Sumitomo Drive Technologies

Inverter CAI Series
(CAI 40/90 C Type)

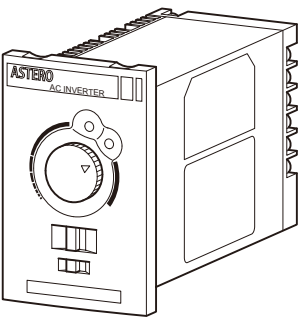
⚠ CAUTION

Carefully read the "Safety Precautions" in the introduction before reading the text of the operation manual in order to thoroughly understand the contents for correct use.

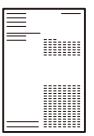
Sumitomo Heavy Industries, Ltd. **Operation Manual** EM0102E-4

[Contents]

[Check the contents of packing]



① Inveter
CAI40C/CAI90C



② Operation
Manual

[Safety Precautions]

Carefully read this operation manual for correct use before installation, operation, maintenance, and inspection. Thoroughly understand the inverter, safety information, and precautions before use.
Safety precautions are classified into "DANGER" and "CAUTION" in this manual.

: Improper handling entails danger, possibly leading to death or serious injury.

: Improper handling entails danger, possibly leading to medium-degree or slight injury or property damage.

Matters classified under 

may also cause serious results depending on the situation.
Be sure to strictly observe these safety precautions.

Precautions in general

- Covers and safety shields have been removed in the illustrations in the operation manual in order to show the details. Be sure to return specified covers and safety shields to the original position before operation. Operate the inverter in conformity with the operation manual.
- The operation manual is subject to change for improvement of the product, change in specifications, and easy use of the manual itself. The operation manual No. will be renewed when a revised edition is issued.
- Remodeling of the inverter by the customer is beyond the scope of our warrantee, and we will not take responsibility for any result of remodeling.

(1) Confirmation of actual product

⚠ CAUTION

- Do not operate the machine with a damaged inverter or an inverter with some missing parts, otherwise injury may result.

(2) Installation

⚠ CAUTION

- Attach the inverter to metal or other nonflammables, otherwise a fire may break out.
- Do not place the inverter near inflammables, otherwise a fire may break out.
- Do not hold the case at the front of the inverter, otherwise the inverter may drop, leading to injury.
- Do not allow metal chips and other foreign substances to enter, otherwise a fire may break out.
- Install the inverter on a floor strong enough to withstand the weight of the inverter according to the operation manual, otherwise the inverter may drop, leading to injury.

(3) Wiring

⚠ DANGER

- Check that the input power is OFF before wiring, otherwise an electric shock or fire may result.
- Be sure to install a magnetic circuit breaker (MCB), otherwise a fire may break out.
- Be sure to ground the grounding terminal ⏚, otherwise an electric shock or fire may result. (200 V-class Type D grounding)
- Leave the wiring work to an electric engineer.
- Be sure to install the inverter before wiring, otherwise an electric shock or fire may result.
- When connecting the emergency stop circuit, be sure to check the operation of the circuit after wiring, otherwise injury may result.

⚠ CAUTION

- Do not connect an AC power supply to the output terminals (U, V, and W), otherwise injury or a fire may result.
- Check that the voltage of the AC power supply coincides with the specified input voltage of the inverter, otherwise injury or a fire may result.
- Do not subject the inverter to a withstand voltage test, otherwise semiconductor elements may be broken.
- Completely tighten terminal screws, otherwise malfunction, the inverter breakdown, or a fire may result.

(4) Operation

⚠ DANGER

- Be sure to attach the case cover before turning the power on. Do not remove the case cover during power supply, otherwise an electric shock may result.
- Do not operate switches with wet hands, otherwise an electric shock may result.
- Do not touch the inverter terminal when power is being supplied to the inverter although the machine is at rest, otherwise an electric shock may result.
- Trip resetting by turning the power on while the operation signal is on will make the machine resume operation suddenly. Check that the operation signal is off before turning the power on, otherwise injury may result.

⚠ CAUTION

- Do not touch the die-cast case and radiation fin, which become very hot, otherwise skin burn may result.
- The inverter permits easy operation setting from low to high speed. Carefully check the allowable range of the motor and machine before setting, otherwise injury may result.
- Prepare a retention brake separately as necessary, otherwise injury may result.
- Do not check signals during operation, otherwise the equipment may be broken.

(5) Maintenance and inspection

⚠ DANGER

- This inverter has a high-voltage terminal, which is dangerous. Do not touch it, otherwise an electric shock may result.
- Conduct maintenance or inspection five minutes or more after the input power is turned off, otherwise an electric shock may result.
- Leave maintenance and inspection to a specialist. Remove accessories (watch, ring, etc.) before work, otherwise an electric shock or injury may result.

⚠ CAUTION

- Semiconductor elements are used in the inverter. Handle the inverter carefully, otherwise static electricity, etc. may break the inverter.
- Do not change wiring or attach/detach the panel while the power is supplied, otherwise an electric shock, injury, or equipment breakage may result.

(6) Others

⚠ DANGER

- Do not remodel the inverter, otherwise an electric shock, injury, or a fire may result.

1. Standard specifications

Product name		CAI40C	CAI90C
Applicable motor		3-phase induction motor	
Applicable motor output (W)		25/40	60/90
Standards		Conforming to CE mark and cUL	
Output rating	Frequency (Hz)	1.0 to 120Hz Note:1	
	Output capacity (VA)	106/152	212/303
	Output current (A)	0.28/0.4	0.56/0.8
	Output voltage (V)	3-phase 200 to 240V (depend on power supply voltage)	
Input power supply	Voltage (V)	1-phase 100 to 120 V ±10% or 200 to 240 V ±10%	
	Frequency (Hz)	50/60 ±5%	
	Input current (A)	0.5 to 1.5	1.0 to 3.0
Control characteristics	Control method	PWM control (Pattern: V/F)	
	Frequency setting	Front panel volume or external volume	
	Torque boost	Low : 0 High : 8% (Dip switch setting)	
	Over load durability	150% output for 1 min.	
	Acceleration/ deceleration time	0.05 to 30.0s Note:2	
	Torque setting	High/Low (Dip switch setting)	
	Front panel switch	Run/Stop switch and Forward/Reverse switch	
	Input/Output signal	Run/Stop command, Forward/Reverse command, frequency command, free-run input, and alarm signal output	
Protection function	Details of alarm	Self-diagnosis trip, protection form overvoltage, protection from instantaneous overcurrent, protection from undervoltage, protection from overload, protection of coolant from overheating, and electronic thermal	
	Alarm display	LED (blinking) for the front panel	
	Alarm output	Open collector	
Cooling method		Self-cooling	
Ambient condition	Location of installation	Indoors, Below 1000m of altitude, without corrosive gas, liquid, or dust	
	Degree of contamination	2	
	Ambient temperature	-10°C to +40°C without dew condensation or freezing	
	Storage temperature	-20°C to 60°C	
	Humidity	90%RH or less	

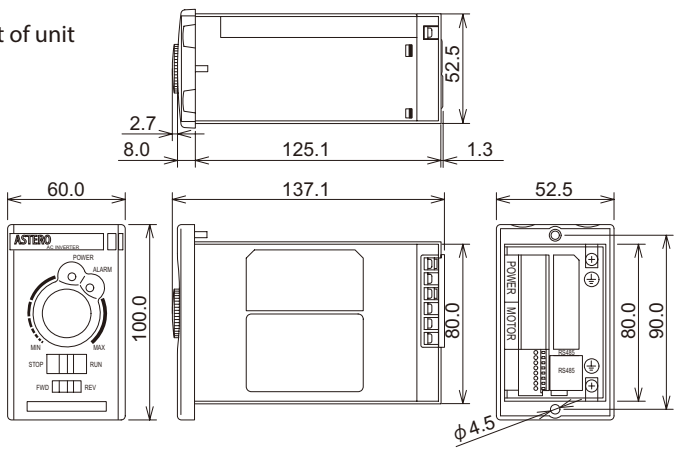
Note: 1. When driving the geared motor, use by frequency setting below the maximum input speed of the gear.
2. No regenerative circuit for brakes is built in.

2. Outline drawing

■ Outline drawing

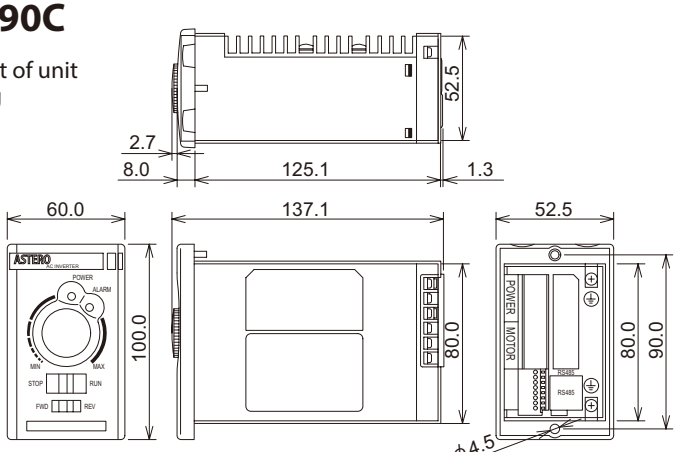
CAI40C

Weight of unit
0.30kg



CAI90C

Weight of unit
0.47kg



Unit: mm

3. Installation

3.1 Installation dimensions/method

Refer to Fig.(a) when installing the inverter. The inverter of the installation surface as shown in Fig.(b).
(DIN rail cannot be attached.)
Refer to p.7 for the outside dimensions.

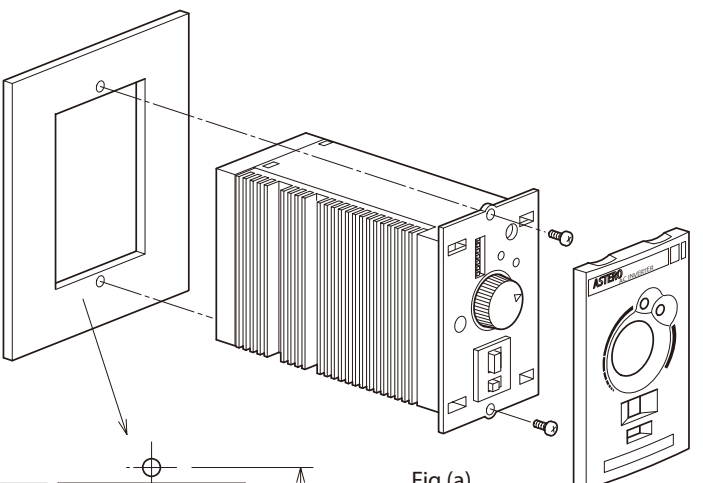


Fig.(a)

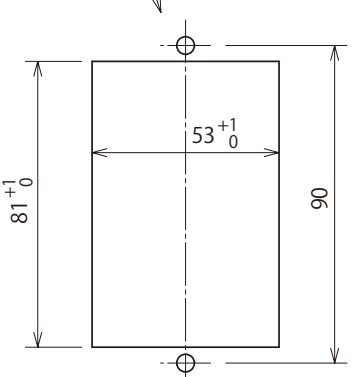
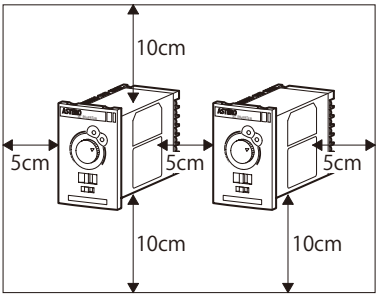
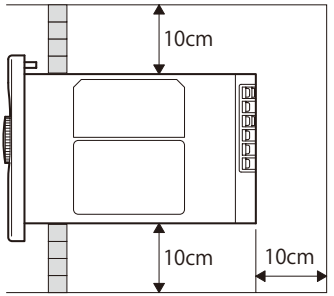


Fig.(b)

Secure the inverter without a gap between the inverter and the mounting surface by using the mounting hole in the inverter.

3.2 Place of installation

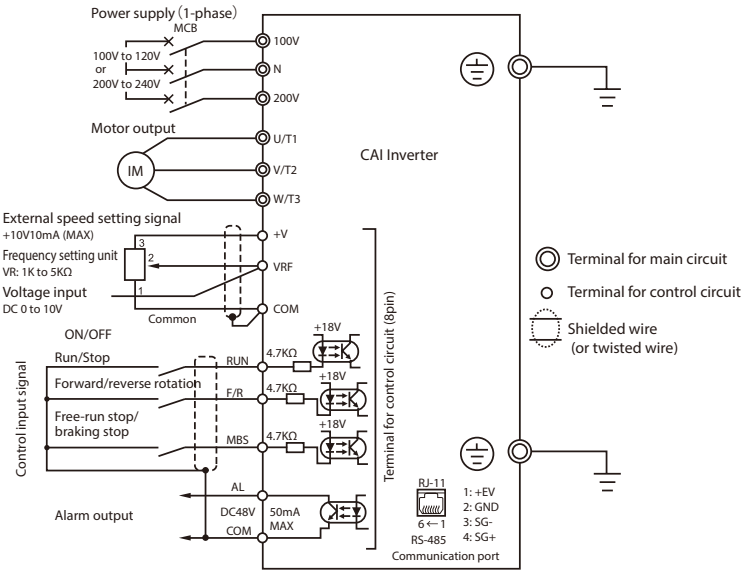




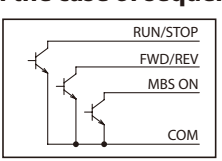
- Set the inverter vertically and provide a space for ventilation around the inverter.
- Avoid hot or humid places or places with a large quantity of dust, iron powder, or chips.
- The ambient temperature shall be within the range of -10 to +40°C.
- Avoid direct sunlight.
- Install in places with no corrosive gas or grinding fluid.
- The inverter is not of a waterproofing structure. Avoid outdoor use.
- Install the inverter in places without vibration. Avoid continuous use of resonance point.

4. Wiring

4.1 Standard connection diagram



4.2 In the case of sequence



Recommended peripheral equipments

Name	Manufacturer	Model	Applicable CAI Inverter Model
Magnetic circuit breaker (MCB)	Mitsubishi Electric	BL-2C 6A	CAI40C, CAI90C
AC reactor	Sumitomo Heavy Industries	ET682WW-01	
Noise filter		ET681WW-01	
Frequency setting unit (VR)		EVR-01	

⚠ CAUTION

4.3 Precautions as to wiring

(1) Main circuit

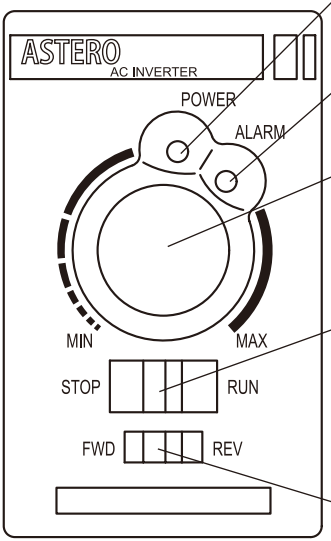
1) Do not connect the power input terminal and motor output terminals (U, V, and W) reversely.
2) Do not ground the motor output terminals (U, V, and W). Check that the motor output terminals are not grounded before turning the power on.
3) Be sure to turn off the power before wiring the main circuit terminal, grounding terminal, and control terminal or when removing the wiring.
4) Do not short-circuit the motor output terminals (U, V, and W) with each other. Check that motor output terminals are not short-circuited with each other before turning the power on.
5) When operating the inverter, use a magnetic circuit breaker (MCB) and a thermal relay (TH-RY) as necessary according to the standard connection diagram. Select a magnetic circuit breaker and a thermal relay that match the motor rating.
6) The grounding terminal is inverter ground (FG). Use Type D grounding (100Ω or less; Ø1.6 mm or less).
7) Do not install a power factor improved (phase-advanced) capacitor, which may be broken by heating because of the high harmonics of the inverter output.
8) Be sure to use a crimp terminal with insulation sheathing for connection to the main circuit terminal (100 V, N, 200 V).

(2) Control circuit

1) Do not apply voltage exceeding 48 VDC or current exceeding 50 mA to the output terminal (AL, COM), or do not apply voltage to reversed polarity.
2) Do not apply voltage to the input terminal (RUN. F/R. MBS) from outside.
3) When driving the relay directly by the output terminal (AL, COM), install a flywheel diode (FD).
4) The grounding wire connected to the control circuit must be twisted or shielded wire.
5) Ground the shield of the shielded wire.
6) Separate the cable to be connected to the control circuit from the power line.
7) Apply a screwdriver perpendicular to the terminal and tighten the wire.

5. Operation

5.1 Front panel



POWER LED
Lights while the power is ON.

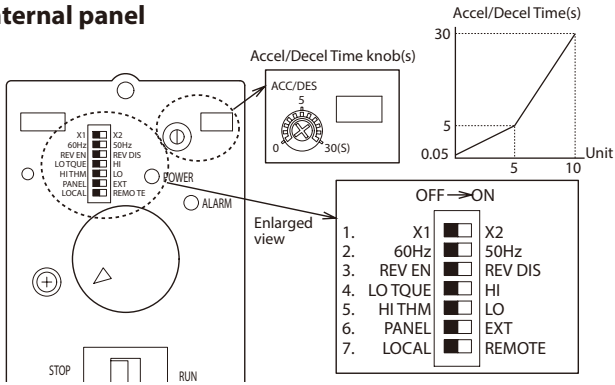
ALARM LED
Blinks when the protective function is in operation.
(Refer to p.22 for details.)

Potentiometer
(Refer to p.14 for details.)

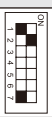
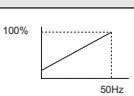
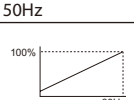
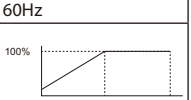
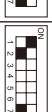
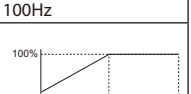
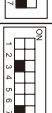
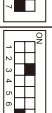
RUN/STOP Switch

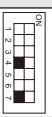
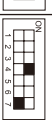
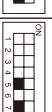
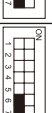
Forward/Reverse Switch
(Usable in the panel mode.
Refer to p.14 for details.)

5.2 Internal panel



• Dip switch setting

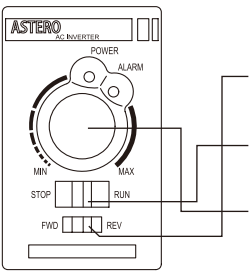
Setting item	Switch setting	
Max. output frequency		 50Hz
		 60Hz
		 100Hz
		 120Hz
Reverse rotation control		Reverse rotation possible
		Reverse rotation impossible

Setting item	Switch setting	
Torque setting		Low-torque output
		High-torque output
Electronic thermal setting		For 40 and 90 W 40W: 0.4A 90W: 0.8A
		For 25 and 60 W 40W: 0.28A 60W: 0.56A
Operation command source setting		Operation command control by front panel
		Operation command control by external terminal

Note: All settings are OFF when the product is shipped.

< Try to operate >

• When using the front panel for operation



Front panel

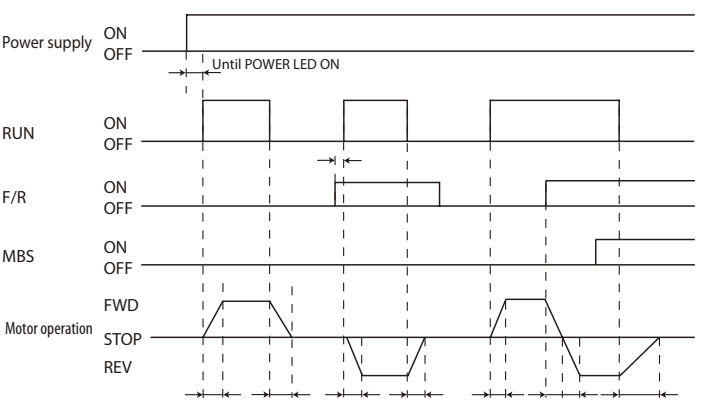
Step 1 Power ON
(Power LED ON)

Step 2 Determine the direction of rotation. (FWD or REV)

Step 3 Set to RUN.

Step 4 Set the speed of rotation. (Adjustment using the potentiometer)

• When using the EXT mode for operation (Control input signal)



L1: accel/decel set time
L2: free-run stop time

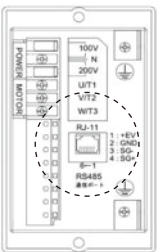
Note: Caution to be exercised when external speed setting is used.
The EXT mode permits the potentiometer on the front panel to control the speed during external speed control. The set frequency at that time is the total of respective set frequencies. Set "MIN" when the potentiometer on the front panel is not used.

6. RS485 Serial Communication

Serial communication with the external control device is possible using the RS485 communication port (RJ11) on the back side for the inverter.

Pin assignment of RJ11 connector

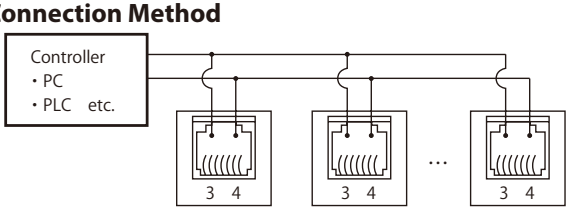
No.	Signal	Contents	Reference
1	+15V	+15Vdc	Power supply +15Vdc
2	GND	Ground	
3	SG–	Send/Receive–	-
4	SG+	Send/Receive+	
5	-	Unused	-
6			



6.1 Specifications

Items	Contents	Reference
Transmission speed	9600 bit/s	Baud rate
Communication method	Half duplex communication	-
Synchronous method	Start-stop synchronous communication	
Transmission code	ASCII Code	
Communication method	Serial transmission	
Compliant interface	RS485	
Data bit length	7 bits	7, N, 2
Parity check	None	
Stop bit length	2 bits	
Starting method	One-sided startup method by host-side command	-
Waiting time	10ms	
Connection form	RS485	1 : 31
Error check	LRC checksum	2 bits

6.2 Connection Method



Up to 63 units can be connected the controller using RS485 serial communication.

6.3 Setting for the Inverter Address (DIP Switch)

For RS485 communication, set the DIP switch 7 to ON.
(In this case, you will not be able to drive on the front panel and terminals.)
DIP switch 1 to 6 is used to set the inverter address.
Refer to the following setting example.

RS485 communication (DIP switch 7: ON)

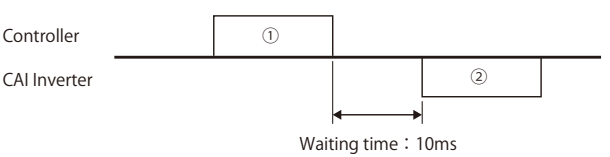
- For address = 1 (See the right table.)
  $(2^0\times1) + (2^1\times0) + (2^2\times0) + (2^3\times0) + (2^4\times0) + (2^5\times0) = 1$
- For address = 23
  $(2^0\times1) + (2^1\times1) + (2^2\times1) + (2^3\times0) + (2^4\times1) + (2^5\times0) = 23$
- For address = 63
  $(2^0\times1) + (2^1\times1) + (2^2\times1) + (2^3\times1) + (2^4\times1) + (2^5\times1) = 63$

No.	DIP Switch		Address Setting
	OFF (×0)	ON (×1)	
1	○		2^5
2	○		2^4
3	○		2^3
4	○		2^2
5	○		2^1
6		○	2^0
7		○	RS485

Note: When the control mode is switched to the front panel or the terminal, the address is stored in the memory. (DIP switch 7: OFF)
When the parameter is reset, the address remains in the memory.
In the case of setting for the new address, DIP switch 7 is ON after power OFF.
Resetting the address and start the inverter.

6.4 Communication Procedure

Communication between the controller and the inverter is performed as follows.
Reply data ② from the inverter will be replied after receiving data ① .
The inverter does not have active output.



① Transmission data from the controller to CAI inverter
② Transmission data from CAI inverter to the controller

6.5 Communication Protocol

6.5.1 Frame Format Transmitted and Received

STX	Start data ' : ' (ASCII code/3AH)
ADR1	Communication address:
ADR0	Address information of 8 bits×2 that composes ASCII code
CMD1	Command code:
CMD0	Command information of 8 bits×2that composes ASCII code
DATA (n-1) to 0	Data structure: 8 bits×n data that composes ASCII code of 2n (n ≦ 25, ASCII code = 50 Max.)
LRC CHK1	LRC Checksum:
LRC CHK0	8 bits×2 checksum that composes ASCII code
END1	END data: END1 = CR (0DH) , END0=LF (0AH)

Note: ADR (Communication address) → Specify the inverter address 1 to 63.
CMD (Command code), DATA (Data format depends on CMD.)
CMD = 03H → Read Data, CMD = 06H → Write Data

Example

Command code 03H: Reading N data (1 to 12) Ex. Reading 2 data from address 2102H for the inverter (Address 1)				Command code 06H: Writing 1 data Ex. Setting the frequency for the inverter (Address 1) Frequency setting address: 2001H 60Hz(Decimal···6000 →Hexadecimal···1770H)			
Transmission message		Receive message		Transmission message		Receive message	
STX	' : '	STX	' : '	STX	' : '	STX	' : '
ADR1	'0'	ADR1	'0'	ADR1	'0'	ADR1	'0'
ADR0	'1'	ADR0	'1'	ADR0	'1'	ADR0	'1'
CMD1	'0'	CMD1	'0'	CMD1	'0'	CMD1	'0'
CMD0	'3'	CMD0	'3'	CMD0	'6'	CMD0	'6'
Starting data address	'2'	Number of data (Byte)	'0'	Data address	'2'	Data address	'2'
	'1'				'0'		'0'
	'0'		'4'		'0'		'0'
	'2'				'1'		'1'
Number of read data	'0'	2102H	'1'	Data	'1'	Data	'1'
			'7'				
	'0'		'7'		'7'		'7'
			'0'				
	'0'	2103H	'0'		'7'		'7'
			'0'				
	'2'		'0'		'0'		'0'
			'0'				
LRC CHK1	'D'	LRC CHK1	'7'	LRC CHK1	'5'	LRC CHK1	'5'
LRC CHK0	'7'	LRC CHK0	'1'	LRC CHK0	'1'	LRC CHK0	'1'
END1	CR	END1	CR	END1	CR	END1	CR
END0	LF	END0	LF	END0	LF	END0	LF

6.5.2 Parameter Table

Address	Parameter Name	R/W	Data Contents	Setting Data (Decimal)	Initial
Setting	Recognition code of the inverter	R	Depend on the inverter	-	#
0001	Rated current	R			# . #
0002	Parameter reset	R/W	Reset	10	0
0003	Max. output frequency setting	R/W	50Hz	0	1
			60Hz	1	
			100Hz	2	
			120Hz	3	
0004	Acceleration/Deceleration time	R/W	0.05 to 30 (s)	5 to 3000	500
0005	Reverse setting	R/W	Reverse NG	0	1
			Reverse OK	1	
0006	Torque setting	R/W	High	0	1
			Low	1	
0007	Electronic thermal	R/W	25/60 (W)	0	1
			40/100 (W)	1	
0008	Communication address	R	1 to 63	01 to 63	1
0009	Software version	R	Depend on the inverter	-	# . #
0010	Min. output voltage	R/W	1.5 to 20.0 (V)	15 to 200	15
0011	Torque boost	R/W	3.0 to 8.0 (V)	30 to 80	80
0012	Terminal function setting	R/W	RUN: FWD/STOP	0	1
			F/R: REV/STOP		
			RUN: RUN/STOP	1	
			F/R: FWD/REV		

Note: R (Read), W (Write)

6.5.3 List of Address

Items	Address	Explanation	
Parameters of the Inverter	nnnnH	nnnn: Address for parameters (Set the address for parameters of the Inverter.)	
Write	2000H	bit 0, 1	00 : No function
			01 : STOP
			10 : RUN
			11 : No function
		bit 2, 3, 6 to 15	Unused (0)
		bit 4, 5	00 : Reserved
			01 : Forward
			10 : Reverse
			11 : Switching the direction of rotation
	2001H	Frequency	Ex. at 60Hz : 6000 (Decimal)
	2002H	bit 0, 2 to 15	Unused (0)
		bit 1	1 : Reset
Read	2100H (Fault Code)	00 : Normal operation / 01 : Over current / 02 : Over voltage 03 : Heatsink over temperature 04 : Over load / 07 : CPU fault (cF3) / 14 : Under voltage 15 : CPU fault (cF1) / 16 : CPU fault (cF2) 20 : Software protection /21 : Operation error 22 : Hardware fault (Over temperature) cF3.1 23 : Hardware fault (Over voltage) cF3.2 24 : Hardware fault (Under voltage) cF3.3 26 : Hardware fault (Current detection) cF3.5 30 : Hardware fault hpf.2 / 31 : Hardware fault hpf.3	
	2101H	bit 0, 1	00 : STOP
			01 : Decelerate stop
			10 : Zero Speed
			11 : RUN
		bit 2, 5 to 9, 11 to 15	Unused (0)
		bit 3, 4	00 : Forward
			01 : Reverse → Forward
			10 : Forward → Reverse
			11 : Reverse
		bit 10	1 : Communication
	2102H	Setting frequency F (###.##)	
	2103H	Output frequency H (###.##)	
	2104H	Output current A (#.##)	
	2105H	DC-link voltage V (###)	
	2106H	Output voltage V (###.#)	

6.5.4 Calculation for LRC (Longitudinal Redundancy Check)

STX	': '	-
ADR1	'0'	01H
ADR0	'1'	
CMD1	'0'	03H
CMD0	'3'	
Starting data address	'2'	21H
	'1'	
	'0'	02H
	'2'	
Number of read data	'0'	00H
	'0'	
	'0'	02H
	'2'	
LRC CHK1	'D'	01H + 03H + 21H + 02H + 00H + 01H = 29H
LRC CHK0	'7'	LRC = 29H Complement = FF – 29 + 1 = D7H
END1	CR	-
END0	LF	

6.5.5 Response in case of Fault

The inverter sends normal data when it receives a command message from the master device.
However, if fault occurs during communication, normal data will not be sent to the master device.
The cause of fault is classified as follows.

(1) Communication fault between the master device and the inverter
No transmission from the inverter → The master device outputs the result of timeout.
Cause ① Communication line not connected, contact failure, disconnection.
② Setting the unused address for the inverter

(2) Fault code in the received message of the inverter
The inverter transmits fault code to the master device.
Confirm with fault code.

6.5.6 List of Fault Code

Fault Code	Explanation
01	Illegal command code: Command data other than those indicated by 03 and 06 is received.
02	Illegal address data: Address data other than those indicated by 6.5.2 and 6.5.3 is received.
03	Illegal data: Data other than those indicated by 6.5.2 and 6.5.3 is received.
04	Communication function fault: The requested operation cannot be performed due to the communication function fault.
09	Checksum error: Check if LRC checksum is accurate.
20	Watchdog timer: After receiving the valid message for Modbus communication, the timer is reset to 0.

6.5.7 Reply Format for Fault Code

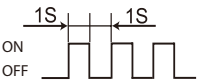
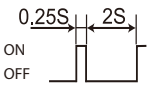
Example: Command Code 06H (In the case of fault code 02H is returned.)

STX	' : '	3AH
ADR1	'0'	30H
ADR0	'1'	31H
Function (CMD) 1	'8'	38H
Function (CMD) 2	'6'	36H
Exclusion code	'0'	30H
	'2'	32H
LRC CHK1	'7'	43H
LRC CHK0	'7'	46H
END1	CR	0DH
END0	LF	0AH

7. Alarm output

7.1 Protective function

When the following functions are activated, the inverter output is stopped. Check the details of respective alarms, and take corrective measures. Be sure to turn off the power before taking corrective measures.

Protective function	Contents	LED blinking pattern	Correction
Protection of setting	The inverter is stopped to prevent setting change during operation.		Check to see if the dipswitch setting is changed during operation.
Hardware failure	Stop due to hardware failure		Turn off the power, and wait for one minute. If the similar phenomenon occurs when the power is turned on again, contact us and return the product.
Protection from instantaneous overcurrent	The inverter is stopped when overcurrent flows due to overloading on the output side and when the output side is short-circuited.		Check to see if the motor lead wire is short-circuited.
Protection from overvoltage	The inverter is stopped when the overvoltage in the DC intermediate circuit is detected.		Check to see if the primary voltage is higher than the specified value.
Protection from undervoltage	The inverter is stopped when the undervoltage in the DC intermediate circuit is detected.		Check to see if the primary voltage is lower than the specified value.
Protection from coolant overheating	The inverter is stopped when overheating of coolant is detected.		Check the mounting condition and ambient temperature.
Protection from overload Electronic thermal	The inverter is stopped when the current due to overcurrent is detected. The inverter is stopped due to motor overloading.		Check to see if the equipment load is abnormal.

Note: When the protective function is activated, the contact of the open collector maintains conductivity until the protective function is cancelled. Check the LED of the main unit to understand the details of alarm.

7.2 Reset methods when protective function is activated

Reset the protective function by any one of the following methods.
(1) Turn off the input power.
(2) Set the operation stop switch on the front panel in the STOP position.
(3) Set the external control terminal "RUN" in the STOP (OFF) position.
(4) Transmit the Reset command when RS485 is used.

8. Maintenance and inspection

General-purpose inverters are stationary equipment in which semiconductor elements are used. Daily inspection is necessary to prevent unexpected nonconformance due to the influence of operating environment (temperature, humidity, dust, vibration, etc.), secular change of parts, and service life.

8.1 Precautions as to maintenance and inspection

⚠ CAUTION

(1) The operator himself shall turn on or off the power to prevent improper operation by any person not concerned.
(2) After the power is turned off, the internal circuit remains charged by high voltage. Turn off the power and wait for some time (more than one minute) after the LED on the operation panel has gone out before inspection.

8.2 Inspection items and period

Conduct daily inspection and periodical inspection as follows:

Classification	Inspection period	Inspection item
Daily inspection	Every day	• Check the ambient temperature, humidity, dust, foreign substances, etc. • Is there any abnormal vibration and sound? • Is the main circuit voltage normal? • Is there any foul smell? • Cleaned state of the operation section.
Periodical inspection	One year	• Megohmmeter test (between main circuit terminal and grounding terminal) • Is the tightened section loosened? • Is there any trace of overheating? • Is the output voltage of each phase unbalanced because of single inverter operation? • Is the terminal block damaged?

Note: The inspection period may change when the operating condition differs during periodical inspection.

9. Precautions as to operation

⚠ CAUTION

9.1 Precautions as to use

(1) A high-voltage circuit is provided on the printed circuit board. Never touch it by hand.
(2) The internal circuit remains charged with high voltage for some time after the power is turned off. Wait for one minute after turning off the power before inspection.
(3) Never touch the motor output terminal (UVW) even during free-run stop.
(4) The power is not turned off when operation is stopped by the stop command. Exercise care to prevent an electric shock or unexpected restart.
(5) Be sure to turn off the power when the inverter is not to be used for a long time, otherwise improper operation may cause an electric shock.
(6) When operation at the output frequency exceeding 60 Hz is desired, the motor will rotate at a high speed, and the resultant unstable motor rotation may cause breakdown. Check that the motor is made especially for high-speed rotation and the safe operation can be expected when the motor is mounted. It is recommended to periodically check the equipment for safe operation.
(7) Operation may be unstable at a certain output frequency or under a certain load condition depending on the combination of the inverter and motor. Sufficiently confirm stability by actual operation.
(8) Check that the input voltage is within the range of rating before turning the power on. When a voltage exceeding the rated voltage is applied, fire or smoke may be generated inside the inverter. In addition, abnormal sound may be produced in some cases.
(9) The side of the inverter will become hot. Install the inverter on metal or other nonflammables.
(10) Exercise special care so that dust or iron powder will not enter the inverter.
(11) The electronic thermal is the fixed current (rated current of the inverter). Use a thermal relay except the Astero motor. The motor may not be protected from overloading when start-stop operation is repeated frequently; therefore, check the motor temperature rise.
(12) The operator must check for the safety of the surrounding before turning on or off the power. Prevent operation by any person who is not concerned.

(13) If the supply voltage drops when the power supply is interrupted instantaneously, the inverter will detect the undervoltage and shut off the output. When the supply voltage is restored, the inverter automatically resumes operation. Check the system consistency.
(14) The heat sink on the side of the inverter becomes hot. Never touch it during operation or before a sufficient time passes after the inverter is stopped.
(15) Every possible effort has been made to ensure the quality of the product. However, unexpected external noise and static electricity, as well as incorrect terminal wiring, may cause operation beyond the setting. Pay special attention to your machines and their safety.

⚠ CAUTION

9.2 Operational precautions

(1) The voltage source capacity shall be within the range from 1.5 times the inverter capacity to 500 kVA. When the voltage source capacity exceeds 500 kVA or a phase advance capacitor is switched on the power supply side, an excessive peak current may flow through the power input circuit, braking the converter section. In that case, install a power factor improved AC reactor, which matches the inverter capacity, on the input side of each inverter.
(2) Wiring or operation sequence that permits application of input voltage to the output side of the inverter will cause inverter breakdown. Avoid it.
(3) The life of inverter is greatly influenced by the ambient temperature. Lower the ambient temperature as much as possible within the allowable range.
(4) Do not install an electromagnetic contactor between the inverter and motor to run and stop the motor by the electromagnetic contactor. Run and stop the motor by the operation switch on the front panel or by the external control terminal "RUN."
(5) Do not connect a phase advance capacitor to the output side of the inverter, otherwise the phase advance capacitor may be broken.
(6) Do not conduct overload operation in excess of the inverter capacity (example: operation in excess of the rated current of the inverter), otherwise the inverter may be broken or the service life of the inverter may be shortened.
(7) When operating a motor by the inverter, the leakage current may increase and the earth leakage breaker may malfunction. In that case, use an earth leakage breaker, which is made to prevent high harmonics from reaching an inverter, in the system in question and other systems.
(8) This inverter is for 3-phase induction motors. Do not use the inverter for single-phase motors.

(9) When using the inverter for parallel operation of more than one motor, select an appropriate inverter capacity so that the total rated current will be lower than the rated current of the inverter. When the total of motor output is used for selection, the rated current of the inverter may be exceeded depending on the type of motor. Exercise care.

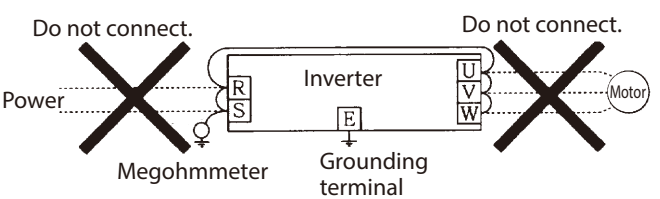
(10) The total length of the inverter and motor wire shall not exceed 50 m (20 m in the case of shielded wire). Install a reactor, etc. between the inverter and motor when the wiring is long.

(11) Check that the wire on the terminal block is tightened correctly. If it is loose, overheating may result.

(12) When the inverter is used to operate a motor, radio noise may be generated in the inverter input/output wires and motor, adversely affecting electronic equipment. In that case, install an inverter input/output filter or put the wire in a conduit to control the noise to a certain extent.

(13) Pay attention to the following when an inverter with a built-in electronic thermal is used:
- The electronic thermal is the rated current for the inverter. Check the rated current of the applicable motor.
- Adopt individual operation (one inverter for one motor).

(14) Conduct a megohmmeter test of the inverter itself only for the main circuit according the procedure shown below. When conducting a megohmmeter test for an external circuit, remove all terminals of the main circuit so that the test voltage will not be applied to the inverter. Use a 500 DVC megohmmeter, and check that the reading exceeds 1 MΩ.



10. Safety Guideline

Safety Guideline

EN

As "Warning" and "Caution" are critical information to prevent hazardous situation, make sure to read this guideline fully along with the instruction manual and follow the instructions therein.

⚠ Warning : Improper handling may cause hazardous situation (electric shock, fire, personal injury, etc.), resulting in a potentially serious personal injury and/or death.

⚠ Caution : Improper handling may cause hazardous situation (fire, injuries, physical damage, etc.), resulting in a possible medium damage or personal injury. It may cause physical damages only.

⚠ Warning

- Please ensure the grounding (ground wire).
- An electrician with expertise should work on wiring.
- Make sure the power is turned OFF before starting up the system.
- Make sure that the unit is installed before wiring.
- Do not touch internal components or terminals of the inverter (or servo amplifier) or attach/remove the wiring or connectors while an inverter is energized.
- Do not open the front cover of the inverter when it is energized or has residual voltage left.
- Do not manipulate controls using wet hands.
- Do not touch terminals or connectors even while the inverter (or servo amplifier) is energized but suspended.
- Make sure that the inverter has been switched to a mode in which it will not be operative after recovered when otherwise it may be hazardous to the operator.
- Please provide an emergency stop switch separately.
- Reset the alarm after making sure that an operation command has been disabled.
- Turn OFF the power and wait for 10 minutes or more before working on a service.
- Unauthorized operators should not work on maintenance, service, and part replacement.

⚠ Caution

- Attach the inverter to such incombustible as metal, and keep combustibles away.
- Do not contaminate the inverter with foreign materials, including dusts, etc.
- Install the inverter on a vertical wall without oscillations which can reliably support the unit weight described on the instruction manual.
- Keep it away from hot and humid ambient environment with corrosive gas, and explosive gas, etc. and install in a room without direct sunlight.
- Make sure that the product's rated voltage matches the alternator's voltage.
- Do not connect the alternator to output terminals (U, V, and W).
- Do not connect a resistance directly to a direct current terminal.
- Use a power line, leakage detection breaker, or electromagnetic contactor with a designated (rated) capacity or equivalent.
- Do not stop the operation of the inverter (or servo amplifier) by turning ON/OFF the electromagnetic contactor placed at the power supply and output.
- Tighten a screw with a rated torque. In addition, do not leave the screw loosened.
- Do not touch the cooling fan.
- The cooling fin and the damping resistor are heated and hot. Do not touch.
- Check if rotation, abnormal noise, oscillations of the motor could be detected during operation.

Sicherheitsrichtlinien

GR

Da es sich bei „Warnung" und „Achtung" um überaus wichtige Hinweise zur Verhinderung von Gefahrensituationen handelt, müssen Sie diese Richtlinien sowie die Betriebsanleitung gründlich lesen und alle darin angesprochenen Anweisungen befolgen.

⚠ Warnung : Unsachgemäße Handhabung führt unter Umständen zu Gefahrensituationen (elektrischer Schlag, Feuer, Personenschaden, usw.), welche wiederum zu schwerwiegenden körperlichen Verletzungen und/oder Tod führen können.

⚠ Achtung : Unsachgemäße Handhabung führt unter Umständen zu Gefahrensituationen (Feuer, Verletzungen, Sachschaden, etc.), welche wiederum zu mittelschweren Sach- oder Personenschäden führen können.

⚠ Warnung

- Stellen Sie eine ordnungsgemäße Erdung (Erdungskabel) sicher.
- Nur erfahrenes Personal sollte an der Verkabelung arbeiten.
- Vergewissern Sie sich, dass der Strom abgestellt ist, bevor Sie mit der Arbeit am System beginnen.
- Vergewissern Sie sich, dass die Einheit korrekt eingebaut ist, bevor Sie mit dem Verlegen der Kabel beginnen.
- Berühren Sie keine inneren Bauteile oder Klemmen des Frequenzumrichters (oder Servoverstärkers) und und befestigen oder entfernen Sie keinesfalls die Verkabelung oder Anschlüsse, solange der Frequenzumrichter am Stromnetz hängt.
- Öffnen Sie nicht die vordere Abdeckung des Frequenzumrichters, solange dieser am Stromnetz hängt oder Restspannung hat.
- Berühren Sie keine Bedienelemente mit nassen Händen.
- Berühren Sie keine Klemmen oder Anschlüsse, auch dann nicht, wenn der Frequenzumrichter (oder Servoverstärker) bereits abgeklemmt ist, da gefährliche Restspannungen vorhanden sein können.
- Vergewissern Sie sich, dass sich der Frequenzumrichter in einem Modus befindet, in dem er nach Netzwiederkehr nicht arbeitet, da ansonsten eine Gefahrensituation für den Bediener besteht.
- Sorgen Sie bitte für die Bereitstellung eines separaten Not-Aus-Schalters.
- Setzen Sie den Alarm zurück, nachdem Sie sichergestellt haben, dass ein Betriebsbefehl deaktiviert wurde.
- Schalten Sie den Strom AUS und warten Sie mindestens 10 Minuten bevor Sie mit den Wartungsarbeiten beginnen.
- Nicht autorisiertes Personal darf keine Reparatur- und Wartungsarbeiten vornehmen und keine Teile austauschen austauschen,

⚠ Achtung

- Bringen Sie den Frequenzumrichter an nicht brennbaren Oberflächen wie Metall an und halten Sie ihn von brennbaren Flächen fern.
- Verunreinigen Sie den Frequenzumrichter nicht mit Fremdstoffen, wie z.B. Staub o.ä.
- Installieren Sie den Frequenzumrichter an einer senkrechten, feststehenden Wand, die das in der Bedienungsanleitung angegebene Gewicht des Frequenzumrichters sicher tragen kann.
- Installieren Sie den Frequenzumrichter in einem Raum ohne direkte Sonneneinstrahlung und vermeiden Sie feucht-warme Bedingungen und korrosives sowie explosives Atmosphäre.
- Vergewissern Sie sich, dass die Nennspannung des Produkts mit der Netzspannung übereinstimmt.
- Schließen Sie den Generator nicht an Abgangsklemmen (U, V, und W) an.
- Schließen Sie keinen Widerstand direkt an eine Gleichstromklemme an.
- Verwenden Sie für die Netzversorgung einen Motorschutzschalter, ein Schaltschütz oder etwas Ähnliches mit passender Leistung.
- Schalten Sie den Frequenzumrichters (oder Servoverstärker) nicht über das Netzschütz aus.
- Ziehen Sie die Schraube mit dem angegebenen Drehmoment fest. Es ist überaus wichtig, dass Sie die Schraube immer festziehen.
- Berühren Sie nicht das Gerätelüfter.
- Der Bremswiderstand und der Kühlkörper werden heiß. Fassen Sie diese nicht an.
- Überprüfen Sie, ob der Motor dreht, ungewöhnliche Geräusche macht oder ob Vibrationen während des Betriebs auftreten.

Consignes de sécurité

FR

Les sections «Danger» et «Attention» fournissent d'importantes informations sur la prèvention des situations dangereuses. Veillez par consèquent à lire les prèsentes consignes dans leur intègralitè, conjointement avec le manuel d'instructions, et à respecter les instructions contenues dans ce manuel.

⚠ Danger : une mauvaise manipulation peut entraîner une situation dangereuse (choc électrique, incendie, blessure, etc.) et par conséquent, des blessures potentiellement graves voire mortelles.

⚠ Attention : une mauvaise manipulation peut entraîner une situation dangereuse (incendie, blessures, dègâts matèriels, etc.) et par conséquent, des blessures ou dègâts matèriels moyennement sèvères. Cela peut entraîner des dègâts matèriels uniquement.

⚠ Danger

- Veuillez vèrifier la mise à la terre (câble de mise à la terre).
- Un èlectricien qualifiè doit intervenir sur le câblage.
- Assurez-vous que l'alimentation est coupée avant de dèmarrer le système.
- Assurez-vous que l'unitè est installèe avant le câblage.
- Ne touchez pas les composants internes ni les bornes de l'onduleur (ou servoamplificateur), ni ne fixez/dèposez le câblage ou les connecteurs lorsque l'onduleur est alimentè.
- N'ouvrez pas le capot avant de l'onduleur lorsque celui-ci est alimentè ou parcouru par une tension rèsiduelle.
- Ne manipulez pas les commandes avec des mains mouillèes.
- Ne touchez pas les bornes ni les connecteurs même lorsque l'onduleur (ou servoamplificateur) est alimentè mais que son fonctionnement est suspendu.
- Après rètablissement de l'alimentation èlectrique, assurez-vous que l'onduleur est dans un mode dans lequel il est inopèrant, sinon il peut prèsenter un risque pour l'opèrateur.
- Veuillez fournir un contacteur d'arrêt d'urgence sèparèment.
- Rèinitialisez l'alarme après vous être assurè qu'une commande de fonctionnement a ètè dèsactivèe.
- Coupez l'alimentation et attendez 10 minutes minimum avant d'effectuer un entretien.
- Les opèrateurs non autorisès ne doivent pas effectuer de maintenance, d'entretien ou de remplacement de pièces.

⚠ Attention

- Fixez l'onduleur à un matèriau non combustible tel que le mètal, et maintenez les combustibles à l'écart.
- Ne contaminez pas l'onduleur avec des matèriaux ètrangers, notamment de la poussière, etc.
- Installez l'onduleur sur une paroi verticale sans oscillation et pouvant supporter le poids de l'unitè, indiquè dans le manuel d'instructions.
- Conservez-le à l'abri de la chaleur, de l'humiditè, des gaz corrosifs et explosifs, etc., et installez-le à l'abri du soleil.
- Assurez-vous que la tension nominale du produit correspond à la tension de l'alternateur.
- Ne connectez pas l'alternateur aux bornes de sortie (U, V et W).
- Ne connectez pas de rèsistance directement à une borne de courant continu.
- Utilisez une ligne d'alimentation, un disjoncteur anti-fuite ou un contacteur èlectromagnètique avec une capacitè (nominale) dèsignèe ou èquivalente.
- N'interrompez pas le fonctionnement de l'onduleur (ou servoamplificateur) en allumant/coupant le contacteur èlectromagnètique placè au niveau de l'alimentation èlectrique et de la sortie.
- Serrez une vis à un couple nominal. En outre, ne laissez pas la vis desserrèe.
- Ne touchez pas le ventilateur de refroidissement.
- Le ventilateur de refroidissement et la rèsistance d'amortissement sont chauffès et chauds. N'y touchez pas.
- Recherchez d'èventuels bruits anormaux, rotations ou oscillations du moteur pendant son fonctionnement.

Linee guida sulla sicurezza

IT

Poichè "Avvertenza" e "Attenzione" forniscono informazioni fondamentali per prevenire situazioni pericolose, leggere interamente le presenti linee guida e il manuale di istruzioni, attenendosi alle istruzioni fornite.

⚠ Avvertenza : L'errata manipolazione può generare situazioni pericolose (scossa elettrica, incendio, lesioni personali, ecc.), inoltre potrebbe causare gravi lesioni personali e/o il decesso.

⚠ Attenzione : L'errata manipolazione può generare situazioni pericolose (incendio, lesioni, danni fisici, ecc.), inoltre potrebbe causare danni di media entità o lesioni personali. Può causare solo danni fisici.

⚠ Avvertenza

- Controllare la messa a terra (filo di messa a terra).
- Gli interventi sul cablaggio devono essere eseguiti da un elettricista esperto.
- Assicurarsi che l'alimentazione sia SCOLLEGATA prima di avviare il sistema.
- Verificare che l'unità venga installata prima del cablaggio.
- Non toccare i componenti interni o i morsetti dell'inverter (o del servoamplificatore), non collegare/rimuovere il cablaggio o i connettori quando un inverter è sotto tensione.
- Non aprire il coperchio anteriore dell'inverter quando è sotto tensione o in presenza di tensione residua.
- Non toccare i comandi con le mani bagnate.
- Non toccare i morsetti o i connettori neanche quando l'inverter (o il servoamplificatore) è sotto tensione ma è sospeso.
- Assicurarsi che l'inverter sia stato commutato su una modalità in cui non sarà operativo dopo il ripristino dell'alimentazione, poichè altrimenti potrebbe rappresentare un pericolo per l'operatore.
- Predisporre separatamente un interruttore di arresto di emergenza.
- Reimpostare l'allarme dopo essersi assicurati che sia stato disabilitato un comando operativo.
- Scollegare l'alimentazione e attendere 10 o più minuti prima di un intervento di assistenza.
- Gli operatori non autorizzati non devono eseguire interventi di manutenzione, assistenza e sostituzione dei componenti.

⚠ Attenzione

- Collegare l'inverter a materiali non combustibili come il metallo e tenere lontani i combustibili.
- Non contaminare l'inverter con materiali estranei, quali le polveri, ecc.
- Installare l'inverter su una parete verticale che non sia soggetta a oscillazioni e che sia in grado di supportare in maniera affidabile il peso dell'unità descritto nel manuale di istruzioni.
- Mantenerlo lontano da ambienti caldi e umidi, da ambienti con gas corrosivi ed esplosivi, ecc.; installarlo in una stanza in cui non penetri luce solare diretta.
- Assicurarsi che la tensione nominale del prodotto corrisponda alla tensione dell'alternatore.
- Non collegare l'alternatore ai morsetti di uscita (U, V e W).
- Non collegare una resistenza direttamente a un morsetto che porta corrente continua.
- Utilizzare una linea di alimentazione, un interruttore di rilevamento di dispersione, oppure un contattore elettromagnetico con capacità designata (nominale) o equivalente.
- Non interrompere il funzionamento dell'inverter (o del servoamplificatore) accendendo o spegnendo il contattore elettromagnetico posizionato sull'alimentazione e sull'uscita.
- Serrare una vite con coppia nominale. Inoltre, non lasciare la vite allentata.
- Non toccare la ventola di raffreddamento.
- L'aletta di raffreddamento e la resistenza di smorzamento vengono riscaldate e scottano. Non toccare.
- Controllare se, durante il funzionamento, si rilevano rotazione, rumori anomali, oscillazioni del motore.

Directrices de seguridad

ES

"Advertencia" y "Precaución" indican elementos de información esenciales para evitar situaciones peligrosas. Por lo tanto, asegúrese de leer detenidamente estas directrices junto con el manual de instrucciones, y de seguir las indicaciones que contienen.

⚠ Advertencia : Una manipulación incorrecta puede originar situaciones peligrosas (descargas elèctricas, incendios, lesiones personales, etc.), que pueden causar lesiones personales graves e incluso la muerte.

⚠ Precaución : Una manipulación incorrecta puede originar situaciones peligrosas (incendios, lesiones, daños físicos, etc.), que pueden causar daños materiales o lesiones personales. Puede que cause solamente daños físicos.

⚠ Advertencia

- Asegure la conexión a tierra (cable de masa).
- Un electricista cualificado debe ocuparse del cableado.
- Asegúrese de que la alimentación está desconectada antes de activar el sistema.
- Asegúrese de que la unidad está instalada antes de tender el cableado.
- No toque los componentes internos ni los terminales del inversor (o servoamplificador), ni conecte/desconecte el cableado o los conectores con el inversor conectado a la alimentación.
- No abra la cubierta delantera del inversor si está conectado a la alimentación o si tiene tensión residual.
- No manipule los controles con las manos húmedas.
- No toque los terminales o los conectores con el inversor (o el servoamplificador) conectado a la alimentación, ni siquiera aunque estè suspendido.
- Asegúrese de que el inversor se encuentra en un modo en el que no pueda reactivarse cuando se restablezca la alimentación y esto suponga un peligro para el operario.
- Asegúrese de incorporar un interruptor de parada de emergencia independiente.
- Restablezca la alarma una vez se haya asegurado de haber desactivado el comando de funcionamiento.
- Desconecte la alimentación y espere como mínimo 10 minutos antes de iniciar un trabajo de reparación.
- Los operarios que no cuenten con la autorización necesaria no deben realizar tareas de mantenimiento, reparación ni sustitución de piezas.

⚠ Precaución

- Instale el inversor sobre materiales no combustibles, como metales en general, y mantenga los materiales combustibles a una distancia prudencial.
- Evite contaminar el inversor con materiales extraños, como el polvo, etcètera.
- Instale el inversor en una pared vertical sin oscilaciones y lo bastante resistente como para soportar el peso de la unidad, tal y como se describe en el manual de instrucciones.
- Mantenga la unidad alejada de ambientes calurosos y húmedos con gases corrosivos y explosivos. Realice la instalación en una sala sin luz solar directa.
- Asegúrese de que la tensión nominal del producto coincide con la tensión del alternador.
- No conecte el alternador a los terminales de salida (U, V y W).
- No conecte una resistencia directamente a un terminal de corriente continua.
- Use un cable de alimentación, un disyuntor de detección de fugas o un contactor electromagnètico con la capacidad nominal designada o equivalente.
- No detenga el inversor (o el servoamplificador) apagando o encendiendo el contactor electromagnètico ubicado en la fuente de alimentación y en la salida.
- Apriete el tornillo al par especificado. Asegúrese de no dejar el tornillo sin apretar.
- No toque el ventilador.
- El disipador de calor y la resistencia de amortiguación se calientan considerablemente. No los toque.
- Compruebe si se producen rotaciones, ruidos u oscilaciones anormales en el motor durante su funcionamiento.

Indicações de segurança

PO

As secções "Aviso" e "Cuidado" contêm informações essenciais para evitar situações de perigo; certifique-se de que lê estas indicações na totalidade, juntamente com o manual de instruções e siga as instruções neles contidas.

⚠ Aviso : O manuseamento incorreto pode causar uma situação de perigo (choque elètrico, incêndio, lesões, etc.), resultando em potenciais lesões pessoais sèrias e/ou morte.

⚠ Cuidado : O manuseamento incorreto pode causar uma situação de perigo (incêndio, lesões, danos físicos, etc.), resultando num possível dano ou lesão pessoal de dimensões mèdias. Pode causar apenas danos físicos.

⚠ Aviso

- Certifique-se de que o dispositivo é ligado à terra corretamente (cabo de ligação à terra).
- A instalação elètrica deve ser efetuada por um eletricista com formação para o efeito.
- Certifique-se de que a alimentação está DESLIGADA antes de ligar o sistema.
- Certifique-se de que a unidade está instalada antes da montagem da instalação elètrica.
- Não toque em terminais ou componentes internos do conversor (ou servomecanismo) nem ligue/retire os cabos ou conectores quando o conversor está com corrente.
- Não abra a cobertura dianteira do conversor quando este está com corrente ou tem tensão residual.
- Não manipule os controlos com as mãos molhadas.
- Não toque em terminais ou conectores mesmo quando o conversor (ou servomecanismo) está com corrente mas suspenso.
- Certifique-se de que o conversor foi ligado num modo em que não estará operacional após a restauração da alimentação de corrente, caso contrário pode ser perigoso para o operador.
- Disponibilize um interruptor de paragem de emergência separadamente.
- Reponha o alarme depois de se certificar de que o comando de funcionamento foi desativado.
- DESLIGUE a alimentação e espere pelo menos 10 minutos antes de realizar um trabalho.
- A manutenção, revisão e a substituição de peças não devem ser realizadas por operadores não autorizados.

⚠ Cuidado

- Ligue o conversor a materiais não combustíveis, como metal, e mantenha-o afastado de materiais combustíveis.
- Não contamine o conversor com materiais estranhos, incluindo poeiras, etc.
- Instale o conversor na vertical, numa parede sem oscilações e com capacidade para suportar de forma fiável o peso da unidade descrito no manual de instruções.
- Certifique-se de que o dispositivo não è colocado em locais com ambientes húmidos e quentes com gás corrosivo e gás explosivo, etc.. Instale-o num compartimento sem luz natural direta.
- Certifique-se de que a tensão nominal do produto corresponde à tensão do alternador.
- Não ligue o alternador a terminais de saída (U, V, e W).
- Não ligue uma resistência diretamente a um terminal de corrente contínua.
- Utilize um cabo de alimentação, um disjuntor de deteção de fugas ou um contactor eletromagnètico com uma capacidade (nominal) designada ou equivalente.
- Não interrompa o funcionamento do conversor (ou servomecanismo) LIGANDO/DESLIGANDO o contactor eletromagnètico localizado na fonte e saída de alimentação.
- Aperte o parafuso ao binário nominal. Para além disso, não deixe o parafuso desapertado.
- Não toque no ventilador de arrefecimento.
- O ventilador de arrefecimento e a resistência de amortecimento estão quentes. Não toque.
- Verifique se ocorrem oscilações, ruídos irregulares ou rotação do motor durante o funcionamento.

Warranty

The scope of our warranty for our products is limited to the range of our manufacture.
Warranty (period and contents)

Warranty Period	The warranty period for the new Products shall be 18 months after the shipment of the Products from the seller's works or 12 months from the Products coming into operation, whether comes first.
Warranty Condition	In the event that any problem or damage to the Product arises during the "Warranty Period" from defects in the Product whenever the Product is properly installed and combined with the Buyer's equipment or machines, maintained as specified in the maintenance manual, and properly operated under the conditions described in the catalog or as otherwise agree upon in writing between the Seller and the Buyer or its customers; the Seller will provide, at its sole discretion, appropriate repair or replacement of the Product, without charge, at a designated facility, except as stipulated in the "Warranty Exclusions" described below. However, if the Product is installed or integrated into the Buyer's equipment or machines, the Seller shall not reimburse the cost of: removal or re-installation of the Product or other incidental costs related thereto, any lost opportunity, any profit loss or other incidental or consequential losses or damages incurred by the Buyer or its customers.
Warranty Exclusions	Not withstanding the above warranty, the warranty as set forth herein shall not apply to any problem or damage to the Product that is caused by : 1. installation, connection, combination or integration of the Product in or to the other equipment or machine that is rendered by any person or entity other than the Seller ; 2. insufficient maintenance or improper operation by the Buyer or its customers, such that the Product is not maintained in accordance with the maintenance manual provided or designated by the Seller ; 3. improper use or operation of the Product by the Buyer or its customers that is not informed to the Seller, including, without limitation, the Buyer's or its customers' operation of the Product not in conformity with the specifications, or use of lubricating oil in the Product that is not recommended by the Seller ; 4. any problem or damage to any equipment or machine to which the Product is installed, connected or combined, or on any specifications particular to the Buyer or its customers ; 5. any changes, modifications, improvements or alterations to the Product or those functions that are rendered on the Product by any person or entity other than the Seller ; 6. any parts in the Product that are supplied or designated by the Buyer or its customers ; 7. earthquake, fire, flood, sea-breeze, gas, thunder, acts of God or any other reasons beyond the control of the Seller ; 8. normal wear and tear, or deterioration of the Product's parts, such as bearings, oil-seals ; 9. any other troubles, problems or damage to the Product that are not attributable to the Seller.

Worldwide Locations

North America / South America

Sumitomo Machinery Corporation of America (SMA)
4200 Holland Blvd. Chesapeake, VA 23323, U.S.A.
TEL (1)757-485-3355 FAX (1)757-485-7490

SM Cyclo of Canada, Ltd. (SMC)
1453 Cornwall Road, Oakville, ON L6J 7T5, Canada
TEL (1)905-469-1050 FAX (1)905-469-1055

EMEA

Sumitomo (SHI) Cyclo Drive Germany GmbH (SCG)
Cyclostraße 92, 85229 Markt Indersdorf, Germany
TEL (49)8136-66-0

India

Sumi-Cyclo Drive India Private Limited (SDI)
Gat No. 186, Raisoni Industrial Park, Alandi Markal Road,
Fulgaon-Pune, Maharashtra, India
TEL (91)96-0774-5353

Southeast Asia/Oceania

Sumitomo (SHI) Cyclo Drive Asia Pacific Pte. Ltd. (SCA)
83 Joo Koon Circle, Singapore 629109
TEL (65)6591-7800 FAX (65)6863-4238

China

Sumitomo (SHI) Cyclo Drive Shanghai, Ltd. (SCS)
Room 1101, SMEG Plaza, Office Building, No.1386
Hongqiao Road, Changning District, Shanghai, China
200336
TEL (86)21-3462-7877 FAX (86)21-3462-7922

Taiwan

Tatung SM-Cyclo Co., Ltd. (TSC)
22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.
TEL (886)2-2595-7275 FAX (886)2-2595-5594

Korea

Sumitomo (SHI) Cyclo Drive Korea, Ltd. (SCK)
913, 19 Saemunan-ro 5-gil, Jongno-gu, Seoul,
Republic of Korea 03173
TEL (82)2-730-0151 FAX (82)2-730-0156

Japan

Sumitomo Heavy Industries, Ltd. (SHI)
ThinkPark Tower, 1-1 Osaki 2-chome, Shinagawa-ku,
Tokyo 141-6025, Japan
TEL (81)3-6737-2511 FAX (81)3-6866-5160

Sumitomo Heavy Industries, Ltd. PTC Group
ThinkPark Tower, 1-1 Osaki 2-chome, Shinagawa-ku, Tokyo 141-6025, Japan

No.EM0102E-4.6
EI18 Issued on May-2024