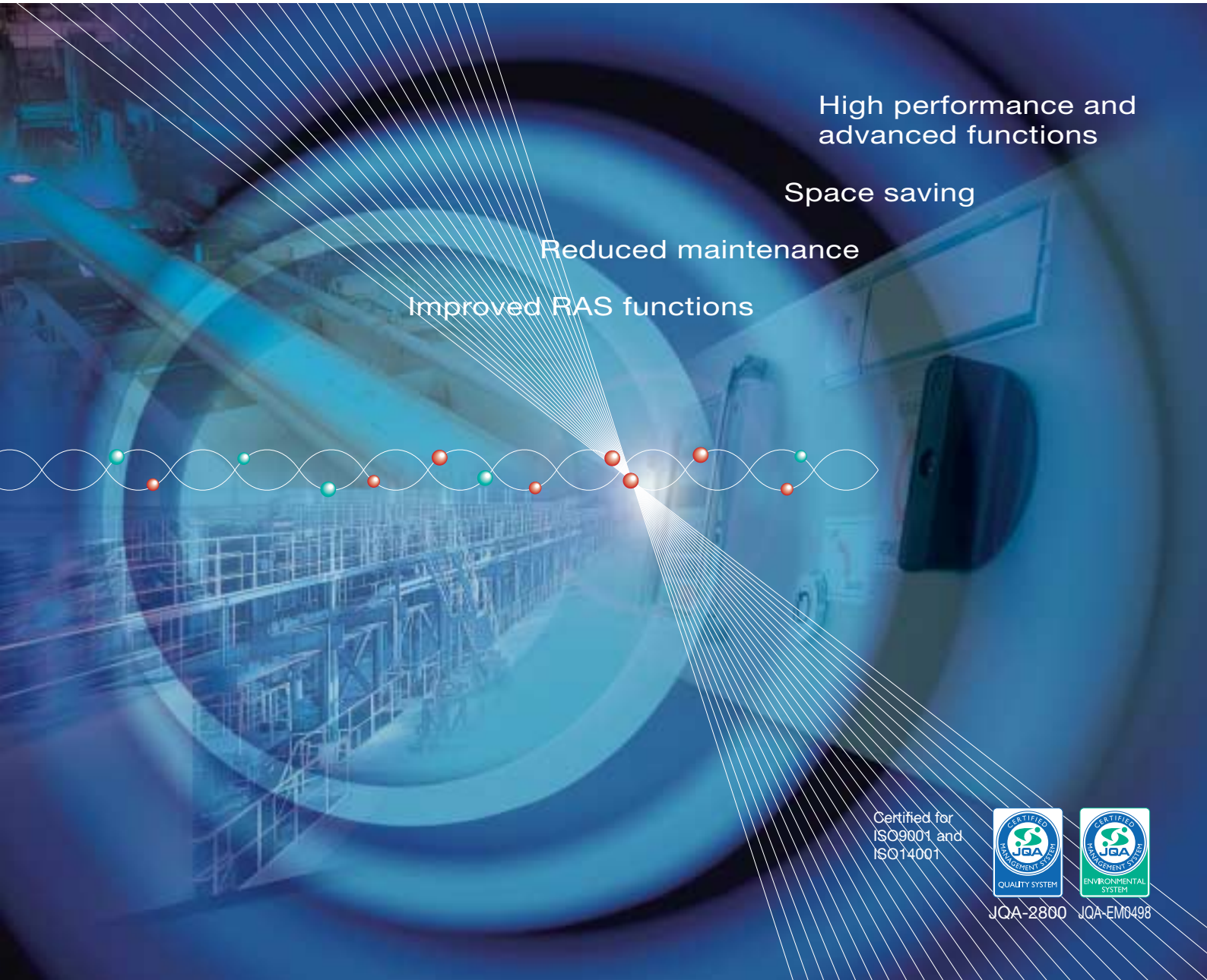
YASKAWA

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



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.

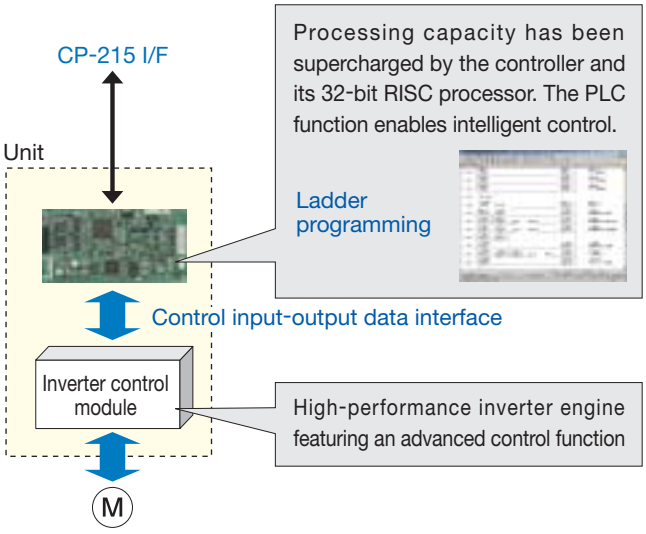
- LV1HM: Unique design of multiple-drawer unit saves space and reduces maintenance with the world's-smallest class of inverter control modules.
- LV1HF: Inverter units and peripheral devices are contained for easy and tidy storage in limited space.
- LV1HS: Slim drive modules deliver a large capacity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

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.

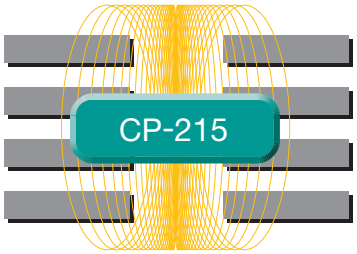
∗1 : Permanent-magnet synchronous motor

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.

Flexibility in unit arrangements

The optimal unit arrangement for the system can be achieved, as units with different capacities can be installed within the same 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	
	11 to 15	9	
	18.5	7	
	22 to 30	6	
	37 to 45	5	

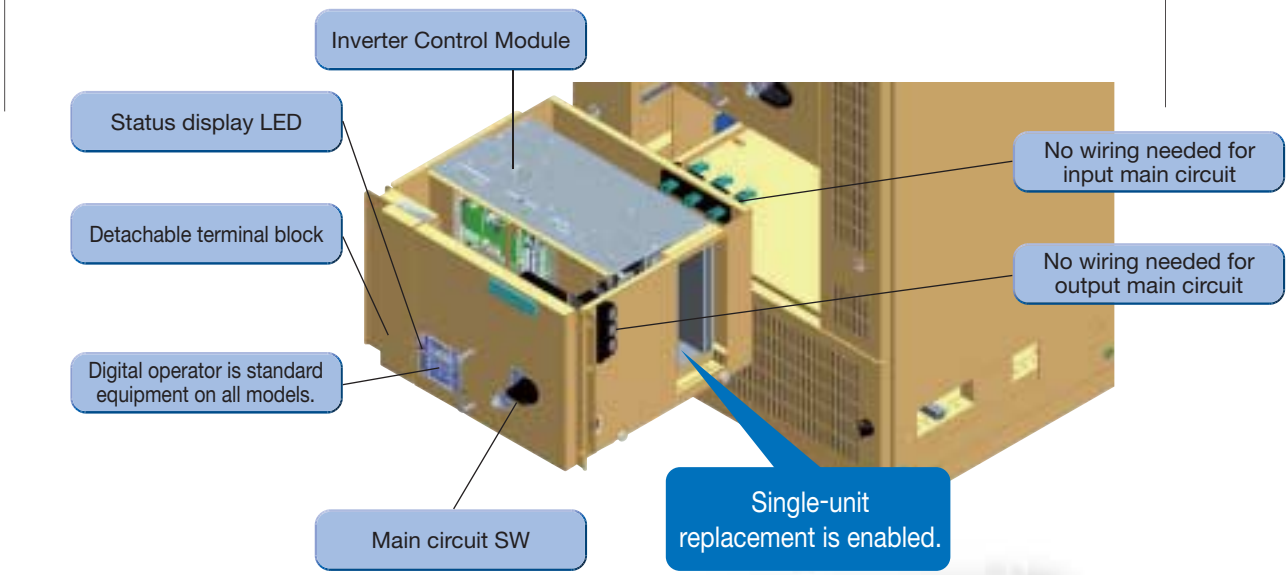
Unit-type construction enables easy maintenance.

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)



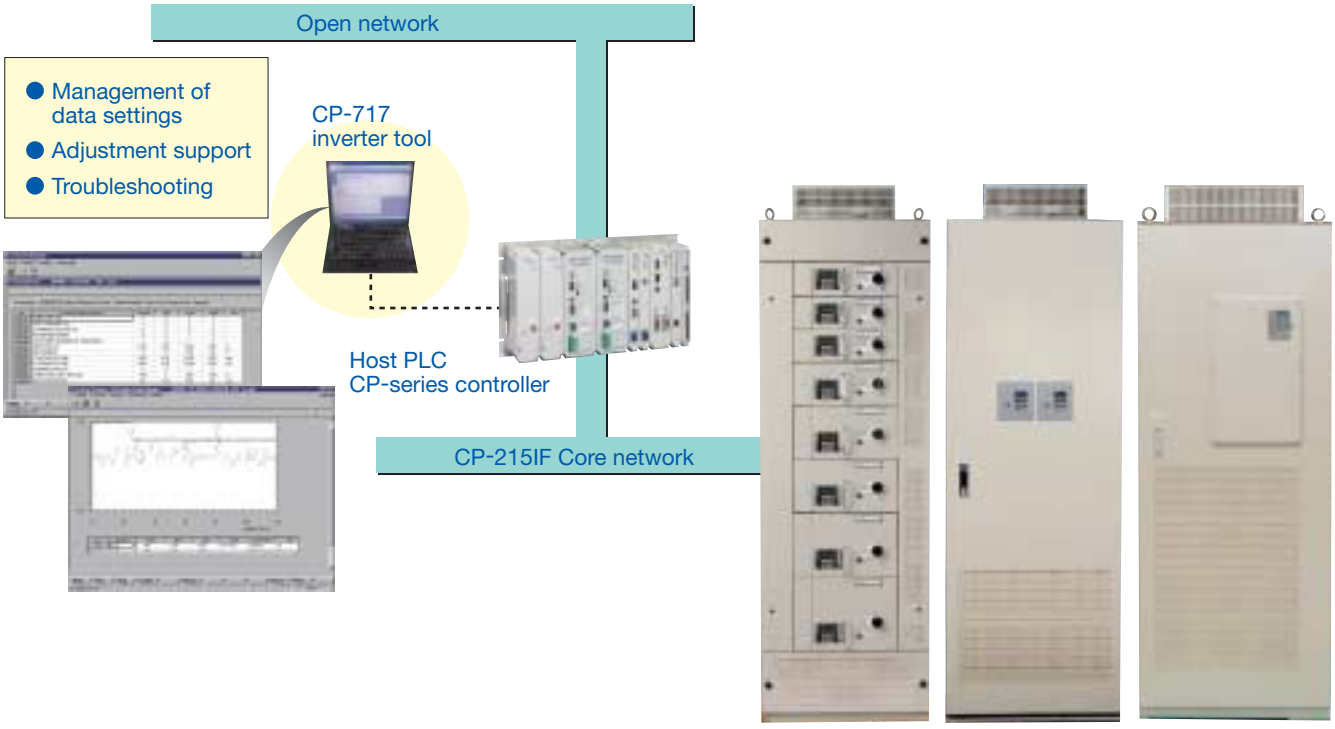
Drive Module

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.



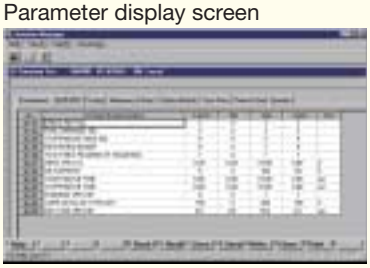
- Operating condition monitoring and parameter setting functions
- Enhanced self-diagnosis and remaining-life prediction functions
- Traceback for fault analysis and fault history display
- Enhanced monitor functions
- Autotuning for adjustment support
  (Setting of speed and other control parameters,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

CP-717 inverter tool description

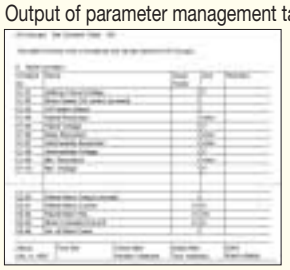
Management of data settings

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

Parameter display screen



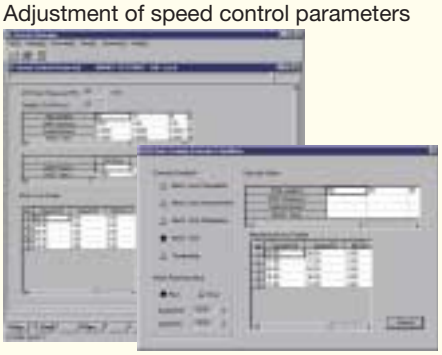
Output of parameter management table (print out)



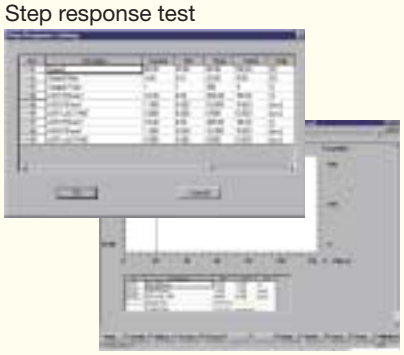
Adjustment support

Related parameters can be adjusted according to monitor load characteristics.

Adjustment of speed control parameters

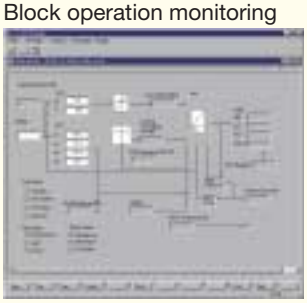


Step response test

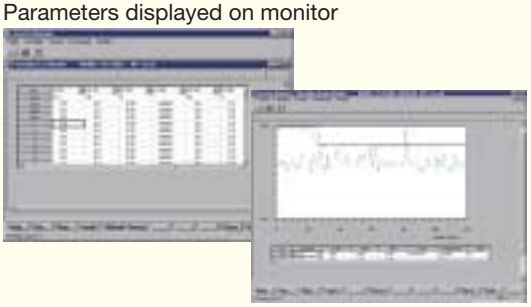


Trial run adjustment while monitoring real-time data of individual inverters is possible.

Block operation monitoring



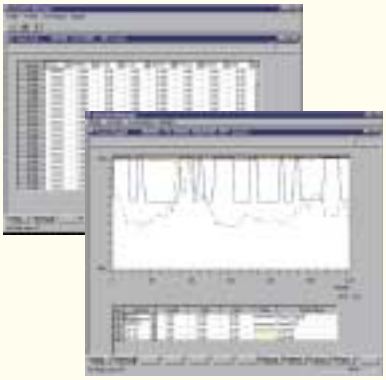
Parameters displayed on monitor



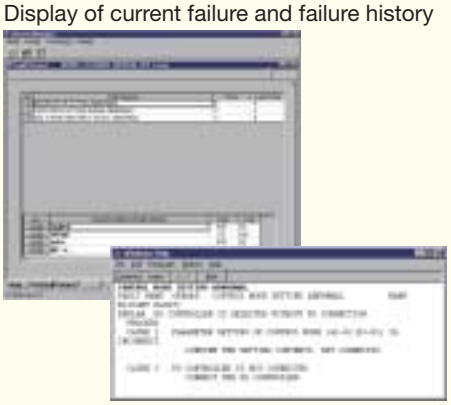
Troubleshooting

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

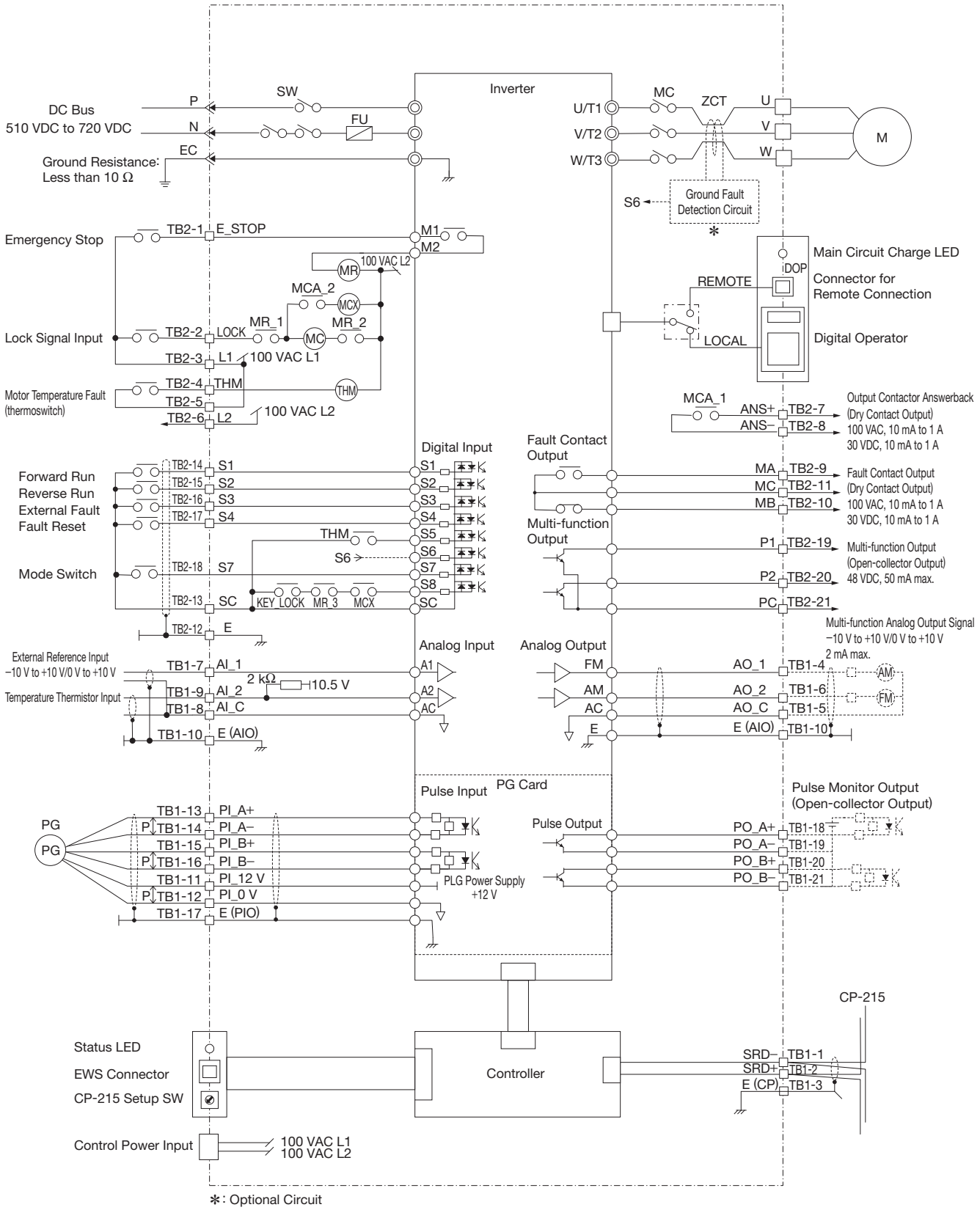
Traceback in the event of a failure



Display of current failure and failure history



Connections



Terminal Functions

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	Output	–10 V to +10 V/0 V to +10 V 2 mA max.
	5	AO_C	Analog monitor common		
	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	Output	PLG power supply output (200 mA max.)
	12	PI_0 V	PLG power supply 0 V		
	13	PI_A+	Pulse Input A+	Input	12-V photocoupler input or 5-V differential input
	14	PI_A–	Pulse Input A–		
	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)		
	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	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)		
	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

Model		CIMR-LV1HMD□2□□□ (200 V)												CIMR-LV1HMD□4□□□ (400 V)													
		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 ±0.01% of the max. output frequency (–10°C to +40°C) Analog reference: within ±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.
	Overvoltage 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	CP-215IF*5	Link transmission: register input 2048 words, register output 512 words max. Message transmission: MEMOBUS/no protocol (user 13 CH max.)

Environmental Conditions

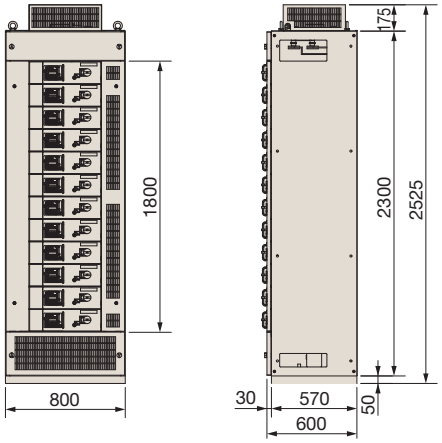
Conditions		Specifications
Applicable Standards		JIS, JEM, JEC
Environment	Atmosphere	General environmental conditions (free from dust and corrosive gases)
	Ambient Temperature	–10°C to +45°C
	Humidity	90% RH or less (no condensation)
	Storage Temperature	–20°C to +60°C
	Altitude	1000 m or less
	Area 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 M

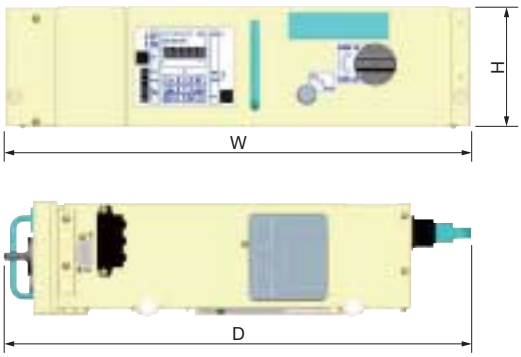
Panel Dimensions



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 W	D	H	Maximum Number of Installed Units	Model CIMR-LV1HMD□4□□□	Capacity kW	Approx. Mass kg	Unit Dimension mm W	D	H	Maximum Number of Installed Units
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				
5P5	5.5						7P5	7.5					
7P5	7.5						011	11	24			200	9
011	11	24			200	9	015	15	24.5				
015	15	27			250	7	018	18.5	27			250	7
018	18.5	30					022	22	39.5			300	6
022	22	39.5			300	6	030	30	43.5				
							037	37	56			350	5
							045	45	57.5				

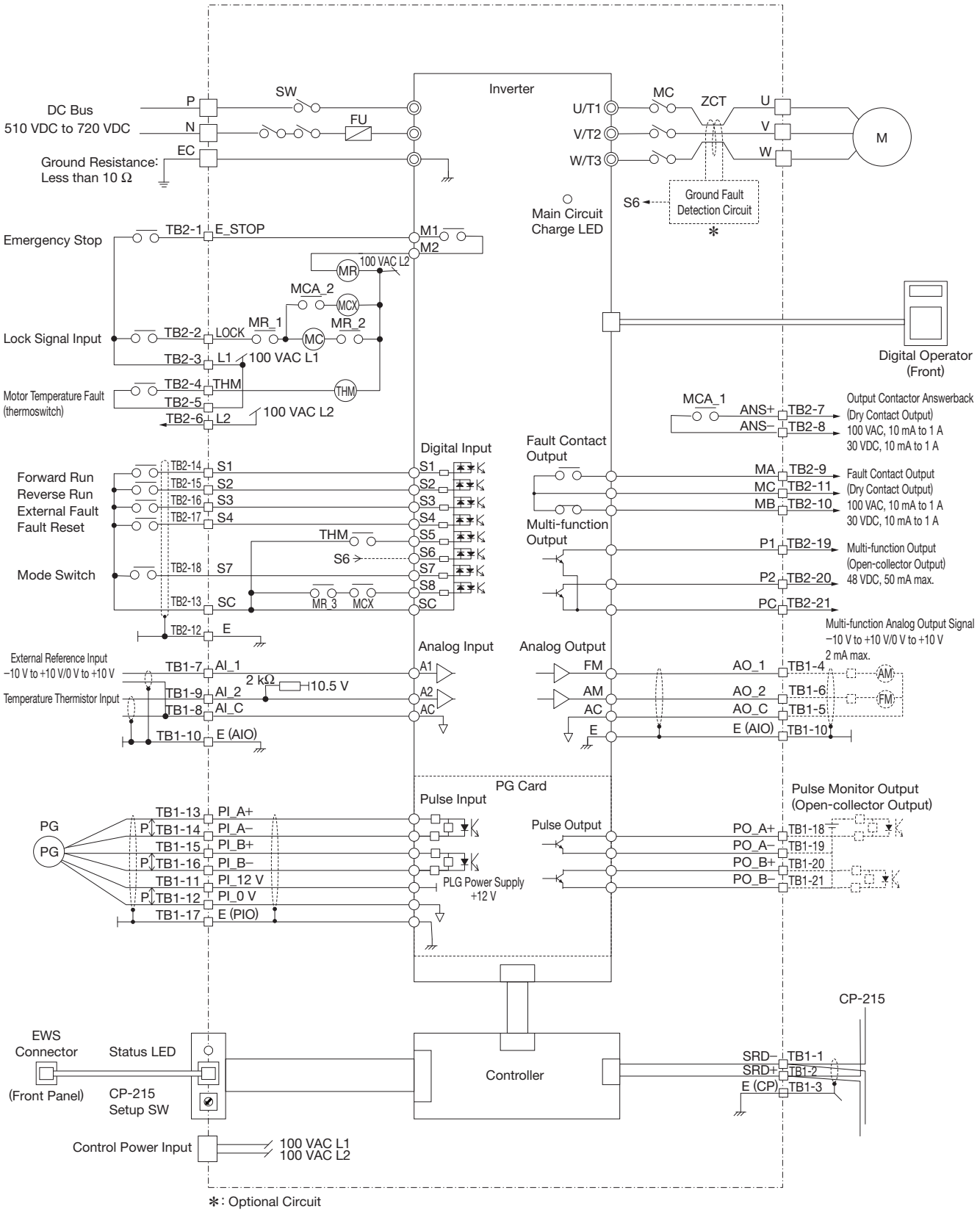
Unit Model Numbers

CIMR-LV1H M D A 4 0P4

- Inverter
- FSDrive-LV1H
- Unit/Module features
  - M: Multiple stacking unit drawers type
- Input Specifications
  - D: DC input
- Circuit Type
  - A: Standard
  - B: With an earth leakage relay
- Voltage
  - 2: 200 V
  - 4: 400 V
- Capacity

0P4: 0.4 kW	2P2: 2.2 kW	7P5: 7.5 kW	022: 22 kW
0P7: 0.75 kW	3P0: 3.0 kW	011: 11 kW	030: 30 kW
1P1: 1.1 kW	3P7: 3.7 kW	015: 15 kW	037: 37 kW
1P5: 1.5 kW	5P5: 5.5 kW	018: 18.5 kW	045: 45 kW

Connections



Terminal Functions

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	Output	–10 V to +10 V/0 V to +10 V 2 mA max.
	5	AO_C	Analog monitor common		
	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	Output	PLG power supply output (200 mA max.)
	12	PI_0 V	PLG power supply 0 V		
	13	PI_A+	Pulse Input A+	Input	12-V photocoupler input or 5-V differential input
	14	PI_A–	Pulse Input A–		
	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)		
	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	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)		
	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

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						
Output	Rated Output Capacity*3 kVA	85	114	137	165	198	232	282
	Rated Output Current*4 A	112	150	180	216	260	304	370
	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 ±0.01% of the max. output frequency (–10°C to +40°C) Analog reference: within ±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.
	Overvoltage Protection	Stops when DC bus exceeds approx. 820 V.
	Undervoltage Protection	Stops when DC bus 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	CP-215IF*5	Link transmission: register input 2048 words, register output 512 words max. Message transmission: MEMOBUS/no protocol (user 13 CH max.)

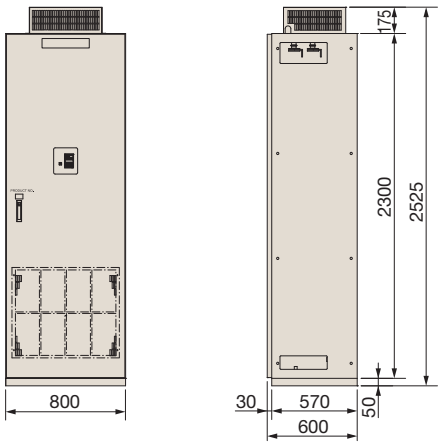
Environmental Conditions

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 or less (no condensation)
	Storage Temperature	–20°C to +60°C
	Altitude	1000 m or less
	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.

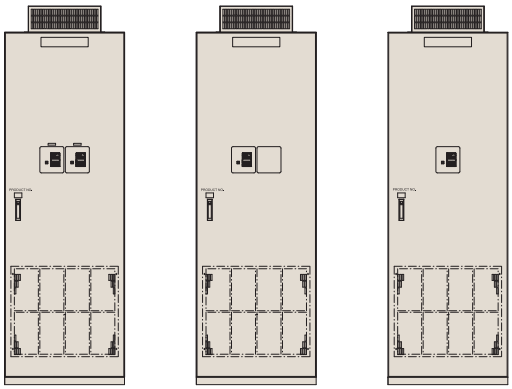
Dimensions Units: mm

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

Unit Model Numbers

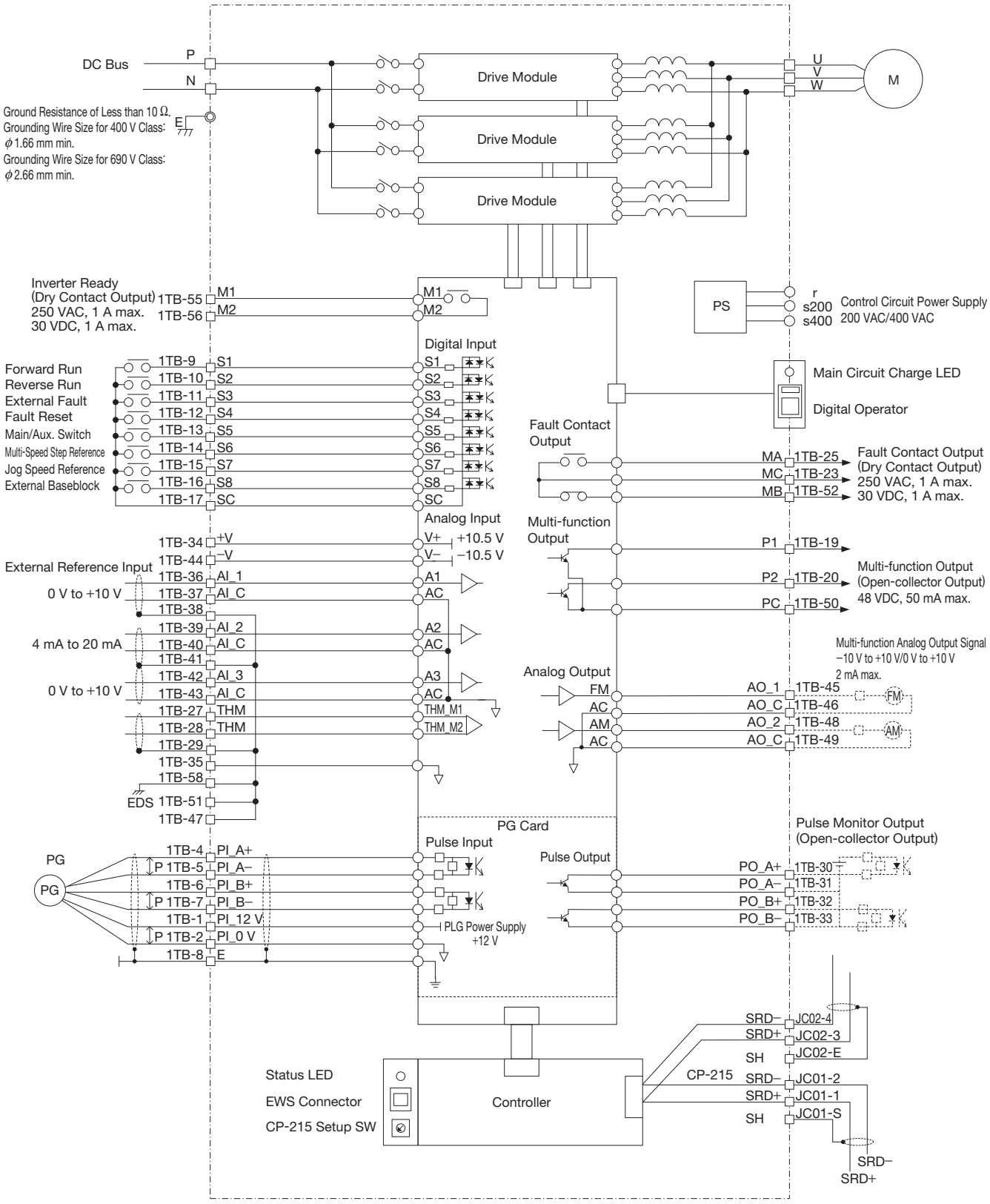
CIMR-LV1H F D A 4 055

- Inverter
- FSDrive-LV1H
- Unit/Module features
  - F: Inverter unit, compact for use in panels
- Input Specifications
  - D: DC input
- Circuit Type
  - A: Standard
  - B: With an earth leakage relay
- Voltage
  - 4: 400 V
- Capacity
  - 055: 55 kW
  - 075: 75 kW
  - 090: 90 kW
  - 110: 110 kW
  - 132: 132 kW
  - 160: 160 kW
  - 185: 185 kW

Inverter

FSDrive-LV1HS: Slim Drive Module, Large Capacity

Connections



Terminal Functions

Terminal Name		Signal Name
Main Circuit Terminal	P, N	Main circuit input
	U, V, W	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	24 VDC, 8 mA Photocoupler 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	–	

Inverter FSDrive-LV1HS: Slim Drive Module, Large Capacity

Specifications

Type

Model		CIMR-LV1HSR□4□□□(400 V)					CIMR-LV1HSR□6□□□(690 V)				
		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									
	Career 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 ±0.01% of the max. output frequency (−10°C to +40°C) Analog reference: within ±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
	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	±0.2% in Open Loop Vector Control (25°C±10°C), 0.01% in Closed Loop Vector Control (25°C±10°C)
	Speed Response	5 Hz (25±10°C) (Open Loop Vector Control)
	Accel/Decel Time	0.00 s to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)
	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.
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.
	Overvoltage 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
	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	CP-215IF*6	Link transmission: register input 2048 words, register output 512 words max. Message transmission: MEMOBUS/no protocol (user 13 CH max.)

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
	Altitude	1000 m or less
	Area of Use	Indoors
Cabinet Specifications	Form	Vertically-standalone type, protective front panel type
	Painting	5Y7/1 both for inner and outer surfaces
Enclosure		IP51 compliant(Note)

Note: See ∗2 on page 22.

∗6 : PROFIBUS-DP and CP-213 can be used depending on converters.

Dimensions Units: mm

Panel Dimensions

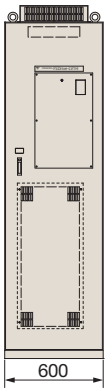


Figure 1

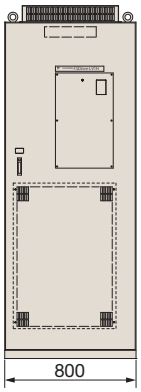


Figure 2

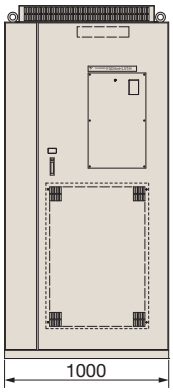


Figure 3

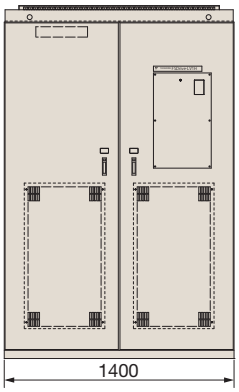


Figure 4

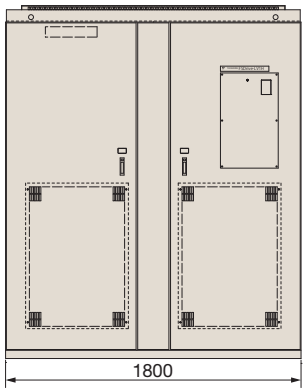
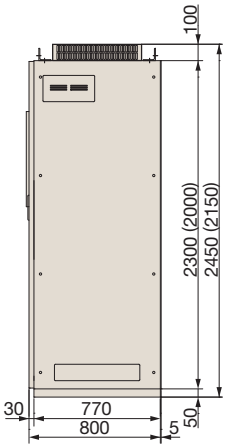


Figure 5



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	
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

CIMR-LV1H S R A 4 200

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)

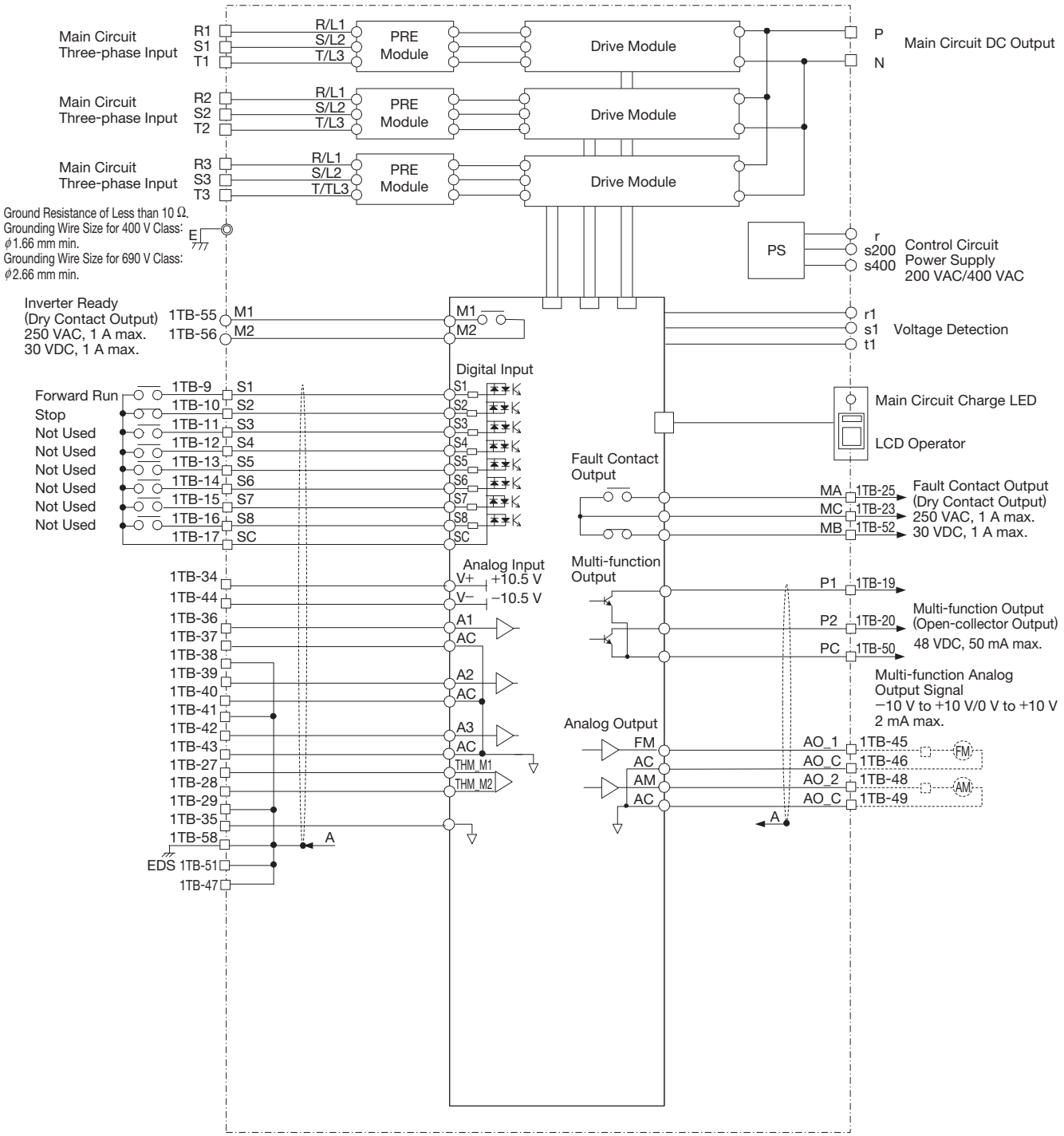
Voltage
4: 400 V
6: 690 V

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

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

Model			CIMR-LC1HSR□4□□□ (400 V)					CIMR-LC1HSRA6□□□ (690 V)				
			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	1900
	Rated Output Current	A	380	760	1140	1520	1900	370	740	1110	1480	1850
	Rated Output Voltage		660 VDC					1020 VDC				
	Overload Tolerance		150% of rated input current for 60 s									
	Career Frequency		2 kHz									
	Max. Output Voltage		720 VDC					1040 VDC				
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)									
	Power Supply Equipment Capacity	kVA	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.
	Overvoltage 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 (K5 = 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/s² at 10 Hz to 55 Hz
Cabinet Specifications	Form	Vertically-standalone type
	Painting	5Y7/1 both for inner and outer surfaces
Enclosure		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

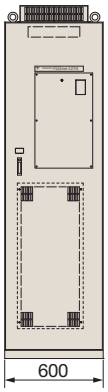


Figure 1

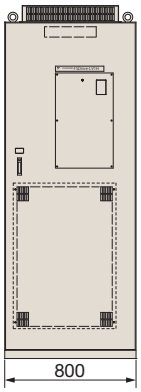


Figure 2

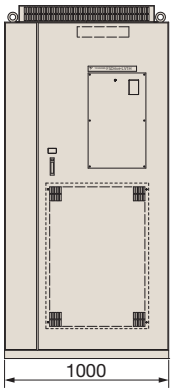


Figure 3

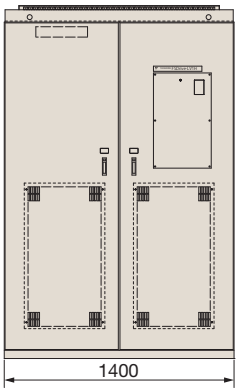


Figure 4

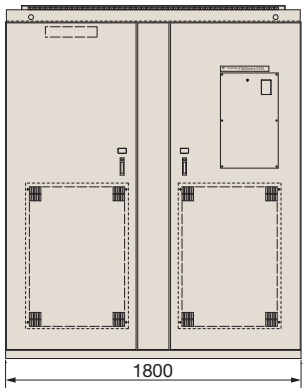
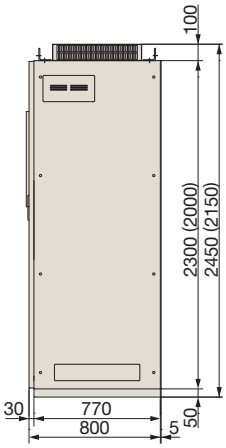


Figure 5



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	
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

CIMR-LC1H S R C 4 200

FSDrive-LC1HS:
Slim Drive Module, Large Capacity

Specifications
R: Regenerative power

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

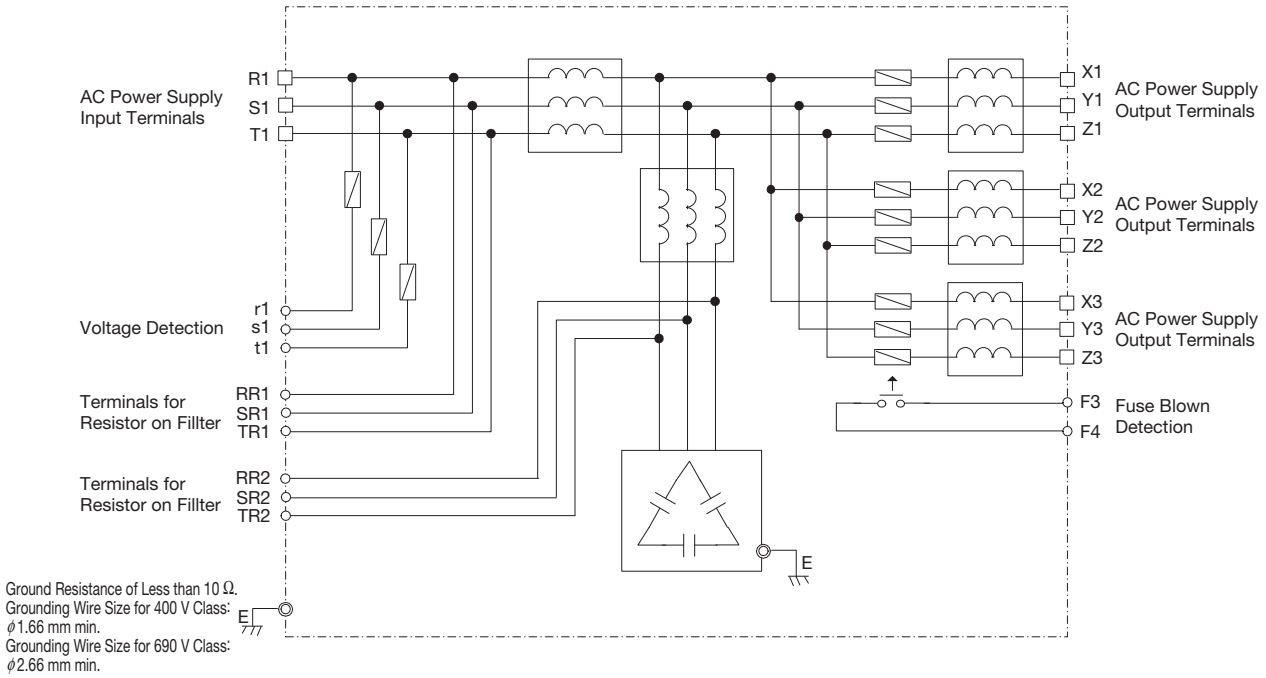
Voltage
4: 400 V
6: 690 V

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

Reactor 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

Model		CIMR-LA1HSR□4□□□ (400 V)					CIMR-LA1HSRA6□□□ (690 V)				
		200	400	600	800	10C	350	700	10C	14C	17C
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	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/s² at 10 Hz to 55 Hz
Cabinet Specifications	Form	Vertically-standalone type
	Painting	5Y7/1 both for inner and outer surfaces
Enclosure		IP20

Dimensions Units: mm

Panel Dimensions

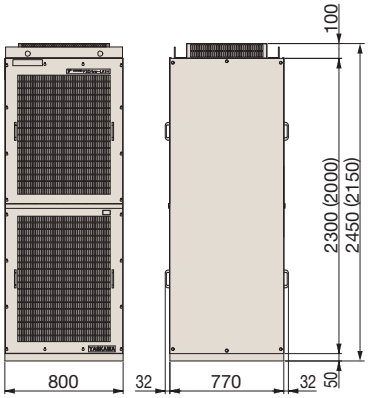


Figure 1

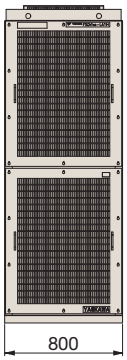


Figure 2

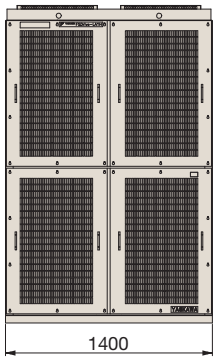


Figure 3

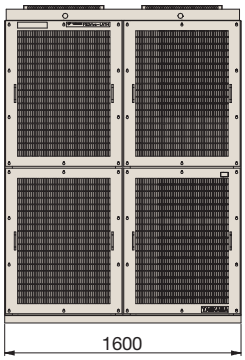
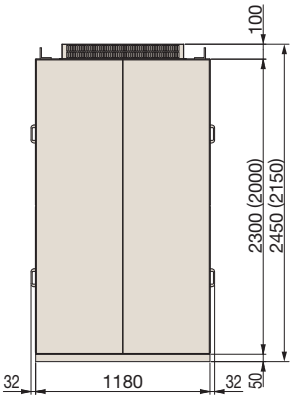


Figure 4



Right
(Same for all models)

Model Number and Rated Capacity

400 V			690 V			Figure*
Model CIMR-LA1HSR□4□□□	Capacity kW	Approx. Mass kg	Model CIMR-LA1HSR□6□□□	Capacity kW	Approx. Mass kg	
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

CIMR-LA1H S R A 4 200

FSDrive-LA1HS:
Slim AC Reactor, Large Capacity

Specifications
R: Regenerative power

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

Voltage
4: 400 V
6: 690 V

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

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YASKAWA ELECTRIC CORPORATION

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Specifications are subject to change without notice
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