

Mitsubishi Frequency Converter Setting Instructions

Lean-Lift



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1. General instructions

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1.1 Intended use



Caution

These Setting Instructions are intended for trained technicians employed by the Hänel factory or by Hänel representatives.

All safety instructions and general instructions provided in the Operating Manual "MANL-LL" and in the corresponding Installation Instructions "INST-LL-S" for Lean-Lift must be observed at all times!

In addition, the "Safety Rules & Requirements" provided in the Memorandum for Technical Field Service "SICHA-__" must be observed at all times.

Intended use

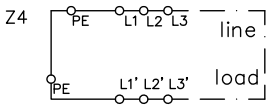
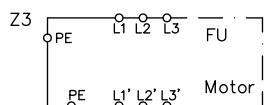
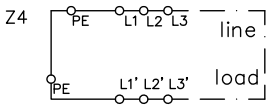
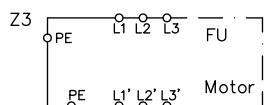
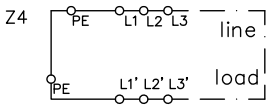
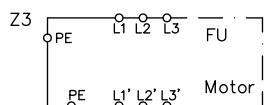
For Lean-Lift with Mitsubishi type FR-A840, FR-A740 or FR-A741 frequency converter.

A frequency converter is used to control the speed of the induction motors. This ensures soft start-up and accurate positioning.

1. General instructions (continued)

1.2 Safety instructions

	SAFETY INSTRUCTION Also refer to the safety instructions in the Mitsubishi installation manuals or user guides.	The Mitsubishi installation manuals and user guides are available for download at: www.Mitsubishi-automation.com/Download
	⚠ DANGER Risk of electrocution! The P+ and N- power terminals of the frequency converter carry potentially fatal high voltage, even when the main switch is switched off.	- Before removing the front cover, switch off the main switch and wait for 10 minutes. - The frequency converter must be earthed using an earth wire.
	SAFETY INSTRUCTION The lift must be de-energised before the front cover is removed. - Switch off the main switch and secure it from being switched on again. - Wait 10 minutes until the capacitors of the frequency converters have discharged to a safe voltage level. - Verify that the lift has been de-energised. An orange LED on the frequency converter signals the residual voltage of the capacitors. - When the main switch is switched on, the front cover must be installed.	- Even if the voltage is switched off, the front cover should be removed only for wiring or inspection. - All work on the electrical equipment of the lift may be carried out by authorised electricians only. - The earthing using an earth wire must conform to national and local safety instructions and directives. (JIS, NEC Section 250, IEC 536 Class 1 and other standards).
	 ⚠ WARNING Fire and burns from hot surfaces Incorrect connections and a missing shielding plate of the braking resistor cause a fire hazard (not for FR-A741).	- The surface of the frequency converter can be very hot and presents a burn hazard. - The surface temperature of the braking resistor can reach well over 100°C (212°F) (not for FR-A741).
	SAFETY INSTRUCTION - Install the frequency converter on non-combustible materials only. - Do not touch the braking resistor or frequency converter shortly after switching off the lift. The surface can be very hot and presents a burn hazard.	- If the frequency converter is damaged, switch off the main switch of the lift. - Do not connect the optional braking resistor directly to DC terminals P+ and N- (not for FR-A741). - The shielding plate on the braking resistor must be installed and ensures the proper clearances from cables, other units and system parts (not for FR-A741).

	⚠ WARNING Electrical hazard! Remove the cooling fans with the main switch switched off only.			
	⚠ CAUTION Input and output filters To prevent electromagnetic interference, the input and output filters must be installed in accordance with the generally applicable rules for EMC-compliant installation of frequency converters.	<table><tr><td> Z4 Mains filter for compliance with EMC limit values  </td><td> Z3 Output filter for protection of the motor and for observing the EMC threshold values  </td></tr></table> Always compare the connection to the circuit diagram.	Z4 Mains filter for compliance with EMC limit values 	Z3 Output filter for protection of the motor and for observing the EMC threshold values 
Z4 Mains filter for compliance with EMC limit values 	Z3 Output filter for protection of the motor and for observing the EMC threshold values 			
	SAFETY INSTRUCTION In the Lean-Lift with FR-A741 frequency converter, the input filter Z4 and output filter Z3 components are under a cover in the electrical drawer and are accessible when the frequency converter is removed.			
	⚠ CAUTION Insulation test at power terminals only: No insulation test (insulation resistance) may be carried out in the control circuit of the frequency converter.	Insulation test may be carried out at the power terminals only.		

1. General instructions (continued)

1.3 Description

The connection of contactors allows multiple motors to be operated sequentially with only one frequency converter.

The supply voltage is 200-240, 380 V or 500-575 V three-phase current with a mains transformer or 400-480 V three-phase current, each 50 or 60 Hz.

The motors are generally designed for a power frequency of 50 Hz and can only be operated on a frequency converter.

The **vertical motor** is operated with a cut-off frequency of 64 Hz for high-speed drives and 87 Hz for economy-speed drives. This means that the motor is supplied with the motor voltage 400 V only at 64 Hz or 87 Hz and with the rated motor voltage of 320 V or 230 V at 50 Hz.

The **horizontal motor** is generally operated with a cut-off frequency of 87 Hz for high-speed or economy-speed drives. This means that the motor is supplied with the motor voltage 400 V only at 87 Hz and with the rated motor voltage of 230 V at 50 Hz.

The **output frequency** is controlled continuously from 0 Hz to 150 Hz for the high-speed version or from 0 Hz to 120 Hz for the economy-speed version by the MP control system. For this purpose, the microprocessor control system controls the nominal frequency of the converter via an analogue input (0-10V). The **nominal frequency** can be adapted using parameter 903 on the frequency converter.

For the respective setting values, refer to the tables in the annex "Frequency converter setting values for the Mitsubishi type FR-A840, FR-A740 or FR-A741".

2. Mitsubishi frequency converter

2.1 Type overview of Mitsubishi models used

Model Mitsubishi		Input voltage	Output	Frequency converter rated current IFU	Dimensions W x H x D
FR-A 740- 00083-E8 FR-A 740-00126-E8	 FR-A740	380 V to 480 V -15% / +10%	2.2 kW 3.7 kW	6 A 9 A	150x140x260 mm (5.91x5.51x2.36")
FR-A-740-00170-E8 FR-A-740-00250-E8	 FR-A740	380 V to 480 V -15% / +10%	5.5 kW 7.5 kW	12 A 17 A	220x170x260 mm (8.66x6.69x10.24")
FR-A-741-00170-E8 FR-A 741-00250-E8	 FR-A741	380 V to 480 V -15% / +10%	5.5 kW 7.5 kW	12 A 17 A	250x270x470 mm (9.84x10.63x18.50")
FR-A-840-00083-2-60 FR-A-840-00126-2-60	 FR-A840	380 V to 480 V -15% / +10%	2.2 kW 3.7 kW	6 A 9 A	150x140x260 mm (5.91x5.51x2.36")
FR-A-840-00170-2-60 FR-A-840-00250-2-60	 FR-A840	380 V to 480 V -15% / +10%	5.5 kW 7.5 kW	12 A 17 A	220x170x260 mm (8.66x6.69x10.24")

2. Mitsubishi frequency converter (continued)

2.2 Connections



Refer also to the power component/control component circuit diagram.

Power system	L1	U	Motor
3 Ph	L2	V	3 Ph
50(60) Hz	L3	W	0-150 Hz
Earth wire connection	PE	2	Analogue voltage 0-10V DC
		5	Analogue voltage 0V DC
		MRS	Controller block
Braking resist	PR	RL	Parameter set 2
(not for FR-A741)	+	RM	U/f vector switching 2
		RH	Parameter set 3
Separate control voltage	L11	RT	U/f vector switching 3
Separate control voltage	L21	SE	24 VDC
		SD	0 VDC
Brake vertical (K91)	RUN	STR	Move down/in
Brake horizontal (K92)	FU	STF	Move up/out
Error message (K8)	IPF		
		S1	"Safely shut off torque" (Channel 1)
Ext. mains supply	+24	S2	"Safely shut off torque" (Channel 2)
Ext. mains supply	SD	SiC	Reference point for S1, S2 inputs
		SO	"Safely shut off torque" output
		SOC	Reference point for SO output

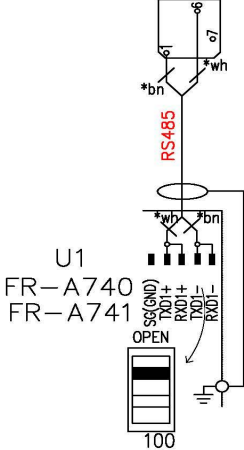
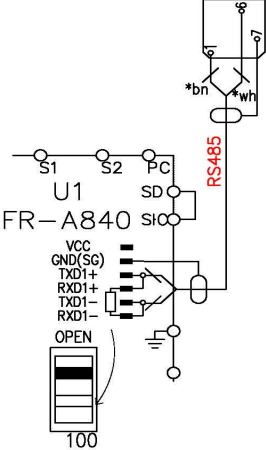
2. Mitsubishi frequency converter (continued)

2.3 FR-A740, FR-A741 or FR-A840 RS-485 interface terminating resistor

2.3.1 With MP12D-CPU-1 (S8-40) MP12D/N-CPU-1 (S8-45) or MP12N-CPU-1 (S8-52-02)



For lifts with MP 12D-CPU-1 (S8-40) or MP 12D/N-CPU-1 (S8-45) or MP 12N-CPU1 (S8-52-02) as version V02 for model years before 03/2017, no terminating resistor is necessary for the RS-485 interface.

Frequency converter type FR-A740 / FR-A741 / FR-A840	MP12D-CPU-1 (S8-40) MP12D/N-CPU-1 (S8-45) or MP12N-CPU-1 (S8-52-02)	
	FR-A740 / FR-A741	FR-A840
X81 board connector of the RS-485 connecting cable <u>without</u> terminating resistor in accordance with the circuit diagram. The terminating resistor at the DIP switch is switched off (factory setting).	 U1 FR-A740 FR-A741	 U1 FR-A840
	Shielding of the RS-485 connecting cable at the frequency converter earthing point.	Connection between the signal ground GND(SG) from the frequency converter to MP12D/N or MP12N-CPU-1 control system via Pin 7 on the X81 board connector.

2. Mitsubishi frequency converter (continued)

2.3 FR-A740, FR-A741 or FR-A840 RS-485 interface terminating resistor (continued)

2.3.2 With MP12N-CPU-1 (S8-52-03) as version V03 and program version CPU-1 $\geq$ V3.3



For lifts with MP 12N control system and MP 12N-CPU1 (S8-52-03) as version V03, a terminating resistor (fitted on X81 board connector and switched on at the frequency converter) is necessary at both ends for the RS-485 interface with program version CPU-1 $\geq$ V3.3.

Frequency converter type	FR-A740 / FR-A741	FR-A840
The X81 board connector with attached 100 ohm terminating resistor in accordance with the circuit diagram		
	Shielding of the RS-485 connecting cable at the frequency converter earthing point.	Connection between the signal ground GND(SG) from the frequency converter to the MP12N-CPU-1 control system via Pin 7 on the X81 board connector.
Position of the terminating resistor on the frequency converter: The 100 ohm terminating resistor is switched on at the DIP switch.		

2. Mitsubishi frequency converter (continued)

2.4 Control units

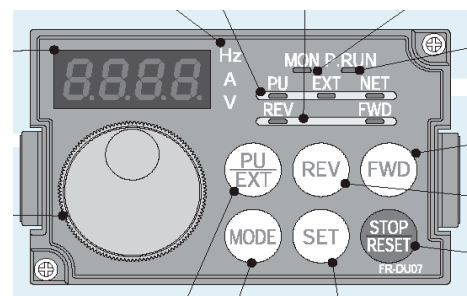
	WARNING Electrical hazard! Inputs via the control units must always be made with dry hands.	
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For the Mitsubishi frequency converter, the control units differ depending on the type as follows:

1a. FR-DU07 control unit (only for FR-A740, FR-A741 frequency converter)

This is the control unit provided.

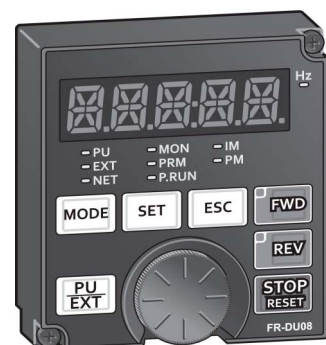
All parameters can be displayed and various values, such as output frequency, apparent current, motor voltage, peak current, and peak value of the link voltage can also be displayed.



1b. FR-DU08 control unit (only for FR-A840 frequency converter)

This is the control unit provided.

All parameters can be displayed and various values, such as output frequency, apparent current, motor voltage, peak current, and peak value of the link voltage can also be displayed.



1c. FR-PU07 programming unit (optional for FR-A840, FR-A740 or FR-A741)

This programming unit is only available as an option and must be operated by trained HÄNEL service personnel only.

Differences to standard FR-DU07 control unit:

- Direct input is possible.
- VF display for easy-to-understand operation and display.

The programming unit can be plugged in using an extension cable (patch 1:1).

All parameters (for FR-A840 only up to parameter <= 999) can be displayed. Using the HELP button, various values, such as output frequency, apparent current, motor voltage, peak current, and peak value of the link voltage can also be displayed.



This document does not provide a description of operation with the FR-PU07 programming unit.



2. Mitsubishi frequency converter (continued)

2.5 Displaying and modifying parameters (with MP 12D/N control system or MP12 N control system and RS485 connection)

SAFETY INSTRUCTION	
- All parameters of the FR-A840, FR-A740 and FR-A741 frequency converters have been configured at the factory. - Parameters may be adjusted only after consulting with the HÄNEL factory in Bad Friedrichshall, Germany.	- The parameter list provided when delivered from the factory corresponds to a tried-and-tested configuration. - An incorrect setting may mean that the device no longer works properly.



Refer to the corresponding "Supplementary Description of the Service Functions Microprocessor Control System MP 12N (z-serfkt.en)".

FR-A740 Up to MP12D/N-CPU-1 program version V2.3/1	FR-A740 / FR-A741 / FR-A840 MP12D/N-CPU-1 program version V2.3/2 or later MP12N-CPU-1 program version V3.0 or later
The initialisation prompt "FREQUENCY CONVERTER WITH RS485" must be set to "YES".	
Only a few parameters are enabled for modification by the MP 12D/N control system or MP12N control system within a minimum and maximum setting range.	
FREQUENCY CONVERTER COMMUNICATION 1 DISPLAY PARAMETERS 2 CHANGE PARAMETERS 3 LOG FREQUENCY CONVERTER ERRORS [// CE /]	FREQUENCY CONVERTER COMMUNICATION 1 DISPLAY PARAMETERS 2 CHANGE PARAMETERS 3 LOG FREQUENCY CONVERTER ERRORS 4 AUTOMATIC SETTING OF MOTOR DATA [// CE /]
The RS485 connecting cable is plugged in at the RJ-45 jack. No RS485 connection is possible by plugging in the control unit.	The RS485 connecting cable has a fixed connection to the frequency converter at terminals TXD and RXD. The FR-DU07 and FR-DU08 control units can be operated at the same time.
Parameters can also be changed using the FR-DU04 control unit.	All parameters are write-protected and cannot be changed via the Mitsubishi FR-DU07 or FR-DU08 control units.

2. Mitsubishi frequency converter (continued)

2.6 Error message FREQUENCY CONVERTER <X> (only with MP 12D/N or MP12 N control systems and RS485 connection)

An internal frequency converter error message is signalled when the error message "FREQUENCY CONVERTER <X>" appears. The number code <X> may be deciphered using the table below.

MP 12D/MP 12N control system Number code <X>	Mitsubishi FR-A Brief description	Mitsubishi error description	MP 12D/MP 12N control system Number code <X>	Mitsubishi FR-A Brief description	Mitsubishi error description
0		Error not defined	160	E.OPT	Error related to connection with an (external) option unit
16	E.OC1	Overcurrent at acceleration	161	E.OP1	Error in the internal (expansion slot) installed communication option unit
17	E.OC2	Overcurrent at constant speed	163	E.OP3	Error of communication option
18	E.OC3	Overcurrent for braking operation or stop	164	E.16	Error display triggered by user with the PLC function
32	E.OV1	Overvoltage at acceleration	165	E.17	
33	E.OV2	Overvoltage at constant speed	166	E.18	
34	E.OV3	Overvoltage for braking operation or stop	167	E.19	
48	E.THT	Frequency converter overload protection	168	E.20	
49	E.THM	Motor overload protection	176	E.PE	Memory error
64	E.FIN	Overheating of the heat sink	177	E.PUE	Connection error to control unit
80	E.IPF	Instantaneous power failure, safety function	178	E.RET	Number of retries exceeded
81	E.UVT	Undervoltage protection	179	E.PE2	Memory error
82	E.ILF	Input phase error	192	E.CPU	CPU error
96	E.OLT	Shutoff protection, motor overload protection	193	E.CTE	Short-circuit of connection to control unit, short-circuit of second serial interface
97	E.SOT	Missing synchronisation	194	E.P24	Short-circuit of the 24 V DC output voltage
112	E.BE	Braking transistor error	196	E.CDO	Permitted leakage current exceeded
128	E.GF	Overcurrent due to earth fault	197	E.IOH	Overheating of the switch-on resistor
129	E.LF	Open output phase	198	E.SER	Communication with MP control system
144	E.OHT	Triggering an external protective motor switch (thermal contact)	199	E.AIE	Analogue input error
145	E.PTC	PTC thermistor activation	200	E.USB	USB interface communication error

2. Mitsubishi frequency converter (continued)

2.6 Error message FREQUENCY CONVERTER <X> (only with MP 12D/N or MP12 N control systems and RS485 connection) (continued)

MP 12D/MP 12N control system Number code <X>	Mitsubishi FR-A Brief description	Mitsubishi error description	MP 12D/MP 12N control system Number code <X>	Mitsubishi FR-A Brief description	Mitsubishi error description
201	E.SAF	Error in the safety circuit	225	E.IAH	Internal excess temperature
202	E.PBT	Error in internal circuit	228	E.LCI	Loss of current target value
208	E.OS	Speed too high	229	E.PCH	Error in pre-filling mode
209	E.OSD	Speed deviation too high	230	E.PID	Signal error in PID control
210	E.ECT	Encoder error (no signal)	241	E.1	Error in the internal (expansion slot 1) installed option unit
211	E.OD	Position deviation too high	242	E.2	Error in the internal (expansion slot 2) installed option unit
213	E.MB1	Brake activation error parameter 285	243	E.3	Error in the internal (expansion slot 3) installed option unit
214	E.MB2	Brake activation error parameter 282	245	E.5	CPU error
215	E.MB3	BOF signal switches during standstill	246	E.6	CPU error
216	E.MB4	BOF signal not present for more than 2s.	247	E.7	CPU error
217	E.MB5	BRI signal not present for more than 2s.	251	E.11	No delay in reversion of rotation
218	E.MB6	Although the BOF signal is switched on, the BRI signal has been switched off.	253	E.13	Error in internal circuit
219	E.MB7	BRI signal still present after more than 2s.	-	-	-
220	E.EP	Phase fault at encoder	255	-	No connection between MP control system and frequency converters
222	E.MP	Magnetic pole position unknown			

2. Mitsubishi frequency converter (continued)

2.7 Display of error messages, warnings and pre-alarms on the control unit or programming unit

Display	Mitsubishi description	Explanation for Lean-Lift
E---	Display of the error message from fault memory	Refer to SERVICE FUNCTIONS \ FREQUENCY CONVERTER \ fault memory
HOLD	Locks the control unit or programming unit	
LOCD	Password-protected	All parameters are write-protected. Parameter change only after input of a 4-digit order-specific password in Parameter 297.
Err.	Error	Control unit or programming unit not connected correctly.
OL	Motor overload protection activated (due to overcurrent)	During the vertical movement by current limit Parameter 22 or during horizontal movement by Parameter 48.
oL	Motor overload protection activated (due to intermediate circuit overvoltage)	During the downward movement
Rb	Braking resistor pre-alarm	(Not for FR-A741) During the downward movement upon exceeding 85% of the duty cycle set in Parameter 70.
TH	Pre-alarm for electronic thermal motor protection	Exceeding 85% of the root mean square motor current value set in Parameter 9 (for the vertical drive) or in Parameter 51 (for the horizontal drive).
PS	Frequency converter has been stopped by the control unit.	
SL	Speed limiter has activated	Only for speed regulation setting by parameter
CP	Copy parameters	
SA	Safely shut off torque	(Only for FR-A840) safety system is not set.
UF	USB host error	
EV	Operation with external supply voltage (24)	(Only for FR-A840) alternatively for ECOMODE option

3. Parameters and error messages

3.1 Transferring parameters using HÄNEL JUMP service software



Only for lifts that have been delivered from the factory with the Mitsubishi type FR-A740 or FR-A741 frequency converter (firmware 7992) or FR-A840 (firmware from . 8102 or higher) and have program version V2.3/2.

All parameters can be transferred using the existing RS485 connection and the JUMP service software. To do so, you need the corresponding up-to-date HÄNEL frequency converter parameter file "FREQUEN1_Vxxxx.FRA" (also refer to www.service-hanel.de/Download).

Step	Task	General
1	- Create the RS232 connection to the PC and interface S2 of the MP 12D control system. - Establish the Ethernet connection to the PC and the Ethernet interface of the MP 12N control system.	Note: For automatic selection of the correct parameter set, the correct drive type (ES11 to ES51) or (HS21 to HS51) must be entered in the initialisation. For additional information, refer to the specification on the type plate.
2	(Only for MP 12D control system:) Call up the "Software update" menu - Switch on the lift. - Press the [1] key until the "Software update" menu is displayed. → "Software update" menu is displayed. - In the "Software Update" menu, press the [4] key (Set frequency converter parameters). - Press the [↑] / [↓] key to select the baud rate. - The number of data bits is fixed at "8" and the number of stop bits is fixed at "1". The interface used is S2 = X38. - Press the [←] key.	For more information, refer to the Technical Description for Microprocessor Control System MP 12D "T-12D", Service notes.
3	Start JUMP and call up Upload\Frequency converter parameters. (MP 12D and MP 12N control systems) - Start the JUMP software. - Select and open the corresponding HÄNEL "Frequen1.FRA" file. → A progress display in the form of a bar shows the status of data transmission. The data are transmitted to the CPU 1. → Once the parameters have been transferred correctly, this is indicated by a corresponding display of the control system. → Frequency converter parameters have been transferred.	For additional information, refer to www.service-hanel.de/Download  Copying the parameters is not possible for the FR-DU07, FR-DU08 or FR-PU07 control units. Parameters are transmitted solely using the HÄNEL JUMP using the current "Frequen1.FRA" file.
4	Switch off the lift.	

3. Parameters and error messages (continued)

3.2 Notes on certain parameters and error messages

3.2.1 General notes for parameters of the types FR-A740 / FR-A741 / FR-A840



The parameter file Frequen1_Vxy.FRA transfers the setting values.
Using the MP12D/N or MP12N control system, certain parameters are adjusted during the parameter transfer or even before the lift run and can differ from the setting values from the Annex.

Parameter / Designation		FR-A740	FR-A741	FR-A840
1	Maximum output frequency	For the setting > 120 Hz, e.g. for lifts with the drive type HS21 to HS51, configuration occurs using Parameter 18.		
20	Reference frequency for acceleration/deceleration time	The frequency converter uses this setting to change the parameters for the acceleration and deceleration ramps (Parameter 7, 8, 43, 44, 110, 111). For manual entry of the parameters using the control unit, this parameter must be set in order before the parameters 7, 8, 43, 44, 110, 111.		
8	Deceleration ramp parameter set 1 (vertical drive)	This parameter for the deceleration ramp is adapted to the smaller value by the MP12D/N or MP12N control system at the time of the parameter transfer.		
22	Current limit parameter set 1 (vertical drive)	This parameter is increased before the lift run due to run-in compensation of the MP12D/N or MP12N control system by a factor of 1.05 to 1.25 depending on the run-in state.		
44	Deceleration ramp parameter set 2 (horizontal drive)	This parameter for the deceleration ramp is adapted to the smaller value by the MP12D/N or MP12N control system at the time of the parameter transfer.		
48	Current limit parameter set 2 (horizontal drive)	This parameter is increased before the lift run due to run-in compensation of the MP12D/N or MP12N control system by a factor of 1.05 to 1.1 increased depending on the run-in state.		
70	Braking resistor duty cycle	Setting range <= 15%. For lifts starting at approx. >=8.5 m (334.65") and 2x braking resistor with firmware 7992 / 5 setting value >= 50%.	Parameter not available.	Setting range <= 100%. For lifts starting at approx. >=8.5 m (334.65") and 2x braking resistor setting value >= 50%.
81	Number of motor poles for automatic setting of motor data.	For the parameter transfer, the value 14 is transferred as described in the parameter file. For manual input of the parameters via the control unit, a value of 4 must be set.		For the parameter transfer, the value 14 is changed to a value of 4 by the MP12N control system with a CPU-1 program version: V3.2 or later, and then it is transferred. For manual input of the parameters via the control unit, a value of 4 must be set.
82, 90 .. 94, 96	Parameters for the vector control parameter set 1 (vertical drive)	These parameters are set during automatic setting of motor data (AUTOTUNE) by the MP12D/N or MP12N control system and by the frequency converter.		

3. Parameters and error messages (continued)

3.2 Notes on certain parameters and error messages (continued)

Parameter / Designation		FR-A740	FR-A741	FR-A840
51, 450, 451, 456 .. 463	Parameters for the vector control parameter set 2 (horizontal drive)	These parameters are set during automatic setting of motor data (AUTOTUNE) by the MP12D/N or MP12N control system and by the frequency converter.		
168 169	Firmware version Parameter 168 / 169	7992 / 4: Minimum version 7992 / 5: Optional for Parameter 70 >= 50%	8102 / >= 10: Minimum version 8102 / 18: Current default.	8485 / >= 6: Minimum version 8485 / 10: Current default.

3.2.2 Special notes on the hidden parameters for the manual input of parameters.



The parameters listed below are hidden parameters and can be changed only with the FR-PU04 programming unit by entering a value of 801 in Parameter 77.

Parameter / Designation		FR-A740	FR-A741	FR-A840
155	Switch-on condition for RT signal	For the parameter transfer, the value 1 is transferred as described in the parameter file. For manual input, this requires setting Parameter 77 to the value 801 with the FR-PU04 programming unit.		
632 633 634	Setting of the initial phase error detection (for FR-A 741 / FR-A840)	Parameters are not available, see Parameter 730 to 732	For the parameter transfer, these are transferred as described in the parameter file. For manual input, Parameter 77 must be set to the value 801.	
730 731 732	Setting of the initial phase error detection (for FR-A 740)	For the parameter transfer, these are transferred as described in the parameter file. For manual input, Parameter 77 must be set to the value 801.	Parameters are not available, see Parameter 632 to 634	

3. Parameters and error messages (continued)

3.2 Notes on certain parameters and error messages (continued)

3.2.3 Notes on certain error messages



Potential display values for troubleshooting are described for the error message listed below.

Error message		Name	FR-A740	FR-A741	FR-A840
MP12 D/N control system (x)	FR-DU control unit				
(16) (17) (18)	E.OC1	Overcurrent	Check the firmware of the frequency converter using Parameter 168 / 169 at the minimum version.		
	E.OC2	Acceleration constant	7992 / >=4	8102 / >=10	
	E.OC3	Speed during braking operation	At the factory setting with Parameter 52 = 11 = PEAK I, the short-term peak current [A] after each lift run is stored and can be displayed using the control unit by pressing the SET button twice. Alternatively for FR-PU04 control unit: 11 = PEAK I = peak current [A] <= 1.8 x IFU As soon as peak current PEAK I exceeds > 180% of the frequency converter rated current, the error message E.OC1 to E.OC3 appears. For the frequency converter rated current, refer to the type overview. - Check of the power component at low-resistance connection of all 3 phases between frequency converter U1 and the respective motors. - Check of the control component, particularly in the area of the parameter switchover by contacts K2 and, where appropriate, K12.		
(32) (33) (34)	E.OV1	Overvoltage	Check the connection and resistance value of the braking resistor (not FR-A741).		
	E.OV2	Acceleration constant	FR-PU04 control unit display: 8 = DC Link = intermediate circuit voltage <= 780 V 12 = DC Peak V = Max. intermediate circuit voltage < 800 V Rb = Braking resistor pre-alarm < 85% 9 = Br.Duty % = braking resistor load / duty cycle [%]		
	E.OV3	Speed during braking operation	Parameter 70 setting range: Firmware 7992 / 4 <= 15% Firmware 7992 / 5 <= 100%	---	Parameter 70 setting range: <= 100%
			During the downward movement, the braking resistor duty cycle [%] must be less than the value set in Parameter 70. For a lift height >= 8.5 m (334.65") and 2x braking resistor in parallel, the duty cycle can be set to a value >= 50% in Parameter 70.		
(49)	E.THM	Motor overload protection	The (thermal) root mean square of the value in Parameter 9 (for the vertical drive) or in Parameter 51 (for the Horizontal drive) has been reached. Control unit, 1 x SET button = motor current [A] FR-PU04 programming unit / display 2 = Current = motor current [A] Motor current [A] <= 1.5 x Parameter 9 or 51		

3. Parameters and error messages (continued)

3.2 Notes on certain parameters and error messages (continued)

3.2.4 Notes on certain error messages (continued)

Error message		Name	FR-A740	FR-A741	FR-A840
(96)	E.OLT	Shutoff protection, motor overload protection	The vertical drive M1 or the horizontal drive M2 have been operated for ≥ 3 s at the set current limit (Parameter 22 or 48) with reduced motor frequency 0.5 Hz. Control unit, 1 x SET button = motor current [A] FR-PU04 programming unit / display 2 = Current = motor current [A] Motor current [A] $\leq$ IFU / 100% x Parameter 22 or 48 2 = Current = Motor current [A] $\leq$ IFU / 100% x Parameter 22 or 48		
(216)	E.MB4	BOF signal not working.	In order for the vertical brake to be activated by auxiliary contactor K91, a certain motor current threshold has to be achieved. Due to a lack of parameter switchover at the input terminals RL, RM, RT by contactors K2, K3 or K4, the frequency converter works in parameter set 1, but the smaller horizontal drive is operated. FR-PU04 control unit display: 15 = I/P signal = display of the input terminals 16 = O/P signal = display of the output terminals		

4. Automatic setting of motor data (autotuning) with RS485 connection

4.1 With Mitsubishi FR-A740, FR-A741 or FR-A840 through MP control system (CPU-1 program version $\geq$ V2.3/2)



Only for lifts that have been factory-equipped with the Mitsubishi type FR-A740, FR-A741 or FR-A840 frequency converter and that have been delivered with a CPU-1 program version $\geq$ V2.3/2.

4.1.1 Vertical motor M1

Before the lift is commissioned, vertical motor M1 must be measured using the "Automatic setting of motor data" function.



Refer to the corresponding "Supplementary Description of the Service Functions Microprocessor Control System MP 12N (z-serfkt.en)".

If the vertical motor has not been measured, the message "VERTICAL MOTOR AUTOMATIC SETTING NOT CARRIED OUT" is displayed. No lift run is possible, and the error message "FREQUENCY CONVERTER (16)" or "FREQUENCY CONVERTER (17)" is displayed.

4.1.2 Horizontal motor M2

Parameters P453 and P51 have already been transferred with the Frequen1 parameter file. Parameter P51 is displayed for horizontal motor M2 for automatic setting of motor data and can be modified based on the following table if necessary.



Refer to the corresponding "Supplementary Description of the Service Functions Microprocessor Control System MP 12D/N (z-serfkt.en)".

The "rated current of the motor [A]" specifications (Parameter P51) in the following table are required and are requested for automatic setting of motor data for horizontal motor M2.

Horizontal motor M2	Parameter	Leroy Somer			SEW Eurodrive		
		/250	/500	/1000	/250	/500	/1000
		4p LS71L-FCR			S37 DT 71D4	S37 DT 80K4	S37 DT 80N4
Container load in accordance with type plate		/250 - 300 HS	/400 - 500 HS	/800 - 1000 HS	/250 - 300 ES / HS	/400 - 500 HS	/800 - 1000 ES / HS
Motor data according to type plate of motor		0.37 kW Δ 230 V	0.55 kW Δ 230 V	0.75 kW Δ 230 V	0.37 kW Δ 230 V	0.55 kW Δ 230 V	0.75 kW Δ 230 V
Motor power rating [kW]	P453	0.4 kW	0.55 kW	0.75 kW	0.4 kW	0.55 kW	0.75 kW
Motor rated current [A]	P51	2.7 A	3.34 A	3.5 A	1.99 A	3.05 A	3.65 A

Table: Horizontal motors with energy efficiency class nIE until approximately 2007

Horizontal motor M2	Para- meter	SEW Eurodrive Lean-Lift <= 3260				SEW Eurodrive Lean-Lift >= 3660	
		/250	/500	/700	/1000	/500	/700
		S37 DRS 71S4	S37 DRS 71M4	S37 DRS 71M4	S37 DRS 80N4	S47 DRS 71M4	S47 DRS 71M4
Container load in accordance with type plate		/250 - 300 ES / HS	/400 - 500 ES / HS	/600 - 700 ES	/ 800 - 1000 ES / HS	/400 - 500 HS	/600 - 700 HS
Motor data according to type plate of motor		0.37 kW Δ 230 V	0.55 kW Δ 230 V	0.55 kW Δ 230 V	0.75 kW Δ 230 V	0.55 kW Δ 230 V	0.75 kW Δ 230 V
Motor power rating [kW]	P453	0.4 kW	0.55 kW	0.55 kW	0.75 kW	0.55 kW	0.75 kW
Motor rated current [A]	P51	1.98 A	2.7 A	2.7 A	3.15 A	2.7 A	3.15 A

Table: Horizontal motors with energy efficiency class IE1 in the time period from 2007 until approximately 2020

Horizontal motor M2	Para- meter	SEW Eurodrive Lean-Lift <= 3260				SEW Eurodrive Lean-Lift >= 3660	
		/250	/500	/700	/1000	/500	/700
		S37 DRN71MS4	S37 DRN71M4	S37 DRN80MK4	S37 DRN80MK4	S47 DRN80MK4	S47 DRN80M4
Container load in accordance with type plate		/250 - 300 ES / HS	/400 - 500 ES / HS	/600 - 7000 ES	/ 800 - 1000 ES / HS	/400 - 500 HS	/600 - 700 HS
Motor data according to type plate of motor		0.25 kW Δ 230 V	0.37 kW Δ 230 V	0.55 kW Δ 230 V	0.55 kW Δ 230 V	0.55 kW Δ 230 V	0.75 kW Δ 230 V
Motor power rating [kW]	P453	0.4 kW	0.4 kW	0.55 kW	0.55 kW	0.55 kW	0.75 kW
Motor rated current [A]	P51	1.6 A	1.78 A	2.25 A	2.25 A	2.25 A	3.05 A

Table: Horizontal motors with energy efficiency class IE3 starting in 2020

4. Automatic setting of motor data (autotuning) with RS485 connection (continued)

4.1 With Mitsubishi FR-A740, FR-A741 or FR-A840 through MP control system (CPU-1 program version $\geq$ V2.3/2) (continued)

4.1.3 Error messages during automatic setting of motor data

Error messages: FREQUENCY CONVERTER <X>	
FREQUENCY CONVERTER (8)	Forced termination
FREQUENCY CONVERTER (9)	Safety function during automatic setting
FREQUENCY CONVERTER (91)	Overcurrent during automatic setting
FREQUENCY CONVERTER (92)	Undercurrent during automatic setting
FREQUENCY CONVERTER (93) or CALCULATION ERROR	The motor is too small and the cable is too long.
FREQUENCY CONVERTER (94)	Frequency target value error

4. Automatic setting of motor data (autotuning) with RS485 connection (continued)

4.2 Run-in compensation and the corresponding optimised parameter file for the horizontal drives supplied at the time of delivery.

4.2.1 No run-in compensation with MP 12D control system (starting with/up to program version CPU-1 V2.3 / V2.6)

The values listed for Parameter 22 and Parameter 48 in the Annex "A-Frequen1 setting values" apply to run-in condition only. During the run-in phase, at rated load, the message "MOT.CURRENT TOO HIGH (X)" may be displayed prematurely. In this case, the setting of Parameter 22 and Parameter 48 can be adapted and increased under SERVICE FUNCTIONS \ FREQUENCY CONVERTER COMMUNICATION \ CHANGE PARAMETERS after consulting with the HÄNEL factory.

Parameter file optimised for the horizontal motor M2 supplied at the time of delivery	Leroy Somer	SEW Eurodrive			SEW Eurodrive		
	Up to 38/2009	39/2009 - 33/2010			Beginning 34/2010		
	Type / 250 .. /1000 HS	Type/ 250	Type/500 - /700	Type/ 1000	Type/250	Type/500 - /700	Type/ 1000
	4p LS71L-FCR	S37 DT 71D4	S37 DT 80K4	S37 DT 80 N4	S37 DRS 71S4	S37 DRS 71M4	S37 DT 80 N4
	0.37 - 0.75 kW	0.37 kW	0.55 kW	0.75 kW	0.37 kW	0.55 kW	0.75 kW
Standard with FR-A540	No programming using parameter file possible						
Standard with FR-A740	'=Frequen1_V2605.FRA	≥ Frequen1_V2605.FRA			≥ Frequen1_V2605.FRA		
Eco-Drive with FR-A741	---	≥ Frequen1ECO_V2605.FRA			≥ Frequen1ECO_V2605.FRA		

4.2.2 Automatic run-in compensation with MP 12N control system (starting with program version CPU-1: V2.7)

For lifts from model year 2010 with MP 12N control systems (program version CPU-1: V2.7 and), there is an automatic adaptation of the torque-dependent Parameters 22 and 48 for the FR-A740 / A741 frequency converter depending on the already consumed energy. Adapting Parameters 22 and 48 is possible only by entering a commission (order)-specific password. For program version V2.8 or higher, parameter transfer takes place independently of the version with/without ECO-DRIVE.

Parameter file optimised for the horizontal motor M2 supplied at the time of delivery	SEW Eurodrive			SEW Eurodrive			SEW Eurodrive		
	39/2009 - 33/2010			Beginning 34/2010			Beginning 35/2011		
	Type/ 250	Type/ 500 - / 700	Type/ 1000	Type/ 250	Type/ 500 - / 700	Type/ 1000	Type/ 250	Type/ 500 - / 700	Type/ 1000
	S37 DT 71D4	S37 DT 80K4	S37 DT 80 S4	S37 DRS 71S4	S37 DRS 71M4	S37 DT 80 S4	S37 DRS 71S4	S37 DRS 71M4	S37 DRS 80
	0.37 kW	0.55 kW	0.75 kW	0.37 kW	0.55 kW	0.75 kW	0.37 kW	0.55 kW	0.75 kW
Standard with FR-A740	≥ Frequen1_V2703.FRA			≥ Frequen1_V2704.FRA			Frequen1_V2928.FRA		
Eco-Drive with FR-A741	≥ Frequen1ECO_V2703.FRA			≥ Frequen1ECO_V2704.FRA					
Standard with FR-A840							Frequen1_V2930_FRA840.FRA		

4. Automatic setting of motor data (autotuning) with RS485 connection (continued)

4.2 Run-in compensation and the corresponding optimised parameter file for the horizontal drives supplied at the time of delivery. (continued)

4.2.3 Automatic run-in compensation with MP 12N control system (starting with program version CPU-1: V3.2)

For lifts of model year 2016 or later with MP 12N control system (CPU-1 program version: V3.2 or later), the FR-A840 frequency converter is supported. There is an automatic adaptation of the torque-dependent Parameters 22 and 48 for the FR-A740 / A741 frequency converter depending on the already consumed energy.

Adapting Parameters 22 and 48 is possible only by entering a commission (order)-specific password.

Parameter file optimised for the horizontal motor M2 supplied at the time of delivery	SEW Eurodrive LL <= 3260			SEW Eurodrive LL >= 3660	
	Beginning 2016				
	Type/250	Type/500 - /700	Type/1000	Type/500	Type/700
	S37 DRS 71S4	S37 DRS 71M4	S37 DRS 80	S37 DRS 71M4	S37 DRS 80
	0.37 kW	0.55 kW	0.75 kW	0.55 kW	0.75 kW
side panel with FR-A740 / A741 up to <= V3.1 with FR-A840 up to <= V3.1	Frequen1_V2928.FRA Frequen1_V2930_FRA840.FRA				
Standard with FR-A740 / A741 / A840 starting from >= V3.2	Frequen1_V3201.FRA				

4.2.4 Automatic run-in compensation with MP 12N and MP14 control system (CPU-1 program version: V3.3 or later) for IE1 + IE3 drives

For lifts of model year 40/2018 or later with MP 12N control system (CPU-1 program version: V3.2 or later), the FR-A840 frequency converter is supported. There is an automatic adaptation of the torque-dependent Parameters 22 and 48 for the FR-A740 / A741 frequency converter depending on the already consumed energy.

Adapting Parameters 22 and 48 is possible only by entering a commission (order)-specific password.

Parameter file optimised for the horizontal motor M2 supplied at the time of delivery	SEW Eurodrive LL <= 3260			SEW Eurodrive LL>=3660		SEW Eurodrive LL <= 3260			SEW Eurodrive LL>=3660	
	Beginning 40/2018					Beginning 2020				
	Type/250	Type/500 - /700	Type/ 1000	Type/500	Type/700	Type/250	Type/500	Type/700 - /1000	Type/500	Type/700
	S37 DRS 71S4	S37 DRS 71M4	S37 DRS 80	S37 DRS 71M4	S37 DRS 80	S37 DRN 71MS4	S37 DRN 71M4	S37 DRN80M K4	S37 DRN80MK4	
	0.37 kW	0.55 kW	0.75 kW	0.55 kW	0.75 kW	0.25 kW	0.37 kW	0.55 kW	0.55 kW	
Standard with FR-A740 / A741 / A840 starting from >= V3.3	Frequen1_V3312.FRA					Frequen1_V3405.FRA				

5. Automatic setting of motor data (autotuning) without RS-485 connection

Before the lift is commissioned, vertical motor M1 must be measured by the control unit using the "Automatic setting of motor data" function.

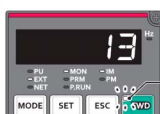
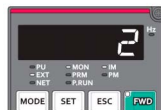
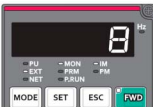


Only for lifts older than 2007 / manufacturing week 25 with program version CPU-1 ≤ V2.3/1.



Operation of the FR-DU07 and FR-DU08 control units is described in the operating manuals for the Mitsubishi frequency converter. These are available for download at: www.Mitsubishi-automation.com/Download.

5.1 Vertical motor M1

Procedure for automatic setting of motor data	FR-DU07 display for FR-A740 / 741 frequency converter	FR-DU08 display for FR-A840 frequency converter
Select "PU" operating mode	By pressing the PU/EXT button.	
Select parameter display	When you press the MODE button several times, the display of the parameter number "Pr.." appears.	
Select Parameter "96"	Turn the digital dial until "Pr96" appears on the display.	
Change parameter 96 according to value "1".	Turn the digital dial until the value "1" is displayed. Confirm the entry by pressing the SET button.	
 The automatic setting of motor data can be started only when contactor K1 for the vertical motor is switched; to do so, the safety must be set by pressing the START button on the MP 12D/N or MP 12N control system.		
Start the automatic setting by pressing the "FWD" button, "1" is displayed.		
As soon as the automatic setting of motor data is finished, "3" is displayed on the control unit.		
An error message is indicated with the values "8, 9, 91, 92 or 93"; the automatic setting of motor data must be repeated.		

5.2 Error messages during automatic setting of motor data

Error messages on the control unit			
8	Forced termination	92	Undercurrent during automatic setting
9	Safety function during automatic setting	93	The motor is too small and the cable is too long.
91	Overcurrent during automatic setting	94	Frequency target value error

6. Replacement of frequency converters after FR-A840

6.1 Replacing the FR-A540 or FR-A740 frequency converter with FR-A840

The FR-A840 frequency converter matches the existing MITSUBISHI FR-A540 or FR-A740 frequency converter in terms of dimensions, connection labels, operation and basic function and can easily replace it.

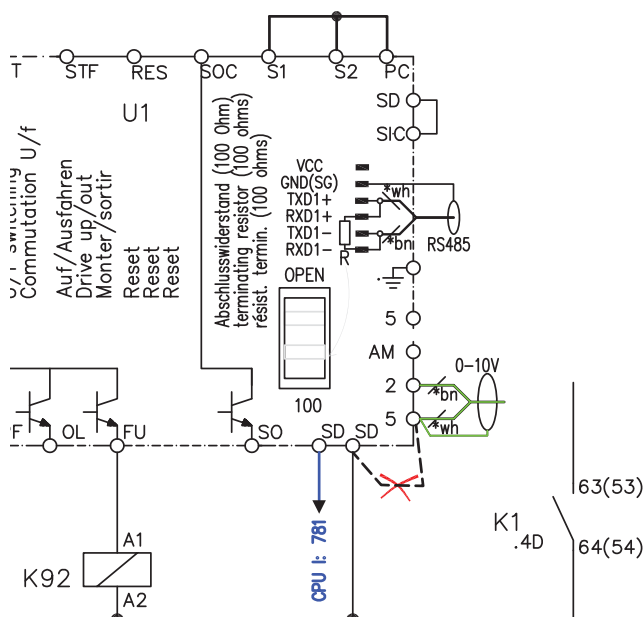
In spare part orders used as a replacement for the FR-A540 or FR-A740, an additional new sealing frame, a connecting cable with analogue voltage of 0-10 V and 6 orange double wire ferrules $l=10$ mm (0.39 in) are included in delivery.

Unlike the FR-A540 or FR-A740, the connecting cable with analogue voltage of 0-10 V is not shielded on a shield plate with a shield clamp. Instead, the shielding is connected to the 0 V DC connection via terminal 5.

In the case of FR-A740 or FR-A540, the 0 V DC connection between MP12D/N-CPU-I and SD terminal of the frequency converter is connected to the 0-10 V analogue voltage via terminal 755.

In the case of FR-A840, a blue wire connection is required between the SD terminal of the frequency converter and the MP12D/N-CPU-I terminal 781 when replacing the connecting cable with analogue voltage of 0-10 V.

Step	Task	General
1	Remove the RS485 connecting cable between the frequency converter and CPU I.	Only for MP control system with program version CPU-1 $\geq$ V2.3/2
2	Remove the connecting cable with analogue voltage (0-10 V) between the frequency converter and CPU I. Remove the connection between the frequency converter terminals 5 and SD.	
3	Replace the frequency converter, take over the existing wiring.	Use double wire ferrules with a length of 10 mm (0.39 in).
4	Connect the new RS485 connecting cable between the frequency converter and CPU I.	Only for MP control system with program version CPU-1 $\geq$ V2.3/2
5	Connect the new connecting cable with analogue voltage (0-10 V) between the frequency converter and CPU I.	
6	Establish a new wire connection between the free SD terminal of the frequency converter and CPU I: Terminal X83:781.	Use blue wire, 0.5 mm^2 (AWG18). If necessary, use double wire ferrules for connecting to CPU I.



6. Replacement of frequency converters after FR-A840 (continued)

6.2 Change FR-A840 to 7992/4 firmware for lifts with program version CPU-1 ≤ V3.1/x

6.2.1 Basis



For lifts with the MP 12D or MP 12N control system and CPU-1 program version ≤ V3.1/x with RS-485 connection, a hidden parameter must be activated on the frequency converter to detect the FR-A840. After restarting, the MP 12D / MP 12N control system detects this frequency converter. The firmware 7992/4 appears under Software versions.

6.2.2 Procedure for setting the hidden parameter with firmware 8485/x x≥7



In addition to the existing FR-DU08 control unit, a FR-PU07 programming unit is required! See Chapter 2.4

Procedure	FR-PU07 programming unit + FR-DU08 control unit
Select Parameter "77"	Connect FR-PU07 Turn the digital dial until "Pr77" appears on the display
Change Parameter 77 to "801"	Turn the digital dial until the value "801" is displayed. Confirm the entry by pressing the SET button. Remove FR-PU07, connect FR-DU08. The hidden parameter "1499" is now visible.
Select Parameter "1499"	Turn the digital dial until "Pr1499" appears on the display.
Change Parameter 1499 from "65535" (default) to "5000"	Turn the digital dial until the value "5000" is displayed. Confirm the entry by pressing the SET button.
Switch off the frequency converter and switch it back on	Parameter 168 = "7992" and Parameter 169 = "4" are exported via the RS485 connection
Reset frequency converter parameters via JUMP.	See Chapter 3

7. Annex - Mitsubishi frequency converter setting values

Revision notes

- | | |
|--|------------|
| Last issue dated: | 2007-12-12 |
| • Completely revised for possible translation into all languages. | |
| • Without added graphic | |
| • With additional safety instructions | |
| | 2009-03-10 |
| • With FR-A741 frequency converter | |
| | 2009-04-08 |
| • With reference to Z3 and Z4 | |
| | 2010-09-16 |
| • New SEW DRS motors, different power values and run-in compensation | |
| | 2011-08-24 |
| • 4.2.2 Horizontal motor M2 changed | |
| • 4.3 V2605.FRA; 2802.FRA instead of V2604.FRA; V2802.FRA; V29.FRA | |
| • FR-A840 added, FR-A540 removed | |
| | 2016-04-19 |
| • 2.3. RS-485 interface terminating resistor to match MP12D/N-CPU-1 | |
| 3.2 Notes on certain parameters | |
| | 2017-03-20 |
| • 6.1 Replacing the FR-A540 or FR-A740 with FR-A840 added | |
| | 2017-07-25 |
| • 4.2 Parameter versions updated | |
| • 4.2 Horizontal motor IE1 + IE3 for LL<=3260 and >=3660 added | |