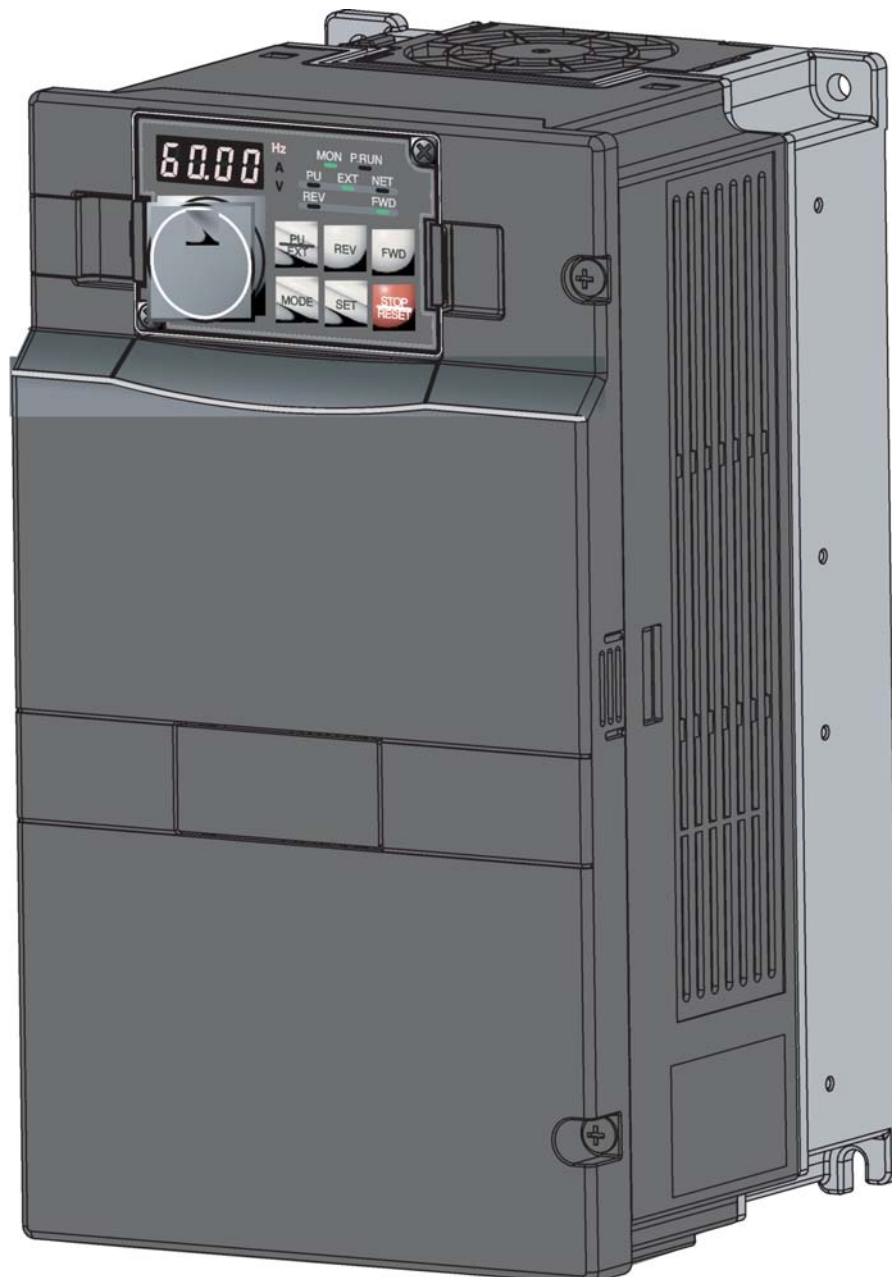




## Mitsubishi Frequency Converter Setting Instructions

Lean-Lift





## Contents

<b>1.</b>	<b>General instructions.....</b>	<b>4</b>
1.1	Intended use.....	4
1.2	Safety instructions.....	5
1.3	Description.....	7
<b>2.</b>	<b>Mitsubishi frequency converter.....</b>	<b>8</b>
2.1	Overview of Mitsubishi models used.....	8
2.2	Connections.....	9
2.3	Control units.....	9
2.4	Displaying and modifying parameters (with MP12D/N control system and RS485 connection).....	11
2.5	Error message FREQUENCY CONVERTER <X> (only with MP 12D/N control system and RS 485 connection).....	12
<b>3.</b>	<b>Transferring parameters using HÄNEL JUMP service software .....</b>	<b>13</b>
<b>4.</b>	<b>Automatic setting of motor data (autotuning).....</b>	<b>14</b>
4.1	With Mitsubishi FR-A540 or FR-A740 through control unit (up to program version V2.3/1).....	14
4.1.1	Vertical motor m1.....	14
4.1.2	Error messages during automatic setting of motor data.....	14
4.2	With Mitsubishi FR-A 740 or FR-A 741 through MP control system (from program version V2.3/2).....	15
4.2.1	Vertical motor m1.....	15
4.2.2	Horizontal motor M2.....	15
4.2.3	Error messages during automatic setting of motor data.....	15

## Annex - Mitsubishi frequency converter setting values

## 1. General instructions

### 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.


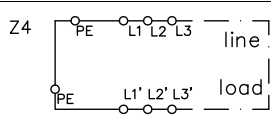
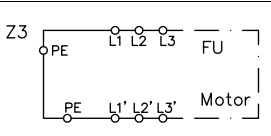
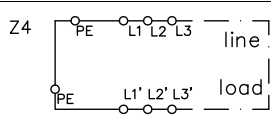
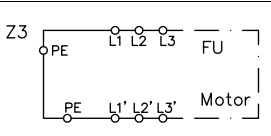
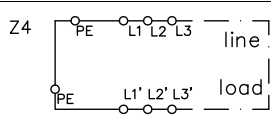
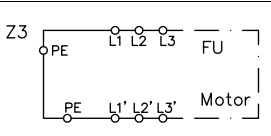


#### Intended use

For Lean-Lift with Mitsubishi type FR-A540, 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.

## 1.2 Safety instructions

	<b>SAFETY INSTRUCTION</b> Also refer to the safety instructions in the Mitsubishi installation manuals or user guides.	<ul style="list-style-type: none"> <li>The Mitsubishi installation manuals and user guides are available for download at: <a href="http://www.Mitsubishi-automation.com/Download">www.Mitsubishi-automation.com/Download</a></li> </ul>
	<b>⚠ DANGER</b> <b>Risk of electrocution!</b> <ul style="list-style-type: none"> <li>The P+ and N- power terminals of the frequency converter carry potentially fatal high voltage, even when the main switch is switched off.</li> </ul>	<ul style="list-style-type: none"> <li>Before removing the front cover, switch off the main switch and wait for 10 minutes.</li> <li>The frequency converter must be earthed using an earth wire.</li> </ul>
	<b>SAFETY INSTRUCTION</b> <b>The lift must be de-energised before the terminal cover is removed.</b> <ul style="list-style-type: none"> <li>Switch off the main switch and secure it from being switched on again.</li> <li>Wait 10 minutes until the capacitors of the frequency converters have discharged to a safe voltage level.</li> <li>Verify that the lift has been de-energised. An orange LED on the frequency converter signals the residual voltage of the capacitors.</li> <li>When the main switch is switched on, the front cover must be installed.</li> </ul>	<ul style="list-style-type: none"> <li>Even if the voltage is switched off, the front cover should be removed only for wiring or inspection.</li> <li>All work on the electrical equipment of the lift may be carried out by authorised electricians only.</li> <li>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).</li> </ul>
	<b>⚠ WARNING</b> <b>Fire and burns from hot surfaces</b> <ul style="list-style-type: none"> <li>Incorrect connections and a missing shielding plate of the braking resistor cause a fire hazard (not for FR-A741).</li> </ul>	<ul style="list-style-type: none"> <li>The surface of the frequency converter can be very hot and presents a burn hazard.</li> <li>The surface temperature of the braking resistor can reach well over 100 °C (212 °F) (not for FR-A741).</li> </ul>
	<b>SAFETY INSTRUCTION</b> <ul style="list-style-type: none"> <li>Install the frequency converter on non-combustible materials only.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>If the frequency converter is damaged, switch off the main switch of the lift.</li> <li>Do not connect the optional braking resistor directly to DC terminals P+ and N- (not for FR-A741).</li> <li>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).</li> </ul>
	<b>⚠ WARNING</b> <b>Electrical hazard!!</b> <ul style="list-style-type: none"> <li>Remove the cooling fans with the main switch switched off only.</li> </ul>	

<div>  <b>CAUTION</b> </div>			
<b>Input and output filters</b> <ul style="list-style-type: none"> <li>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.</li> </ul>	<table> <tr> <td> <b>Z4</b>  Mains filter for compliance with EMC limit values   </td><td> <b>Z3</b>  Output filter for protection of the motor and for observing the EMC threshold values   </td></tr> </table> <p>Always compare the connection to the circuit diagram.</p>	<b>Z4</b> Mains filter for compliance with EMC limit values 	<b>Z3</b> Output filter for protection of the motor and for observing the EMC threshold values 
<b>Z4</b> Mains filter for compliance with EMC limit values 	<b>Z3</b> Output filter for protection of the motor and for observing the EMC threshold values 		
<div> <b>SAFETY INSTRUCTION</b> </div>			
<ul style="list-style-type: none"> <li>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.</li> </ul>			
<div>  <b>CAUTION</b> </div>			
<b>Insulation test at power terminals only:</b> <ul style="list-style-type: none"> <li>No insulation test (insulation resistance) may be carried out in the control circuit of the frequency converter.</li> </ul>	<ul style="list-style-type: none"> <li>Insulation test may be carried at the power terminals only.</li> </ul>		

## 1.3 Description

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

The supply voltage is 200-230, 380 V or 500-575 V three-phase current with 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-A540, FR-A740 or FR-A741".

## 2. Mitsubishi frequency converter

### 2.1 Overview of Mitsubishi models used

Model Mitsubishi		Input voltage	Output	Rated converter current	Dimensions W x H x D
FR-A 540 5.5K FR-A 540 7.5K	 FR-A540	380 V to 480 V -15 % / +10 %	5.5 kW 7.5 kW	12 A 17 A	220 x 170 x 260 mm (8.66 x 6.69 x 10.24")
FR-A 740 00090 FR-A 740 00120	 FR-A740	380 V to 480 V -15 % / +10 %	2.2 kW 3.7 kW	6 A 9 A	150 x 140 x 260 mm (5.91 x 5.51 x 2.36")
FR-A 740 00170 FR-A 740 00250	 FR-A740	380 V to 480 V -15 % / +10 %	5.5 kW 7.5 kW	12 A 17 A	220 x 170 x 260 mm (8.66 x 6.69 x 10.24")
FR-A 741 00170 FR-A 741 00250	 FR-A741	380 V to 480 V -15 % / +10 %	5.5 kW 7.5 kW	12 A 17 A	250 x 270 x 470 mm (9.84 x 10.63 x 18.50")



## 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
		RT	U/f vector switching 3
		SE	24 VDC
		SD	0 VDC
Brake vertical (K9/1)	RUN	STR	Move down/in
Brake horizontal (K9/2)	FU	STF	Move up/out
Error message (K8)	IPF		

## 2.3 Control units

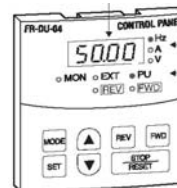
		<b>WARNING</b>	
	<b>Electrical hazard!!</b> <ul style="list-style-type: none"> <li>Inputs via the control units must always be made with dry hands.</li> </ul>		

For the Mitsubishi frequency converter, the control units differ depending on the type as follows:

## 1a. FR-DU04 control unit (only for FR-A540 frequency converter)

This is the control unit provided.

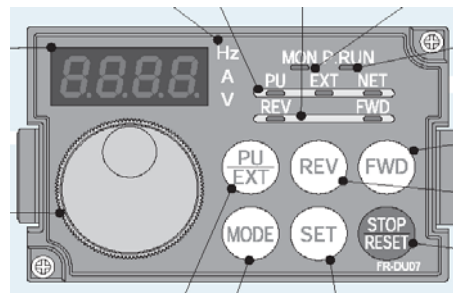
All parameters can be displayed and various values, such as output frequency, apparent current, motor voltage, peak current, and peak value of the link voltage can also be displayed.



## 1b. FR-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.



## 2a. FR-PU04 programming unit (optional for FR-A540 or FR-A740)

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:

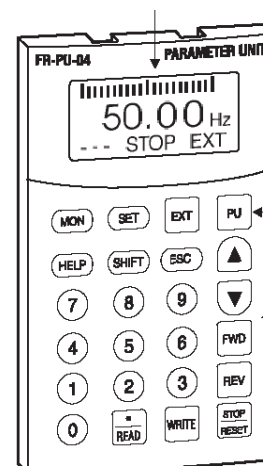
- Direct input is possible.
- VF display for easy-to-understand operation and display.

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

All parameters 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-PU04 programming unit.



## 2b. FR-PU07 programming unit (optional for FR-A540, 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 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.



## 2.4    Displaying and modifying parameters (with MP12D/N control system and RS485 connection)

SAFETY INSTRUCTION	
<ul style="list-style-type: none"> <li>• All parameters of the FR-A740 and FR-A741 frequency converters have been configured at the factory.</li> <li>• Parameters may be adjusted only after consulting with the HÄNEL factory in Bad Friedrichshall, Germany.</li> </ul>	<ul style="list-style-type: none"> <li>• The parameter list provided when delivered from the factory corresponds to a tried-and-tested configuration.</li> <li>• An incorrect setting may mean that the device no longer works properly.</li> </ul>



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

FR-A540 / FR-A740 to program version MP12D/N V2.3/1	FR-A740 / FR-A741 from program version MP12D/N V2.3/2
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 within a minimum and maximum setting range.	
<div style="background-color: #333; color: white; padding: 10px;"> <p style="text-align: center; margin: 0;">FREQUENCY CONVERTER COMMUNICATION</p> <p>■ 1 DISPLAY PARAMETERS</p> <p>2 CHANGE PARAMETERS</p> <p>3 LOG FREQUENCY CONVERTER ERRORS</p> <p style="text-align: right; margin-top: 10px;">[↑/↓/CE/←]</p> </div>	<div style="background-color: #333; color: white; padding: 10px;"> <p style="text-align: center; margin: 0;">FREQUENCY CONVERTER COMMUNICATION</p> <p>■ 1 DISPLAY PARAMETERS</p> <p>2 CHANGE PARAMETERS</p> <p>3 LOG FREQUENCY CONVERTER ERRORS</p> <p>4 AUTOMATIC SETTING OF MOTOR DATA</p> <p style="text-align: right; margin-top: 10px;">[↑/↓/CE/←]</p> </div>
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 control unit 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 control unit.

### 2.5 Error message FREQUENCY CONVERTER <X> (only with MP 12D/N control system and RS 485 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.


MP12D/N control system Number code <X>	Mitsubishi FR-A 74_ Brief description	Mitsubishi error description	MP12D/N control system Number code <X>	Mitsubishi FR-A 74_ Brief description	Mitsubishi error description
0		Error not defined	176	E.PE	Memory error
16	E.OC1	Overcurrent at acceleration	177	E.PUE	Connection error to control unit
17	E.OC2	Overcurrent at constant speed	178	E.RET	Number of retries exceeded
18	E.OC3	Overcurrent for braking operation or stop	193	E.CTE	Short-circuit of connection to control unit, short-circuit of second serial interface
32	E.OV1	Overvoltage at acceleration	194	E.P24	Short-circuit of the 24 V DC output voltage
33	E.OV2	Overvoltage at constant speed	198	E.SER	Communication with MP control system
34	E.OV3	Overvoltage for braking operation or stop	199	E.AIE	Analogue input error
48	E.THT	Frequency converter overload protection	200	E.USB	USB interface communication error
49	E.THM	Motor overload protection	213	E.MB1	Brake activation error parameter 285
64	E.FIN	Overheating of the heat sink	214	E.MB2	Brake activation error parameter 282
80	E.IPF	Instantaneous power failure, safety function	215	E.MB3	BOF signal switches during standstill
81	E.UVT	Undervoltage protection	216	E.MB4	BOF signal not present for more than 2s.
82	E.ILF	Input phase error	217	E.MB5	BRI signal not present for more than 2s.
96	E.OLT	Shutoff protection, motor overload protection	218	E.MB6	Although the BOF signal is switched on, the BRI signal has been switched off.
128	E.GF	Overcurrent due to earth fault	219	E.MB7	BRI signal still present after more than 2s.
129	E.LF	Open output phase	253	E.13	Error in internal circuit
145	E.PTC	PTC thermistor activation	-	-	
163	E.OP3	Error of communication option	255	-	No connection between MP control system and frequency converters

## 3. 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 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.FRA" (also refer to [www.service-hanel.de/Download](http://www.service-hanel.de/Download)).

Step	Task	Notes
1	<ul style="list-style-type: none"> <li>Create the RS232 connection to the PC and interface S2 of the MP 12D control system.</li> <li>Create the Ethernet connection to the PC and the Ethernet interface of the MP12N control system.</li> </ul>	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	<p><b>(Only for MP12D control system:)</b></p> <p><b>Call up the "Software update" menu</b></p> <ul style="list-style-type: none"> <li>Switch on the lift.</li> <li>Press the <b>[ 1 ]</b> key until the "Software update" menu is displayed.</li> <li>→ "Software update" menu is displayed.</li> <li>In the "Software Update" menu, press the <b>[ 4 ]</b> key (Set frequency converter parameters).</li> <li>Press the <b>[ ↑ ] / [ ↓ ]</b> 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.</li> <li>Press the <b>[ ← ]</b> key.</li> </ul>	For more information, refer to the Technical Description for Microprocessor Control System MP 12D "T-12D", Service notes.
3	<p><b>Start JUMP and call up Upload\Frequency converter parameters.</b></p> <p><b>(MP12D and MP12N control system)</b></p> <ul style="list-style-type: none"> <li>Start the JUMP software.</li> <li>Select and open the corresponding HÄNEL "Frequen1.FRA" file.</li> <li>→ A progress display in the form of a bar shows the status of data transmission. The data are transmitted to the MP 12D/N CPU 1.</li> <li>→ Once the parameters have been transferred correctly, this is indicated by a corresponding display of the MP 12D/N control system.</li> <li>→ Frequency converter parameters have been transferred.</li> </ul>	<p>For additional information, refer to <a href="http://www.service-hanel.de/Download">www.service-hanel.de/Download</a></p> <div>  <p>Copying the parameters is not possible for the FR-DU07 control unit. Parameters are transmitted solely using the HÄNEL JUMP using the current "Frequen1.FRA" file.</p> </div>
4	<ul style="list-style-type: none"> <li>Switch off the lift.</li> </ul>	

## 4. Automatic setting of motor data (autotuning)

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

### 4.1 With Mitsubishi FR-A540 or FR-A740 through control unit (up to program version V2.3/1)


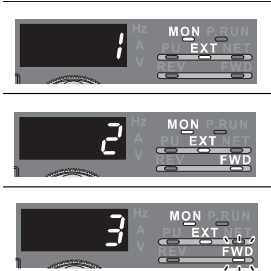



Only for lifts with Mitsubishi type FR-A540 or FR-A 740 frequency converter for model years before 2007 / manufacturing week 25



Operation of the FR-DU04 and FR-DU07 control units is described in the user guides for the Mitsubishi frequency converter. These are available for download at: [www.Mitsubishi-automation.com/Download](http://www.Mitsubishi-automation.com/Download).

#### 4.1.1 Vertical motor m1

Procedure for automatic setting of motor data	FR-DU07 display for FR-A740 frequency converter	FR-DU04 display for FR-A540 frequency converter
Select "PU" operating mode	By pressing the PU/EXT button.	By pressing the "MODE" button several times and pressing the arrow button until "OP.ND" appears on the display.
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.	Press the arrow button 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.	Press the arrow button 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 MP12D/N 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.		

#### 4.1.2 Error messages during automatic setting of motor data

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

### 4.2 With Mitsubishi FR-A 740 or FR-A 741 through MP control system (from program version V2.3/2)



Only for lifts that have been factory-equipped with the Mitsubishi type FR-A 740 or FR-A741 frequency converter and that have program version V2.3/2.

#### 4.2.1 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 12D/N (z-serfkt.de)".

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.

#### 4.2.2 Horizontal motor M2

The horizontal motor M2 is delivered from the factory with the corresponding motor data.

Optionally, the horizontal drives can be measured via the automatic setting of motor data.



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

The specifications in the following table are required if the automatic setting of motor data has to be repeated for horizontal motor M2.

Horizontal motor M2	Parameters	Leroy Somer			SEW Eurodrive		
		4p LS71L-FCR			S37 DT 71	S37 DT 80	S37 DT 80
Power rating [kW]	P453	0.4 kW	0.55 kW	0.75 kW	0.4 kW	0.55 kW	0.75 kW
Rated current [A]	P51	2.0 A	3.34 A	3.5 A	2.0 A	3.05 A	3.65 A

#### 4.2.3 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.

## 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

## Hänel

### Büro- und Lagersysteme

Postfach 11 61

D-74173 Bad Friedrichshall

Phone: +49 7136/27725

Fax: +49 7136/27741

<http://www.hanel.de>

**Innovative ideas. Sound technology. Flexible systems.**

