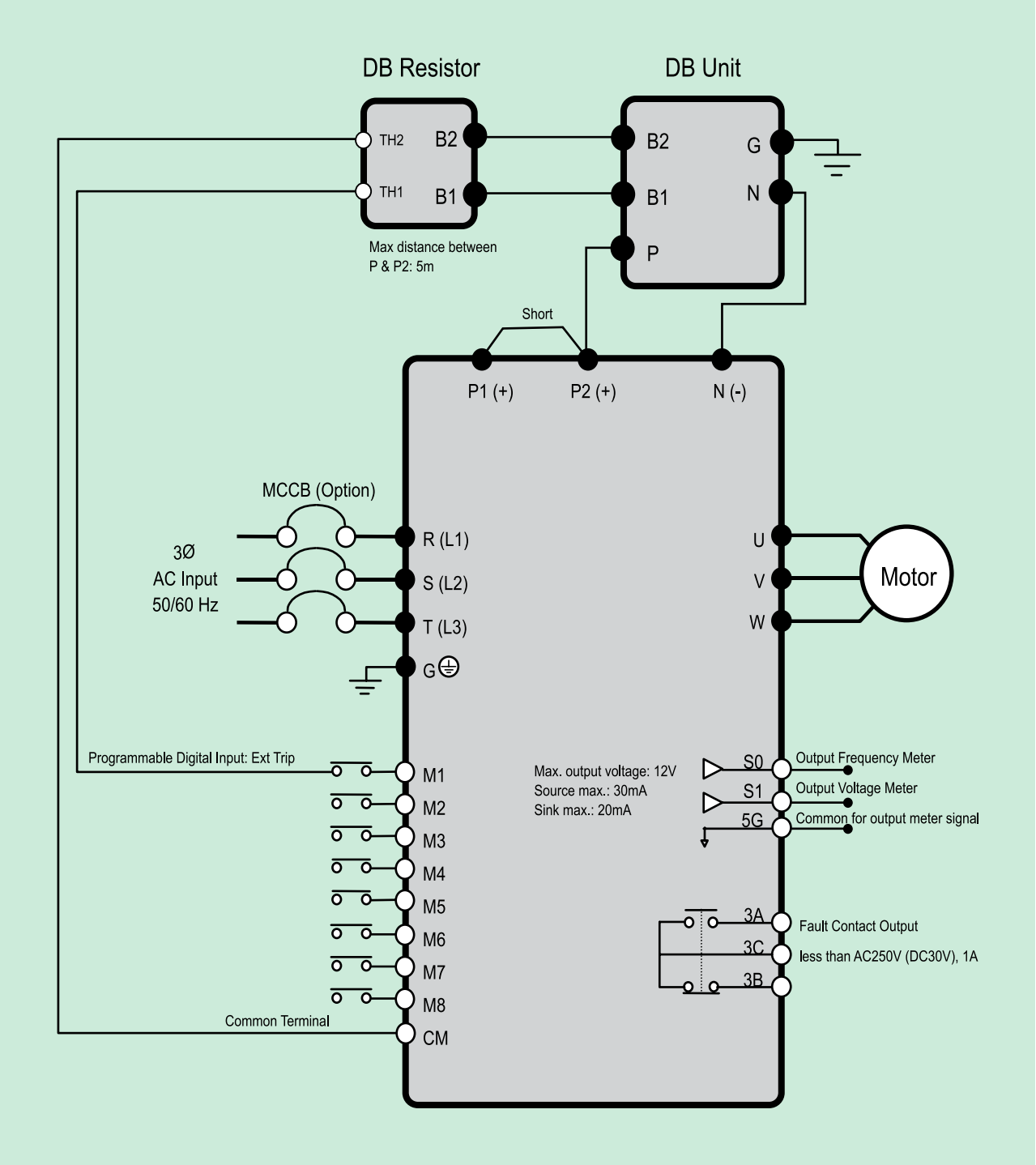
Group 2

Group 3

Terminals	Description	Terminals	Description
G	Ground terminal	N	Connect to drive terminal N
B2	Connect to DB Resistor's B2	P	Connect to drive terminal P1
B1	Connect to DB Resistor's B1	CM	OH common
N	Connect to drive terminal N	OH*	Over Heat Trip output terminal (Open Collector output: 20mA, 27V DC)
P	Connect to drive terminal P1		

Wiring for DB Unit and DB Resistor

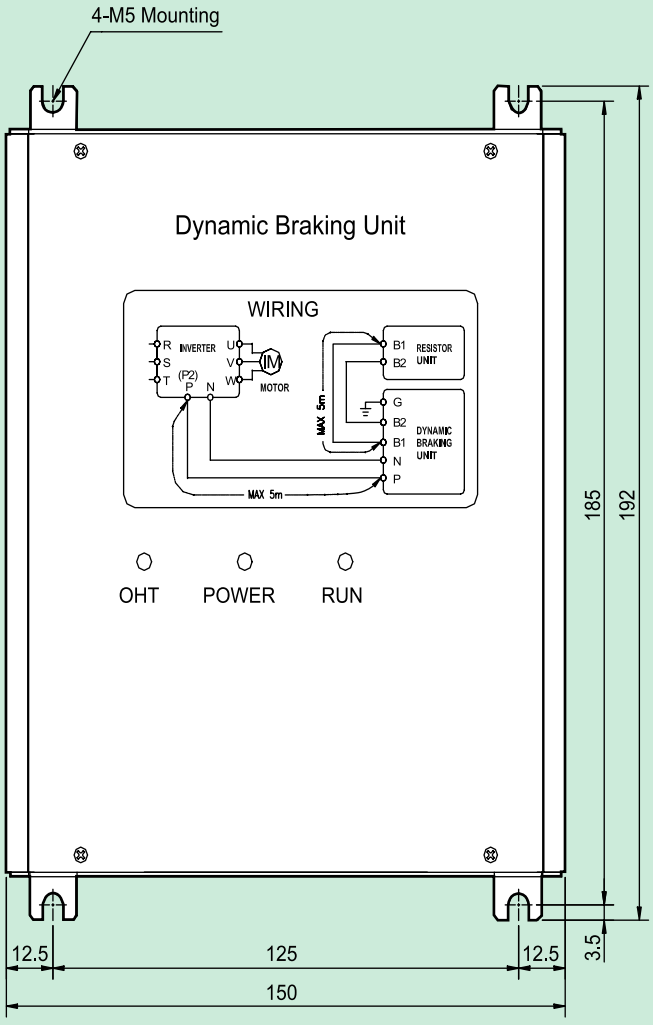
5.5 to 90kW

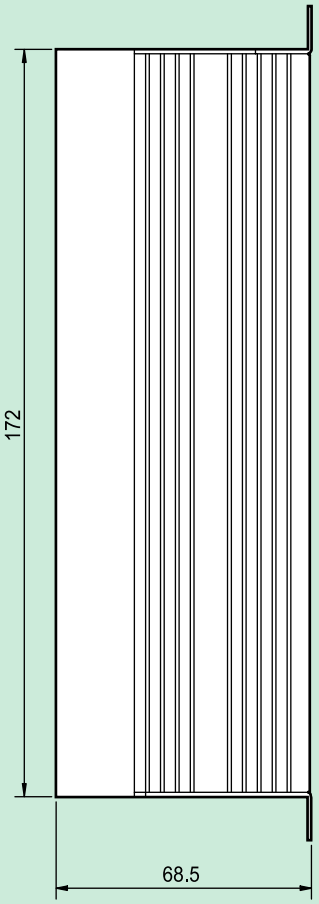


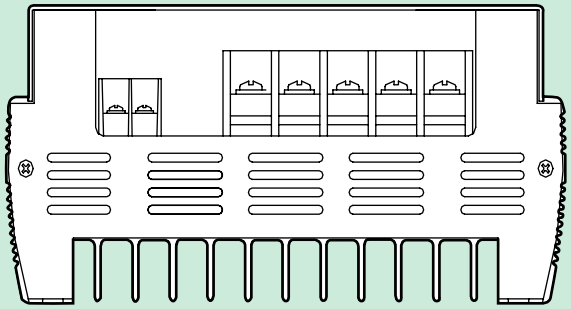
DB resistor terminal	Description
B1, B2	Wire terminal properly based on wiring block diagram. Connect a DB resistor to the DB Unit's B1, B2 terminals.
TH1, TH2	Thermal sensor terminal of DB resistor. Normal temperature (Ambient): Contact ON (TH1-TH2 closed) DB resistor overheated: Contact OFF (TH1-TH2 Open). Wire it to the drive terminal defined as External Trip.

DB (Dynamic Braking) Unit

Group 1



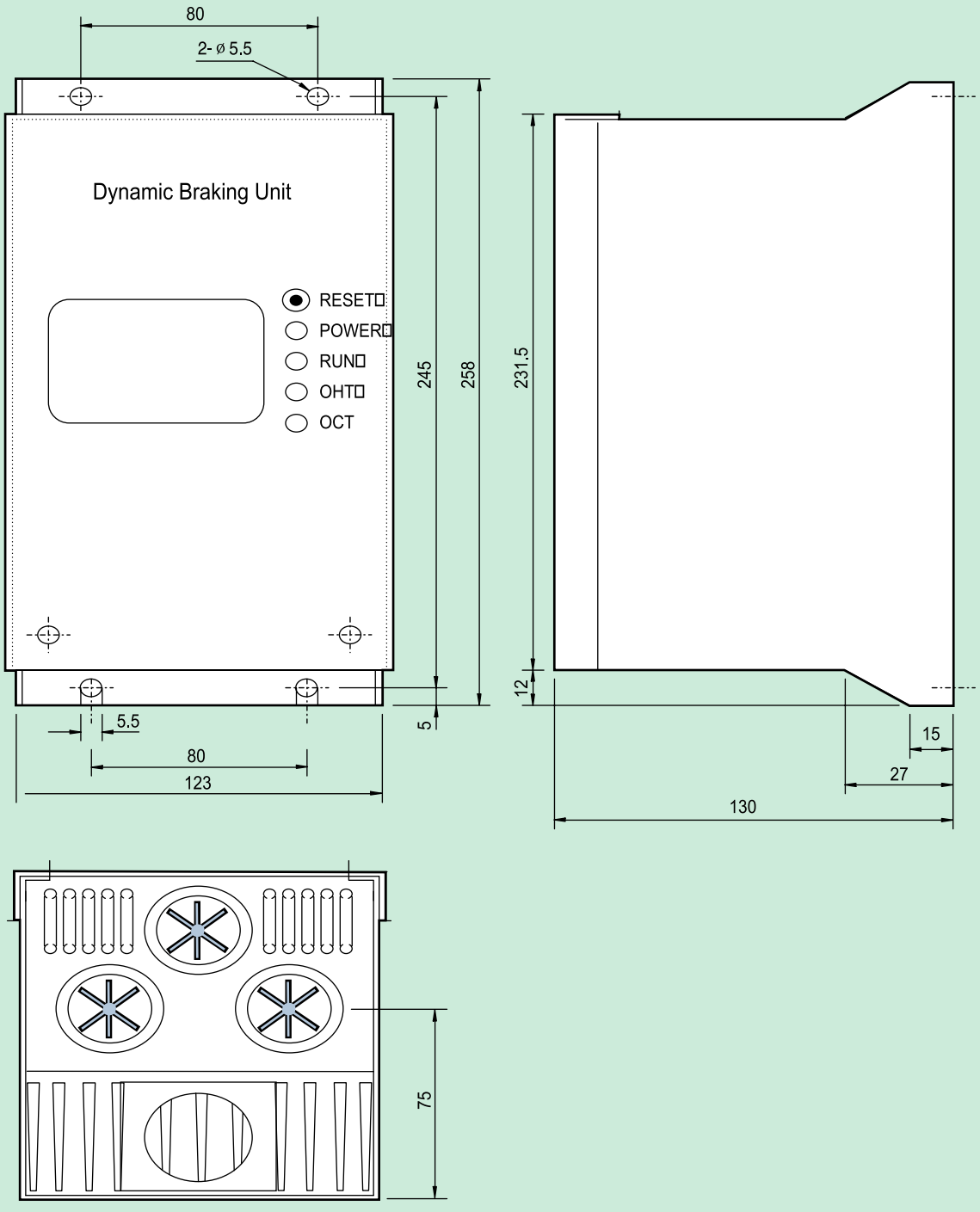




Unit: mm & kg

DB (Dynamic Braking) Unit

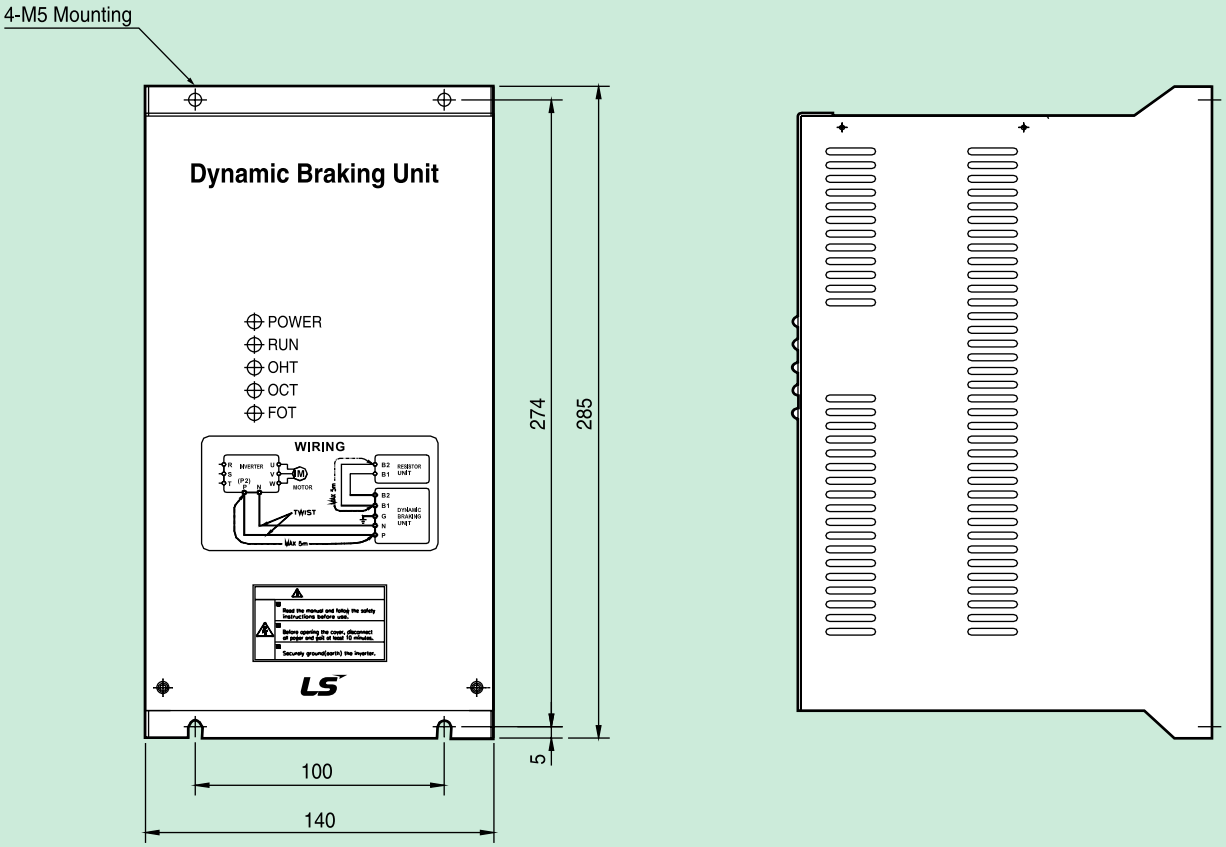
Group 2

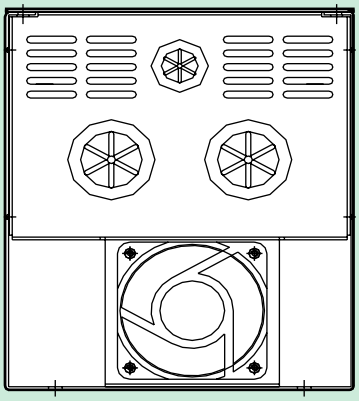


Unit: mm & kg

DB (Dynamic Braking) Unit

Group 3





Unit: mm & kg

External DB Resistor

The MD100P series do not built-in DB resistor on power stack as factory installation. External DB Unit and Resistor (Optional) should be installed. See the following table for more details (ED: 5%, Continuous Braking Time: 15 sec). If Enable duty (%ED) is increased to 10%, use external DB resistor having twice Wattage rating.

Applied motor capacity (kW)		Operating rate (ED/Continuous Braking Time)	100% Braking Torque			150% Braking Torque		
			(ohm)	(W)	Type	(ohm)	(W)	Type
400V	0.75	5%/15 sec	900	100	TYPE 1	600	150	TYPE 1
	1.5	5%/15 sec	450	200	TYPE 1	300	300	TYPE 1
	2.2	5%/15 sec	300	300	TYPE 1	200	400	TYPE 1
	3.7	5%/15 sec	200	500	TYPE 2	130	600	TYPE 2
	5.5	5%/15 sec	120	700	Type 3	85	1000	Type 3
	7.5	5%/15 sec	90	1000	Type 3	60	1200	Type 3
	11	5%/15 sec	60	1400	Type 3	40	2000	Type 3
	15	5%/15 sec	45	2000	Type 3	30	2400	Type 3
	18.5	5%/15 sec	35	2400	Type 3	20	3600	Type 3
	22	5%/15 sec	30	2800	Type 3	20	3600	Type 3
	30	10%/6 sec	16.9	6400	-	-	-	-
	37	10%/6 sec	16.9	6400	-	-	-	-
	45	10%/6 sec	11.4	9600	-	-	-	-
	55	10%/6 sec	11.4	9600	-	-	-	-
	75	10%/6 sec	8.4	12800	-	-	-	-
	90	10%/6 sec	8.4	12800	-	-	-	-

Peripheral Device

MCCB (Molded Case Circuit Breaker) and MC (Magnetic Contactor)

Voltage	Capacity (kW)	Circuit Breaker (MCCB)		Leakage Breaker (ELCB)	Magnetic Contactor (MC)
		Rated Current (A)	Rated Current (A)	Rated Current (A)	Rated Current (A)
3 Phase 200V	5.5	50	50	50	32
	7.5	60	60	60	40
	11	100	100	100	55
	15	125	125	125	65
	18.5	150	150	150	105
	22	175	175	175	130
	30	225	225	225	150
	5.5	30	30	30	22
	7.5	30	30	30	22
3 Phase 400V	11	50	50	50	40
	15	60	60	60	50
	18.5	60	60	60	50
	22	100	100	100	65
	30	125	125	125	75
	37	150	150	150	105
	45	200	200	200	130
	55	250	250	250	150
	75	300	300	300	185
	90	350	350	350	225
	110	400	400	400	330
	132	500	500	500	400
	160	600	630	630	400
	220	800	800	800	630
	280	1000	1000	1000	630
	315	1200	1200	1200	800
	375	1400	1400	1400	900
	450	1600	1600	1600	1000

Peripheral Device

AC Input Fuse

Voltage	Motor (kW)	Drive Model	AC Input Fuse (A)	AC Reactor		DC Reactor	
				(mH)	(A)	(mH)	(A)
400V Class	5.5	MDLV0055100P-4	20	1.22	15	5.34	14
	7.5	MDLV0075100P-4	30	1.14	20	4.04	19
	11	MDLV0110100P-4	40	0.81	30	2.76	29
	15	MDLV0150100P-4	60	0.61	38	2.18	36
	18.5	MDLV0185100P-4	70	0.45	50	1.79	48
	22	MDLV0220100P-4	80	0.39	58	1.54	55
	30	MDLV0300100P-4	100	0.287	80	1.191	76
	37	MDLV0370100P-4	125	0.232	98	0.975	93
	45	MDLV0450100P-4	150	0.195	118	0.886	112
	55	MDLV0550100P-4	175	0.157	142	0.753	135
	75	MDLV0750100P-4	250	0.122	196	0.436	187
	90	MDLV0900100P-4	300	0.096	237	0.352	225
	110	MDLV1100100P-4	350	0.081	289	Built-in	
	132	MDLV1300100P-4	400	0.069	341	Built-in	
	160	MDLV1600100P-4	450	0.057	420	Built-in	
	220	MDLV2200100P-4	700	0.042	558	Built-in	
	280	MDLV2800100P-4	800	0.029	799	Built-in	
	315	MDLV3150100P-4	900	0.029	799	0.090	836
	375	MDLV3750100P-4	1000	0.024	952-	0.076	996

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