LX

Lift inverter for all motors
Model: 3G3LX
400 V Class Three-Phase Input 3.7 to 18.5 kW

QUICK START GUIDE

OMRON

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</table>

User interface	Input terminal	Multifunctional input terminal	Functions: SET (Set 2nd motor data), FRS (Free-run stop), EXT (External trip), SFT (Software lock), RS (Reset), PCLR (Clear the current position), MI1 (General-purpose input 1), MI2 (General-purpose input 2), MI3 (General-purpose input 3), MI4 (General-purpose input 4), MI5 (General-purpose input 5), MI6 (General-purpose input 6), MI7 (General-purpose input 7), MI8 (General-purpose input 8)
			SPD1 (Multi-speed 1 setting), SPD2 (Multi-speed 2 setting), SPD3 (Multi-speed 3 setting), RESC (Rescue), INSP (Inspection), RL (Releveling), COK (Contactor check signal), BOK (Brake check signal), FP1 (Floor position 1), FP2 (Floor position 2), FP3 (Floor position 3), FP4 (Floor position 4), FP5 (Floor position 5), PAL (Auto learning data latch trigger), TCL (Torque bias latch trigger), LVS (Leveling signal), NFS (Near floor), CMC (Control mode change)
		Safety stop	Two input (GS1, GS2)
Protection			Over current, Over voltage, Under voltage, Over load (electric thermal function), Ground fault at power-on, External error, EEPROM error, CT error, CPU error, Braking resistor overload, Phase failure detection
			Speed-reference error, Contactor error, Brake error, Wrong rotation detection, Over acceleration, Over speed, Speed deviation error, FB-option not connect.
Operator	LCD Operator		5 line LCD, Back-Light color: white (@normal), Red (@Error/Warning)
	Keys		FWD RUN, REV RUN, STOP/RESET, REMOTE, READ, WRITE, ESC, SET, UP, DOWN, PREV. PAGE, NEXT PAGE
System requeriments	Protective construction		IP20
	Ambient temperature for operation		-10 to 40°C derating may apply if high carrier or current output
	Storage temperature		-20 to 65°C
	Humidity		20-90% RH (There must not be condensation)
	Vibration		5.9 m/s^2 (0.6G) 10 to 55Hz
	Altitude		Altitude 1,000m or less and room (There must be neither causticity gas nor dust)
Design Life of parts			10 years (Design lifetime is calculation and out of guaranty)
Global standards			CE, UL, c-UL approvals
EU RoHS compliant			EU RoHS compliant by restricting to use hazardous substance
Optional	Encoder Feedback Option		3G3AX-ABS30 or 3G3AX-ABS: Incremental, EnDat and HIPERFACE including 1-board (2-Encoder input)
			3G3AX-PG01: Incremental, (1-Encoder input)
	Enhancing I/O		3G3AX-EIO: 5 digital input / 2 relay output / 1 open-collector output

1-2 Power Ratings

Item			Three-phase 400V class specifications						
Product model 3G3LX-□			**A4037**	**A4040**	**A4055**	**A4075**	**A4110**	**A4150**	**A4185**
Motor (kW)			3.7	4.0	5.5	7.5	11.0	15.0	18.5
Output ratings	**Inverter capacity (kVA)**	**400 V**	5.7	5.9	9.7	13.1	17.3	22.1	26.3
		480 V	6.8	7.1	11.6	15.8	20.7	26.6	31.5
	Rated output current (A) (3min, 50%ED)		9	11	14	19	27	34	41
	Overcurrent level (A)		28.0	34.2	43.6	59.1	77.8	99.6	118.2
	Max. output voltage (V)		3 phase 380 to 480V (according to the input voltage)						
	Max. output frequency (Hz)		Max. 400Hz						
Input voltage			Control source: Single phase 200-240V (+10%, -15%) and 50/60Hz (±5%)						
			Main circuit power supply: Three phase 380-480V (+10%, -15%) and 50/60Hz (±5%)						
Braking	**Braking circuit**		With built-in controller						
	Minimum resistance (Ω)		70	70	70	35	35	24	24
	Duty at minimum resistance		10%						
	Minimum resistance at continuous running (Ω)		200	200	200	150	150	100	100
Size	**W (mm)**		150	210	210	210	210	250	250
	H (mm)		255	260	260	260	260	390	390
	D (mm)		140	170	170	170	170	190	190
Protective structure			IP20						
Cooling method			Forced air cooling						

1-3   Wiring Sizes and Protections

Refer to the below table for wiring the inverter power and tightening torque.

Please use Pozidriv screwdrivers to avoid damage to the screw

	Inverter rating (kW)	Inverter model (3G3 LX-)	Power line (mm²) R,S, T, U, V, W, P, PD, N	Ground line (mm²)	External breaking resistor between P-RB (mm²)	Terminal screw size	Pressure terminal	Tightening torque Nm	Wire Range (AWG)	Input/Output protection/contactors	
										Input Fuse[*1] Input MCCB[*2] Earth leakage breaker capacity[*3]	Output contact or rating[*4]
400 V class	3.7	4037	2	2	2	M4	2-4	1.2 (MAX 1.8)	14 (Stranded only)	15 A	15 A
	4.0	4040	3.5	3.5	3.5	M5	R2-5	2.4 (MAX 4.0)	12	15 A	15 A
	5.5	4055	3.5	3.5	3.5	M5	R2-5	2.4 (MAX 4.0)	12	20 A	20 A
	7.5	4075	3.5	3.5	3.5	M5	3. 5-5	2.4 (MAX 4.0)	10	30 A	25 A
	11	4110	5.5	5.5	5.5	M6	R5. 5-6	2.4 (MAX 4.0)	8	30 A	35 A
	15	4150	8	8	8	M6	8-6	4.5 (MAX 4.9)	6	40 A	35 A
	18.5	4185	14	14	14	M6	14-6	4.5 (MAX 4.9)	6	50 A	50 A

*1. Input fuse: J class.

*2. Input MCCB: Inverse time.

*3. Earth leakage breaker capacity: Leak current according regulations.

*4. Output contactor rating: Inverter ready type.

1-4   Overload Capacity

Overload capacity: 150% 30 second / 200% 4 second

For the inverter protection:

- The current rating of inverter is a condition of 3min 50%ED, Overload current load is 150% 30 sec. (The continuous rating is 75% of the controller ratings)

- Thermal electrons of the following time limit characteristics operate according to this specification.


Time limit characteristic for controller
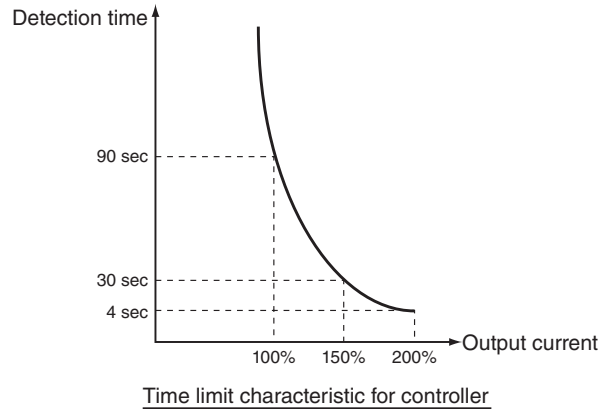
Note 1: It is not possible to change at the level. Because it is a purpose to protect the inverter.

Note 2: When the integrated value of the current exceeds the time limit characteristic, inverter becomes error condition. (E39: Controller overload)
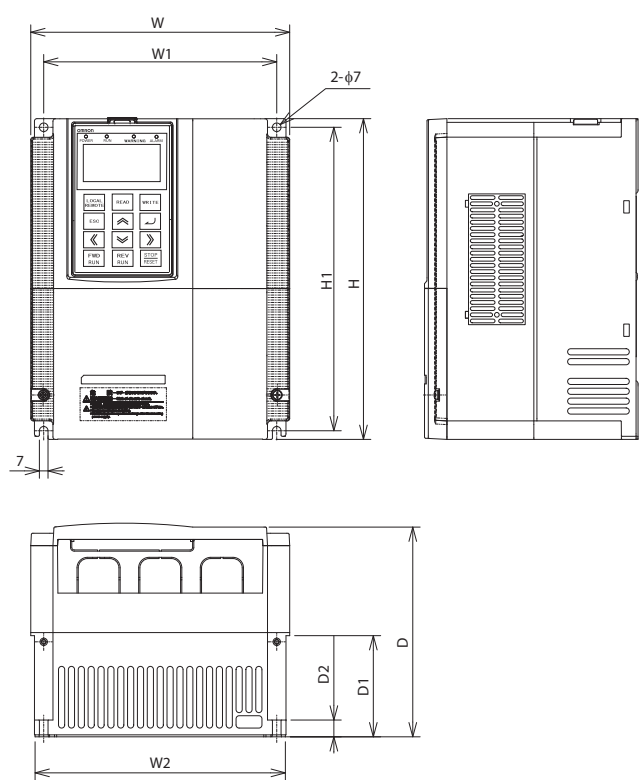
Starting torque:

- 200% 0.3Hz (sensor less vector control = open loop vector control)

- 150% 0Hz (closed loop vector control when combined with one size smaller motor)
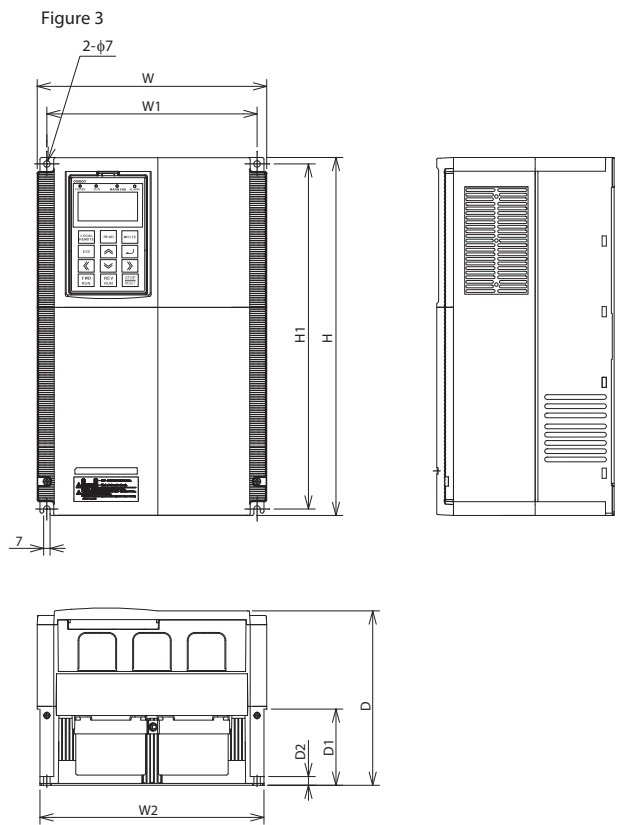
1-5   External Dimensions
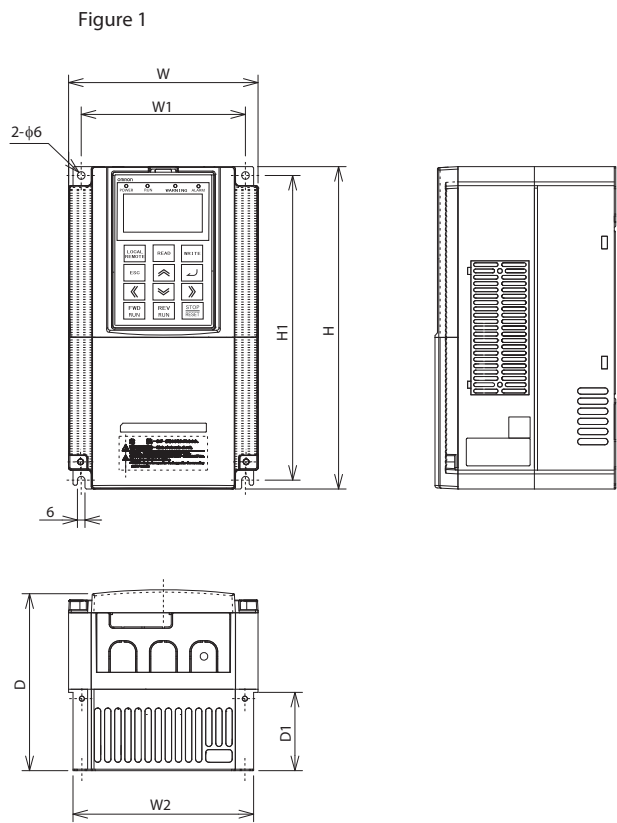
Figure 1

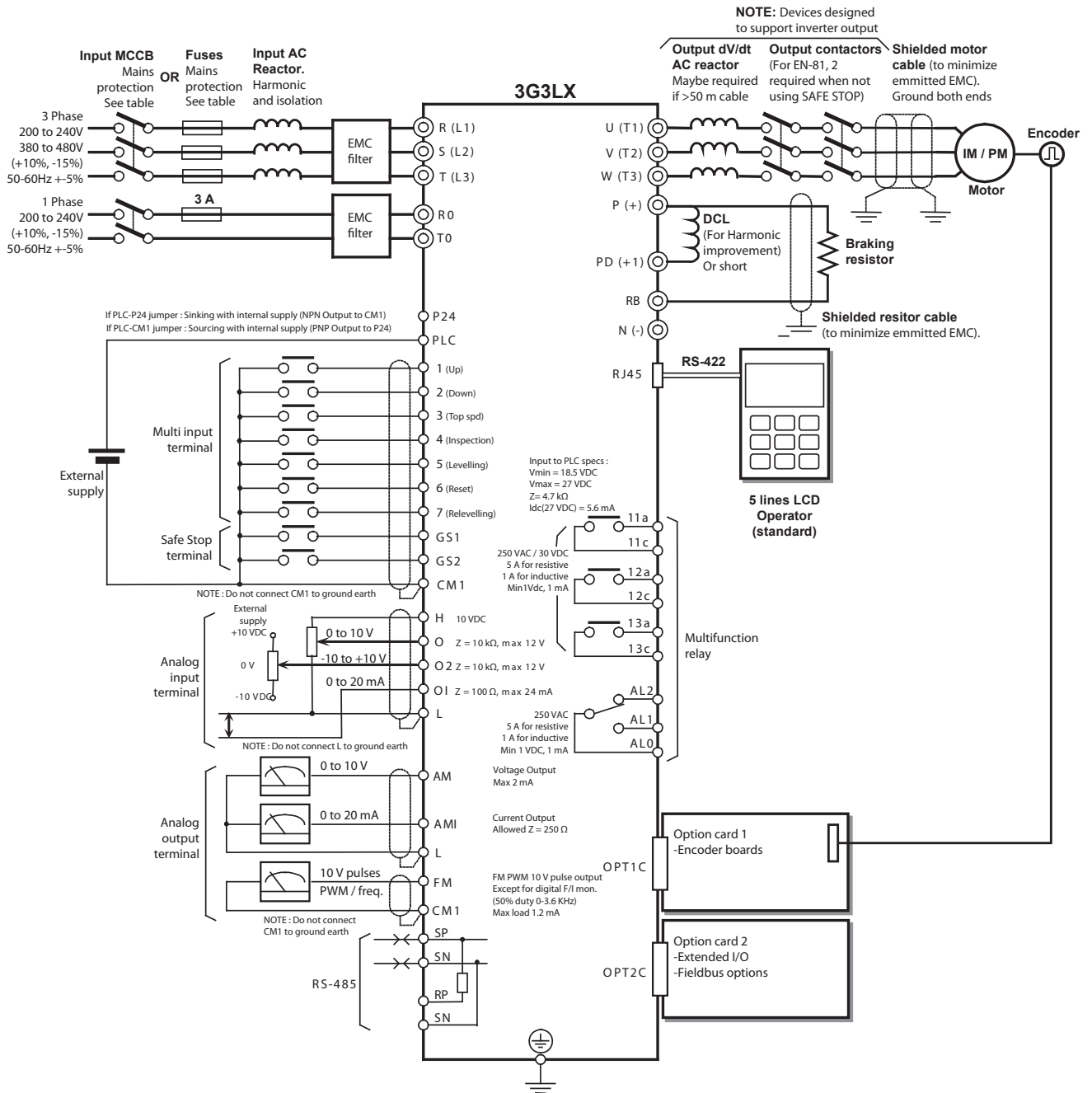| Figure 1								
Voltage class	Model	W	W1	W2	H	H1	D	D1	Weight (kg)
3-phase 400 V	3G3LX-A4037	150	130	143	255	241	140	62	3.5

Figure 2

Figure 2										
Voltage class	**Model**	**W**	**W1**	**W2**	**H**	**H1**	**D**	**D1**	**D2**	**Weight (kg)**
3-phase 400 V	3G3LX-4040	210	189	203	260	246	170	82	13.6	6
	3G3LX-4055									
	3G3LX-4075									
	3G3LX-4110									

Figure 3

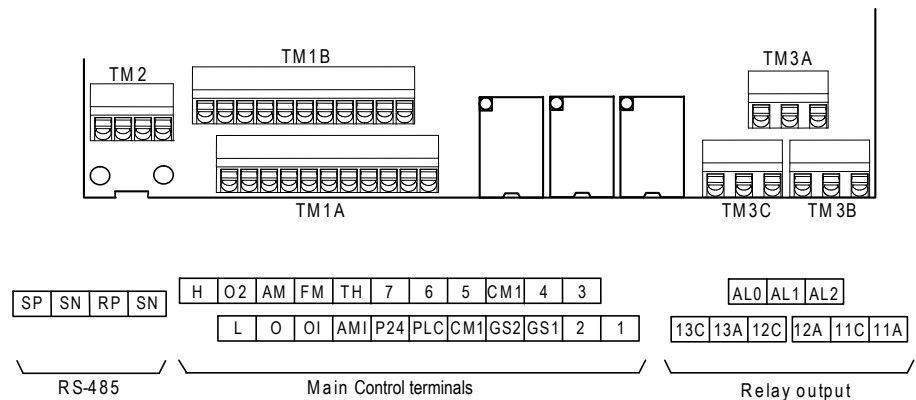| Figure 3										
Voltage class	Model	W	W1	W2	H	H1	D	D1	D2	Weight (kg)
3-phase 400 V	3G3LX-A4150	250	229	244	390	376	190	83	9.5	14
	3G3LX-A4185									

2-1   Wiring Overview

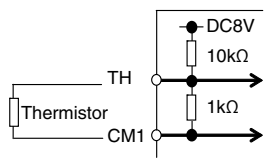**NOTE:** Devices designed to support inverter output

Input MCCB Mains protection See table **OR**

Fuses Mains protection See table

Input AC Reactor. Harmonic and isolation

Output dV/dt AC reactor Maybe required if >50 m cable

Output contactors (For EN-81, 2 required when not using SAFE STOP)

Shielded motor cable (to minimize emmitted EMC). Ground both ends

3G3LX

3 Phase
200 to 240V
380 to 480V
(+10%, -15%)
50-60Hz +-5%

1 Phase
200 to 240V
(+10%, -15%)
50-60Hz +-5%

3 A

EMC filter

EMC filter

R (L1)
S (L2)
T (L3)

R0
T0

U (T1)
V (T2)
W (T3)

P (+)
PD (+1)

RB

N (-)

DCL (For Harmonic improvement) Or short

Braking resistor

Shielded resitor cable (to minimize emmitted EMC).

IM / PM Motor

Encoder

If PLC-P24 jumper : Sinking with internal supply (NPN Output to CM1)
If PLC-CM1 jumper : Sourcing with internal supply (PNP Output to P24)

P24
PLC

RS-422

RJ45

5 lines LCD Operator (standard)

Multi input terminal

1 (Up)
2 (Down)
3 (Top spd)
4 (Inspection)
5 (Levelling)
6 (Reset)
7 (Relevelling)

Input to PLC specs :
Vmin = 18.5 VDC
Vmax = 27 VDC
Z= 4.7 kΩ
Idc(27 VDC) = 5.6 mA

External supply

Safe Stop terminal

GS1
GS2
CM1

11a
11c

12a
12c

13a
13c

250 VAC / 30 VDC
5 A for resistive
1 A for inductive
Min1Vdc, 1 mA

Multifunction relay

NOTE : Do not connect CM1 to ground earth

External supply +10 VDC

0 to 10 V

-10 to +10 V

0 V

0 to 20 mA

-10 VDC

H   10 VDC
O $Z = 10$ kΩ, max 12 V
O2 $Z = 10$ kΩ, max 12 V
OI $Z = 100$ Ω, max 24 mA
L

Analog input terminal

AL2
AL1
AL0

250 VAC
5 A for resistive
1 A for inductive
Min 1 VDC, 1 mA

NOTE : Do not connect L to ground earth

0 to 10 V

0 to 20 mA

10 V pulses
PWM / freq.

AM
Voltage Output Max 2 mA

AMI
Current Output Allowed $Z = 250$ Ω

L

FM
FM PWM 10 V pulse output Except for digital F/I mon. (50% duty 0-3.6 KHz) Max load 1.2 mA

Analog output terminal

CM1

NOTE : Do not connect CM1 to ground earth

Option card 1 -Encoder boards

OPT1C

SP
SN
RP
SN

RS-485

Option card 2 -Extended I/O -Fieldbus options

OPT2C

2-2 Power Wiring

Terminal name	Purpose	Details
R, S, T (L1, L2, L3)	Main circuit power supply	Three phase 380-480V
R0, T0	Control circuit power supply	Single phase 200-240V for any voltage class
U, V, W (T1, T2, T3)	Motor output	Three phase motor connection (IM/PM)
PD, P (+1, +)	DC reactor	Remove the link and install DC reactor for improvement of harmonics level and power factor
P, RB (+, RB)	External brake resistor	An external braking resistor is connected
P, N (+, -)	Regeneration braking unit	For connection of external regeneration braking unit
G	Earth	Earthing terminal. Please ground large ground. C seed (400V class)

Terminals	Applicable models
R0 T0 — Charge lamp / R (L1) S (L2) T (L3) U (T1) V (T2) W (T3) / PD (+1) P (+) N (-) RB (RB) G G / P(+) -PD(+1) link. Remove for DC reactor connection	3G3LX-A4037 R0, T0: M4 Earthing terminal: M4 Power terminals: M4
R0 T0 Charge lamp / RB (RB) / R (L1) S (L2) T (L3) PD (+1) P (+) N (-) U (T1) V (T2) W (T3) / G G / P(+) -PD(+1) link. Remove for DC reactor connection	3G3LX-A4040, A4055, A4075 R0, T0: M4 Earthing terminal: M5 Power terminals: M5 3G3LX-A4110 R0, T0: M4 Earthing terminal: M5 Power terminals: M6
R0 T0 RB (RB) Charge lamp / R (L1) S (L2) T (L3) PD (+1) P (+) N (-) U (T1) V (T2) W (T3) / G G / P(+) -PD(+1) link. Remove for DC reactor connection	3G3LX-A4150, A4185 R0, T0: M4 Earthing terminal: M6 Power terminals: M6

Note Please use Pozidriv screwdrivers in order not to damage the screws with standard PHILIPS driver.

2-3 Control Wiring

TM 2   TM1B   TM3A

TM1A   TM3C   TM 3B

| SP | SN | RP | SN |

| H | O2 | AM | FM | TH | 7 | 6 | 5 | CM1 | 4 | 3 |
| L | O | OI | AMI | P24 | PLC | CM1 | GS2 | GS1 | 2 | 1 |

| AL0 | AL1 | AL2 |
| 13C | 13A | 12C | 12A | 11C | 11A |

RS-485   Main Control terminals   Relay output

	Type	Name	Purpose	Details	Electrical specification
Analogue	Power supply	L	Analog power supply common	Common terminal for analog inputs (O, O2, OI) and analog outputs (AM, AMI). **Note:** Do not connect to ground earth.	
		H	Power supply for analog potentiometer	+10Vdc power supply for potentiometer connected to analog voltage input.	Permissible load current 20 mA or less
	Inputs	O	Analog voltage input Speed Reference / Torque bias (load cell)	0-10V voltage input. For speed reference or torque bias (load cell compensation)	Input impedance: 10kΩ Range of input voltage DC: 0.3 to ±12V
		O2	Analog voltage input Speed Reference / Torque bias (load cell)	±10VDC voltage input. For speed reference, torque limit or torque bias (load cell compensation)	Input impedance: 10kΩ Range of input voltage DC: 0 to ±12V
		OI	Analog current input Speed Reference / Torque bias (load cell)	0-20mA DC (4-20mA DC) current input. For speed reference or torque bias (load cell compensation)	Input impedance: 100Ω 24mA maximum current input
	Outputs	AM	Analog voltage output	0-10V voltage output. Used to monitor inverter magnitudes.	2mA maximum load
		AMI	Analog current output	0-20mA (4-20mA DC) current output.	Permissible load impedance below 250Ω
		TH	External thermistor Input terminal	When an external thermistor (either PTC or NTC types, selectable by b098) is connected and the resistance measured reflects abnormal temperature level, the inverter will trip (if enabled). The thermistor connect between TH and CM1. Electric thermistor power: 100mW or more. Default impedance for temperature alarm: 3kΩ (but the level for the temperature alarm can be adjusted between 0-9999Ω by b099).	Range of permissible input voltage: 0 to 8VDC Input circuit: DC8V 10kΩ TH 1kΩ Thermistor CM1
Digital	Pulse output	FM	Digital voltage monitor	0-10V digital output working as PWM output (duty cycle control) for most inverter monitors, except for C027=03 (Digital Output Frequency), it becomes frequency output.	Maximum output current of 1.2mA. The maximum frequency is 3.6kHz.
	Power supply	P24	24VDC power supply terminals for digital inputs	24VDC power supply for the digital inputs. When source logic is selected, it becomes the common point of inputs.	Permissible maximum output current 100mA.
		CM1	0V terminal for digital inputs supply	0V terminal for 24VDC (P24) power supply terminal, thermistor input (TH) terminal and the FM terminal. When the sink logic is selected, it becomes the common point of inputs. **Note:** Do not connect to ground earth.	

Type		Name	Purpose	Details	Electrical specification
Digital	Contact input	1 2 3 4 5 6 7 GS1 GS2	Multifunction input terminal	It is possible to allocate any of the digital multifunction inputs to this terminals. When safety inputs GS1 and GS2 are enabled by hardware dip-switch SW1, multifunction settings 78: GS1 and 79: GS2 are compulsory. When safety inputs are disabled, GS1 and GS2 can be used as standard multifunction inputs.	Minimum ON voltage: 18VDC Input impedance PLC-input: 4.7kΩ Maximum ON voltage: 27VDC
		PLC	Digital inputs common	This terminal is used as the common terminal of the digital inputs. For internal supply (and voltage-free contacts): Short between P24 and PLC: Sink logic (the current will flow from the LX input to the output) Short between CM1 and PLC: Source logic (the current will flow from the output to the LX input)	Input load: 5.6mA at 27VDC
	Contact output	11a 11c	Multifunction output terminal	Any multifunction output signal can be set to this terminals	Maximum relay contact capacity: 250VAC 5A (resistance load) 250VAC 1A (inductive load) 30VDC 5A (resistance load) 30VDC 1A (inductive load) Minimum relay contact capacity: 1VDC 1mA
		12a 12c			
		13a 13c			
		AL0 AL1 AL2			Maximum relay contact capacity: AL1-AL0: 250VAC 2A (resistance load) 250VAC 0.2A(inductiveload) AL2-AL0: 250VAC 1A (resistance load) 250VAC 0.2A (inductive load) Minimum point of contact capacity: 100VAC 10mA 5VDC 100mA

2-3-1   Screwless Terminals Connection

To connect cable, just push the terminal into position.

To release cable, press the orange tab with small screwdriver and remove cable.

2.5 mm
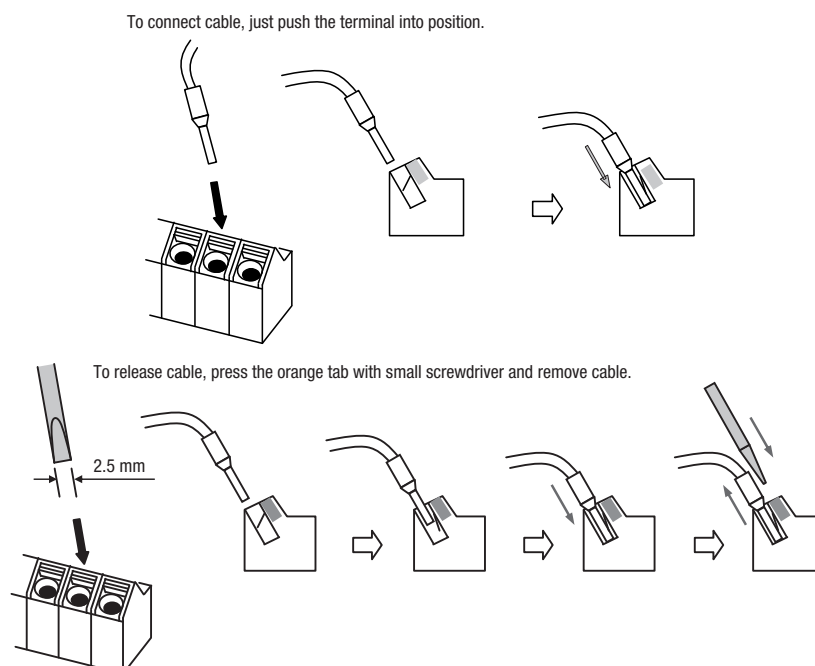
2-3-2 Safe Stop Disable Function

3G3LX inverter incorporates a SAFE STOP function. 2 redundant inputs are required (GS1/GS2).

The function is purely hardware based, but to be managed correctly by the software, the settings of the multifunctions have to be fixed to GS1 (C008=78:GS1) and GS2 (C009=79:GS2). This function can not be set to other multifunction terminals. The SAFE STOP function can be disabled, in order to use the inputs for other purposes.

To enable the safety function check SW1 = ON (factory setting). To modify the switch, removal of the terminal board (see diagram) is necessary. When SW1 = OFF, the inputs are used as standard multifunction inputs, in that case any multifunction setting is valid for C008 and C009. The SW1 is difficult to access to minimize possibility of change by mistake.
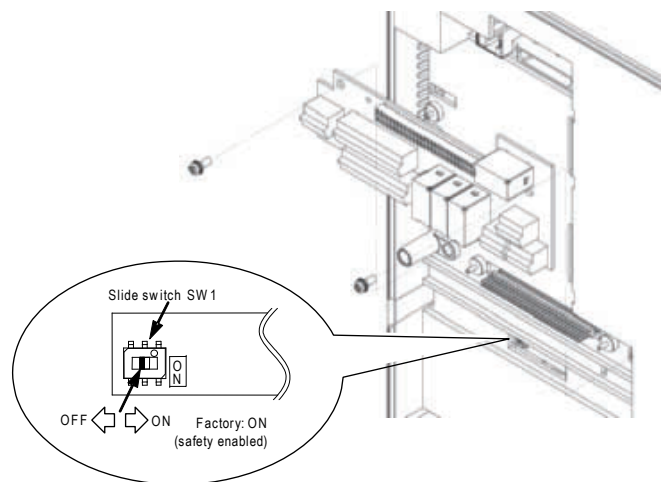
2-3-3 Digital Inputs Sink/Source (typ. NPN/PNP) settings
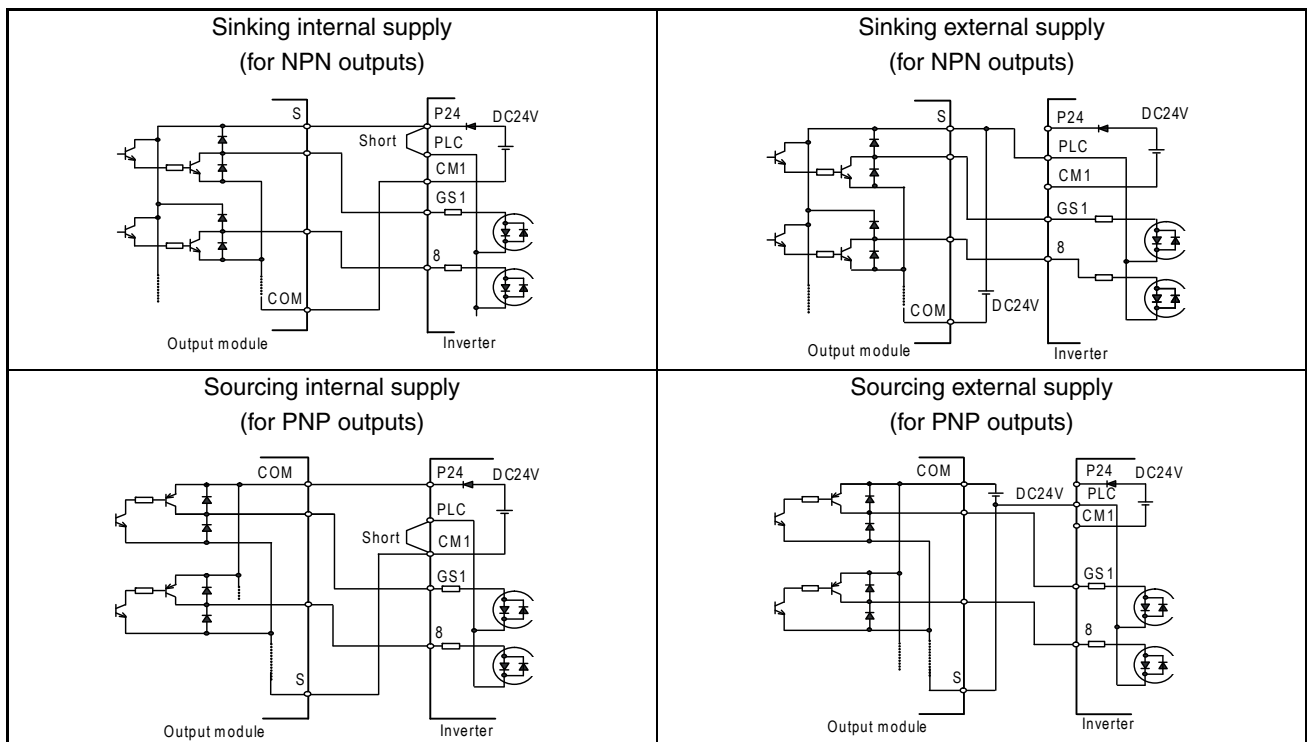
2-4   Option Boards

Board type	Model	Specification
Encoder feedback	3G3AX-PG01	• 5V line driver incremental encoder (A/B/Z) • For one encoder input
	3G3AX-ABS30 Optimized for Gearless motors and 3G3AX-ABS Standard all purpose	It corresponds to the following three kinds of encoders. 1) HIPERFACE 2) EnDat2.1/2.2 3) Incremental encoder (A/B/Z aspect) • For two encoder input There is a version optimized for strong noise immunity if used with gearless type of motors (typically PM motors)
Expansion I/O board	3G3AX-EIO	5 digital inputs (open collector) 1 digital output (open collector) 2 relay outputs

Installation of option boards:
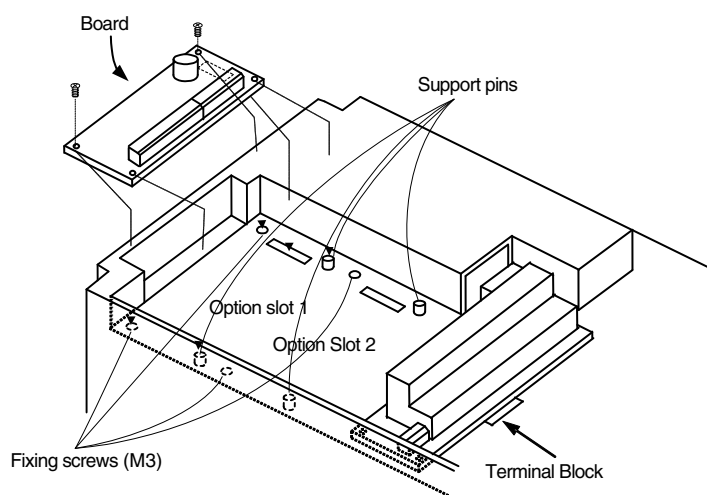
2-4-1 3G3AX-ABS or 3G3AX-ABS30 double channel universal encoder board

The difference between this boards is that 3G3AX-ABS30 is optimized for the reduced rpm range of the gearless motors, providing higher immunity to noise and more precise speed sensing at low speeds.

For installing, it is necessary to remove the inverter front cover. After mounting board in inverter (either Slot 1 or Slot 2, but only one board can be installed). 2 screw fixing is required (provided with the board).
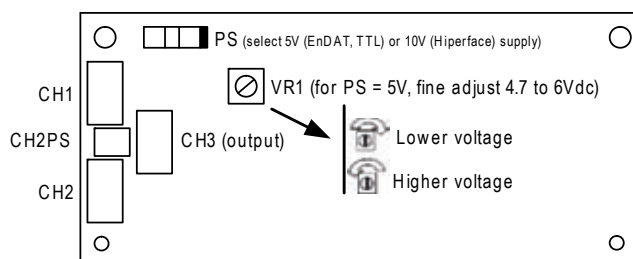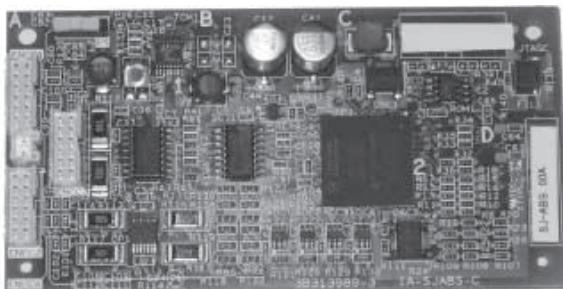
CH1 - CH3 (ENCC1 to ENCC3) --> 90311-012LF or equivalent (Maker: FCI)

CH2P2 (ENCC4) --> Housing: PAP-02V-S or equivalent /

Contact: SPHD-002T-P0.5 or SPHD-001T-P0.5

(Maker: JST)

Short extension cables to terminal board for encoder cable connection are standard accessories.

Certain short extension cables to common encoder connectors are optional accessories from OMRON.

Short extension cables to any connector type can be supplied by OMRON under request.

Direct encoder board to motor encoder connectors can be supplied by OMRON under request.

Function explanation of terminals according to type of encoder connected.

Connector	PIN	Signal name					
		Color	EnDat v2.1	EnDat v2.2	HIPERFACE	Incremental	
ENCC1 (CH1) Pin No. (board top)	1	Brown/Green	Up	Up	Us	5V/10V	Select PS1 supply according encoder type (Linedriver or EnDat = 5V, Hiperface = 10V)
	2	Pink	0V	0V	GND	0V	
	3	Violet	DATA	DATA	DATA+	-	
	4	Green/Black	/DATA	/DATA	DATA-	-	
	5	Red/Black	CLOCK	CLOCK	-	-	
	6	White	/CLOCK	/CLOCK	-	-	
	7	White/Green	A+	-	+COS	A+	
	8	Blue/Black	A-	-	REFCOS	A-	
	9	Yellow/Black	B+	-	+SIN	B+	
	10	Yellow	B-	-	REFSIN	B-	
	11	Grey	-	-	-	Z+	Only used for incremental encoder
	12	Blue	-	-	-	Z-	
ENCC2 (CH2) Pin No. (board top)	1	Brown/Green	Up	Up	Us	5V/10V	For the second channel, supply has to be provided from external by ENCC4 connector
	2	Pink	0V	0V	GND	0V	
	3	Violet	DATA	DATA	DATA+	-	
	4	Green/Black	/DATA	/DATA	DATA-	-	
	5	Red/Black	CLOCK	CLOCK	-	-	
	6	White	/CLOCK	/CLOCK	-	-	
	7	White/Green	A+	-	+COS	A+	
	8	Blue/Black	A-	-	REFCOS	A-	
	9	Yellow/Black	B+	-	+SIN	B+	
	10	Yellow	B-	-	REFSIN	B-	
	11	Grey	-	-	-	Z+	Only used for incremental encoder
	12	Blue	-	-	-	Z-	
ENCC3 (CHOUT) Pin No. (board top)	1	Brown/Green	Unused				
	2	Pink					
	3	Violet					
	4	Green/Black					
	5	Red/Black	CH1 MON-A+				Monitor terminal of the CH1 encoder (TTL 5V linedriver output)
	6	White	CH1 MON-A-				
	7	White/Green	CH1 MON-B+				
	8	Blue/Black	CH1 MON-B-				
	9	Yellow/Black	CH2 MON-A+				Monitor terminal of the CH2 encoder (TTL 5V linedriver output)
	10	Yellow	CH2 MON-A-				
	11	Grey	CH2 MON-B+				
	12	Blue	CH2 MON-B-				
ENCC4 (CH2PS) (power supply for CH2) Pin No. (board top)	1		CH2 encoder power supply				External power supply to be connected here with voltage according to encoder connected to CH2.
	2		CH2 encoder power supply common				

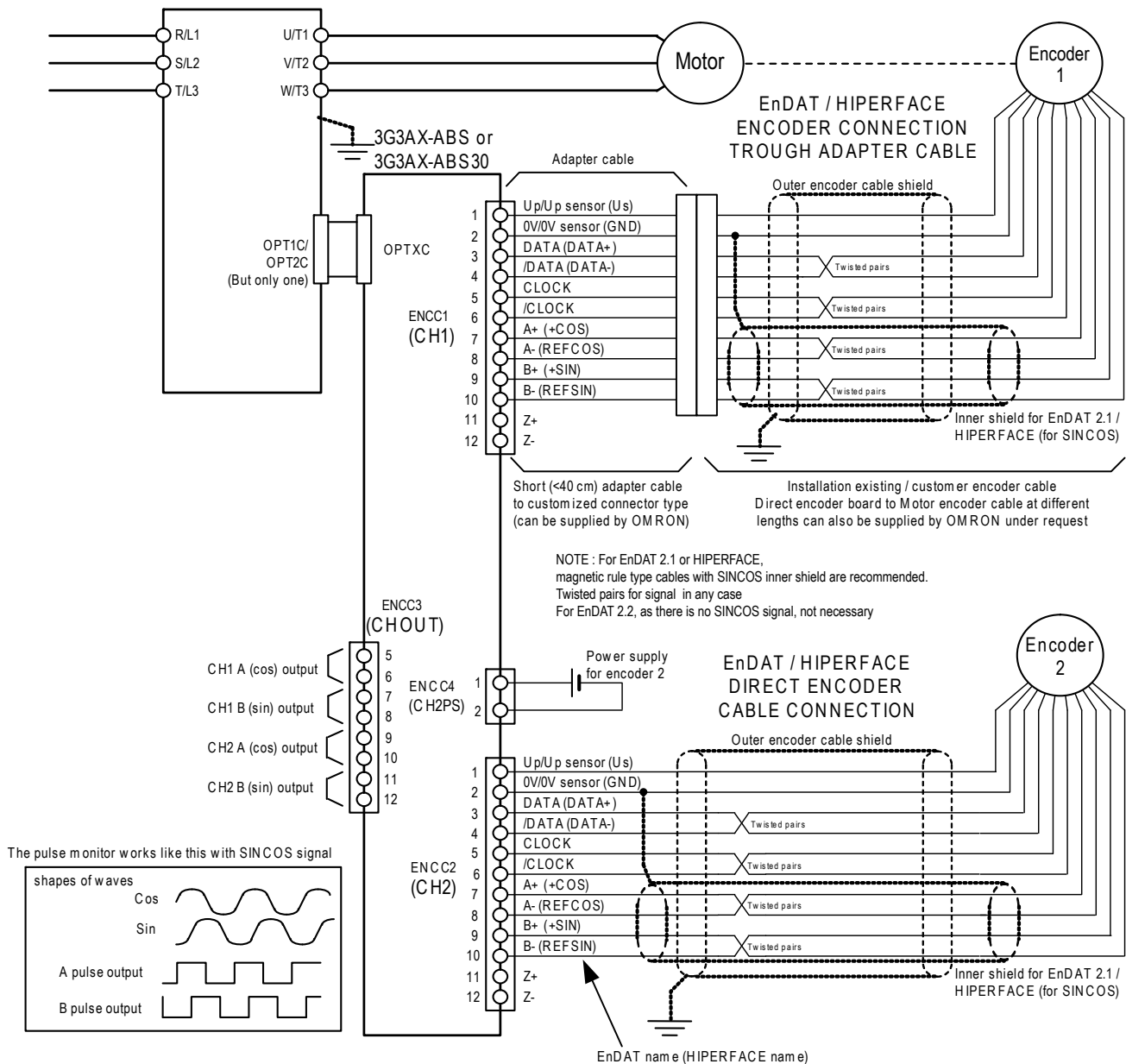## 2-4-1-1 Encoder Connections for 2 Encoder Wiring Example

Encoder 1 is connected with adapter cable and encoder 2 is directly connected.

For EnDat v2.1 or HIPERFACE encoder, it is highly recommended to use double braided cable with internal shield for the analog SINCOS lines and twisted pairs for the differential cables. The reason is that the analog 1Vpp signals, even being differential, present more.

For incremental encoders or EnDat v2.2 a single shield cable with twisted pairs of good quality braided shield is enough.

EnDat v2.1 or HIPERFACE short distance (<1m) single braided cable diam 4.5mm: E235078 (AWM STYLE 20549) --> HEIDENHAIN ref 605090-xx.

EnDat v2.1 or HIPERFACE long distance is needed double braided cable diam 8mm: E63216 (AWM STYLE 20963) --> HEIDENHAIN ref 266306-xx.

2-4-1-2 Examples of Possible Adapter Cables

Strip wires
AX-ABS-CNSW30/45/60-EE

Zhiel Abbegg Zetadyn type
AX-ABS-CNDB30/45/60-EE

CT Unidrive type
AX-ABS-CNHD30/45/60-EE

Applicability of cable by distance and inverter reference (it is important to keep this cable as short as possible):

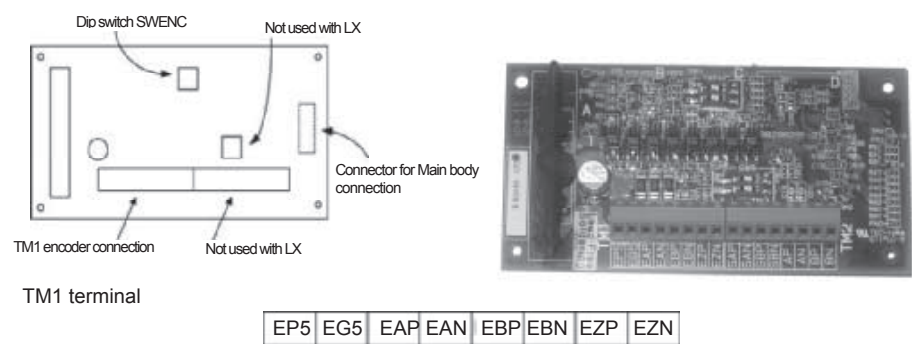| Cable length	Mount connector in grounding plate accessory in inverter	Mount connector in cabinet plate nearby inverter
30	3G3LX-4037 to 3G3LX-4110	N.A.
45	3G3LX-4150 to 3G3LX-4185	3G3LX-4037 to 3G3LX-4110
60	N.A.	3G3LX-4150 to 3G3LX-4185

2-4-1-3 Encoder Wiring Self-check

The LX has a complete encoder wiring check when used with a 3G3AX-ABS or 3G3AX-ABS30 cards. It will check and report most common wiring problems with the encoders before running the inverter.

Type	A, /A, B, /B sin, /sin, cos, /cos any disconnected	A (sin) <> /A (/sin) B (cos) <> /B (/cos) pairs exchanged	A (sin) <> B (cos) /A (/sin) <> /B (/cos) swapped	CLK, /CLK, DATA or /DATA wiring error
Linedriver	Static "ENCx wiring"	Dynamic "Rotatory dir"	Dynamic "Rotation dir"	N.A.
EnDat	Static "ENCx wiring"	Static "ENCx wiring"	Static "ENCx wiring"	Static "ENCx Com"
HIPERFACE	Static "ENCx wiring"	Static "ENCx wiring"	Static "ENCx wiring"	Static "ENCx Com"

Note With absolute encoders, the full reversal of A(SIN) and B(COS) channels is the only wiring mistake that can not be detected in static condition (it is impossible for the encoder input to recognize this fact). This will be reported as Reverse direction or similar mismatch error at first run.

2-4-2 3G3AX-PG01 Linedriver Single Channel Encoder Board

Dip switch SWENC

Not used with LX

Connector for Main body connection

TM1 encoder connection

Not used with LX

TM1 terminal

| EP5 | EG5 | EAP | EAN | EBP | EBN | EZP | EZN |

Terminal name	Terminal function	Function	Electric specification
EP5 (+5VDC) EG5 (GND)	Encoder power supply input	Power supply for the encoder	+/- 5VDC, 150mA max
EAP, EAN, EBP, EBN, EZP, EZN	Encoder signal inputs	A, B, Z: rotary encoder signal input	Linedriver encoder input (based on RS-422 standard)

**Note** TM2 terminal is reserved for use with LX inverter.

DIP Switch settings

DIP switch	Switch No.		Contents
SWENC	1	ON	Detection of disconnected A or B signal (EAP-EAN or EBP-EBN) enabled
		OFF	Detection of disconnected A or B signal (EAP-EAN or EBP-EBN) disabled
	2	ON	Detection of disconnected Z signal (EZP-EZN) is enabled
		OFF	Detection of disconnected Z signal (EZP-EZN) is disabled

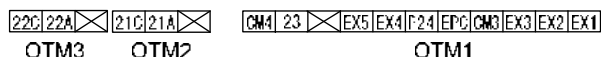**Note** SWR dip switch is reserved for use with LX inverter.

Sample wiring diagram
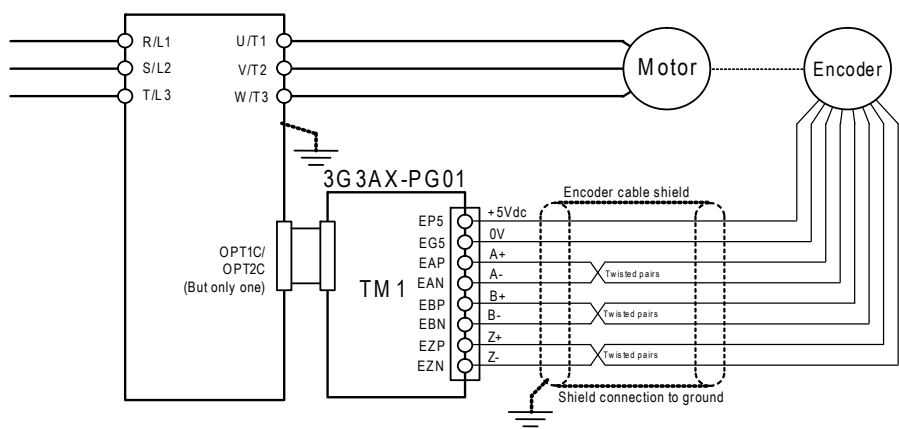
2-4-3   3G3AX-EIO Expansion I/O Board
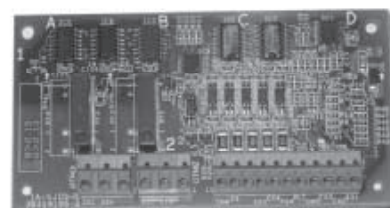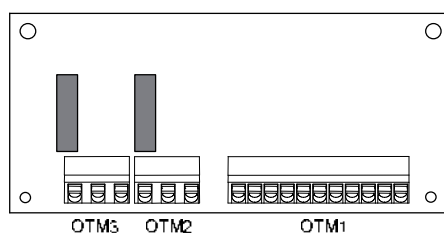
| Board type	Model	Specification
Expansion I/O board	3G3AX-EIO	5 digital inputs (open collector) 1 digital output (open collector) 2 relay outputs

Terminal descriptions:

| Terminal stand	Terminal name	Signal name	Description	Specifications
OTM1	Power supply	P24	It is DC24V power supply for the digital inputs supply. It becomes the common terminal for the source logic (typ. PNP)	Maximum load: 100mA
	Power supply	CM3	Common terminal for the P24 power supply. It becomes common terminal for the sink logic (typ. NPN)	
	Multifunction input terminal	EX1 EX2 EX3 EX4 EX5	Multifunction inputs available as for the inverter standard input terminals	Electric characteristics Input - EPC Minimum ON condition: DC 18VDC Input impedance: 4.7kΩ Max. voltage: DC 27VDC Max. load current: About 5.6mA at power supply DC 27VDC.
	Multifunction input terminal common	EPC	Sink (NPN) logic: P24-EPC Source (PNP) logic: CM3-EPC	
	Open collector output	23	Multifunction outputs available as for the inverter standard output terminals	Voltage drop at on state: 4VDC or less Maximum voltage: DC27V Maximum current: 50mA
	Output terminal common	CM4	Common terminal for the open collector output.	
OTM2	Relay outputs	21A 21C	Multifunction outputs available as for the inverter standard output terminals.	5A 250VAC 5A 30VDC
OTM3		22A 22C		
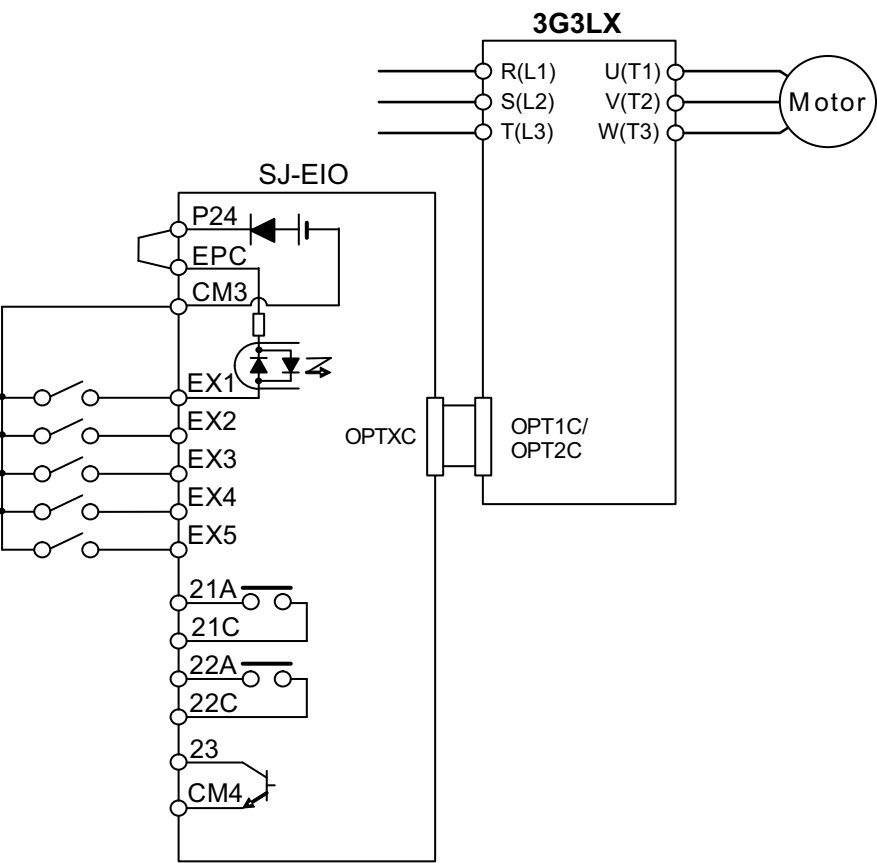
2-5 Grounding Plates

Ground plates attachments are available to facilitate cable arrangement and shield groundings.

Grounding plate LX Size 1 (3.7 kW)
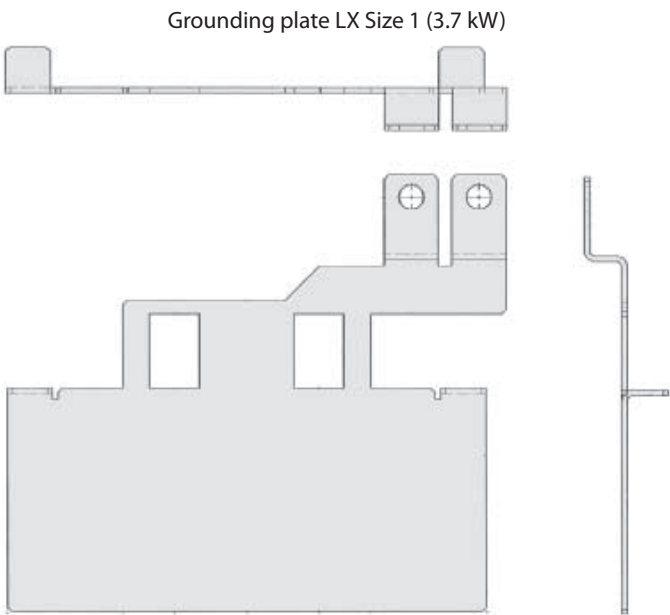
Grounding plate LX Size 2 (4 kW-11 kW)
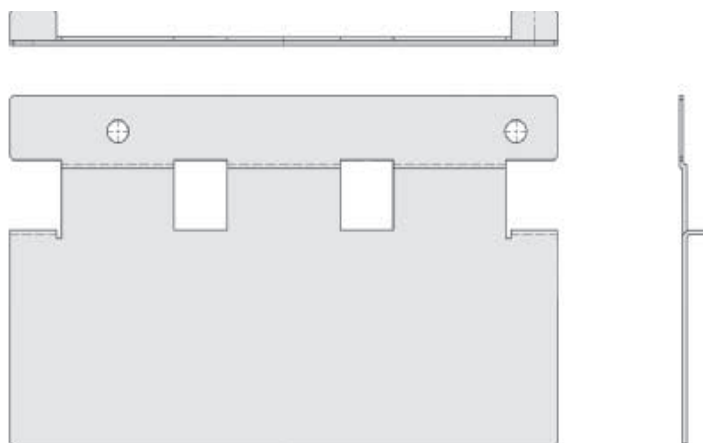
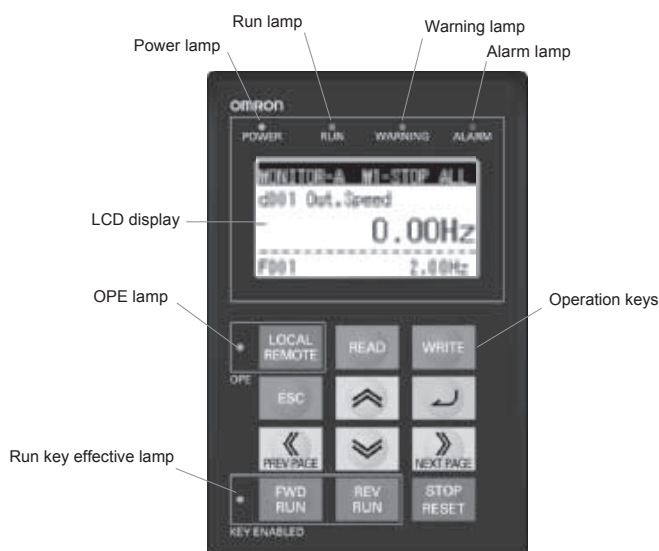Grounding plate LX Size 3 (15 kW-18.5 kW)
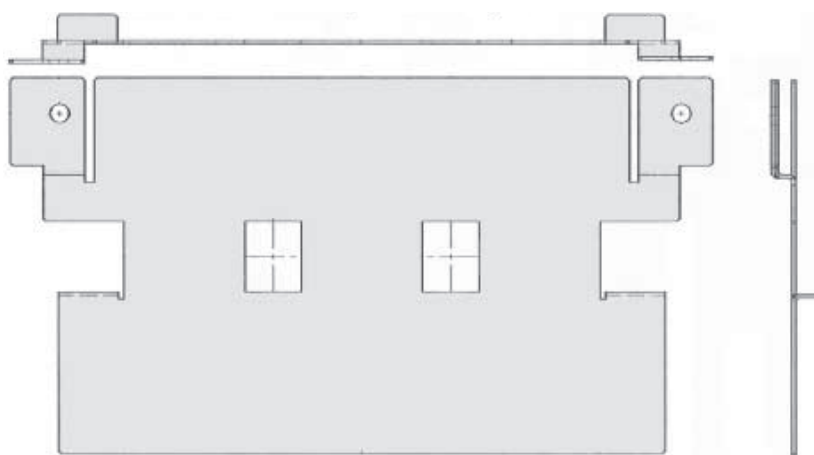
SECTION 3
Programming the LX Inverter

3-1   LCD Display Use

The LCD in LX is designed to make easy edition and access to parameters.

Name	Content
Power lamp	On (green) when there is control power supply to the inverter.
Run lamp	On (green) when inverter is running the motor.
Warning lamp	On (red) when there is a warning in the inverter.
Alarm lamp	On (red) while there is an error in the inverter.
LCD display	Monitors, parameters and error messages are shown. The backlight shows red color in case of inverter alarm or error.
OPE lamp	On (green), when the operator keys become effective (by RUN source selection or by Autotuning process). By pressing 3 sec or more the LOCAL/REMOTE key, it becomes operator run control as well.
Run key effective lamp	On (green) when the FWD RUN/REV key are effective.
Operation keys	Navigation and COPY function keys. Check additional descriptions.

3-1-1   Top Bar Status (permanent)

Item	Content of display	Content
Display mode	MONITOR-A	Monitor mode A
	MONITOR-B	Monitor mode B
	FUNCTION	Function mode
	TRIP	Trip (error mode)
	WARNING	Warning mode
	OPTION	LCD configuration mode
Motor selected	M1	Motor 1 (SET multifunction = OFF)
	M2	Motor 2 (SET multifunction = ON)
Inverter RUN status	STOP	It is stopping
	FWD	Forward direction
	REV	Reverse direction
Display selection	ALL	All displays
	UTL	Function individual display
	USR	User setting display
	CMP	Compare display

3-1-2   LCD Settings

To enter edition of LCD settings, press ⌃ + ⌄ + ‹ together. The OPTION MODE menu will be shown (this is a menu inside of the LCD operator, not in the inverter).

Here it is possible to set the following LCD adjustments:

Item	Content
Language	1-English, 2-German, 3-French, 4-Spanish, 5-Italian, 6-Portuguese, 7-Japanese, 8-Chinese, 9-Turkish, 10-Russian
Date and Time	The date and time are set. Display format for date also selected here
Read Lock	Read data prohibit on the operator side
INV Type select	Do not change it
READ/WRITE COPY mode	Select the copy function capacity: "4 parameter sets" or "1 parameter set + Drive Programming"
Backlight Auto-Off	It can be selected if the backlight flickers in red in case of inverter alarm
Operator Reset	Don't use
Test Mode	Don't use

3-1-3   Display Modes

The different display modes are selected from the main access level by the
[►] and [◄] keys.

MONITOR-A M1-STOP ALL	MONITOR-B M1-STOP ALL	FUNCTION M1-STOP ALL	TRIP M1-STOP ALL
d001 Out.Speed	Output.Speed 0.00Hz	F001	E97.1
	Out.Crnt 0.00A	SetSpeed(Crawl)	
0.00Hz	Rotation STOP	2.00Hz	RUN Request
F001 2.00Hz	In.TM HHLLLLLLL	[0.00 – 50.00]	270111 16:31 Stop

3-1-3-1   Monitor-A: 1 Monitor, 1 Parameter

In MONITOR-A it is possible to select one monitor and it is possible to edit 1
parameter.

To change the monitor parameter selected:

```
MONITOR-A M1-STOP ALL
d001 Out.Speed

              0.00Hz
F001      2.00Hz
```
[↵]

```
MONITOR-A M1-STOP ALL
d001 Out.Speed

              0.00Hz
F001      2.00Hz
```
[⌃] [⌄] [◄] [►] to select the monitor, then [ESC]

```
MONITOR-A M1-STOP ALL
d029 Pos-Ref

              +0
F001      2.00Hz
```

To edit the parameter:

```
MONITOR-A M1-STOP ALL
d001 Out.Speed

              0.00Hz
F001      2.00Hz
```
[↵] [↵]

```
MONITOR-A M1-STOP ALL
d001 Out.Speed

              0.00Hz
F003      0005.8s
```
[⌃] [⌄] [◄] [►] to edit the parameter, then [ESC]

To change the parameter to edit:

```
MONITOR-A M1-STOP ALL
d001 Out.Speed

              0.00Hz
F001      2.00Hz
```
[↵] [↵] [ESC]

```
MONITOR-A M1-STOP ALL
d001 Out.Speed

              0.00Hz
F003      1.80s
```
[⌃] [⌄] [◄] [►] to select the parameter, then [↵]

To change the default monitor at power-up, change parameter F012.

3-1-3-2 Monitor-B: 4 Monitor Mode

In MONITOR-B it is possible to select up to 4 monitor in one screen.

In this mode, once selected, the 4 monitor selection will remain after power off.

```
MONITOR-B  M1-STOP ALL
Out.Speed        0.00Hz
Out.Crnt          0.00A
Rotation           STOP
In.TM        HHLLLLLLL
```

⏎

```
MONITOR-B  M1-STOP ALL
Out.Speed        0.00Hz
Out.Crnt          0.00A
Rotation           STOP
In.TM        HHLLLLLLL
```

⌃ ⌄ to select one of the 4 monitors

```
MONITOR-B  M1-STOP ALL
Out.Speed        0.00Hz
Out.Crnt          0.00A
Rotation           STOP
In.TM        HHLLLLLLL
```

⏎

```
MONITOR-B  M1-STOP ALL


d003 Rotation


```

⌃ ⌄ « » to select the monitor

```
MONITOR-B  M1-STOP ALL


d006 Out.TM


```

⏎ to fix it.

```
MONITOR-B  M1-STOP ALL
Out.Speed        0.00Hz
Out.Crnt          0.00A
Out.TM             LHLL
In.TM        HHLLLLLLL
```

3-1-3-3   Function: 1 Parameter edit

In this mode, all available information about the parameter is displayed.

To select the parameter to edit:

```
FUNCTION    M1-STOP ALL
F001
SetSpeed(Crawl)
                2.00Hz
   [0.00 - 50.00]
```

```
FUNCTION    M1-STOP ALL
F001
SetSpeed(Crawl)
                2.00Hz
   [0.00 - 50.00]
```
to select the parameter

```
FUNCTION    M1-STOP ALL
A044
Control mode, 1st
  00:IM-VC
      [00 - 06]
```
to select the parameter to edit

```
FUNCTION    M1-STOP ALL
A044
Control mode, 1st
  00:IM-VC
      [00 - 06]
```

TIP: to see default parameter value, press [ESC] and [PREV PAGE] together in this mode.

```
FUNCTION    M1-STOP ALL
A044
Control mode, 1st
  06:PM-CLV
      [00 - 06]
```
to fix the value.

3-1-3-4   TRIP/WARNING and TRIP/HISTORY

In this mode, inverter TRIP information is shown.

As the LCD has Real Time Clock facility, the trip history includes the occurrence date and time for each of the 6 last trips. The main screen shows the occurrence of the last trip, including the time it has occurred and in which moment of the inverter operation (Stop, Accel, Run, Decel).

```
TRIP        M1-STOP ALL
E97.1


RUN Request

100723 14:55     Stop
```
From the main TRIP screen, push [↵] to enter detail mode

```
TRIP        M1-STOP ALL
ERR1     RUN Request
100727 19:22     Stop
Out.Speed        0.00Hz
Out.Crnt         0.00A
```
From here [∧] [∨] to see other trip history

```
TRIP        M1-STOP ALL
ERR2     FB-Opt.Ans.
100724 10:38     Stop
Out.Speed        0.00Hz
Out.Crnt         0.00A
```
If some trip does not contain information, a blank page is shown:

```
TRIP        M1-STOP ALL
ERR6


    (no data)

```
After cycle through the TRIP, the WARNING status is shown:

```
WARNING     M1-STOP ALL



    (no data)

```

Press [PREV PAGE] [NEXT PAGE] in a trip to read more information:

```
TRIP        M1-STOP ALL
ERR1     RUN Request
100727 19:22     Stop

Out.Speed        0.00Hz
Out.Crnt         0.00A
```
[NEXT PAGE]
```
TRIP        M1-STOP ALL
ERR1     RUN Request
DC Voltage   287.5Vdc
RUN time         10hr
ON time          25hr
```
[PREV PAGE]
```
TRIP        M1-STOP ALL
ERR1     RUN Request
100727 19:22     Stop

Out.Speed        0.00Hz
Out.Crnt         0.00A
```

3-1-4   Password Protection

It is possible to prevent change of parameter access level by password protection facility. The desired access level and parameter access should be established prior to locking the password.

Display code	Function name	Setting range/content	Initial value	Remarks
F005	Display password input	0000h to FFFFh	0000h	
F006	Display password setting	0000h to FFFFh	0000h	
F007	Soft lock password input	0000h to FFFFh	0000h	
F008	Soft lock password setting	0000h to FFFFh	0000h	
F011	Function code display restriction	00: ALL (full displays)	00	
		01: FUNCTION (function-specific display)		
		02: USER (user setting)		
		03: COMPARE (data comparison display)		
		05: MONITOR (monitor only display)		
F013	Soft lock selection	00: MD0 (Only F013 change with SFT: ON)	00	
		01: MD1 (Only F013 and freq data with SFT: ON)		
		02: MD2 (Only F013 change always)		
		03: MD3 (Only F013 and freq data always)		

3-1-5   Password Diagram
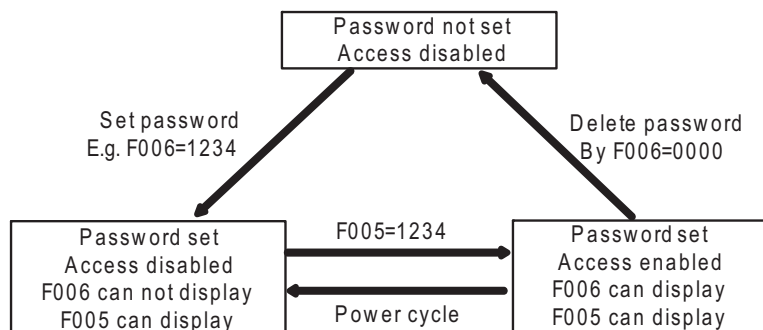
3-1-6   Verify Function to Check Changed Parameters

In order to check what parameters have changed from inverter default settings:

F011 (Function code display restriction) = 03: COMPARE

With this setting, only the parameters that have changed will be visible.

This mode can be quickly recognized by the "CMP" indication in the status bar of the display.

```
FUNCTION    M1-STOP CMP
A001
Speed ref. source
  02:OI
     [01 - 08]
```

3-1-7 Function to Check the Default Setting of Parameters

In the parameter editing mode is possible to check the original default setting by pressing ▨ + ◄ .

FUNCTION M1-STOP ALL		FUNCTION M1-STOP ALL		FUNCTION M1-STOP ALL
A001		A001		A001
Speed ref. source		Speed ref. source		Speed ref. source
02:0I		02:0I		* 04:MULTI
[01 - 08]	↵ ↵	[01 - 08]	▨ + ◄	[01 - 08]
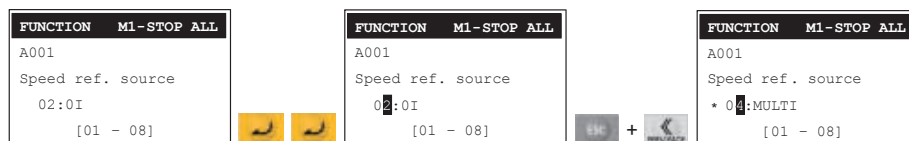
In this mode, press ↵ to fix the default setting in the parameter or ▨ to ignore.

3-1-8 Copy Function: READ/COPY/COMPARE

To use the copy function, first select the type of COPY function in LCD settings. Single (1 parameter set + Drive program) or Quad (4 parameter sets only) and also copy function enabled:

Display code	Function name	Setting range/content	Initial value	Remarks
F014	Copy function enable	00: Disable (copy function invalidity)	00	
		01: Enable (copy function effective)		

Enter in Read Mode pressing ▨ key,

The selection of which memory to overwrite (in case it is set for 4 memories) appears:

```
READ
1.------ --:-- -----
2.------ --:-- -----
3.------ --:-- -----
4.------ --:-- -----
```
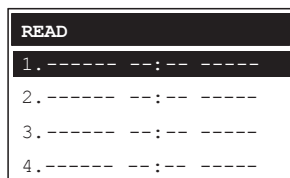
Select by ⌃ ⌄ and then press ↵

It will ask you for the operation to carry on that memory:

```
READ
Data No.1
Select data
  01: Read data
```
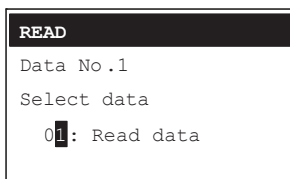
01	READ data
02	READ data+Drive Programming
03	VERIFY data
04	VERIFY Drive Programming
05	Cancel

At this point it is possible to verify the contents of LCD towards the inverter memory.

Once a memory contains data it looks like this:

```
READ
1.141210 10:33 INV81
2.------ --:-- -----
3.------ --:-- -----
4.------ --:-- -----
```
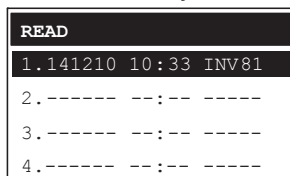
After storing data, it is shown the recorded data, time and inverter "code".

When the ▨ key is pressed, it is possible to recover data to inverter from a memory.

Note Inverter model, power rating and firmware should be the same for this function to work properly (can not copy to different model).

3-1-9 Inverter Parameter Initialization

To reset all parameters, set F030=04 and then F034=01.

Display code	Function name	Setting range/content	Initial value	Remarks
F030	Initialization mode selection	00: No (disable)	00	
		01: Err data (error history)		
		02: Parameter		
		03: Err/Pm (error history and parameter)		
		04: Err/Pm/EzSQ (error history, params and Drive Programming)		
F032	Initialization data selection	00: All (all data)	00	
		01: Exc. TERM (the parameter related to the terminals excluded)		
		02: Exc. COM (the parameter related to the communication is excluded)		
		03: Exc. TERM/COM (the parameter related to the terminal and communication is excluded)		
F034	Initialize trigger selection	00: No action (disable)	00	
		01: Initialize (enable)		

4-1   Control Mode Settings

Display code	Function name	Setting range/content	Initial value	Remarks
A044	Control mode setting, 1st motor	00: IM-VC (V/F control)	00	For the second motor: A244
		03: IM-OLV (open loop vector control)		
		04: IM-0HzOLV (open loop vector control (0Hz domain))		
		05: IM-CLV (closed loop vector control (IM))		
		06: PM-CLV (closed loop vector control (PM))		

4-1-1   Set Encoder Configuration (Closed Loop Modes)

List of known encoders supported:

Type	Reference
Linedriver	Any incremental encoder from 128 to 10000
EnDat 2.1	Heidenhain: • ECN1313 EnDAT01 • ECN1325 EnDAT01 • ECN113 EnDAT01 • ECN413 EnDAT01 • ECN425 EnDAT01 • EQN425 EnDAT01 (multiturn) • ROQ425 EnDAT01 (multiturn) Any EnDat 2.1 compatible with above.
EnDat 2.2	Heidenhain: • ECN423 EnDAT02 • ECN425 EnDAT02 • ECN1325 EnDAT02 • ECN125 EnDAT02 • ROQ437 EnDAT02 (multiturn) • EQN437 EnDAT02 (multiturn) • EQN1337 EnDAT02 (multiturn) Any EnDat 2.2 compatible with above.
Hiperface	Stegmann: • SRS50 • SRS60 • SRS660 • SRM50 (multiturn) • SRM60 (multiturn) Any Hiperface compatible with above encoder.

Parameter	Description	Value
P003	Parameter Auto setting for Encoder	00: Disable
		01: Enable
P004	1st-motor speed feedback source selection	00: non (not use)
		01: ch1-inc (incremental (CH1))
		02: ch1-HIPER (HIPERFACE (CH1))
		03: ch1-En2.1 (EnDat 2.1 (CH1))
		04: ch1-En2.2 (EnDat 2.2 (CH1))
		05: ch2-inc (incremental (CH2))
		06: ch2-HIPER (HIPERFACE (CH2))
		07: ch2-En2.1 (EnDat 2.1 (CH2))
		08: ch2-En2.2 (EnDat 2.2 (CH2))

If the type of encoder is EnDat or Hiperface and parameter autosetting enabled, the inverter will check the encoder data and autoset the ppr and bit depth of encoder. This check will take some second to execute at the power up sequence of inverter. If the power up time is important for the system, it can be set to disabled, and parameters fixed by user.

Parameter	Description	Value
P010	CH1-ENC constant setting	1024
P011	CH1-ENC resolution setting	0

4-2   Set Lift Machine Parameters

It is necessary to set the correct lift system values, in order that the scaling functions and some limiting functions to work properly. The basic mechanical system information should be set in LX parameters.

Parameter	Function name	Setting range/content	Initial value
F015	Traction sheave diameter	100 to 2000 (mm)	400
F016	Roping ratio	00: (1:1)	00
		01: (1:2)	
		02: (1:3)	
		03: (1:4)	
F017	Gear ratio	0.10 to 40.00	1.00

4-2-1   The Traction Sheave Diameter

The traction sheave diameter (F015) is the pulley where the lift ropes receive the motor force. In the case of geared motor, it is attached after the gear (gear ratio in that case to be defined in F017). In the case of gearless motor, it forms integral part of the motor (like in the figure).

4-2-2　The Roping Ratio

F016 refers to the way the force of the motor is transmitted to the lift car by using different pulley suspension systems.

By the roping ratio it is possible to add some multiplied force to the car, in exchange of a proportionally diminished speed.

The most common in average lift are 1:1 and 2:1.

1:1 is very cost and size effective mechanical solution, with the drawback that the lift load is reflected directly to the motor sheave, and it becomes more difficult to achieve perfect performance specially in the case of gearless motor (no gearbox).

**Typical 1:1
full wrap**

**Typical 2:1
half wrap**

**Typical 2:1
half wrap**
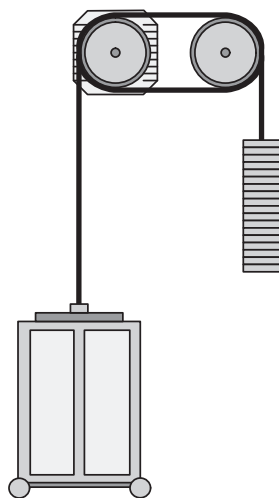
- Cheap installation
- Less space
- Difficult to tune
- Difficult maintenance
- Low comfort
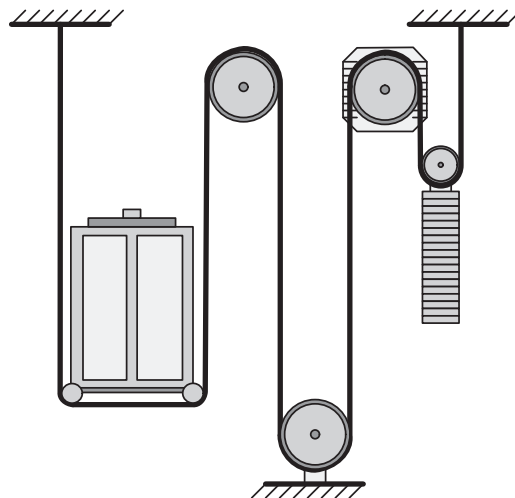
- Expensive
- More space
- Easy to tune
- High comfort
- Best for roomless
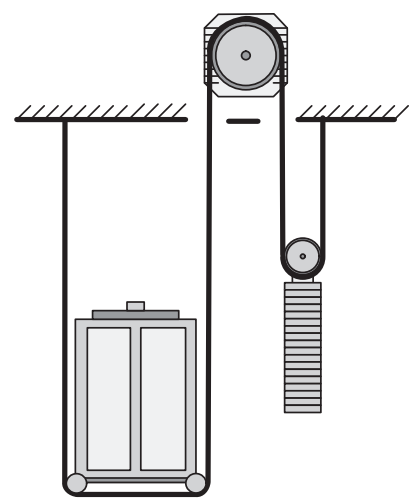
- Balanced
- Medium space
- Medium to tune
- Good comfort
- Best for room lifts

**Uncommon 3:1
half wrap**
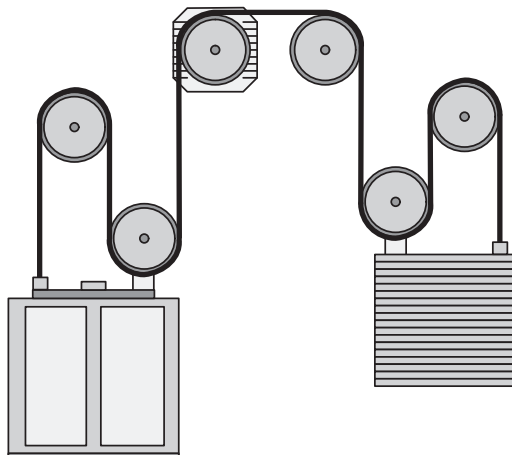
**Typical 4:1
half wrap**
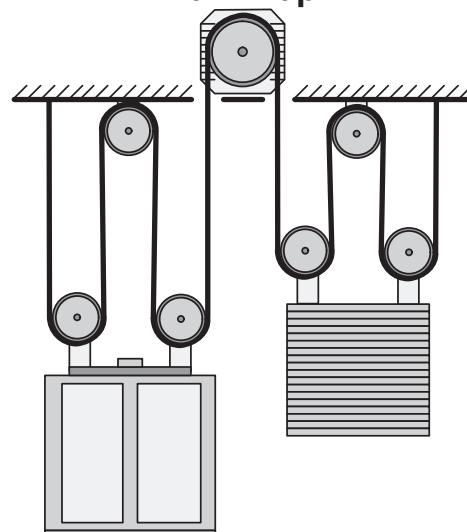
Large capacity goods elevator

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4-2-3   Motor and Encoders Rotation Direction

It is required to make sure about some motor installation topics before proceeding.

Where is the encoder attached referring to the inverter?

Where is the motor installed in the liftway?

Is it clockwise rotation Up or Down direction?

U - V - W sequence corresponds by default to UP direction command and encoder A before B phase precedence. Phase on encoder normally depends on where encoder is mounted related to motor rotation. There are motors with similar frame and shapes that rotate different direction.

Parameter	Function name	Setting range/content	Initial value
A016	Motor rotation reverse	00: Direct (Phase-A leading)	00
		01: Reverse (Phase-B leading)	
P016	CH1 ENC position	00: Direct (Phase-A leading)	00
		01: Reverse (Phase-B leading)	
P026	CH2 ENC position	00: Direct (Phase-A leading)	00
		01: Reverse (Phase-B leading)	
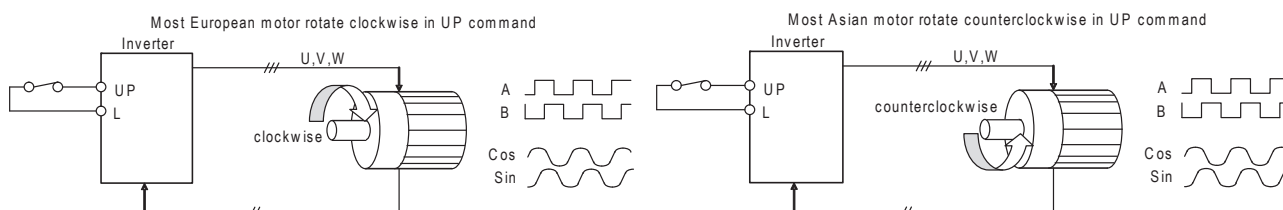
Driving instruction	A016 (output)	Output to motor (european direction)	Sign of d008	P016/P026 (encoder)
UP	00: Direct	Clockwise (CW)	Plus	00: Direct
			Minus	01: Reverse
		Counterclockwise (CCW)	Plus	00: Direct
			Minus	01: Reverse
	01: Reverse	Clockwise (CW)	Plus	01: Reverse
			Minus	00: Direct
		Counterclockwise (CCW)	Plus	01: Reverse
			Minus	00: Direct

Note Incremental encoders may change the rotation direction by exchange of A <-> B and /A <-> /B. EnDat or HIPERFACE encoders will not change the rotation direction by exchange of SIN <-> COS signals, because internally to the encoder, the signals are always interpreted in the same direction for the absolute communications part (therefore, changing will cause mismatch between incremental reading in the encoder board and absolute reading by encoder communications).

Normally A016 will be used to change the motor working direction without changing the wiring to motor connections.

Just with this parameter, the inverter will handle the reverse working correctly without additional settings.

A016 (motor rotation reversal)=0
UP = clockwise

A016 (motor rotation reversal)=1
UP = counterclockwise
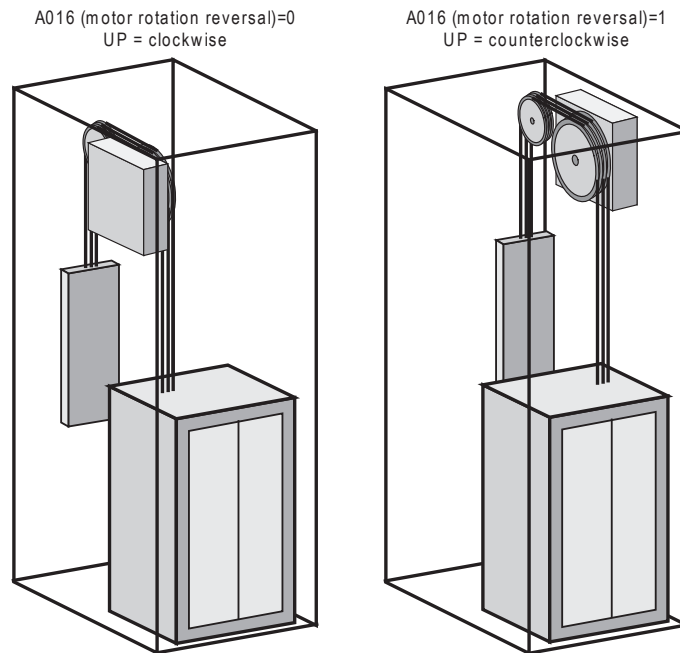
The most of the times this setting will be used to adapt the motor mounting position in roomless installations, as shown in the figure.

It is recommended to wire the motor always with the same connections, and change rotation direction by the software parameter A016.

4-2-4 Decide the Units for Speed and Acceleration

Parameter	Function name	Setting range/content	Initial value	Remarks
F020	Speed unit selection	00: Hz	00	
		01: min-1		
		02: m/s		
		03: %		
		04: ft/m		
F021	Acceleration/Deceleration unit selection	00: s (sec)	00	
		01: m/s^2		

4-3 The Interface to the Controller

There are many types of lift controllers in the market. Some of them are very old control systems, prepared for a 2 speed motor installation.

Others are modern CPU based systems, prepared to control inverter drives.

Due to the many possibilities, LX implements a flexible speed and control reference system. LX can virtually adapt to any control requirements signals.

4-3-1   Decide your Control Configuration and Speed References

Parameter	Function name	Setting range/content	Initial value	Remarks
A001	Speed reference selection	01: O (O-L input)	04	
		02: OI (OI-L input)		
		03: O2 (O2-L input)		
		04: Multi (multi speed)		
		05: RS485 (RS485 Modbus-RTU)		
		06: OP1 (option card 1)		
		07: OP2 (option card 2)		
		08: PRG (Drive Programming)		
A019	Multi speed selection	00: Lift (lift speed)	00	
		01: Multi (multi stage speed)		

A019=00 (lift sequence) is recommended as the signals have a clear priority level and definition. Special sequences are created for signals like inspection.

Multi speed selection (A019)	Digital input						Speed name
	EMP	INS1	INS2/RL	SPD3	SPD2	SPD1	
00 (Lift sequence)	1	X	X	X	X	X	Em-Power operation (A036)
	0	1	0	X	X	X	Inspection (A034)
	0	1	1	X	X	X	Inspection 2 (A035)
	0	0	1	X	X	X	Releveling (A033)
	0	0	0	0	0	1	Crawl (A029)
	0	0	0	0	1	0	Fast (A028)
	0	0	0	0	1	1	Multi speed 3 (A023)
	0	0	0	1	0	0	Multi speed 4 (A024)
	0	0	0	1	0	1	Multi speed 5 (A025)
	0	0	0	1	1	0	Multi speed 6 (A026)
	0	0	0	1	1	1	Multi speed 7 (A027)
	0	0	0	0	0	0	Special Speed (A020) (A039=02-InMid4)

In case of A019=01 (Multistage) a selection method similar to standard inverter is established.

Multi speed selection (A019)	Digital input						Speed name
	EMP	INS1	INS2/RL	SPD3	SPD2	SPD1	
01 (Multi stage)	1	X	X	X	X	X	Em-Power operation (A036)
	0	1	0	X	X	X	Inspection (A034)
	0	1	1	X	X	X	Inspection 2 (A035)
	0	0	1	X	X	X	Releveling (A033)
	0	0	0	0	0	1	Multi speed 1 (A021)
	0	0	0	0	1	0	Multi speed 2 (A022)
	0	0	0	0	1	1	Multi speed 3 (A023)
	0	0	0	1	0	0	Multi speed 4 (A024)
	0	0	0	1	0	1	Multi speed 5 (A025)
	0	0	0	1	1	0	Multi speed 6 (A026)
	0	0	0	1	1	1	Multi speed 7 (A027)
	0	0	0	0	0	0	Special Speed (A020) (A039=02(InMid4))

In the Multispeed mode, there is no direct recognition of the type of speed selected (top, levelling, inspection).

To recognize it 2 parameters can be defined as the limits for crawl, inspection and highspeed.

There are several function that need this to work properly (3 ASR, Quickfloor, inspection sequence, high speed retrigger).

Parameter	Function name	Setting range/content	Initial value	Remarks
A037	Inspection speed upper limit	0.00 to Maximum speed (Hz)	30.00	
A038	Fast/Crawl speed detection level	0.00 to Maximum speed (Hz)	20.00	

In practice:

Condition	Corresponding speed instruction
Selected speed < A038	Low-speed (Crawl) instruction
A038 < selected speed < A037	Inspection running speed
A037 < selected speed	High-speed (Fast) instruction
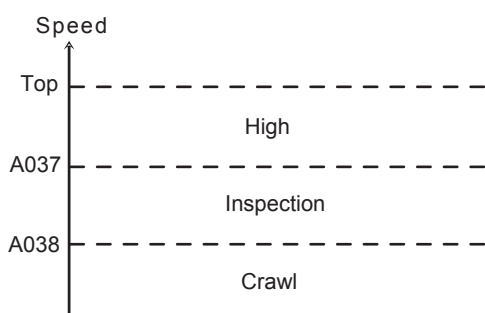
The behavior of the condition of missing speed reference (all inputs open) is selected with A039.

Parameter	Function name	Setting range/content	Initial value	Remarks
A039	Operation mode if speed reference missing [Op-Mode @Spd Cmd lost]	00: Stop 01: Crawl 02: Special (Special speed)	01	

When the control system blocks the sequence if contactor output from inverter is not closed (not closing GS, e.g. in the typical but not recommended case that inverter GS is commanded by auxiliary contact from contactor), then we can ignore GS to start the sequence (b074=02).

Parameter	Function name	Setting range/content	Initial value	Remarks
b074	Separated RUN active @GS error [Separated RUN timing]	00: Err (Normal error) 01: Seq-err (Sequence error) 02: Silent error	00	

Selecting the "no speed reference" response (no digital input for speed reference closed). It is possible to stop in absence of speed selection inputs by A040=00.

Parameter	Function name	Setting range/content	Initial value	Remarks
A040	Operation mode @zero speed reference [Op-mode @zero speed]	00: STOP 01: RUN 02: BRAKE	00	

Selecting the reaction to a high speed reference after crawl has already started (abnormal in lift sequence). To prevent it (and keep the crawl speed) select A105=00 and the desired reaction in A106.

Parameter	Function name	Setting range/content	Initial value	Remarks
A105	High speed retrigger [Hi-Speed Retrigger]	00: Disable	00	
		01: Enable		
A106	Run mode @A105 = disable [Hi-Speed Retrg. mode]	00: Stop	00	
		01: Error		
		02: Seq-Err		
		03: Silent error		

Selecting the reaction to zero speed reference (from any source, with any digital input combination).

Parameter	Function name	Setting range/content	Initial value	Remarks
A040	Operation mode @zero speed reference [Op-mode @zero speed]	00: STOP	00	
		01: RUN		
		02: BRAKE		

Assign the corresponding multifunctions to the appropiate inputs/outputs:

Parameter	Function name	Setting range/content	Initial value	Remarks
C001 to C009	Multi input terminal 1 to 7/GS1/GS2	02: SPD1 (multi-speed 1 setting)	-	
		03: SPD2 (multi-speed 2 setting)		
		04: SPD3 (multi-speed 3 setting)		
		61: EMP (Em-Power operation)		
		62: INSP (inspection)		
		63: RL (releveling)		

Modify the speed references according your overall combination.

Parameter	Function name	Setting range/content	Initial value	Remarks
A020	Special speed	0.00 to Maximum speed (Hz)	0.00	
A021	Multispeed 1	0.00 to Maximum speed (Hz)	0.00	
A022	Multispeed 2	0.00 to Maximum speed (Hz)	0.00	
A023	Multispeed 3	0.00 to Maximum speed (Hz)	0.00	
A024	Multispeed 4	0.00 to Maximum speed (Hz)	0.00	
A025	Multispeed 5	0.00 to Maximum speed (Hz)	0.00	
A026	Multispeed 6	0.00 to Maximum speed (Hz)	0.00	
A027	Multispeed 7	0.00 to Maximum speed (Hz)	0.00	
A028	Fast speed	0.00 to Maximum speed (Hz)	0.00	
A029	Crawl speed	0.00 to Maximum speed (Hz)	0.00	
A034	Inspection speed 1	0.00 to Maximum speed (Hz)	0.00	
A035	Inspection speed 2	0.00 to Maximum speed (Hz)	0.00	
A036	Em-power speed	0.00 to Maximum speed (Hz)	0.00	

4-3-2   Decide your Basic Lift Profile and Comfort (Accel, Decel and Jerk Parameters)

Basic profile settings by LX default configuration:
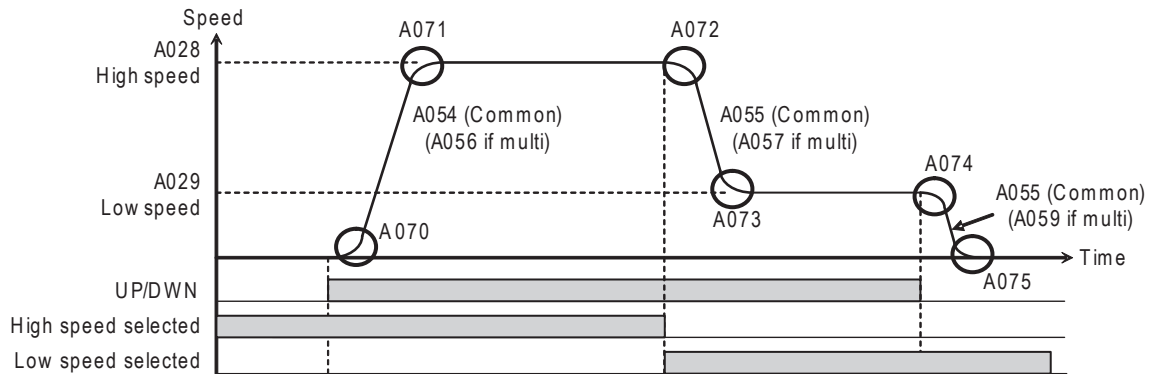
Parameter	Function name	Setting range/content	Initial value	Remarks
A050	Acceleration curve selection	00: Linear	04	
		04: Lift-S		
A051	Deceleration curve selection	00: Linear	04	
		04: Lift-S		
A070	Lift-S-curve @acceleration ratio 1	0 to 100 (%) A070 + A071 <= 100%	25	
A071	Lift-S-curve @acceleration ratio 2	0 to 100 (%) A070 + A071 <= 100%	15	
A072	Lift-S-curve @deceleration ratio 1	0 to 100 (%) A072 + A073 <= 100%	15	
A073	Lift-S-curve @deceleration ratio 2	0 to 100 (%) A072 + A073 <= 100%	15	
A074	Lift-S-curve @stop ratio 1	0 to 100 (%) A074 + A075 <= 100%	15	
A075	Lift-S-curve @stop ratio 2	0 to 100 (%) A074 + A075 <= 100%	15	
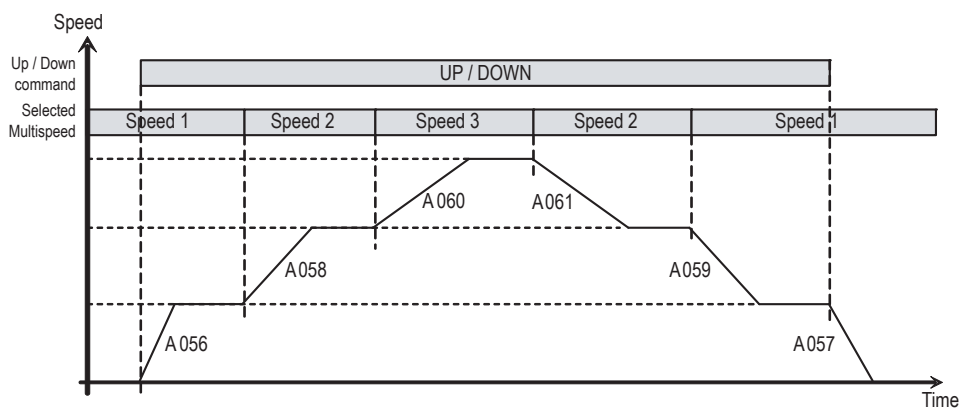
No.	Before the change speed	After the change speed	Status	Selecting Accel/Decel time
1	Stop	Multi speed 1	Accel.	A056 (Accel. time @ Multi speed 1)
2	Multi speed 1	Multi speed 2	Accel.	A058 (Accel. time @ Multi speed 2)
3	Multi speed 2	Multi speed 3	Accel.	A060 (Accel. time @ Multi speed 3)
4	Multi speed 3	Multi speed 2	Decel.	A061 (Accel. time @ Multi speed 3)
5	Multi speed 2	Multi speed 1	Decel.	A059 (Accel. time @ Multi speed 2)
6	Multi speed 1	Stop	Decel.	A057 (Accel. time @ Multi speed 1)

Parameter	Function name	Setting range/content	Initial value	Remarks
A052	Accel/Decel time input selection	00: REM (keypad)	00	
		01: OP1 (option 1)		
		02: OP2 (option 2)		
		03: PRG (Drive Programming)		
A053	Accel/Decel selection	00: Common (Using A054/A055)	00	
		01: Multi (multi usage accel/decel)		
A054	Acceleration time setting @Common/Special speed	0.00 to 3600.00 (sec)	1.80	
A055	Deceleration time setting @Common/Special speed	0.00 to 3600.00 (sec)	1.80	
A056	Acceleration time @Fast speed/Multi speed 1	0.00 to 3600.00 (sec)	1.80	
A057	Deceleration time @Fast speed/Multi speed 1	0.00 to 3600.00 (sec)	1.80	
A058	Acceleration time @Crawl speed/Multi speed 2	0.00 to 3600.00 (sec)	1.80	
A059	Deceleration time @Crawl speed/Multi speed 2	0.00 to 3600.00 (sec)	1.80	
A060	Acceleration time @Multi speed 3	0.00 to 3600.00 (sec)	1.80	
A061	Deceleration time @Multi speed 3	0.00 to 3600.00 (sec)	1.80	
A062	Acceleration time @Multi speed 4	0.00 to 3600.00 (sec)	1.80	
A063	Deceleration time @Multi speed 4	0.00 to 3600.00 (sec)	1.80	
A064	Acceleration time @Multi speed 5	0.00 to 3600.00 (sec)	1.80	
A065	Deceleration time @Multi speed 5	0.00 to 3600.00 (sec)	1.80	
A066	Acceleration time @Releveling speed/Multi speed 6	0.00 to 3600.00 (sec)	1.80	
A067	Deceleration time @Releveling speed/Multi speed 6	0.00 to 3600.00 (sec)	1.80	

Parameter	Function name	Setting range/content	Initial value	Remarks
A068	Acceleration time @Inspection speed/ Multi speed 7	0.00 to 3600.00 (sec)	1.80	
A069	Deceleration time @Inspection speed/ Multi speed 7	0.00 to 3600.00 (sec)	1.80	

4-3-3 Decide the Timings of your Lift Sequence (Speed Control Mode Shown)
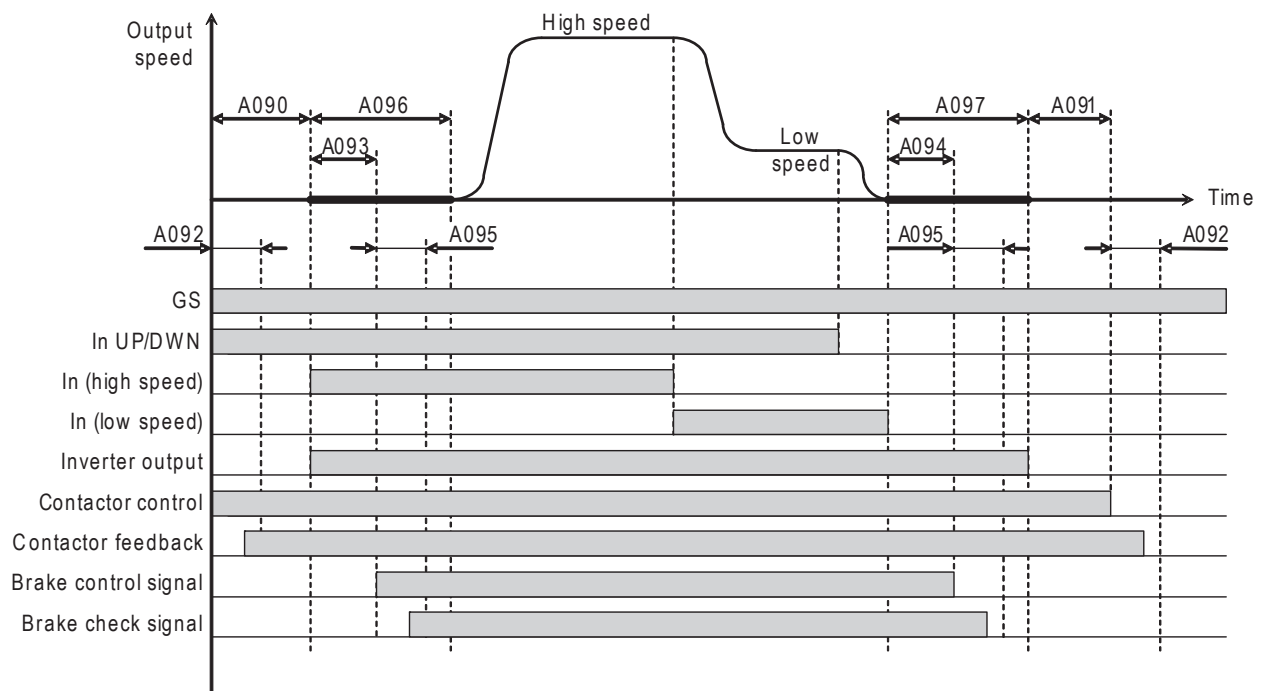
Contactor control:

Parameter	Function name	Setting range/content	Initial value	Remarks
A090	Run delay time, 1st motor	0.00 to 2.00 (sec)	0.20	For the second setting A290
A091	Contactor off delay time, 1st motor	0.00 to 2.00 (sec)	0.10	For the second setting A291
A092	Contactor answer back check time, 1st motor	0.00 to 5.00 (sec)	0.10	For the second setting A292
b070	Separated Contactor check error	00: Error (normal error)	00	
		01: Seq-Err (sequence error)		
		02: Silent error		
b074	Separated RUN active @GS error	00: Error (normal error)	00	
		01: Seq-Err (sequence error)		
		02: Silent error		

Parameter	Function name	Setting range/content	Initial value	Remarks
C001 to C009	Multi input terminal 1 to 7/GS1/GS2	64: COK (contactor check signal)	-	
C021 to C026	Multi output relay 11 to 13/RY	51: CON (contactor control signal)	-	

Brake control:

Parameter	Function name	Setting range/content	Initial value	Remarks
A093	Brake open delay time, 1st motor	0.00 to 2.00 (sec)	0.20	For the second motor A293
A094	Brake close delay time, 1st motor	0.00 to 2.00 (sec)	0.20	For the second motor A294
A095	Brake answer back check time, 1st motor	0.00 to 5.00 (sec)	0.10	For the second motor A295
A096	Servo lock/DC injection time @start, 1st motor	0.00 to 10.00 (sec)	0.60	For the second motor A296
A097	Servo lock/DC injection time @stop, 1st motor	0.00 to 10.00 (sec)	0.60	For the second motor A297
A098	DC injection power @start, 1st motor	0 to 100 (%)	50	For the second motor A298
A099	DC injection power @stop, 1st motor	0 to 100 (%)	50	For the second motor A299
b071	Separated brake check error	00: Error (normal error)	00	
		01: Seq-Err (sequence error)		
		02: Silent error		
b078	Separated brake condition error	00: Error (normal error)	00	
		01: Seq-Err (sequence error)		
		02: Silent error		
C001 to C009	Multi input terminal 1 to 7/GS1/GS2	65: BOK (brake check signal)	-	
C021 to C026	Multi output relay 11 to 13/RY	52: BRK (brake control signal)	-	

5-1   Prepare Motor Parameters for Autotuning

Only few motor plate parameters are required to be set before the Autotuning process: Motor power, number of poles, nominal current, nominal and maximum speed.

Parameter	Function name	Setting range/content	Initial value
H003	Motor capacity, 1st motor	0.20 to 75.00 (kW)	KW
H004	Motor poles setting, 1st motor	2 to 48 (poles)	4
A003	Base speed setting, 1st motor	1.00Hz to Maximum speed (Hz), 1st motor	50.00
A004	Maximum speed setting, 1st motor	1.00Hz to 400.00Hz	50.00

Please note that after changing motor capacity or pole number parameters, the inverter will check internal motor data tables and set motor parameters with new data. Don't change this parameters once the autotuning has been made, or the autotuning data will be lost.

Nominal current resides in different parameter for IM and PM motor.

Parameter	Function name	Setting range/content	Initial value
H025	IM motor rated current, 1st motor	0.0 to 200.0 (A)	KVA
H075	PM motor rated current, 1st motor	0.0 to 200.0 (A)	KVA

Ke (PM motor voltage constant) - (can not be established by static tuning). For PM motor if only static tuning is possible, the inverter can operate the motor, even with a totally wrong voltage constant (the LX inverter can find correct Ke during operation), but the best performance is achieved if Ke is known or estimated (see below).

J (PM motor and lift inertia constant) - (can not be established by static tuning). Default inertia setting should be enough to move the lift. However if oscillation is observed, probably the inertia value is low. Try to increase step by step or follow the advise later how to tune.

Parameter	Function name	Setting range/content	Initial value
H073	PM motor voltage constant, 1st motor	0.1 to 6553.5 (mV/(rad/s))	KVA
H074	PM motor constant J, 1st motor	0.001 to 9999.000	KVA

If this parameters are not available it is ok with a rough estimation. LX has big tolerance to wrong settings (self-regulation is applied during run). However the performance and smoothness of the lift can be improved if correct parameters are set or tuned.

5-1-1 Rough Estimation of Ke for PM Motors only (if Rotary Tuning not Possible)

This parameter can be autotuned by rotary tuning only.

In case of static tuning is the only possibility, it should be checked by motor catalog data or contacting motor manufacturer

If it is not possible to get Ke motor constant from motor manufacturer, please estimate as:

$$Ke\ (H073)\ _{mV/(rad/s)} = \frac{15594\ x\ BackEMF\ at\ nominal\ rpm\ (V)}{Pole\ number\ x\ nominal\ rpm}$$

Being BackEMF the voltage measured line to line, with the motor disconnected but rotating (forced) at the nominal rpm (acting as a generator).

A very rough setting if this experimental value (better than nothing) is to imagine as BackEMF a certain proportion of the nominal motor voltage (e.g. 60%) which is typically the case.

$$Ke\ (rough)\ (H073)\ _{mV/(rad/s)} = \frac{15594\ x\ 0.6\ x\ Nominal\ motor\ voltage\ at\ nominal\ rpm\ (V)}{Pole\ number\ x\ nominal\ rpm}$$

Note Even if this approximation is suggested, there may be motors which do not correspond to this setting. In case motor rotation is unstable, please try rotational tuning or contacting motor manufacturer for the missing data.

Note Sometimes, the motor manufacturer will state only the electric nominal frequency (Hz), not the rpm, by having the pole number available. Just use the common relation to convert between:

$$Motor\ nominal\ speed\ (rpm) = \frac{120\ x\ Nominal\ frequency\ (Hz)}{Pole\ number}$$

5-1-2 Rough Estimation of IO (No Load Current) (for IM Motors only if Rotary Tuning not Possible)

It is possible to determine approximation for no load from the motor plate data.

If motor cos φ is available, we can use the following:
I0 no load current (A) = Inominal x sin (arccos (cos φ))
In absence of cos φ, very rough approximation (as starting point) is:
I0 = 0.6 x Inominal

Another possibility is to measure the motor current at nominal frequency without load (this is the meaning of the No Load Current)

5-1-3   Inertia Parameter Estimation (IM or PM)

If the rotary tuning is not possible, the inertia parameter can be estimated by calculating the reflected inertia of the lift system, ropes and pulley reflected to the motor shaft. However inertia is quite simple to tune manually during first lift trial runs checking the lift behavior (see *6-2 Inertia Parameter Setting (if the Rotating Autotuning could not be adjusted)* section).

5-2   Magnet Offset Static Auto-tuning (only PM Motor)

Make sure that the contactor to the motor is closed (inverter will close the contactor output, but many times there are more conditions for the motor contactors to close in the lift system).

The brake is not necessary to release in the magnet position offset tuning.

GS1 and GS2 safety inputs should be closed in case of safety is enabled.

Motor Magnet position offset static auto-tuning		
Parameter	**Description**	**Value**
H001	Auto-tuning setting	05: MG-POS (Magnet position offset tuning (PM))
Activate RUN signal (press RUN on keypad)		

The magnet position offset tuning steps:

• Contactor closed
• Static initial magnet position estimation
• Contactor open

When the message "PM-Auto-tuning End" appears, indicates auto-tuning is finished. Check parameter P012-CH1-ENC magnet position offset (PM), if the value of degree is near the last value, the auto-tune is ok. On the other hand, if the value of P012 differs a lot of the last one, before do the auto-tune, it is necessary.

5-3   Full Static Tuning (PM or IM Motor)

The static tuning will measure the magnet offset (PM motors) and the electric motor magnitudes (PM and IM motors) without moving the motor (brake can stay closed).

Make sure that the contactor to the motor is closed (inverter will output contactor, but the control system may have additional conditions).

The brake is not necessary to release in the static tuning mode.

GS1 and GS2 safety inputs should be closed in case of safety is enabled.

Motor full static auto-tuning			
Step	**Parameter**	**Description**	**Value**
1	H001	Auto-tuning setting	For IM Motor (01: NRT-IM)
			For PM Motor (03: NRT-PM)
2	Activate RUN signal (press RUN on keypad)		

The static autotuning steps:
- Contactor closed
- PM only: Static initial magnet position estimation
- Static DC current excitation sequence to find motor electric data:
    - IM Motor: H020(R1), H021(R2), H022(L)
    - PM Motor: H070(R), H071(Ld), H072(Lq)
- Contactor open

When the message "PM-Autotuning End" appears, indicates auto-tuning is finished.

If message "PM-Autotuning NG" appears, something went wrong:

Motor disconnected

Motor too big or small for the inverter power rating.

Motor with unusual electric characteristics (please check with manufacturer), it causes the measurements to end up out of range.

5-4   Full Rotary Tuning

This rotating autotuning can only be run with the motor unroped from the lift cabin (it moves the motor without full torque, so it has some risk on very unbalanced lifts).

It will measure the magnet offset (PM Motors), the electric motor magnitudes (PM and IM motors) without moving the motor (brake can stay closed).

Then there is a rotation phase of the tuning, where the inverter will find out motor voltage constant Ke (for PM), No load current (for IM) and motor system inertia J (Both IM and PM).

Make sure that the contactor to the motor is closed (inverter will output contactor, but the control system may have additional conditions).

The brake is necessary to release in the static tuning mode (the inverter will not release the brake for safety reasons). It should be released by the control system.

GS1 and GS2 safety inputs should be closed in case of safety is enabled.

Dynamic rotating auto-tuning		
Parameter	**Description**	**Value**
H001	Auto-tuning setting	For IM Motor (02: AUT-IM)
		For PM Motor (04: AUT-PM)
Activate RUN signal (press RUN on keypad)		

The rotating autotuning steps:
- Contactor closed
- PM only: Static initial magnet position estimation
- Static DC current excitation sequence to find motor electric data:
    - IM Motor: H020(R1), H021(R2), H022(L)
    - PM Motor: H070(R), H071(Ld), H072(Lq)
- Rotation phase to find motor dynamic data:
    - IM Motor: H023(IO), H024(J)
    - PM Motor: H073(Ke), H074(J)
- Contactor open

If the rotating tuning phase is interrupted by overcurrent or overvoltage trip, try again after reducing value of again parameter H005.

When the message "PM-Autotuning OK" appears, indicates auto-tuning is finished.

If message "PM-Autotuning NG", something went wrong:

- Motor disconnected
- Motor too big or too small for the inverter power rating
- Motor with unusual electric characteristics (please check with manufacturer), it causes the measurements to end up out of range.

5-5   Use Motor Magnet Position Offset Static Tuning to detect wrong Motor Wiring

If static magnet position tuning is performed repeatedly, similar offset number (P012) appears (with about 10% tolerance). But the motor is moved a bit (like release the brake by hand for half a second, make sure motor moves a bit, but just a bit, less than one motor pole rotation equivalent), the difference will keep small only if the U-V-W phase rotation is correct. This is about 95% of the times a valid "hand check" that the U-V-W motor phase rotation matches the direction of the encoder rotation.

5-6   Precautions about PM Motor

PM Motor demagnetizing risk by too high current:

If PM Motor is used, permitted max current (demagnetizing current) of the PM Motor should be higher than the overcurrent level of the inverter. Normally this parameter is higher than 200% of motor nominal current, but depends on manufacturer design.

PM Motor with incremental encoder limitations:

It is possible to control PM Motor with a simple incremental encoder. However at the first starting after the power supply is turn on, following limitations apply:

1. There will be delay time after the run command is turned on because of the detection operation of magnetic pole position.

2. Because the current to the same torque increase more than unusual until one rotation at max. is made for the encoder, continuous torque may be 50% at worst.

The Max. torque in that case may become 50% of the expected max. torque at worst.

SECTION 6
Tuning for a Smooth Lift Ride

Once the controller configuration and interface is checked, it is time for the first run. In case of lift installation, a first run in inspection mode is recommended for testing. If everything is OK at this point the motor should run correctly in the adequate direction.

If the sequence does not start, the direction of rotation is wrong (motor turning ok, but on the wrong direction, or encoder errors occurs in first movement, please recheck the items until this point).

If everything runs ok, it's time to make the first lift standard call run, and adjust (if required) for the smooth ride.

6-1   Single Parameter for Control Stiffness

It may happen with default gain settings, that the motor spins slightly at start for some short time in the reverse direction of the heavy weight of the lift car. This is called rollback. It is compensated by adjusting some parameters of the speed control loop.

Parameter	Function name	Setting range/content	Initial value
H005	Rigidity constant, 1st motor	0.1 to 5000.0 (%)	100.0

Increasing this value will increase the overall control stiffness, therefore reducing rollback effect.

It may happen that a unique setting is not optimal setting for all the lift travel. In that case it is necessary to set separately the gains for each lift travel section (see below section).

Too low H005 — High speed / Low speed

Too high H005 — High speed / Low speed

Correct H005 settings — High speed / Low speed
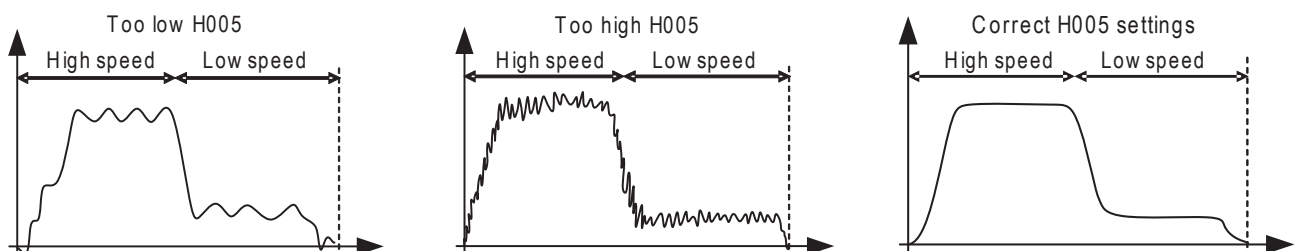
6-2 Inertia Parameter Setting (if the Rotating Autotuning could not be adjusted)

H074 (PM Motor) or H024 (IM Motor) is the addition of motor inertia + lift inertia reflection to the motor shaft. It injects a feedforward term proportional to acceleration and deceleration phases.

This parameter can be found by the inverter in a rotary autotuning phase.

If not possible to perform rotary tuning, it is simple to make manual adjustment by increasing, decreasing the parameter according to the motor response moving the lift:

Too low motor inertia settings (overshooting) High speed Low speed

Too high motor inertia settings (overcompensation) High speed Low speed

Correct motor inertia settings High speed Low speed
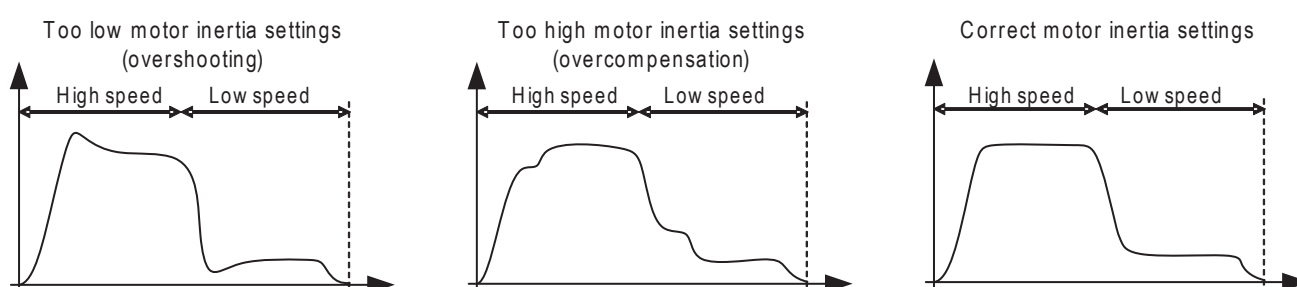
6-3 Individual Gain Settings during Lift Travel sections

If the global setting is not enough to adjust the whole lift travel quality, it may be necessary to adjust each portion of lift travel separately.

Parameter	Function name	Setting range/content	Initial value	Remarks
H005	Rigidity constant, 1st motor	0.1 to 5000.0 (%)	100.0	For the second motor: H205
H007	ASR gain switching speed	0.00 to 400.00 (Hz)	0.00	
H008	ASR proportional gain @start	0.0 to 1000.0 (%)	100.0	
H009	ASR integral gain @start	0.0 to 1000.0 (%)	100.0	
H010	ASR proportional gain @after switching	0.0 to 1000.0 (%)	100.0	
H011	ASR integral gain @after switching	0.0 to 1000.0 (%)	100.0	
H012	ASR proportional gain @to Zero	0.0 to 1000.0 (%)	100.0	
H013	ASR integral gain @to Zero	0.0 to 1000.0 (%)	100.0	

ASR gain and positional loop gain adjustment
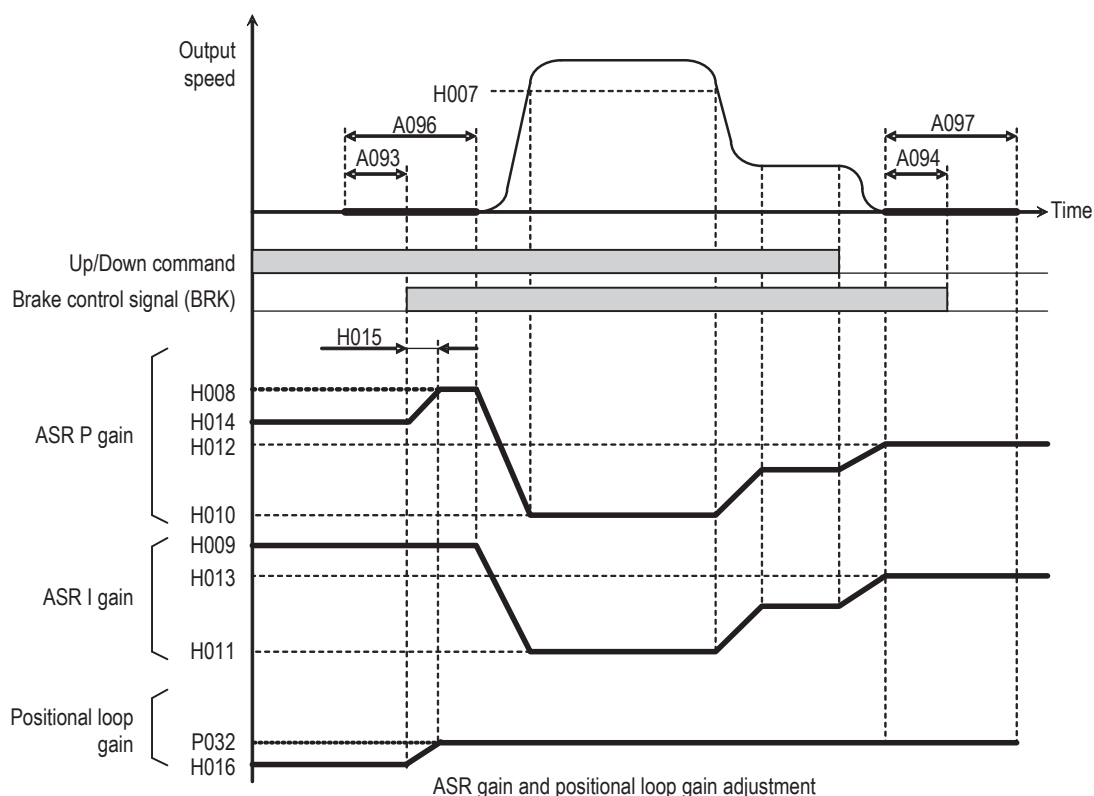
Increase the reaction time of the control loops (increase the integral term) or increase of proportional gain for stronger correction.

In case of the problem is excessive vibration in some area, reduce gains in that area. Change one parameter at the time.

Position gain (next point) will also affect in the zero speed holding sections.

6-4 Position Gain for Closed Loop Servo Clock at Start and Stop (only Closed Loop)

Both in closed loop IM and PM motor control, the inverter will perform a closed loop position control to achieve zero speed section at start and end.

Parameter	Function name	Setting range/content	Initial value	Remarks
P032	Positional loop gain setting	0.00 to 100.00	0.50	

Zero speed position control area
(bold) only in closed loop control
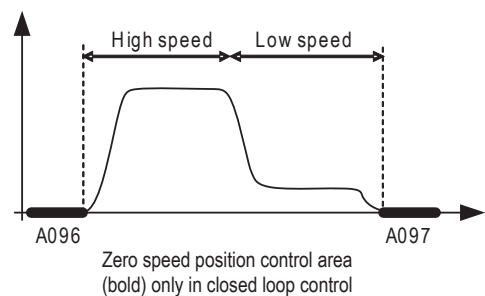
Similar to the speed loop gains. Too high position gain will lead to vibration errors during the zero speed holding portions.

6-5   Rollback Tuning and Noise at Start

Several factor influence the reaction of motor at first brake opening.

This is due to the weight reflected to the motor. Therefore this effect will be more visible in systems with suspension system 1:1 or with heavy lift cars. The fundamental reason why rollback occurs is because while the brake is closed, the inverter can not detect the strength required to hold the load.

After brake opening, the system will have to adjust his control loops according the gains to compensate this effect. It is possible to improve Rollback making use of the different gain settings during brake closed and after brake open.

Rollback in heavy load lift with low roping ratio (1:1).
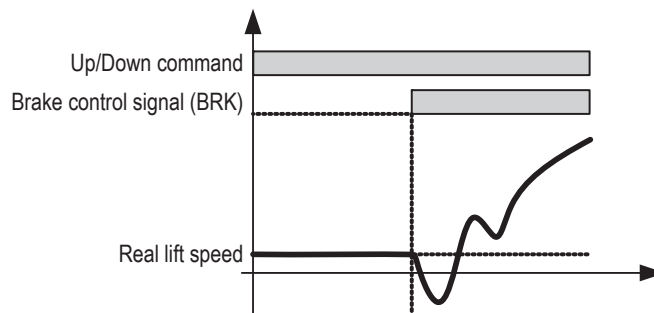
Rollback compensated after high global gains increase (H005), but too high for the brake closed portion.
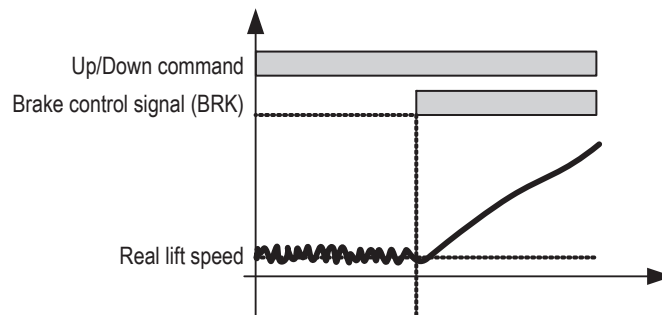
Rollback after gains compensated at brake closed (as the effect is at brake closed, lower H014 and H016 to cancel the vibration).
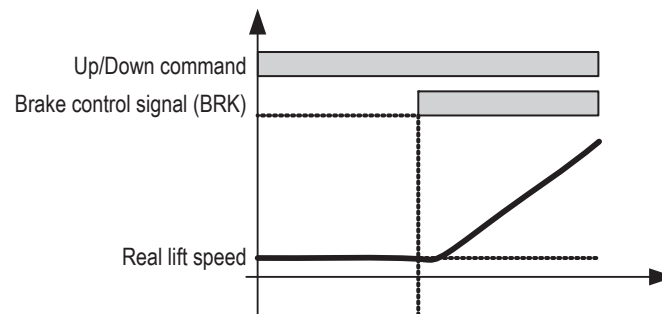
System after rollback compensated by gains H008 / P032 / H014 / H016.

H015 should be adjusted according to the brake opening mechanical response time, so that the gain is gradually increasing.

Parameter	Function name	Setting range/content	Initial value	Remarks
H014	ASR proportional gain @brake	0.0 to 1000.0 (%)	100.0	
H015	ASR proportional gain @brake fade out time setting	0.01 to 5.00 (sec)	0.01	
H016	Position loop gain setting @brake	0.00 to 100.00	0.50	

Normally gains during brake (H014: speed and H016: position) will be lower to avoid vibration, and gains after brake open (H008: speed and P032: position).

6-6   Load Cell Compensation at Start

For a perfect cancellation of rollback, torque compensation by load cell is the best solution. Because it really measures the load in the cabin and the inverter will output the right torque to hold the load at brake opening without rollback.

The adjustment is simple:

Set the load cell measurement range by b052 and b053 (this is the corresponding analog input values for minimum weight and maximum weight).

Then calibrate the required compensation for each extreme case, both going up and down (4 settings). Normally, they are symmetrical settings up and down, b054 = b056 and b055 = b057.

The typical setting of b051 is 00 (latch weight value when Up/Down command is given).

Parameter	Function name	Setting range/content	Initial value
b050	Torque bias selection	00: O (O-L input)	02
		01: OI (OI-L input)	
		02: O2 (O2-L input)	
b051	Torque bias latch trigger select	00: RUN (RUN command is active)	00
		01: TCL (terminal "TCL" is ON)	
b052	Load cell calibration @min.	0 to 100 (%)	0
b053	Load cell calibration @max.	0 to 100 (%)	100
b054	Load cell adjustment Bias value @min. Upwards	-300.0 to 300.0 (%)	0
b055	Load cell adjustment Bias value @max. Upwards	-300.0 to 300.0 (%)	0
b056	Load cell adjustment Bias value @min. Downwards	-300.0 to 300.0 (%)	0
b057	Load cell adjustment Bias value @max. Downwards	-300.0 to 300.0 (%)	0
b058	Torque bias Filter time constant	5 to 500 (ms)	10
b059	Torque bias Fade out level setting	0.00 to 400.00 (Hz)	0.00
b060	Torque bias Fade out time setting	0.01 to 5.00 (sec)	0.01
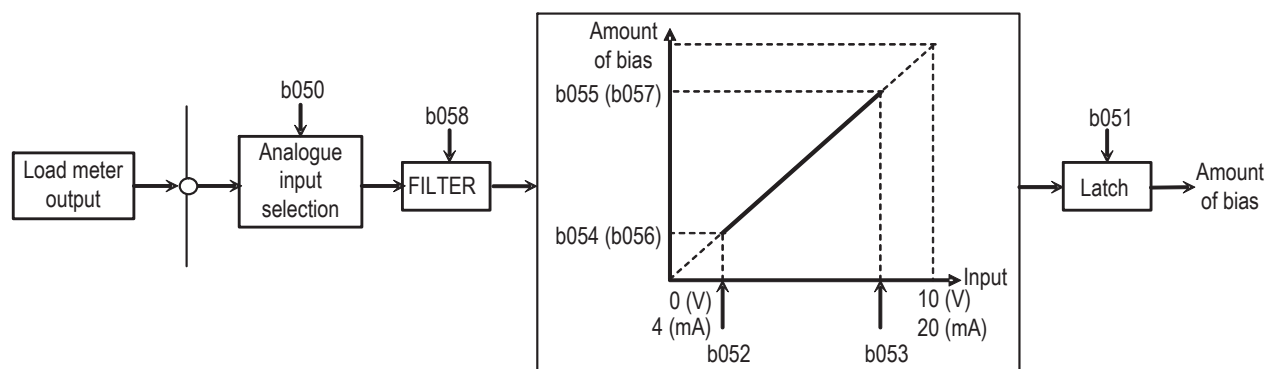
Lift sequence with Load cell compensation used.
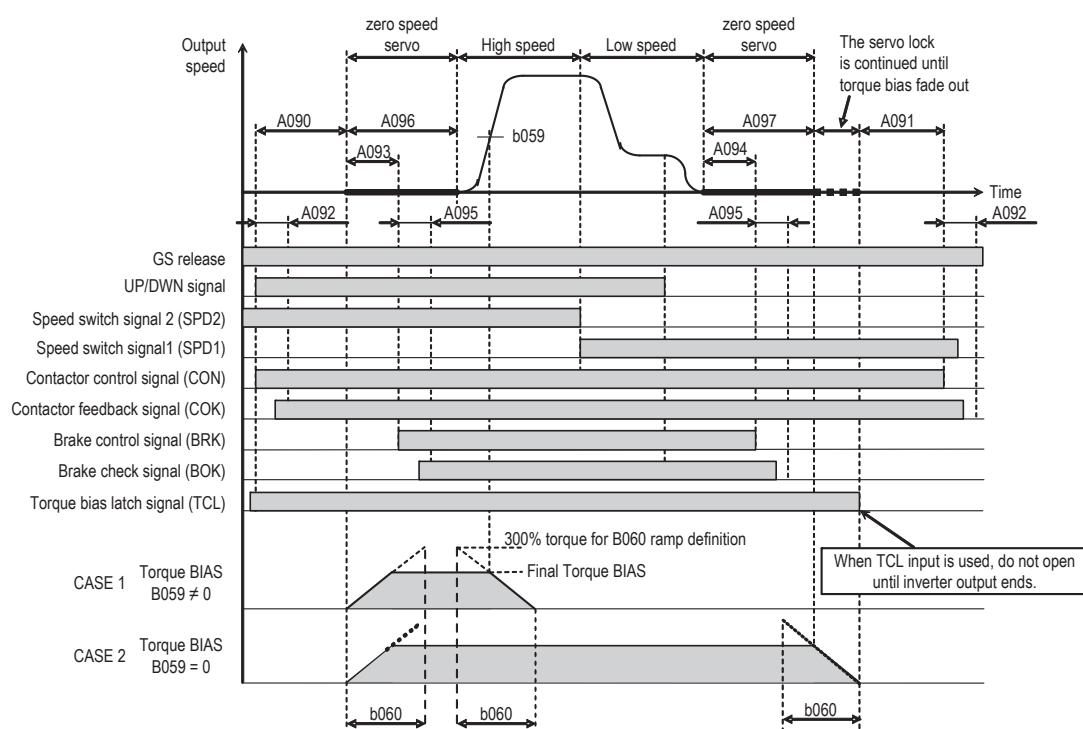
6-7   Shock Noise at Stop after Brake already Closed with PM Motors

Sometimes a noise can be heard at the stop phase when the power is removed from the motor.

Apparently the stopping is perfect, the landing is good, but the noise appears when power is removed from motor (contactor open):
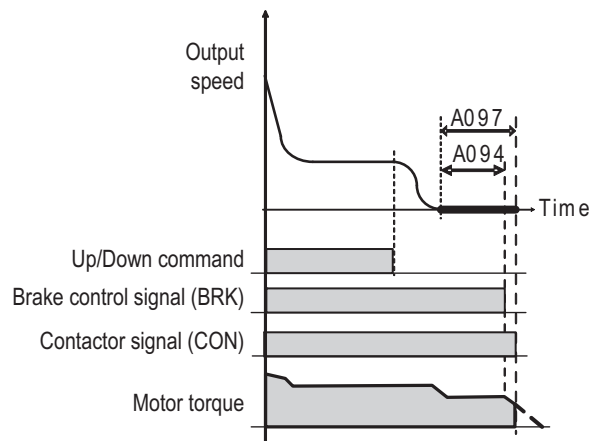
This is due to the reaction of the PM Motor to a sudden torque removal.

To compensate this effect, the time at stop has to be increased to ensure torque has disappear from motor.
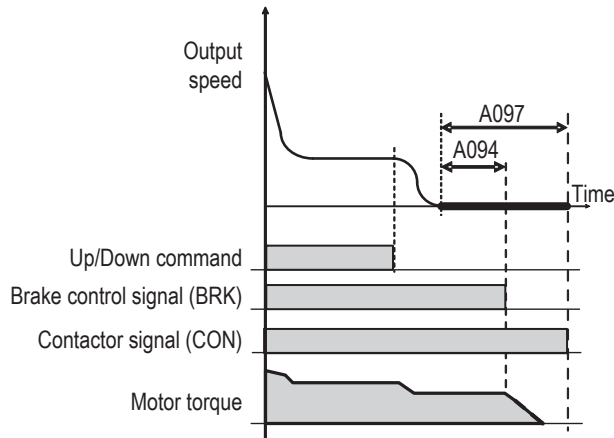
If torque compensation is used, also make sure that parameter for torque fade out timing b060 is set to a long enough value (by default it is b060=0.01 sec).

7-1   Quick Floor

By enabling this function, it is possible to keep the lift approach to the floor as short as possible even with the event of levelling (creep) signal before top speed is reached.

Disabling this function, the stop distance is normally according to the selected speed and deceleration, and adjusted in a normal trip so that the time for low speed is low:

STANDARD LIFT TRAVEL CASE

EARLY CRAWL WITHOUT QUICKFLOOR
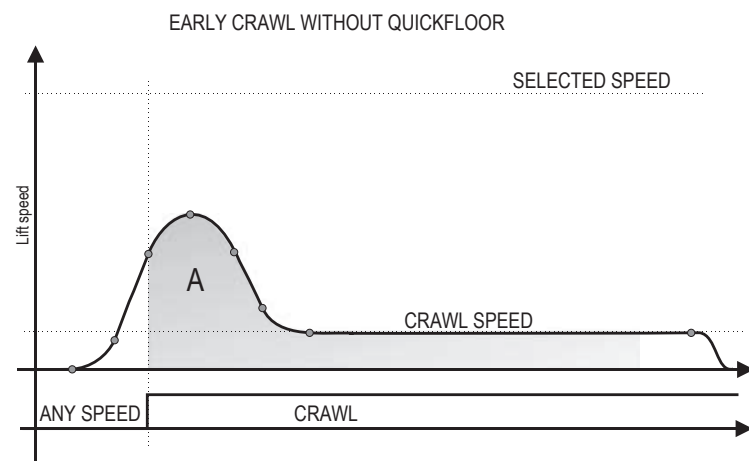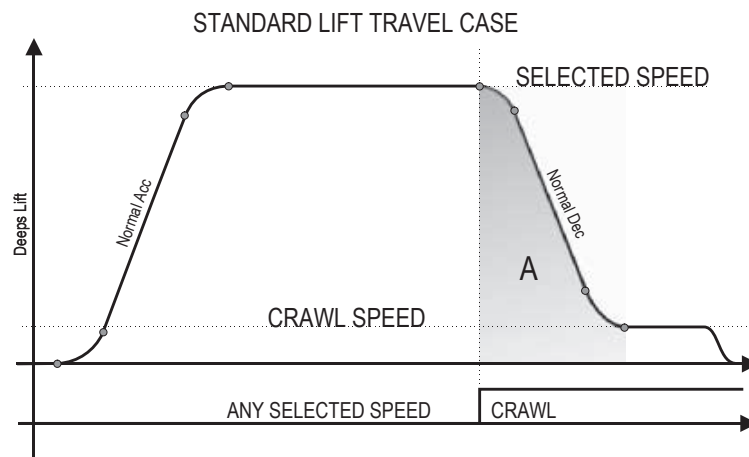
But if the low speed signal appears too early (because so called short floor), the crawl speed becomes too long (because the distance to run is the same).

When the QuickFloor is enabled, this time is optimized, by recalculating a profile that corresponds to the stopping distance "A" with minimized crawl speed.

Depending how late the signal arrives, it will be possible to keep the A113 "Constant speed time" (which helps in the comfort feeling) or it will be necessary to reduce it gradually, and even shorten the deceleration time in order to achieve the distance as priority.

SHORT FLOOR LIFT TRAVEL CASE 1
(best case of crawl speed request)

SELECTED SPEED

In this case, one optimized speed can be found while respecting the desired time at constant speed A113 and respecting the normal deceleration and jerk values.

A113

CALCULATED OPTIMIZED SPEED

Lift speed

NormalAcc

NormalDec

A

CRAWL SPEED

ANY
SPEED
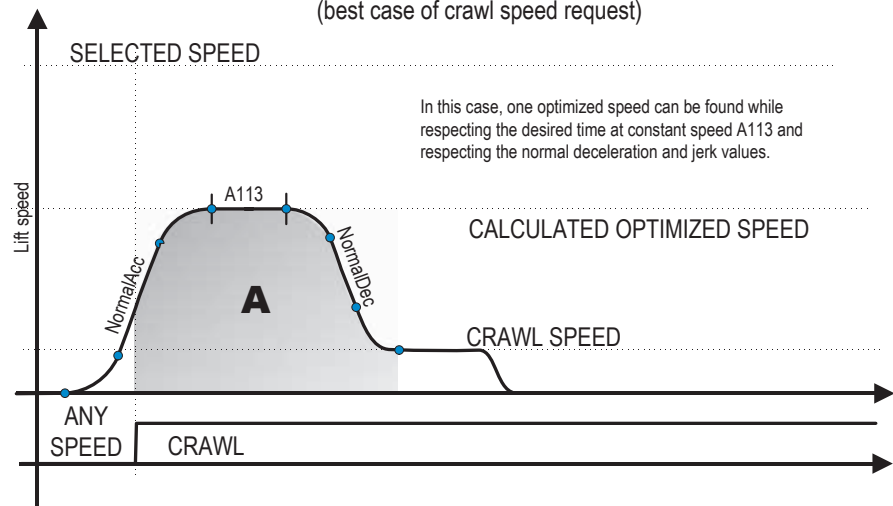
CRAWL

SHORT FLOOR LIFT TRAVEL CASE 2
(late crawl speed)

SELECTED SPEED

<A113

CALCULATED OPTIMIZED SPEED

Lift speed

NormalAcc

NormalDec

In this case, one optimized speed can not be found while respecting the desired time at constant speed A113 but it is possible to respect the normal deceleration and jerk values.
ACTION : Reduce the desired time at constant speed

A

CRAWL SPEED

ANY
SPEED
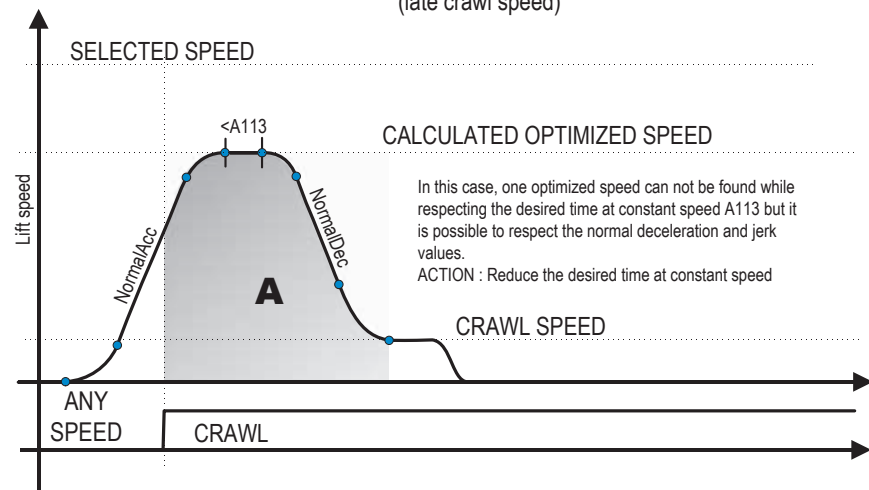
CRAWL

SHORT FLOOR LIFT TRAVEL CASE 3
(very late crawl speed)

SELECTED SPEED

No ct. speed

CALCULATED OPTIMIZED SPEED

Lift speed

NormalAcc

Modified dec/jerk

In this case, one optimized speed can not be found with some time at constant speed and also not possible to respect the original accel/decel and jerk characteristics
ACTION : No time at the optimized speed, and jerk and accel are stretched to the value that respects distance A. The priority of the lift is always to not overrun. If lift maker doesn't like this, he has to recognize the shortfloor condition during the floor call recognition...

A

CRAWL SPEED

ANY
SPEED

CRAWL

Parameter	Function name	Setting range/content	Initial value	Remarks
A111	Quick floor selection	00: Disable	00	
		01: Enable		
A113	Minimum constant speed time	0.0 to 2.0 (sec)	0.0	
A114	Distance calculation Acceleration time gain	50.0 to 200.0 (%)	100.0	
A115	Distance calculation Deceleration time gain	50.0 to 200.0 (%)	100.0	

7-2   Emergency Rescue

This function allows operation of the lift with special supply voltage in black-out conditions. It is necessary that emergency power supply is connected to the system.

The interest of the inverter having this mode, is that it will accept voltage supply levels not allowed during normal operation, but convenient to build up a economical emergency solution.

7-2-1   Emergency Wiring
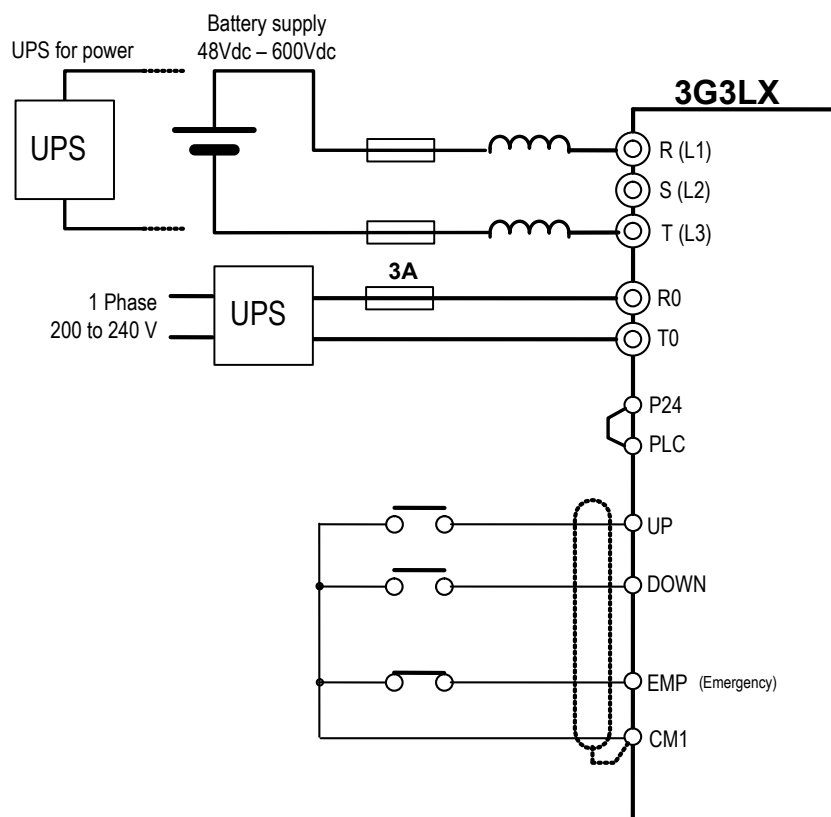
7-2-2   Emergency Backup Power Required

Control and power have separate supply. It is recommended to keep it separate, to guarantee stable supply to control section.

It is always necessary to use a UPS 220VAC supply for the control part.

Pcontrol = 30W (50VA or more).

Real measurement data: LX 3.7kW, supplied at 220VAC with fan ON: 60mA AC 13W.

For the power part, it is possible to supply DC voltage or AC voltage during emergency condition. There is no specific limit in voltage or current, but there is always a practical limit to be able to drive the motor and obtain the required torque for the lift movement. This is defined by the motor Speed/Voltage/Torque characteristic curves. A typical 48VDC is considered the lowest typical voltage for a resonance rescue operation at a 10-15% speed for average motor.

It is clear that designing the backup power to cover full power rating of the lift installation in emergency conditions is huge cost and volume. There may be cases, however, where this is necessary (e.g. a Hospital, operation-critical business). In this case, the dimensioning resembles that of a permanent operation sizing, involving emergency supplies as expensive 3 phase high power UPS or more affordable fuel based electric generators.

It is normally decided the power based on a much lower speed (and so power requirement) than normal lift operation. If using attractive functions "light load" test, it is possible to save a big amount of energy (with additional management from the control system).

Parameter	Function name	Setting range/content	Initial value	Remarks
A036	Em-power speed setting, 1st motor	0.00 to Maximum speed (Hz)	0.00	
b030	UPS protect direction selection	00: Disable	00	
		01: AUTO		
		02: AUTO-1st (motor 1 only)		
		03: MANUAL		
		04: MANUAL-1st (motor 1 only)		
b031	UPS protect direction detect selection	00: Low-C (low current sensing)	00	
		01: ReGnr (regeneration detection)		
b032	UPS protect direction search speed	0.00 to 20.00 (Hz)	3.00	
b033	UPS protect direction search time	0.0 to 5.0 (sec)	1.0	
b034	Battery voltage for Em-power operation	48 to 600 (V)	200	
b035	Em-power operation torque limit	0 to 300 (%)	150	
C001 to C009	Multi input terminal 1 to 7/GS1/GS2	61: EMP (Em-Power operation)	-	
C021 to C026	Multi output terminal 11 to 13/RY	54: UPS (UPS Protect direction search status)	-	
		55: UPD (UPS Protect direction)		

If the input EMP (Emergency) is enabled, the inverter will not check some standard alarms, being possible to supply lower voltage than during normal operation.

It will automatically apply the special rescue reference, special torque limits (to protect the power supply system from collapsing).

7-2-3   Detecting the Best (Lower Power) Direction to Move

If selected (b030), the LX will try to find automatically the direction for the less power consumption. Optionally it can also test and report for the control system to force the final direction.

When b030 = 00: Disable, the inverter will just run at the emergency speed, without light load test in the direction where the UP/DOWN command was input.
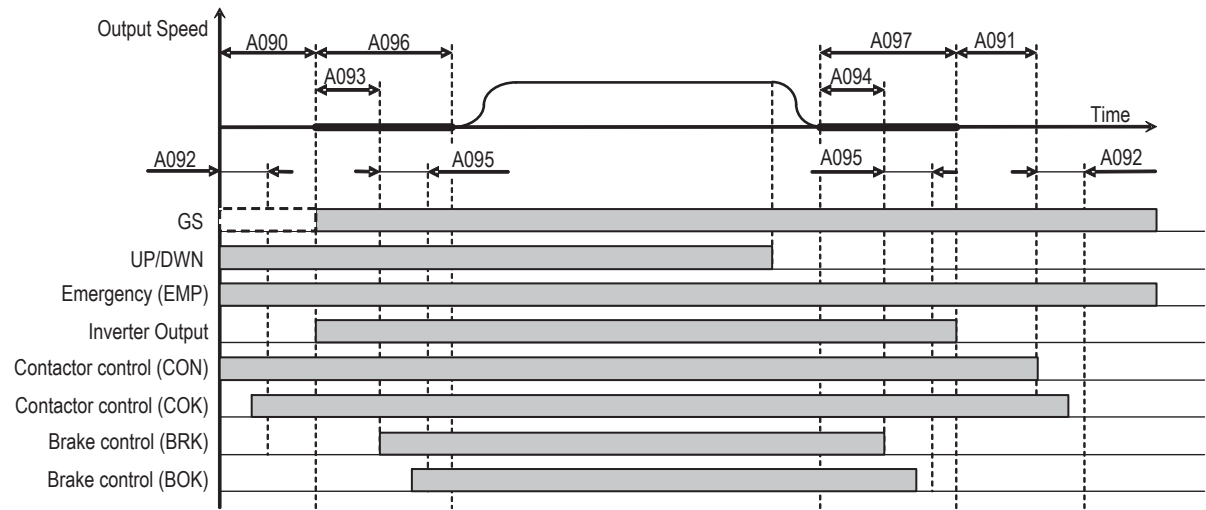
When b030 = 01: AUTO, the inverter will decide the running direction internally, and report by the outputs, regardless the UP/DOWN command input.

Result in AUTO when the light load direction is UP direction

Result in AUTO when the light load direction is DOWN direction
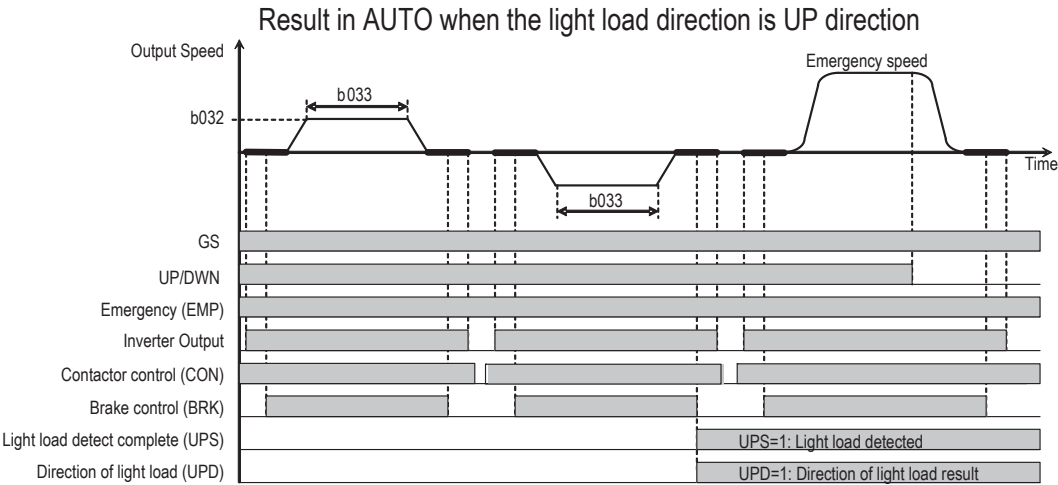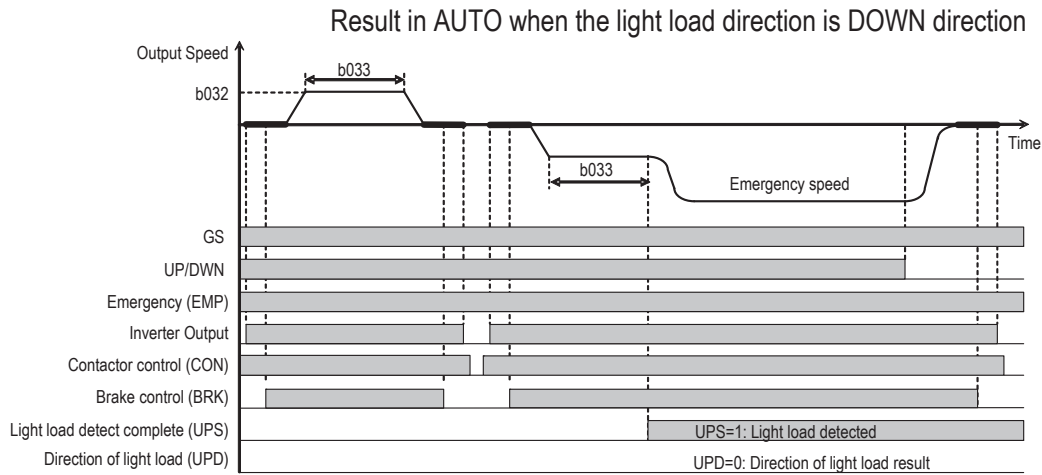
When b030 = 03: MANUAL, the inverter will make the light load test, and report by the outputs, but will obey the commanded direction from the inputs.

For this mode, the two inputs UP/DOWN have to be set simultaneously, and only one removed after the inverter reports the result.
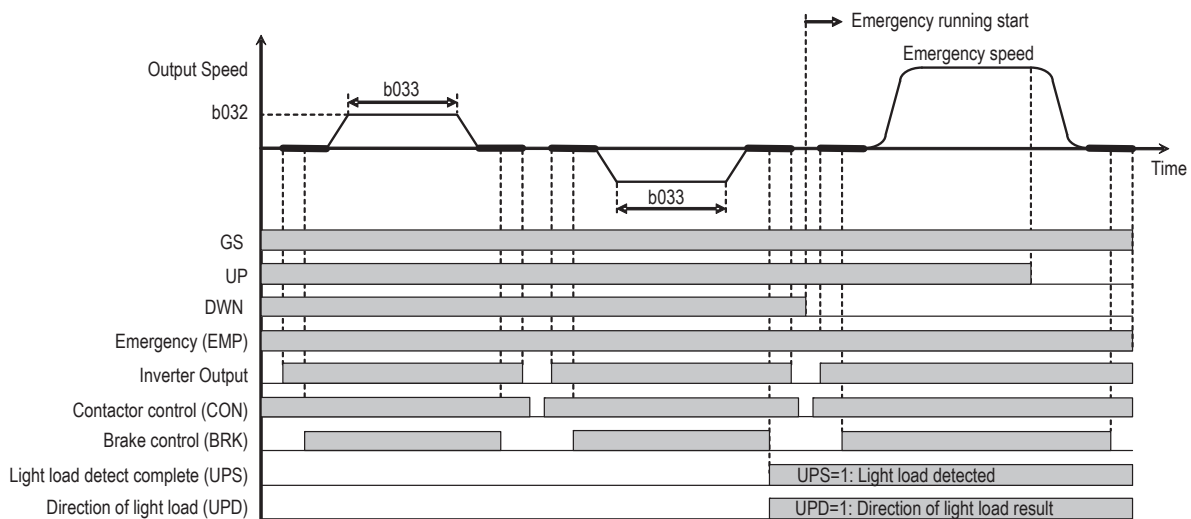
7-3 Position Control

The LX can control position directly based on internal process.

Relative (near to floor signal required) and absolute positioning (no need of sensor).

By parameter A045 we enable position control method.

Parameter	Function name	Setting range/content	Initial value	Remarks
A045	Lift sequence mode setting, 1st motor	00: SPD (speed control mode)	00	For the second control: A245
		01: DP1 (direct position mode 1 with levelling signal)		
		02: DP2 (direct position mode 2 with levelling signal)		

The sequence is basically the same, but it differs because there are no speed reference changes. The positioning takes the lift to the floor directly.

With A045 = 01 (DP1: Relative position mode), a levelling signal is required to trigger into position control mode. The position registers become the stopping distance.
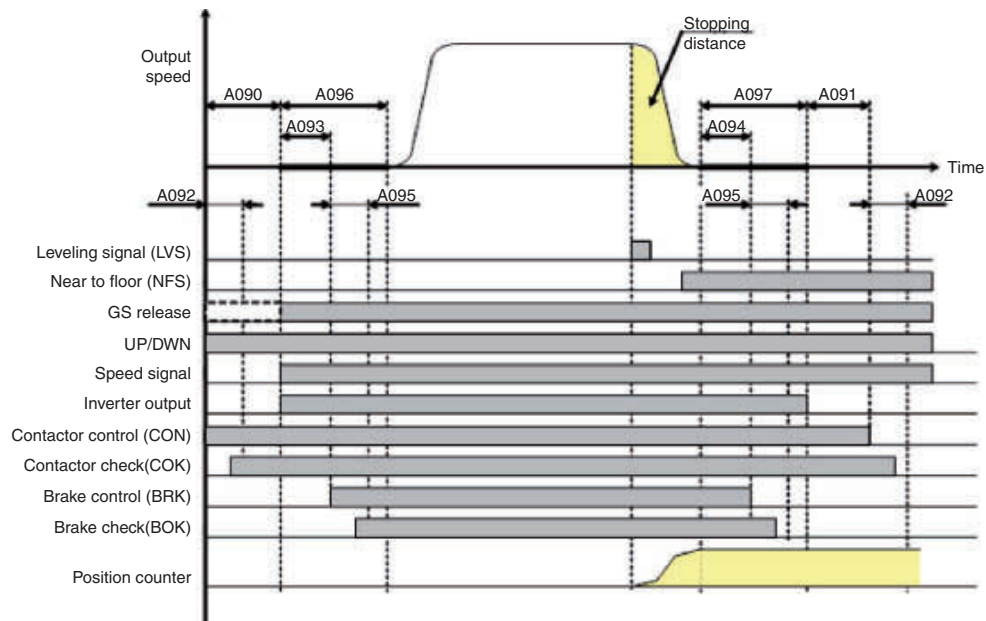
With A045 = 02 (DP2: Absolute position mode), all the floors have a specific absolute position.
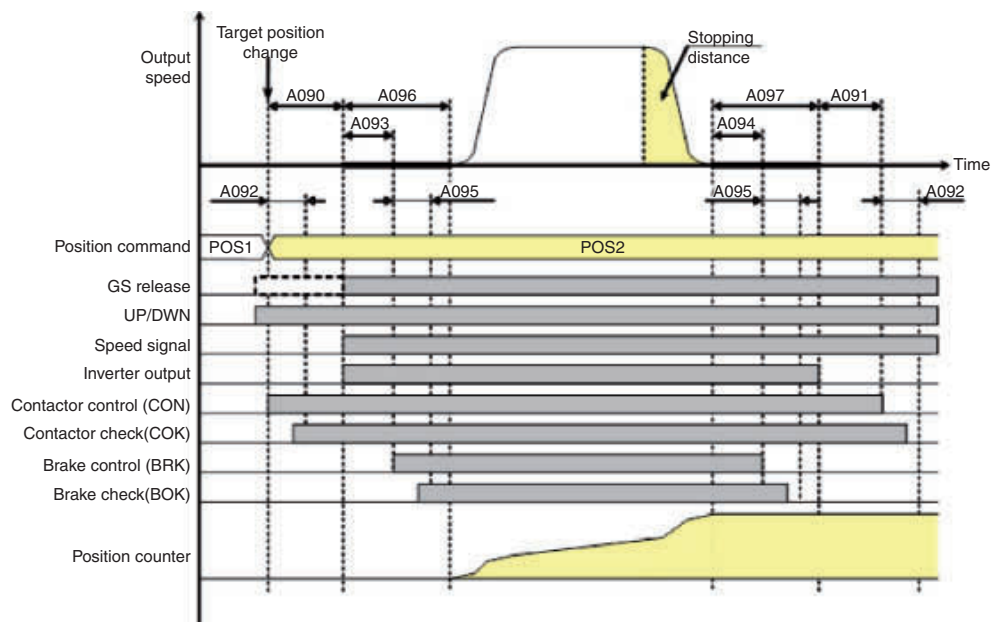
Encoder selection for the positioning function:

Parameter	Function name	Setting range/content	Initial value	Remarks
P005	1st-motor Position feedback source selection	00: Non (not use)	00	For the second motor: P205
		01: ch1-inc (incremental (CH1))		
		02: ch1-HIPER (HIPERFACE (CH1))		
		03: ch1-En2.1 (EnDat 2.1 (CH1))		
		04: ch1-En2.2 (EnDat 2.2 (CH1))		
		05: ch2-inc (incremental (CH2))		
		06: ch2-HIPER (HIPERFACE (CH2))		
		07: ch2-En2.1 (EnDat 2.1 (CH2))		
		08: ch2-En2.2 (EnDat 2.2 (CH2))		

Settings for the bit depth to be used for position control, and the pulley ratio for external measurement (when dedicated position encoder is used).

Parameter	Function name	Setting range/content	Initial value	Remarks
P010	CH1-ENC constant setting	0.128 to 65535 (/rev)	1024	
P011	CH1-ENC resolution setting	0 to 31 (bit/rev)	0	
P013	CH1-ENC revolutions	0 to 16 (bit)	0	
P014	CH1-Numerator of motor gear ratio	1 to 9999	1	
P015	CH1-Denominator of motor gear ratio	1 to 9999	1	
P016	CH1-ENC position	00: Direct (Phase-A leading)	00	
		01: Reverse (Phase-B leading)		

Needless to say, that for EnDat or HIPERFACE types, multiturn encoders should be used for a good range of positioning. EnDat 2.2 offers 37 bit encoder.

Encoder setting examples:

Parameter	Function name	Incremental encoder	Absolute encoder			
			Single turn ex) ECN1313	Multi turn ex) EQN1325	EnDat 2.2 ex) EQN1337	HIPERFACE ex) SRM64
P010/P020	Encoder constant setting	Wavy pulse/number	2048	2048	0	1024
P011/P021	Encoder resolution setting	0	13	13	25	15
P013/P023	Encoder revolutions	0	0	12	12	12

Example on how the encoder information is considered when EQN1337 shown settings.

For speed feedback, the lower 25bit are used directly.

Lower 25bit is used for the speed
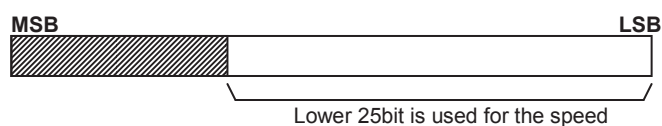
For position counting, the lower 5bit are neglected, because 32bit position registers.
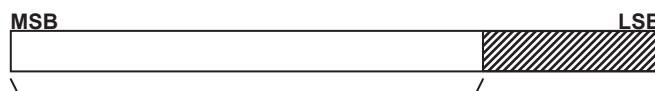
The lower 5bit is neglected in order to achieve the highest 32bit resolution for position, but without overrange.

The normal layout is that external encoder to the motor is used for positioning. Example of external measurement system (source Kübler):

The reason is that this systems will not depend on motor sheave slipping or rope extensioning.

In case of the same encoder in the motor is used (not recommended), it is required to make sure that slipping in the ropes is not produced or minimized (normally only possible in installation with small number of floors).

Parameter	Function name	Setting range/content	Initial value	Remarks
P030	Positioning completion range setting	0 to 10000	5	
P050 to P089	Floor position 00 to 39	-2147483647 to 2147483647	0	
C001 to C009	Multi input terminal 1 to 7/ GS1/GS2	40: PCLR (clear the current position)	-	
		66: FP1 (floor position 1)		
		67: FP2 (floor position 2)		
		68: FP3 (floor position 3)		
		69: FP4 (floor position 4)		
		70: FP5 (floor position 5)		
		71: FP6 (floor position 6)		

7-3-1   Auto Learning Function

Up to 40 floor can be stored by autolearning function. They are memorized in a simple sequence, by proceeding with a slow lift running process after setting P090 to 01: ADD (bottom to top floor). Each time PAL (position autolear) or NFS (near to floor) signal appear, the new floor position is memorized.

When finished the autolearning function, P090 is return to 00: Disable.

Parameter	Function name	Setting range/content	Initial value	Remarks
P090	Auto Learning mode selection	00: Disable	00	
		01: ADD (enable (add))		
		02: SUB (enable (sub))		
P091	Auto Learning start position No.	0 to 39	0	
P092	Auto Learning trigger selection	00: PAL	00	
		01: NFS		
P093	Auto Learning position offset	0 to 1073741823	0	
C001 to C007	Multi input terminal 1 to 7/GS1/GS2	40: PCLR (clear the current position)	-	
		72: PAL (auto learning data latch trigger)		
		75: NFS (near floor signal)		

Example of P090 = 01: ADD and P091 = 0, and RUN at low speed is given:

1	With the first trigger, floor 00 is set : P050=current position
2	Every new trigger signal, a new position is memorized.

Floor position 03 → P053

Difference between PAL and NFS as trigger

Floor position 02 → P052

Floor position

Floor position 01 → P051

P093

Run direction

PAL   NFS

Floor position 00 → P050
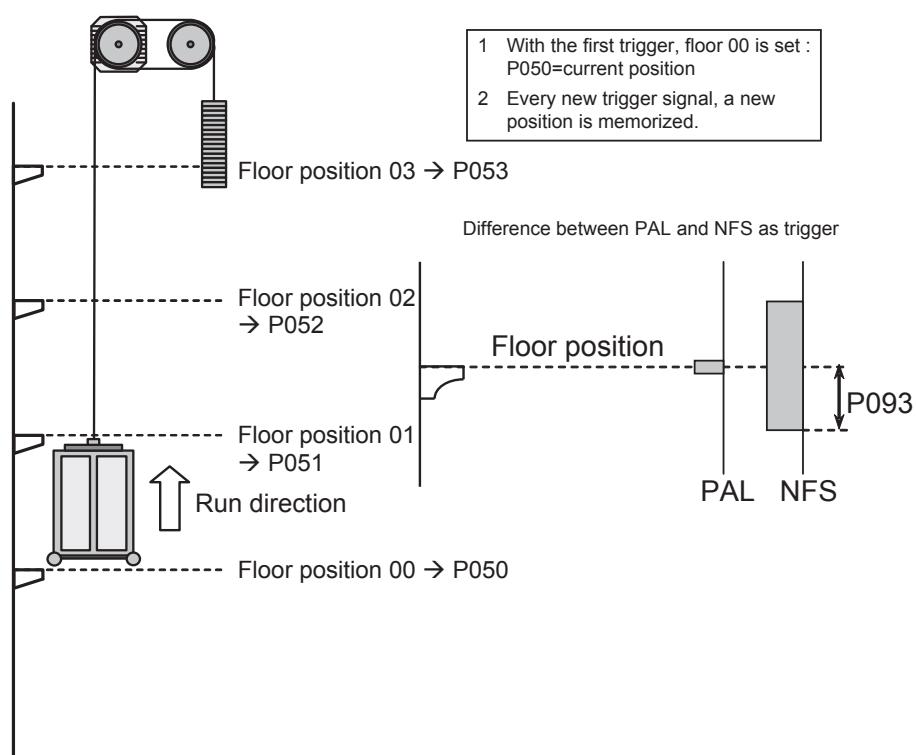
8-1 Monitors

Display code	Function name	Setting range/content	Default setting	Contents
d001	Output speed monitor [Out. Speed]	0.00 to 400.00 (Hz)	-	
d002	Output current monitor [Out. Crnt]	0.0 to 9999.9 (A)	-	
d003	Rotation direction monitor [Rotation]	FWD (forward), STOP (stopped), REV (reverse)	-	
d004	Multi input terminal status [In. TM]	ON = "H", OFF = "L"	-	
d005	Multi input terminal status (I/O option) [In. ExTM]	ON = "H", OFF = "L"	-	
d006	Multi output terminal status [Out. TM]	ON = "H", OFF = "L"	-	
d007	Multi output terminal status (I/O option) [Out. ExTM]	ON = "H", OFF = "L"	-	
d008	Actual-speed monitor [Dtct. Speed]	-400.00 to 400.00 (Hz)	-	@using encoder option
d009	Acceleration monitor [Accel Rate]	0.0 to ±9.8 (m/s^2)	-	@using encoder option
d010	Torque bias monitor [TRQ bias]	-300 to 300 (%)	-	
d012	Torque monitor [Out. Torque]	-300 to 300 (%)	-	
d013	Output voltage monitor [Out. Volt]	0.0 to 600.0 (V)	-	
d014	Power monitor [Power]	0.0 to 999.9 (kW)	-	
d015	Cumulative power monitor [S-Pwr]	0.0 to 99999.0	-	
d016	Cumulative operation RUN time monitor [RUN time]	0 to 99999	-	
d017	Cumulative power-on time monitor [ON time]	0 to 99999	-	
d018	Heat sink temperature monitor [H. sink Temp]	2 to 200 (ºC)	-	
d019	Motor temperature monitor [Mtr Temp]	2 to 200 (ºC)	-	
d022	Life-check monitor [Life-check]	Life time warning = "H", Normal = "L"	-	
d023	Program counter [PRG Count]	0 to 1024	-	
d024	Program number monitor [PRG No.]	0 to 9999	-	
d025	User monitor 0 [Umon0]	-2147483647 to 2147483647	-	

Display code	Function name	Setting range/content	Default setting	Contents
d026	User monitor 1 [Umon1]	-2147483647 to 2147483647	-	
d027	User monitor 2 [Umon2]	-2147483647 to 2147483647	-	
d029	Position reference monitor [Pos-Ref]	-2147483647 to 2147483647	-	
d030	Position feedback monitor [Pos-fb]	-2147483647 to 2147483647	-	
d031	Position feedback monitor (Speed-ENC) [PF Spd]	-2147483647 to 2147483647	-	
d032	ENC deviation monitor @ 2-ENC input [ENC. dev]	0 to 99999 (mm)	-	
d033	Auto Learning monitor [AutoLearn]	0 to 32	-	
d080	Error Counter [ERR Count]	0 to 65535 (times)	-	
d081	Error monitor 1 [ERR1 ******]	Error Factor	-	
		Output frequency (Hz)	-	
		Current (A)	-	
		DC bus voltage (V)	-	
		Running time (hours)	-	
		Power-on time (hours)	-	
		Real time clock	-	
d082	Error monitor 2 [ERR2 ******]	Error Factor	-	
		Output frequency (Hz)	-	
		Current (A)	-	
		DC bus voltage (V)	-	
		Running time (hours)	-	
		Power-on time (hours)	-	
		Real time clock	-	
d083	Error monitor 3 [ERR3 ******]	Error Factor	-	
		Output frequency (Hz)	-	
		Current (A)	-	
		DC bus voltage (V)	-	
		Running time (hours)	-	
		Power-on time (hours)	-	
		Real time clock	-	
d084	Error monitor 4 [ERR4 ******]	Error Factor	-	
		Output frequency (Hz)	-	
		Current (A)	-	
		DC bus voltage (V)	-	
		Running time (hours)	-	
		Power-on time (hours)	-	
		Real time clock	-	
d085	Error monitor 5 [ERR5 ******]	Error Factor	-	
		Output frequency (Hz)	-	
		Current (A)	-	
		DC bus voltage (V)	-	
		Running time (hours)	-	
		Power-on time (hours)	-	
		Real time clock	-	

Display code	Function name	Setting range/content	Default setting	Contents
d086	Error monitor 6 [ERR6 ******]	Error Factor	-	
		Output frequency (Hz)	-	
		Current (A)	-	
		DC bus voltage (V)	-	
		Running time (hours)	-	
		Power-on time (hours)	-	
		Real time clock	-	
d090	Operator programming error monitor [Warning]	Warning code	-	
d102	DC voltage monitor [DC Voltage]	0.0 to 999.9 (V)	-	
d103	BRD load factor monitor [BRD load]	0.0 to 100.0 (%)	-	
d104	Electronic thermal overload monitor (MTR) [E-thm Mtr]	0.0 to 100.0 (%)	-	
d105	Electronic thermal overload monitor (CTL) [E-thm Ctl]	0.0 to 100.0 (%)	-	
d106	Firmware version monitor [FirmW Ver.]	Ver.xx.xx (for DCP initial command)	-	
d112	SEQ-error monitor [SEQ-Err]	ON = "H", OFF = "L"	-	

8-2 Parameter Table

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
F001	Speed reference setting [SetSpeed (*****)]	0.00 to Maximum speed (Hz)	-	OK			Yes
F002	Acceleration time setting [Acc. Time (*****)]	0.01 to 3600.00 (sec)	-		OK		Yes
F003	Deceleration time setting [Dec. Time (*****)]	0.01 to 3600.00 (sec)	-		OK		Yes
F005	Display password input [Disp-PassWord?]	0000h to FFFFh	0000h				Yes
F006	Display password setting [Disp-PassWord set]	0000h to FFFFh	0000h				Yes
F007	Soft lock password input [SoftLock Password?]	0000h to FFFFh	0000h				Yes
F008	Soft lock password setting [SoftLock Password set]	0000h to FFFFh	0000h				Yes
F010	STOP key enable [STOP-key Select]	00: Enable 01: Disable 02: Reset (Disabling only the function to stop)	00				Yes
F011	Function code display restriction [Display Select]	00: ALL (Full display) 01: FUNCTION (Function-specific display) 02: USER (User setting) 03: COMPARE (Data comparison display) 05: MONITOR (Monitor only display)	00				Yes
F012	Initial-display selection [Initial Disp. select]	d001 to P205, no (Monitor-B)	d001				Yes
F013	Soft lock selection [Soft Lock]	00: MD0 (Disabling change of data other than "F013" when SFT is ON) 01: MD1 (Disabling change of data other than "F013" and frequency settings when SFT is ON) 02: MD2 (Disabling change of data other than "F013") 03: MD3 (Disabling change of data other than "F013" and frequency settings)	00				Yes
F014	Copy function enable [Copy Function]	00: Disable 01: Enable	00				Yes
F015	Traction sheave diameter [Sheave Diameter]	100 to 2000 (mm)	400				Yes
F016	Roping ratio [Roping Ratio]	00: (1 : 1) 01: (1 : 2) 02: (1 : 3) 03: (1 : 4)	00				Yes
F017	Gear ratio [Gear Ratio]	0.10 to 40.00	1.00				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
F018	Position-ENC pooley diameter [P-ENC. Pooley Diameter]	100 to 2000 (mm)	400				Yes
F019	Position-ENC calculation gain [P-ENC. Cal. gain]	0.01 to 100.00	1.00				Yes
F020	Speed unit selection [Speed unit select]	00: Hz 01: min-1 02: m/s 03: % 04: ft/m	00				Yes
F021	Acceleration/Deceleration unit selection [Acc/Dec unit select]	00: s (sec) 01: m/s^2	00				Yes
F022	Position unit selection [Position unit select]	00: non 01: mm 02: cm	00				Yes
F023	Cumulative input power data clear [Power data clear]	00: CNT (continue) 01: CLR (counter clear)	00				Yes
F024	Cumulative input power display gain setting [Power data disp. gain]	1 to 1000	1				Yes
F025	Drive Program (EzSQ) function selection [EzSQ function select]	00: Disable 01: Enable	00				Yes
F026	Drive Program (EzSQ) RUN trigger [EzSQ Run trigger]	00: TRM ("PRG" terminal) 01: PARAM (setting F025 = enable)	01				Yes
F030	Initialization mode selection [Initialization mode]	00: no (disable) 01: Err data (error history) 02: Parameter 03: Err/Prm (Error history and Parameter) 04: Err/Prm/EzSQ (Error history, Parameter and Drive Programming)	00				Yes
F031	Initialization area selection [Initialization area]	01: 01 02: 02	01				Yes
F032	Initialization data selection [Initialization data]	00: All 01: Exc. TERM (The parameter related to the terminals excluded) 02: Exc. COM (The parameter related to the communication is excluded) 03: Exc. TERM/COM (The parameter related to the terminal and communication is excluded)	00				Yes
F034	Initialize trigger selection [Initialize trigger]	00: No action (disable) 01: Initialize (enable)	00				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A001	Speed reference selection [Speed ref. source]	01: O (Using O-L input)	04				No
		02: OI (Using OI-L input)					
		03: O2 (Using O2-L input)					
		04: Multi (Using Multi speed)					
		05: RS485 (Using RS485 Mod-bus-RTU)					
		06: OP1 (Using option card 1)					
		07: OP2 (Using option card 2)					
		08: PRG (Using Drive Program-ming)					
A002	RUN command source selection [RUN cmd source]	01: TRM (Using control circuit terminal)	01				No
		02: REM (Using keypad)					
		03: RS485 (Using RS485)					
		04: OP1 (Using option card 1)					
		05: OP2 (Using option card 2)					
A003	Base speed setting, 1st motor [Base Speed, 1st]	1.00 to Maximum speed (Hz), 1st motor	50.00	OK			No
A004	Maximum speed setting, 1st motor [Maximum Speed. 1st]	1.00 to 400.00 (Hz)	50.00	OK			No
A006	Start speed adjustment (@ VF, OLV) [Start speed]	0.10 to 9.99 (Hz)	0.10	OK			No
A007	Carrier frequency setting [Carrier frequency]	2.0 to 15.0 (kHz)	8.0	OK			No
A016	Motor rotation reverse [Mtr rotation Rev.]	00: Direct (Phase-A leading)	00				No
		01: Reverse (Phase-B leading)					
A019	Multi speed selection [Multi-Spd mode]	00: Lift (Lift speed)	00				No
		01: Multi (Multi stage speed)					
A020	Special speed setting [Special Speed]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A021	Multi speed 1 setting [Multi-Speed 01]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A022	Multi speed 2 setting [Multi-Speed 02]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A023	Multi speed 3 setting [Multi-Speed 03]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A024	Multi speed 4 setting [Multi-Speed 04]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A025	Multi speed 5 setting [Multi-Speed 05]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A026	Multi speed 6 setting [Multi-Speed 06]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A027	Multi speed 7 setting [Multi-Speed 07]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A028	Fast speed setting [Fast Speed]	0.00 to Maximum speed (Hz)	50.00	OK			Yes
A029	Crawl Speed setting [Crawl Speed]	0.00 to Maximum speed (Hz)	2.00	OK			Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A033	Releveling Speed setting [Releveling Speed]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A034	Inspection speed setting [Inspection Speed 1]	0.00 to Maximum speed (Hz)	25.00	OK			Yes
A035	Inspection speed 2 setting [Inspection Speed 2]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A036	Em-power speed setting, 1st motor [Em-Power Speed, 1st]	0.00 to Maximum speed (Hz)	0.00	OK			Yes
A037	Inspection speed upper limit [Inspection UpperLim]	0.00 to Maximum speed (Hz)	30.00	OK			No
A038	Fast/Crawl speed detection level [Fast/Crawl Dtct. Lv]	0.00 to Maximum speed (Hz)	20.00	OK			No
A039	Operation mode if speed reference missing [Op-mode @Spd Cmd Lost]	00: Stop 01: Crawl 02: Special (Special speed)	01				No
A040	Operation mode @zero speed reference [OP-mode @zero speed]	00: STOP 01: RUN 02: BRAKE	00				No
A044	Control mode setting, 1st motor [Control mode, 1st]	00: IM-VC (V/F control) 03: IM-OLV (Open loop vector control) 04: IM-0HzOLV (Open loop vector control (0Hz domain)) 05: IM-CLV (Closed loop Vector control (IM)) 06: PM-CLV (Closed loop Vector control (PM))	00				No
A045	Lift sequence mode setting, 1st motor (effective only CLV mode) [Lift sequence, 1st]	00: SPD (Speed control mode) 01: DP1 (Direct position mode 1 with levelling signal) 02: DP2 (Direct position mode 2 with levelling signal)	00				No
A046	Control mode setting @CMC=ON, 1st motor [Control mode(CMC), 1st]	00: IM-VC (V/F control) 03: IM-OLV (Open loop vector control) 04: IM-0HzOLV (Open loop vector control (0Hz domain)) 05: IM-CLV (Closed loop Vector control (IM)) 06: PM-CLV (Closed loop Vector control (PM))	00				No
A050	Acceleration curve selection [Acceleration curve]	00: Linear 04: Lift-S	04				No
A051	Deceleration curve selection [Deceleration curve]	00: Linear 04: Lift-S	04				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A052	Accel/Decel time input selection [Acc/Dec input source]	00: REM (keypad) 01: OP1 (option 1) 02: OP2 (option 2) 03: PRG (Drive Programming)	00				No
A053	Accel/Decel selection [Acc/Dec select]	00: Common (Using A054/A055) 01: Multi (Multi usage Accel/Decel)	00				No
A054	Acceleration time setting @Common/Special speed [Acc. Time @Common/sp1]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A055	Deceleration time setting @Common/ Special speed [Dec. Time @Common/sp1]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A056	Acceleration time @Fast Speed/Multi speed 1 [Acc. Time @Fast/Multi1]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A057	Deceleration time @Fast Speed/Multi speed 1 [Dec Time @Fast/Multi1]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A058	Acceleration time @Crawl Speed/Multi speed 2 [Acc. Time @Crwl/Multi2]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A059	Deceleration time @Crawl Speed/Multi speed 2 [Dec. Time @Crwl/Multi2]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A060	Acceleration time @Multi speed 3 [Acc. Time @Multi3]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A061	Deceleration time @Multi speed 3 [Dec. Time @Multi3]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A062	Acceleration time @Multi speed 4 [Acc. Time @Multi4]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A063	Deceleration time @Multi speed 4 [Dec. Time @Multi4]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A064	Acceleration time @Multi speed 5 [Acc. Time @Multi5]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A065	Deceleration time @Multi speed 5 [Dec. Time @Multi5]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A066	Acceleration time @Releveling speed/Multi speed 6 [Acc. Time @ReLv/Multi6]	0.00 to 3600.00 (sec)	1.80		OK		Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A067	Deceleration time @Releveling speed/Multi speed 6 [Dec. Time @ReLv/Multi6]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A068	Acceleration time @Inspection speed/Multi speed 7 [Acc. Time @Insp/Multi7]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A069	Deceleration time @Inspection speed/Multi speed 7 [Dec. Time @Insp/Multi7]	0.00 to 3600.00 (sec)	1.80		OK		Yes
A070	Lift-S-curve @acceleration ratio 1 [S-curve Ratio @acc. 1]	0 to 100 (%) A070 + A071 <= 100%	25				No
A071	Lift-S-curve @acceleration ratio 2 [S-curve Ratio @acc. 2]	0 to 100 (%) A070 + A071 <= 100%	15				No
A072	Lift-S-curve @deceleration ratio 1 [S-curve Ratio @dec. 1]	0 to 100 (%) A072 + A073 <= 100%	15				No
A073	Lift-S-curve @deceleration ratio 2 [S-curve Ratio @dec. 2]	0 to 100 (%) A072 + A073 <= 100%	15				No
A074	Lift-S-curve @stop ratio 1 [S-curve Ratio @stop. 1]	0 to 100 (%) A074 + A075 <= 100%	15				No
A075	Lift-S-curve @stop ratio 2 [S-curve Ratio @stop. 2]	0 to 100 (%) A074 + A075 <= 100%	15				No
A076	Speed Limit, 1st motor [Speed Limit, 1st]	0.00 to Maximum speed (Hz)	0.00	OK			No
A080	V/f gain setting, 1st motor [V/f gain, 1st]	20 to 100 (%)	100				Yes
A081	AVR function select, 1st motor [AVR function, 1st]	00: ON (Always on) 01: OFF (Always off) 02: DOFF (Off during deceleration)	02				No
A082	AVR voltage selection, 1st motor [AVR voltage, 1st]	00: 200(V) - 200V class 01: 208(V) - 200V class 02: 215(V) - 200V class 03: 220(V) - 200V class 04: 230(V) - 200V class 05: 240(V) - 200V class 06: 380(V) - 400V class 07: 400(V) - 400V class 08: 415(V) - 400V class 09: 440(V) - 400V class 10: 460(V) - 400V class 11: 480(V) - 400V class	200/400				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A090	Run delay time, 1st motor [Run delay time, 1st]	0.00 to 2.00 (sec)	0.20				No
A091	Contactor off delay time, 1st motor [Cont. open delay, 1st]	0.00 to 2.00 (sec)	0.10				No
A092	Contactor answer back check time, 1st motor [Cont. Ans back, 1st]	0.00 to 5.00 (sec)	0.10				No
A093	Brake open delay time, 1st motor [Brk Open delay, 1st]	0.00 to 2.00 (sec)	0.20				No
A094	Brake close delay time, 1st motor [Brk Close delay, 1st]	0.00 to 2.00 (sec)	0.20				No
A095	Brake answer back check time, 1st motor [Brake Ans. back, 1st]	0.00 to 5.00 (sec)	0.10				No
A096	Servo lock/ DC injection time @start, 1st motor [Stnd-Still @start, 1st]	0.00 to 10.00 (sec)	0.60				No
A097	Servo lock/ DC injection time @stop, 1st motor [Stnd-Still @stop, 1st]	0.00 to 10.00 (sec)	0.60				No
A098	DC injection power @start, 1st motor [DC power @start, 1st]	0 to 100 (%)	50				No
A099	DC injection power @stop, 1st motor [DC power @stop, 1st]	0 to 100 (%)	50				No
A105	High speed retrigger [Hi-Speed Retrigger]	00: Disable 01: Enable	00				No
A106	Run mode @A105 = disable [Hi-Speed Retrg. mode]	00: Stop 01: Error 02: Seq-Err 03: Silent error	00				No
A111	Quick floor selection [Quick floor function]	00: Disable 01: Enable	00				No
A113	Minimum constant speed time [Min. Const-Spd time]	0.0 to 2.0 (sec)	0.0				No
A114	Distance calculation Acceleration time gain [Calc. gain @acc]	50.00 to 200.00 (%)	100.00				No
A115	Distance calculation Deceleration time gain [Calc. gain @dec]	50.00 to 200.00 (%)	100.00				No
A150	O-L input active range start speed [[O] range start speed]	0.00 to 400.00 (Hz)	0.00	OK			Yes
A151	O-L input active range end speed [[O] range end speed]	0.00 to 400.00 (Hz)	0.00	OK			Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A152	O-L input active range start voltage [[O] range start voltage]	0 to 100 (%)	0				Yes
A153	O-L input active range end voltage [[O] range end voltage]	0 to 100 (%)	100				Yes
A154	O-L input start speed enable [[O] start-spd enable]	00: O-EXS (External start frequency) 01: 0Hz	01				Yes
A155	OI-L input active range start speed [[OI] range start speed]	0.00 to 400.00 (Hz)	0.00	OK			Yes
A156	OI-L input active range end speed [[OI] range end speed]	0.00 to 400.00 (Hz)	0.00	OK			Yes
A157	OI-L input active range start current [[OI] range start crnt]	0 to 100 (%)	20				Yes
A158	OI-L input active range end current [[OI] range end crnt]	0 to 100 (%)	100				Yes
A159	OI-L input start speed enable [[OI] start-spd enable]	00: O-EXS (External start frequency) 01: 0Hz	00				Yes
A160	O2-L input active range start speed [[O2] range start speed]	-400.00 to 400.00 (Hz)	0.00	OK			Yes
A161	O2-L input active range end speed [[O2] range end speed]	-400.00 to 400.00 (Hz)	0.00	OK			Yes
A162	O2-L input active range start voltage [[O2] range start volt.]	-100 to 100 (%)	-100				Yes
A163	O2-L input active range end voltage [[O2] range end volt.]	-100 to 100 (%)	100				Yes
A164	External frequency filter time const [Analog input filter]	1 to 30 (or 31) (31: 500ms filter ±0.1Hz with hysteresis)	8				Yes
A203	Base speed setting, 2nd motor [Base Speed, 2nd]	1.00 to Maximum speed (Hz), 2nd motor	50.00	OK			No
A204	Maximum speed setting, 2nd motor [Maximum speed. 2nd]	1.00 to 400.00 (Hz)	50.00	OK			No
A236	Em-power speed setting, 2nd motor [Em-Power Speed, 2nd]	0.00 to Maximum speed (Hz)	0.00	OK			Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A244	Control mode setting, 2nd motor [Control mode, 2nd]	00: IM-VC (V/F control)	00				No
		03: IM-OLV (Open loop vector control)					
		04: IM-0HzOLV (Open loop vector control (0Hz domain))					
		05: IM-CLV (Closed loop Vector control (IM))					
		06: PM-CLV (Closed loop Vector control (PM))					
A245	Lift sequence mode setting, 2nd motor (effective only CLV mode) [Lift sequence, 2nd]	00: SPD (Speed control mode)	00				No
		01: DP1 (Direct position mode 1 with levelling signal)					
		02: DP2 (Direct position mode 2 with levelling signal)					
A246	Control mode setting @CMC=ON, 2nd motor [Control mode (CMC), 2nd]	00: IM-VC (V/F control)	00				No
		03: IM-OLV (Open loop vector control)					
		04: IM-0HzOLV (Open loop vector control (0Hz domain))					
		05: IM-CLV (Closed loop Vector control (IM))					
		06: PM-CLV (Closed loop Vector control (PM))					
A276	Speed Limit, 2nd motor [Speed Limit, 2nd]	0.00 to Maximum speed (Hz)	0.00	OK			No
A280	V/f gain setting, 2nd motor [V/f gain, 2nd]	20 to 100 (%)	100				Yes
A281	AVR function select, 2nd motor [AVR function, 2nd]	00: ON (Always on)	02				No
		01: OFF (Always off)					
		02: DOFF (Off during deceleration)					
A282	AVR voltage selection, 2nd motor [AVR voltage, 2nd]	00: 200(V) - 200V class	200/400				No
		01: 208(V) - 200V class					
		02: 215(V) - 200V class					
		03: 220(V) - 200V class					
		04: 230(V) - 200V class					
		05: 240(V) - 200V class					
		06: 380(V) - 400V class					
		07: 400(V) - 400V class					
		08: 415(V) - 400V class					
		09: 440(V) - 400V class					
		10: 460(V) - 400V class					
		11: 480(V) - 400V class					
A290	Run delay time, 2nd motor [Run delay time, 2nd]	0.00 to 2.00 (sec)	0.20				No
A291	Contactor off delay time, 2nd motor [Cont. open delay, 2nd]	0.00 to 2.00 (sec)	0.10				No
A292	Contactor answer back check time, 2nd motor [Cont. Ans back, 2nd]	0.00 to 5.00 (sec)	0.10				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
A293	Brake open delay time, 2nd motor [Brk Open delay, 2nd]	0.00 to 2.00 (sec)	0.20				No
A294	Brake close delay time, 2nd motor [Brk Close delay, 2nd]	0.00 to 2.00 (sec)	0.20				No
A295	Brake answer back check time, 2nd motor [Brake Ans. back, 2nd]	0.00 to 5.00 (sec)	0.10				No
A296	Servo lock/ DC injection time @start, 2nd motor [Stnd-Still @start, 2nd]	0.00 to 10.00 (sec)	0.60				No
A297	Servo lock/ DC injection time @stop, 2nd motor [Stnd-Still @stop, 2nd]	0.00 to 10.00 (sec)	0.60				No
A298	DC injection power @start, 2nd motor [DC power @start, 2nd]	0 to 100 (%)	50				No
A299	DC injection power @stop, 2nd motor [DC power @stop, 2nd]	0 to 100 (%)	50				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
b001	Auto reset selection [Auto-Reset select]	00: Disable	02				No
		01: AL-out (Fault signal output)					
		02: No-out (Fault signal no output)					
b002	Number of Auto reset [Number of Auto-Reset]	1 to 10 (times)	2				No
b003	UV auto reset selection [Under_V Auto-Reset]	00: b002 (Setting in b002)	00				No
		01: FREE (Always auto reset)					
b004	Instantaneous power failure/ under-voltage trip alarm enable [IP/UV error enable]	00: OFF (Disable)	00				No
		01: ON (Enable)					
		02: DOFF (Disable during stopping and decelerating to stop)					
b005	Restart selection @after error reset [Error restart select]	00: Manual	01				No
		01: AUTO					
b006	Phase loss detection enable [Phase loss detect]	00: Disable	00				No
		01: Enable					
b012	Electronic thermal level setting, 1st motor [E-thermal level, 1st]	0.2 x Rated current to 1.0 x Rated current (A)	Rated current				Yes
b013	Electronic thermal characteristic, 1st motor [E-thermal Char, 1st]	00: Reduce (Reduced-torque characteristic)	01				Yes
		01: Const (Constant-torque characteristic)					
		02: Free (Free setting)					
b015	Free setting electronic thermal speed 1 [Freq. 1 @Free E-thm]	0.00 to b017 (Hz)	0.00	OK			Yes
b016	Free setting electronic thermal current 1 [Crnt. 1 @Free E-thm]	0 to Rated current (A)	0.0				Yes
b017	Free setting electronic thermal speed 2 [Freq. 2 @Free E-thm]	b015 to b019 (Hz)	0.00	OK			Yes
b018	Free setting electronic thermal current 2 [Crnt. 2 @Free E-thm]	0 to Rated current (A)	0.0				Yes
b019	Free setting electronic thermal speed 3 [Freq. 3 @Free E-thm]	b017 to 400.00 (Hz)	0.00	OK			Yes
b020	Free setting electronic thermal current 3 [Crnt. 3 @Free E-thm]	0 to Rated current (A)	0.0				Yes
b021	Overload restriction mode [Overload Rest. mode1]	00: Disable	00				Yes
		01: ACC/Const (Enable during accel and constant speed)					
		02: Const (Enable during constant speed)					
		03: R-Inc (Enable during accel and constant speed (increasing the speed during regeneration))					

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
b022	Overload restriction setting [Overload Rest. level1]	0.5 x Rated current to 1.0 x Rated current (A)	0.5 x Rated current				Yes
b023	Deceleration rate at overload restriction [Overload Rest. time1]	0.10 to 30.00 (sec)	1.00		OK		Yes
b024	Overload restriction mode (2) [Overload Rest. mode2]	00: Disable	00				Yes
		01: ACC/Const (Enable during accel and constant speed)					
		02: Const (Enable during constant speed)					
		03: R-Inc (Enable during accel and constant speed (increasing the speed during regeneration))					
b025	Overload restriction setting (2) [Overload Rest. level2]	0.2 x Rated current to 2.0 x Rated current (A)	1.5 x Rated current				Yes
b026	Deceleration rate at overload restriction (2) [Overload Rest. time2]	0.10 to 30.00 (sec)	1.00				Yes
b027	Over current suppression enable [OverCrnt. Sup select]	00: Disable	01				Yes
		01: Enable					
b030	UPS protect direction selection [UPD Search select]	00: Disable	00				No
		01: AUTO					
		02: AUTO-1st (motor 1 only)					
		03: MANUAL					
		04: MANUAL-1st (motor 1 only)					
b031	UPS protect direction detect selection [UPD Search type]	00: Low-C (low current detection)	00				No
		01: ReGnr (Regeneration detection)					
b032	UPS protect direction search speed [UPD Search speed]	0.00 to 20.00 (Hz)	3.0	OK			No
b033	UPS protect direction search time [UPD Search time]	0.0 to 5.0 (sec)	1.0				No
b034	Battery voltage for Em-power operation [Battery Voltage]	48 to 600 (V)	200				No
b035	Em-power operation torque limit [Trq.limit @Em-Power]	0 to 300 (%)	150				No
b040	Torque limit selection [Trq.limit mode]	00: 4-SET (Quadrant-specific setting)	00				Yes
		01: TM (Switching by terminal)					
		02: O2 (Analog input)					
b041	Torque limit (1) (forward-driving) [Trq.limit1 @UP-Drv]	0 to 300 (%)	200				Yes
b042	Torque limit (2) (reverse-regenerating) [Trq.limit2 @DWN-Rgn]	0 to 300 (%)	200				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
b043	Torque limit (3) (reverse-driving) [Trq.limit3 @DWN-Drv]	0 to 300 (%)	200				Yes
b044	Torque limit (4) (forward-regenerating) [Trq.limit4 @UP-Rgn]	0 to 300 (%)	200				Yes
b046	Counter direction Run protective enable [Counter Dir. protect]	00: Disable 01: Enable	00				Yes
b050	Torque bias selection [Trq.bias select]	00: O (O-L input) 01: OI (OI-L input) 02: O2 (O2-L input)	00				No
b051	Torque bias latch trigger select [Trq.bias latch trigger]	00: RUN (RUN command is active) 01: TCL (Terminal "TCL" is ON)	00				No
b052	Load cell calibration @min. [Adj.L-Cell @Min]	0 to 100 (%)	0				No
b053	Load cell calibration @max. [Adj.L-Cell @Max]	0 to 100 (%)	100				No
b054	Load cell adjustment Bias value @min. Upwards [Adj.L-Cell @V-Min/UP]	-300.0 to 300.0 (%)	0				No
b055	Load cell adjustment Bias value @max. Upwards [Adj.L-Cell @V-Max/UP]	-300.0 to 300.0 (%)	0				No
b056	Load cell adjustment Bias value @min. Down-wards [Adj.L-Cell @V-Min/DWN]	-300.0 to 300.0 (%)	0				No
b057	Load cell adjustment Bias value @max. Down-wards [Adj.L-Cell @V-Max/DWN]	-300.0 to 300.0 (%)	0				No
b058	Torque bias Filter time constant [Trq.bias Filter]	5 to 500 (ms)	10				No
b059	Torque bias Fade out level setting [Trq.bias FadeOut Level]	0.00 to 400.00 (Hz)	0.00				No
b060	Torque bias Fade out time setting [Trq.bias FadeOut Time]	0.01 to 5.00 (sec)	0.01				No
b069	Slip compensation gain @VC, 1st motor [Slip-Cmp. gain, 1st]	0 to 255 (%)	100				Yes
b070	Separated Contactor check error [Separated Cont.-err]	00: Err (Normal error) 01: Seq-Err (Sequence error) 02: Silent error	00				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
b071	Separated brake check error [Separated Brake-err]	00: Err (Normal error) 01: Seq-Err (Sequence error) 02: Silent error	00				No
b072	Separated NFS no input error [Separated NFS-err]	00: Err (Normal error) 01: Seq-Err (Sequence error) 02: Silent error	00				No
b074	Separated RUN active @GS error [Separated RUN timing]	00: Err (Normal error) 01: Seq-Err (Sequence error) 02: Silent error	00				No
b075	Separated Lift time out error [Separated Lift timeout]	00: Err (Normal error) 01: Seq-Err (Sequence error) 02: Silent error	00				No
b076	Lift movement timeout time setting [Lift timeout time]	0.00 to 10.00 (sec)	5.00				No
b077	Lift movement timeout level setting [Lift timeout Lvl.]	0.00 to 400.00 (Hz)	0.00	OK			No
b078	Separated Brake condition error [Separated Brake cond.]	00: Err (Normal error) 01: Seq-Err (Sequence error) 02: Silent error	00				No
b090	Cooling fan control [Cooling Fan control]	00: OFF (Always operating the fan) 01: ON (Operating the fan only during inverter operation (including 5 minutes after power-on and power-off)) 02: Thm (The temperature of the fan rises)	02				Yes
b095	Dynamic brake control [Dynamic Brake control]	00: OFF 01: ON_STPOFF (Disable while the motor is stopped) 02: ON_STPON (Enable while the motor is stopped)	02				Yes
b096	Dynamic brake activation level [Dynamic Brake Act. Lv]	200V class: 330 to 380 (V) 400V class: 660 to 760 (V)	360/720				Yes
b097	Dynamic braking usage ratio [Dynamic Brake %ED]	0.0 to 100.0 (%)	100.0				Yes
b098	Thermistor for thermal protection Control [Thermistor control]	00: OFF (Disable the thermistor) 01: PTC (Enable the thermistor with PTC) 02: NTC (Enable the thermistor with NTC)	00				Yes
b099	Thermal protection level setting [Thm. protection Level]	0 to 9999 (ohm)	3000				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
b100*	Output phase loss detection enable [Out-Ph. loss detect]	00: Disable	00				No
		01: 1-phase (1 phase observation)					
		02: 3-phase (2 or 3 phase observation)					
b101*	Output phase loss detection time [Out-Ph. loss time]	0.01 to 10.00 (sec)	1.00				No
b102*	Output phase loss detection level [Out-Ph. loss level]	0.0 to 100.0 (%)	5.0				No
b212	Electronic thermal level setting, 2nd motor [E-thermal Level, 2nd]	0.2 x Rated current to 1.0 x Rated current (A)	Rated current				Yes
b213	Electronic thermal characteristic, 2nd motor [E-thermal Char, 2nd]	00: Reduce (Reduced-torque characteristic)	01				Yes
		01: Const (Constant-torque characteristic)					
		02: Free (Free setting)					
b269	Slip compensation gain @VC, 2nd motor [Slip-Cmp. gain, 2nd]	0 to 255 (%)	100				Yes

* From firmware version 1.09

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C001	Multi input terminal (1) setting [IN-Term[1] select]	00: UP (Upward RUN)	00 (UP)				No
		01: DWN (Downward RUN)					
		02: SPD1 (Multi-speed 1 setting)					
		03: SPD2 (Multi-speed 2 setting)					
		04: SPD3 (Multi-speed 3 setting)					
		08: SET (Set 2nd motor data)					
		11: FRS (Free-run stop)					
		12: EXT (External trip)					
		15: SFT (Soft lock)					
		18: RS (Reset)					
		32: OLR (Change OL-level)					
		33: TL (Torque limit enable)					
		34: TRQ1 (Change Torque Limit 1)					
		35: TRQ2 (Change Torque Limit 2)					
		40: PCLR (Clear the current position)					
		46: KHC (kwh clear)					
		49: MI1 (General-purpose input 1)					
		50: MI2 (General-purpose input 2)					
		51: MI3 (General-purpose input 3)					
		52: MI4 (General-purpose input 4)					
		53: MI5 (General-purpose input 5)					
		54: MI6 (General-purpose input 6)					
		55: MI7 (General-purpose input 7)					
		56: MI8 (General-purpose input 8)					
		57: MI9 (General-purpose input 9)					
		58: MI10 (General-purpose input 10)					
		59: MI11 (General-purpose input 11)					
		60: MI12 (General-purpose input 12)					
		61: EMP (Em-Power operation)					
		62: INSP (Inspection)					
		63: RL (Releveling)					
		64: COK (Contactor check signal)					
		65: BOK (Brake check signal)					
		66: FP1 (Floor position 1)					
		67: FP2 (Floor position 2)					
		68: FP3 (Floor position 3)					
		69: FP4 (Floor position 4)					
		70: FP5 (Floor position 5)					
		71: FP6 (Floor position 6)					
		72: PAL (Auto Learning data latch trigger)					
		73: TCL (Torque bias latch trigger)					
		74: LVS (Leveling signal)					
		75: NFS (Near floor signal)					
		76: PRG (Program run)					
		77: CMC (Control mode change)					
		78: GS1 (Gate suppress 1)					
		79: GS2 (Gate suppress 2)					
		no: no assignment					

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C002	Multi input terminal (2) setting [IN-Term[2] select]	Same as the settings of C001	01 (DWN)				No
C003	Multi input terminal (3) setting [IN-Term[3] select]	Same as the settings of C001	03 (SPD2)				No
C004	Multi input terminal (4) setting [IN-Term[4] select]	Same as the settings of C001	62 (INSP)				No
C005	Multi input terminal (5) setting [IN-Term[5] select]	Same as the settings of C001	74 (LVS)				No
C006	Multi input terminal (6) setting [IN-Term[6] select]	Same as the settings of C001	18 (RS)				No
C007	Multi input terminal (7) setting [IN-Term[7] select]	Same as the settings of C001	63 (RL)				No
C008	Multi input terminal (GS1) setting [IN-Term[GS1] select]	Same as the settings of C001	78 (GS1)				No
C009	Multi input terminal (GS2) setting [IN-Term[GS2] select]	Same as the settings of C001	79 (GS2)				No
C011	Terminal (1) activate state [IN-Term[1] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C012	Terminal (2) activate state [IN-Term[2] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C013	Terminal (3) activate state [IN-Term[3] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C014	Terminal (4) activate state [IN-Term[4] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C015	Terminal (5) activate state [IN-Term[5] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C016	Terminal (6) activate state [IN-Term[6] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C017	Terminal (7) activate state [IN-Term[7] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C018	Terminal (GS1) activate state [IN-Term[GS1] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C019	Terminal (GS2) activate state [IN-Term[GS2] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C021	Multi output relay (11) setting [OUT-Term[11] select]	00: RUN (Running)	52 (BRK)				No
		01: FA1 (Constant-speed reached)					
		02: FA2 (Set frequency overreached)					
		03: OL (Overload advance signal(1))					
		05: AL (Alarm signal)					
		06: FA3 (Set frequency reached)					
		07: OTQ (Over-torque)					
		08: IP (Instantaneous power failure)					
		09: UV (Under-voltage)					
		10: TRQ (Torque limited)					
		11: RNT (Operation time over)					
		12: ONT (Plug-in time over)					
		13: THM (Thermal alarm signal (MTR))					
		14: ZS (0Hz detection signal)					
		16: POK (Positioning completed)					
		17: FA4 (Set frequency overreached2)					
		18: FA5 (Set frequency reached 2)					
		19: OL2 (Overload advance signal 2)					
		20: TH-C (Thermal alarm signal (CTL))					
		23: NDc (Network Disconnection)					
		30: WAC (Capacitor life warning)					
		31: WAF (Cooling-fan speed drop)					
		32: FR (Starting contact signal)					
		33: OHF (Heat sink overheat warning)					
		34: LOC (Low-current indication signal)					
		35: MO1 (General purpose output 1)					
		36: MO2 (General purpose output 2)					
		37: MO3 (General purpose output 3)					
		38: MO4 (General purpose output 4)					
		39: MO5 (General purpose output 5)					
		40: MO6 (General purpose output 6)					
		41: MO7 (General purpose output 7)					
		44: IRDY (Inverter ready)					
		45: FWR (Forward rotation)					
		46: RWR (Reverse rotation)					
		47: MJA (Major failure)					
		51: CON (Contactor control signal)					
		52: BRK (Brake control signal)					
		54: UPS (UPS Protect direction search status)					
		55: UPD (UPS Protect direction)					
		56: GMON (Gate suppress monitor)					
		57: MPS (Magnet pole position search)					
		58: SEQ (SEQ error)					
C022	Multi output relay (12) setting [OUT-Term[12] select]	Same as the settings of C021	51 (CON)				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C023	Multi output relay (13) setting [OUT-Term[13] select]	Same as the settings of C021	44 (IRDY)				No
C026	Multi output relay (RY) setting [OUT-Term [RY] select]	Same as the settings of C021	05 (AL)				No
C027	[FM] signal selection [[FM] Signal Select]	00: A-S (Output speed)	00				No
		01: A (Output current)					
		02: T (Output torque)					
		03: D-F (Digital output speed)					
		04: Vout (Output voltage)					
		05: Power (Input power)					
		06: THM (Electronic thermal over load: MTR)					
		07: LAD-S (LAD speed)					
		09: TH-Mtr (Motor temperature)					
		10: TH-Fin (Heat sink temperature)					
		12: Devi (Encoder deviation)					
		13: THM-CTL (Electronic thermal over load: CTL)					
		14: YA0 (General-purpose output YA0)					
C028	[AM] signal selection [[AM] Signal Select]	00: A-S (Output speed)	00				No
		01: A (Output current)					
		02: T (Output torque)					
		04: Vout (Output voltage)					
		05: Power (Input power)					
		06: THM (Electronic thermal over load: MTR)					
		07: LAD-S (LAD speed)					
		09: TH-Mtr (Motor temperature)					
		10: TH-Fin (Heat sink temperature)					
		12: Devi (Encoder deviation)					
		13: THM-CTL (Electronic thermal over load: CTL)					
		15: YA1 (General-purpose output YA1)					
C029	[AMI] signal selection [[AMI] Signal Select]	00: A-S (Output speed)	01				No
		01: A (Output current)					
		02: T (Output torque)					
		04: Vout (Output voltage)					
		05: Power (Input power)					
		06: THM (Electronic thermal over load: MTR)					
		07: LAD-S (LAD speed)					
		09: TH-Mtr (Motor temperature)					
		10: TH-Fin (Heat sink temperature)					
		12: Devi (Encoder deviation)					
		13: THM-CTL (Electronic thermal over load: CTL)					
		16: YA2 (General-purpose output YA2)					

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C030	Encoder deviation monitor max value [ENC. dev monitor Max]	0 to 99999 (mm)	1000				Yes
C031	Multi output relay [11] active state [OUT-Term[11] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C032	Multi output relay [12] active state [OUT-Term[12] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C033	Multi output relay [13] active state [OUT-Term[13] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C036	Multi output relay [RY] active state [OUT-Term [RY] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
C038	Low-current indication signal output mode selection [[LOC] signal Mode]	00: Always (Output during accel/decel and constant-speed operation) 01: Const (Output only during constant-speed operation)	00				Yes
C039	Low-current indication signal detection level [[LOC] signal Level]	0 to 2.0 x Rated current (A)	Rated current				Yes
C040	Overload alarm output mode [[OL] signal Mode]	00: Always (Output during accel/decel and constant-speed operation) 01: Const (Output only during constant-speed operation)	00				Yes
C041	Overload alarm level setting [[OL] signal Level]	0 to 2.0 x Rated current (A)	Rated current				Yes
C042	Speed arrival setting for accel. [Speed arrival @acc]	0.00 to 400.00 (Hz)	0.00	OK			Yes
C043	Speed arrival setting for decel. [Speed arrival @dec]	0.00 to 400.00 (Hz)	0.00	OK			Yes
C045	Speed arrival setting for accel. (2) [Speed arrival @acc2]	0.00 to 400.00 (Hz)	0.00	OK			Yes
C046	Speed arrival setting for decel. (2) [Speed arrival @dec2]	0.00 to 400.00 (Hz)	0.00	OK			Yes
C055	Over-torque level setting (upward-driving) [OverTrq Lv. @UP-Drv]	0 to 300 (%)	100				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C056	Over-torque level setting (downward regenerating) [OverTrq Lv. @DWN-Rgn]	0 to 300 (%)	100				Yes
C057	Over-torque level setting (downward driving) [OverTrq Lv. @DWN-Drv]	0 to 300 (%)	100				Yes
C058	Over-torque level setting (upward regenerating) [OverTrq Lv. @UP-Rgn]	0 to 300 (%)	100				Yes
C060	Run/power-on warning time [Run/Pw-on warn time]	0 to 655350 (hour)	0				Yes
C061	E-thermal warning level setting (motor) [E-thm warn Level Mtr]	0 to 100 (%)	80				Yes
C062	E-thermal warning level setting (controller) [E-thm warn Level Ctl]	0 to 100 (%)	80				Yes
C063	Zero speed detection level [Zero-spd detect Level]	0.00 to 100.00 (Hz)	0.00	OK			Yes
C064	Heat sink overheat warning level [Heatsnk Overheat Level]	0 to 200 (ºC)	120				Yes
C071	Communication speed selection [Comm. BauRate]	03: 2400bps 04: 4800bps 05: 9600bps 06: 19200bps 07: 38400bps	04				No
C072	Node allocation [Comm. Node]	1 to 247	1				No
C074	Communication parity selection [Comm. Parity]	00: NO (No parity) 01: EVN (Even parity) 02: ODD (Odd parity)	00				No
C075	Communication stop bit selection [Comm. StopBit]	1: 1 bit 2: 2 bits	1				No
C076	Selection of the operation after communication error [Comm. ErrMode]	00: Error 01: STP-Err (Error after decel and stop the motor) 02: Ignor (Ignoring errors) 04: Dec-STP (Decel and stop the motor)	02				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C077	Communication timeout limit before tripping [Comm. TimeOut]	0.00 to 99.99 (sec)	0.00				No
C078	Communication wait time [Comm. Wait time]	0 to 1000 (msec)	0				No
C079	Communication mode selection [Comm. Mode select]	01: Modbus (Modbus-RTU)	01				No
C081	[O] input scan calibration [Adj. span [O]]	0 to 65535	Factory setting				Yes
C082	[OI] input scan calibration [Adj. span [OI]]	0 to 65535					Yes
C083	[O2] input scan calibration [Adj. span [O2]]	0 to 65535					Yes
C085	Thermistor input tuning [Adj. tmp [TH]]	0.0 to 1000.0					Yes
C091	Debug mode enable [Debug mode]	00: MD0 01: MD1	00				Yes
C105	FM gain adjustment [[FM] gain adjust]	50 to 200 (%)	100				Yes
C106	AM gain adjustment [[AM] gain adjust]	50 to 200 (%)	100				Yes
C107	AMI gain adjustment [[AMI] gain adjust]	50 to 200 (%)	100				Yes
C109	AM bias adjustment [[AM] bias adjust]	0 to 100 (%)	0				Yes
C110	AMI bias adjustment [[AMI] bias adjust]	0 to 100 (%)	20				Yes
C111	Overload alarm (2) level setting [[OL2] signal Level]	0.0 to 2.0 x rated current (A)	Rated current				Yes
C121	[O] input zero calibration [Adj. zero [O]]	0 to 65535	Factory setting				Yes
C122	[OI] input zero calibration [Adj. zero [OI]]	0 to 65535					Yes
C123	[O2] input zero calibration [Adj. zero [O2]]	0 to 65535					Yes
C130	Output [11] on-delay time [ON-delay time [11]]	0.0 to 100.0 (sec)	0.0				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C131	Output [11] off-delay time [OFF-delay time [11]]	0.0 to 100.0 (sec)	0.0				Yes
C132	Output [12] on-delay time [ON-delay time [12]]	0.0 to 100.0 (sec)	0.0				Yes
C133	Output [12] off-delay time [OFF-delay time [12]]	0.0 to 100.0 (sec)	0.0				Yes
C134	Output [13] on-delay time [ON-delay time [13]]	0.0 to 100.0 (sec)	0.0				Yes
C135	Output [13] off-delay time [OFF-delay time [13]]	0.0 to 100.0 (sec)	0.0				Yes
C140	Output [RY] on-delay time [ON-delay time [RY]]	0.0 to 100.0 (sec)	0.0				Yes
C141	Output [RY] off-delay time [OFF-delay time [RY]]	0.0 to 100.0 (sec)	0.0				Yes
C160	Input terminal [1] response time [Response time [1]]	0 to 200 (ms)	1				Yes
C161	Input terminal [2] response time [Response time [2]]	0 to 200 (ms)	1				Yes
C162	Input terminal [3] response time [Response time [3]]	0 to 200 (ms)	1				Yes
C163	Input terminal [4] response time [Response time [4]]	0 to 200 (ms)	1				Yes
C164	Input terminal [5] response time [Response time [5]]	0 to 200 (ms)	1				Yes
C165	Input terminal [6] response time [Response time [6]]	0 to 200 (ms)	1				Yes
C166	Input terminal [7] response time [Response time [7]]	0 to 200 (ms)	1				Yes
C167	Input terminal [GS1] response time [Response time [GS1]]	0 to 200 (ms)	1				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
C168	Input terminal [GS2] response time [Response time [GS2]]	0 to 200 (ms)	1				Yes
C169	Multistage speed/ position determination time [M. Spd/Pos latch time]	0 to 200 (ms)	0				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
H001	Auto-tuning Setting [Auto-tuning Mode set.]	00: NOR (disable)	00				No
		01: NRT-IM (auto-tuning without rotation (IM))					
		02: AUT-IM (auto-tuning with rotation (IM))					
		03: NRT-PM (auto-tuning without rotation (PM))					
		04: AUT-PM (auto-tuning with rotation (PM))					
		05: MG-POS (magnet position offset tuning (PM))					
H002	RUN command source @Autotuning [RUN @Auto-tuning]	00: REM (Force "RUN" key)	00				No
		01: A002 (setting by A002)					
H003	Motor capacity, 1st motor [Motor capacity, 1st]	0.20 to 75.00 (kW)	Same INV (kW)				No
H004	Motor poles setting, 1st motor [Motor poles, 1st]	2 to 48 (poles)	4				No
H005	Rigidity constant, 1st motor [Rigidity constant, 1st]	0.1 to 5000.0 (%)	100.0				Yes
H006	Motor stabilization constant, 1st motor [Stabilize cnst, 1st]	0 to 255 (%)	100				Yes
H007	ASR gain switching speed [ASR gain switch speed]	0.00 to 400.00 (Hz)	0.00	OK			Yes
H008	ASR proportional gain @start [ASR P-gain @start]	0.0 to 1000.0 (%)	100.0				Yes
H009	ASR integral gain @start [ASR I-gain @start]	0.0 to 1000.0 (%)	100.0				Yes
H010	ASR proportional gain @after switching [ASR P-gain @after SW]	0.0 to 1000.0 (%)	100.0				Yes
H011	ASR integral gain @after switching [ASR I-gain @after SW]	0.0 to 1000.0 (%)	100.0				Yes
H012	ASR proportional gain @to Zero [ASR P-gain @stop]	0.0 to 1000.0 (%)	100.0				Yes
H013	ASR integral gain @to Zero [ASR I-gain @stop]	0.0 to 1000.0 (%)	100.0				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
H014	ASR proportional gain @brake [ASR P-gain @brake]	0.0 to 1000.0 (%)	100.0				Yes
H015	ASR proportional gain @brake fade out time setting [Gain FadeOut Time]	0.01 to 5.00 (sec)	0.01				No
H016	Position loop gain setting @brake [P-loop gain @brake]	0.00 to 100.00	0.50				Yes
H017	ACR gain adjustment @IM-OLV (with C091=1) [ACR gain @IM-OLV]	1 to 10000	150				No
H018	ACR gain adjustment @IM-CLV [ACR gain @IM-CLV]	1 to 10000	2000				No
H019	ACR gain adjustment @PM-OLV [ACR gain @PM-OLV]	1 to 10000	500				No
H020	IM motor constant R1, 1st motor [IM constant R1, 1st]	0.001 to 65.535 (ohm)	Depend on the motor capacity				No
H021	IM motor constant R2, 1st motor [IM constant R2, 1st]	0.001 to 65.535 (ohm)					No
H022	IM motor constant L, 1st motor [IM constant L, 1st]	0.01 to 655.35 (mH)					No
H023	IM motor constant IO, 1st motor [IM constant IO, 1st]	0.01 to 655.35 (A)					No
H024	IM motor constant J, 1st motor [IM constant J, 1st]	0.001 to 9999.000					No
H025	IM motor Rated current, 1st motor [IM cnst. Rated-I, 1st]	0.0 to 200.0 (A)					No
H060	0Hz-OLV limit, 1st motor [0Hz OLV-Limit, 1st]	0.0 to 100.0 (%)	75.0				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
H070	PM motor constant R, 1st motor [PM constant R, 1st]	0.001 to 65.535 (ohm)	Depend on the motor capacity				No
H071	PM motor constant d-axis L, 1st motor [PM constant Ld, 1st]	0.01 to 655.35 (mH)					No
H072	PM motor constant q-axis L, 1st motor [PM constant Lq, 1st]	0.01 to 655.35 (mH)					No
H073	PM motor voltage constant, 1st motor [PM constant Ke, 1st]	0.1 to 6553.5 (mV/(rad/s))					No
H074	PM motor constant J, 1st motor [PM constant J, 1st]	0.001 to 9999.000					No
H075	PM motor Rated current, 1st motor [PM const. Rated-I, 1st]	0.0 to 200.0 (A)					No
H080	Encoder Read/ Write selection [ENC. data R/W select]	00: No (not access) 01: ENC1 >> INV 02: ENC1 << INV 03: ENC2 >> INV 04: ENC2 << INV 05: Verify-ENC1 06: Verify-ENC2	00				Yes
H081	Encoder Read/ Write enable [ENC. data R/W]	00: Disable 01: Enable	00				No
H203	Motor capacity, 2nd motor [Motor capacity, 2nd]	0.20 to 75.00 (kW)	Same INV (kW)				No
H204	Motor poles set- ting, 2nd motor [Motor poles, 2nd]	2 to 48 (poles)	4				No
H205	Rigidity constant, 2nd motor [Rigidity constant, 2nd]	0.1 to 5000.0 (%)	100.0				Yes
H206	Motor stabilization constant, 2nd motor [Stabilize cnst, 2nd]	0 to 255 (%)	100				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
H220	IM motor constant R1, 2nd motor [IM constant R1, 2nd]	0.001 to 65.535 (ohm)	Depend on the motor capacity				No
H221	IM motor constant R2, 2nd motor [IM constant R2, 2nd]	0.001 to 65.535 (ohm)					No
H222	IM motor constant L, 2nd motor [IM constant L, 2nd]	0.01 to 655.35 (mH)					No
H223	IM motor constant IO, 2nd motor [IM constant IO, 2nd]	0.01 to 655.35 (A)					No
H224	IM motor constant J, 2nd motor [IM constant J, 2nd]	0.001 to 9999.000					No
H225	IM motor Rated current, 2nd motor [IM cnst. Rated-I, 2nd]	0.0 to 200.0 (A)					No
H260	0Hz-OLV limit, 2nd motor [0Hz OLV-Limit, 2nd]	0.0 to 100.0 (%)	75.0				Yes
H270	PM motor constant R, 2nd motor [PM constant R, 2nd]	0.001 to 65.535 (ohm)	Depend on the motor capacity				No
H271	PM motor constant d-axis L, 2nd motor [PM constant Ld, 2nd]	0.01 to 655.35 (mH)					No
H272	PM motor constant q-axis L, 2nd motor [PM constant Lq, 2nd]	0.01 to 655.35 (mH)					No
H273	PM motor voltage constant, 2nd motor [PM constant Ke, 2nd]	0.1 to 6553.5 (mV/(rad/s))					No
H274	PM motor constant J, 2nd motor [PM constant J, 2nd]	0.001 to 9999.000					No
H275	PM motor Rated current, 2nd motor [PM const. Rated-I, 2nd]	0.0 to 200.0 (A)					No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
P001	Operation mode on option card 1 error [OP1 Operation Mode]	00: ERR (Error)	00				No
		01: RUN (Ignore error (running))					
P002	Operation mode on option card 2 error [OP2 Operation Mode]	00: ERR (Error)	00				No
		01: RUN (Ignore error (running))					
P003	Parameter Auto setting for Encoder [Enc. Param. Auto-Set]	00: Disable	01				No
		01: Enable					
P004	1st-motor speed feedback source selection [SPD-FB Source Sel, 1st]	00: non (not use)	00				No
		01: ch1-inc (incremental (CH1))					
		02: ch1-HIPER (HIPERFACE (CH1))					
		03: ch1-En2.1 (EnDat 2.1 (CH1))					
		04: ch1-En2.2 (EnDat 2.2 (CH1))					
		05: ch2-inc (incremental (CH2))					
		06: ch2-HIPER (HIPERFACE (CH2))					
		07: ch2-En2.1 (EnDat 2.1 (CH2))					
		08: ch2-En2.2 (EnDat 2.2 (CH2))					
P005	1st-motor Position feedback source selection [POS-FB Source Sel, 1st]	00: non (not use)	00				No
		01: ch1-inc (incremental (CH1))					
		02: ch1-HIPER (HIPERFACE (CH1))					
		03: ch1-En2.1 (EnDat 2.1 (CH1))					
		04: ch1-En2.2 (EnDat 2.2 (CH1))					
		05: ch2-inc (incremental (CH2))					
		06: ch2-HIPER (HIPERFACE (CH2))					
		07: ch2-En2.1 (EnDat 2.1 (CH2))					
		08: ch2-En2.2 (EnDat 2.2 (CH2))					
P010	CH1-ENC constant setting [ENC. Constant (ch1)]	0.128 to 65535 (/rev)	1024				No
P011	CH1-ENC resolution setting [ENC. Resolution (ch1)]	0 to 31 (bit/rev)	0				No
P012	CH1-ENC magnet position offset (PM) [ENC. MgPos- offset (ch1)]	0 to 360 (deg)	60				No
P013	CH1-ENC revolutions [ENC. Revolution (ch1)]	0 to 16 (bit)	0				No
P014	CH1-Numerator of motor gear ratio [ENC. Gear ratio N (ch1)]	1 to 9999	1				No
P015	CH1-Denominator of motor gear ratio [ENC. Gear ratio D (ch1)]	1 to 9999	1				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
P016	CH1-ENC position [ENC. Position set (CH1)]	00: Direct (Phase-A leading) 01: Reverse (Phase-B leading)	00				No
P020	CH2-ENC constant setting [ENC. Constant (ch2)]	0.128 to 65535 (/rev)	1024				No
P021	CH2-ENC resolution setting [ENC. Resolution (ch2)]	0 to 31 (bit/rev)	0				No
P022	CH2-ENC magnet position offset (PM) [ENC. MgPos-offset (ch2)]	0 to 360 (deg)	60				No
P023	CH2-ENC revolutions [ENC. Revolution (ch2)]	0 to 16 (bit)	0				No
P024	CH2-Numerator of motor gear ratio [ENC. Gear ratio N (ch2)]	1 to 9999	1				No
P025	CH2-Denominator of motor gear ratio [ENC. Gear ratio D (ch2)]	1 to 9999	1				No
P026	CH2-ENC position [ENC. Position set (CH2)]	00: Direct (Phase-A leading) 01: Reverse (Phase-B leading)	00				No
P030	Positioning completion range setting [POS-Completion range]	0 to 10000	5				No
P032	Position loop gain setting [Position loop gain]	0.00 to 100.00	0.50				Yes
P035	Encoder disconnection detection Delay time [ENC. discon delay time]	0.0 to 5.0 (sec)	0.5				Yes
P036*	Encoder disconnection detection tolerance level [SinCos tolerance]	0 to 100 (%)	25				No
P038	Over-speed error detection level setting [OverSpd. detect level]	0.0 to 150.0 (%)	120.0				Yes
P039	Over-speed error detection time setting [OverSpd. detect time]	0.0 to 5.0 (sec)	0.2				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
P040	Speed deviation error detection level setting [Spd dev. detect level]	0.0 to 100.0 (%)	15.0				Yes
P041	Speed deviation error detection time setting [Spd dev. detect time]	0.0 to 5.0 (sec)	0.5				Yes
P042	Over-acceleration error detection level setting [OverAcc. detect level]	0.0 to 50.0 (m/s^2)	1.0				Yes
P043	Over-acceleration error detection times setting [OverAcc. detect time]	0.0 to 5.0 (sec)	0.3				Yes
P044	Wrong rotation detection distance setting [Wrong rot detect dis.]	0 to 1000 (mm)	100				Yes
P050 to P089	Floor position 00 to 39 [Floor position 00] to [Floor position 39]	-2147483647 to 2147483647	0			OK	Yes
P090	Auto Learning mode selection [Auto-Learn select]	00: Disable 01: ADD (Enable (Add)) 02: SUB (Enable (Sub))	00				No
P091	Auto Learning start position No. [Auto-Learn No.]	0 to 39	0				No
P092	Auto Learning trigger selection [Auto-Learn trigger]	00: PAL 01: NFS	00				No
P093	Auto Learning position offset [Auto-Learn offset]	0 to 1073741823	0			OK	No
P094	Acceleration distance calc. Gain [Acc-t gain @dis. cal]	50.00 to 200.00 (%)	100.00				Yes
P095	Deceleration stop distance calc. Gain [Dec-t. gain @dis. cal]	50.00 to 200.00 (%)	100.00				Yes
P096	Deceleration stop distance calc. Bias [Bias gain @dis. cal]	0.00 to 655.35 (%)	0.00				Yes

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
P097	Scurve gain for distance calculation (with C091=1) [S-trvl. gain @dis. cal]	50.00 to 200.00 (%)	100.00				Yes
P098	Speed Limit in APR control [APR limit spd]	0.00 to 100.00 (%)	1.00				Yes
P099	APR start speed [APR start spd]	0.00 to 100.00 (%)	0.20				Yes
P100 to P131	Drive Program parameter U(00) to U(31) [EzSQ parameter U(00)] to [EzSQ parameter U(31)]	0 to 65535	0				Yes
P140	Multi input [Ex. IN1] [ExIN-Term[1] Select]	Same as the settings of C001 to C005	No				No
P141	Multi input [Ex. IN2] [ExIN-Term[2] Select]		No				No
P142	Multi input [Ex. IN3] [ExIN-Term[3] Select]		No				No
P143	Multi input [Ex. IN4] [ExIN-Term[4] Select]		No				No
P144	Multi input [Ex. IN5] [ExIN-Term[5] Select]		No				No
P145	Multi output [Ex. OUT1] [ExOUT-Term[11] Select]	Same as the settings of C021 to C023 and C026	No				No
P146	Multi output [Ex. OUT2] [ExOUT-Term[12] Select]		No				No
P147	Multi output [Ex. OUT3] [ExOUT-Term[13] Select]		No				No
P150	Multi input [Ex. IN1] activate state [ExIN-Term[1] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
P151	Multi input [Ex. IN2] activate state [ExIN-Term[2] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No
P152	Multi input [Ex. IN3] activate state [ExIN-Term[3] NO/NC]	00: NO (normal open) 01: NC (normal close)	00				No

Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
P153	Multi input [Ex. IN4] activate state [ExIN-Term[4] NO/NC]	00: NO (normal open)	00				No
		01: NC (normal close)					
P154	Multi input [Ex. IN5] activate state [ExIN-Term[5] NO/NC]	00: NO (normal open)	00				No
		01: NC (normal close)					
P155	Multi output [Ex. OUT1] activate state [ExOUT-Term[11] NO/NC]	00: NO (normal open)	00				No
		01: NC (normal close)					
P156	Multi output [Ex. OUT2] activate state [ExOUT-Term[12] NO/NC]	00: NO (normal open)	00				No
		01: NC (normal close)					
P157	Multi output [Ex. OUT3] activate state [ExOUT-Term[13] NO/NC]	00: NO (normal open)	00				No
		01: NC (normal close)					
P160	Multi input [Ex. IN1] response time [Response time EX[1]]	0 to 200 (ms)	1				Yes
P161	Multi input [Ex. IN2] response time [Response time EX[2]]	0 to 200 (ms)	1				Yes
P162	Multi input [Ex. IN3] response time [Response time EX[3]]	0 to 200 (ms)	1				Yes
P163	Multi input [Ex. IN4] response time [Response time EX[4]]	0 to 200 (ms)	1				Yes
P164	Multi input [Ex. IN5] response time [Response time EX[5]]	0 to 200 (ms)	1				Yes
P170	Multi output [Ex. OUT1] on-delay time [ON-delay time Ex[11]]	0.0 to 100.0 (sec)	0.0				Yes
P171	Multi output [Ex. OUT1] off-delay time [OFF-delay time Ex[11]]	0.0 to 100.0 (sec)	0.0				Yes
P172	Multi output [Ex. OUT2] on-delay time [ON-delay time Ex[12]]	0.0 to 100.0 (sec)	0.0				Yes

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Display code	Function name	Setting range/content	Default setting	Convert F020	Convert F021	Convert F022	Change during RUN
P173	Multi output [Ex. OUT2] off-delay time [OFF-delay time Ex[12]]	0.0 to 100.0 (sec)	0.0				Yes
P174	Multi output [Ex. OUT3] on-delay time [ON-delay time Ex[13]]	0.0 to 100.0 (sec)	0.0				Yes
P175	Multi output [Ex. OUT3] off-delay time [OFF-delay time Ex[13]]	0.0 to 100.0 (sec)	0.0				Yes
P204	2nd-motor Speed feedback source selection [SPD-FB Source Sel, 2nd]	00: non (no use) 01: ch1-inc (Incremental (CH1)) 02: ch1-HIPER (HIPERFACE (CH1)) 03: ch1-En2.1 (EnDat 2.1 (CH1)) 04: ch1-En2.2 (EnDat 2.2 (CH1)) 05: ch2-inc (Incremental (CH2)) 06: ch2-HIPER (HIPERFACE (CH2)) 07: ch2-En2.1 (EnDat 2.1 (CH2)) 08: ch2-En2.2 (EnDat 2.2 (CH2))	00				No
P205	2nd-motor Position feedback source selection [POS-FB Source Sel, 2nd]	00: non (no use) 01: ch1-inc (Incremental (CH1)) 02: ch1-HIPER (HIPERFACE (CH1)) 03: ch1-En2.1 (EnDat 2.1 (CH1)) 04: ch1-En2.2 (EnDat 2.2 (CH1)) 05: ch2-inc (Incremental (CH2)) 06: ch2-HIPER (HIPERFACE (CH2)) 07: ch2-En2.1 (EnDat 2.1 (CH2)) 08: ch2-En2.2 (EnDat 2.2 (CH2))	00				No

* From firmware version 1.09

8-3   User Parameters

It is possible to set up to 32 user parameters selected from all the inverter parameters. If the parameter access level is set to F011=02: USER, only this list of parameters can be edited.

This mode is easily recognized by "USR" indication in the status bar.

Display code	Function name	Setting range/content	Default setting
U001 to U032	User display setting 1 to 32 [User Display 01] to [User Display 32]	no / F001 to P175	-

8-4   Sequence Errors

There is a family of errors that are not directly related to an inverter hardware problem.

This errors have been made flexible and they can be set to behave as standard inverter errors or as particular sequence error that can be reported separately to the lift controller.

E81: Speed reference error (high speed was recall after crawl operation).

E82: Contactor check error (contactor feedback signal mismatch).

E83: Brake check error (brake confirmation signal mismatch).

E95: NFS input not exist (for relative positioning, NFS operation not correct).

E97: RUN request at GS active (inverter is in safety state when RUN is request).

E98: Lift movement timeout (after UP/DOWN signal, lift does not move for a time).

E99: Brake open conditions not OK after A090 time at start of sequence.

Display code	Function name	Setting range/content	Default setting
A105	High speed retrigger	00: Disable	00
		01: Enable	
A106	High-speed retrigger mode	00: Stop	00
		01: Error	
		02: Seq-Err	
		03: Silent error	
b070	Separated Contactor check error	00: Error	00
		01: Seq-Err	
		02: Silent error	
b071	Separated brake check error	00: Error	00
		01: Seq-Err	
		02: Silent error	
b072	Separated NFS no input error	00: Error	00
		01: Seq-Err	
		02: Silent error	
b074	Separated RUN active @GS error	00: Error	00
		01: Seq-Err	
		02: Silent error	
b075	Separated Lift time out error	00: Error	00
		01: Seq-Err	
		02: Silent error	
b076	Lift movement timeout time setting	0.00 to 10.00 (sec)	5.00
b077	Lift movement timeout level setting	0.00 to 400.00 (Hz)	0.00
b078	Separated Brake condition error	00: Error	00
		01: Seq-Err	
		02: Silent error	
C021 to C023	Multi output terminal [11 to 13] setting	58: SEQ (SEQ error)	-

8-5 All Error Codes

Error code	Error Name	HW/SW	Res	Auto RES	Content
E01	Over current protection	HW	OK	OK	Instantaneous over current @constant speed
E02					Instantaneous over current @acceleration
E03					Instantaneous over current @deceleration
E04					Instantaneous over current @other timing
E05	Motor Over load	SW	OK	OK	Internal electronic thermal protection circuit detects a motor overload
E06	Dynamic brake resistor over load	SW	OK	OK	Dynamic brake resistor operation rate exceeded the setting of "b097"
E07	DC bus Over voltage	HW	OK	OK	DC bus voltage rises too high
E08	EEPROM error	SW			Saved Data loss or data incorrect
E09	Under voltage	SW	OK	OK	Voltage drop in DC bus or control supply
E10	Current sensor error	SW			CT in the inverter has become abnormal
E11	CPU error	SW			CPU has operated erratically or gone abnormal
E12	External fault	SW	OK		External device has become abnormal, inverter fetches that signal
E14	Ground fault	HW			When the power supply is turn on, this function detect the ground fault between inverter output and the motor
E15	Input over voltage	HW	OK	OK	Input voltage is kept above 380/760VDC for 100 sec
E16	Instantaneous power failure	SW	OK	OK	Instantaneous power failure lasts 15ms or more
E20	Over heat @FAN stop	HW	OK	OK	Lowering of cooling-fan speed is detected @temperature error
E21	Over heart	HW	OK	OK	Power module temperature rises
E23	GA communication error	SW	OK	OK	Error in Gate array communication
E24	Input phase loss	SW	OK	OK	One of main phase is not connected to the inverter power supply
E25	Main circuit error	HW			Gate array cannot confirm the on/off state of power module
E30	IGBT error	HW	OK	OK	Actuated by the detector incorporated in the power module
E31	IGBT overcurrent	SW	OK	OK	IGBT and FWD are protected against high peak currents depending on carrier frequency setting. Reduce carrier to avoid the trip.
E34	Output phase loss detection	SW	OK	OK	When a output phase loss is detected, an inverter outputs "Output phase loss" error.
E35	Motor over heart	HW	OK	OK	Inverter monitors the resistance of thermistor connected to the inverter's TH terminal
E38	Over load @Low speed	SW	OK	OK	Overload occurs during the motor operation at very low speed at 0.2Hz or less
E39	Controller Over load	SW	OK	OK	Internal electronic thermal protection circuit detects a controller overload
E41	Modbus communication time out	SW	OK	OK	Timeout occurs because of line disconnection during the communication in Modbus-RTU mode
E43	Drive Programming invalid instruction	SW	OK		- The PRG terminal was turned on without a program down loaded to the inverter
					- The program stored in inverter memory has been destroyed

Error code	Error Name	HW/SW	Res	Auto RES	Content
E44	Drive Programming nesting count error	SW	OK		- Subroutines are nested in more than 8 layers
					- For next loop statements are nested in more than 8 layers
					- If statements are nested in more than 8 layers
E45	Drive Programming instruction error	SW	OK		- The jump destination of a go to instruction is a next instruction to end a for or other loop
					- The variable "U(ii)" referenced via another variable is not found
					- An arithmetic instruction caused:
					1) Overflow
					2) Underflow
					3) Division by zero
					- A "chgparam" instruction caused:
					1) Reference to a nonexistent parameter
					2) Writing of a value out of the setting range
					3) Change of a parameter value that cannot be updated during inverter operation
					4) Change of a parameter value of which updating is restricted by software lock
E50	Drive Program user trip 0	SW	OK		User "Trip 0" command by Drive Program
E51	Drive Program user trip 1	SW	OK		User "Trip 1" command by Drive Program
E52	Drive Program user trip 2	SW	OK		User "Trip 2" command by Drive Program
E53	Drive Program user trip 3	SW	OK		User "Trip 3" command by Drive Program
E54	Drive Program user trip 4	SW	OK		User "Trip 4" command by Drive Program
E55	Drive Program user trip 5	SW	OK		User "Trip 5" command by Drive Program
E56	Drive Program user trip 6	SW	OK		User "Trip 6" command by Drive Program
E57	Drive Program user trip 7	SW	OK		User "Trip 7" command by Drive Program
E58	Drive Program user trip 8	SW	OK		User "Trip 8" command by Drive Program
E59	Drive Program user trip 9	SW	OK		User "Trip 9" command by Drive Program
E60 to E69	Option 1 error 0 to 9	HW/SW	OK		
E70 to E79	Option 2 error 0 to 9	HW/SW	OK		
E81	Speed-reference error	SW	OK	OK	High speed re-trigger (@A105 = 00)
E82	Contactor check error	SW	OK	OK	Detected no output contactor answer back for A092 time setting
E83	Brake check error	SW	OK	OK	Detected no output brake answer back for A095 time setting
E84	Wrong rotation detection	SW	OK	OK	The direction of the RUN command is opposite in the direction at the detection speed
E85	Encoder disconnection (CH1) (Communication timeout)	SW	OK		Timeout occurs because of line disconnection during the communication between Encoder to Inverter
E86	Encoder disconnection (CH2) (Communication timeout)	SW	OK		Timeout occurs because of line disconnection during the communication between Encoder to Inverter
E87[*1]	Encoder disconnection (CH1)	HW/SW	OK		Detected when no encoder pulses are received for a time longer than the setting of P035
E88[*1]	Encoder disconnection (CH2)	HW/SW	OK		Detected when no encoder pulses are received for a time longer than the setting of P035
E89	Over acceleration	SW	OK	OK	The acceleration more than the P042 setting value continued more than the P043 setting time

Error code	Error Name	HW/SW	Res	Auto RES	Content
E90	Over speed detection	SW	OK	OK	The over speed more than the P038 setting value continues at the P039 setting time
E91	Speed deviation detection	SW	OK	OK	The speed deviation more than the P040 setting value continues at the P041 setting time
E92	FB-option not connect	SW	OK		It drove without installing the feedback option with the FVC control had been selected
E93	Setting data is wrong for FB-option	SW	OK		The mistake is found in the setting concerning the feedback option
E94	Position control range error	SW	OK	OK	Position counter becomes 268435455 pulses or more
E95	NFS signal is not input	SW	OK	OK	When positioning is completed, the NFS signal is not input in the "Direct Position 1"
E97	RUN is requested at GS active	SW	OK	OK	The UP/DWN signal was turned on in the state of effective GS
E98	Lift movement timeout	SW	OK	OK	When RUN is requested and after a b076 time, the output speed was below the b077 setting value
E99	Brake conditions for start are not fulfilled	SW	OK	OK	After the A090 setting time passes, the brake control cannot be begun.

Note   1: It is effective only in CLV control (A044/A244 = "05" or "06").

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