COMMISSIONING INSTRUCTION FOR DRIVE SYSTEMS V^{3}F25 AND V^{3}F18

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1 GENERAL

1.1 Validity of the instruction

This instruction is valid for commissioning and testing the operation of the drive modules V^{3}F18 and V^{3}F25 (HCB board 781380G01) in following elevator configurations.

This instruction replaces AM-11.65.015 V^{3}F25 commissioning instruction.

Elevator/revision	Drive/revision	Control system	Elevator level manual
MonoSpace® 1.6 m/s	V^{3}F18/ 760100	LCE/No Cabinet	AM-01.01.026 (D)
MonoSpace® Special	V^{3}F18/ 760100	LCE/No Cabinet	AM-01.01.049
MiniSpace™	V^{3}F25/ 782999	LCE	AM-01.01.043 and AM-01.01.043-EXT and AM-01.01.031
TranSys™	V^{3}F18/ 760100	LCE/No Cabinet	AM-01.01.073
EcoSystem MR® (in North America)	V^{3}F25/782999	LCE	AM-01.01.055 and AM-01.01.065
MonoSpace® (in North America)	V^{3}F25/782999	LCE	AM-01.01.056 and AM-01.01.065

For commissioning of Alta Elevators with V^{3}F25 drive, refer to AM-11.65.021.

1.2 Related documents

Refer to the elevator level instructions for the commissioning prerequisites, safety chain checking, setting the non-drive features, special features and **especially for the working safety**.

- AM-01.03.001 Use of fall arrest systems on elevator construction and modernisation sites
- AM-01.03.002 Take 5 - Electrical Safety When Working on Elevators
- Elevator level instructions
- Parameter list 779980
- Brake adjustment instructions:
  AM-04.08.021 for MX10
  AM-04.08.022 for MX18
  AM-04.08.023 for MX20
  AM-04.08.024 for MX32
- AM-11.65.021 Alta / V^3F25 and V^3F25MLB commissioning instruction
- AS-11.65.001 Instruction to replace V^3F25 module
- AS-11.65.020 Replacement Instruction for HCB board
- AS-11.65.008 Repair Instruction for V^3F25MLB drive system
- AS-11.65.005 Repair Instruction for V^3F18 drive system
- AR-11.65.009 Spare Parts Manual for V^3F18 Drive
- AR-11.65.011 Spare Parts Manual for V^3F25MLB Drive
- AR-11.65.008 Spare Parts Manual for V^3F25 Drive

1.3 Abbreviations

CMB = Current Measurement Board

EBD = Emergency Battery Drive

EPD = Emergency Power Drive

LBR = Line Bridge

LWD = Load Weighing Device

MAP = Maintenance Access Panel

MLB = Modulated Line Bridge

NTS = Normal Terminal Slowdown

RDF = Recall Drive Feature (In North America machine room inspection drive is used instead of RDF drive.)

2 SAFETY

2.1 General working safety

This instruction is used in accordance with several elevator configurations. You must read the safety instructions in each elevator level installation manual to ensure your working safety.

Take special care when working on the car roof or other position where is danger of falling.

Refer to **AM-01.03.001** use of fall arrest systems on elevator construction and modernisation sites.

When there is any doubt of the correct working method, ask your superiors.

2.2 Electrical working safety

Read carefully the electrical working safety instructions in the corresponding elevator level manual to ensure the correct switching off and locking methods in each elevator.

Pay special attention when working on the car roof if there are powered parts in your working area.

Refer to **AM-01.03.002** "Take 5 - Electrical Safety When Working on Elevators".

The Take 5 safety initiative is designed for installation, servicing, maintenance and modernisation work done on elevators. The AM describes safe working procedures for preventing electric shock and other possible hazards from unwanted movement of equipment to yourself and others when working on elevators. Read and follow all related instructions and comply with your local safety codes and rules.

The following 5 steps must be taken in the specified order unless there are essential reasons for doing otherwise:

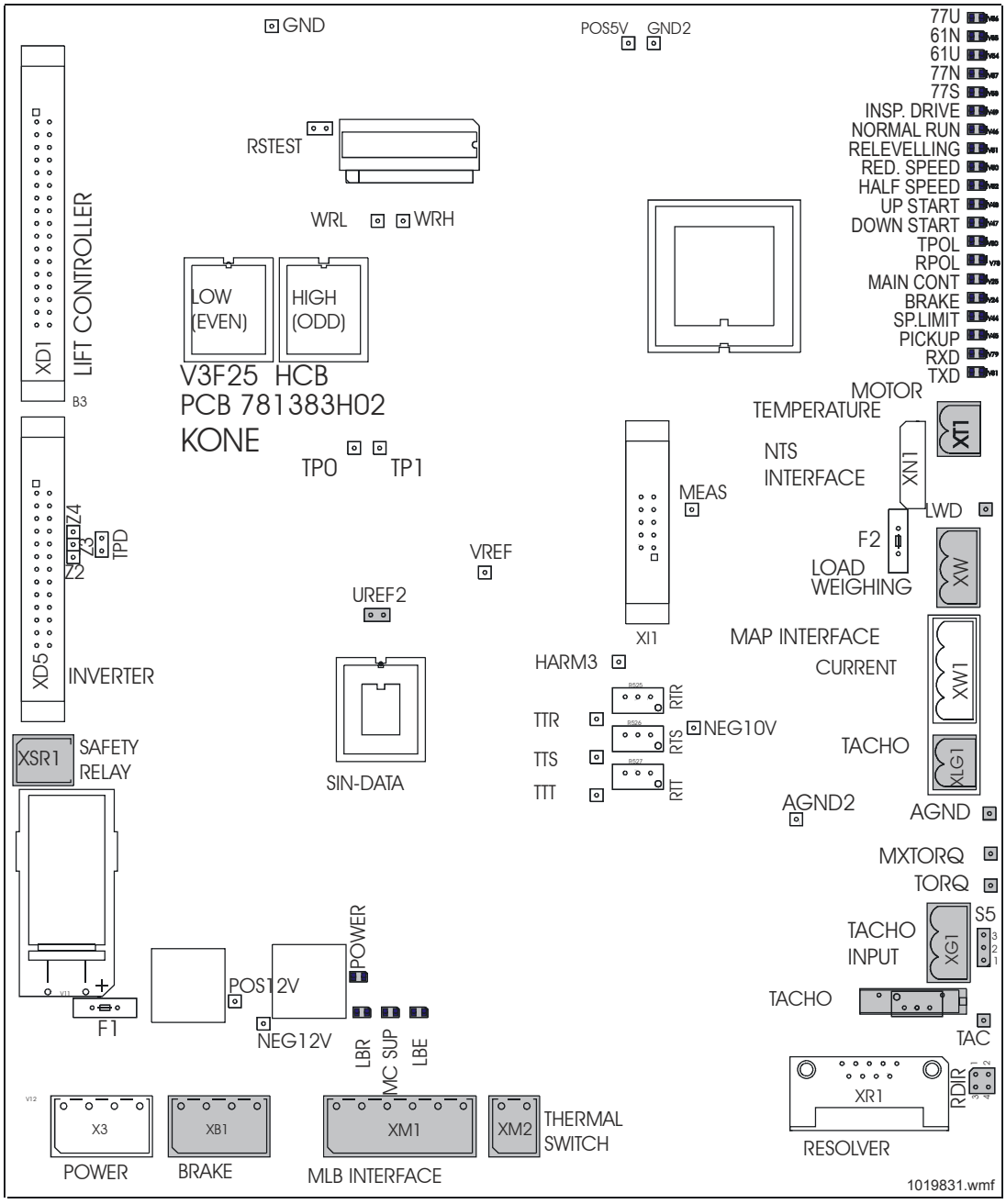
Take 5 steps to ensure electrical safety:

1. Disconnect power supply completely.
2. Secure power supply against re-connection.
3. Verify that the installation is de-energised.
4. Check the requirements for earthing in special circumstances. (This operation may only be carried out by qualified personnel in co-operation with the person responsible for the building electrification who must ensure that the technique can be safely employed in this situation.)
5. Provide protection against adjacent live parts.

3 INTRODUCTION OF COMPONENTS

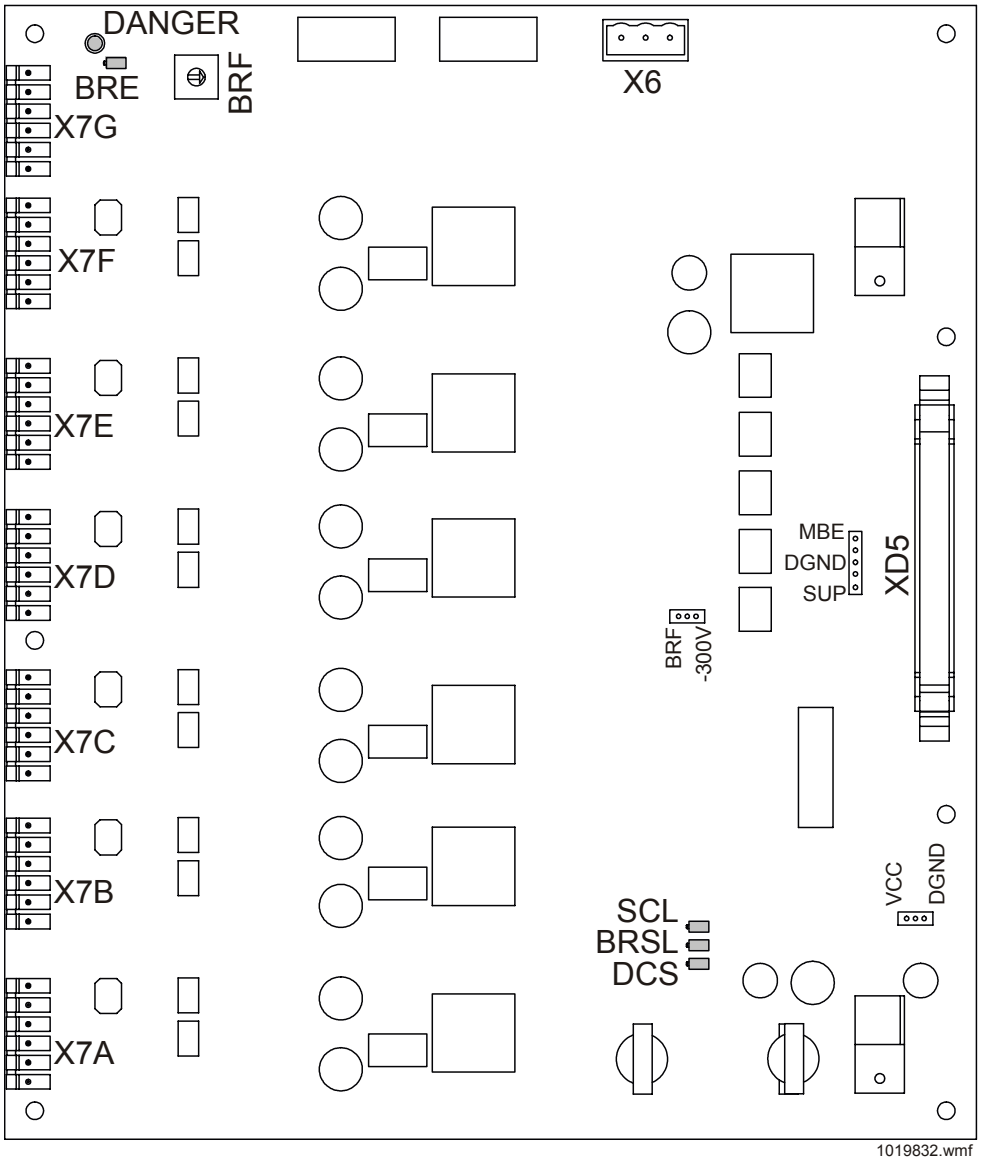
3.1 Common boards

3.1.1 HCB board (781380G01)



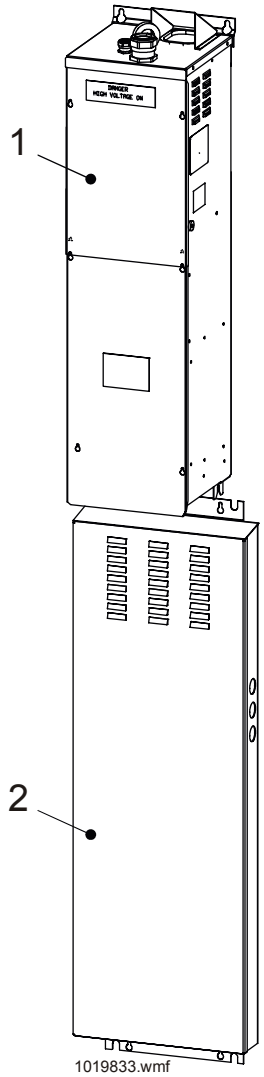
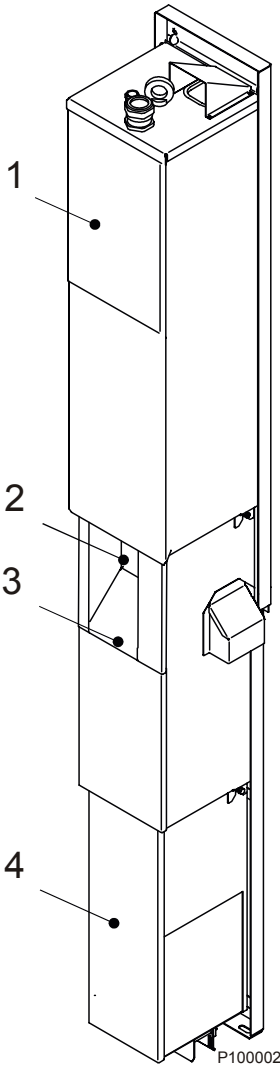
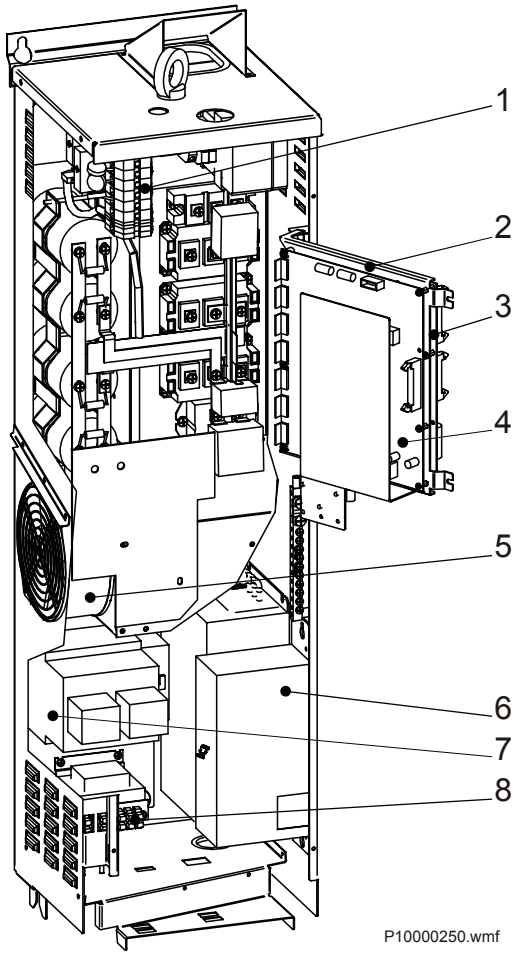
LED indications on the HCB board		
LED	**Normal**	**Indicates**
77:U	Yellow	Car is at the switch area.
61:N		
61:U		
77:N		
77:S		
INSP. DRIVE		Driving mode.
NORMAL RUN		
RELEVELLING		
RED.SPEED		
HALF SPEED		
UP START		Driving direction.
DOWN START		
TPOL	Green	Tachometer polarity. LED lights when the motor is rotating in up direction.
RPOL	Green	Resolver polarity. LED lights when the motor is rotating in up direction.
MAIN CONT	Yellow	Main contactor enables command given by V^3F.
BRAKE		Drive gives brake open command.
SP. LIMIT		Speed is under ADO speed limit. **ADO speed** parameter **(6_25)**.
PICKUP		LED turns off to indicate deceleration point. LED is on all other times.
RXD		HCB board is receiving characters from LCE.
TXD		HCB board is transmitting characters to LCE.
LBR		MLB (Modulated Line Bridge) allows driving. On while running. Off while stopped.
MC SUP		Main contactor is active.
LBE		HCB gives start command to MLB. Always off if no MLB.
POWER	Green	Power is ON and HCB board is alive.

3.1.2 Inverter board (725800G01)



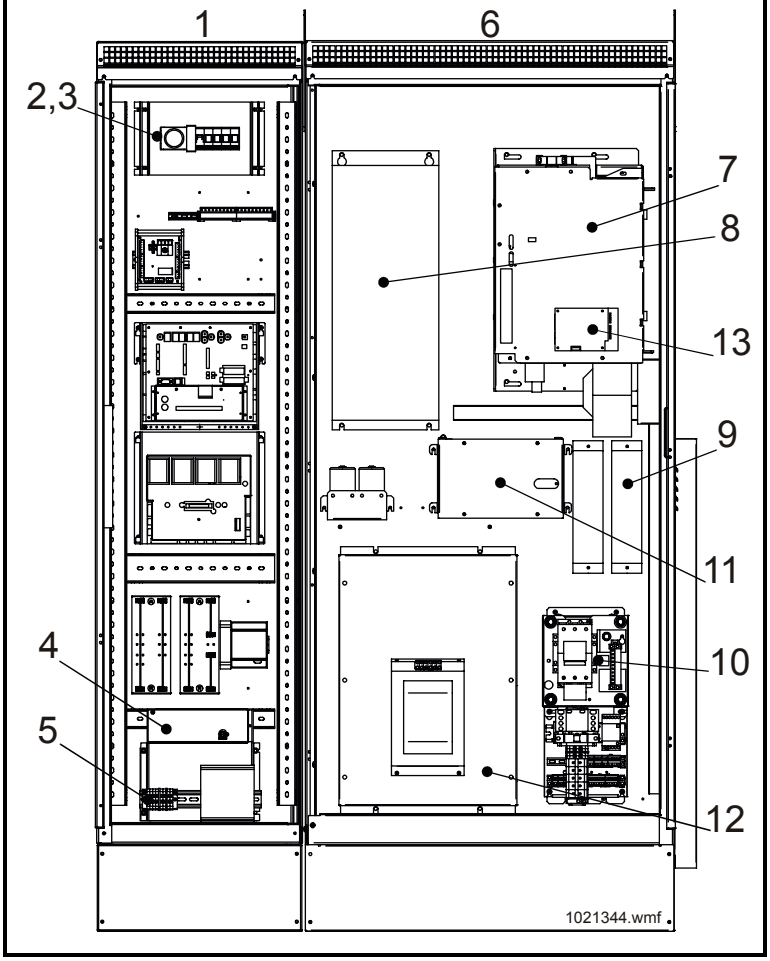
LED indications on the inverter board			
LED	**Note**	**Normal**	**Indicates**
DANGER		Yellow	High voltage exists in the intermediate circuit.
SCL	Active approx. 8 sec. also after power up	Red	Overcurrent in the motor.
BRSL		Red	Problem in the braking transistor circuit.
DCS		Red	DC over or under voltage.
BRE	**Not a fault LED**	Red	Resistor braking is on.

3.2 Panels in the elevator shaft

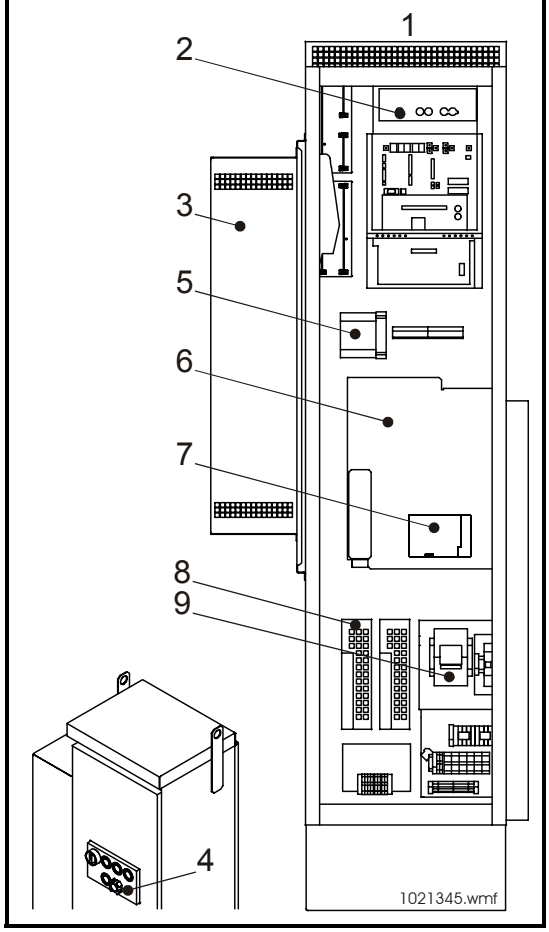
Panels in the elevator shaft in the MonoSpace® elevators with V^{3}F18 drive	Shaft electrification panel in the MonoSpace® Special and TranSys™ elevators	V^{3}F18 drive panel
1. Drive panel (385)	1. Drive panel (385)	1. CMB board (385:A3)
2. LCE and optional boards	2. Main switch module	2. PCB rack
	3. Main switch 220:1	3. HCB board 781380G01 (385:A1)
	4. LCE and optional boards	4. Inverter board 725800G01(385:A2)
		5. Fan (303)
		6. Brake control module (385:A5)
		7. Main contactors (201:1)
		8. Control voltage transformer (385:T1)
 1019833.wmf	 P10000249.wmf	 P10000250.wmf

3.3 Panels in the machine room

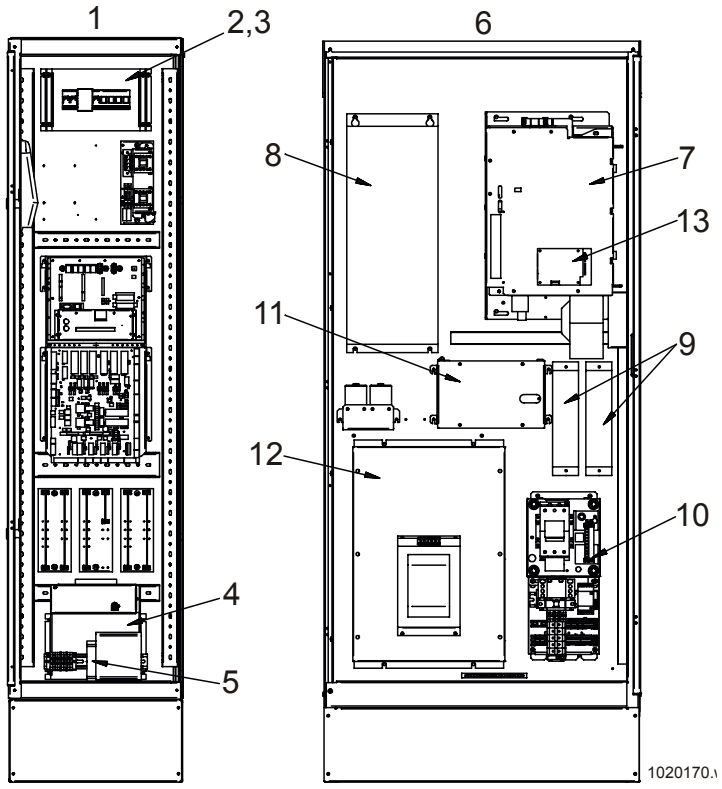
MLB control panel and MLB drive panel in the MiniSpace™ elevators with V^{3}F25 drive	
1. MLB control panel	6. MLB drive panel
2. Switch unit	7. V^{3}F25 (385)
3. RDF buttons (270)	8. MLB line bridge (386)
4. Power module	9. Brake control unit (388)
5. Drive panel interface module	10. Main contactor module (201:1)
	11. Resistor module: charging resistor and fuse (390)
	12. Line filter unit (389)
	13. NTS module



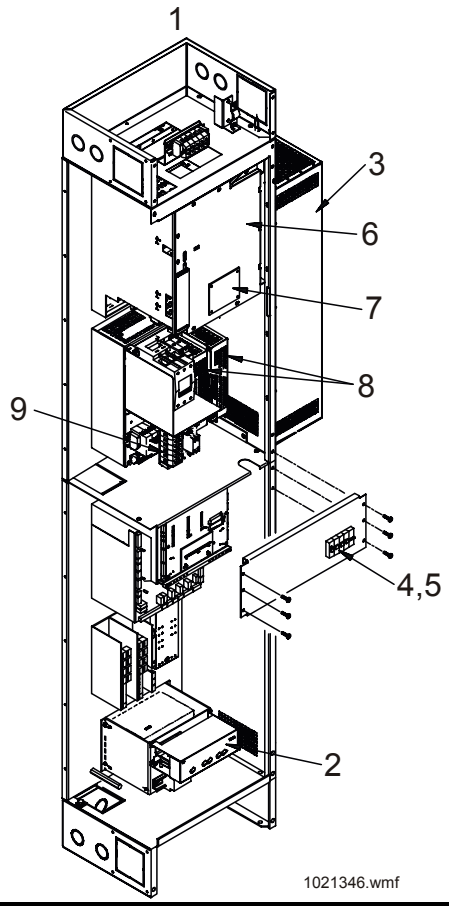
Control/drive panel in MiniSpace™ elevators
1. Control panel and drive panel
2. Power module
3. Brake resistor (306)
4. RDF buttons (270)
5. Optional devices
6. V^{3}F25 (385)
7. NTS module
8. Brake control unit (388)
9. Main contactor module (201:1)



MLB control panel and MLB drive panel in the elevators in North America (MonoSpace® and EcoSystem MR®)	
1. MLB control panel	6. MLB drive panel
2. Switch unit	7. V^{3}F25 (385)
3. Machine room inspection drive buttons	8. MLB line bridge (386)
4. Power module	9. Brake control unit (388)
5. Drive panel interface module	10. Main contactor module (201:1)
	11. Resistor module: charging resistor and fuse (390)
	12. Line filter unit (389)
	13. NTS module



Control panel and drive panel in the elevators in North America (MonoSpace® and EcoSystem MR®)
1. Control panel and drive panel
2. Power module
3. Brake resistor (306)
4. Machine room inspection drive buttons
5. Switch unit
6. V^{3}F25 (385)
7. NTS module
8. Brake control unit (388)
9. Main contactor module (201:1)



4 INITIAL COMMISSIONING OF THE MACHINE (WITHOUT ROPES)

4.1 Prerequisites and preparations

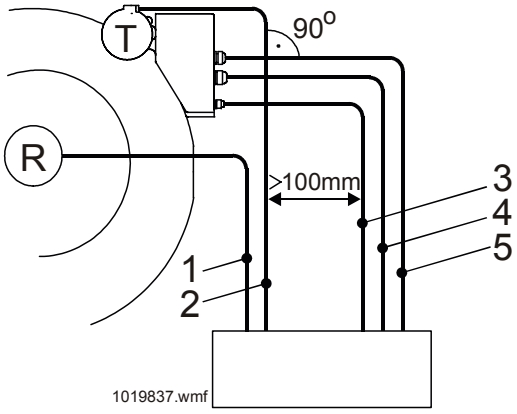
Refer to the elevator level installation manuals for the prerequisites and preparations that each elevator needs to have been done before commissioning of the machine.

4.1.1 Checking the mechanical obstructions

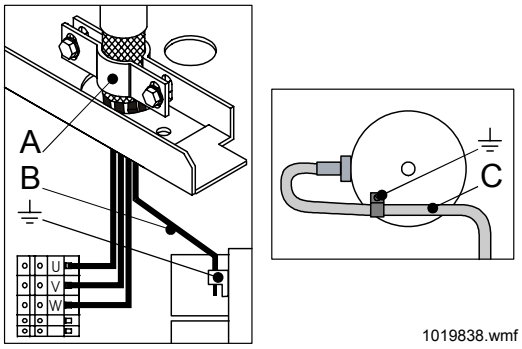
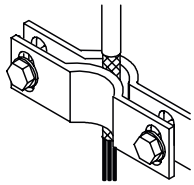
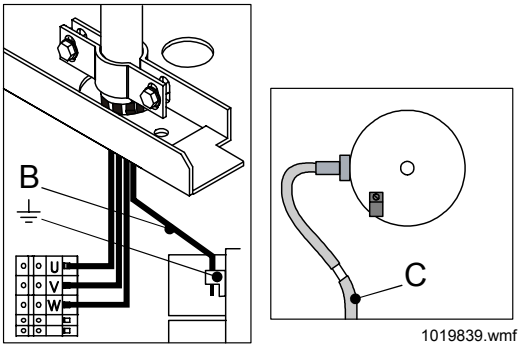
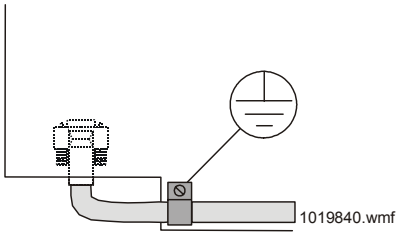
Step	Action	Note
1	Check that there is nothing leaning against the traction sheave.	
2	Check that the ropes are not on.	
3	Check that the cables are connected and covers of the panels and boxes are closed.	

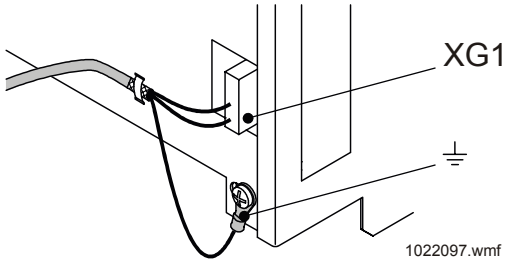
4.1.2 Checking cable routes

For elevators in North America (MonoSpace® and EcoSystem MR®) refer to AM-01.01.065.

Step	Action	Note
1	Resolver cable and tachometer cables must be separated from motor supply, brake control and thermistor cables. Otherwise there might be disturbances in the resolver and tachometer signals. These cables can cross each other in angle of 90 degree. If these cables are routed parallel, the minimum clearance between these two cable groups must be 100 mm.	 1 = Resolver cable 2 = Tachometer cable 3 = Brake control cable 4 = Motor cable 5 = Thermistor cable

4.1.3 Checking the earthing and connections of the motor cables

Step	Action	Note
1	**Motor supply cable with shield:** Check that the motor supply cable is earthed in both ends: • Cable shield is connected to the motor body. • The outer cable shield is connected to the controller body. • The inner cable shield is attached to the earthing sleeve (A) in the cable entry of the drive module. • Earth wire (B) is connected to the earth terminals in both ends. Check that the resolver cable shield (C) is connected to the resolver body at the machine end.	**CAUTION!** Do not overtight!  1019838.wmf Alternative fixing for thin cables.  1022317.wmf
2	**Motor supply cable without shield:** Check that the earth (B) wire of the motor supply cable is connected to the earth terminals in both ends. Detach the earthing of the resolver cable (C) at the resolver body.	 1019839.wmf
3	Check that the resolver cable shield is connected to the drive module body in the controller end.	 1019840.wmf

Step	Action	Note
4	Check that the shield of the tachometer cable is connected to the drive body. Check that the earth wire is connected to the drive.	**CAUTION!**Do not connect the tachometer shielding to the earthing at the motor end. 
5	Check that the shield of the brake cable is connected to the controller body.	
6	Check the connection and tightness of wires in the terminals.	Refer to the wiring diagrams.

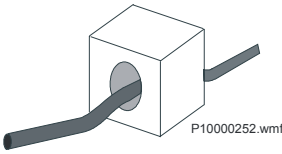
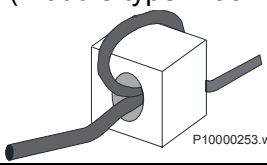
4.2 Setting parameters

4.2.1 Entering the drive menu

Step	Action	Note
1	Ensure that the power is OFF.	
2	Turn the elevator to RDF (machine room inspection drive in North America).	
3	Turn the power ON.	Refer to the elevator level installation manual.
4	Select menu **6**.	Come out from drive menu when you want to drive the elevator.

4.2.2 Setting the drive parameters

All the 14 steps in the following table must always be carried out.

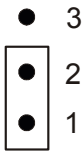
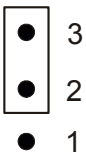
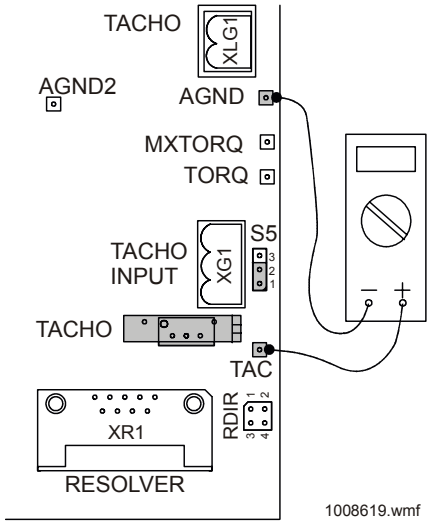
Step	Action	Note
1	Check that **document identification (6_0)** parameter matches the ID on parameter list 779980 (APPENDIX).	
Set the elevator dependent parameters:		
2	**Motor type (6_1)** parameter	Setting **Motor type (6_1)** parameter turns other values to default settings for that type of motor.
3	**Nominal speed (6_2)** parameter	
4	**Elevator load (6_3)** parameter	
5	**Roping (6_4)** parameter	
6	**Current sensor scaling (6_5)** parameter Set value of **Current sensor scaling (5)** parameter to 1 or 2 depending on the wiring on the CMB board in the drive module. **Value 1**: wire passes through coil once (module type = 55 A, 80 A or 100 A)  P10000252.wmf **Value 2**: wire is looped to pass through coil twice (module type = 38 A or 40 A)  P10000253.wmf	
7	**KTC factor (6_6)** parameter	Refer to the motor label. For motor type MX18/Q1 see the following table.
8	**Traction sheave diameter (6_7)** parameter	
9	**Tacho pulley diameter (6_8)** parameter	Check from the motor.

Step	Action	Note	
10	NOTE! This step is required only for elevators with MLB control panel. **Enable line bridge/Safety relay supervision (6_38)** parameter. The safety relay replaces the other main contactor. If there is one main contactor in the elevator controller, the safety relay supervision must be activated (safety relay contacts connected to the connector XSR1). The safety relay supervision is set to active as a default at the factory. There is safety relay supervision in the drive software from version 4.06 on. To check the drive software version see value of parameter **(4_11)**.	Values of **Enable line bridge/Safety relay supervision parameter:** **Controller with 2 main contactors:** 0 = MLB not used. 1 = EPD (generator use; MLB not used on speed reduction and correction drive.)* 2 = EBD (battery drive use; MLB not used on correction drive;C-process cases.)* 3 = MLB used always. **Controller with 1 main contactor and safety relay supervision:** 10 = MLB not used, factory initial value 11 = EPD (generator use; MLB not used on speed reduction and correction drive.)* 12 = EBD (battery drive use; MLB not used on correction drive;C-process cases.)* 13 = MLB used always * These settings should be used only, if both the brake resistors and MLB are installed.	
11	**Resolver type (6_39)** parameter	**Machine**	**Resolver type**
		MX10/Q2	2 (resolver inside the machine)
		MX18/Q1	1
		MX18/Q2	1
		MX20/Q2	2 (resolver inside the machine)
		MX32/Q2	1 (or 2**)
	** Only for resolver type Tamagawa TS2641N12E64		
12	**CM scaling (6_41)** parameter		
13	**Number of pole pairs (6_60)** parameter	**Machine**	**Pole pairs**
		MX10/Q2	10
		MX18/Q1	19
		MX18/Q2	12
		MX20/Q2	12
		MX32/Q2	12
14	Select **Save (6_99)** parameter.	0 is blinking in the display.	
	Turn 0 to 1 and press ACCEPT.	0 turns steady.	

Values of KTC factor (parameter 6) for MX18/Q1 motor alternatives	
Machine 710185GXX	**Torque factor of stator coil**
G01, G02, G09, G18	121.1 Nm/A
G03, G04, G60, G61	100.6 Nm/A
G05, G06, G08, G19, G59, G62, G63, G65, G66	80.9 Nm/A
G07, G10, G11, G13, G20, G21, G22, G23, G24, G26, G29, G39, G64, G67, G68, G69	70.0 Nm/A
G12, G14, G15, G17, G25, G27, G70, G71, G72, G74, G76	60.6 Nm/A
G28, G78, G79, G16, G90, G91, G73, G75, G77	50.2 Nm/A
G30, G31, G32, G33, G34, G35, G36, G37, G38, G49, G80, G81, G82, G84, G86	39.7 Nm/A
G40, G41, G42, G43, G44, G45, G46, G47, G48, G83, G85, G87, G88	34.7 Nm/A
G50, G51, G52, G53, G54, G56	29.7 Nm/A
G55, G57, G58	24.6 Nm/A

4.3 Setting the input information

4.3.1 Adjusting the tacho test potentiometer

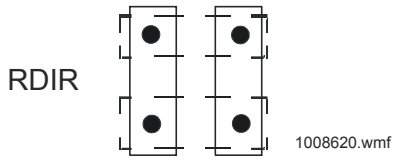
Step	Action	Note
1	Read the value of **TAC (6_10)** parameter.	This voltage reading is negative (-).
2	Set jumper S5 to the test position. Test position:  P10000254.wmf	Normal position:  P10000255.wmf
3	Measure the tacho-test-voltage by connecting a meter between AGND (-) and TAC (+).	
4	Adjust the TACHO potentiometer until the meter reads the same value as shown in the read only parameter **TAC (6_10)**.	
5	After the adjustment is done, reset jumper S5 to normal position.	

4.3.2 Checking the MXTORQ

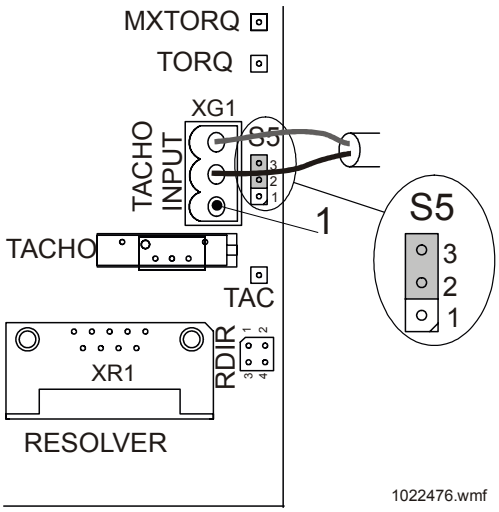
Step	Action	Note
1	Check the value of **MXTORQ (6_9)** parameter (this is a “read only” value).	The correct value is between 1.00 and 4.90.
2	If the display shows -.--, recheck the drive parameter settings.	

4.3.3 Checking the resolver polarity

NOTE! There are two RDIR jumpers. Always install both jumpers, either horizontal or vertical.

Step	Action	Note
1	Manually rotate the traction sheave upwards. **RPOL** LED should light.	
	If the **RPOL** LED does not light, the polarity is wrong: • Turn the power OFF. • Turn RDIR jumpers through 90 degrees. • Turn the power ON.	
2	Manually rotate the traction sheave downwards and check that the **RPOL** LED is off.	

4.3.4 Checking the tachometer polarity

Step	Action	Note
1	Ensure that S5 jumper is in normal position.	 1. Not used
2	Manually rotate the traction sheave upwards. **TPOL** LED should light.	
	If the **TPOL** LED does not light, the polarity is wrong: • Turn the power OFF. • Swap the tachometer wires in the upper terminals. • Turn the power ON. **In North America** when using V3FNTS board, ensure that wires from HCB XG1/1 and XG1/2 are connected to NTS XG1/1 and XG1/2.	
3	Manually rotate the traction sheave downwards and check that the **TPOL** LED is off.	

4.4 Initial setting of the resolver angle

WARNING

Check that there is nothing in contact with the machinery traction sheave or ropes.

- The resolver angle should always be set without having suspension ropes installed.
- If the ropes are installed, the recommended unbalance is 50 %. Allowed unbalance is 30...70 %.
- If ropes are installed, the LWD must be adjusted before setting the resolver angle.
- If no ropes, parameter **(5_1)** must read L 50. If parameter **(5_1)** does not read L 50, select parameter **(6_74)** and set value to -1 and press select. Default value for the software based LWD scaling is 50 %.

4.4.1 Setting the resolver angle

Step	Action	Note
1	Activate the automatic resolver angle setting using **Resolver AutoDetect (6_70)** parameter in menu.	After the activation the buzzer in the drive starts to beep [* * * *].
2	Drive the car in **heavy direction** (up direction, if no ropes) until it stops. For a successful run the motor sheave turns about 1.5 rotations.	**LISTEN TO THE BEEPS:** [* * * *] = Drive requests you to drive in heavy direction.
	If you tried four times without any success, change the **motor rotation direction**: • turn the **power OFF, wait 5 minutes** and • **swap two phases** (U and V) in the motor cable.	[__ * * *] = the angle was not found.
3	After successful drive in the heavy direction drive the car in **light direction** (down direction, if no ropes) until it stops.	[* *] = Drive in light direction.
4	Repeat the drive in **heavy** direction.	[* * * *] = Drive in heavy direction.
5	Repeat the drive in **light** direction.	[* *] = Drive in light direction.
6	Listen to the sound fo **possible fault** detected during the adjustment.	[__ * *] = Fault **If a fault occurs, switch the power OFF and ON.** Possible reason for the fault is wrong LWD setting, the LWD setting is missing or the elevator is too much out of balance.

4.4.2 Checking the resolver angle and recording the value

Step	Action	Note
1	Read the value of **Resolver angle (6_61)** parameter. If the value is 0, restart the adjustment.	It is recommended to **repeat the adjustment** to get a more accurate angle value.
	If no other possibility, resolver angle can also be found manually by entering the value of **Resolver angle (6_61)** parameter in the range of 1 - 360 degrees. Change the value by increments of 20 degrees. Attempt to run the car after each increment. Resolver angle is satisfactory when the car runs. Fine tuning will be required before final commissioning.	
2	Select **Save (6_99)** parameter.	0 is blinking in the display.
	Turn 0 to 1 and press ACCEPT.	0 turns steady.
3	Check that correct value is recorded.	

5 COMMISSIONING OF THE MACHINE AFTER ROPING

Refer to the elevator level installation manual before commissioning with ropes.

5.1 LWD setup

Normal drive including relevelling are not permitted until LWD setup is done. RDF (machine room inspection drive in North America) and setup drive are permitted.

5.1.1 Checking the LWD operation

MiniSpace™, MonoSpace® Special and elevators in North America (EcoSystem MR® and MonoSpace®):

Step	Action	Note
1	Turn the elevator to RDF (machine room inspection drive in North America).	
2	Ensure that the car is empty. Drive the car to suitable floor level.	
3	Check the mechanical adjustment of LWD under the car.	
4	Check that voltage between points LWD - AGND on HCB board is between 0.5 V and 1.5 V. If not, check the air gap. It should be 3 - 5 mm.	

MonoSpace® and TranSys™ elevators with V^{3}F18 drive:

Do this check only if there are problems.

Step	Action	Note
1	Turn the elevator to RDF.	
2	Ensure that the car is empty. Drive the car to suitable floor level.	
3	Add and remove some load in car and see that the voltage between points LWD and AGND on the HCB board is changing when changing the load in car.	
	If the voltage does not change, check connections and mechanical condition of LWD. You may have to replace LWD and its hanger.	

5.1.2 Basic LWD setting

Follow this working order exactly. If you forget one step or give wrong values, you have to restart whole LWD setting.

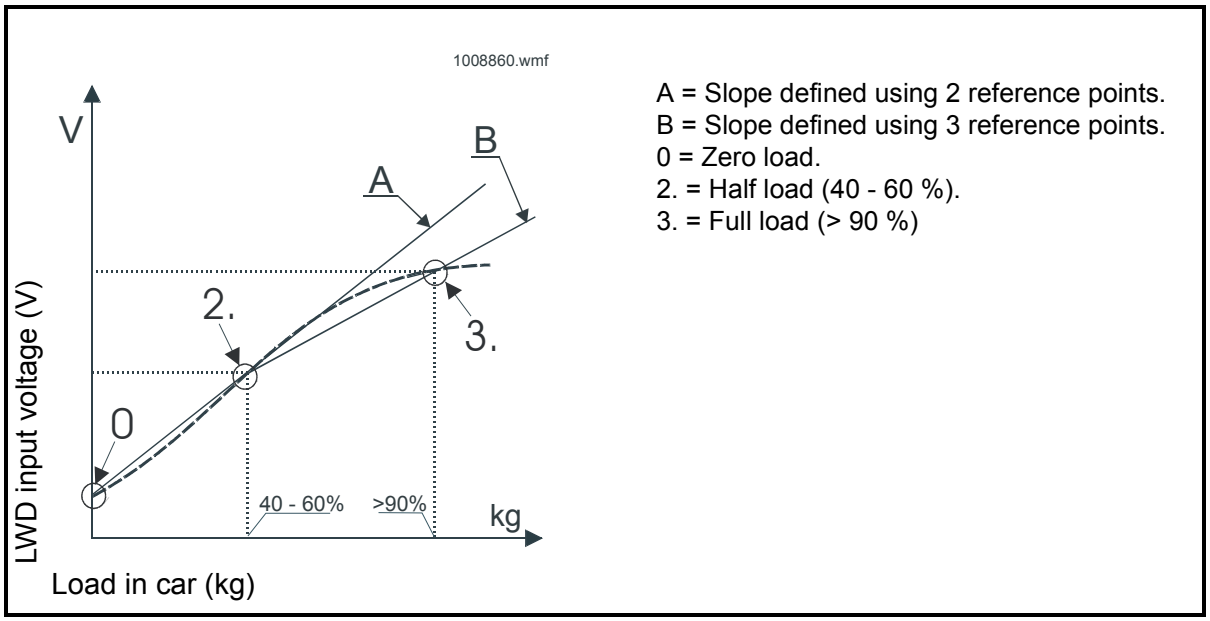
Step	Action	On display
Reset the LWD setup.		
1	Select **Enable LWD setup (6_74)** parameter.	0 is blinking.
	Turn 0 to -1 (minus one).	-1 is blinking.
	Push ACCEPT.	6_74_0, all digits start to blink.
	Push MENU.	6_74
2	Select **Save (6_99)** parameter .	0 is blinking.
	Turn 0 to 1 and push ACCEPT.	0 turns steady.
Zero load:		
3	Select **Enable LWD setup (6_74)** parameter.	0 is blinking.
	Push ACCEPT.	6_74_0, all digits start to blink.
	Push MENU.	6_74
Half load:		
4	Place from 40 % to 60 % of the rated load in the car.	6_74
	Push ACCEPT.	0 is blinking.
	Give the load value in kilos (kg).	Load value is blinking.
	Push ACCEPT.	6_74_0, all digits start to blink.
	Push MENU	6_74
5	Select **Save (6_99)** parameter .	0 is blinking in the display.
	Turn 0 to 1 and press ACCEPT.	0 turns steady.
6	Leave **menu 6** and check that the correct value is recorded by reading the value of **LWD adjustment (5_1)** parameter.	
7	Check that the LWD information changes when the load is changing.	

5.1.3 Fine tuning the LWD setting

Follow this working order exactly. If you forget one step or give wrong values, you have to restart whole LWD setting.

Fine adjustment of LWD with full load setting is necessary only if there are difficulties to get accurate LWD values when the car is full loaded.

Step	Action	On display
Full load:		
1	Place more than 90 % of the rated load in the car. In **MiniSpace™ and MonoSpace® Special** elevators: Check that the springs under the car are not fully compressed.	
	Select **Enable LWD setup (6_74)** parameter.	0 is blinking.
	Give the load value in kilos (kg).	Load value is blinking.
	Push ACCEPT.	6_74_0, all digits start to blink.
	Push MENU	6_74
2	Select **Save (6_99)** parameter .	0 is blinking in the display.
	Turn 0 to 1 and press ACCEPT.	0 turns steady.
3	Leave menu 6 and check that the correct value is recorded by reading the value of **LWD adjustment (5_1)** parameter.	



A = Slope defined using 2 reference points.
B = Slope defined using 3 reference points.
0 = Zero load.
2. = Half load (40 - 60 %).
3. = Full load (> 90 %)

5.2 Repeating the resolver angle setting

Repeat the resolver angle setting when the ropes are installed.

This must be done before shaft setup.

Refer to Initial setting of the resolver angle.

5.3 Shaft setup

Step	Action	Note
1	Ensure that the elevator is in RDF mode (machine room inspection drive mode in North America).	
2	Drive the car just below the bottom floor.	
3	Check that the LEDs 61:U, 77:N and 77:S light.	**LED 61:N must not light.** LCE LEDs 30 and/or B30 must light.
4	Activate the setup mode from the controller. Set **Shaft setup (5_2)** parameter to 1.	The buzzer on the HCB board starts to sound: long beeps with some delay. **[___]**
5	Turn the RDF (machine room inspection drive in North America) to normal.	Elevator starts the setup drive upwards.
6	Follow the setup drive steps on the user interface.	Elevator is ready for the normal drive when the elevator stops at the topmost floor and the user interface shows the number of the topmost floor.

5.4 Fine tuning the resolver angle

Step	Action	Note
1	Drive the elevator with full speed in the heavy direction (always between the same levels).	
2	Record the values of **Resolver angle (6_61)** and **Motor torque measurement (6_71)**.	**Motor torque measurement (6_71)** is the average value of the TORQ signals. It is a “read only” value.
3	Return the elevator back to the starting level.	
4	Increase the value of the **Resolver angle (6_61)** by 5°.	
5	Repeat steps 1-3.	
6	Compare the two motor torque values.	If the value of the second run is lower than the first one, **Resolver angle (6_61)** value must be increased. If the value of the second run is higher than the first one, **Resolver angle (6_61)** value must be decreased.
7	Increase/decrease the **Resolver angle (6_61)** by 5°.	
8	Repeat the drive in the heavy direction.	
9	Record the values of **Resolver angle (6_61)** and **Motor torque measurement (6_71)**.	
10	Return the elevator back to the starting level.	
11	Compare the values of two last recorded **Motor torque measurement (6_71)**.	
12	Repeat steps 7-11 until you have found the lowest value for the **Motor toque measurement (6_71)**.	Typical value is < 0.9 (the lower value the better).
13	Set the **Resolver angle (6_61)** to the value where the **Motor torque measurement (6_71)** is lowest.	

6 FINE ADJUSTMENTS

It is necessary to fine adjust the setting combinations to optimise the ride comfort.

Before the fine adjustments ensure that the installation is completed and elevator is correctly balanced:

- 50 % of the rated load in the car.
- Car located in the mid of the elevator shaft.
- Car and counterweight balance deviation tolerance is ± 50 kg (checked in the elevator shaft by opening the brake).

Refer to the elevator level installation instruction for the prerequisites before the fine adjustment.

If the elevator mechanics or balancing are changed, the fine adjustment should be repeated.

These adjustments can be done after several successful drives over the full length of travel.

6.1 Drive adjustments and checks (speed control)

Action	Too high parameter value	Too low parameter value
Change the value of **P factor (6_20)** parameter in 0.5 increments. NOTE!Usually it is better to set the value as high as possible.	Vibrations and noise in motor.	Car does not reach the floor level. Car may jump during relevelling. Relevelling problems.
Change the value of **I factor (6_26)** parameter in 0.5 increments.	Car does not reach the floor. May decrease vibrations.	May cause noise in motor. May cause other vibrations.
Change the value of **Tacho filter time (6_36)** parameter step by step. NOTE!This parameter is typically changed to avoid interference in tachometer signal.	Car may not reach the floor. May cause overspeeding.	
Change the value of **KTW/Q (6_29)** parameter. **KTW/Q** = total moving masses divided by elevator load. Moving masses = sling + car + car door + decoration + counterweight + ropes + travelling cable + compensation (if applicable).	It is better to set this a little bit higher than the calculated value.	Car does not reach the floor. Car movement does not follow the speed curve. Car jumps when landing a floor. Relevelling problems.

6.2 Starting

Step	Action	Note
1	If the mechanical brakes are still engaged when the drive starts, increase the value of **Start delay (6_37)** parameter. Recheck the operation.	Normally the brake start delay parameter does not need adjustment. NOTE!Do not increase the value unnecessarily. A too high value decreases the performance of the elevator.

6.3 Jerky start or roll back

Whenever the resolver angle is changed or fine tuned, repeat these adjustments.

Repeat these adjustments always before leaving the elevator in normal use.

Shaft setup should be done before these adjustments. It is important to adjust these in following order.

6.3.1 Preparations

Step	Action	Note
1	Check the load weighing information. Adjust if needed.	See LWD setup.
2	Set the value of **Start delay (6_37)** parameter to 1 second.	These are temporary settings for the next adjustments.
3	If the value of **P factor (6_20)** parameter is more than 1.5 set the value to 1.5.	

6.3.2 Balancing error parameter

Load corresponding **50 % of the rated load** must be in the car. The car must be in the **middle of the elevator shaft**.

Step	Action	Note
1	Observe the movement of the elevator during the start. Drive the elevator up and down a few times **in RDF mode (machine room inspection drive mode in North America) from the middle of the elevator shaft**. Adjust the value of **Balancing error (6_28)** parameter in 0.02 increments until the starts get better and are similar in both directions.	Default value of **Balancing error (6_28)** parameter is 0. NOTE!Parameter can also have negative values. Always start to drive from the same level. **Wait 10 sec. between successive drives:** the LWD signal oscillates for a while after stopping.
2	Choose the correct value according to the best starting (= similar starting to up and down) reached.	If the value is **too high,** the **motor tends to rotate downwards** while starting. If the value is **too low** the **motor tends to rotate upwards** while starting.

6.3.3 Rope weight parameter

Load corresponding **50 % of the rated load** must be in the car. The car must be **at the bottom floor**.

Step	Action	Note
1	Drive the elevator upwards a few times in RDF mode (machine room inspection drive mode in North America) from the bottom floor. Observe the movement of elevator during the start.	**Rope weight (6_30)** parameter: No compensating ropes => value 3.0. Compensating ropes => value 0. Overcompensation causes negative value. Always start to drive from the bottom floor. **Wait 10 sec. between successive drives:** the LWD signal may oscillate for a while after stopping.
	If there is roll back, decrease the value of **Rope weight (6_30)** parameter in 0.5 increments.	
	If there is jerk (small uncontrolled acceleration), increase the value of **Rope weight (6_30)** parameter in 0.5 increments.	
2	Choose the correct value according to the best starting (= no uncontrolled acceleration) reached.	

6.3.4 Start torque scaling parameter

Empty car must be **at the bottom floor**.

Step	Action	Note
1	Drive the elevator upwards a few times in RDF mode (machine room inspection drive mode in North America) from the bottom floor. Observe the movement of elevator during the start.	Default value of **Start torque scaling (6_27)** parameter is 1.00. Always start to drive from the bottom floor. **Wait 10 sec. between successive drives:** the LWD signal may oscillate for a while after stopping.
	If there is roll back, decrease the value of **Start torque scaling (6_27)** parameter in 0.05 increments.	

6.3.5 Setting start delay and P factor parameters to original values

Step	Action	Note
1	Set **Start delay (6_37) and P factor (6_20)** parameters to original values.	Refer to the APPENDIX parameter list 779980.
2	Select **Save (6_99)** parameter.	0 is blinking in the display.
	Turn 0 to 1 and press ACCEPT.	0 turns steady.
3	Check that the correct value is recorded.	

6.4 Stopping (final rounding to the floor)

Step	Action	Note
1	For smoother and longer rounding increase the value of **Final jerk distance (6_32)** parameter. If you want faster landing to the floor level decrease the value.	Default value of **Final jerk distance (6_32)** parameter is 125 mm. Typical cases: • If ADO is used, set long rounding (125-200 mm). • If no ADO, set short rounding (25-100 mm).

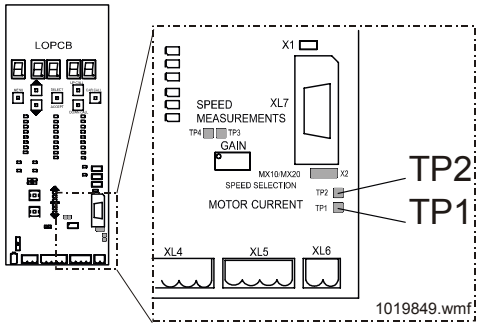
6.5 Testing with heavy loads

Refer to the elevator level installation manuals for the safety inspection procedure of each elevator.

Follow the safety instructions and precautions that are described for each elevator type individually.

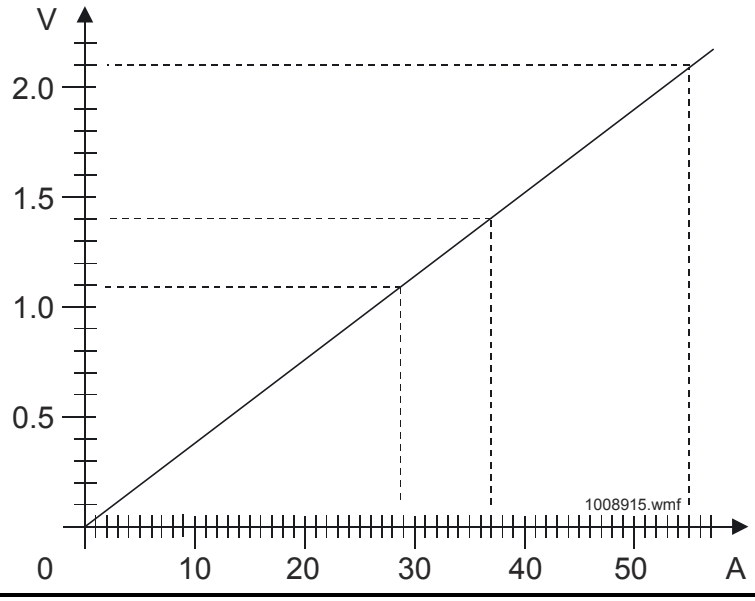
Step	Action	Note
1	Activate **Enable traction test (6_72)** parameter.	No one is allowed to be in the car.
	Enable traction test (6_72) parameter increases the value of the supervision limit between the speed reference and tachometer feedback **for one drive**. The buzzer sounds continuously when the traction testing is enabled.	**Even if the load in the car exceeds 110 % of the rated load, the information that the drive gives the elevator control is exactly 100 %.** However the drive itself uses the correct load value for driving.
2	If the motor does not rotate, adjust the value of **Torque scaling (6_40)** parameter temporary higher up to 3.0.	
3	Check the value of **MXTORQ (6_9)** parameter (max. 4.8 V), if the drive fails reactivate the test.	

6.6 Balance measurement in elevators with V^{3}F18 drive and MAP panel

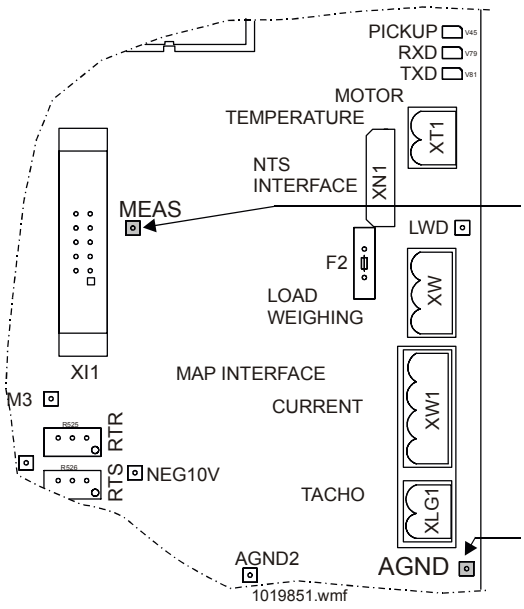
Step	Action	Note
1	Measure the voltage in the maintenance panel between test pins TP1 and TP2 on LOP-CB board in MAP panel. This voltage is equivalent to the motor current. Scaling ratio of the measurement: **<u>38 mV corresponds 1 A</u>**.	Measuring points on **LOP-CB board**: 
2	Drive the empty car downwards and with rated load upwards.	Use rated speed. Measure these values at same level in the elevator shaft.
3	Record values.	The difference of the measurements may be about 5 %.
4	If the difference is more than 5 %, recheck the elevator mechanical balancing. Check also the adjustment of guide shoes or rollers against the guide.	

Measured voltage	Motor current
1.1 VDC	29 A
1.2 VDC	32 A
1.3 VDC	34 A
1.4 VDC	37 A
1.5 VDC	39 A
1.6 VDC	42 A
1.7 VDC	45 A
1.8 VDC	47 A
1.9 VDC	50 A
2.0 VDC	53 A
2.1 VDC	55 A
1.1 VDC	29 A

Figure



6.7 Balance measurement in elevators with V^{3}F25 drive

Step	Action	Note
1	Measure the voltage between MEAS test point and AGND on HCB board. This voltage is equivalent to the motor current.	Measuring points on **HCB board:** 
2	Drive the empty car downwards and with rated load upwards.	Use rated speed. Measure these values at same level in the elevator shaft.
3	Record values.	The difference of the measurements may be about 5 %.
4	If the difference is more than 5 %, recheck the elevator mechanical balancing. Check also the adjustment of guide shoes or rollers against the guide.	

V^{3}F25 drive, nominal current	CMB board Pass through	MEAS test point 1 VAC equals
40 A, 782999G01	2	30 A
80 A, 782999G02	1	60 A
100 A, 782999G04	1	80 A

7 APPROVALS AND VERSION HISTORY

Compiled by: Technical Editor / Ville Malmiala

Checked by: Life Cycle Manager / Pasi Raassina
KCO Installation Support / Risto Vikström
KCO Installation Support / Paul Durbin
KCO Installation Support / Riccardo Pittau

Approved by: KCO Installation Support / Bob Major

Issue	Date	Description of Change	Ref CR	Approved by
-	2001-06-26	First issue		Petri Huotari
A	2001-08-22			Petri Huotari
B	2001-11-13	Several minor changes and new document template		Anssi Venho
C	2002-06-10	Rewritten to cover the commissioning of the machineries with V^3F25 and V^3F18 drives in MonoSpace Special and MiniSpace elevators.		Anssi Venho
D	2003-06-17	Extended to cover commissionings of MonoSpace (1.6 m/s) and TranSys (4000 kg) with V^3F18 drive.		Anssi Venho
E	2004-01-08	Extended to cover commissioning of elevators in North America (MonoSpace® and EcoSystem MR®). Safety relay supervision -feature added. Appendix D updated.		Bob Major

APPENDIX A. Returning the initial settings

Step	Action	Note
1	Turn the value of **Resolver angle (6_61)** parameter to 0.	This is recommended when you do not know the status of the settings of the HCB board.
2	Turn the value of **Initial settings (6_98)** parameter to 1.	
3	Switch the power OFF and ON.	

APPENDIX B. Buzzer warnings

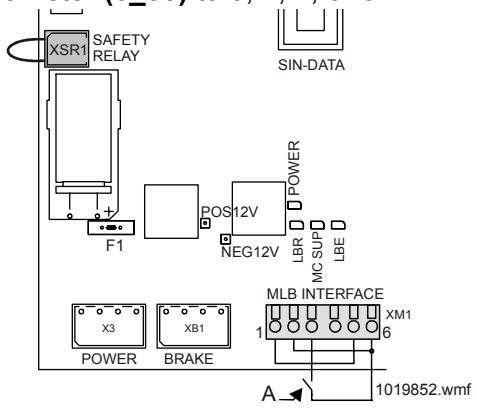
- [*]: a short beep
- [__]: a long beep
- [q]: 15 sec. delay
- [m]: 1 min. delay
- [ ]: approx. 1 sec. delay
- [_____]: continuous beep

	Warning	Buzzer code
1	Module too hot or cold.	[__ * __ * m]
2	Motor hot.	[__ * m]
3	Resolver angle is not adjusted, angle value is zero.	[* * * * q]
4	**Resolver Autodetect (6_70)** function is activated - driving to heavy direction (up).	[* * * *]
5	**Resolver Autodetect (6_70)** function: driving to light direction (down).	[* *]
6	**Resolver Autodetect (6_70)** function: There is a fault in adjustment procedure.	[__ * *]
7	**Resolver Autodetect (6_70)** function: Angle value could not be found. Refer to Initial setting of the resolver angle.	[__ * * *]
8	Setup is not done.	[* __ * m]
9	Setup command is active.	[__]
10	Setup: Fault in the elevator shaft devices during the setup.	[__ * * * * q]
11	NTS error: V^{3}F has started NTS deceleration in normal mode.	[* * * q]
12	Parameter value is changed.	[* q]
13	Position fault in V^{3}F.	[* __]
14	Buffer and traction tests.	[_____]

APPENDIX C. Troubleshooting

C.1 Connections

If the **motor does not rotate** check that the connections are correct. Refer to the circuit diagrams and maintenance instruction AS-11.65.020.

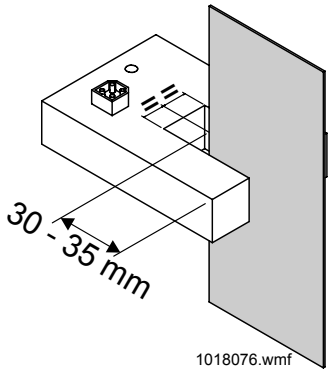
Check the connection of connectors **XSR1** (safety relay input) and **XM1** (MLB Interface) on HCB board. Refer to the circuit diagrams. If you have to change the connection of the connector XSR1 (safety relay input) or XM1 (main contactor supervision), switch the power off. The new connection will be valid after power up.	One example of the connections: Safety relay connection is not used. Main contactor (A) is supervised. XSR1 is overconnected. Set the value of parameter **(6_38)** to 0, 1, 2, or 3. 

C.2 Drive fault codes

Fault	Symptoms of fault	Action
Drive faults		
0101 Drive stop	Emergency stop or Error detected by the drive diagnostics.	See other fault codes.
0102 Motor overcurrent.	Emergency stop. Prevents new drive before the fault is corrected.	• Check the drive parameters. • Check the current scaling. • Check the mechanical brake.
0103 Damaged Braking resistor or electrical circuits.	Emergency stop	• Check the circuits of the braking resistors. • Check condition and connection of the braking resistors.

Fault	Symptoms of fault	Action
0104 Motor too hot	Prevents new drive before the fault is corrected.	• Check the machine room ventilation • Check the resolver angle (measure the current) • Check resistance of the thermistor circuit
0105 AC voltage in the intermediate circuit is too low or too high.	Emergency stop. Prevents new drive before the fault is corrected.	• If the supply voltage drops during drive, decrease the acceleration rate at **acceleration (6_21)** parameter. • If this fault is active during start, check the charging circuit, fuses and braking transistor.
0106 Inverter not OK	Prevents new drive before the fault is corrected.	• Check connections of tachometer and thermal switch (XM2). • The value for **Tacho fault counter (6_35)** parameter may be too sensitive. Turn the elevator to RDF (machine room inspection in North America) and back to Normal to reset the tacho fault counter. • If LBR LED does not light, refer to AS-11.65.008 and circuit diagrams. • If LBR lights but LBE is not activated at start, check (6_38). • If MLB is 'shutdown', check voltage in the supply and X10/ 16 in MLB (+24V). • Remove the U_{REF2} jumper.
0107 LWD adjustment value out of scale.	Elevator controller prevents the drive. (Drive allows driving)	• Check the LWD mechanical adjustment and settings of the load values. • Check the load in car.

Fault	Symptoms of fault	Action
0108 Motor /Tacho failure	Emergency stop Elevator overspeeds or does not follow the speed reference.	• Check the condition and wiring of the tachometer • Check mechanical brakes • Check the connections for loose contacts. • Check earthings. • Check the initial drive settings/ adjustments
0109 Position lost	Elevator does not take car calls, but drives correction and synchronisation drives.	• Check the 61 vanes, 77 and NTS switches. • Check the actual speed, tacho scaling and parameters. • Perform the shaft setup after vane /switch adjustment.
0110 Drive temperature too high / low	Car is stopped at landing. The temperature at heat sink is too low or high or locked current function operates. (Elevator starts 5 minutes after the heat sink is cooled two degrees under the limit).	• Check ventilation of the machine room and operation of the cooling fan. • Check connections of the temperature sensor on CMB board. • Check that the mechanical brake opens correctly when the elevator starts. • Check the adjustments to prevent unnecessary re-levelling.
Faults related to shaft setup		
0111 Vane 61:N below 61:U	Shaft setup not completed.	• Check the order of switches 61:U and N. • Check that the vanes or magnets are positioned according to the shaft vane diagram. • Perform the shaft setup after vane or magnet/switch adjustment.

Fault	Symptoms of fault	Action
0112 Overlapping of switches 61:U and N too small	Shaft setup not completed.	• Check that the vanes or magnets and switches are positioned according to the shaft vane diagram. • If there are vanes they must be correctly aligned in accordance to the oscillator reader.  • Perform the shaft setup after vane or magnet/switch adjustment.
0113 Synchronisation switch fault	Shaft setup not completed.	• Check the positioning of the magnets and the gap between switch and magnet. • Perform the shaft setup after vane /switch adjustment.
0114 Too short distance between the floors.	Shaft setup not completed.	• Check that the vanes and switches are positioned according to the shaft vane diagram. • Perform the shaft setup after vane /switch adjustment.
0115 Overlapping of switches 61:U and N too long in the topmost floor.	Shaft setup not completed.	• Correct the positioning of the vanes. • Perform the shaft setup after vane /switch adjustment.
0116 Wrong top floor count	Shaft setup not completed.	• Perform the shaft setup.

Fault	Symptoms of fault	Action
0117 Shaft setup not done	Elevator does not run the normal drive. Only RDF (machine room inspection drive in North America) and inspection drives are possible.	• Perform the shaft setup.
Other faults		
0125 Torque limit exceeded	**MXTORQ (6_9)** parameter shows on display -, -- or emergency stop during acceleration.	• Check the parameters for MXTORQ. • Check the motor cable connections. • Increase the value of **Torque scaling (6_40)** parameter.
0126 Safety relay open	Emergency stop. Elevator does not start.	• Check the connection of XSR1 on HCB board and control panel. • Check parameter **(6_38)**.
0127 Main contactor not energized	Emergency stop / Main contactor time out (2 seconds).	Check the circuits of the main contactor (MC_SUP LED).
0128 LWD setup not done	Normal drive prevented. Load values for **Enable LWD setup (6_74)** parameter are not set.	Perform the LWD setup. (Minimum two values must be given)
NTS faults		
0150 V1 NTS switch faulty	Elevator stops, correction drive and returns to the bottom floor.	Check the order and operation of NTS switches.
0151 V1 NTS switch fault	Elevator stops, correction drive and returns to the bottom floor.	Check the positioning and operation of NTS switches.
0152 V1 NTS stopping	Position lost and the elevator stopped by the NTS switches.	See fault 0109 “Position lost”.

APPENDIX D. Parameter table 779980

V3F18/V3F25M Parameter Table 779980.XLS

The document id of this sheet must match with the id reported by LCE menu 6_0. This menu can be used only when the drive is in the inspection mode !!	LCE menu	unit	range	Initial value	Drive settings
Elevator depedendent values					
- **document identification** of the parameter set (= this sheet)	**6_0**		2011	**2011**	
- **Motor type** (MX10,MX18, MX20, MX32)	**6_1**		10, 18, 20, 32	18	
- **nominal speed** (of the elevator)	**6_2**	m/s	0,5, ..., 3,5	2,5	
- **elevator load** (car nominal load in kilos)	**6_3**	kg	400, ..., 7 000	630	
- **roping** (roping system that reduce car speed by 1x, 2x or 4x)	**6_4**		1, 2, 4	2	
- **current sensor scaling** (= 40A module wire 2 times thru, 80A module wire 1 time thru)	**6_5**		1, 2	2	
- **Ktc factor** (torque vs current from the motor label)	**6_6**	Nm/A	5,0, ..., 150,0	29,7	
- **traction sheave diameter** (determines resolver scaling)	**6_7**	mm	480, ..., 750	650	
- **tacho pulley diameter** (37.5mm, 55 mm or 75.mm)	**6_8**	mm	37,50, 55,00, 75,00	75,00	
Calculated values: **NOTE! MXTORQ and TAC are read only values !**					
- **MXTORQ** (maximum torque voltage)	**6_9**	V	0,000, ..., 5,000	2,344	
- **TAC** (tacho test voltage)	**6_10**	V	-2,350, ..., -7,450	-3,572	
Additional parameters:					
- **P factor** (= proportional gain of speed controller)	**6_20**	s/m	0,0, ..., 15,9	5,0	
- **acceleration** (determines also jerk)	**6_21**	m/s^2	0,3, ..., 1,2	0,8	
- **inspection speed** (= elevator speed in inspection or RDF mode)	**6_22**	m/s	0,3, 0,5	0.3	
- **speed reduction** (= reduced speed / nom. speed)	**6_23**		0,15, ..., 1,00	0,50	
- **relevelling speed**	**6_24**	m/s	0,01, ..., 0,05	0,03	
- **ADO speed** (speed level supervision for ADO and relevelling operation)	**6_25**	m/s	0,20, ..., 0,70	0,50	
- **I factor** (= integration time of speed controller)	**6_26**	sec	0,05, ..., 1,00	0,20	
- **start torque scaling**	**6_27**		0,50, ..., 1,10	1,00	
- **balancing error**	**6_28**		-0,30, ..., 0,30	0,00	
- **KTW/Q factor** (= total moving masses / elevator load)	**6_29**		0,4, ..., 7,0	2,8	
- **rope weight**	**6_30**	kg/m	-2,0, ..., 7,0	0,0	
- **car cable weight**	**6_31**	kg/m	0,00, ..., 5,00	0,00	
- **final jerk distance** (= additional distance used for final jerk)	**6_32**	mm	0, ..., 250	125	
- **relevelling correction distance**	**6_33**	mm	0, ..., 20	0	
- **tacho scaling factor**	**6_34**		0,400, ..., 0,900	0,900	
- **tacho fault counter** (0=off, nn=tacho fault counter limit to stuck the drive)	**6_35**		0, ..., 10	0	
- **tacho filter time**	**6_36**	ms	0, ..., 40	0	
- **start delay** (= brake open command -> speed ref.)	**6_37**	s	0,01, ..., 1,00	0,25	
- **enable line bridge / safety relay supervision** (exists) yes no not used 10 0 except half speed or correction drive 11 1 except correction drive 12 2 used all the time 13 3	**6_38**		0, ..., 13	10	
- **Resolver type** (1=1x resolver, 2=2x resolver)	**6_39**		1, 2	1	
- **torque scaling** (=max torque / nominal torque)	**6_40**		1,66, ..., 3,33	2,50	
- **CM scaling** (= current measurement scaling: 100A module uses 80A/V, others 60A/V.)	**6_41**	A/V	40, ..., 80	60,0	
- **vane length** (= mechanical length of 61 vanes)	**6_42**	mm	50, ..., 500	150	
Machinery Parameters:					
- **number of pole pairs**	**6_60**		10, 12, 19	12	
- **resolver angle**	**6_61**	° ele	0, ..., 360	0	
Commissioning and tests **NOTE! Traction and buffer tests are valid for one start only.**					
- **Resolver AutoDetect** (resolver angle automatic tuning)	**6_70**		0, 1	0	
- **motor torque measurement**	**6_71**		-1,500, ..., 1,500	0	
- **enable traction test**	**6_72**		0, 1	0	
- **enable buffer test**	**6_73**		0, 1	0	
- **enable LWD setup** (-1 = clear setup, 0 = empty car, nnn = load in kg)	**6_74**	kg	-1, 7 000	0	
Permanent Store **NOTE! Set resolver angle (6_61) to 0 before downloading initial settings (6_98). Whenever initial settings are downloaded, make power break !**					
- initial **settings**	**6_98**		0, 1	0	
- **save** (saves parameters into permanent memory)	**6_99**		0, 1	0	

This page has been added to make double-sided printing easier.