



LOW-VOLTAGE INVERTER DRIVE FOR SYSTEMS FSDrive-LV1H SERIES

LV1HM: 200 V, 0.4 kW to 22 kW
400 V, 0.4 kW to 45 kW
LV1HF: 400 V, 55 kW to 185 kW
LV1HS: 400 V, 200 kW to 1000 kW
690 V, 350 kW to 1750 kW

High performance and advanced functions

Space saving

Reduced maintenance

Improved RAS functions

Certified for
ISO9001 and
ISO14001



JQA-2800



JQA-EM0498

The FSDrive-LV1H series delivers outstanding performance because the design continues the traditionally reliable quality of Yaskawa system inverter drives.

Yaskawa's inverter drives for system applications are industrial variable speed drives. For enhanced performance and functions, the priority throughout the development stage has been given on high quality and high reliability.

The FSDrive-LV1H series is the culmination of Yaskawa's many decades of technological expertise.

This is the most advanced inverter drive available that can meet the wide range of requirements that include compactness, reduced maintenance, network compliance, user-friendliness and flexibility.

To update existing systems as well as to efficiently install new systems, Yaskawa offers the ultimate variable speed system with the FSDrive-LV1H series of inverter drives with a wide range of capacities from small to large.



APPLICATIONS



FEATURES

The FSDrive-LV1H series delivers high performance and advanced functions including a PLC function and advanced control functions. Improved RAS functions make high-quality preventive maintenance possible.

- LV1HM: Unique design of multiple-drawer unit saves space and reduces maintenance with the world's-smallest class of inverter control modules.
- LV1HF: Inverter units and peripheral devices are contained for easy and tidy storage in limited space.
- LV1HS: Slim drive modules deliver a large capacity with parallel connection of a maximum of five drive modules.

High performance and advanced functions p.3
Space saving p.4
Reduced maintenance p.5
Improved RAS functions p.6 to 7

LINE-UP



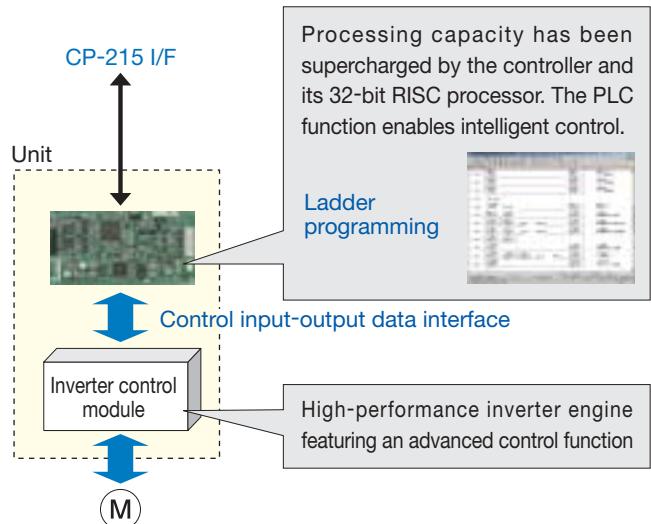


Delivers the high performance and advanced functions required for industrial variable-speed machinery.

FSDrive Series

PLC function

Data processing capacity has been greatly enhanced, as the inverter features an ASIC for drives developed by Yaskawa and a controller with a 32-bit RISC processor.



Advanced control functions

Vibration control (torque observer), external flux command, and other advanced control functions are provided on all models. This facilitates construction of a flexible and high-performance drive system.

Supports a variety of control modes.

V/f Control, V/f Control with PG, Open Loop Vector Control, Closed Loop Vector Control, Open Loop Vector Control for PM^{*1} and Closed Loop Vector Control for PM are all possible.

* 1 : Permanent-magnet synchronous motor

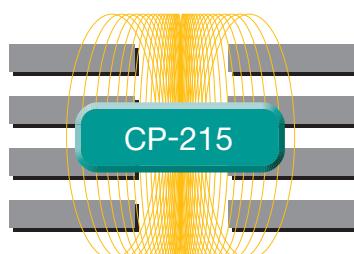


LV1HM Unit

Compliant with a variety of networks

The units are connected to each other by Yaskawa's high speed communications CP-215. An existing system can be easily replaced because connections with the host PLC can be made via PROFIBUS-DP^{*2}, Yaskawa's field network CP-213, or other communications protocols by using adapters.

* 2 : PROFIBUS-DP is a trademark of PROFIBUS & PROFINET International.



Loaded with EMS^{*3} Control

The inverter drive comes loaded with EMS Control, providing EMS power supply capability without requiring extra equipment.

* 3 : Electromagnetic stirring



Super Enhanced Space Efficiency

FSDrive Series

50% greater storage efficiency than our previous models

The FSDrive-LV1HM enables the multiple stacking of drawer units.

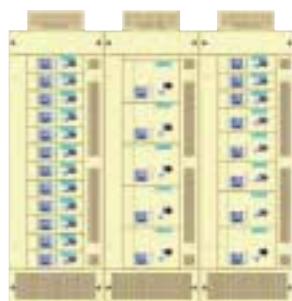
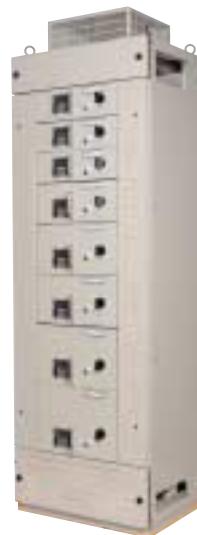
The world's smallest class of inverter control modules are employed for drawer units, bringing even greater storage efficiency.

Control boards, output contactors and other parts are efficiently housed.



A 35% smaller footprint than our previous models.

All drawer units are accessible from the front, eliminating the need for a work space behind the panel.



Voltage	Capacity kW	Number of contained unit	Panel dimensions (W×H×D) mm
200 V Class	0.4 to 7.5	12	800×2300×600
	11	9	
	15 to 18.5	7	
	22	6	
400 V Class	0.4 to 7.5	12	800×2300×600
	11 to 15	9	
	18.5	7	
	22 to 30	6	
	37 to 45	5	





Unit-type construction enables easy maintenance.

FSDrive Series

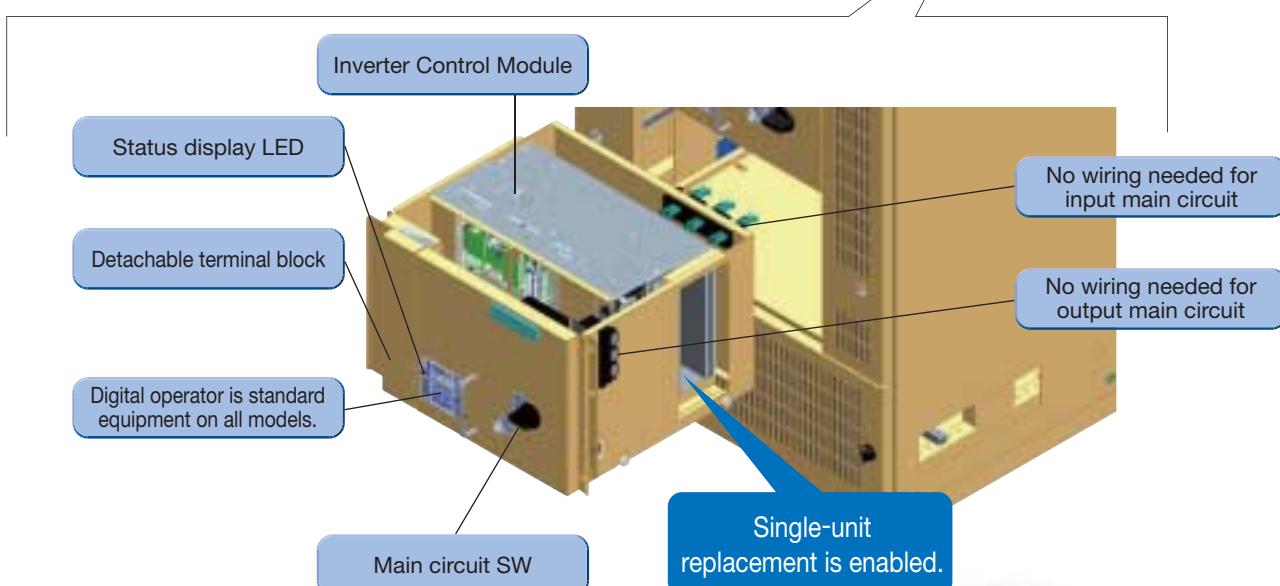
Integrate Inverter Drive with Peripheral Devices

Restoration time after error can be significantly reduced by replacement of a unit.

- The digital operator provided on the front of each unit displays the error type, making it easy to locate errors.
- The terminal-free connector employed for the input and output main circuits eliminates the need for wiring.
- Detachable terminal block allows replacement of any unit without the need to remove the external I/O wiring.
- Programs and data settings for the controller can be downloaded from the PC (EWS). Transport addresses can be set with a switch.
- Easy replacement in the event of a failure (Failure recovery time: no more than 30 minutes)



30
minutes
or less



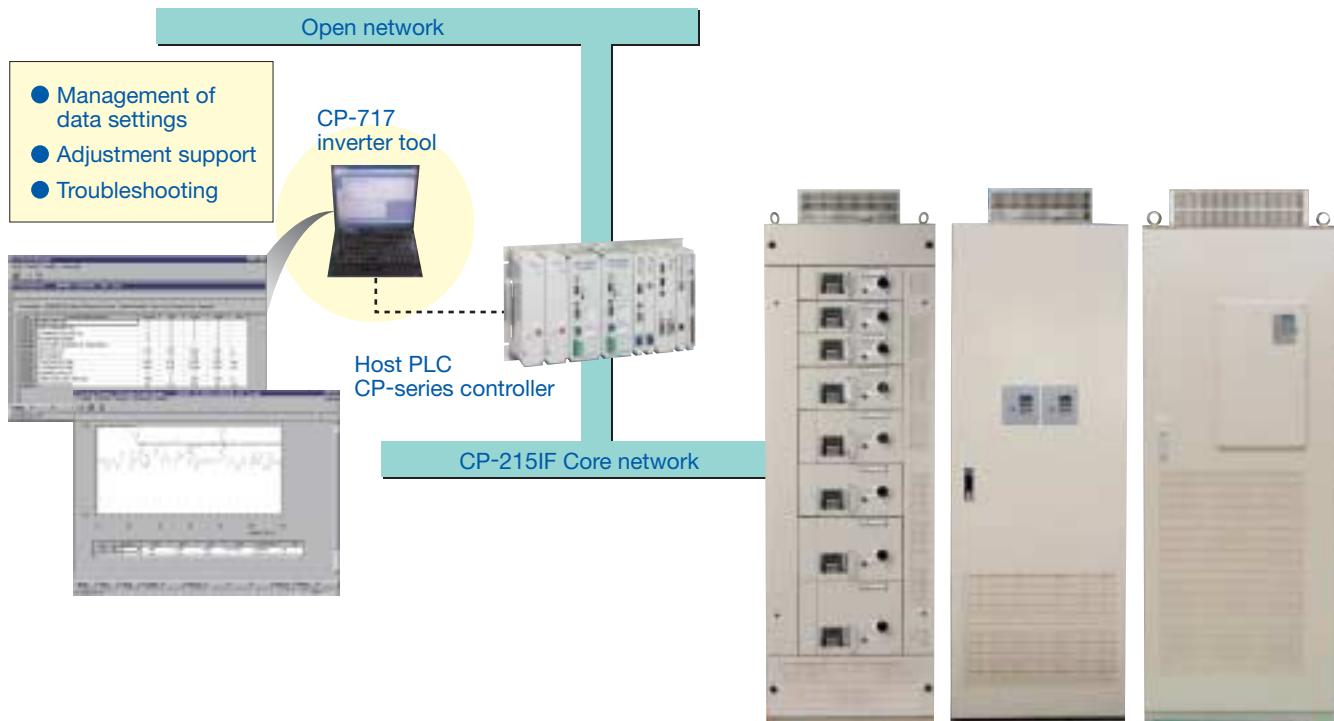
Drive Module

The slim LV1HS contains drive modules. These modules can be easily replaced.

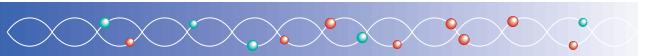
High-Quality Preventive Maintenance

Enhanced RAS functions utilizing the inverter support tool

The status of all inverters connected by CP-215, including their parameter settings, monitoring, and fault displays, can be monitored simultaneously by connecting the PC to the host PLC and using the inverter support tool CP-717.



- Operating condition monitoring and parameter setting functions
- Enhanced self-diagnosis and remaining-life prediction functions
- Traceback for fault analysis and fault history display
- Enhanced monitor functions
- Autotuning for adjustment support
(Setting of speed and other control parameters, and guidance)

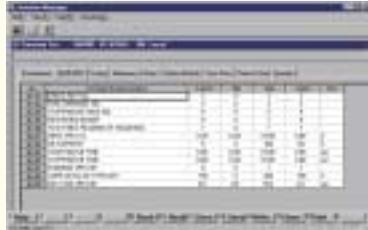


CP-717 inverter tool description

Management of data settings

Online reading, display and writing of inverter parameters. Loading, dumping and comparison can be done from the management file.

Parameter display screen



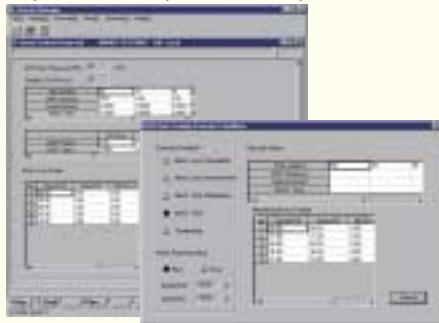
Output of parameter management table (print out)



Adjustment support

Related parameters can be adjusted according to monitor load characteristics.

Adjustment of speed control parameters

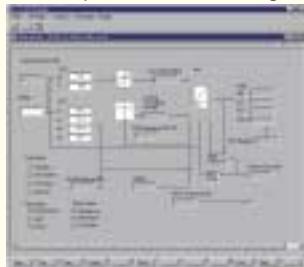


Step response test



Trial run adjustment while monitoring real-time data of individual inverters is possible.

Block operation monitoring



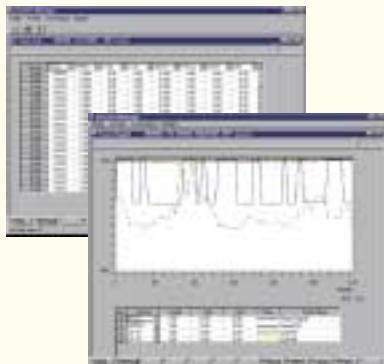
Parameters displayed on monitor



Troubleshooting

Reduced downtime and detailed analysis of causative elements in the event of a failure.

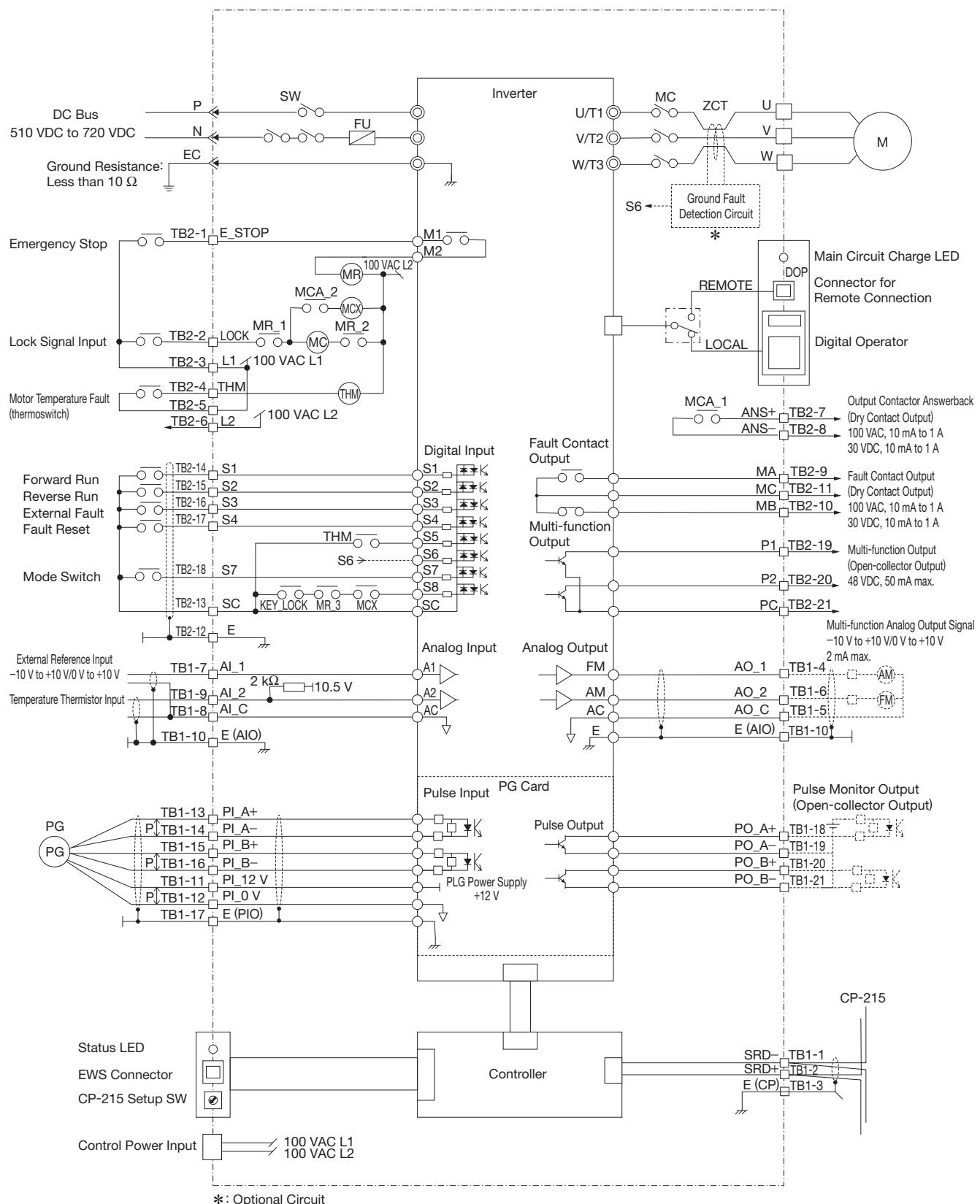
Traceback in the event of a failure



Display of current failure and failure history



Connections



Terminal Functions

FSDrive-
M LV1H

Terminals

Terminal Name		Signal Name
Main Circuit Terminal	P, N	Main circuit input
	U, V, W	Main circuit output
	L1, L2	Control power input 100 VAC/110 VAC

Control Circuit Terminals

Terminal Block Name	Terminal No.	Signal Name	Function	Input/Output	Signal Level
TB1	1	SRD-	CP-215 send/receive signal-	Input/Output	5-V differential, transformer isolation
	2	SRD+	CP-215 send/receive signal+		
	3	E (CP)	CP-215 shield sheath	-	
	4	AO_1	Multi-function analog monitor 1		
	5	AO_C	Analog monitor common	Output	-10 V to +10 V/0 V to +10 V 2 mA max.
	6	AO_2	Multi-function analog monitor 2		
	7	AI_1	Analog input 1 (reference input)	Input	AI_1: -10 V to +10 V/0 V to +10 V
	8	AI_C	Analog input common		
	9	AI_2	Analog input 2 (thermistor input)		
	10	E (AIO)	Analog input/output shield sheath	-	
	11	PI_12 V	PLG power supply 12 V		
	12	PI_0 V	PLG power supply 0 V	Output	PLG power supply output (200 mA max.)
	13	PI_A+	Pulse Input A+		
	14	PI_A-	Pulse Input A-	Input	12-V photocoupler input or 5-V differential input
	15	PI_B+	Pulse Input B+		
	16	PI_B-	Pulse Input B-		
	17	E (PIO)	PI and PO cable shield sheath	-	
	18	PO_A+	Pulse Monitor_A+		
	19	PO_A-	Pulse Monitor_A-	Output	12-V complementary output or 5-V differential output
	20	PO_B+	Pulse Monitor_B+		
	21	PO_B-	Pulse Monitor_B-		
TB2	1	E_STOP	Emergency stop	Input	100 VAC, 11 mA
	2	LOCK	Lock signal input		
	3	L1	No. 1 and 2 common wire (100 VAC, phase L1)		
	4	THM	Motor temperature fault (thermoswitch)	Input	100 VAC, 11 mA
	5	L1	No. 4 common wire (100 VAC, phase L1)		
	6	L2	100 VAC, phase L2	Input	100 VAC
	7	ANS+	Output contactor answerback signal		
	8	ANS-	Contact Output	Output	Dry contact 100 VAC, 10 mA to 1 A 30 VDC, 10 mA to 1 A
	9	MA	Fault contact output (NO contact)		
	10	MB	Fault contact output (NC contact)	Output	Dry contact 100 VAC, 10 mA to 1 A 30 VDC, 10 mA to 1 A
	11	MC	Fault contact output common		
	12	E	Shield Sheath	-	
	13	SC	Sequence input common		
	14	S1	Sequence input (forward run)	Input	24 VDC, 8 mA Photocoupler input
	15	S2	Sequence input (reverse run)		
	16	S3	Sequence input (external fault)		
	17	S4	Sequence input (fault reset)		
	18	S7	Sequence input (mode switch)		
	19	P1	Multi-function output	Output	48 VDC, 50 mA Open-collector output
	20	P2	Multi-function output		
	21	PC	Multi-function output common		

Specifications

Type	CIMR-LV1HMD□2□□□(200 V)																CIMR-LV1HMD□4□□□(400 V)																
Model	0P4	0P7	1P1	1P5	2P2	3P0	3P7	5P5	7P5	011	015	018	022	0P4	0P7	1P5	2P2	3P0	3P7	5P5	7P5	011	015	018	022	030	037	045					
Max. Applicable Motor Capacity*1	kW	0.4	0.75	1.1	1.5	2.2	3	3.7	5.5	7.5	11	15	18.5	22	0.4	0.75	1.5	2.2	3	3.7	5.5	7.5	11	15	18.5	22	30	37	45				
Rated Input Current*2	A	2.9	5.8	7	7.5	11	15.6	18.9	28	37	52	68	80	82	1.8	3.2	4.4	6	8.2	10.4	15	20	29	39	44	43	58	71	86				
Rated Input Voltage	270 VDC to 340 VDC																510 VDC to 720 VDC																
Output	Rated Output Capacity*3	kVA	1.2	1.9	2.6	3	4.2	5.3	6.7	9.5	12.6	17.9	23	29	32	1.4	2.6	3.7	4.2	5.5	7	11.3	13.7	18.3	24	30	34	46	57	69			
	Rated Output Current*4	A	3.2	5	6.9	8	11	14	17.5	25	33	47	60	75	85	1.8	3.4	4.8	5.5	7.2	9.2	14.8	18	24	31	39	45	60	75	91			
	Overload Tolerance	—																150% of rated output current for 60 s															
	Max. Output Voltage	Three-phase 200 V to 240 V (relative to input voltage)																Three-phase 380 V to 480 V (relative to input voltage)															
	Max. Output Frequency	—																400 Hz (user-set)															

* 1: The motor capacity (kW) refers to a Yaskawa 4-pole, 60 Hz motor.

The rated output current of the inverter output amps should be equal to or greater than the motor rated current.

* 2: Value displayed is for operating at the rated output current. This value may fluctuate based on power supply side impedance, as well as the power supply transformer, input side reactor, and wiring.

* 3: The rated output capacity is calculated with a rated output voltage of 220 VAC or 440 VAC.

* 4: Carrier frequency is set to 2 kHz.

Drive Specifications		Conditions	Specifications
Control Characteristics	Control Method	V/f Control, V/f Control with PG, Open Loop Vector Control, Closed Loop Vector Control, EMS Control, Open Loop Vector Control for PM, and Closed Loop Vector Control for PM	
	Frequency Control Range	0.01 Hz to 400 Hz	
	Frequency Accuracy (Temperature Fluctuation)	Digital reference : within $\pm 0.01\%$ of the max. output frequency (-10°C to +40°C) Analog reference: within $\pm 0.1\%$ of the max. output frequency (25°C±10°C)	
	Frequency Setting Resolution	Digital reference : 0.01 Hz Analog reference: 0.03 Hz/60 Hz (11 bit)	
	Output Frequency Resolution	0.001 Hz	
	Speed Control Range	1:1500 (Closed Loop Vector Control and Closed Loop Vector Control for PM) 1:200 (Open Loop Vector Control) 1:40 (V/f Control and V/f Control with PG) 1:20 (Open Loop Vector Control for PM) 1:100 (Advanced Open Loop Vector Control for PM)	
	Speed Control Accuracy	±0.2% in Open Loop Vector Control (25°C±10°C), 0.01% in Closed Loop Vector Control (25°C±10°C)	
	Speed Response	10 Hz in Open Loop Vector Control (25°C±10°C), 50 Hz in Closed Loop Vector Control (25°C±10°C) (excludes temperature fluctuation when performing rotational autotuning)	
	Accel/Decel Time	0.00 s to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)	
	Main Control Functions	Torque control, droop control, speed/torque control switch, feed forward control, load torque observer control, momentary power loss ride-thru, speed search, overtorque detection, torque limit, autotuning, dwell, slip compensation, torque compensation, energy saving control, etc.	
Protective Functions	Motor Protection	Electronic thermal overload relay	
	Momentary Overcurrent Protection	Drive stops when output current exceeds 200% of rated output current.	
	Overload Protection	Drive stops after 60 s at 150% of rated output current.	
	Oversupply Protection	200 V: Stops when DC bus voltage exceeds approx. 410 V. 400 V: Stops when DC bus voltage exceeds approx. 820 V.	
	Undervoltage Protection	200 V: Stops when DC bus voltage falls below approx. 190 V. 400 V: Stops when DC bus voltage falls below approx. 380 V.	
	Heatsink Overheat Protection	Thermistor	
	Stall Prevention	Stall prevention during acceleration/deceleration and constant speed operation	
	Ground Fault Protection	Protection by electronic circuit	
	Charge LED	Charge LED remains lit until DC bus has fallen below approx. 50 V	
	Blown Fuse Protection	Provided	

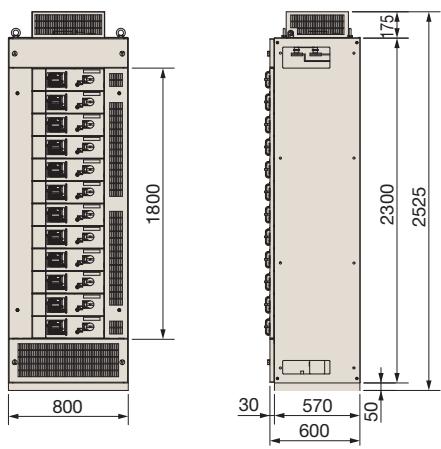
Controller Specifications		Conditions	Specifications
PLC Functions	Program Capacity	User program: 512 kbyte (equivalent to 8 k steps)	
	Running Speed	1 k step/1 ms	
	Language	CP language (ladder language, about 120 types) Text-type language, SFC, chart type	
	Scanning Speed	High speed: 1.0 ms to 30 ms Low speed : 1.0 ms to 300 ms	
	Trace	Data trace : 128 kW (32 kW×4 Gr) Fault trace : 32 kW	
	Inverter Trace	36 kW (16 points×2048 records)	
	Communications	Link transmission: register input 2048 words, register output 512 words max.	
		Message transmission: MEMOBUS/no protocol (user 13 CH max.)	
Environmental Conditions		Conditions	Specifications
Environment	Applicable Standards		JIS, JEM, JEC
	Atmosphere		General environmental conditions (free from dust and corrosive gases)
	Ambient Temperature		-10°C to +45°C
	Humidity		90% RH or less (no condensation)
	Storage Temperature		-20°C to +60°C
	Altitude		1000 m or less
Cabinet Specifications	Area of Use		Indoors
	Form		Vertically-standalone type, protective front panel type
	Painting		5Y/1 both for inner and outer surfaces
Enclosure		IP40	

Dimensions

Units: mm

FSDrive-
M LV1H

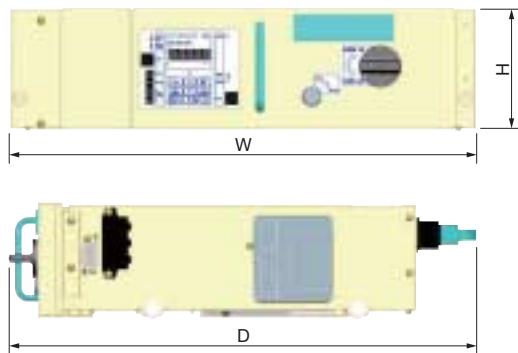
Panel Dimensions



Different types of units can be installed as long as their combined total height does not exceed 1,800 mm. For example, one unit each of 30 kW (300)*, 18.5 kW (250)*, 15 kW (200)* and 7 units of 7.5 kW (7×150)* can be installed.

* : Numbers in parenthesis indicate the unit height in mm

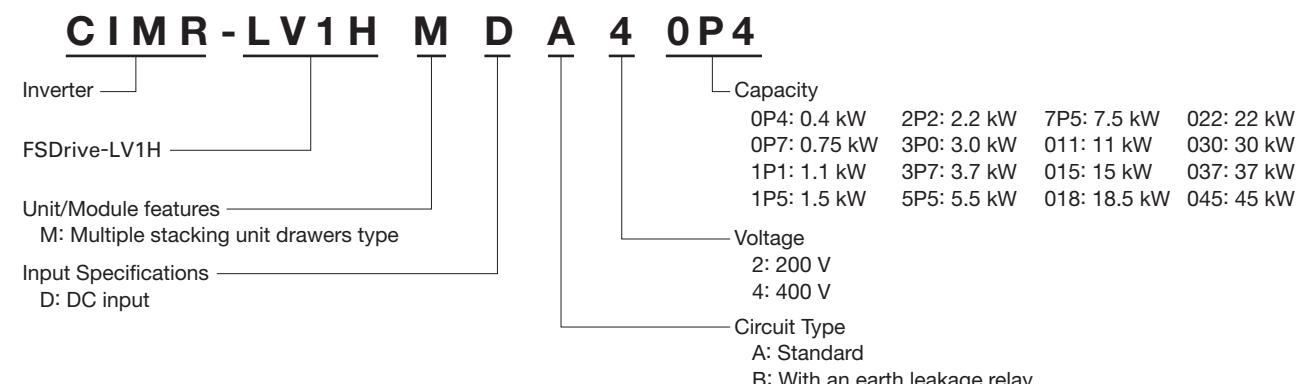
Installed Units



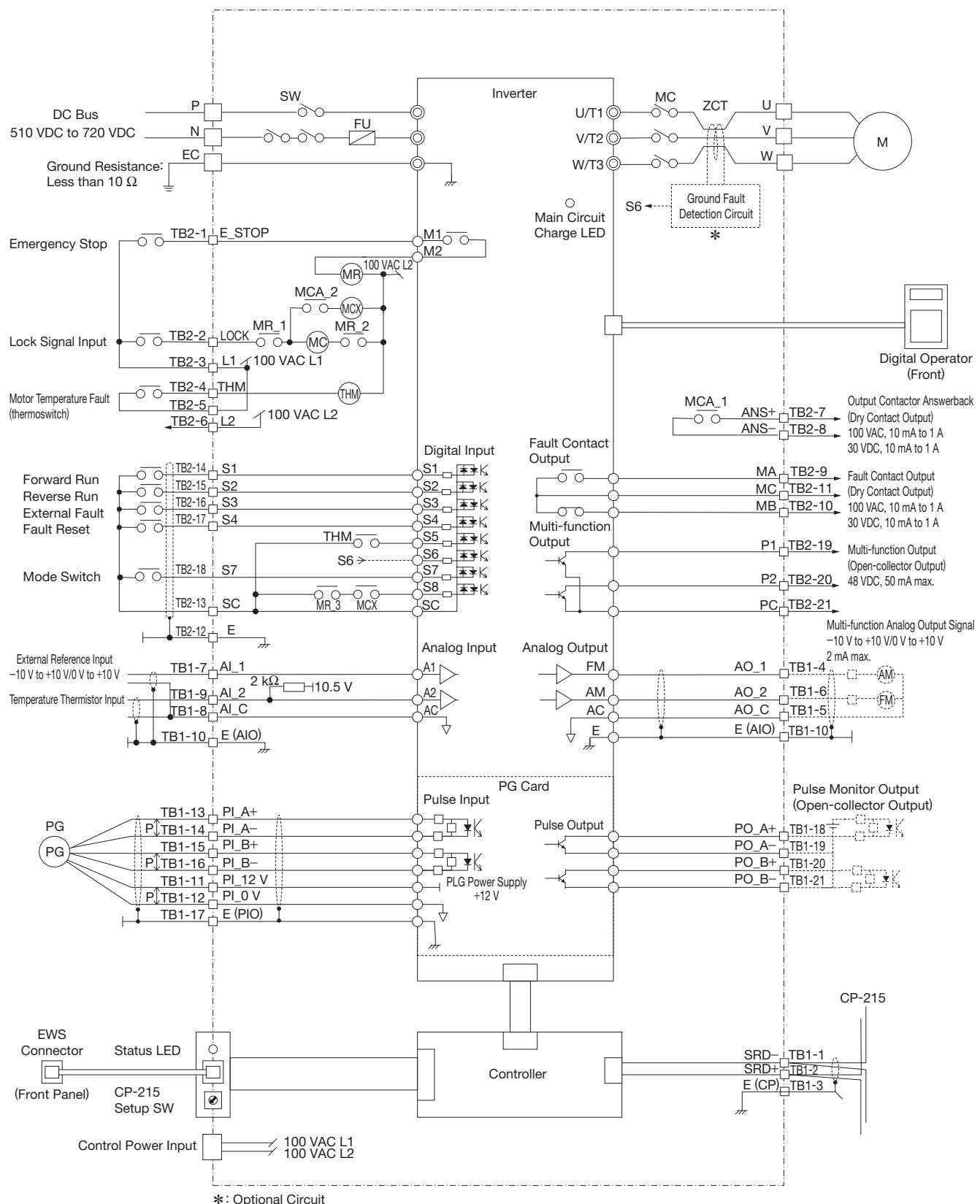
Panel Dimensions and Number of Installed Units

200 V Class						400 V Class							
Model CIMR-LV1HMD□2□□□	Capacity kW	Approx. Mass kg	Unit Dimension mm			Maximum Number of Installed Units	Model CIMR-LV1HMD□4□□□	Capacity kW	Approx. Mass kg	Unit Dimension mm			Maximum Number of Installed Units
			W	D	H					W	D	H	
0P4	0.4	17	565	600	150	12	0P4	0.4	17	565	600	150	12
0P7	0.75						0P7	0.75					
1P1	1.1						1P5	1.5					
1P5	1.5						2P2	2.2					
2P2	2.2						3P0	3.0					
3P0	3.0						3P7	3.7					
3P7	3.7						5P5	5.5	17.5	565	600	150	12
5P5	5.5						7P5	7.5					
7P5	7.5						011	11					
011	11	24					015	15					9
015	15	27					018	18.5					7
018	18.5	30					022	22					6
022	22	39.5					030	30					5
							037	37					
							045	45					

Unit Model Numbers



Connections



Terminal Functions

FSDrive-
F LV1H

Terminals

Terminal Name		Signal Name
Main Circuit Terminal	P, N	Main circuit input
	U, V, W	Main circuit output
	L1, L2	Control power input 100 VAC/110 VAC

Control Circuit Terminals

Terminal Block Name	Terminal No.	Signal Name	Function	Input/Output	Signal Level
TB1	1	SRD-	CP-215 send/receive signal-	Input/Output	5-V differential, transformer isolation
	2	SRD+	CP-215 send/receive signal+		
	3	E (CP)	CP-215 shield sheath	-	
	4	AO_1	Multi-function analog monitor 1		
	5	AO_C	Analog monitor common	Output	-10 V to +10 V/0 V to +10 V 2 mA max.
	6	AO_2	Multi-function analog monitor 2		
	7	AI_1	Analog input 1 (reference input)	Input	AI_1: -10 V to +10 V/0 V to +10 V
	8	AI_C	Analog input common		
	9	AI_2	Analog input 2 (thermistor input)		
	10	E (AIO)	Analog input/output shield sheath	-	
	11	PI_12 V	PLG power supply 12 V		
	12	PI_0 V	PLG power supply 0 V	Output	PLG power supply output (200 mA max.)
	13	PI_A+	Pulse Input A+		
	14	PI_A-	Pulse Input A-	Input	12-V photocoupler input or 5-V differential input
	15	PI_B+	Pulse Input B+		
	16	PI_B-	Pulse Input B-	-	
	17	E (PIO)	PI and PO cable shield sheath		
	18	PO_A+	Pulse Monitor_A+	Output	12-V complementary output or 5-V differential output
	19	PO_A-	Pulse Monitor_A-		
	20	PO_B+	Pulse Monitor_B+	-	
	21	PO_B-	Pulse Monitor_B-		
TB2	1	E_STOP	Emergency stop	Input	100 VAC, 11 mA
	2	LOCK	Lock signal input		
	3	L1	No. 1 and 2 common wire (100 VAC, phase L1)	Input	100 VAC, 11 mA
	4	THM	Motor temperature fault (thermoswitch)		
	5	L1	No. 4 common wire (100 VAC, phase L1)	Input	100 VAC
	6	L2	100 VAC, phase L2		
	7	ANS+	Output contactor answerback signal	Output	Dry contact 100 VAC, 10 mA to 1 A 30 VDC, 10 mA to 1 A
	8	ANS-	Contact Output		
	9	MA	Fault contact output (NO contact)	Output	Dry contact 100 VAC, 10 mA to 1 A 30 VDC, 10 mA to 1 A
	10	MB	Fault contact output (NC contact)		
	11	MC	Fault contact output common	-	
	12	E	Shield Sheath		
	13	SC	Sequence input common	Input	24 VDC, 8 mA Photocoupler input
	14	S1	Sequence input (forward run)		
	15	S2	Sequence input (reverse run)		
	16	S3	Sequence input (external fault)		
	17	S4	Sequence input (fault reset)		
	18	S7	Sequence input (mode switch)	Output	48 VDC, 50 mA Open-collector output
	19	P1	Multi-function output		
	20	P2	Multi-function output		
	21	PC	Multi-function output common		

Specifications

Type							
Model: CIMR-LV1HFD□4□□□	055	075	090	110	132	160	185
Max. Applicable Motor Capacity*1 kW	55	75	90	110	132	160	185
Rated Input Current*2 A	105	142	170	207	248	300	346
Rated Input Voltage	510 VDC to 720 VDC						
	Rated Output Capacity*3 kVA	85	114	137	165	198	232
	Rated Output Current*4 A	112	150	180	216	260	304
Output	Overload Tolerance	150% of rated output current for 60 s					
	Max. Output Voltage	Three-phase 380 V to 480 V (relative to input voltage)					
	Max. Output Frequency	400 Hz (user-set)					

* 1: The motor capacity (kW) refers to a Yaskawa 4-pole, 60 Hz, 400 V motor.

The rated output current of the inverter output amps should be equal to or greater than the motor rated current.

* 2: Value displayed is for operating at the rated output current. This value may fluctuate based on power supply side impedance, as well as the power supply transformer, input side reactor, and wiring.

* 3: Rated output capacity is calculated with a rated output voltage of 440 VAC.

* 4: Carrier frequency is set to 2 kHz.

Drive Specifications	
Conditions	Specifications
Control Characteristics	Control Method
	V/f Control, V/f Control with PG, Open Loop Vector Control, Closed Loop Vector Control, EMS Control, Open Loop Vector Control for PM, and Closed Loop Vector Control for PM
	Frequency Control Range
	0.01 Hz to 400 Hz, 55 kW to 160 kW; 0.01 Hz to 150 Hz, 185 kW
	Frequency Accuracy (Temperature Fluctuation)
	Digital reference : within $\pm 0.01\%$ of the max. output frequency (-10°C to +40°C) Analog reference: within $\pm 0.1\%$ of the max. output frequency (25°C±10°C)
	Frequency Setting Resolution
	Digital reference : 0.01 Hz Analog reference: 0.03 Hz/60 Hz (11 bit)
	Output Frequency Resolution
	0.001 Hz
Protective Functions	Speed Control Range
	1:1500 (Closed Loop Vector Control and Closed Loop Vector Control for PM) 1:200 (Open Loop Vector Control) 1:40 (V/f Control and V/f Control with PG) 1:20 (Open Loop Vector Control for PM) 1:100 (Advanced Open Loop Vector Control for PM)
	Speed Control Accuracy
	±0.2% in Open Loop Vector Control (25°C±10°C), 0.01% in Closed Loop Vector Control (25°C±10°C)
	Speed Response
	10 Hz in Open Loop Vector Control (25°C±10°C), 50 Hz in Closed Loop Vector Control (25°C±10°C) (excludes temperature fluctuation when performing rotational autotuning)
	Accel/Decel Time
	0.00 s to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)
	Main Control Functions
	Torque control, droop control, speed/torque control switch, feed forward control, load torque observer control, momentary power loss ride-thru, speed search, overtorque detection, torque limit, autotuning, dwell, slip compensation, torque compensation, energy saving control, etc.
PLC Functions	Motor Protection
	Electronic thermal overload relay
	Momentary Overcurrent Protection
	Drive stops when output current exceeds 200% of rated output current.
	Overload Protection
	Drive stops after 60 s at 150% of rated output current.
	Oversupply Protection
	Stops when DC bus exceeds approx. 820 V.
	Undervoltage Protection
	Stops when DC bus falls below approx. 380 V.
Communications	Heatsink Overheat Protection
	Thermistor
	Stall Prevention
	Stall prevention during acceleration/deceleration and constant speed operation
	Ground Fault Protection
	Protection by electronic circuit
	Charge LED
	Charge LED remains lit until DC bus has fallen below approx. 50 V
	Blown Fuse Protection
	Provided

Controller Specifications		Environmental Conditions			
Conditions	Specifications	Conditions	Specifications		
PLC Functions	Program Capacity	User program: 512 kbyte (equivalent to 8 k steps)	Environment	Applicable Standards	JIS, JEM, JEC
	Running Speed	1 k step/1 ms			General environmental conditions (free from dust and corrosive gases)
	Language	CP language (ladder language, about 120 types) Text-type language, SFC, chart type		Ambient Temperature	-10°C to +45°C
	Scanning Speed	High speed: 1.0 ms to 30 ms Low speed: 1.0 ms to 300 ms		Humidity	90% RH or less (no condensation)
	Trace	Data trace : 128 kW (32 kW×4 Gr) Fault trace : 32 kW		Storage Temperature	-20°C to +60°C
	Inverter Trace	36 kW (16 points×2048 records)		Altitude	1000 m or less
	CP-215IF*5	Link transmission: register input 2048 words, register output 512 words max. Message transmission: MEMOBUS/no protocol (user 13 CH max.)		Area of Use	Indoors
		Cabinet Specifications	Form	Vertically-standalone type, protective front panel type	
			Painting	5Y7/1 both for inner and outer surfaces	
		Enclosure	IP40		

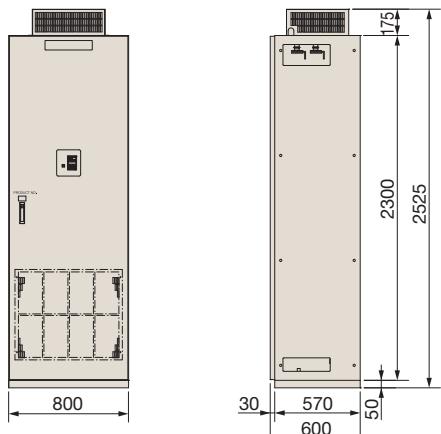
* 5 : PROFIBUS-DP and CP-213 can be used depending on converters.

Dimensions

Units: mm

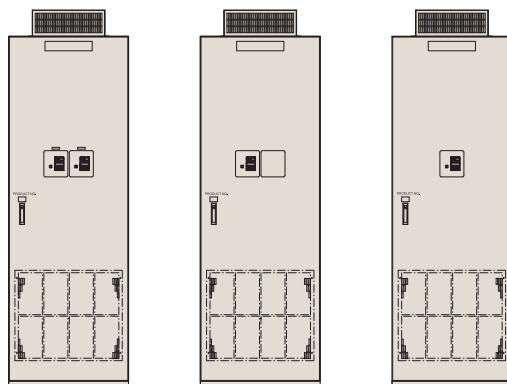
FSDrive-^{LV1H}
F

Panel Dimensions



The number of inverter units that can be installed varies in accordance with the capacity of the inverter drive: two units in 55-kW or 75-kW inverter drive, one unit in 90 kW or more.

Exterior



Two units in
55-kW or 75-kW drive

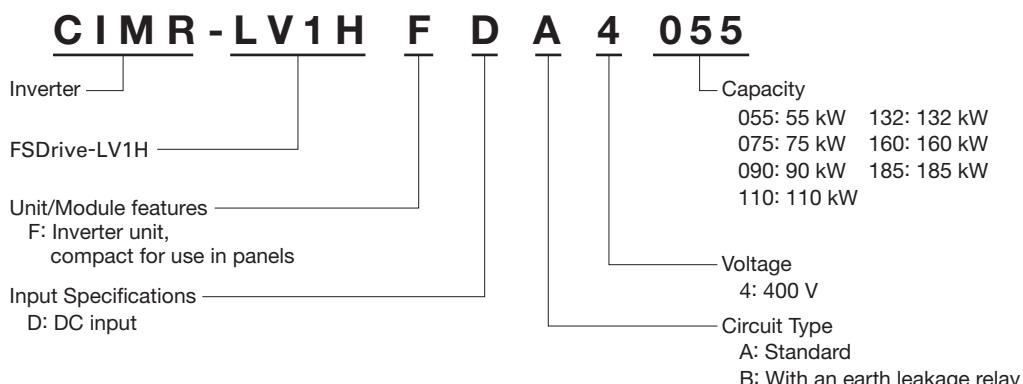
One unit in
55-kW or 75-kW drive

One unit in
90-kW drive

Number of Installed Units

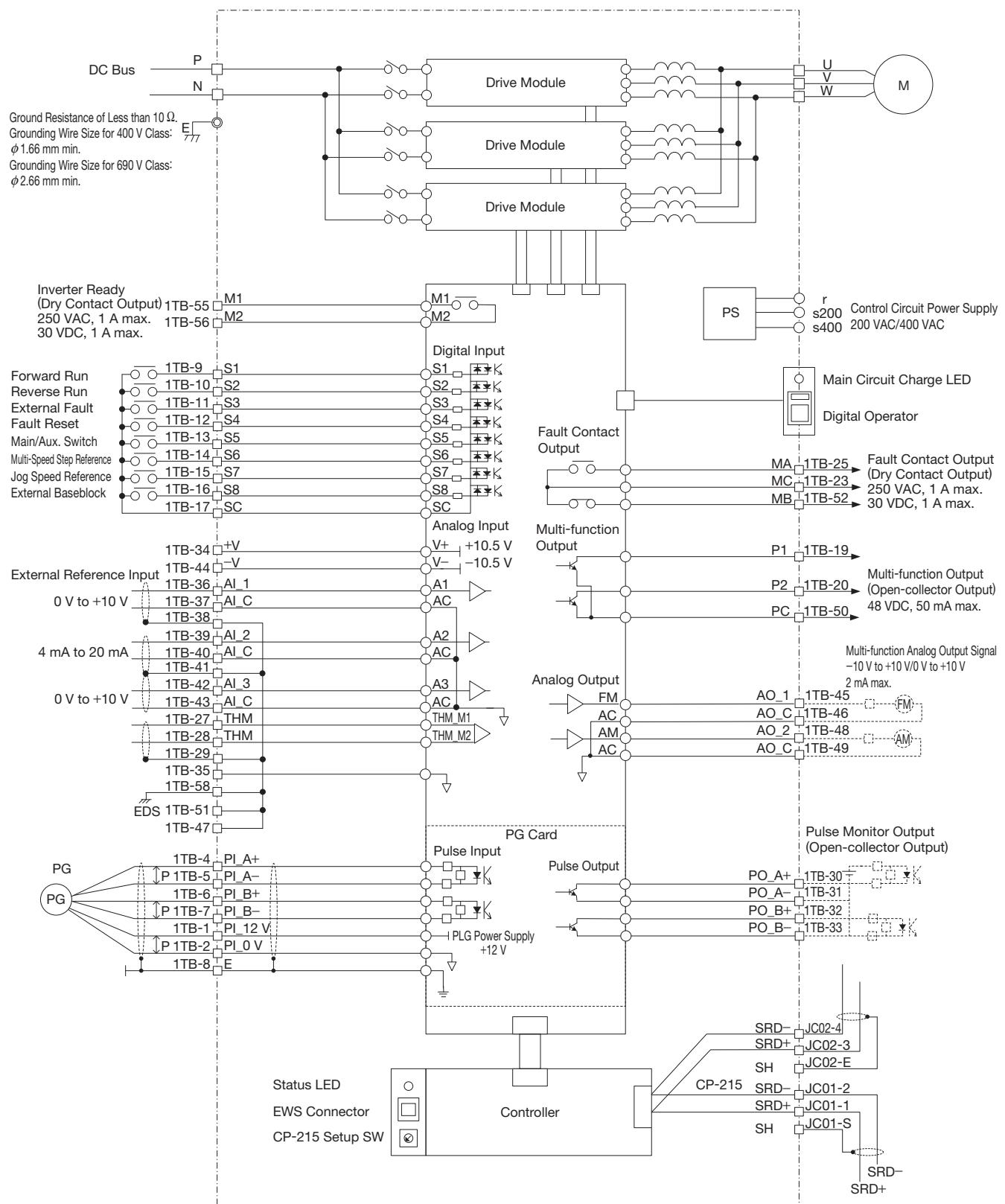
Unit Model Number	Capacity kW	Maximum Number of Installed Units
CIMR-LV1HFD□4□□□	55	2
055		
075	75	
090	90	1
110	110	
132	132	
160	160	
185	185	

Unit Model Numbers



FSDrive-LV1HS: Slim Drive Module, Large Capacity

Connections



Terminal Functions

Terminal Name		Signal Name
Main Circuit Terminal	P, N U, V, W	Main circuit input Main circuit output

Control Circuit Terminals

Terminal Block Name	Terminal No.	Signal Name	Function	Input/Output	Signal Level
1TB	1	PI_12 V	PLG power supply 12 V	Output	PLG power supply output (200 mA max.)
	2	PI_0 V	PLG power supply 0 V	Output	
	3	—			
	4	PI_A+	Pulse Input A+	Input	12-V photocoupler input
	5	PI_A-	Pulse Input A-	Input	
	6	PI_B+	Pulse Input B+	Input	
	7	PI_B-	Pulse Input B-	Input	
	8	E	PI and PO cable shield sheath	—	
	9	S1	Sequence input (forward run)	Input	
	10	S2	Sequence input (reverse run)	Input	
	11	S3	Sequence input (external fault)	Input	
	12	S4	Sequence input (fault reset)	Input	
	13	S5	Sequence input (main/aux. switch reference)	Input	
	14	S6	Sequence input (multi-speed step reference)	Input	
	15	S7	Sequence input (jog speed reference)	Input	
	16	S8	Sequence input (external baseblock)	Input	
	17	SC	Sequence input common	Input	
	18	—			
	19	P1	Multi-function output	Output	48 VDC, 50 mA Open-collector output
	20	P2	Multi-function output	Output	
	21	—			
	22	—			
	23	MC	Fault contact output common	Output	Dry contact 250 VAC, 10 mA to 1 A 30 VDC, 10 mA to 1 A
	24	—			
	25	MA	Fault contact output (NO contact)	Output	
	26	—			
	27	THM+	Thermistor input	Input	
	28	THM-			
	29	EDS	Shield Sheath	—	
	30	PO_A+	Pulse Monitor_A+	Output	12-V complementary output
	31	PO_A-	Pulse Monitor_A-	Output	
	32	PO_B+	Pulse Monitor_B+	Output	
	33	PO_B-	Pulse Monitor_B-	Output	
	34	+V	Analog power supply	Output	+10.5 V (20 mA)
	35	SG		—	
	36	AI_1	Analog input 1 (reference input)	Input	—10 V to +10 V/0 V to +10 V
	37	AI_C	Analog input common	Input	
	38	EDS	Shield Sheath	—	
	39	AI_2	Analog input 2 (reference input)	Input	4 mA to 20 mA /0 V to 10 V
	40	AI_C	Analog input common	Input	
	41	EDS	Shield Sheath	—	
	42	AI_3	Analog input 3 (reference input)	Input	—10 V to +10 V/0 V to +10 V
	43	AI_C	Analog input common	Input	
	44	-V	Analog power supply	Output	—10.5 V (20 mA)
	45	AO_1	Multi-function analog monitor 1	Output	—10 V to +10 V/0 V to +10 V 2 mA max.
	46	AO_C	Analog monitor common	Output	
	47	EDS	Shield Sheath	—	
	48	AO_2	Multi-function analog monitor 2	Output	—10 V to +10 V/0 V to +10 V 2 mA max.
	49	AO_C	Analog monitor common	Output	
	50	PC	Multi-function output common	Output	
	51	EDS	Shield Sheath	—	
	52	MB	Fault contact output (NC contact)	Output	
	53	—			
	54	—			
	55	M1	Inverter ready (NO contact)	Output	Dry contact 250 VAC, 10 mA to 1 A 30 VDC, 10 mA to 1 A
	56	M2		Output	
	57	—			
	58	EDS	Shield Sheath	—	

FSDrive-LV1HS: Slim Drive Module, Large Capacity

Specifications

Type		CIMR-LV1HSR□4□□□(400 V)					CIMR-LV1HSR□6□□□(690 V)				
Model		200	400	600	800	10C	350	700	10C	14C	17C
Max. Applicable Motor Capacity* ¹ kW		200	400	600	800	1000	350	700	1050	1400	1750
Rated Input Current* ² A		373	739	1104	1467	1830	410	814	1216	1618	2019
Rated Input Voltage		510 VDC to 720 VDC					810 VDC to 1040 VDC				
Output	Rated Output Capacity* ³ kVA	320	610	920	1220	1530	440	840	1260	1680	2100
	Rated Output Current* ⁴ A	414	800	1200	1600	2000	360	700	1050	1400	1750
	Overload Tolerance	150% of rated output current for 60 s									
	CARRIER Frequency	2 kHz									
	Max. Output Voltage* ⁵	Three-phase 380 V to 480 V (relative to input voltage)					Three-phase 600 V to 690 V (proportional to input voltage)				
Max. Output Frequency		150 Hz									

* 1 : The rated output current of the inverter drive output amps should be equal to or greater than the motor rated current.

* 2 : Value displayed is for operating at the rated output current. This value may fluctuate based on power supply side impedance, as well as the power supply transformer, input side reactor, and wiring.

* 3 : The rated output capacity is calculated with a rated output voltage of 440 VAC or 690 VAC.

* 4 : Carrier frequency is set to 2 kHz.

* 5 : Varies by the type of input power supply and inverter drive capacity.

Drive Specifications		Conditions	Specifications
Control Characteristics	Control Method	V/f Control, V/f Control with PG, Open Loop Vector Control, Closed Loop Vector Control, EMS Control	
	Frequency Control Range	0.01 Hz to 150 Hz	
	Frequency Accuracy (Temperature Fluctuation)	Digital reference : within $\pm 0.01\%$ of the max. output frequency (-10°C to $+40^{\circ}\text{C}$) Analog reference: within $\pm 0.1\%$ of the max. output frequency ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$)	
	Frequency Setting Resolution	Digital reference : 0.01 Hz Analog reference: 0.03 Hz/60 Hz (11 bit)	
	Output Frequency Resolution	0.001 Hz	
	Starting Torque	150%/3 Hz (V/f Control) 150%/3 Hz (V/f Control with PG) 200%/0.3 Hz (Open Loop Vector Control) 200%/0 min ⁻¹ (Closed Loop Vector Control)	
	Speed Control Range	1:40 (V/f Control) 1:40 (V/f Control with PG) 1:200 (Open Loop Vector Control) 1:1500 (Closed Loop Vector Control)	
	Speed Control Accuracy	$\pm 0.2\%$ in Open Loop Vector Control ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$), 0.01% in Closed Loop Vector Control ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$)	
	Speed Response	5 Hz ($25 \pm 10^{\circ}\text{C}$) (Open Loop Vector Control)	
	Accel/Decel Time	0.00 s to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)	
Protective Functions	Voltage/Frequency Characteristics	User-selected programs and V/f preset patterns possible	
	Main Control Functions	Torque control, droop control, speed/torque control switch, feed forward control, load torque observer control, momentary power loss ride-thru, speed search, overtorque detection, torque limit, autotuning, dwell, slip compensation, torque compensation, energy saving control, etc.	
	Motor Protection	Electronic thermal overload relay	
	Momentary Overcurrent Protection	Drive stops when output current exceeds 200% of rated output current.	
	Overload Protection	Drive stops after 60 s at 150% of rated output current.	
	Overspeed Protection	400 V: Stops when DC bus voltage exceeds approx. 820 V. 690 V: Stops when DC bus voltage exceeds approx. 1196 V.	
	Undervoltage Protection	400 V: Stops when DC bus voltage falls below approx. 380 V. 690 V: Stops when DC bus voltage falls below approx. 570 V.	
	Momentary Power Loss Compensation	Stops immediately after power loss of 15 ms, recovers from power loss and restarts in 2 s.	
	Heatsink Overheat Protection	Thermistor	
	Stall Prevention	Stall prevention during acceleration/deceleration and constant speed operation	
Communications	Ground Fault Protection	Protection by electronic circuit	
	Charge LED	Charge LED remains lit until DC bus has fallen below approx. 50 V	
Blown Fuse Protection		Provided	

Controller Specifications		Environmental Conditions		
Conditions	Specifications	Conditions	Specifications	
Program Capacity	User program: 512 kbyte (equivalent to 8 k steps)	Applicable Standards	JIS, JEM, JEC	
Running Speed	1 k step/1 ms		Atmosphere General environmental conditions (free from dust and corrosive gases)	
Language	CP language (ladder language, about 120 types) Text-type language, SFC, chart type		Ambient Temperature -10°C to $+45^{\circ}\text{C}$	
Scanning Speed	High speed: 1.0 ms to 30 ms Low speed: 1.0 ms to 300 ms		Humidity 90% RH (no condensation)	
Trace	Data trace : 128 kW (32 kW×4 Gr) Fault trace : 32 kW		Storage Temperature -20°C to $+60^{\circ}\text{C}$	
Inverter Trace	36 kW (16 points×2048 records)		Altitude 1000 m or less	
CP-215IF* ⁶	Link transmission: register input 2048 words, register output 512 words max.		Area of Use Indoors	
	Message transmission: MEMOBUS/no protocol (user 13 CH max.)		Cabinet Form Vertically-standalone type, protective front panel type	
			Painting 5Y/1 both for inner and outer surfaces	
			Enclosure IP51 compliant ^(Note)	

Note: See *2 on page 22.

Dimensions Units: mm

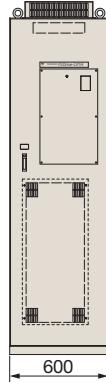
Panel Dimensions


Figure 1

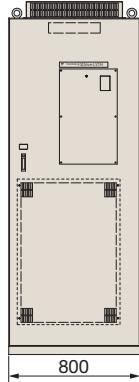


Figure 2

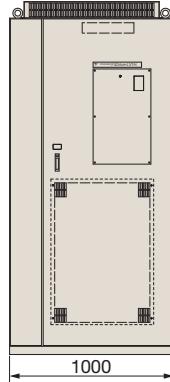


Figure 3

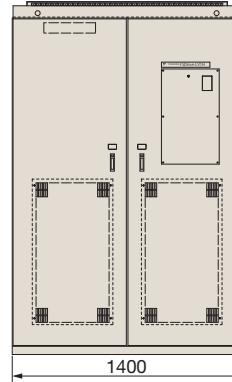


Figure 4

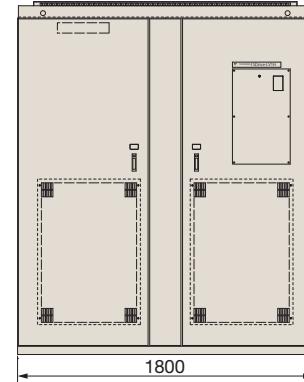
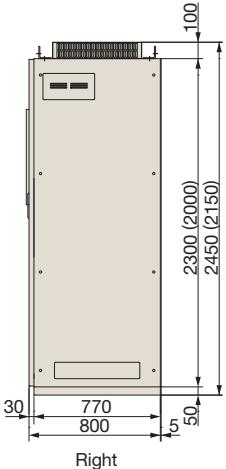


Figure 5


 Right
(Same for all models)

Model Number and Rated Capacity

400 V			690 V			Figure*
Model CIMR-LV1HSR□4□□□	Capacity kW	Approx. Mass kg	Model CIMR-LV1HSR□6□□□	Capacity kW	Approx. Mass kg	Figure*
200	200	450	350	350	450	1
400	400	650	700	700	700	2
600	600	900	10C	1050	1000	3
800	800	1250	14C	1400	1350	4
10C	1000	1400	17C	1750	1550	5

* : The panel height varies in accordance with circuit type.

Model Numbers
C I M R - L V 1 H S R A 4 2 0 0

 FSDrive-LV1HS:
Slim Drive Module, Large Capacity

 Circuit Type (1)
R: No inrush prevention
C: Inrush prevention

 Circuit Type (2)
A: With DC_SW (panel height: 2300 mm)
B: Without DC_SW (panel height: 2300 mm)
C: Without DC_SW (panel height: 2000 mm)

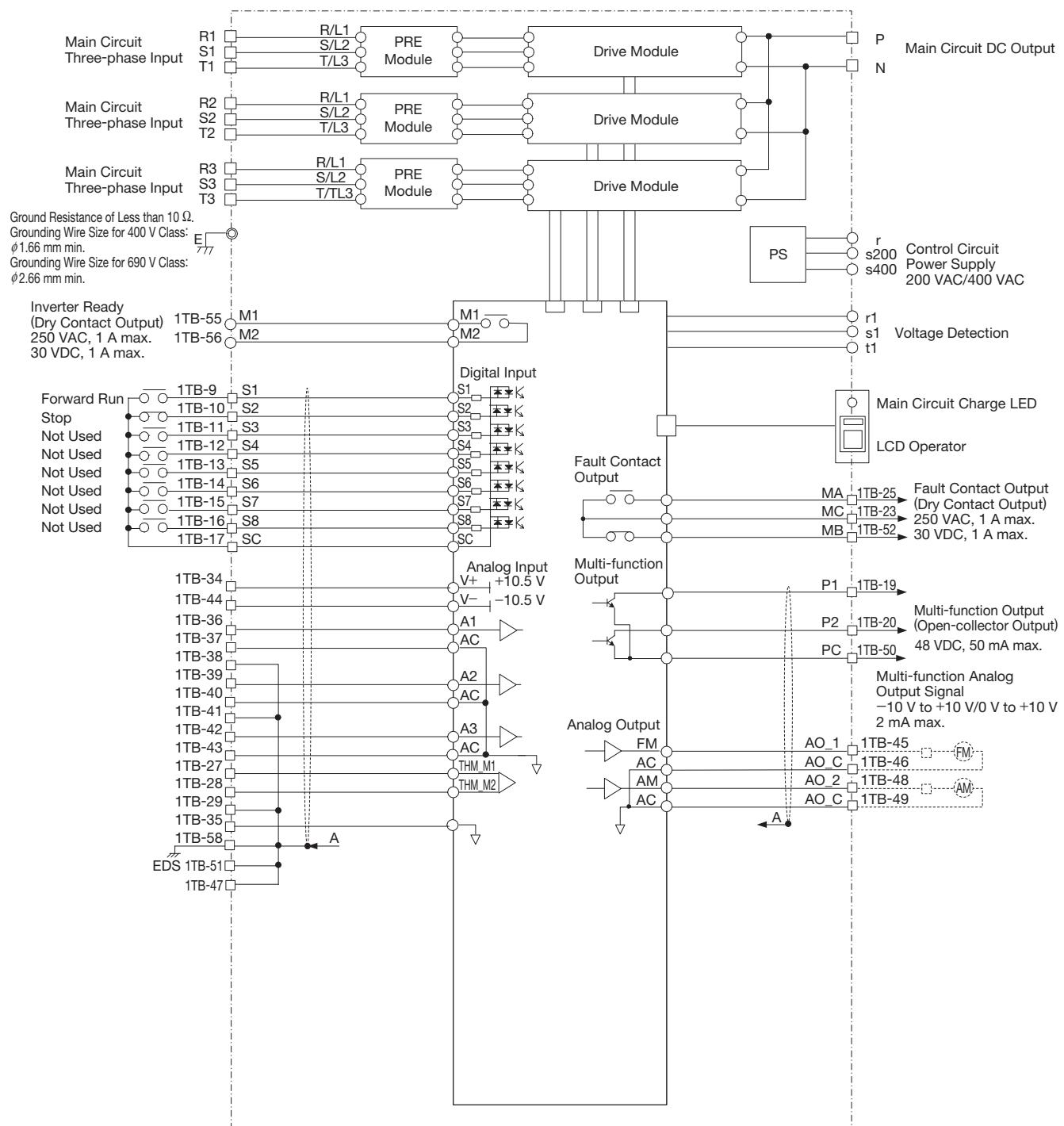
 Capacity
400 V 690 V
200: 200 kW 350: 350 kW
400: 400 kW 700: 700 kW
600: 600 kW 10C: 1050 kW
800: 800 kW 14C: 1400 kW
10C: 1000 kW 17C: 1750 kW

 Voltage
4: 400 V
6: 690 V

Note: The above model numbers do not represent the combinations for all models.

Converter FSDrive-LC1HS: Slim Drive Module, Large Capacity

Connections



Terminal Functions

Terminal Name		Signal Name	Specifications
Main Circuit Input Terminal	R	Main circuit phase-R input	Main circuit three-phase input
	S	Main circuit phase-S input	
	T	Main circuit phase-T input	
Main Circuit Output Terminal	P	Main circuit phase-P output	Main circuit DC output
	N	Main circuit phase-N output	

Control Circuit Terminals

Terminal Block Name	Terminal No.	Signal Name	Function	Input/Output	Signal Level
1TB	1	—			
	2	—			
	3	—			
	4	—			
	5	—			
	6	—			
	7	—			
	8	—			
	9	S1	Sequence input (forward run)	Input	24 VDC, 8 mA Photocoupler input
	10	S2	Sequence input (stop)	Input	
	11	S3	Not used.	Input	
	12	S4	Not used.	Input	
	13	S5	Not used.	Input	
	14	S6	Not used.	Input	
	15	S7	Not used.	Input	
	16	S8	Not used.	Input	
	17	SC		Input	
	18	—			
	19	P1	Multi-function output	Output	48 VDC, 50 mA Open-collector output
	20	P2	Multi-function output	Output	
	21	—			
	22	—			
	23	MC	Fault contact output common	Output	Dry contact 250 VAC, 1 A max. 30 VDC, 1 A max.
	24	—	—	—	
	25	MA	Fault contact output (NO contact)	Output	
	26	—			
	27	—			
	28	—			
	29	EDS	Shield Sheath	—	
	30	—			
	31	—			
	32	—			
	33	—			
	34	—			
	35	—			
	36	—			
	37	—			
	38	EDS	Shield Sheath	—	
	39	—			
	40	—			
	41	EDS	Shield Sheath	—	
	42	—			
	43	—			
	44	—			
	45	AO_1	Multi-function analog monitor 1	Output	−10 V to +10 V/0 V to +10 V 2 mA max.
	46	AO_C	Analog monitor common	Output	
	47	EDS	Shield Sheath	—	
	48	AO_2	Multi-function analog monitor 2	Output	−10 V to +10 V/0 V to +10 V 2 mA max.
	49	AO_C	Analog monitor common	Output	
	50	PC	Multi-function output common	Output	
	51	EDS	Shield Sheath	—	
	52	MB	Fault contact output (NC contact)	Output	
	53	—			
	54	—			
	55	M1	Inverter ready (NO contact)	Output	Dry contact 250 VAC, 1 A max. 30 VDC, 1 A max.
	56	M2		Output	
	57	—			
	58	EDS	Shield Sheath	—	

Converter FSDrive-LC1HS: Slim Drive Module, Large Capacity

Specifications

Type		CIMR-LC1HSR□4□□□ (400 V)					CIMR-LC1HSRA6□□□ (690 V)																		
Model		200	400	600	800	10C	350	700	10C	14C	17C														
Max. Applicable Inverter Drive Capacity	kW	200	400	600	800	1000	350	700	1050	1400	1750														
Rated Input Current	A	414	800	1200	1600	2000	360	700	1050	1400	1750														
Output	Rated Output Capacity	kW	250	500	750	1000	1250	380	760	1140	1520														
	Rated Output Current	A	380	760	1140	1520	1900	370	740	1110	1480														
	Rated Output Voltage		660 VDC				1020 VDC																		
	Overload Tolerance		150% of rated input current for 60 s																						
Power Supply	Career Frequency		2 kHz																						
	Max. Output Voltage		720 VDC				1040 VDC																		
	Rated Voltage and Rated Frequency		Three-phase 380 VAC to 480 VAC, 50/60 Hz				Three-phase 600 VAC to 690 VAC, 50/60 Hz																		
	Allowable Voltage Fluctuation		-15% to +10%																						
Allowable Frequency Fluctuation		±3%/300 ms (free phase rotation)																							
Power Supply Equipment Capacity		Power supply capacity greater than the rated input capacity																							

Drive Specifications		Conditions	Specifications
Control Characteristics	Control Method	Sine Wave PWM*1	
	Input Power Factor	0.99 min. (at rated current)	
	Output Voltage Accuracy	±5%	
Protective Functions	Momentary Overcurrent Protection	Drive stops when input current exceeds 200% of rated input current.	
	Overload Protection	Drive stops after 60 s at 150% of rated input current.	
	Oversupply Protection	400 V: Stops when DC bus voltage exceeds approx. 820 V. 690 V: Stops when DC bus voltage exceeds approx. 1200 V.	
	Undervoltage Protection (Output)	400 V: Stops when DC bus voltage falls below approx. 380 V. 690 V: Stops when DC bus voltage falls below approx. 570 V.	
	Undervoltage Protection (Input)	400 V: Stops when input voltage falls below approx. 300 V 690 V: Stops when input voltage falls below approx. 500 V	
	Heatsink Overheat Protection	Thermistor	
	Ground Fault Protection	Protection by electronic circuit	
	Charge LED	Charge LED remains lit until DC bus has fallen below approx. 50 V	
	Blown Fuse Protection	Stops by fuse blown.	

* 1: The FSDrive-LC1HS conforms to the conditions for self-excited three-phase bridges ($K_5 = 0$) outlined by the "Japanese Guidelines for Reduction of Harmonic Emission" published by the Ministry of Economy, Trade and Industry in Japan. These bridges generate no harmonics, but the harmonics are not completely eliminated.

Environmental Conditions		Conditions	Specifications
Applicable Standards		JIS, JEM, JEC	
Environment	Atmosphere	General environmental conditions (free from dust and corrosive gases)	
	Ambient Temperature	-10°C to +45°C	
	Humidity	90% RH (no condensation)	
	Storage Temperature	-20°C to +60°C (temperature applicable for a short time of storage such as during transportation)	
	Altitude	1000 m or less	
	Area of Use	Indoors	
	Vibration	2.0 m/s ² at 10 Hz to 55 Hz	
Cabinet	Form	Vertically-standalone type	
Specifications	Painting	5Y7/1 both for inner and outer surfaces	
Enclosure	IP	IP51 compliant*2	

* 2: The regenerative converter is completely shielded from all sides of the enclosure panel. Gaskets and filters are installed to completely seal shut any openings that would allow air to pass through (such as around the enclosure door), sufficiently protecting the regenerative converter from dust. The design also keeps small amount of dripping water from splashing up and directly entering the enclosure. In regards to ventilation, the standard regenerative converter has an IP20 rating. A protective cover for cables entering the regenerative converter is included.

Dimensions Units: mm

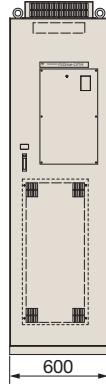
Panel Dimensions


Figure 1

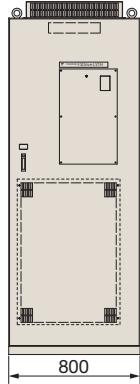


Figure 2

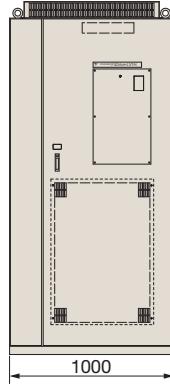


Figure 3

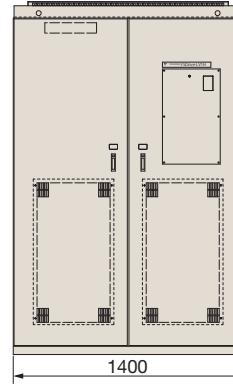


Figure 4

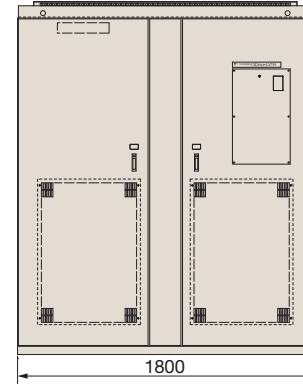
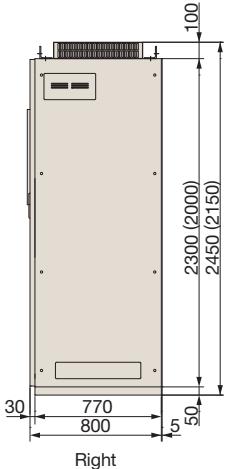


Figure 5

Right
(Same for all models)
Model Number and Rated Capacity

400 V			690 V			Figure*
Model CIMR-LC1HSR□4□□□	Capacity kW	Approx. Mass kg	Model CIMR-LC1HSR□6□□□	Capacity kW	Approx. Mass kg	Figure*
200	200	450	350	350	500	1
400	400	650	700	700	700	2
600	600	900	10C	1050	950	3
800	800	1200	14C	1400	1300	4
10C	1000	1400	17C	1750	1500	5

* : The panel height varies in accordance with circuit type.

Model Numbers
C I M R - L C 1 H S R C 4 2 0 0

 FSDrive-LC1HS:
Slim Drive Module, Large Capacity

 Specifications
R: Regenerative power

 Specifications
A: Panel height: 2300 mm
C: Panel height: 2000 mm

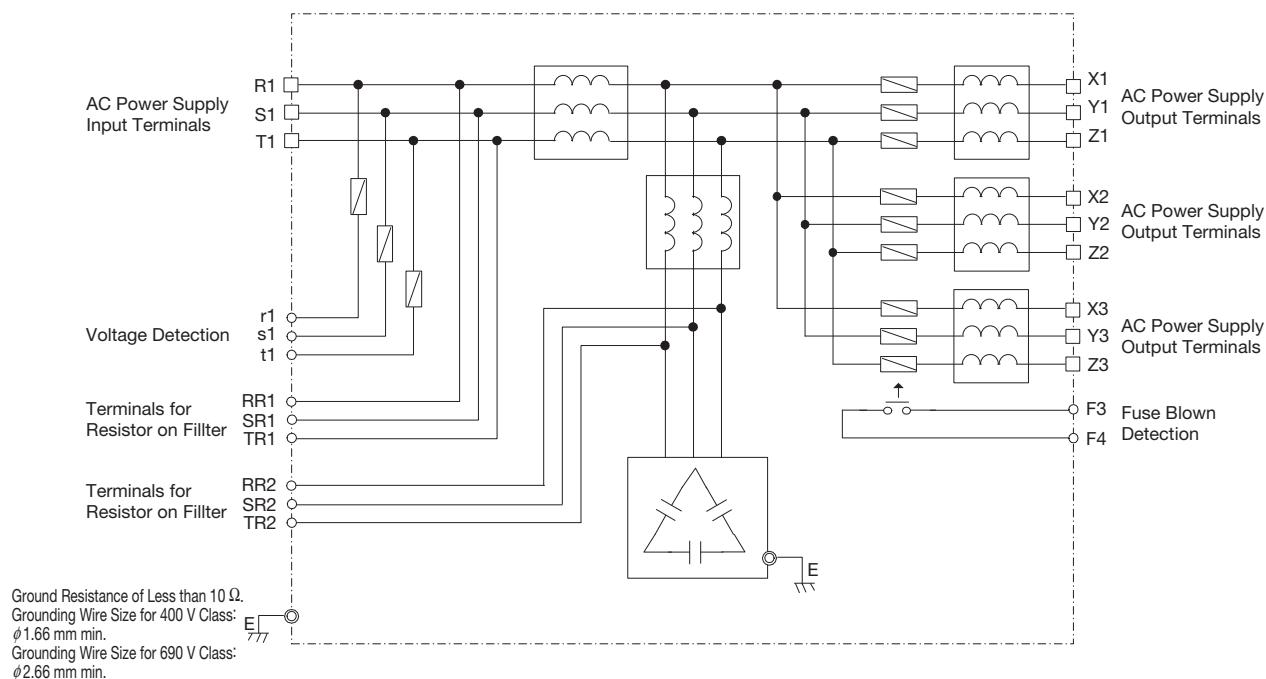
 Applicable inverter drives
 400 V 690 V
 200: 200 kW 350: 350 kW
 400: 400 kW 700: 700 kW
 600: 600 kW 10C: 1050 kW
 800: 800 kW 14C: 1400 kW
 10C: 1000 kW 17C: 1750 kW

 Voltage
 4: 400 V
 6: 690 V

Note: The above model numbers do not represent the combinations for all models.

FSDrive-LA1HS: Slim AC Reactor, Large Capacity

Connections



Terminal Functions

Terminal Name		Signal Name	Specifications							
Main Circuit Input Terminal	R1	Main circuit phase-R input	Main circuit three-phase input Note: Main circuit inputs should be wired directly to the terminals on the AC reactor for 400 V class 600 kW or larger models and 690 V class 1050 kW or larger models.							
	S1	Main circuit phase-S input								
	T1	Main circuit phase-T input								
Main Circuit Output Terminal	X1, X2, X3, X4, X5	Main circuit phase-X output	Main circuit three-phase output The number of terminals on the AC reactor varies by capacity (max. 5 groups of 3 phases).							
	Y1, Y2, Y3, Y4, Y5	Main circuit phase-Y output								
	Z1, Z2, Z3, Z4, Z5	Main circuit phase-Z output								

Specifications

Type	CIMR-LA1HSR□4□□□(400 V)										CIMR-LA1HSRA6□□□(690 V)					
Model	200	400	600	800	10C	350	700	10C	14C	17C	200	400	600	800	10C	
Power Supply	Rated Voltage and Rated Frequency Three-phase 380 VAC to 480 VAC, 50/60 Hz										Three-phase 600 VAC to 690 VAC, 50/60 Hz					
	Allowable Voltage Fluctuation -15% to +10%															
	Allowable Frequency Fluctuation ±3%/300 ms (free phase rotation)															
	Rated Input Current A	414	800	1200	1600	2000	360	700	1050	1400	1750					
	Power Supply Equipment Capacity kVA	Power supply capacity greater than the rated input capacity														
Applicable converters		CIMR-LC1HSR□4□□□					CIMR-LC1HSRA6□□□					200	400	600	800	10C
		200	400	600	800	10C	350	700	10C	14C	17C					

Environmental Conditions

Conditions		Specifications									
Applicable Standards	JIS, JEM, JEC										
Environment	Atmosphere	General environmental conditions (free from dust and corrosive gases)									
	Ambient Temperature	-10°C to +45°C									
	Humidity	90% RH (no condensation)									
	Storage Temperature	-20°C to +60°C (temperature applicable for a short time of storage such as during transportation)									
	Altitude	1000 m or less									
	Area of Use	Indoors									
	Vibration	2.0 m/s ² at 10 Hz to 55 Hz									
Cabinet	Form	Vertically-standalone type									
Specifications	Painting	5Y7/1 both for inner and outer surfaces									
Enclosure	IP20										

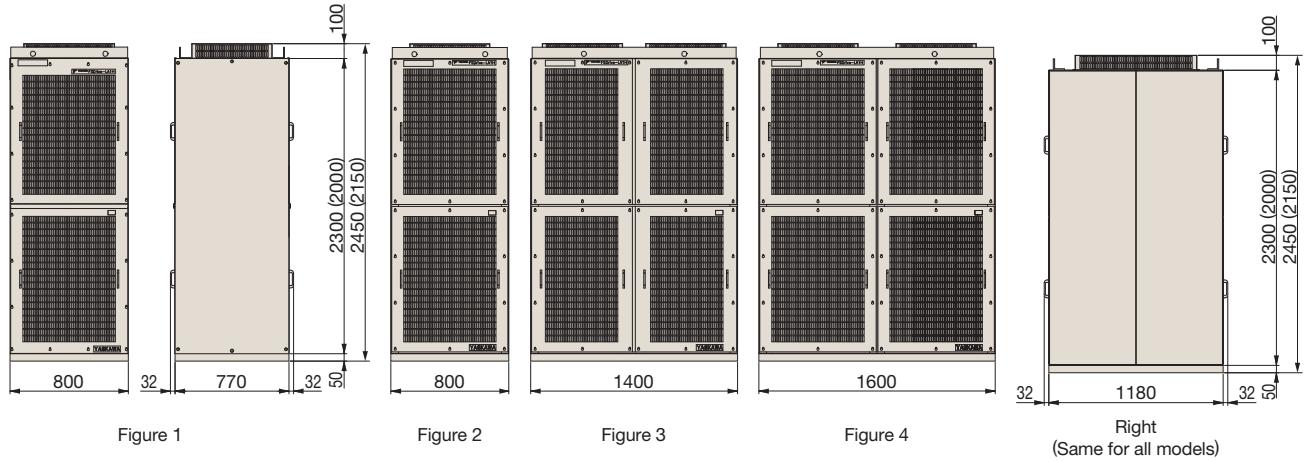
Dimensions Units: mm
Panel Dimensions


Figure 1

Figure 2

Figure 3

Figure 4

Right
(Same for all models)
Model Number and Rated Capacity

400 V			690 V			Figure*
Model	Capacity kW	Approx. Mass kg	Model	Capacity kW	Approx. Mass kg	
CIMR-LA1HSR□4□□□			CIMR-LA1HSR□6□□□			
200	200	550	350	350	750	1
400	400	850	700	700	1200	2
600	600	1300	10C	1050	1800	3
800	800	1700	14C	1400	2300	4
10C	1000	2000	17C	1750	2750	4

* : The panel height varies in accordance with circuit type.

Model Numbers

C I M R - L A 1 H S R A 4 2 0 0

FSDrive-LA1HS: _____
Slim AC Reactor, Large Capacity

Specifications _____
R: Regenerative power

Specifications _____
A: Panel height: 2300 mm
C: Panel height: 2000 mm

Applicable converters

400 V	690 V
200: 200 kW	350: 350 kW
400: 400 kW	700: 700 kW
600: 600 kW	10C: 1050 kW
800: 800 kW	14C: 1400 kW
10C: 1000 kW	17C: 1750 kW

Voltage
4: 400 V
6: 690 V

Note: The above model numbers do not represent the combinations for all models.

FSDrive-LV1H SERIES

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice
for ongoing product modifications and improvements.

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