KEYPAD PANEL FUNCTIONS AND OPERATIONS

Keypad panel

LED monitor

- In Operation mode: Displays the setting frequency, output current, voltage, motor speed, or line speed.
- In Trip mode: Displays code indicating the cause of trip.

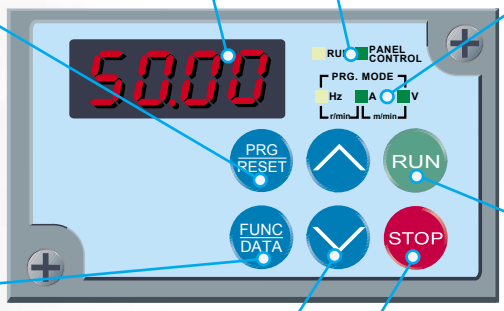
Operation mode indication

RUN : This LED goes on during operating.
PANEL CONTROL : When Function code F02 is set at 0 , 2, or 3 (Keypad operation), this LED goes on.

Program/Reset key

Switches between operation mode and program mode.

- When tripped: Releases the trip-stop state and changes to operation mode.



Unit indication

Displays the unit of the value shown on the LED monitor.

Run key

Starts the inverter.

- In Stop mode: Invalid when the function code F02 is set at 1 (external operation).

Function/Data select key

Changes the displayed values of LED monitor, selects and stores the function codes and data codes.

Up/Down keys

- In Operation mode: Increases or decreases the frequency or motor speed.
- In Program mode: Increases or decreases function code number and data set value.

Stop key

Stops the inverter.

- In Operation mode: Invalid when the function code F02 is set at 1 (external operation).

Keypad panel operation

1 Turn on the power supply, press the ▲ or ▼ key to set output frequency. When you press the RUN key, the motor will run at the set frequency and with function code/data at factory shipment. When you press the STOP key, the motor will decelerates and stops.

2 Procedure for selecting and changing function codes and data codes.
The keypad panel operation how to select a functions code and change its data code is explained below.

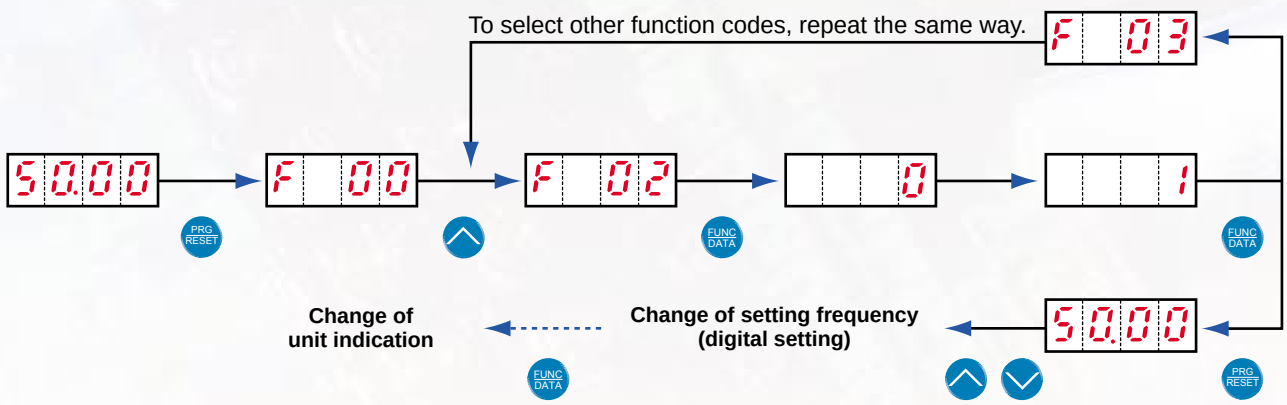
1) Press the PRG RESET key to select the program mode.
2) Pressing FUNC DATA key alternates the displayed data between the function code and its data.
(F00 ➡ 0 ➡ F01 ➡ 0 ➡ • • • • •)
3) With data displayed, press the ▲ or ▼ key to change the data code.
4) Press the FUNC DATA key to update the data for the selected function code.
*In step 2 above, if the ▲ or ▼ key is pressed when the function code is displayed, only the function code changes sequentially (see below).
(F00 ➡ F01 ➡ F02 ➡ F03 ➡ • • • • •)

The keypad panel modes are classified in the following 5 modes

Monitor, keys \ Mode		Program mode (operation stopped)	Program mode (duringoperation)	Stop mode	Operation mode	Trip mode
Monitor	8888	Displays the function code or data code. (Blinking)	Displays the function code or data code. (Lighting)	Displays the set frequency, output current, output voltage, motor speed, line speed. (Blinkihg)	Displays the output frequency, output current, output voltage, motor speed, line speed. (Lighting)	Displays the trip content or alarm history. (Blinking or Lighting)
	PRG MODE Hz A V Lighting r/min m/min	Indicates the PRG mode during stopping.	Indicates the PRG mode during operation.	Unit indication of the above value.	Unit indication of the above value.	None
		PRG MODE Hz A V Lighting r/min m/min	PRG MODE Hz A V Lighting r/min m/min	Freq.. / Current / Voltage / Motor speed / Line speed — PRG MODE Hz A V r/min m/min	Freq.. / Current / Voltage / Motor speed / Line speed — PRG MODE Hz A V r/min m/min	Not lit
	PANEL CONTROL	Indicates whether keypad panel operation or external signal operation. (ON during keypad panel operation)				
	RUN	Indicates the operation has stopped. (☐RUN not lit)	Indicates the during operation. (▣RUN lighting	Indicates the operation has stopped. (☐RUN not lit)	Indicates the during operation. (▣RUN lighting	Indicates “stopping in trip mode”. (▣RUN lighting
Keys	PRG RESET	Swtches to the stop mode	Changes to operation mode	Switches to “Program mode (operation stopped)”.	Switches to “Program mode during operation”.	Releases the trip and switches to “stop mode” or “operation mode”.
	FUNC DATA	Changes the display between function code and data code, stores data code, and then updates function codes.		Shifts the values on the LED monitor and the unit of the unit indication LED.		Invalid
	▲ ▼	Increases/decreases function code number and data code.	Increases/decreases the data code number and stores data temporary.	Increases/decreases the setting of frequency, motor speed, line speed.		Display the alarm history.
	RUN	Invalid	Invalid	Switches to operation mode.	Invalid	Invalid
	STOP	Invalid	Switches to “stop mode” or “Program mode (operation stopped)”.	Invalid	Switches to the stop mode.	Invalid

Procedure for selecting function codes and data codes

(Ex. Changing data code from 0 to 1 of function code F02)



FUNCTION SETTINGS

Fundamental functions

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function		Setting range	Min. unit	Factory setting
	Code	Name			
Basic Functions	F00	Data protection	0 : Data change enable 1 : Data protection	-	0
	F01	Frequency command1	0 : KEYPAD operation (▲ or ▼ key) 1 : Voltage input (terminal 12) (0 to +10V DC, 0 to +5V DC) 2 : Current input (terminal C1) (4 to 20mA DC) 3 : Voltage and current input (terminals 12 and C1) 4 : Reversible operation with polarity (terminal 12)(0 to ±10V DC) 5 : Inverse mode operation (terminal 12) (+10 to 0V DC) 6 : Inverse mode operation (terminal C1) (20 to 4mA DC) 7 : UP/DOWN control 1 (initial freq. = 0Hz) 8 : UP/DOWN control 2 (initial freq. = last value)	-	0
	F02	Operation method	0 : KEYPAD operation (forward/reverse : by signal input) 1 : FWD or REV command signal operation 2 : KEYPAD operation (FWD) 3 : KEYPAD operation (REV)	-	2
	F03	Maximum frequency 1	50 to 400Hz	1Hz	50
	F04	Base frequency 1	25 to 400Hz	1Hz	50
	F05	Rated voltage 1 (at Base frequency 1)	0(Free), 160 to 480V (400V class) 0(Free), 80 to 240V (200V class)	1V	400 230
	F06	Maximum voltage 1 (at Maximum frequency 1)	160 to 480V (400V class) 80 to 240V (200V class)	1V	400 230
	F07	Acceleration time 1	0.01 to 3600s	0.0.1s	6.00
	F08	Deceleration time 1	0.01 to 3600s	0.0.1s	6.00
	F09	Torque boost 1	0 : Automatic (for constant torque load) 1 : Manual (for variable torque load) 2 : Manual (for proportional torque load) 3 to 31 : Manual (for constant torque load)	1	0
	F10	Electronic thermal overload relay for motor 1 (Select)	0: Inactive 1: Active (for 4-pole standard motor) 2: Active (for 4-pole inverter motor)	-	1
	F11	(Level)	Approx. 20 to 135% of rated current	0.01A	*1)
	F12	(Thermal time constant)	0.5 to 10.0 min	0.1min	5.0
	F13	Electronic thermal overload relay (for braking resistor)	0 : Inactive 1 : Active (for external braking resistor : DB□□□-□C) 2 : Active (for external braking resistor : TK80W 120Ω)	-	0
	F14	Restart mode after momentary power failure	0 : Inactive (Trip and alarm when power failure occurs.) 1 : Inactive (Trip, and alarm when power recovers.) 2 : Inactive (Deceleration stop, and alarm.) 3 : Active (Momentarily stops and restarts at output frequency of before power failure) 4 : Active (Momentarily stops and restarts at starting frequency)	-	0
	F15	Frequency limiter (High)	0 to 400Hz	1Hz	70
	F16	(Low)	0 to 400Hz	1Hz	0
	F17	Gain (for freq. setting signal)	0.0 to 200.0%	0,1%	100.0
	F18	Bias frequency	–400 to +400Hz	1Hz	0
	F20	DC brake (Starting freq.)	0.0 to 60.0Hz	0.1Hz	0.0
	F21	(Braking level)	0 to 100%	1%	0
	F22	(Braking time)	0.0 (DC brake inactive), 0.1 to 30.0s	0.1s	0.0
	F23	Starting frequency (Freq.)	0.1 to 60.0Hz	0.1Hz	0.5
	F24	(Holding time)	0.0 to 10.0s	0.1s	0.0
	F25	Stop frequency	0.1 to 6.0Hz	0.1Hz	0.2
	F26	Motor sound (Carrier freq.)	0.75 to 15kHz	1kHz	15
	F27	(Sound tone)	0 : Level 0 2 : Level 2 1 : Level 1 3 : Level 3	-	0

Fundamental functions (continued)

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Code	Function Name	Setting range	Min. unit	Factory setting
Basic Functions	F29	FMA, FMP (Select)	0 : Analog output (FMA) 1 : Pulse output (FMP)	-	0
	F30	FM (Voltage adjust)	0 to 200%	1%	100
	F31	(Function)	0 : Output frequency 1 (Before slip compensation) 1 : Output frequency 2 (After slip compensation) 2 : Output current 3 : Output voltage 4 : Output torque 5 : Load factor 6 : Input power 7 : PID feedback value 8 : DC link circuit voltage	-	0
	F33	FM (Pulse rate)	300 to 6000 p/s (at full scale)	1p/s	1440
	F34	(Voltage adjust)	0% : (Pluse rate output: 50% duty) 1 to 200% : (Voltage adjust: 2670p/s, duty adjust)	1%	0
	F35	(Function)	0 : Output frequency 1 (Before slip compensation) 1 : Output frequency 2 (After slip compensation) 2 : Output current 3 : Output voltage 4 : Output torque 5 : Load factor 6 : Input power 7 : PID feedback value 8 : DC link circuit voltage	-	0
	F36	30Ry operation mode	0 : The relay (30) excites on trip mode. 1 : The relay (30) excites on normal mode.	-	0
	F40	Torque limiter 1 (Driving)	20 to 200, 999% (999: No limit) *2)	1%	180
	F41	(Braking)	20 to 200, 999% (999: No limit) *2)	1%	150
	F42	Torque-vector control 1	0 : Inactive 1 : Active	-	0

NOTES:
*1) Typical value of standard Silectron Sistemi 4P motor.
*2) Percent shall be set according to FUNCTION CODE: P02 OR A11, Motor capacity.

Extension terminal functions

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Code	Function Name	Setting range	Min. unit	Factory setting
X1-X5 Terminal	E01	X1 terminal function	Selects from the following items.	-	0
	E02	X2 terminal function	0 : Multistep freq. selection (16 steps) [SS1]	-	1
	E03	X3 terminal function	1 : Multistep freq. selection (16 steps) [SS2]	-	2
	E04	X4 terminal function	2 : Multistep freq. selection (16 steps) [SS4]	-	6
	E05	X5 terminal function	3 : Multistep freq. selection (16 steps) [SS8]	-	7
			4 : ACC / DEC time select. (1 step) [RT1] 5 : 3-wire operation stop command [HLD] 6 : Coast-to-stop command [BX] 7 : Alarm reset [RST] 8 : Trip command (External fault) [THR] 9 : Freq. set. 2 / Freq. set. 1 [Hz2/Hz1] 10 : Motor 2 / Motor 1 [M2/M1] 11 : DC brake command [DCBRK] 12 : Torque limiter 2 / Torque limiter 1 [TL2/TL1] 13 : UP command [UP] 14 : DOWN command [DOWN] 15 : Write enable for KEYPAD [WE-KP] 16 : PID control cancel [Hz/PID] 17 : Inverse mode changeover (terminals 12 and C1) [IVS] 18 : Link enable (Bus,RS485) [LE]		
ACC 2 DEC 2	E10	Acceleration time 2	0.01 to 3600s	0.01s	10.0
	E11	Deceleration time 2		0.01s	10.0
	E16	Torque limiter 2 (Driving)	20 to 200%, 999% (999: No limit) *2)	1%	180
	E17	(Braking)	0 (Automatic deceleration control), 20 to 200%, 999% (999: No limit) *2)	1%	150

Extension terminal functions (continued)

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function Code	Function Name	Setting range	Min. unit	Factory setting
Y1, Y2 Terminal	E20	Y1 terminal function	Selects from the following items. 0 : Inverter running [RUN] 1 : Frequency equivalence signal [FAR] 2 : Frequency level detection [FDT] 3 : Undervoltage detection signal [LU] 4 : Torque polarity detection (Braking/Driving) [B/D] 5 : Torque limiting [TL] 6 : Auto-restarting [IPF] 7 : Overload early warning [OL] 8 : Lifetime alarm (main circuit capacitor) [LIFE] 9 : 2nd Freq. equivalence detection [FAR2]	-	0
	E21	Y2 terminal function		-	7
	E29	Frequency equivalence delay	0.01 to 10.0s	0.01s	0.1
	E30	FAR funct. signal (Hysteresis)	0.0 to 10.0 Hz	0.1Hz	2.5
	E31	FDT function signal (Level)	0 to 400 Hz	1Hz	50
	E32	(Hysteresis)	0.0 to 30.0 Hz	0.1Hz	1.0
	E33	OL functionl signal (Mode select)	0 : Thermal calculation 1 : Output current	-	0
	E34	(Level)	Approx. 20 to 200% of rated current	0.01A	*1
	E35	(Timer)	0.0 to 60.0s	0.1s	10.0
LED Monitor	E40	Display coefficient A	0.00 to 200.0	0.01	0.01
	E41	Display coefficient B	0.00 to 200.0	0.01	0.00
	E42	LED Display filter	0.0 to 5.0s	0.1s	0.5

NOTES:
*1) Typical value of standard Silectron Sistemi 4P motor.

Control functions of frequency

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function Code	Function Name	Setting range	Min. unit	Factory setting
Jump Hz Control	C01	(Jump freq. 1)	0 to 400Hz	1Hz	0
	C02	Jump (Jump freq. 2)		1Hz	0
	C03	frequency (Jump freq. 3)		1Hz	0
	C04	(Hysteresis)	0 to 30Hz	1Hz	3
Multi-Hz Control	C05	(Freq. 1)	0.00 to 400.0Hz	0.01Hz	0.00
	C06	(Freq. 2)		0.01Hz	0.00
	C07	(Freq. 3)		0.01Hz	0.00
	C08	(Freq. 4)		0.01Hz	0.00
	C09	(Freq. 5)		0.01Hz	0.00
	C10	(Freq. 6)		0.01Hz	0.00
	C11	Multistep (Freq. 7)		0.01Hz	0.00
	C12	frequency (Freq. 8)		0.01Hz	0.00
	C13	setting (Freq. 9)		0.01Hz	0.00
	C14	(Freq.10)		0.01Hz	0.00
	C15	(Freq.11)		0.01Hz	0.00
	C16	(Freq.12)		0.01Hz	0.00
	C17	(Freq.13)		0.01Hz	0.00
	C18	(Freq.14)		0.01Hz	0.00
	C19	(Freq.15)		0.01Hz	0.00
Timer Operation	C21	Timer operation	0 : Inactire 1 : Active	-	0
	C22	(Stage 1)	• Operation time: 0.00 to 3600s	0.01s	0.00
	C30	Frequency command 2	0 : KEYPAD operation (or key) to 8 : UP/DOWN control 2 (initial freq. = last value) } Same as F01	-	2
	C31	Offset (Terminal 12)	–5.0 to +5.0%	0.1%	0.0
	C32	(Terminal C1)	–5.0 to +5.0%	0.1%	0.0
	C33	Analog setting signal filter	0.00 to +5.00s	0.01s	0.05

NOTES:
*1) Typical value of standard Silectron Sistemi 4P motor.

Motor parameters

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function		Setting range	Min. unit	Factory setting
	Code	Name			
Motor 1	P01	Number of motor 1 poles	2 to 14	2	4
	P02	Motor 1 (Capacity)	3.7kW or smaller : 0.01 to 5.50 kW 5.5kW or larger : 0.01 to 11.00 kW	0.01kW	*1)
	P03	Motor 1 (Rated current)	0.00 to 99.9 A	0.01A	*1)
	P04	Motor 1 (Tuning)	0 : Inactive 1 : Active (One time tuning of %R1 and %X (on motor stopping mode)) 2 : Active (One time tuning of %R1, %X and Io (on motor running mode))	-	0
	P05	Motor 1 (On-line Tuning)	0 : Inactive 1 : Active (Real time tuning of %R2)	-	0
	P06	Motor 1 (No-load current)	0.00 to 99.9 A	0.01A	*1)
	P07	Motor 1 (%R1 setting)	0.00 to 50.00 %	0.01%	*1)
	P08	Motor 1 (%X setting)	0.00 to 50.00 %	0.01%	*1)
	P09	Motor 1 (Slip compensation control 1)	0.00 to +15.00Hz	0.01Hz	0.00
	P10	Motor 1 (Slip compensation response time)	0.01 to 10.00s	0.01s	0.5

NOTES:
*1) Typical value of standard Silectron Sistemi 4P motor.

High performance functions

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function		Setting range	Min. unit	Factory setting
	Code	Name			
High Performance Functions	H01	Accumulated operation time	Monitoring only	1h	0
	H02	Trip history	Monitoring only	-	-
	H03	Data initializing (Data reset)	0 : Manual set value 1 : Return to factory set value	-	0
	H04	Auto-reset (Times)	0 (Inactive), 1 to 10 times	1	0
	H05	Auto-reset (Reset interval)	2 to 20s	1s	5
	H06	Fan stop operation	0 : Inactive 1 : Active (Fan stops at low temperature mode) for 1.5kW or larger model only	-	0
	H07	ACC/DEC pattern (Mode select)	0 : Linear 2 : S-curve (strong) 1 : S-curve (weak) 3 : Non-linear (For variable torque load)	-	0
	H09	Start mode (Rotating motor pick up)	0 : Inactive 1 : Active (Only when Auto-restart after momentary power failure mode) 2 : Active (All start modes)	-	1
	H10	Energy-saving operation	0 : Inactive 1 : Active (Only when torque boost "F09" is set at manual setting mode.)	-	0
	H11	DEC mode	0 : Normal (according to "H07" mode) 1 : Coast-to-stop	-	0
	H12	Instantaneous overcurrent limiting	0 : Inactive 1 : Active	-	1
	H13	Auto-restart (Restart time)	0.1 to 5.0s	0.1s	0.1
	H14	Auto-restart (Freq. fall rate)	0.00 to 100.00Hz/s	0.01Hz/s	10.00
PID Control	H20	PID control (Mode select)	0 : Inactive 1 : Active (PID output 0 to 100% / Frefuency 0 to max.) 2 : Active (Inverse operation mode : PID output 0 to 100% / Frefuency max. to 0)	-	0
	H21	(Feedback signal)	0 : Terminal 12 (0 to +10V) 2 : Terminal 12 (+10 to 0V) 1 : Terminal C1 (4 to 20mA) 3 : Terminal C1 (20 to 4mA)	-	1
	H22	(P-gain)	0.01 to 10.00	0.01	0.10
	H23	(I-gain)	0.0 : Inactive 0.1 to 3600s	0.1s	0.0
	H24	(D-gain)	0.00 : Inactive 0.01 to 10.0s	0.01s	0.00
	H25	(Feedback filter)	0.0 to 60.0s	0.1s	0.5
Y1, Y2 Terminal	H26	PTC thermistor (Mode select)	0 : Inactive 1 : Active	-	0
	H27	(Level)	0.00 to 5.00V	0.01V	1.60
	H28	Droop operation	–9.9 to 0.0Hz	0.1Hz	0.0

High performance functions (continued)

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function		Setting range	Min. unit	Factory setting
	Code	Name			
Serial Link	H30	Serial link (Function select)	(Code)(Monitor)(Frequency command)(Operation command) 0 : X - - X : Valid 1 : X X - - : Invalid 2 : X - X 3 : X X X	-	0
	H31	RS 485 (Address)	1 to 31	1	1
	H32	(Mode select on no response error)	0 : Trip and alarm (Er8) 1 : Op eration for H33 timer, and alarm (Er8) 2 : Operation for H33 timer,and retry to communicate. * If the retry fails, then the inverter trips("Er 8"). 3 : Continuous operation	-	0
	H33	(Timer)	0 to 60.0s	0.1s	2.0
	H34	(Baud rate)	0 : 19200 bit/s 2 : 4800 4 : 1200 1 : 9600 3 : 2400	-	1
	H35	(Data length)	0 : 8 bit 1 : 7 bit	-	0
	H36	(Parity check)	0 : No checking 1 : Even parity 2 : Odd parity	-	0
	H37	(Stop bits)	0 : 1 bit 1 : 2 bit	-	0
	H38	(No response error detection time)	0 (No detection), 1 to 60s	1s	0
	H39	(Response interval)	0.00 to 1.00s	0.01s	0.01
Diagnostic	H40	Max. temperature of heat sink	Monitoring only	°C	-
	H41	Maximum effective current	Monitoring only	A	-
	H42	Main circuit capacitor lifetime	Monitoring only	0.1%	-
	H43	Cooling fan accumulated operation time	Monitoring only	10h	-
	H44	Inverter ROM version	Monitoring only	-	-
	H45	Keypad panel ROM version	Monitoring only	-	-
	H46	Option ROM version	Monotoring only	-	-

NOTES:
*1) Typical value of standard Silectron Sistemi 4P motor.

Alternative Motor Parameters

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function		Setting range	Min. unit	Factory setting
	Code	Name			
Motor 2	A01	Maximum frequency 2	50 to 400Hz	1Hz	50
	A02	Base frequency 2	25 to 400Hz	1Hz	50
	A03	Rated voltage 2 (at Base frequency 2)	0 (Free), 160 to 480V (400V class) 0 (Free), 80 to 240V (200V class)	1V	400 230
	A04	Maximum voltage 2 (at Maximum frequency 2)	160 to 480V (400V class) 80 to 240V (200V class)	1V	400 230
	A05	Torque boost 2	0 : Automatic (for constant torque load) 1 : Manual (for variable torque load) 2 : Manual (for proportional torque load) 3 : Manual (for constant torque load)	-	0
	A06	Electronic thermal (Select) overload relay for motor 2	0 : Inactive 1 : Active (for 4-pole standard motor) 2 : Active (for 4-pole inverter motor)	-	1
	A07	(Level)	Approx. 20 to 135% of rated current	0.01A	*1)
	A08	(Thermal time constant)	0.5 to 10.0 min	0.1min	5.0

Alternative Motor Parameters (continued)

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverte is stopped.

	Function		Setting range	Min. unit	Factory setting
	Code	Name			
Motor 2	A09	Torque vector control 2	0 : Inactive 1 : Active	-	0
	A10	Number of motor 2 poles	2 to 14	2	4
	A11	Motor 2 (Capacity)	0.01 to 11.00 kw	0.01kW	*1)
	A12	(Rated current)	0.00 to 99.9 A	0.01A	*1)
	A13	(Tuning)	0 : Inactive 1 : Active (One time tuning of %R1 and %X (on motor stopping mode)) 2 : Active (One time tuning of %R1, %X and Io (on motor running mode))	-	0
	A14	(On-line Tuning)	0 : Inactive 1 : Active (Real time tuning of %R1 and %X)	-	0
	A15	(No-load current)	0.00 to 99.9 A	0.01A	*1)
	A16	(%R1 setting)	0.00 to 50.00 %	0.01%	*1)
	A17	(%X setting)	0.00 to 50.00 %	0.01%	*1)
	A18	Slip compensation control 2	0.00 to +15.00 Hz	0.01Hz	0.00
	A19	(Slip compensation resnonse time)	0.01 to 10.00 s	0.1s	0.5

NOTES:
*1) Typical value of standard Silectron Sistemi 4P motor.

PROTECTIVE FUNCTIONS

Function	Description			LED monitor
Overcurrent protection (Short-circuit) (Ground fault)	• Stops running to protect inverter from an overcurrent resulting from overload. • Stops running to protect inverter from an overcurrent due to a short-circuit in the output circuit. • Stops running to protect inverter from an overcurrent due to a ground fault in the output circuit.		During acceleration	OC1
			During deceleration	OC2
			While running at constant speed	OC3
Overvoltage protection	• The inverter stops when it detects an overvoltage in the DC link circuit.	• 400V series : 800V DC or more 200V series : 400V DC or more • Protection is not assured if excess AC line voltage is applied inadvertently.	During acceleration	OU1
			During deceleration	OU2
			While running at constant speed	OU3
Incoming surge protection	• Protects the inverter against surge voltage between the main circuit power line and ground. • Protects the inverter against surge voltage in the main circuit power line.	• The inverter may be tripped by some other protective function.		
Undervoltage protection	• Stops the inverter when the DC link circuit voltage drops below undervoltage level.	• 400V series : 400V DC or less • 200V series : 200V DC or less		LU
Input phase loss protection	• The inverter is protected from being damaged when open-phase fault occurs.			Lin
Overheat protection	• Stops the inverter when it detects excess heat sink temperature in case of cooling fan failure or overload.			OH1
	• When the external braking resistor overheats, the inverter stops discharging and running.			dbH
Electronic thermal overload relay (Motor protection)	• This function stops the inverter by detecting an inverter overload.			OLU
	• This function stops the inverter by detecting an overload in a standard motor or inverter motor.		Motor 1 overload	OL1
			Motor 2 overload	OL2
Stall prevention (Momentary overcurrent limitation)	• When an output current exceeds the limit during acceleration, this function lowers output frequency to prevent the occurrence of an OC1 trip.	• The stall prevention function can be disabled.		
External alarm input	• The inverter stops on receiving external alarm signals.	• Use THR terminal function (digital input).		OH2
Alarm output (for any fault)	• The inverter outputs a relay contact signal when the inverter issued an alarm and stopped.	• Output terminals: 30A, 30B, and 30C • Use the RST terminal function for signal input. • Even if main power input is turned off, alarm history and trip-cause data are retained.		
Alarm reset command	• An alarm-stop state of the inverter can be cleared with the RESET key or by a digital input signal (RST).			
Alarm history memory	• Stores up to four instances of previous alarm data.			
Storage of data on cause of trip	• The inverter can store and display details of the latest alarm history data.			
Memory error	• The inverter checks memory data after power-on and when the data is written. If a memory error is detected, the inverter stops.			Er1
KEYPAD panel communication error	• If an error is detected in communication between the inverter and KEYPAD when the Keypad panel is being used, the inverter stops.	• When operated by external signals, the inverter continues running. The alarm output (for any fault) is not output. Only Er2 is displayed.		Er2
CPU error	• If the inverter detects a CPU error caused by noise or some other factor, the inverter stops.			Er3
Option communication error	• If a checksum error or disconnection is detected during communication, the inverter issues an alarm.			Er4
Option error	• If a linkage error or other option error is detected, the inverter issues an alarm.			Er5
Output phase loss error	If an unbalance of output circuits is detected during tuning, this function issues an alarm (and stops the inverter).			Er7
RS485 communication error	• If an RS485 communication error is detected, the inverter issues an alarm.			Er8

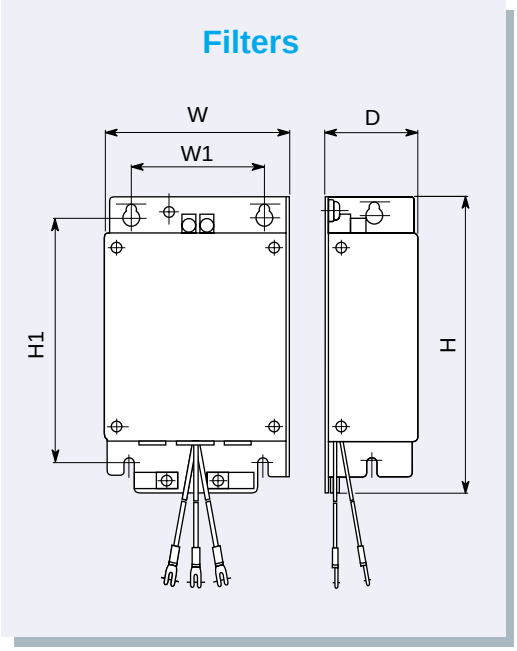
NOTES :
1)Retaining alarm signal when auxiliary controll power supply is not used :
If the inverter power supply is cut off while an internal alarm signal is being output, the alarm signal cannot be retained.
2)To issue the RESET command, press the PRG RESET key on the KEYPAD panel or connect terminals RST and CM once and disconnect them afterwards.
3)Fault history data is stored for the past four trips.

OPTIONS

EMC filters

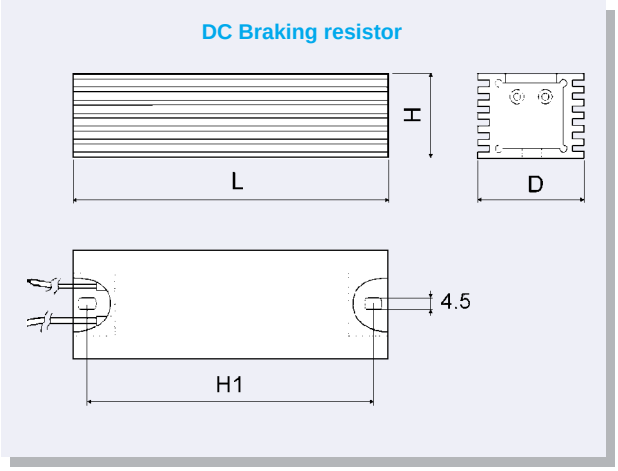
Power supply voltage	Nominal applied motor [kW]	Inverter type	Filter			
			Type	Rated voltage [V]	Rated current [A]	Leakage current [mA]
Three-phase 400V*	0.4 to 0.75	GVX1000-0,4 a 0,75-T	FT1000-2.2-T	500	5	11,3
	1.5, 2.2	GVX1000-1.5, 2.2-T			10	
	4.0	GVX1000-4.0-T	FT1000-4.0-T		15	
	5.5, 7.5	GVX1000-5.5, 7.5-T	FT1000-7.5-T		30	25
Single-phase 230V*	0.2 to 0.4	GVX1000-0.2 to 0.4-S	FT1000-0.4-S	250	6,5	20,3
	0.75	GVX1000-0.75-S	FT1000-0.75-S		18	
	1.5, 2.2	GVX1000-1.5, 2.2-S	FT1000-2.2-S		29	

Power supply voltage	Filter						
	Type	Dimensions [mm]					Mass [kg]
		W	W1	H	H1	D	
Three-phase 400V*	FT1000-2.2-T	110	80	191	165	41	0,75 / 0,95
	FT1000-4.0-T	174	145			46	1,35
	FT1000-7.5-T	182		278	252	50	1,98
Single-phase 230V*	FT1000-0.4-S	71	55	189	178	36	0,47
	FT1000-0.75-S	110	80	191	165		0,75
	FT1000-2.2-S	174	145			41	1,1



Braking resistors

Inverter type		Resistor code	Braking torque	Dimensions			
				H	L	D	H1
Single-phase 230V series	GVX1000-0.2-S	SR-0.75-S	150%	27	90	36	79
	GVX1000-0.4-S						
	GVX1000-0.75-S						
	GVX1000-1.5-S	SR-1.5-S			105		94
	GVX1000-2.2-S	SR-2.2-S					
Three-phase 400V series	GVX1000-0.4-T	SR-0.75-T			90		79
	GVX1000-0.75-T						
	GVX1000-1.5-T	SR-1.5-T			105		94
	GVX1000-2.2-T	SR-2.2-T			155		144
	GVX1000-4.0-T	SR-4.0-T			105		94
	GVX1000-5.5-T	SR-11-T			155		144
	GVX1000-7.5-T						



* The resistors are dimensioned exclusively for obtaining the torque performances shown in the table above.

* The braking time considered is 5 sec and the duty cycle is 5%.

* For different braking time applications, duty cycle or for regenerative or stationary braking, please contact Silectron sistemi.

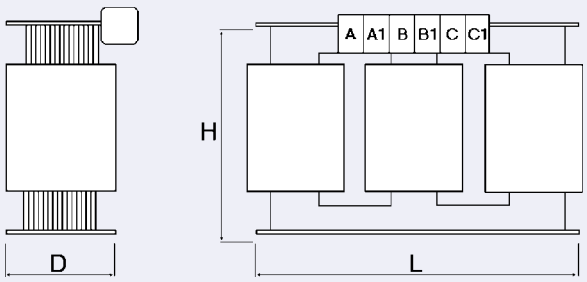
* The manufacturer has the right to modify at any time the dimensions and characteristics of the resistors, without notice

AC reactors

Inverter type		Reactor code	In/Out	Dimensions		
				H	L	D
Single-phase 230V series	GVX1000-0.2-S	SI-0.2-S	In	45	50	45
	GVX1000-0.4-S	SI-0.75-S		90	72	60
	GVX1000-0.75-S					
	GVX1000-1.5-S	SI-2.2-S		95	88	80
	GVX1000-2.2-S					
Three-phase 400V series	GVX1000-0.4-T	SI-0.75-T	In/Out	145	140	80
	GVX1000-0.75-T					
	GVX1000-1.5-T	SI-1.5-T				
	GVX1000-2.2-T	SI-2.2-T				
	GVX1000-4.0-T	SI-4.0-T				
	GVX1000-5.5-T	SI-7.5-T				
	GVX1000-7.5-T	SI-15-T		200	185	120

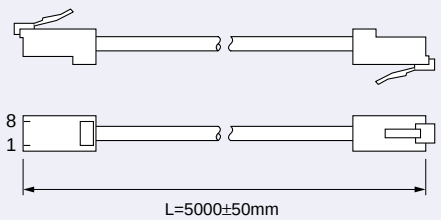
* The reactors shown above, should be used under the following conditions:
the operating frequency shall be less than 70 Hz.
the maximum number of simultaneous motors applied shall be two
* The manufacturer has the right to modify at any time the dimensions and characteristics of the inductors, without notice

AC Reactors

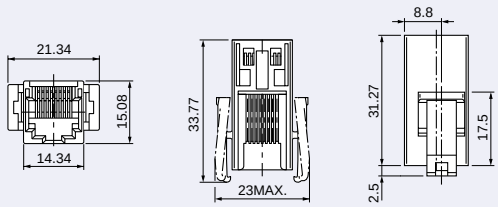


Extension cable with adapter for Keypad panel

Cable



Adapter



Wiring equipment

Power supply voltage	Nominal applied motor [kW]	Inverter type	Rated current [A]		Recommended wire size [mm²]				
					Input circuit [L1/R, L2/S, L3/T]		Output circuit [U, V, W]	DCR circuit [P1, P(+)]	DB circuit [P(+), DB, N(-)]
			With DCR	Without reactor	With DCR	Without reactor			
Three-phase 400V	0.4, 0.75	GVX1000-0.4, 0.75-T	5	5	2.0	2.0	2.0	2.0	2.0
	1.5	GVX1000-1.5-T	5	10					
	2.2	GVX1000-2.2-T	5	15					
	4.0	GVX1000-4.0-T	10	20					
	5.5	GVX1000-5.5-T	15	30					
	7.5	GVX1000-7.5-T	20	40		3.5			
Single-phase 230V	0.2	GVX1000-0.2-S	5	5	2.0	2.0	2.0	2.0	2.0
	0.4	GVX1000-0.4-S		10					
	0.75	GVX1000-0.75-S	10	15					
	1.5	GVX1000-1.5-S	15	20					
	2.2	GVX1000-2.2-S	20	30		3.5			

NOTES :
• For molded-case circuit breakers (MCCB) and earth-leakage circuit breakers (ELCB), the required frame type and series depend on the facility transformer capacity and other factors. When selecting optimal breakers, refer to the relevant technical data.
• Also select the rated sensitive current of ELCB utilizing the technical data.
• The recommended wire sizes are based on the condition that the temperature inside the panel does not exceeds 50°C.
• The above wires are 600V HIV insulated cables (75°C).
• Data in the above table may differ for different conditions (ambient temperature, power supply voltage, and other factors).

BONFIGLIOLI GROUP SERIES GV X1000 INVERTERS CAN BE USED FOR ALMOST ALL INDUSTRIAL PLANT AND EQUIPMENT AREAS

Fans

- Air-conditioning system (for factory, building, office, hospital, clean room, shop, and cattle barn)
- Dryer
- Boiler fan
- Fans for controlling furnace temperature
- Roof fans controlled as a group
- Refrigerator
- Compressor
- Built-in blower in a film-manufacturing machine
- Cooling-tower fans
- Ventilating fans
- Air-conditioning equipment

Machine tools

- Grinding machine
- Sanding machine
- Milling machine
- Lathe
- Drilling machine
- Turntable
- Work positioning machine
- PC board drilling machine
- Winding machine
- Press

Electric pumps

- Tankless water supply system
- Submersible motor pump
- Vacuum pump
- Fountain pump
- Cooling water pump
- Circulating hot water pump
- Well pump
- Agricultural storage pump
- Water treatment system
- Constant-flow pump
- Sludge pump

Food processing machines

- Food mixing machine
- Food slicer
- Grain milling machine (bread, cake, noodles)
- Tea making machine
- Rice cleaning machine

Packaging machinery

- Individual packaging/inner- packaging machine
- Packing machine
- Outer-packaging machine

Paper making/textile machinery

- Spinning machine
- Knitting machine
- Textile printing machine
- Industrial sawing machine
- Synthetic fiber manufacturing plant

Conveyance machinery

- Crane (traveling, traversing, hoisting)
- Automated warehouse
- Conveyor (belt, chain, screw, roller)
- Lift
- Car parking facility
- Elevator, escalator
- Automatic door
- Shutter equipment
- Speed-change gear

Chemical machinery/wood working machines

- Fluid mixing machine
- Extruder
- Vibrator
- Centrifugal separator
- Coating machine
- Take-up roller
- Routing machine
- Sanding machine
- Planing machine

Other machinery

- Automated feed/medicine mixer
- Commercial-use washing machine
- Offset printing press
- Book-binding machine
- Car-washing machine
- Shredder
- Dishwasher
- Test equipment
- Crusher

GV X1000

NOTES

Application to standard motors

- **Driving to standard motor**
  When driving a 400V standard motor with an inverter, damange may occur in the insulation of motor. Use the output circuit filter (OFL) if necessary after confirmation with the motor manufacturer.

- **Torque characteristics and temperature rise**
  When the inverter is used to operate a standard motor, the temperature rises a little higher than during operation by a commercial power supply. The cooling effect decreases in the low-speed range, reducing the allowable output torque. (If a constant torque is required in the low-speed range, use a motor equipped with a separately ventilating fan).

- **Vibration**
  Use of an inverter does not increase vibration of a standard motor, but when the motor is mounted to a machine, resonance may be caused by the natural frequencies including the natural frequency of the machine system. * We recommend that you use rubber coupling or anti-vibration rubber.
  * We also recommend that you use the inverter jump frequency control function to avoid resonance point in the motor operation.
  Note that operation of a 2-pole motor at 60Hz or over may cause abnormal vibration.

- **Noise**
  When an inverter drives a standard motor, the motor noise level increases compared with being driven by a commercial power supply.
  To reduce noise, set the inverter carrier frequency at a high level. High-speed operation at 60Hz or over can result in more noise.

Application to special motors

- **Explosion-proof motors**
  When driving an explosion-proof motor with an inverter, use a combination of a motor and an inverter that has been approved in advance. Such approved products are available in our special product series. Contact Silectron Sistemi for details.

- **Submersible motors and pumps**
  These motors have a larger rated current than standard motors. Select the inverter capacity so that these motors can run within the inverter-rated current.
  These motors differ from standard motors in thermal characteristics. Set a small value according to the motor's thermal time constant for setting electronic thermal relay function.

- **Brake motors**
  For motors with parallel-connection brakes, obtain the brake power from the primary circuit (commercial power supply). If you connect the brake power to the inverter power output circuit by mistake, problems may occur.
  Do not use inverters for driving motors equipped with series-connection brakes.

- **Geared motors**
  When the power transmission mechanism uses an oil-lubricated gearbox or speed changer/reducer, continuous motor operation at low speed may cause poor lubrication.

- **Synchronous motors**
  It is necessary to use software suitable for the motor type.
  Contact Silectron Sistemi for details.

- **Single-phase motors**
  Single-phase motors are not suitable for inverter-driven variable speed operation.
  Use a three-phase motor.
  * Even if a single-phase power supply is available, use a three-phase motor, because the inverter provides three-phase output.

Combination with peripheral device

- **Installation location**
  Use the inverter in an ambient temperature range between -10˚ and 50˚C.
  Install an inverter on non-flammable material.
  The inverter and braking resistor surfaces become hot under certain operating conditions.

- **Installing Auto Breaker (MCCB)**
  Install an auto Breaker (MCCB) or earth-leakage circuit breaker in the primary circuit of the inverter to protect wires.

- **Magnetic contactor in the secondary circuit**
  If a magnetic contactor is mounted in the secondary circuit for switching to the motor operation by commercial power supply or for any other purposes, ensure that the inverter and the motor are stopped before you turn on or off the contactor.

- **Magnetic contactor in the primary circuit**
  Do not open or close the magnetic contactor in the primary circuit more than once an hour.
  If frequent starts and stops are required during motor operation, send FWD and REV signals to and from the control terminal.

- **Protecting the motor**
  When you drive a motor with an inverter, the motor can be protected with an electronic thermal relay function of the inverter.

  In addition to the operation level, set the motor type (standard motor, inverter motor). For high-speed motors or water-cooled motors, set a small value as the thermal time constant and protect the motor in combination with the cooling system OFF signal.

  When driving several motors with an inverter, connect a thermal overload relay to each motor and turn on the inverter's electronic thermal relay.

  If you connect the motor thermal relay to the motor with a long cable, high-frequency current may flow into the wiring floating capacity. This may cause the relay to trip at a current lower than the set value for the thermal relay. If this happens, lower the carrier frequency or use the output circuit filter (OFL).

- **Power-factor correcting capacitor**
  Do not mount the power-factor correcting capacitor in the inverter primary circuit. (Use the DC reactor to improve the inverter power factor).
  Do not use the power-factor correcting capacitor in the inverter secondary circuit. Overcurrent trip will occur, disabling motor operation.

- **Reducing noise**
  Use of filter and shielded wires are typical measures against noise that meets EMC Directives. For details, refer to the operation procedure manual.

- **Measures against surge current**
  If OV trip occurs while the inverter is stopped or operated under a light load, it is assumed that the surge current is generated by open/close of the phase-advancing capacitor in the power system.
  * Connect a DC reactor to the inverter.

- **Megger test**
  When checking insulation resistance of the inverter, use a 500V megger and follow the instructions described in the instruction manual.

Wiring

- **Control circuit wiring length**
  When conducting a remote control, limit the wiring length between the inverter and the operator box to 20m or less and use twisted shield cable.

- **Wiring length between inverter and motor**
  If long wiring is used between the inverter and the motor, the inverter will overheat or trip because of overcurrent (under the influence of high-frequency current flowing into the floating capacity) in the wires connected to the phases. Ensure that the wiring is shorter than 50m.
  If 50m must be exceeded, lower the carrier frequency or mount an output circuit filter (OFL).

- **Wiring size**
  Select a cable with a sufficient capacity by referring to the current value or recommended wire size.

- **Grounding**
  Securely ground the inverter using the grounding terminal.

Selecting inverter capacity

- **Driving standard motor**
  Select an inverter from the capacity range of nominal applied motors shown in the inverter standard specifications table. When large starting torque is required or acceleration or deceleration is required in a short time, select an inverter with a capacity one class greater than the standard.

- **Driving special motor**
  Select an inverter that meets the following condition:
  Inverter rated current Motor rated current

Transportation, storage inverters

When transporting or storing inverters, select the procedures and places that meet the environmental conditions given in the inverter specifications. Ensure the above environmental conditions are met also when transporting an inverter mounted to a machine.

GV X1000